InterLab®

Final Report on

TOBY-R200
FCC ID: XPY1EHM44NN
IC: 8595A-1EHM44NN

Report Reference:	MDE_UBLOX_1626_FCCb according to: FCC Part 22, Subpart H, Part 24, subpart E, Part 27 Subpart C
Date:	January 04, 2017

Test Laboratory:
7layers GmbH
Borsigstraße 11
40880 Ratingen
Germany

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12140-01-00

1 Administrative Data

1.1 Project Data

Project Responsible:	Patrick Lomax
Date Of Test Report:	2017/01/04
Date of first test:	2016/11/08
Date of last test:	2016/11/10

1.2 Applicant Data

Company Name:	u-blox AG
Street:	Zürcherstrasse 68, CH-8800 Thalwil
Country:	Switzerland
Contact Person:	Mr. Giulio Comar
Function:	Certification Manager
Department:	Cellular Product Certification
Phone:	+41 44 722 7462
Fax:	+41 44 722 7447
E-Mail:	giulio.comar@u-blox.com

1.3 Test Laboratory Data

The following list shows all places and laboratories involved for test result generation:

7 layers DE

Company Name :	7layers GmbH
Street :	Borsigstrasse 11
City :	40880 Ratingen
Country :	Germany
Contact Person :	Mr. Michael Albert
Phone :	+49 2102 749 201
Fax :	+49 2102 749 444
E Mail :	Michael.Albert@7Layers.com

Laboratory Details

Lab ID	*Identification*	*Responsible*	*Accreditation Info*
Lab 1	Radiated Emissions	Mr. Marco Kullik Mr. Jens Dörwald	DAkkS-Registration no. D-PL-12140-01-00 ISEDC OATS registration number 3699A-1 FCC accreditation registration number 929146
Lab 2	Radio Lab	Mr. Dobrin Dobrinov Mr. Daniel Gall	DAkkS-Registration no. D-PL-12140-01-00 ISEDC OATS registration number 3699A-1 FCC accreditation registration number 929146

1.4 Signature of the Testing Responsible

Patrick Lomax
responsible for tests performed in: Lab 1, Lab 2

7 layers GmbH, Borsigstr. 11
40880 Ratingen, Germany
Phone +49 (0)2102 749 0

1.5 Signature of the Accreditation Responsible

[M. Kullik]

Accreditation scope responsible person
responsible for Lab 1, Lab 2

2 Test Object Data

2.1 General OUT Description

The following section lists all OUTs (Object's Under Test) involved during testing.

OUT: TOBY-R200

Type / Model / Family:	TOBY-R200 FCC ID: XPY1EHM44NN IC: 8595A-1EHM44NN
Product Category:	Module
Manufacturer:	
Company Name:	See applicant data
Contact Person:	-

Parameter List:

Parameter name	*Value*
Parameter for Scope FCC_v2:	
AC Power Supply	120v/60Hz AC
Antenna gain	The product does not include a predefined antenna.
DC Power Supply	12v DC
highest channel	251 (848.8MHz) for GSM850, 810 (1909.8MHz) for GSM1900, 4233 (846.6MHz) for FDD5, 9538 (1907.6MHz) for FDD2
lowest channel	128 (824.2MHz) for GSM850, 512 (1850.2MHz) for GSM1900, 4132 (826.4MHz) for FDD5, 9262 (1852.4MHz)for FDD2
LTE_Operating Frequencies	Please see Annex for channel list
mid channel	190 (836.6MHz) for GSM850, 661 (1880.0MHz) for GSM1900, 4183 (836.6MHz) for FDD5, 9400 (1880MHz) for FDD2

2.2 Detailed Description of OUT Samples

Sample : AE06

OUT Identifier	TOBY-R200		
Sample Description	RF Sample		
Serial No.	352848080016583		
HW Status	283002		
SW Status	30.19		
Date of Receipt	2016/10/24		
Low Voltage	3.3 V	*Low Temp.*	-20 °C
High Voltage	4.4 V	*High Temp.*	55 °C
Nominal Voltage	3.8 V	*Normal Temp.*	25 °C

Sample : AJ06

OUT Identifier	TOBY-R200		
Sample Description	Standard Sample		
Serial No.	352848080016799		
HW Status	283002		
SW Status	30.19		
Date of Receipt	2016/10/24		
Low Voltage	3.3 V	*Low Temp.*	-20 °C
High Voltage	4.4 V	*High Temp.*	55 °C
Nominal Voltage	3.8 V	*Normal Temp.*	25 °C

Sample : AT10

OUT Identifier	TOBY-R200		
Sample Description	Standard Sample		
Serial No.	352848080028158		
HW Status	283A01		
SW Status	30.26		
Low Voltage	3.3 V	*Low Temp.*	-20 °C
High Voltage	4.4 V	*High Temp.*	55 °C
Nominal Voltage	3.8 V	*Normal Temp.*	25 °C

2.3 OUT Features

Features for OUT: TOBY-R200

Designation	*Description*	*Allowed Values*	*Supported Value(s)*
Features for scope: FCC_v2			
Eant	removable antenna supplied and type tested with the radio equipment, designed as an indispensable part of the equipment		
EDGE850	EUT supports EDGE in the band 824 MHz - 849 MHz		
EDGE1900	EUT supports EDGE in the band 1850 MHz - 1910 MHz		
eFDD2			
eFDD4			
eFDD5			
eFDD12			
FDD2	EUT supports UMTS FDD2 in the band 1850 MHz - 1910 MHz		
FDD5	EUT supports UMTS FDD5 in the band 824 MHz - 849 MHz		
GSM850	EUT supports GSM850 band 824MHz - 849MHz		
HSDPA-FDD2	EUT supports UMTS FDD2 HSDPA in the band 1850 MHz - 1910 MHz		
HSDPA-FDD5	EUT supports UMTS FDD5 HSDPA in the band 824 MHz - 849 MHz		
HSUPA-FDD2	EUT supports UMTS FDD2 HSUPA in the band 1850 MHz - 1910 MHz		
HSUPA-FDD5	EUT supports UMTS FDD5 HSUPA in the band 824 MHz - 849 MHz		
PCS1900	EUT supports PCS1900 band 1850MHz - 1910MHz		
TantC	temporary antenna connector, which may be only built-in for testing, designed as an example part of the equipment		

2.4 Auxiliary Equipment

AE No.	*Type Designation*	*Serial No.*	*HW Status*	*SW Status*	*Description*
AE 02	EVB-WL3		NO_EVK_CS_191A00		Evaluation test board
AE 03	GSATT151000009				700-2800 MHz Antenna #1
AE 04	GSATT151000009				700-2800 MHz Antenna #2
AE 01	UUX324-1215	E09-0291984			AC/DC converter

2.5 Setups used for Testing

For each setup a relation is given to determine if and which samples and auxiliary equipment is used.
The left side list all OUT samples and the right side lists all auxiliary equipment for the given setup.

Setup No.	*List of OUT samples*		*List of auxiliary equipment*	
	Sample No.	*Sample Description*	*AE No.*	*AE Description*
AE06	**(AE06)**			
	Sample: AE06	RF Sample	AE 02	Evaluation test board
			AE 01	AC/DC converter
AJ06	**(AJ06)**			
	Sample: AJ06	Standard Sample	AE 02	Evaluation test board
			AE 03	700-2800 MHz Antenna #1
			AE 04	700-2800 MHz Antenna #2
			AE 01	AC/DC converter
AT10	**(AT10)**			
	Sample: AT10	Standard Sample	AE 02	Evaluation test board
			AE 01	AC/DC converter

3 Results

3.1 General

Documentation of tested devices: Available at the test laboratory.

Interpretation of the test results: The results of the inspection are described on the following pages, where 'Conformity' or 'Passed' means that the certification criteria were verified and that the tested device is conform to the applied standard.

In cases where 'Declaration' is printed, the required documents are available in the manufacturers product documentation.

In cases where 'not applicable' is printed, the test case requirements are not relevant to the specific equipment implementation.

3.2 List of the Applicable Body

(Bodies for Scope: FCC_v2)

Designation	*Description*
FCC47CFRChIPART22PUBLIC MOBILE SERVICES	Part 22, Subpart H - Cellular Radiotelephone Service
FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES	Part 24, Subpart E - Broadband PCS
FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	Part 27, Subpart C - Technical Standards

3.3 List of Test Specification

Test Specification:	**FCC part 2 and 22**
Version	10-1-16 Edition
Title:	PART 2 - GENERAL RULES AND REGULATIONS PART 22 - PUBLIC MOBILE SERVICES

Applicable Errata	*Activate Date*	*Comment*
ANSI C63.4-2003	04/1/30	

Test Specification:	**FCC part 2 and 24**
Version	10-1-16 Edition
Title:	PART 2 - GENERAL RULES AND REGULATIONS PART 24 - PERSONAL COMMUNICATIONS SERVICES

Applicable Errata	*Activate Date*	*Comment*
ANSI C63.4-2003	04/1/30	

Test Specification:	**FCC part 2 and 27**
Version	10-1-16 Edition
Title:	PART 2 - GENERAL RULES AND REGULATIONS PART 27 - MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

3.4 Summary

Test Case Identifier / Name *Test (condition)*	*Result*	*Date of Test*	*Lab Ref.*	*Setup*
Test Specification: FCC part 2 and 22				
22.1 RF Power Output §2.1046, §22.913				
22.1; _RF Power Output Summary §2.1046, §22.913	Passed	2016/11/09	Lab 2	AT10
22.2 Frequency stability §2.1055				
22.2; _Frequency stability Summary §2.1055	Passed	2016/11/09	Lab 2	AE06
22.3 Spurious emissions at antenna terminals §2.1051, §22.917				
22.3; Spurious emissions at antenna terminals summary §2.1051, §22.917	Passed	2016/11/09	Lab 2	AE06
22.4 Field strength of spurious radiation §2.1053, §22.917				
22.4; Field strength of spurious radiation Summary §2.1053, §22.917	Passed	2016/11/10	Lab 1	AJ06
22.4; Frequency Band = 850, Mode = EDGE, Channel = 128, Frequency = 824.2MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = 850, Mode = EDGE, Channel = 190, Frequency = 836.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = 850, Mode = EDGE, Channel = 251, Frequency = 848.8MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = 850, Mode = GSM, Channel = 128, Frequency = 824.2MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = 850, Mode = GSM, Channel = 251, Frequency = 848.8MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20425, Frequency = 826.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20525, Frequency = 836.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20625, Frequency = 846.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4132, Frequency = 826.4MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4183, Frequency = 836.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4233, Frequency = 846.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4132, Frequency = 826.4MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4183, Frequency = 836.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4233, Frequency = 846.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4132, Frequency = 826.4MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4183, Frequency = 836.6MHz	Passed	2016/11/08	Lab 1	AJ06
22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4233, Frequency = 846.6MHz	Passed	2016/11/08	Lab 1	AJ06

Test Case Identifier / Name *Test (condition)*	*Result*	*Date of Test*	*Lab* *Ref.*	*Setup*
22.5 Emission and Occupied Bandwidth §2.1049, §22.917				
22.5; _Emission and Occupied Bandwidth Summary §2.1049, §22.917	Passed	2016/11/09	Lab 2	AT10
22.6 Band edge compliance §2.1053, §22.917				
22.6; _Band edge compliance Summary §2.1053, §22.917	Passed	2016/11/09	Lab 2	AE06
22.7 Peak-to-Average Ratio Summary §2.1046				
22.7; Peak-to-Average Ratio Summary §2.1046	Passed	2016/11/09	Lab 2	AE06
Test Specification: FCC part 2 and 24				
24.1 RF Power Output §2.1046, §24.232				
24.1; RF Power Output Summary §2.1046, §24.232	Passed	2016/11/09	Lab 2	AE06
24.2 Frequency stability §2.1055, §24.235				
24.2; Frequency stability Summary §2.1055, 24.235	Passed	2016/11/09	Lab 2	AE06
24.3 Spurious emissions at antenna terminals §2.1051, §24.238				
24.3; Spurious emissions at antenna terminals Summary §2.1051, §24.238	Passed	2016/11/09	Lab 2	AE06

Test Case Identifier / Name Test (condition)	Result	Date of Test	Lab Ref.	Setup
24.4 Field strength of spurious radiation §2.1053, §24.238				
24.4; Field strength of spurious radiation Summary §2.1053, §24.238	Passed	2016/11/10	Lab 1	AJ06
24.4; Frequency Band = 1900, Mode = EDGE, Channel = 512, Frequency = 1850.2MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = 1900, Mode = EDGE, Channel = 661, Frequency = 1880.0MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = 1900, Mode = EDGE, Channel = 810, Frequency = 1909.8MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = 1900, Mode = GSM, Channel = 512, Frequency = 1850.2MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = 1900, Mode = GSM, Channel = 810, Frequency = 1909.8MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = eFDD2, Mode = QPSK 5MHz, Channel = 18625, Frequency = 1852.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = eFDD2, Mode = QPSK 5MHz, Channel = 18900, Frequency = 1880MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = eFDD2, Mode = QPSK 5MHz, Channel = 19175, Frequency = 1907.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = HSDPA, Channel = 9262, Frequency = 1852.4MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = HSDPA, Channel = 9400, Frequency = 1880MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = HSDPA, Channel = 9538, Frequency = 1907.6MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = HSUPA, Channel = 9262, Frequency = 1852.4MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = HSUPA, Channel = 9400, Frequency = 1880MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = HSUPA, Channel = 9538, Frequency = 1907.6MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = W-CDMA, Channel = 9262, Frequency = 1852.4MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = W-CDMA, Channel = 9400, Frequency = 1880MHz	Passed	2016/11/08	Lab 1	AJ06
24.4; Frequency Band = FDD2, Mode = W-CDMA, Channel = 9538, Frequency = 1907.6MHz	Passed	2016/11/08	Lab 1	AJ06
24.5 Emission and Occupied Bandwidth §2.1049, §24.238				
24.5; Emission and Occupied Bandwidth Summary §2.1049, §24.238	Passed	2016/11/09	Lab 2	AE06
24.6 Band edge compliance §2.1053, §24.238				
24.6; Band edge compliance summary §2.1053, §24.238	Passed	2016/11/09	Lab 2	AE06
24.7 Peak-to-Average ratio §2.1046, §24.232				
24.7; Peak-to-Average Ratio Summary §2.1046, §24.232	Passed	2016/11/09	Lab 2	AE06

Test Specification: FCC part 2 and 27

Test Case Identifier / Name *Test (condition)*	*Result*	*Date of Test*	*Lab* *Ref.*	*Setup*
27.1 RF Power Output §2.1046, §27.250				
27.1; RF Power Output Summary §2.1046, §27.250	Passed	2016/11/09	Lab 2	AE06
27.2 Frequency stability §2.1055, §27.54				
27.2; Frequency stability Summary §2.1055, §27.54	Passed	2016/11/09	Lab 2	AE06
27.3 Spurious emissions at antenna terminals §2.1051, §27.53				
27.3; Spurious emissions at antenna terminals Summary §2.1051, §27.53	Passed	2016/11/09	Lab 2	AE06
27.4 Field strength of spurious radiation §2.1053, §27.53				
27.4; Field strength of spurious radiation Summary §2.1053, §27.53	Passed	2016/11/10	Lab 1	AJ06
27.4; Frequency Band = eFDD12, Mode = QPSK 5MHz, Channel = 23035, Frequency = 701.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
27.4; Frequency Band = eFDD12, Mode = QPSK 5MHz, Channel = 23095, Frequency = 707.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
27.4; Frequency Band = eFDD12, Mode = QPSK 5MHz, Channel = 23155, Frequency = 713.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
27.4; Frequency Band = eFDD4, Mode = QPSK 5MHz, Channel = 19975, Frequency = 1712.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
27.4; Frequency Band = eFDD4, Mode = QPSK 5MHz, Channel = 20175, Frequency = 1732.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
27.4; Frequency Band = eFDD4, Mode = QPSK 5MHz, Channel = 20375, Frequency = 1752.5MHz, Method = radiated	Passed	2016/11/08	Lab 1	AJ06
27.5 Emission and Occupied Bandwidth §2.1049				
27.5; Emission and Occupied Bandwidth Summary §2.1049	Passed	2016/11/09	Lab 2	AE06
27.6 Band edge compliance §2.1053, §27.53				
27.6; Band edge compliance summary §2.1053, §27.53	Passed	2016/11/09	Lab 2	AE06
27.7 Peak-to-Average ratio §2.1046, §27.50				
27.7; Peak-to-Average Ratio Summary §2.1046, §27.50	Passed	2016/11/09	Lab 2	AE06

3.5 Detailed Results

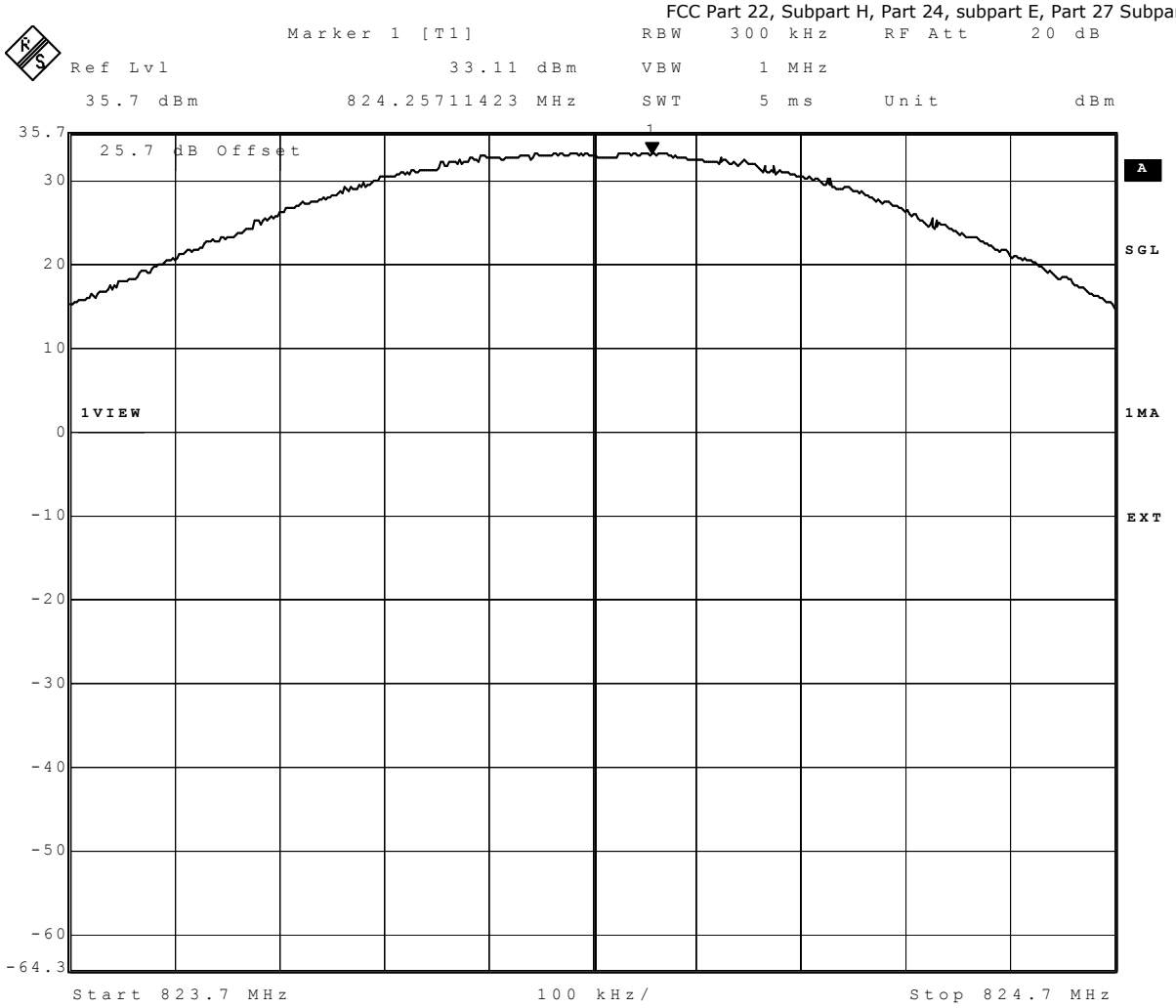
3.5.1 22.1 RF Power Output §2.1046, §22.913

Test: 22.1; _RF Power Output Summary §2.1046, §22.913

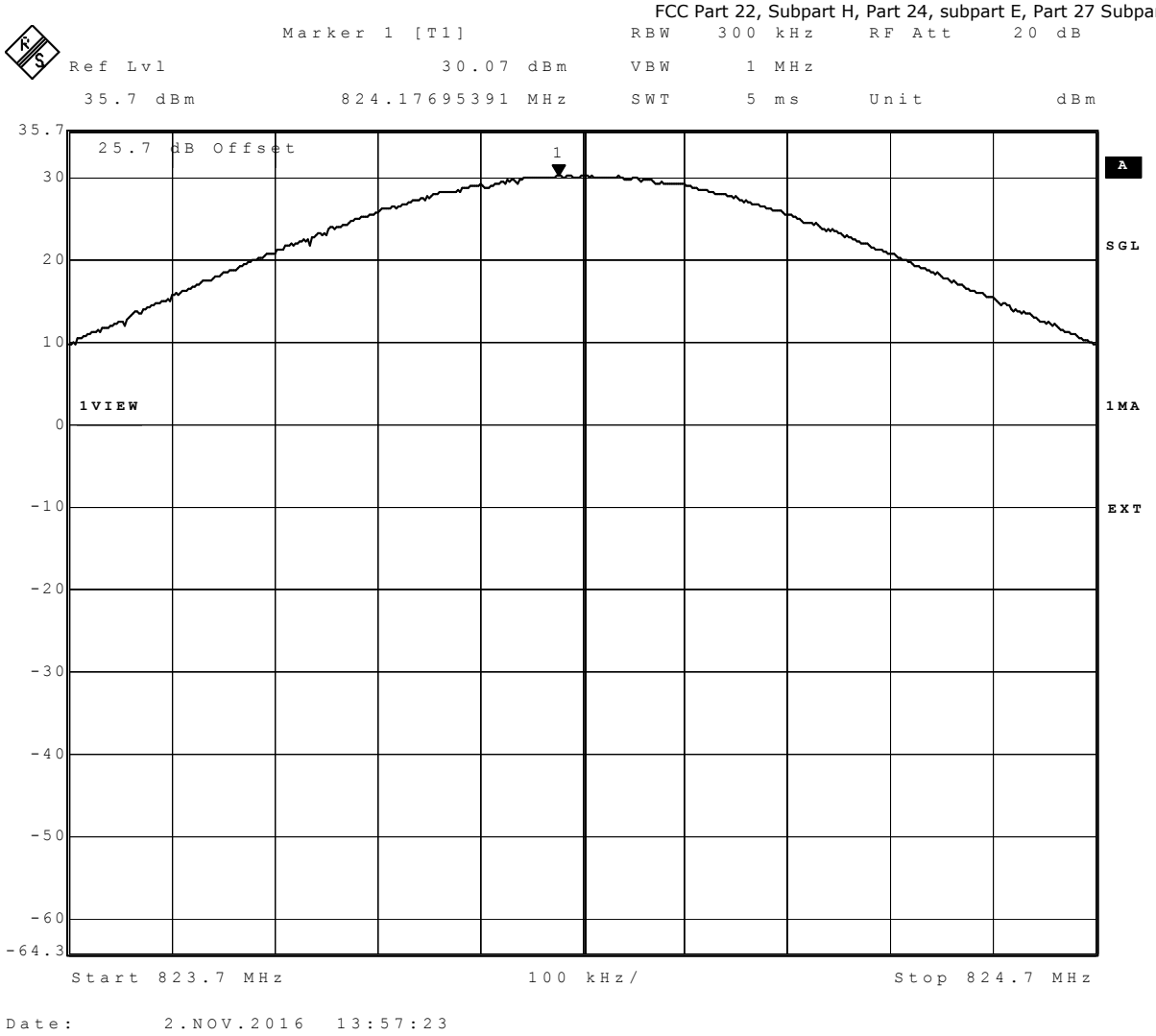
Result:	Passed
Setup No.:	AT10
Date of Test:	2016/11/09 10:38
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Transmitter Output Powe

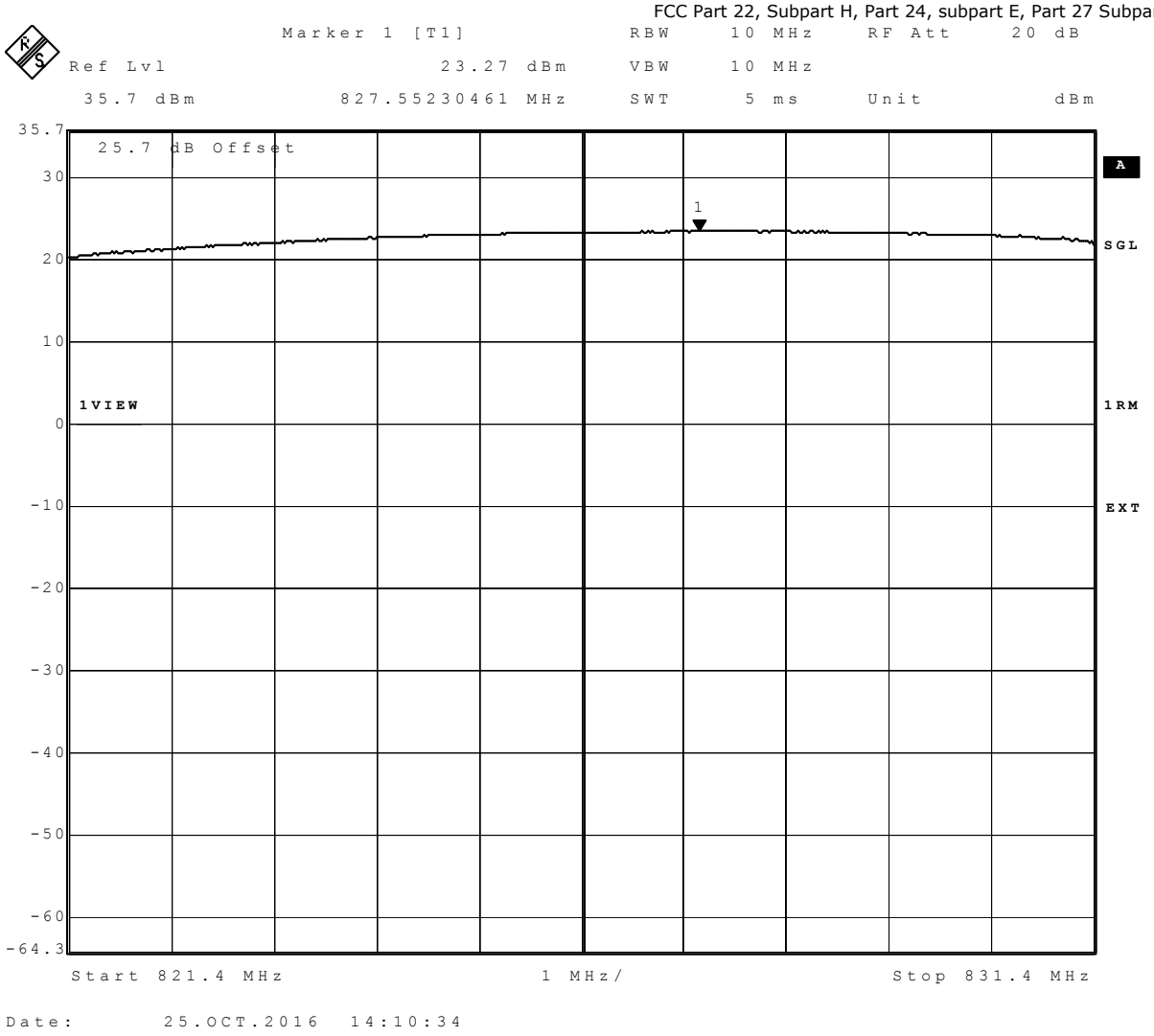
Radio Technology	Channel	Ressource Blocks	Bandwidth (MHz)	Peak Conducted Power (dBm)	Average Conducted Power (dBm)	RMS Conducted Power (dBm)	FCC EIRP Limit (W)	IC EIRP Limit (W)	Maximum Antenna Gain (dBi)
GSM 850	low	-	0.2	33.11	32.96	33.06	11.48	11.5	7.49
GSM 850	mid	-	0.2	32.95	32.9	32.84	11.48	11.5	7.65
GSM 850	high	-	0.2	32.92	32.81	32.85	11.48	11.5	7.68
GSM 850 EDGE	low	-	0.2	30.07	30.04	29.95	11.48	11.5	10.53
GSM 850 EDGE	mid	-	0.2	29.88	29.72	29.73	11.48	11.5	10.72
GSM 850 EDGE	high	-	0.2	30.04	29.98	30.02	11.48	11.5	10.56
FDD V	low	-	5	28.48	23.11	23.27	11.48	11.5	17.33
FDD V	mid	-	5	28.87	22.96	23.18	11.48	11.5	17.42
FDD V	high	-	5	28.48	22.93	23.12	11.48	11.5	17.48
FDD V HSDPA Subtest 1	low	-	5	28.7	23.36	23.75	11.48	11.5	16.85
FDD V HSDPA Subtest 1	mid	-	5	28.87	23.32	23.57	11.48	11.5	17.03
FDD V HSDPA Subtest 1	high	-	5	28.74	23.22	23.51	11.48	11.5	17.09
FDD V HSDPA Subtest 2	low	-	5	29.28	23.09	24.25	11.48	11.5	16.35
FDD V HSDPA Subtest 2	mid	-	5	29.28	23.03	23.53	11.48	11.5	17.07
FDD V HSDPA Subtest 2	high	-	5	30.3	23.04	23.54	11.48	11.5	17.06
FDD V HSDPA Subtest 3	low	-	5	29.82	22.94	23.66	11.48	11.5	16.94
FDD V HSDPA Subtest 3	mid	-	5	29.82	22.89	23.68	11.48	11.5	16.92
FDD V HSDPA Subtest 3	high	-	5	29.7	22.87	23.58	11.48	11.5	17.02
FDD V HSDPA Subtest 4	low	-	5	29.28	23	23.64	11.48	11.5	16.96
FDD V HSDPA Subtest 4	mid	-	5	29.82	22.83	23.64	11.48	11.5	16.96
FDD V HSDPA Subtest 4	high	-	5	29.82	22.86	23.63	11.48	11.5	16.97
FDD V HSUPA Subtest 1	low	-	5	29.7	23.4	23.66	11.48	11.5	16.94
FDD V HSUPA Subtest 1	mid	-	5	29.98	23.25	23.56	11.48	11.5	17.04
FDD V HSUPA Subtest 1	high	-	5	29.98	23.22	23.63	11.48	11.5	16.97
FDD V HSUPA Subtest 2	low	-	5	28.74	21.57	22.61	11.48	11.5	17.99
FDD V HSUPA Subtest 2	mid	-	5	30.54	22.65	23.38	11.48	11.5	17.22
FDD V HSUPA Subtest 2	high	-	5	30.54	22.52	23.11	11.48	11.5	17.49
FDD V HSUPA Subtest 3	low	-	5	30.3	22.67	23.46	11.48	11.5	17.14
FDD V HSUPA Subtest 3	mid	-	5	31.05	23.41	24.24	11.48	11.5	16.36
FDD V HSUPA Subtest 3	high	-	5	30.62	23.56	24.32	11.48	11.5	16.28
FDD V HSUPA Subtest 4	low	-	5	27.19	21.06	21.36	11.48	11.5	19.24
FDD V HSUPA Subtest 4	mid	-	5	29.82	22.42	23.15	11.48	11.5	17.45
FDD V HSUPA Subtest 4	high	-	5	30.3	22.69	23.76	11.48	11.5	16.84
FDD V HSUPA Subtest 5	low	-	5	29.82	23.72	23.89	11.48	11.5	16.71
FDD V HSUPA Subtest 5	mid	-	5	29.82	23.22	23.88	11.48	11.5	16.72
FDD V HSUPA Subtest 5	high	-	5	29.28	23.46	23.47	11.48	11.5	17.13
eFDD 5 QPSK	low	1	1.4	-	-	21.56	11.48	11.5	19.04
eFDD 5 QPSK	low	3	1.4	-	-	21.22	11.48	11.5	19.38
eFDD 5 QPSK	low	6	1.4	-	-	20.21	11.48	11.5	20.39
eFDD 5 QPSK	mid	1	1.4	-	-	21.49	11.48	11.5	19.11
eFDD 5 QPSK	mid	3	1.4	-	-	21.07	11.48	11.5	19.53
eFDD 5 QPSK	mid	6	1.4	-	-	20.11	11.48	11.5	20.49
eFDD 5 QPSK	high	1	1.4	-	-	21.2	11.48	11.5	19.4
eFDD 5 QPSK	high	3	1.4	-	-	20.84	11.48	11.5	19.76
eFDD 5 QPSK	high	6	1.4	-	-	19.93	11.48	11.5	20.67
eFDD 5 16QAM	low	1	1.4	-	-	20.6	11.48	11.5	20
eFDD 5 16QAM	low	6	1.4	-	-	19.4	11.48	11.5	21.2
eFDD 5 16QAM	mid	1	1.4	-	-	20.39	11.48	11.5	20.21
eFDD 5 16QAM	mid	6	1.4	-	-	19.17	11.48	11.5	21.43
eFDD 5 16QAM	high	1	1.4	-	-	20.21	11.48	11.5	20.39
eFDD 5 16QAM	high	6	1.4	-	-	18.93	11.48	11.5	21.67
eFDD 5 QPSK	low	1	3	-	-	21.97	11.48	11.5	18.63
eFDD 5 QPSK	low	15	3	-	-	20.73	11.48	11.5	19.87
eFDD 5 QPSK	mid	1	3	-	-	21.64	11.48	11.5	18.96
eFDD 5 QPSK	mid	15	3	-	-	20.48	11.48	11.5	20.12
eFDD 5 QPSK	high	1	3	-	-	21.54	11.48	11.5	19.06
eFDD 5 QPSK	high	15	3	-	-	20.28	11.48	11.5	20.32
eFDD 5 16QAM	low	1	3	-	-	21	11.48	11.5	19.6
eFDD 5 16QAM	low	15	3	-	-	19.81	11.48	11.5	20.79
eFDD 5 16QAM	mid	1	3	-	-	20.86	11.48	11.5	19.74
eFDD 5 16QAM	mid	15	3	-	-	19.58	11.48	11.5	21.02
eFDD 5 16QAM	high	1	3	-	-	20.74	11.48	11.5	19.86
eFDD 5 16QAM	high	15	3	-	-	19.36	11.48	11.5	21.24
eFDD 5 QPSK	low	1	5	-	-	22.05	11.48	11.5	18.55
eFDD 5 QPSK	low	12	5	-	-	20.7	11.48	11.5	19.9
eFDD 5 QPSK	low	25	5	-	-	20.69	11.48	11.5	19.91
eFDD 5 QPSK	mid	1	5	-	-	21.85	11.48	11.5	18.75
eFDD 5 QPSK	mid	12	5	-	-	20.46	11.48	11.5	20.14
eFDD 5 QPSK	mid	25	5	-	-	20.43	11.48	11.5	20.17
eFDD 5 QPSK	high	1	5	-	-	21.54	11.48	11.5	19.06
eFDD 5 QPSK	high	12	5	-	-	20.24	11.48	11.5	20.36
eFDD 5 QPSK	high	25	5	-	-	20.28	11.48	11.5	20.32
eFDD 5 16QAM	low	1	5	-	-	20.99	11.48	11.5	19.61
eFDD 5 16QAM	low	25	5	-	-	19.7	11.48	11.5	20.9
eFDD 5 16QAM	mid	1	5	-	-	20.81	11.48	11.5	19.79
eFDD 5 16QAM	mid	25	5	-	-	19.43	11.48	11.5	21.17
eFDD 5 16QAM	high	1	5	-	-	21.03	11.48	11.5	19.57
eFDD 5 16QAM	high	25	5	-	-	19.35	11.48	11.5	21.25
eFDD 5 QPSK	low	1	10	-	-	22.06	11.48	11.5	18.54
eFDD 5 QPSK	low	50	10	-	-	20.86	11.48	11.5	19.74
eFDD 5 QPSK	mid	1	10	-	-	22	11.48	11.5	18.6
eFDD 5 QPSK	mid	50	10	-	-	20.67	11.48	11.5	19.93
eFDD 5 QPSK	high	1	10	-	-	21.73	11.48	11.5	18.87
eFDD 5 QPSK	high	50	10	-	-	20.6	11.48	11.5	20
eFDD 5 16QAM	low	1	10	-	-	21.07	11.48	11.5	19.53
eFDD 5 16QAM	low	50	10	-	-	19.91	11.48	11.5	20.69
eFDD 5 16QAM	mid	1	10	-	-	20.74	11.48	11.5	19.86
eFDD 5 16QAM	mid	50	10	-	-	19.72	11.48	11.5	20.88
eFDD 5 16QAM	high	1	10	-	-	20.71	11.48	11.5	19.89
eFDD 5 16QAM	high	50	10	-	-	19.64	11.48	11.5	20.96



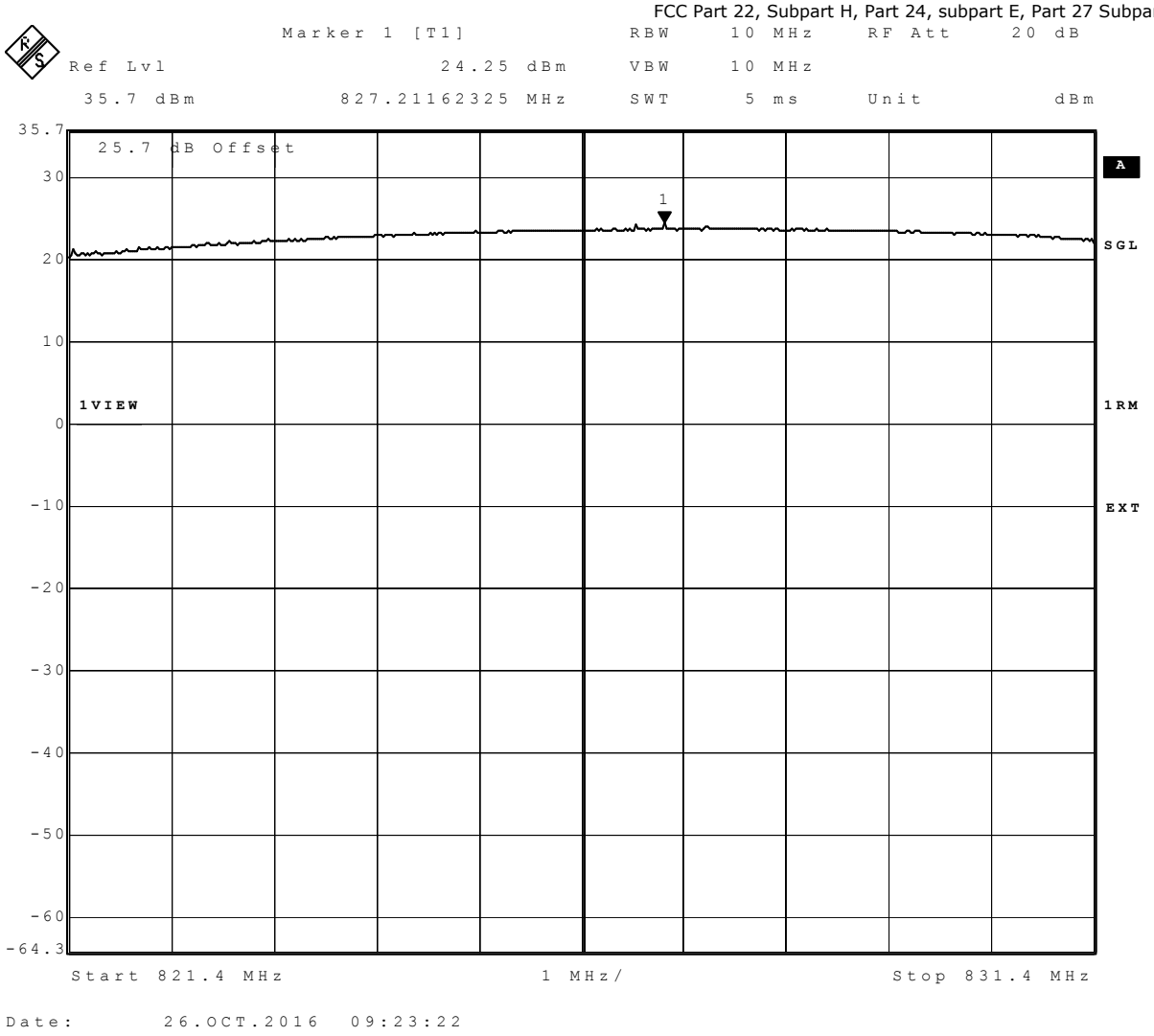
GSM850, Channel: low



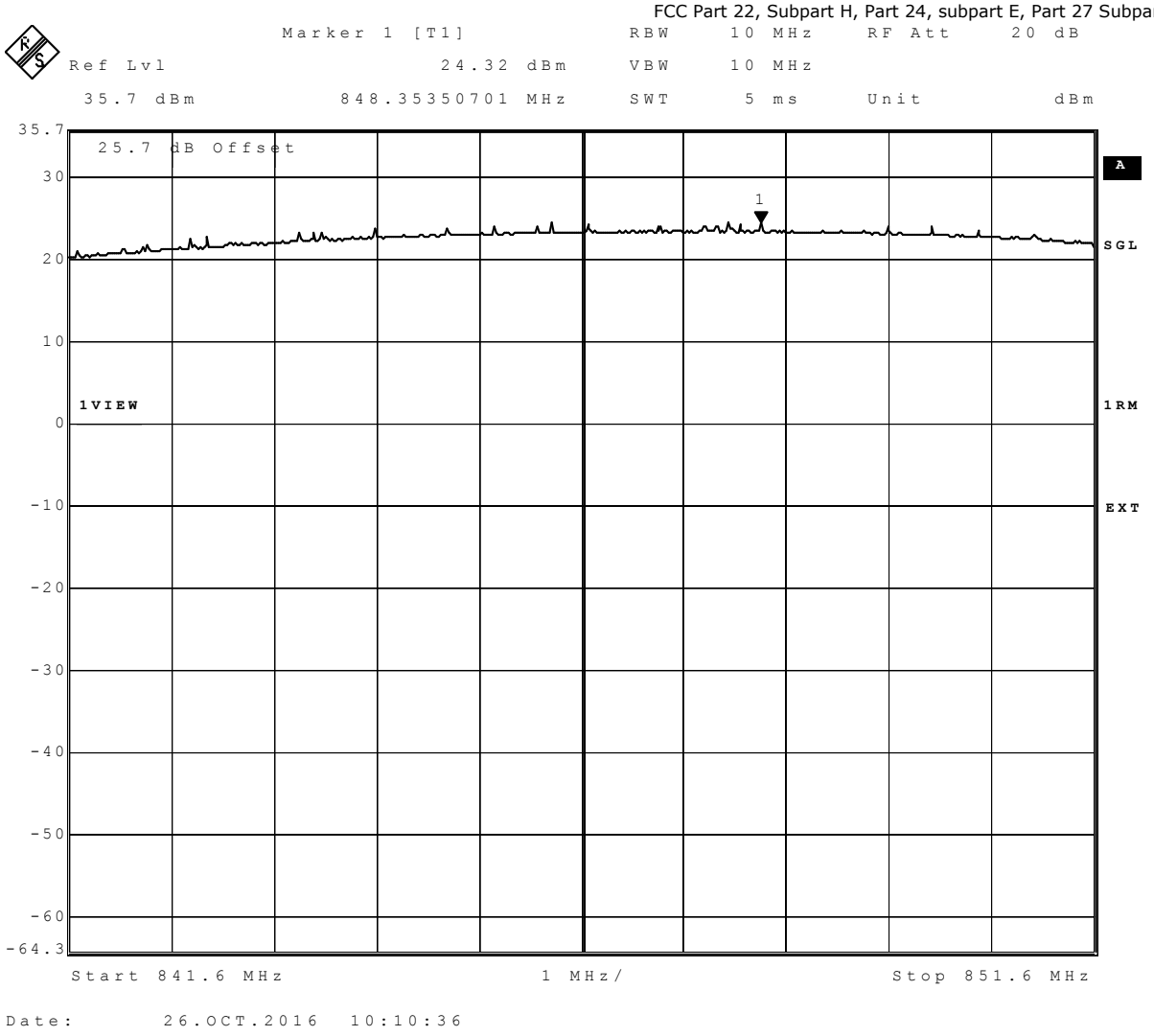
GSM850 EDGE, Channel: low



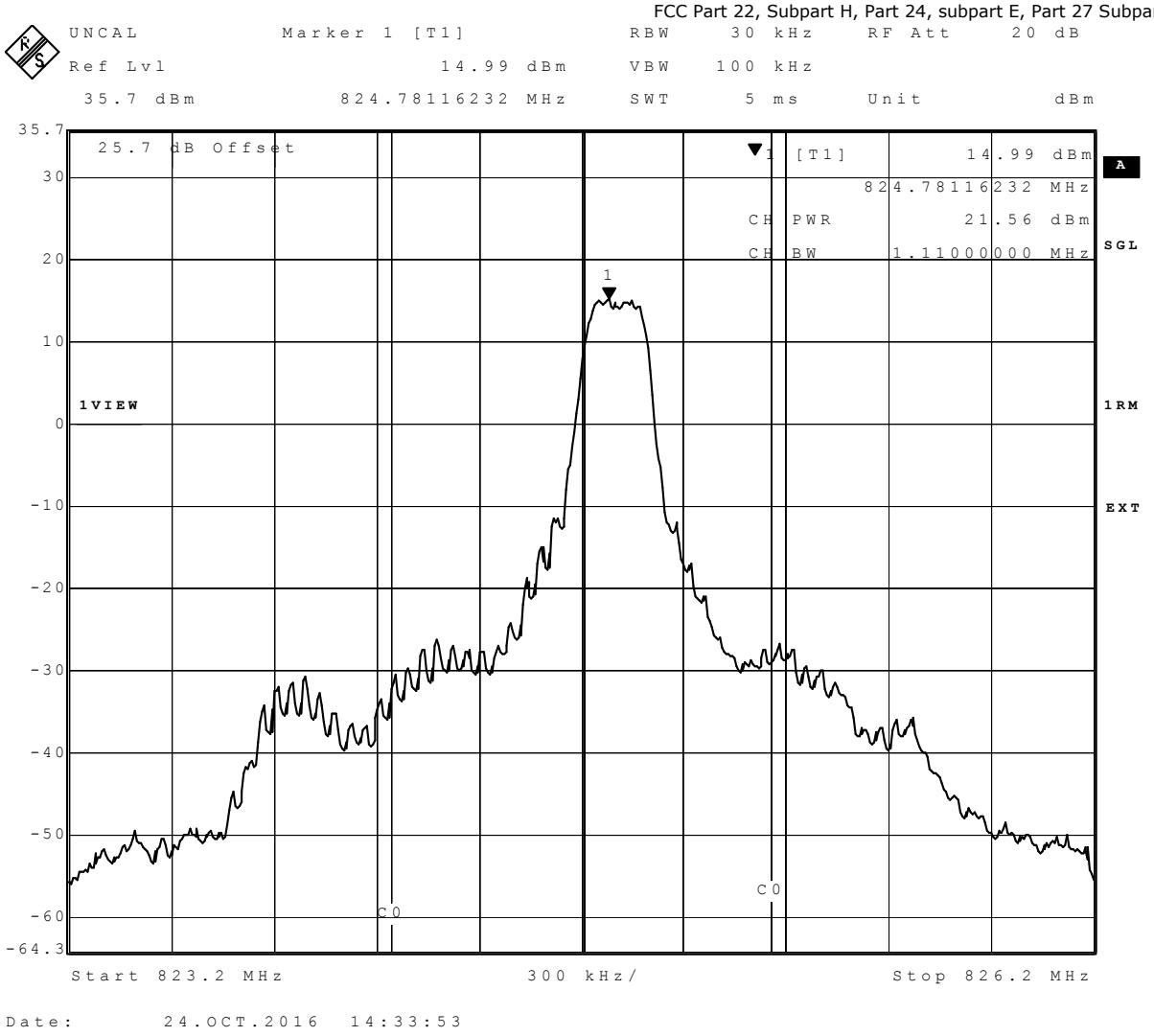
FDD V, Channel: low



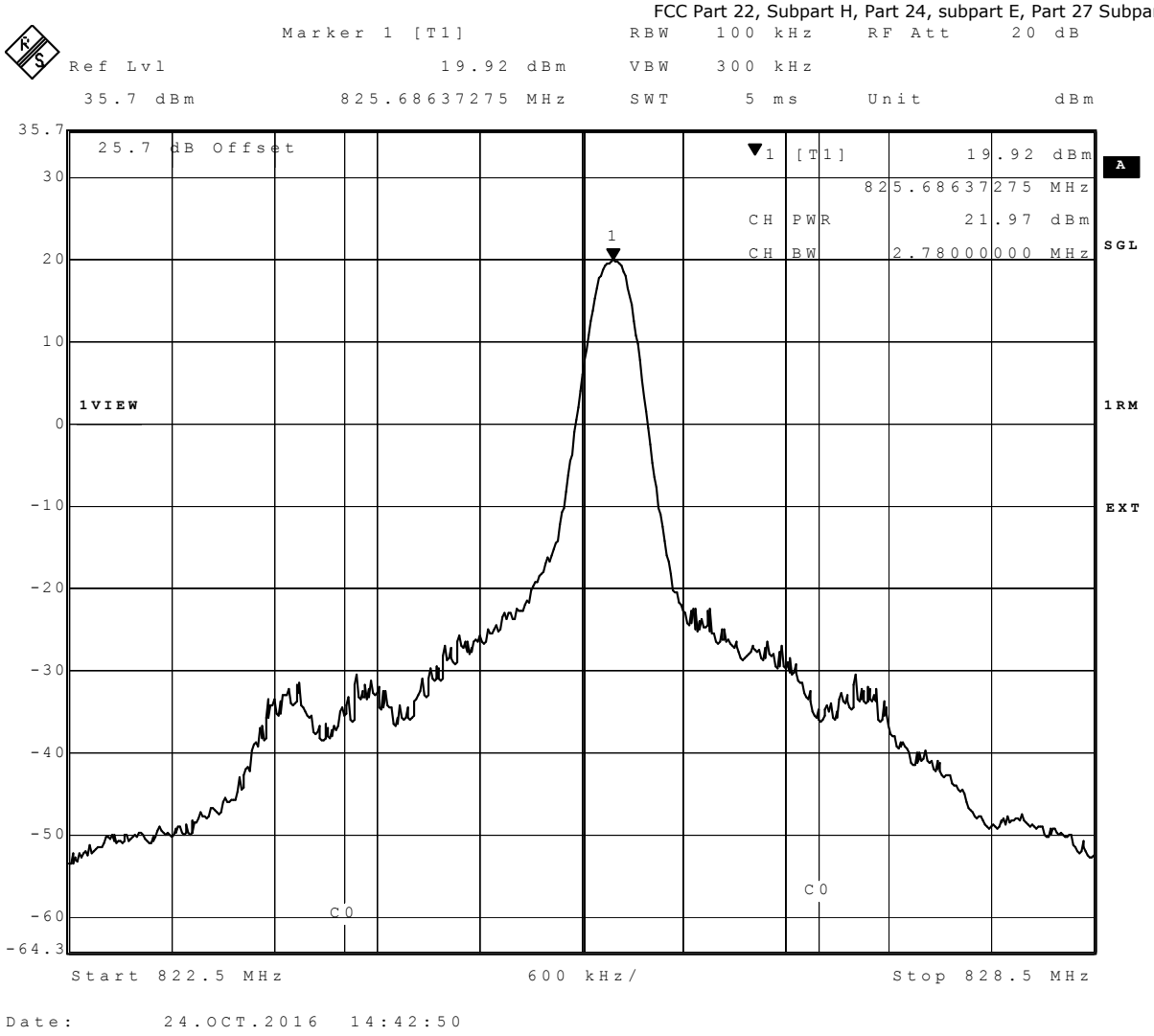
FDD V HSDPA, Channel: low



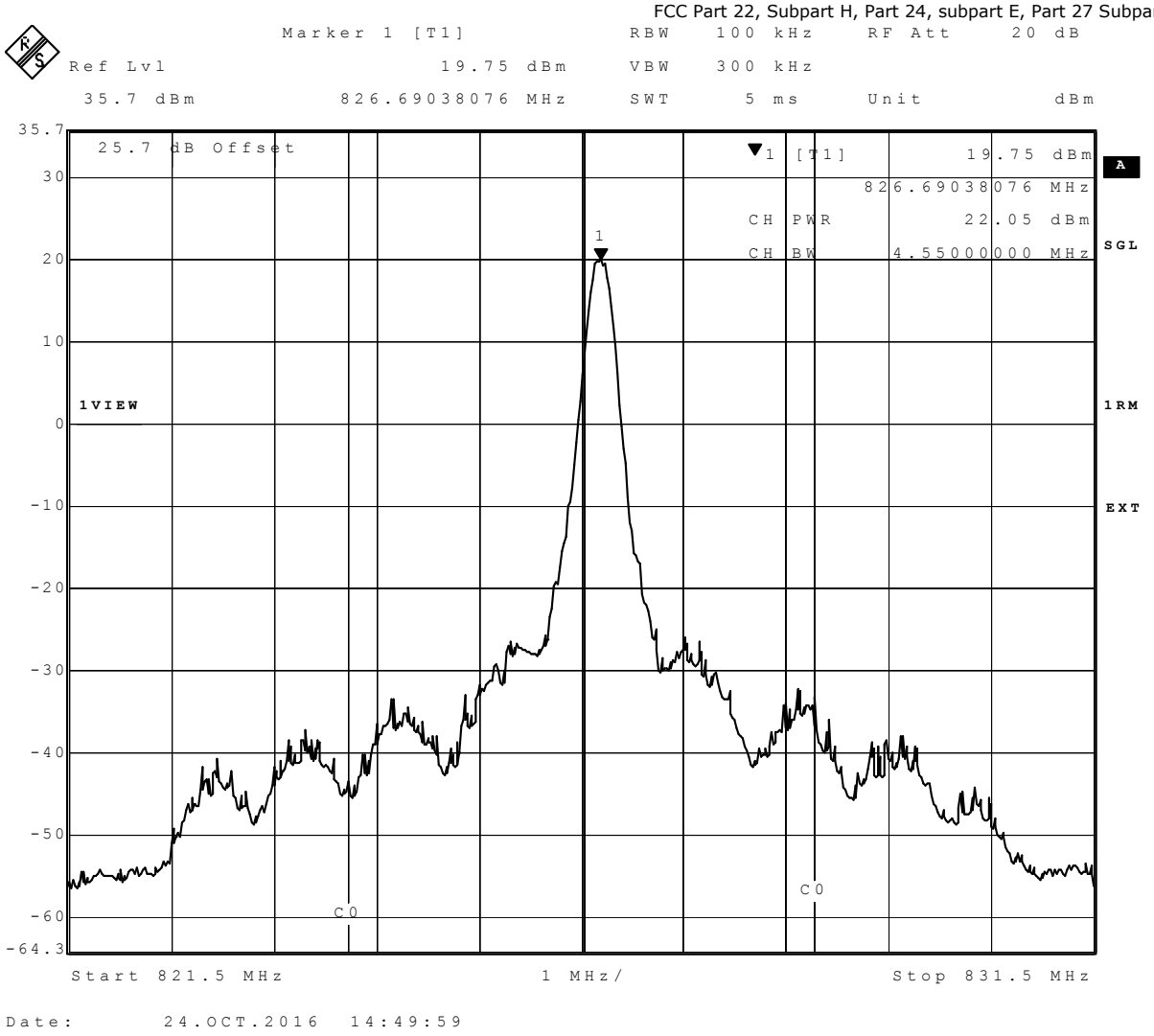
FDD V HSUPA, Channel: high



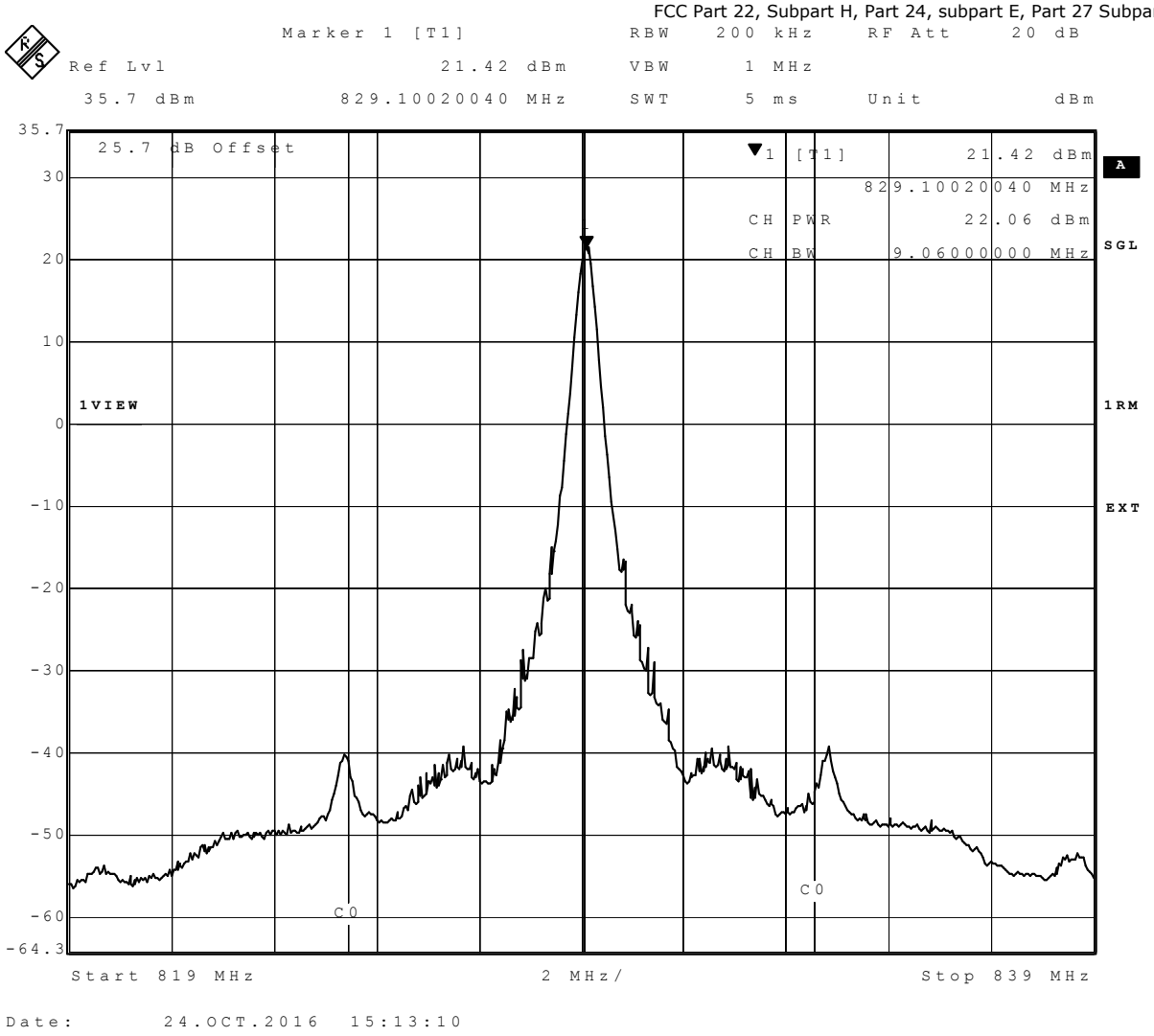
eFDD5 QPSK, 1.4MHz, RB1, Channel: low



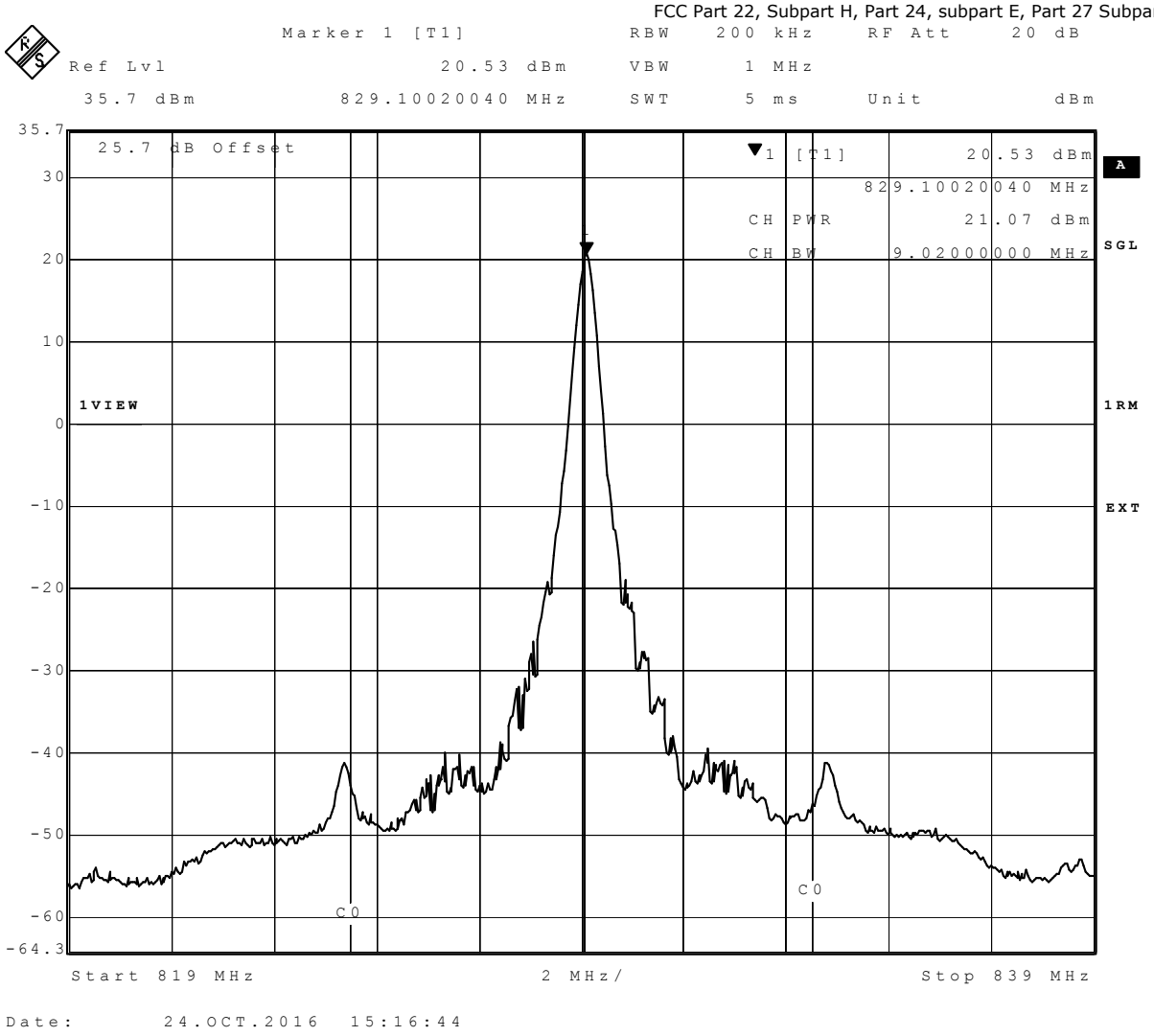
eFDDV QPSK, 3MHz, RB1, Channel: low



eFDDV QPSK, 5MHz, RB1, Channel: low



eFDDV QPSK, 10MHz, RB1, Channel. low



eFDDV 16QAM, 10MHz, RB1, Channel. low

3.5.2 22.2 Frequency stability §2.1055

Test: 22.2; _Frequency stability Summary §2.1055

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 12:09
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Detailed Results:

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	-17	-28	passed
-30	5			-20	-37	passed
-30	10			-19	-37	passed
-20	0	normal	2095.5	-11	-22	passed
-20	5			-16	-32	passed
-20	10			-14	-27	passed
-10	0	normal	2095.5	-10	-20	passed
-10	5			-12	-21	passed
-10	10			-12	-26	passed
0	0	normal	2095.5	-5	-16	passed
0	5			-7	-15	passed
0	10			-8	-22	passed
10	0	normal	2095.5	-8	-17	passed
10	5			-6	-13	passed
10	10			-2	-11	passed
20	0	low	2095.5	-6	-12	passed
20	5			-4	-19	passed
20	10			-3	-17	passed
20	0	normal = high [1)]	2095.5	-3	-11	passed
20	5			-9	-19	passed
20	10			-2	-17	passed
20	0	high	2095.5	-6	-13	passed
20	5			-5	-22	passed
20	10			-4	-11	passed
30	0	normal	2095.5	-4	-17	passed
30	5			-4	-17	passed
30	10			-2	-19	passed
40	0	normal	2095.5	-3	-16	passed
40	5			-2	-15	passed
40	10			-2	-13	passed
50	0	normal	2095.5	-1	-11	passed
50	5			-3	-18	passed
50	10			-6	-19	passed

EDGE 850 Band, Mid channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	-11	-18	passed
-30	5			-14	-23	passed
-30	10			-12	-23	passed
-20	0	normal	2095.5	-8	-14	passed
-20	5			-6	-15	passed
-20	10			-7	-21	passed
-10	0	normal	2095.5	-6	-12	passed
-10	5			-4	-13	passed
-10	10			-1	-15	passed
0	0	normal	2095.5	1	9	passed
0	5			-3	-13	passed
0	10			-2	-12	passed
10	0	normal	2095.5	1	9	passed
10	5			4	12	passed
10	10			3	14	passed
20	0	low	2095.5	3	11	passed
20	5			2	14	passed
20	10			3	14	passed
20	0	normal = high [1)]	2095.5	0	6	passed
20	5			3	14	passed
20	10			2	11	passed
20	0	high	2095.5	2	10	passed
20	5			7	12	passed
20	10			3	13	passed
30	0	normal	2095.5	4	9	passed
30	5			6	12	passed
30	10			2	13	passed
40	0	normal	2095.5	3	8	passed
40	5			7	13	passed
40	10			4	11	passed
50	0	normal	2095.5	3	7	passed
50	5			5	11	passed
50	10			3	14	passed

GSM 850 Band, Mid channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	36	23	passed
-30	5			32	72	passed
-30	10			28	55	passed
-20	0	normal	2095.5	19	25	passed
-20	5			25	38	passed
-20	10			21	52	passed
-10	0	normal	2095.5	37	103	passed
-10	5			29	62	passed
-10	10			34	83	passed
0	0	normal	2095.5	26	49	passed
0	5			36	65	passed
0	10			29	39	passed
10	0	normal	2095.5	41	68	passed
10	5			17	74	passed
10	10			13	35	passed
20	0	low	2095.5	14	28	passed
20	5			13	31	passed
20	10			18	29	passed
20	0	normal = high [1)]	2095.5	9	61	passed
20	5			25	37	passed
20	10			31	42	passed
20	0	high	2095.5	36	39	passed
20	5			29	48	passed
20	10			34	40	passed
30	0	normal	2095.5	20	36	passed
30	5			23	44	passed
30	10			4	39	passed
40	0	normal	2095.5	48	93	passed
40	5			13	68	passed
40	10			27	37	passed
50	0	normal	2095.5	36	30	passed
50	5			44	27	passed
50	10			15	77	passed

HSDPA FDD 5, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	-28	-322	passed
-30	5			104	350	passed
-30	10			99	-383	passed
-20	0	normal	2095.5	80	357	passed
-20	5			97	410	passed
-20	10			-70	-440	passed
-10	0	normal	2095.5	-94	-442	passed
-10	5			-21	-435	passed
-10	10			-20	-427	passed
0	0	normal	2095.5	89	436	passed
0	5			-57	-425	passed
0	10			-105	-458	passed
10	0	normal	2095.5	-50	-437	passed
10	5			-30	-328	passed
10	10			-64	-325	passed
20	0	low	2095.5	-51	-463	passed
20	5			-38	-454	passed
20	10			-55	-464	passed
20	0	normal = high [1)]	2095.5	-45	-396	passed
20	5			-36	-396	passed
20	10			87	354	passed
20	0	high	2095.5	-44	-479	passed
20	5			-42	-479	passed
20	10			90	-378	passed
30	0	normal	2095.5	-14	-400	passed
30	5			-11	452	passed
30	10			-16	-354	passed
40	0	normal	2095.5	-81	-399	passed
40	5			-50	-216	passed
40	10			-68	-268	passed
50	0	normal	2095.5	6	-82	passed
50	5			-26	-400	passed
50	10			41	-378	passed

HSUPA, FDD 5, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2091.25	15	61	passed
-30	5			18	84	passed
-30	10			3	30	passed
-20	0	normal	2091.25	16	41	passed
-20	5			7	16	passed
-20	10			12	25	passed
-10	0	normal	2091.25	18	19	passed
-10	5			5	24	passed
-10	10			22	5	passed
0	0	normal	2091.25	17	17	passed
0	5			37	45	passed
0	10			35	18	passed
10	0	normal	2091.25	20	24	passed
10	5			6	39	passed
10	10			19	103	passed
20	0	low	2091.25	14	36	passed
20	5			12	28	passed
20	10			7	18	passed
20	0	normal = high [1)]	2091.25	10	12	passed
20	5			28	21	passed
20	10			31	38	passed
20	0	high	2091.25	3	24	passed
20	5			18	62	passed
20	10			9	54	passed
30	0	normal	2091.25	21	47	passed
30	5			23	26	passed
30	10			9	78	passed
40	0	normal	2091.25	27	10	passed
40	5			5	28	passed
40	10			18	14	passed
50	0	normal	2091.25	14	94	passed
50	5			28	51	passed
50	10			20	37	passed

LTE, eFDD5, QPSK 5MHz BW, Mid channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	34	87	passed
-30	5			16	45	passed
-30	10			72	80	passed
-20	0	normal	2095.5	25	37	passed
-20	5			39	66	passed
-20	10			10	63	passed
-10	0	normal	2095.5	26	27	passed
-10	5			46	38	passed
-10	10			19	59	passed
0	0	normal	2095.5	20	46	passed
0	5			25	29	passed
0	10			21	77	passed
10	0	normal	2095.5	17	24	passed
10	5			18	49	passed
10	10			36	69	passed
20	0	low	2095.5	46	38	passed
20	5			32	67	passed
20	10			43	86	passed
20	0	normal = high [1)]	2095.5	17	37	passed
20	5			32	55	passed
20	10			28	81	passed
20	0	high	2095.5	35	88	passed
20	5			36	89	passed
20	10			27	77	passed
30	0	normal	2095.5	37	27	passed
30	5			9	34	passed
30	10			14	79	passed
40	0	normal	2095.5	18	106	passed
40	5			22	69	passed
40	10			36	48	passed
50	0	normal	2095.5	34	67	passed
50	5			27	47	passed
50	10			11	43	passed

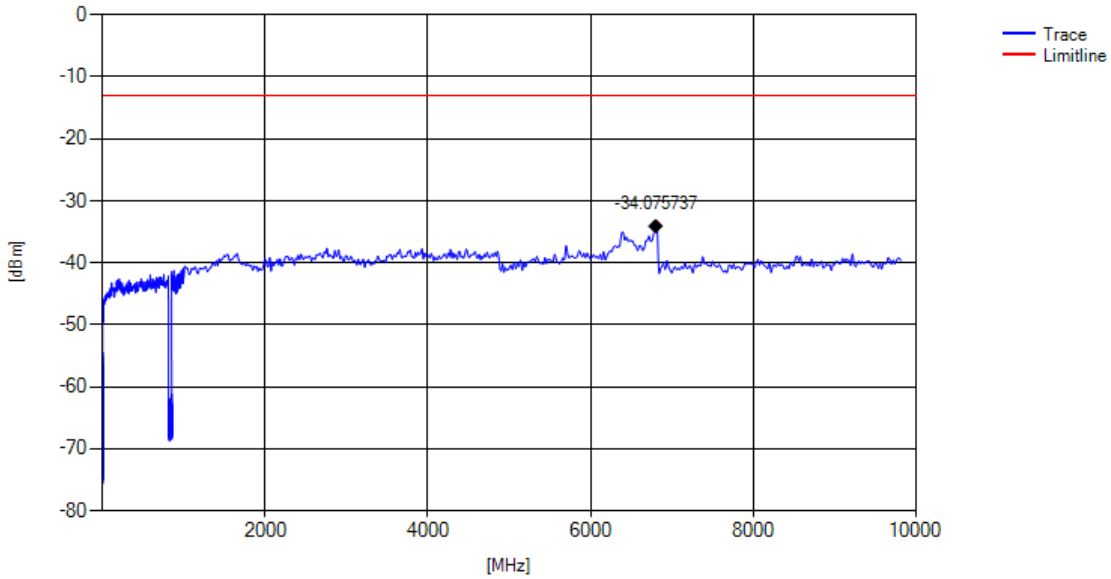
UMTS, FDD5. Mid Channel

3.5.3 22.3 Spurious emissions at antenna terminals §2.1051, §22.917

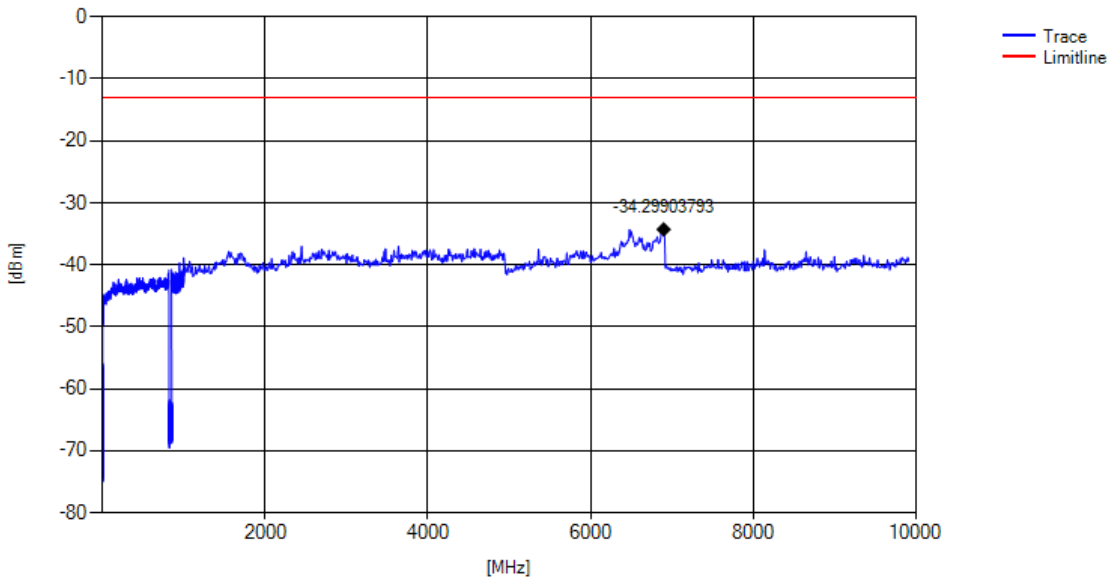
Test: 22.3; Spurious emissions at antenna terminals summary §2.1051, §22.917

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 12:15
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

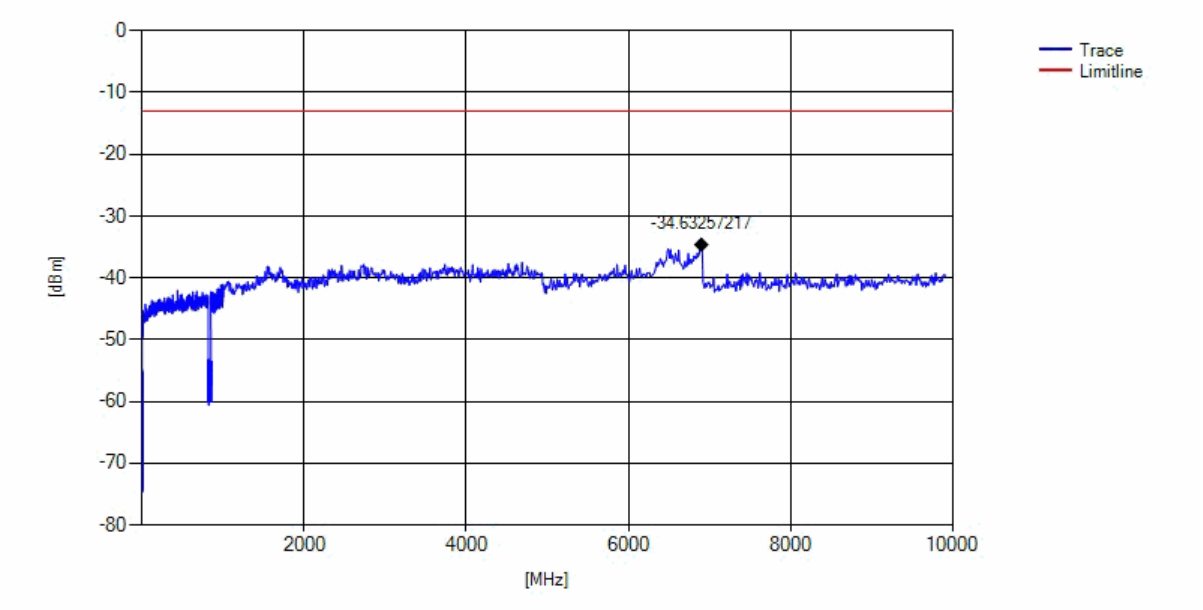
Detailed Results:



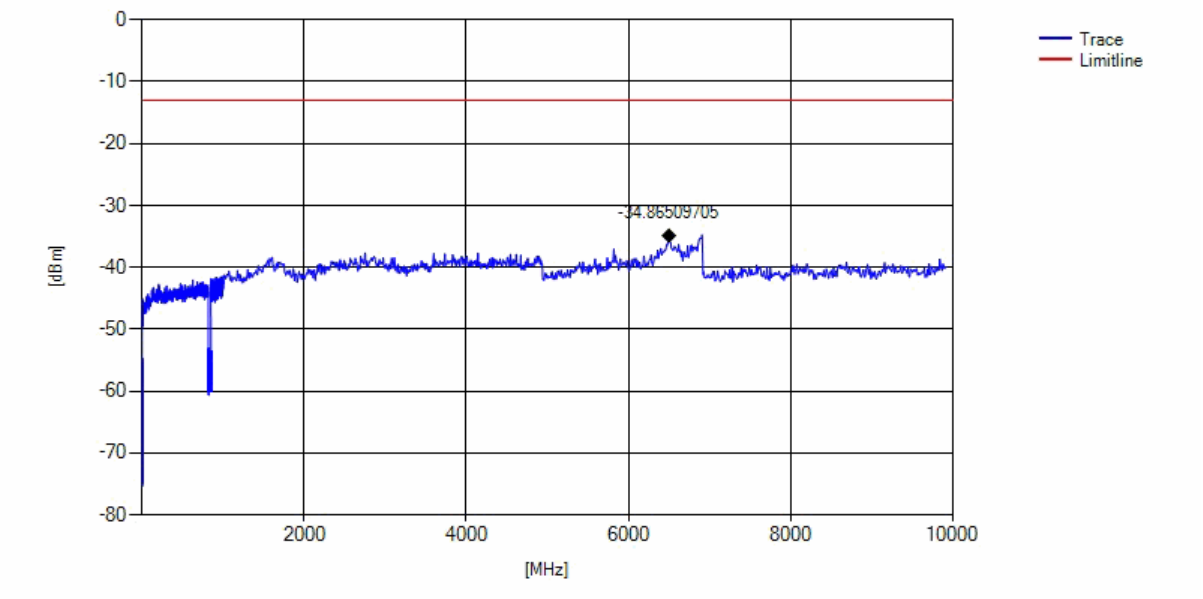
GSM850 EDGE, Channel: mid



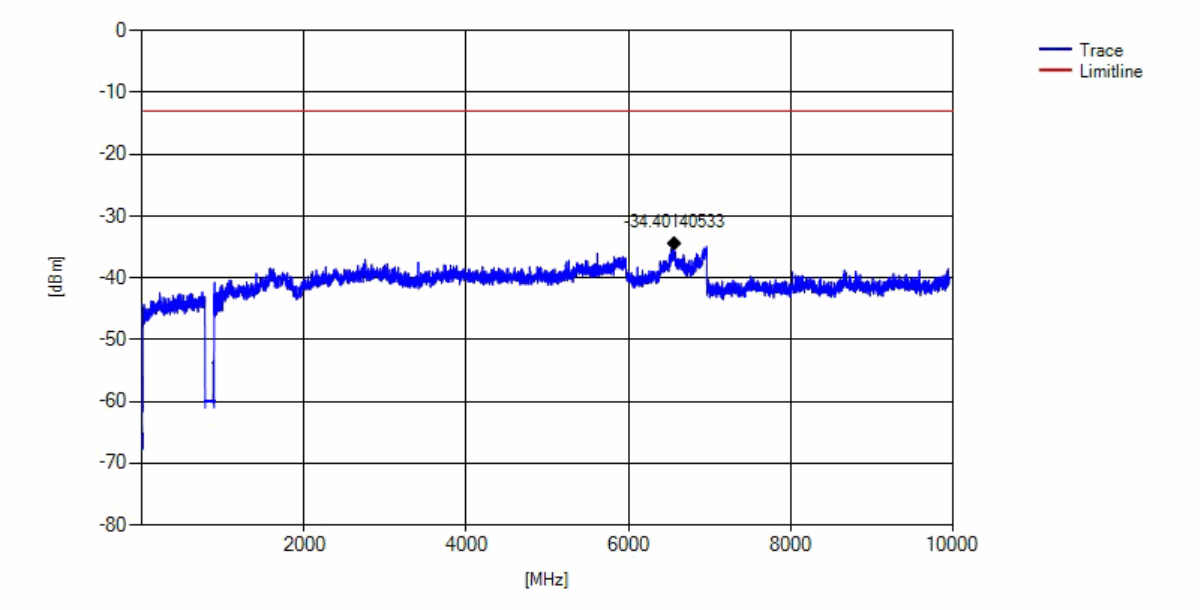
GSM850, Channel: mid



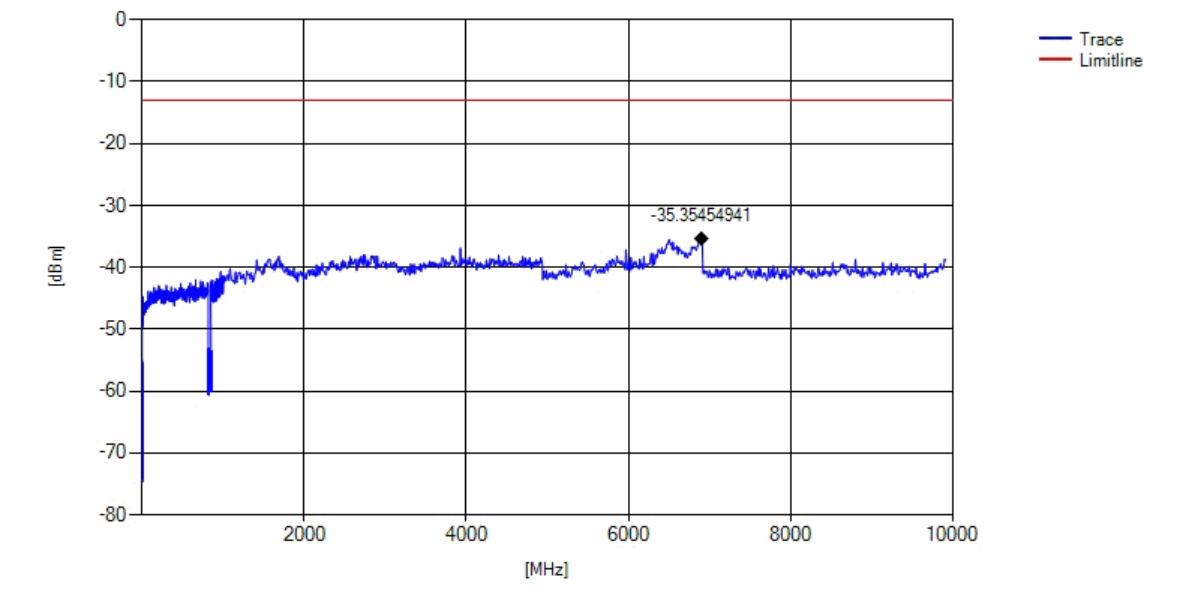
FDDV HSDPA, Channel: mid



FDDV HSUPA, Channel: mid



eFDDV QPSK, Channel: mid



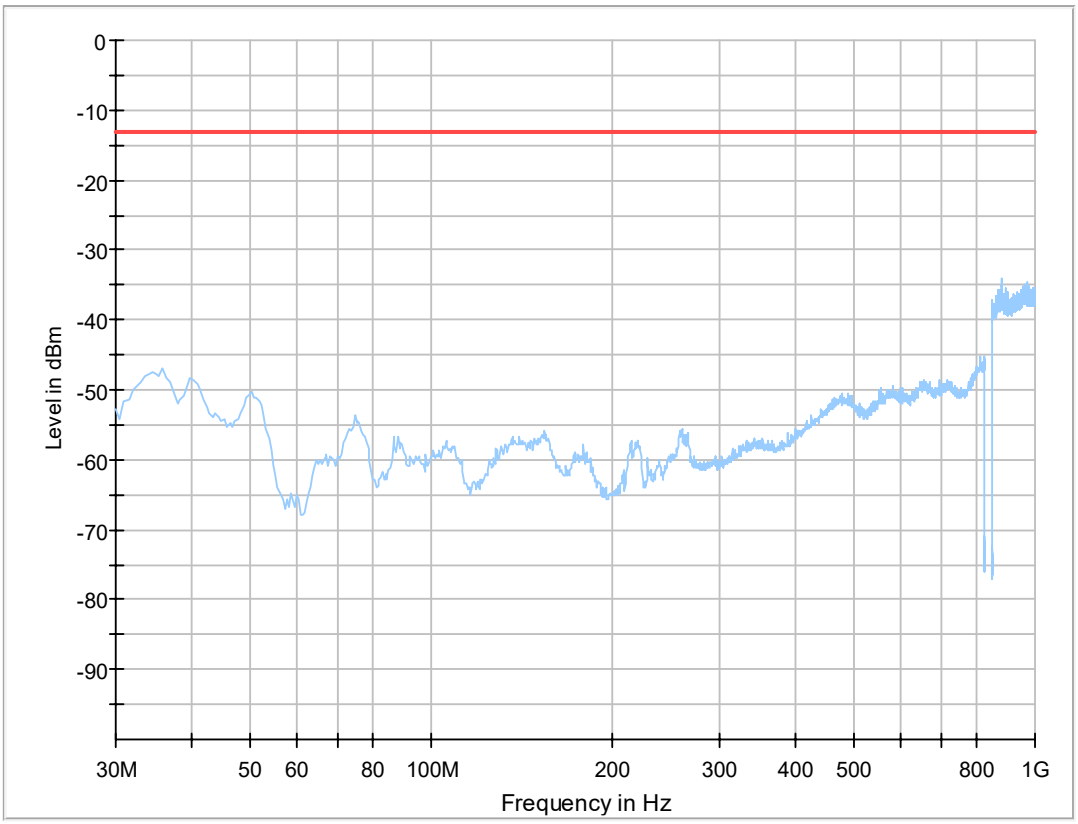
FDDV, Channel: mid

3.5.4 22.4 Field strength of spurious radiation §2.1053, §22.917

Test: 22.4; Field strength of spurious radiation Summary §2.1053, §22.917

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/10 8:00
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Detailed Results:



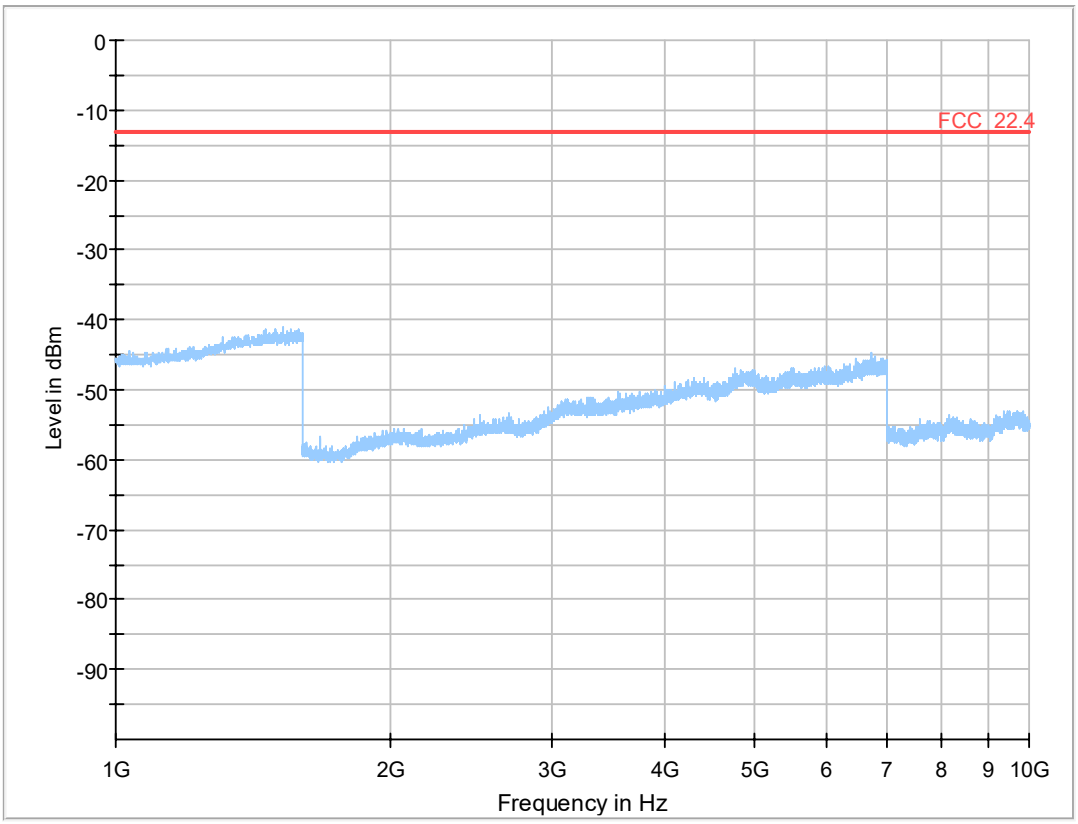
Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

30 MHz - 1GHz: GSM850 EDGE, Channel: mid



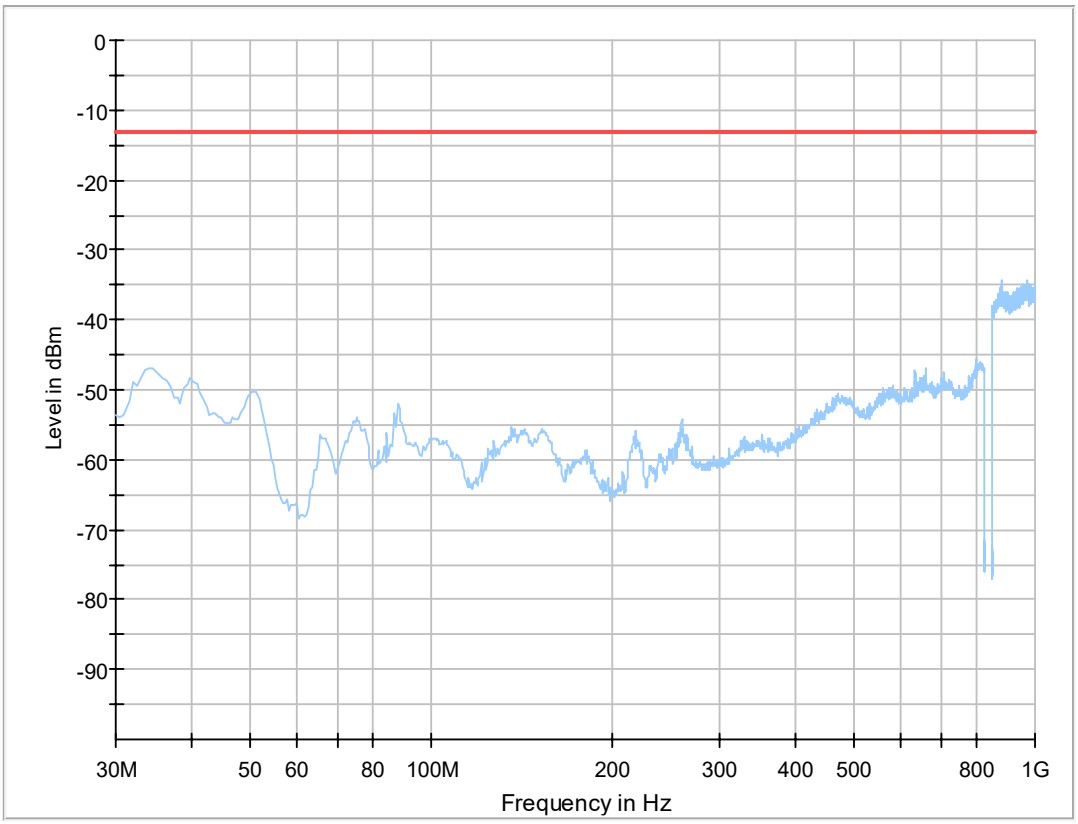
Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

1 GHz - 10GHz: GSM850 EDGE, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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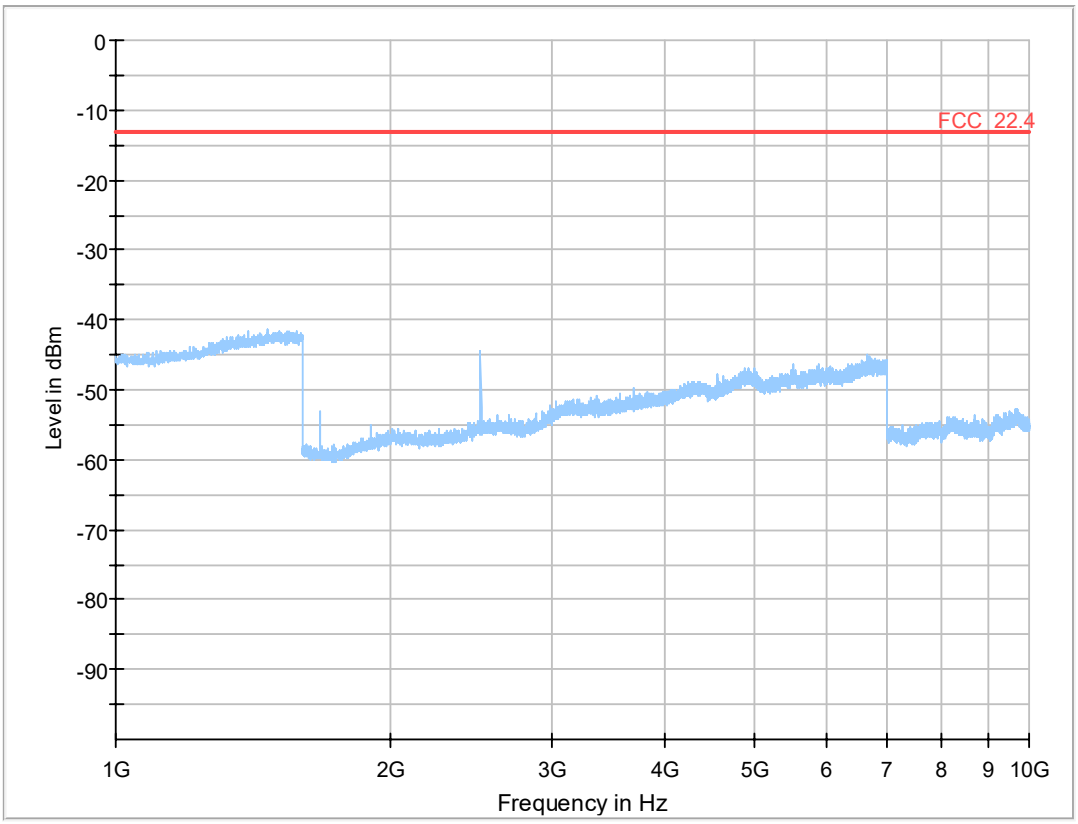
30 MHz - 1GHz: GSM850, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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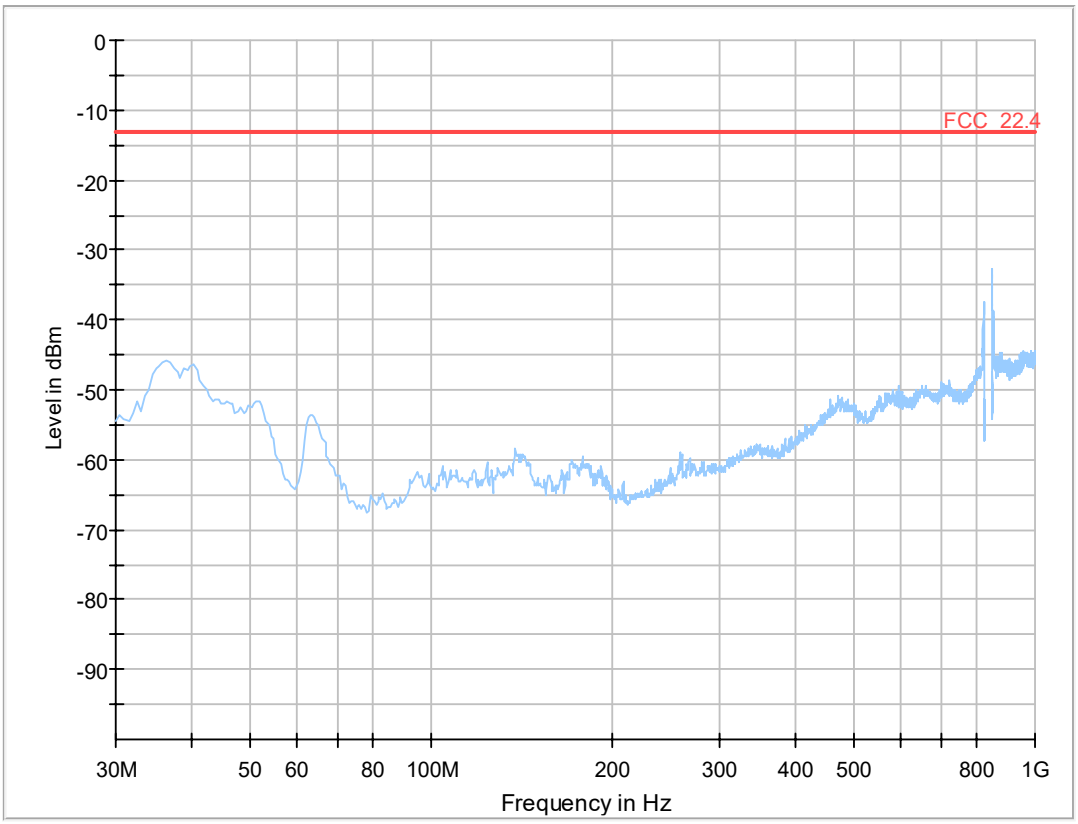
1 GHz - 10GHz: GSM850, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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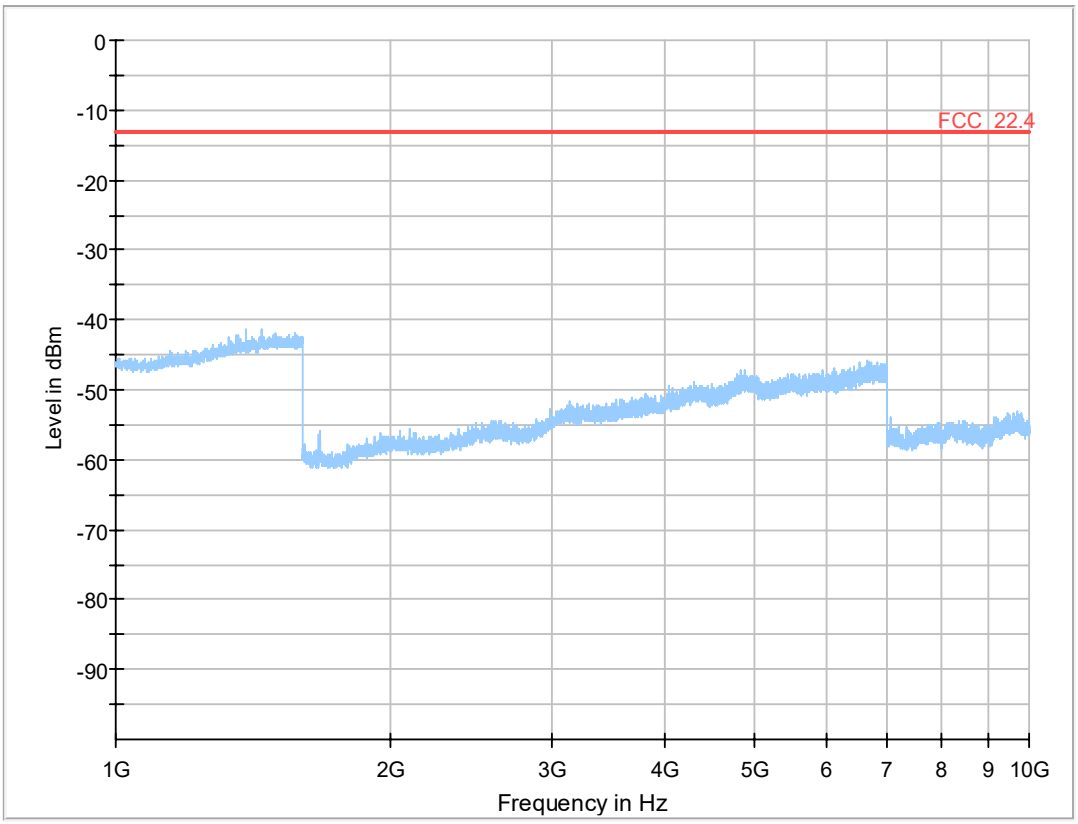
30 MHz - 1GHz: FDD V HSDPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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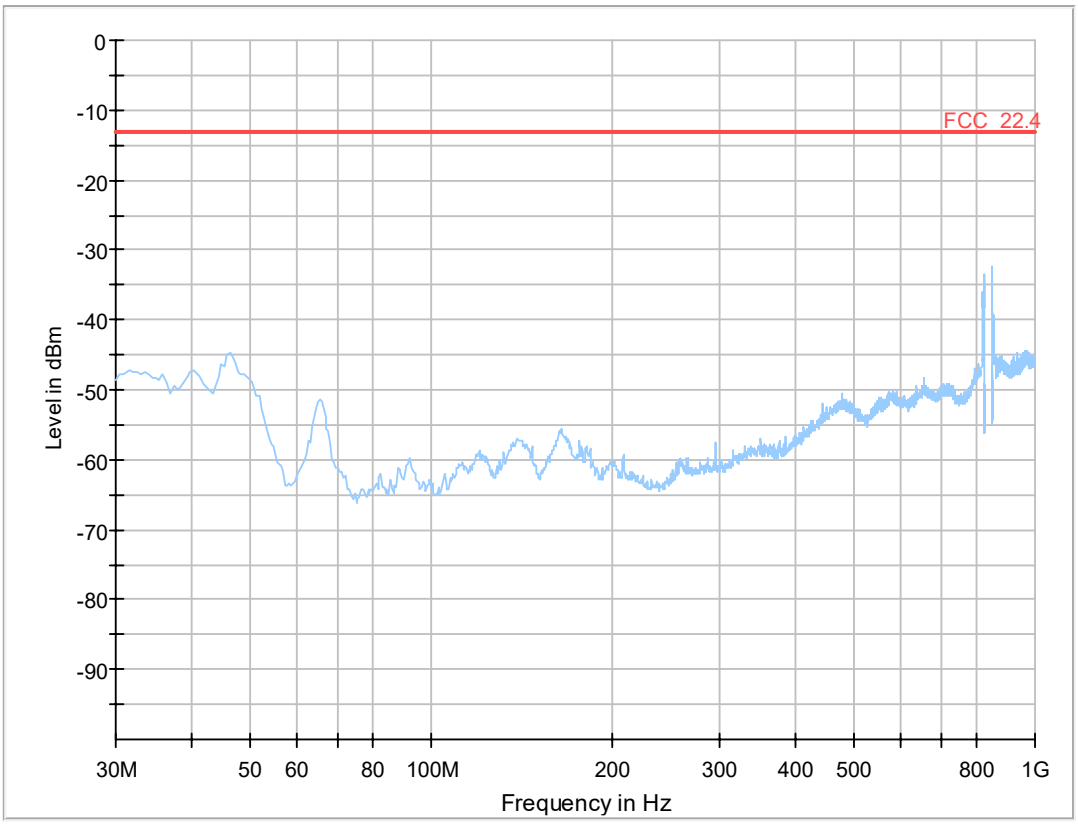
1 GHz - 10GHz: FDD V HSDPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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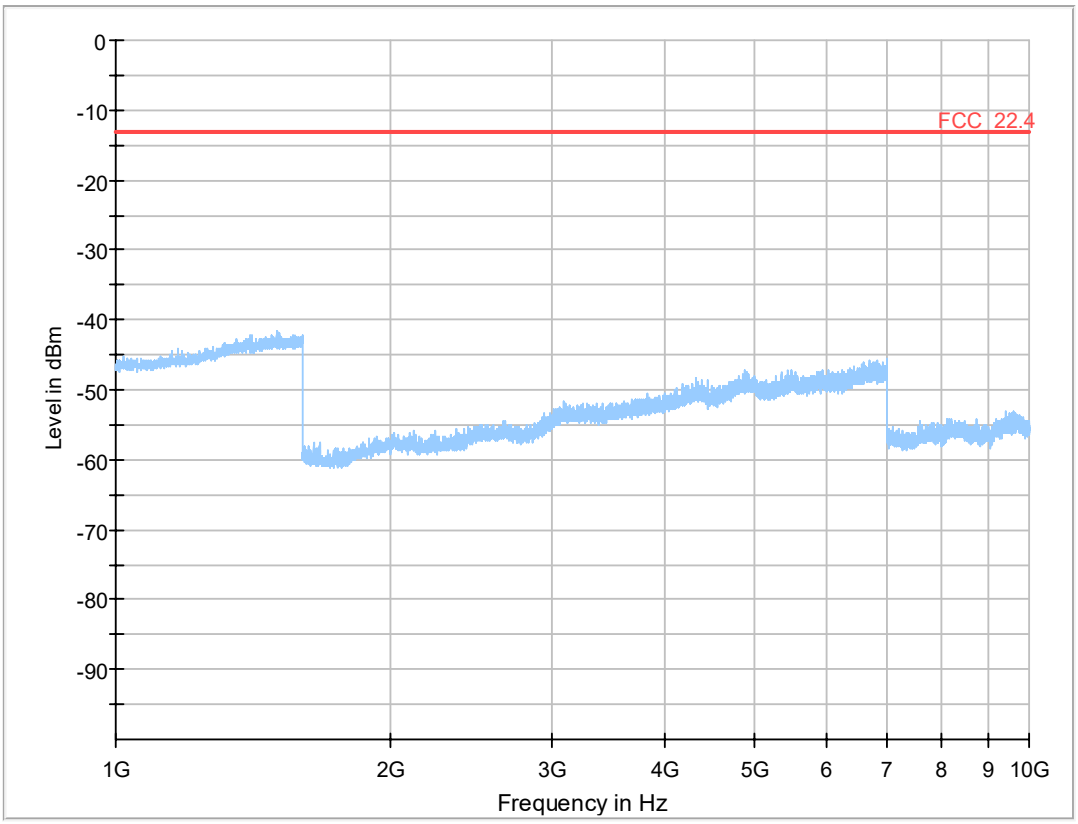
30 MHz - 1GHz: FDD V HSUPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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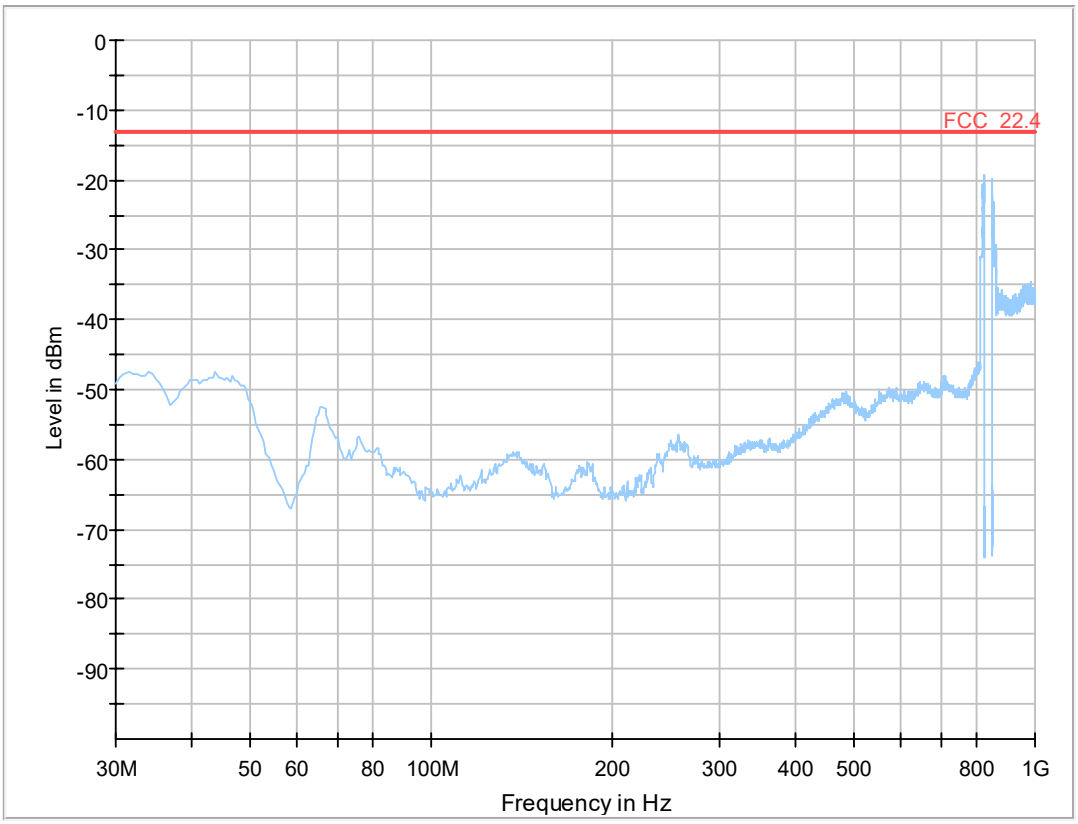
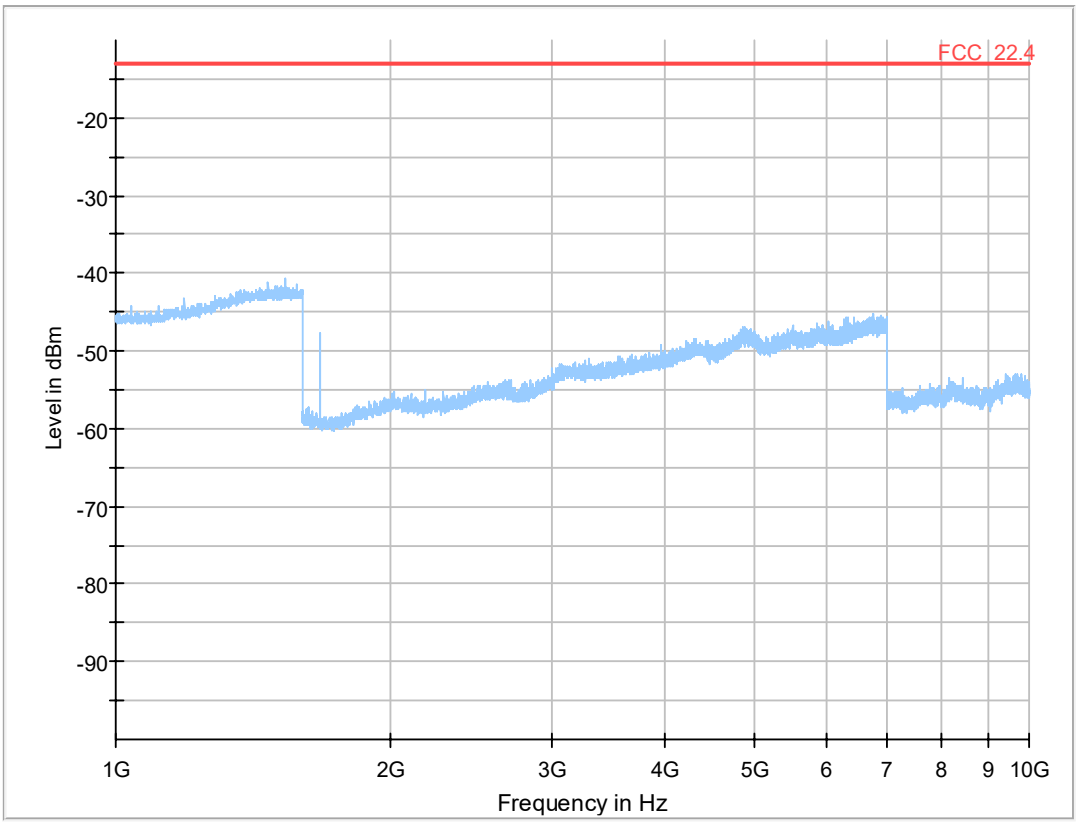
1 GHz - 10GHz: FDD V HSUPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
823.000000	-19.30	-13.00	6.30	7000.0	1000.000	150.0	V	-90.0	90.0	-71.9
850.000000	-19.78	-13.00	6.78	2000.0	1000.000	150.0	V	-90.0	90.0	-73.5

30 MHz - 1GHz: eFDD V, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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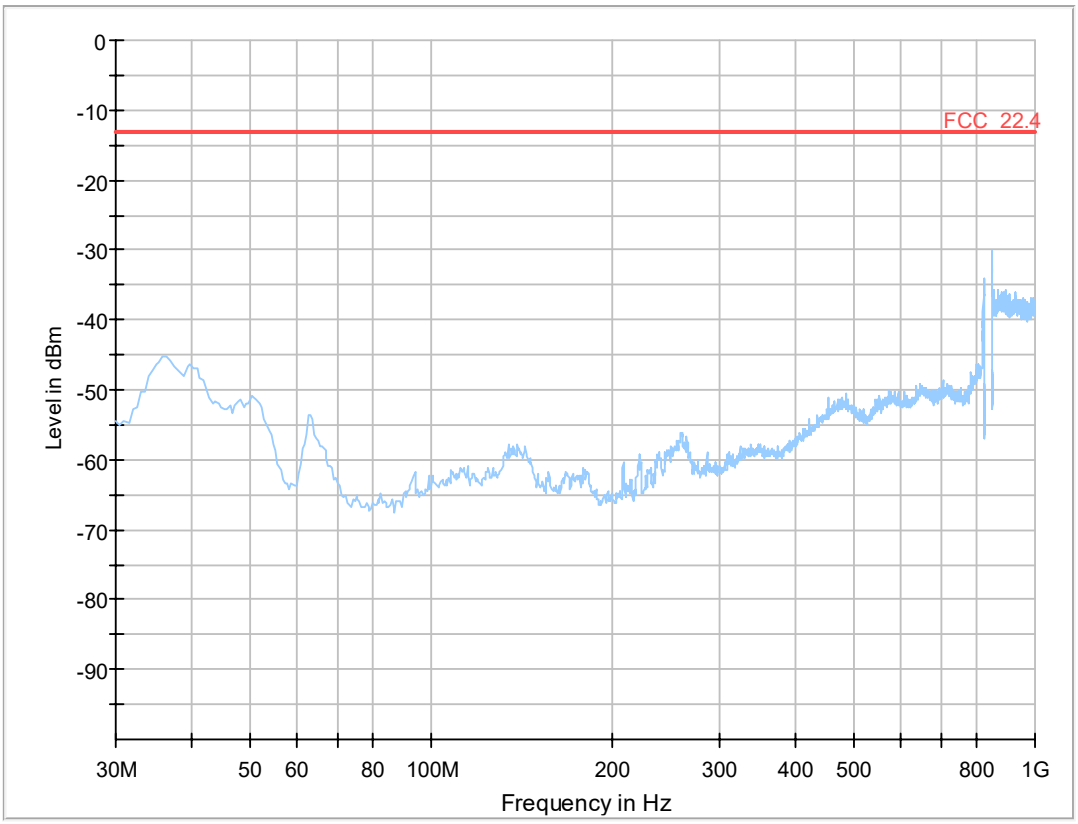
1 GHz - 10GHz: eFDD V, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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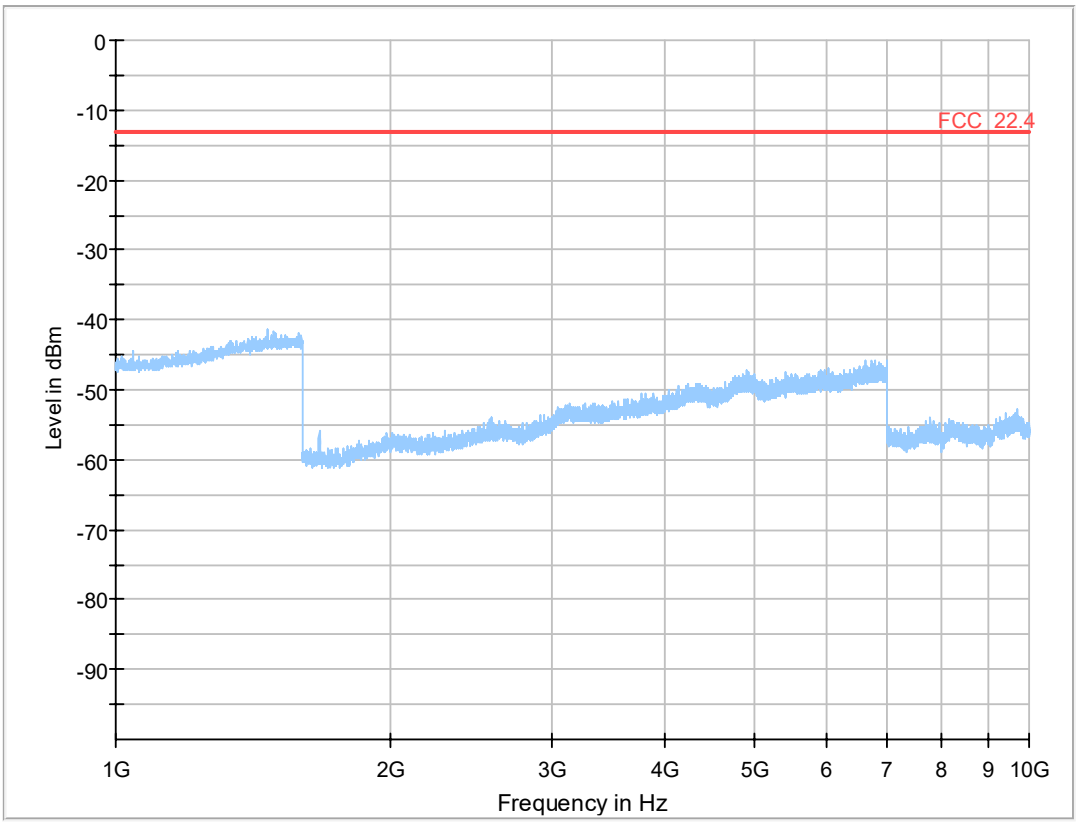
30 MHz - 1GHz: FDD V, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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1 GHz - 10GHz: FDD V, Channel: mid

Test: 22.4; Frequency Band = 850, Mode = EDGE, Channel = 128, Frequency = 824.2MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:26
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = 850, Mode = EDGE, Channel = 190, Frequency = 836.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:27
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = 850, Mode = EDGE, Channel = 251, Frequency = 848.8MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:26
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = 850, Mode = GSM, Channel = 128, Frequency = 824.2MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:23
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:24
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = 850, Mode = GSM, Channel = 251, Frequency = 848.8MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:25
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20425, Frequency = 826.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:33
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20525, Frequency = 836.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:33
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20625, Frequency = 846.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:35
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4132, Frequency = 826.4MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:31
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4183, Frequency = 836.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:31
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4233, Frequency = 846.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:32
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4132, Frequency = 826.4MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:29
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4183, Frequency = 836.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:29
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4233, Frequency = 846.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:29
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4132, Frequency = 826.4MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:28
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4183, Frequency = 836.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:27
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Test: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4233, Frequency = 846.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:28
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

3.5.5 22.5 Emission and Occupied Bandwidth §2.1049, §22.917

Test: 22.5; _Emission and Occupied Bandwidth Summary §2.1049, §22.917

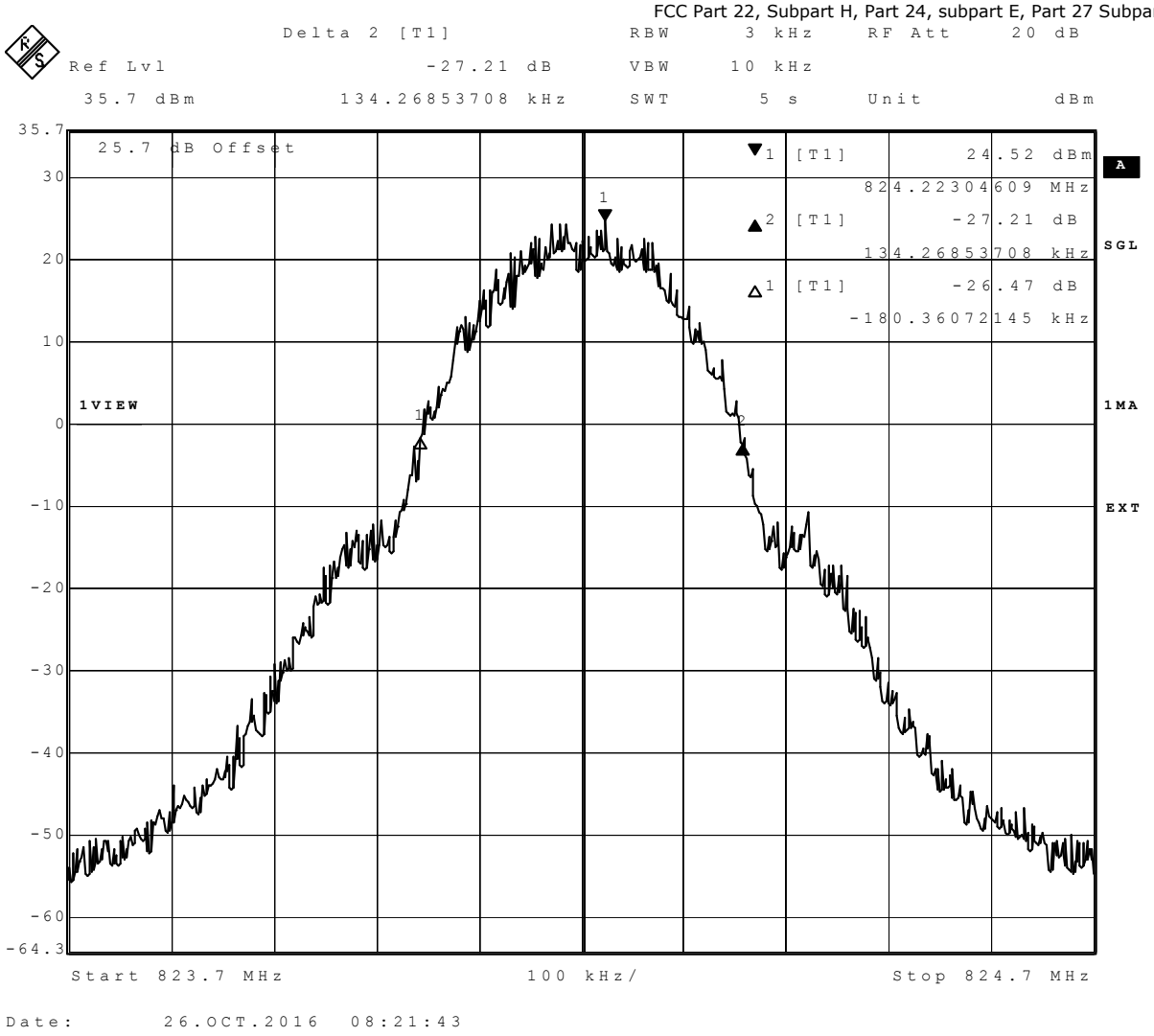
Result:	Passed
Setup No.:	AT10
Date of Test:	2016/11/09 11:38
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Detailed Results:

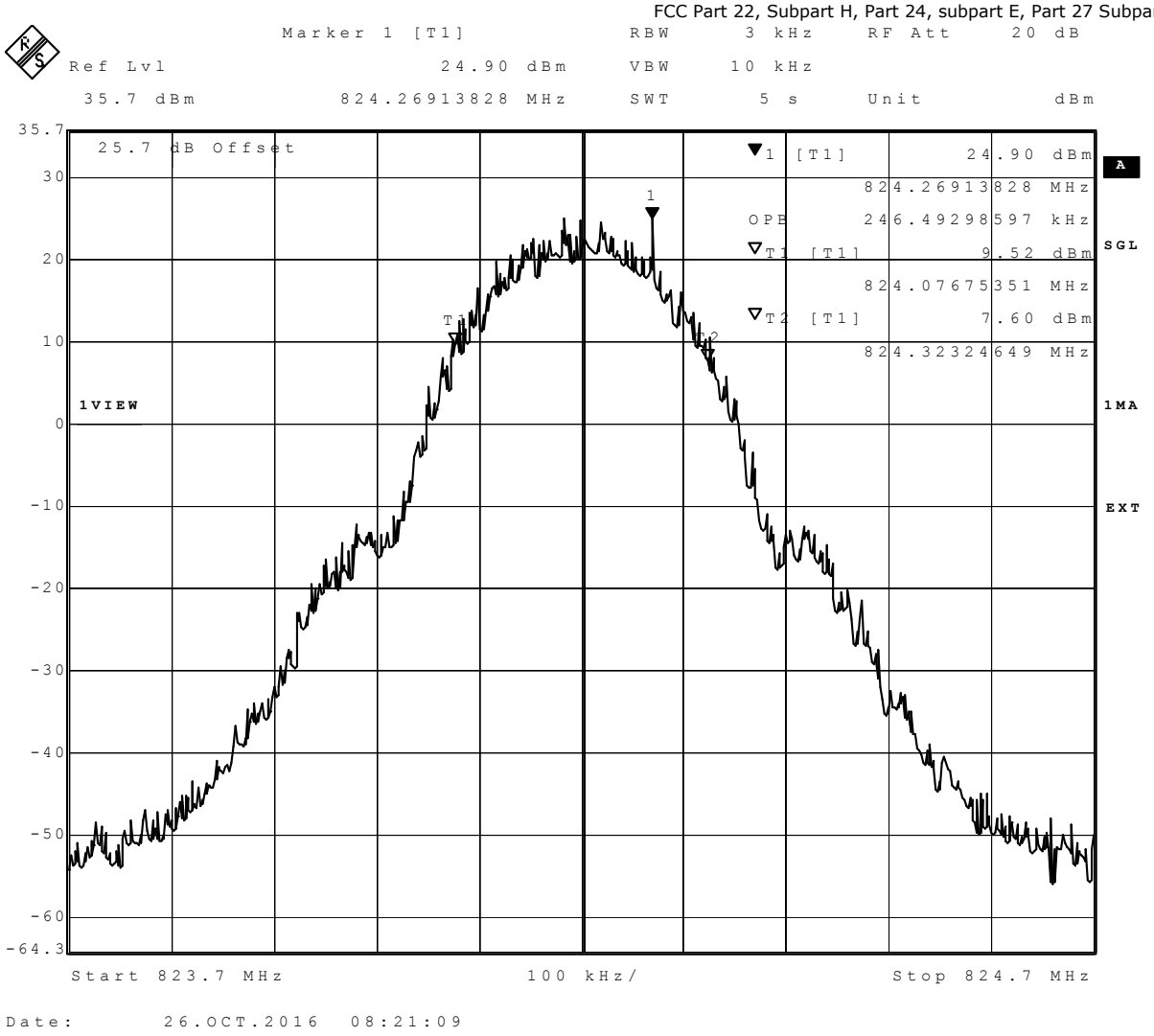
Emission and Occupied Bandwidth

Ambient temperature:	26 °C
Relative humidity:	35%

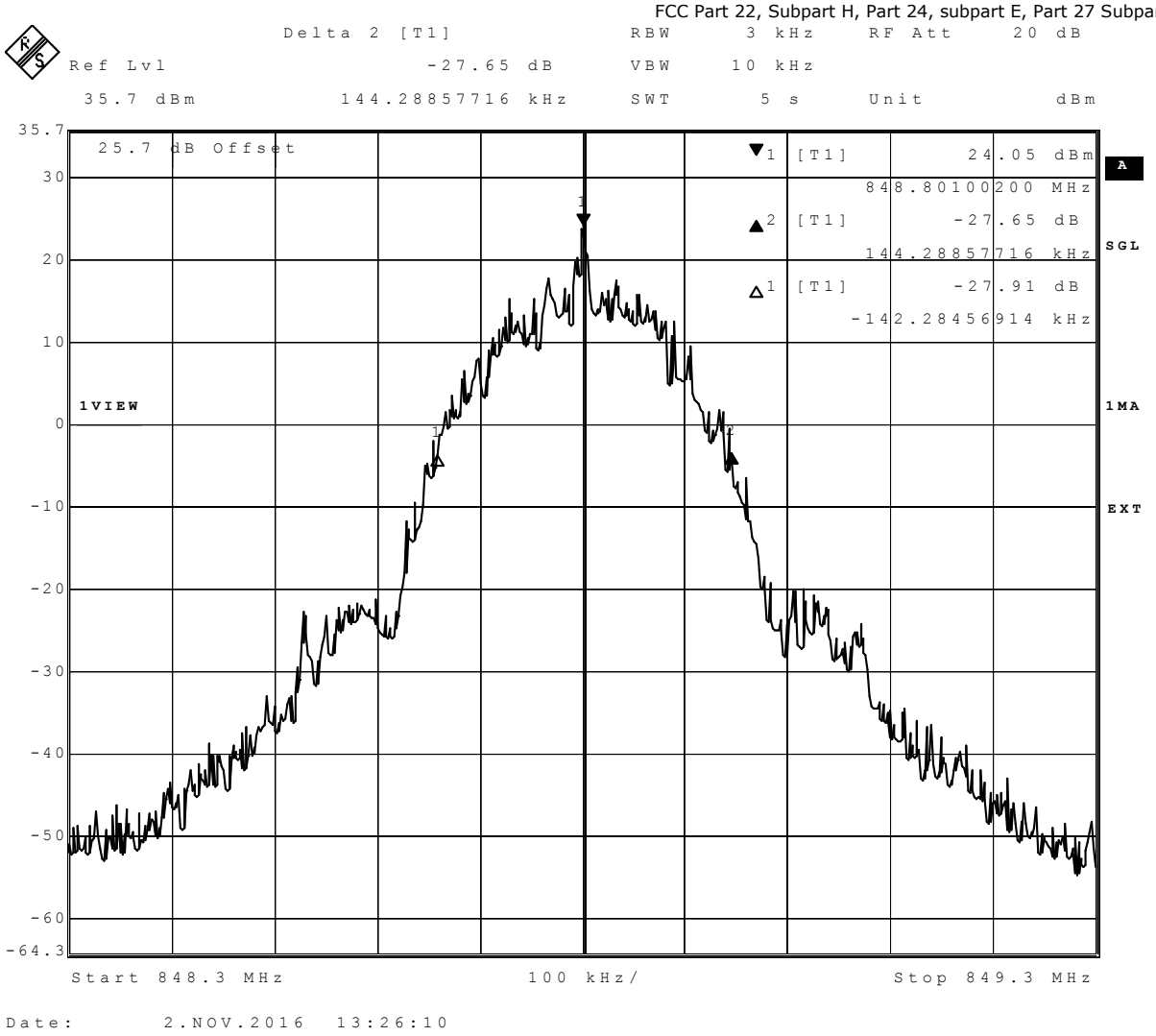
Radio Technology	Channel	Ressource Blocks	Bandwidth (MHz)	Nominal BW [MHz]	26 dB BW [kHz]	99 % BW [kHz]
GSM 850	low	-	0.2	0.2	314.63	246.49
GSM 850	mid	-	0.2	0.2	310.62	244.49
GSM 850	high	-	0.2	0.2	310.62	246.49
GSM 850 EDGE	low	-	0.2	0.2	276.55	236.47
GSM 850 EDGE	mid	-	0.2	0.2	282.57	238.48
GSM 850 EDGE	high	-	0.2	0.2	286.57	238.48
FDD V	low	-	5	5	4669.34	4088.18
FDD V	mid	-	5	5	4669.34	4068.14
FDD V	high	-	5	5	4669.34	4068.14
FDD V HSDPA Subtest 1	low	-	5	5	4669.34	4068.14
FDD V HSDPA Subtest 1	mid	-	5	5	4689.39	4068.14
FDD V HSDPA Subtest 1	high	-	5	5	4669.34	4068.14
FDD V HSUPA Subtest 1	low	-	5	5	4689.39	4088.18
FDD V HSUPA Subtest 1	mid	-	5	5	4689.38	4088.18
FDD V HSUPA Subtest 1	high	-	5	5	4669.34	4088.18
FDD V HSUPA Subtest 5	low	-	5	5	4709.42	4088.18
FDD V HSUPA Subtest 5	mid	-	5	5	4689.38	4088.18
FDD V HSUPA Subtest 5	high	-	5	5	4709.42	4088.18
eFDD 5 QPSK	low	6	1.4	1.4	-	1112.22
eFDD 5 QPSK	mid	6	1.4	1.4	-	1112.22
eFDD 5 QPSK	high	6	1.4	1.4	-	1118.24
eFDD 5 16QAM	low	6	1.4	1.4	-	1118.24
eFDD 5 16QAM	mid	6	1.4	1.4	-	1106.21
eFDD 5 16QAM	high	6	1.4	1.4	-	1118.24
eFDD 5 QPSK	low	15	3	3	-	2777.56
eFDD 5 QPSK	mid	15	3	3	-	2765.53
eFDD 5 QPSK	high	15	3	3	-	2765.53
eFDD 5 16QAM	low	15	3	3	-	2777.56
eFDD 5 16QAM	mid	15	3	3	-	2765.53
eFDD 5 16QAM	high	15	3	3	-	2753.51
eFDD 5 QPSK	low	25	5	5	-	4549.1
eFDD 5 QPSK	mid	25	5	5	-	4509.02
eFDD 5 QPSK	high	25	5	5	-	4549.1
eFDD 5 16QAM	low	25	5	5	-	4569.14
eFDD 5 16QAM	mid	25	5	5	-	4549.1
eFDD 5 16QAM	high	25	5	5	-	4529.06
eFDD 5 QPSK	low	50	10	10	-	9058.12
eFDD 5 QPSK	mid	50	10	10	-	9018.04
eFDD 5 QPSK	high	50	10	10	-	9058.12
eFDD 5 16QAM	low	50	10	10	-	9018.04
eFDD 5 16QAM	mid	50	10	10	-	9018.04
eFDD 5 16QAM	high	50	10	10	-	9058.12



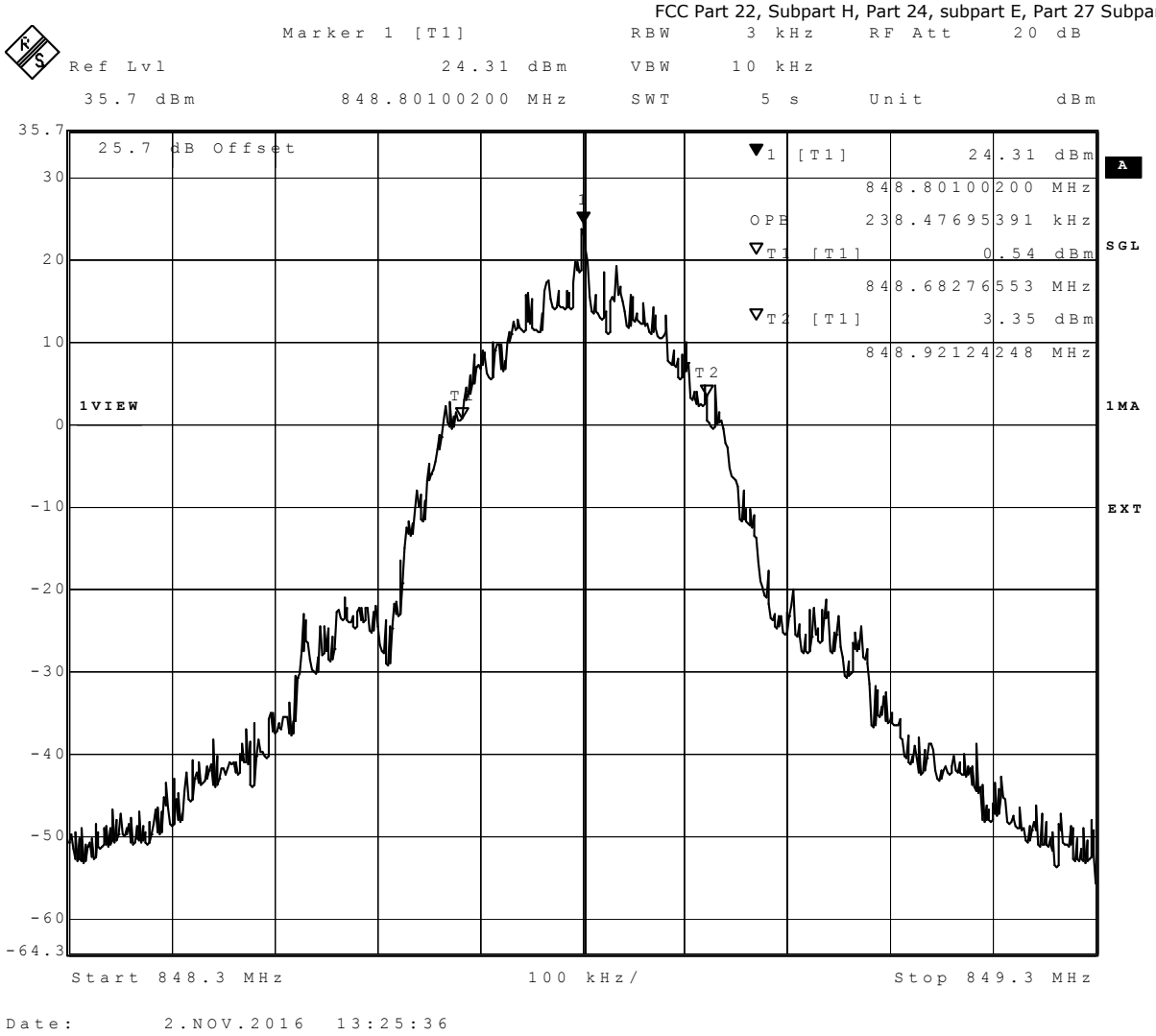
GSM850 26dB, Channel: low



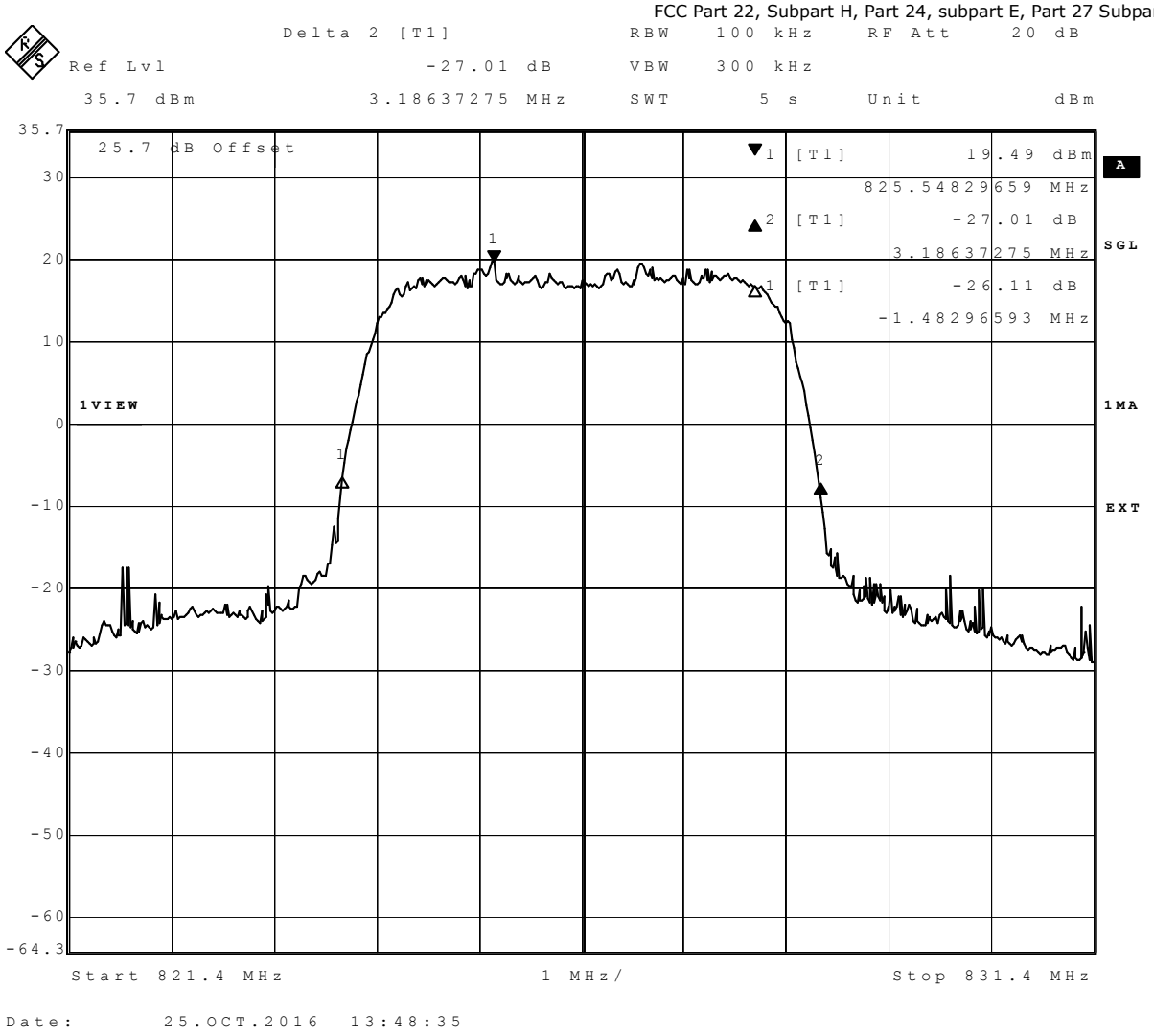
GSM850 99%, Channel: low



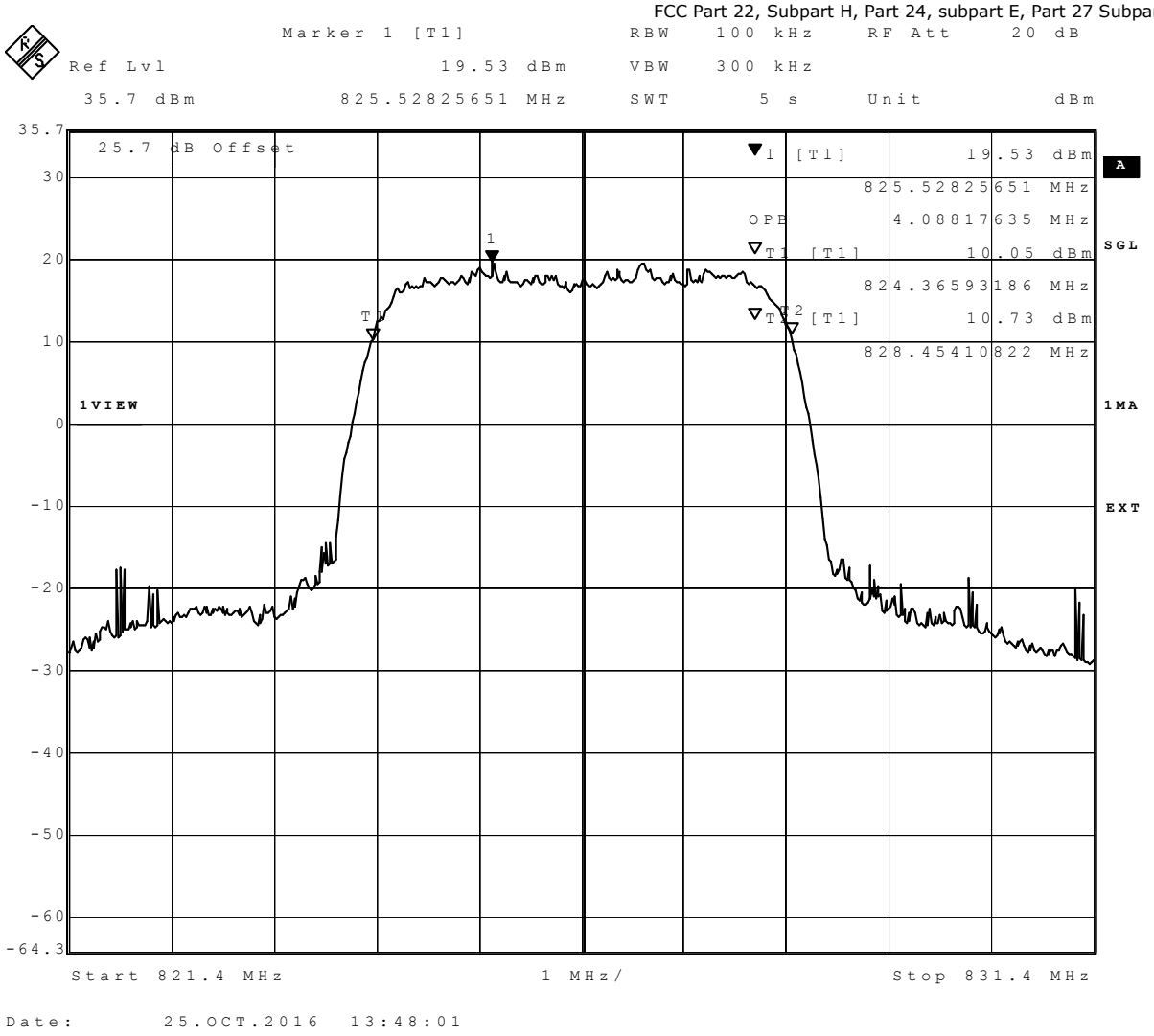
GSM850 EDGE 26dB, Channel: high



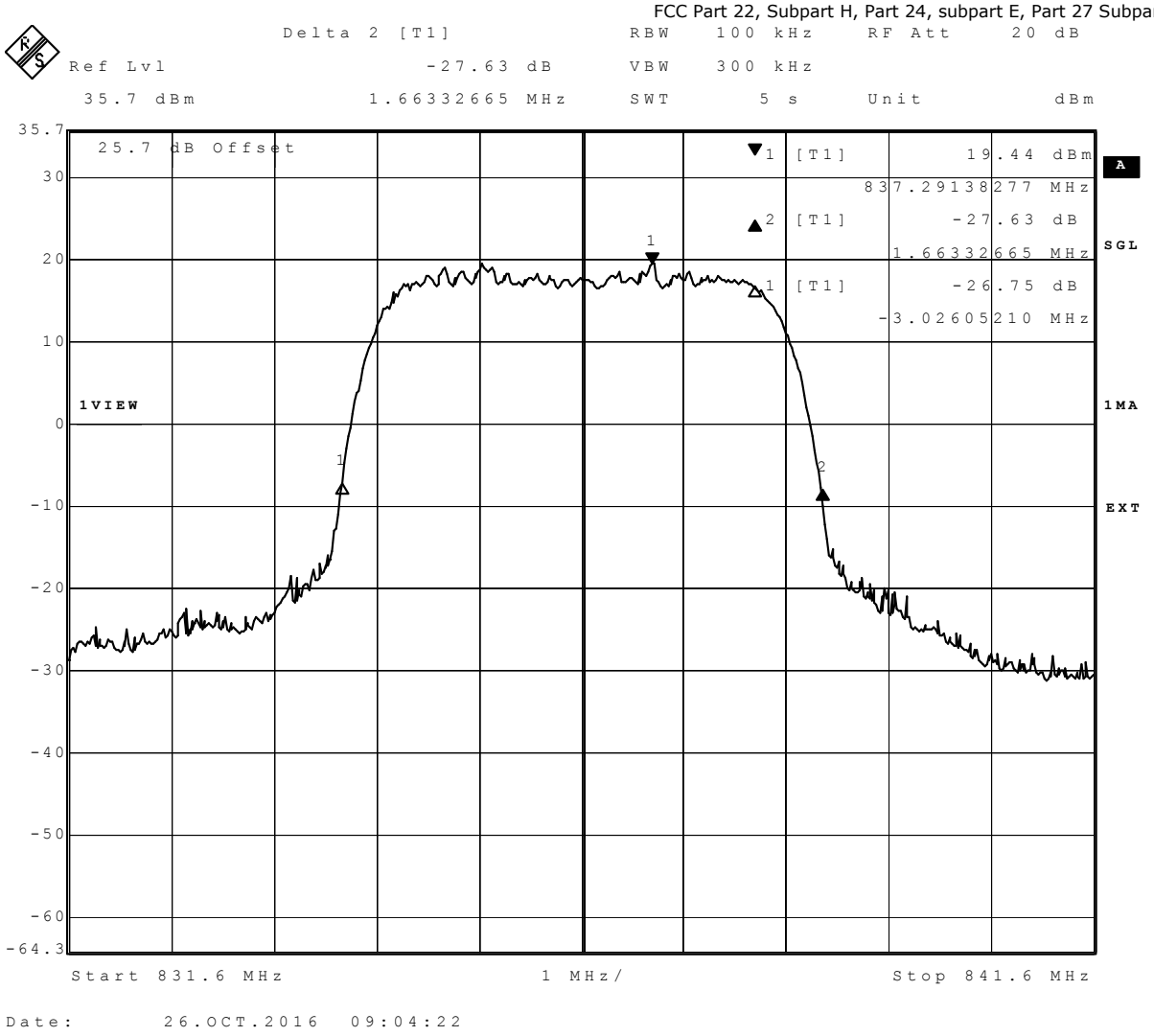
GSM850 EDGE 99%, Channel: high



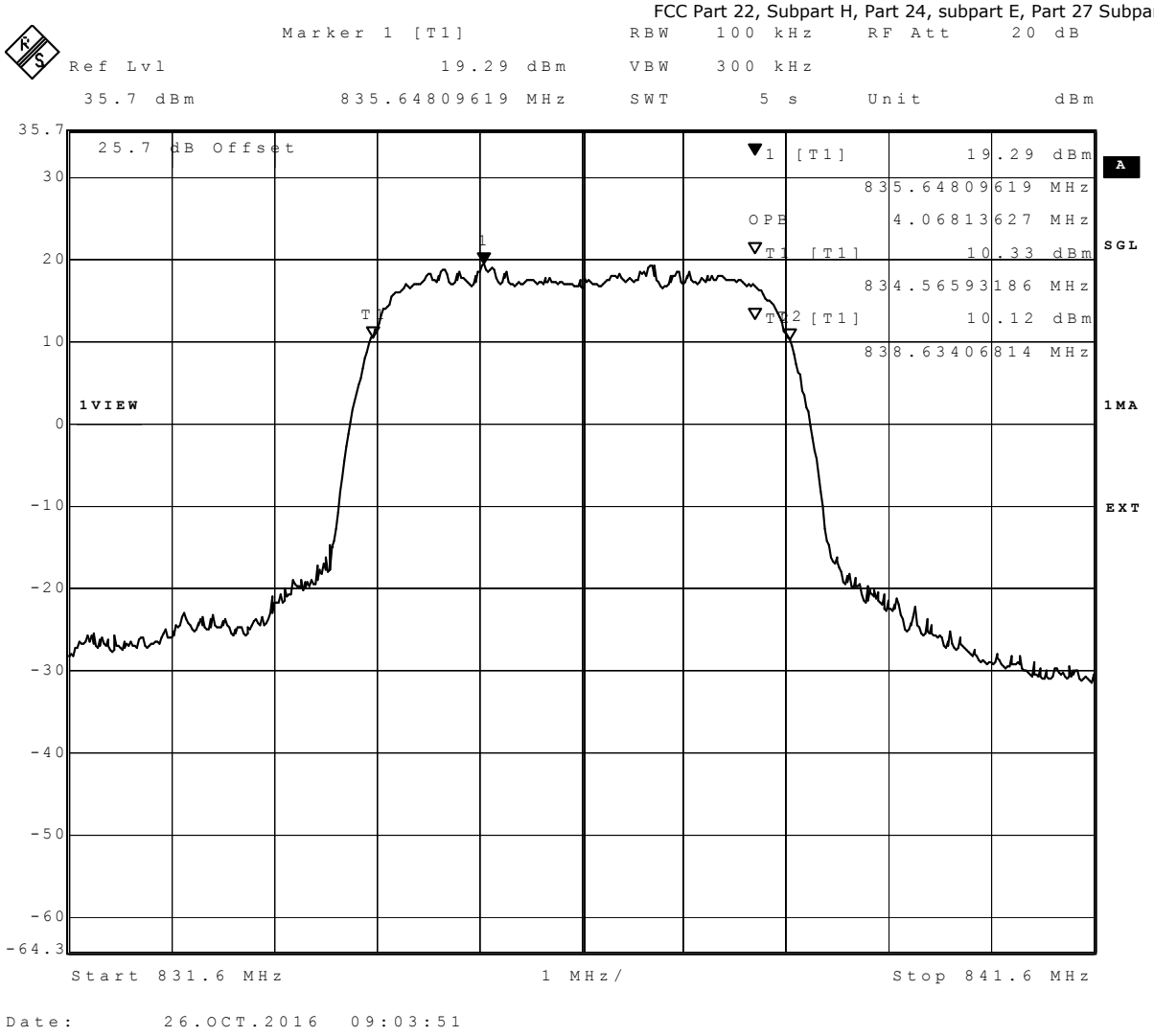
FDD V 26dB, channel: low



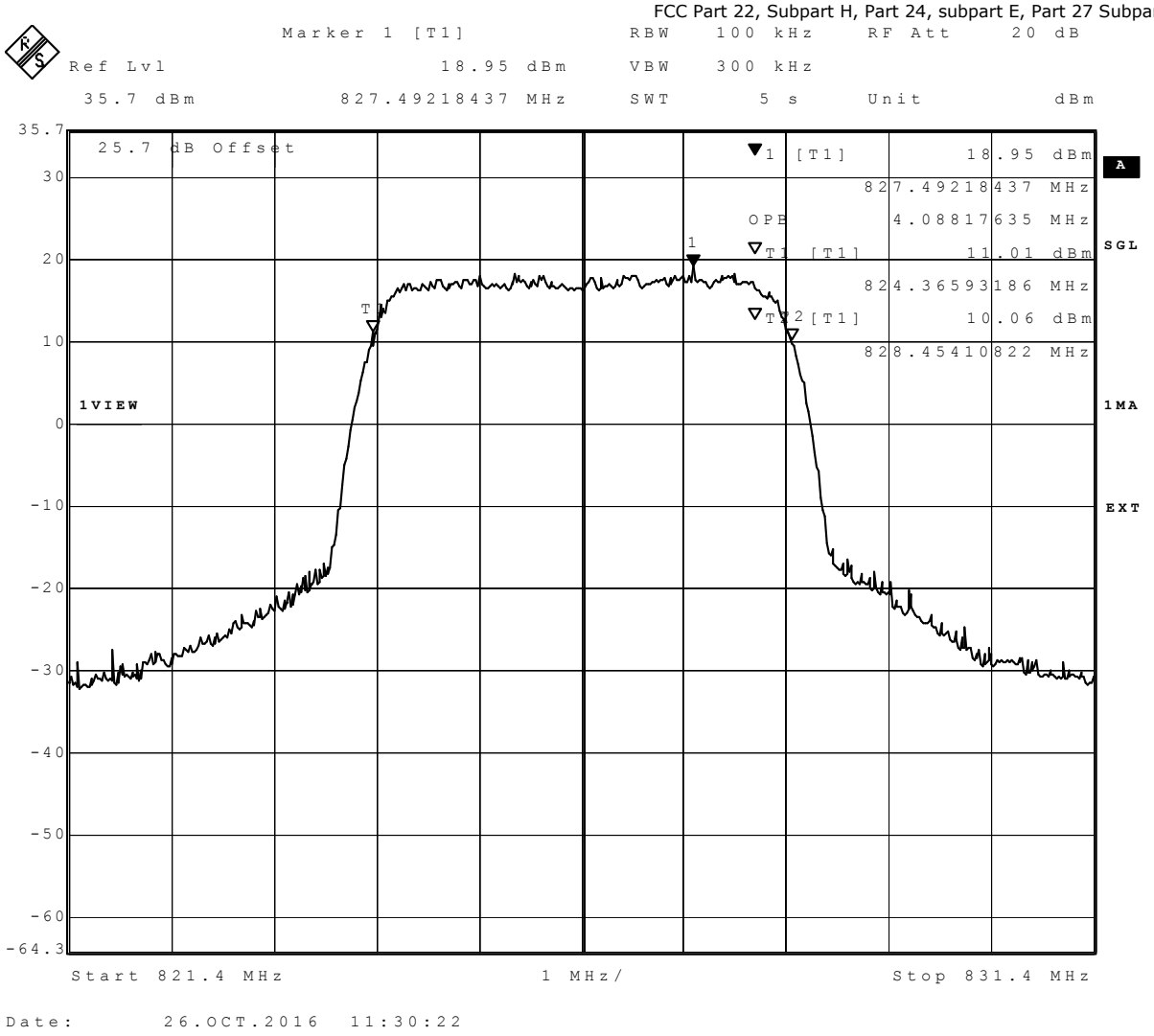
FDD V 99%, channel: low



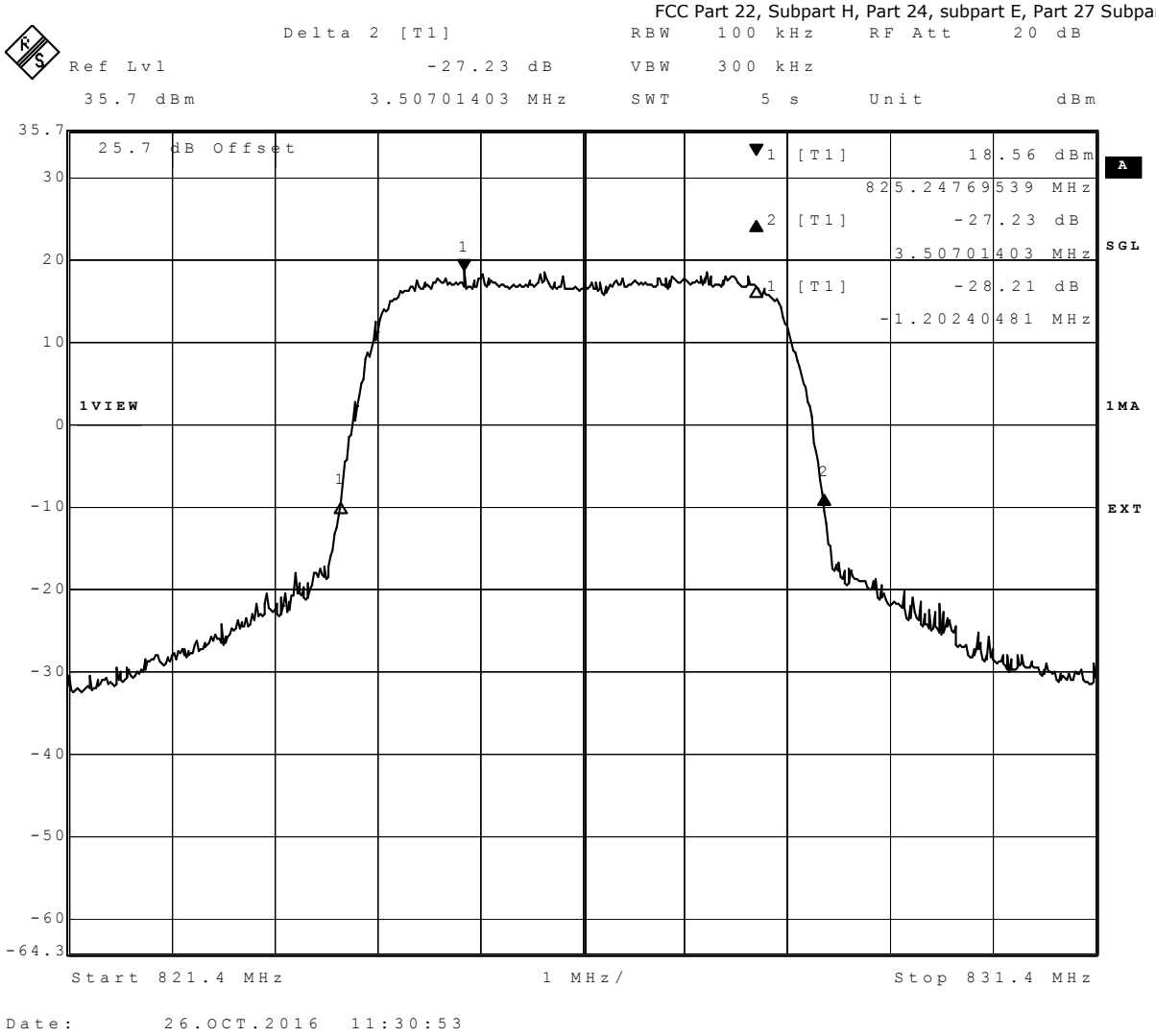
FDD V HSDPA 26dB, Channel: mid



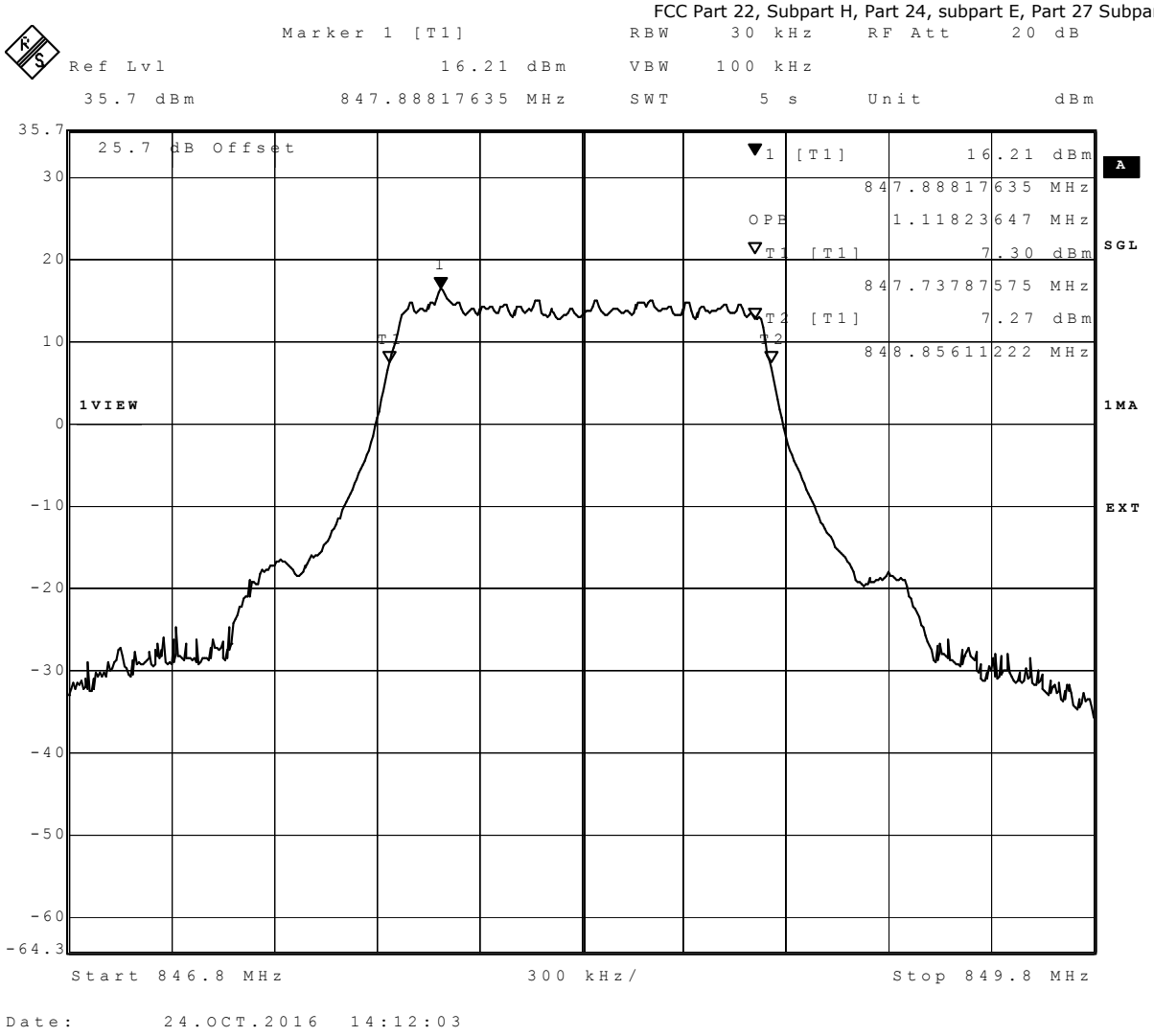
FDD V HSDPA 99%, Channel: mid



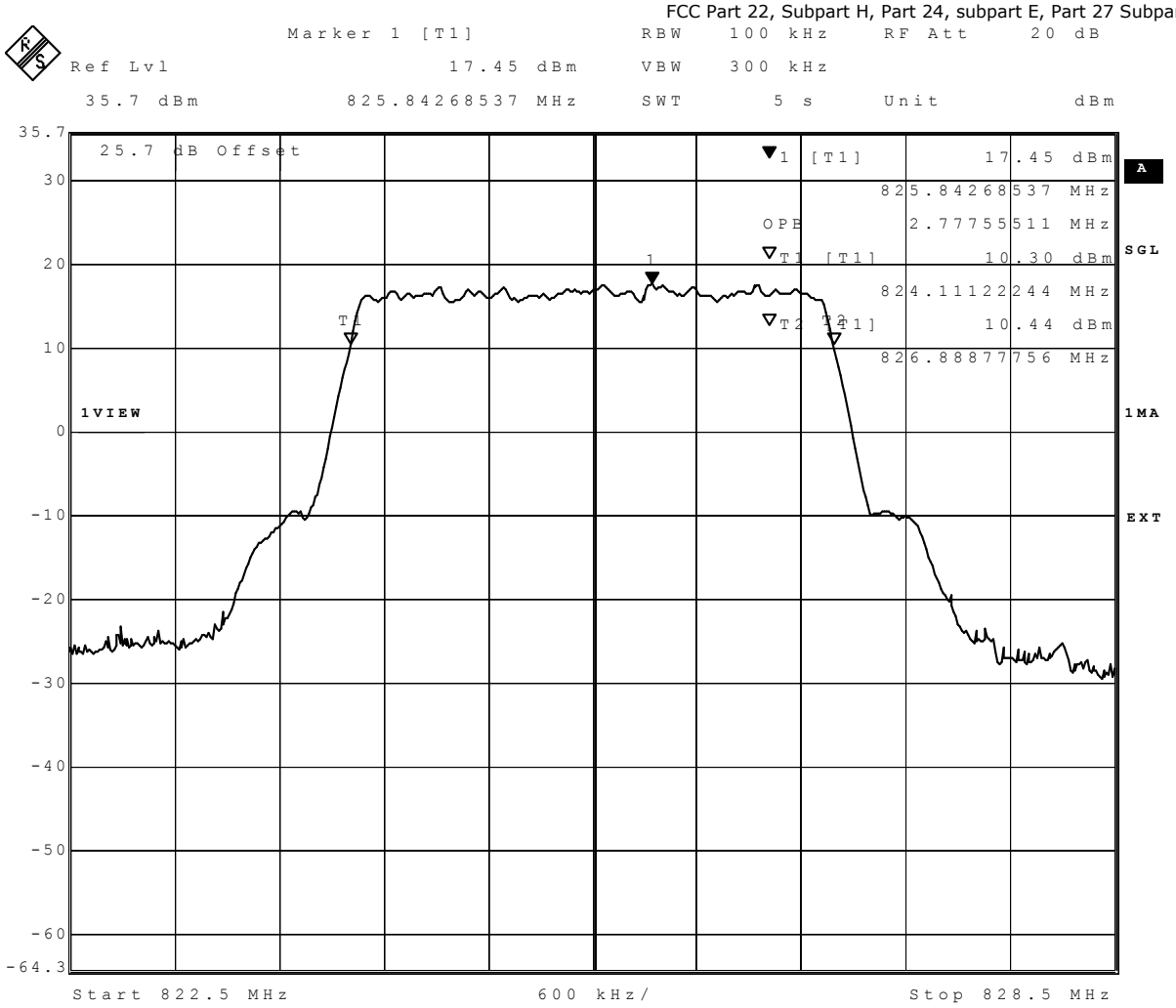
FDD V HSUPA 26dB, Channel: low



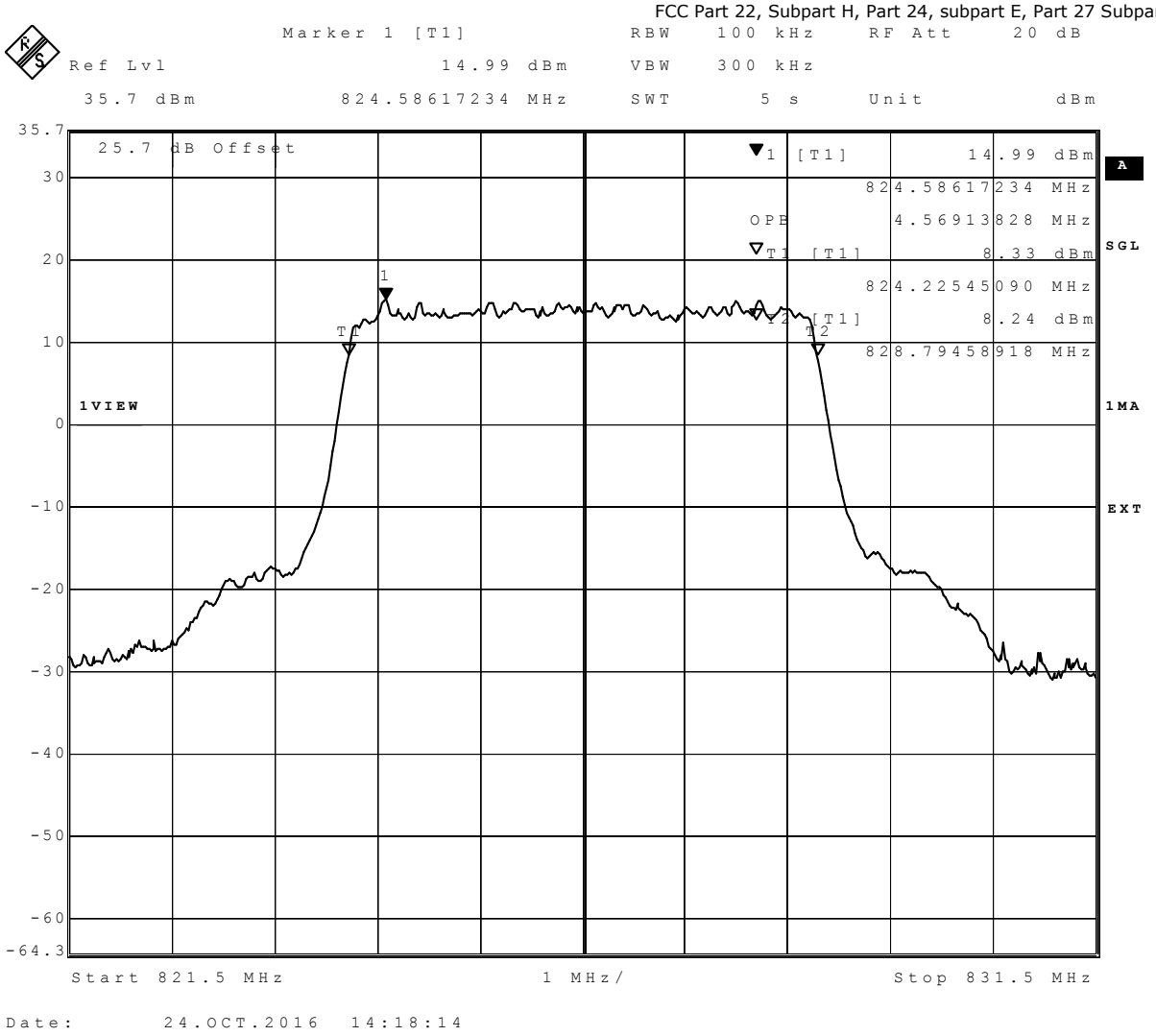
FDD V HSUPA 99%, Channel: low



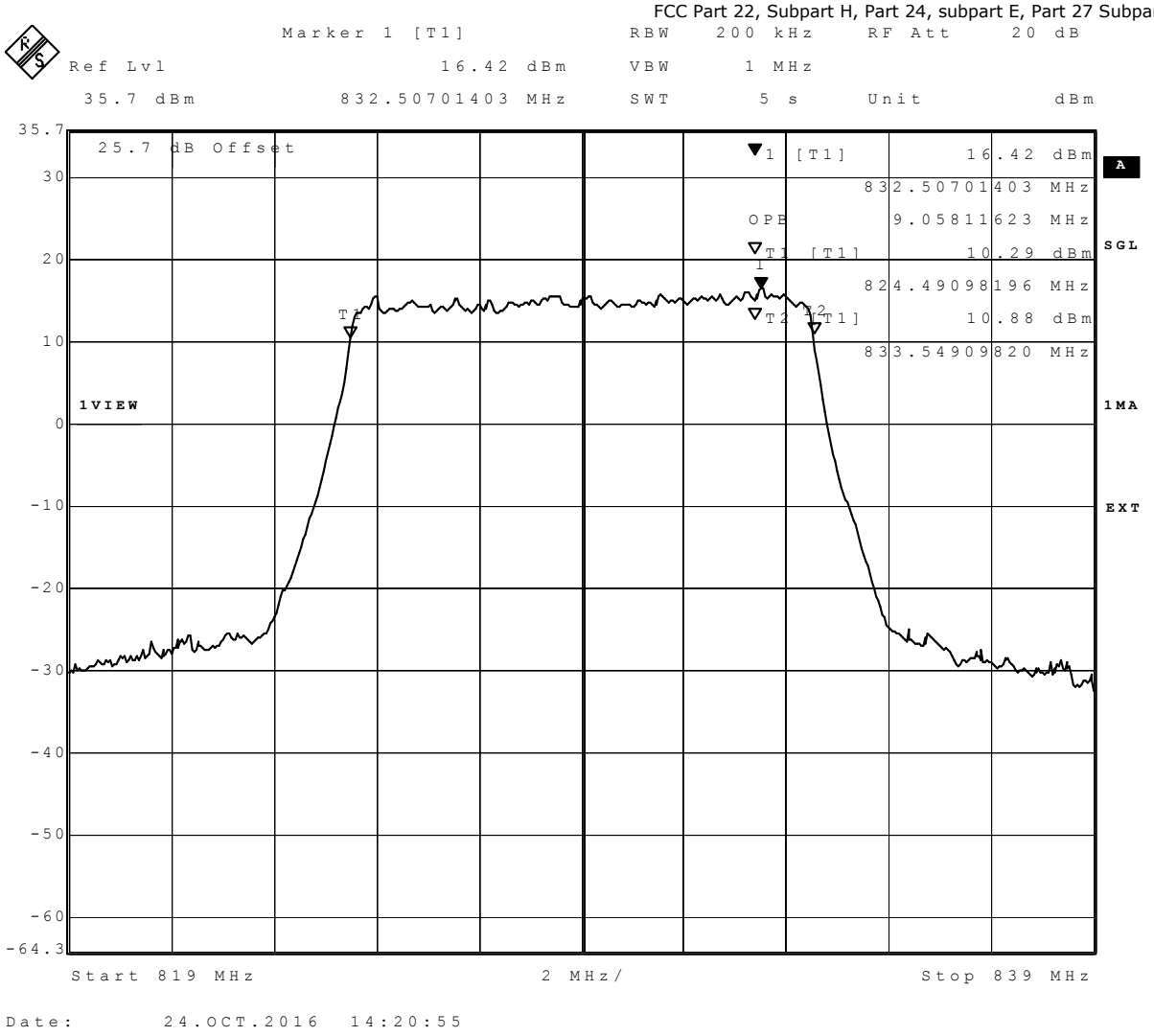
eFDD5 16QAM, 1.4MHz, Channel: high



eFDD5 QPSK, 3MHz, Channel: low



eFDD5 16QAM, 5MHz, Channel: low



eFDD5 QPSK, 10MHz, Channel: low

3.5.6 22.6 Band edge compliance §2.1053, §22.917

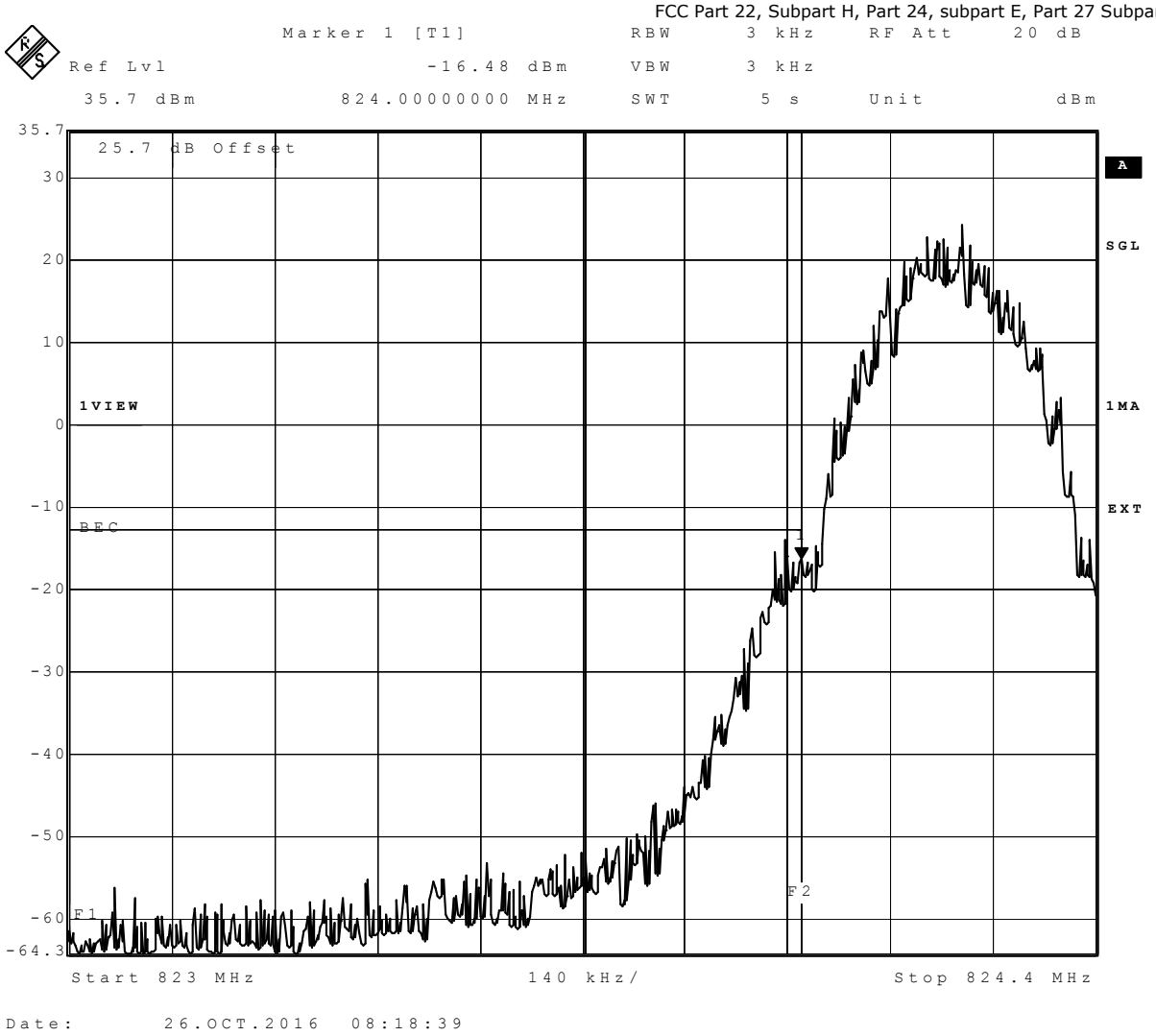
Test: 22.6; _Band edge compliance Summary §2.1053, §22.917

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 12:22
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

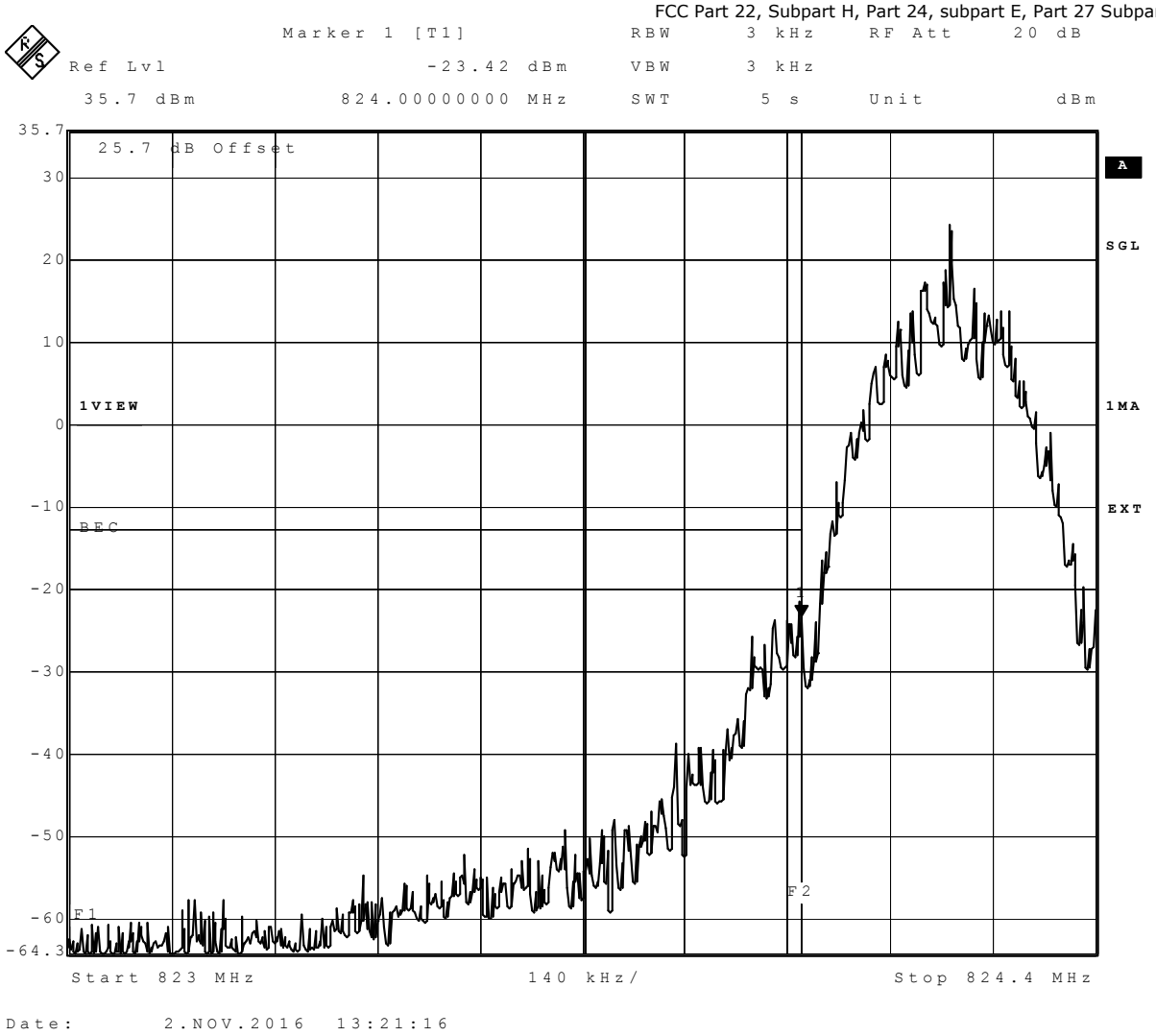
Detailed Results:

Band Edge	
Ambient temperature:	**20 °C**
Relative humidity:	**60 %**

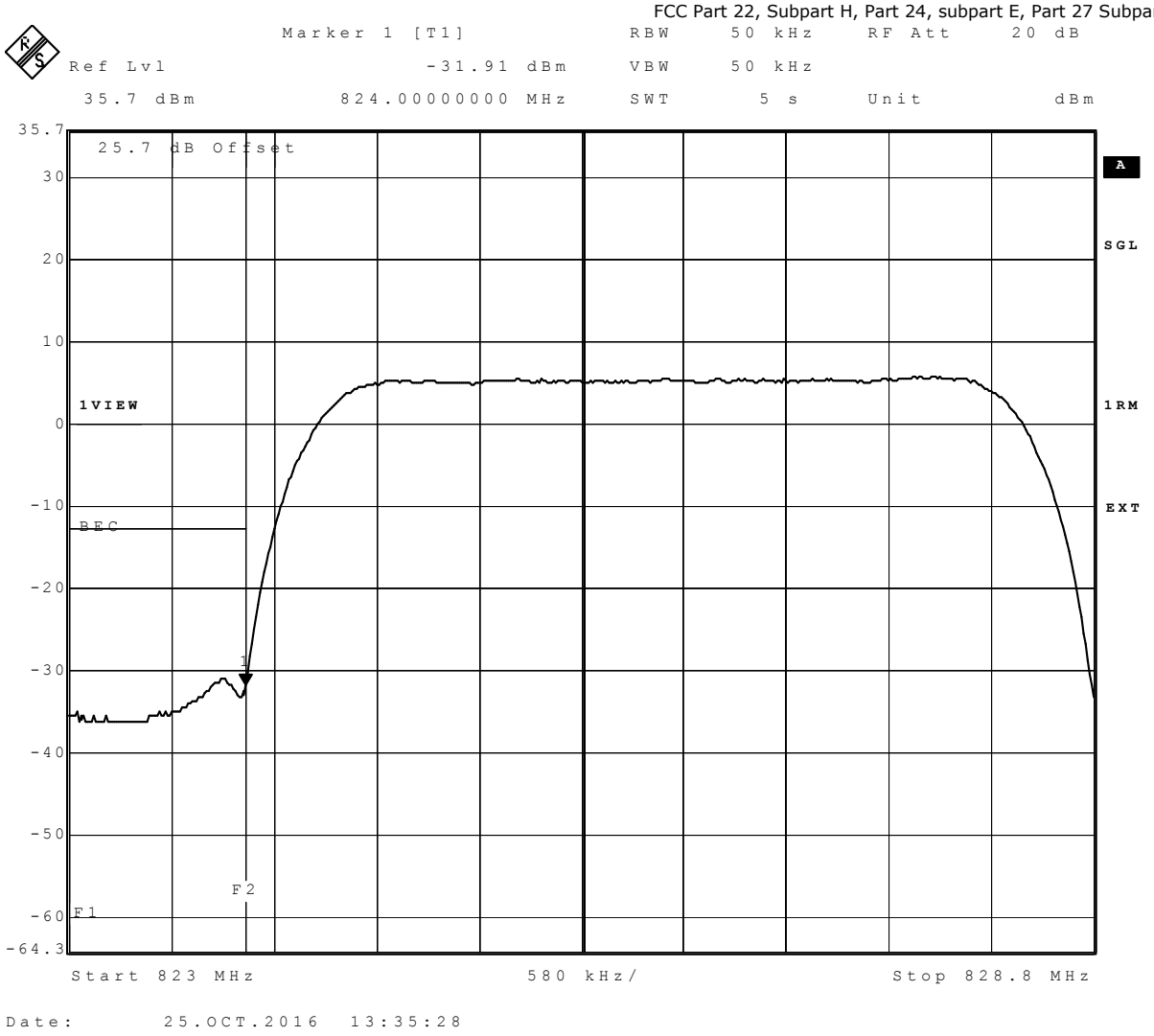
Radio Technology	Channel	Nominal BW	Ressource Blocks	Peak [dBm]	Average [dBm]	RMS [dBm]	Limit /dBm	Margin to Limit /dB	Verdict
GSM 850	low	0.2	-	-16.48	-35.26	-28.27	-13	3.48	Passed
GSM 850	high	0.2	-	-18.74	-38.28	-28.74	-13	5.74	Passed
GSM 850 EDGE	low	0.2	-	-23.42	-45.89	-36.94	-13	10.42	Passed
GSM 850 EDGE	high	0.2	-	-26.79	-47.82	-36.34	-13	13.79	Passed
FDD V	low	5	-	-20.43	-32.63	-31.91	-13	18.91	Passed
FDD V	high	5	-	-22.94	-33.02	-32.26	-13	19.26	Passed
FDD V HSDPA Subtest 1	low	5	-	-20.75	-32.26	-31.24	-13	18.24	Passed
FDD V HSDPA Subtest 1	high	5	-	-20.42	-31.91	-31.24	-13	18.24	Passed
FDD V HSUPA Subtest 1	low	5	-	-22.03	-30.32	-29.76	-13	16.76	Passed
FDD V HSUPA Subtest 1	high	5	-	-19.97	-31.24	-30.04	-13	17.04	Passed
FDD V HSUPA Subtest 5	low	5	-	**-22.2**	**-30.92**	**-30.04**	-13	17.04	Passed
FDD V HSUPA Subtest 5	high	5	-	**-19.7**	**-31.57**	**-30.62**	-13	17.62	Passed
eFDD 5 QPSK	low	1.4	6	-16.18	-28	-26.4	-13	13.4	Passed
eFDD 5 QPSK	high	1.4	6	-16.9	-29.52	-27.72	-13	14.72	Passed
eFDD 5 16QAM	low	1.4	6	**-16.2**	**-29.5**	**-27.4**	-13	14.4	Passed
eFDD 5 16QAM	high	1.4	6	**-18.5**	**-30.62**	**-28.98**	-13	15.98	Passed
eFDD 5 QPSK	low	3	15	-15.58	-30.32	-27.61	-13	14.61	Passed
eFDD 5 QPSK	high	3	15	-16.3	-32.63	-29.5	-13	16.5	Passed
eFDD 5 16QAM	low	3	15	-15.55	-30.92	-28.04	-13	15.04	Passed
eFDD 5 16QAM	high	3	15	-17.25	-33.42	-30.32	-13	17.32	Passed
eFDD 5 QPSK	low	5	25	-13.77	-31.91	-28.74	-13	15.74	Passed
eFDD 5 QPSK	high	5	25	-14.32	-34.29	-30.32	-13	17.32	Passed
eFDD 5 16QAM	low	5	25	-16.78	-33.42	-30.62	-13	17.62	Passed
eFDD 5 16QAM	high	5	25	-16	-35.26	-30.92	-13	17.92	Passed
eFDD 5 QPSK	low	10	50	-14.53	-34.76	-30.92	-13	17.92	Passed
eFDD 5 QPSK	high	10	50	-15.01	-36.94	-32.26	-13	19.26	Passed
eFDD 5 16QAM	low	10	50	**-16.2**	**-36.34**	**-32.26**	-13	19.26	Passed
eFDD 5 16QAM	high	10	50	**-14.9**	**-38.28**	**-33.42**	-13	20.42	Passed



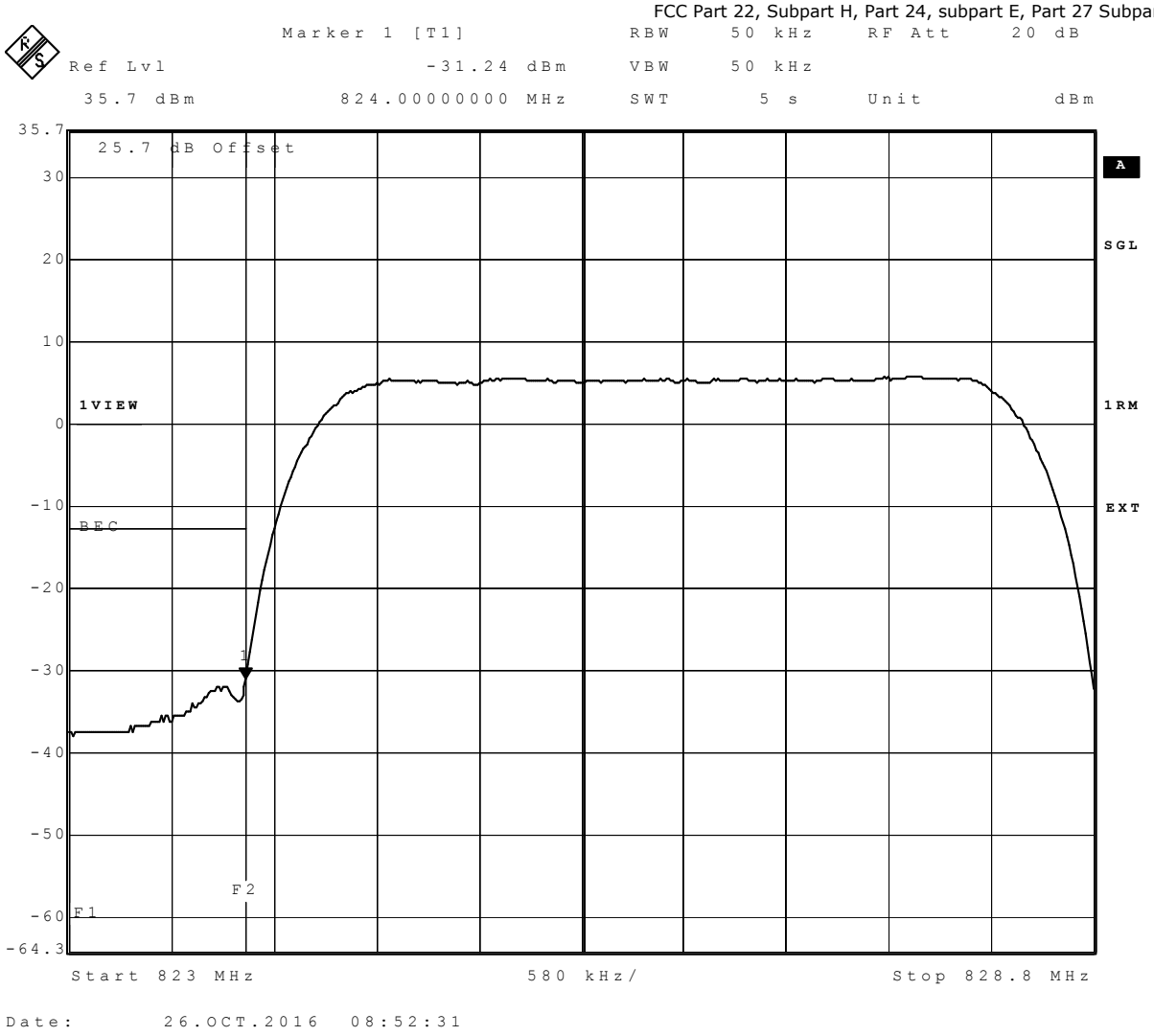
GSM850, Channel: low



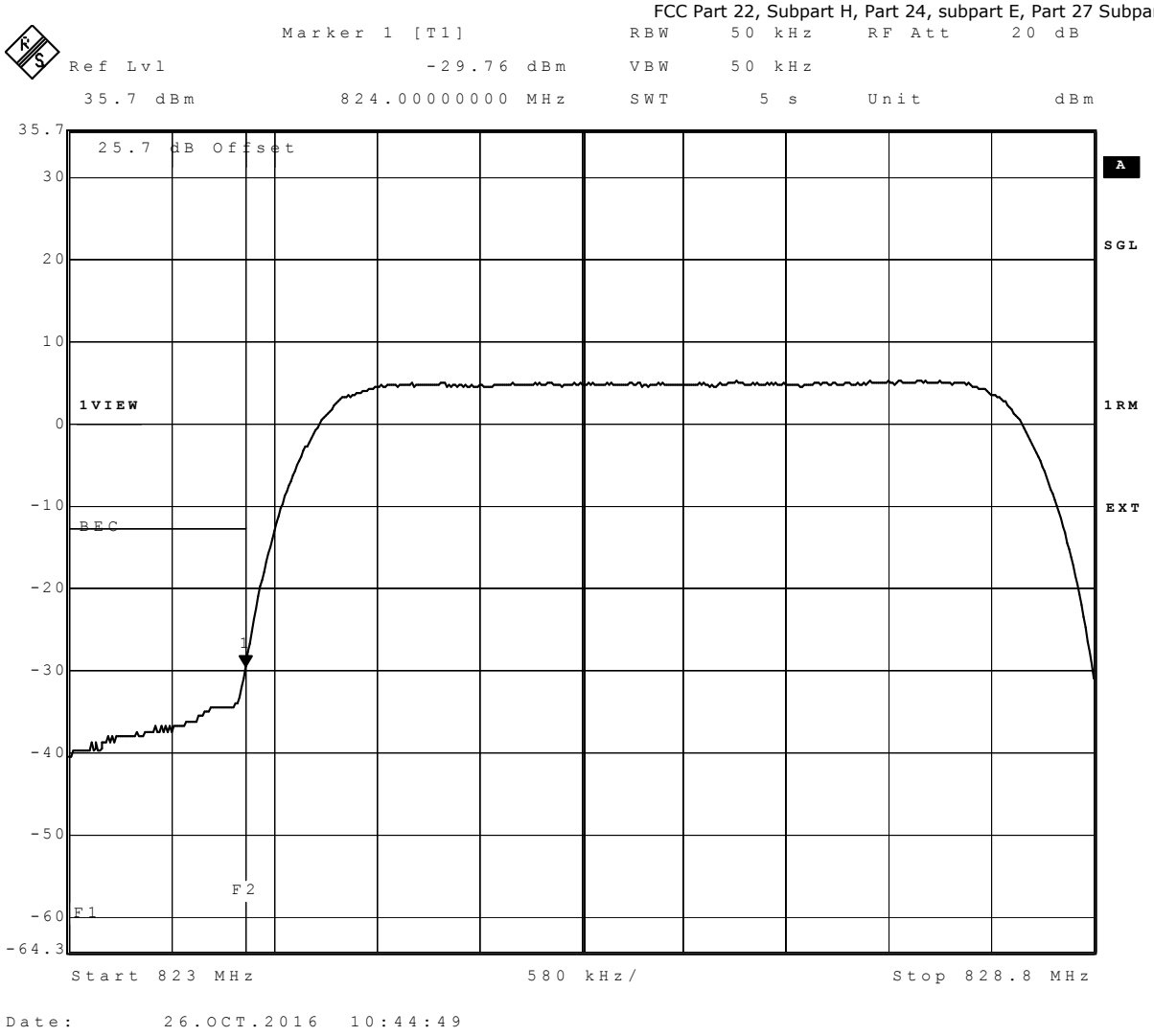
GSM850 EDGE, Channel: low



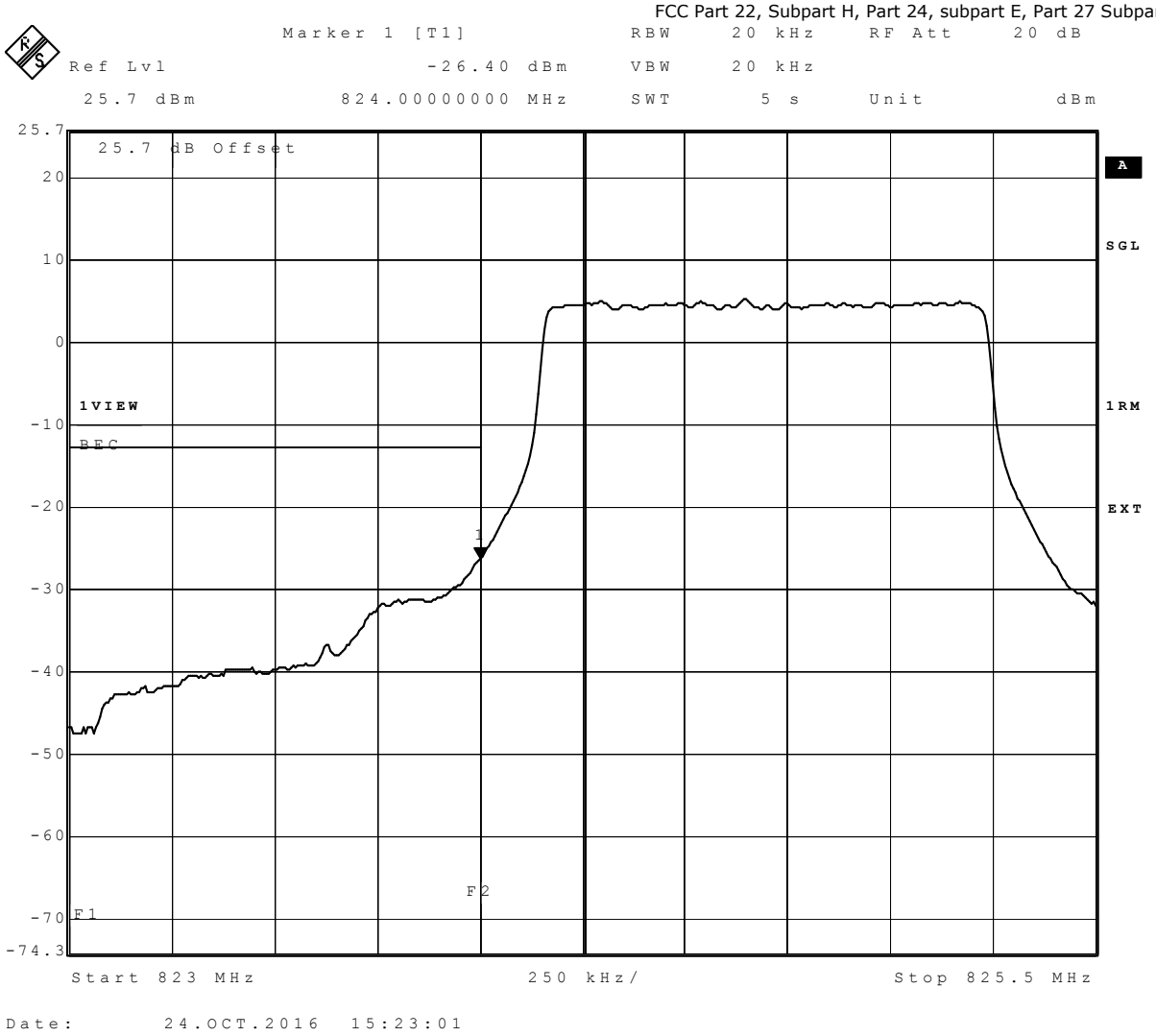
FDDV, Channel: low



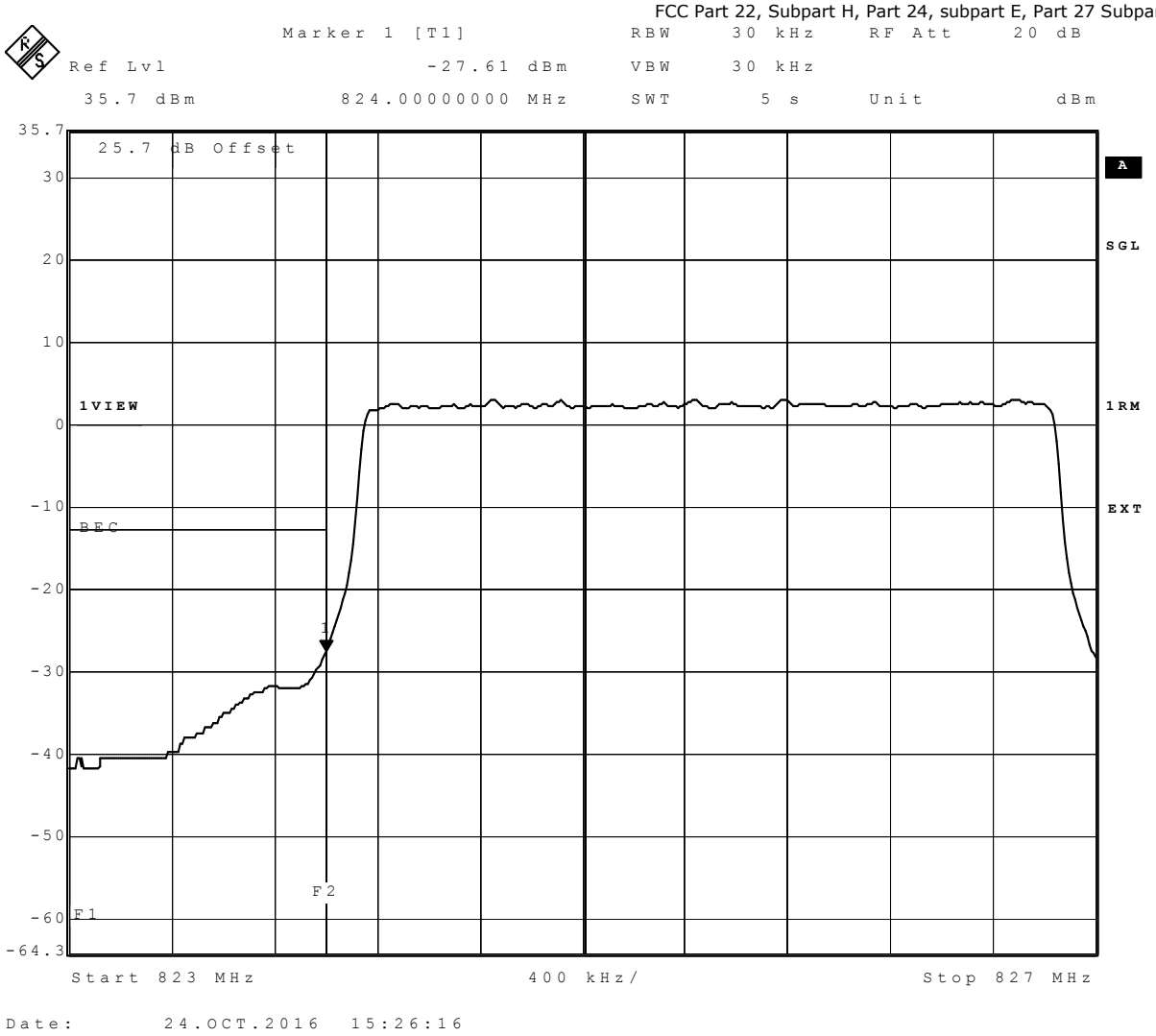
FDDV HSDPA, Channel: low



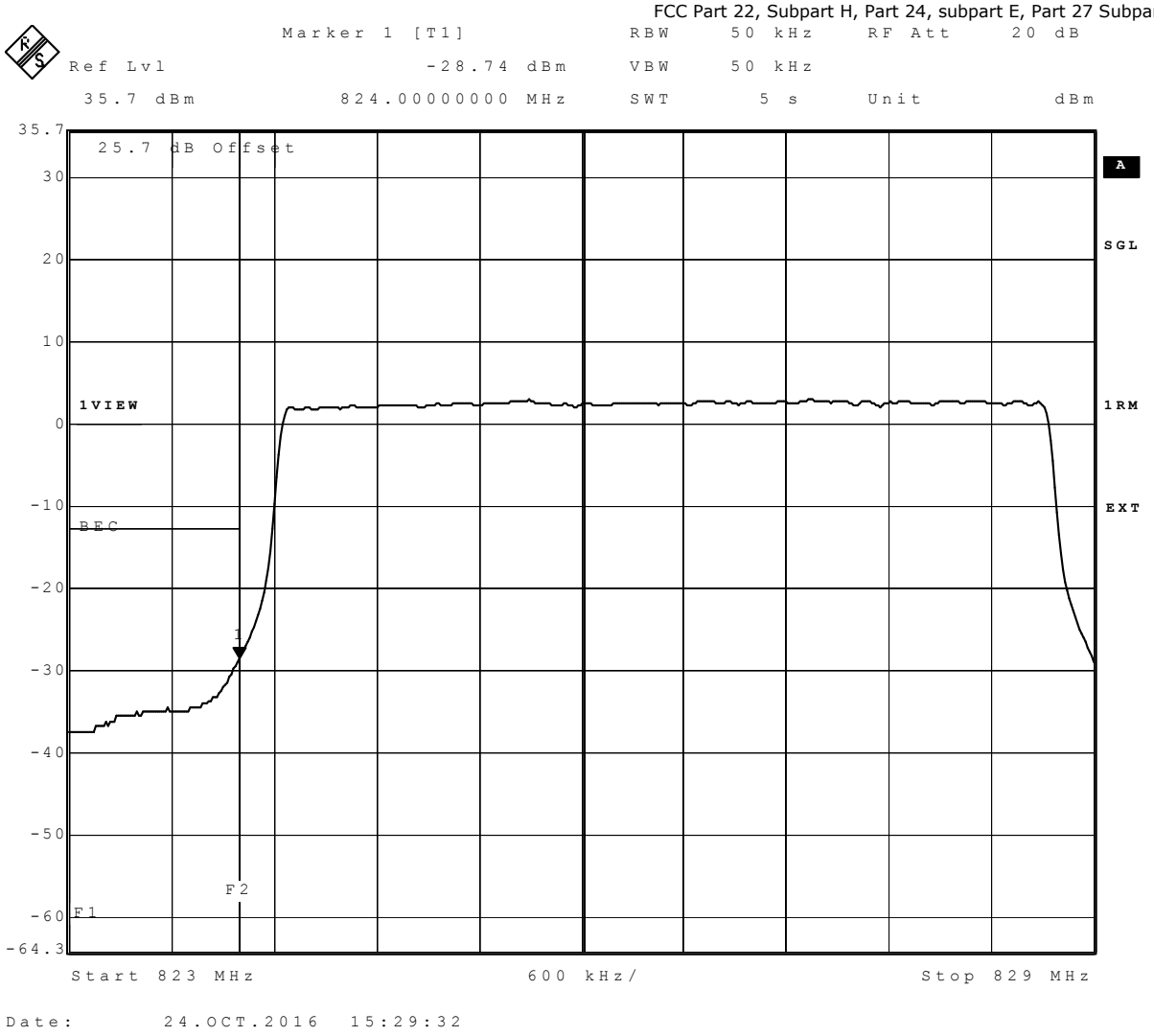
FDDV HSUPA, Channel: low



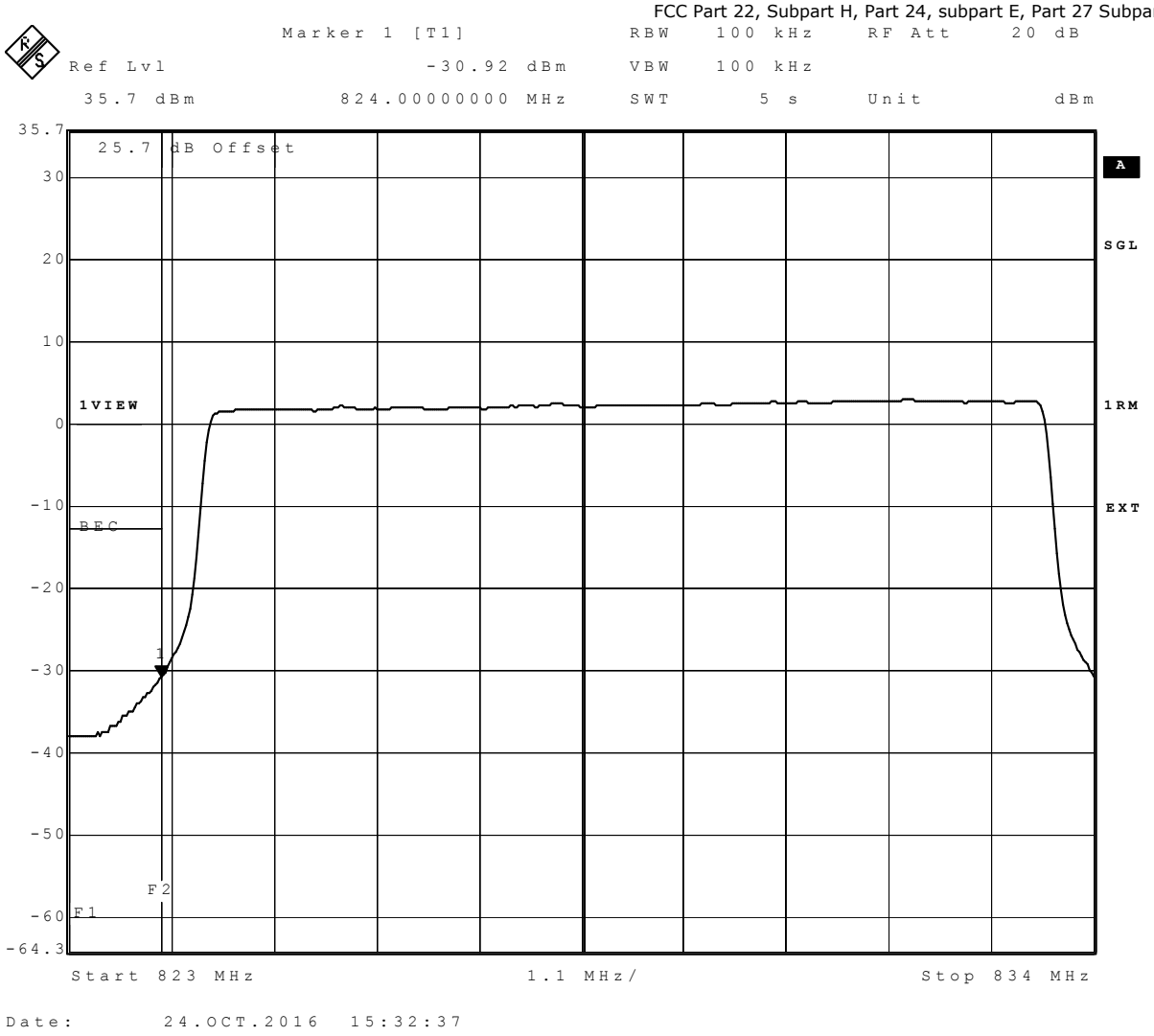
eFDDV QPSK, 1.4MHz, Channel: low



eFDDV QPSK, 3MHz, Channel: low



eFDD5 QPSK, 5MHz, Channel: low



eFDDV QPSK, 10MHz, Channel: low

3.5.7 22.7 Peak-to-Average Ratio Summary §2.1046

Test: 22.7; Peak-to-Average Ratio Summary §2.1046

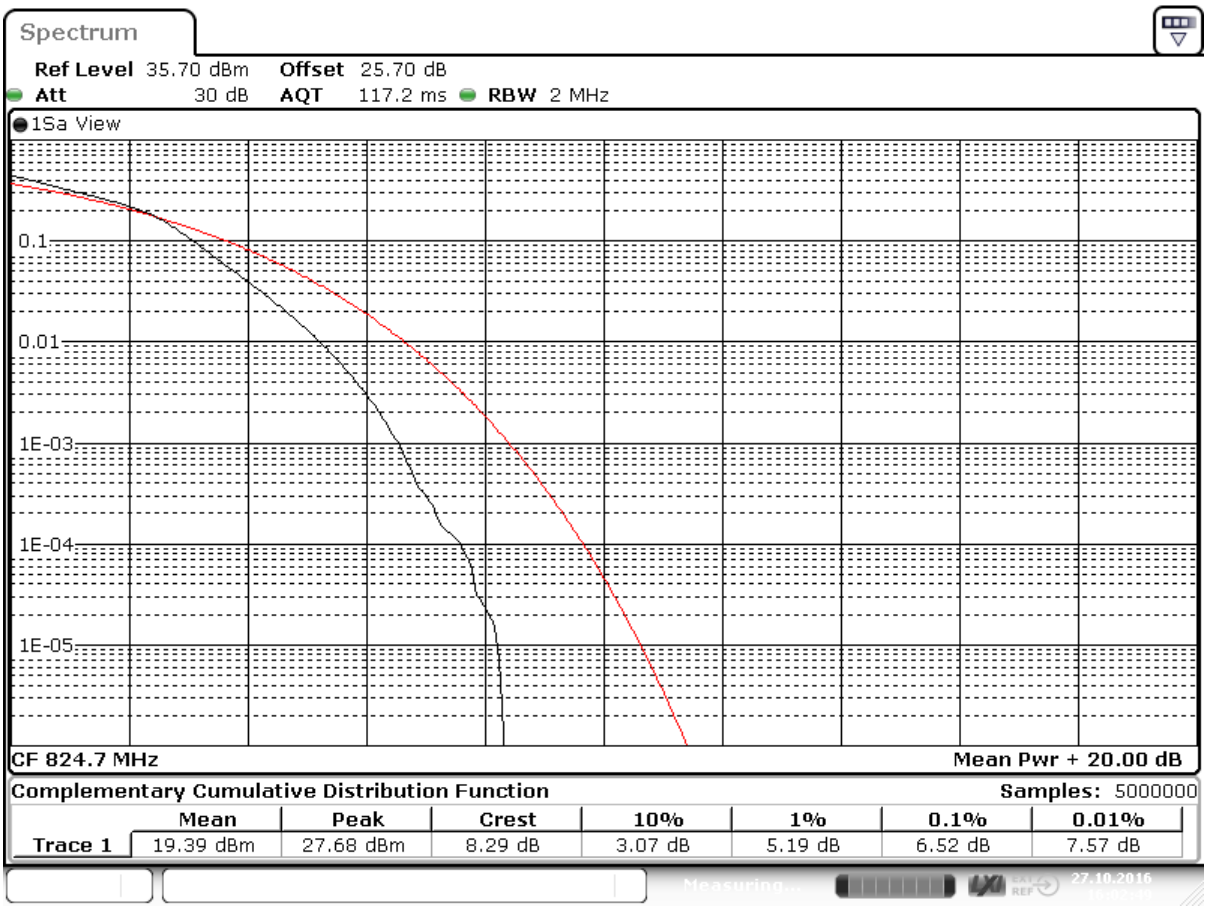
Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 12:02
Body:	FCC47CFRChIPART22PUBLIC MOBILE SERVICES
Test Specification:	FCC part 2 and 22

Detailed Results:

Peak to Average Ratio

Ambient temperature: 26 °C
Relative humidity: 35%

Radio Technology	Channel	Ressource Blocks	Bandwidth (MHz)	Peak to Average Ratio	Limit (IC) (dB)	Verdict
GSM 850	low	-	0.2	0.15	13	PASSED
GSM 850	mid	-	0.2	0.05	13	PASSED
GSM 850	high	-	0.2	0.11	13	PASSED
GSM 850 EDGE	low	-	0.2	0.03	13	PASSED
GSM 850 EDGE	mid	-	0.2	0.16	13	PASSED
GSM 850 EDGE	high	-	0.2	0.11	13	PASSED
FDD V	low	-	5	5.37	13	PASSED
FDD V	mid	-	5	5.91	13	PASSED
FDD V	high	-	5	5.55	13	PASSED
FDD V HSDPA Subtest 1	low	-	5	5.34	13	PASSED
FDD V HSDPA Subtest 1	mid	-	5	5.55	13	PASSED
FDD V HSDPA Subtest 1	high	-	5	5.52	13	PASSED
FDD V HSUPA Subtest 1	low	-	5	6.19	13	PASSED
FDD V HSUPA Subtest 1	mid	-	5	6.25	13	PASSED
FDD V HSUPA Subtest 1	high	-	5	7.26	13	PASSED
FDD V HSUPA Subtest 5	low	-	5	6.88	13	PASSED
FDD V HSUPA Subtest 5	mid	-	5	6.93	13	PASSED
FDD V HSUPA Subtest 5	high	-	5	6.83	13	PASSED
eFDD 5 QPSK	low	6	1.4	5.62	13	PASSED
eFDD 5 QPSK	mid	6	1.4	5.65	13	PASSED
eFDD 5 QPSK	high	6	1.4	5.48	13	PASSED
eFDD 5 16QAM	low	6	1.4	6.52	13	PASSED
eFDD 5 16QAM	mid	6	1.4	6.41	13	PASSED
eFDD 5 16QAM	high	6	1.4	6.43	13	PASSED



Date: 27.OCT.2016 16:02:49

eFDDV 16QAM, Channel: low

3.5.8 24.1 RF Power Output §2.1046, §24.232

Test: 24.1; RF Power Output Summary §2.1046, §24.232

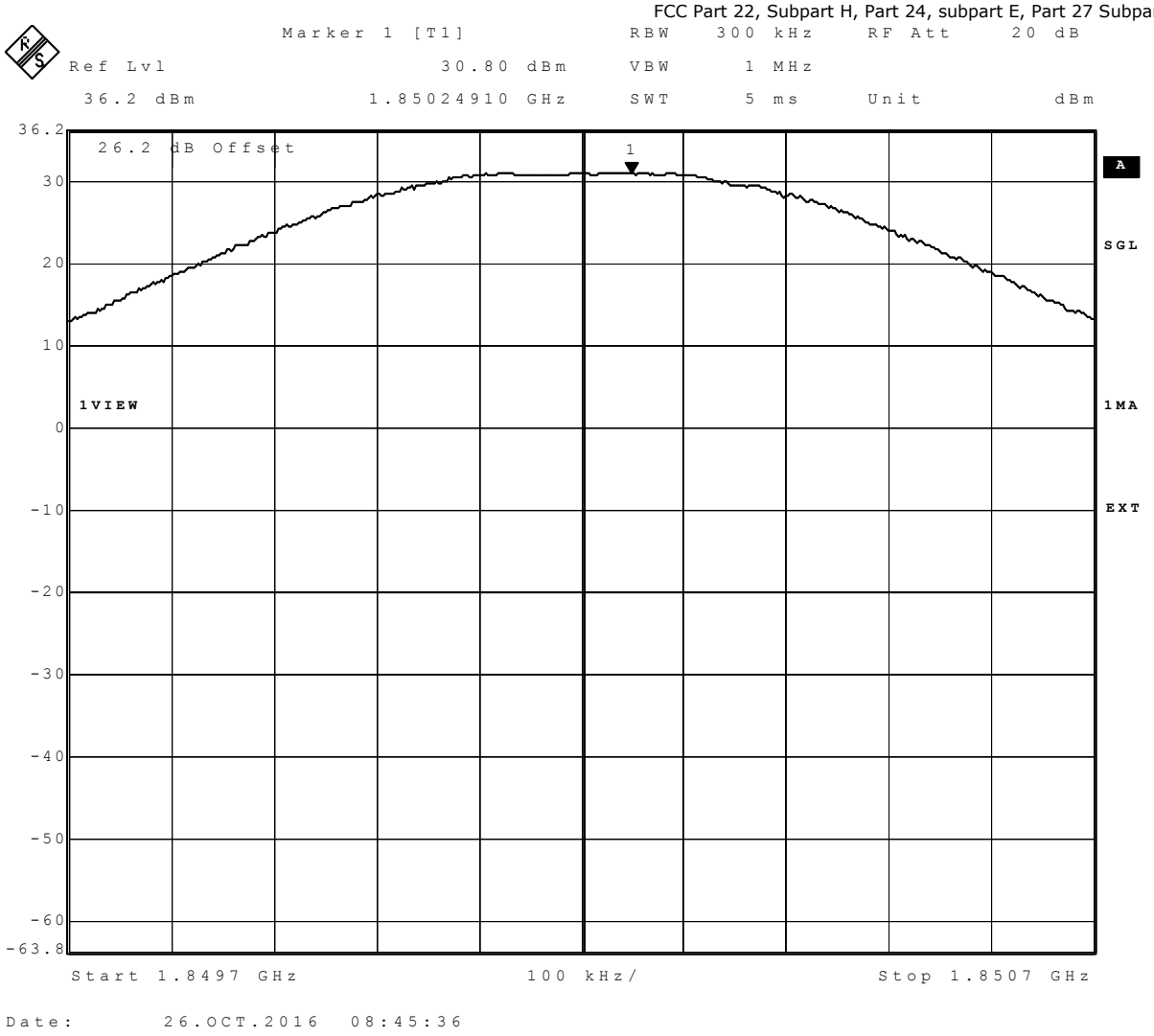
Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 8:26
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Detailed Results:

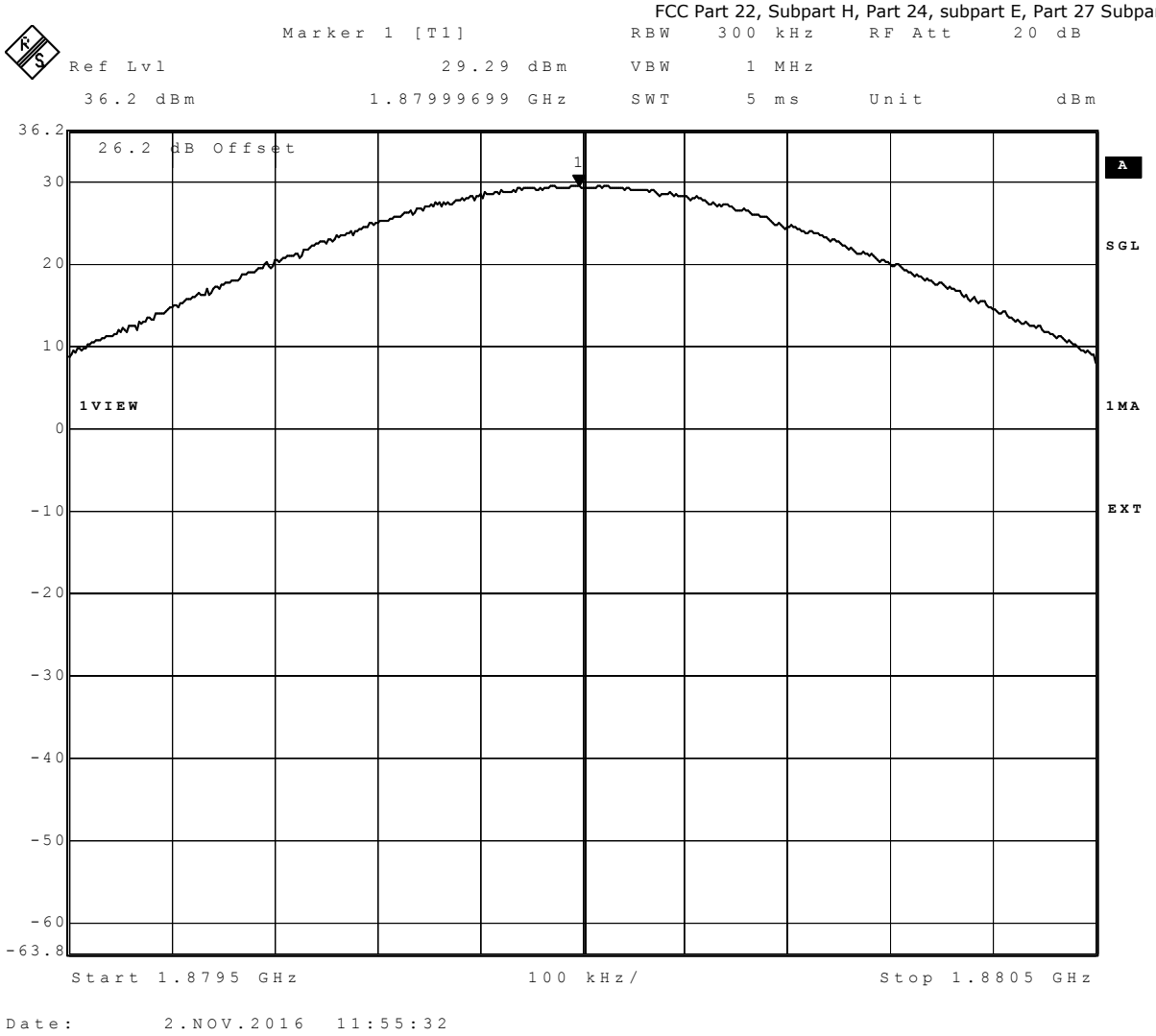
Transmitter Output Power								
Ambient temperature:	26 °C							
Relative humidity:	35%							
Radio Technology	**Channel**	**Bandwidth (MHz)**	**Peak Conducted Power (dBm)**	**Average Conducted Power (dBm)**	**RMS Conducted Power (dBm)**	**FCC / IC EIRP Limit (W)**	**Maximum Antenna Gain (dBi)**	**Verdict**
GSM 1900	low	0.2	30.8	30.77	30.8	2	2.2	Passed
GSM 1900	mid	0.2	30.8	30.77	30.78	2	2.2	Passed
GSM 1900	high	0.2	30.75	30.72	30.75	2	2.25	Passed
GSM 1900 EDGE	low	0.2	29.27	29.25	29.12	2	3.73	Passed
GSM 1900 EDGE	mid	0.2	29.29	29.27	29.26	2	3.71	Passed
GSM 1900 EDGE	high	0.2	29.17	29.13	29.14	2	3.83	Passed
FDD II	low	5	28.86	23.18	23.32	2	9.68	Passed
FDD II	mid	5	28.59	23.01	23.17	2	9.83	Passed
FDD II	high	5	28.59	22.94	23.13	2	9.87	Passed
FDD II HSDPA Subtest 1	low	5	28.71	23.46	23.66	2	9.34	Passed
FDD II HSDPA Subtest 1	mid	5	28.71	23.45	23.59	2	9.41	Passed
FDD II HSDPA Subtest 1	high	5	28.86	23.26	23.47	2	9.53	Passed
FDD II HSDPA Subtest 2	low	5	29.6	23.71	24.2	2	8.8	Passed
FDD II HSDPA Subtest 2	mid	5	29.24	23.75	24.31	2	8.69	Passed
FDD II HSDPA Subtest 2	high	5	29.78	23.59	24.06	2	8.94	Passed
FDD II HSDPA Subtest 3	low	5	29.6	23.88	24.68	2	8.32	Passed
FDD II HSDPA Subtest 3	mid	5	30.05	23.84	24.37	2	8.63	Passed
FDD II HSDPA Subtest 3	high	5	30.2	23.71	24.11	2	8.89	Passed
FDD II HSDPA Subtest 4	low	5	30.2	23.71	24.47	2	8.53	Passed
FDD II HSDPA Subtest 4	mid	5	29.47	23.74	24.49	2	8.51	Passed
FDD II HSDPA Subtest 4	high	5	29.78	23.46	24.2	2	8.8	Passed
FDD II HSUPA Subtest 1	low	5	30.05	23.14	23.55	2	9.45	Passed
FDD II HSUPA Subtest 1	mid	5	29.47	23.27	23.57	2	9.43	Passed
FDD II HSUPA Subtest 1	high	5	30.05	22.91	23.54	2	9.46	Passed
FDD II HSUPA Subtest 2	low	5	30.05	22.46	23.36	2	9.64	Passed
FDD II HSUPA Subtest 2	mid	5	30.96	22.37	23.13	2	9.87	Passed
FDD II HSUPA Subtest 2	high	5	30.64	22.04	22.92	2	10.08	Passed
FDD II HSUPA Subtest 3	low	5	31.12	23.47	24.29	2	8.71	Passed
FDD II HSUPA Subtest 3	mid	5	30.96	23.43	24.24	2	8.76	Passed
FDD II HSUPA Subtest 3	high	5	31.04	22.96	24	2	9	Passed
FDD II HSUPA Subtest 4	low	5	30.8	22.51	23.51	2	9.49	Passed
FDD II HSUPA Subtest 4	mid	5	30.48	22.48	23.57	2	9.43	Passed
FDD II HSUPA Subtest 4	high	5	30.72	22.18	23.38	2	9.62	Passed
FDD II HSUPA Subtest 5	low	5	29.6	23.53	23.55	2	9.45	Passed
FDD II HSUPA Subtest 5	mid	5	30.48	23.54	23.79	2	9.21	Passed
FDD II HSUPA Subtest 5	high	5	30.32	23.11	23.43	2	9.57	Passed

Transmitter Output Power							
Ambient temperature:	26 °C						
Relative humidity:	35%						
Radio Technology	**Channel**	**Ressource Blocks**	**Bandwidth (MHz)**	**RMS Conducted Power (dBm)**	**FCC / IC EIRP Limit (W)**	**Maximum Antenna Gain (dBi)**	**Verdict**
eFDD 2 QPSK	low	1	1.4	21.19	2	11.81	Passed
eFDD 2 QPSK	low	3	1.4	20.74	2	12.26	Passed
eFDD 2 QPSK	low	6	1.4	19.61	2	13.39	Passed
eFDD 2 QPSK	mid	1	1.4	21.39	2	11.61	Passed
eFDD 2 QPSK	mid	3	1.4	20.99	2	12.01	Passed
eFDD 2 QPSK	mid	6	1.4	20.14	2	12.86	Passed
eFDD 2 QPSK	high	1	1.4	21.05	2	11.95	Passed
eFDD 2 QPSK	high	3	1.4	20.65	2	12.35	Passed
eFDD 2 QPSK	high	6	1.4	19.78	2	13.22	Passed
eFDD 2 16QAM	low	1	1.4	20.15	2	12.85	Passed
eFDD 2 16QAM	low	6	1.4	18.73	2	14.27	Passed
eFDD 2 16QAM	mid	1	1.4	20.35	2	12.65	Passed
eFDD 2 16QAM	mid	6	1.4	19.23	2	13.77	Passed
eFDD 2 16QAM	high	1	1.4	20.04	2	12.96	Passed
eFDD 2 16QAM	high	6	1.4	18.75	2	14.25	Passed
eFDD 2 QPSK	low	1	3	21.55	2	11.45	Passed
eFDD 2 QPSK	low	15	3	20.16	2	12.84	Passed
eFDD 2 QPSK	mid	1	3	21.84	2	11.16	Passed
eFDD 2 QPSK	mid	15	3	20.5	2	12.5	Passed
eFDD 2 QPSK	high	1	3	21.52	2	11.48	Passed
eFDD 2 QPSK	high	15	3	20.05	2	12.95	Passed
eFDD 2 16QAM	low	1	3	20.48	2	12.52	Passed
eFDD 2 16QAM	low	15	3	19.22	2	13.78	Passed
eFDD 2 16QAM	mid	1	3	20.75	2	12.25	Passed
eFDD 2 16QAM	mid	15	3	19.47	2	13.53	Passed
eFDD 2 16QAM	high	1	3	20.43	2	12.57	Passed
eFDD 2 16QAM	high	15	3	19.15	2	13.85	Passed
eFDD 2 QPSK	low	1	5	21.51	2	11.49	Passed
eFDD 2 QPSK	low	12	5	20.16	2	12.84	Passed
eFDD 2 QPSK	low	25	5	20.24	2	12.76	Passed
eFDD 2 QPSK	mid	1	5	21.81	2	11.19	Passed
eFDD 2 QPSK	mid	12	5	20.48	2	12.52	Passed
eFDD 2 QPSK	mid	25	5	20.43	2	12.57	Passed
eFDD 2 QPSK	high	1	5	21.34	2	11.66	Passed
eFDD 2 QPSK	high	12	5	20.14	2	12.86	Passed
eFDD 2 QPSK	high	25	5	20.06	2	12.94	Passed
eFDD 2 16QAM	low	1	5	20.68	2	12.32	Passed
eFDD 2 16QAM	low	25	5	19.22	2	13.78	Passed
eFDD 2 16QAM	mid	1	5	20.9	2	12.1	Passed
eFDD 2 16QAM	mid	25	5	19.4	2	13.6	Passed
eFDD 2 16QAM	high	1	5	20.74	2	12.26	Passed
eFDD 2 16QAM	high	25	5	19.07	2	13.93	Passed

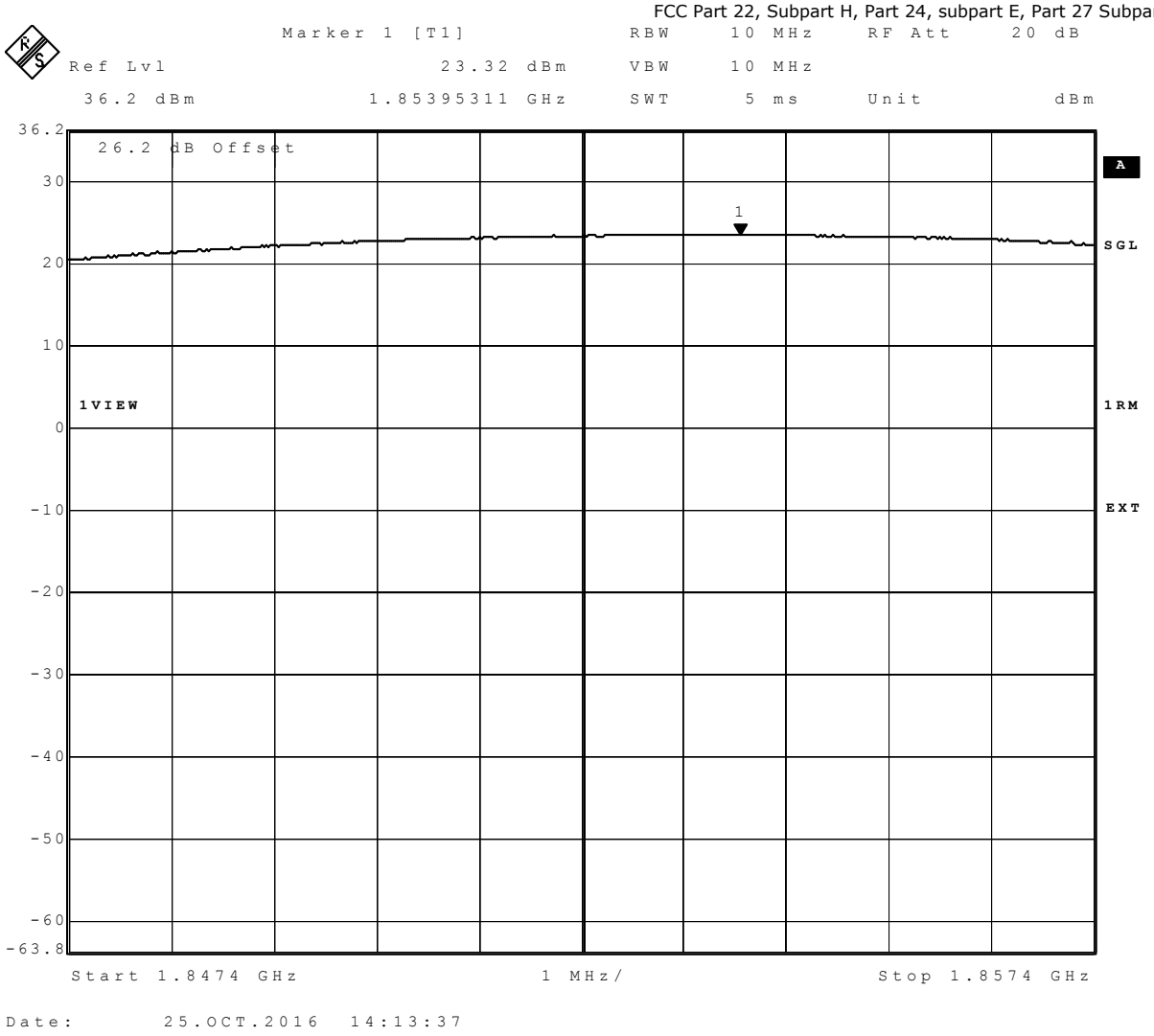
Transmitter Output Power							
Ambient temperature:	26 °C						
Relative humidity:	35%						
Radio Technology	**Channel**	**Ressource Blocks**	**Bandwidth (MHz)**	**RMS Conducted Power (dBm)**	**FCC / IC EIRP Limit (W)**	**Maximum Antenna Gain (dBi)**	**Verdict**
eFDD 2 QPSK	low	1	10	21.8	2	11.2	Passed
eFDD 2 QPSK	low	50	10	20.43	2	12.57	Passed
eFDD 2 QPSK	mid	1	10	21.86	2	11.14	Passed
eFDD 2 QPSK	mid	50	10	20.66	2	12.34	Passed
eFDD 2 QPSK	high	1	10	21.59	2	11.41	Passed
eFDD 2 QPSK	high	50	10	20.39	2	12.61	Passed
eFDD 2 16QAM	low	1	10	20.68	2	12.32	Passed
eFDD 2 16QAM	low	50	10	19.6	2	13.4	Passed
eFDD 2 16QAM	mid	1	10	20.79	2	12.21	Passed
eFDD 2 16QAM	mid	50	10	19.82	2	13.18	Passed
eFDD 2 16QAM	high	1	10	20.62	2	12.38	Passed
eFDD 2 16QAM	high	50	10	19.43	2	13.57	Passed
eFDD 2 QPSK	low	1	15	21.8	2	11.2	Passed
eFDD 2 QPSK	low	36	15	20.83	2	12.17	Passed
eFDD 2 QPSK	low	75	15	20.65	2	12.35	Passed
eFDD 2 QPSK	mid	1	15	21.92	2	11.08	Passed
eFDD 2 QPSK	mid	36	15	20.91	2	12.09	Passed
eFDD 2 QPSK	mid	75	15	20.79	2	12.21	Passed
eFDD 2 QPSK	high	1	15	21.72	2	11.28	Passed
eFDD 2 QPSK	high	36	15	20.79	2	12.21	Passed
eFDD 2 QPSK	high	75	15	20.48	2	12.52	Passed
eFDD 2 16QAM	low	1	15	20.82	2	12.18	Passed
eFDD 2 16QAM	low	75	15	19.81	2	13.19	Passed
eFDD 2 16QAM	mid	1	15	20.87	2	12.13	Passed
eFDD 2 16QAM	mid	75	15	19.98	2	13.02	Passed
eFDD 2 16QAM	high	1	15	20.71	2	12.29	Passed
eFDD 2 16QAM	high	75	15	19.58	2	13.42	Passed
eFDD 2 QPSK	low	1	20	21.73	2	11.27	Passed
eFDD 2 QPSK	low	100	20	20.66	2	12.34	Passed
eFDD 2 QPSK	mid	1	20	21.89	2	11.11	Passed
eFDD 2 QPSK	mid	100	20	20.81	2	12.19	Passed
eFDD 2 QPSK	high	1	20	21.56	2	11.44	Passed
eFDD 2 QPSK	high	100	20	20.65	2	12.35	Passed
eFDD 2 16QAM	low	1	20	20.7	2	12.3	Passed
eFDD 2 16QAM	low	100	20	19.94	2	13.06	Passed
eFDD 2 16QAM	mid	1	20	20.78	2	12.22	Passed
eFDD 2 16QAM	mid	100	20	19.98	2	13.02	Passed
eFDD 2 16QAM	high	1	20	20.62	2	12.38	Passed
eFDD 2 16QAM	high	100	20	19.77	2	13.23	Passed



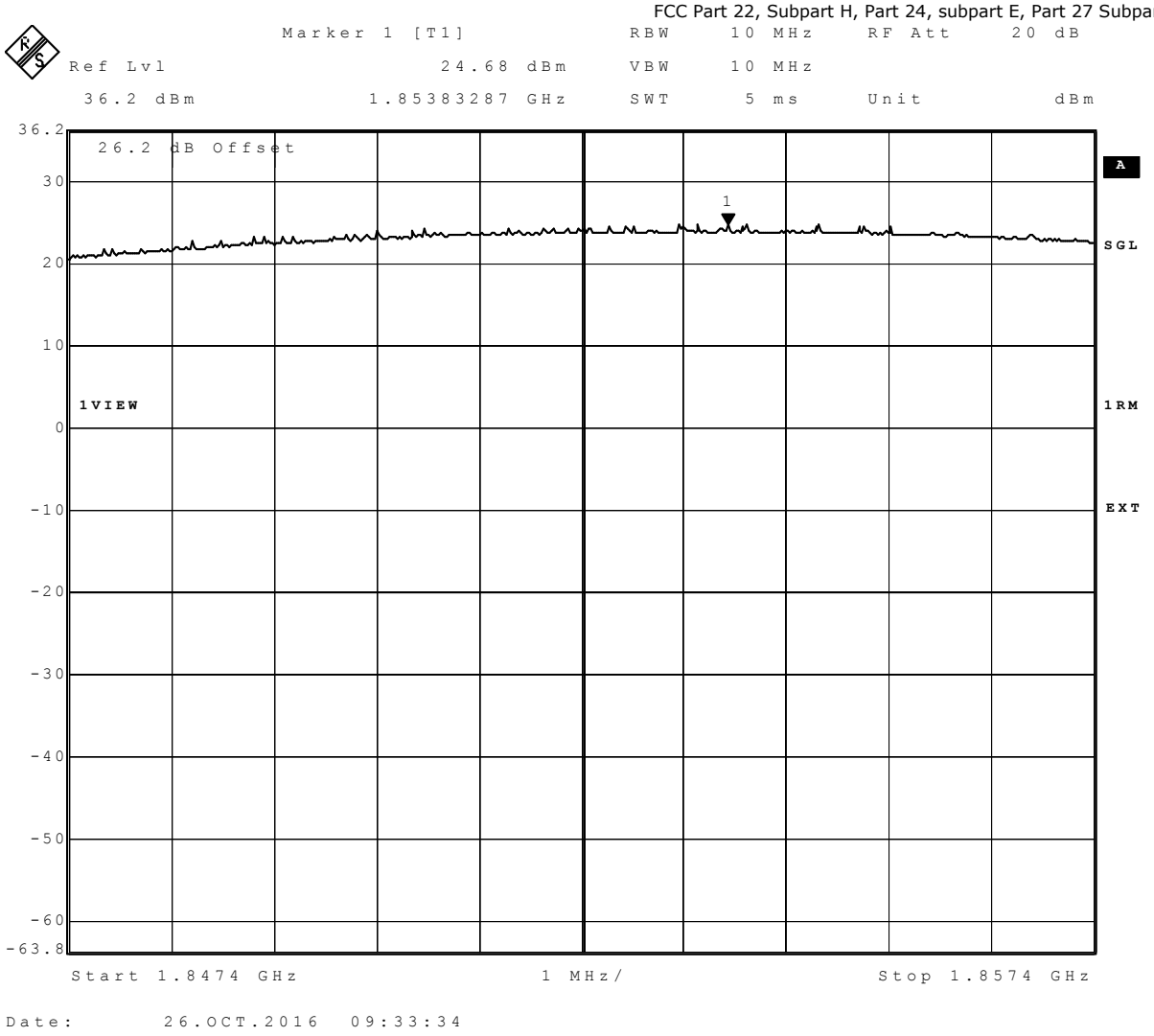
GSM1900 Channel: low



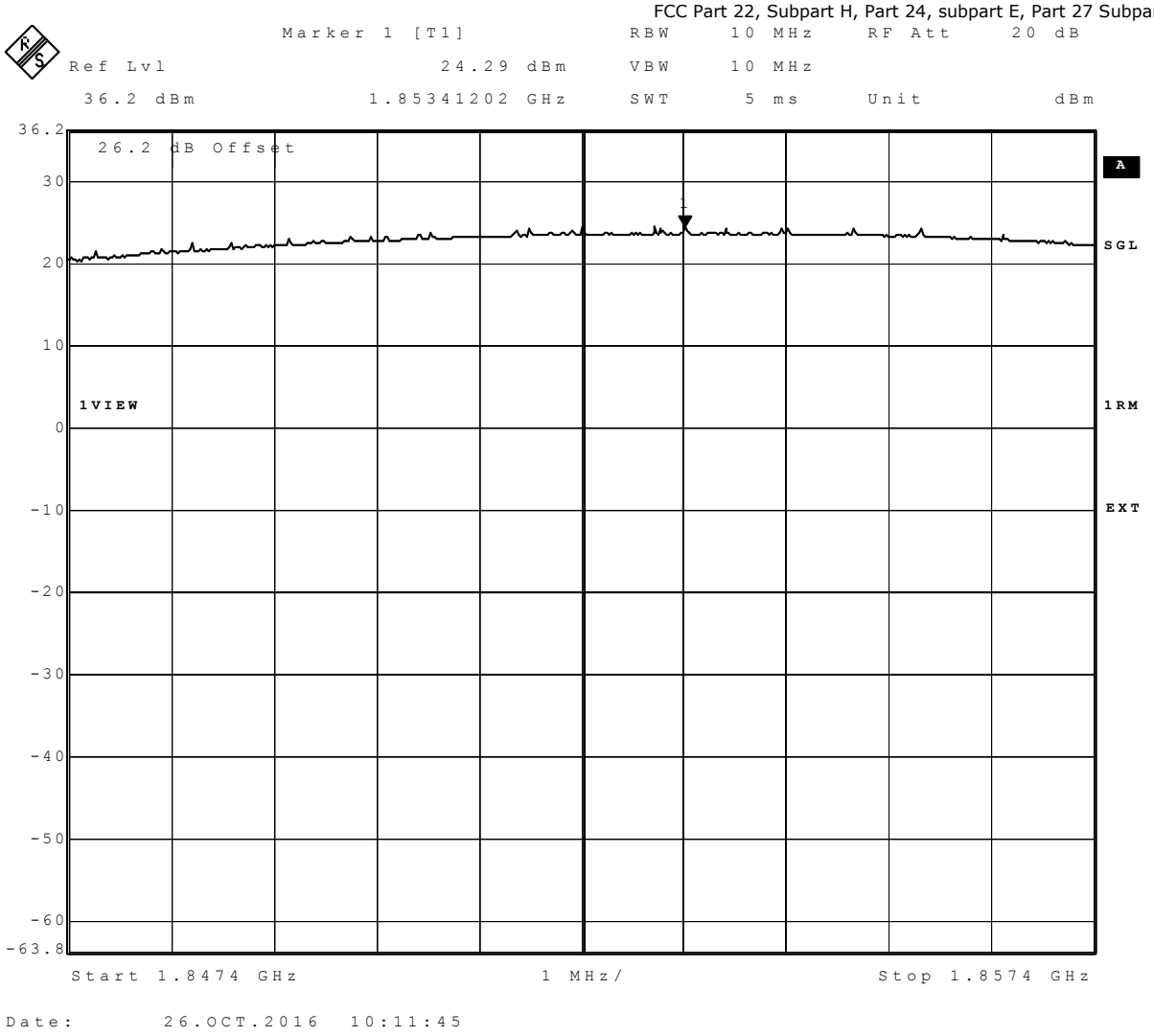
GSM1900 EDGE Channel: mid



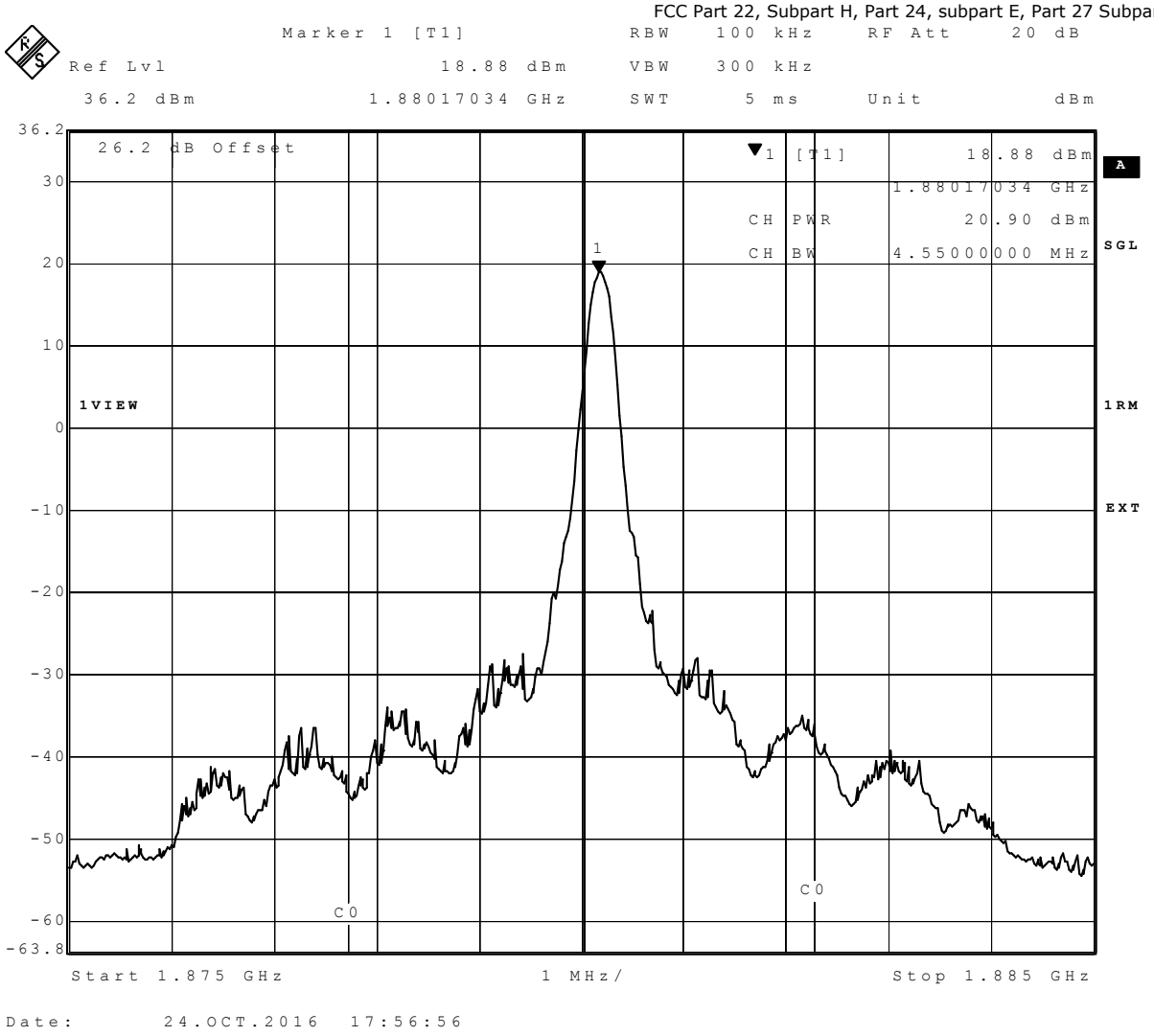
FDDII Channel: low



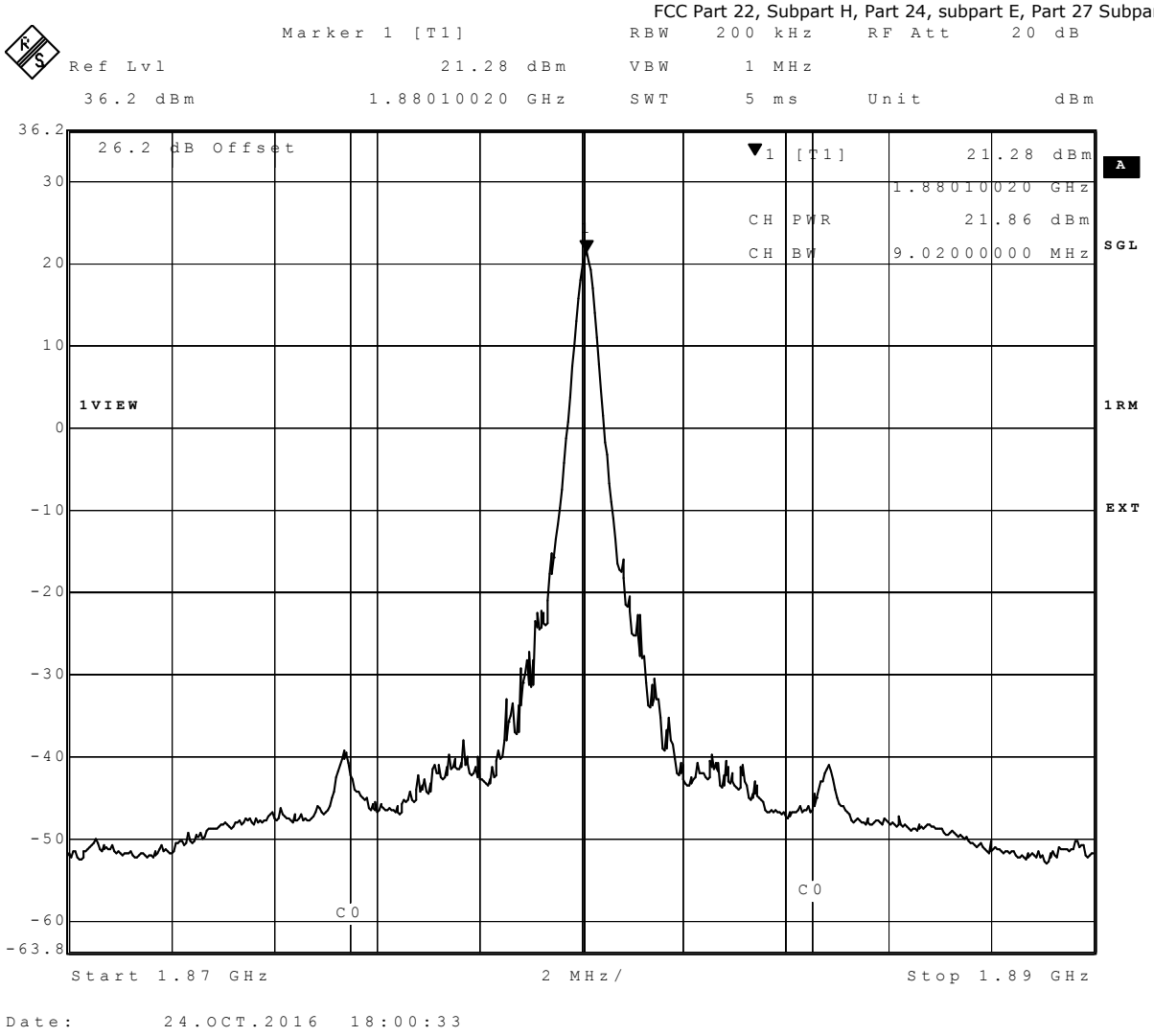
FDDII HSDPA Channel: low



FDDII HSUPA Channel: low



eFDDII 16QAM, 5MHz, RB1, Channel: mid



eFDDII QPSK, 10MHz, RB1, Channel: mid

3.5.9 24.2 Frequency stability §2.1055, §24.235

Test: 24.2; Frequency stability Summary §2.1055, 24.235

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 9:55
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Detailed Results:

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4700	8	18	passed
-30	5			4	22	passed
-30	10			5	23	passed
-20	0	normal	4700	17	29	passed
-20	5			7	24	passed
-20	10			9	30	passed
-10	0	normal	4700	12	23	passed
-10	5			12	28	passed
-10	10			9	27	passed
0	0	normal	4700	15	25	passed
0	5			11	28	passed
0	10			8	24	passed
10	0	normal	4700	7	22	passed
10	5			3	25	passed
10	10			2	27	passed
20	0	low	4700	7	26	passed
20	5			4	20	passed
20	10			3	28	passed
20	0	normal = high [1)]	4700	6	19	passed
20	5			3	30	passed
20	10			1	30	passed
20	0	high	4700	-2	-18	passed
20	5			2	21	passed
20	10			4	28	passed
30	0	normal	4700	8	30	passed
30	5			4	21	passed
30	10			2	33	passed
40	0	normal	4700	6	29	passed
40	5			5	22	passed
40	10			2	24	passed
50	0	normal	4700	3	26	passed
50	5			4	18	passed
50	10			6	25	passed

EDGE 1900, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4700	15	25	passed
-30	5			17	34	passed
-30	10			19	28	passed
-20	0	normal	4700	20	32	passed
-20	5			15	37	passed
-20	10			14	33	passed
-10	0	normal	4700	20	34	passed
-10	5			18	39	passed
-10	10			17	39	passed
0	0	normal	4700	17	32	passed
0	5			16	35	passed
0	10			15	36	passed
10	0	normal	4700	14	32	passed
10	5			12	34	passed
10	10			13	34	passed
20	0	low	4700	13	28	passed
20	5			12	36	passed
20	10			14	36	passed
20	0	normal = high [1)]	4700	12	22	passed
20	5			16	38	passed
20	10			17	36	passed
20	0	high	4700	18	33	passed
20	5			17	36	passed
20	10			22	34	passed
30	0	normal	4700	17	24	passed
30	5			15	38	passed
30	10			14	31	passed
40	0	normal	4700	15	23	passed
40	5			18	31	passed
40	10			14	28	passed
50	0	normal	4700	14	24	passed
50	5			21	33	passed
50	10			15	26	passed

GSM 1900, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4700	34	28	passed
-30	5			26	53	passed
-30	10			24	41	passed
-20	0	normal	4700	28	88	passed
-20	5			31	45	passed
-20	10			24	52	passed
-10	0	normal	4700	19	39	passed
-10	5			37	82	passed
-10	10			25	34	passed
0	0	normal	4700	33	29	passed
0	5			23	41	passed
0	10			26	49	passed
10	0	normal	4700	19	14	passed
10	5			15	62	passed
10	10			20	37	passed
20	0	low	4700	14	32	passed
20	5			20	49	passed
20	10			24	16	passed
20	0	normal = high [1)]	4700	27	35	passed
20	5			18	17	passed
20	10			20	42	passed
20	0	high	4700	31	38	passed
20	5			11	45	passed
20	10			18	36	passed
30	0	normal	4700	31	29	passed
30	5			9	31	passed
30	10			15	58	passed
40	0	normal	4700	28	47	passed
40	5			26	35	passed
40	10			23	40	passed
50	0	normal	4700	27	55	passed
50	5			30	28	passed
50	10			21	74	passed

HSDPA, FDD2, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4700	-9	538	passed
-30	5			64	506	passed
-30	10			-63	556	passed
-20	0	normal	4700	-92	-474	passed
-20	5			-70	-371	passed
-20	10			-50	-477	passed
-10	0	normal	4700	-54	-411	passed
-10	5			-38	-487	passed
-10	10			27	-407	passed
0	0	normal	4700	-48	-406	passed
0	5			-37	437	passed
0	10			87	353	passed
10	0	normal	4700	-4	-432	passed
10	5			94	393	passed
10	10			-122	-549	passed
20	0	low	4700	-44	-406	passed
20	5			-95	-489	passed
20	10			-38	-454	passed
20	0	normal = high [1)]	4700	71	376	passed
20	5			55	-303	passed
20	10			-21	393	passed
20	0	high	4700	-56	-485	passed
20	5			-17	476	passed
20	10			102	413	passed
30	0	normal	4700	-43	-467	passed
30	5			-25	-452	passed
30	10			-99	-538	passed
40	0	normal	4700	-1	-409	passed
40	5			-45	-516	passed
40	10			-62	-343	passed
50	0	normal	4700	105	388	passed
50	5			-57	-361	passed
50	10			-21	-335	passed

HSUPA, FDD2, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4700	27	54	passed
-30	5			14	23	passed
-30	10			16	67	passed
-20	0	normal	4700	21	48	passed
-20	5			23	26	passed
-20	10			9	33	passed
-10	0	normal	4700	34	11	passed
-10	5			21	27	passed
-10	10			26	27	passed
0	0	normal	4700	15	18	passed
0	5			10	44	passed
0	10			18	69	passed
10	0	normal	4700	3	35	passed
10	5			15	13	passed
10	10			9	18	passed
20	0	low	4700	4	26	passed
20	5			21	34	passed
20	10			12	42	passed
20	0	normal = high [1)]	4700	12	42	passed
20	5			4	23	passed
20	10			11	13	passed
20	0	high	4700	14	38	passed
20	5			8	24	passed
20	10			26	44	passed
30	0	normal	4700	18	37	passed
30	5			24	31	passed
30	10			8	55	passed
40	0	normal	4700	23	85	passed
40	5			11	62	passed
40	10			19	70	passed
50	0	normal	4700	3	43	passed
50	5			16	17	passed
50	10			11	38	passed

LTE, eFDD2, 5 MHz BW, QPSK, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4700	10	47	passed
-30	5			22	40	passed
-30	10			19	38	passed
-20	0	normal	4700	37	56	passed
-20	5			24	49	passed
-20	10			35	33	passed
-10	0	normal	4700	51	33	passed
-10	5			29	59	passed
-10	10			42	82	passed
0	0	normal	4700	35	38	passed
0	5			49	32	passed
0	10			46	71	passed
10	0	normal	4700	17	92	passed
10	5			23	65	passed
10	10			15	80	passed
20	0	low	4700	26	44	passed
20	5			18	82	passed
20	10			32	66	passed
20	0	normal = high [1)]	4700	9	46	passed
20	5			18	29	passed
20	10			24	38	passed
20	0	high	4700	16	34	passed
20	5			24	48	passed
20	10			32	64	passed
30	0	normal	4700	36	27	passed
30	5			39	35	passed
30	10			35	21	passed
40	0	normal	4700	16	89	passed
40	5			21	73	passed
40	10			36	47	passed
50	0	normal	4700	28	114	passed
50	5			42	84	passed
50	10			39	93	passed

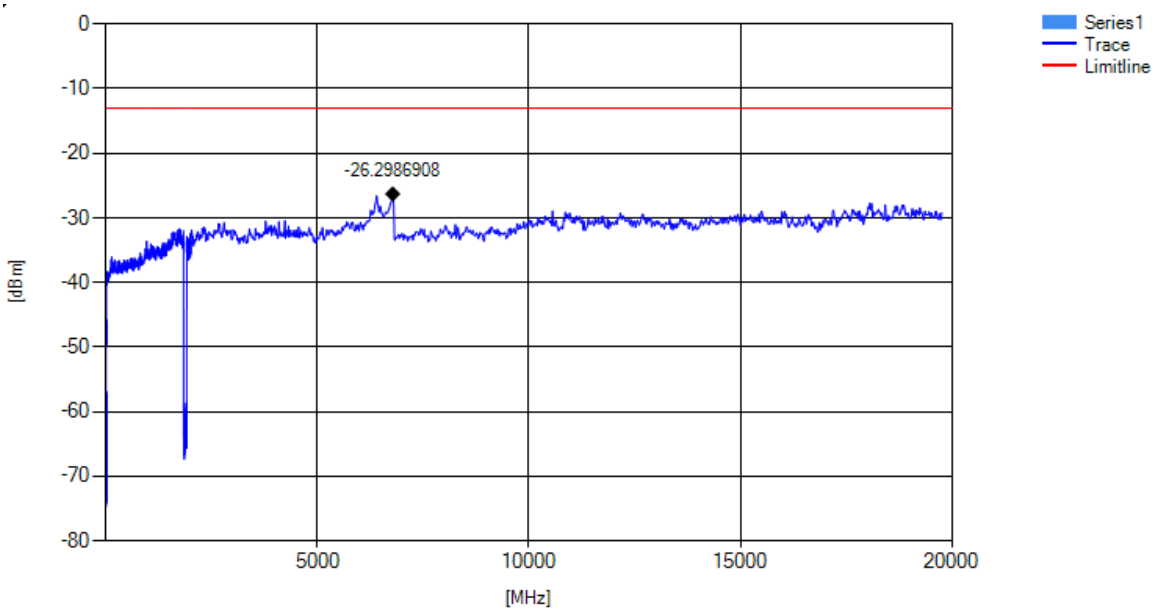
UMTS, FDD2, Mid Channel

3.5.10 24.3 Spurious emissions at antenna terminals §2.1051, §24.238

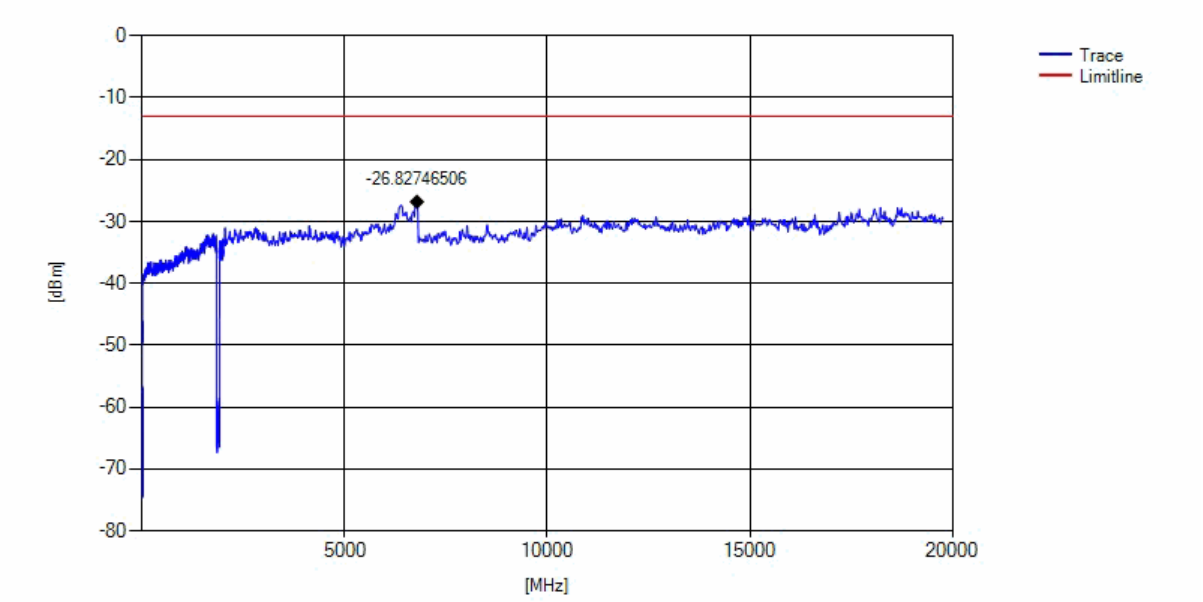
Test: 24.3; Spurious emissions at antenna terminals Summary §2.1051, §24.238

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 9:58
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

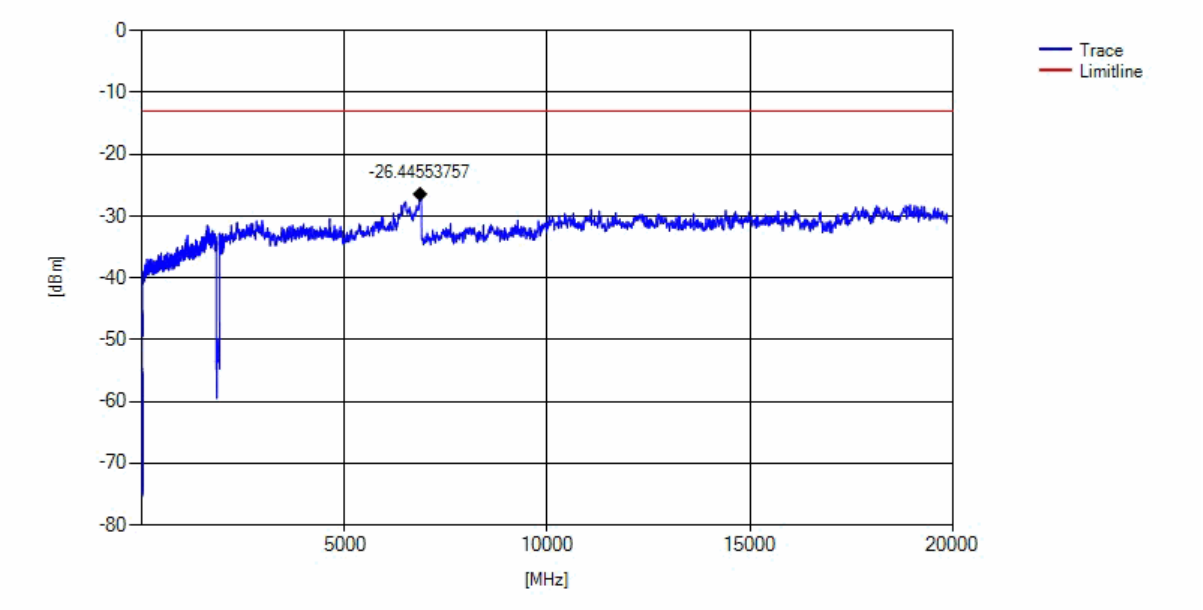
Detailed Results:



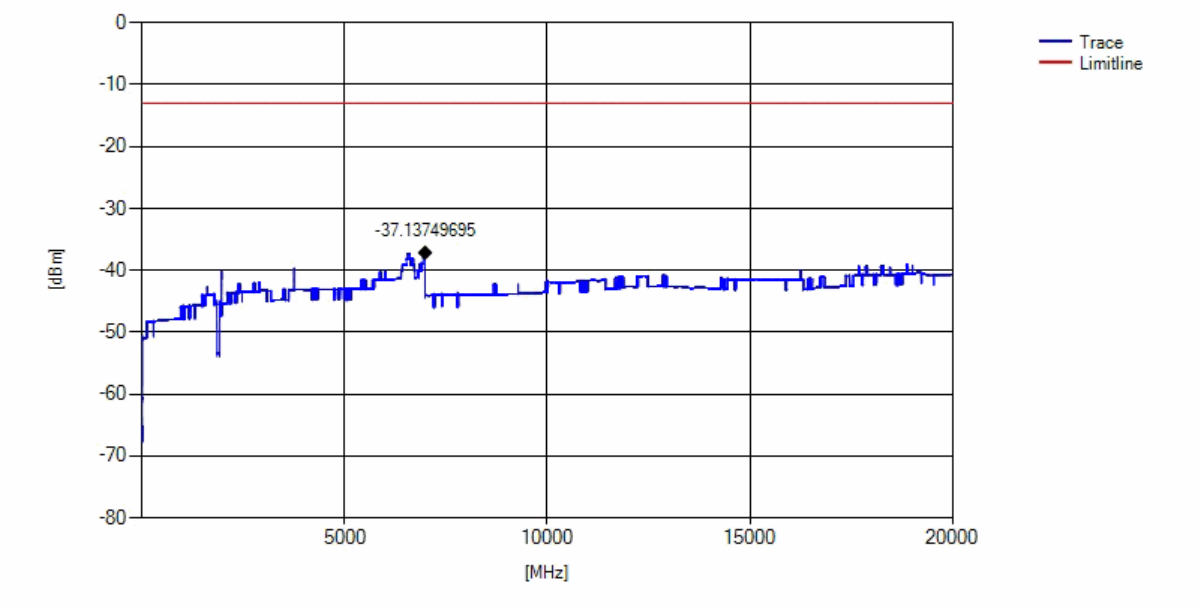
GSM1900 GSM, Channel: mid



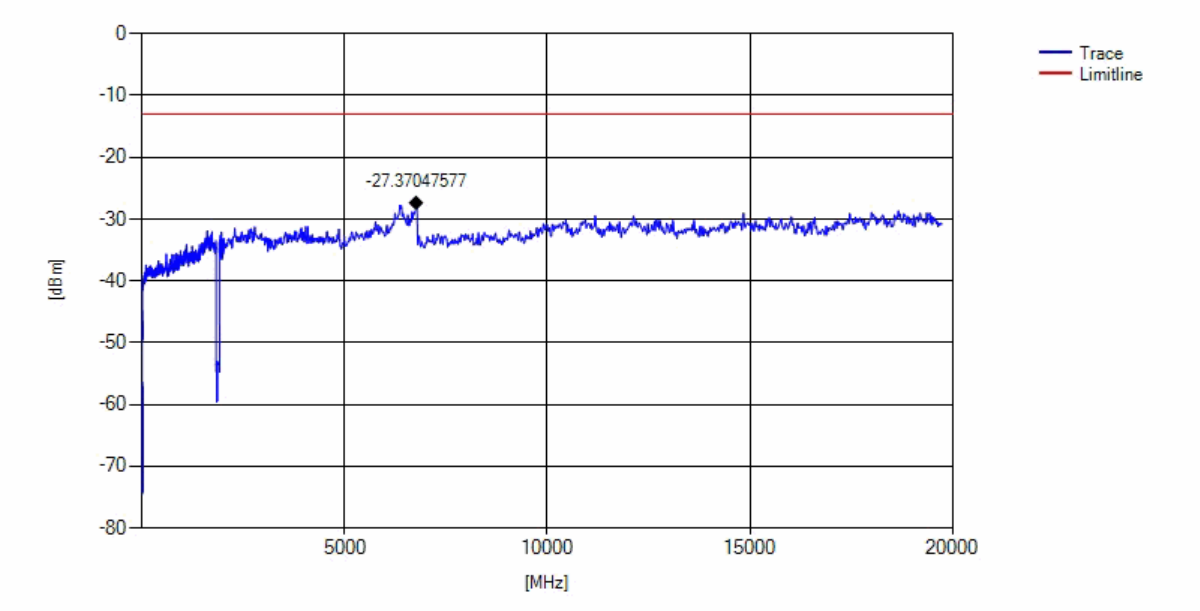
GSM1900 EDGE, Channel: mid



FDDII HSUPA, Channel: mid



eFDDII QPSK, 5MHz, Channel: mid



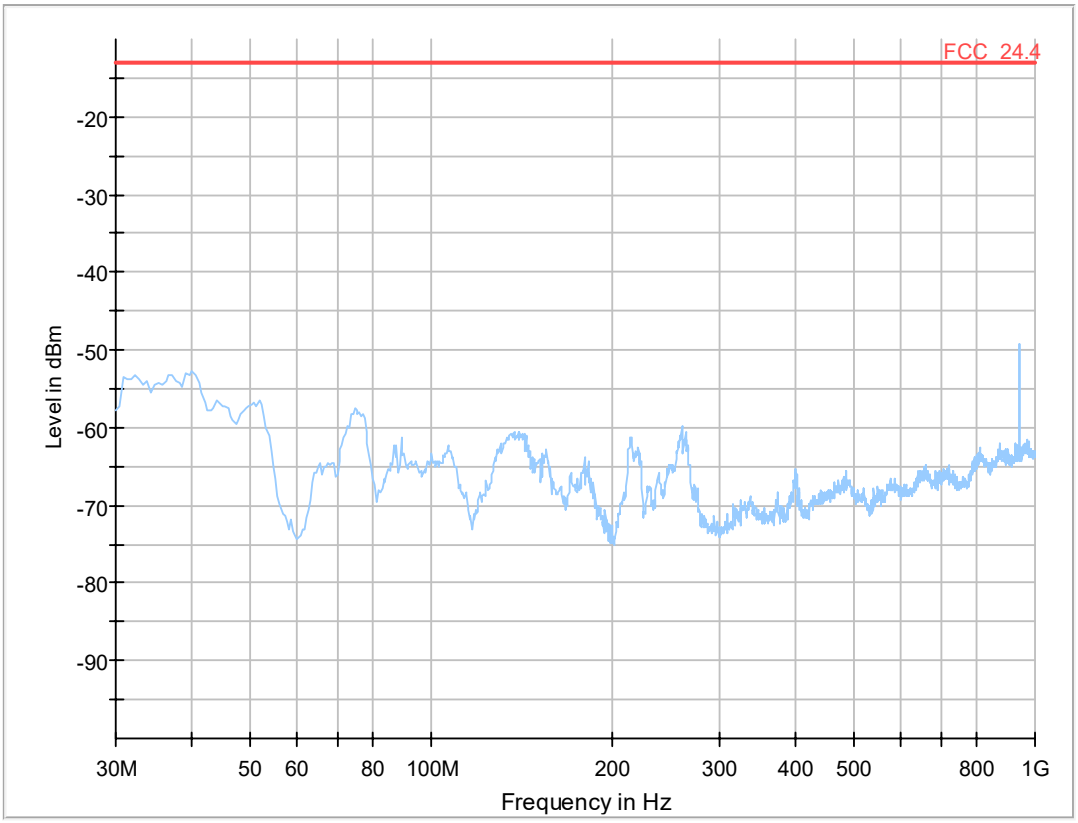
FDDII HSDPA, Channel: mid

3.5.11 24.4 Field strength of spurious radiation §2.1053, §24.238

Test: 24.4; Field strength of spurious radiation Summary §2.1053, §24.238

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/10 8:58
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Detailed Results:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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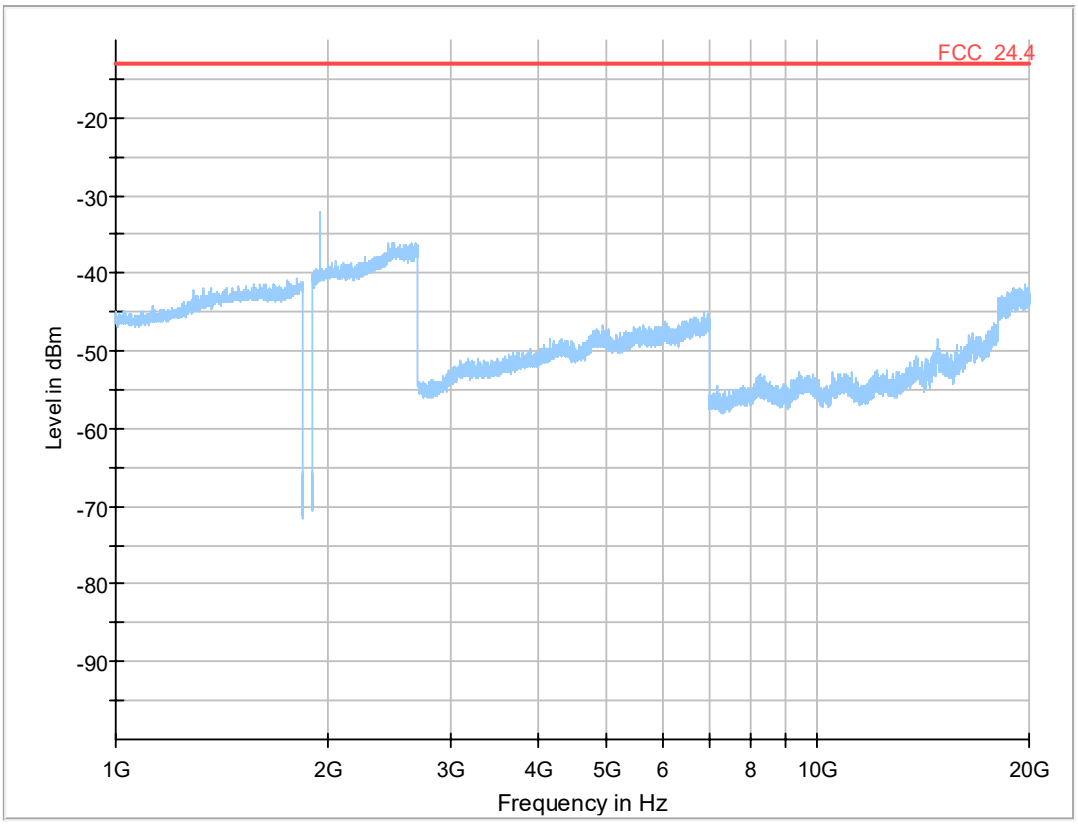
30 MHz - 1GHz: GSM1900 EDGE, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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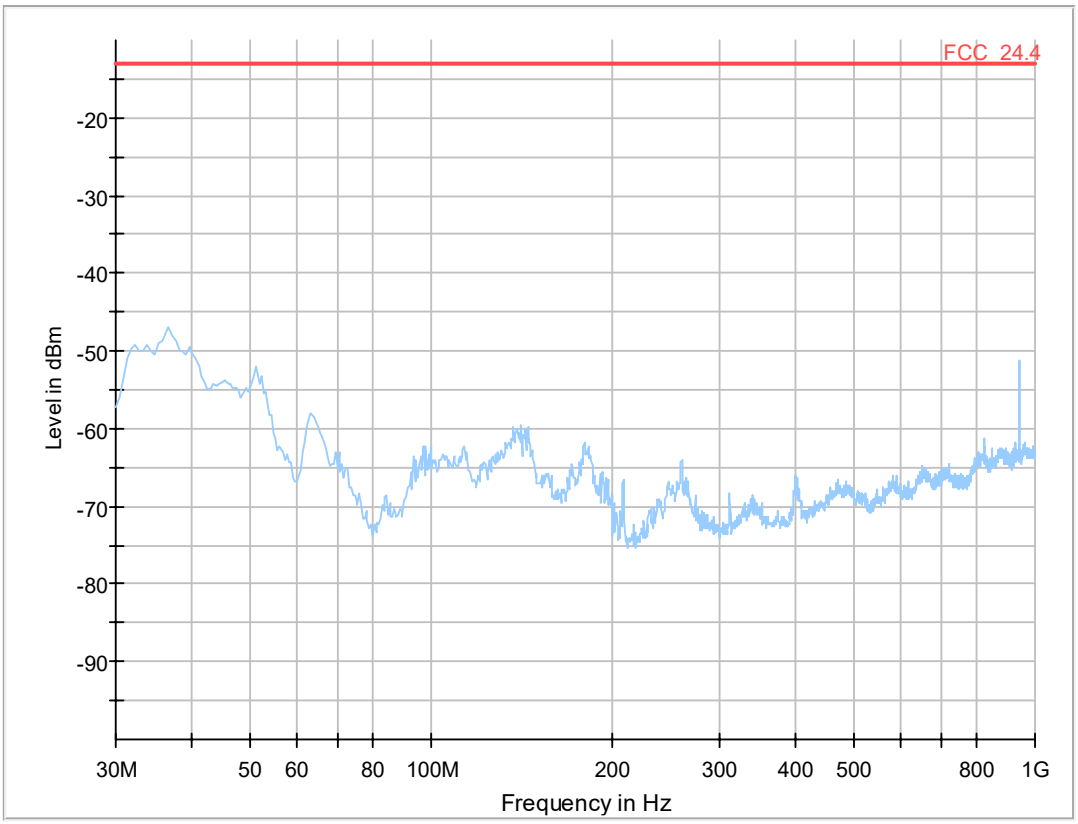
1 GHz - 20GHz: GSM1900 EDGE, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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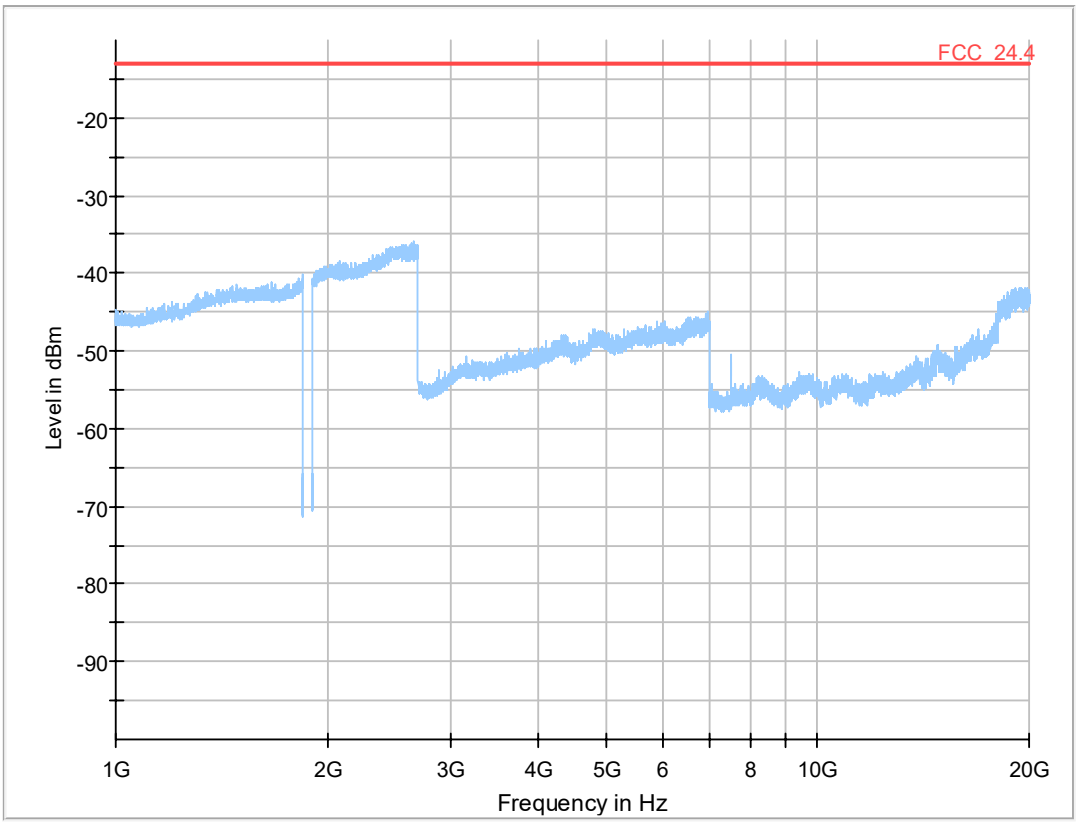
30 MHz - 1GHz: GSM1900, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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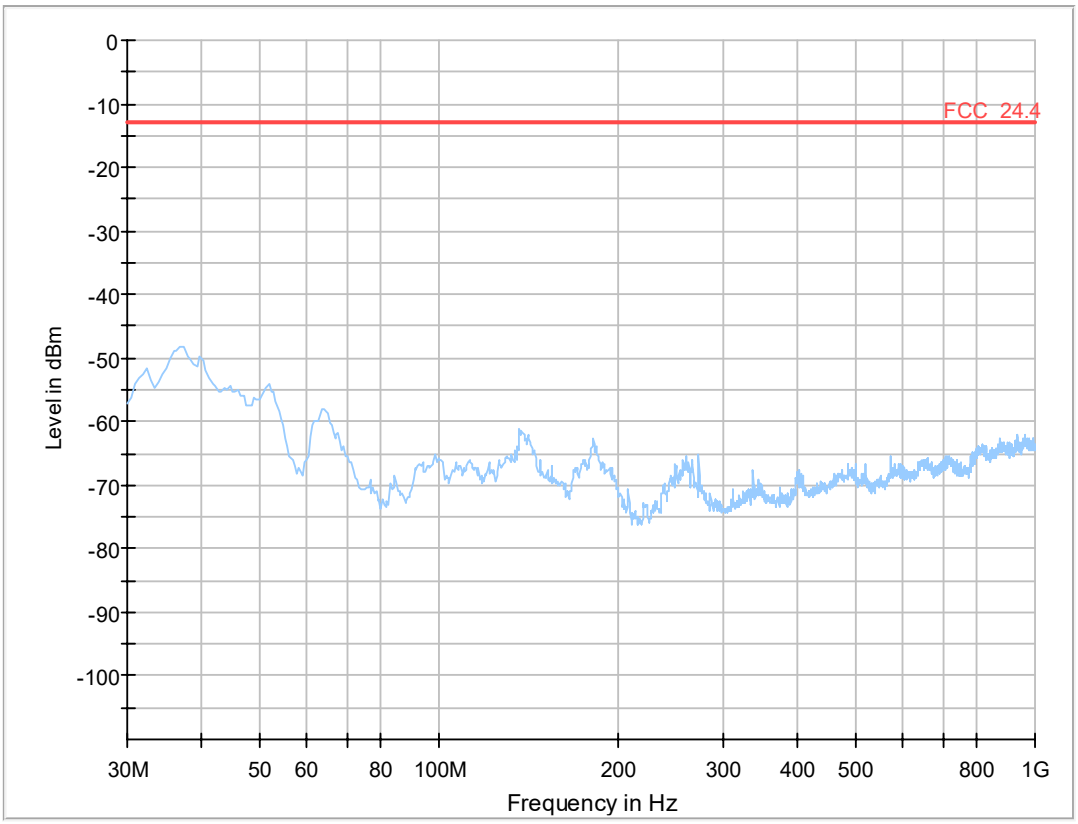
1 GHz - 20GHz: GSM1900, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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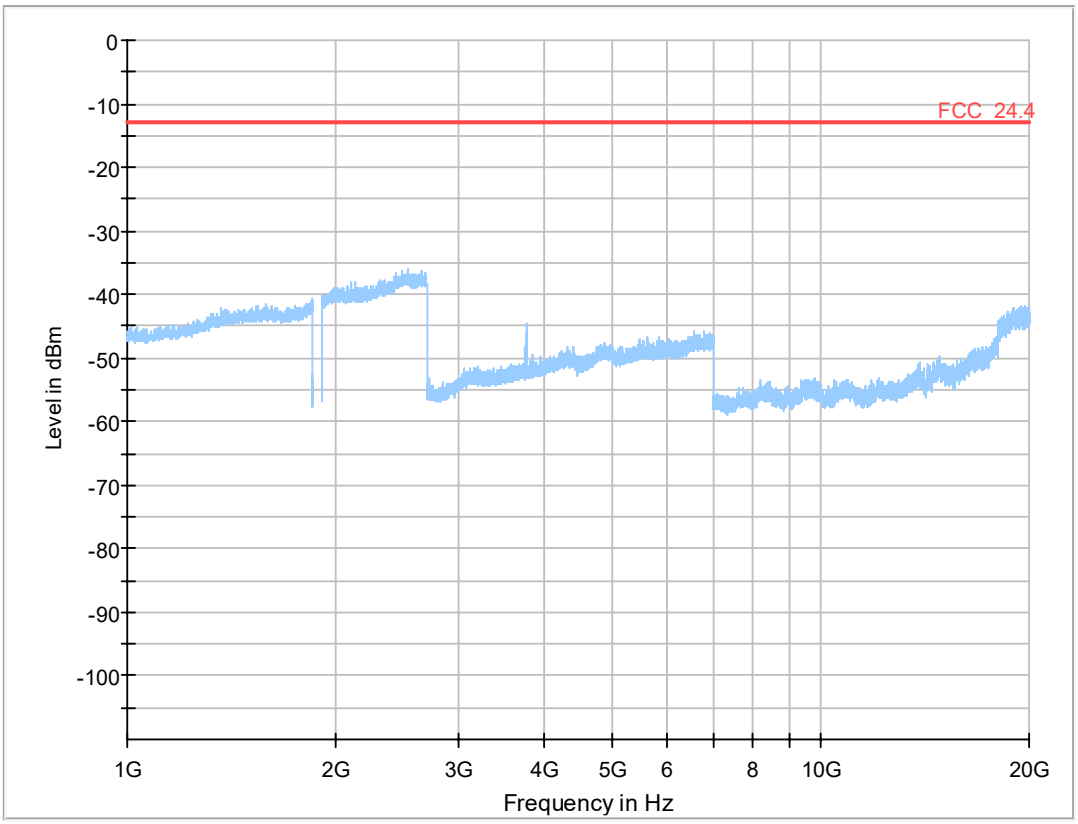
30 MHz - 1GHz: FDD II HSDPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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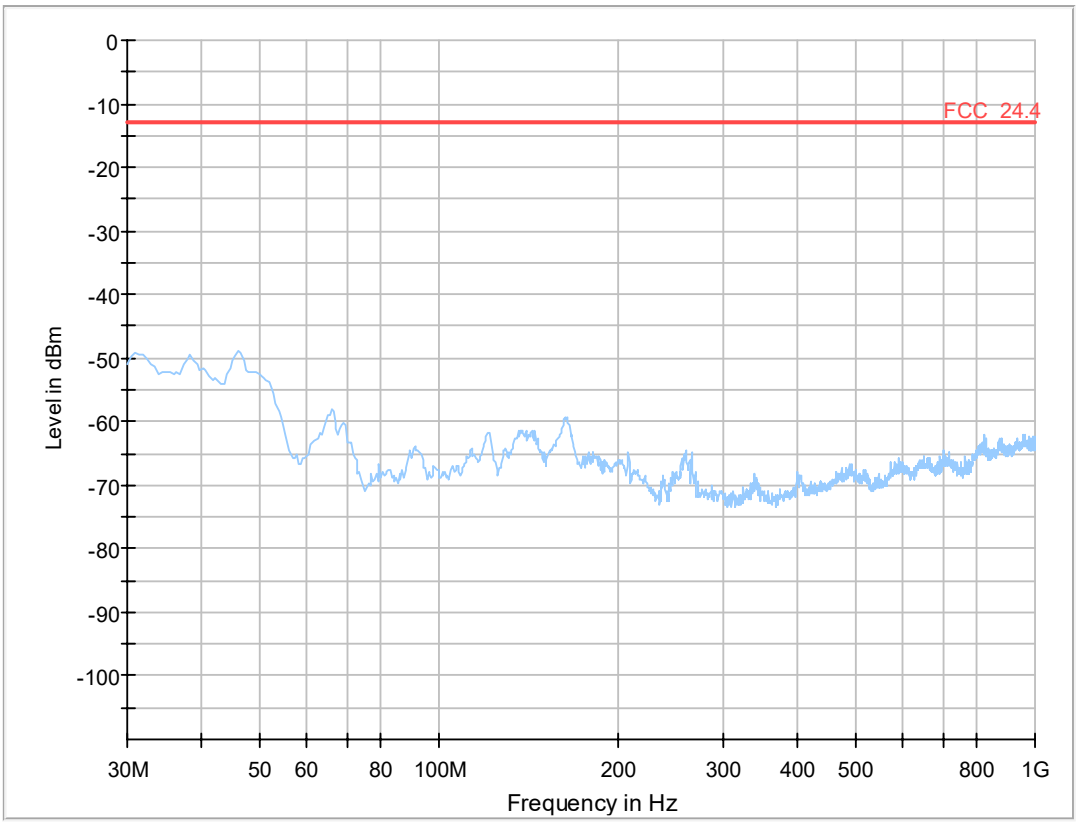
1 GHz - 20GHz: FDD II HSDPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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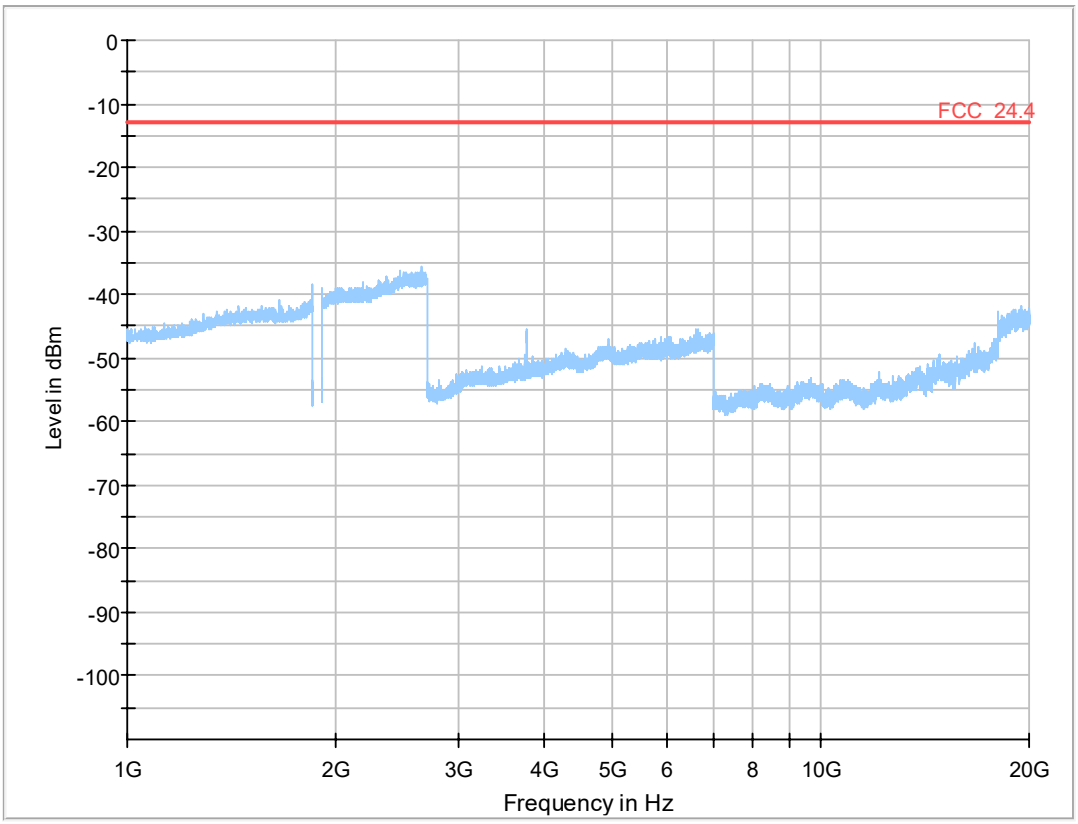
30 MHz - 1GHz: FDD V HSUPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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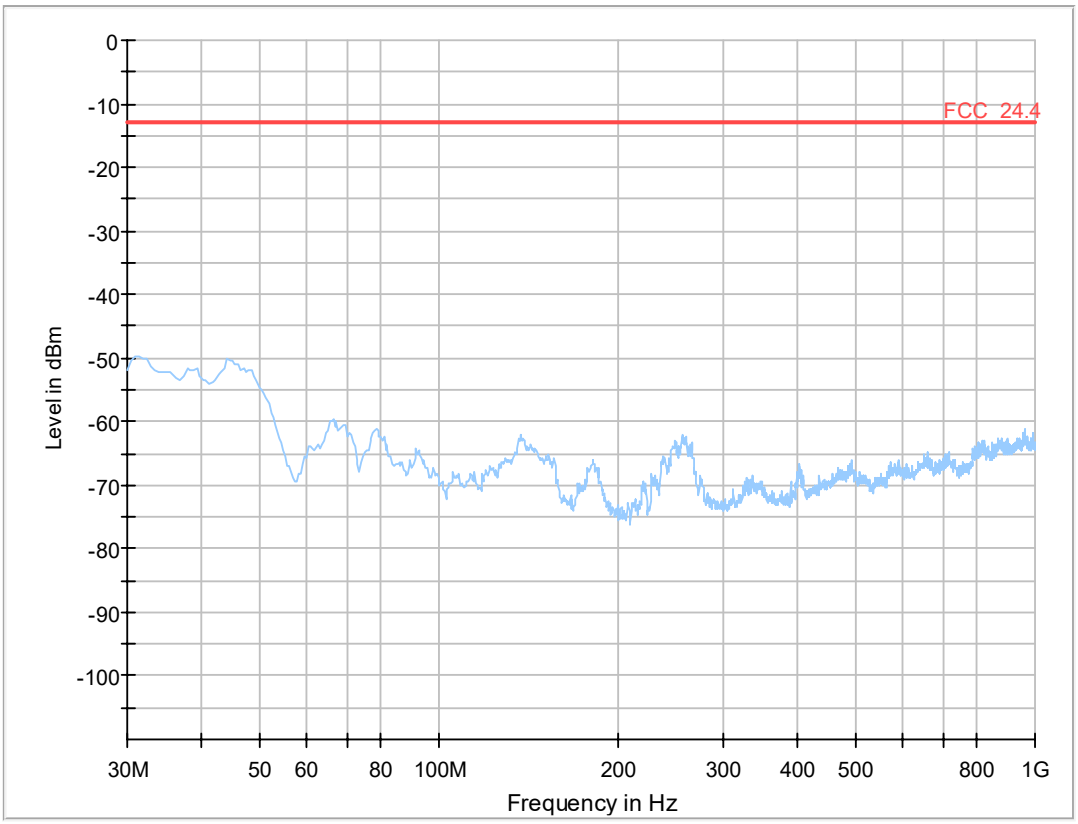
1 GHz - 20GHz: FDD V HSUPA, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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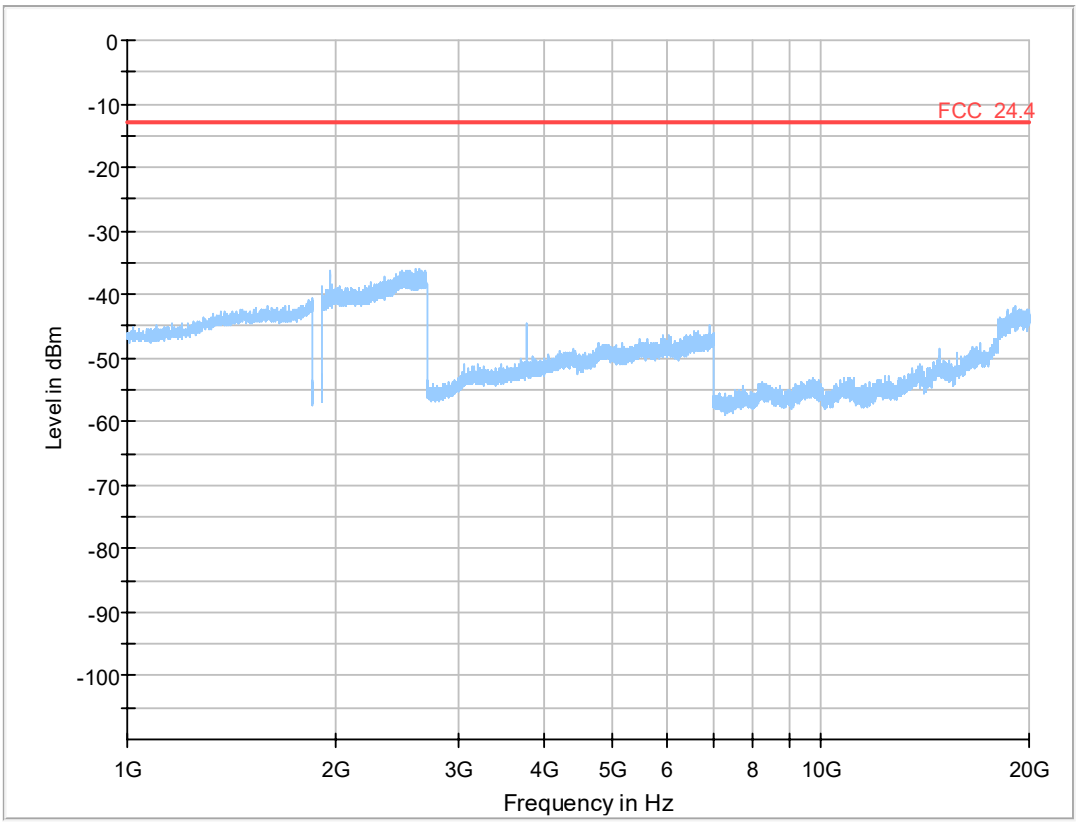
30 MHz - 1GHz: eFDD2, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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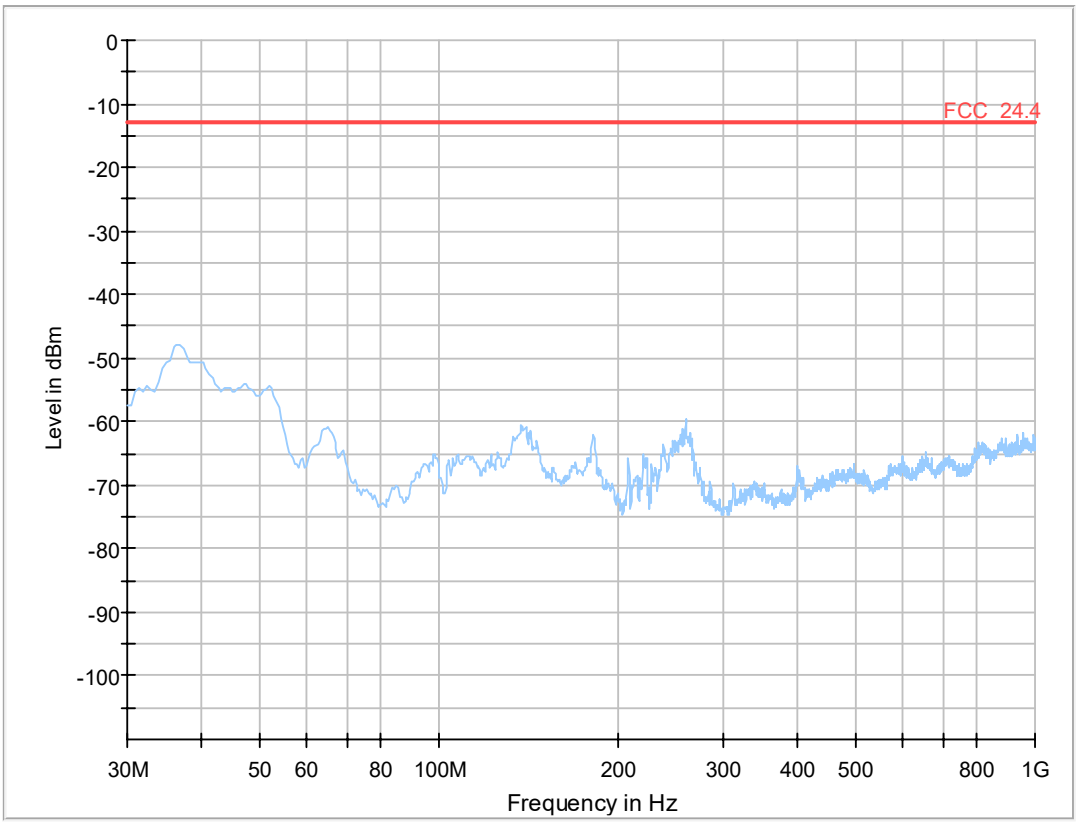
1 GHz - 20GHz: eFDD2, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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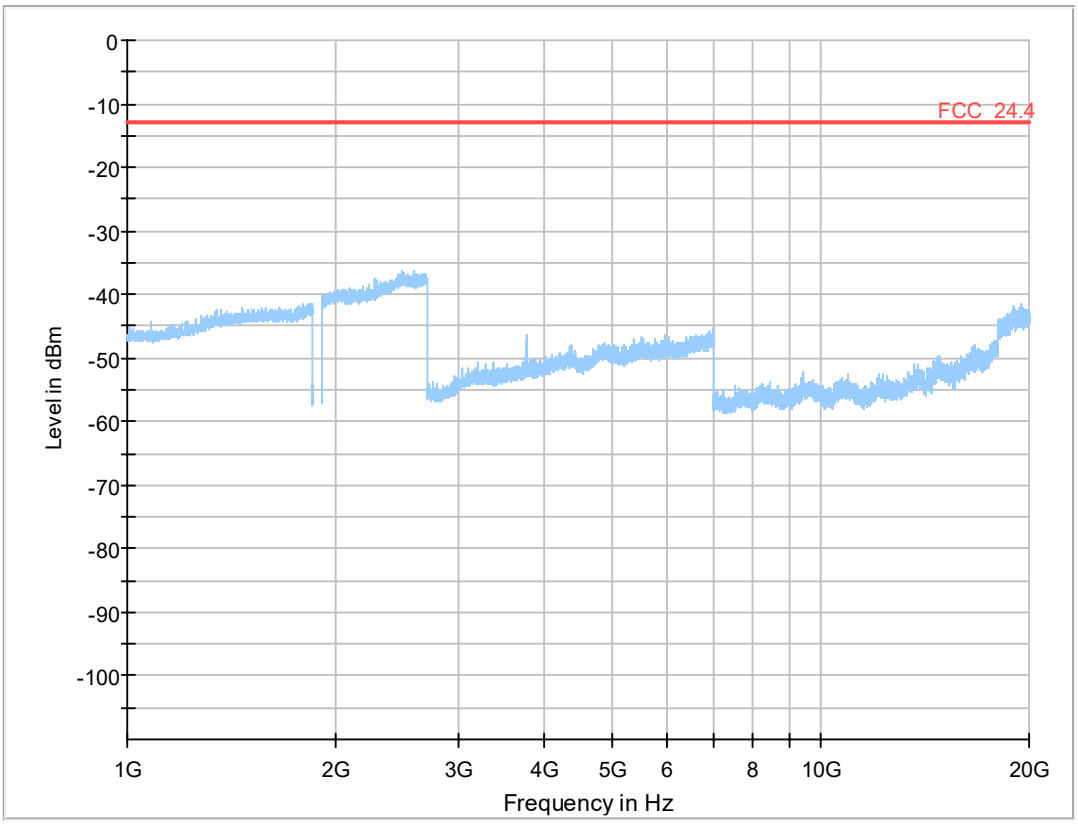
Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

30 MHz - 1GHz: FDD II, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

1 GHz - 20GHz: FDD II, Channel: mid

Test: 24.4; Frequency Band = 1900, Mode = EDGE, Channel = 512, Frequency = 1850.2MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:44
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = 1900, Mode = EDGE, Channel = 661, Frequency = 1880.0MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:44
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = 1900, Mode = EDGE, Channel = 810, Frequency = 1909.8MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:43
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = 1900, Mode = GSM, Channel = 512, Frequency = 1850.2MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:42
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:42
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = 1900, Mode = GSM, Channel = 810, Frequency = 1909.8MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:43
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = eFDD2, Mode = QPSK 5MHz, Channel = 18625, Frequency = 1852.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:48
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = eFDD2, Mode = QPSK 5MHz, Channel = 18900, Frequency = 1880MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:49
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = eFDD2, Mode = QPSK 5MHz, Channel = 19175, Frequency = 1907.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:49
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = HSDPA, Channel = 9262, Frequency = 1852.4MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:47
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = HSDPA, Channel = 9400, Frequency = 1880MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:48
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = HSDPA, Channel = 9538, Frequency = 1907.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:47
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = HSUPA, Channel = 9262, Frequency = 1852.4MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:46
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = HSUPA, Channel = 9400, Frequency = 1880MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:46
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = HSUPA, Channel = 9538, Frequency = 1907.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:46
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = W-CDMA, Channel = 9262, Frequency = 1852.4MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:45
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = W-CDMA, Channel = 9400, Frequency = 1880MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:45
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Test: 24.4; Frequency Band = FDD2, Mode = W-CDMA, Channel = 9538, Frequency = 1907.6MHz

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:45
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

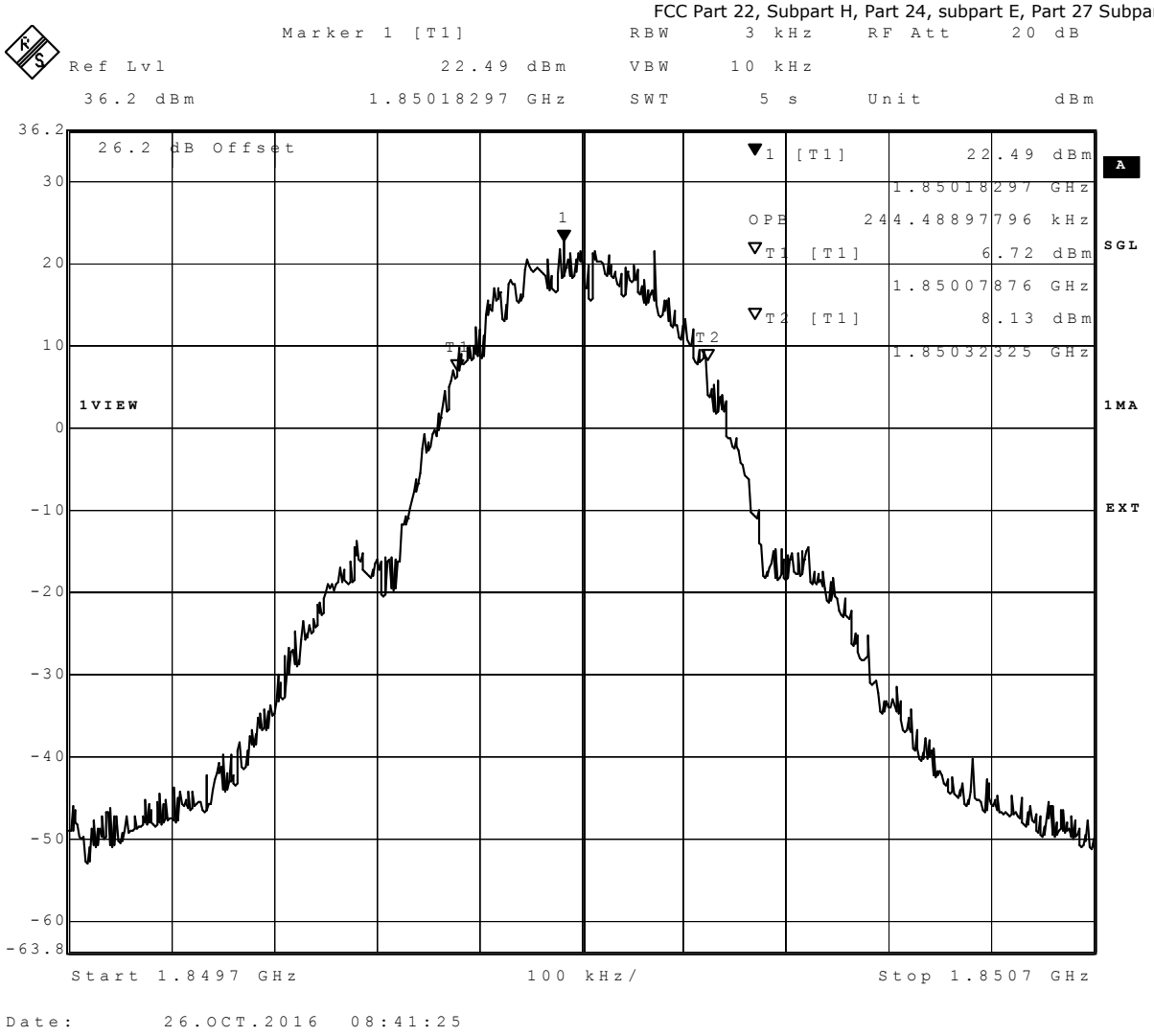
3.5.12 24.5 Emission and Occupied Bandwidth §2.1049, §24.238

Test: 24.5; Emission and Occupied Bandwidth Summary §2.1049, §24.238

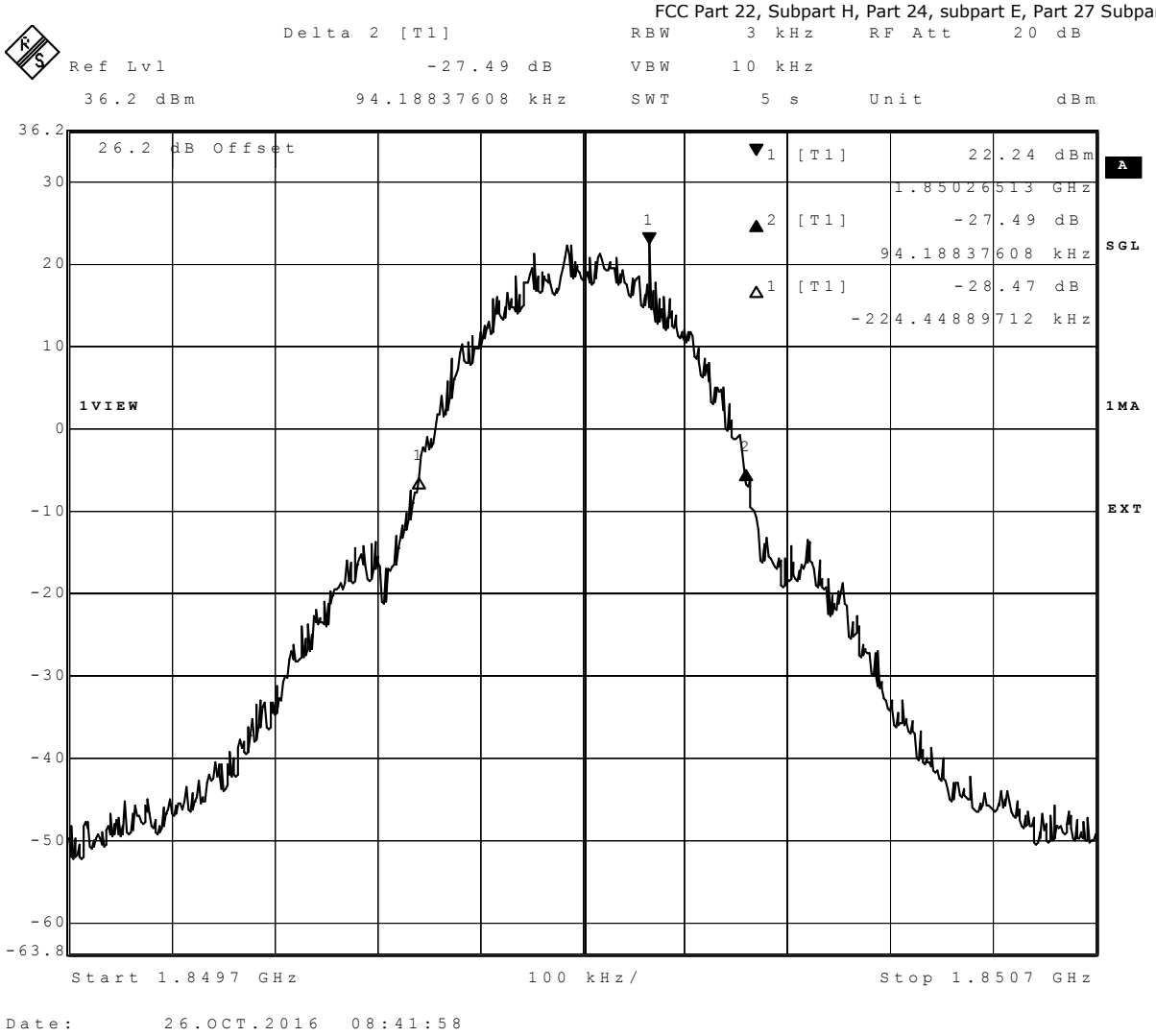
Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 8:47
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Detailed Results:

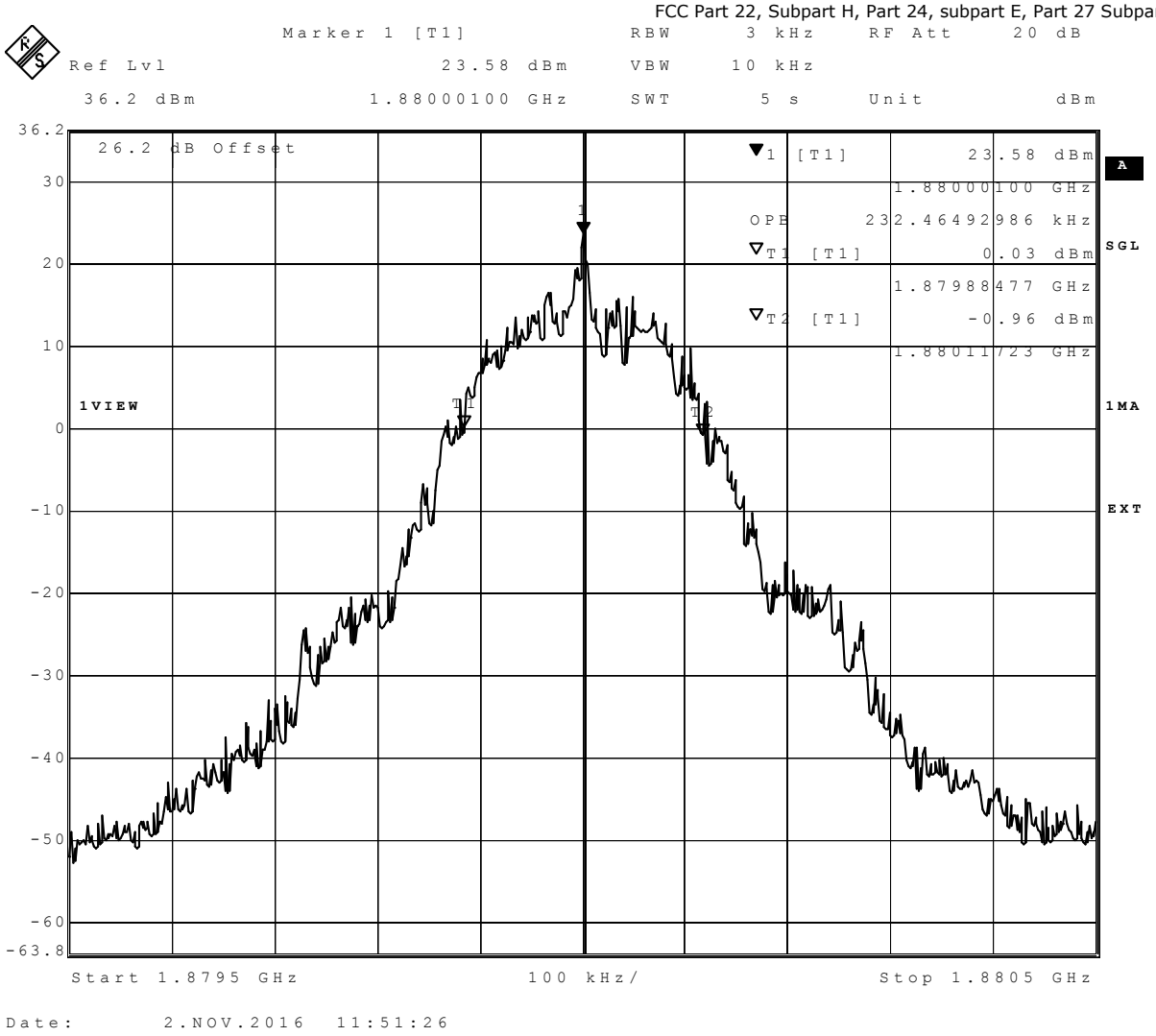
Emission and Occupied Bandwidth						
Ambient temperature:	26 °C					
Relative humidity:	35%					
Radio Technology	**Channel**	**Ressource Blocks**	**Bandwidth (MHz)**	**Nominal BW [MHz]**	**26 dB BW [kHz]**	**99 % BW [kHz]**
GSM 1900	low	-	0.2	0.2	318.64	244.49
GSM 1900	mid	-	0.2	0.2	312.63	246.49
GSM 1900	high	-	0.2	0.2	308.62	246.49
GSM 1900 EDGE	low	-	0.2	0.2	280.56	236.47
GSM 1900 EDGE	mid	-	0.2	0.2	282.57	232.46
GSM 1900 EDGE	high	-	0.2	0.2	276.55	230.46
FDD II	low	-	5	5	4689.38	4088.18
FDD II	mid	-	5	5	4669.34	4068.14
FDD II	high	-	5	5	4669.34	4088.18
FDD II HSDPA Subtest 1	low	-	5	5	4709.42	4068.14
FDD II HSDPA Subtest 1	mid	-	5	5	4689.39	4068.14
FDD II HSDPA Subtest 1	high	-	5	5	4669.34	4068.14
FDD II HSUPA Subtest 1	low	-	5	5	4689.39	4108.22
FDD II HSUPA Subtest 1	mid	-	5	5	4709.42	4088.18
FDD II HSUPA Subtest 1	high	-	5	5	4689.38	4088.18
FDD II HSUPA Subtest 5	low	-	5	5	4709.42	4108.22
FDD II HSUPA Subtest 5	mid	-	5	5	4689.38	4088.18
FDD II HSUPA Subtest 5	high	-	5	5	4709.42	4088.18
eFDD 2 QPSK	low	6	1.4	1.4	-	1112.22
eFDD 2 QPSK	mid	6	1.4	1.4	-	1106.21
eFDD 2 QPSK	high	6	1.4	1.4	-	1118.24
eFDD 2 16QAM	low	6	1.4	1.4	-	1106.21
eFDD 2 16QAM	mid	6	1.4	1.4	-	1124.25
eFDD 2 16QAM	high	6	1.4	1.4	-	1112.22
eFDD 2 QPSK	low	15	3	3	-	2765.53
eFDD 2 QPSK	mid	15	3	3	-	2765.53
eFDD 2 QPSK	high	15	3	3	-	2765.53
eFDD 2 16QAM	low	15	3	3	-	2765.53
eFDD 2 16QAM	mid	15	3	3	-	2765.53
eFDD 2 16QAM	high	15	3	3	-	2765.53
eFDD 2 QPSK	low	25	5	5	-	4549.1
eFDD 2 QPSK	mid	25	5	5	-	4529.06
eFDD 2 QPSK	high	25	5	5	-	4509.02
eFDD 2 16QAM	low	25	5	5	-	4529.06
eFDD 2 16QAM	mid	25	5	5	-	4549.1
eFDD 2 16QAM	high	25	5	5	-	4549.1
eFDD 2 QPSK	low	50	10	10	-	9058.12
eFDD 2 QPSK	mid	50	10	10	-	9018.04
eFDD 2 QPSK	high	50	10	10	-	9058.12
eFDD 2 16QAM	low	50	10	10	-	9058.12
eFDD 2 16QAM	mid	50	10	10	-	9058.12
eFDD 2 16QAM	high	50	10	10	-	9018.04
eFDD 2 QPSK	low	75	15	15	-	13707.41
eFDD 2 QPSK	mid	75	15	15	-	13527.05
eFDD 2 QPSK	high	75	15	15	-	13527.05
eFDD 2 16QAM	low	75	15	15	-	13647.29
eFDD 2 16QAM	mid	75	15	15	-	13587.17
eFDD 2 16QAM	high	75	15	15	-	13527.05
eFDD 2 QPSK	low	100	20	20	-	18196.39
eFDD 2 QPSK	mid	100	20	20	-	18196.39
eFDD 2 QPSK	high	100	20	20	-	18196.39
eFDD 2 16QAM	low	100	20	20	-	18196.39
eFDD 2 16QAM	mid	100	20	20	-	18116.23
eFDD 2 16QAM	high	100	20	20	-	18196.39



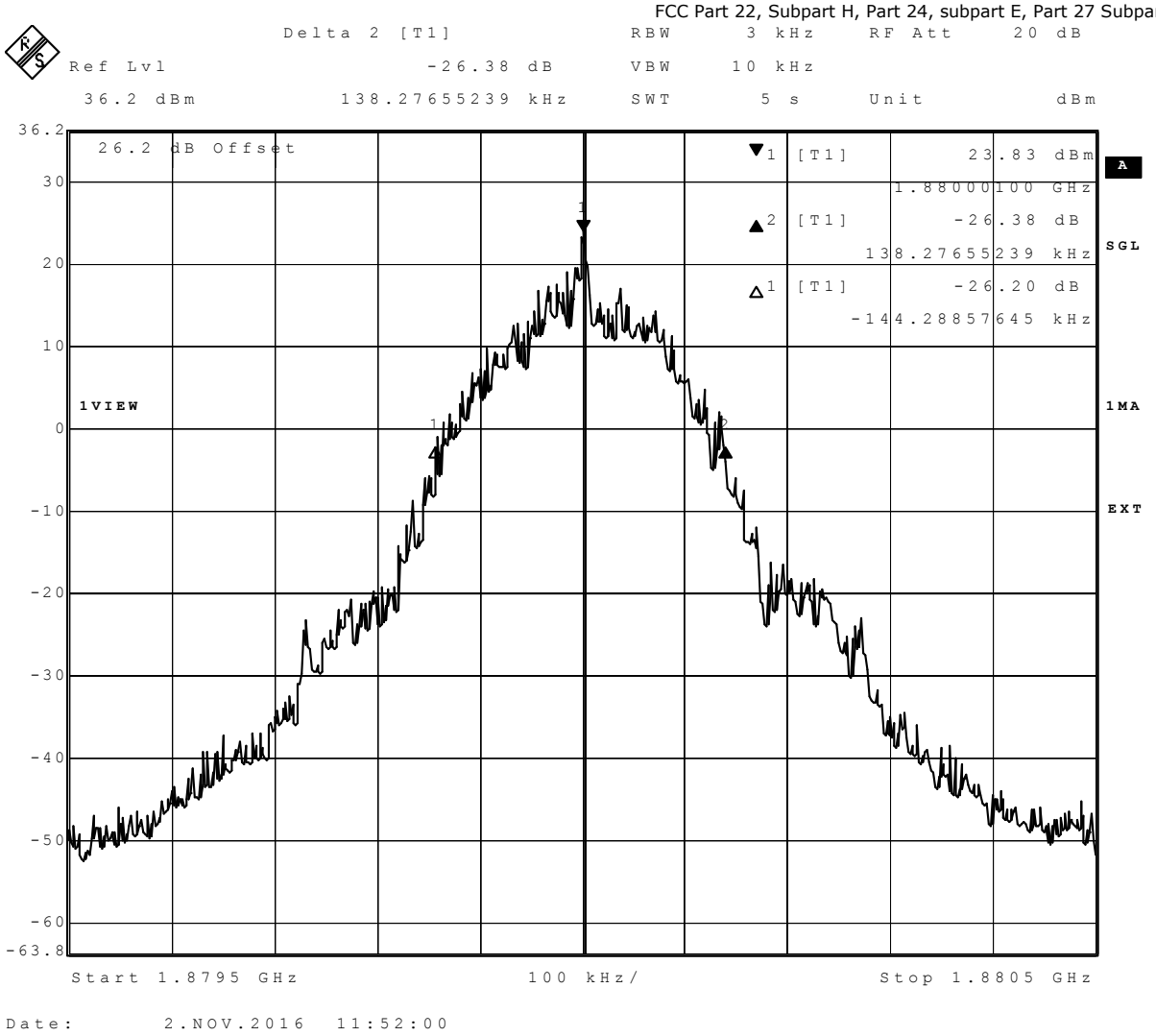
GSM1900 26dB, Channel: low



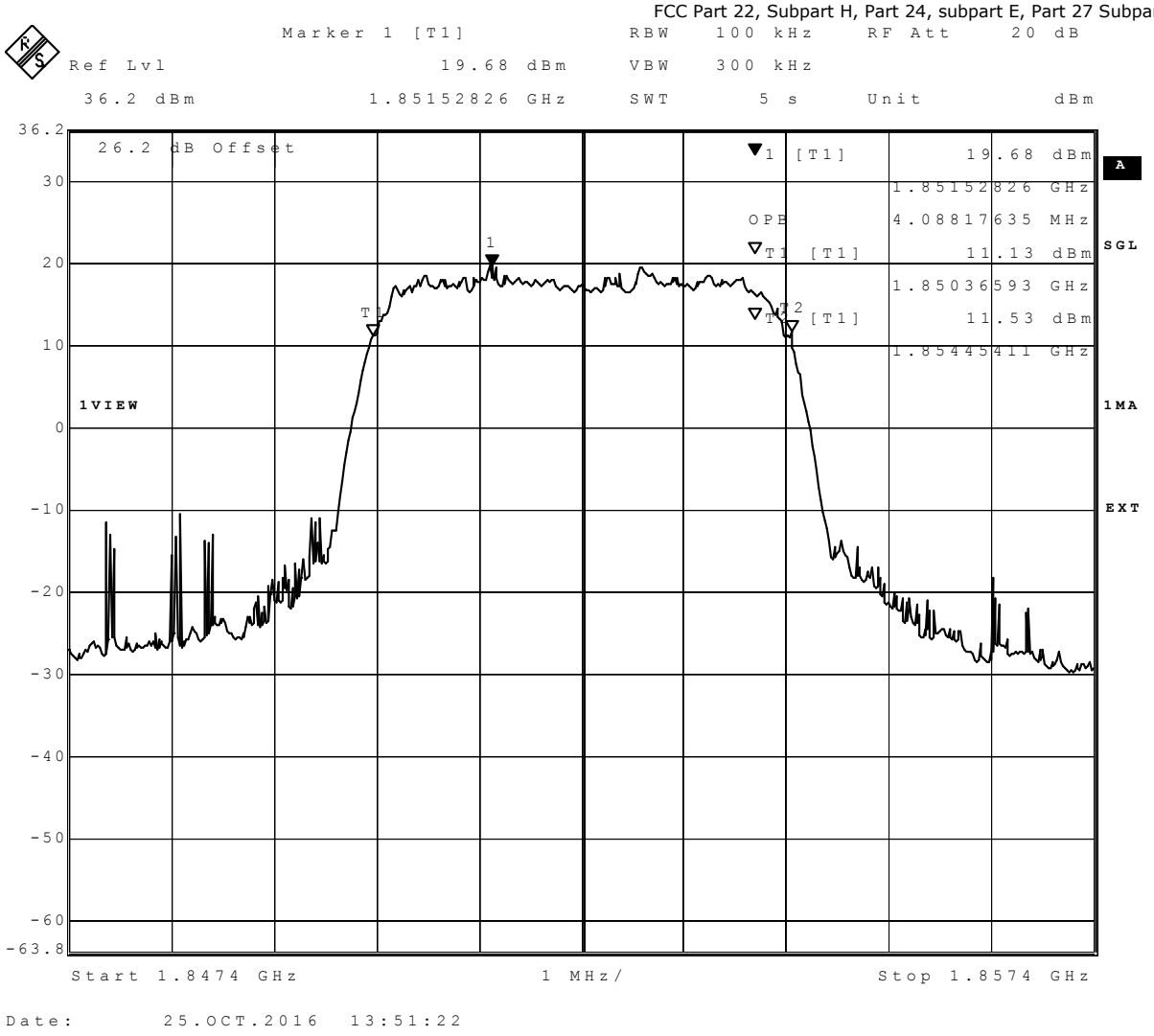
GSM1900 99%, Channel: low



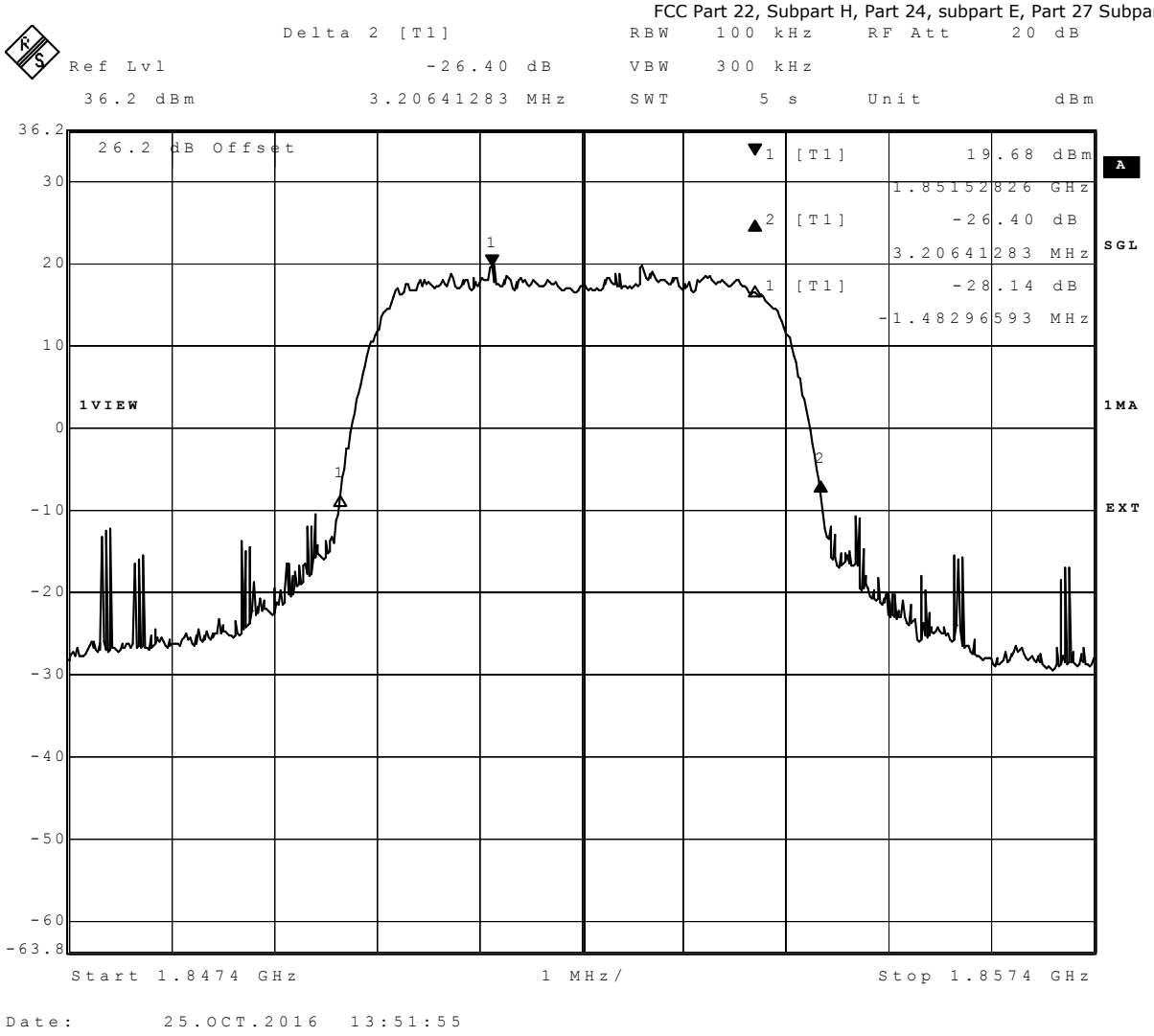
GSM1900 EDGE 26dB, Channel: mid



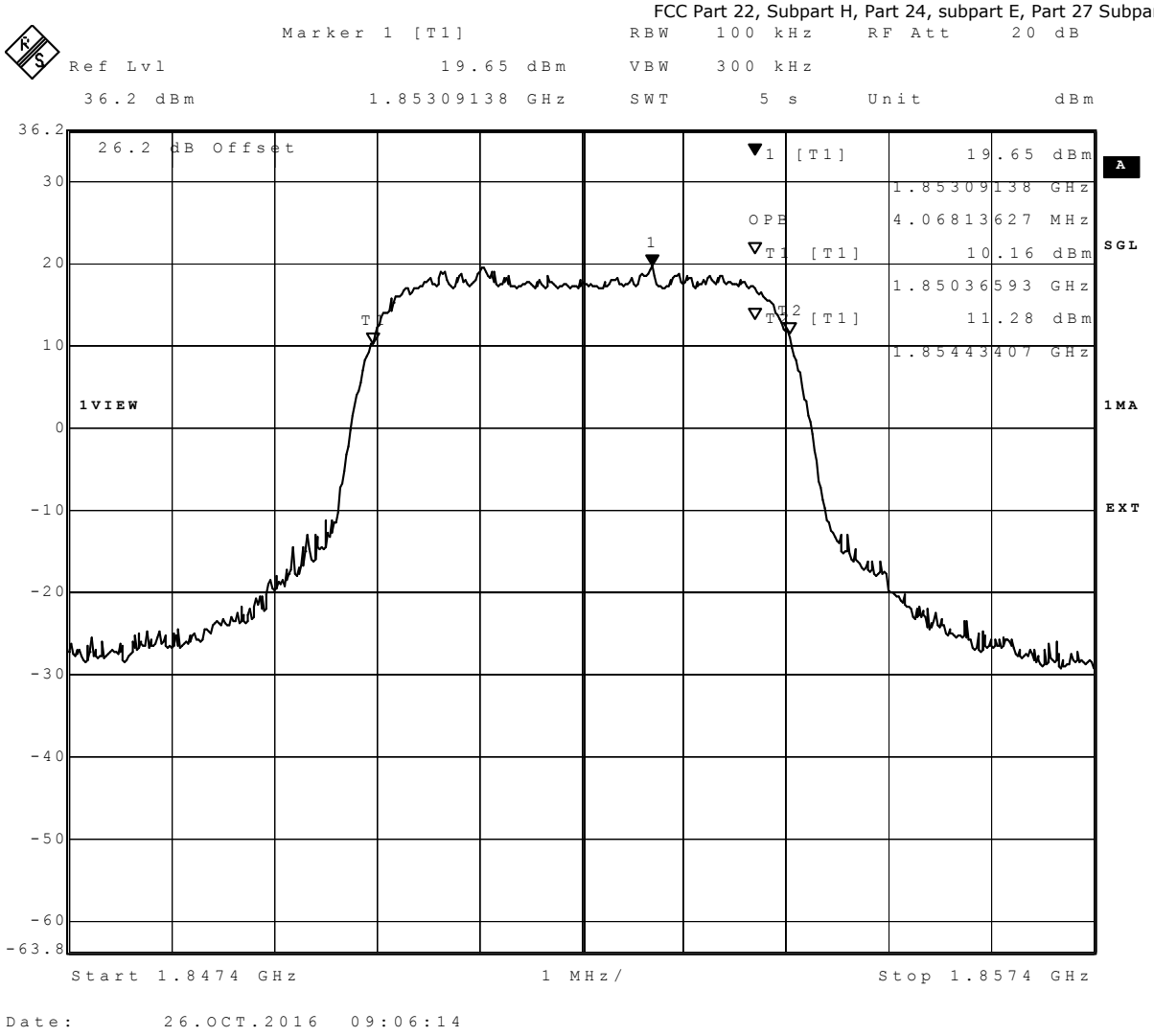
GSM1900 EDGE 99%, Channel: mid



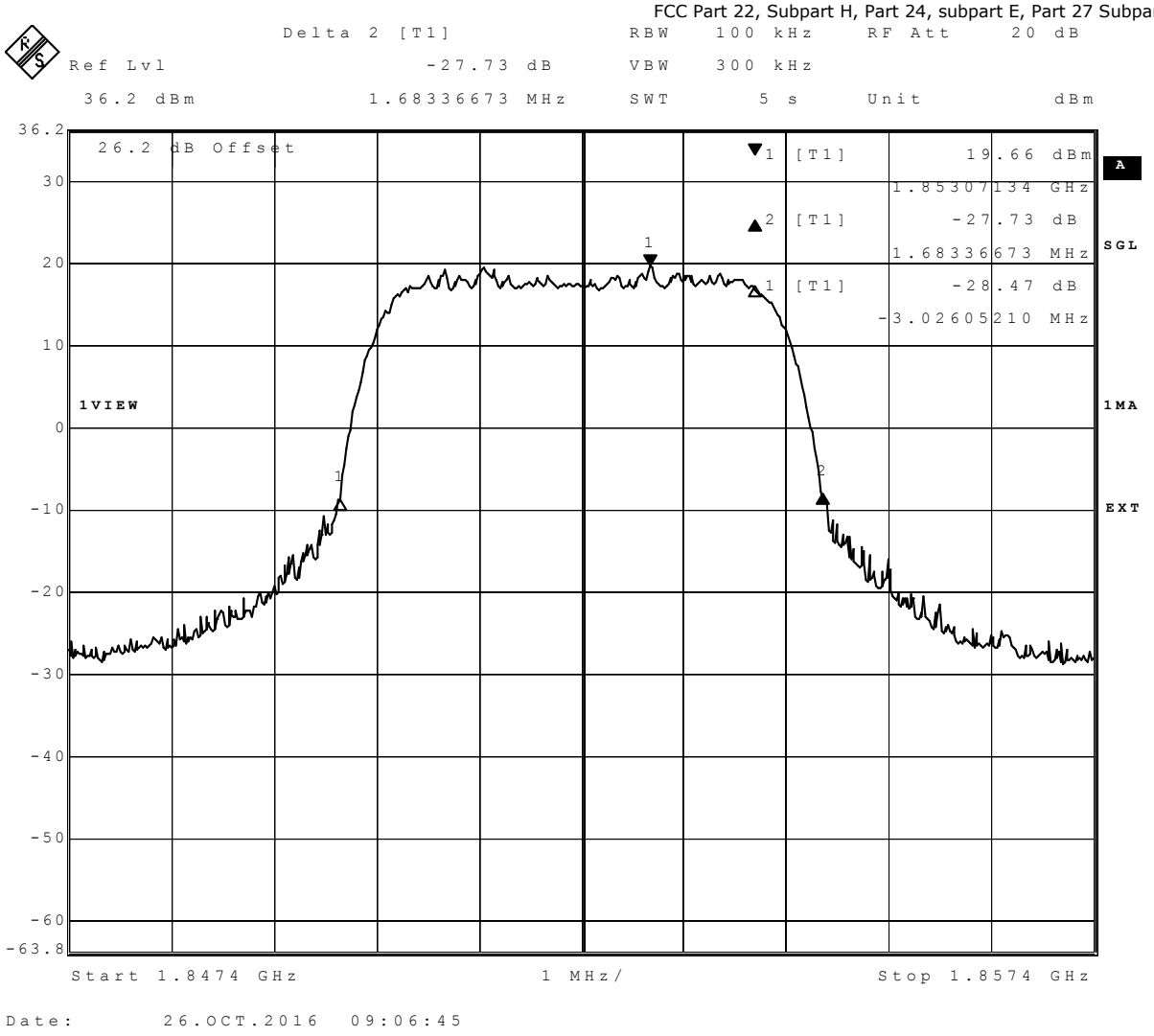
FDDII 26dB, Channel: low



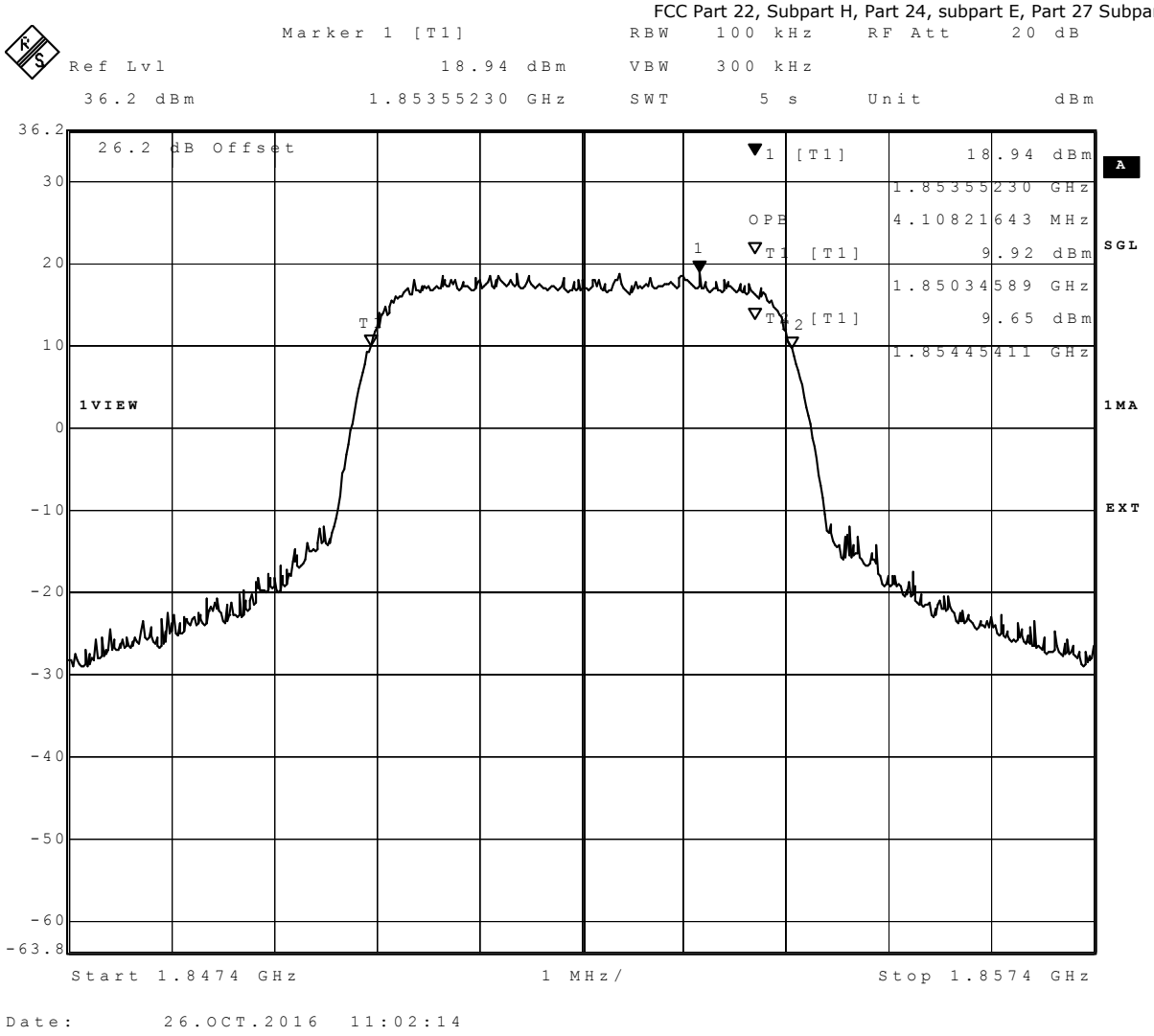
FDDII 99%, Channel: low



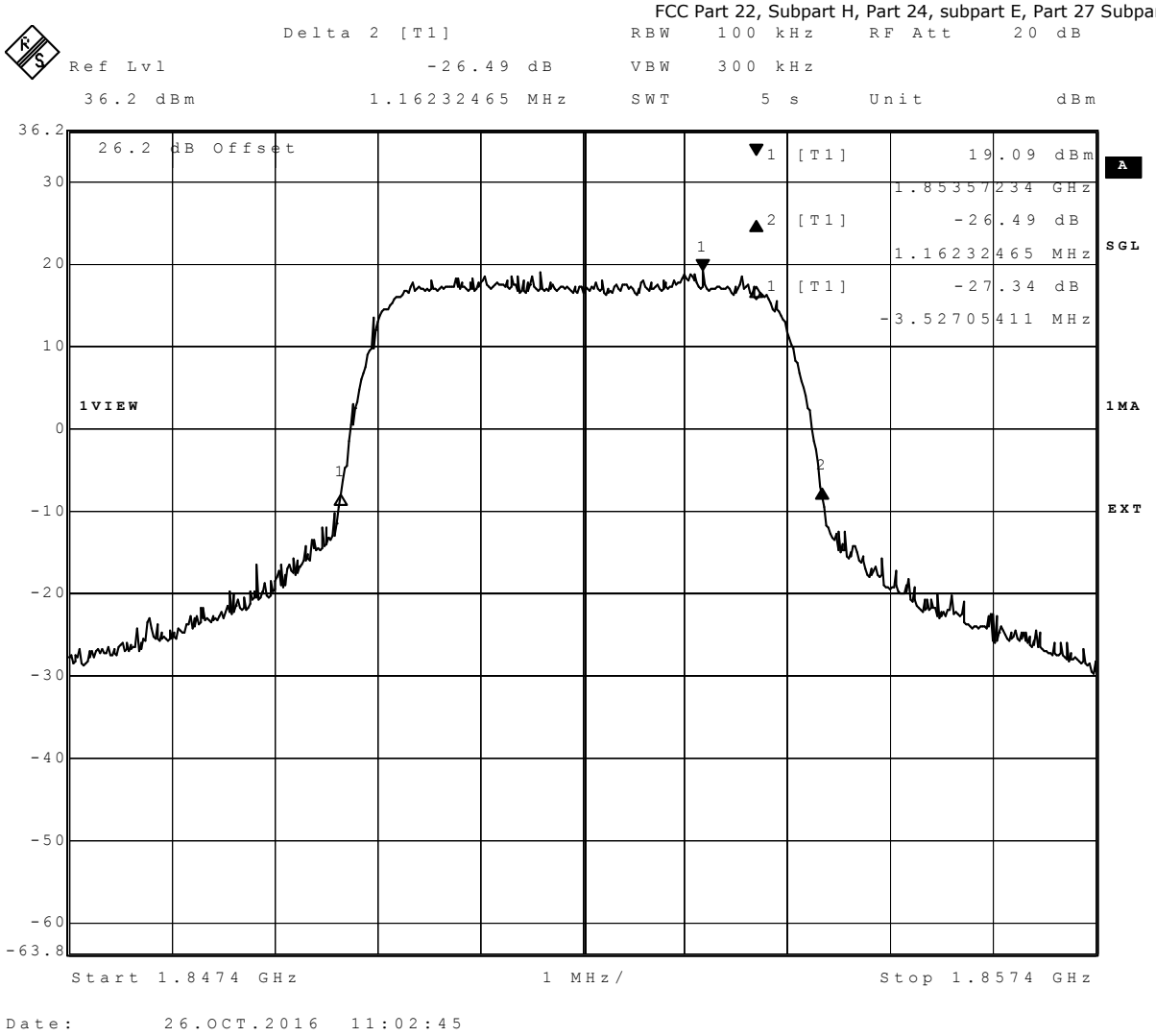
FDDII HSDPA 26dB, Channel: low



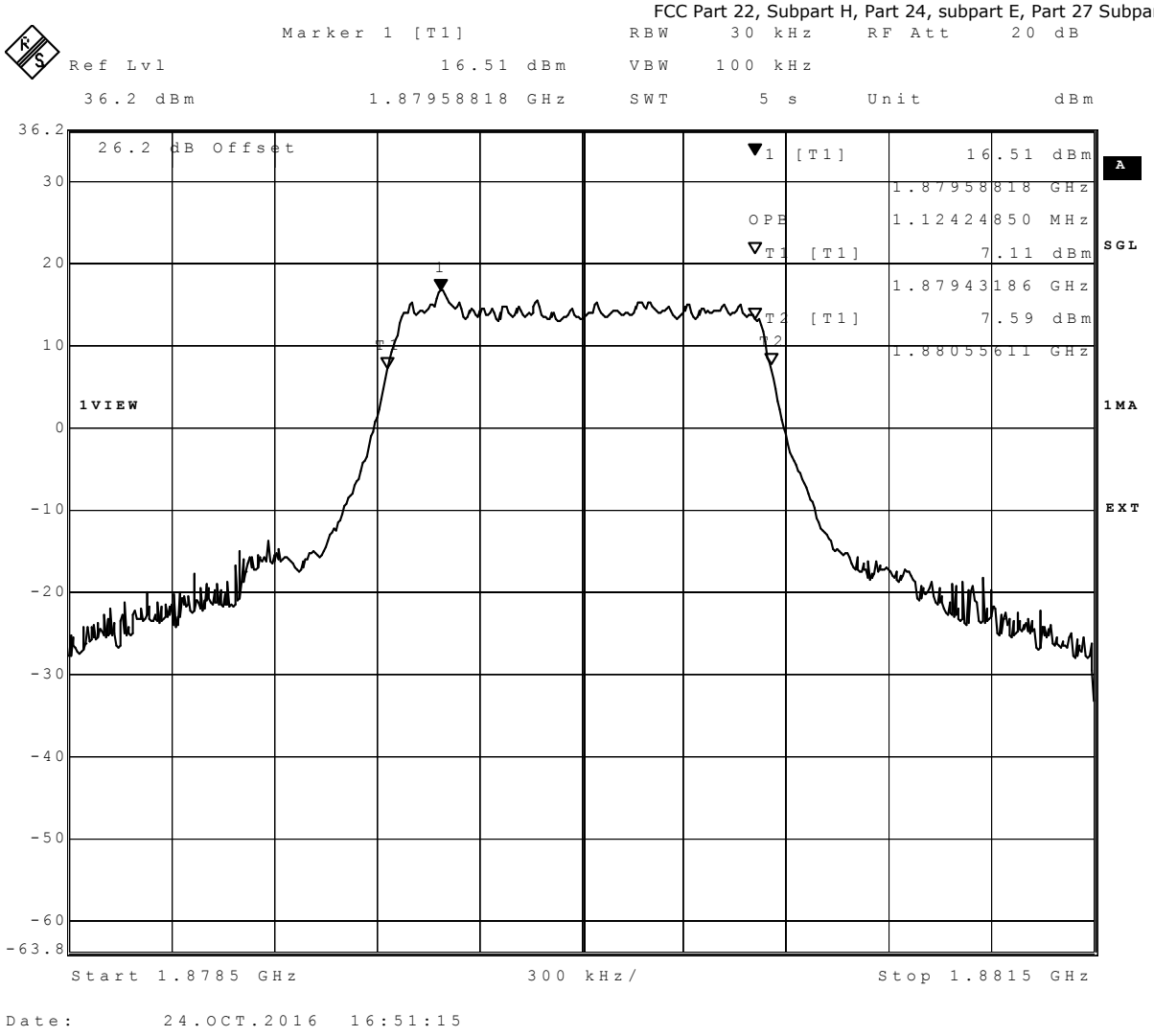
FDDII HSDPA 99%, Channel: low



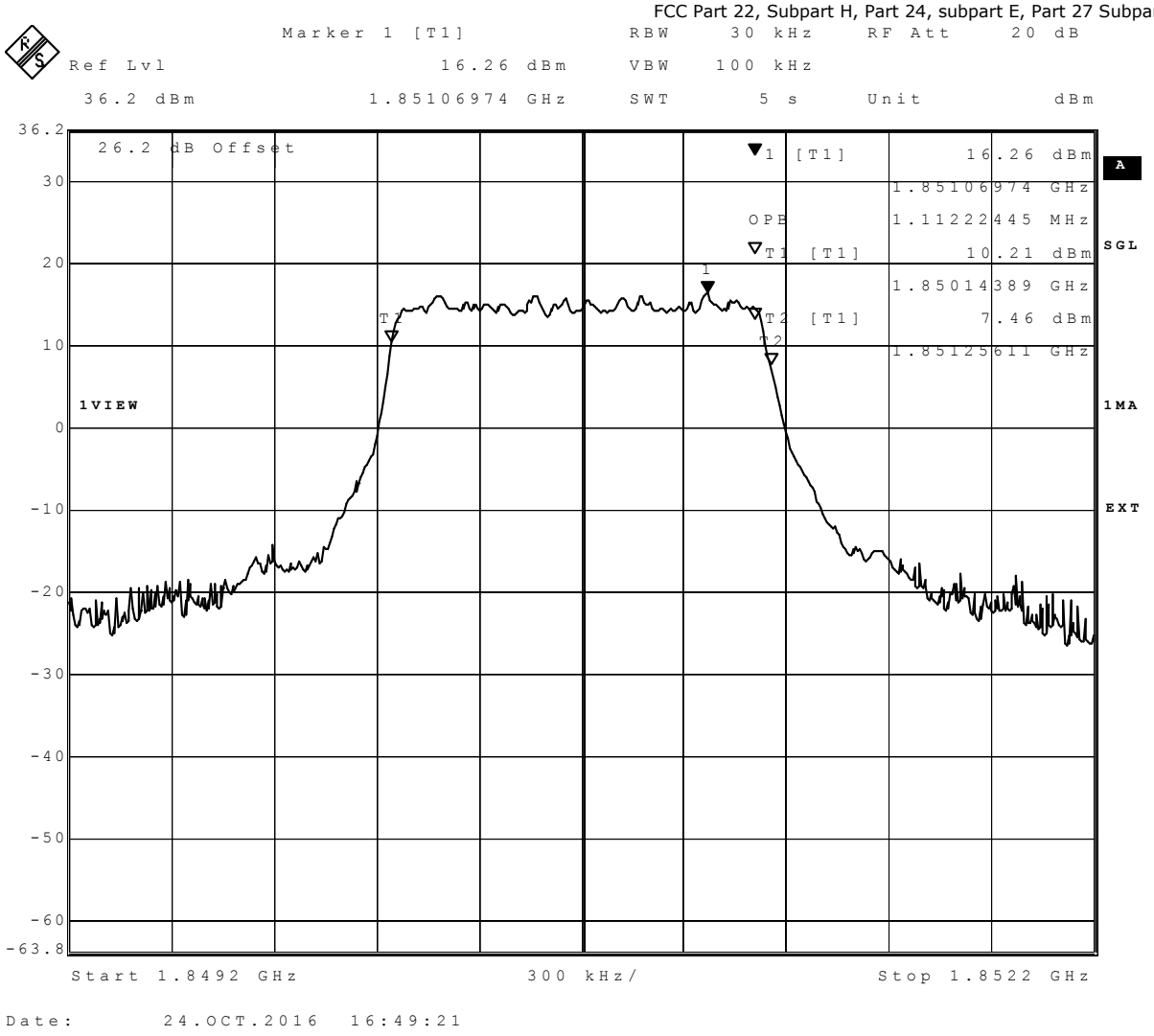
FDDII HSUPA 26dB, Channel: low



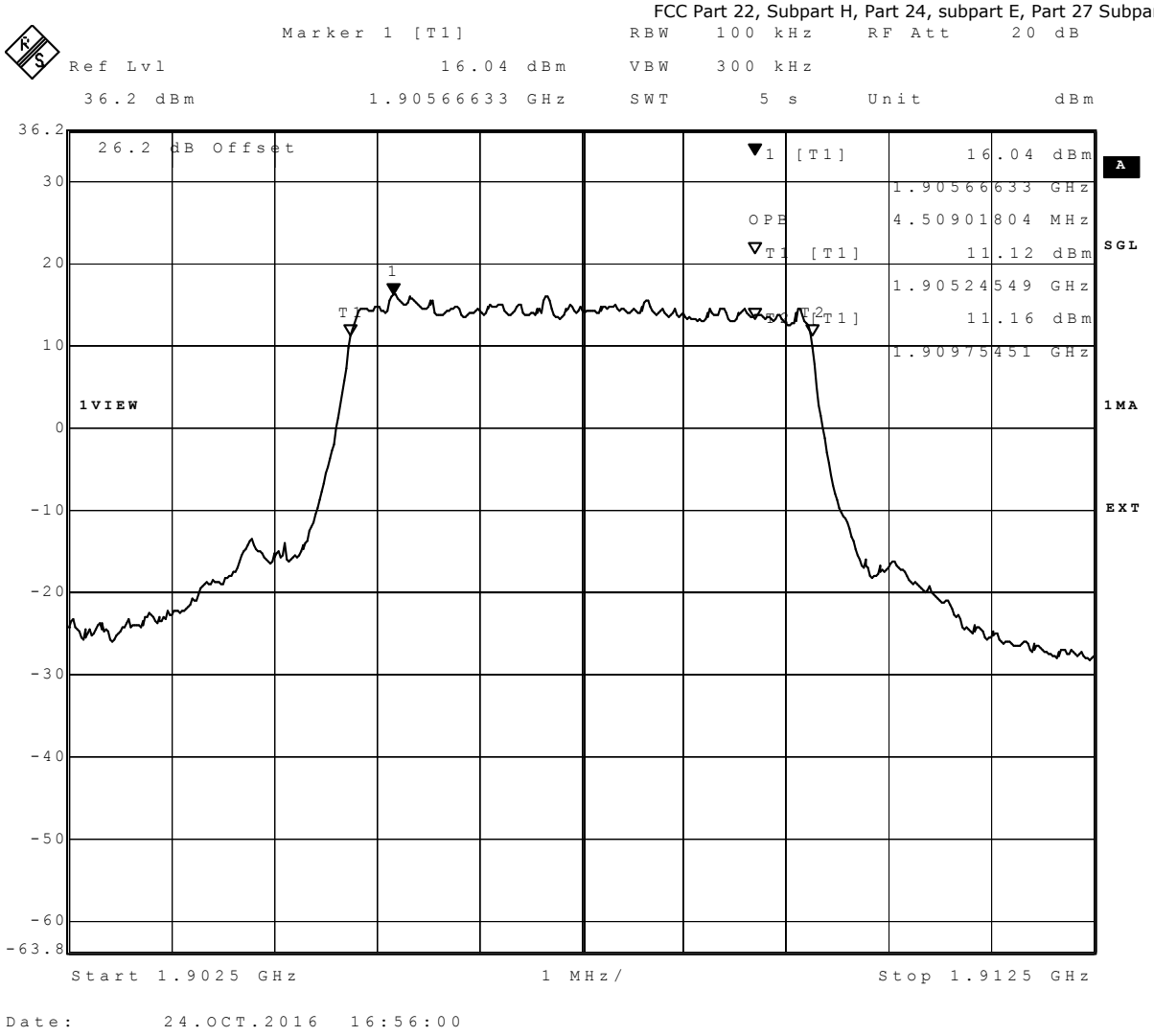
FDDII HSUPA 99%, Channel: low



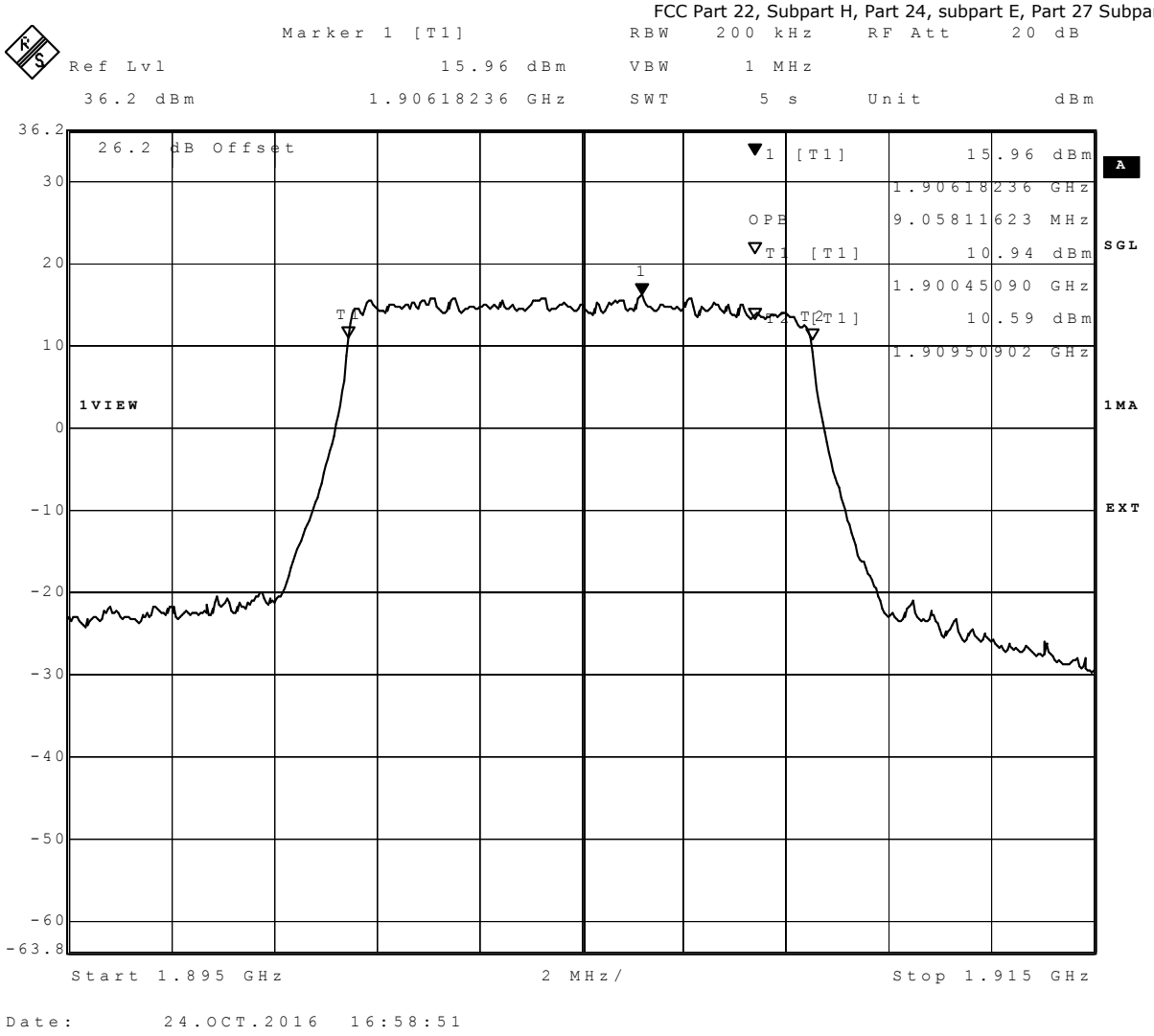
eFDDII 16QAM, 1.4MHz, RB6, Channel: mid



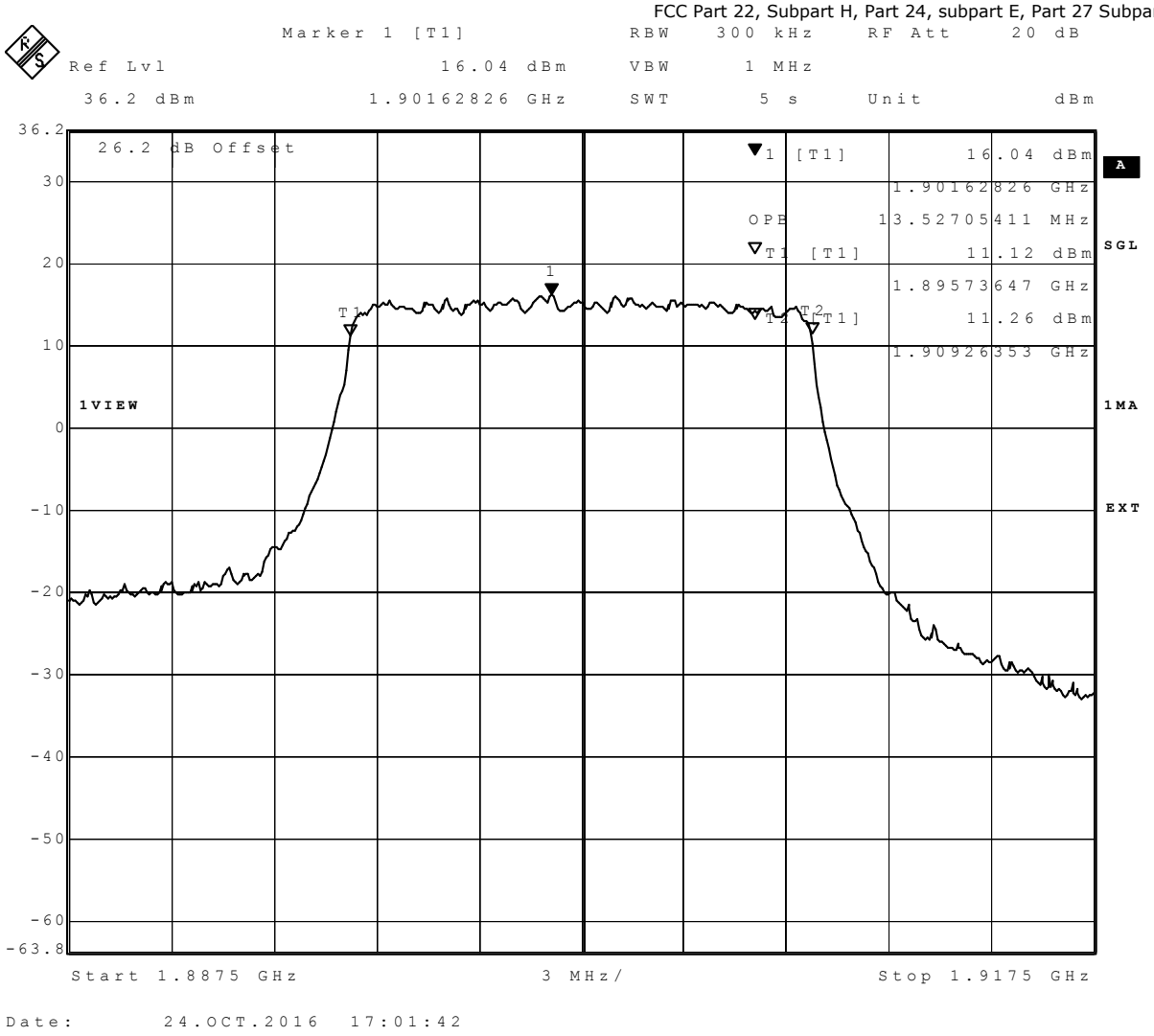
eFDDII QPSK, 3MHz, RB6, Channel: low



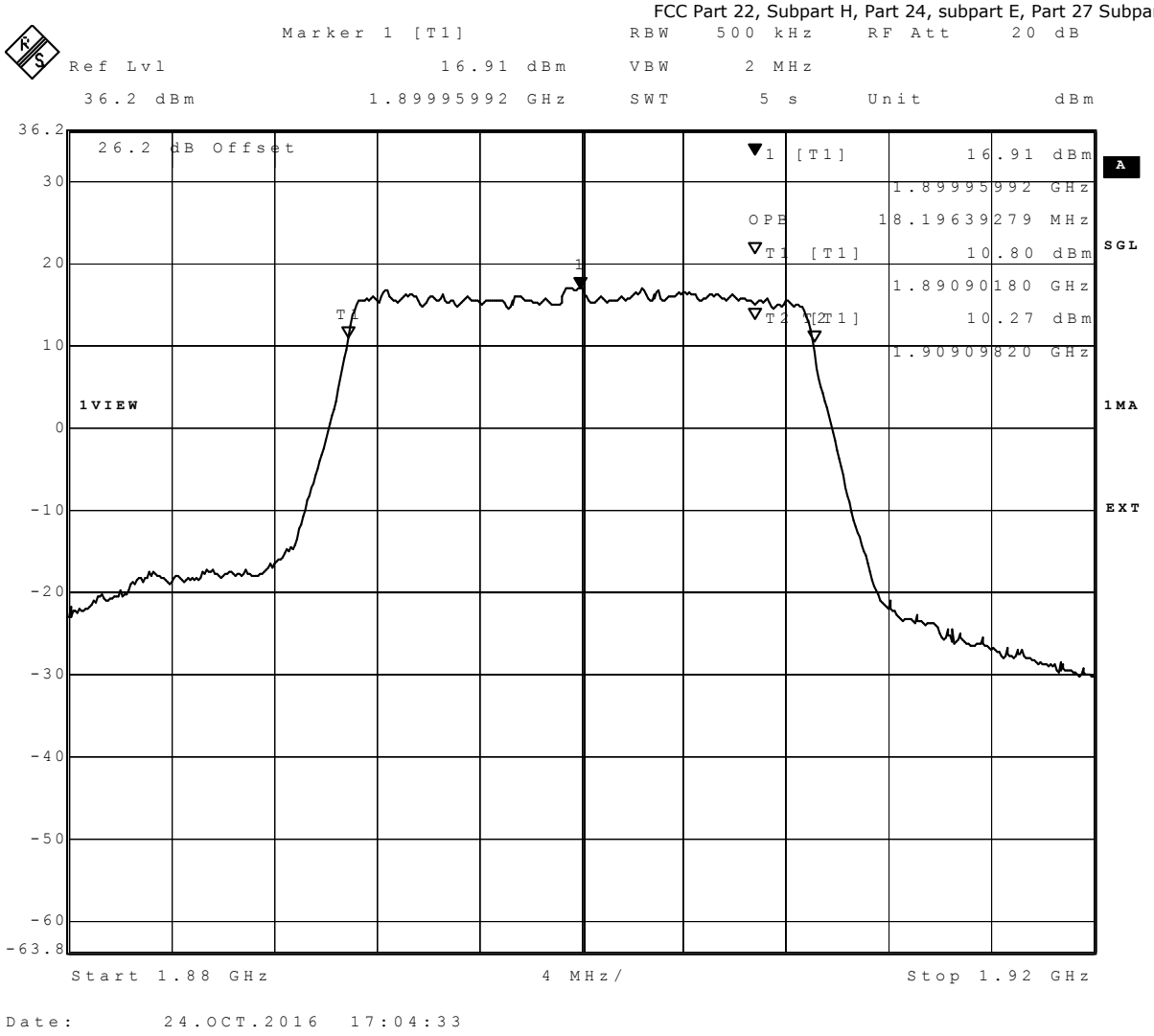
eFDDII QPSK, 5MHz, RB25, Channel: high



eFDDII QPSK, 10MHz, RB25, Channel: high



eFDDII QPSK, 15MHz, RB75, Channel: low



eFDDII QPSK, 20MHz, RB100, Channel: high

3.5.13 24.6 Band edge compliance §2.1053, §24.238

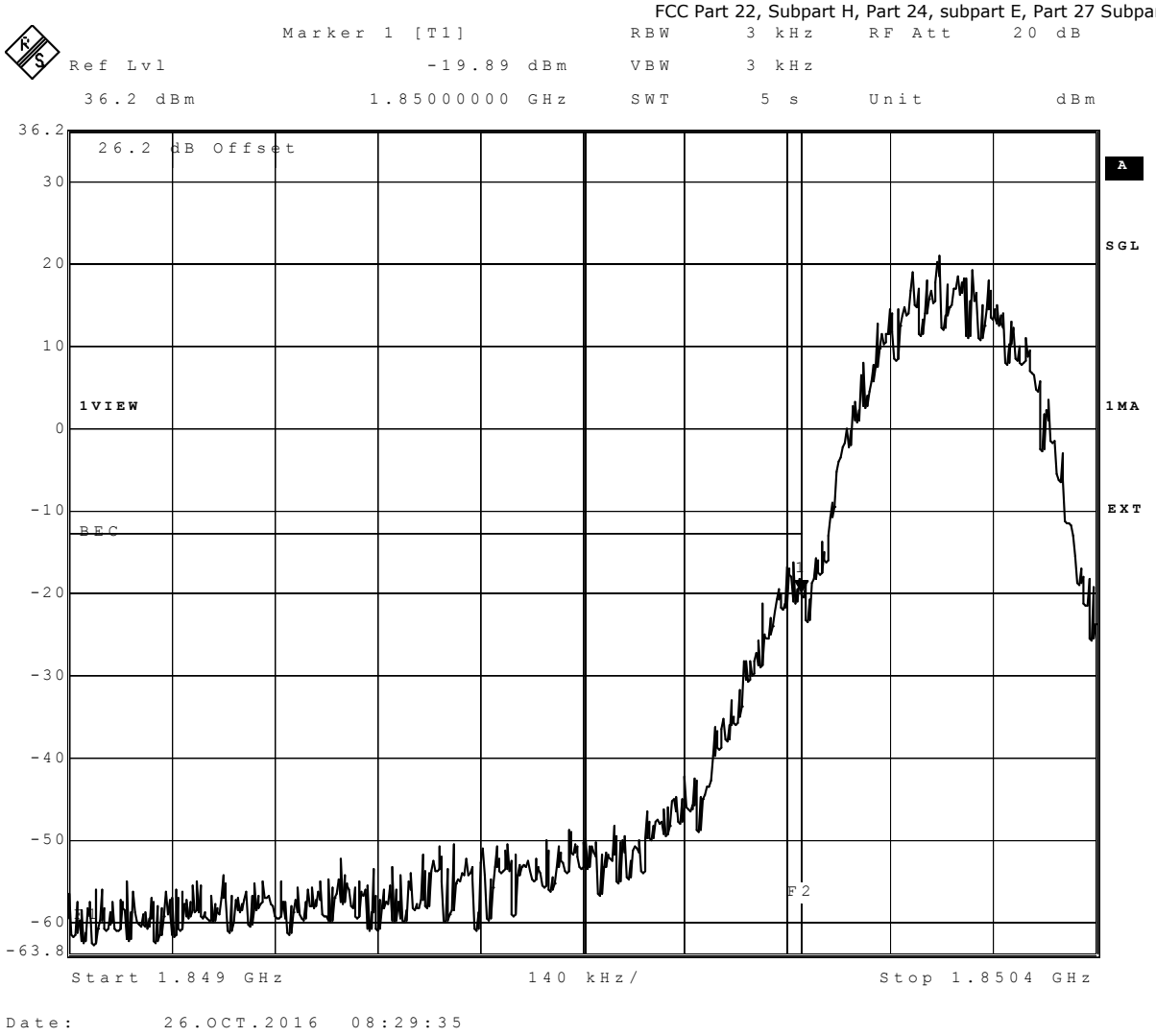
Test: 24.6; Band edge compliance summary §2.1053, §24.238

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 9:14
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

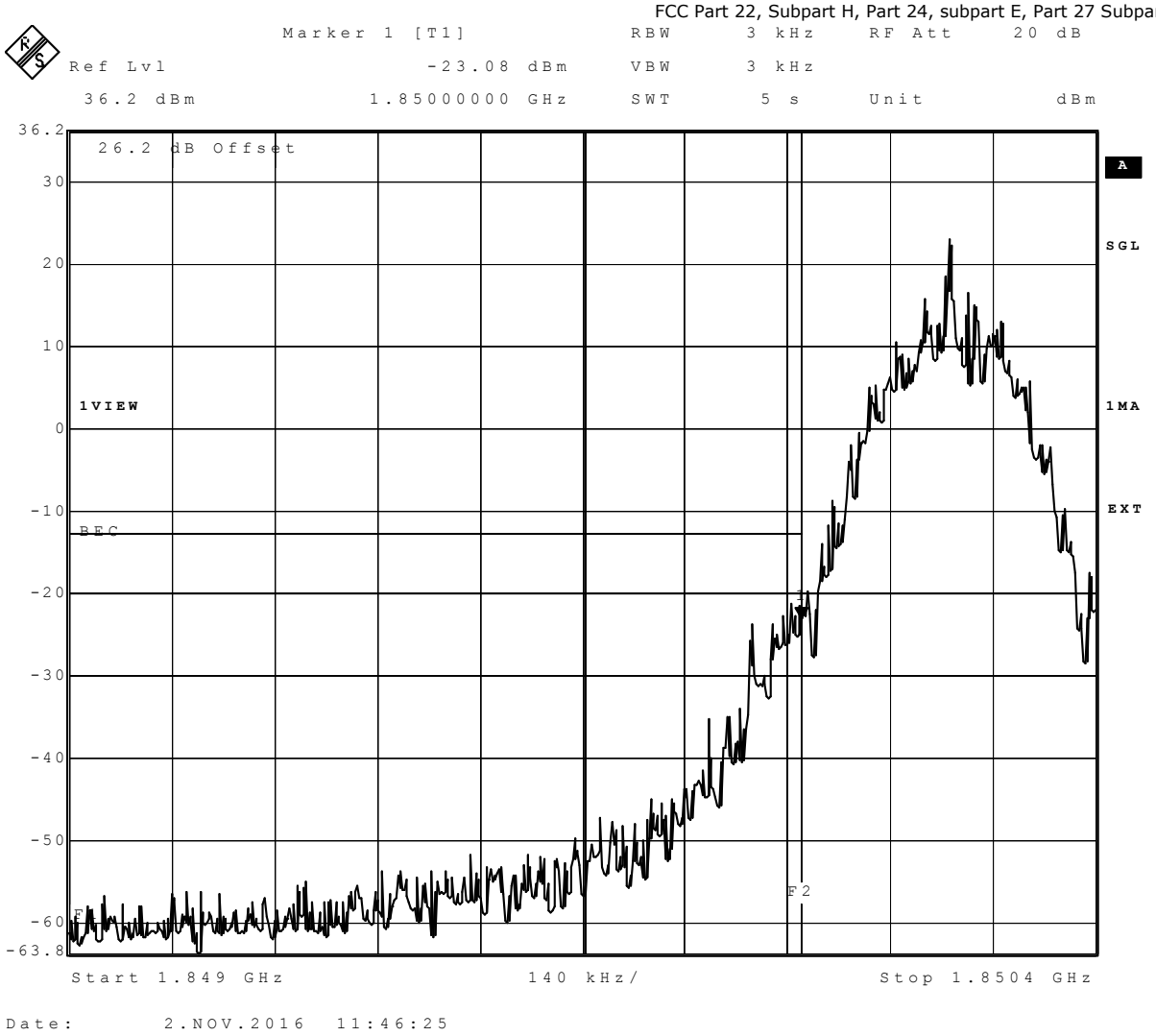
Detailed Results:

Band Edge

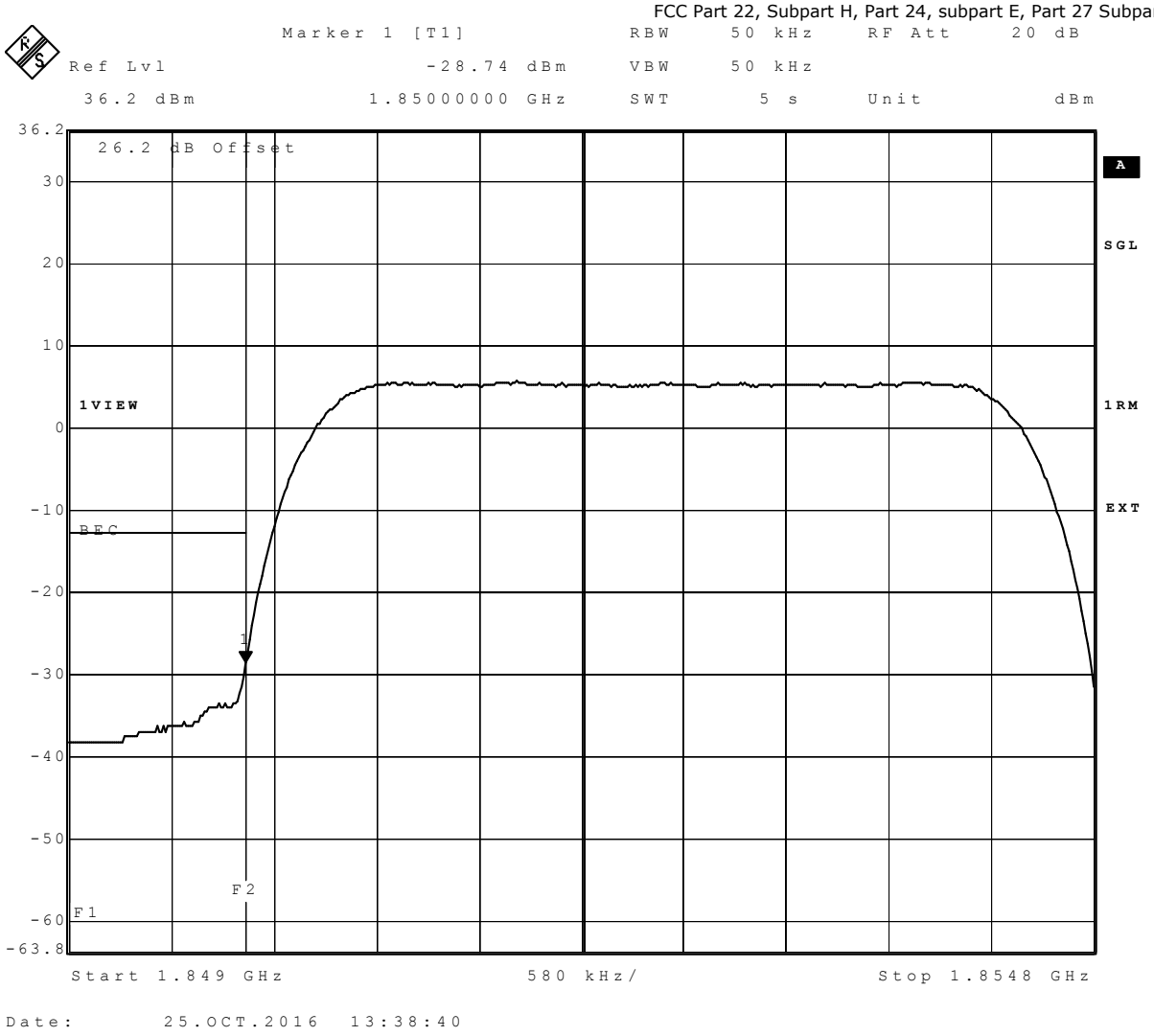
Radio Technology	Channel	Nominal BW	Ressource Blocks	Peak [dBm]	Average [dBm]	RMS [dBm]	Limit /dBm	Margin to Limit /dB	Verdict
GSM 1900	low	0.2	-	-19.89	-39.37	-30.12	-13	6.89	Passed
GSM 1900	high	0.2	-	-21.64	-38.54	-30.74	-13	8.64	Passed
GSM 1900 EDGE	low	0.2	-	**-23.08**	**-43.8**	**-34.76**	-13	10.08	Passed
GSM 1900 EDGE	high	0.2	-	**-24.34**	**-40.28**	**-34.26**	-13	11.34	Passed
FDD II	low	5	-	**-19.44**	**-29.82**	**-28.74**	-13	15.74	Passed
FDD II	high	5	-	**-20.89**	**-33.79**	**-32.92**	-13	19.92	Passed
FDD II HSDPA Subtest 1	low	5	-	**-19.6**	**-29**	**-28**	-13	15	Passed
FDD II HSDPA Subtest 1	high	5	-	**-18.77**	**-32.13**	**-30.74**	-13	17.74	Passed
FDD II HSUPA Subtest 1	low	5	-	**-19.78**	**-28.74**	**-27.54**	-13	14.54	Passed
FDD II HSUPA Subtest 1	high	5	-	**-19.98**	**-31.07**	**-30.12**	-13	17.12	Passed
FDD II HSUPA Subtest 5	low	5	-	**-16.74**	**-29**	**-27.54**	-13	14.54	Passed
FDD II HSUPA Subtest 5	high	5	-	**-20.86**	**-31.41**	**-30.42**	-13	17.42	Passed
eFDD 2 QPSK	low	1.4	6	**-15.68**	**-26.9**	**-25.92**	-13	12.92	Passed
eFDD 2 QPSK	high	1.4	6	**-17.25**	**-28**	**-26.7**	-13	13.7	Passed
eFDD 2 16QAM	low	1.4	6	**-15.75**	**-28.48**	**-26.9**	-13	13.9	Passed
eFDD 2 16QAM	high	1.4	6	**-17.4**	**-29.26**	**-27.77**	-13	14.77	Passed
eFDD 2 QPSK	low	3	15	**-14.67**	**-28.48**	**-26.7**	-13	13.7	Passed
eFDD 2 QPSK	high	3	15	**-16.92**	**-30.74**	**-28.74**	-13	15.74	Passed
eFDD 2 16QAM	low	3	15	**-15.56**	**-29.54**	**-27.54**	-13	14.54	Passed
eFDD 2 16QAM	high	3	15	**-18.44**	**-31.41**	**-29.54**	-13	16.54	Passed
eFDD 2 QPSK	low	5	25	**-13.49**	**-30.12**	**-27.77**	-13	14.77	Passed
eFDD 2 QPSK	high	5	25	**-14.38**	**-32.13**	**-29.82**	-13	16.82	Passed
eFDD 2 16QAM	low	5	25	**-16.37**	**-31.41**	**-29.26**	-13	16.26	Passed
eFDD 2 16QAM	high	5	25	**-15.69**	**-32.92**	**-30.42**	-13	17.42	Passed
eFDD 2 QPSK	low	10	50	**-13.45**	**-31.41**	**-29.26**	-13	16.26	Passed
eFDD 2 QPSK	high	10	50	**-14.76**	**-33.79**	**-31.41**	-13	18.41	Passed
eFDD 2 16QAM	low	10	50	**-15.21**	**-32.52**	**-30.12**	-13	17.12	Passed
eFDD 2 16QAM	high	10	50	**-15.73**	**-34.76**	**-32.52**	-13	19.52	Passed
eFDD 2 QPSK	low	15	75	**-9.73**	**-29.26**	**-27.32**	-13	14.32	Passed
eFDD 2 QPSK	high	15	75	**-12.04**	**-32.92**	**-29.82**	-13	16.82	Passed
eFDD 2 16QAM	low	15	75	**-10.5**	**-30.12**	**-28**	-13	15	Passed
eFDD 2 16QAM	high	15	75	**-12.3**	**-33.79**	**-30.74**	-13	17.74	Passed
eFDD 2 QPSK	low	20	100	**-15.93**	**-31.76**	**-30.42**	-13	17.42	Passed
eFDD 2 QPSK	high	20	100	**-14.13**	**-34.76**	**-32.13**	-13	19.13	Passed
eFDD 2 16QAM	low	20	100	**-15.86**	**-32.52**	**-31.07**	-13	18.07	Passed
eFDD 2 16QAM	high	20	100	**-16.45**	**-35.84**	**-33.79**	-13	20.79	Passed



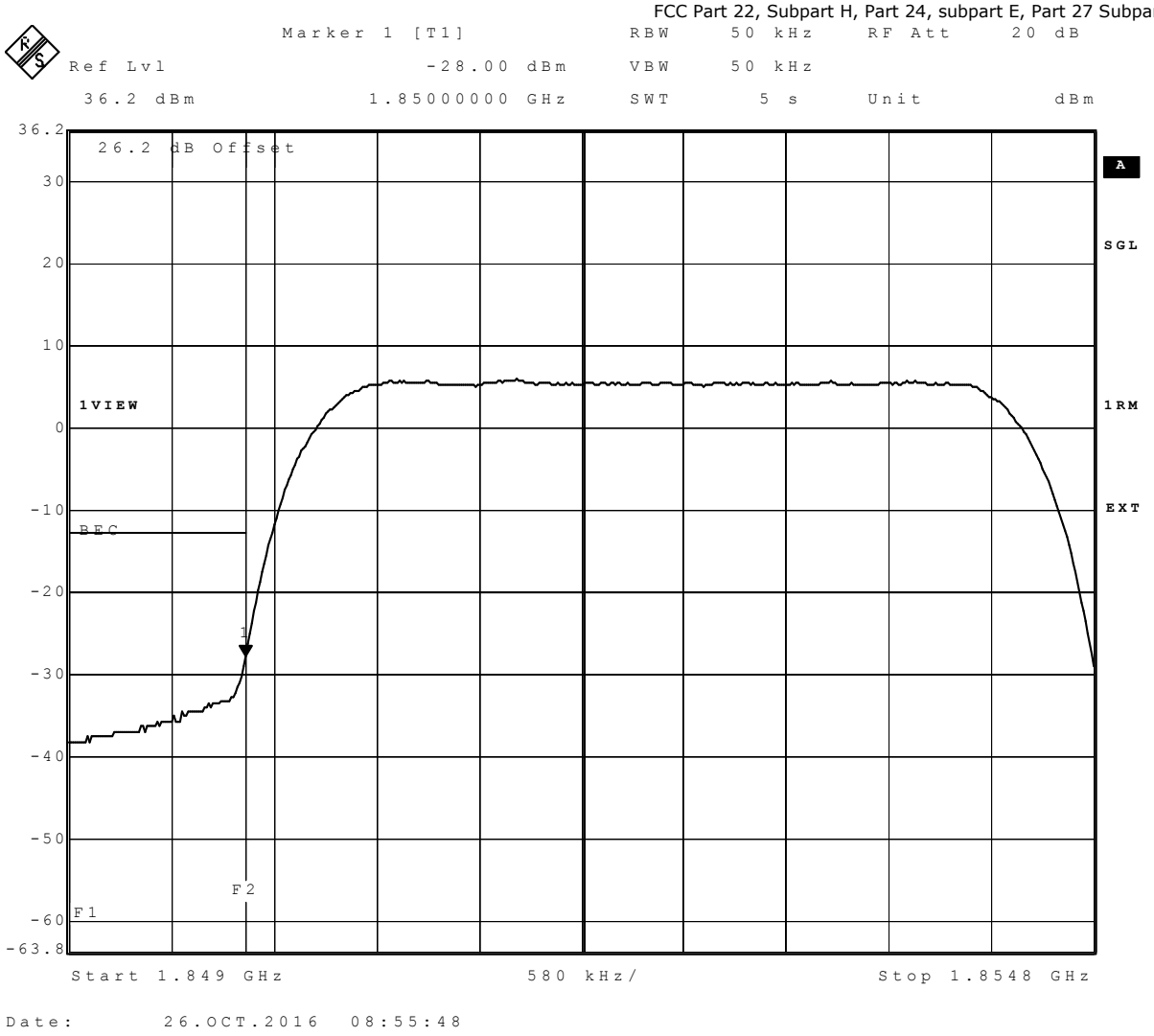
GSM1900, Channel: low



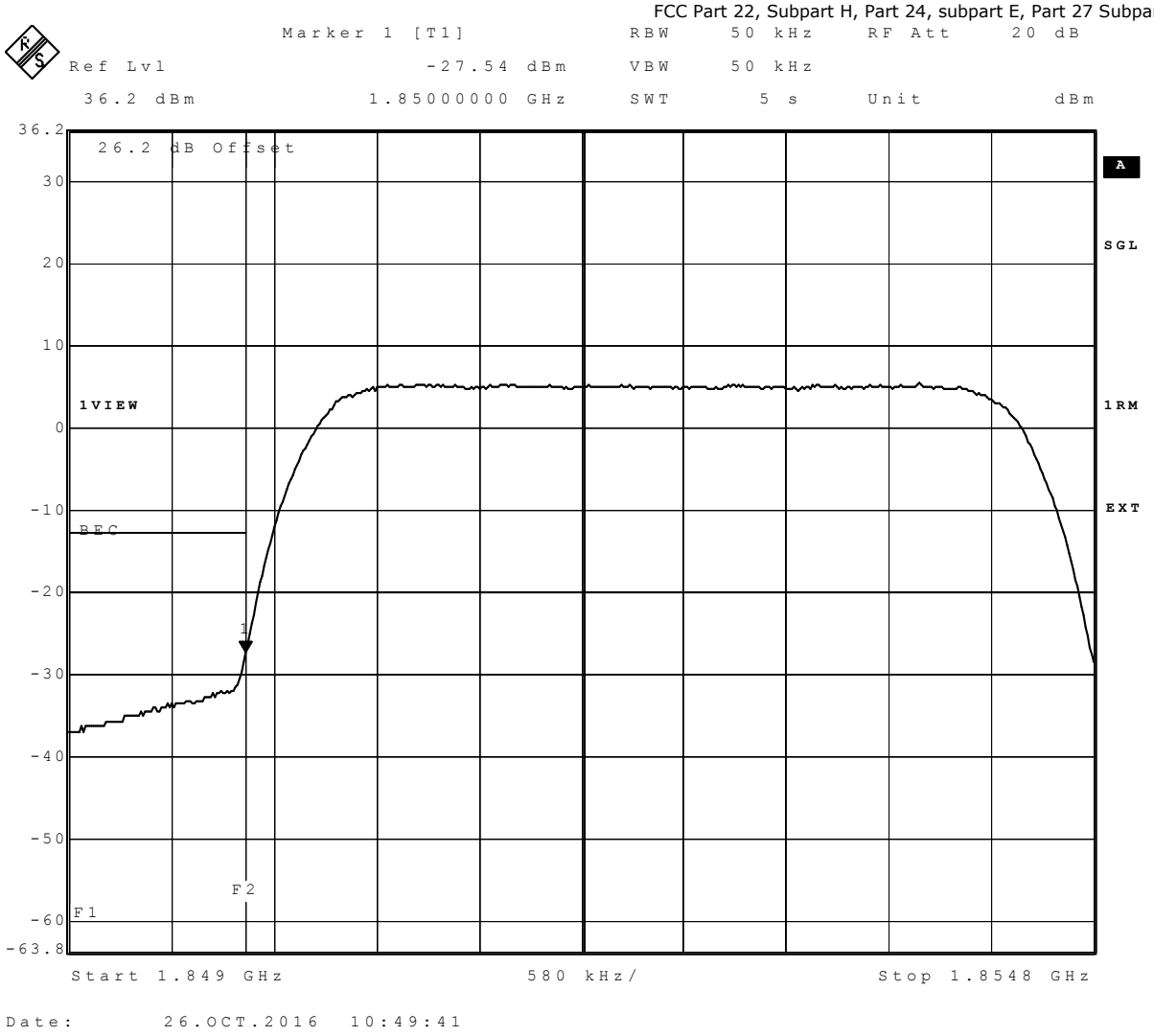
GSM1900 EDGE, Channel: low



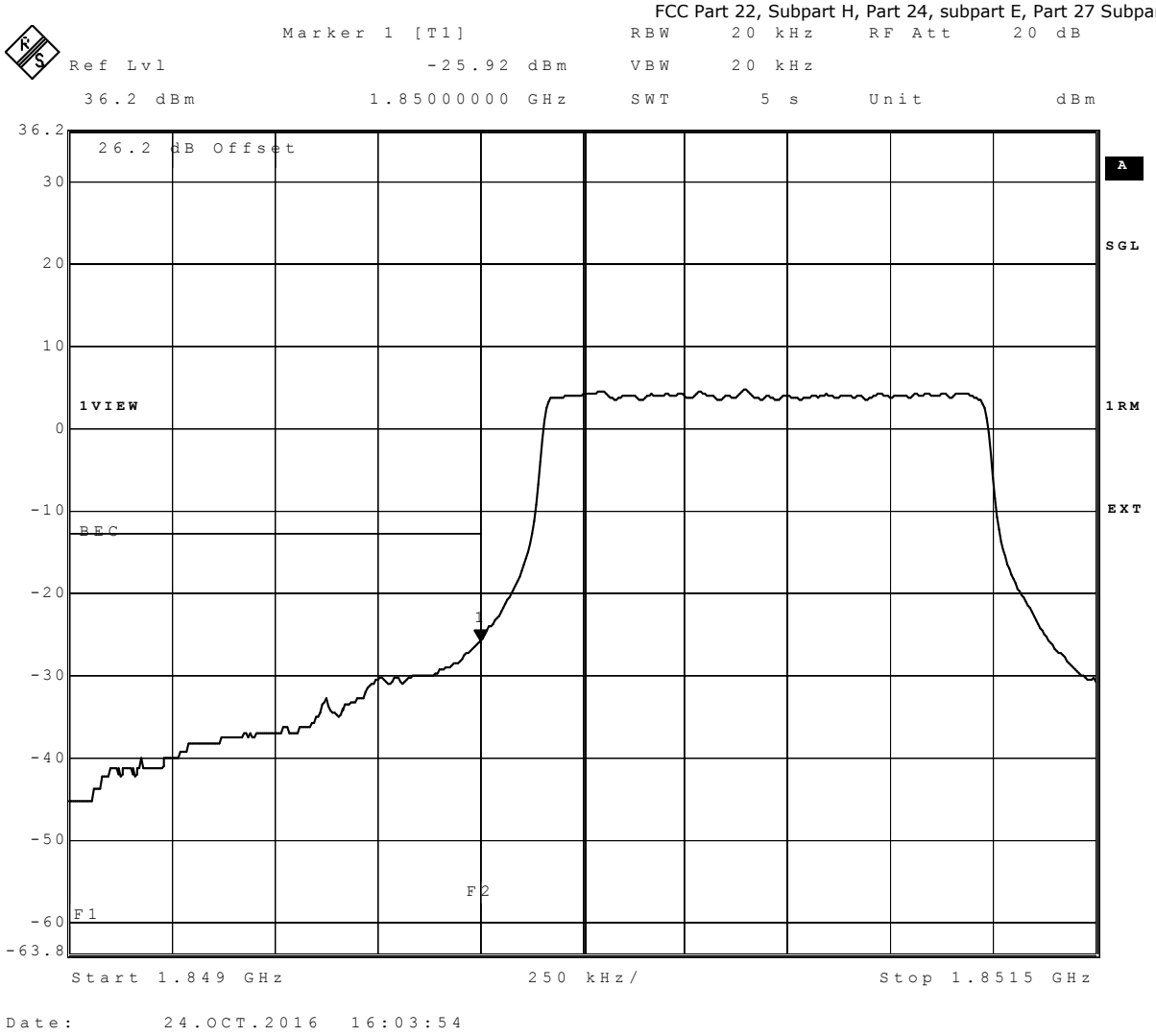
FDDII, Channel: low



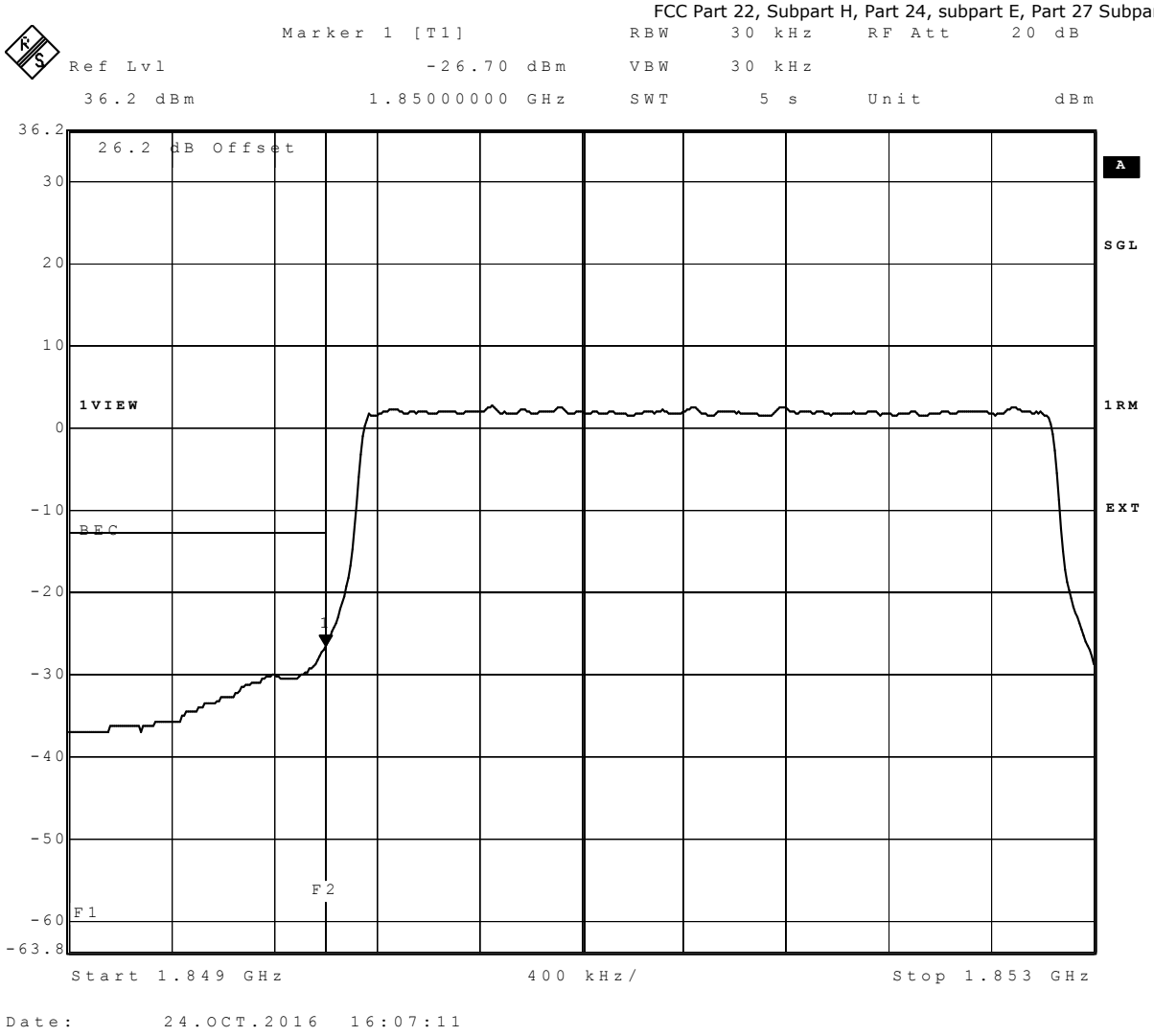
FDDII HSDPA, Channel: low



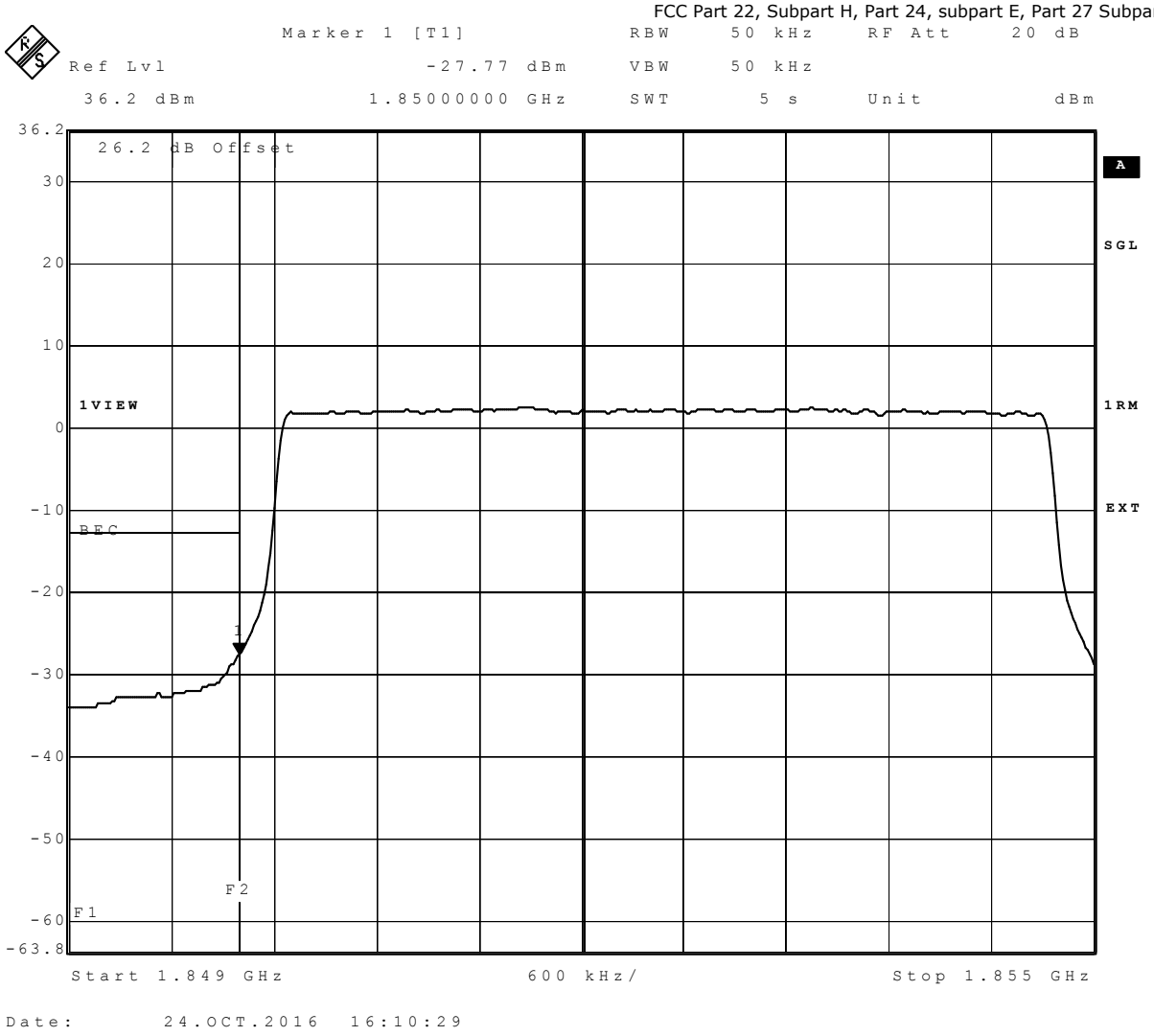
FDDII HSUPA, Channel: low



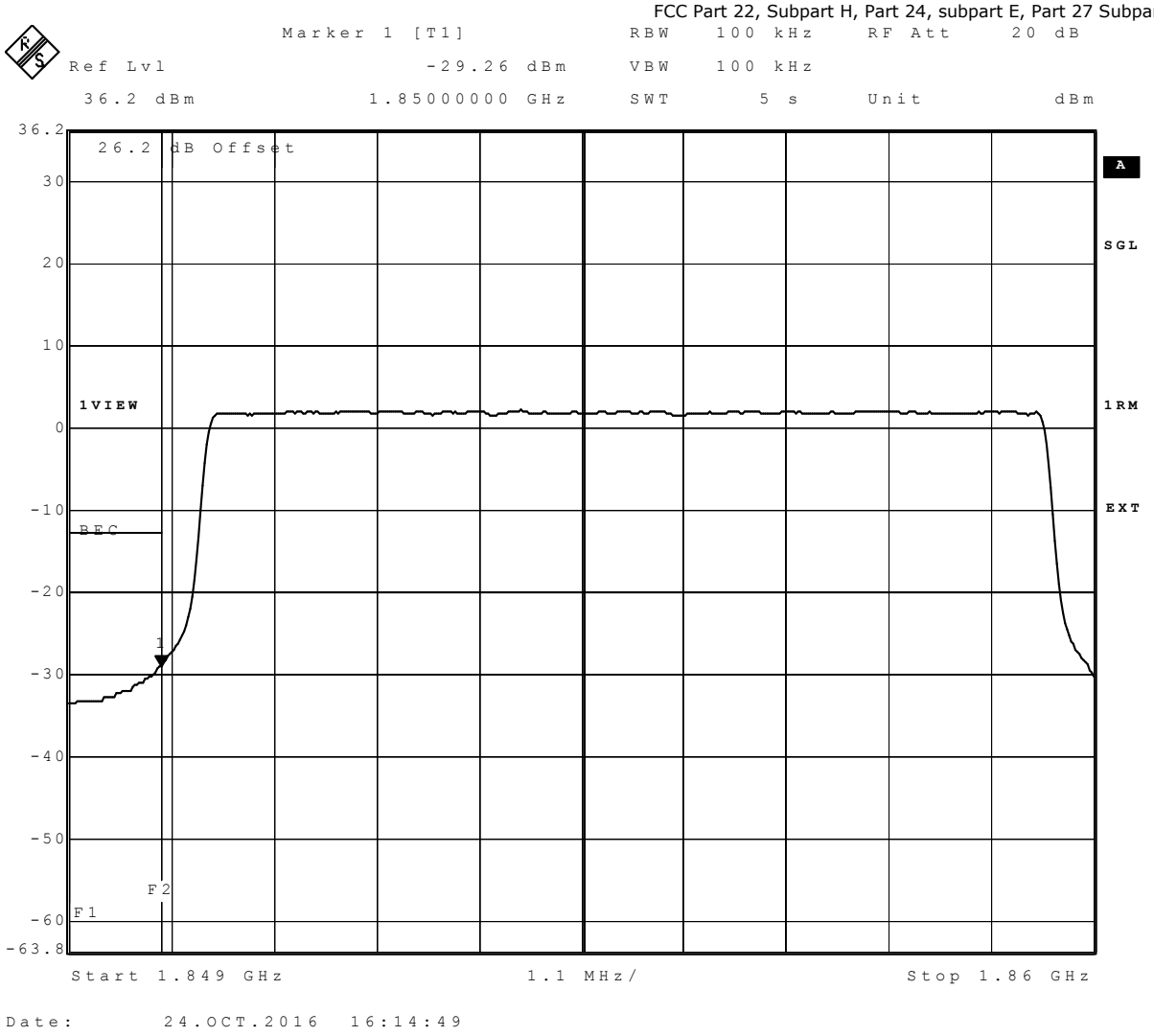
eFDDII QPSK, 1.4MHz, Channel: low



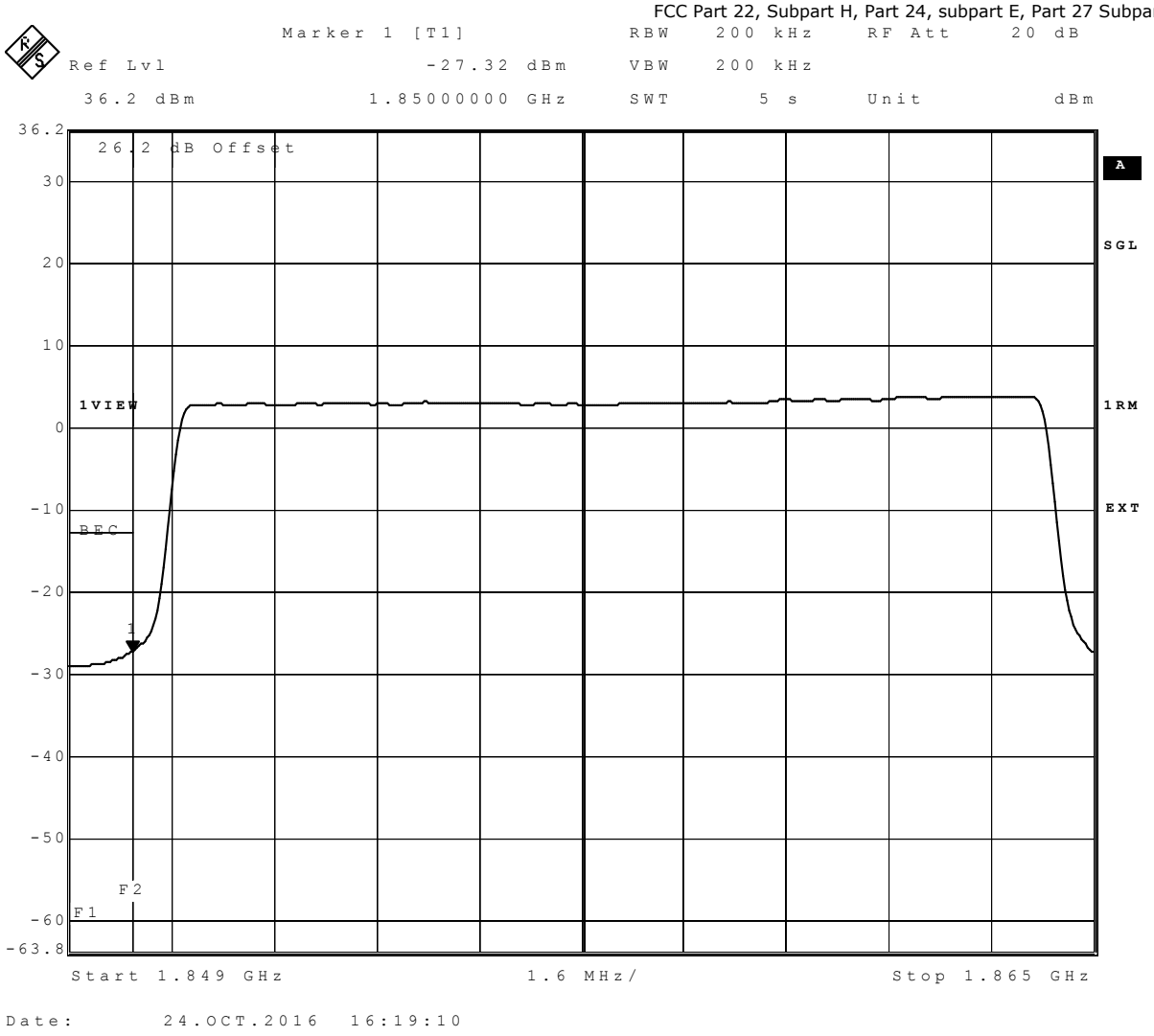
eFDDII QPSK, 3MHz, Channel: low



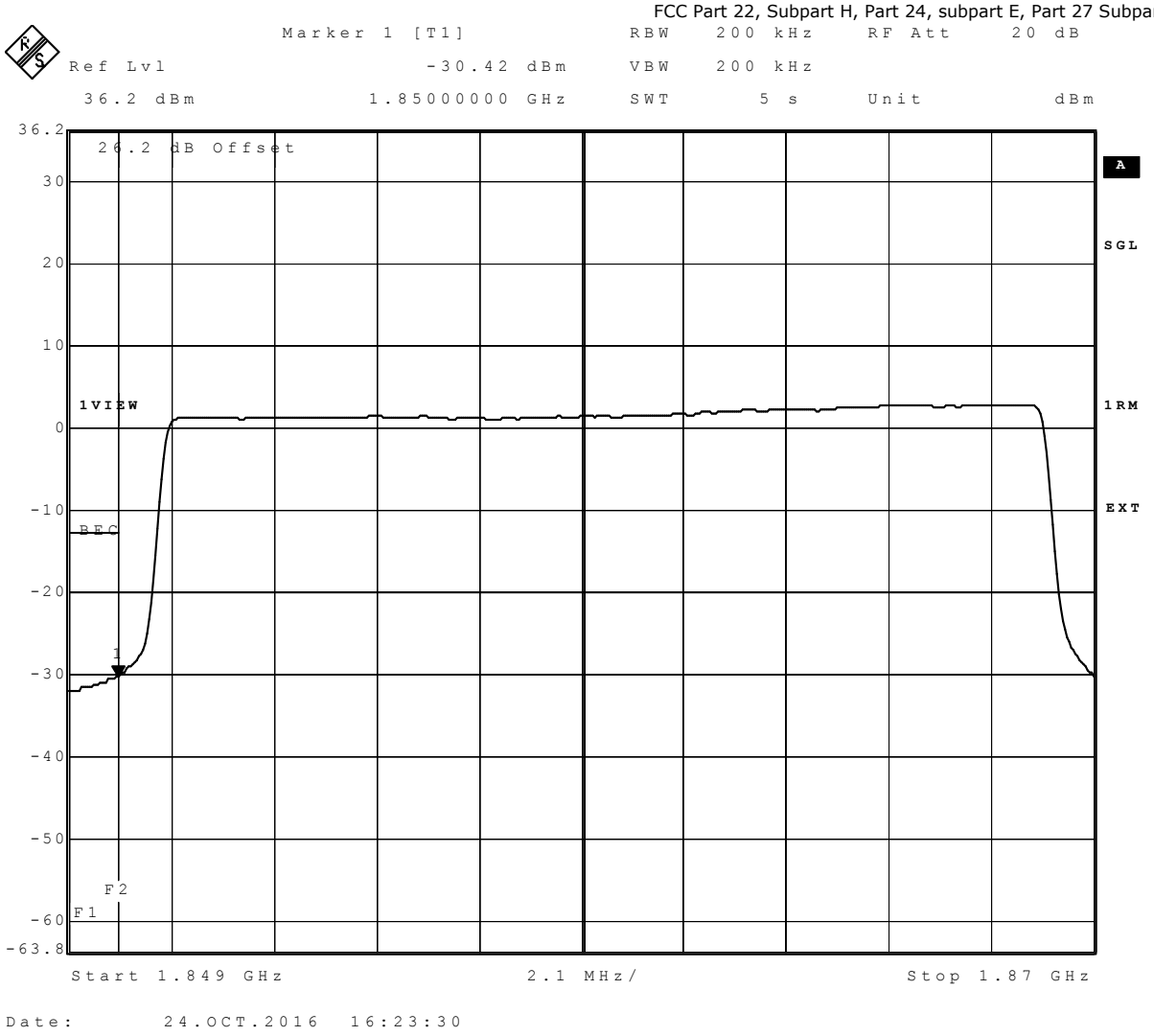
eFDDII QPSK, 5MHz, Channel: low



eFDDII QPSK, 10MHz, Channel: low



eFDDII QPSK, 15MHz, Channel: low



eFDDII QPSK, 20MHz, Channel: low

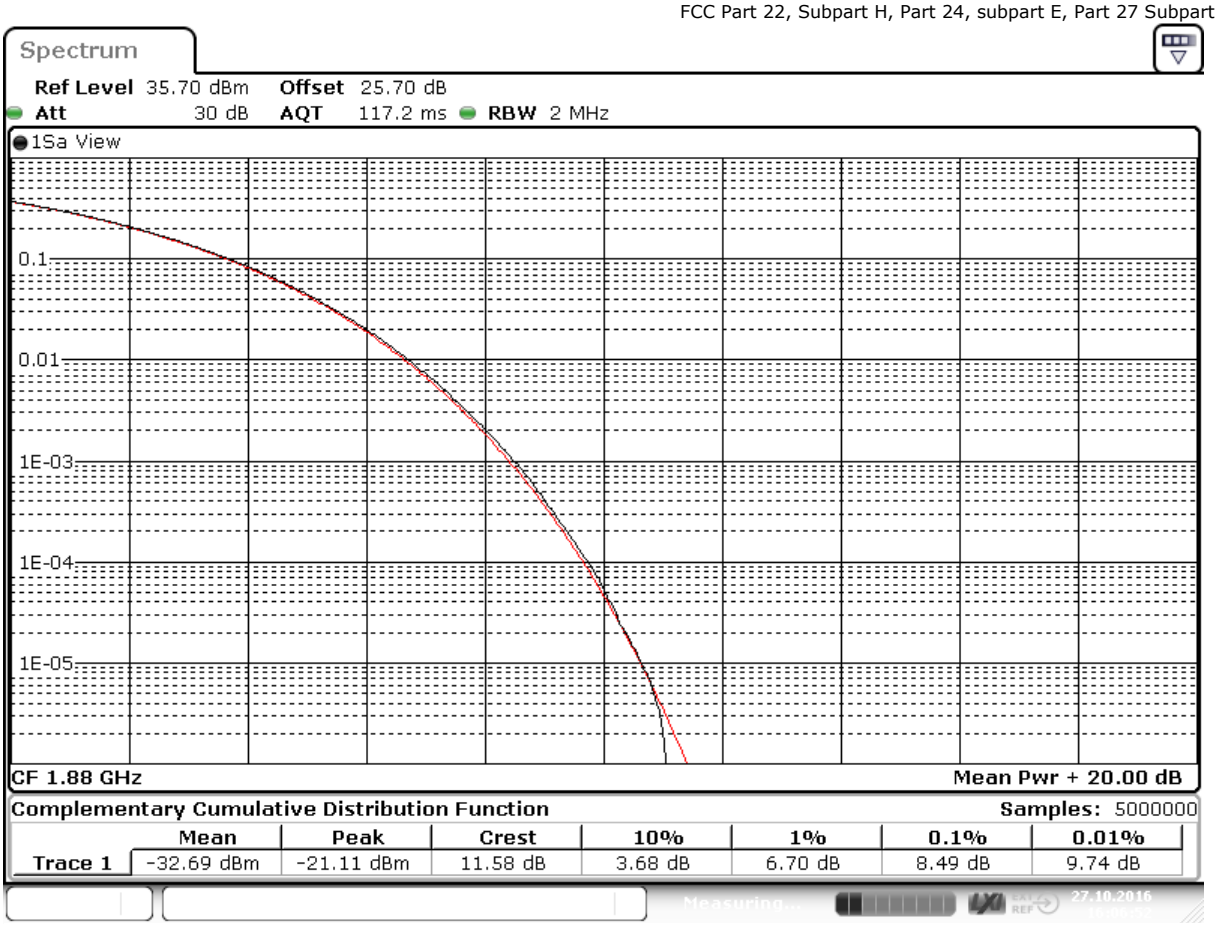
3.5.14 24.7 Peak-to-Average ratio §2.1046, §24.232

Test: 24.7; Peak-to-Average Ratio Summary §2.1046, §24.232

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 9:43
Body:	FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 24

Detailed Results:

Peak to Average Ratio						
Ambient temperature:	26 °C					
Relative humidity:	35%					
Radio Technology	**Channel**	**Ressource Blocks**	**Bandwidth (MHz)**	**Peak to Average Ratio**	**Limit (IC) (dB)**	**Verdict**
GSM 1900	low	-	0.2	0.03	13	PASSED
GSM 1900	mid	-	0.2	0.03	13	PASSED
GSM 1900	high	-	0.2	0.03	13	PASSED
GSM 1900 EDGE	low	-	0.2	0.02	13	PASSED
GSM 1900 EDGE	mid	-	0.2	0.02	13	PASSED
GSM 1900 EDGE	high	-	0.2	0.04	13	PASSED
FDD II	low	-	5	5.68	13	PASSED
FDD II	mid	-	5	5.58	13	PASSED
FDD II	high	-	5	5.65	13	PASSED
FDD II HSDPA Subtest 1	low	-	5	5.25	13	PASSED
FDD II HSDPA Subtest 1	mid	-	5	5.26	13	PASSED
FDD II HSDPA Subtest 1	high	-	5	5.6	13	PASSED
FDD II HSUPA Subtest 1	low	-	5	5.89	13	PASSED
FDD II HSUPA Subtest 1	mid	-	5	5.49	13	PASSED
FDD II HSUPA Subtest 1	high	-	5	6.19	13	PASSED
FDD II HSUPA Subtest 5	low	-	5	5.72	13	PASSED
FDD II HSUPA Subtest 5	mid	-	5	6.21	13	PASSED
FDD II HSUPA Subtest 5	high	-	5	6.49	13	PASSED
eFDD 2 QPSK	low	6	1.4	5.51	13	PASSED
eFDD 2 QPSK	mid	6	1.4	5.48	13	PASSED
eFDD 2 QPSK	high	6	1.4	5.59	13	PASSED
eFDD 2 16QAM	low	6	1.4	6.26	13	PASSED
eFDD 2 16QAM	mid	6	1.4	8.49	13	PASSED
eFDD 2 16QAM	high	6	1.4	8.46	13	PASSED



Date: 27.OCT.2016 16:06:52

eFDDII 16QAM, 1.4MHz, RB6, Channel: mid

3.5.15 27.1 RF Power Output §2.1046, §27.250

Test: 27.1; RF Power Output Summary §2.1046, §27.250

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 15:05
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

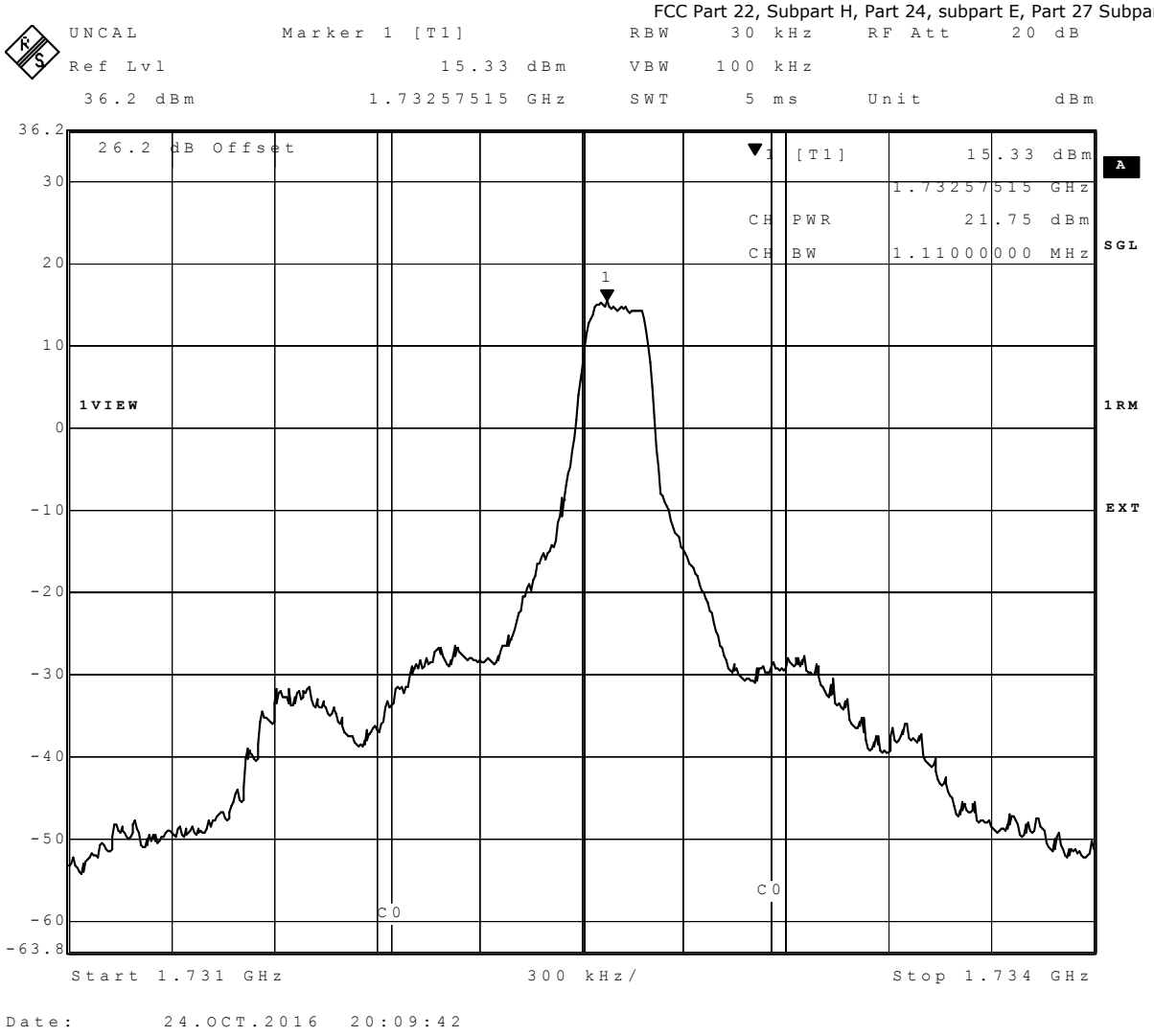
Detailed Results:

Transmitter Output Power								
Ambient temperature:	26 °C							
Relative humidity:	35%							
Radio Technology	**Channel**	**Ressource Blocks**	**Bandwidth (MHz)**	**RMS Conducted Power (dBm)**	**FCC EIRP Limit (W**	**IC EIRP Limit (W**	**Maximum Antenna Gain FCC (dBi)**	**Maximum Antenna Gain IC (dBi)**
eFDD 4 QPSK	low	1	1.4	21.55	1	1	8.45	8.45
eFDD 4 QPSK	low	3	1.4	21.41	1	1	8.59	8.59
eFDD 4 QPSK	low	6	1.4	20.17	1	1	9.83	9.83
eFDD 4 QPSK	mid	1	1.4	21.75	1	1	8.25	8.25
eFDD 4 QPSK	mid	3	1.4	21.36	1	1	8.64	8.64
eFDD 4 QPSK	mid	6	1.4	20.11	1	1	9.89	9.89
eFDD 4 QPSK	high	1	1.4	21.65	1	1	8.35	8.35
eFDD 4 QPSK	high	3	1.4	21.44	1	1	8.56	8.56
eFDD 4 QPSK	high	6	1.4	20.35	1	1	9.65	9.65
eFDD 4 16QAM	low	1	1.4	20.82	1	1	9.18	9.18
eFDD 4 16QAM	low	6	1.4	19.34	1	1	10.66	10.66
eFDD 4 16QAM	mid	1	1.4	20.68	1	1	9.32	9.32
eFDD 4 16QAM	mid	6	1.4	19.32	1	1	10.68	10.68
eFDD 4 16QAM	high	1	1.4	20.73	1	1	9.27	9.27
eFDD 4 16QAM	high	6	1.4	19.35	1	1	10.65	10.65
eFDD 4 QPSK	low	1	3	21.97	1	1	8.03	8.03
eFDD 4 QPSK	low	15	3	20.6	1	1	9.4	9.4
eFDD 4 QPSK	mid	1	3	21.97	1	1	8.03	8.03
eFDD 4 QPSK	mid	15	3	20.65	1	1	9.35	9.35
eFDD 4 QPSK	high	1	3	22.13	1	1	7.87	7.87
eFDD 4 QPSK	high	15	3	20.79	1	1	9.21	9.21
eFDD 4 16QAM	low	1	3	21.02	1	1	8.98	8.98
eFDD 4 16QAM	low	15	3	19.71	1	1	10.29	10.29
eFDD 4 16QAM	mid	1	3	21.03	1	1	8.97	8.97
eFDD 4 16QAM	mid	15	3	19.68	1	1	10.32	10.32
eFDD 4 16QAM	high	1	3	21.01	1	1	8.99	8.99
eFDD 4 16QAM	high	15	3	19.86	1	1	10.14	10.14
eFDD 4 QPSK	low	1	5	22.04	1	1	7.96	7.96
eFDD 4 QPSK	low	12	5	20.65	1	1	9.35	9.35
eFDD 4 QPSK	low	25	5	20.62	1	1	9.38	9.38
eFDD 4 QPSK	mid	1	5	22.05	1	1	7.95	7.95
eFDD 4 QPSK	mid	12	5	20.59	1	1	9.41	9.41
eFDD 4 QPSK	mid	25	5	20.67	1	1	9.33	9.33
eFDD 4 QPSK	high	1	5	22.08	1	1	7.92	7.92
eFDD 4 QPSK	high	12	5	20.7	1	1	9.3	9.3
eFDD 4 QPSK	high	25	5	20.66	1	1	9.34	9.34
eFDD 4 16QAM	low	1	5	20.95	1	1	9.05	9.05
eFDD 4 16QAM	low	25	5	19.56	1	1	10.44	10.44
eFDD 4 16QAM	mid	1	5	21.06	1	1	8.94	8.94
eFDD 4 16QAM	mid	25	5	19.65	1	1	10.35	10.35
eFDD 4 16QAM	high	1	5	21.2	1	1	8.8	8.8
eFDD 4 16QAM	high	25	5	19.77	1	1	10.23	10.23
eFDD 4 QPSK	low	1	10	21.6	1	1	8.4	8.4
eFDD 4 QPSK	low	50	10	20.78	1	1	9.22	9.22
eFDD 4 QPSK	mid	1	10	21.5	1	1	8.5	8.5
eFDD 4 QPSK	mid	50	10	20.86	1	1	9.14	9.14
eFDD 4 QPSK	high	1	10	22.17	1	1	7.83	7.83
eFDD 4 QPSK	high	50	10	20.92	1	1	9.08	9.08
eFDD 4 16QAM	low	1	10	20.96	1	1	9.04	9.04
eFDD 4 16QAM	low	50	10	19.78	1	1	10.22	10.22
eFDD 4 16QAM	mid	1	10	20.99	1	1	9.01	9.01
eFDD 4 16QAM	mid	50	10	19.85	1	1	10.15	10.15
eFDD 4 16QAM	high	1	10	21.13	1	1	8.87	8.87
eFDD 4 16QAM	high	50	10	19.98	1	1	10.02	10.02
eFDD 4 QPSK	low	1	15	22.1	1	1	7.9	7.9
eFDD 4 QPSK	low	36	15	21.11	1	1	8.89	8.89
eFDD 4 QPSK	low	75	15	20.95	1	1	9.05	9.05
eFDD 4 QPSK	mid	1	15	22.21	1	1	7.79	7.79
eFDD 4 QPSK	mid	36	15	21.07	1	1	8.93	8.93
eFDD 4 QPSK	mid	75	15	20.97	1	1	9.03	9.03
eFDD 4 QPSK	high	1	15	22.24	1	1	7.76	7.76
eFDD 4 QPSK	high	36	15	21.23	1	1	8.77	8.77
eFDD 4 QPSK	high	75	15	21.02	1	1	8.98	8.98
eFDD 4 16QAM	low	1	15	21.07	1	1	8.93	8.93
eFDD 4 16QAM	low	75	15	20	1	1	10	10
eFDD 4 16QAM	mid	1	15	21.33	1	1	8.67	8.67
eFDD 4 16QAM	mid	75	15	19.96	1	1	10.04	10.04
eFDD 4 16QAM	high	1	15	21.33	1	1	8.67	8.67
eFDD 4 16QAM	high	75	15	20.1	1	1	9.9	9.9
eFDD 4 QPSK	low	1	20	21.97	1	1	8.03	8.03
eFDD 4 QPSK	low	100	20	20.99	1	1	9.01	9.01
eFDD 4 QPSK	mid	1	20	21.97	1	1	8.03	8.03
eFDD 4 QPSK	mid	100	20	21.03	1	1	8.97	8.97
eFDD 4 QPSK	high	1	20	22.15	1	1	7.85	7.85
eFDD 4 QPSK	high	100	20	21.12	1	1	8.88	8.88
eFDD 4 16QAM	low	1	20	20.9	1	1	9.1	9.1
eFDD 4 16QAM	low	100	20	19.91	1	1	10.09	10.09
eFDD 4 16QAM	mid	1	20	20.81	1	1	9.19	9.19
eFDD 4 16QAM	mid	100	20	19.99	1	1	10.01	10.01
eFDD 4 16QAM	high	1	20	21.13	1	1	8.87	8.87

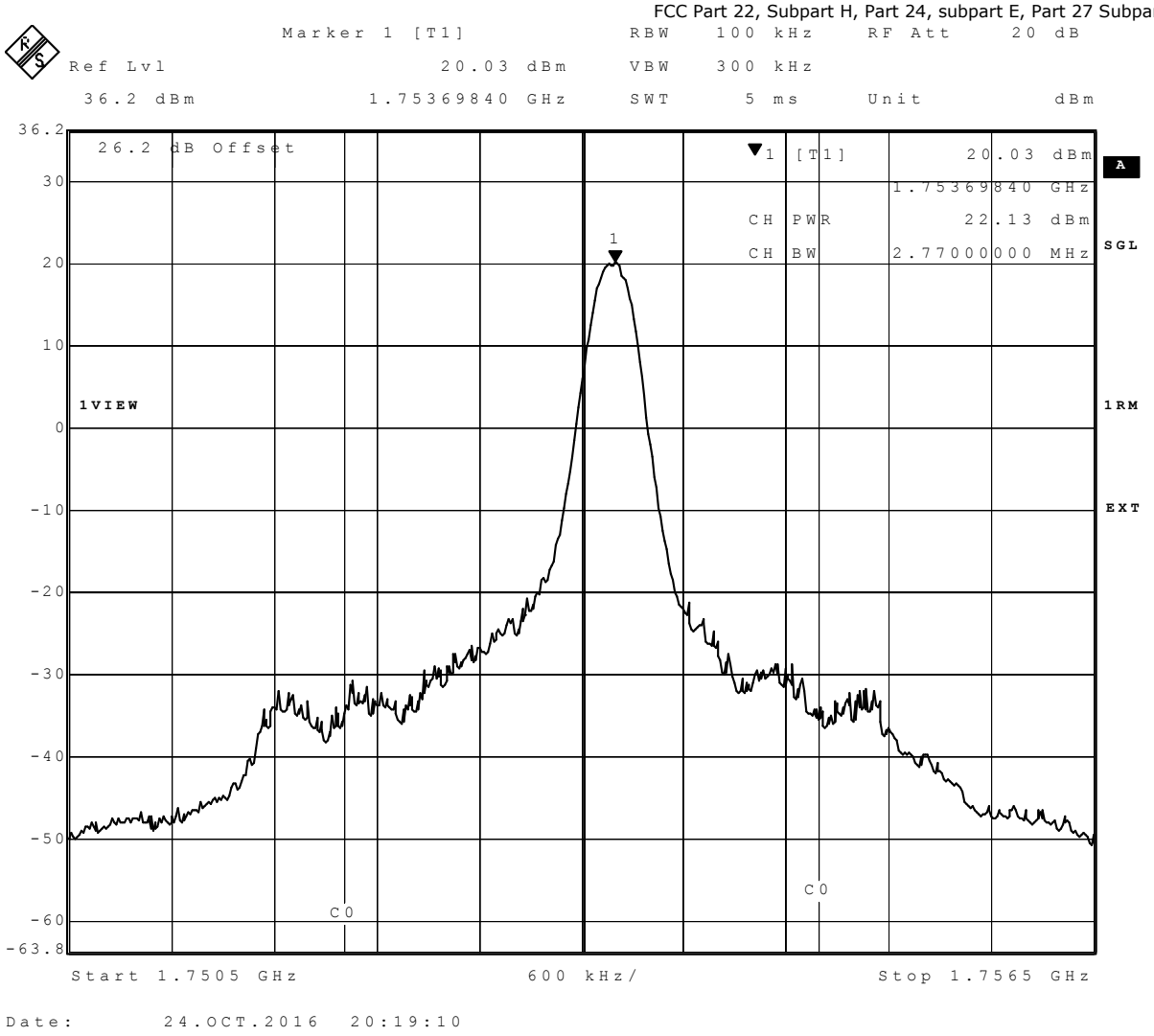
Transmitter Output Power

Ambient temperature: 26 °C
Relative humidity: 35%

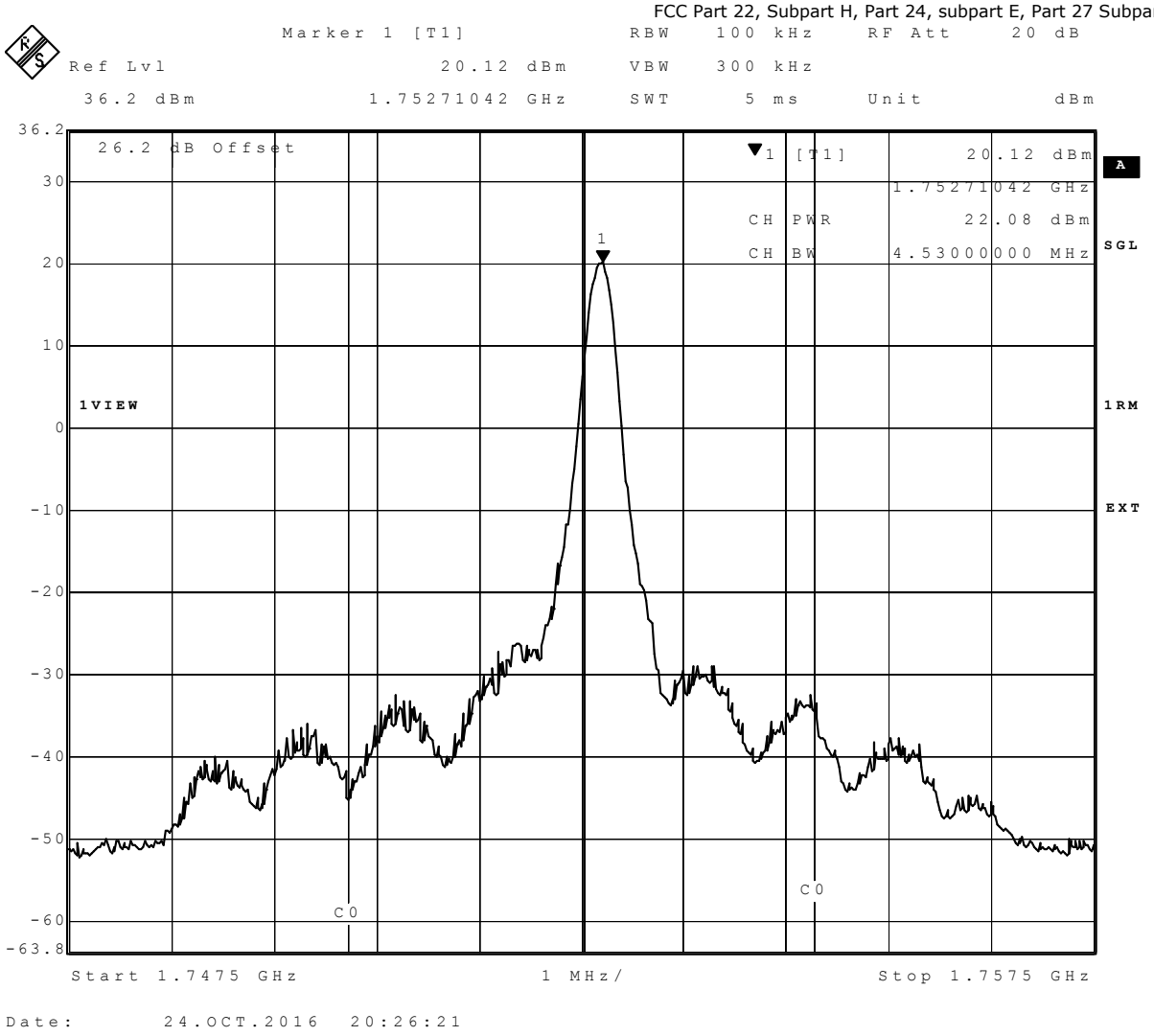
Radio Technology	Channel	Ressource Blocks	Bandwidth (MHz)	RMS Conducted Power (dBm)	FCC EIRP Limit (W)	IC EIRP Limit (W)	Maximum Antenna Gain FCC (dBi)	Maximum Antenna Gain IC (dBi)
eFDD 12 QPSK	low	1	1.4	21.35	1	1	8.65	8.65
eFDD 12 QPSK	low	3	1.4	21.02	1	1	8.98	8.98
eFDD 12 QPSK	low	6	1.4	20.07	1	1	9.93	9.93
eFDD 12 QPSK	mid	1	1.4	21.29	1	1	8.71	8.71
eFDD 12 QPSK	mid	3	1.4	21.07	1	1	8.93	8.93
eFDD 12 QPSK	mid	6	1.4	20.06	1	1	9.94	9.94
eFDD 12 QPSK	high	1	1.4	21.16	1	1	8.84	8.84
eFDD 12 QPSK	high	3	1.4	20.94	1	1	9.06	9.06
eFDD 12 QPSK	high	6	1.4	19.86	1	1	10.14	10.14
eFDD 12 16QAM	low	1	1.4	20.4	1	1	9.6	9.6
eFDD 12 16QAM	low	6	1.4	19.02	1	1	10.98	10.98
eFDD 12 16QAM	mid	1	1.4	20.26	1	1	9.74	9.74
eFDD 12 16QAM	mid	6	1.4	19.08	1	1	10.92	10.92
eFDD 12 16QAM	high	1	1.4	20.15	1	1	9.85	9.85
eFDD 12 16QAM	high	6	1.4	18.87	1	1	11.13	11.13
eFDD 12 QPSK	low	1	3	21.71	1	1	8.29	8.29
eFDD 12 QPSK	low	15	3	20.52	1	1	9.48	9.48
eFDD 12 QPSK	mid	1	3	21.76	1	1	8.24	8.24
eFDD 12 QPSK	mid	15	3	20.47	1	1	9.53	9.53
eFDD 12 QPSK	high	1	3	21.66	1	1	8.34	8.34
eFDD 12 QPSK	high	15	3	20.24	1	1	9.76	9.76
eFDD 12 16QAM	low	1	3	20.75	1	1	9.25	9.25
eFDD 12 16QAM	low	15	3	19.52	1	1	10.48	10.48
eFDD 12 16QAM	mid	1	3	20.83	1	1	9.17	9.17
eFDD 12 16QAM	mid	15	3	19.47	1	1	10.53	10.53
eFDD 12 16QAM	high	1	3	20.63	1	1	9.37	9.37
eFDD 12 16QAM	high	15	3	19.3	1	1	10.7	10.7
eFDD 12 QPSK	low	1	5	21.79	1	1	8.21	8.21
eFDD 12 QPSK	low	12	5	20.43	1	1	9.57	9.57
eFDD 12 QPSK	low	25	5	20.41	1	1	9.59	9.59
eFDD 12 QPSK	mid	1	5	21.88	1	1	8.12	8.12
eFDD 12 QPSK	mid	12	5	20.51	1	1	9.49	9.49
eFDD 12 QPSK	mid	25	5	20.39	1	1	9.61	9.61
eFDD 12 QPSK	high	1	5	21.71	1	1	8.29	8.29
eFDD 12 QPSK	high	12	5	20.33	1	1	9.67	9.67
eFDD 12 QPSK	high	25	5	20.33	1	1	9.67	9.67
eFDD 12 16QAM	low	1	5	20.86	1	1	9.14	9.14
eFDD 12 16QAM	low	25	5	19.42	1	1	10.58	10.58
eFDD 12 16QAM	mid	1	5	20.78	1	1	9.22	9.22
eFDD 12 16QAM	mid	25	5	19.39	1	1	10.61	10.61
eFDD 12 16QAM	high	1	5	20.95	1	1	9.05	9.05
eFDD 12 16QAM	high	25	5	19.37	1	1	10.63	10.63
eFDD 12 QPSK	low	1	10	21.99	1	1	8.01	8.01
eFDD 12 QPSK	low	50	10	20.79	1	1	9.21	9.21
eFDD 12 QPSK	mid	1	10	21.94	1	1	8.06	8.06
eFDD 12 QPSK	mid	50	10	20.73	1	1	9.27	9.27
eFDD 12 QPSK	high	1	10	21.93	1	1	8.07	8.07
eFDD 12 QPSK	high	50	10	20.7	1	1	9.3	9.3
eFDD 12 16QAM	low	1	10	21.05	1	1	8.95	8.95
eFDD 12 16QAM	low	50	10	19.71	1	1	10.29	10.29
eFDD 12 16QAM	mid	1	10	20.89	1	1	9.11	9.11
eFDD 12 16QAM	mid	50	10	19.74	1	1	10.26	10.26
eFDD 12 16QAM	high	1	10	20.92	1	1	9.08	9.08
eFDD 12 16QAM	high	50	10	19.66	1	1	10.34	10.34



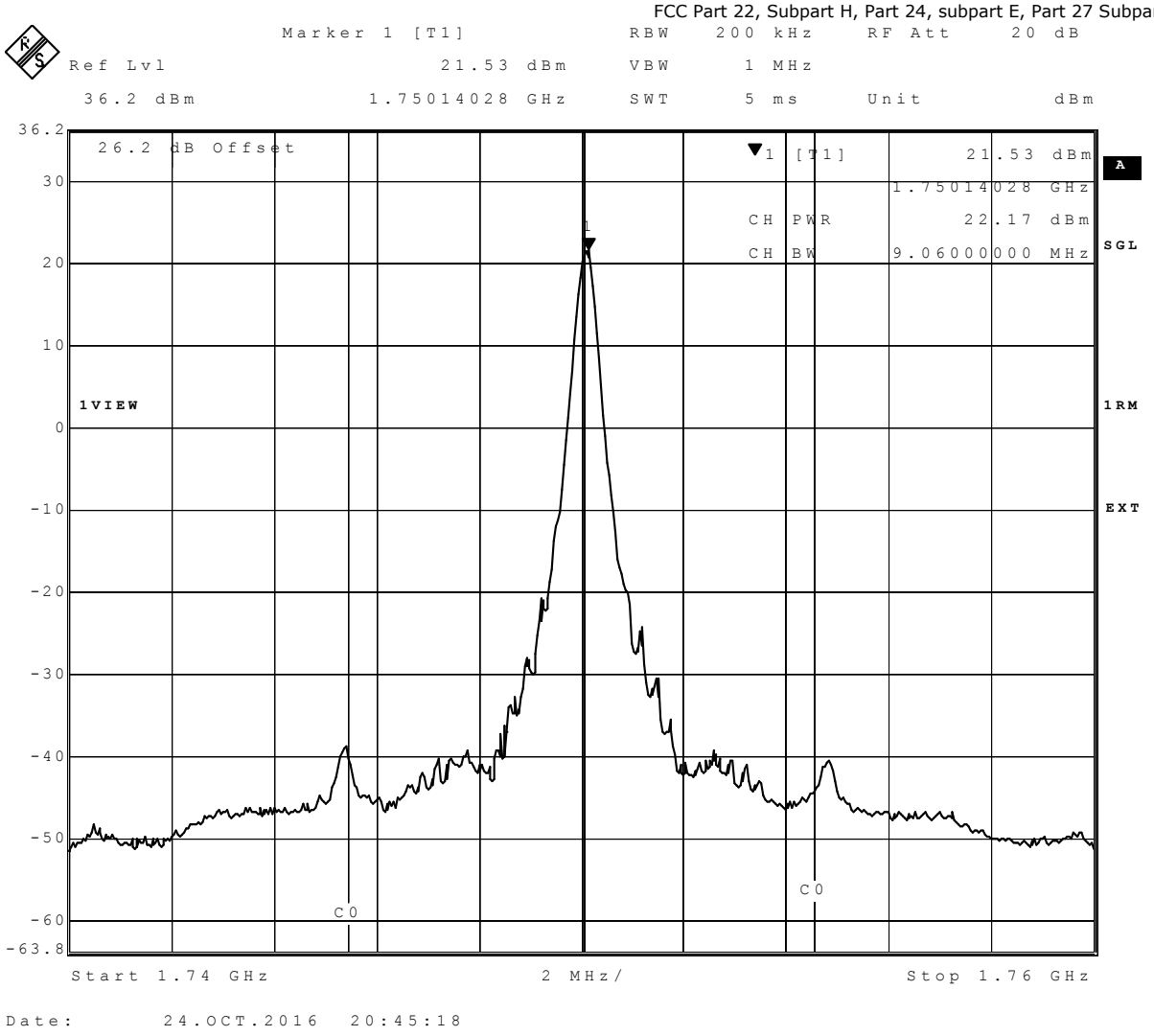
eFDD4 QPSK, 1.4MHz, RB1, Channel: mid



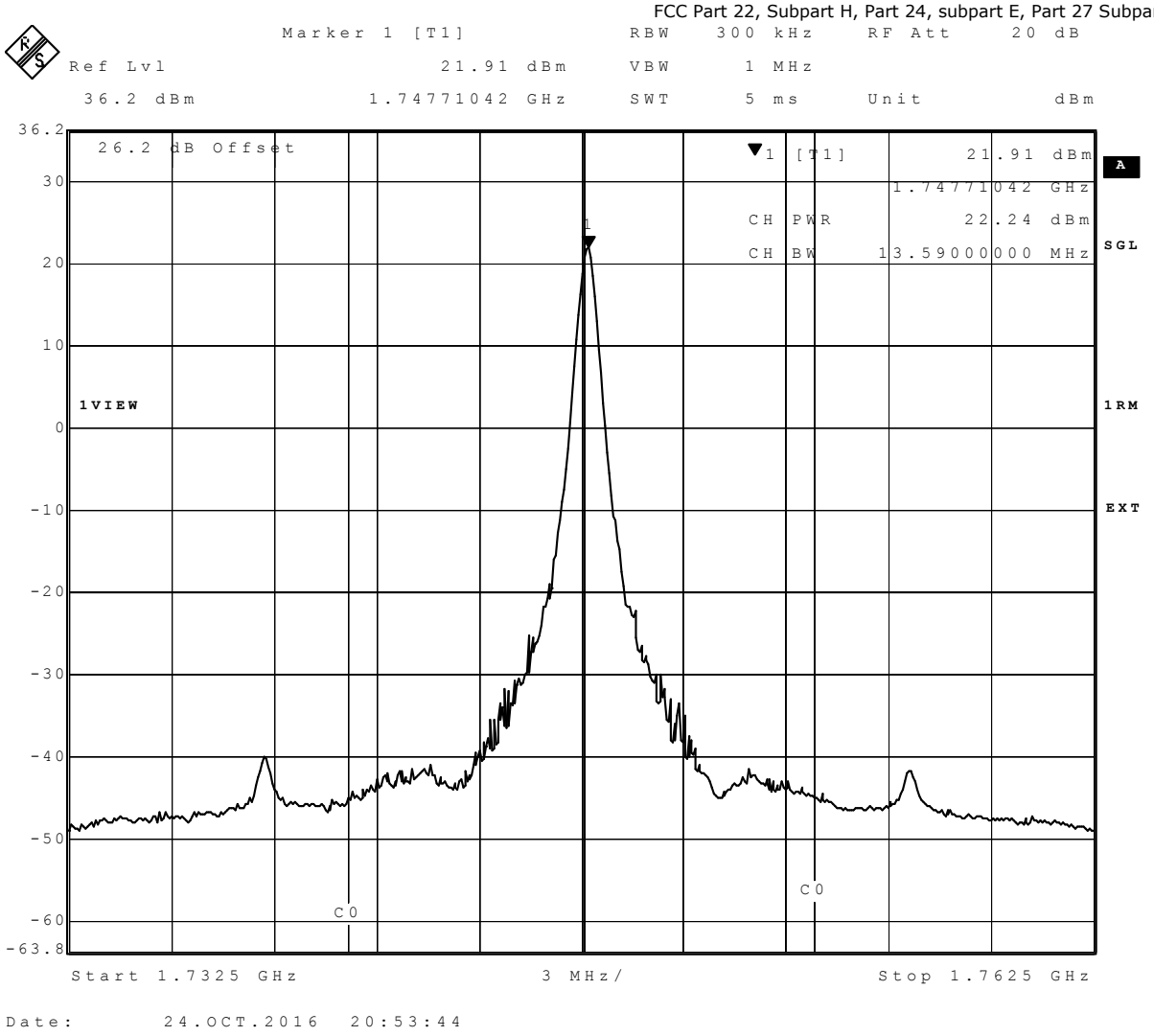
eFDD4 QPSK, 3MHz, RB1, Channel: mid



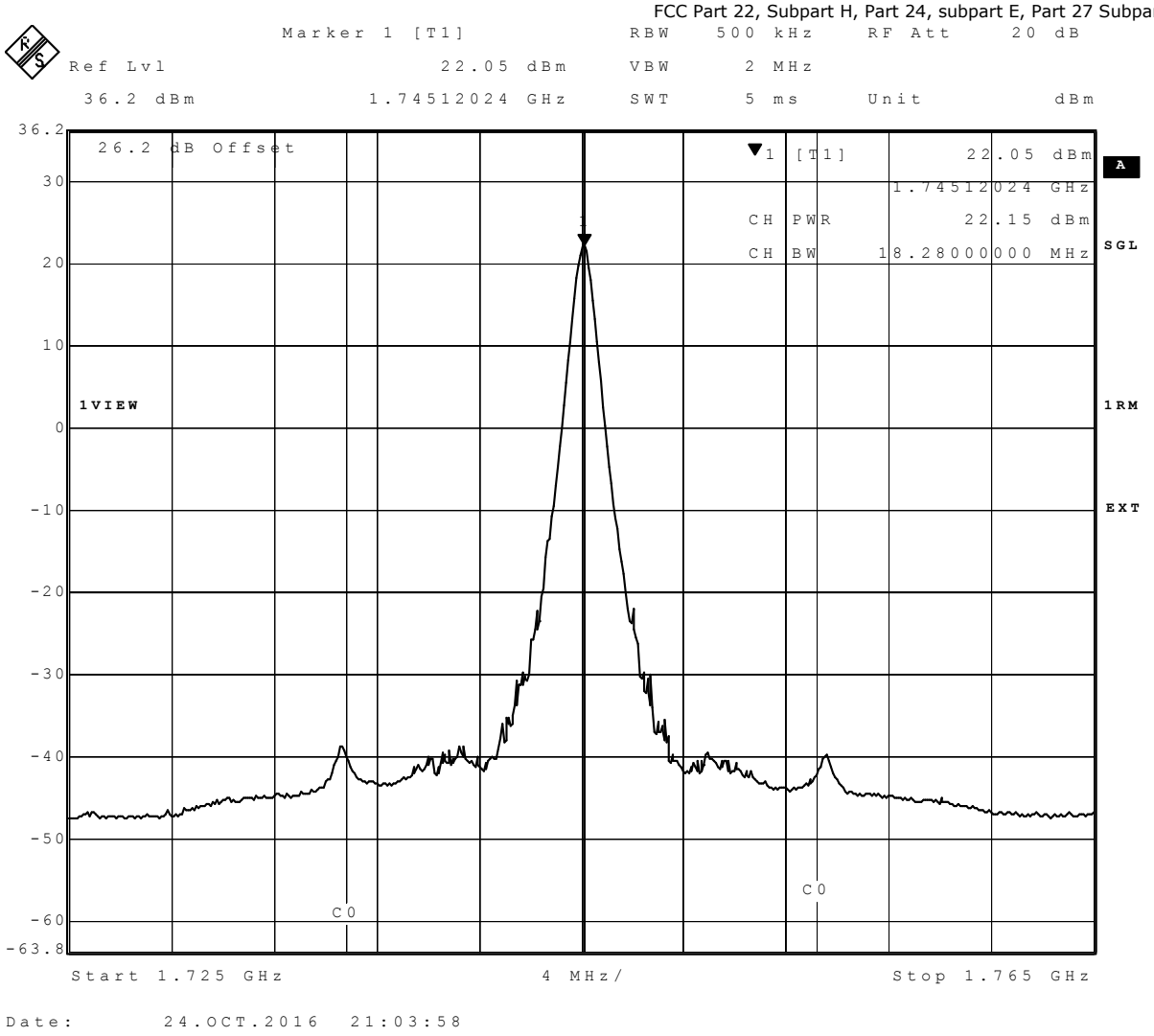
eFDD4 QPSK, 5MHz, RB1, Channel: high



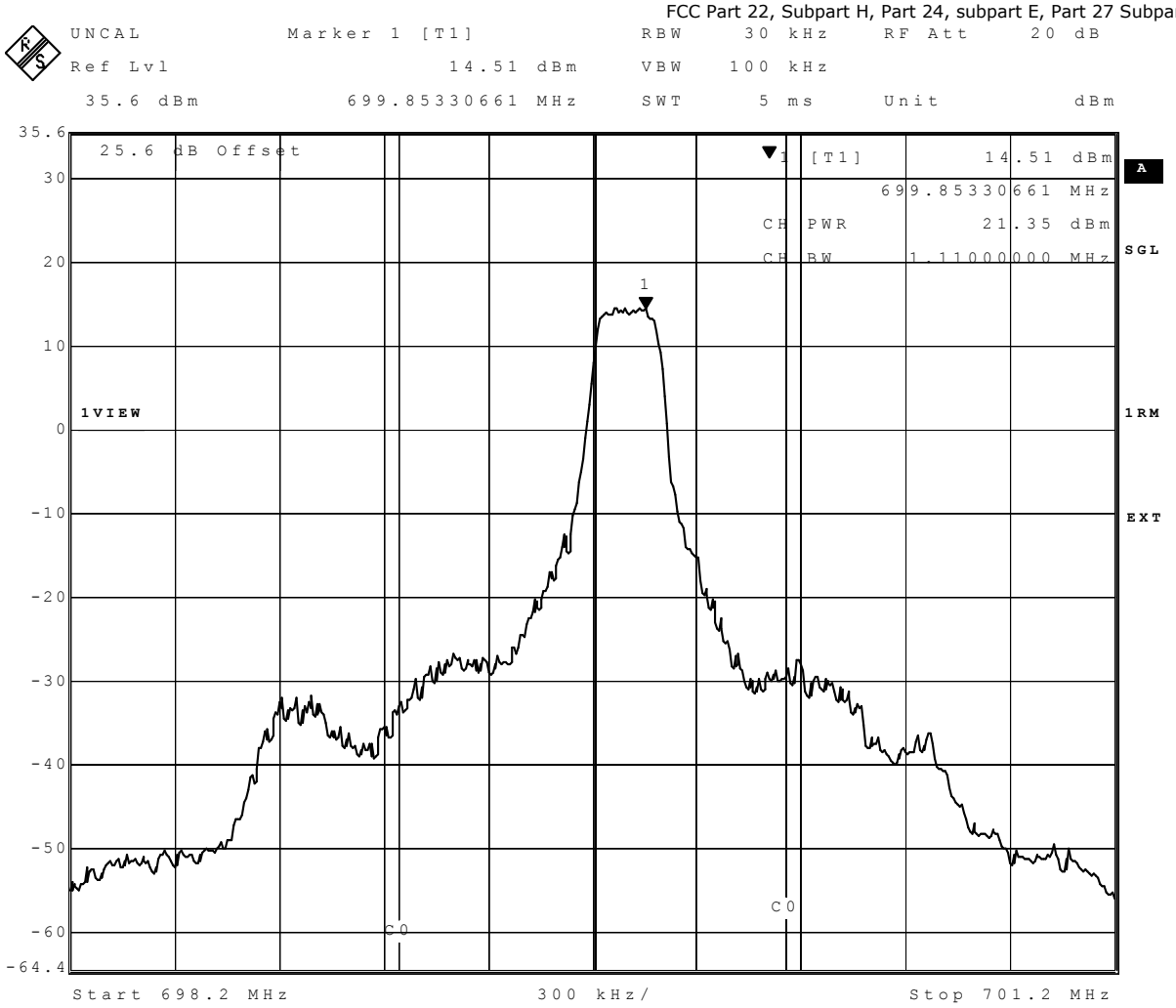
eFDD4 QPSK, 10MHz, RB1, Channel: high



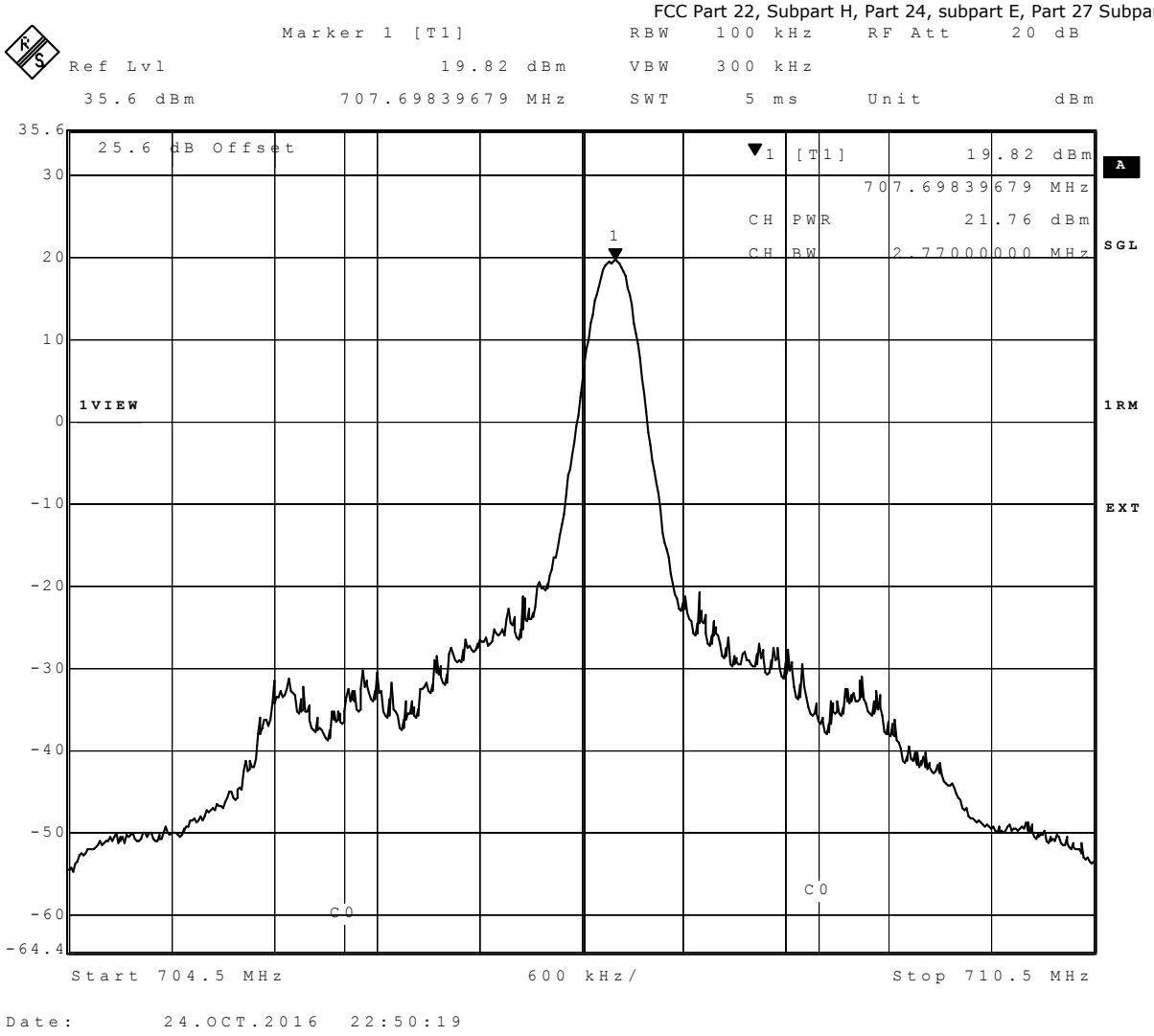
eFDD4 QPSK, 15MHz, RB1, Channel: high



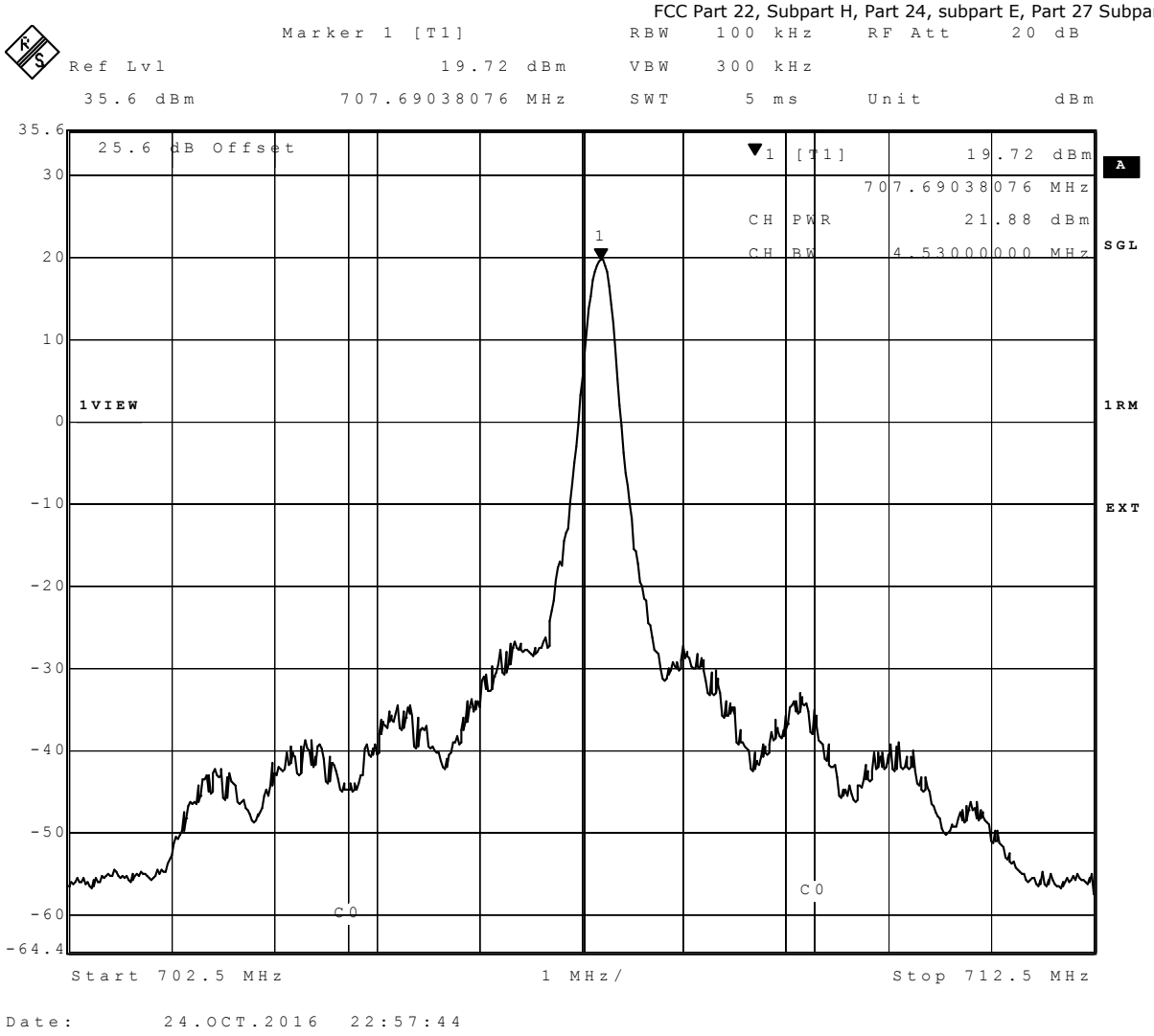
eFDD4 QPSK, 20MHz, RB1, Channel: high



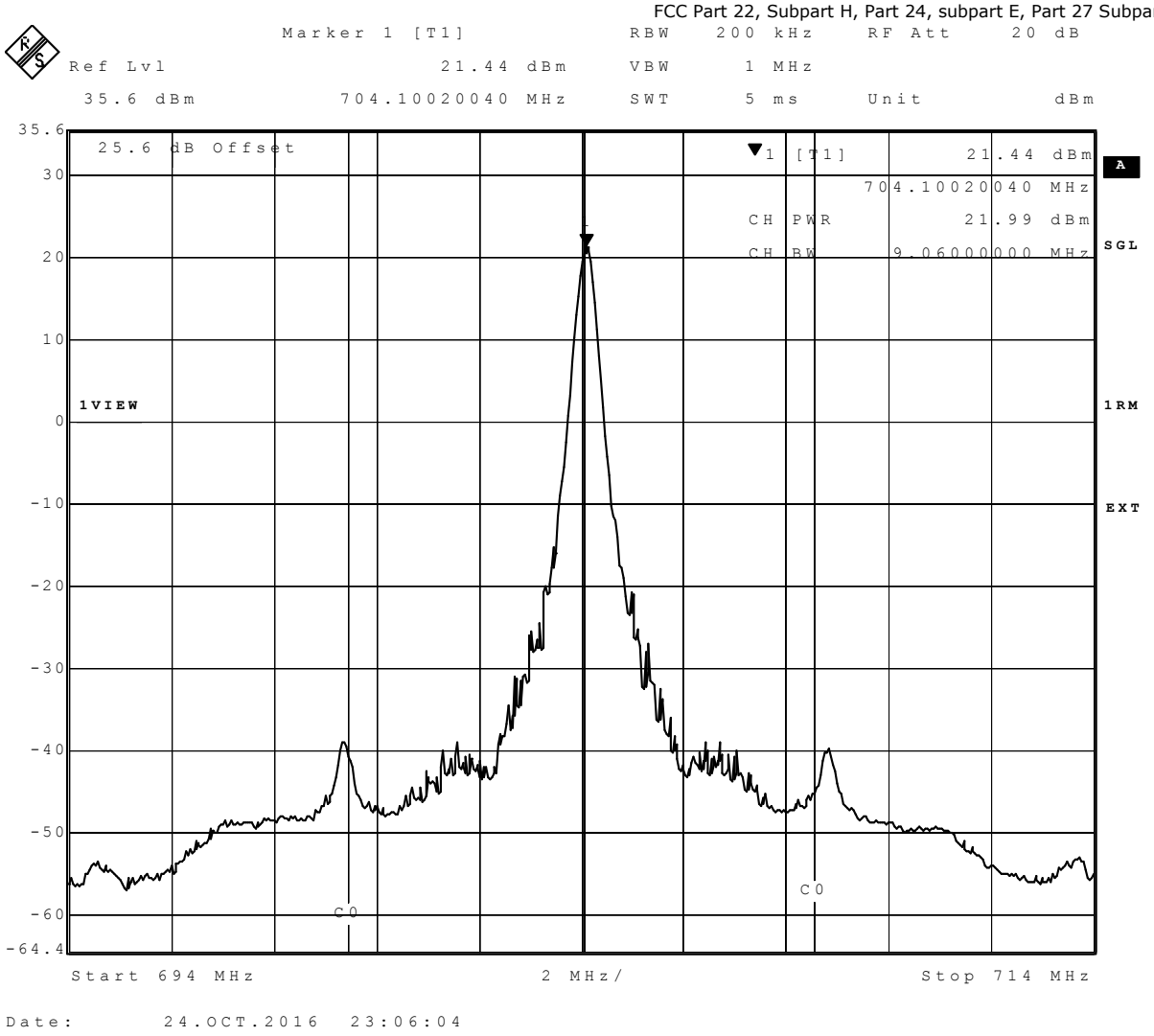
eFDD12 QPSK, 1.4MHz, 1RB, Channel: low



eFDD12 QPSK, 3MHz, RB1, Channel: mid



eFDD12 QPSK, 5MHz, RB1, Channel: mid



eFDD12 QPSK, 10MHz, RB1, Channel: low

3.5.16 27.2 Frequency stability §2.1055, §27.54

Test: 27.2; Frequency stability Summary §2.1055, §27.54

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 15:41
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Detailed Results:

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	4331.25	54	100	passed
-30	5			50	107	passed
-30	10			52	99	passed
-20	0	normal	4331.25	30	85	passed
-20	5			17	99	passed
-20	10			16	61	passed
-10	0	normal	4331.25	16	153	passed
-10	5			9	-119	passed
-10	10			26	94	passed
0	0	normal	4331.25	9	91	passed
0	5			5	123	passed
0	10			-9	96	passed
10	0	normal	4331.25	1	177	passed
10	5			-8	334	passed
10	10			-6	-297	passed
20	0	low	4331.25	45	97	passed
20	5			40	101	passed
20	10			53	113	passed
20	0	normal = high [1)]	4331.25	-6	140	passed
20	5			11	346	passed
20	10			-22	-228	passed
20	0	high	4331.25	44	90	passed
20	5			51	110	passed
20	10			54	90	passed
30	0	normal	4331.25	-7	-160	passed
30	5			2	110	passed
30	10			-21	-125	passed
40	0	normal	4331.25	5	-193	passed
40	5			14	90	passed
40	10			5	310	passed
50	0	normal	4331.25	8	-131	passed
50	5			25	93	passed
50	10			2	153	passed

LTE, eFDD4, QPSK, 5 MHz BW, Mid Channel

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	1769	45	97	passed
-30	5			40	101	passed
-30	10			53	113	passed
-20	0	normal	1769	-2	72	passed
-20	5			8	-124	passed
-20	10			7	-176	passed
-10	0	normal	1769	59	108	passed
-10	5			56	92	passed
-10	10			55	112	passed
0	0	normal	1769	53	99	passed
0	5			49	105	passed
0	10			61	105	passed
10	0	normal	1769	17	108	passed
10	5			34	128	passed
10	10			16	-114	passed
20	0	low	1769	24	-120	passed
20	5			34	161	passed
20	10			24	80	passed
20	0	normal = high [1)]	1769	28	63	passed
20	5			29	79	passed
20	10			26	-136	passed
20	0	high	1769	26	163	passed
20	5			20	-106	passed
20	10			40	163	passed
30	0	normal	1769	47	110	passed
30	5			52	112	passed
30	10			53	98	passed
40	0	normal	1769	54	100	passed
40	5			50	107	passed
40	10			52	99	passed
50	0	normal	1769	-9	-151	passed
50	5			-12	-195	passed
50	10			-15	-107	passed

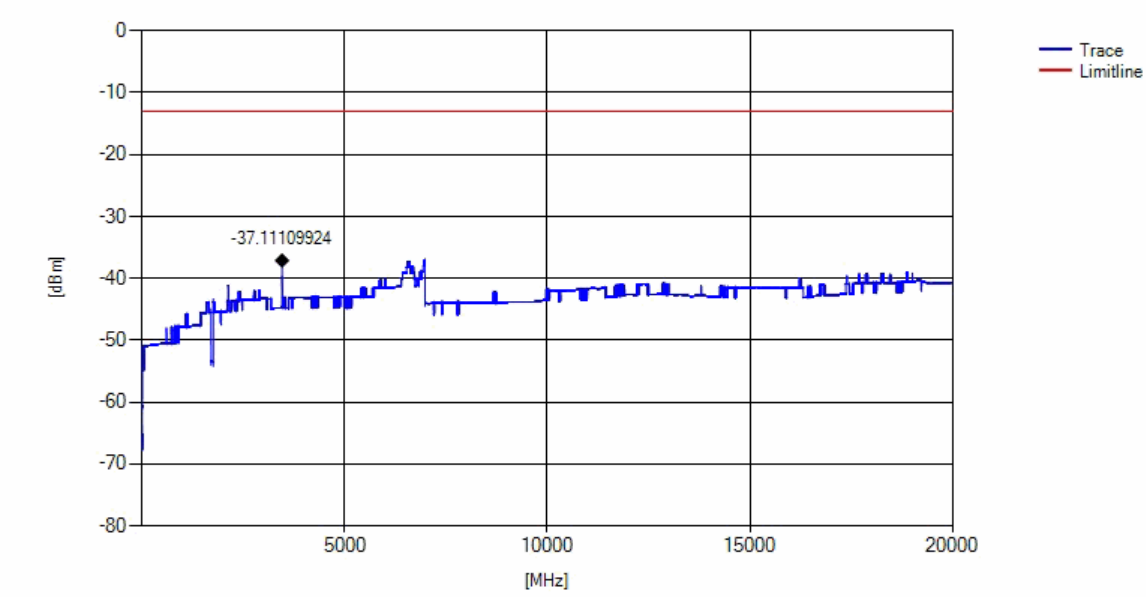
LTE, eFDD12, QPSK, 5 MHz BW, Mid Channel

3.5.17 27.3 Spurious emissions at antenna terminals §2.1051, §27.53

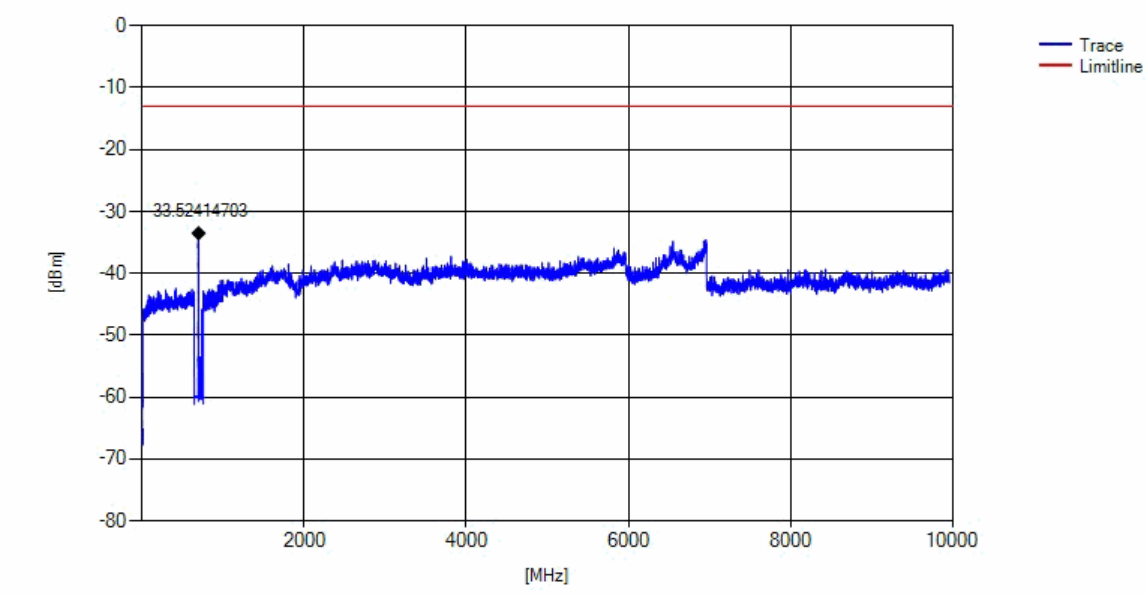
Test: 27.3; Spurious emissions at antenna terminals Summary §2.1051, §27.53

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 15:43
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Detailed Results:



eFDD4 QPSK, Channel: mid



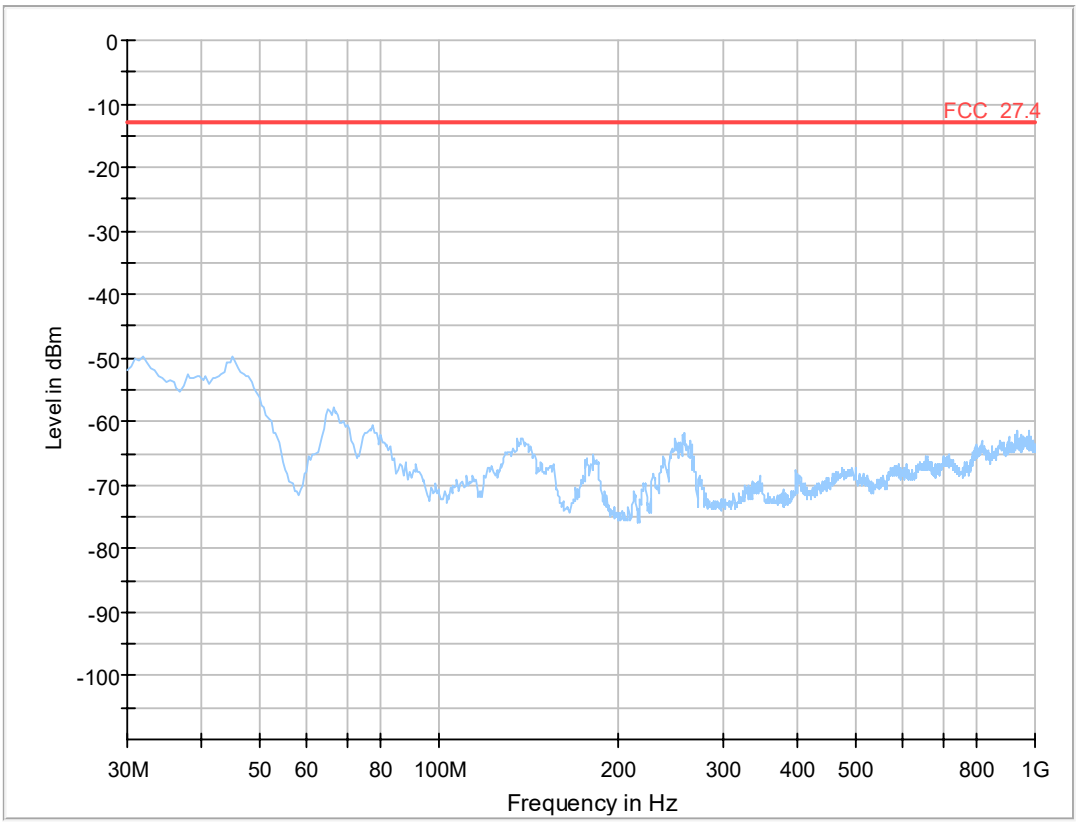
eFDD12 QPSK, Channel: mid

3.5.18 27.4 Field strength of spurious radiation §2.1053, §27.53

Test: 27.4; Field strength of spurious radiation Summary §2.1053, §27.53

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/10 8:52
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Detailed Results:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
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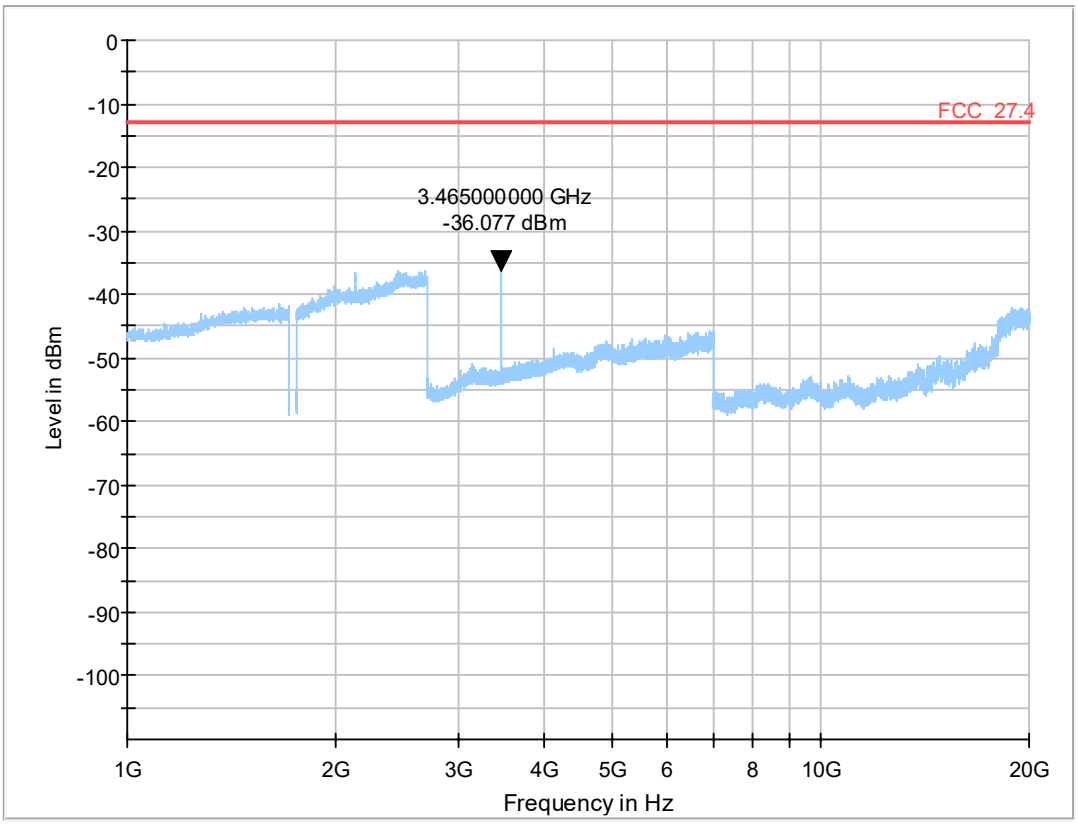
30 MHz - 1GHz: eFDD4, Channel: mid



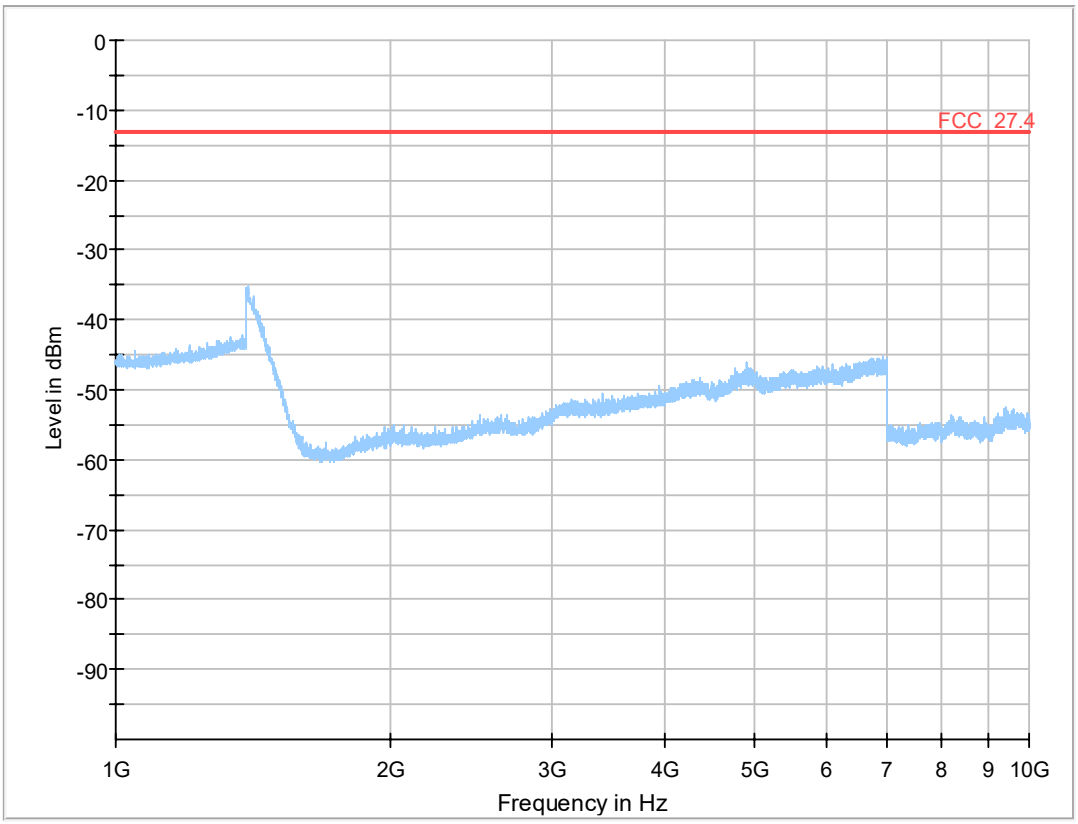
Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

1 GHz - 20GHz: eFDD4, Channel: mid



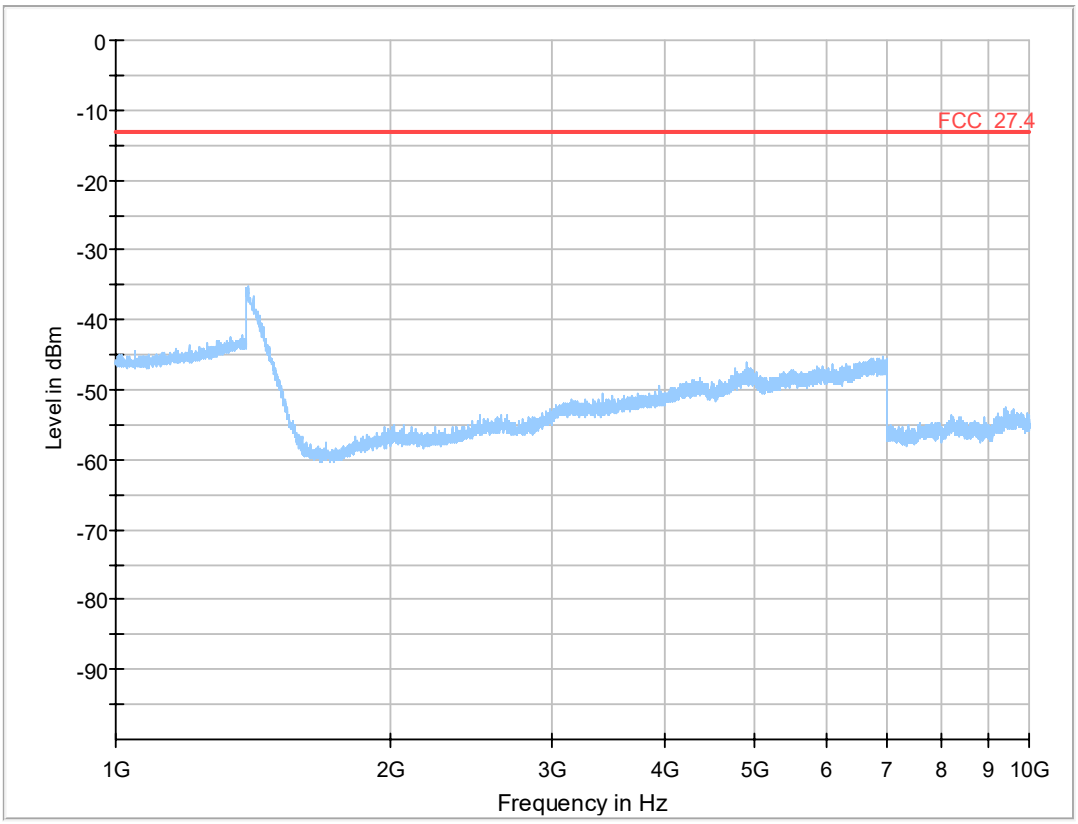
Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

30 MHz - 1GHz: eFDD12, Channel: mid



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

Final_Result

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
---	---	---	---	---	---	---		---	---	---

1 GHz - 10GHz: eFDD12, Channel: mid

Test: 27.4; Frequency Band = eFDD12, Mode = QPSK 5MHz, Channel = 23035, Frequency = 701.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:51
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Test: 27.4; Frequency Band = eFDD12, Mode = QPSK 5MHz, Channel = 23095, Frequency = 707.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:51
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Test: 27.4; Frequency Band = eFDD12, Mode = QPSK 5MHz, Channel = 23155, Frequency = 713.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:52
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Test: 27.4; Frequency Band = eFDD4, Mode = QPSK 5MHz, Channel = 19975, Frequency = 1712.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:52
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Test: 27.4; Frequency Band = eFDD4, Mode = QPSK 5MHz, Channel = 20175, Frequency = 1732.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:53
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Test: 27.4; Frequency Band = eFDD4, Mode = QPSK 5MHz, Channel = 20375, Frequency = 1752.5MHz, Method = radiated

Result:	Passed
Setup No.:	AJ06
Date of Test:	2016/11/08 8:54
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

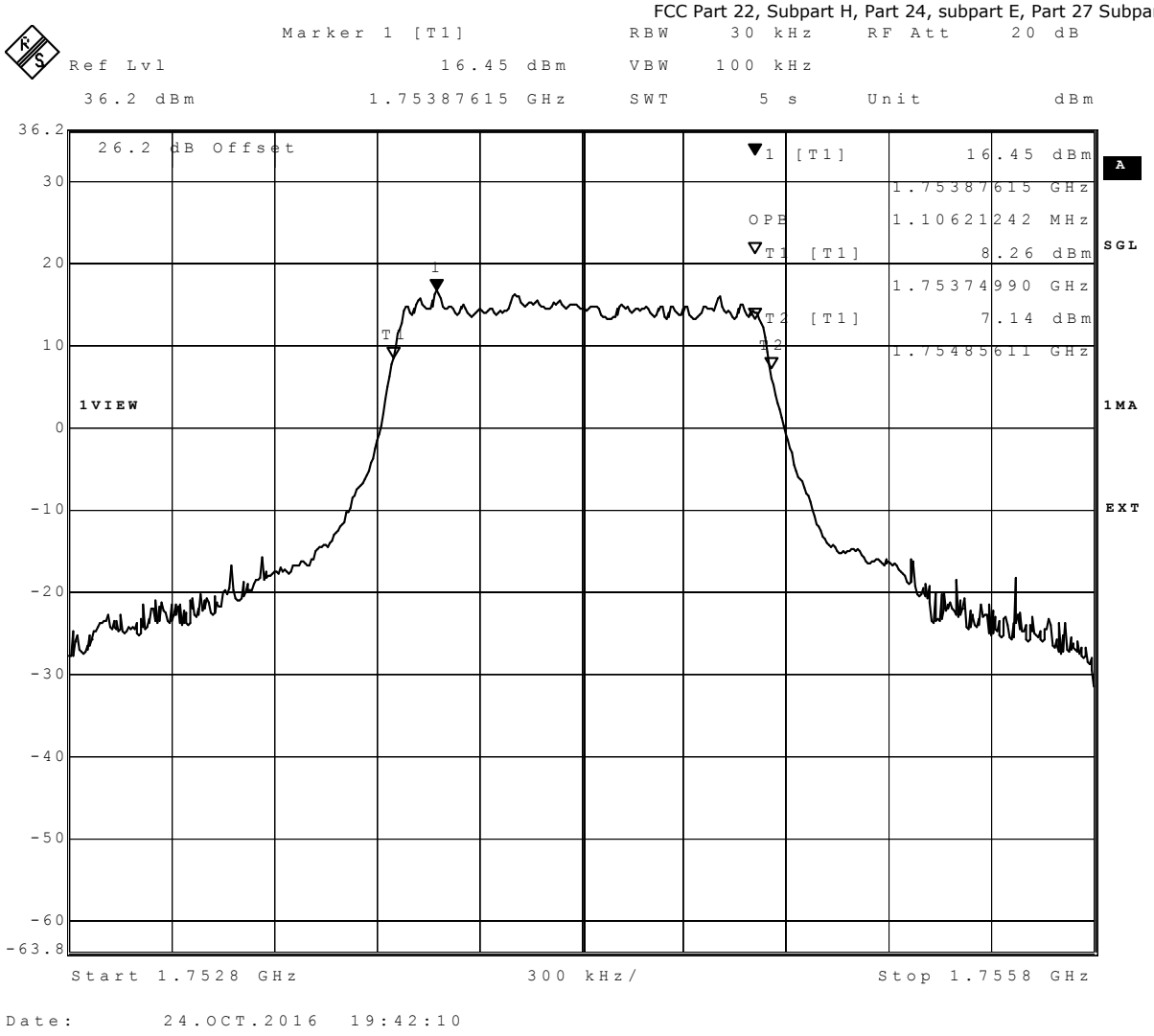
3.5.19 27.5 Emission and Occupied Bandwidth §2.1049

Test: 27.5; Emission and Occupied Bandwidth Summary §2.1049

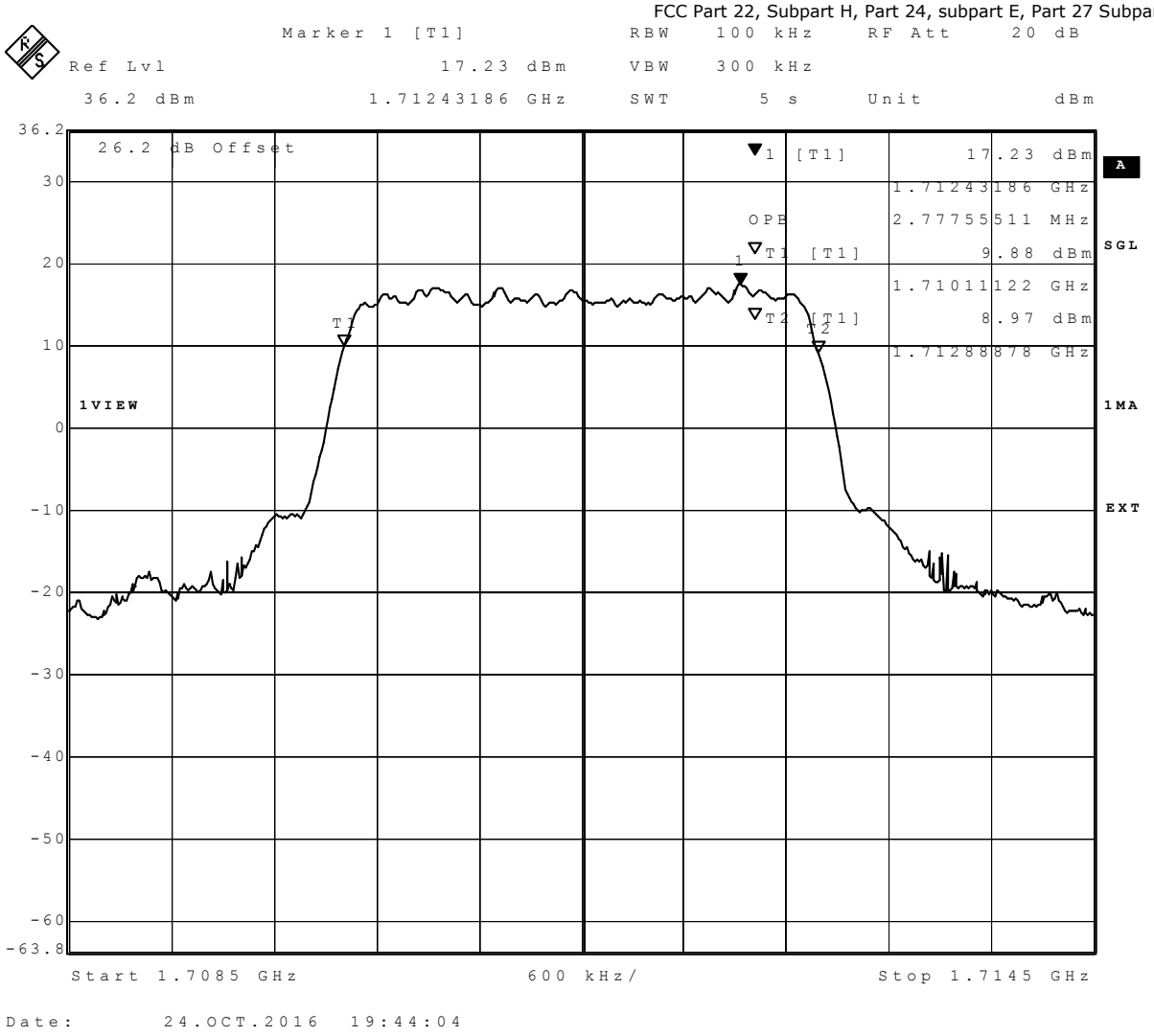
Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 16:24
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Detailed Results:

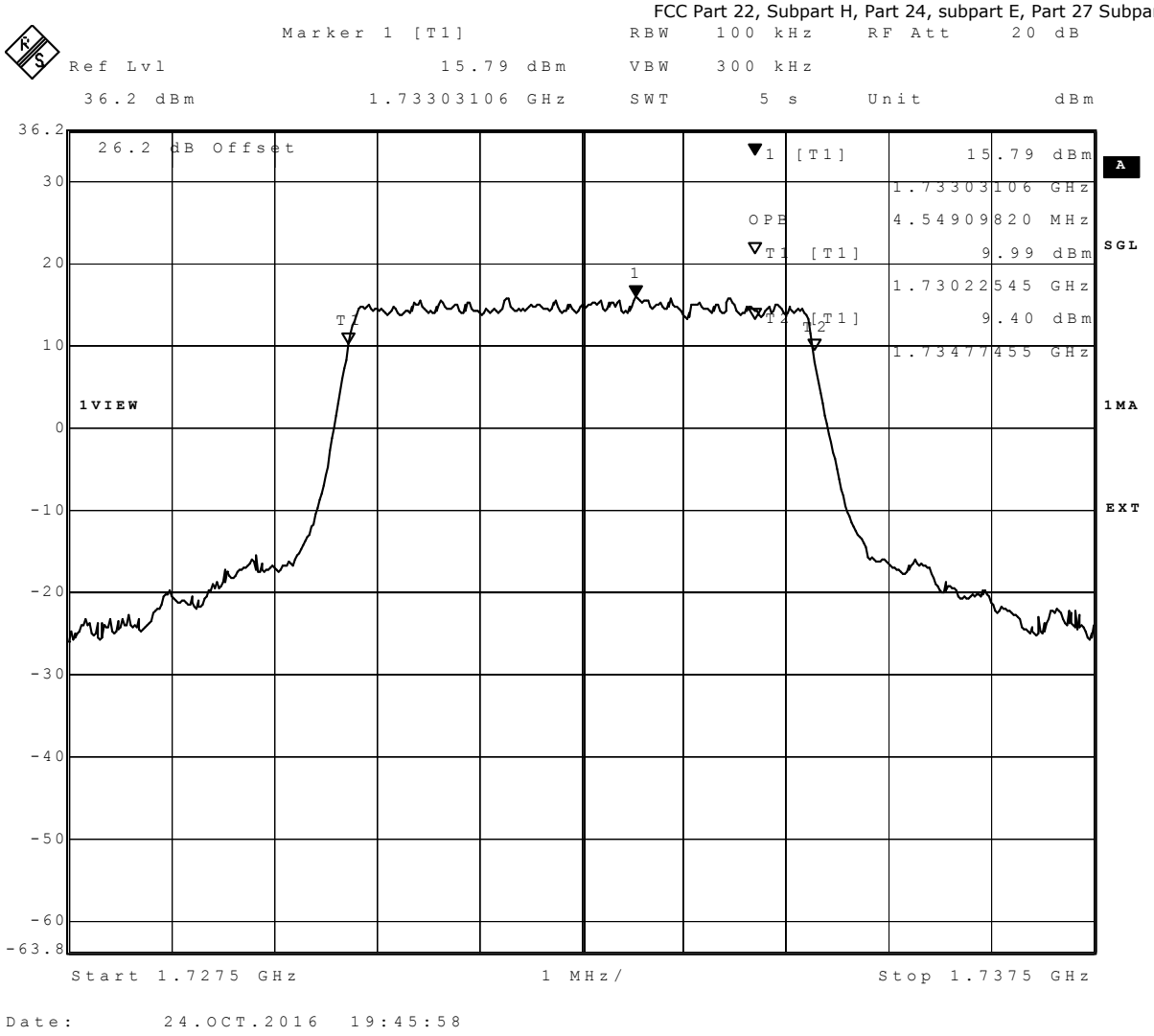
Emission and Occupied Bandwidth						
Ambient temperature:	26 °C					
Relative humidity:	35%					
Radio Technology	**Channel**	**Ressource Blocks**	**Bandwidth (MHz)**	**Nominal BW [MHz]**	**26 dB BW [kHz]**	**99 % BW [kHz]**
eFDD 4 QPSK	low	6	1.4	1.4	-	1112.22
eFDD 4 QPSK	mid	6	1.4	1.4	-	1112.22
eFDD 4 QPSK	high	6	1.4	1.4	-	1118.24
eFDD 4 16QAM	low	6	1.4	1.4	-	1118.24
eFDD 4 16QAM	mid	6	1.4	1.4	-	1112.22
eFDD 4 16QAM	high	6	1.4	1.4	-	1106.21
eFDD 4 QPSK	low	15	3	3	-	2765.53
eFDD 4 QPSK	mid	15	3	3	-	2765.53
eFDD 4 QPSK	high	15	3	3	-	2765.53
eFDD 4 16QAM	low	15	3	3	-	2777.56
eFDD 4 16QAM	mid	15	3	3	-	2765.53
eFDD 4 16QAM	high	15	3	3	-	2765.53
eFDD 4 QPSK	low	25	5	5	-	4549.1
eFDD 4 QPSK	mid	25	5	5	-	4549.1
eFDD 4 QPSK	high	25	5	5	-	4529.06
eFDD 4 16QAM	low	25	5	5	-	4509.02
eFDD 4 16QAM	mid	25	5	5	-	4529.06
eFDD 4 16QAM	high	25	5	5	-	4549.1
eFDD 4 QPSK	low	50	10	10	-	9058.12
eFDD 4 QPSK	mid	50	10	10	-	9018.04
eFDD 4 QPSK	high	50	10	10	-	9058.12
eFDD 4 16QAM	low	50	10	10	-	9058.12
eFDD 4 16QAM	mid	50	10	10	-	9058.12
eFDD 4 16QAM	high	50	10	10	-	9058.12
eFDD 4 QPSK	low	75	15	15	-	13707.41
eFDD 4 QPSK	mid	75	15	15	-	13527.05
eFDD 4 QPSK	high	75	15	15	-	13587.17
eFDD 4 16QAM	low	75	15	15	-	13647.29
eFDD 4 16QAM	mid	75	15	15	-	13587.17
eFDD 4 16QAM	high	75	15	15	-	13647.29
eFDD 4 QPSK	low	100	20	20	-	18116.23
eFDD 4 QPSK	mid	100	20	20	-	18196.39
eFDD 4 QPSK	high	100	20	20	-	18276.55
eFDD 4 16QAM	low	100	20	20	-	18196.39
eFDD 4 16QAM	mid	100	20	20	-	18196.39
eFDD 4 16QAM	high	100	20	20	-	18276.55
eFDD 12 QPSK	low	6	1.4	1.4	-	1112.22
eFDD 12 QPSK	mid	6	1.4	1.4	-	1112.22
eFDD 12 QPSK	high	6	1.4	1.4	-	1112.22
eFDD 12 16QAM	low	6	1.4	1.4	-	1112.22
eFDD 12 16QAM	mid	6	1.4	1.4	-	1106.21
eFDD 12 16QAM	high	6	1.4	1.4	-	1124.25
eFDD 12 QPSK	low	15	3	3	-	2765.53
eFDD 12 QPSK	mid	15	3	3	-	2765.53
eFDD 12 QPSK	high	15	3	3	-	2753.51
eFDD 12 16QAM	low	15	3	3	-	2777.56
eFDD 12 16QAM	mid	15	3	3	-	2753.51
eFDD 12 16QAM	high	15	3	3	-	2777.56
eFDD 12 QPSK	low	25	5	5	-	4549.1
eFDD 12 QPSK	mid	25	5	5	-	4529.06
eFDD 12 QPSK	high	25	5	5	-	4529.06
eFDD 12 16QAM	low	25	5	5	-	4529.06
eFDD 12 16QAM	mid	25	5	5	-	4529.06
eFDD 12 16QAM	high	25	5	5	-	4569.14
eFDD 12 QPSK	low	50	10	10	-	9058.12
eFDD 12 QPSK	mid	50	10	10	-	9018.04
eFDD 12 QPSK	high	50	10	10	-	9058.12
eFDD 12 16QAM	low	50	10	10	-	9058.12
eFDD 12 16QAM	mid	50	10	10	-	9058.12
eFDD 12 16QAM	high	50	10	10	-	9058.12



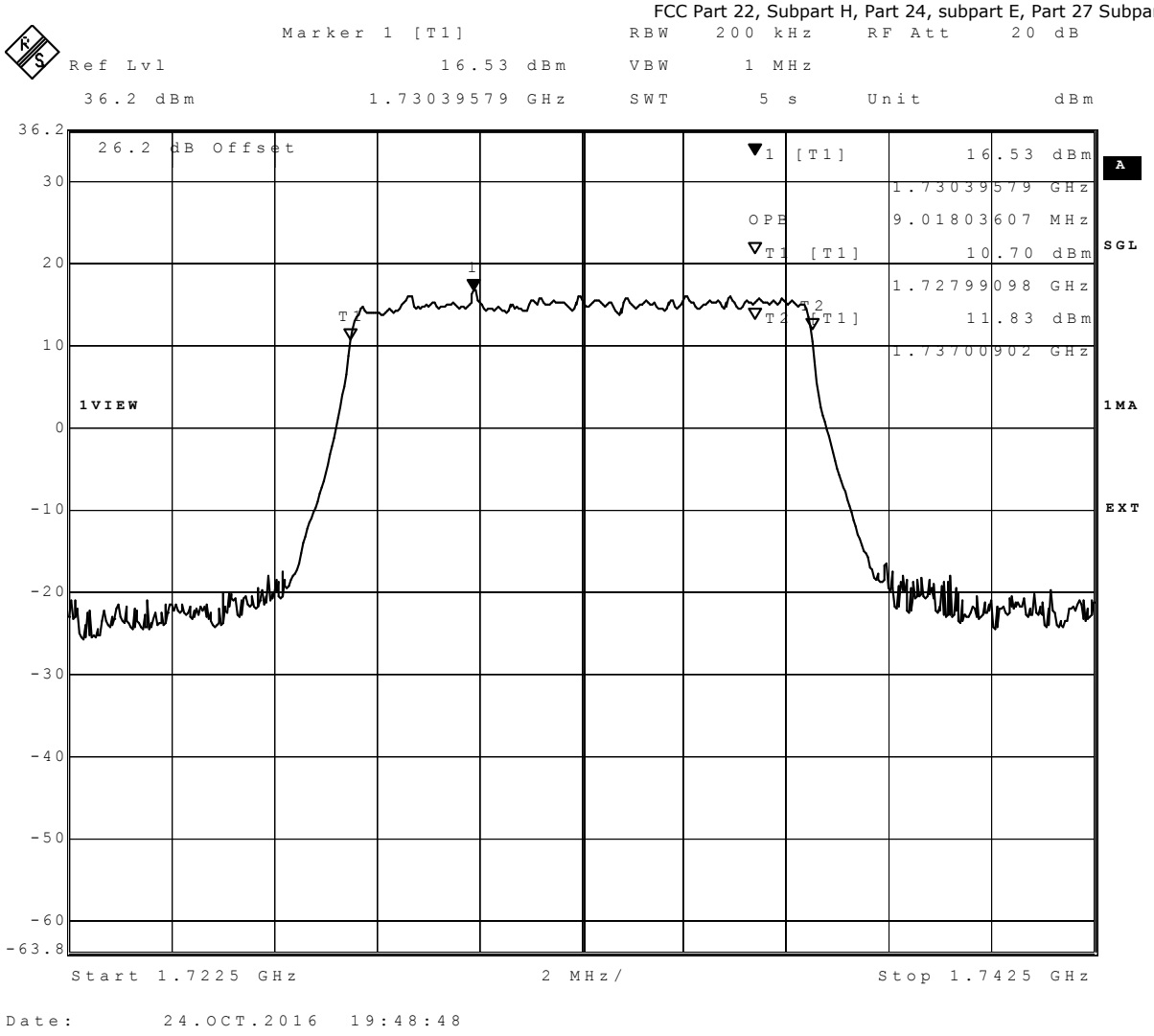
eFDD4 16QAM, 1.4MHz, Channel: high



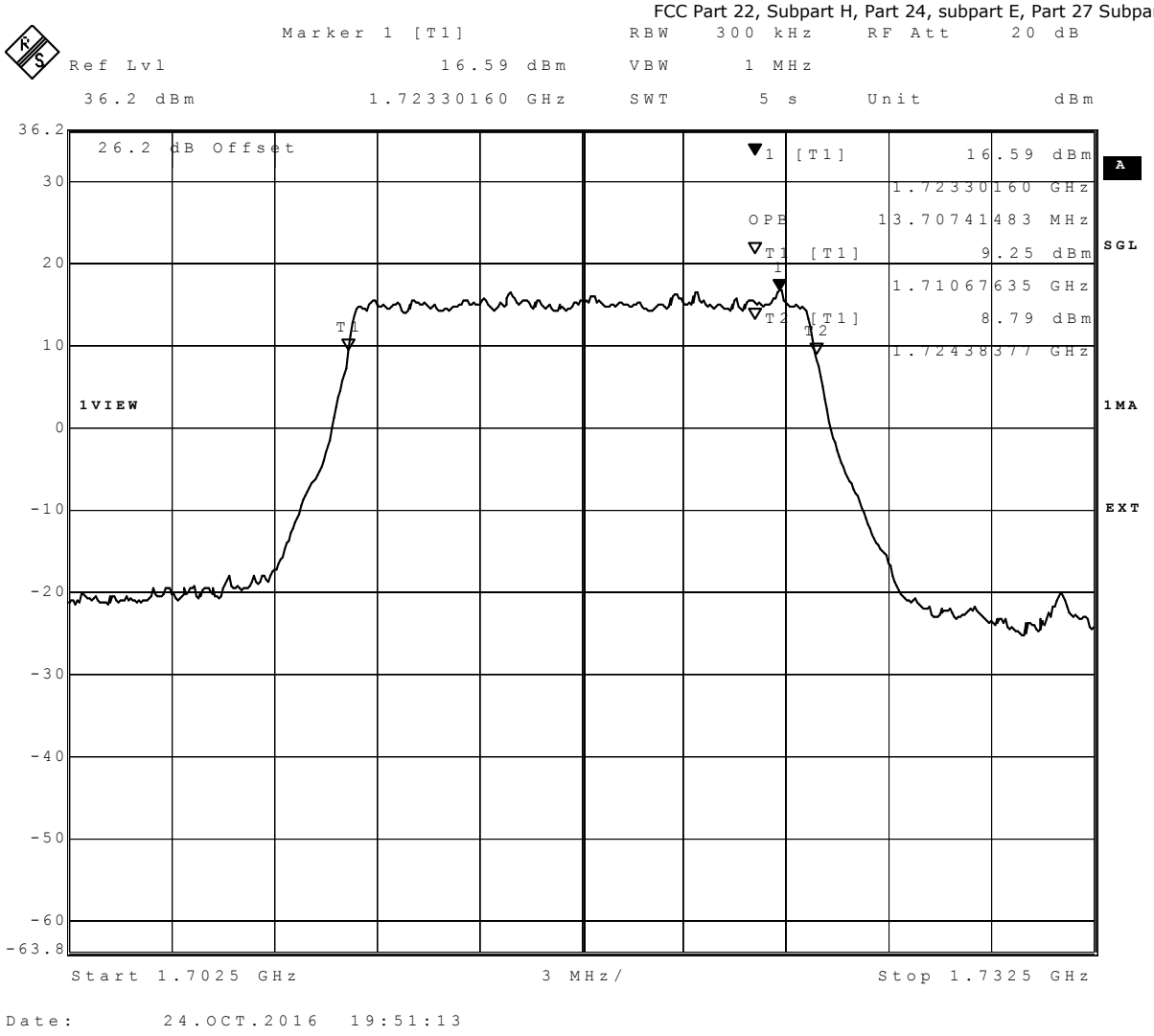
eFDD4 16QAM, 3MHz, Channel: low



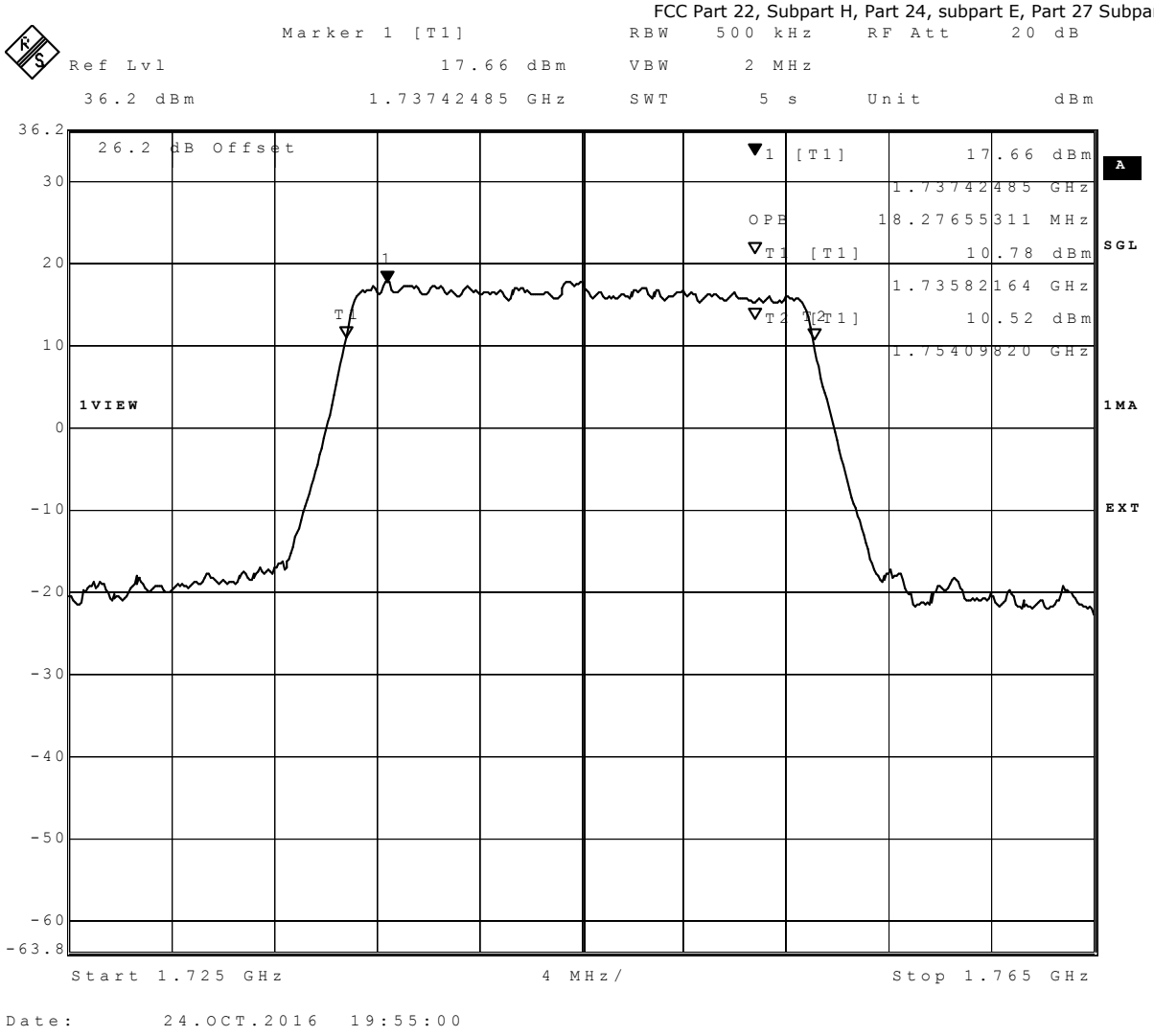
eFDD4 QPSK, 5MHz, Channel: mid



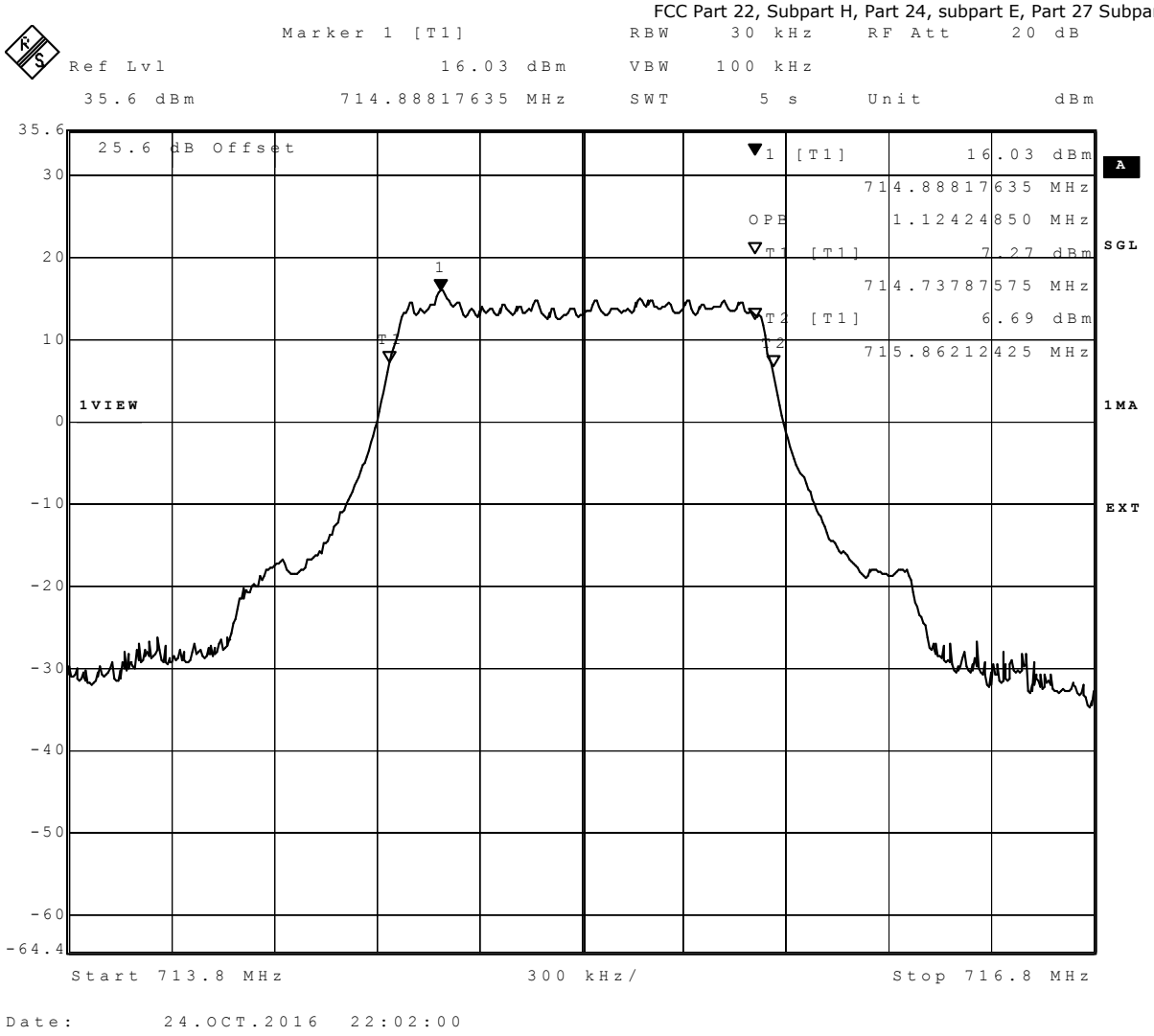
eFDD4 QPSK, 10MHz, Channel: mid



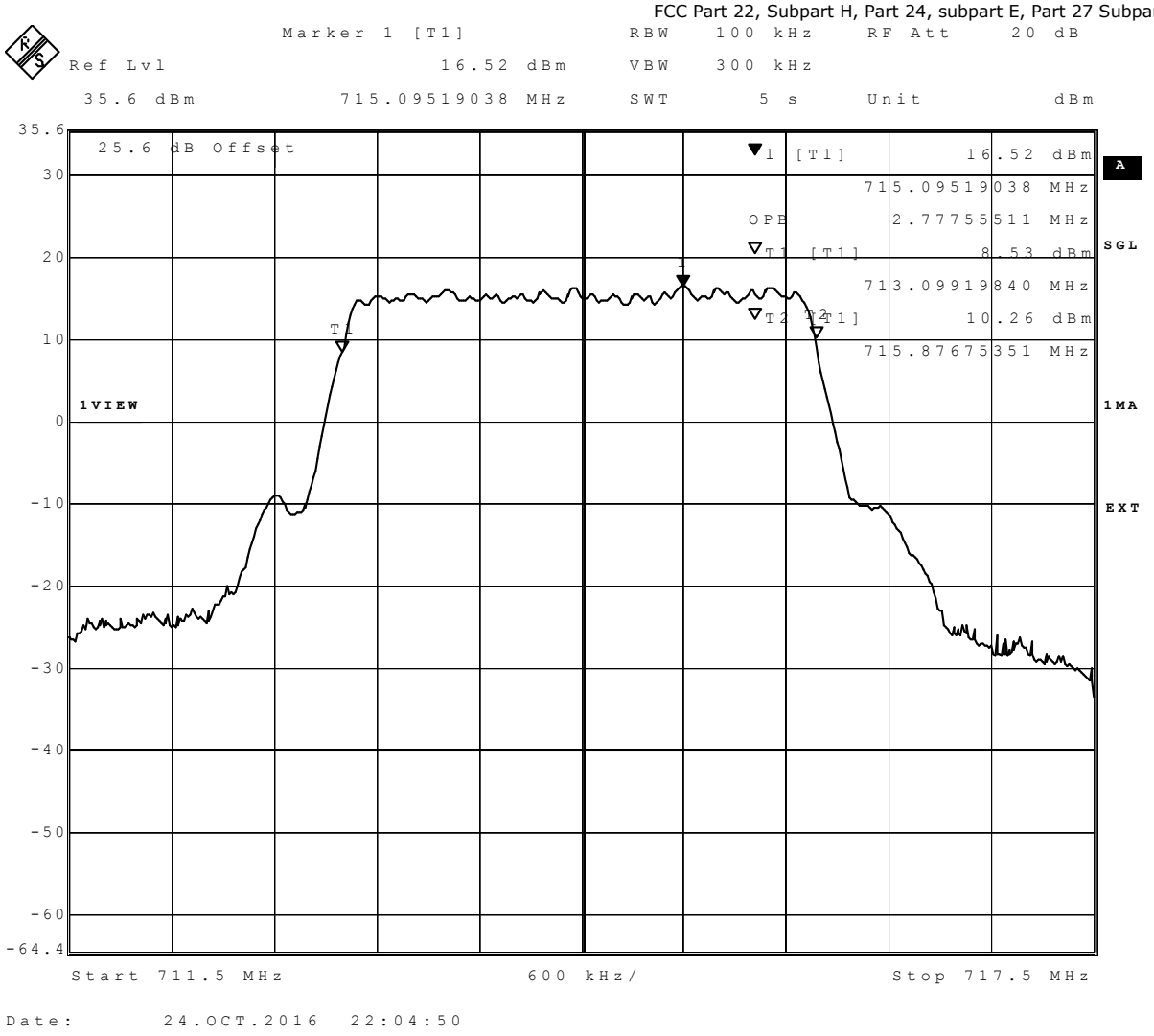
eFDD4 QPSK, 15MHz, Channel: low



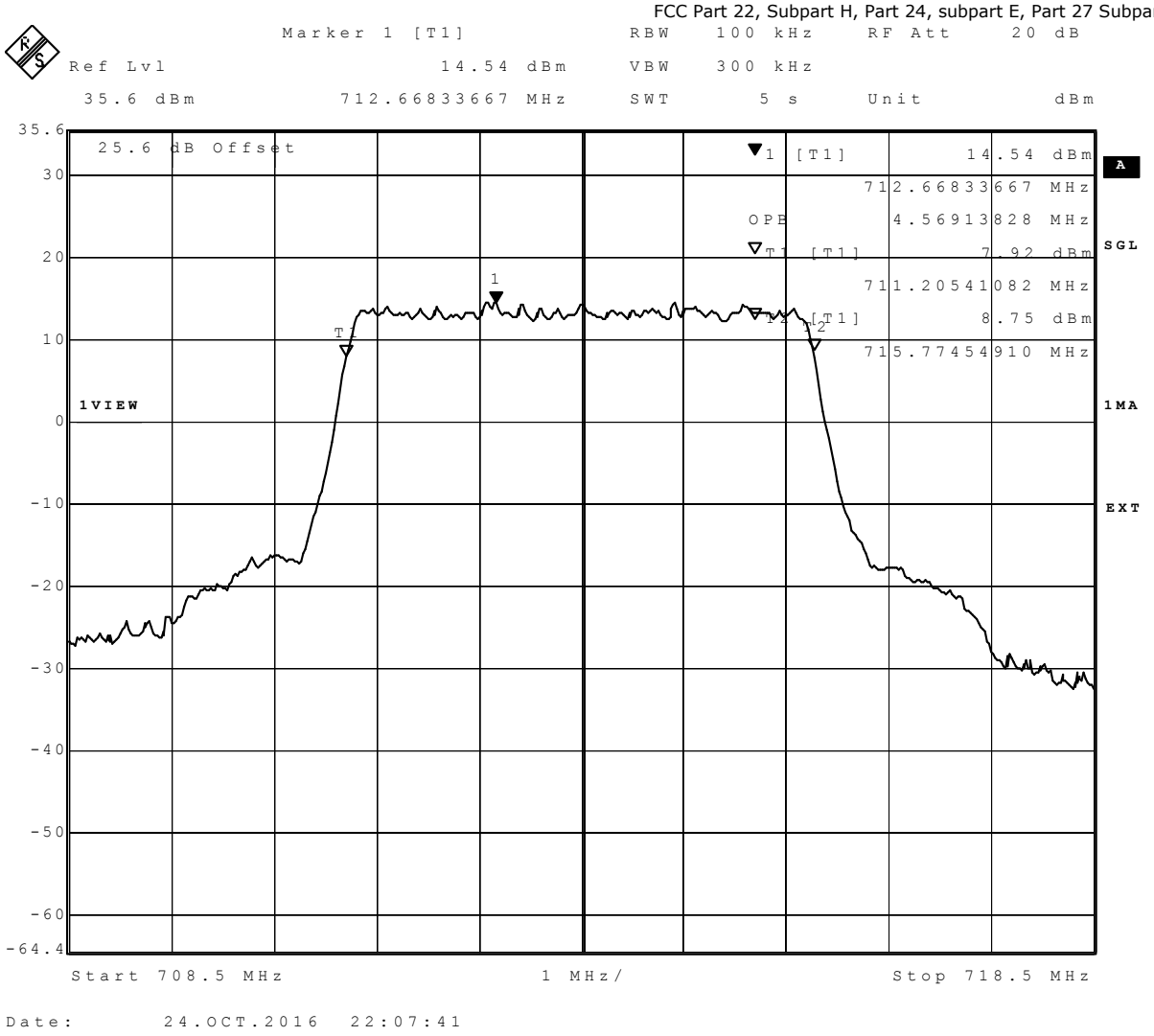
eFDD4 QPSK, 20MHz, Channel: high



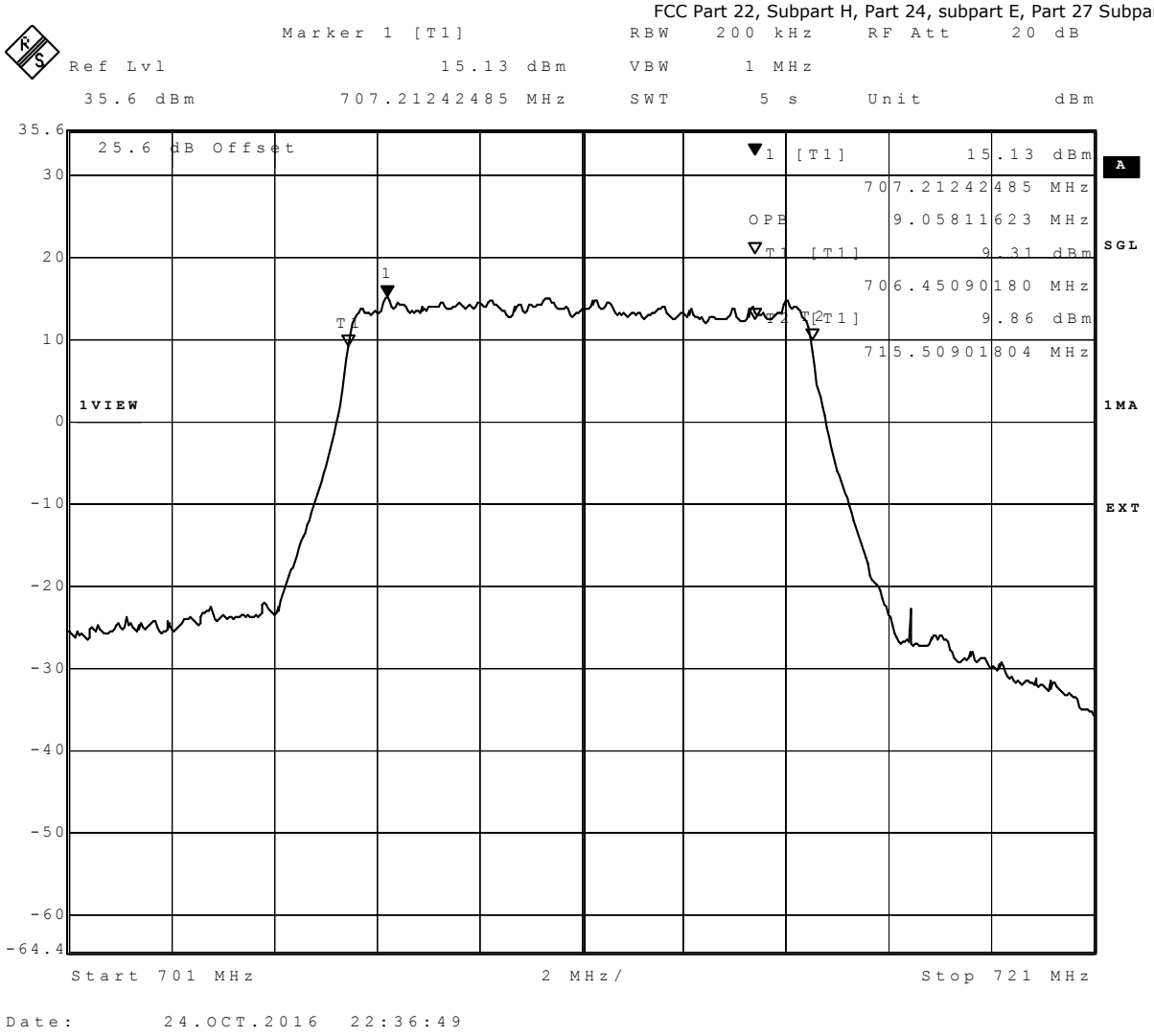
eFDD12 16QAM, 1.4MHz, Channel: high



eFDD12 16QAM, 3MHz, Channel: high



eFDD12 16QAM, 5MHz, Channel: high



eFDD12 16QAM, 10MHz, Channel: high

3.5.20 27.6 Band edge compliance §2.1053, §27.53

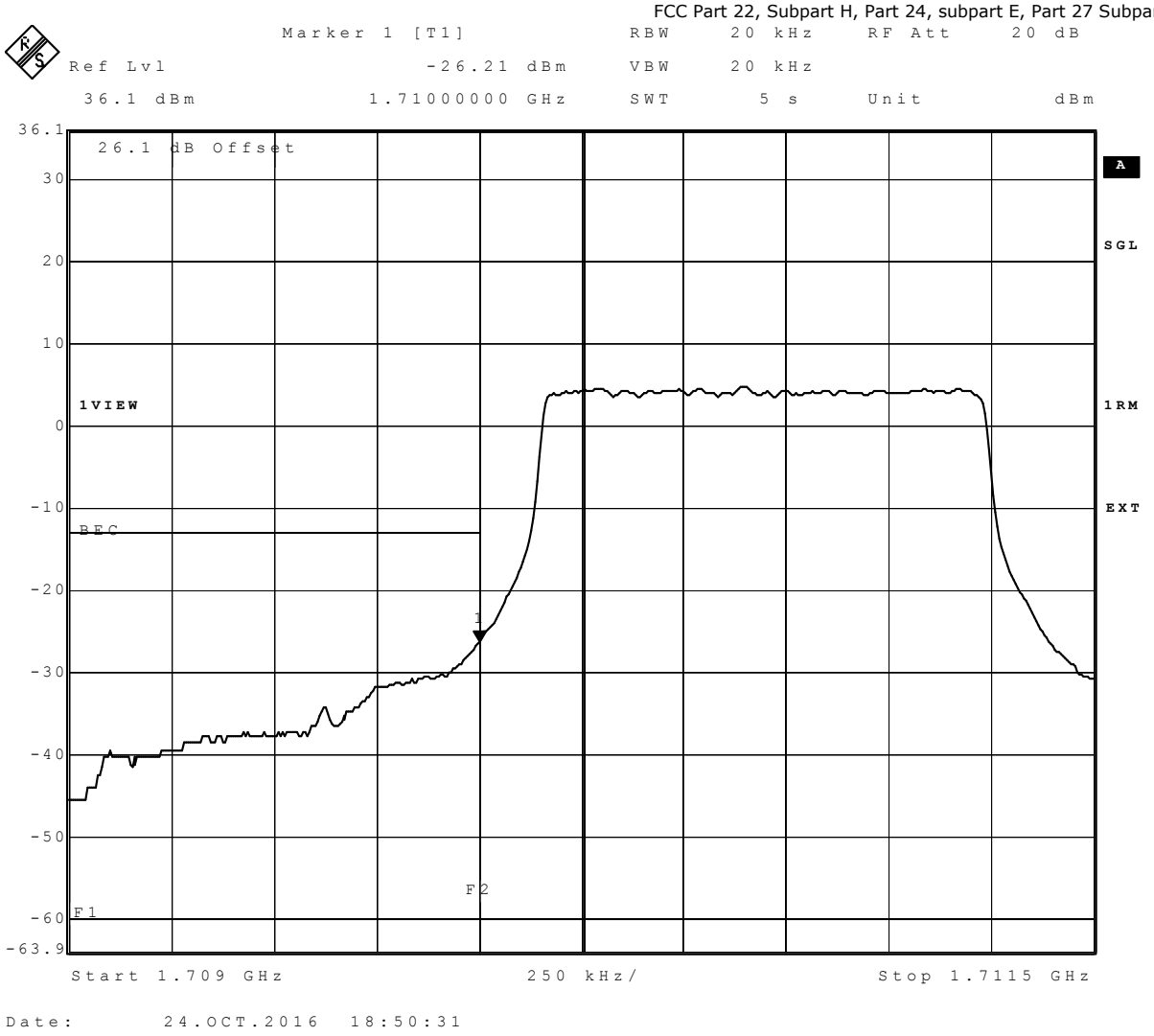
Test: 27.6; Band edge compliance summary §2.1053, §27.53

Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 16:04
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

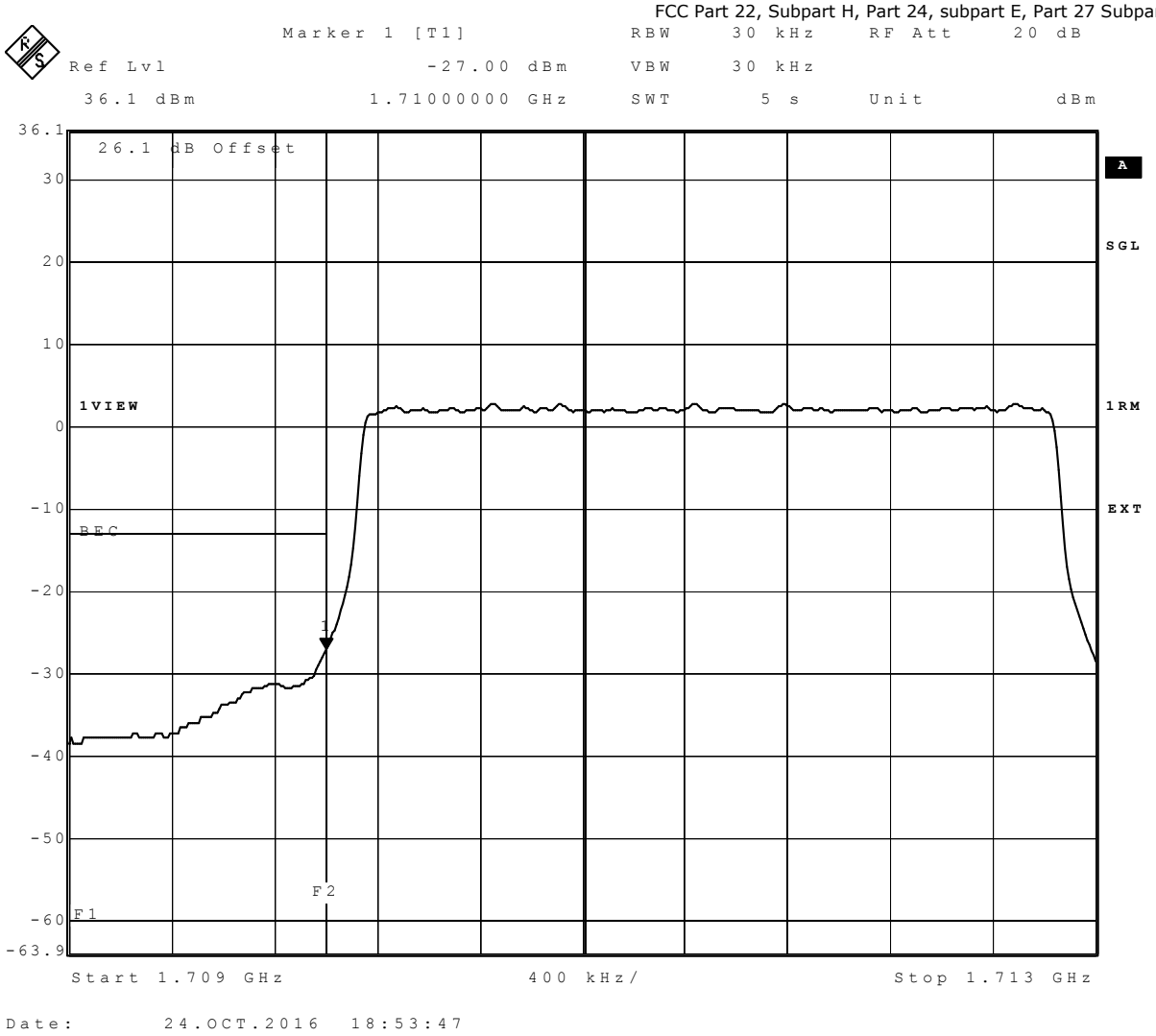
Detailed Results:

Ambient temperature:	20 °C	Relative humidity:	60 %

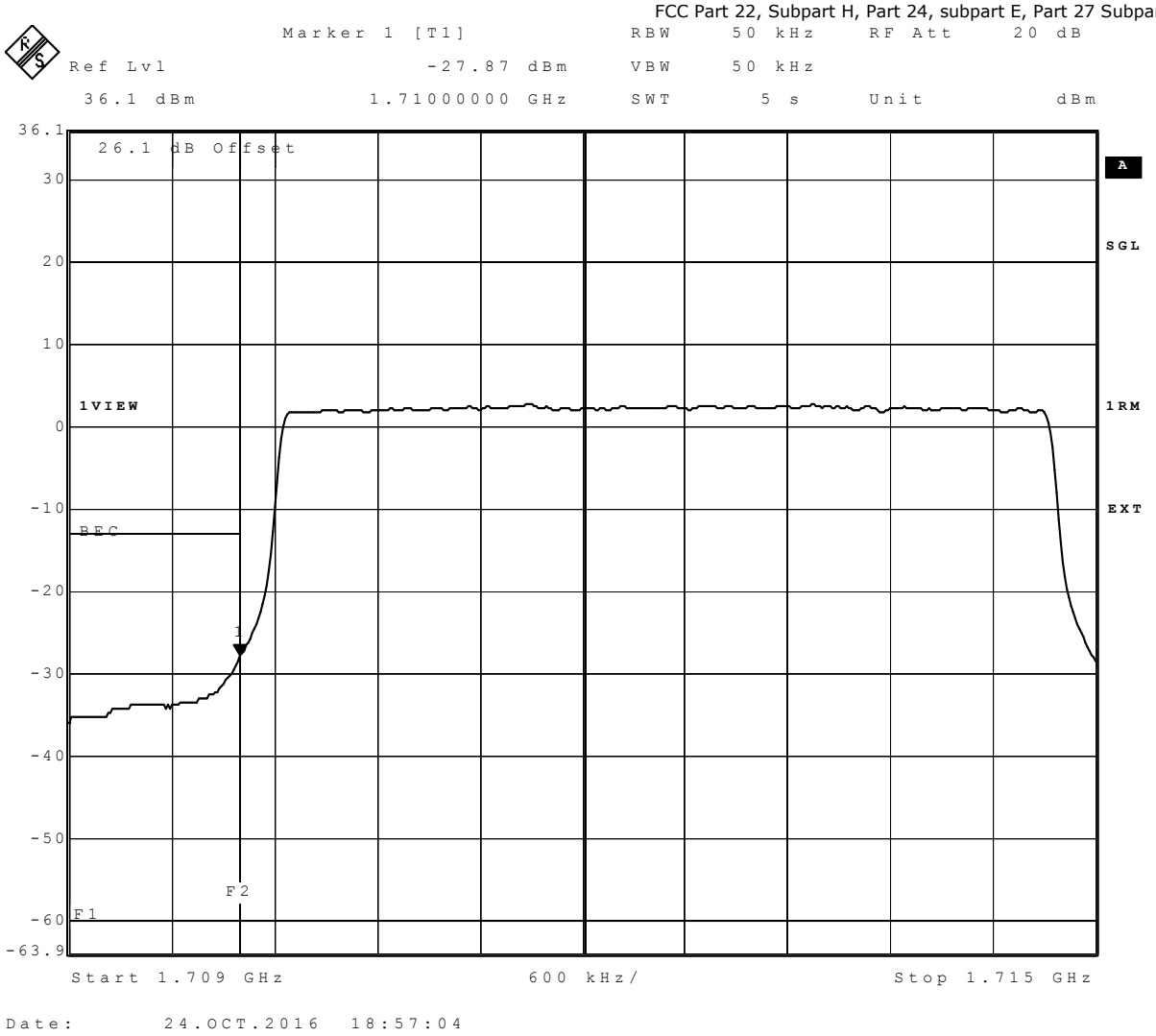
Radio Technology	Channel	Nominal BW	Ressource Blocks	Peak [dBm]	Average [dBm]	RMS [dBm]	Limit /dBm	Margin to Limit /dB	Verdict
eFDD 4 QPSK	low	1.4	6	**-16.1**	**-27.64**	**-26.21**	-13	13.21	Passed
eFDD 4 QPSK	high	1.4	6	**-16.6**	**-28.58**	**-27**	-13	14	Passed
eFDD 4 16QAM	low	1.4	6	**-16.5**	**-28.84**	**-27**	-13	14	Passed
eFDD 4 16QAM	high	1.4	6	**-16.8**	**-29.1**	**-27.64**	-13	14.64	Passed
eFDD 4 QPSK	low	3	15	**-15.1**	**-29.36**	**-27**	-13	14	Passed
eFDD 4 QPSK	high	3	15	**-15.4**	**-30.52**	**-28.1**	-13	15.1	Passed
eFDD 4 16QAM	low	3	15	**-16.2**	**-29.92**	**-27.64**	-13	14.64	Passed
eFDD 4 16QAM	high	3	15	**-16.4**	**-30.84**	**-28.84**	-13	15.84	Passed
eFDD 4 QPSK	low	5	25	**-13.7**	**-30.84**	**-27.87**	-13	14.87	Passed
eFDD 4 QPSK	high	5	25	**-13.7**	**-31.51**	**-28.58**	-13	15.58	Passed
eFDD 4 16QAM	low	5	25	**-17.8**	**-33.02**	**-30.22**	-13	17.22	Passed
eFDD 4 16QAM	high	5	25	**-17**	**-33.44**	**-30.52**	-13	17.52	Passed
eFDD 4 QPSK	low	10	50	**-13.6**	**-32.23**	**-29.36**	-13	16.36	Passed
eFDD 4 QPSK	high	10	50	**-14.2**	**-33.44**	**-30.52**	-13	17.52	Passed
eFDD 4 16QAM	low	10	50	**-16**	**-33.44**	**-30.84**	-13	17.84	Passed
eFDD 4 16QAM	high	10	50	**-13.8**	**-34.36**	**-31.51**	-13	18.51	Passed
eFDD 4 QPSK	low	15	75	**-9.53**	**-30.84**	**-28.34**	-13	15.34	Passed
eFDD 4 QPSK	high	15	75	**-10.3**	**-33.02**	**-29.1**	-13	16.1	Passed
eFDD 4 16QAM	low	15	75	**-10.7**	**-31.51**	**-28.84**	-13	15.84	Passed
eFDD 4 16QAM	high	15	75	**-10.9**	**-33.44**	**-29.92**	-13	16.92	Passed
eFDD 4 QPSK	low	20	100	**-15.9**	**-32.23**	**-30.52**	-13	17.52	Passed
eFDD 4 QPSK	high	20	100	**-12.5**	**-34.36**	**-31.86**	-13	18.86	Passed
eFDD 4 16QAM	low	20	100	**-16**	**-33.02**	**-31.17**	-13	18.17	Passed
eFDD 4 16QAM	high	20	100	**-14.9**	**-35.38**	**-33.02**	-13	20.02	Passed
eFDD 12 QPSK	low	1.4	6	**-12.8**	**-26.16**	**-23.71**	-13	10.71	Passed
eFDD 12 QPSK	high	1.4	6	**-12.3**	**-28.37**	**-25.48**	-13	12.48	Passed
eFDD 12 16QAM	low	1.4	6	**-12.2**	**-27.92**	**-25.16**	-13	12.16	Passed
eFDD 12 16QAM	high	1.4	6	**-14.1**	**-29.34**	**-26.52**	-13	13.52	Passed
eFDD 12 QPSK	low	3	15	**-15**	**-29.34**	**-27.1**	-13	14.1	Passed
eFDD 12 QPSK	high	3	15	**-16.3**	**-31.67**	**-28.6**	-13	15.6	Passed
eFDD 12 16QAM	low	3	15	**-15**	**-30.14**	**-27.5**	-13	14.5	Passed
eFDD 12 16QAM	high	3	15	**-17.6**	**-32.73**	**-29.86**	-13	16.86	Passed
eFDD 12 QPSK	low	5	25	**-13.1**	**-30.42**	**-27.71**	-13	14.71	Passed
eFDD 12 QPSK	high	5	25	**-13.8**	**-32.73**	**-29.34**	-13	16.34	Passed
eFDD 12 16QAM	low	5	25	**-15.9**	**-32.73**	**-29.6**	-13	16.6	Passed
eFDD 12 16QAM	high	5	25	**-15.2**	**-33.52**	**-30.14**	-13	17.14	Passed
eFDD 12 QPSK	low	10	50	**-7.15**	**-28.6**	**-25.65**	-13	12.65	Passed
eFDD 12 QPSK	high	10	50	**-7.75**	**-31.02**	**-27.71**	-13	14.71	Passed
eFDD 12 16QAM	low	10	50	**-9.2**	**-30.14**	**-27.1**	-13	14.1	Passed
eFDD 12 16QAM	high	10	50	**-8.33**	**-32.36**	**-28.84**	-13	15.84	Passed



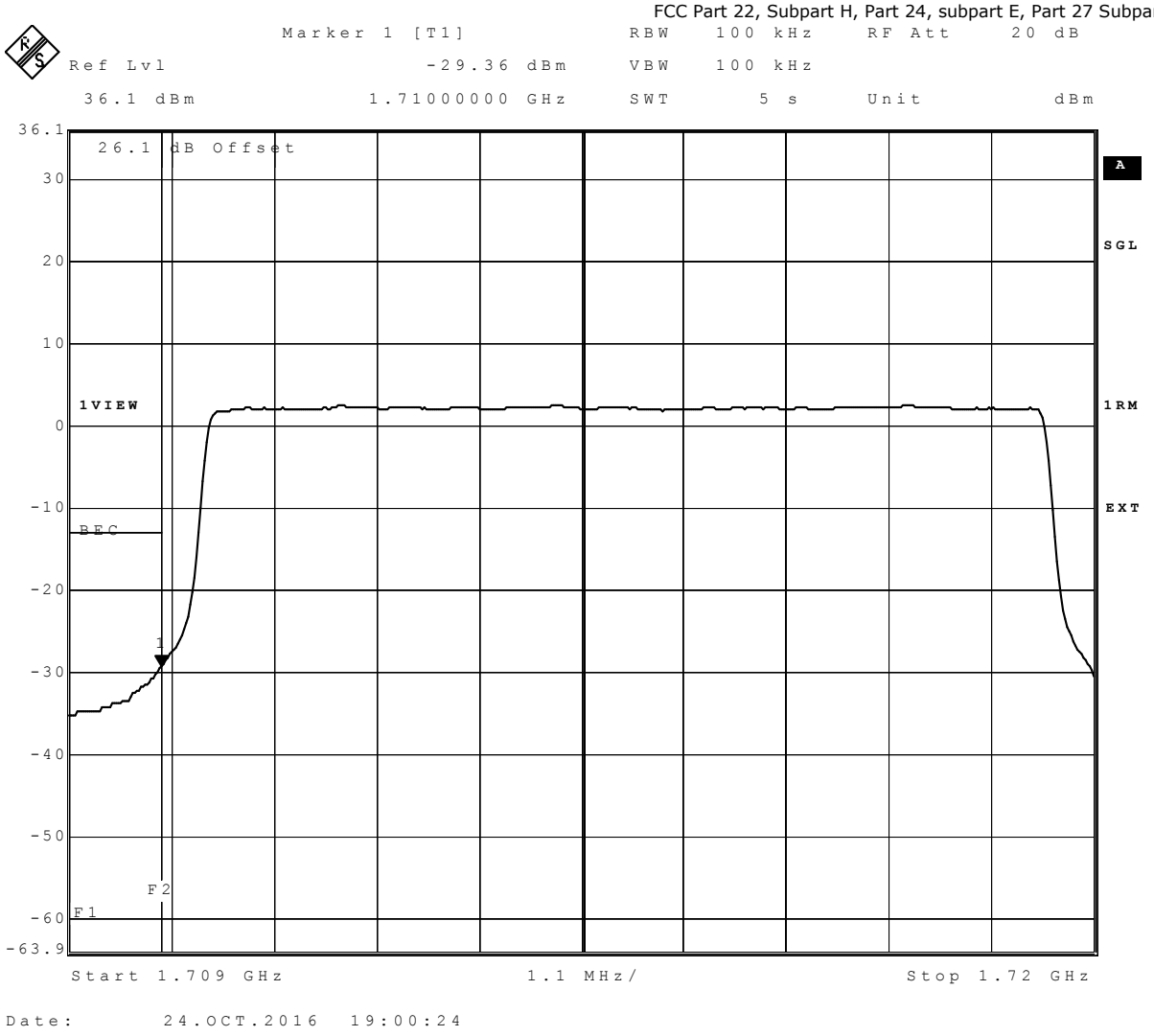
eFDD4 QPSK, 1.4MHz, Channel: low



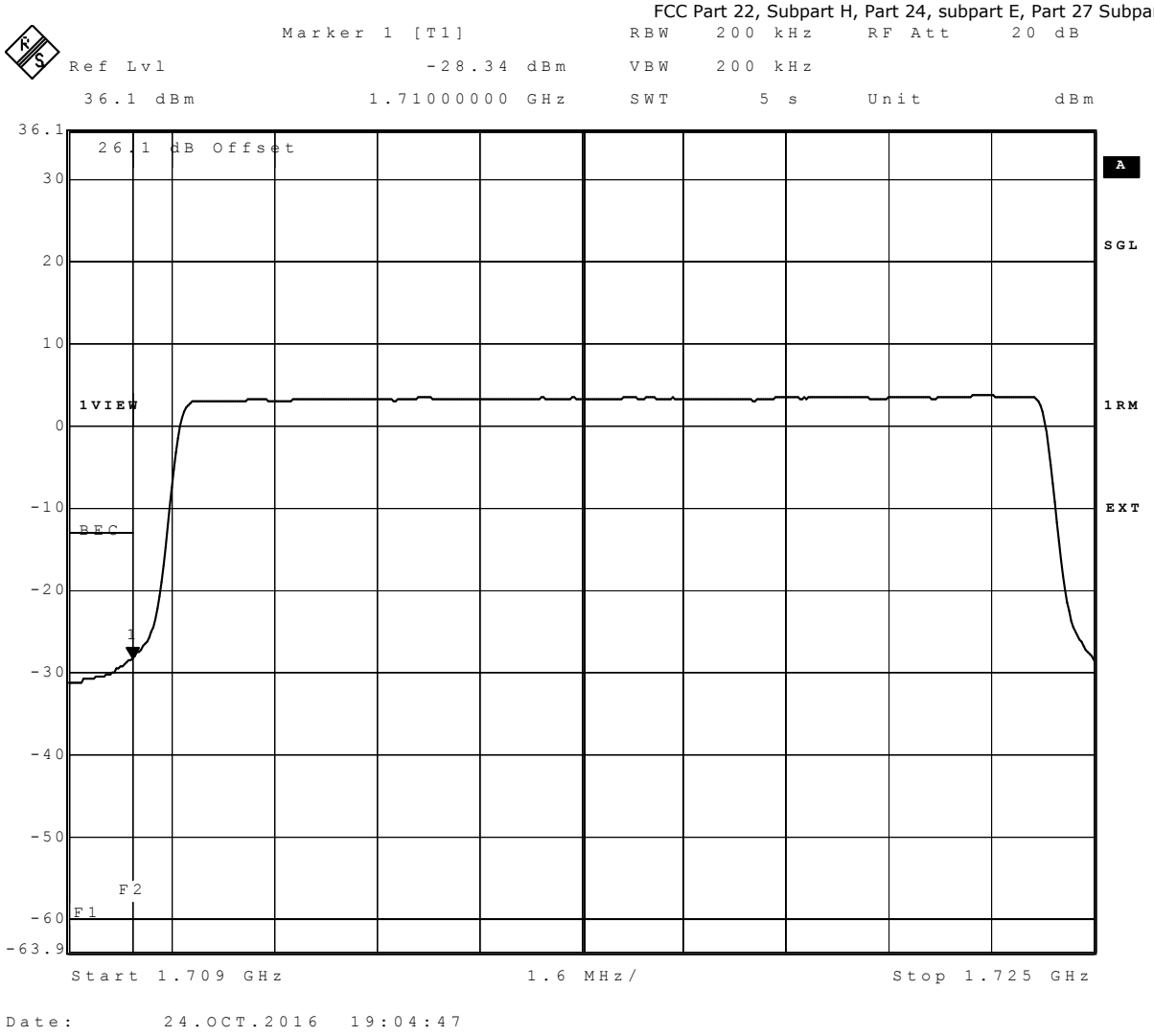
eFDD4 QPSK, 3MHz, Channel: low



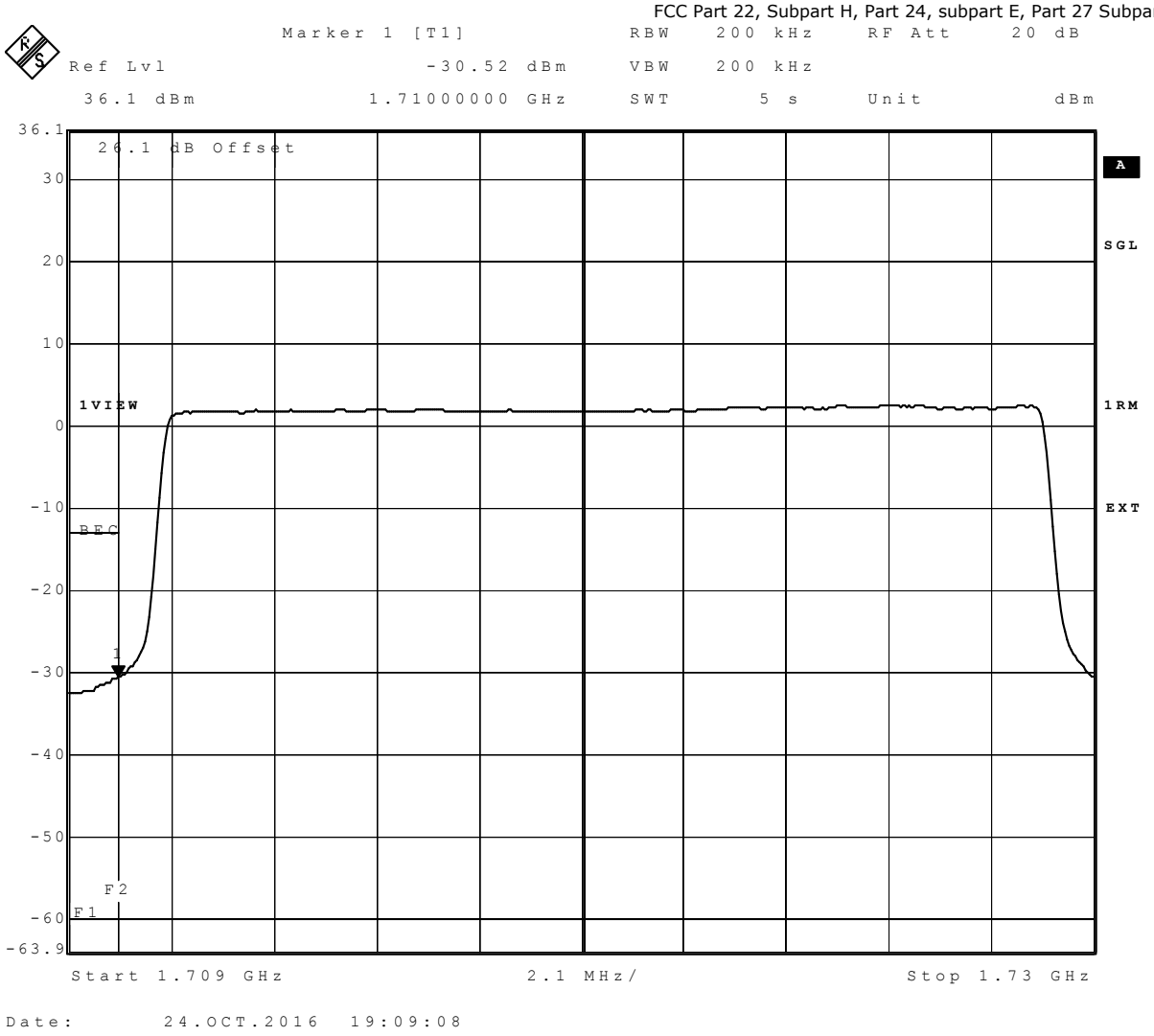
eFDD4 QPSK, 5MHz, Channel: low



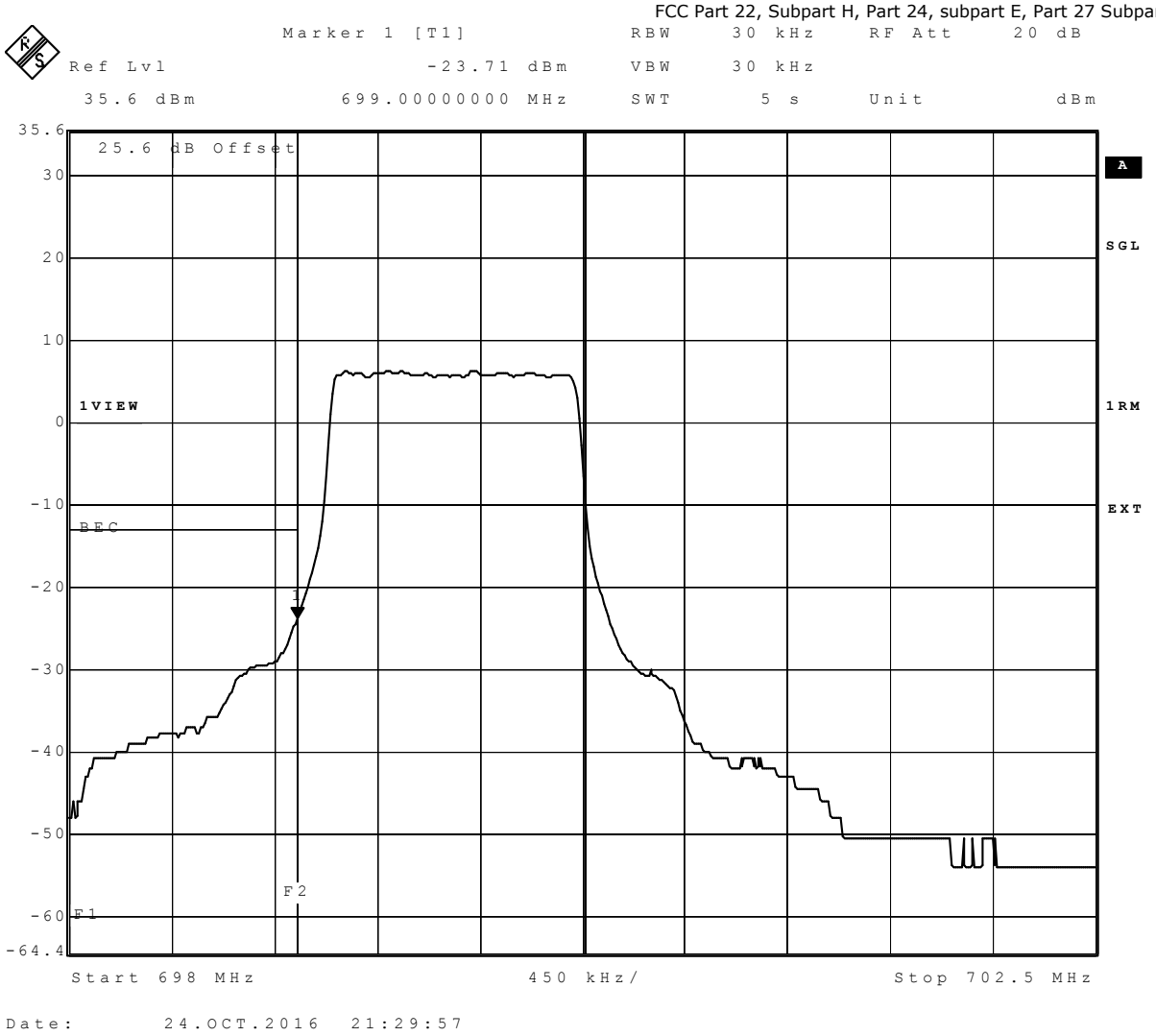
eFDD4 QPSK, 10MHz, Channel: low



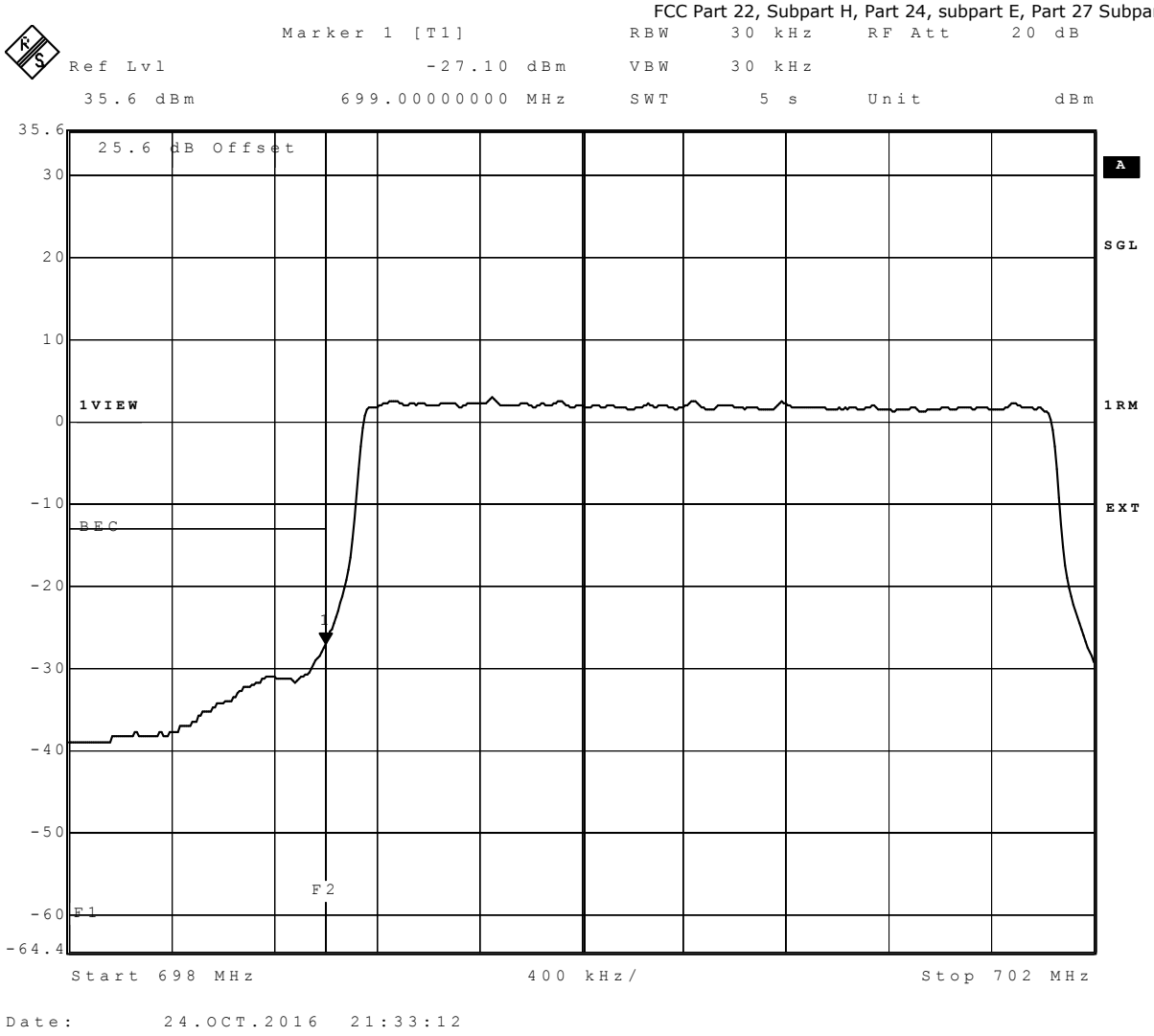
eFDD4 QPSK, 15MHz, Channel: low



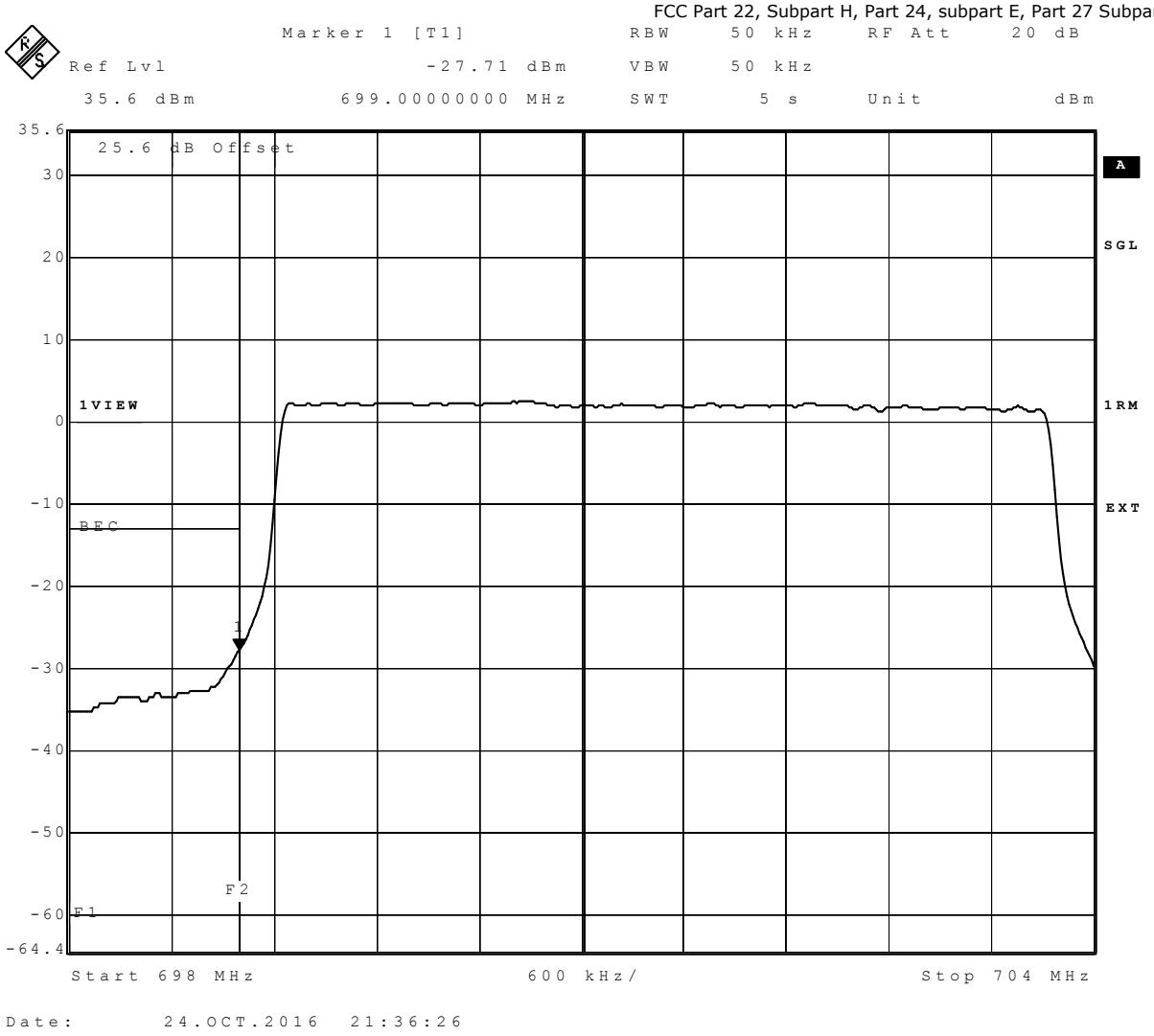
eFDD4 QPSK, 20MHz, Channel: low



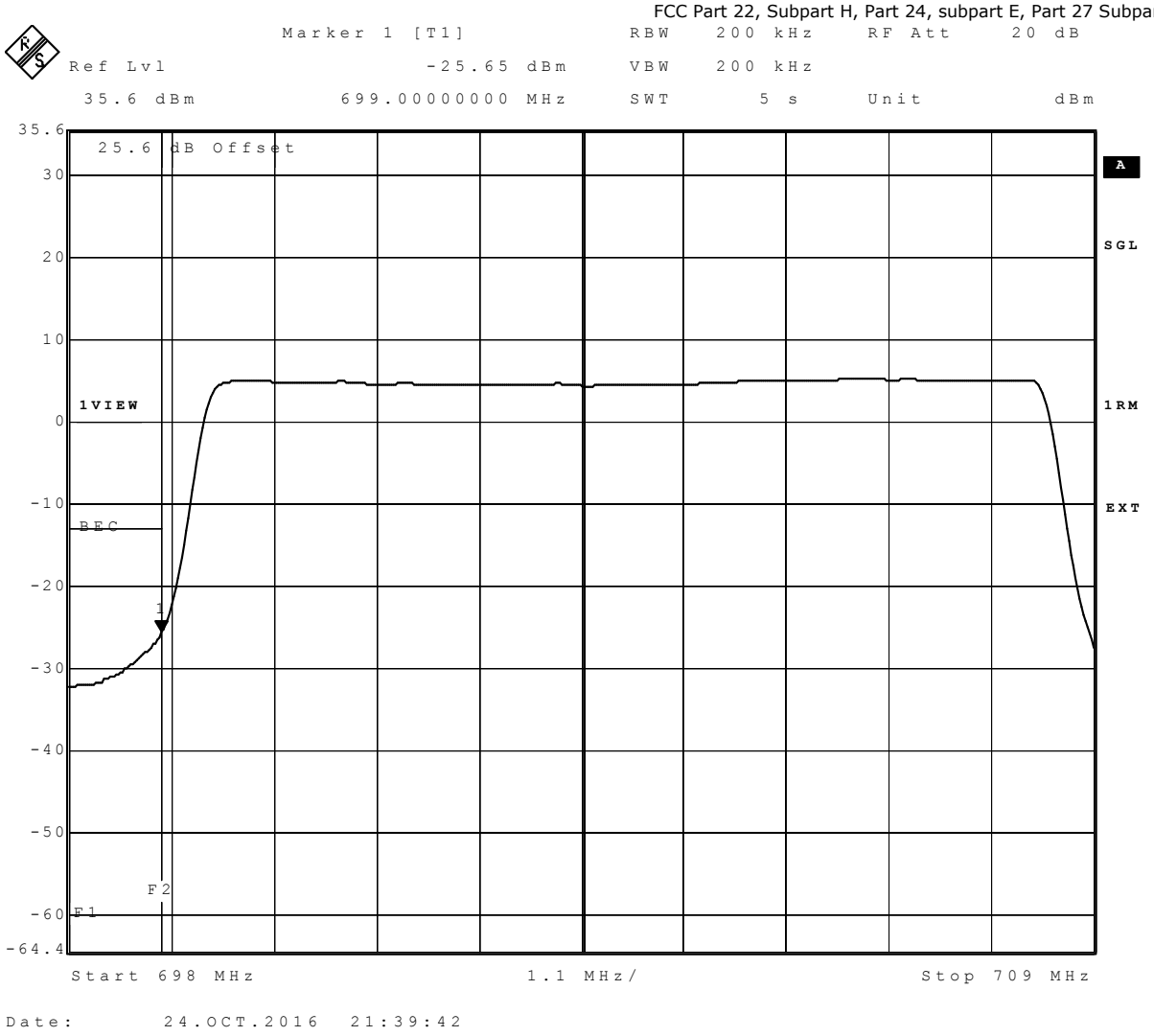
eFDD12 QPSK, 1.4MHz, Channel: low



eFDD12 QPSK, 3MHz, Channel: low



eFDD12 QPSK, 5MHz, Channel: low



eFDD12 QPSK, 10MHz, Channel: low

3.5.21 27.7 Peak-to-Average ratio §2.1046, §27.50

Test: 27.7; Peak-to-Average Ratio Summary §2.1046, §27.50

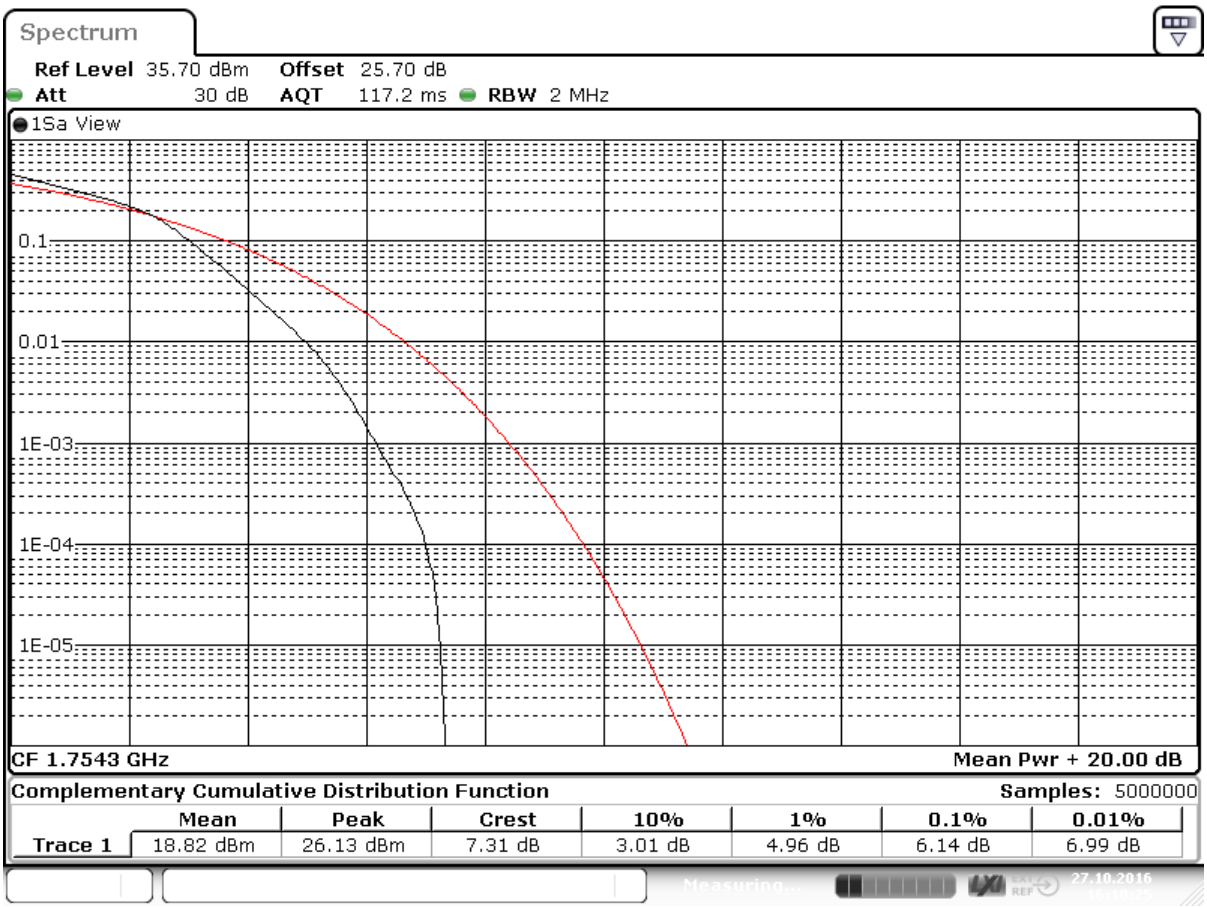
Result:	Passed
Setup No.:	AE06
Date of Test:	2016/11/09 16:43
Body:	FCC47CFRChIPART27MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Test Specification:	FCC part 2 and 27

Detailed Results:

Peak to Average Ratio

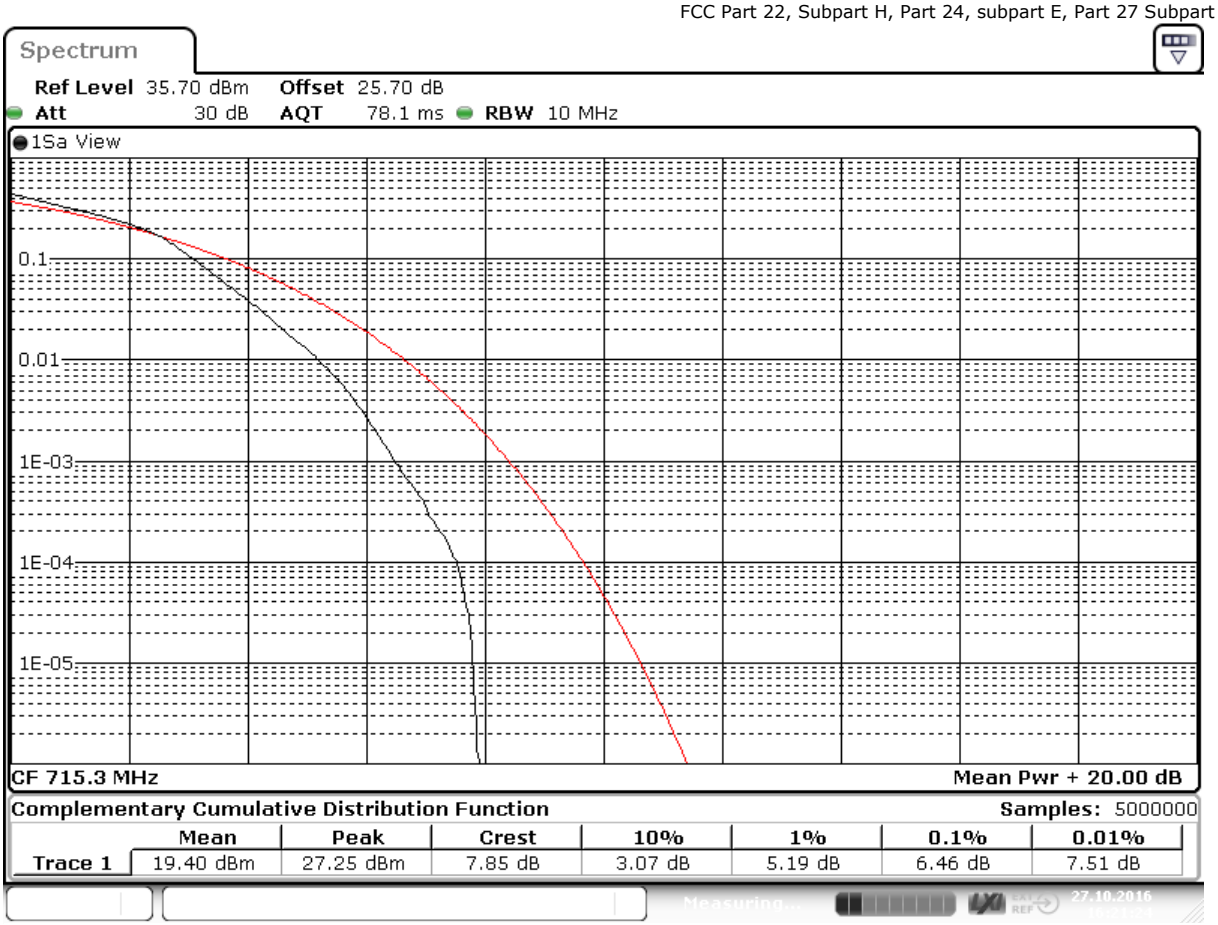
Ambient temperature:	26 °C
Relative humidity:	35%

Radio Technology	Channel	Ressource Blocks	Bandwidth (MHz)	Peak to Average Ratio	Limit (IC) (dB)	Verdict
eFDD 4 QPSK	low	6	1.4	5.25	13	PASSED
eFDD 4 QPSK	mid	6	1.4	5.3	13	PASSED
eFDD 4 QPSK	high	6	1.4	5.36	13	PASSED
eFDD 4 16QAM	low	6	1.4	6.14	13	PASSED
eFDD 4 16QAM	mid	6	1.4	6.12	13	PASSED
eFDD 4 16QAM	high	6	1.4	6.14	13	PASSED
eFDD 12 QPSK	low	6	1.4	5.86	13	PASSED
eFDD 12 QPSK	mid	6	1.4	5.83	13	PASSED
eFDD 12 QPSK	high	6	1.4	5.83	13	PASSED
eFDD 12 16QAM	low	6	1.4	6.61	13	PASSED
eFDD 12 16QAM	mid	6	1.4	6.58	13	PASSED
eFDD 12 16QAM	high	6	1.4	6.46	13	PASSED



Date: 27.OCT.2016 16:10:25

eFDD4 16QAM, Channel: high



Date: 27.OCT.2016 16:21:24

eFDD12 16QAM, Channel: high

4 Test Equipment Details

4.1 List of Used Test Equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:	**Lab 1**		
Description:	Anechoic Chamber for radiated testing		
	Calibration Details	*Last Execution*	*Next Exec.*
	NSA (FCC)	2014/01/09	2017/01/09

Single Devices for Anechoic Chamber

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
Air compressor	none	-	
Anechoic Chamber	10.58 x 6.38 x 6.00 m³	none	
	Calibration Details	*Last Execution*	*Next Exec.*
	FCC listing 96716 3m Part15/18	2014/01/09	2017/01/08
Anechoic Chamber	8.8m x 4.6m x 4.05 m	B83117-S40-X191	Albatross Projects GmbH
Controller Maturo	MCU	961208	Maturo GmbH
EMC camera	CE-CAM/1	-	
EMC camera Nr.2	CCD-400E	0005033	
Filter ISDN	B84312-C110-E1		
Filter Universal 1A	BB4312-C30-H3	-	

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID:	**Lab 1**
Description:	Equipment for emission measurements
Serial Number:	see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Antenna mast	AM 4.0	AM4.0/180/11920 513	Maturo GmbH	
Biconical Broadband Antenna	SBA 9119	9119-005		
Biconical dipole	VUBA 9117	9117-108		
Broadband Amplifier 1 GHz - 4 GHz	AFS4-01000400-1Q-10P-4	-		
Broadband Amplifier 18 GHz - 26 GHz	JS4-18002600-32-5P	849785		
Broadband Amplifier 30 MHz - 18 GHz	JS4-00101800-35-5P	896037		
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01-2		
Cable "ESI to Horn Antenna"	SucoFlex	W18.02-2+W38.02-2		
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2015/06/23	2018/06/22
Double-ridged horn	HF 907	102444	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2015/05/11	2018/05/10
Double-ridged horn-duplicated 2015-07-15 10:47:55	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG	
High Pass Filter	4HC1600/12750-1.5-KK	9942011		
High Pass Filter	5HC2700/12750-1.5-KK	9942012		
High Pass Filter	5HC3500/18000-1.2-KK	200035008		
High Pass Filter	WHKX 7.0/18G-8SS	09		
Horn Antenna Schwarzbeck 15-26.5 GHz BBHA 9170	BBHA 9170	BBHA9170262		
Log.-per. Antenna	HL 562 Ultralog	100609	Rohde & Schwarz GmbH & Co. KG	
Log.-per. Antenna (upgraded)	HL 562 Ultralog new biconicals	830547/003	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2015/06/30	2018/06/29
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD Calibration		2014/11/27	2017/11/27

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
Standard Gain / Pyramidal Horn Antenna 40 GHz	3160-10	00086675	
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5-10kg/024/3790709	Maturo GmbH

Test Equipment Auxiliary Test Equipment

Lab ID:	**Lab 1, Lab 2**
Description:	Single Devices for various Test Equipment
Type:	various
Serial Number:	none

Single Devices for Auxiliary Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Broadband Power Divider N (Aux)	1506A / 93459	LM390		
Broadband Power Divider SMA	WA1515	A855		
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383		
	Calibration Details		*Last Execution*	*Next Exec.*
	DAkkS Calibration		2016/02/04	2018/02/28
Digital Multimeter 13 (Clamp Meter)	Fluke 325	31270091WS	FLUKE	
	Calibration Details		*Last Execution*	*Next Exec.*
	DAkkS-Calibration		2016/02/04	2019/02/28
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018		
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018		
Isolating Transformer	LTS 604	1888		
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24		
Signal Analyzer	FSV30	103005	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD calibration		2016/02/25	2018/02/24
Spectrum Analyser	FSU26	200418		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2016/11/03	2017/11/02
Spectrum Analyzer	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD calibration		2015/06/23	2018/06/22
Vector Signal Generator	SMIQ 03B	832492/061		

Test Equipment Digital Signalling Devices

Lab ID: **Lab 1, Lab 2**
Description: Signalling equipment for various wireless technologies.

Single Devices for Digital Signalling Devices

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
CMW500	CMW500	107500		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2015/07/13	2017/07/14
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD calibration		2014/12/02	2017/12/01
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD calibration		2014/12/03	2017/12/02
	HW/SW Status		*Date of Start*	*Date of End*
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02 SW options: K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10, Firmware: µP1 8v40 01.12.05 --- SW: K62, K69		2007/01/02 2008/11/03	
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG	

Test Equipment Emission measurement devices

Lab ID:	**Lab 1**
Description:	Equipment for emission measurements
Serial Number:	see single devices

Single Devices for Emission measurement devices

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
EMI Receiver / Spectrum Analyzer	ESR 7	101424		
	Calibration Details		*Last Execution*	*Next Exec.*
	Initial Factory Calibration		2014/11/13	2016/11/12
Personal Computer	Dell	30304832059		
Power Meter	NRVD	828110/016		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2016/05/24	2017/05/23
Sensor Head A	NRV-Z1	827753/005		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2016/05/27	2017/05/26
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2014/06/24	2017/06/23
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DAkkS Calibration (DK)		2015/12/09	2017/12/08
	HW/SW Status		*Date of Start*	*Date of End*
	Firmware-Update 4.34.4 from 3.45 during calibration		2009/12/03	
Spectrum Analyzer	FSW 43	103779		
	Calibration Details		*Last Execution*	*Next Exec.*
	Initial Factory Calibration		2014/11/17	2016/11/16

Test Equipment Multimeter 03

Lab ID:	**Lab 1, Lab 2**
Description:	Fluke 177
Serial Number:	86670383

Single Devices for Multimeter 03

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383		
	Calibration Details		*Last Execution*	*Next Exec.*
	DAkkS Calibration		2016/02/04	2018/02/28

Test Equipment Radio Lab Test Equipment

Lab ID: **Lab 2**
Description: Radio Lab Test Equipment

Single Devices for Radio Lab Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Broadband Power Divider SMA	WA1515	A856		
Coax Attenuator 10dB SMA 2W	4T-10	F9401		
Coax Attenuator 10dB SMA 2W	56-10	W3702		
Coax Attenuator 10dB SMA 2W	56-10	W3711		
Coax Cable Huber&Suhner	Sucotest 2,0m		Huber&Suhner	
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2		
Power Meter	NRVD	828110/016		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2016/05/24	2017/05/23
RF Step Attenuator RSP	RSP	833695/001		
Rubidium Frequency Standard	Datum, Model: MFS	5489/001		
	Calibration Details		*Last Execution*	*Next Exec.*
	DAkks Calibration		2016/06/22	2017/06/23
Sensor Head A	NRV-Z1	827753/005		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2016/05/27	2017/05/26
Signal Generator SME	SME03	827460/016		
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2014/12/02	2017/12/01
Signal Generator SMP	SMP02	833286/0014	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2016/05/24	2019/05/23

Test Equipment T/A Logger 13

Lab ID:	**Lab 1, Lab 2**
Description:	Lufft Opus10 TPR
Type:	Opus10 TPR
Serial Number:	13936

Single Devices for T/A Logger 13

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
ThermoAirpressure Datalogger 13 (Environ)	Opus10 TPR (8253.00)	13936	

Calibration Details	*Last Execution*	*Next Exec.*
Customized calibration	2015/02/27	2017/02/26

Test Equipment T/H Logger 03

Lab ID:	**Lab 2**
Description:	Lufft Opus10
Serial Number:	7482

Single Devices for T/H Logger 03

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
ThermoHygro Datalogger 03 (Environ)	Opus10 THI (8152.00)	7482	

Calibration Details	*Last Execution*	*Next Exec.*
Customized calibration	2015/02/27	2017/02/26

Test Equipment T/H Logger 12

Lab ID:	**Lab 1**
Description:	Lufft Opus10
Serial Number:	12482

Single Devices for T/H Logger 12

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
ThermoHygro Datalogger 12 (Environ)	Opus10 THI (8152.00)	12482	

Calibration Details	*Last Execution*	*Next Exec.*
Customized calibration	2015/03/10	2017/03/09

Test Equipment Temperature Chamber 05

Lab ID:	**Lab 2**
Description:	Temperature Chamber VT4002
Type:	Vötsch
Serial Number:	see single devices

Single Devices for Temperature Chamber 05

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
Temperature Chamber Vötsch 05	VT 4002	58566080550010	

Calibration Details	*Last Execution*	*Next Exec.*
Customized calibration	2016/03/09	2018/03/08

5 Annex

5.1 Additional Information for Report

Summary of Test Results

The EUT complied with all performed tests as listed in the summary section of this report.

Technical Report Summary

Type of Authorization :

Certification for a GSM/WCDMA/LTE/CDMA2000 cellular radiotelephone

device
Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

Part 22, Subpart C – Operational and Technical Requirements

§ 22.355 Frequency tolerance

Part 22, Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits
§ 22.917 Emission limitations for cellular equipment

additional documents

ANSI TIA-603-D-2004
KDB 971168 D01

Description of Methods of Measurements

RF Power Output

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1046

Test Description (conducted measurement procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Channel (Frequency): please refer to the detailed results
4) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
5) The test procedure according to TIA-603-D-2004 has been considered.

Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.
§22.913 Effective radiated power limits
(a)(2) Maximum ERP. … The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Emission and Occupied Bandwidth

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1049

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer’s stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Spurious emissions at antenna terminals

Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1051

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the PCS-Band,
b) otherwise [100 kHz] (or [1 MHz] for accelerated sweep times)
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 10 GHz (up to the 10th harmonic) during the call was established

Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value

need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm.
(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Field strength of spurious radiation

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 10 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission measurements.
5) Important Analyser Settings
- [Resolution Bandwidth / Video Bandwidth]:
a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
c) [1 MHz / 3 MHz] otherwise
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarization during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.
7) After this initial test, a final test according to TIA-603-D 2.2.12 Unwanted Emissions is performed on signals which are identified as being close to the limit. For any emissions found to be within 10 dB of the limit, a specific signal substitution measurement is performed at the frequency of the emission to determine the exact e.i.r.p. value.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Frequency stability

Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1055

Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".

3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§22.355 Frequency tolerance

…the carrier frequency of each transmitter in the Public Mobile Service must be maintained within the tolerances given in table C-1 of this section.

Table C-1.- Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile up to 3 watts (ppm)	Mobile above 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/aFor the mid

channel (836.6 MHz) the frequency tolerance is 2.5 ppm (2091.5 Hz).

Band edge compliance

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §22.913

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power

Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth = Video Bandwidth: >1% of the manufacturer’s stated occupied bandwidth

Test Requirements / Limits

§ 22.917 Emission limitations for cellular equipment

Refer to chapter "Field strength of spurious radiation".

Summary of Test Results

The EUT complied with all performed tests as listed in the summary section of this report.

Technical Report Summary

Type of Authorization :

Certification for a GSM/WCDMA/LTE/CDMA2000 cellular radiotelephone

device
Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

Part 24, Subpart E - Broadband PCS

§ 24.232 Power and antenna height limits
§ 24.235 Frequency stability
§ 24.236 Field strength limits
§ 24.238 Emission limitations for Broadband PCS equipment

additional documents

ANSI TIA-603-D-2004

KDB 971168 D01

Description of Methods of Measurements

RF Power Output

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §2.1046

Test Description (conducted measurement procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Channel (Frequency): please refer to the detailed results
4) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
5) The test procedure according to TIA-603-D-2004 has been considered.

Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.
§24.232 Power and antenna height limits
(c) Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Emission and Occupied Bandwidth

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §2.1049

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer’s stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Spurious emissions at antenna terminals

Standard: FCC Part 24, Subpart E

The test was performed according to FCC §2.1051

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the Band,
b) otherwise [1 MHz]
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 20 GHz (up to the 10th harmonic) during the call was established

Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 24.238 Emission limitations for Broadband PCS equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm.
(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Field strength of spurious radiation

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).

4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 20 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission measurements.
5) Important Analyser Settings
- [Resolution Bandwidth / Video Bandwidth]:
a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
c) [1 MHz / 3 MHz] otherwise
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.
7) After this initial test, a final test according to TIA-603-D 2.2.12 Unwanted Emissions is performed on signals which are identified as being close to the limit. For any emissions found to be within 10 dB of the limit, a specific signal substitution measurement is performed at the frequency of the emission to determine the exact e.i.r.p. value.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 24.238 Emission limitations for Broadband PCS equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB

below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Frequency stability

Standard: FCC Part 24, Subpart E

The test was performed according to FCC §2.1055

Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".
3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs
(a) (2) and (3) of this section.
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§24.235 Frequency stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

7Layers interpretation of limit:

To ensure that the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block following limit was used:

+/- 2.5 ppm = 4700 Hz for a frequency of 1880.0 MHz

in accordance with FCC Part 22, Subpart H, §22.355, table C-1: Frequency tolerance for the carrier frequency of mobile transmitters in the Public Mobile Service in the frequency range 821 to 896 MHz.

Band edge compliance

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §24.238

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth = Video Bandwidth: >1% of the manufacturer’s stated occupied bandwidth

Test Requirements / Limits

§ 24.238 Effective radiated power limits

Refer to chapter "Field strength of spurious radiation".

Summary of Test Results

The EUT complied with all performed tests as listed in the summary section of this report.

Technical Report Summary

Type of Authorization :

Certification for a GSM/WCDMA/LTE/CDMA2000 cellular radiotelephone

device
Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

Part 22, Subpart C – Operational and Technical Requirements

§ 22.355 Frequency tolerance

Part 22, Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits
§ 22.917 Emission limitations for cellular equipment

additional documents

ANSI TIA-603-D-2004
KDB 971168 D01

Description of Methods of Measurements

RF Power Output

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1046

Test Description (conducted measurement procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Channel (Frequency): please refer to the detailed results
4) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
5) The test procedure according to TIA-603-D-2004 has been considered.

Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.
§22.913 Effective radiated power limits
(a)(2) Maximum ERP. … The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Emission and Occupied Bandwidth

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1049

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer’s stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Spurious emissions at antenna terminals

Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1051

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the PCS-Band,
b) otherwise [100 kHz] (or [1 MHz] for accelerated sweep times)
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 10 GHz (up to the 10th harmonic) during the call was established

Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value

need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm.
(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Field strength of spurious radiation

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 10 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission measurements.
5) Important Analyser Settings
- [Resolution Bandwidth / Video Bandwidth]:
a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
c) [1 MHz / 3 MHz] otherwise
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarization during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.
7) After this initial test, a final test according to TIA-603-D 2.2.12 Unwanted Emissions is performed on signals which are identified as being close to the limit. For any emissions found to be within 10 dB of the limit, a specific signal substitution measurement is performed at the frequency of the emission to determine the exact e.i.r.p. value.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Frequency stability

Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1055

Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".

3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§22.355 Frequency tolerance

…the carrier frequency of each transmitter in the Public Mobile Service must be maintained within the tolerances given in table C-1 of this section.

Table C-1.- Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile up to 3 watts (ppm)	Mobile above 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/aFor the mid

channel (836.6 MHz) the frequency tolerance is 2.5 ppm (2091.5 Hz).

Band edge compliance

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §22.913

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power

Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth = Video Bandwidth: >1% of the manufacturer’s stated occupied bandwidth

Test Requirements / Limits

§ 22.917 Emission limitations for cellular equipment

Refer to chapter "Field strength of spurious radiation".

Summary of Test Results

The EUT complied with all performed tests as listed in the summary section of this report.

Technical Report Summary

Type of Authorization :

Certification for a GSM/WCDMA/CDMA2000 cellular radiotelephone device

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

Part 24, Subpart E - Broadband PCS

§ 24.232 Power and antenna height limits
§ 24.235 Frequency stability
§ 24.236 Field strength limits
§ 24.238 Emission limitations for Broadband PCS equipment

additional documents

ANSI TIA-603-D-2004

Description of Methods of Measurements

RF Power Output

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §2.1046

Test Description (conducted measurement procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Channel (Frequency): please refer to the detailed results
4) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
5) The test procedure according to TIA-603-D-2004 has been considered.

Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.
§24.232 Power and antenna height limits
(c) Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Emission and Occupied Bandwidth

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §2.1049

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer’s stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Spurious emissions at antenna terminals

Standard: FCC Part 24, Subpart E

The test was performed according to FCC §2.1051

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the Band,
b) otherwise [1 MHz]
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 20 GHz (up to the 10th harmonic) during the call was established

Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 24.238 Emission limitations for Broadband PCS equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm.
(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Field strength of spurious radiation

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).

4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 20 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission measurements.
5) Important Analyser Settings
- [Resolution Bandwidth / Video Bandwidth]:
a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
c) [1 MHz / 3 MHz] otherwise
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.
7) After this initial test, a final test according to TIA-603-D 2.2.12 Unwanted Emissions is performed on signals which are identified as being close to the limit. For any emissions found to be within 10 dB of the limit, a specific signal substitution measurement is performed at the frequency of the emission to determine the exact e.i.r.p. value.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 24.238 Emission limitations for Broadband PCS equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB

below the transmitter power.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Frequency stability

Standard: FCC Part 24, Subpart E

The test was performed according to FCC §2.1055

Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".
3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs
(a) (2) and (3) of this section.
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§24.235 Frequency stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

7Layers interpretation of limit:

To ensure that the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block following limit was used:

+/- 2.5 ppm = 4700 Hz for a frequency of 1880.0 MHz

in accordance with FCC Part 22, Subpart H, §22.355, table C-1: Frequency tolerance for the carrier frequency of mobile transmitters in the Public Mobile Service in the frequency range 821 to 896 MHz.

Band edge compliance

Standard: FCC Part 24, Subpart E

The test was performed according to: FCC §24.238

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth = Video Bandwidth: >1% of the manufacturer’s stated occupied bandwidth

Test Requirements / Limits

§ 24.238 Effective radiated power limits

Refer to chapter "Field strength of spurious radiation".
Summary of Test Results

The EUT complied with all performed tests as listed in the summary section of this report.

Technical Report Summary

Type of Authorization :

Certification for a GSM cellular radiotelephone device

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts
are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

Part 27, Subpart C—Technical Standards

§ 27.50 Power and antenna height limits
§ 27.53 Emissions limits
§ 27.54 Frequency stability

additional documents

ANSI TIA-603-D-2004

Description of Methods of Measurements

RF Power Output

Standard FCC Part 27, Subpart C

The test was performed according to: FCC §2.1046

Test Description (conducted measurement procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Channel (Frequency): please refer to the detailed results
4) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
5) The test procedure according to TIA-603-D-2004 has been considered.

Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §

2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.
§27.50 Power and antenna height limits.
(d) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands:
(2) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to a peak EIRP of 1 watt. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground, and mobile and portable stations must employ a means for limiting power to the minimum necessary for successful communications.

Emission and Occupied Bandwidth

Standard FCC Part 27, Subpart C

The test was performed according to: FCC §2.1049

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer’s stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Spurious emissions at antenna terminals

Standard FCC Part 27, Subpart C

The test was performed according to FCC §2.1051

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".

2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the Band,
b) otherwise [1 MHz]
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 18 GHz (up to the 10th harmonic) during the call is established

Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 27.53 Emission limits

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm.
(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Field strength of spurious radiation

Standard FCC Part 27, Subpart C

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel : please refer to the detailed results
3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 18 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission measurements.
5) Important Analyser Settings
- [Resolution Bandwidth / Video Bandwidth]:
a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
c) [1 MHz / 3 MHz] otherwise
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.
7) After this initial test, a final test according to TIA-603-D 2.2.12 Unwanted Emissions is performed on signals which are identified as being close to the limit. For any emissions found to be within 10 dB of the limit, a specific signal substitution measurement is performed at the frequency of the emission to determine the exact e.i.r.p. value.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 27.53 Emission limits

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.
Remark of the test laboratory: This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.
(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Frequency stability

Standard FCC Part 27, Subpart C

The test was performed according to FCC §2.1055

Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".
3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying

(except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§27.54 Frequency stability

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

7Layers interpretation of limit:

To ensure that the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block following limit was used:

+/- 2.5 ppm = 4350 Hz for channel 1450, frequency 1740.0 MHz
+/- 2.5 ppm = 4331 Hz for channel 1412, frequency 1732.4 MHz

in

Subtests HSDPA

Sub-test	βc	βd	βd (SF)	βc/βd	βHS (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: $?_{ACK}$, $?_{NACK}$ and $?_{CQI}$ = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, $?_{ACK}$ and $?_{NACK}$ = 30/15 with β_{hs} = 30/15 * β_c , and $?_{CQI}$ = 24/15 with β_{hs} = 24/15 * β_c .

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

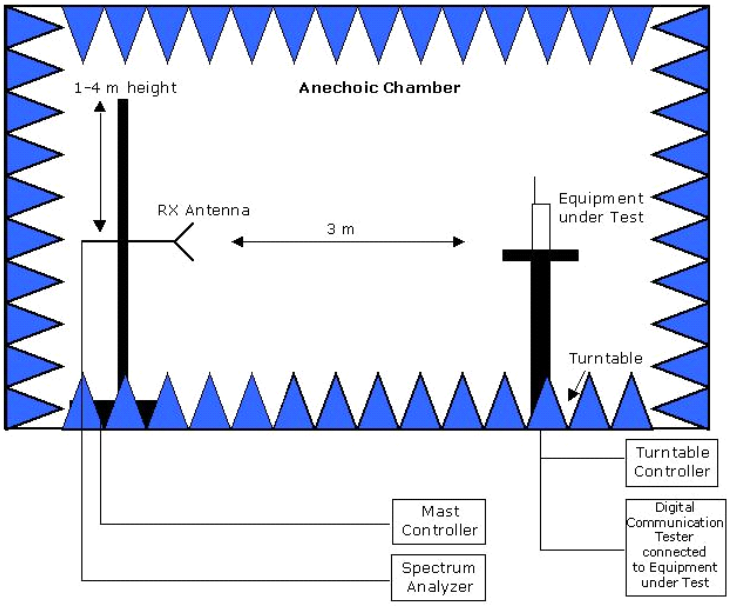
Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Subtests HSUPA

Subtest	Mode	Loopback Mode	Rel99 RMC	HSDPA FRC	HSUPA Test	Number of E-DPDCH Channels
1	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set1	HSUPA Loopback	1
2	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set1	HSUPA Loopback	1
3	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set1	HSUPA Loopback	2
4	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set1	HSUPA Loopback	1
5	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set1	HSUPA Loopback	1

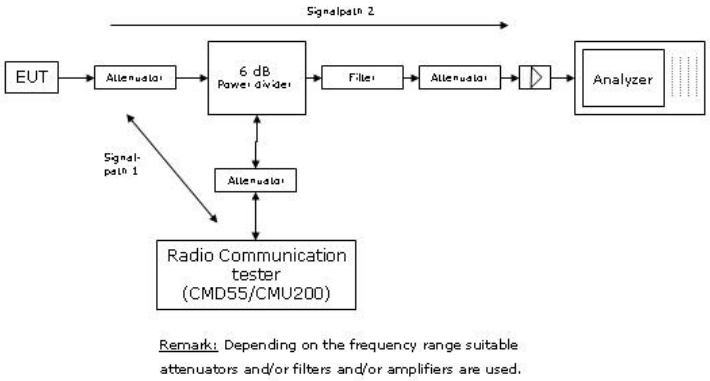
Subtest	Max UL Data Rate (kb/s)	βc/βd	βhs	βed	CM
1	242.1	11/15	22/15	1309/225	1
2	161.3	6/15	12/15	94/75	3
3	524.7	15/9	30/15	47/15	2
4	197.6	2/15	4/15	56/75	3
5	299.6	15/15	30/15	134/15	1

Setup Drawings

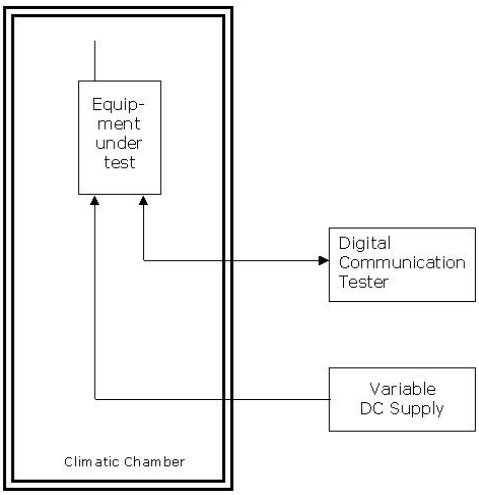


Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

Principle set-up for radiated measurements



Principle set-up for conducted measurements under nominal conditions



Principle set-up for tests under extreme test conditions

TEST MODE	TX / RX	RF Channel			TEST MODE	TX / RX	RF Channel		
		Low	Mid	High			Low	Mid	High
LTE eFDD 2		18607	18900	19193	LTE eFDD 4		19957	20175	20393
	TX (1.4M)	1850.7 MHz	1880 MHz	1909.3 MHz		TX (1.4M)	1710.7MHz	1732.5MHz	1754.3MHz
		CH 18615	CH 18900	CH 19185			CH 19965	CH 20175	CH 20385
	TX (3M)	1851.5 MHz	1880 MHz	1908.5 MHz		TX (3M)	1711.50 MHz	1732.50 MHz	1753.50 MHz
		CH 18625	CH 18900	CH 19175			CH 19975	CH 20175	CH 20375
	TX (5M)	1852.5 MHz	1880 MHz	1907.5 MHz		TX (5M)	1712.50 MHz	1732.50 MHz	1752.50 MHz
		CH 18650	CH 18900	CH 19150			CH 20000	CH 20175	CH 20350
	TX (10)	1855 MHz	1880 MHz	1905 MHz		TX (10)	1715.00 MHz	1732.50 MHz	1750.00 MHz
		CH 18675	CH 18900	CH 19125			CH 20025	CH 20175	CH 20325
	TX (15M)	1857.5 MHz	1880 MHz	1902.5 MHz		TX (15M)	1717.50 MHz	1732.50 MHz	1747.50 MHz
		CH 18700	CH 18900	CH 19100			CH 20050	CH 20175	CH 20300
	TX (20M)	1860 MHz	1880 MHz	1900 MHz		TX (20M)	1720.00 MHz	1732.50 MHz	1745.00 MHz
		CH 607	CH 900	CH 1193			CH 1957	CH 2175	CH 2393
	RX (1.4M)	1930.7 MHz	1960 MHz	1989.3 MHz		RX (1.4M)	2110.70 MHz	2132.50 MHz	2154.30 MHz
		CH 615	CH 900	CH 1185			CH 1965	CH 2175	CH 2385
	RX (3M)	1931.5 MHz	1960 MHz	1988.5 MHz		RX (3M)	2111.50 MHz	2132.50 MHz	2153.50 MHz
		CH 625	CH 900	CH 1175			CH 1975	CH 2175	CH 2375
	RX (5M)	1932.50 MHz	1880.00 MHz	1987.5 MHz		RX (5M)	2112.50 MHz	2132.50 MHz	2152.50 MHz
		CH 650	CH 900	CH 1150			CH 2000	CH 2175	CH 2350
	RX (10M)	1935.00 MHz	1960.00 MHz	1985.00 MHz		RX (10M)	2115.00 MHz	2132.50 MHz	2150.00 MHz
		CH 675	CH 900	CH 1125			CH 2025	CH 2175	CH 2325
	RX (15M)	1937.50 MHz	1960.00 MHz	1982.50 MHz		RX (15M)	2117.50 MHz	2132.50 MHz	2147.50 MHz
		CH 700	CH 900	CH 1100			CH 2050	CH 2175	CH 2300
	RX (20M)	1940.00 MHz	1960.00 MHz	1980.00 MHz		RX (20M)	2120.00 MHz	2132.50 MHz	2145.00 MHz

TEST MODE	TX / RX	RF Channel			TEST MODE	TX / RX	RF Channel		
		Low	Mid	High			Low	Mid	High
LTE eFDD 5		20407	20525	20643	LTE eFDD 12		CH 23017	CH 23095	CH 23173
	TX (1.4M)	824.7	836.5	848.3		TX (1.4M)	699.70 MHz	707.50 MHz	715.30 MHz
		CH 20415	CH 20525	CH 20635			CH 23025	CH 23095	CH 23165
	TX (3M)	825.50 MHz	836.50 MHz	847.50 MHz		TX (3M)	700.50 MHz	707.50 MHz	714.50 MHz
		CH 20425	CH 20525	CH 20625			CH 23035	CH 23095	CH 23155
	TX (5M)	826.50 MHz	836.50 MHz	846.50 MHz		TX (5M)	701.50 MHz	707.50 MHz	713.50 MHz
		CH 20450	CH 20525	CH 20600			CH 23060	CH 23095	CH 23130
	TX (10)	829.00 MHz	836.50 MHz	844.00 MHz		TX (10)	704.00 MHz	707.50 MHz	711.00 MHz
		CH 2407	CH 20525	CH 2643			CH 5017	CH 5095	CH 5173
	RX (1.4M)	869.70 MHz	881.50 MHz	893.70 MHz		RX (1.4M)	729.70 MHz	737.50 MHz	745.30 MHz
		CH 2415	CH 20525	CH 2635			CH 5025	CH 5095	CH 5165
	RX (3M)	870.50 MHz	881.50 MHz	892.50 MHz		RX (3M)	730.50 MHz	737.50 MHz	744.50 MHz
		CH 2425	CH 2525	CH 2625			CH 5035	CH 5095	CH 5155
	RX (5M)	871.50 MHz	881.50 MHz	891.50 MHz		RX (5M)	731.50 MHz	737.50 MHz	743.50 MHz
		CH 2450	CH 2525	CH 2600			CH 5060	CH 5095	CH 5130
	RX (10M)	874.00 MHz	881.50 MHz	889.00 MHz		RX (10M)	734.00 MHz	737.50 MHz	741.00 MHz

Channels used for LTE Testing

Correlation of measurement requirements for Cellular Equipment from FCC and IC

FCC Rule / IC Standard	Part 22	RSS-132 Issue 3, 2016	Part 24	RSS-133 Issue 6, 2013	Part 27	RSS-139 Issue 3, 2015	RSS-130 Issue 1, 2013
Effective (isotropic) Radiated Power	§2.1046 §22.913	RSS-GEN, §6.12 RSS-132, §5.4	§2.1046 §24.232	RSS-GEN, §6.12 RSS-133, §6.4	§2.1046 §27.50	RSS-GEN, §6.12 RSS-139; §6.4	RSS-GEN, §6.12 RSS-130; §4.4
Emission and Occupied Bandwidth	§2.1049	RSS-GEN §6.6	§2.1049	RSS-GEN §6.6	§2.1049	RSS-GEN §6.6	RSS-GEN §6.6
"Spuri" at Antenna Terminal	§2.1051 §22.917	RSS-GEN, §6.13 RSS-132, §5.5	§2.1051 §24.238	RSS-GEN, §6.13 RSS-132, §6.5	§2.1051 §27.53	RSS-GEN, §6.13 RSS-139, §6.5	RSS-GEN, §6.13 RSS-130, §4.6
Band Edge compliance	§2.1051 §22.917	RSS-GEN, §6.13	§2.1051 §24.238	RSS-GEN, §6.13	§2.1051 §27.53	RSS-GEN, §6.13	RSS-GEN, §6.13
Frequency Stability	§2.1055 §22.355	RSS-GEN, §6.11	§2.1055 §24.235	RSS-GEN, §6.11 RSS-132, §6.3	§2.1055 §27.51	RSS-GEN, §6.11 RSS-139, §6.3	RSS-GEN, §6.11 RSS-130, §4.3
Peak to Average Ratio	N/A	RSS-132, §5.3	§2.1046 §24.232	RSS-133, §6.4	§2.1046 §27.50	RSS-139, §6.4	RSS-130; §4.4
Field Strength of Spurious Radiation	§2.1053 §22.917	RSS-GEN, §6.13 RSS-132, §5.2	§2.1053 §24.235	RSS-GEN, §6.13 RSS-133, §6.5	§2.1053 §27.51	RSS-GEN, §6.13 RSS-139, §6.5	RSS-GEN, §6.13 RSS-130, §4.6

*) Receivers which are part of Transceivers are exempted with respect to Notice 2012-DRS0126.

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