FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

Huawei Technologies Co., Ltd

Administration Building, Headquarters of Huawei Technologies Co., Ltd, Bantian, Longgang District, Shenzhen, 518129, P.R.C

FCC ID: QIS-AR502CGL

Report Type:	**Product Name:**
Original Report	Access Router

Test Engineer:	Lorin Bian
Report Number:	RDG170223002
Report Date:	2017-06-07
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Huawei Technologies Co., Ltd*** 's product, model number: ***AR502CG-L (FCC ID: QIS-AR502CGL)*** (the "EUT") in this report was a ***Access Router,*** which was measured approximately: 15.0 cm (L) × 10.0 cm (W) × 4.4 cm (H), rated input voltage: 8-36V DC from power port.

**All measurement and test data in this report was gathered from final production sample, serial number: 170223002 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-02-23, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of ***Huawei Technologies Co., Ltd*** in accordance with: Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E and part 27 of the Federal Communications Commission's rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J, Part 22 Subpart H, Part 24 Subpart E and Part 27.

Applicable Standards: TIA/EIA 603-D-2010.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu).

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D-2010.

The EUT have two inner antenna, and one outer antenna, inner antenna X4 is a AUX antenna for RX, Inner Antenna X3 or Outer Antenna X2 was switched as active antenna by system configuration. Antenna conducted port test performed at X2 port since X3 and X2 have same RF path in front of switch and same components characteristic.X2 and X3 cannot transmit simultaneously

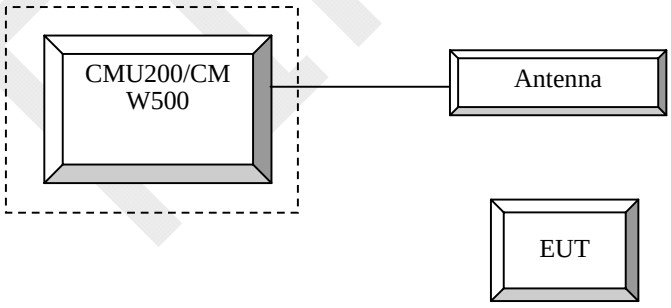
Equipment Modifications

No modification was made to the EUT.

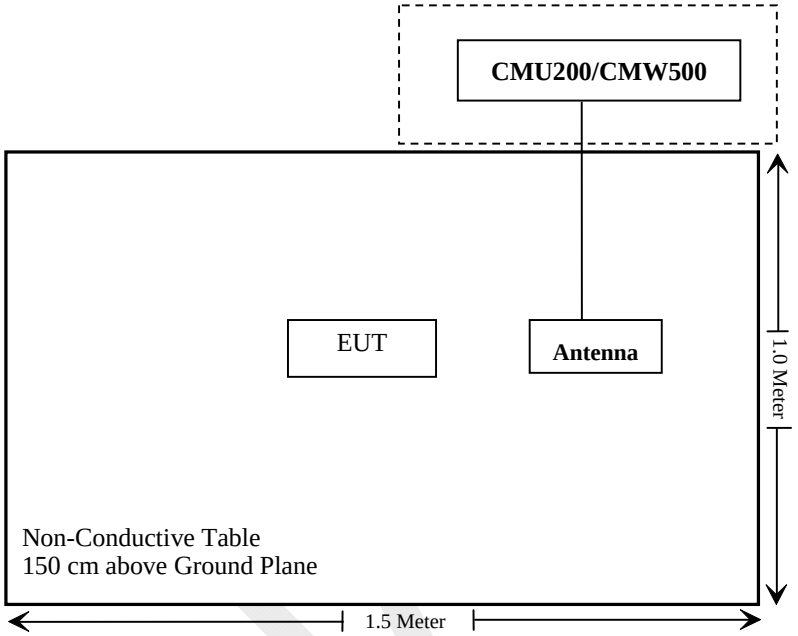
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Wideband Radio Communication tester	CMW500	106891
R&S	Universal Radio Communication Tester	CMU200	11-9435686-111
N/A	ANTENNA	N/A	N/A

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1091	Maximum Permissible Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §27.50	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	Spurious Radiation Emissions	Compliance
§ 22.917 (a); § 24.238 (a); §27.53	Out of band emission, Band Edge	Compliance
§ 2.1055 § 22.355; § 24.235; §27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

FCC §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

For Inner Antenna:

Operating Bands	Frequency Range	Antenna Gain		Maximum Conducted Power Including Turn-Up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Cellular band	824-849	2.5	1.78	30	1000.00	20.00	0.3540	0.55
PCS1900	1850-1910	4	2.51	30	1000.00	20.00	0.5000	1.00
WCDMA Band 2	1850-1910	4	2.51	23	199.53	20.00	0.0998	1.00
WCDMA Band 5	824-849	2.5	1.78	23	199.53	20.00	0.0706	0.55
LTE Band 2	1850-1910	4	2.51	24	251.19	20.00	0.1256	1.00
LTE Band 4	1710-1755	4	2.51	24	251.19	20.00	0.1256	1.00
LTE Band 5	824-849	2.5	1.78	24	251.19	20.00	0.0889	0.55
LTE Band 7	2500-2570	3.5	2.24	24	251.19	20.00	0.1119	1.00

For Outer Antenna:

Operating Bands	Frequency Range	Antenna Gain		Maximum Conducted Power Including Turn-Up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Cellular band	824-849	2	1.58	30	1000.00	20.00	0.3155	0.55
PCS1900	1850-1910	4.5	2.82	30	1000.00	20.00	0.5610	1.00
WCDMA Band 2	1850-1910	4.5	2.82	23	199.53	20.00	0.1119	1.00
WCDMA Band 5	824-849	2	1.58	23	199.53	20.00	0.0629	0.55
LTE Band 2	1850-1910	4.5	2.82	24	251.19	20.00	0.1409	1.00
LTE Band 4	1710-1755	4.5	2.82	24	251.19	20.00	0.1409	1.00
LTE Band 5	824-849	2	1.58	24	251.19	20.00	0.0792	0.55
LTE Band 7	2500-2570	4.5	2.82	24	251.19	20.00	0.1409	1.00

Result: The device meet FCC MPE at 20 cm distance.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046, § 22.913 (a) & § 24.232 (c) & § 27.50 - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

According to FCC §2.1046 and §27.50 (d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

According to FCC §2.1046 and §27.50 (h)(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedure

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
> Slot configuration > Uplink/Gamma
> 33 dBm for GPRS 850
> 30 dBm for GPRS 1900
> 27 dBm for EGPRS 850
> 26 dBm for EGPRS 1900
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset > + 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stable)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off

P0 > 4 dB
Slot Config > Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping > Off
Main Timeslot > 3
Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal on to turn on the signal and change settings

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP
TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc / βd	8/15

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP
TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc	30/15			

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP
TS34.121-1 specification.

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/ βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs=βhs/ βc	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCIs	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

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

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.

Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

DC-HSDPA

The following tests were conducted according to the test requirements in Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK

Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.

Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Radiated method:

ANSI/TIA 603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
R&S	Universal Radio Communication Tester	CMU200	11-9435686-111	2016-07-28	2017-07-27
R&S	Wideband Radio Communication Tester	CMW500	106891	2016-11-23	2017-11-23

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	18~19.5 °C
Relative Humidity:	57~59 %
ATM Pressure:	94.8~95.6 kPa

The testing was performed by Lorin Bian from 2017-03-12 to 2017-03-29.

Conducted Power

Cellular Band & PCS Band

Band	Channel No.	Peak Output Power (dBm)							
		GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	29.03	29.17	28.98	27.48	28.56	26.67	26.05	24.18
	190	29.18	29.10	29.35	27.75	28.99	27.18	26.15	24.64
	251	29.37	29.26	29.49	27.78	29.18	27.27	26.23	24.84
PCS	512	28.66	26.89	26.11	24.14	27.19	24.68	24.19	21.82
	661	29.10	27.25	26.23	24.71	27.33	24.79	24.42	21.97
	810	29.26	27.30	26.38	24.81	27.82	25.09	24.09	22.51

WCDMA Band Ⅱ

Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99 (QPSK)	1	22.62	3.04	22.78	3.12	22.63	2.80
HSDPA (QPSK)	1	20.82	3.05	20.64	3.21	20.73	2.63
	2	20.57	3.09	20.76	2.99	21.01	2.71
	3	21.12	2.88	20.94	2.89	20.57	3.00
	4	20.68	3.34	20.66	3.35	21.01	2.78
HSUPA (QPSK)	1	20.74	2.78	20.87	3.34	20.82	2.62
	2	20.83	3.32	20.70	2.83	20.90	2.91
	3	21.07	3.30	20.35	2.82	20.69	2.69
	4	21.11	3.33	20.46	3.11	20.61	2.88
	5	20.62	3.09	20.64	3.38	20.88	2.95
DC-HSDPA (QPSK)	1	20.61	2.91	20.42	3.00	20.78	2.94
	2	21.04	3.02	20.71	3.35	20.68	2.97
	3	21.12	3.32	20.72	3.32	21.12	2.63
	4	21.08	3.01	20.35	3.36	20.91	2.77
HSPA+ (16QAM)	1	20.72	3.10	20.91	2.97	20.59	3.00

WCDMA Band V

Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99 (QPSK)	1	22.68	2.56	22.84	2.76	22.38	3.04
HSDPA (QPSK)	1	20.93	2.28	21.09	2.86	20.69	2.75
	2	21.08	2.33	21.08	2.47	20.74	3.08
	3	20.66	2.38	21.38	2.70	20.61	3.28
	4	21.21	2.59	21.32	2.56	20.89	2.81
HSUPA (QPSK)	1	20.95	2.62	21.12	2.83	20.80	2.75
	2	20.65	2.36	21.35	2.78	20.82	3.02
	3	20.74	2.35	20.79	2.99	20.43	3.17
	4	20.91	2.45	20.94	2.76	20.84	3.18
	5	20.89	2.46	20.88	2.81	20.60	3.33
DC-HSDPA (QPSK)	1	20.85	2.36	20.88	2.62	20.71	2.75
	2	20.83	2.61	21.04	2.94	20.62	3.32
	3	21.04	2.51	21.03	2.69	20.74	2.87
	4	21.13	2.42	21.30	2.61	20.69	3.21
HSPA+ (16QAM)	1	21.21	2.77	21.16	2.87	20.44	3.12

LTE Band II (PART 24)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.60	22.18	22.26
		1#13	23.03	22.31	22.37
		1#24	23.04	22.46	22.32
		12#0	21.84	21.44	21.52
		12#6	22.21	21.66	21.74
		12#11	22.20	21.67	21.81.
		25#0	22.01	21.44	21.64
	16QAM	1#0	22.13	22.25	22.46
		1#13	22.47	22.50	22.70
		1#24	22.61	22.54	22.52
		12#0	20.61	20.31	20.43
		12#6	20.97	20.52	20.61
		12#11	20.98	20.51	20.68
		25#0	21.20	20.79	21.29
10MHz	QPSK	1#0	22.89	22.49	22.38
		1#24	23.40	22.76	22.55
		1#49	23.27	23.21	22.73
		25#0	22.13	21.57	21.35
		25#12	22.31	21.84	21.62
		25#24	22.19	21.78	21.68
		50#0	22.14	21.62	21.66
	16QAM	1#0	22.82	22.29	22.36
		1#25	23.21	22.68	22.54
		1#49	23.19	23.03	22.68
		25#0	21.46	21.51	21.65
		25#12	21.85	21.84	21.78
		25#24	21.36	21.14	21.21
		50#0	21.26	20.72	20.86
15 MHz	QPSK	1#0	23.09	22.62	22.90
		1#38	23.18	22.74	22.43
		1#74	23.21	23.55	23..01
		36#0	22.40	21.58	21.86
		36#17	22.34	21.75	21.68
		36#35	22.39	22.09	21.63
		75#0	22.39	21.96	21.70
	16QAM	1#0	22.08	21.78	21.94
		1#38	22.27	21.92	21.54
		1#74	22.19	22.64	21.82
		36#0	21.05	20.42	20.61
		36#17	21.11	20.63	20.54
		36#35	21.09	20.78	20.49
		75#0	21.07	20.73	20.59

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
20MHz	QPSK	1#0	22.95	22.43	23.13
		1#49	22.94	22.39	22.45
		1#99	22.67	23.04	22.85
		50#0	22.19	21.50	22.06
		50#24	22.13	21.54	21.78
		50#49	21.99	21.76	21.63
		100#0	22.09	21.57	21.94
	16QAM	1#0	21.98	21.45	22.31
		1#49	22.02	21.50	21.61
		1#99	21.66	22.31	22.06
		50#0	20.84	20.13	20.80
		50#24	20.83	20.16	20.41
		50#49	20.68	20.56	20.31
		100#0	20.77	20.53	20.66

LTE Band IV (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	23.84	22.25	23.35
		1#12	23.79	22.45	23.07
		1#24	23.64	22.71	22.12
		12#0	22.87	21.32	22.29
		12#6	23.10	21.63	22.29
		12#11	22.97	21.60	22.03
		25#0	22.83	21.48	21.99
	16QAM	1#0	22.98	21.25	22.52
		1#12	22.91	21.43	22.30
		1#24	22.79	21.73	21.36
		12#0	21.67	20.11	21.09
		12#6	21.84	20.41	21.08
		12#11	21.73	20.39	20.83
		25#0	21.66	20.21	20.81
10MHz	QPSK	1#0	23.89	22.19	23.46
		1#24	23.79	22.54	23.39
		1#49	23.05	23.06	22.35
		25#0	22.78	21.32	22.39
		25#12	22.60	21.63	22.41
		25#24	22.14	21.65	21.98
		50#0	22.57	21.46	22.11
	16QAM	1#0	22.95	21.23	22.84
		1#24	22.77	21.51	22.82
		1#49	22.05	22.32	21.83
		25#0	21.54	21.36	21.46
		25#12	21.48	21.54	21.45
		25#24	21.03	21.56	20.96
		50#0	21.36	21.06	21.15
15MHz	QPSK	1#0	23.89	22.11	23.48
		1#37	23.05	22.39	23.52
		1#74	22.60	23.71	22.49
		36#0	22.66	21.38	22.58
		36#17	22.36	21.61	22.63
		36#35	21.65	21.95	22.33
		75#0	22.18	21.55	22.36
	16QAM	1#0	23.17	21.49	22.72
		1#37	22.45	21.63	22.87
		1#74	21.98	22.84	21.88
		36#0	21.33	20.24	21.51
		36#17	21.05	20.27	21.57
		36#35	20.37	20.63	21.37
		75#0	20.84	20.38	21.29

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
20MHz	QPSK	1#0	23.73	22.24	22.79
		1#49	22.56	22.20	23.15
		1#99	22.26	23.61	22.88
		50#0	22.30	21.39	22.32
		50#24	21.62	21.44	22.43
		50#49	21.35	22.13	22.37
		100#0	21.89	21.71	22.33
	16QAM	1#0	22.97	21.56	22.14
		1#49	21.85	21.48	22.34
		1#99	21.64	22.93	22.22
		50#0	21.08	20.19	21.05
		50#24	20.46	20.14	21.12
		50#49	20.19	20.83	21.08
		100#0	20.71	20.44	21.06

LTE Band V (PART 22)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	23.28	23.32	22.86
		1#12	23.15	23.59	22.94
		1#24	23.05	23.78	23.15
		12#0	22.23	22.39	21.76
		12#6	22.28	22.66	22.04
		12#11	22.13	22.74	22.19
		25#0	22.17	22.58	21.84
	16QAM	1#0	22.25	22.23	22.13
		1#12	22.47	22.76	22.18
		1#24	22.38	22.98	22.35
		12#0	20.75	21.03	20.37
		12#6	20.76	21.27	20.62
		12#11	20.63	21.33	20.79
		25#0	20.66	21.16	20.38
10MHz	QPSK	1#0	23.40	23.04	23.65
		1#24	23.11	23.66	22.99
		1#49	23.50	23.84	23.41
		25#0	21.97	22.28	22.14
		25#12	22.15	22.71	22.13
		25#24	21.96	22.60	21.94
		50#0	22.07	22.43	22.02
	16QAM	1#0	22.41	22.47	22.76
		1#24	22.14	22.97	22.13
		1#49	22.95	23.16	22.48
		25#0	20.45	20.86	20.98
		25#12	20.62	21.27	20.96
		25#24	20.51	21.18	20.79
		50#0	20.63	21.29	20.84

LTE Band VII (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5 MHz	QPSK	1#0	21.71	21.54	21.39
		1#12	22.02	22.00	21.86
		1#24	22.35	22.05	22.02
		12#0	20.65	20.60	20.46
		12#6	21.05	20.93	20.84
		12#11	21.17	21.01	20.83
		25#0	20.82	20.81	20.61
	16QAM	1#0	20.89	20.75	20.61
		1#12	21.25	21.23	21.01
		1#24	21.48	21.20	21.22
		12#0	19.44	19.34	19.05
		12#6	19.81	19.63	19.39
		12#11	19.94	19.76	19.38
		25#0	19.52	19.51	19.08
10 MHz	QPSK	1#0	21.93	21.45	21.47
		1#24	22.70	22.10	21.75
		1#49	23.19	22.59	22.25
		25#0	20.99	20.53	20.14
		25#12	21.50	20.97	20.55
		25#24	21.64	20.99	20.58
		50#0	21.26	20.86	20.46
	16QAM	1#0	21.01	20.79	20.59
		1#24	21.76	21.31	20.87
		1#49	22.29	21.69	21.26
		25#0	19.73	19.56	19.13
		25#12	20.21	19.66	19.23
		25#24	20.33	19.71	19.28
		50#0	19.99	19.62	19.17

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15 MHz	QPSK	1#0	21.87	21.41	21.92
		1#37	22.80	22.04	21.36
		1#74	23.23	22.88	22.31
		36#0	21.21	20.47	20.48
		36#17	21.78	20.86	20.41
		36#35	22.04	21.04	20.41
		75#0	21.52	20.81	20.49
	16QAM	1#0	21.02	20.58	21.08
		1#37	21.89	21.15	20.56
		1#74	22.39	21.88	21.39
		36#0	20.12	19.29	19.17
		36#17	20.41	19.60	19.12
		36#35	20.68	19.78	19.11
		75#0	20.23	19.59	19.12
20 MHz	QPSK	1#0	21.61	21.25	22.11
		1#49	22.70	21.69	21.18
		1#99	22.15	22.68	21.95
		50#0	21.26	20.52	20.73
		50#24	21.76	20.65	20.30
		50#49	21.81	21.10	20.32
		100#0	21.54	20.82	20.59
	16QAM	1#0	21.20	20.59	21.52
		1#49	22.21	20.90	20.56
		1#99	21.62	21.85	21.04
		50#0	19.95	19.28	19.41
		50#24	20.33	19.58	19.11
		50#49	20.52	19.80	19.12
		100#0	20.29	19.59	19.23

PAR, Band II

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.56	5.40	5.76	13
	100 RB		6.72	7.04	6.76	13
16QAM	1 RB	20 MHz	5.28	6.72	6.52	13
	100 RB		7.64	7.88	7.68	13

PAR, Band IV

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	5.00	5.32	5.20	13
	100 RB		6.88	6.72	6.84	13
16QAM	1 RB	20 MHz	6.32	6.20	6.40	13
	100 RB		7.80	6.80	6.80	13

PAR, Band V

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	5.56	5.24	5.04	13
	50 RB		6.20	6.08	6.16	13
16QAM	1 RB	10 MHz	6.68	6.20	6.28	13
	50 RB		7.16	5.88	7.04	13

PAR, Band VII

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.64	5.28	4.84	13
	100 RB		6.84	6.88	6.68	13
16QAM	1 RB	20 MHz	5.44	6.64	5.72	13
	100 RB		7.92	8.00	7.88	13

Note: peak-to-average ratio (PAR) <13 dB.

ERP & EIRP

Inner Antenna:

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS 850 1slot_Middle Channel								
836.600	H	98.67	23.7	0.0	1	22.7	38.45	15.75
836.600	V	102.21	30.4	0.0	1	29.4	38.45	9.05
EDGE 850 1slot_Middle Channel								
836.600	H	98.56	23.6	0.0	1	22.6	38.45	15.85
836.600	V	101.24	29.4	0.0	1	28.4	38.45	10.05
WCDMA Band V Middle Channel								
836.600	H	89.64	14.7	0.0	1	13.7	38.45	24.75
836.600	V	96.27	24.5	0.0	1	23.5	38.45	14.95

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900 1slot_Middle Channel								
1880.000	H	89.24	16.6	11.7	2.7	25.6	33.0	7.4
1880.000	V	93.45	21.0	11.7	2.7	30.0	33.0	3.0
EDGE 1900 1slot_Middle Channel								
1880.000	H	89.14	16.5	11.7	2.7	25.5	33.0	7.5
1880.000	V	92.74	20.3	11.7	2.7	29.3	33.0	3.7
WCDMA Band II Middle Channel								
1880.000	H	83.81	11.2	11.7	2.7	20.2	33.0	12.8
1880.000	V	85.72	13.3	11.7	2.7	22.3	33.0	10.7

LTE Band II

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
1880.000	H	87.07	14.5	11.7	2.7	23.5	33.00	9.5
1880.000	V	87.18	14.7	11.7	2.7	23.7	33.00	9.3
QPSK 10 MHz Middle Channel								
1880.000	H	86.68	14.1	11.7	2.7	23.1	33.00	9.9
1880.000	V	87.12	14.7	11.7	2.7	23.7	33.00	9.3
QPSK 15 MHz Middle Channel								
1880.000	H	86.78	14.2	11.7	2.7	23.2	33.00	9.8
1880.000	V	86.83	14.4	11.7	2.7	23.4	33.00	9.6
QPSK 20 MHz Middle Channel								
1880.000	H	86.68	14.1	11.7	2.7	23.1	33.00	9.9
1880.000	V	87.35	14.9	11.7	2.7	23.9	33.00	9.1
16QAM 5 MHz Middle Channel								
1880.000	H	86.67	14.1	11.7	2.7	23.1	33.00	9.9
1880.000	V	86.21	13.7	11.7	2.7	22.7	33.00	10.3
16QAM 10 MHz Middle Channel								
1880.000	H	86.57	14	11.7	2.7	23.0	33.00	10.0
1880.000	V	86.18	13.7	11.7	2.7	22.7	33.00	10.3
16QAM 15 MHz Middle Channel								
1880.000	H	86.43	13.8	11.7	2.7	22.8	33.00	10.2
1880.000	V	86.43	14	11.7	2.7	23.0	33.00	10.0
16QAM 20 MHz Middle Channel								
1880.000	H	86.42	13.8	11.7	2.7	22.8	33.00	10.2
1880.000	V	85.59	13.1	11.7	2.7	22.1	33.00	10.9

LTE Band IV

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
1732.500	H	87.91	13.9	10.9	2.5	22.3	30.00	7.7
1732.500	V	88.89	14.5	10.9	2.5	22.9	30.00	7.1
QPSK 10 MHz Middle Channel								
1732.500	H	88.63	14.6	10.9	2.5	23.0	30.00	7.0
1732.500	V	88.68	14.3	10.9	2.5	22.7	30.00	7.3
QPSK 15 MHz Middle Channel								
1732.500	H	87.57	13.5	10.9	2.5	21.9	30.00	8.1
1732.500	V	88.79	14.4	10.9	2.5	22.8	30.00	7.2
QPSK 20 MHz Middle Channel								
1732.500	H	86.86	12.8	10.9	2.5	21.2	30.00	8.8
1732.500	V	88.25	13.9	10.9	2.5	22.3	30.00	7.7
16QAM 5 MHz Middle Channel								
1732.500	H	87.17	13.1	10.9	2.5	21.5	30.00	8.5
1732.500	V	87.96	13.6	10.9	2.5	22.0	30.00	8.0
16QAM 10 MHz Middle Channel								
1732.500	H	87.40	13.3	10.9	2.5	21.7	30.00	8.3
1732.500	V	88.33	14	10.9	2.5	22.4	30.00	7.6
16QAM 15 MHz Middle Channel								
1732.500	H	88.32	14.3	10.9	2.5	22.7	30.00	7.3
1732.500	V	88.11	13.7	10.9	2.5	22.1	30.00	7.9
16QAM 20 MHz Middle Channel								
1732.500	H	88.89	14.8	10.9	2.5	23.2	30.00	6.8
1732.500	V	88.12	13.8	10.9	2.5	22.2	30.00	7.8

LTE Band V

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
836.500	H	96.75	21.8	0.0	1	20.8	33.00	12.2
836.500	V	89.77	18	0.0	1	17.0	33.00	16.0
QPSK 10MHz Middle Channel								
836.500	H	96.98	22.1	0.0	1	21.1	33.00	11.9
836.500	V	89.79	18	0.0	1	17.0	33.00	16.0
16QAM 5MHz Middle Channel								
836.500	H	96.89	22	0.0	1	21.0	33.00	12.0
836.500	V	89.43	17.6	0.0	1	16.6	33.00	16.4
16QAM 10MHz Middle Channel								
836.500	H	97.67	22.7	0.0	1	21.7	33.00	11.3
836.500	V	89.85	18.1	0.0	1	17.1	33.00	15.9

LTE Band VII

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
2535.000	H	84.55	11.9	13.1	3.1	21.9	33.00	11.1
2535.000	V	78.37	7.2	13.1	3.1	17.2	33.00	15.8
QPSK 10 MHz Middle Channel								
2535.000	H	84.39	11.8	13.1	3.1	21.8	33.00	11.2
2535.000	V	77.14	6	13.1	3.1	16.0	33.00	17.0
QPSK 15 MHz Middle Channel								
2535.000	H	84.23	11.6	13.1	3.1	21.6	33.00	11.4
2535.000	V	78.96	7.8	13.1	3.1	17.8	33.00	15.2
QPSK 20MHz Middle Channel								
2535.000	H	84.48	11.9	13.1	3.1	21.9	33.00	11.1
2535.000	V	78.94	7.8	13.1	3.1	17.8	33.00	15.2
16QAM 5 MHz Middle Channel								
2535.000	H	84.41	11.8	13.1	3.1	21.8	33.00	11.2
2535.000	V	78.14	7	13.1	3.1	17.0	33.00	16.0
16QAM 10 MHz Middle Channel								
2535.000	H	84.25	11.6	13.1	3.1	21.6	33.00	11.4
2535.000	V	77.63	6.5	13.1	3.1	16.5	33.00	16.5
16QAM 15 MHz Middle Channel								
2535.000	H	83.94	11.3	13.1	3.1	21.3	33.00	11.7
2535.000	V	78.23	7.1	13.1	3.1	17.1	33.00	15.9
16QAM 20 MHz Middle Channel								
2535.000	H	84.06	11.5	13.1	3.1	21.5	33.00	11.5
2535.000	V	78.14	7	13.1	3.1	17.0	33.00	16.0

Outer Antenna:

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850_Middle Channel								
836.600	H	98.49	23.6	0.0	1	22.6	38.45	15.85
836.600	V	103.00	31.2	0.0	1	30.2	38.45	8.25
EDGE 850_Middle Channel								
836.600	H	98.24	23.3	0.0	1	22.3	38.45	16.15
836.600	V	102.05	30.3	0.0	1	29.3	38.45	9.15
WCDMA Band V Middle Channel								
836.600	H	91.60	16.7	0.0	1	15.7	38.45	22.75
836.600	V	98.20	26.5	0.0	1	25.5	38.45	12.95

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900_Middle Channel								
1880.000	H	89.24	16.6	11.7	2.7	25.6	33.0	7.4
1880.000	V	93.55	21.1	11.7	2.7	30.1	33.0	2.9
EDGE 1900_Middle Channel								
1880.000	H	90.02	17.4	11.7	2.7	26.4	33.0	6.6
1880.000	V	92.89	20.4	11.7	2.7	29.4	33.0	3.6
WCDMA Band II Middle Channel								
1880.000	H	83.81	11.2	11.7	2.7	20.2	33.0	12.8
1880.000	V	91.72	19.3	11.7	2.7	28.3	33.0	4.7

LTE Band II

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
1880.000	H	86.69	14.1	11.7	2.7	23.1	33.00	9.9
1880.000	V	90.21	17.7	11.7	2.7	26.7	33.00	6.3
QPSK 10 MHz Middle Channel								
1880.000	H	86.85	14.2	11.7	2.7	23.2	33.00	9.8
1880.000	V	90.34	17.9	11.7	2.7	26.9	33.00	6.1
QPSK 15 MHz Middle Channel								
1880.000	H	86.32	13.7	11.7	2.7	22.7	33.00	10.3
1880.000	V	90.24	17.8	11.7	2.7	26.8	33.00	6.2
QPSK 20 MHz Middle Channel								
1880.000	H	86.47	13.9	11.7	2.7	22.9	33.00	10.1
1880.000	V	90.32	17.9	11.7	2.7	26.9	33.00	6.1
16QAM 5 MHz Middle Channel								
1880.000	H	85.78	13.2	11.7	2.7	22.2	33.00	10.8
1880.000	V	90.47	18	11.7	2.7	27.0	33.00	6.0
16QAM 10 MHz Middle Channel								
1880.000	H	86.03	13.4	11.7	2.7	22.4	33.00	10.6
1880.000	V	90.78	18.3	11.7	2.7	27.3	33.00	5.7
16QAM 15 MHz Middle Channel								
1880.000	H	85.02	12.4	11.7	2.7	21.4	33.00	11.6
1880.000	V	89.84	17.4	11.7	2.7	26.4	33.00	6.6
16QAM 20 MHz Middle Channel								
1880.000	H	85.24	12.6	11.7	2.7	21.6	33.00	11.4
1880.000	V	90.35	17.9	11.7	2.7	26.9	33.00	6.1

LTE Band IV

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
1732.500	H	89.05	15	10.9	2.5	23.4	30.00	6.6
1732.500	V	91.51	17.1	10.9	2.5	25.5	30.00	4.5
QPSK 10 MHz Middle Channel								
1732.500	H	89.32	15.3	10.9	2.5	23.7	30.00	6.3
1732.500	V	91.78	17.4	10.9	2.5	25.8	30.00	4.2
QPSK 15 MHz Middle Channel								
1732.500	H	89.18	15.1	10.9	2.5	23.5	30.00	6.5
1732.500	V	91.23	16.9	10.9	2.5	25.3	30.00	4.7
QPSK 20 MHz Middle Channel								
1732.500	H	89.37	15.3	10.9	2.5	23.7	30.00	6.3
1732.500	V	91.65	17.3	10.9	2.5	25.7	30.00	4.3
16QAM 5 MHz Middle Channel								
1732.500	H	88.79	14.7	10.9	2.5	23.1	30.00	6.9
1732.500	V	90.76	16.4	10.9	2.5	24.8	30.00	5.2
16QAM 10 MHz Middle Channel								
1732.500	H	89.02	15	10.9	2.5	23.4	30.00	6.6
1732.500	V	91.03	16.7	10.9	2.5	25.1	30.00	4.9
16QAM 15 MHz Middle Channel								
1732.500	H	88.03	14	10.9	2.5	22.4	30.00	7.6
1732.500	V	90.15	15.8	10.9	2.5	24.2	30.00	5.8
16QAM 20 MHz Middle Channel								
1732.500	H	88.41	14.4	10.9	2.5	22.8	30.00	7.2
1732.500	V	90.57	16.2	10.9	2.5	24.6	30.00	5.4

LTE Band V

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
836.500	H	97.50	22.6	0.0	1	21.6	38.45	16.85
836.500	V	98.78	27	0.0	1	26	38.45	12.45
QPSK 10MHz Middle Channel								
836.500	H	97.61	22.7	0.0	1	21.7	38.45	16.75
836.500	V	99.24	27.4	0.0	1	26.4	38.45	12.05
16QAM 5MHz Middle Channel								
836.500	H	96.66	21.7	0.0	1	20.7	38.45	17.75
836.500	V	98.76	27	0.0	1	26.0	38.45	12.45
16QAM 10MHz Middle Channel								
836.500	H	98.34	23.4	0.0	1	22.4	38.45	16.05
836.500	V	99.97	28.2	0.0	1	27.2	38.45	11.25

LTE Band VII

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
2535.000	H	83.39	10.8	13.1	3.1	20.8	33.00	12.2
2535.000	V	83.19	12	13.1	3.1	22.0	33.00	11.0
QPSK 10 MHz Middle Channel								
2535.000	H	83.25	10.6	13.1	3.1	20.6	33.00	12.4
2535.000	V	83.06	11.9	13.1	3.1	21.9	33.00	11.1
QPSK 15 MHz Middle Channel								
2535.000	H	83.14	10.5	13.1	3.1	20.5	33.00	12.5
2535.000	V	83.01	11.9	13.1	3.1	21.9	33.00	11.1
QPSK 20MHz Middle Channel								
2535.000	H	83.28	10.7	13.1	3.1	20.7	33.00	12.3
2535.000	V	82.85	11.7	13.1	3.1	21.7	33.00	11.3
16QAM 5 MHz Middle Channel								
2535.000	H	82.35	9.7	13.1	3.1	19.7	33.00	13.3
2535.000	V	82.76	11.6	13.1	3.1	21.6	33.00	11.4
16QAM 10 MHz Middle Channel								
2535.000	H	82.52	9.9	13.1	3.1	19.9	33.00	13.1
2535.000	V	83.12	12	13.1	3.1	22.0	33.00	11.0
16QAM 15 MHz Middle Channel								
2535.000	H	81.46	8.9	13.1	3.1	18.9	33.00	14.1
2535.000	V	82.18	11	13.1	3.1	21.0	33.00	12.0
16QAM 20 MHz Middle Channel								
2535.000	H	81.87	9.3	13.1	3.1	19.3	33.00	13.7
2535.000	V	82.65	11.5	13.1	3.1	21.5	33.00	11.5

FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH

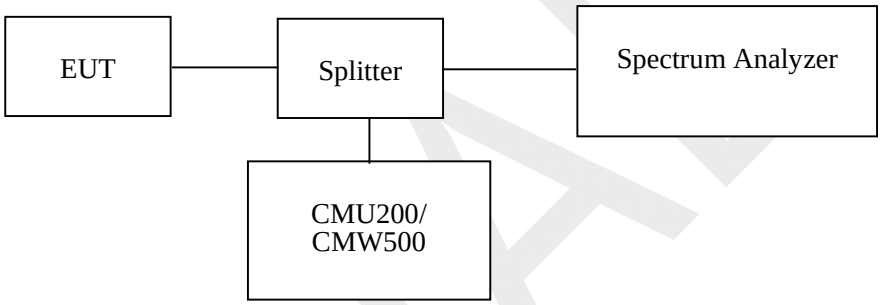
Applicable Standard

FCC §2.1049, §22.917, §22.905, §24.238 and §27.53.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The 26 dB & 99% bandwidth was recorded.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Spliter	N/A	OE0120121	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	18.8~19.5 °C
Relative Humidity:	54~57 %
ATM Pressure:	95.6~95.8 kPa

The testing was performed by Lorin Bian from 2017-03-12 to 2017-05-08.

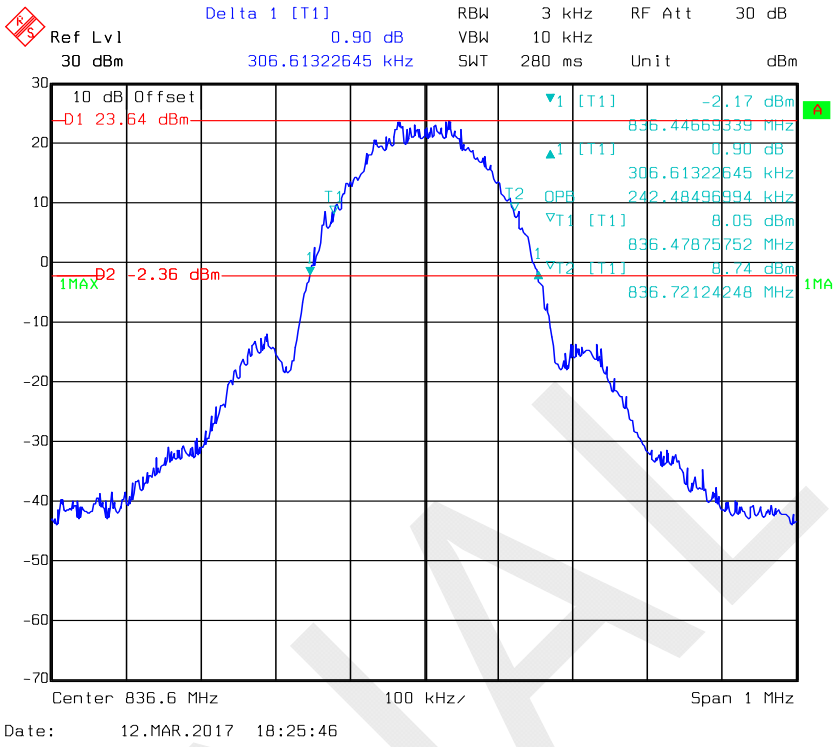
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

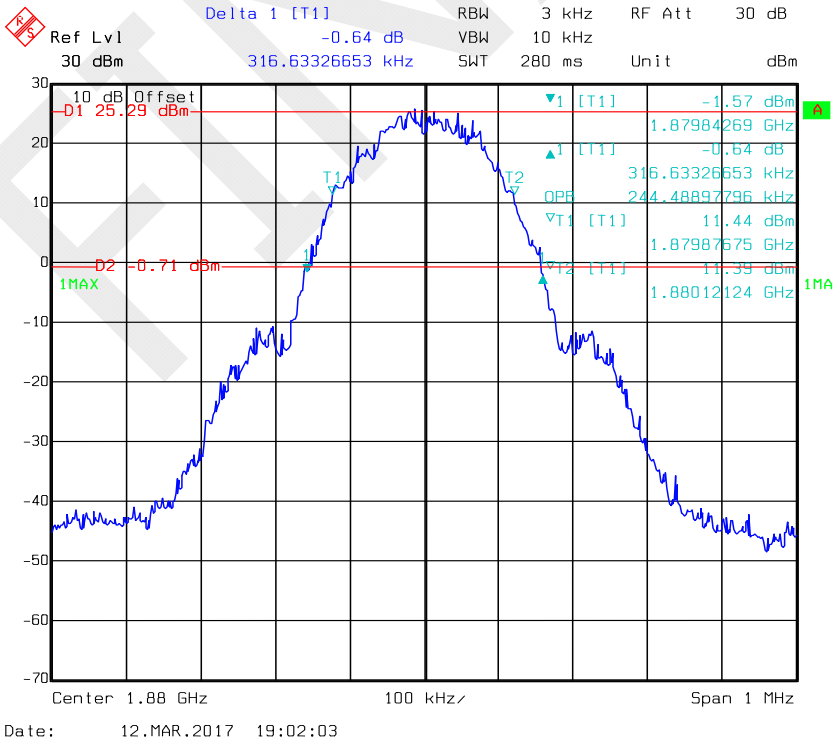
Band	Test Channel	Mode	99% Occupied Bandwidth (kHz)	26 dB Occupied Bandwidth (kHz)
Cellular	M	GPRS	242.48	306.61
		EDGE	244.49	308.62
PCS		GPRS	244.49	316.63
		EDGE	244.48	306.61
WCDMA Band II		Rel 99	4168.34	4749.50
		HSDPA	4188.38	4749.50
		HSUPA	4188.38	4709.42
WCDMA Band V		Rel 99	4188.38	4749.50
		HSDPA	4188.38	4749.50
		HSUPA	4188.38	4809.62

Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band II	QPSK	5	M	4.549	5.070
		10		9.018	9.930
		15		13.466	14.979
		20		18.036	20.020
	16QAM	5	M	4.549	5.070
		10		9.018	9.890
		15		13.466	15.040
		20		18.036	20.100
LTE Band IV	QPSK	5	M	4.529	5.030
		10		9.018	9.900
		15		13.466	15.109
		20		17.955	19.608
	16QAM	5	M	4.529	5.030
		10		9.018	9.980
		15		13.527	15.049
		20		17.955	19.608
LTE Band V	QPSK	5	M	4.509	4.990
		10		8.978	9.850
	16QAM	5	M	4.529	5.050
		10		9.018	9.890
LTE Band VII	QPSK	5	M	4.529	5.050
		10		8.978	9.850
		15		13.466	15.030
		20		18.116	19.959
	16QAM	5	M	4.529	5.050
		10		8.978	9.930
		15		13.527	14.889
		20		18.036	19.849

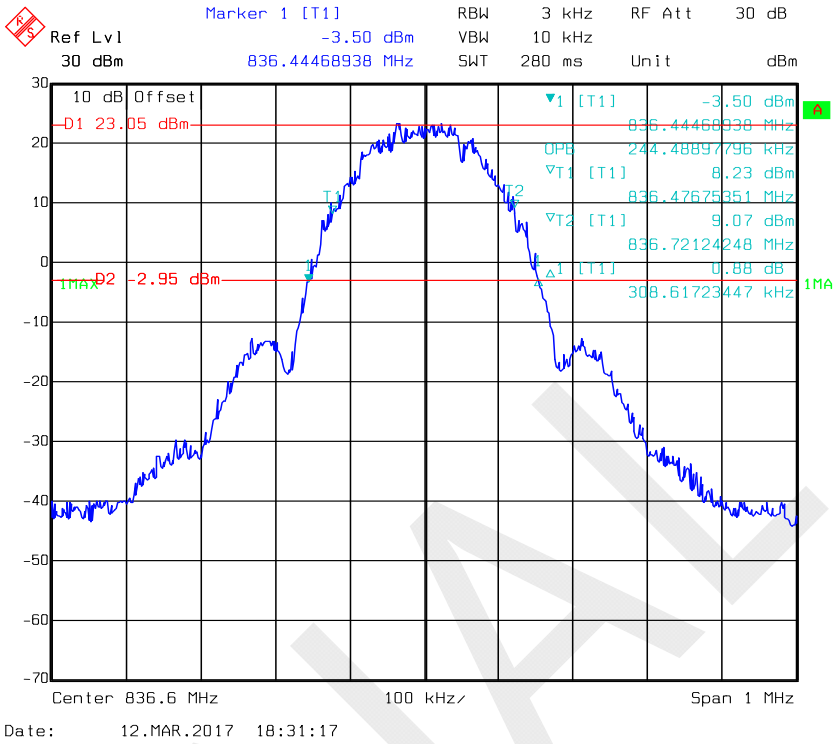
GPRS 850 Cellular Band



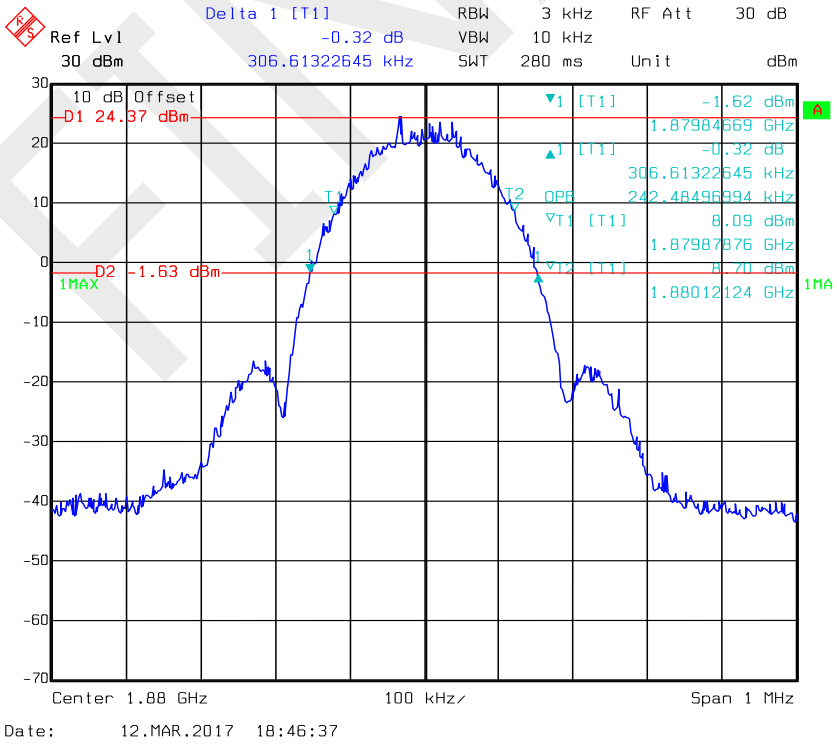
GPRS PCS Band



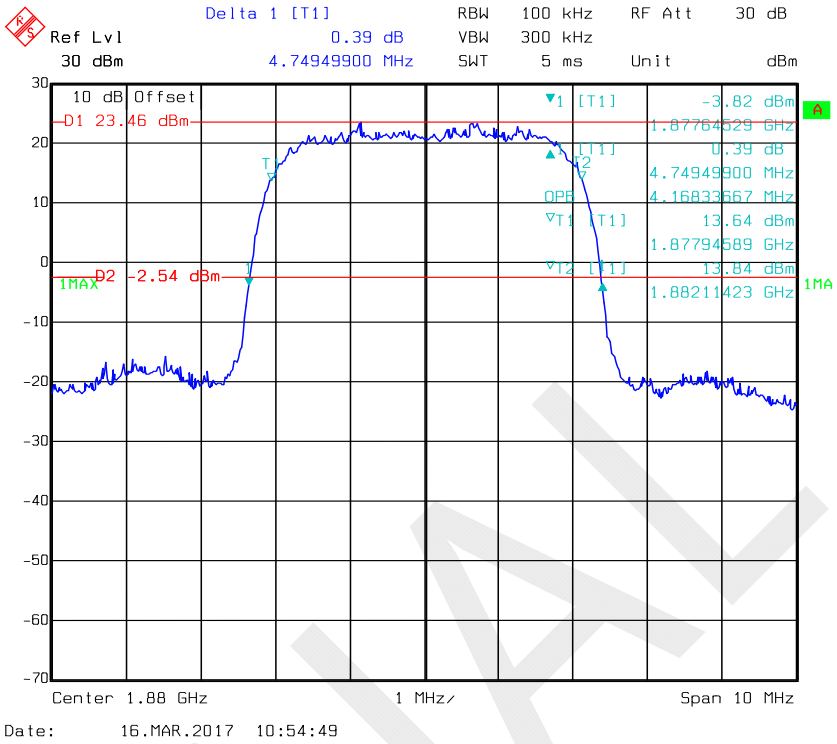
EDGE 850 Cellular Band



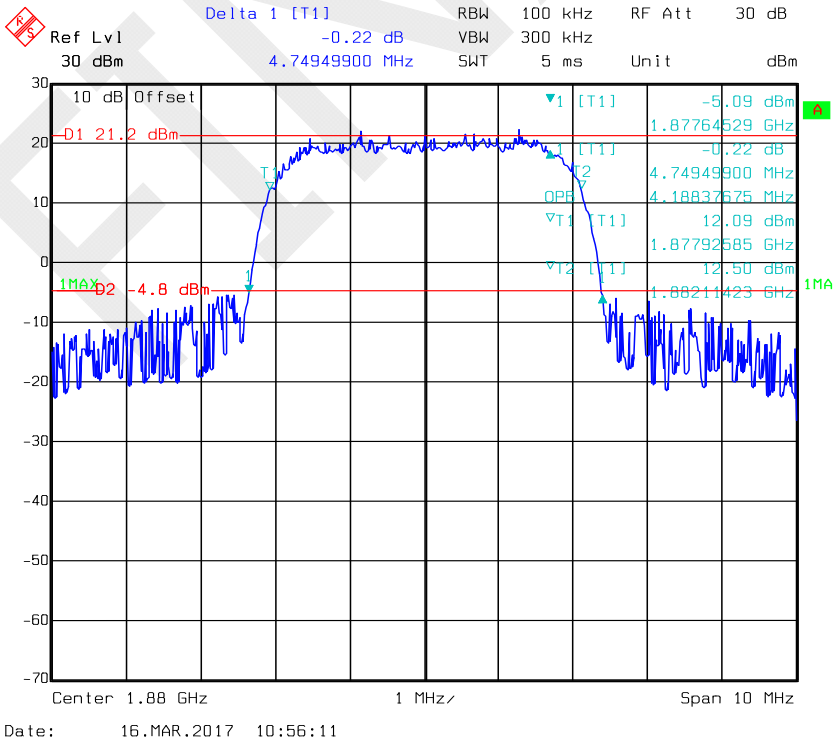
EDGE PCS Band



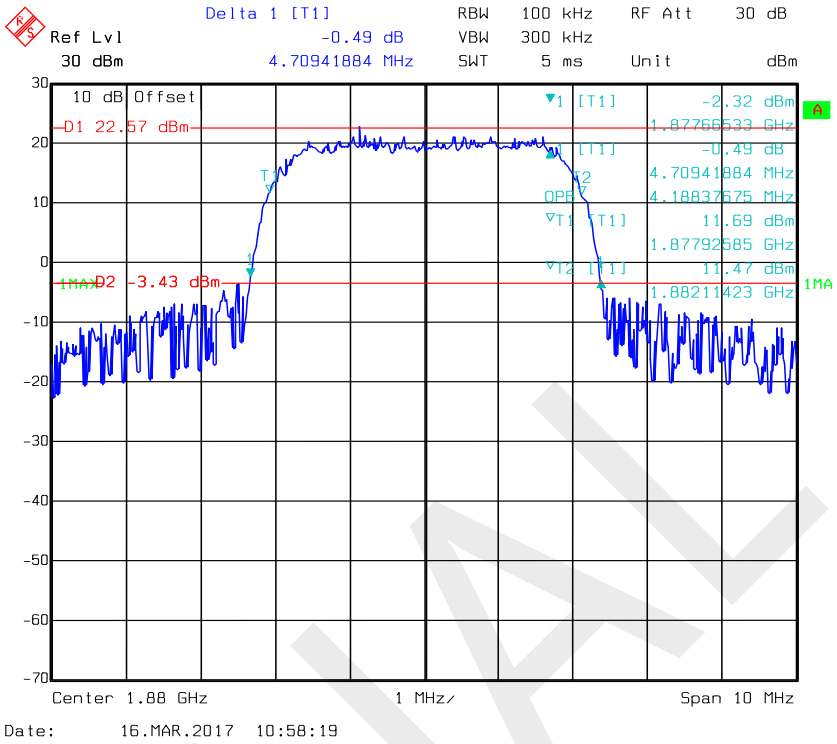
REL99 Band II



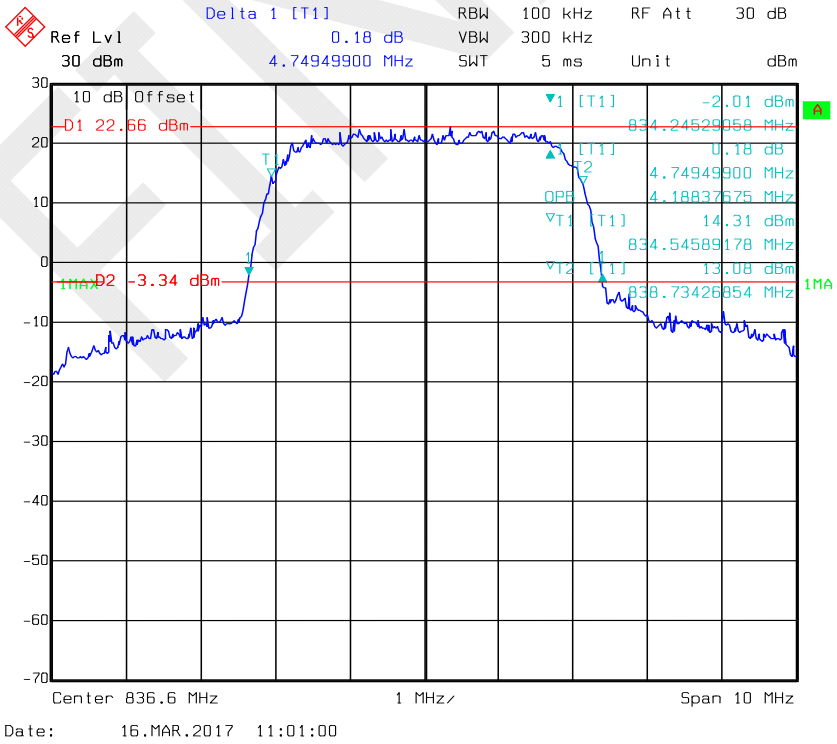
HSDPA Band II



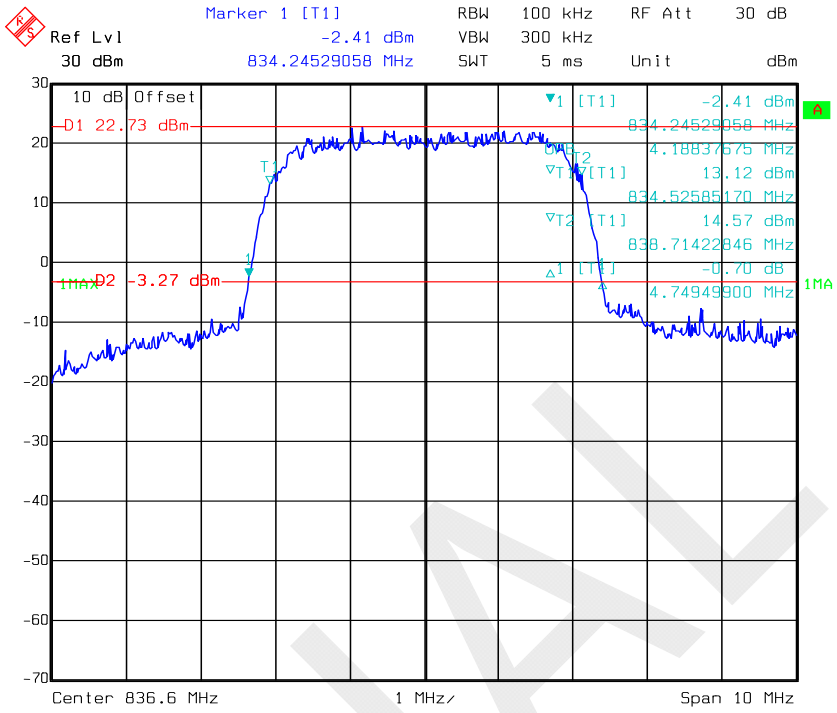
HSUPA Band II



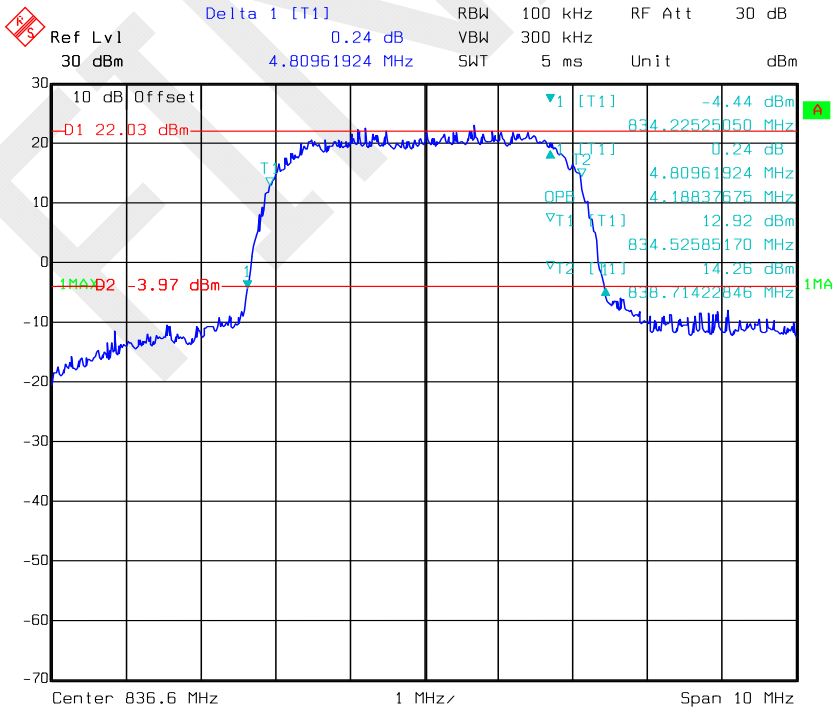
REL99 Band V



HSDPA Band V

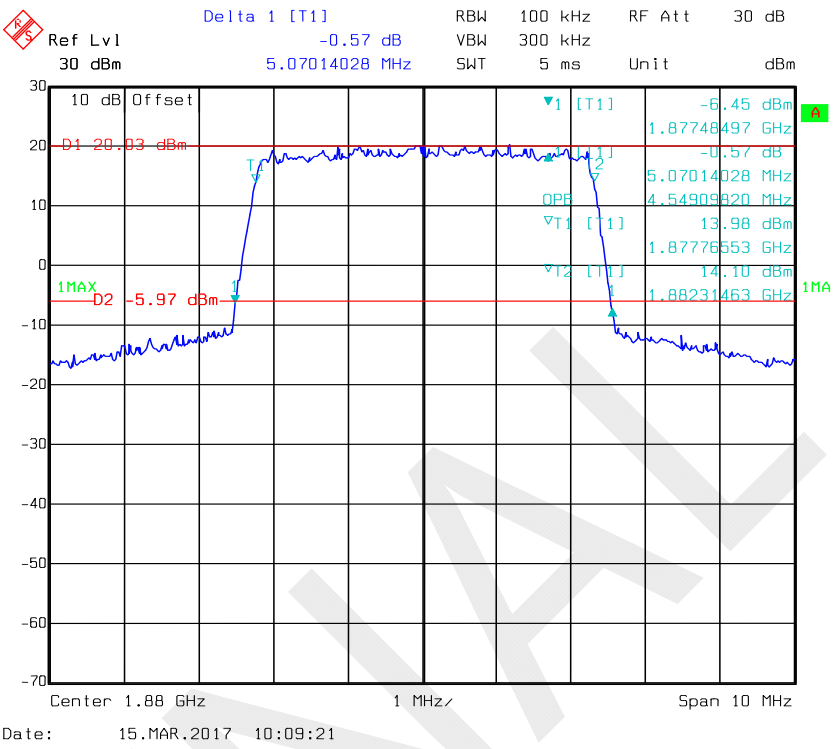


HSUPA Band V

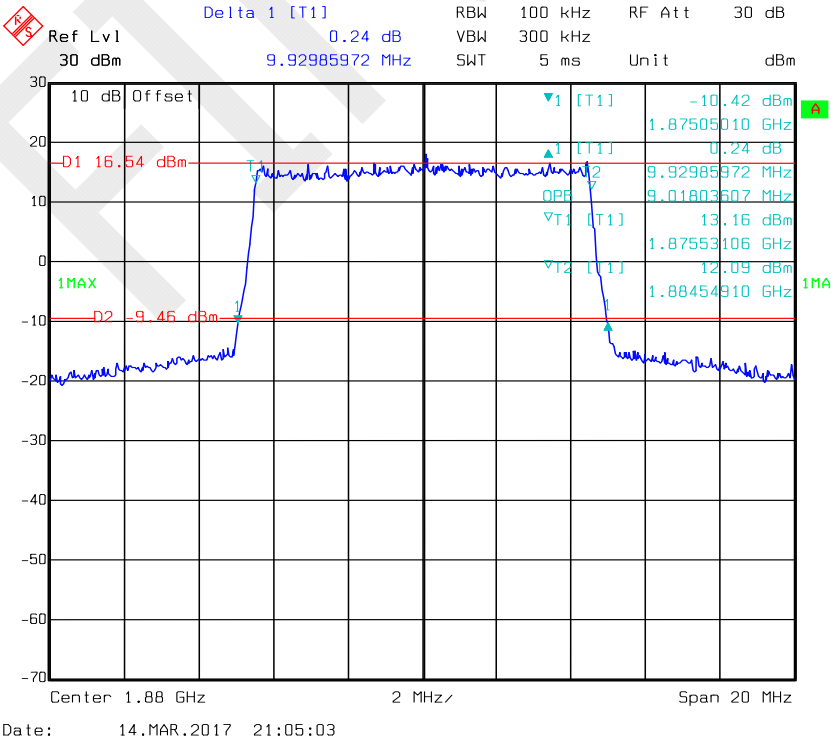


LTE Band II

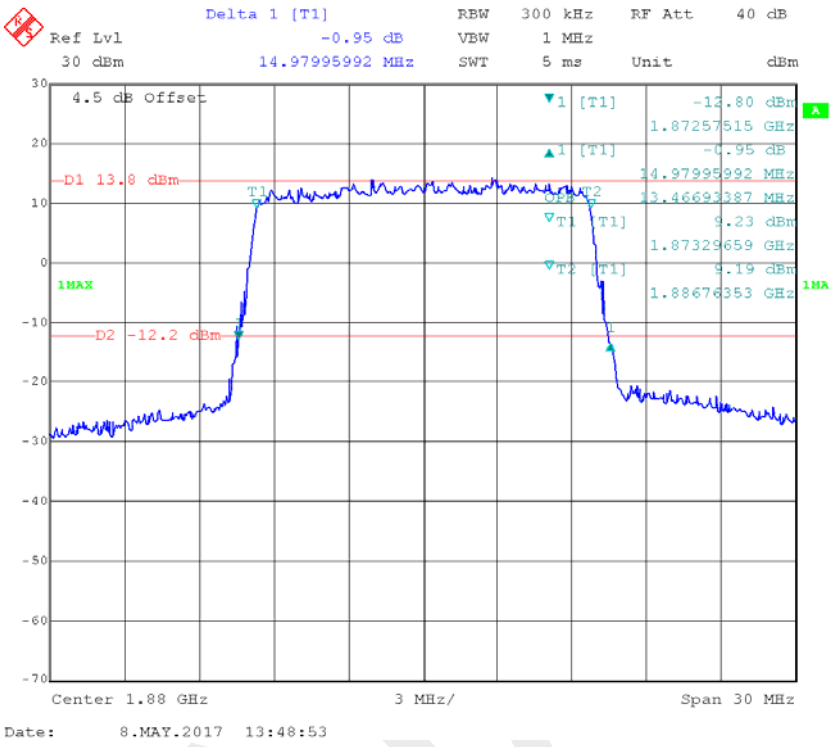
QPSK_5 MHz



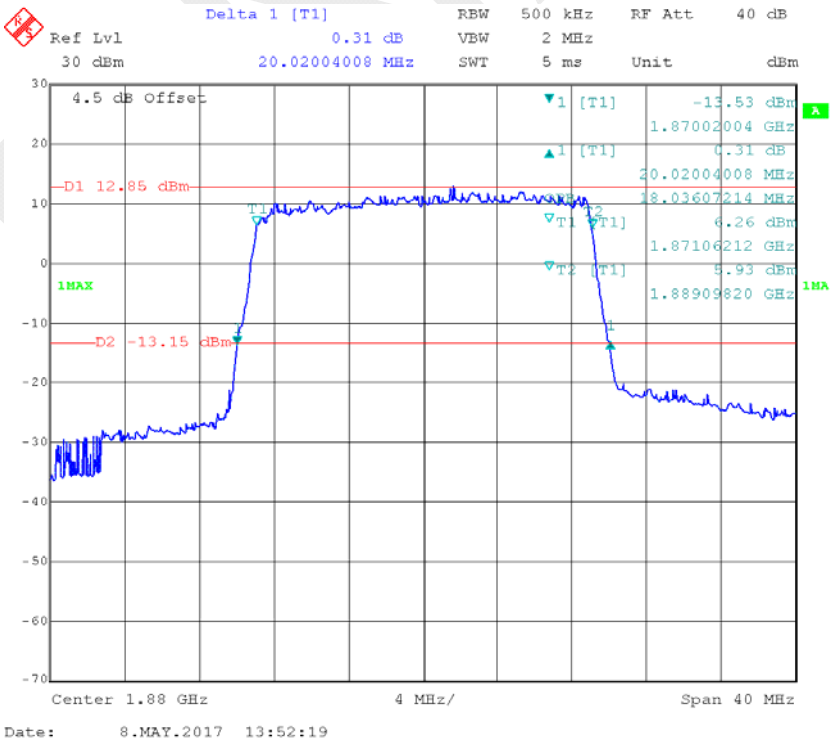
QPSK_10 MHz



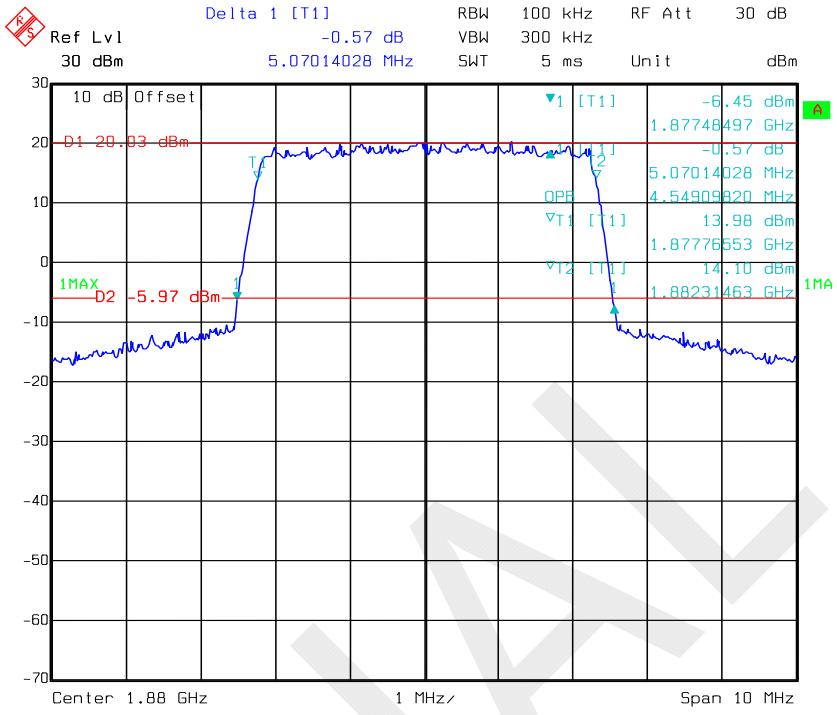
QPSK_15 MHz



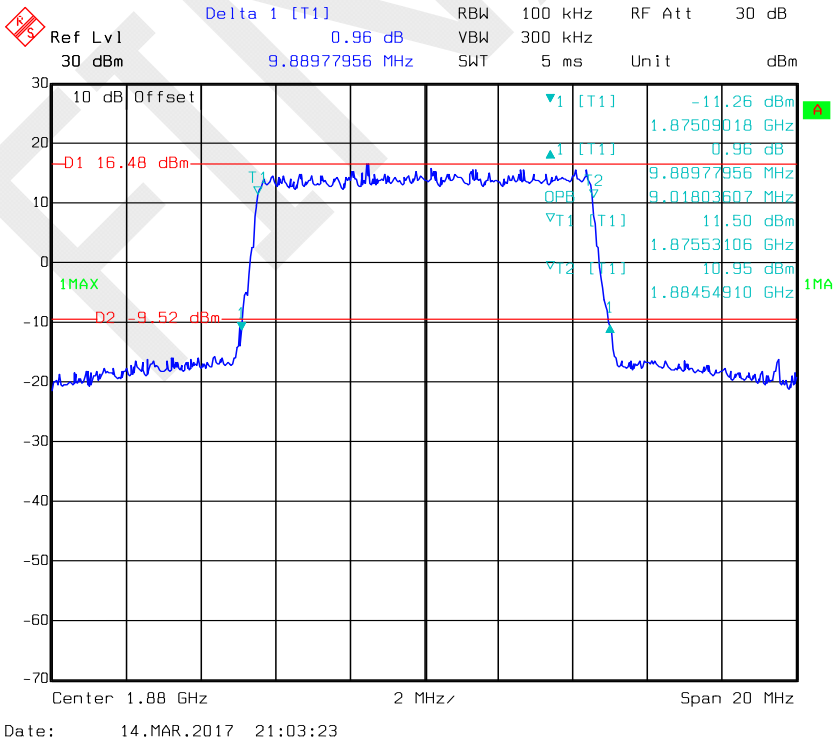
QPSK_20 MHz



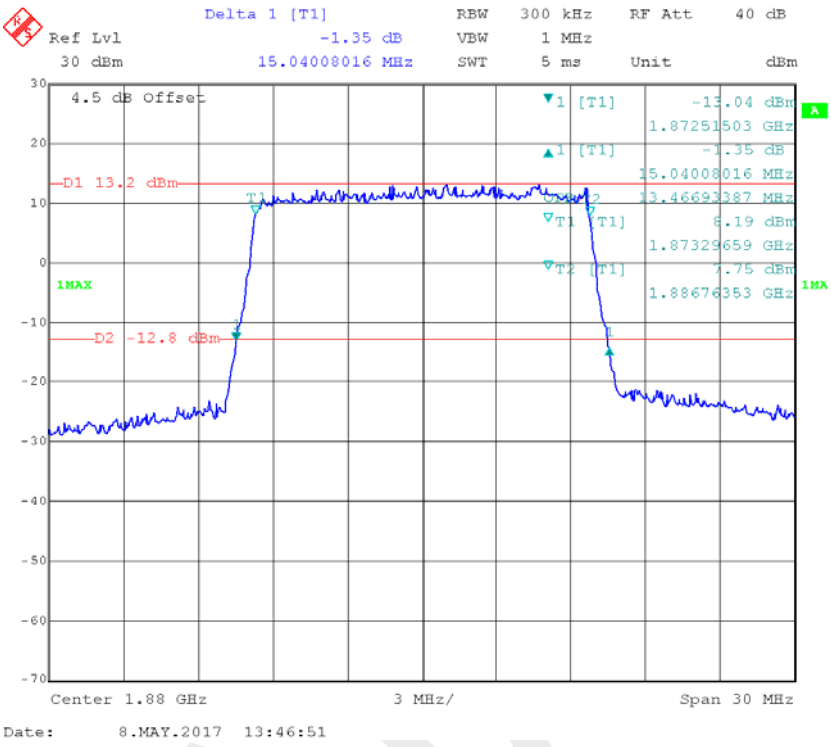
16QAM_5 MHz



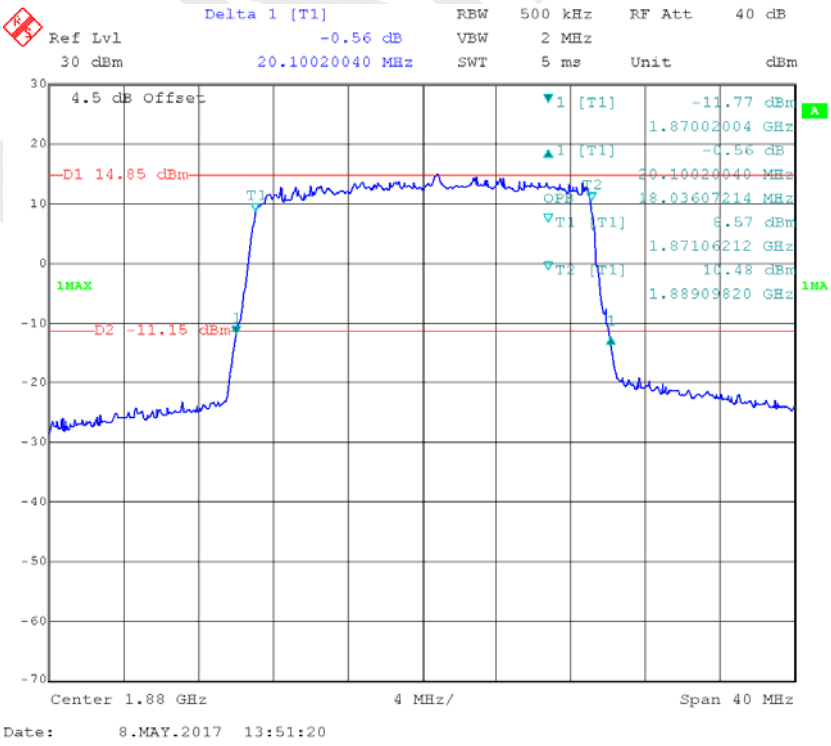
16QAM_10 MHz



16QAM_15 MHz

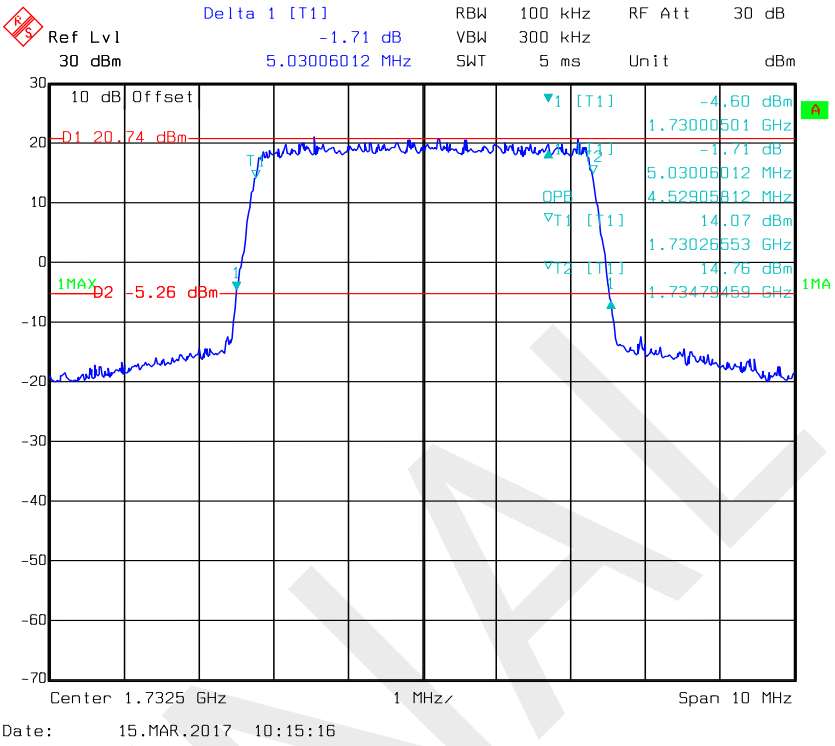


16QAM_20 MHz

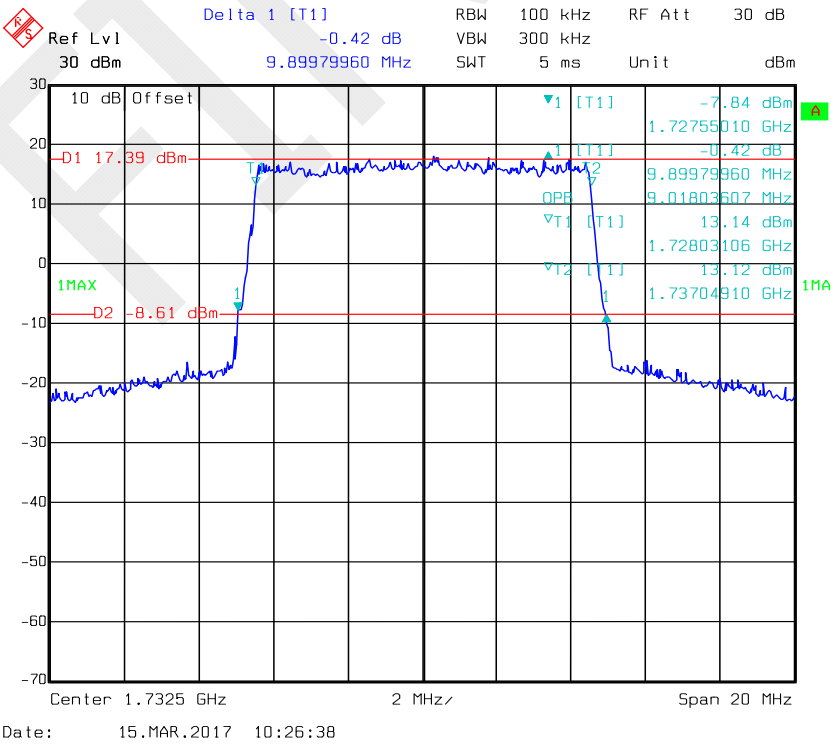


LTE Band IV:

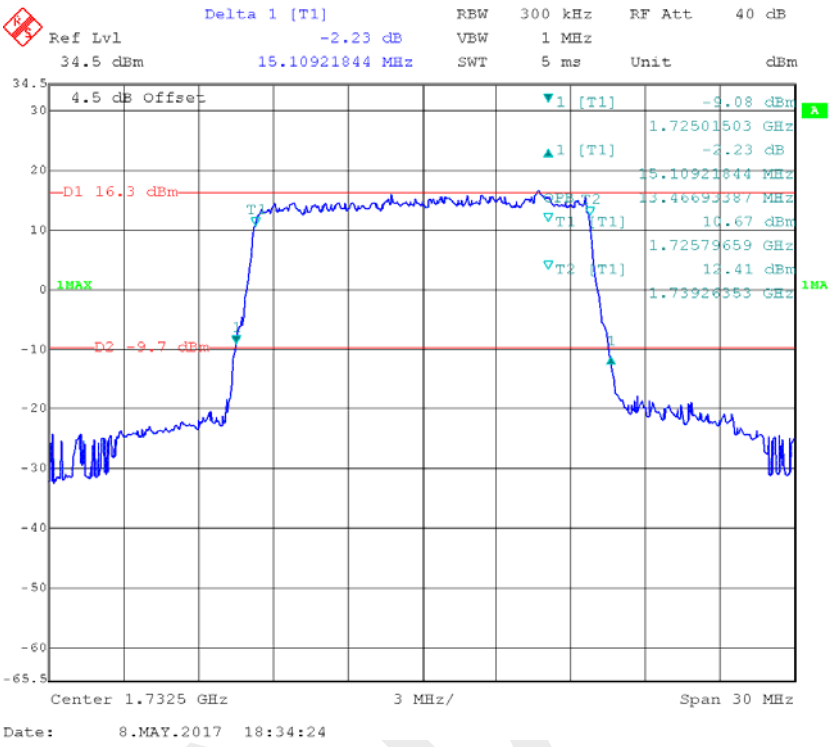
QPSK_5 MHz



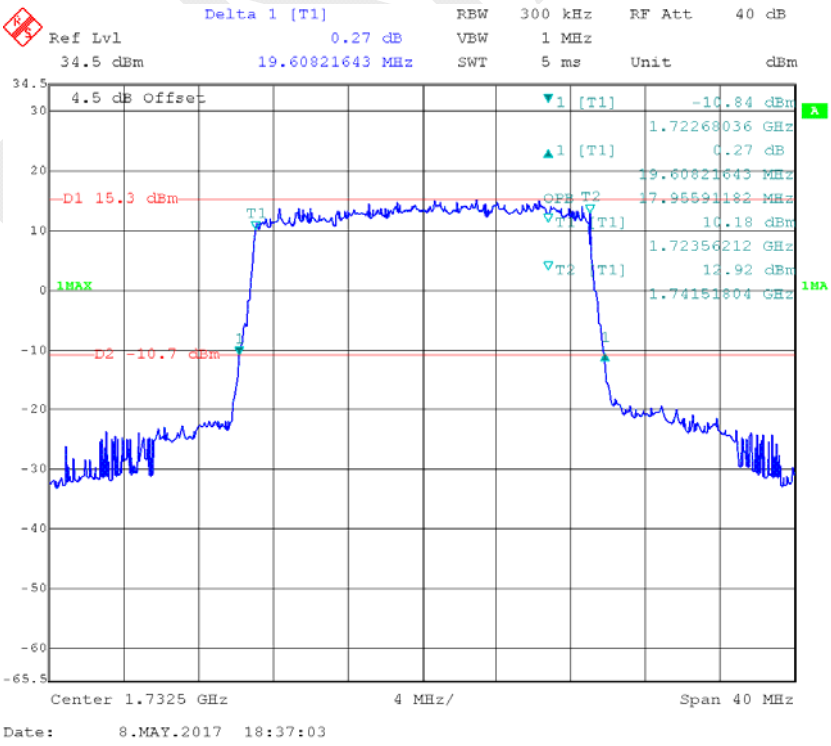
QPSK_10 MHz



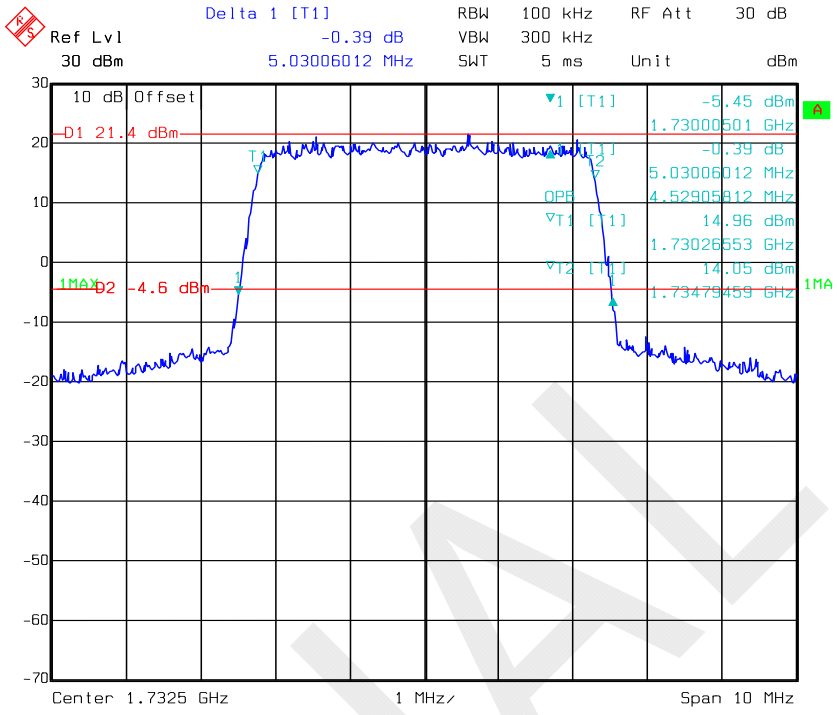
QPSK_15 MHz



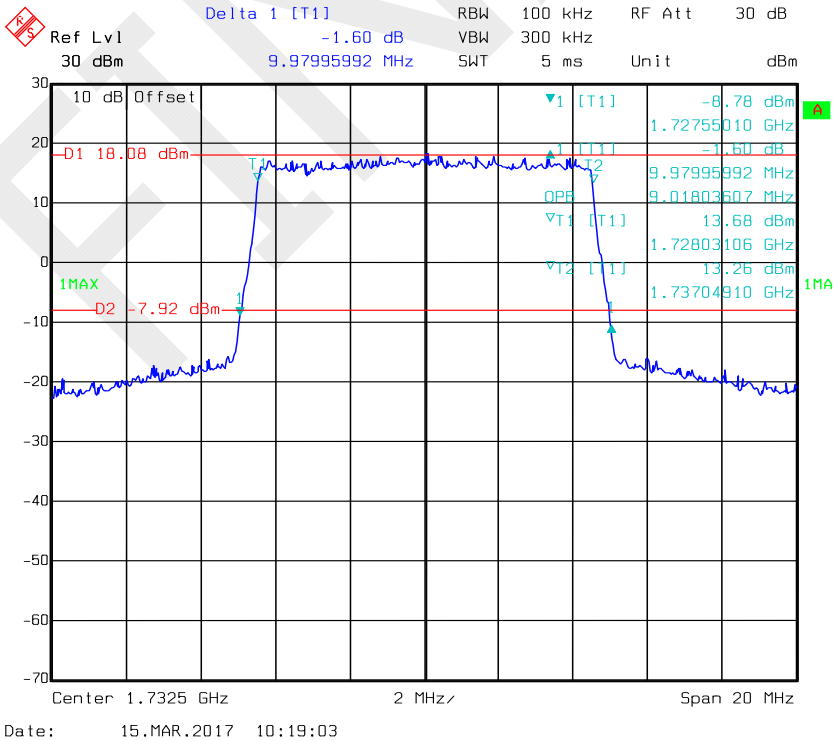
QPSK_20 MHz



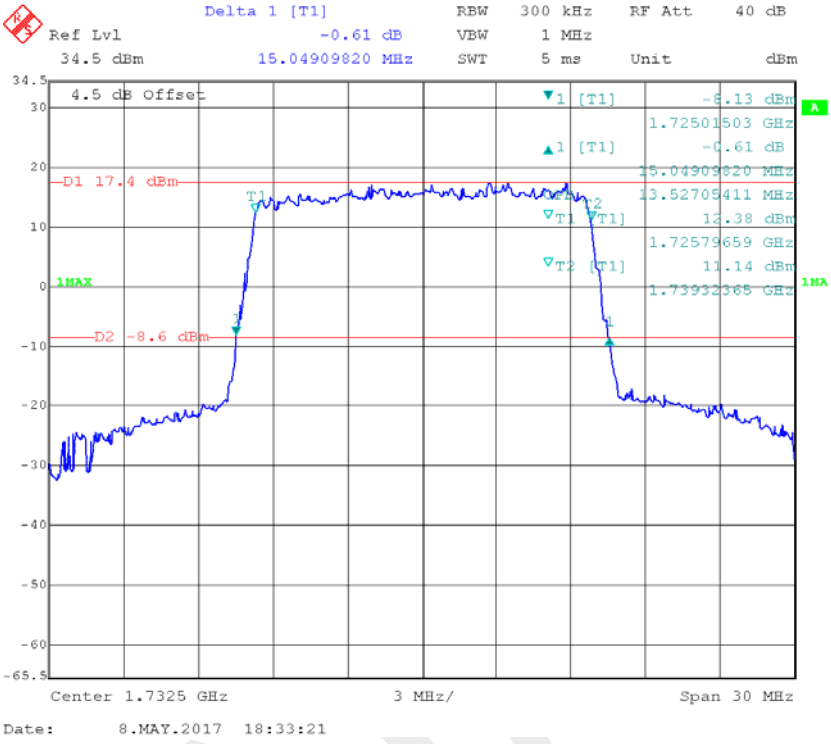
16QAM_5 MHz



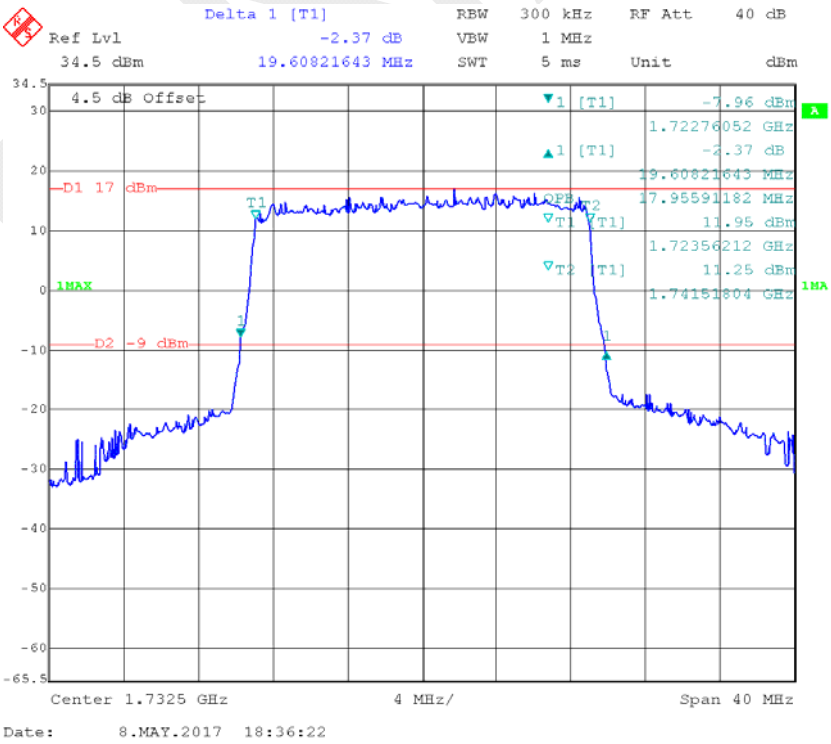
16QAM_10 MHz



16QAM_15 MHz

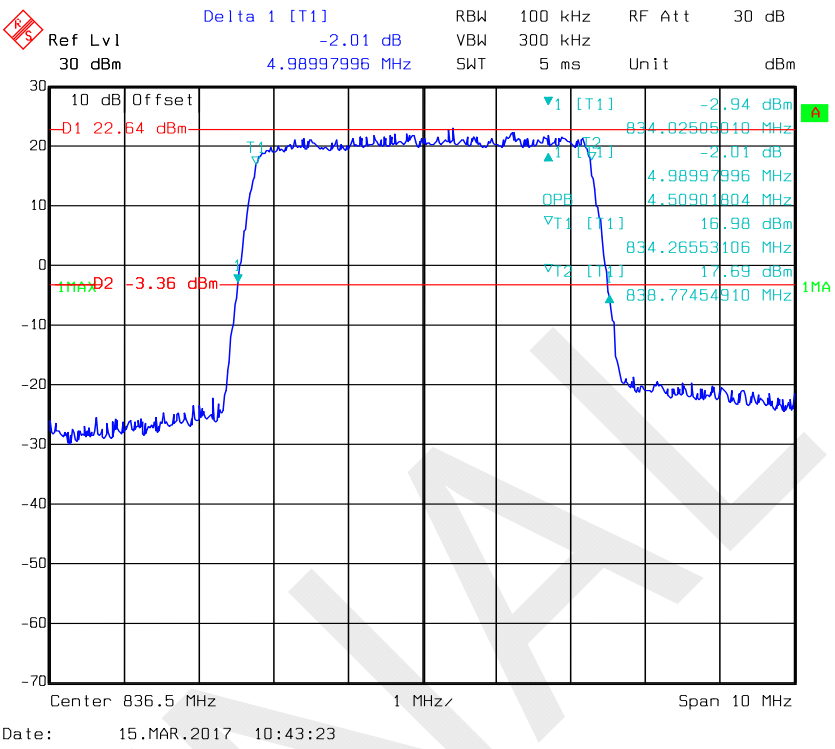


16QAM_20 MHz

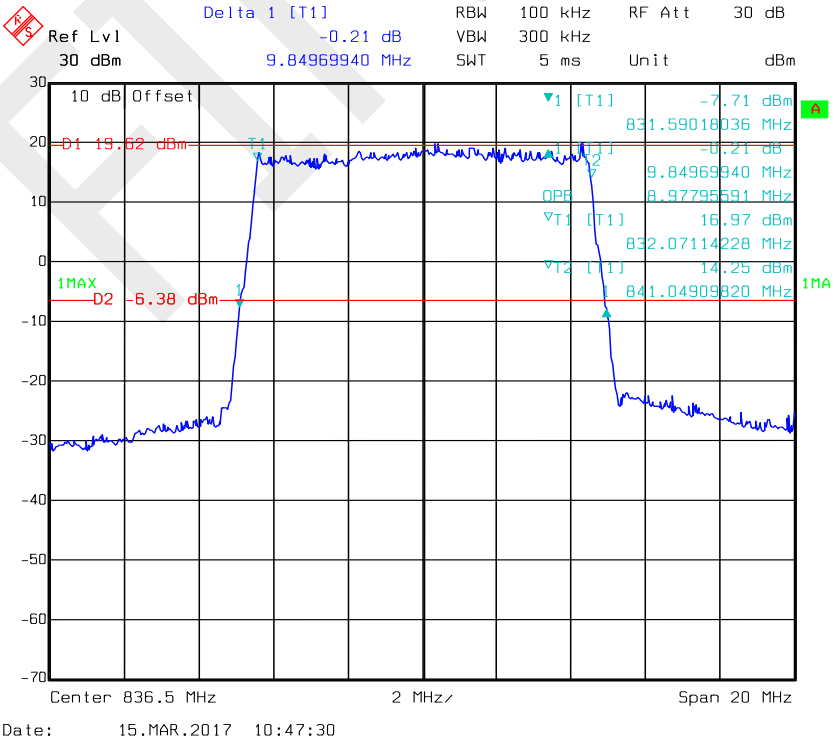


LTE Band V:

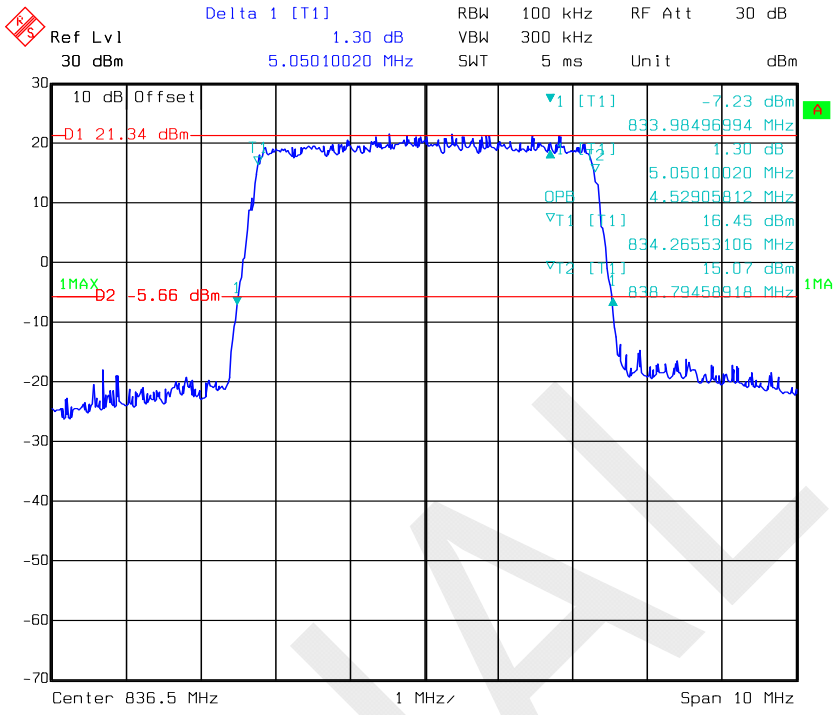
QPSK_5 MHz



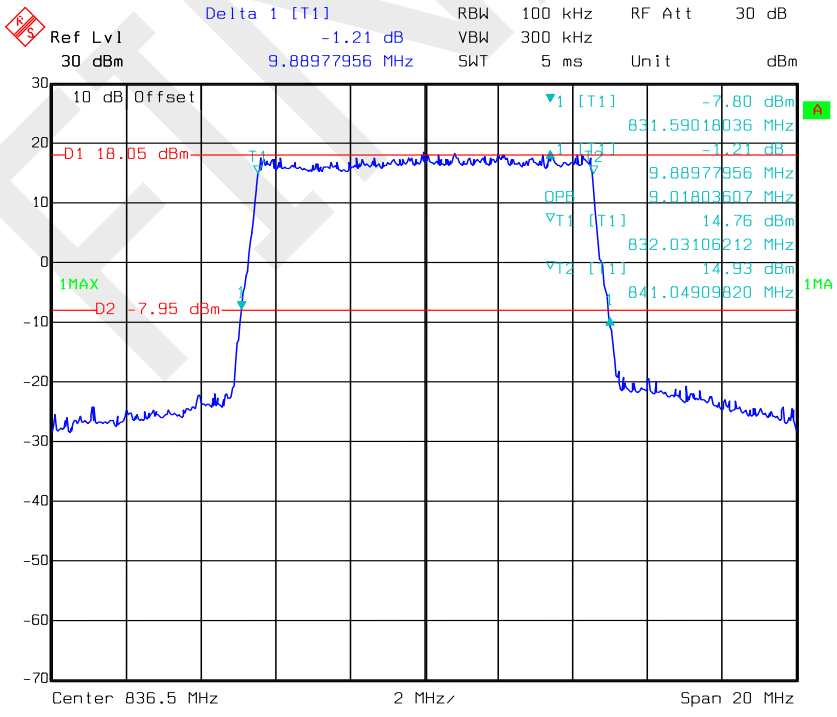
QPSK_10 MHz



16QAM_5 MHz

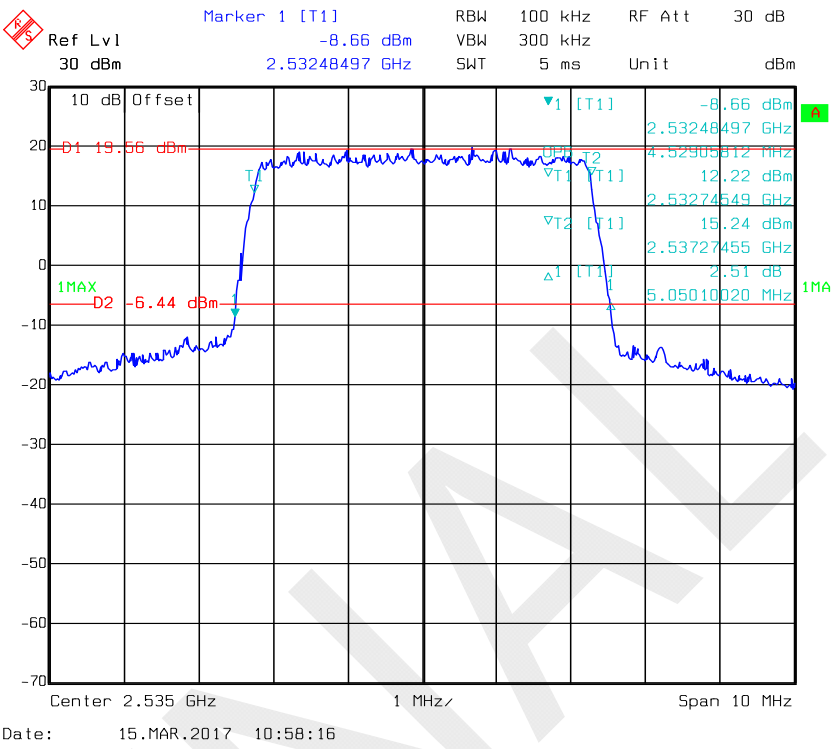


16QAM_10 MHz

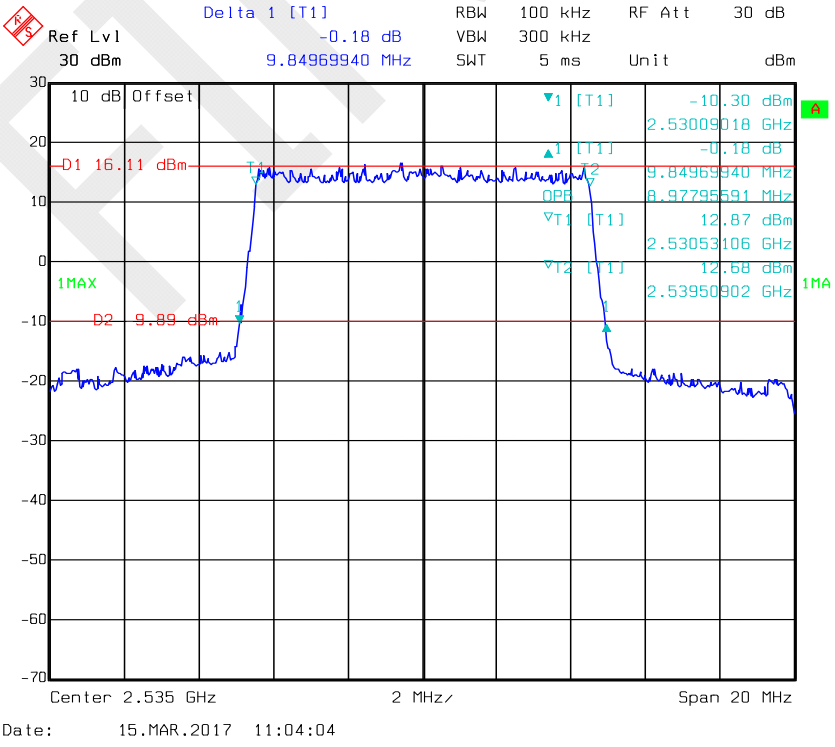


LTE Band VII:

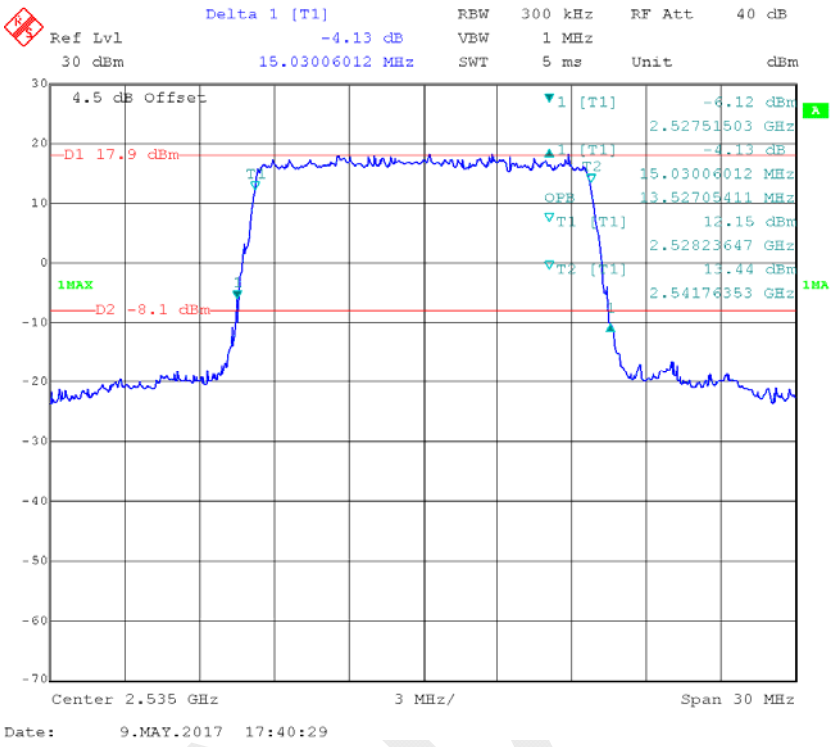
QPSK_5 MHz



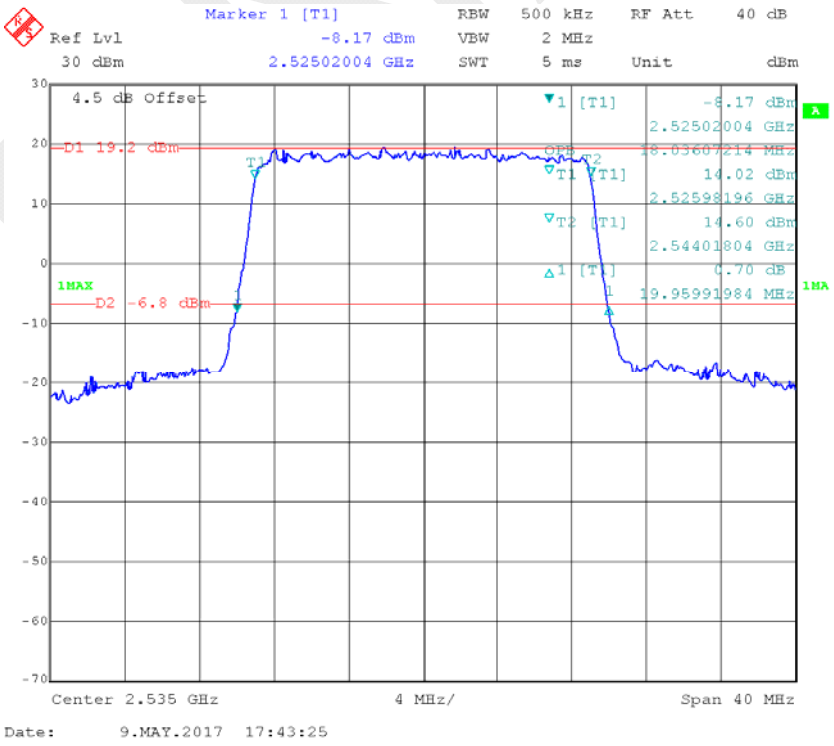
QPSK_10 MHz



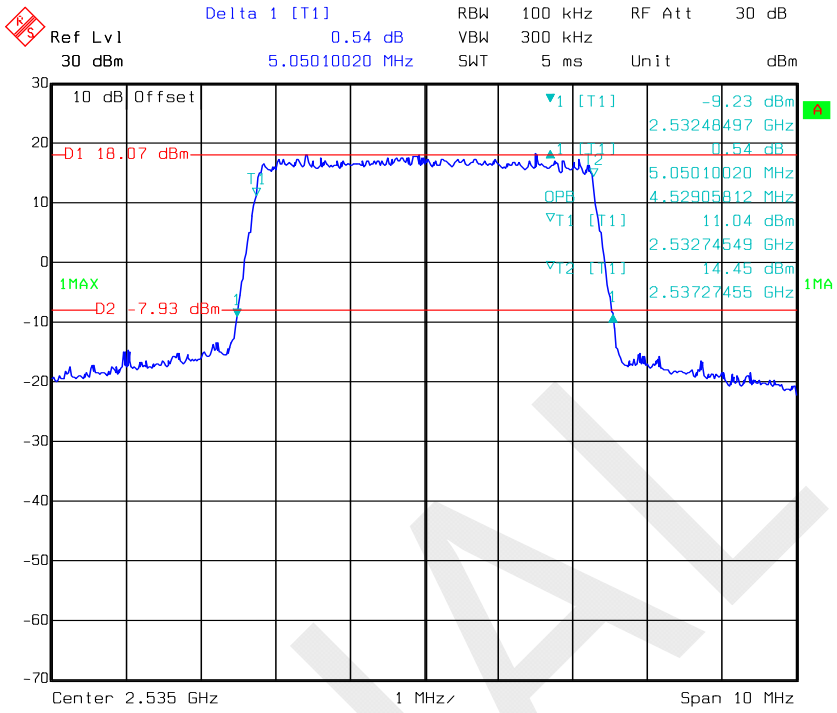
QPSK_15 MHz



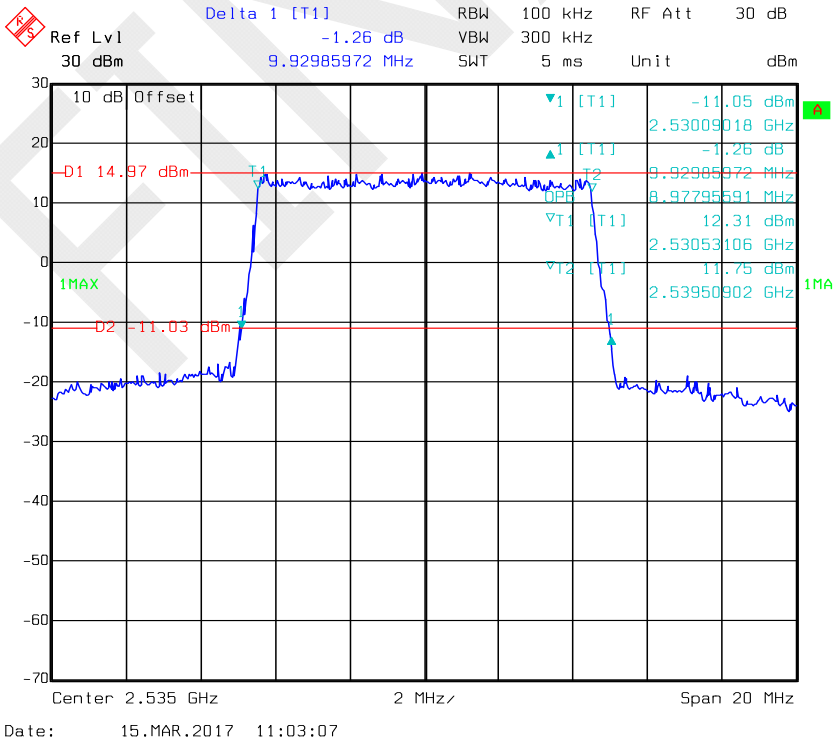
QPSK_20 MHz



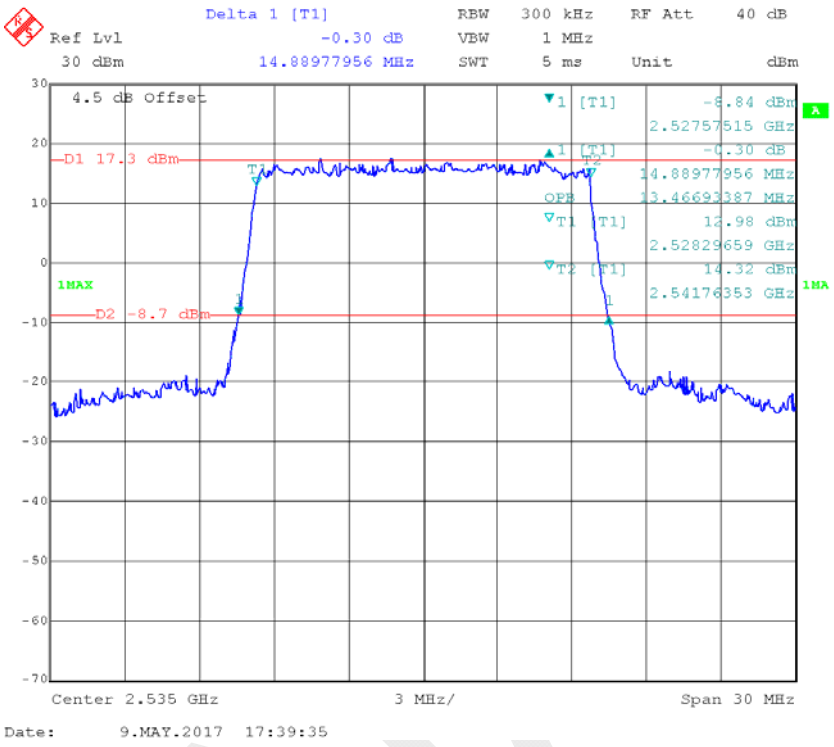
16QAM_5 MHz



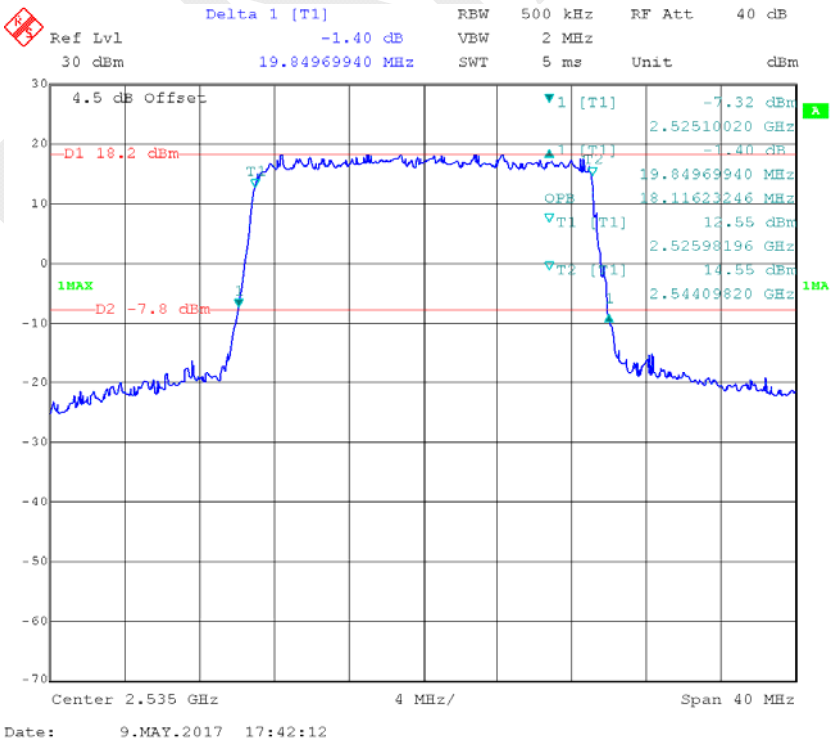
16QAM_10 MHz



16QAM_15 MHz



16QAM_20 MHz



FCC §2.1051, §22.917(a) & §24.238(a) & §27.53- SPURIOUS EMISSIONS AT ANTENNA TERMINALS

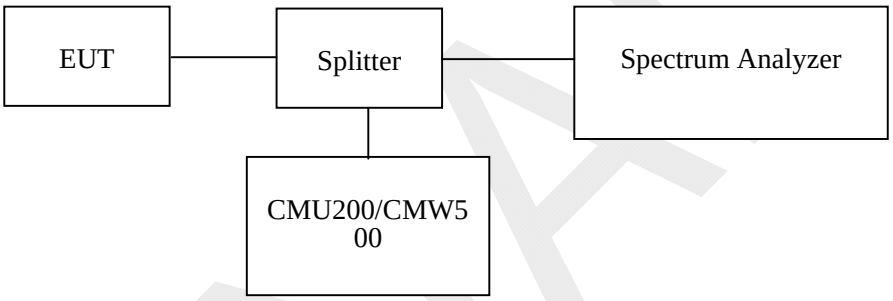
Applicable Standard

FCC §2.1051, §22.917(a) , §24.238(a) and §27.53.

The spectrum was to be investigated to the tenth harmonics or more of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Spliter	N/A	OE0120121	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

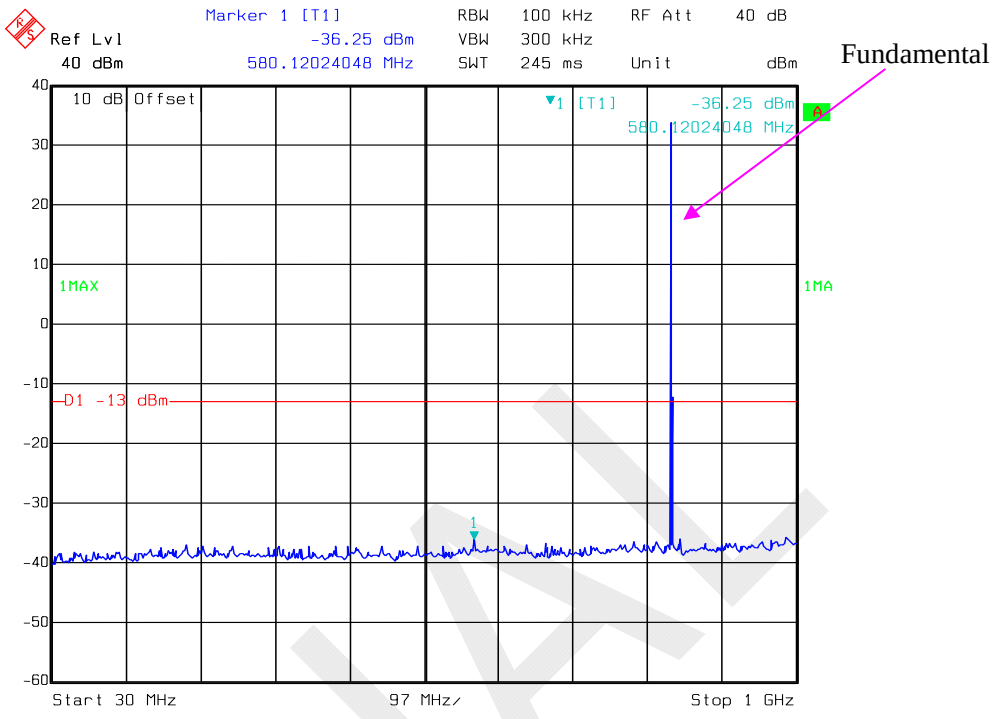
Environmental Conditions

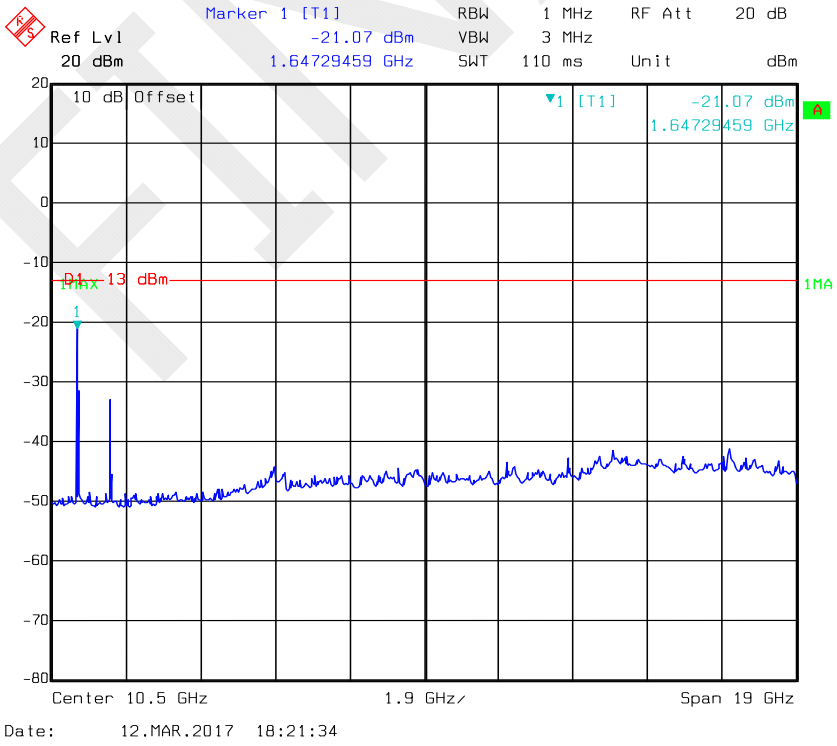
Temperature:	19.5~21 °C
Relative Humidity:	57~58 %
ATM Pressure:	95.3~95.8 kPa

The testing was performed by Lorin Bian from 2017-03-12 to 2017-06-07

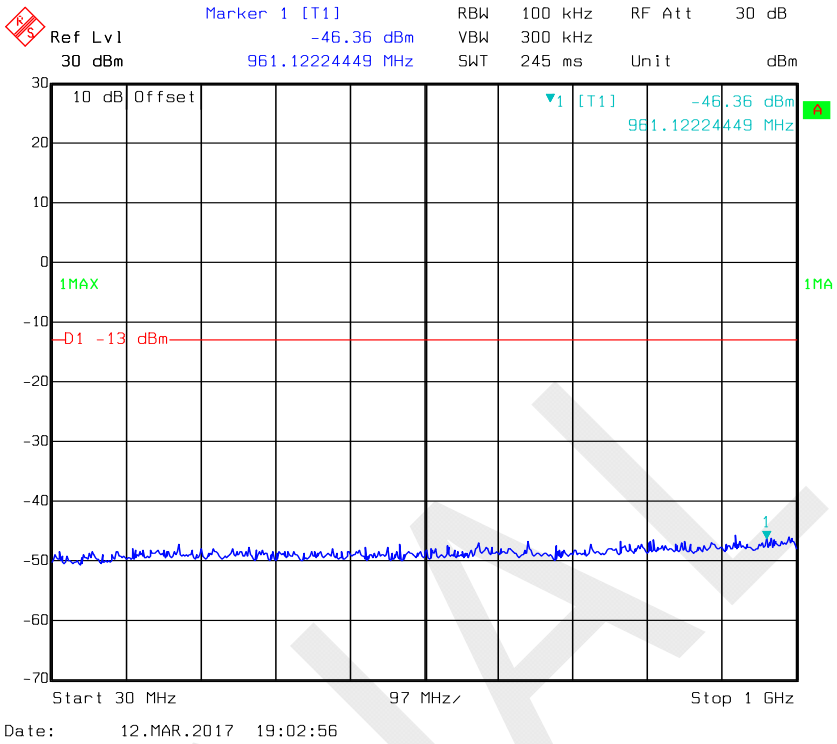
Please refer to the following plots.

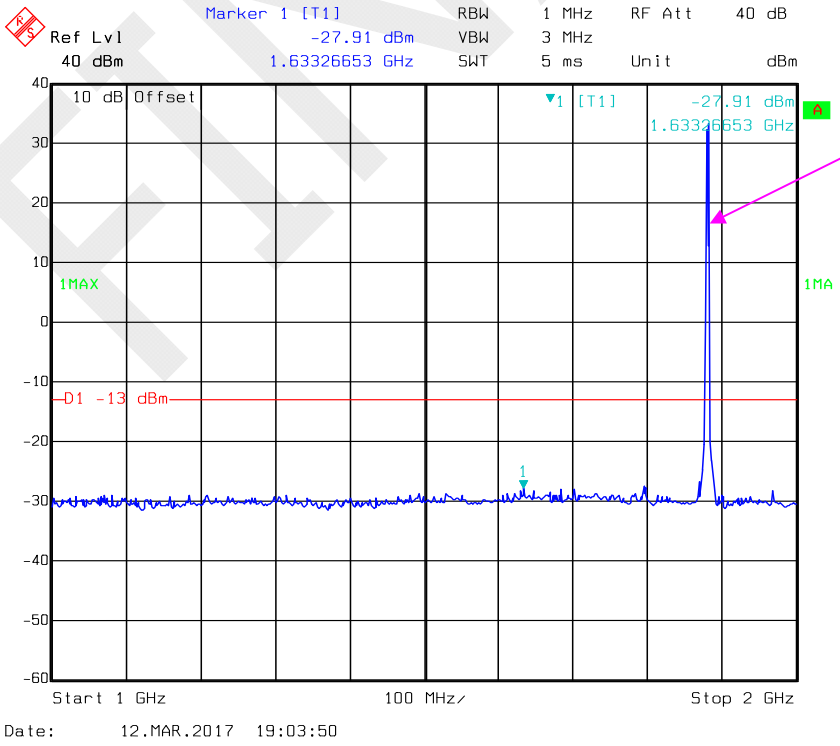
GPRS 850_Middle Channel



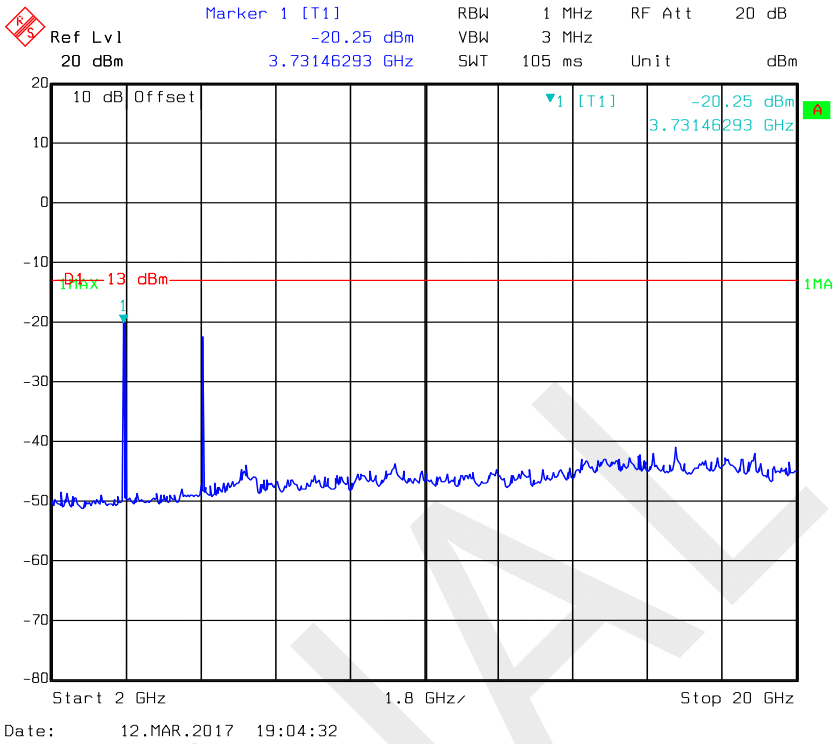


GPRS 1900_ High Channel

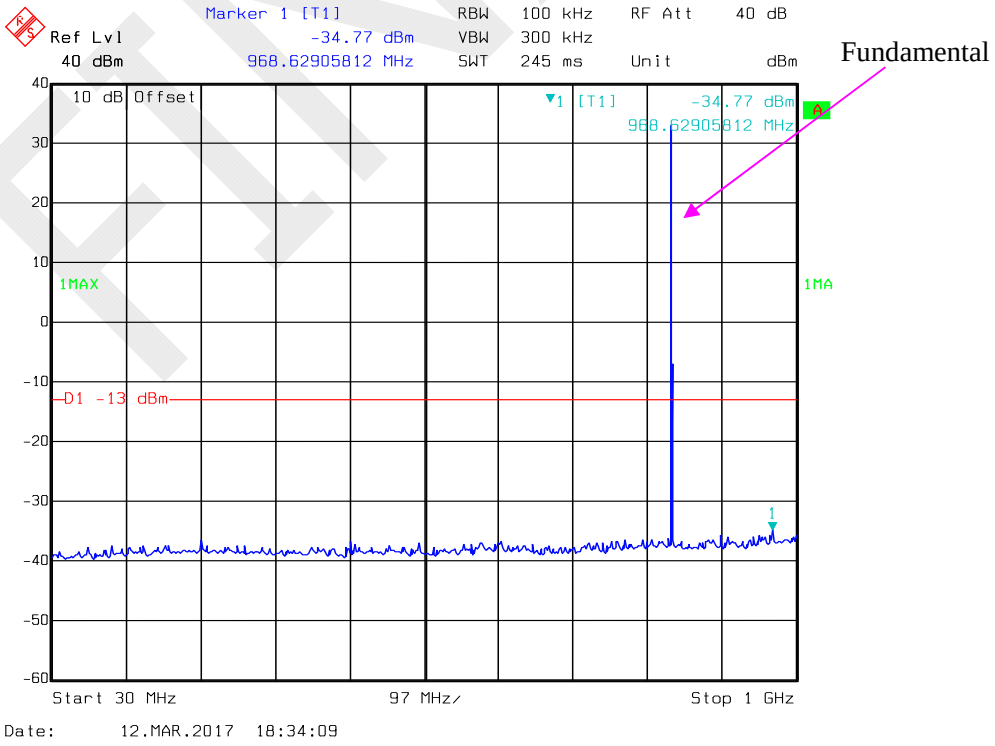


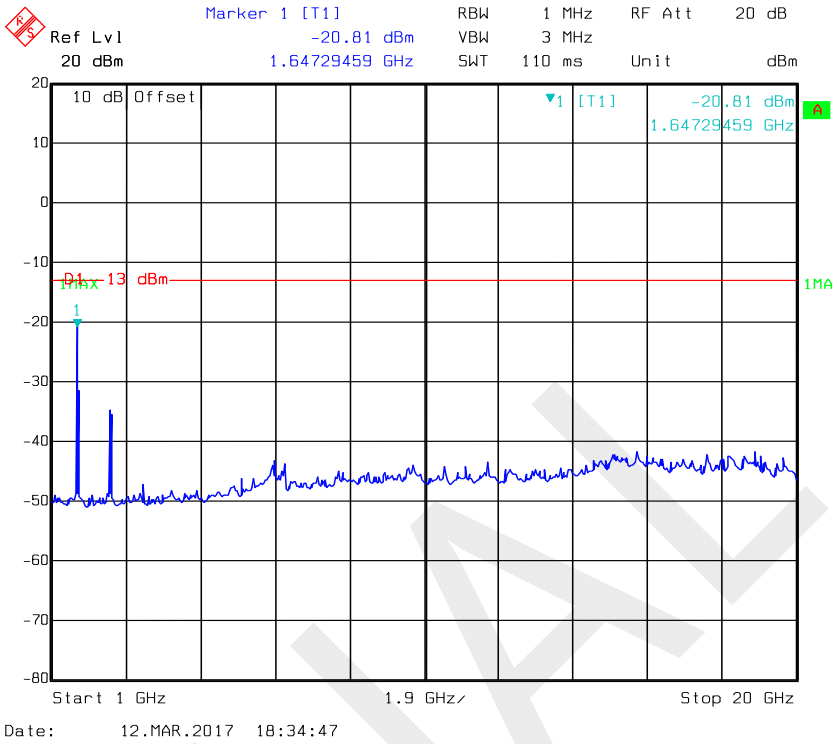


Fundamental

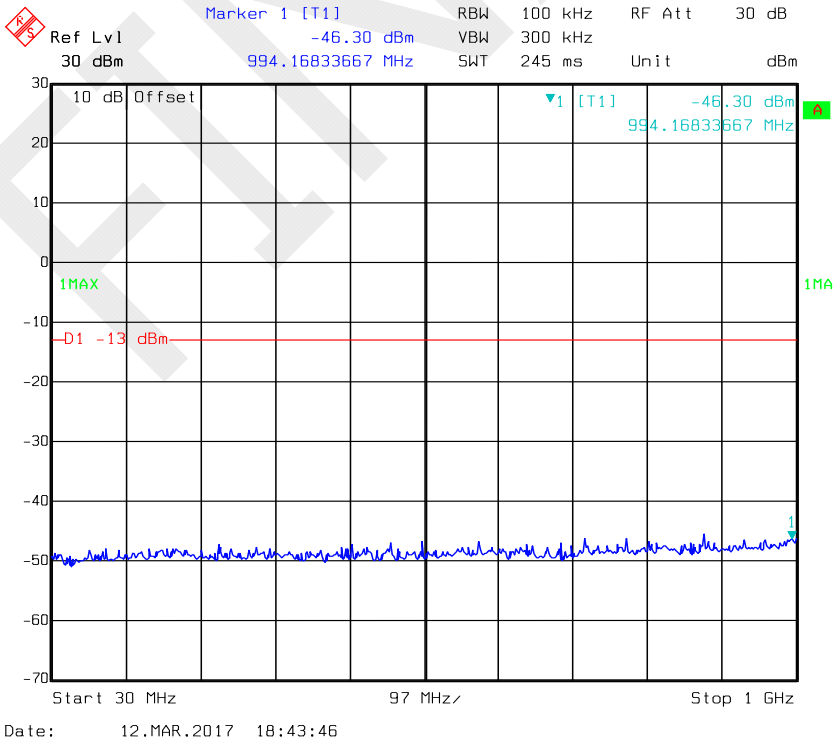


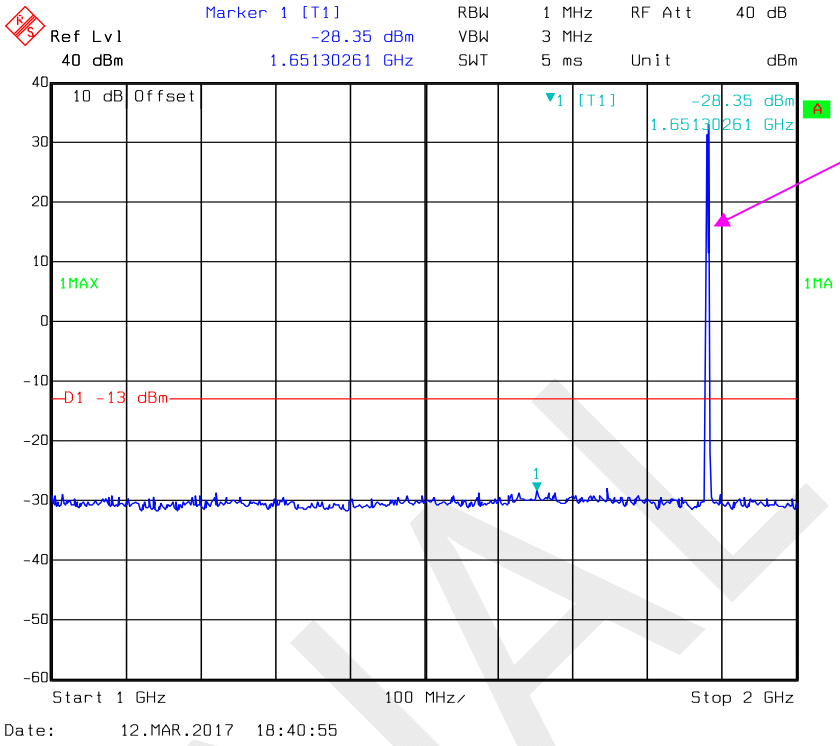
EDGE 850_Middle Channel



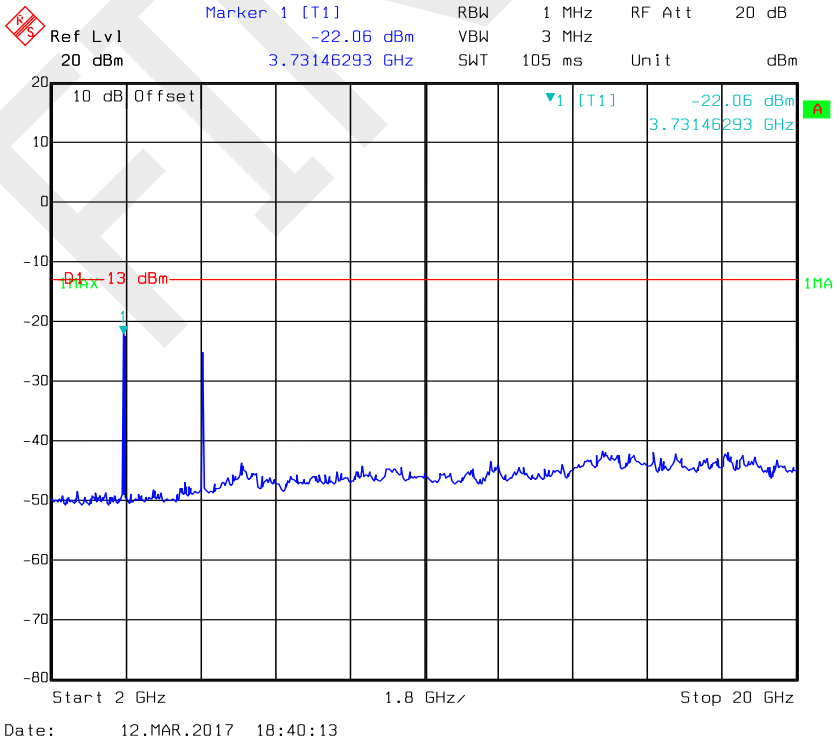


EDGE 1900_ High Channel

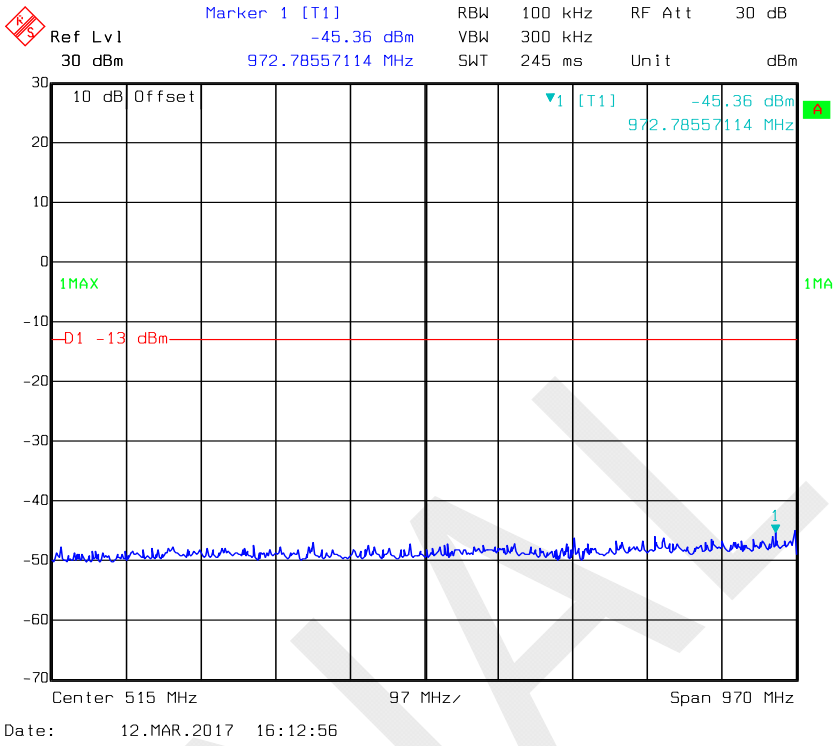


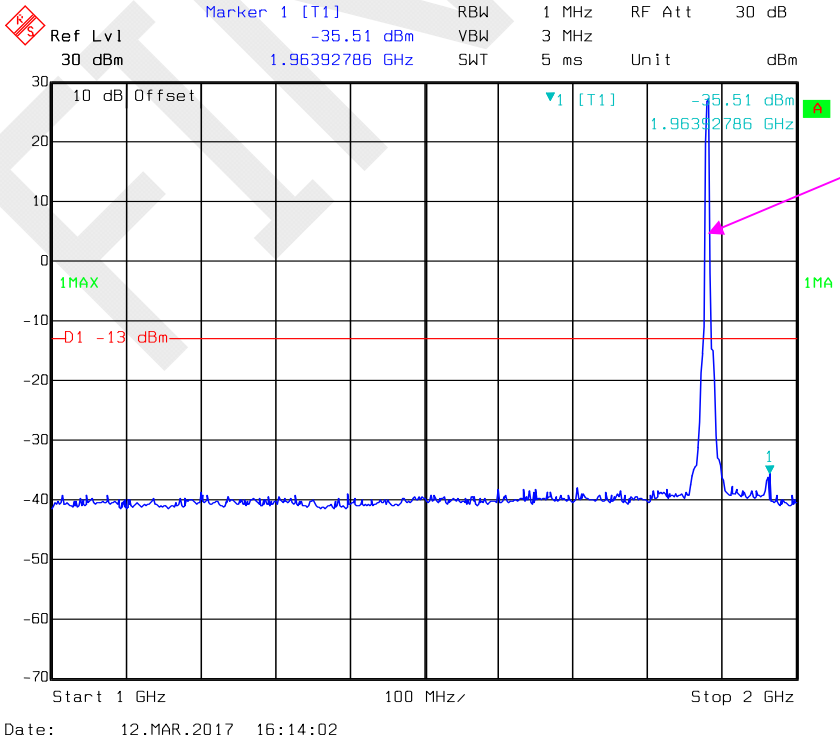


Fundamental

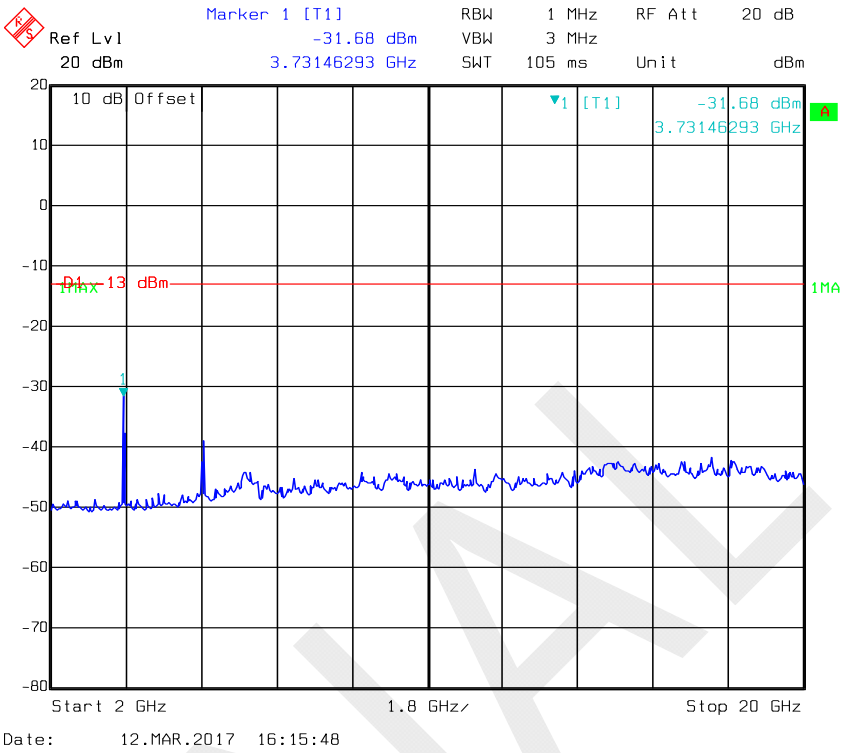


REL99 Band II_ Middle Channel

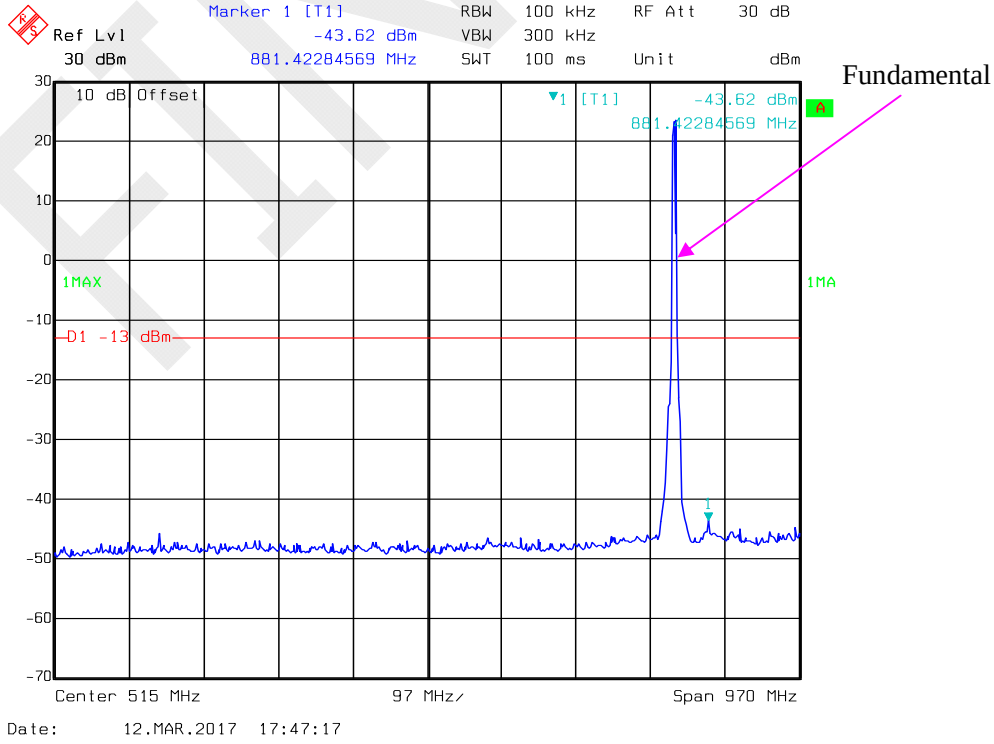


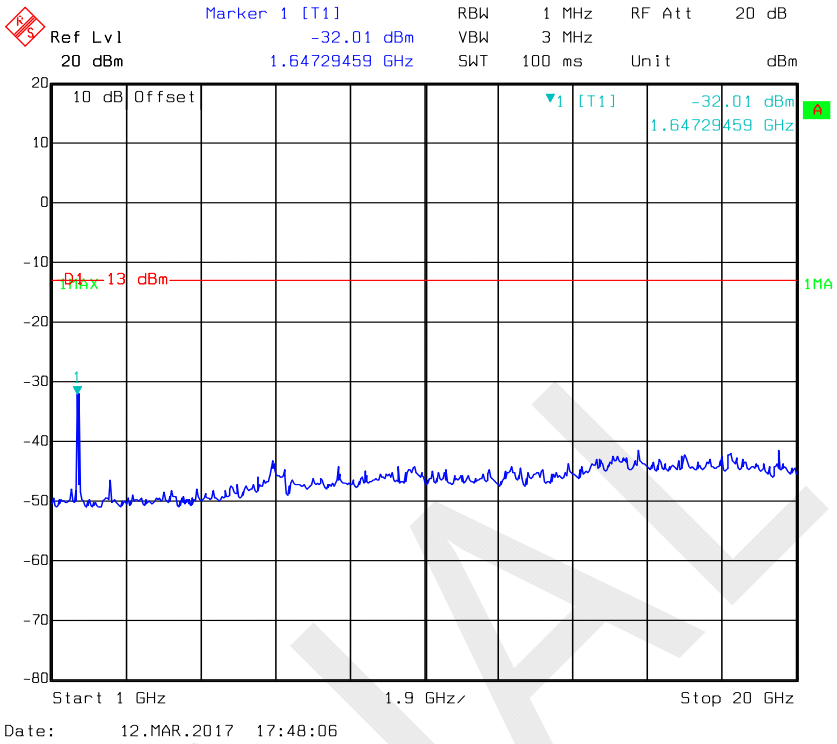


Fundamental



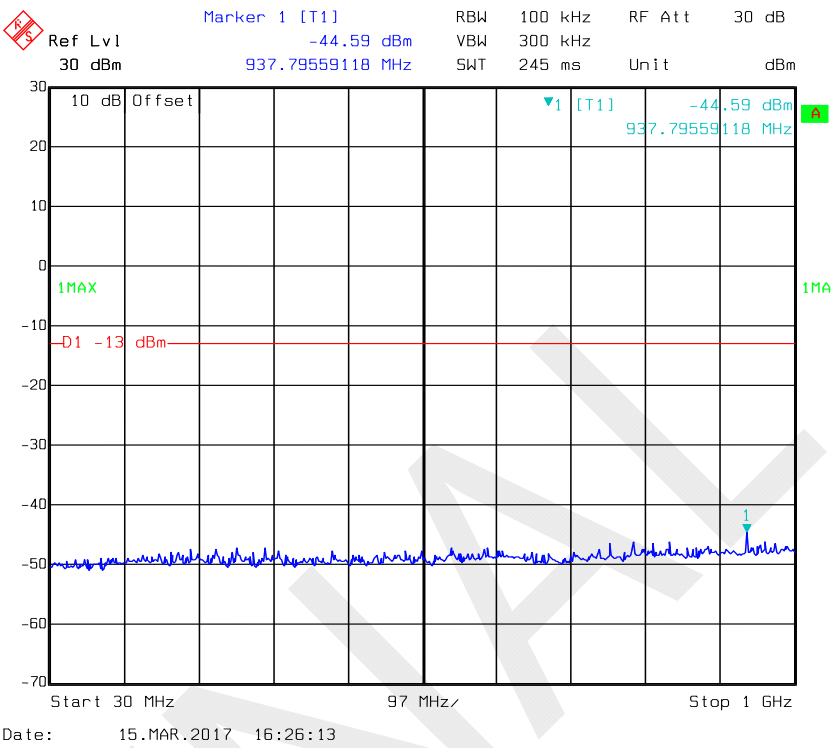
REL99 Band V_ Middle Channel

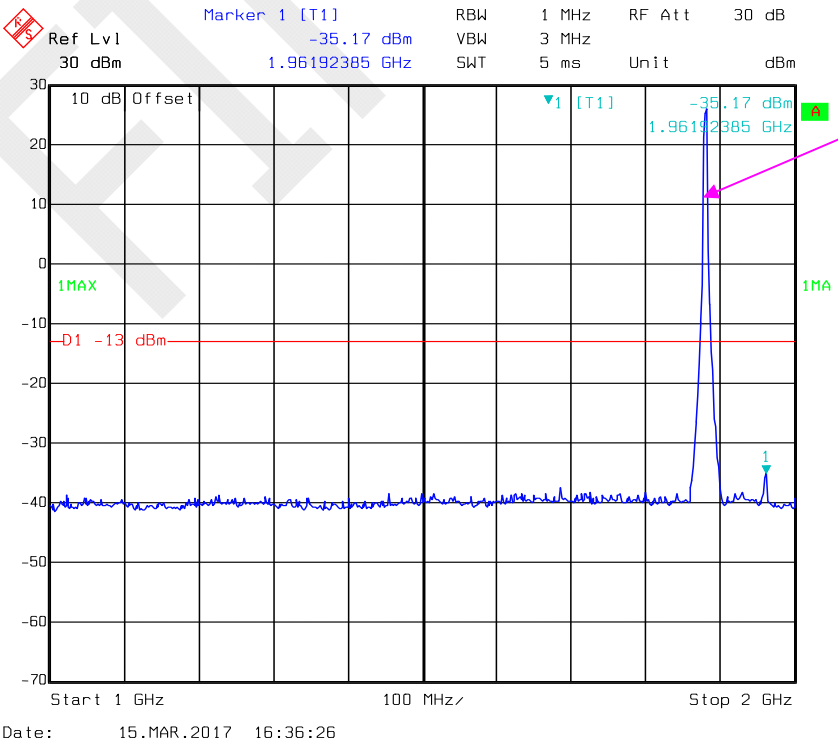



Marker 1 [T1]
Ref Lvl
20 dBm
-32.01 dBm
1.64729459 GHz
RBW 1 MHz
VBW 3 MHz
SWT 100 ms
RF Att 20 dB
Unit dBm
10 dB Offset
1 [T1]
-32.01 dBm
1.64729459 GHz
D1 -13 dBm
1MAX
1MA
Start 1 GHz
1.9 GHz/
Stop 20 GHz
Date: 12.MAR.2017 17:48:06

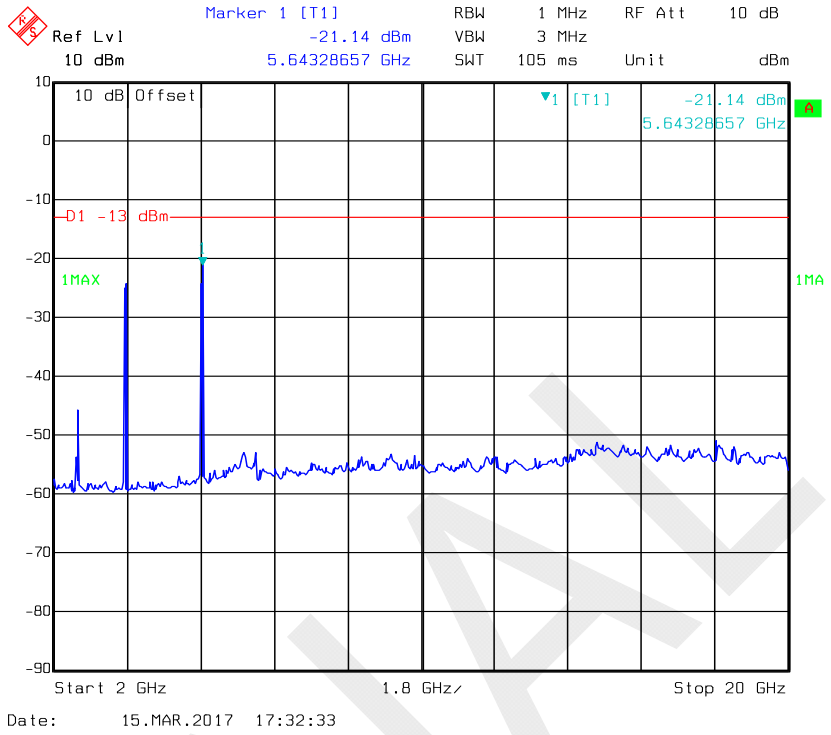
LTE Band II (Middle Channel)

QPSK_5 MHz

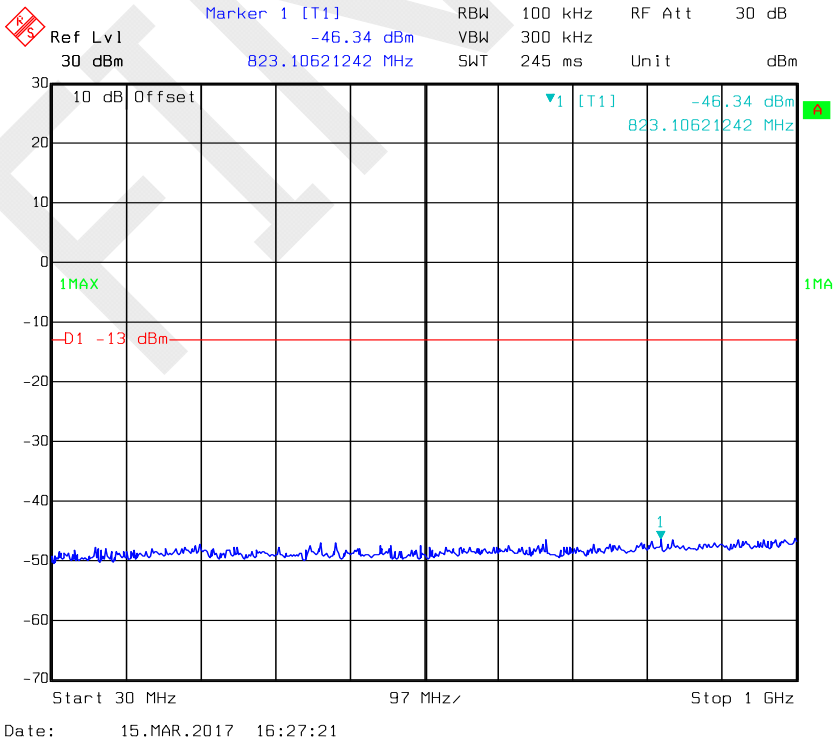


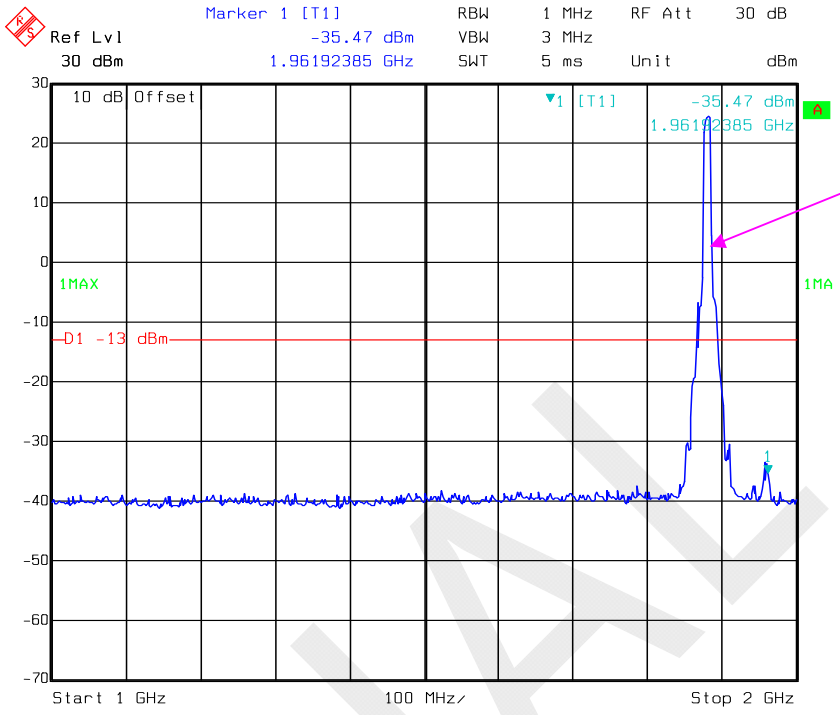


Fundamental

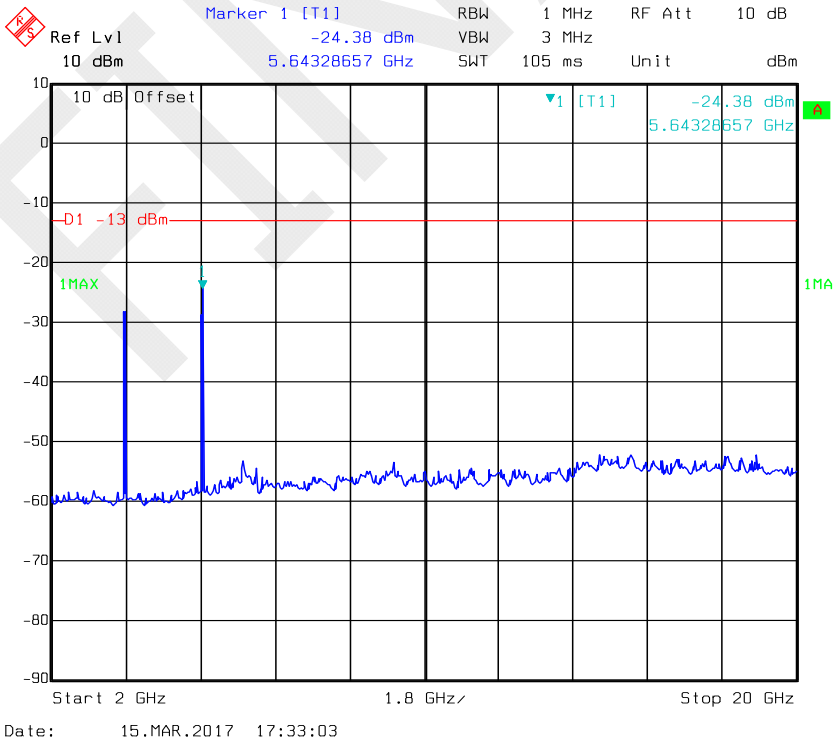

Marker 1 [T1]
Ref Lvl
10 dBm
-21.14 dBm
5.64328657 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
10 dB Offset
▼1 [T1]
-21.14 dBm
5.64328657 GHz
D1 -13 dBm
1MAX
1MA
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 15.MAR.2017 17:32:33

QPSK_10 MHz

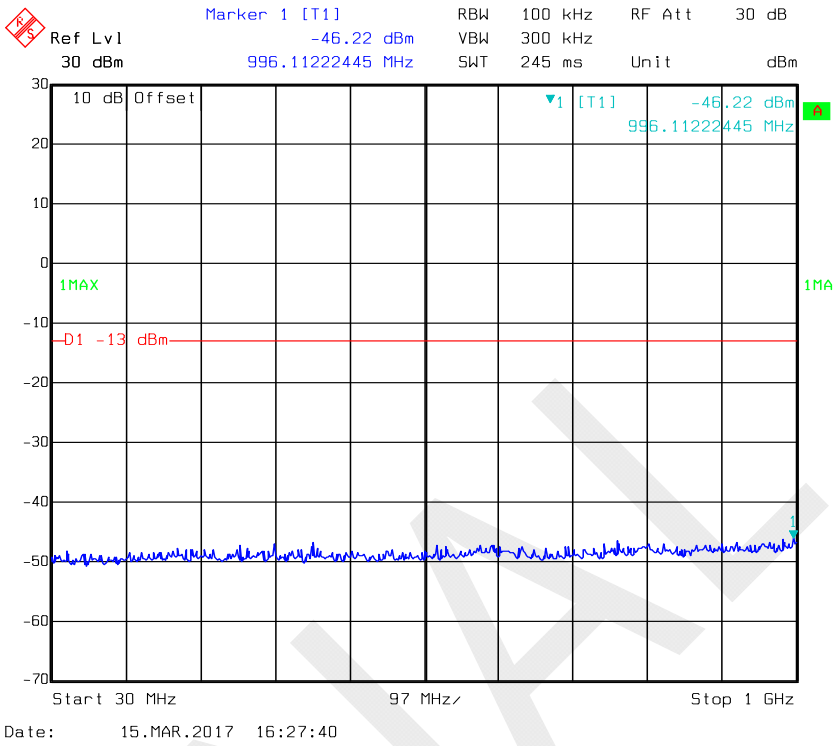

Marker 1 [T1]
Ref Lvl
30 dBm
-46.34 dBm
823.10621242 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
10 dB Offset
▼1 [T1]
-46.34 dBm
823.10621242 MHz
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 15.MAR.2017 16:27:21

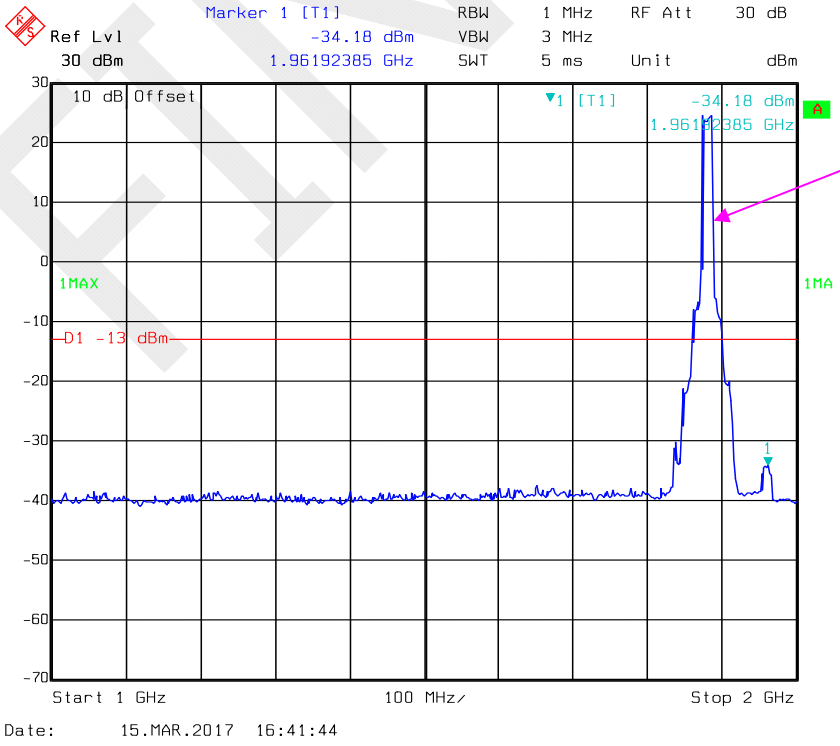


Fundamental

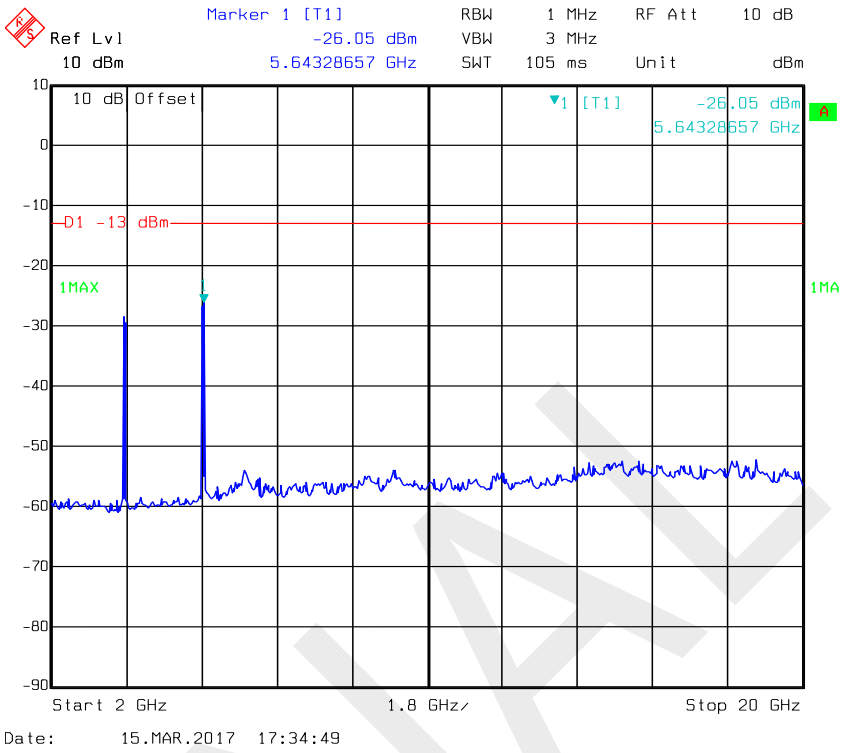


QPSK_15 MHz

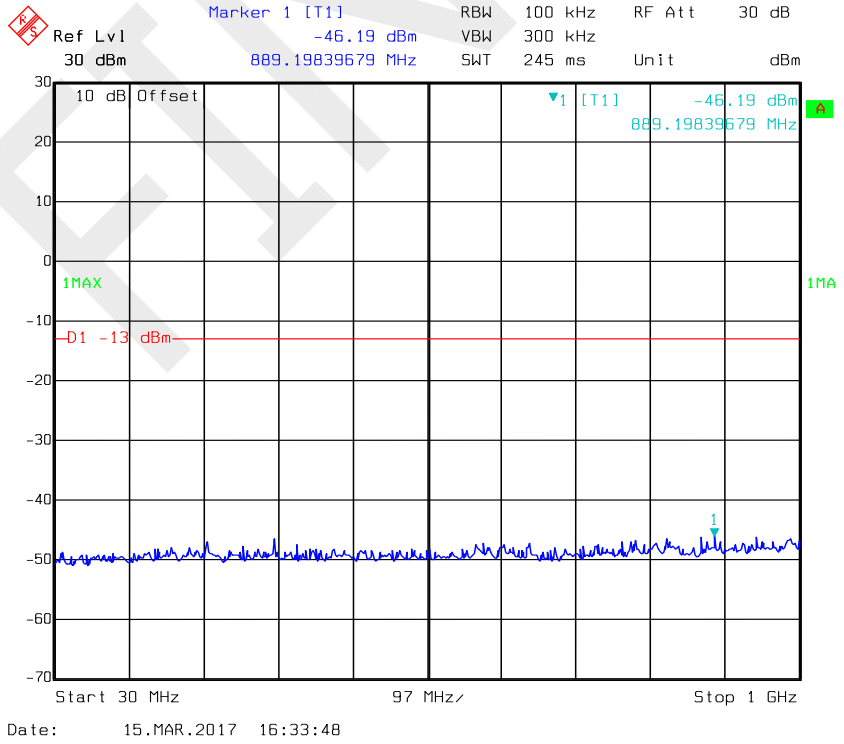


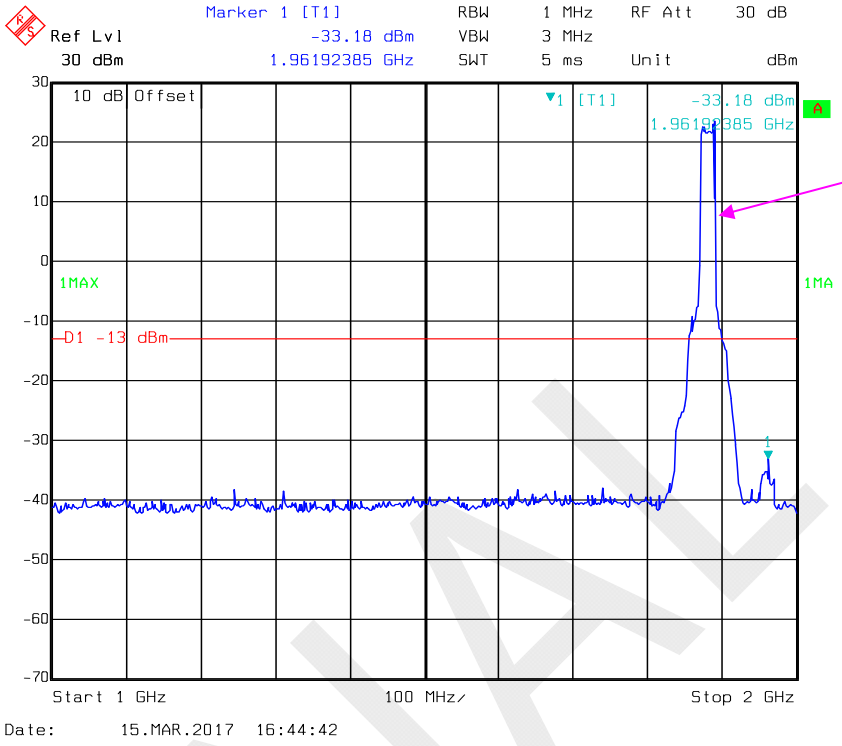


Fundamental

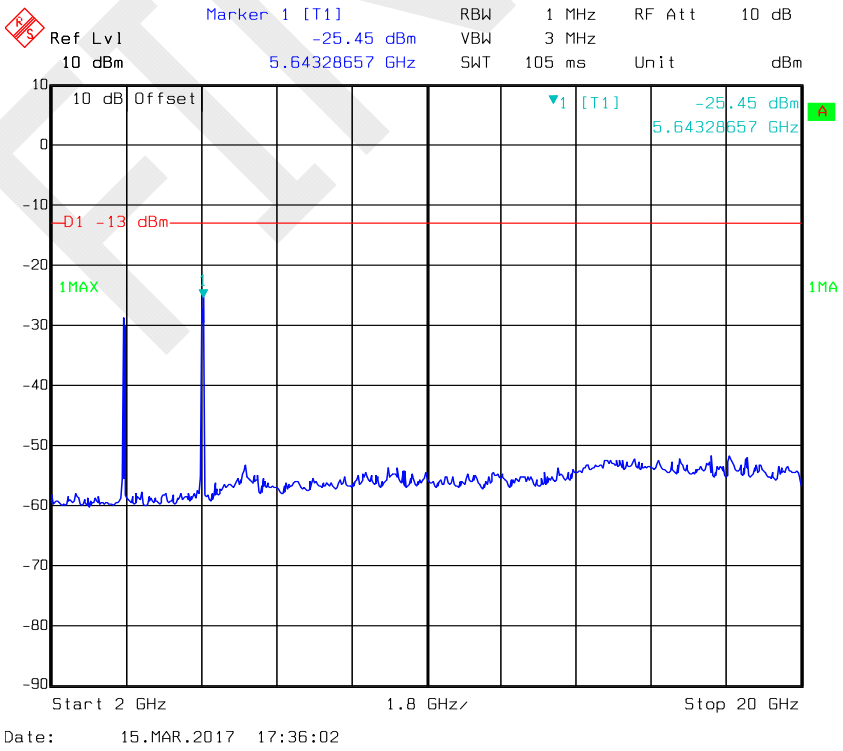

Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
-26.05 dBm
VBW 3 MHz
10 dBm
5.64328657 GHz
SWT 105 ms
Unit dBm
10 dB Offset
▼1 [T1]
-26.05 dBm
5.64328657 GHz
D1 -13 dBm
1MAX
1MA
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 15.MAR.2017 17:34:49

QPSK_20 MHz


Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-46.19 dBm
VBW 300 kHz
30 dBm
889.19839679 MHz
SWT 245 ms
Unit dBm
10 dB Offset
▼1 [T1]
-46.19 dBm
889.19839679 MHz
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 15.MAR.2017 16:33:48

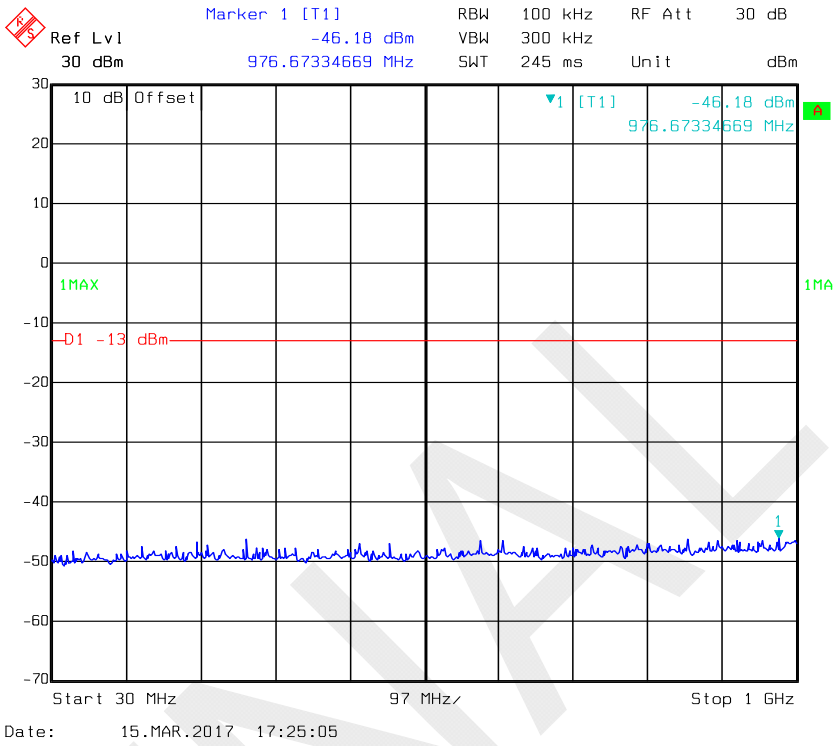


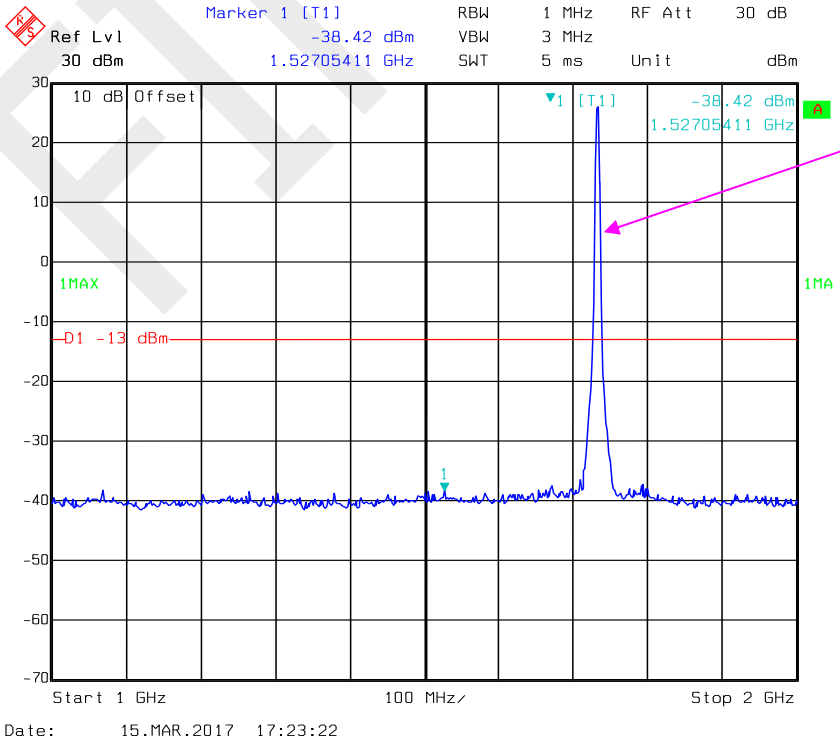
Fundamental



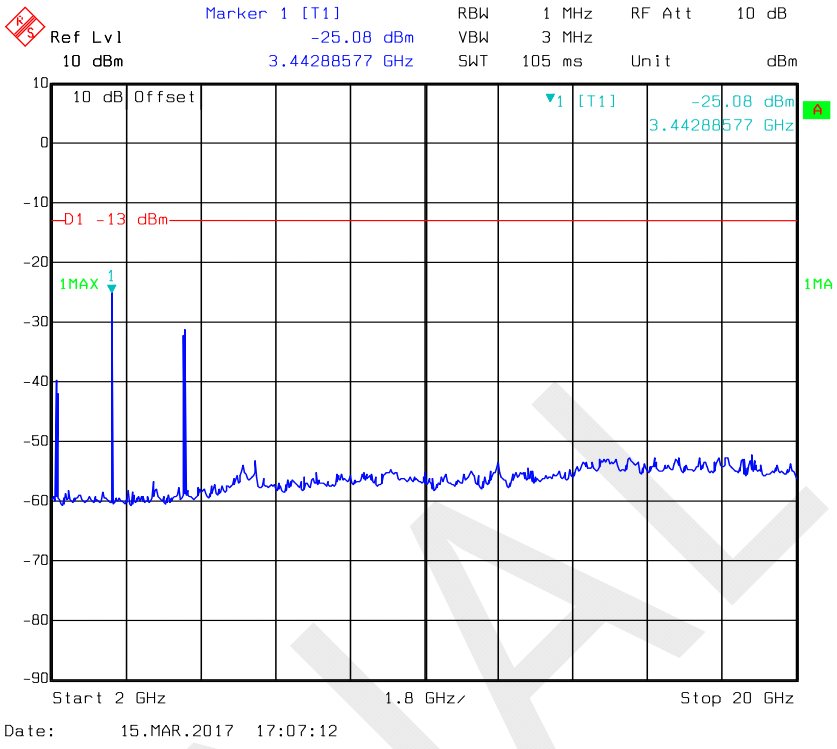
LTE Band IV (Middle Channel)

QPSK_5 MHz

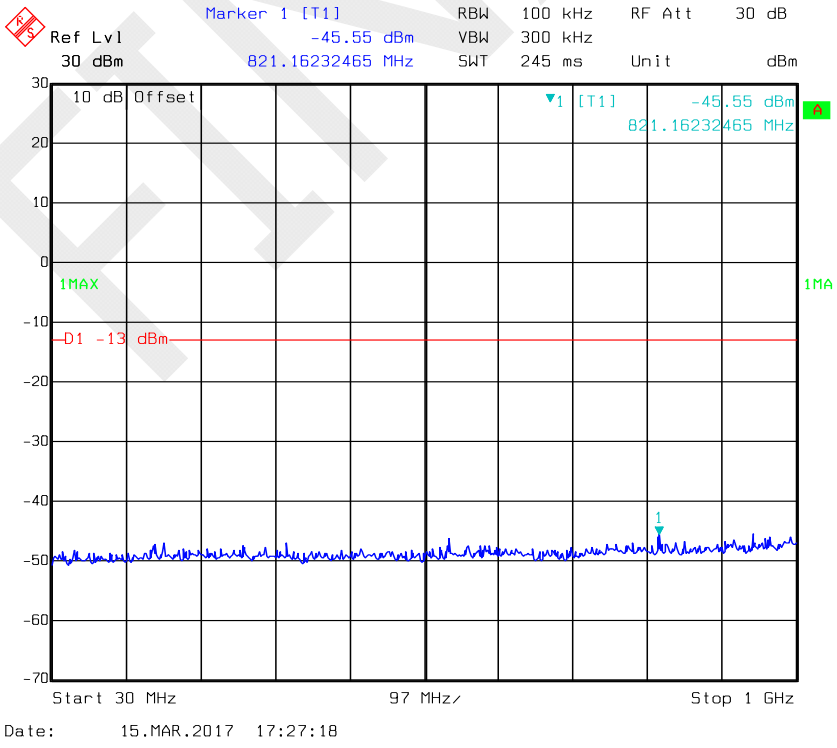


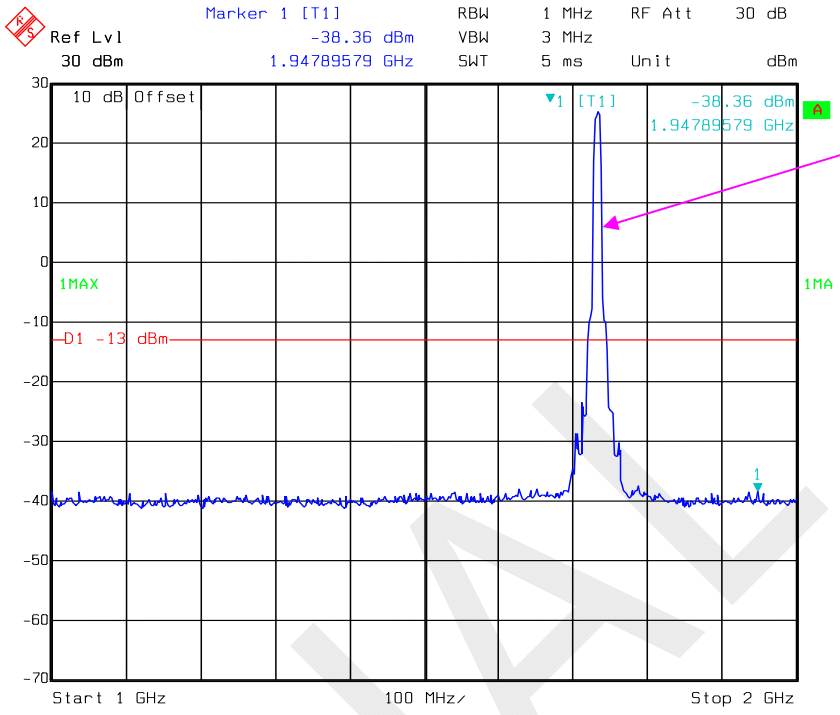


Fundamental

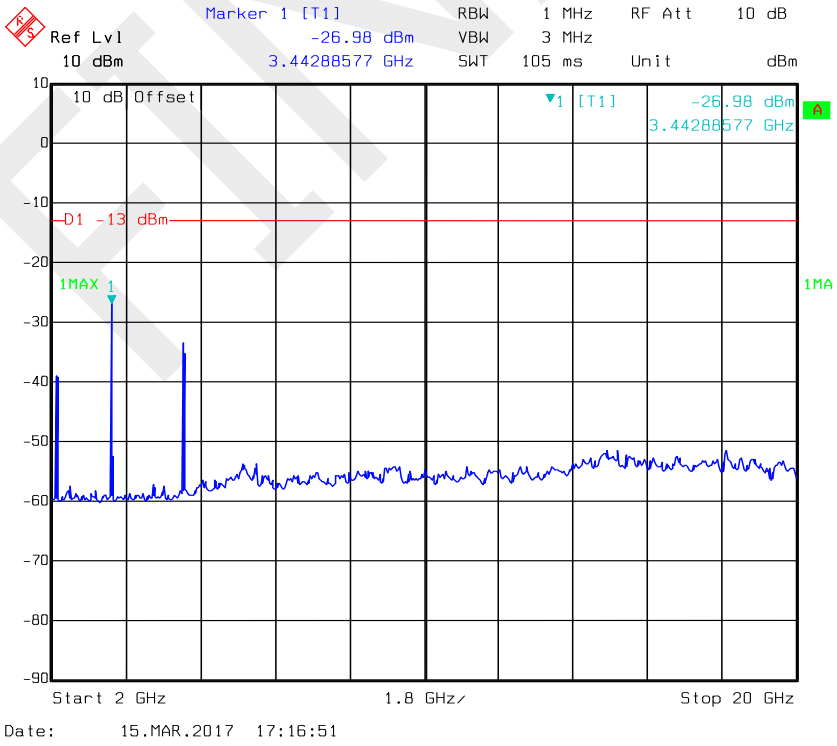

Marker 1 [T1]
-25.08 dBm
3.44288577 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
Ref Lvl
10 dBm
10 dB Offset
D1 -13 dBm
1MAX
1MA
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 15.MAR.2017 17:07:12

QPSK_10 MHz

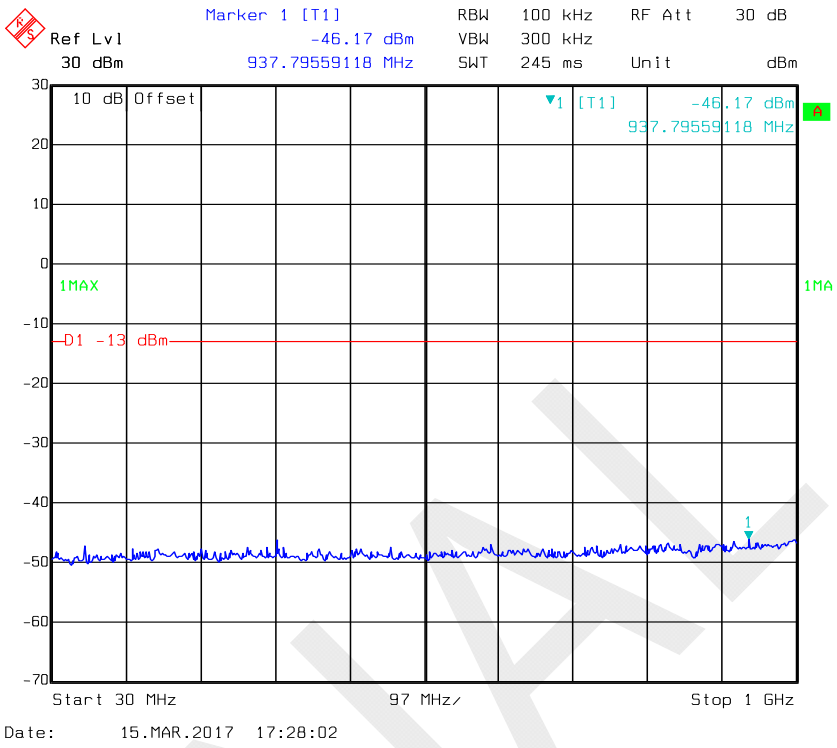

Marker 1 [T1]
-45.55 dBm
821.16232465 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
Ref Lvl
30 dBm
10 dB Offset
D1 -13 dBm
1MAX
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 15.MAR.2017 17:27:18

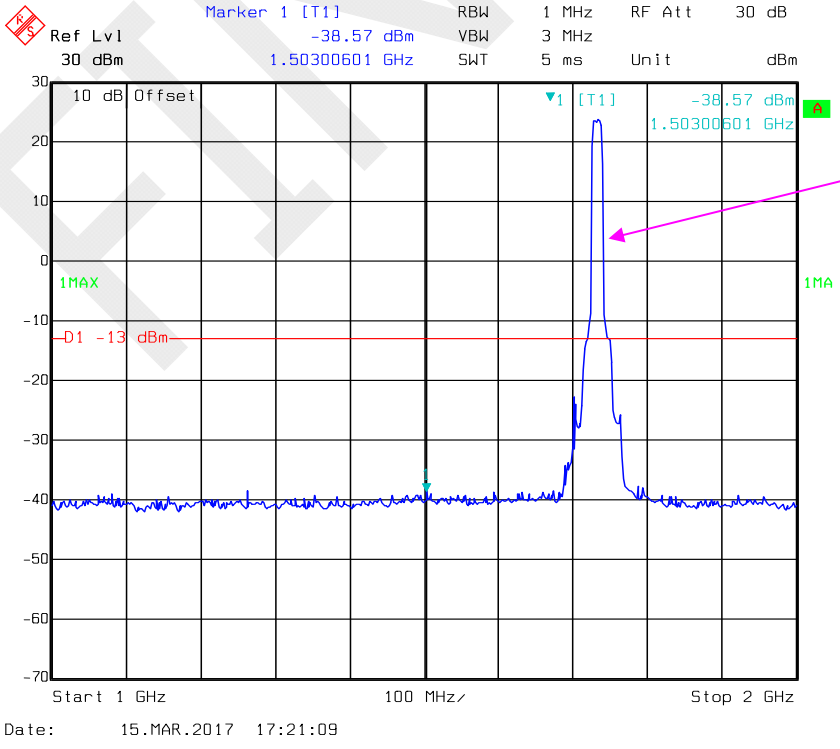


Fundamental

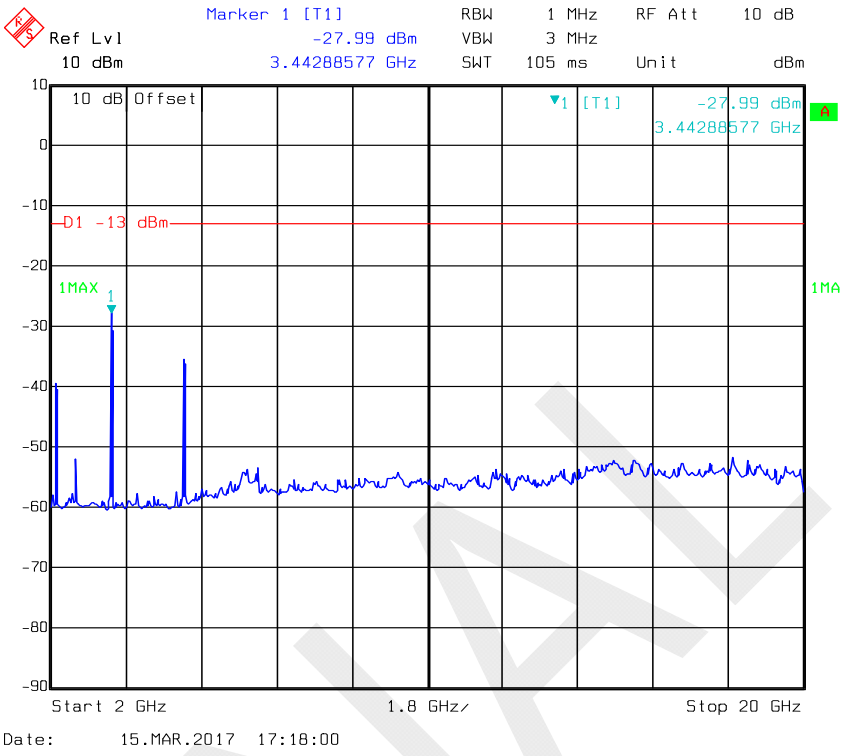


QPSK_15 MHz

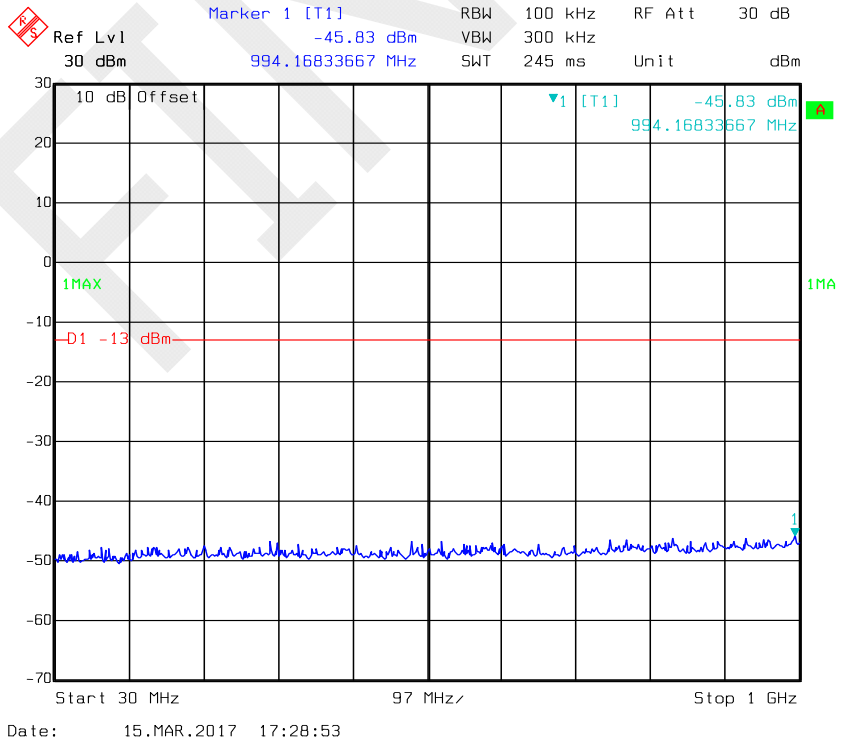


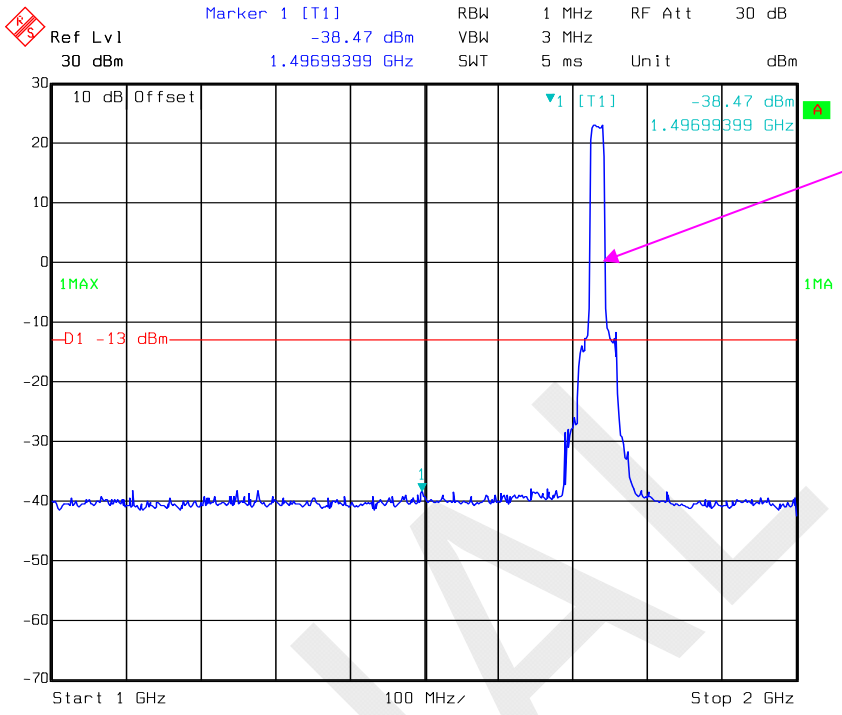


Fundamental

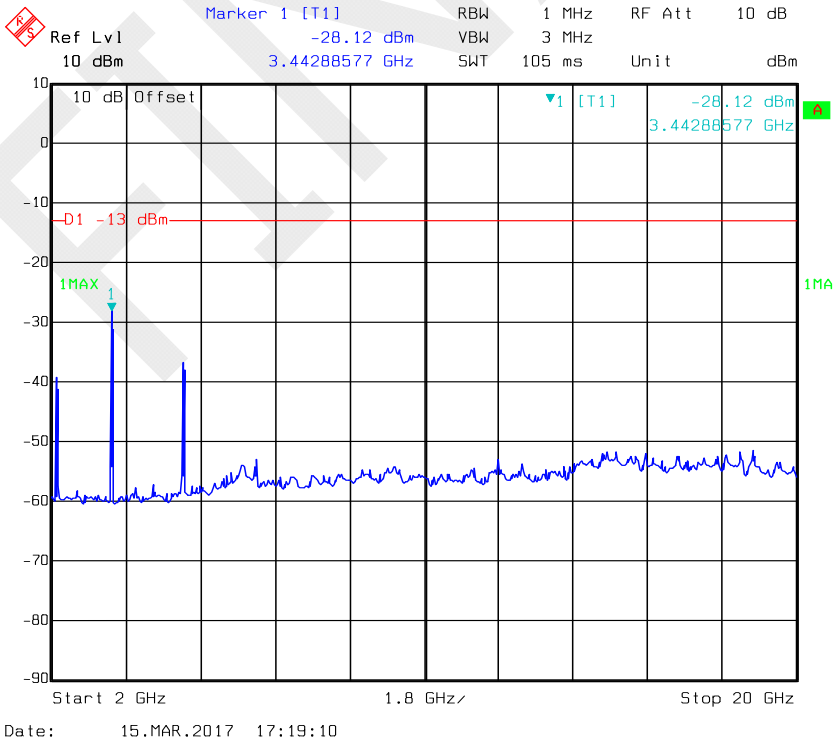

Marker 1 [T1]
-27.99 dBm
3.44288577 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
Ref Lvl
10 dBm
10 dB Offset
D1 -13 dBm
1MAX
1MA
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 15.MAR.2017 17:18:00

QPSK_20 MHz


Marker 1 [T1]
-45.83 dBm
994.16833667 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
Ref Lvl
30 dBm
10 dB Offset
D1 -13 dBm
1MAX
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 15.MAR.2017 17:28:53

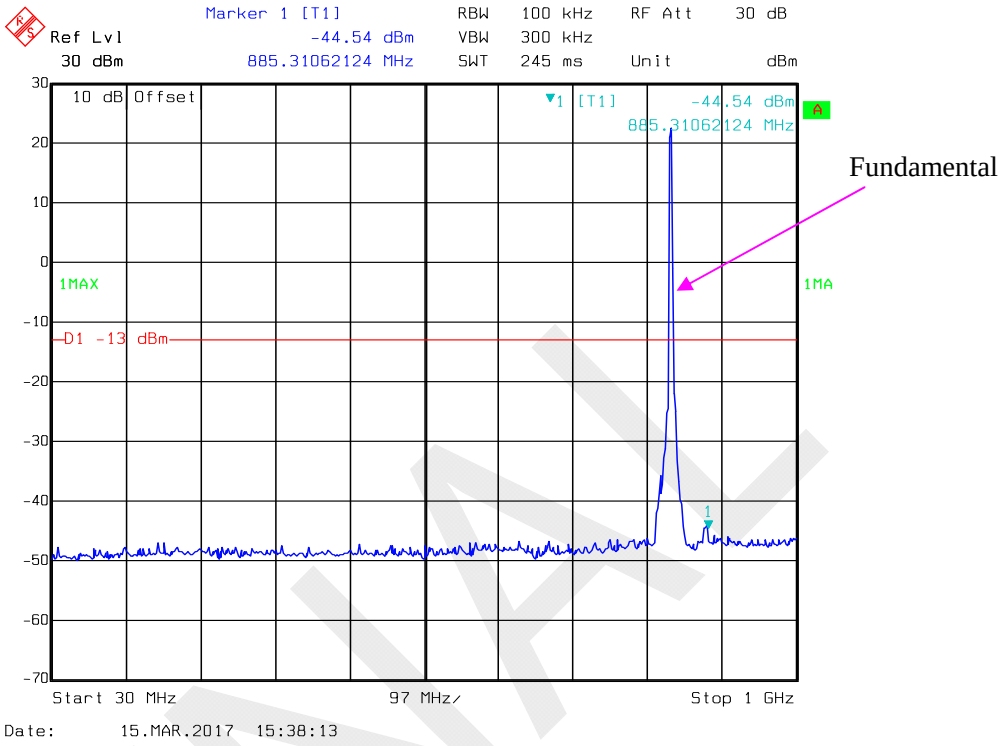


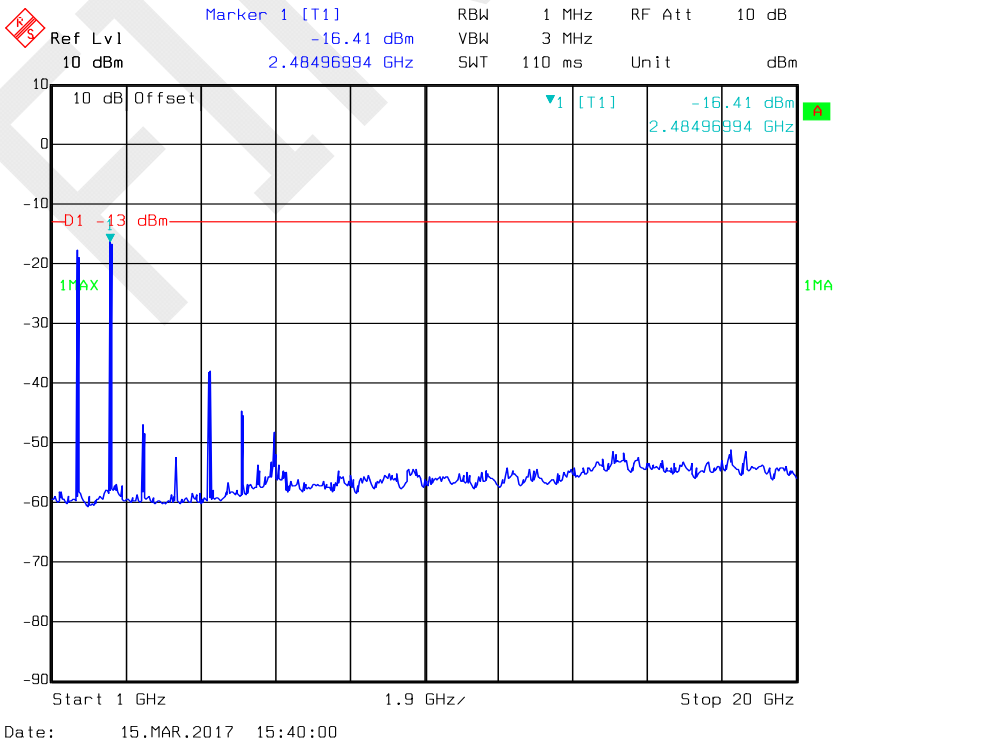
Fundamental



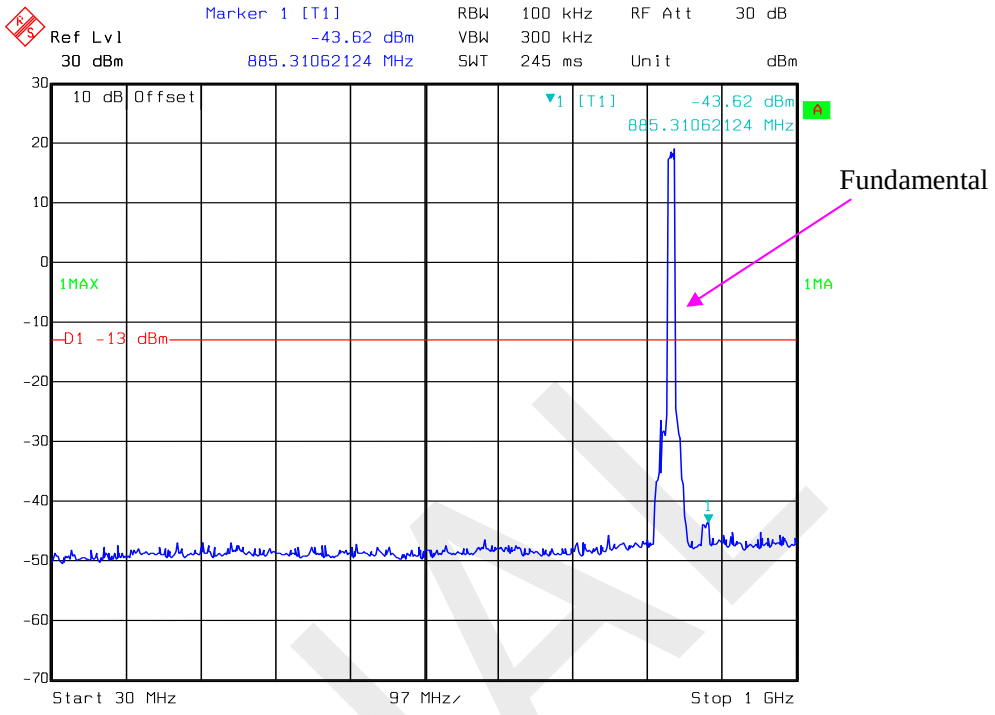
LTE Band V (Middle Channel)

QPSK_5 MHz

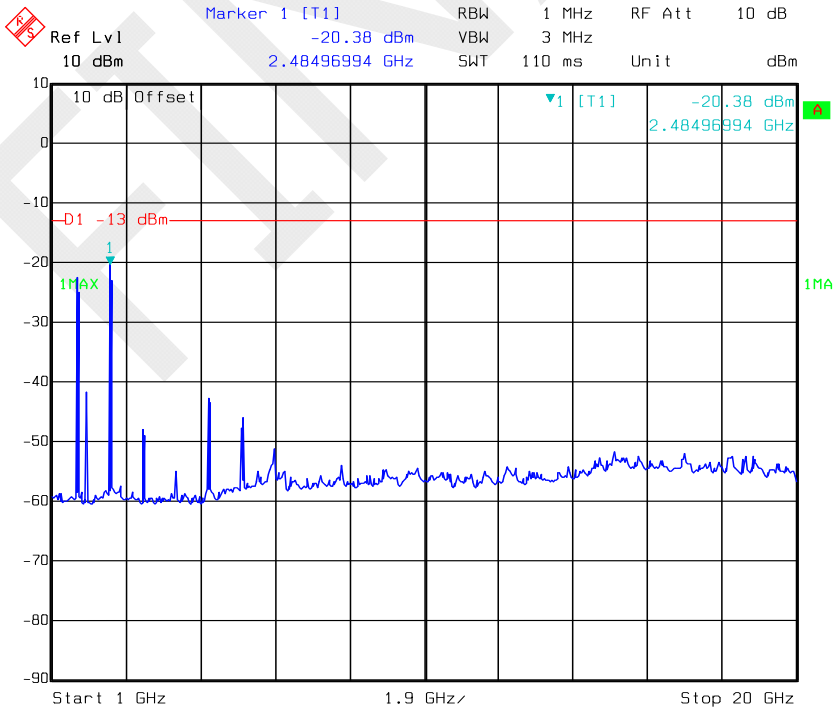




QPSK_10 MHz



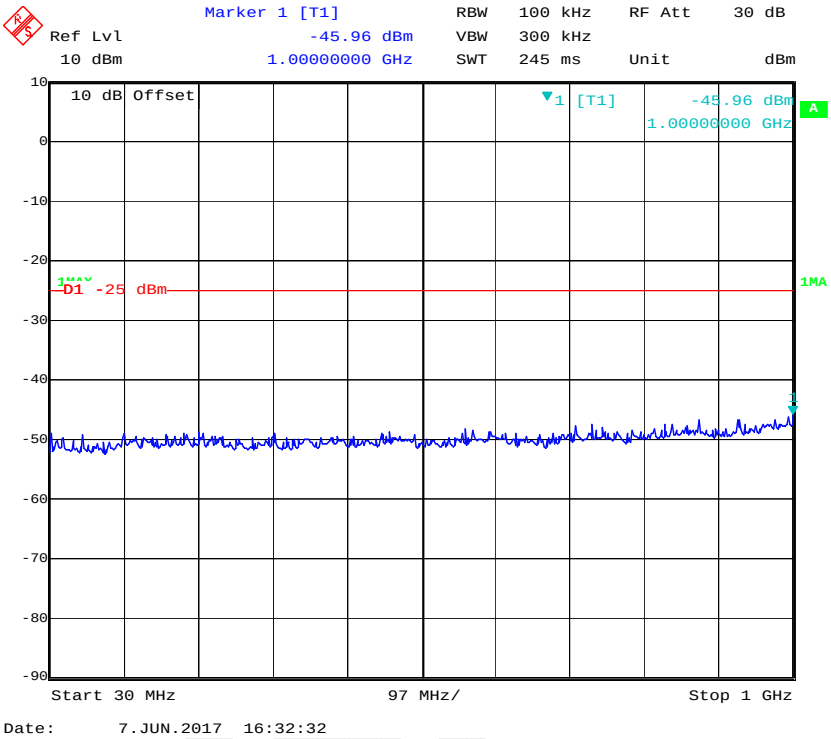
Date: 15.MAR.2017 15:37:00

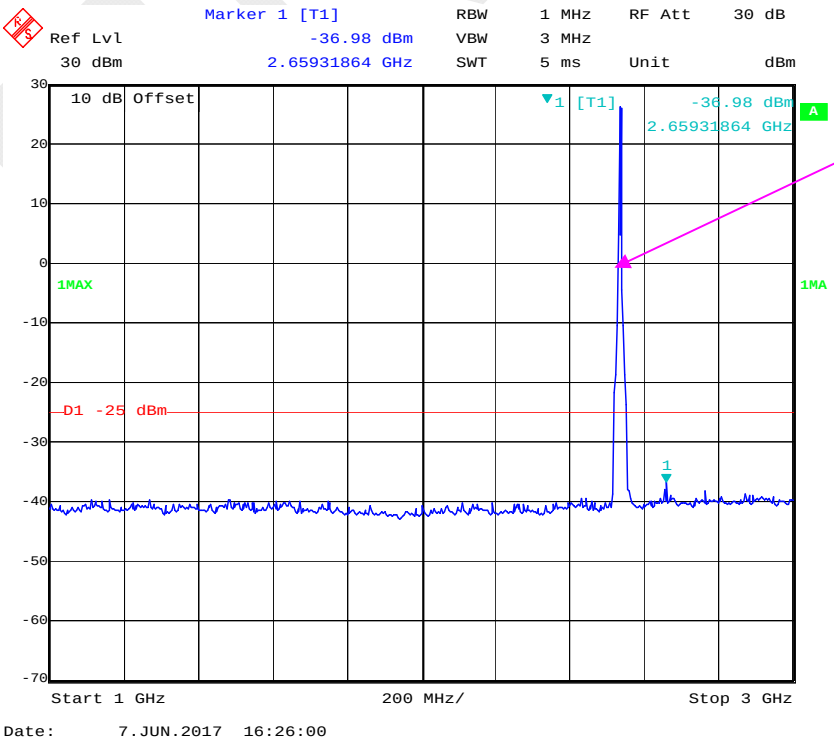


Date: 15.MAR.2017 15:36:07

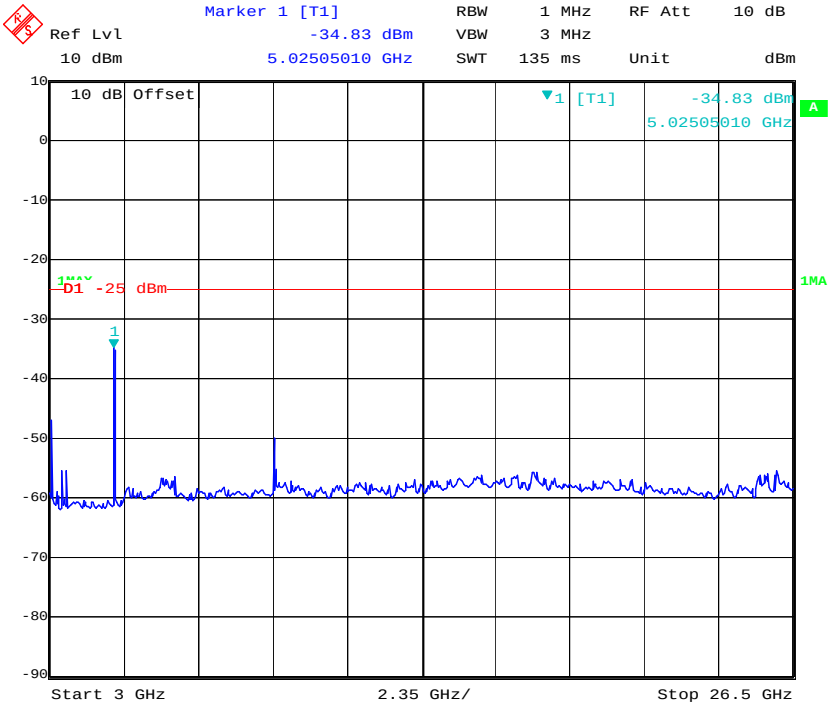
LTE Band VII

QPSK_5 MHz

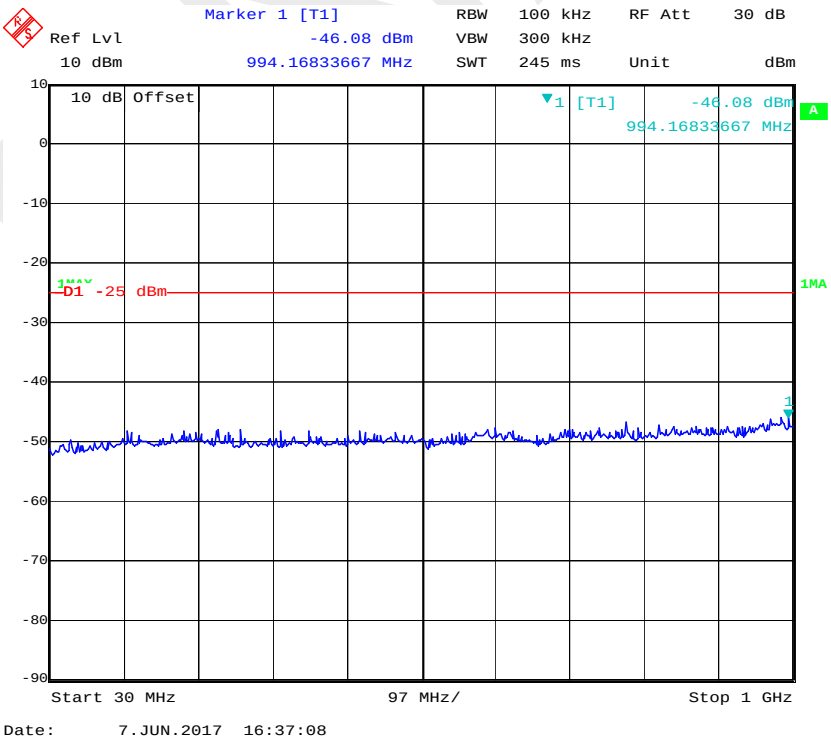


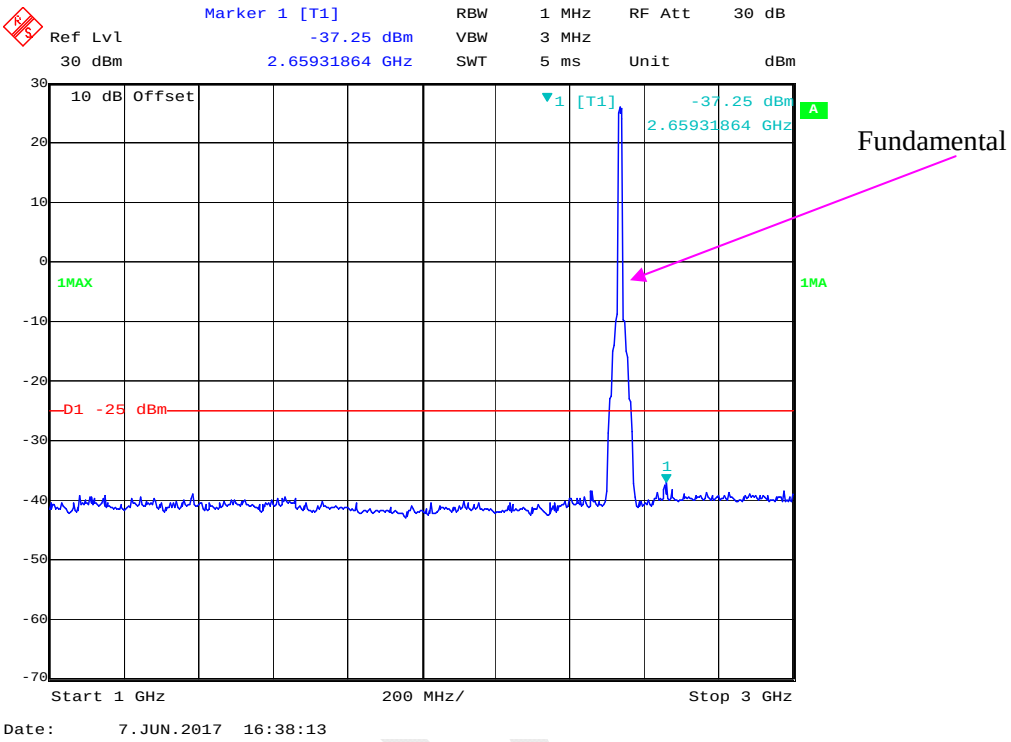


Fundamental

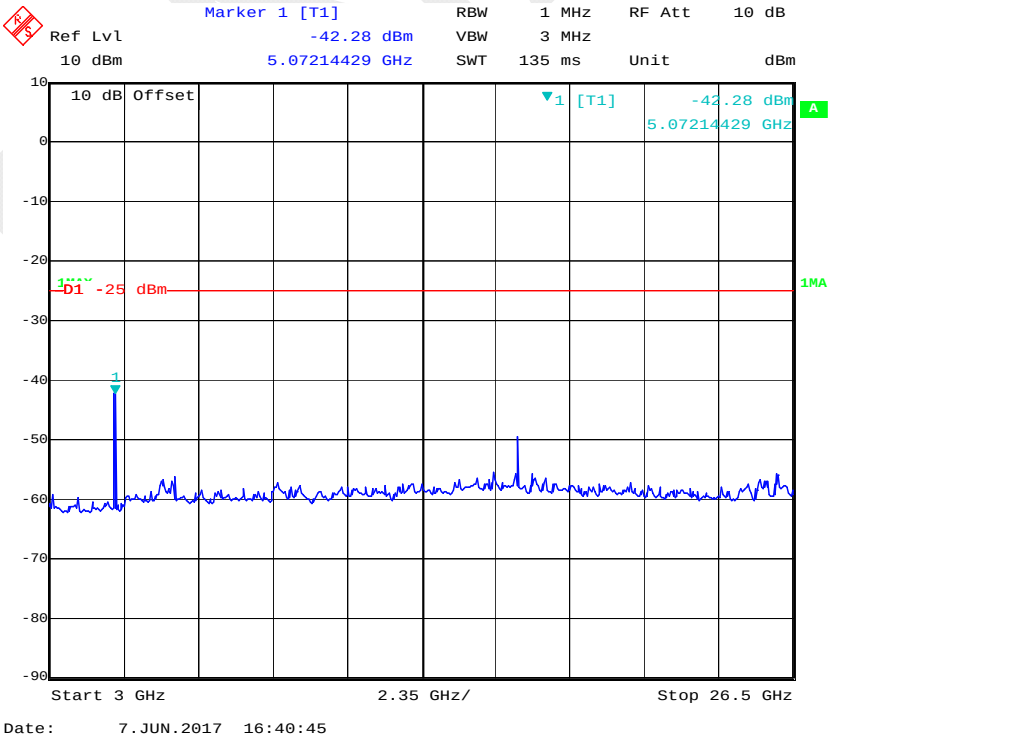

Marker 1 [T1]
Ref Lvl
10 dBm
-34.83 dBm
5.02505010 GHz
RBW 1 MHz
VBW 3 MHz
SWT 135 ms
RF Att 10 dB
Unit dBm
10 dB Offset
1 [T1]
-34.83 dBm
5.02505010 GHz
D1 -25 dBm
1MA
Start 3 GHz
2.35 GHz/
Stop 26.5 GHz
Date: 7.JUN.2017 16:27:13

QPSK_10 MHz

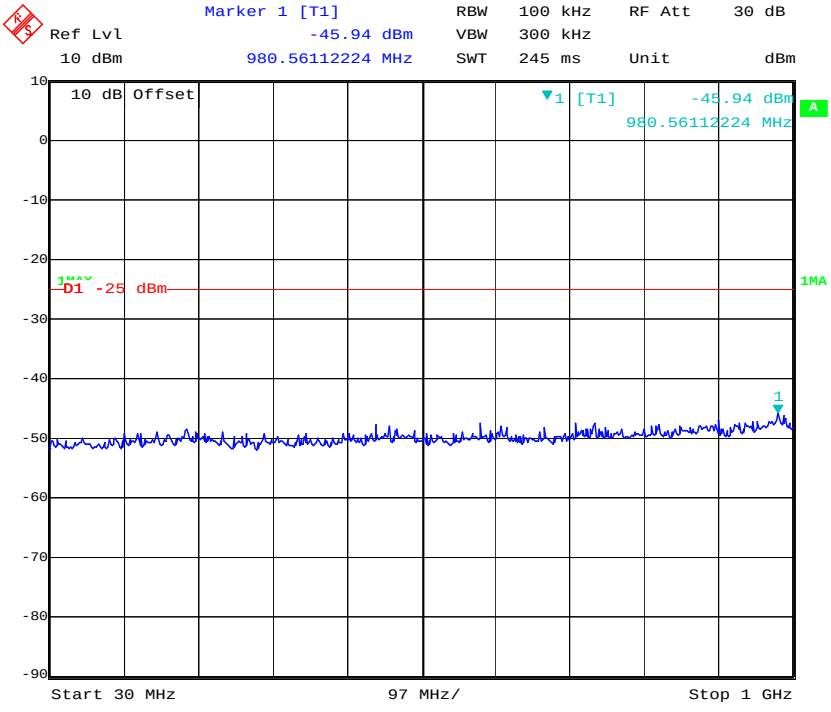

Marker 1 [T1]
Ref Lvl
10 dBm
-46.08 dBm
994.16833667 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
10 dB Offset
1 [T1]
-46.08 dBm
994.16833667 MHz
D1 -25 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 7.JUN.2017 16:37:08

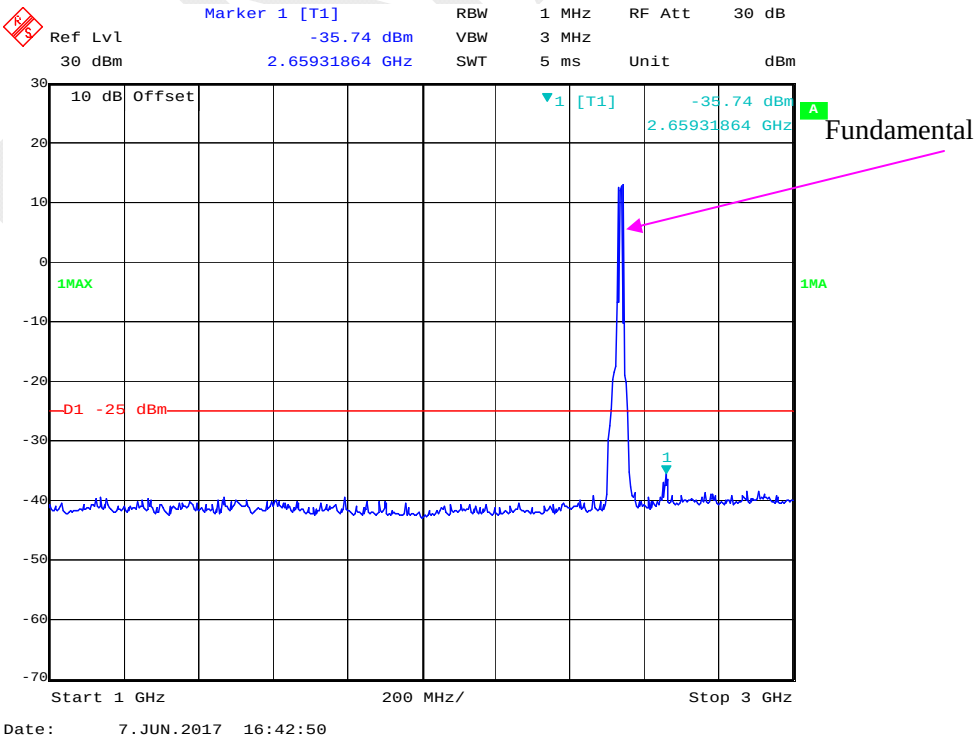


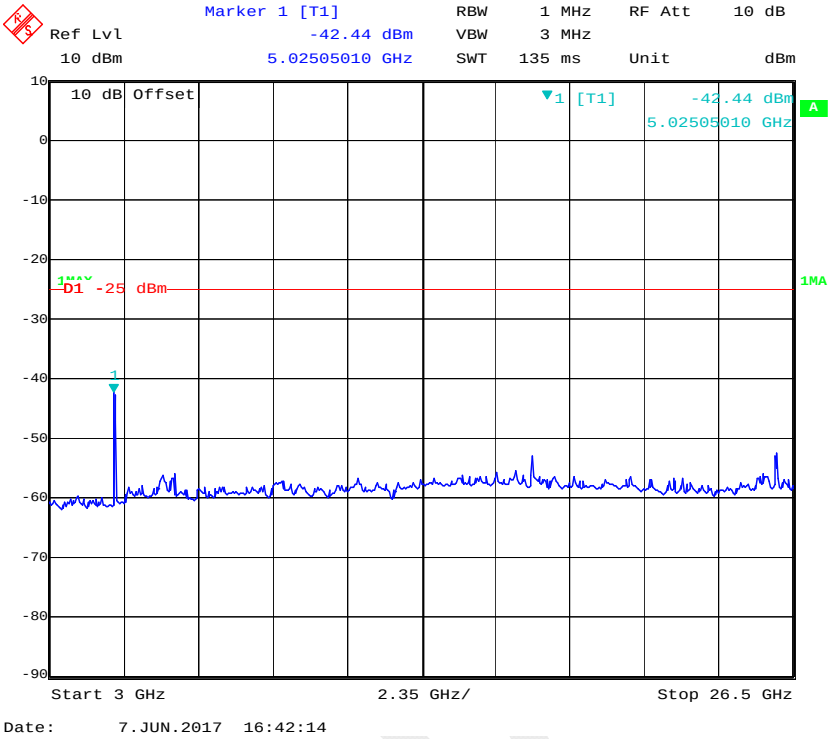
Fundamental



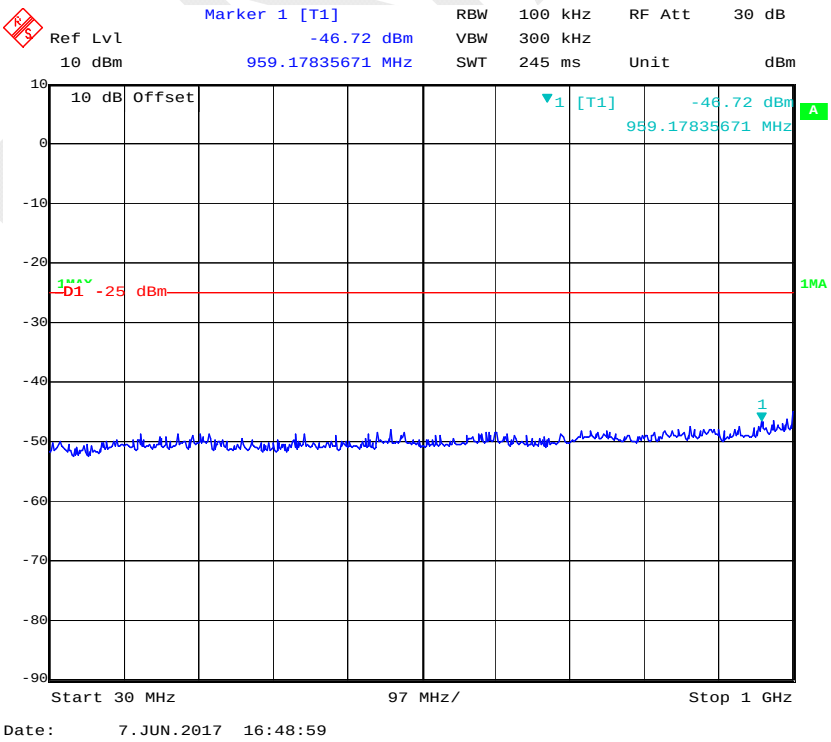
QPSK_15 MHz

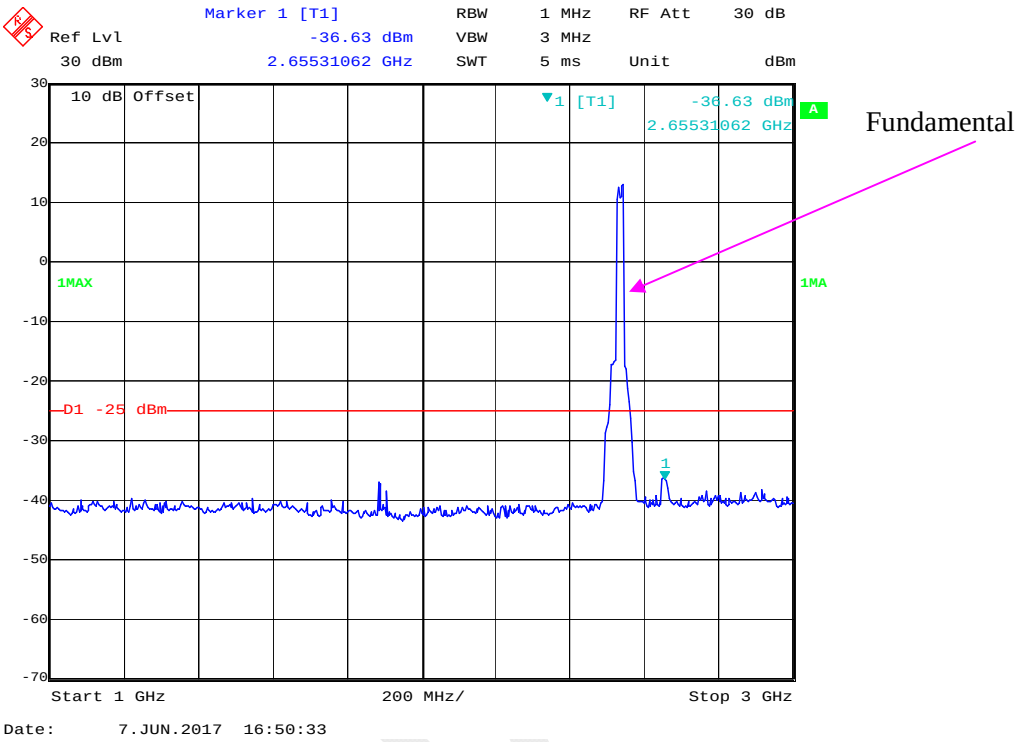

Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-45.94 dBm
VBW 300 kHz
10 dBm
980.56112224 MHz
SWT 245 ms
Unit dBm
10 dB Offset
1 [T1]
-45.94 dBm
980.56112224 MHz
A
1MA
D1 -25 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 7.JUN.2017 16:43:16


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-35.74 dBm
VBW 3 MHz
30 dBm
2.65931864 GHz
SWT 5 ms
Unit dBm
10 dB Offset
1 [T1]
-35.74 dBm
2.65931864 GHz
A
1MA
1MAX
D1 -25 dBm
Fundamental
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 7.JUN.2017 16:42:50

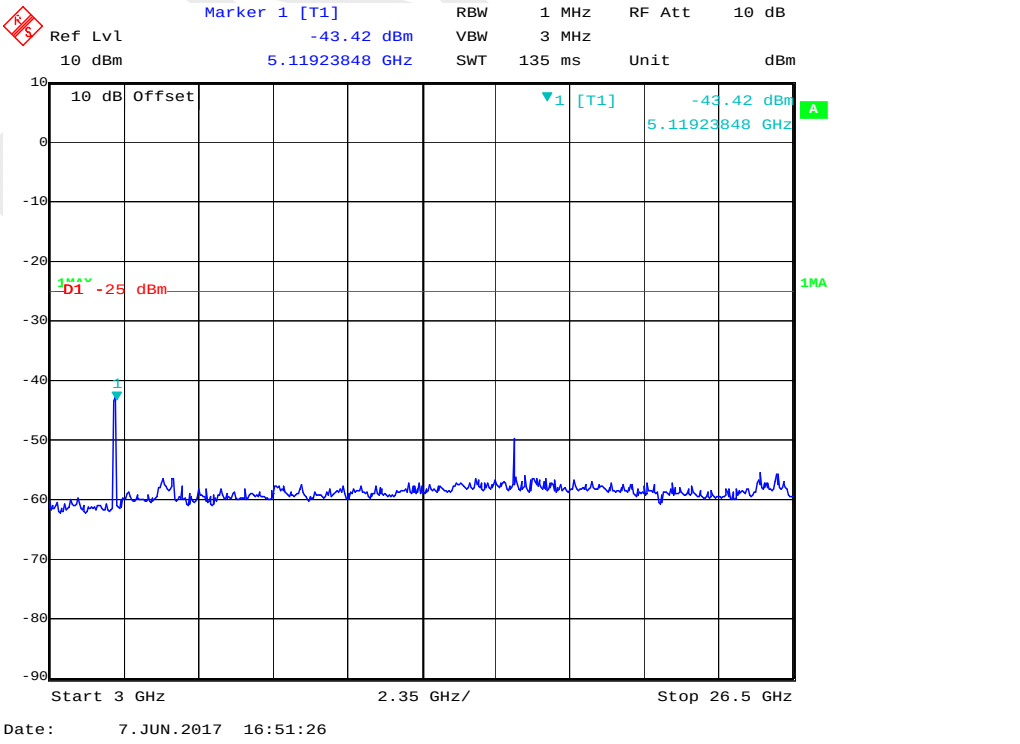

Marker 1 [T1]
Ref Lvl
10 dBm
-42.44 dBm
5.02505010 GHz
RBW 1 MHz
VBW 3 MHz
SWT 135 ms
RF Att 10 dB
Unit dBm
10 dB Offset
1 [T1]
-42.44 dBm
5.02505010 GHz
D1 -25 dBm
1MA
Start 3 GHz
2.35 GHz/
Stop 26.5 GHz
Date: 7.JUN.2017 16:42:14

QPSK_20 MHz


Marker 1 [T1]
Ref Lvl
10 dBm
-46.72 dBm
959.17835671 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
10 dB Offset
1 [T1]
-46.72 dBm
959.17835671 MHz
D1 -25 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 7.JUN.2017 16:48:59



Fundamental



FCC §2.1053, §22.917 & §24.238 & §27.53- SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1315	2016-08-18	2017-08-18
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	18 °C
Relative Humidity:	59 %
ATM Pressure:	94.8 kPa

The testing was performed by Lorin Bian on 2017-03-29.

EUT Operation Mode: Transmitting

Note: For LTE mode, pre-scan with QPSK and 16QAM, worst case is QPSK mode

Inner Antenna:

Cellular Band

30MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS850, Frequency:836.600 MHz								
1673.200	H	43.65	-58.4	10.6	2.5	-50.3	-13.0	37.3
1673.200	V	45.78	-56.6	10.6	2.5	-48.5	-13.0	35.5
2509.800	H	39.42	-60	13.1	3.1	-50.0	-13.0	37.0
2509.800	V	42.64	-55.8	13.1	3.1	-45.8	-13.0	32.8
883.600	H	46.57	-46.5	0.0	1	-47.5	-13.0	34.5
833.600	V	47.85	-48.9	0.0	1	-49.9	-13.0	36.9
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	40.75	-61.3	10.6	2.5	-53.2	-13.0	40.2
1673.200	V	43.62	-58.7	10.6	2.5	-50.6	-13.0	37.6
2509.800	H	38.39	-61	13.1	3.1	-51.0	-13.0	38.0
2509.800	V	40.65	-57.8	13.1	3.1	-47.8	-13.0	34.8
881.660	H	63.87	-29.3	0.0	1	-30.3	-13.0	17.3
881.660	V	53.14	-42.3	0.0	1	-43.3	-13.0	30.3

PCS Band

30MHz-20GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS1900, Frequency:1880.000 MHz								
3760.000	H	38.54	-57.3	13.8	3.8	-47.3	-13.0	34.3
3760.000	V	40.78	-53.9	13.8	3.8	-43.9	-13.0	30.9
5640.000	H	36.87	-57.5	14.0	4.6	-48.1	-13.0	35.1
5640.000	V	37.96	-56.4	14.0	4.6	-47.0	-13.0	34.0
274.440	H	38.24	-66.4	0.0	0.5	-66.9	-13.0	53.9
416.060	V	42.55	-60.8	0.0	0.6	-61.4	-13.0	48.4
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	38.34	-57.5	13.8	3.8	-47.5	-13.0	34.5
3760.000	V	42.65	-52	13.8	3.8	-42.0	-13.0	29.0
5640.000	H	40.57	-53.8	14.0	4.6	-44.4	-13.0	31.4
5640.000	V	41.32	-53	14.0	4.6	-43.6	-13.0	30.6
274.440	H	37.25	-67.4	0.0	0.5	-67.9	-13.0	54.9
400.540	V	35.51	-68.1	0.0	0.6	-68.7	-13.0	55.7

LTE Band II (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1880.00 MHz								
3760.000	H	39.68	-56.2	13.8	3.8	-46.2	-13.0	33.2
3760.000	V	42.13	-52.5	13.8	3.8	-42.5	-13.0	29.5
5640.000	H	36.07	-58.3	14.0	4.6	-48.9	-13.0	35.9
5640.000	V	38.25	-56.1	14.0	4.6	-46.7	-13.0	33.7
274.440	H	38.24	-69.6	0.0	0.5	-70.1	-13.0	57.1
429.640	V	35.97	-55	0.0	0.6	-55.6	-13.0	42.6

LTE Band IV (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1732.500 MHz								
3465.000	H	40.37	-58.1	13.9	3.6	-47.8	-13.0	34.8
3465.000	V	41.82	-55.9	13.9	3.6	-45.6	-13.0	32.6
5197.500	H	32.35	-61.1	14.0	4.8	-51.9	-13.0	38.9
5197.500	V	35.48	-59.5	14.0	4.8	-50.3	-13.0	37.3
453.250	H	38.67	-52.9	0.0	0.7	-53.6	-13.0	40.6
382.510	V	38.25	-56.6	0.0	0.6	-57.2	-13.0	44.2

LTE Band V (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:836.500 MHz								
1673.000	H	42.65	-59.4	10.6	2.5	-51.3	-13.0	38.3
1673.000	V	44.31	-58	10.6	2.5	-49.9	-13.0	36.9
2509.500	H	35.68	-63.7	13.1	3.1	-53.7	-13.0	40.7
2509.500	V	37.47	-61	13.1	3.1	-51.0	-13.0	38.0
885.540	H	53.84	-39.3	0.0	1	-40.3	-13.0	27.3
885.540	V	45.72	-49.6	0.0	1	-50.6	-13.0	37.6

LTE Band VII (30MHz-26GHz)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:2535.000 MHz								
5070.000	H	40.96	-52.4	13.9	4.5	-43.0	-25.0	18.0
5070.000	V	42.05	-52.1	13.9	4.5	-42.7	-25.0	17.7
7605.000	H	31.95	-58.9	13.2	5.7	-51.4	-25.0	26.4
7605.000	V	35.22	-55.7	13.2	5.7	-48.2	-25.0	23.2
327.150	H	41.75	-62.4	0.0	0.5	-62.9	-25.0	37.9
438.810	V	38.25	-52.2	0.0	0.6	-52.8	-25.0	27.8

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = SG Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

Outer Antenna:

Cellular Band

30MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS850, Frequency:836.600 MHz								
1673.200	H	48.95	-53.1	10.6	2.5	-45.0	-13.0	32.0
1673.200	V	48.62	-53.7	10.6	2.5	-45.6	-13.0	32.6
2509.800	H	46.69	-52.7	13.1	3.1	-42.7	-13.0	29.7
2509.800	V	45.84	-52.6	13.1	3.1	-42.6	-13.0	29.6
882.340	H	48.67	-44.5	0.0	1	-45.5	-13.0	32.5
418.640	V	33.44	-69.9	0.0	0.6	-70.5	-13.0	57.5
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	40.75	-61.3	10.6	2.5	-53.2	-13.0	40.2
1673.200	V	43.62	-58.7	10.6	2.5	-50.6	-13.0	37.6
2509.800	H	38.39	-61	13.1	3.1	-51.0	-13.0	38.0
2509.800	V	40.65	-57.8	13.1	3.1	-47.8	-13.0	34.8
879.300	H	65.24	-27.9	0.0	1	-28.9	-13.0	15.9
879.300	V	66.34	-29.2	0.0	1	-30.2	-13.0	17.2

PCS Band

30MHz-20GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS1900, Frequency:1880.000 MHz								
3760.000	H	40.24	-55.6	13.8	3.8	-45.6	-13.0	32.6
3760.000	V	40.99	-53.6	13.8	3.8	-43.6	-13.0	30.6
5640.000	H	47.93	-46.4	14.0	4.6	-37.0	-13.0	24.0
5640.000	V	39.74	-54.6	14.0	4.6	-45.2	-13.0	32.2
278.340	H	39.61	-65	0.0	0.5	-65.5	-13.0	52.5
415.380	V	43.25	-60.2	0.0	0.6	-60.8	-13.0	47.8
WCDMA Band II, R99, Frequency:1880.000 MHz								
1673.200	H	42.69	-59.4	10.6	2.5	-51.3	-13.0	38.3
1673.200	V	45.96	-56.4	10.6	2.5	-48.3	-13.0	35.3
2509.800	H	42.71	-56.7	13.1	3.1	-46.7	-13.0	33.7
2509.800	V	42.69	-55.8	13.1	3.1	-45.8	-13.0	32.8
299.600	H	39.51	-65	0.0	0.5	-65.5	-13.0	52.5
400.540	V	43.60	-60	0.0	0.6	-60.6	-13.0	47.6

LTE Band II (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1880.00 MHz								
3760.000	H	40.77	-55.1	13.8	3.8	-45.1	-13.0	32.1
3760.000	V	43.75	-50.9	13.8	3.8	-40.9	-13.0	27.9
5640.000	H	40.65	-53.7	14.0	4.6	-44.3	-13.0	31.3
5640.000	V	43.55	-50.8	14.0	4.6	-41.4	-13.0	28.4
364.400	H	43.25	-56.4	0.0	0.6	-57.0	-13.0	44.0
431.800	V	38.64	-52.2	0.0	0.6	-52.8	-13.0	39.8

LTE Band IV (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1732.500 MHz								
3465.000	H	43.66	-54.8	13.9	3.6	-44.5	-13.0	31.5
3465.000	V	44.74	-53	13.9	3.6	-42.7	-13.0	29.7
5197.500	H	33.75	-59.7	14.0	4.8	-50.5	-13.0	37.5
5197.500	V	38.80	-56.2	14.0	4.8	-47.0	-13.0	34.0
425.600	H	38.64	-54.9	0.0	0.6	-55.5	-13.0	42.5
384.400	V	39.75	-54.9	0.0	0.6	-55.5	-13.0	42.5

LTE Band V (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:836.500 MHz								
1673.000	H	44.21	-57.8	10.6	2.5	-49.7	-13.0	36.7
1673.000	V	45.69	-56.7	10.6	2.5	-48.6	-13.0	35.6
2509.500	H	33.57	-65.8	13.1	3.1	-55.8	-13.0	42.8
2509.500	V	37.69	-60.8	13.1	3.1	-50.8	-13.0	37.8
886.340	H	56.34	-36.7	0.0	1	-37.7	-13.0	24.7
886.340	V	47.85	-47.5	0.0	1	-48.5	-13.0	35.5

LTE Band VII (30MHz-26GHz)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:2535.000 MHz								
5070.000	H	36.87	-56.5	13.9	4.5	-47.1	-25.0	22.1
5070.000	V	36.94	-57.2	13.9	4.5	-47.8	-25.0	22.8
7605.000	H	37.25	-53.6	13.2	5.7	-46.1	-25.0	21.1
7605.000	V	35.96	-54.9	13.2	5.7	-47.4	-25.0	22.4
364.400	H	43.28	-56.4	0.0	0.6	-57.0	-25.0	32.0
458.000	V	37.42	-52	0.0	0.7	-52.7	-25.0	27.7

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = SG Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

FCC §22.917(a) & §24.238(a) & §27.53- BAND EDGES

Applicable Standard

According to § 22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

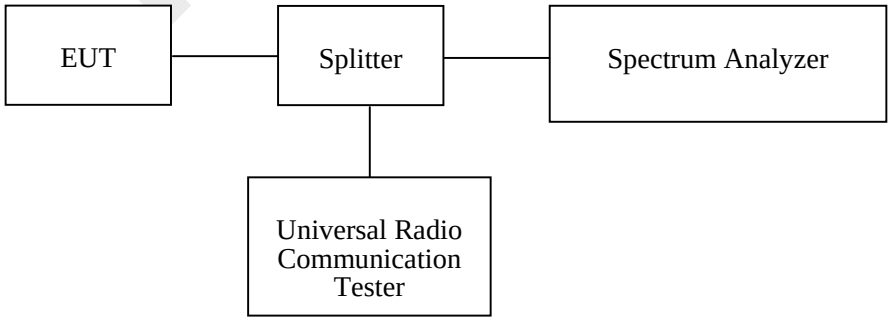
According to §27.53 (h), AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

According to §27.53 (m), (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Spliter	N/A	OE0120121	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

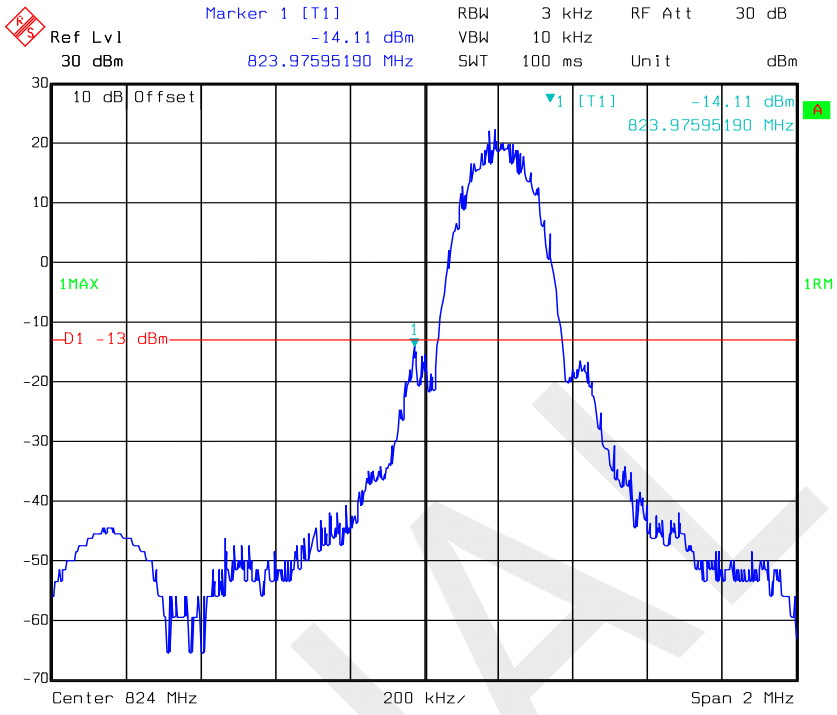
Temperature:	19.5~21 °C
Relative Humidity:	57~58 %
ATM Pressure:	95.3~95.8 kPa

The testing was performed by Lorin Bian from 2017-03-12 to 2017-03-15.

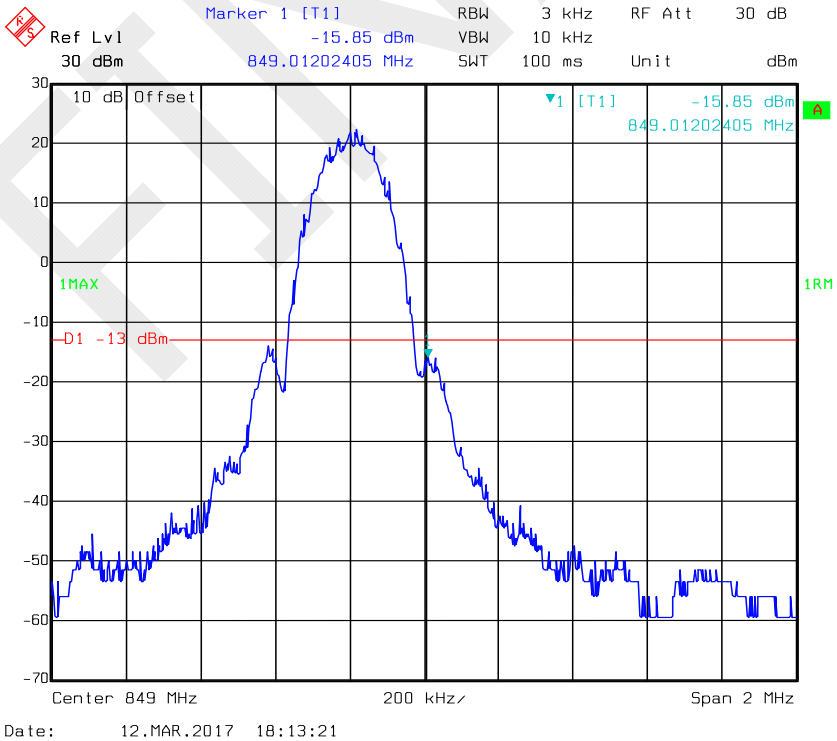
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following plots.

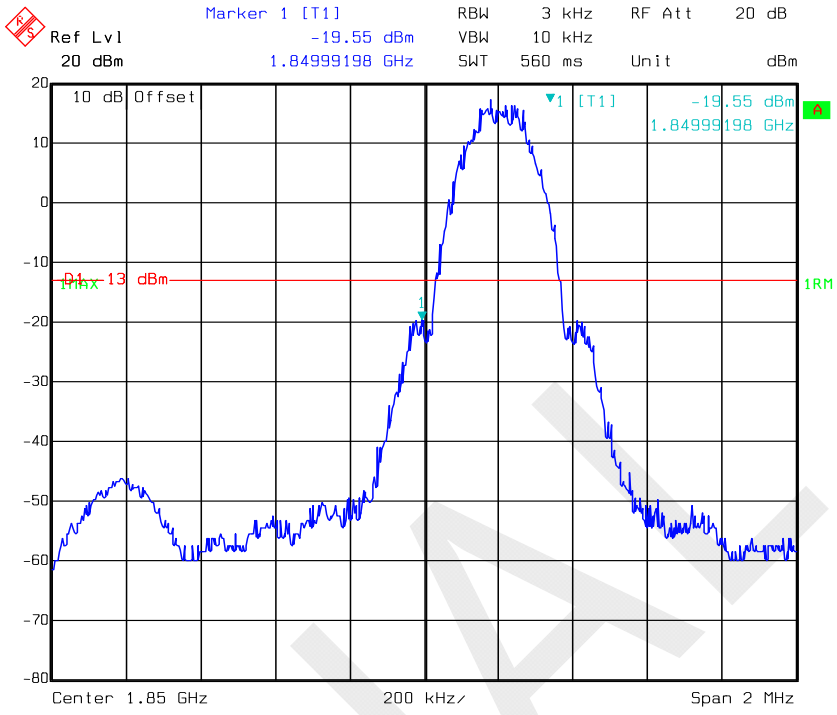
GPRS 850, Left Band Edge



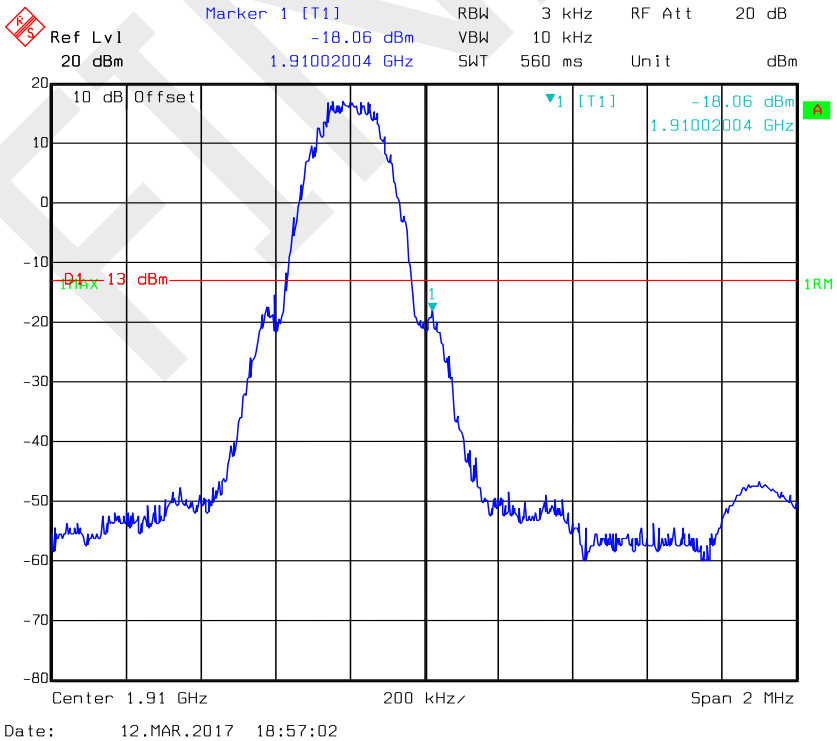
GPRS 850, Right Band Edge



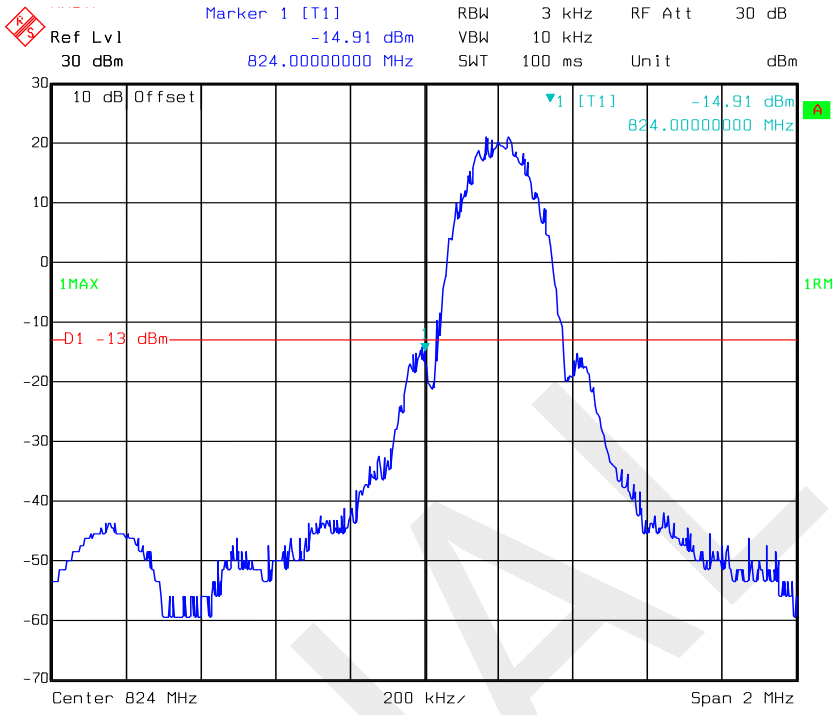
GPRS 1900, Left Band Edge



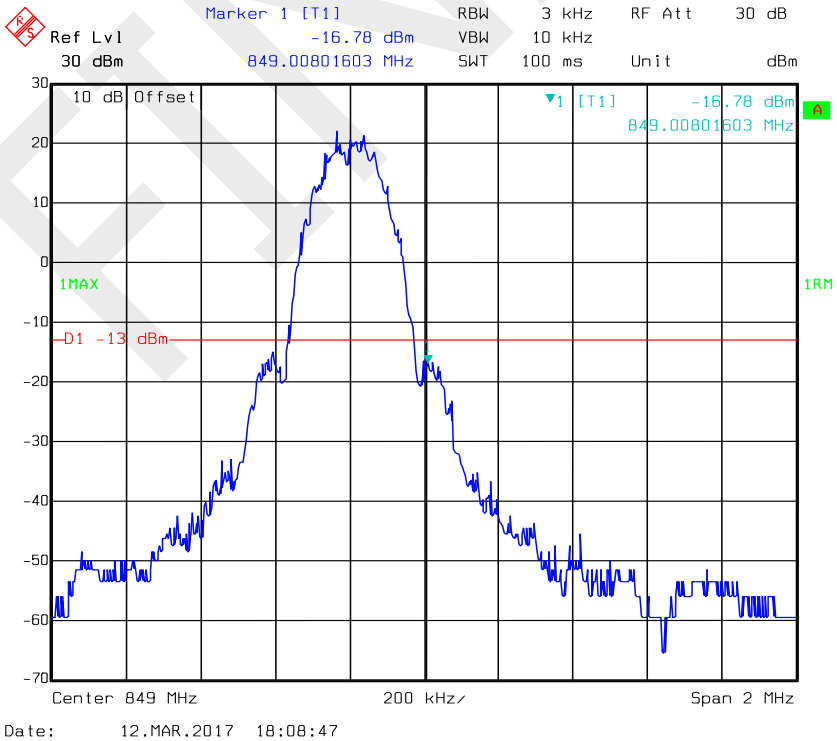
GPRS 1900, Right Band Edge



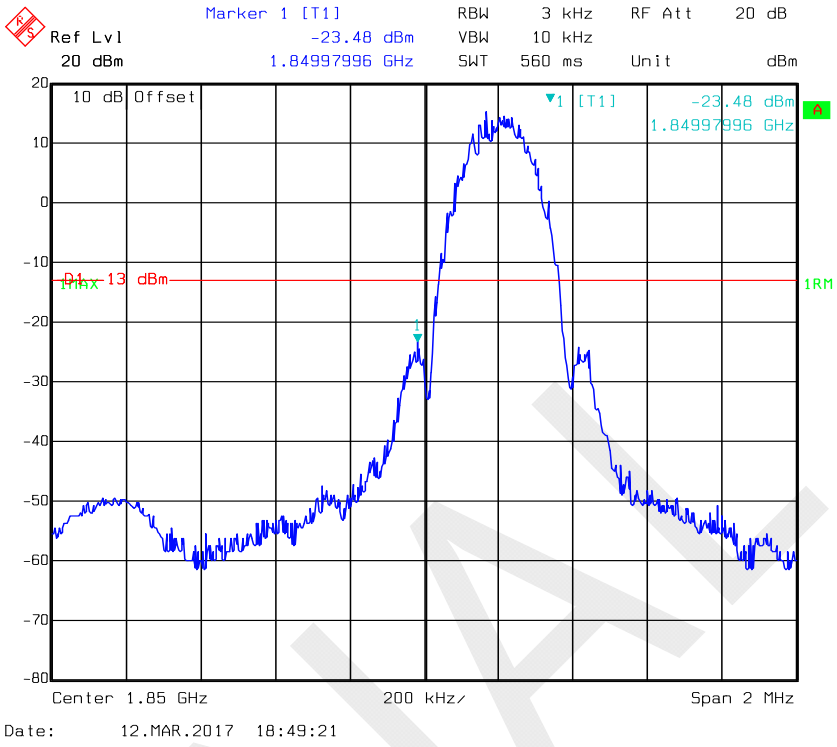
EDGE 850, Left Band Edge



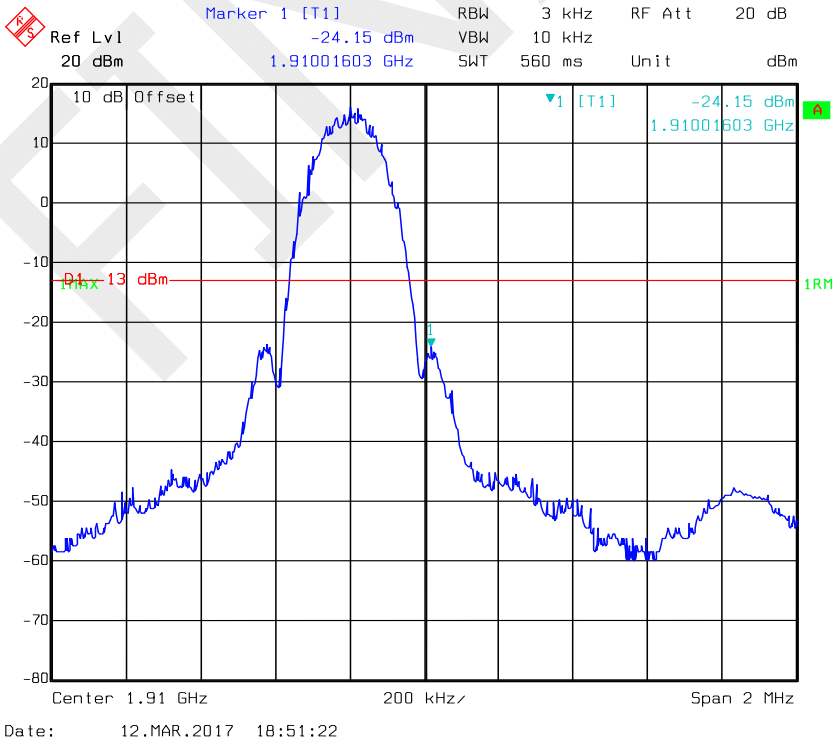
EDGE 850, Right Band Edge



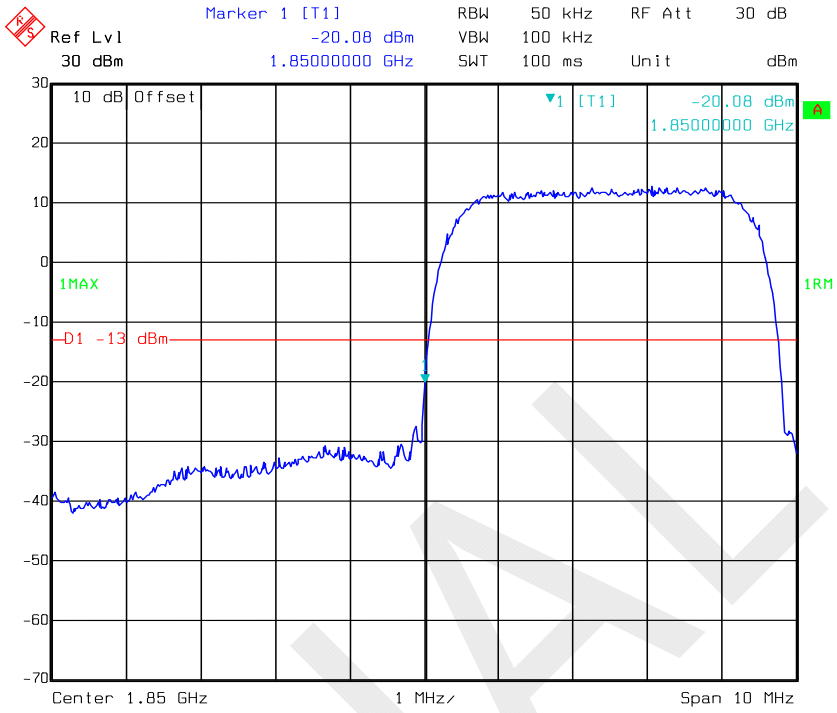
EDGE 1900, Left Band Edge



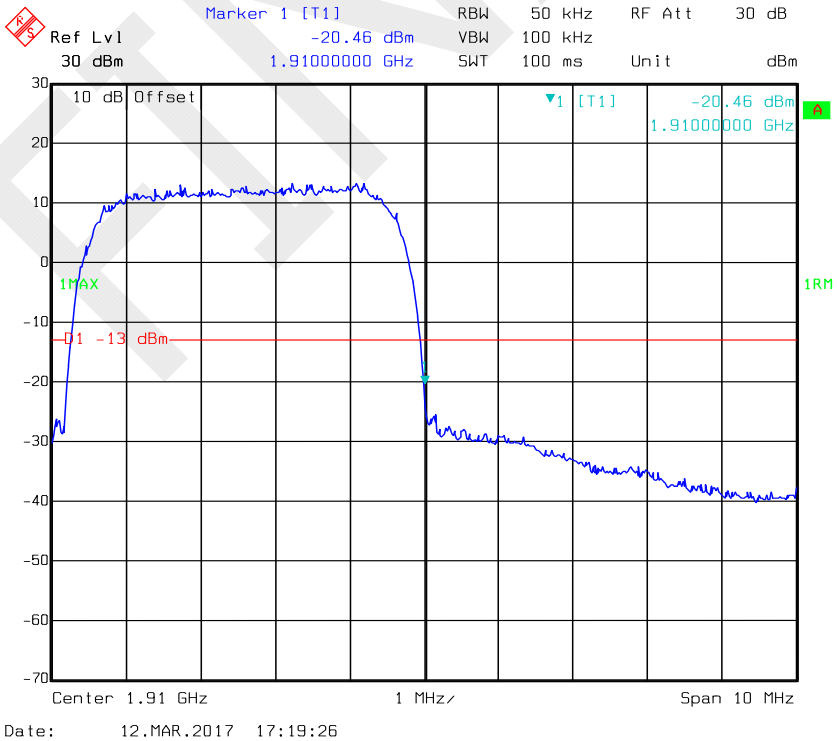
EDGE 1900, Right Band Edge



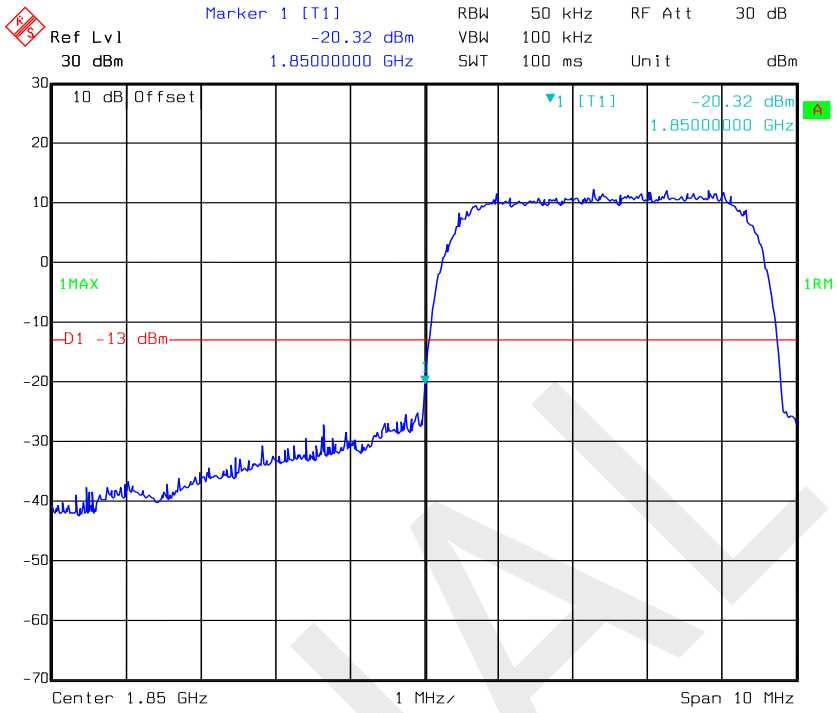
REL99 Band II, Left Band Edge



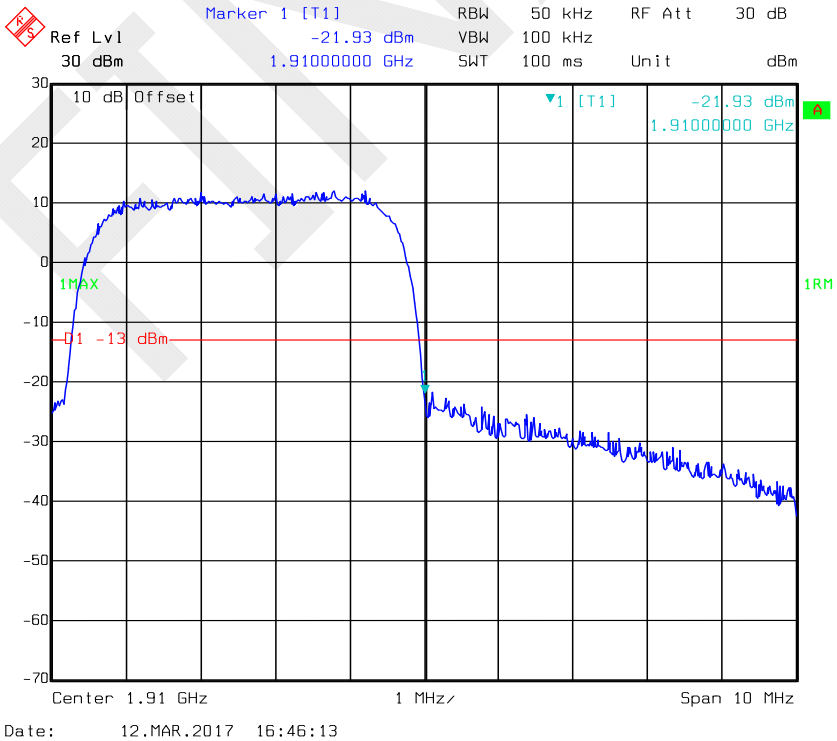
REL99 Band II, Right Band Edge



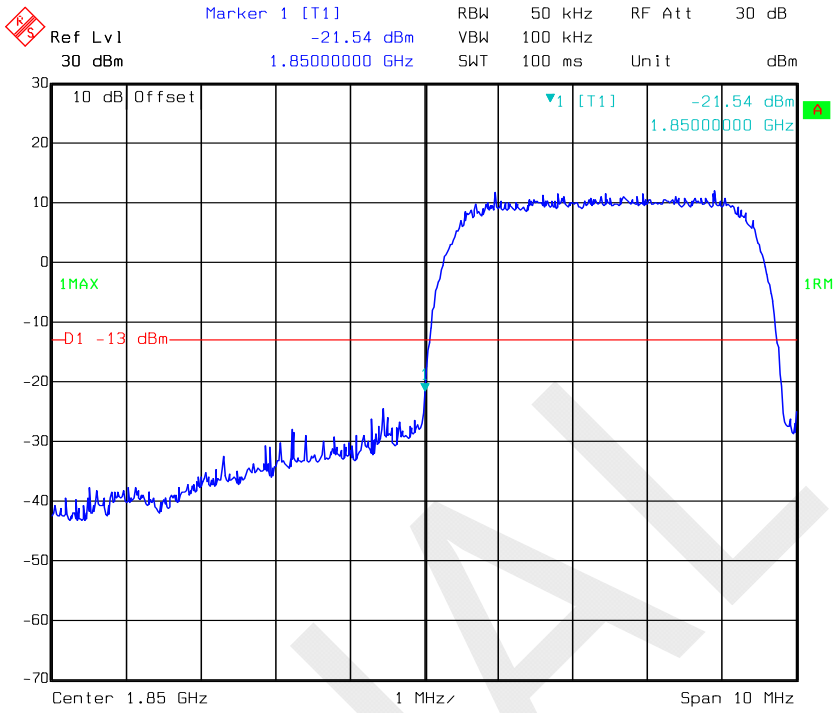
HSDPA Band II, Left Band Edge



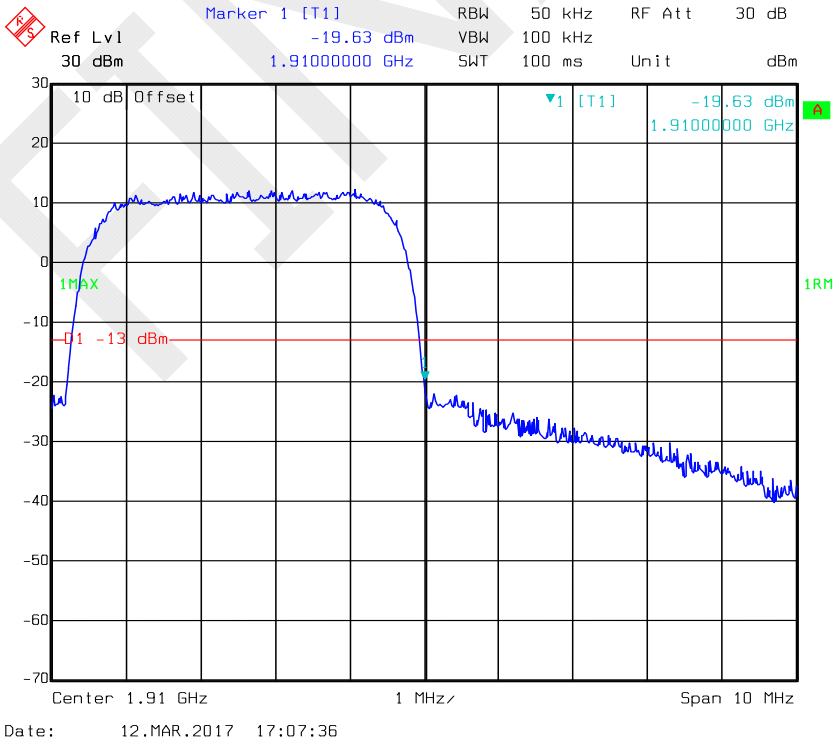
HSDPA Band II, Right Band Edge



HSUPA Band II, Left Band Edge

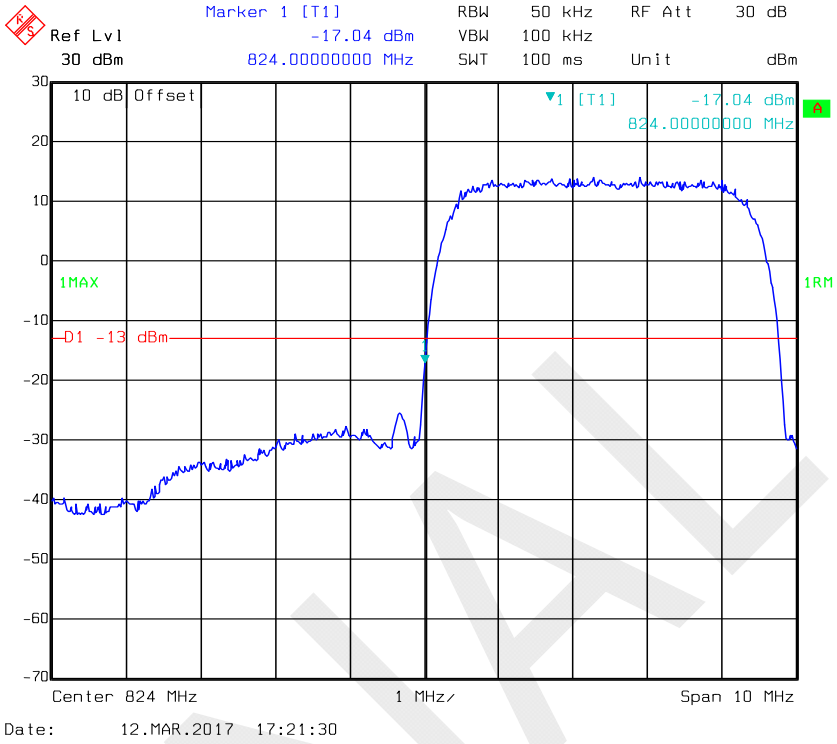


HSUPA Band II, Right Band Edge

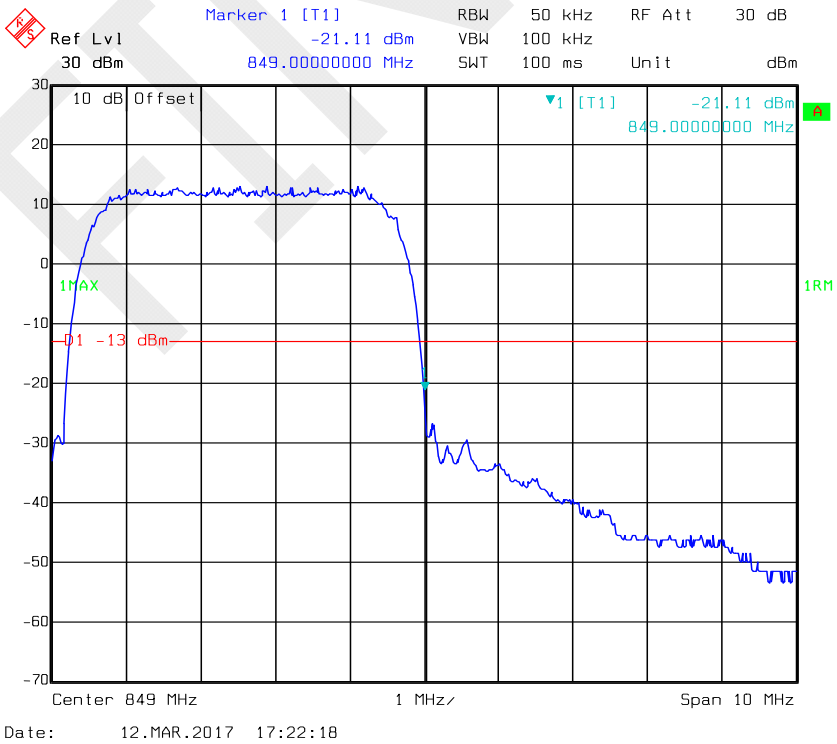


WCDMA Band V

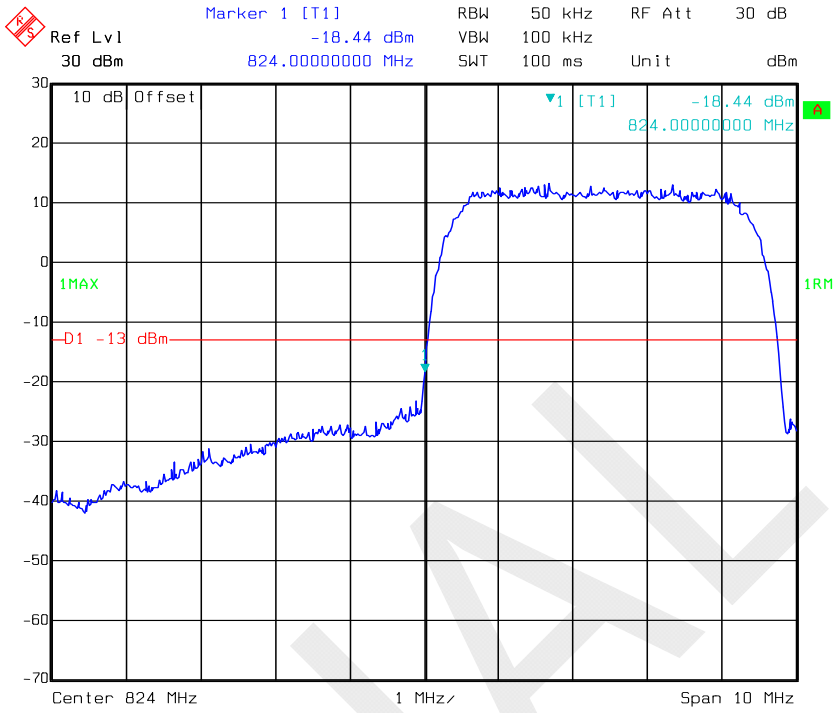
REL99 Band V, Left Band Edge



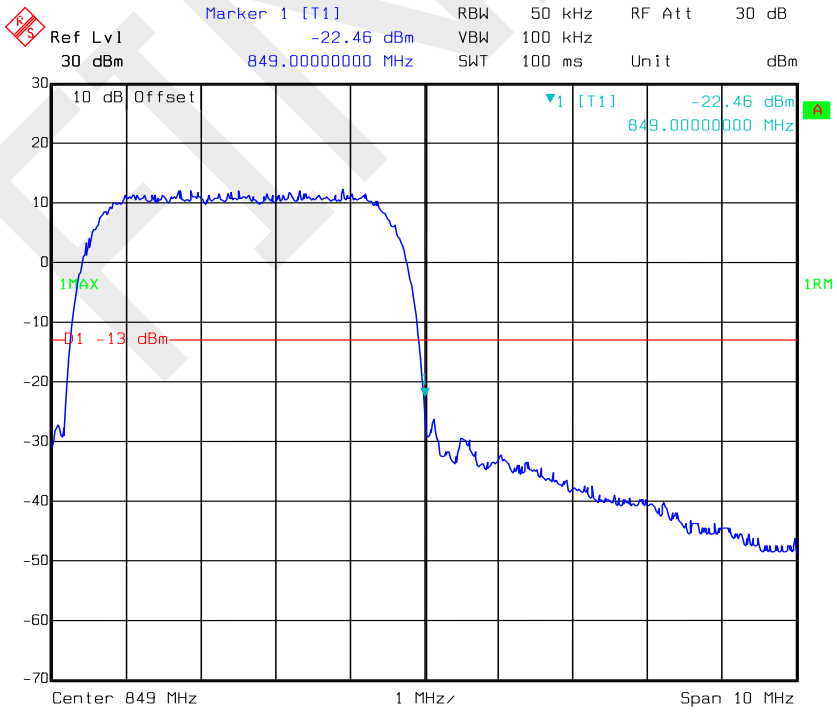
REL99 Band V Right Band Edge



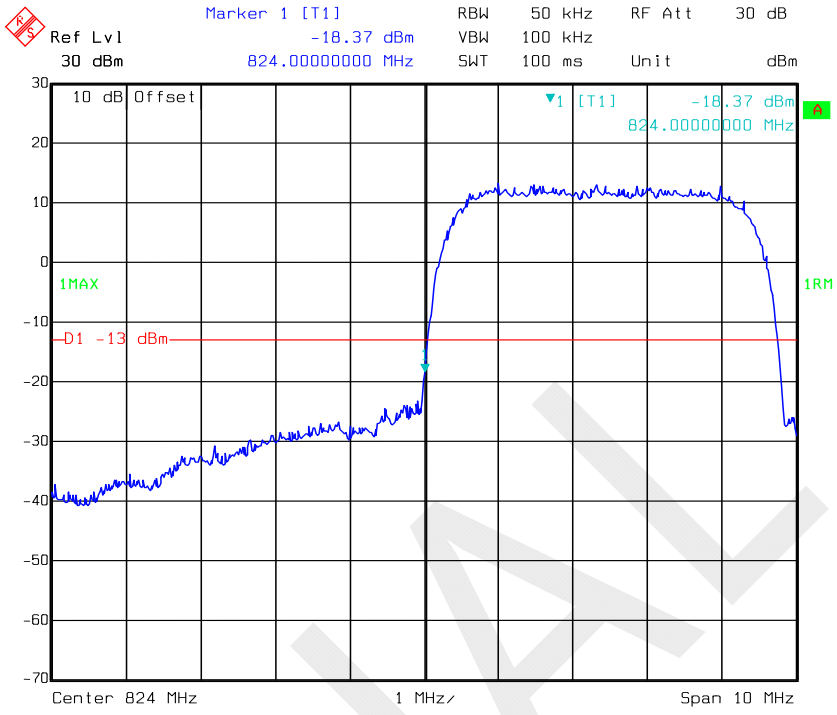
HSDPA Band V, Left Band Edge



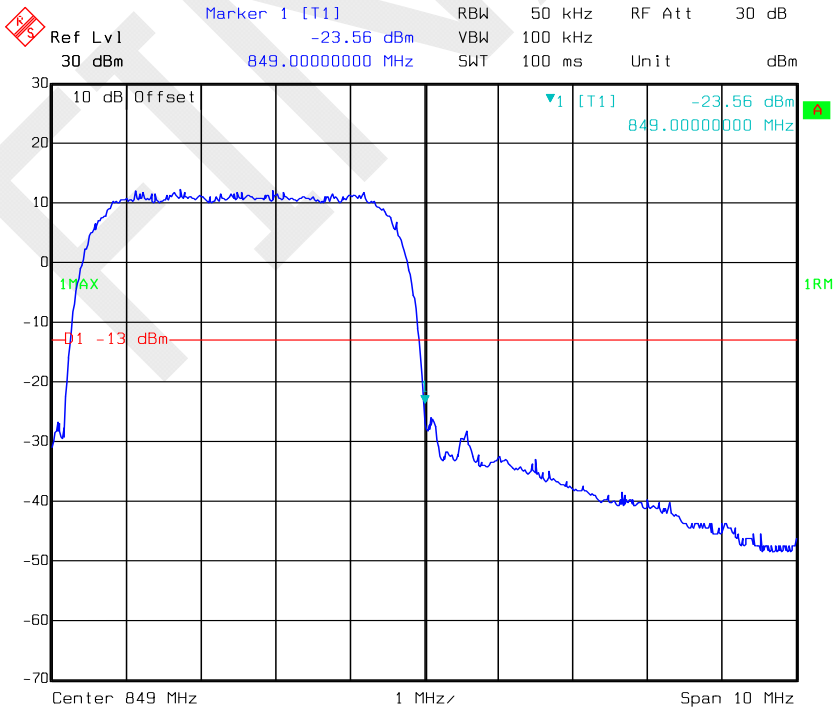
HSDPA Band V, Right Band Edge



HSUPA Band V, Left Band Edge

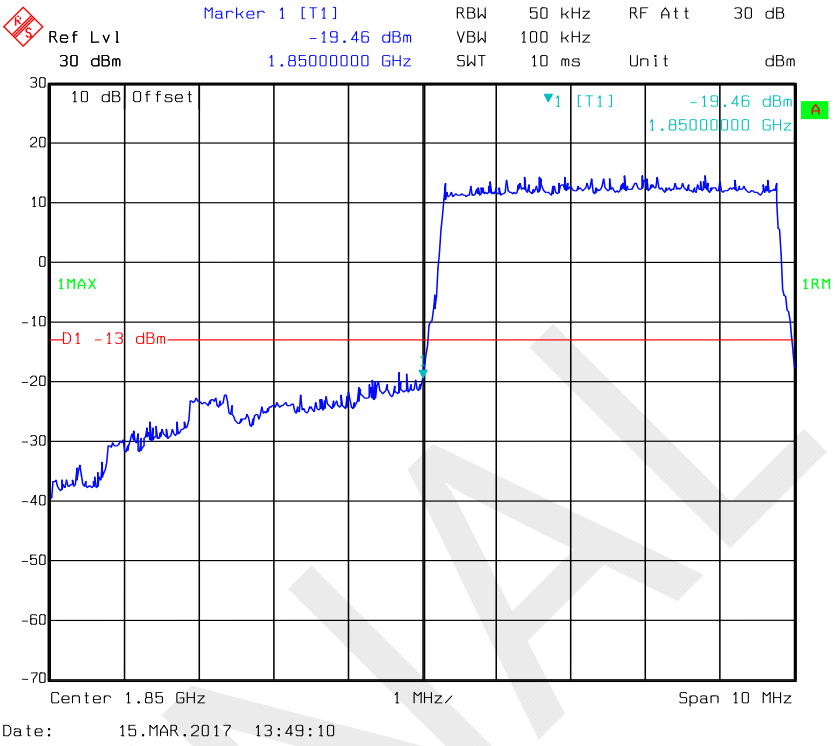


HSUPA Band V, Right Band Edge

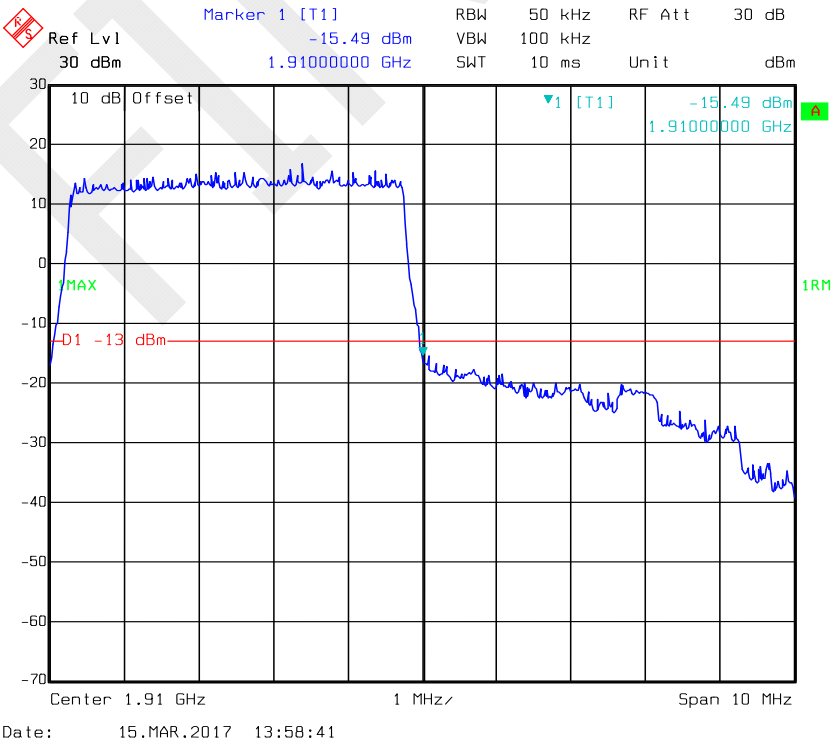


LTE Band II

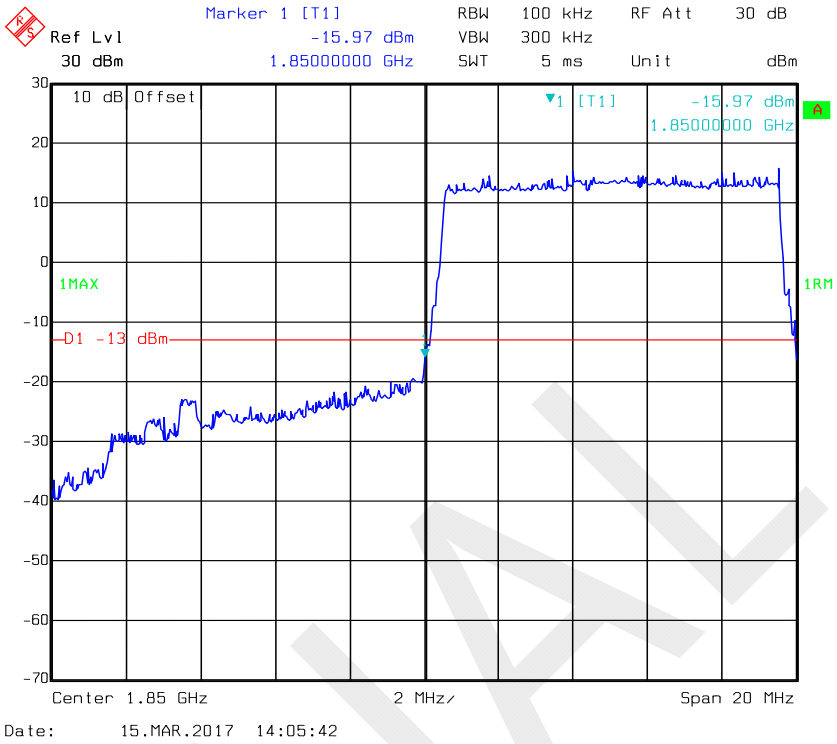
QPSK_5MHz_ 25 RB_ Left



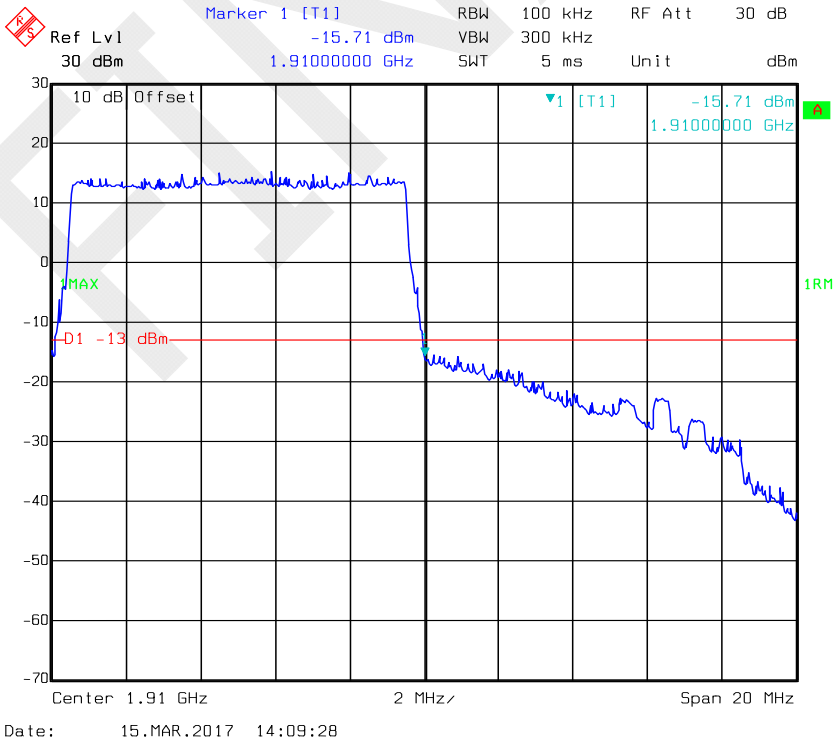
QPSK_5MHz_ 25 RB_ Right



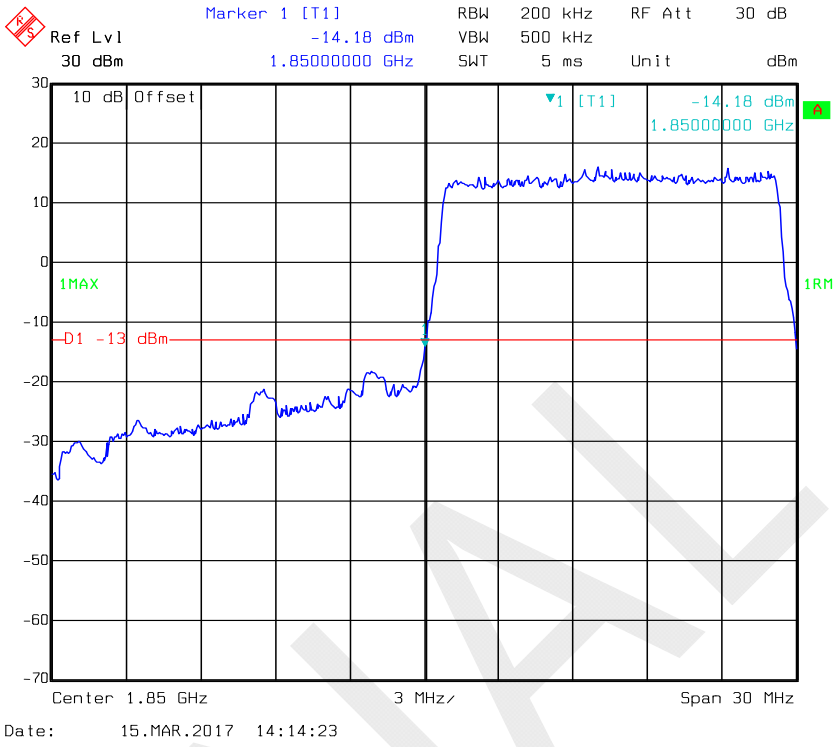
QPSK_10MHz_ 50 RB_ Left



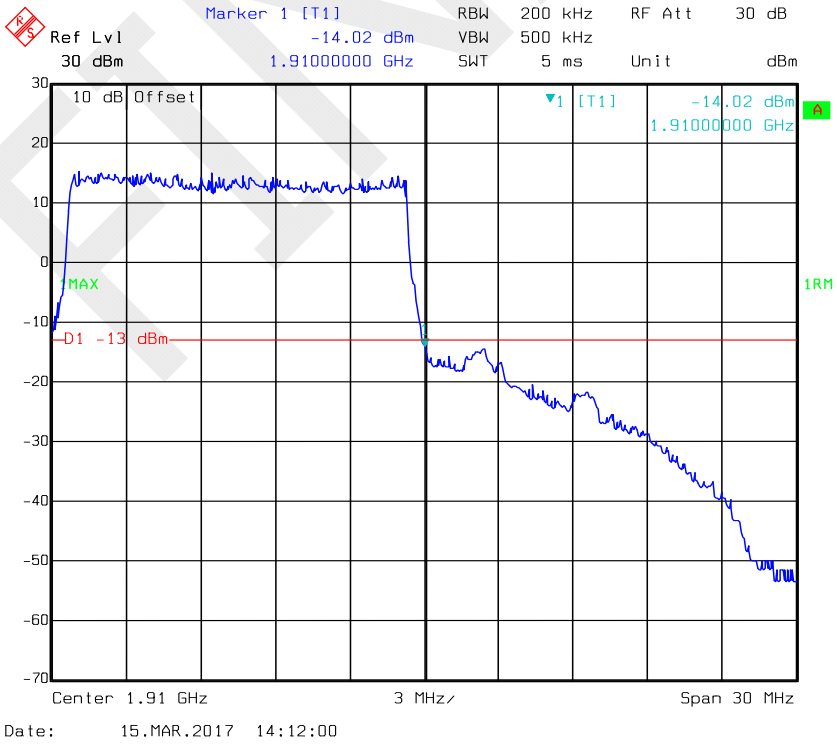
QPSK_10MHz_ 50 RB_ Right



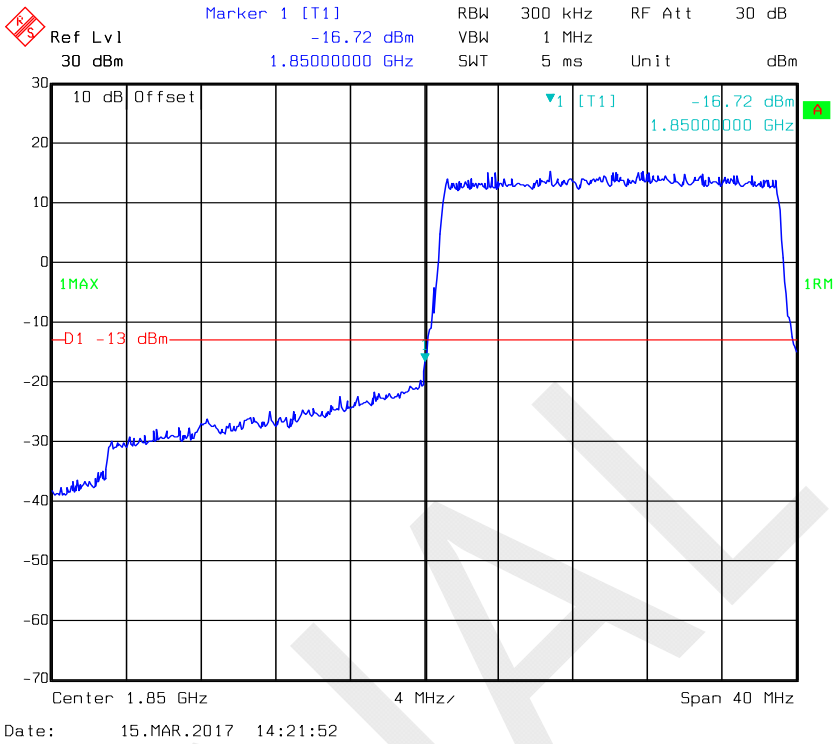
QPSK_15MHz_ 75 RB_ Left



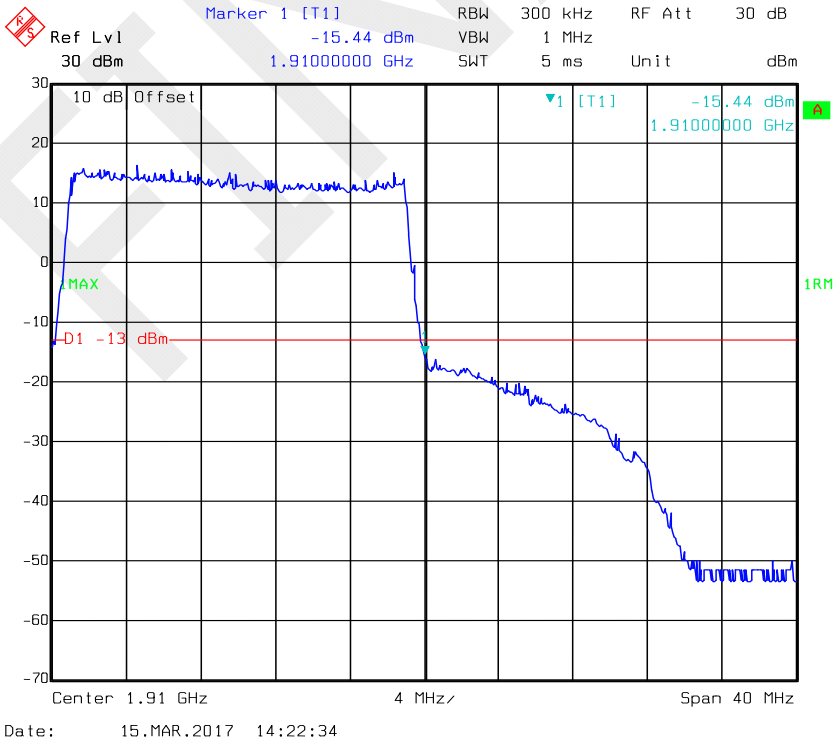
QPSK_15MHz_ 75 RB_ Right



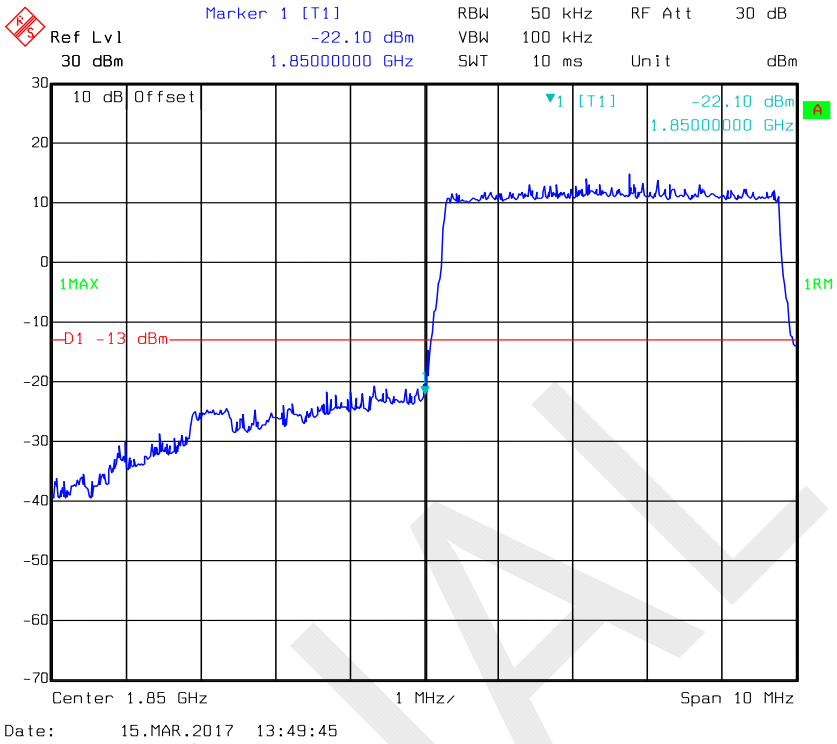
QPSK_20MHz_ FULL RB_ Left



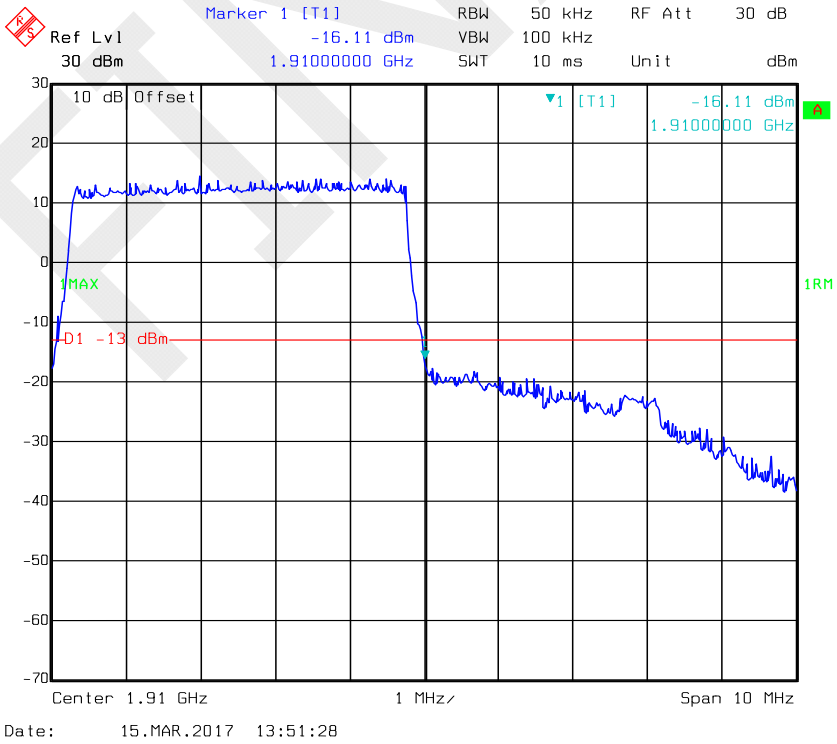
QPSK_20MHz_ FULL RB_ Right



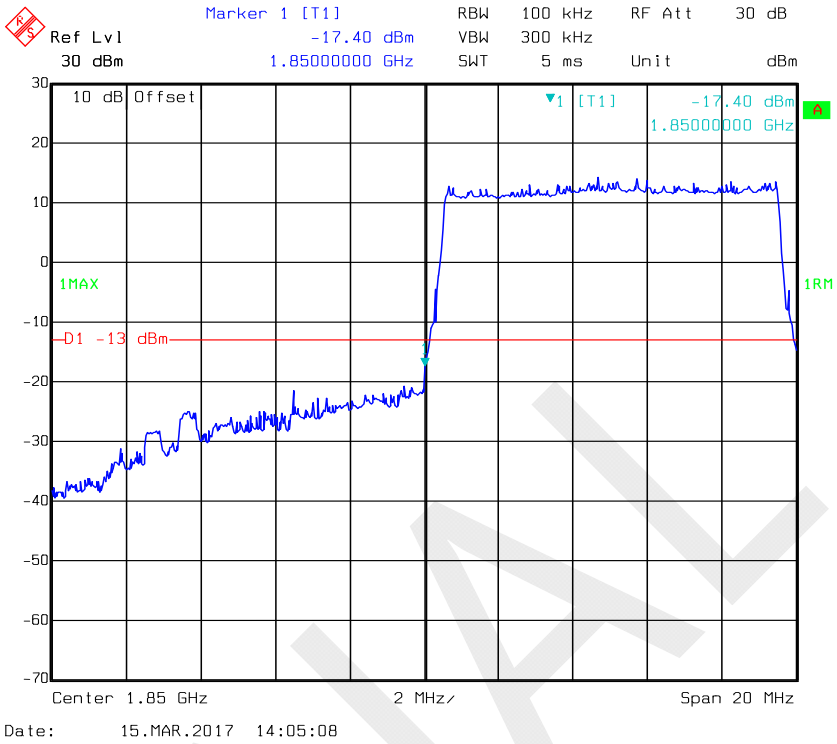
16QAM_5MHz_ 25 RB_ Left



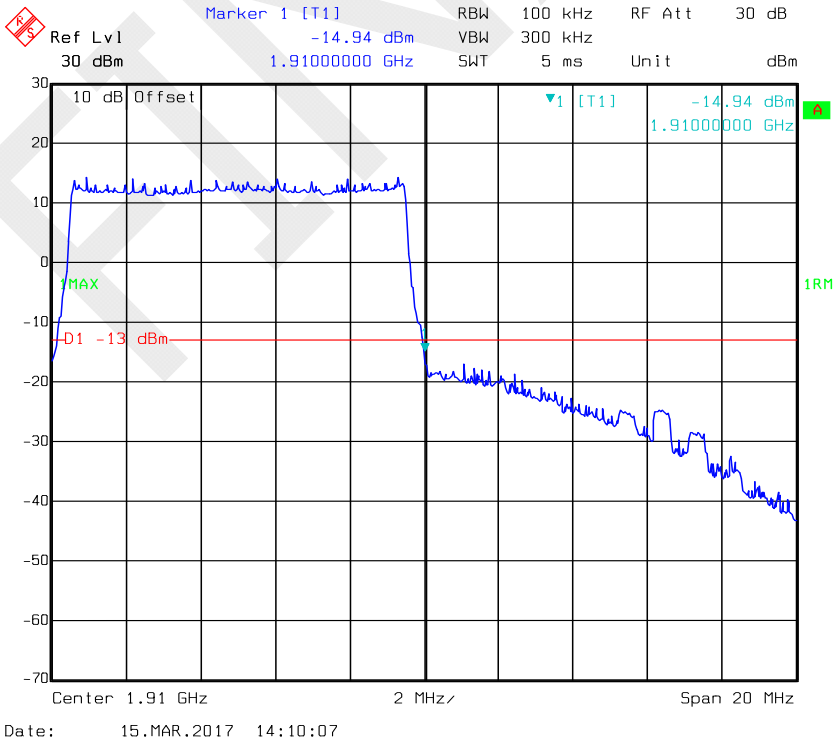
16QAM_5MHz_ 25 RB_ Right



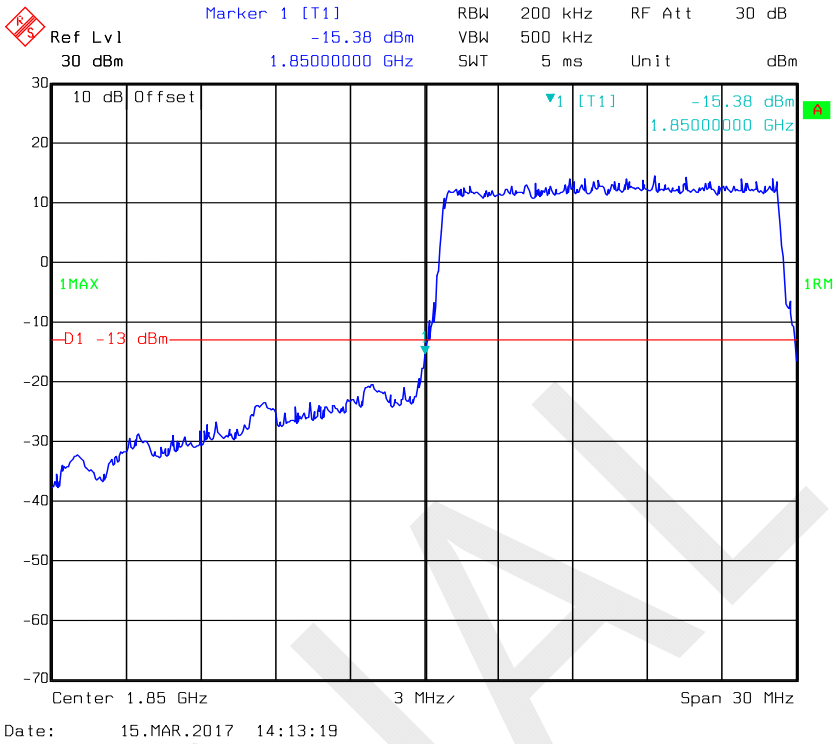
16QAM_10MHz_ 50 RB_ Left



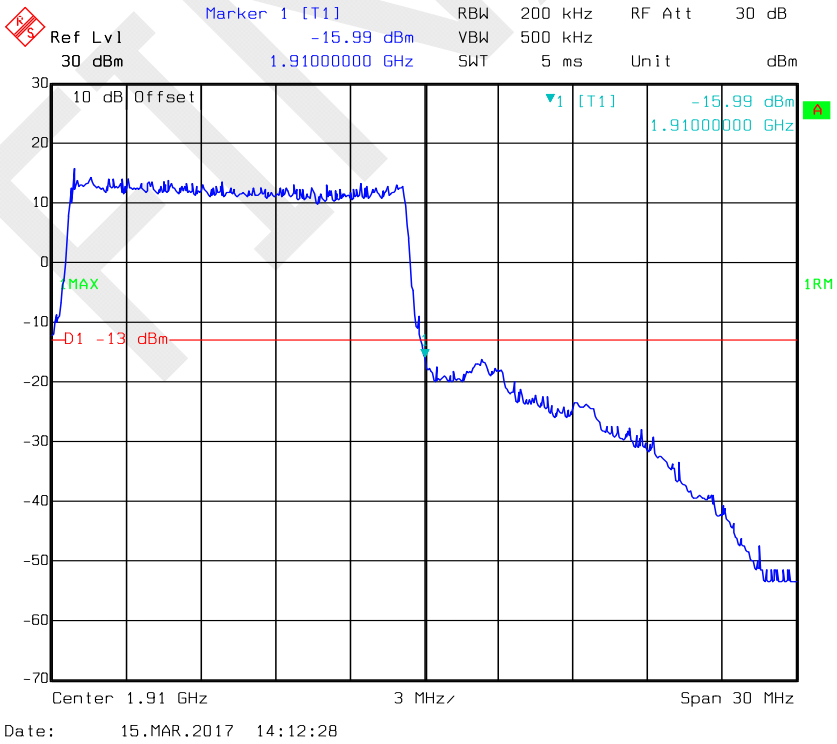
16QAM_10MHz_ 50 RB_ Right



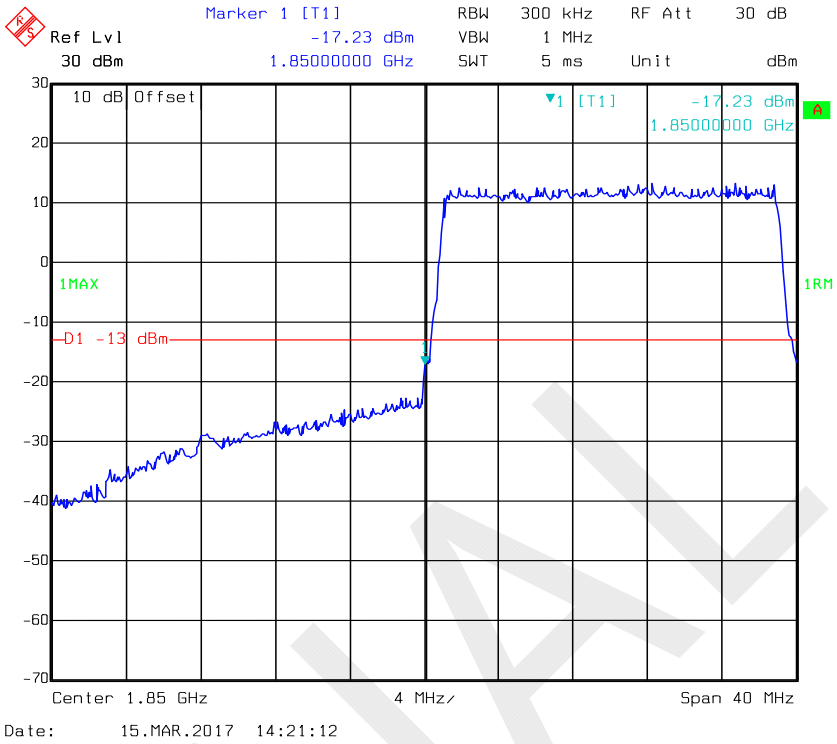
16QAM_15MHz_ 75 RB_ Left



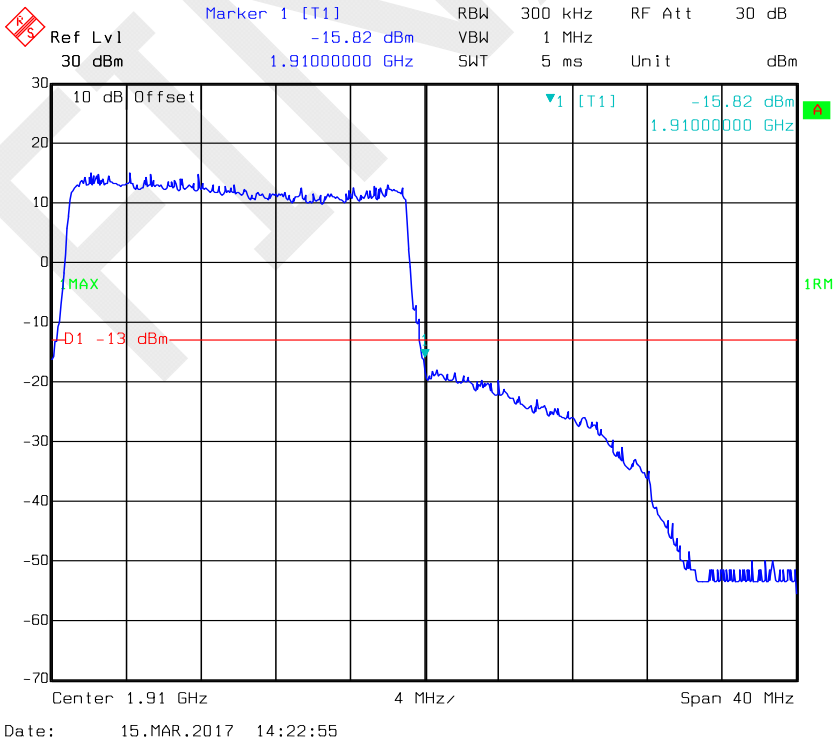
16QAM_15MHz_ 75 RB_ Right



16QAM_20MHz_ FULL RB_ Left

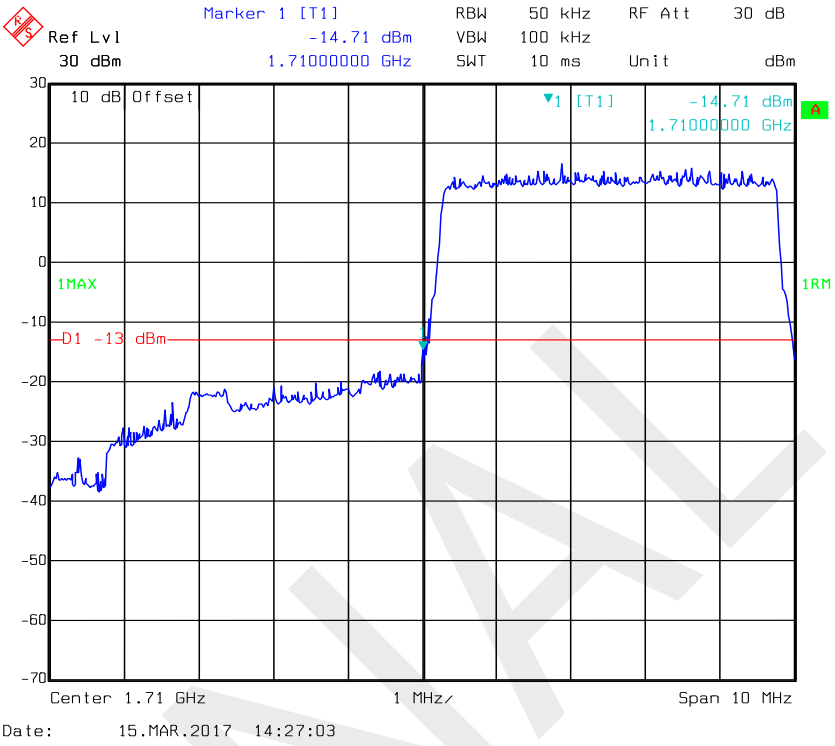


16QAM_20MHz_ FULL RB_ Right

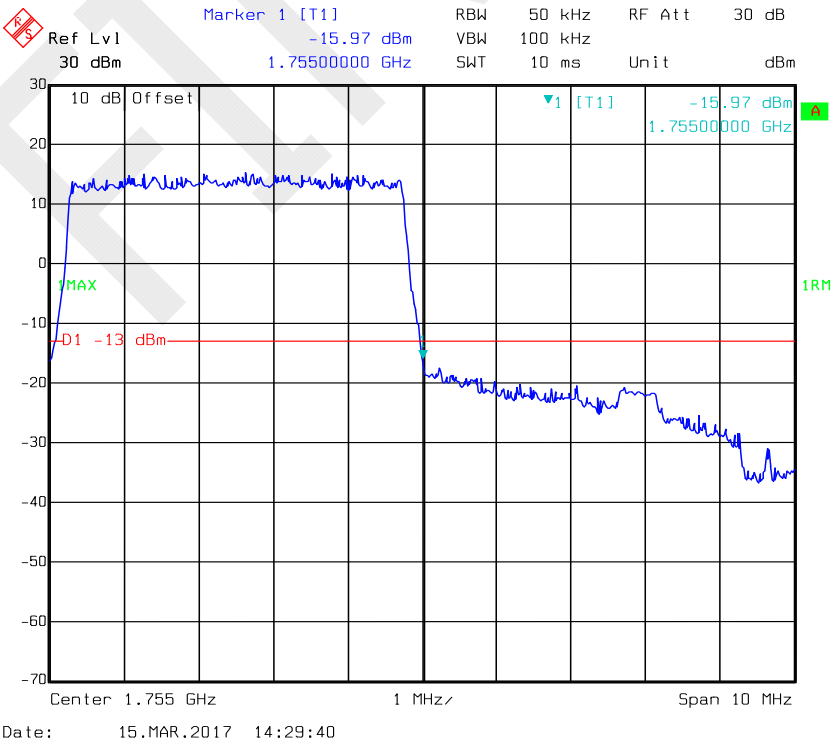


LTE Band IV

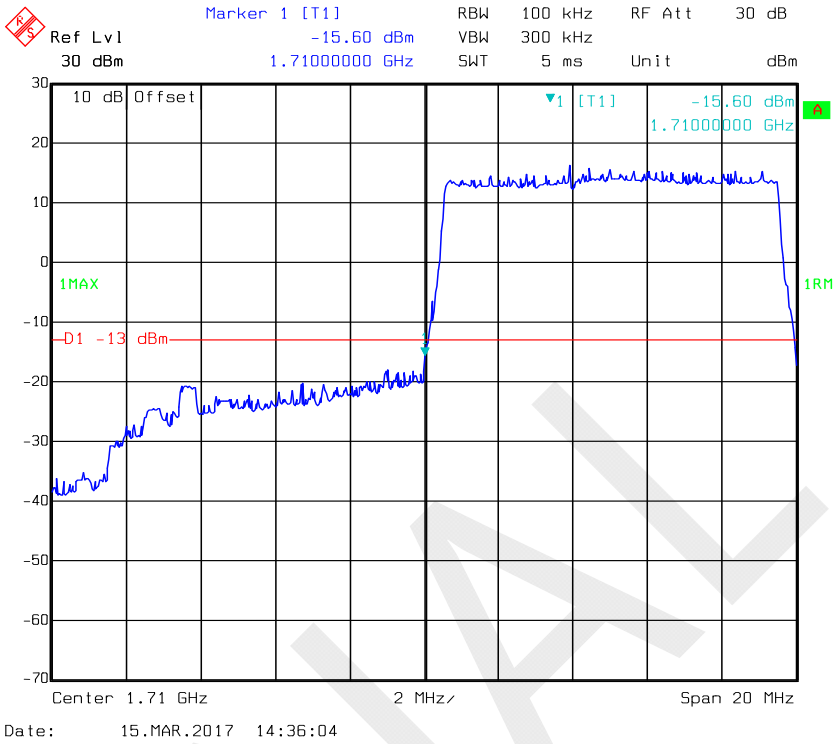
QPSK_5MHz_ 25 RB_ Left



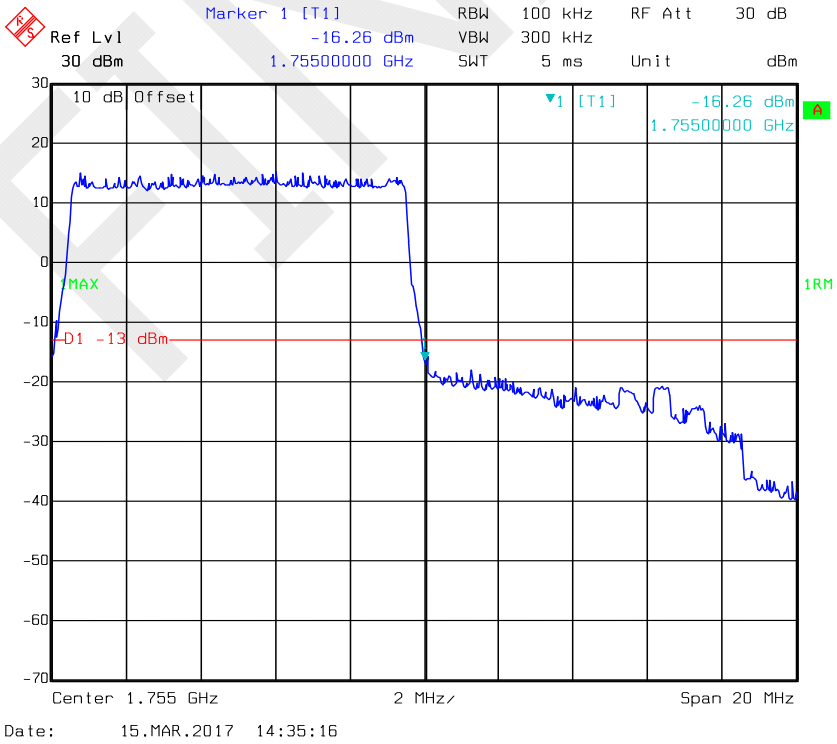
QPSK_5MHz_ 25 RB_ Right



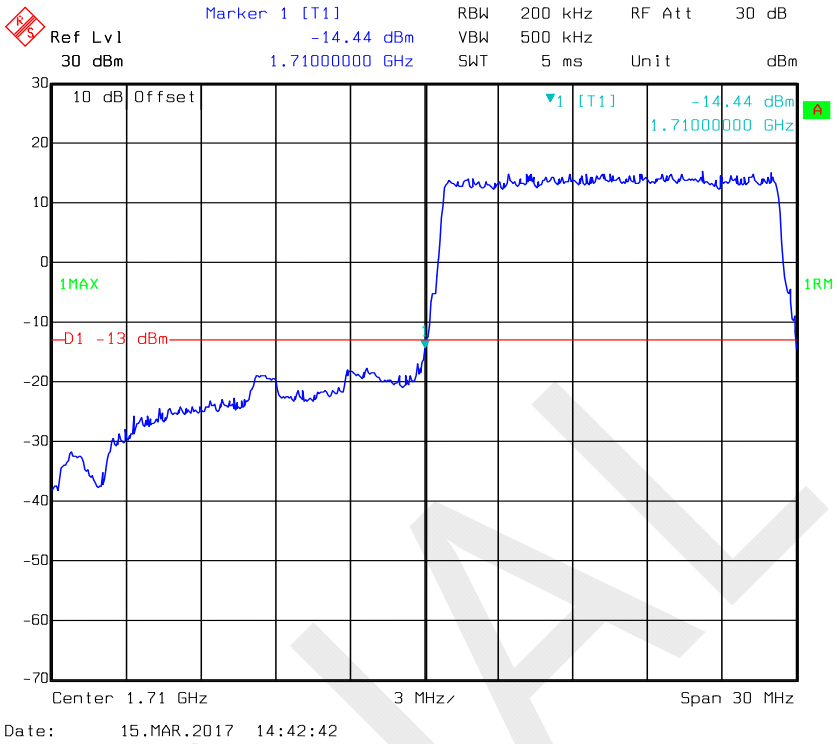
QPSK_10MHz_ 50 RB_ Left



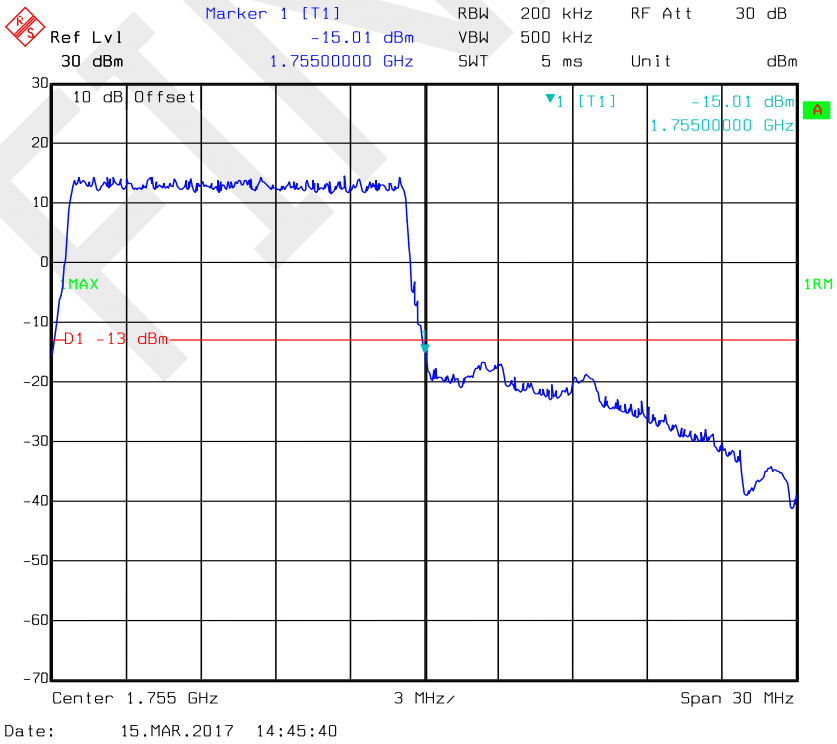
QPSK_10MHz_ 50 RB_ Right



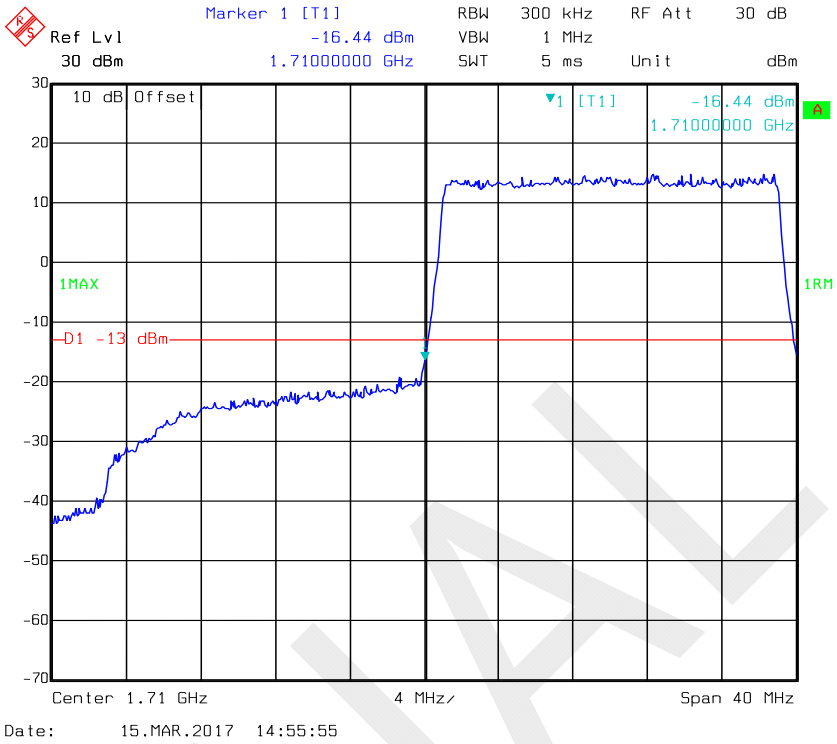
QPSK_15MHz_ 75 RB_ Left



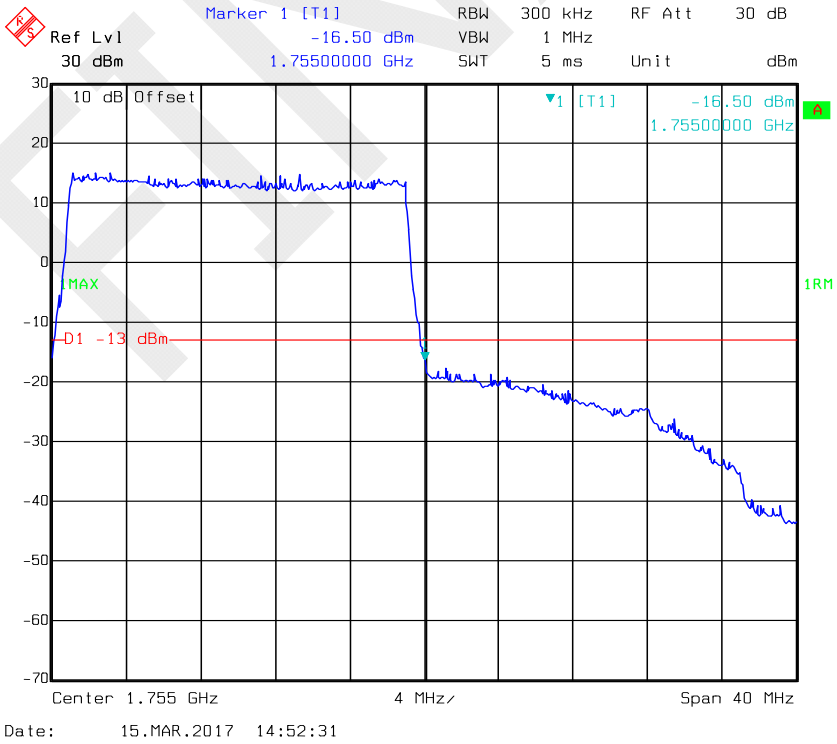
QPSK_15MHz_ 75 RB_ Right



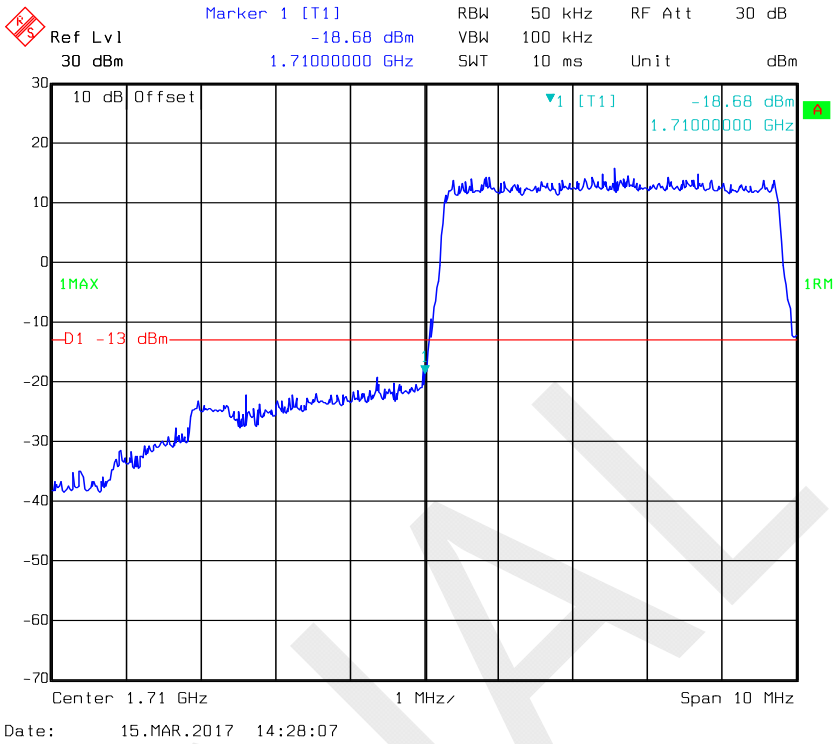
QPSK_20MHz_ FULL RB_ Left



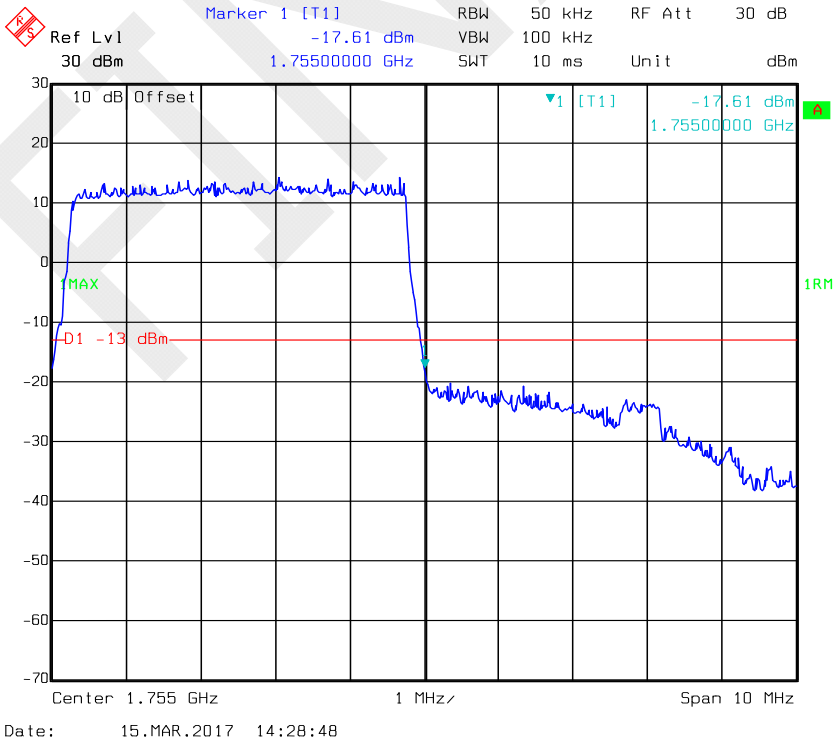
QPSK_20MHz_ FULL RB_ Right



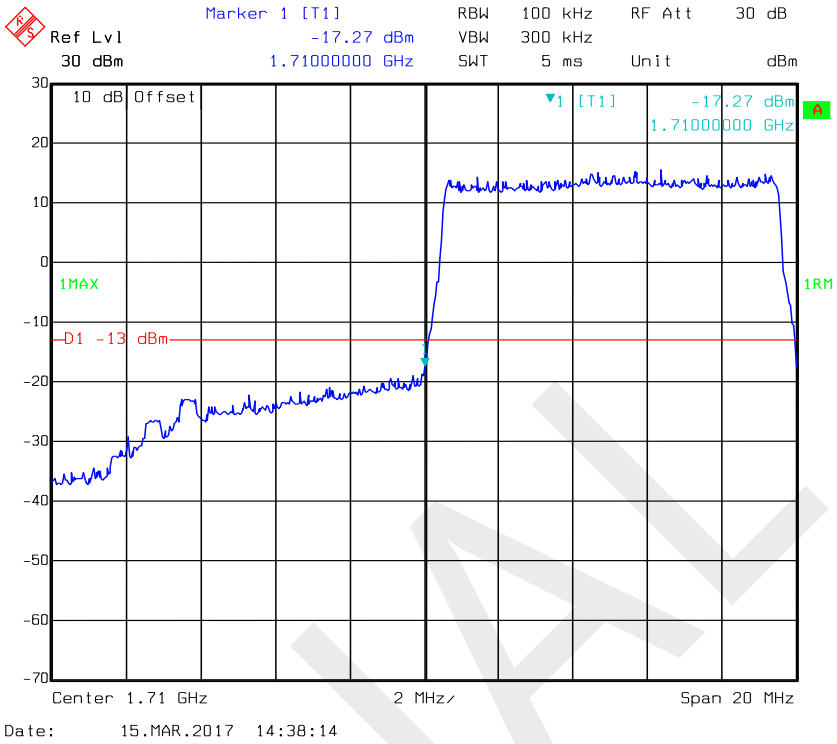
16QAM_5MHz_ 25 RB_ Left



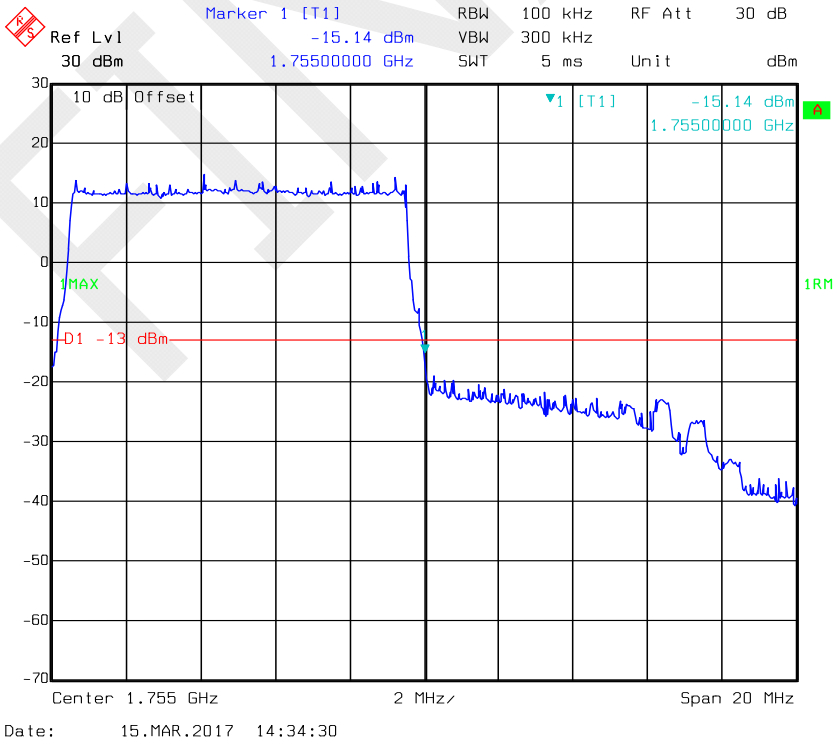
16QAM_5MHz_ 25 RB_ Right



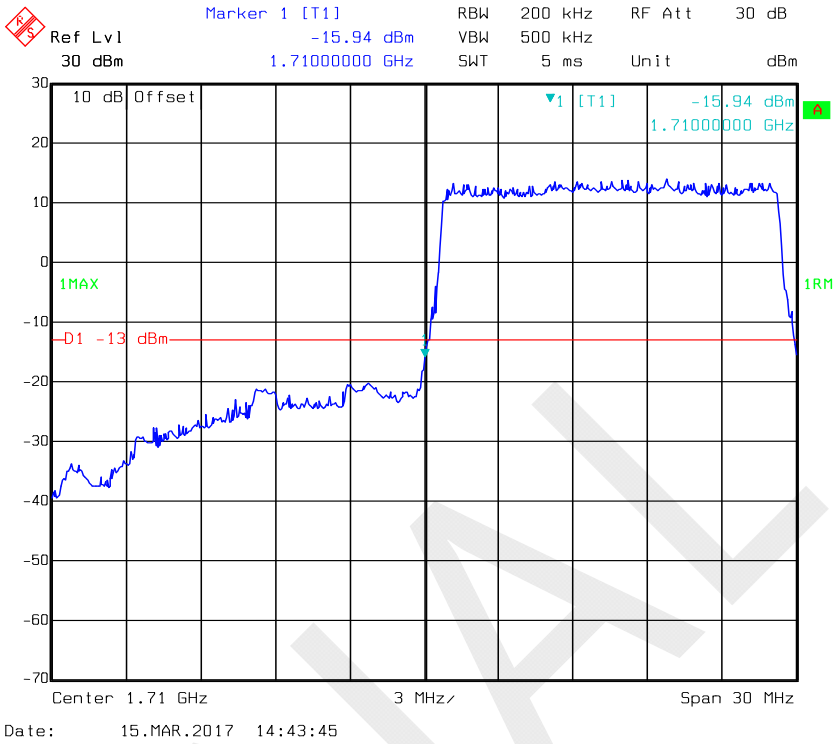
16QAM_10MHz_ 50 RB_ Left



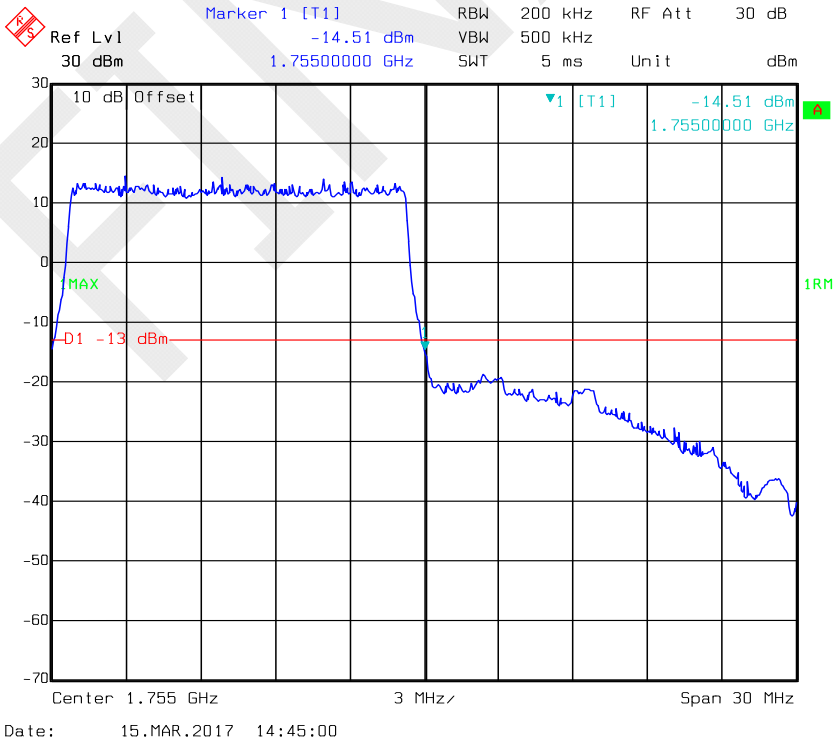
16QAM_10MHz_ 50 RB_ Right



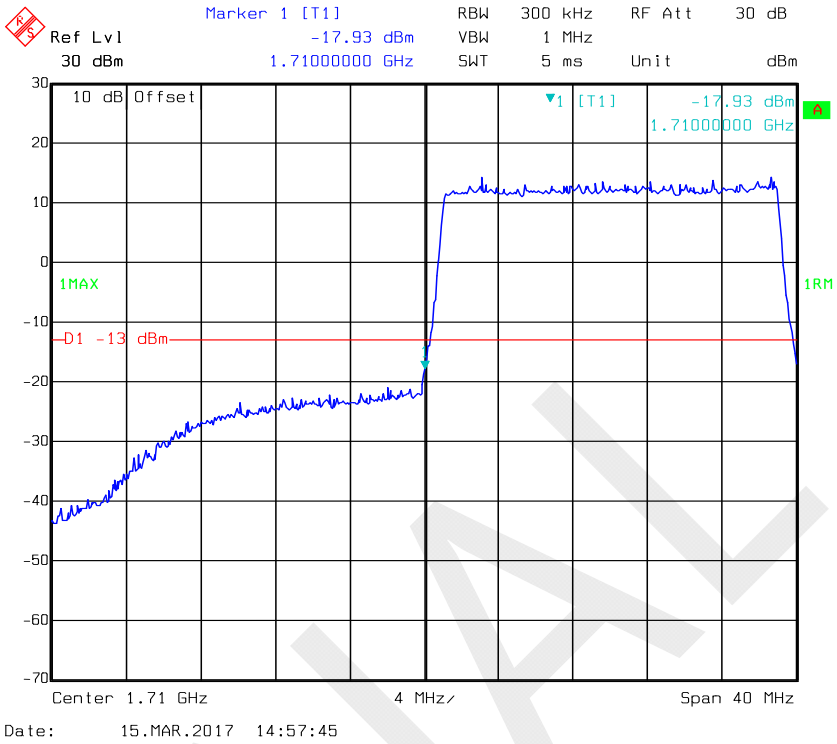
16QAM_15MHz_ 75 RB_ Left



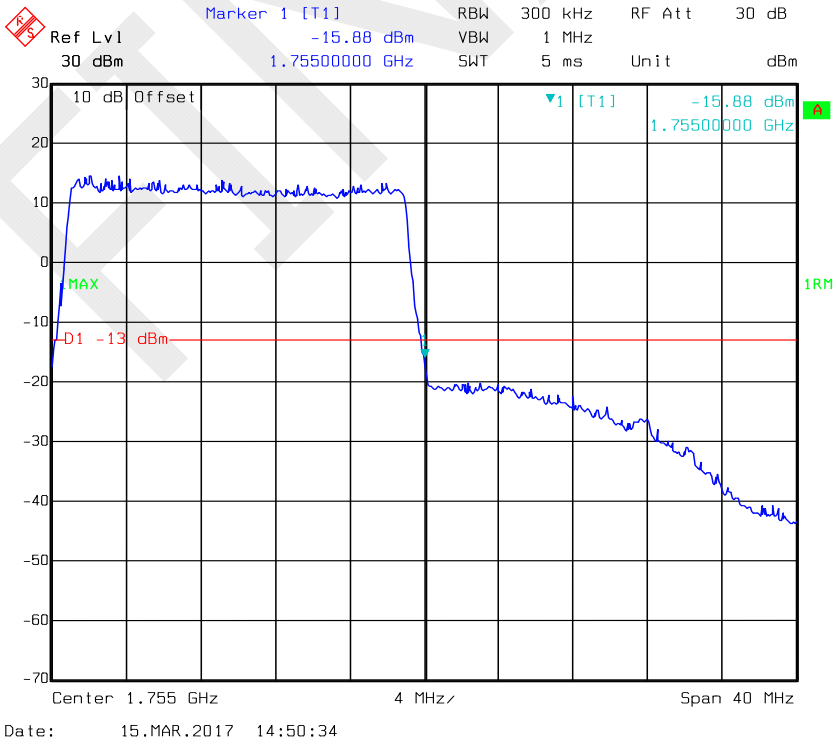
16QAM_15MHz_ 75 RB_ Right



16QAM_20MHz_ FULL RB_ Left

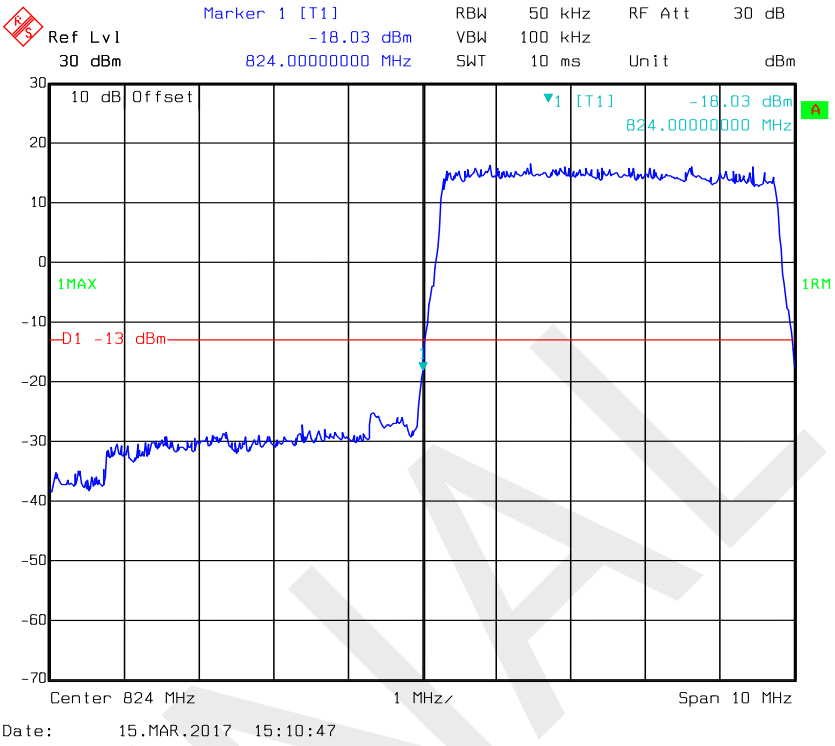


16QAM_20MHz_ FULL RB_ Right

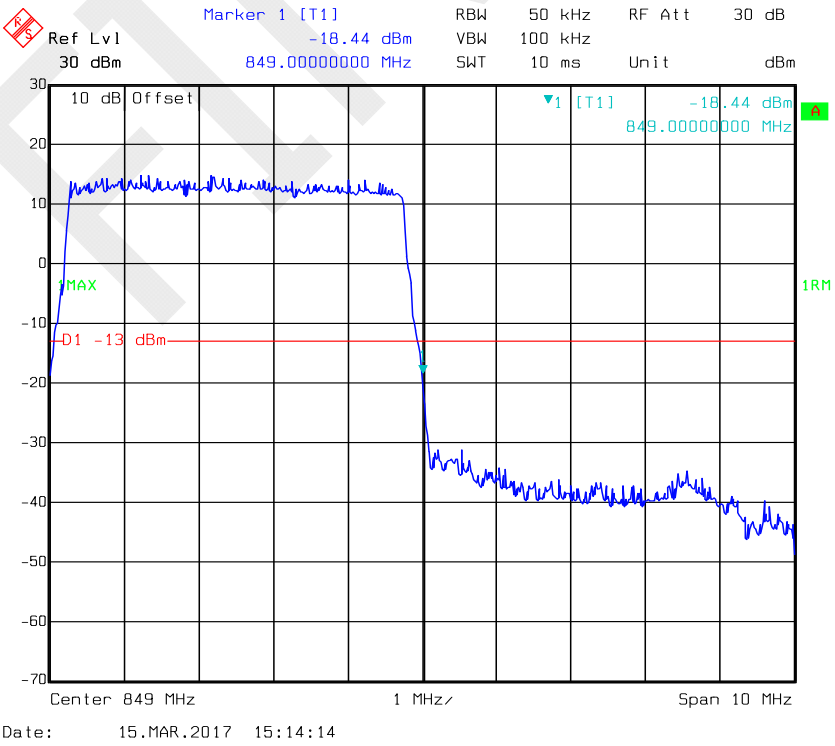


LTE Band V

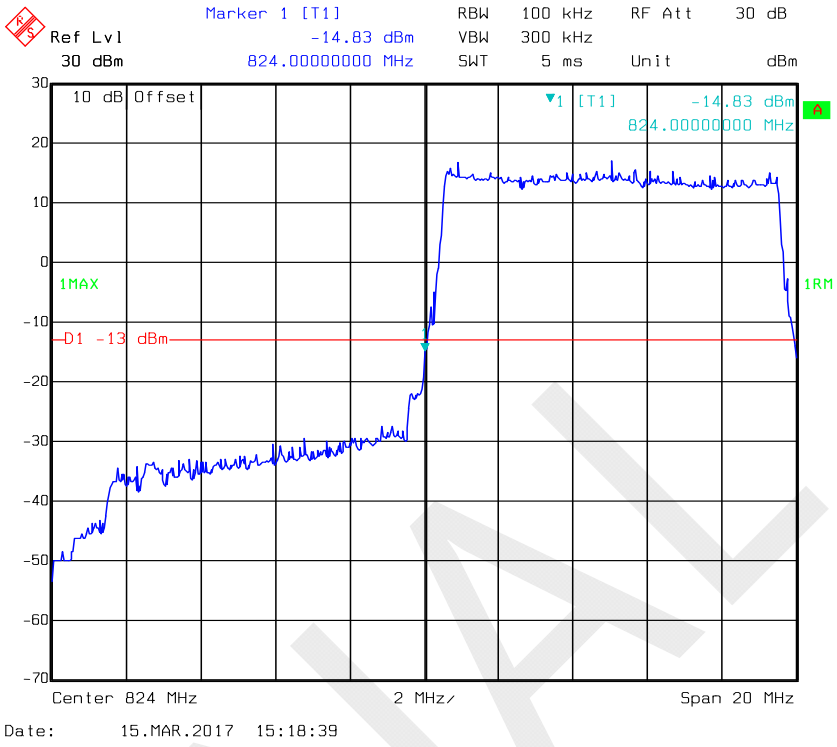
QPSK_5MHz_ 25 RB_ Left



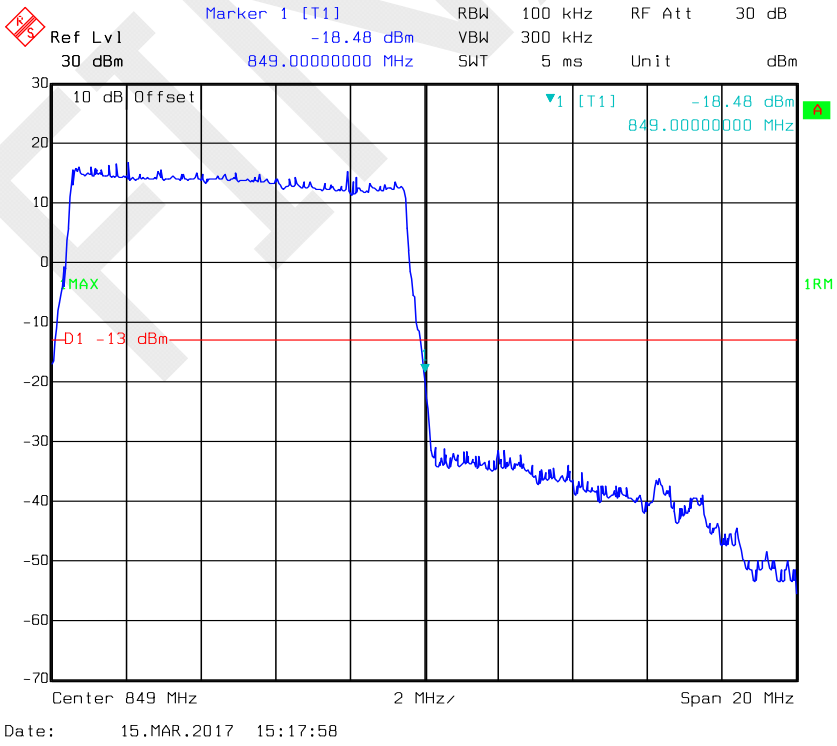
QPSK_5MHz_ 25 RB_ Right



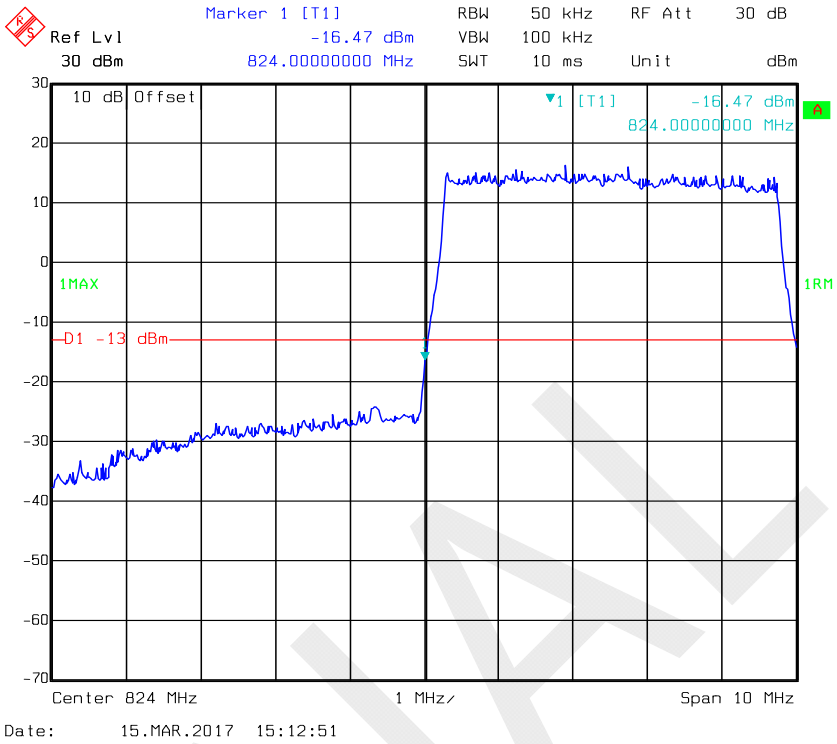
QPSK_10MHz_ 50 RB_ Left



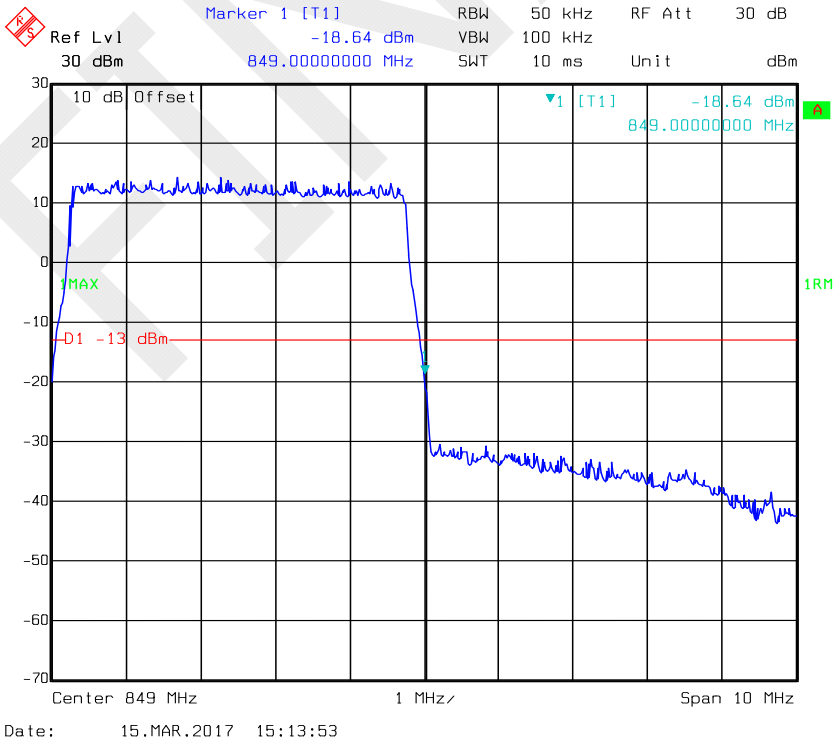
QPSK_10MHz_ 50 RB_ Right



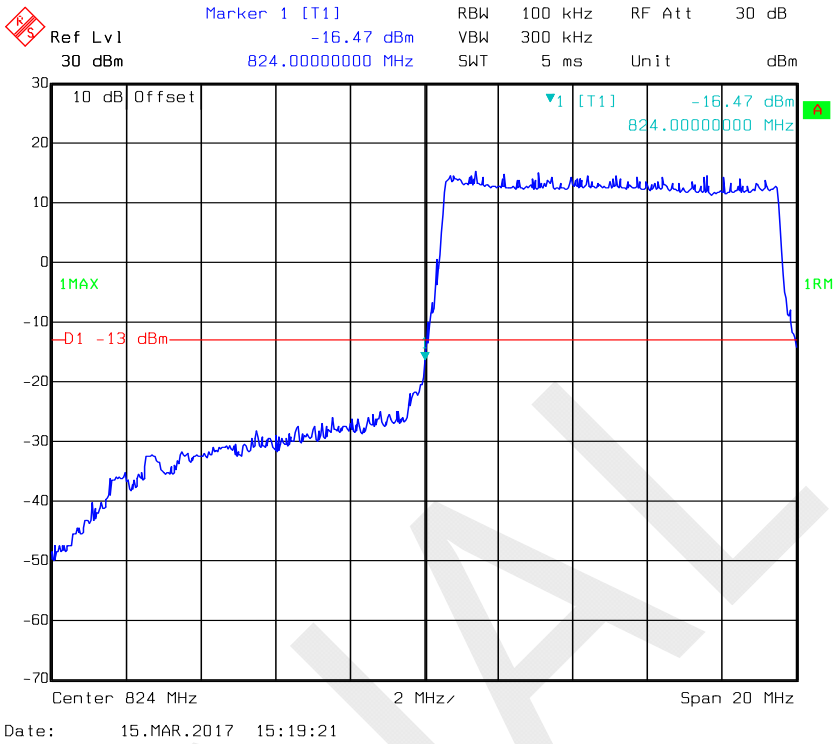
16QAM_5MHz_ 25 RB_ Left



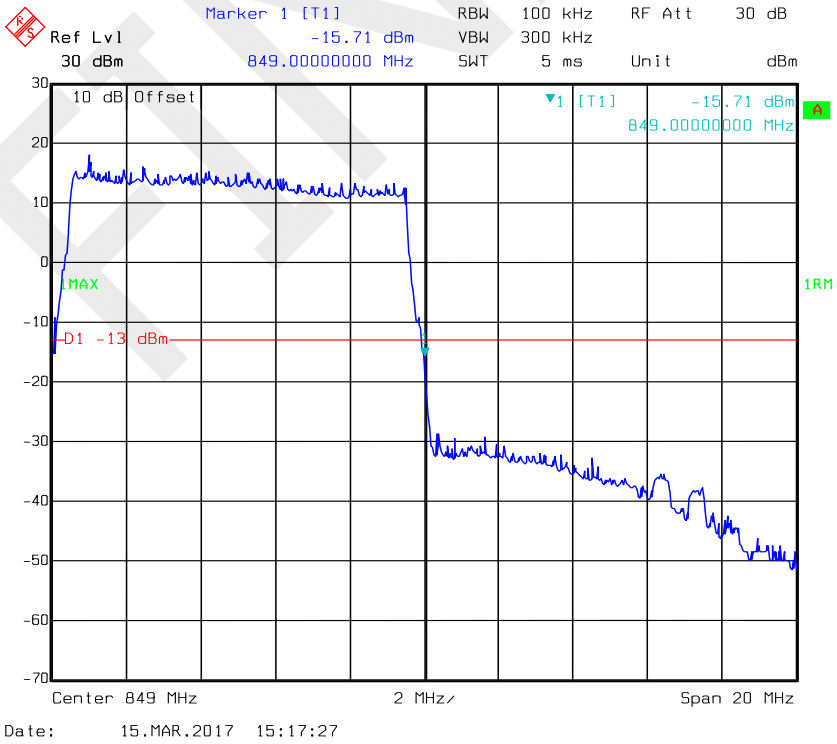
16QAM_5MHz_ 25 RB_ Right



16QAM_10MHz_ 50 RB_ Left

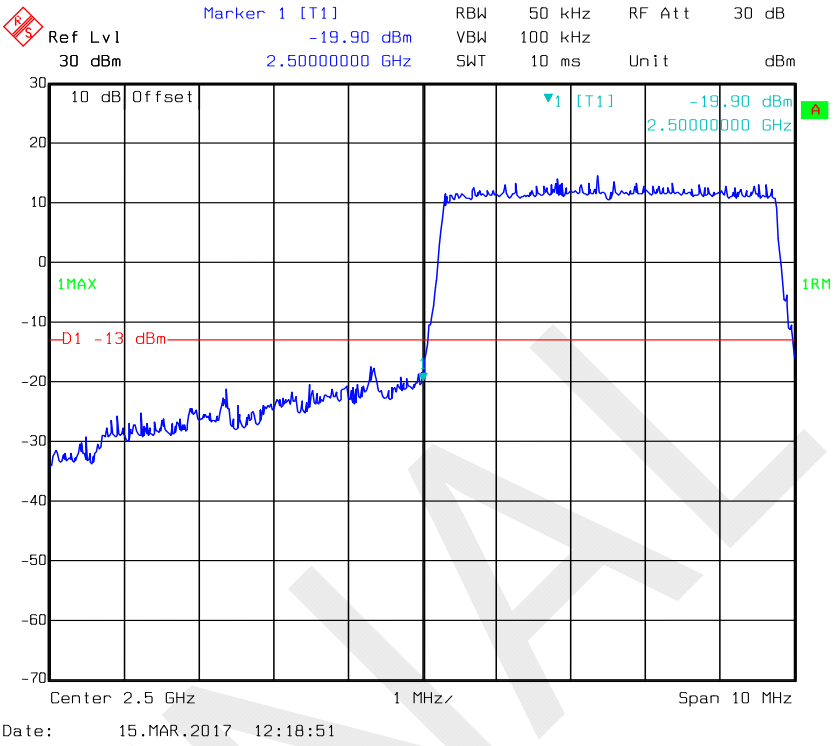


16QAM_10MHz_ 50 RB_ Right

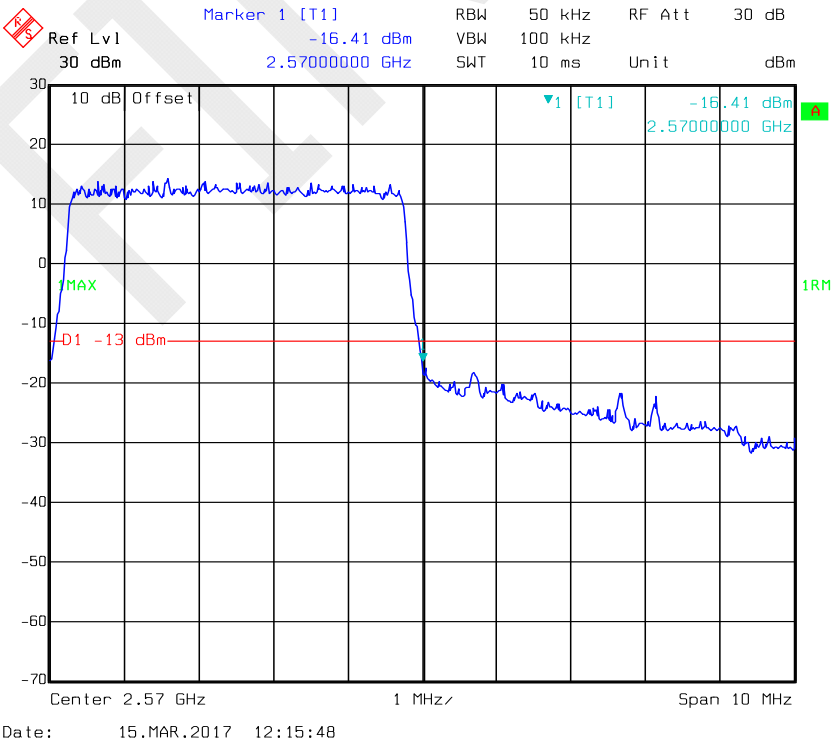


LTE Band VII

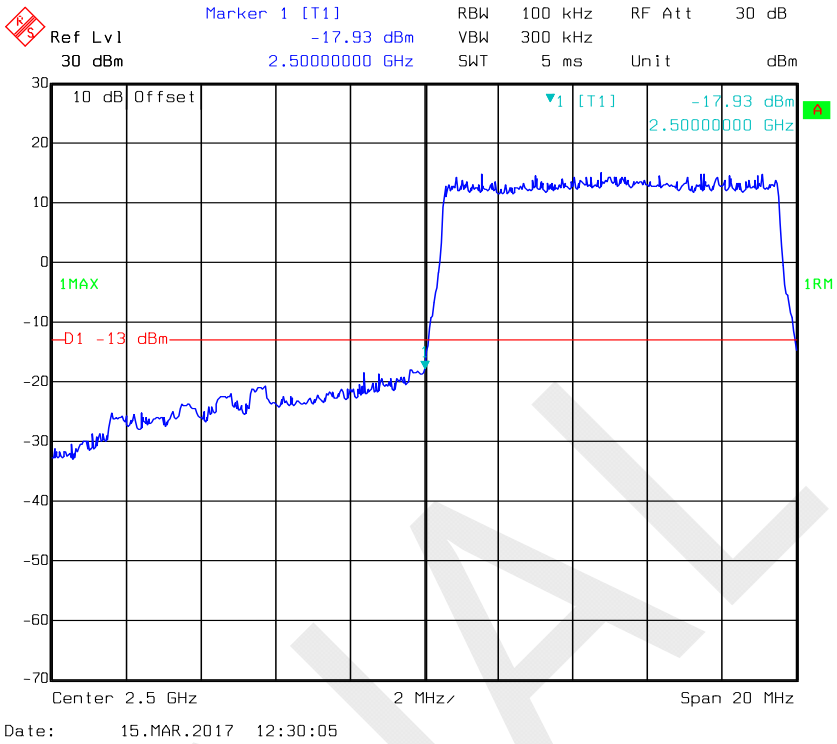
QPSK_5MHz_ 25 RB_ Left



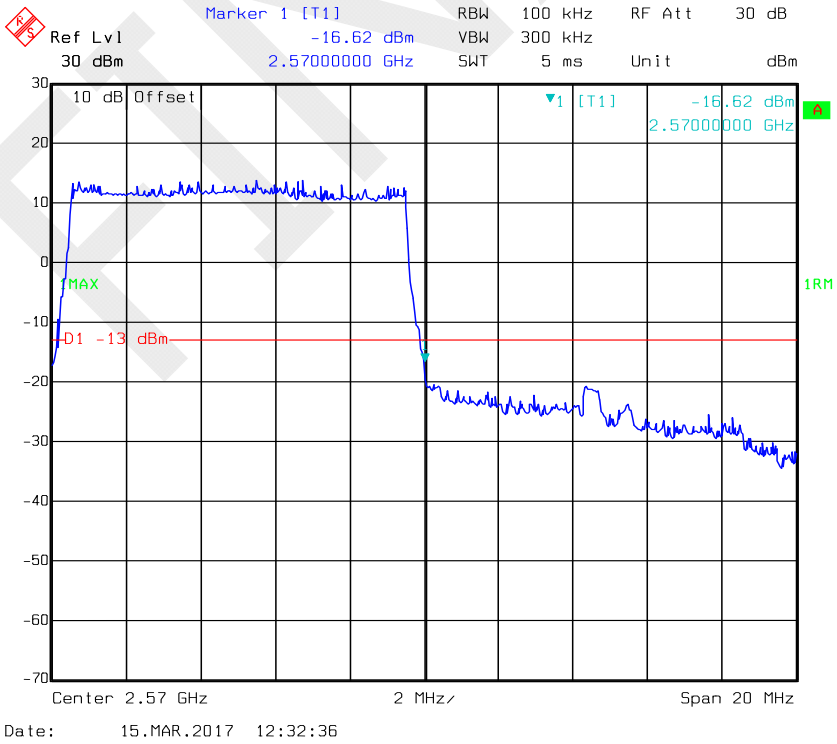
QPSK_5MHz_ 25 RB_ Right



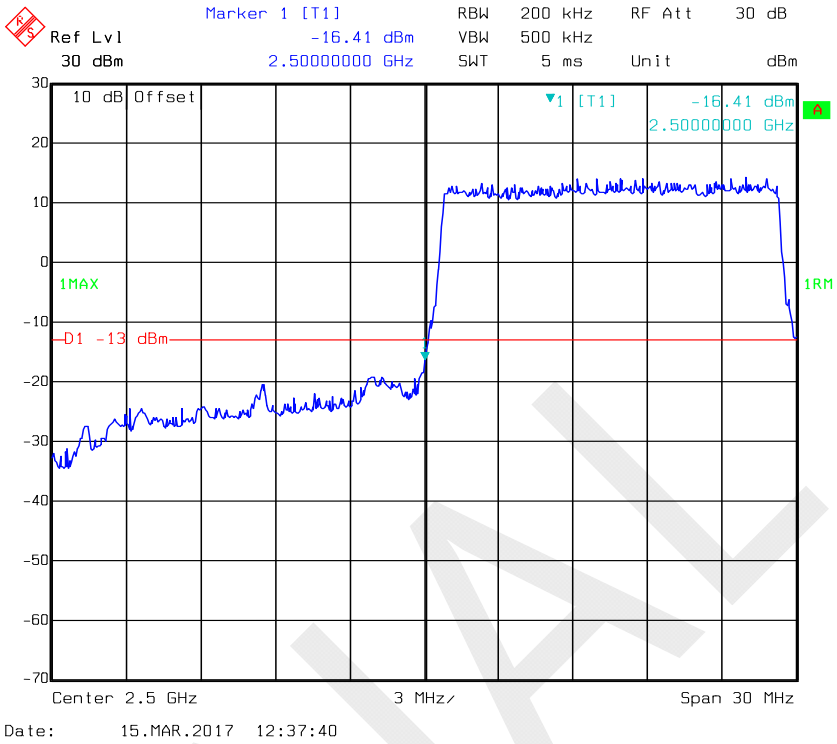
QPSK_10MHz_ 50 RB_ Left



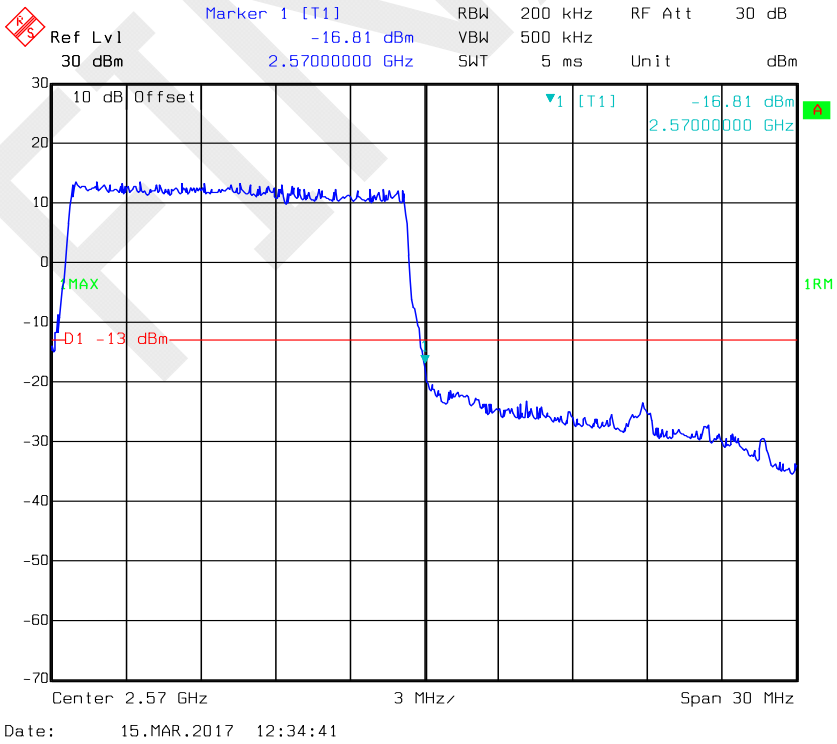
QPSK_10MHz_ 50 RB_ Right



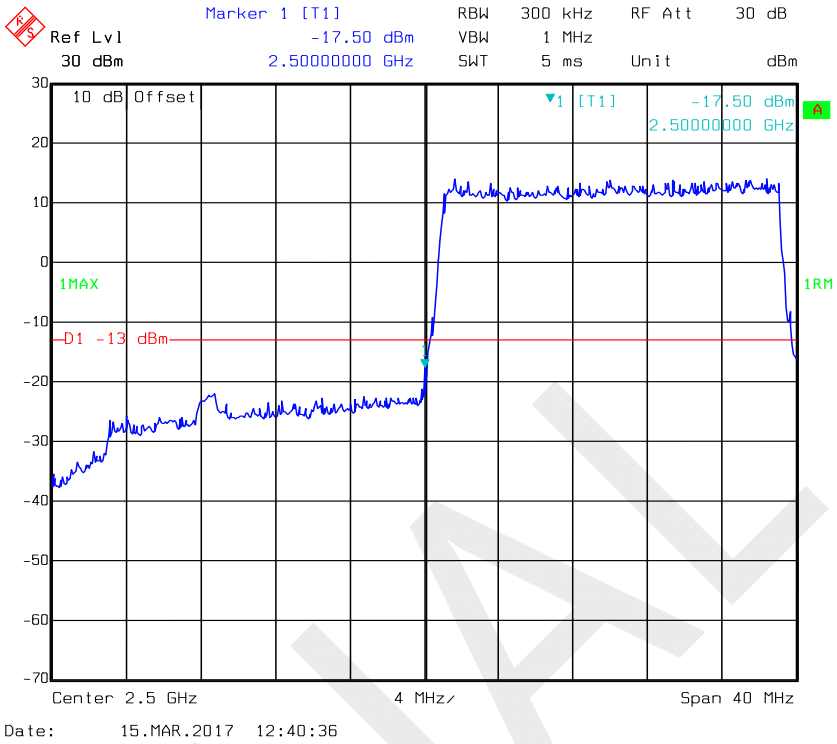
QPSK_15MHz_ 75 RB_ Left



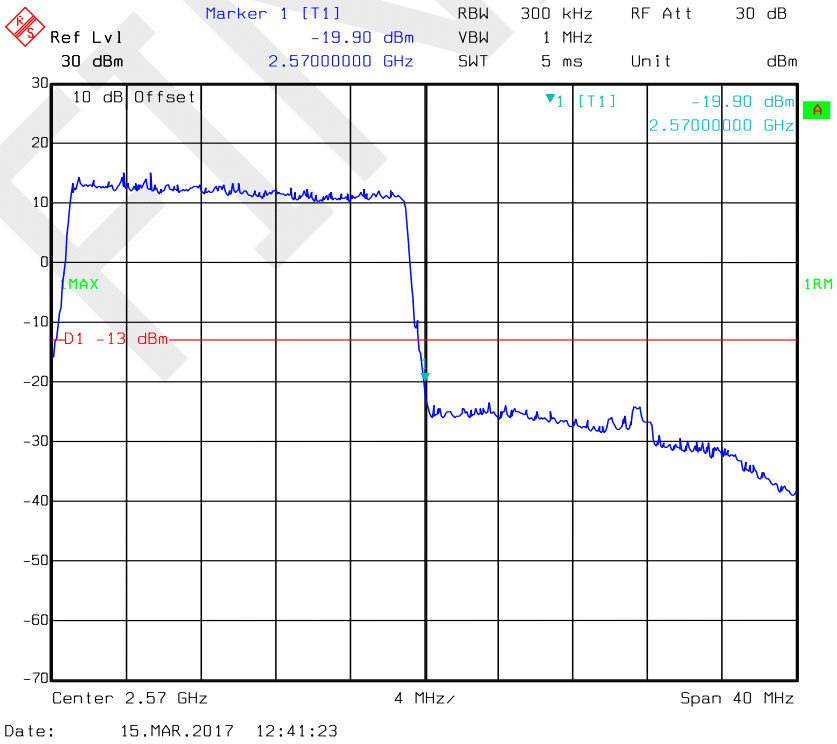
QPSK_15MHz_ 75 RB_ Right



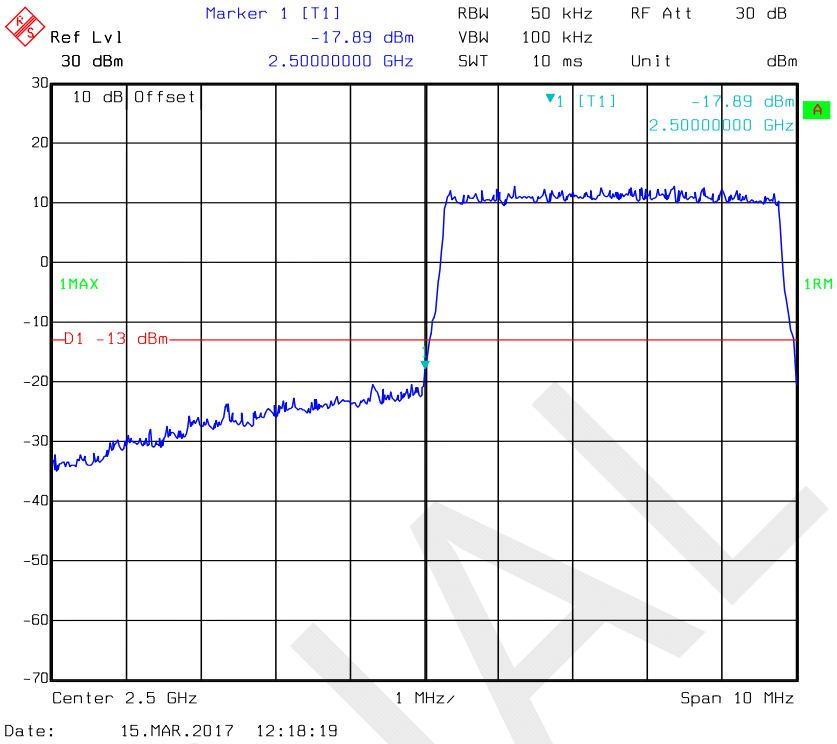
QPSK_20MHz_ FULL RB_ Left



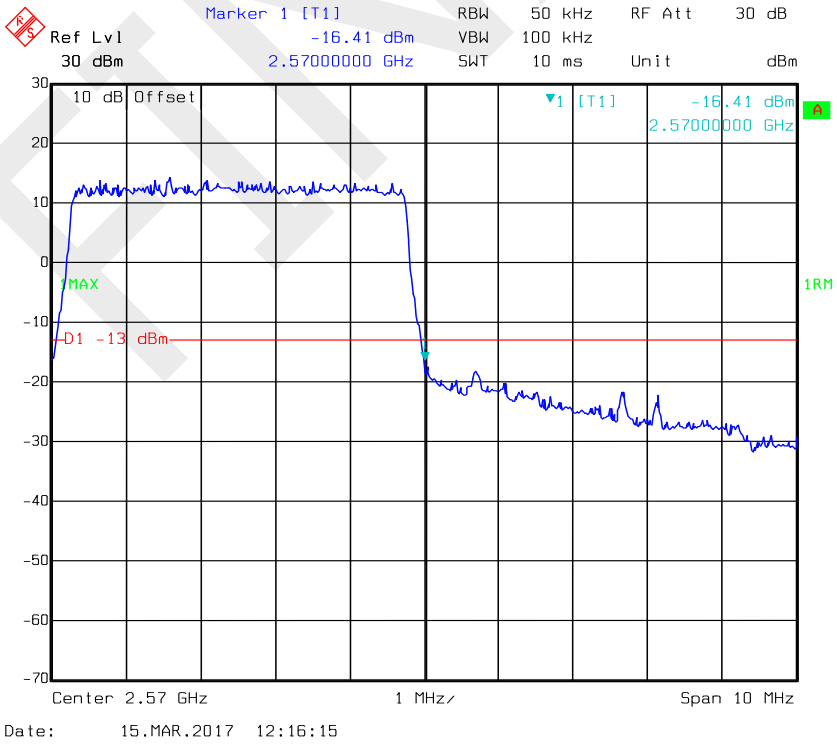
QPSK_20MHz_ FULL RB_ Right



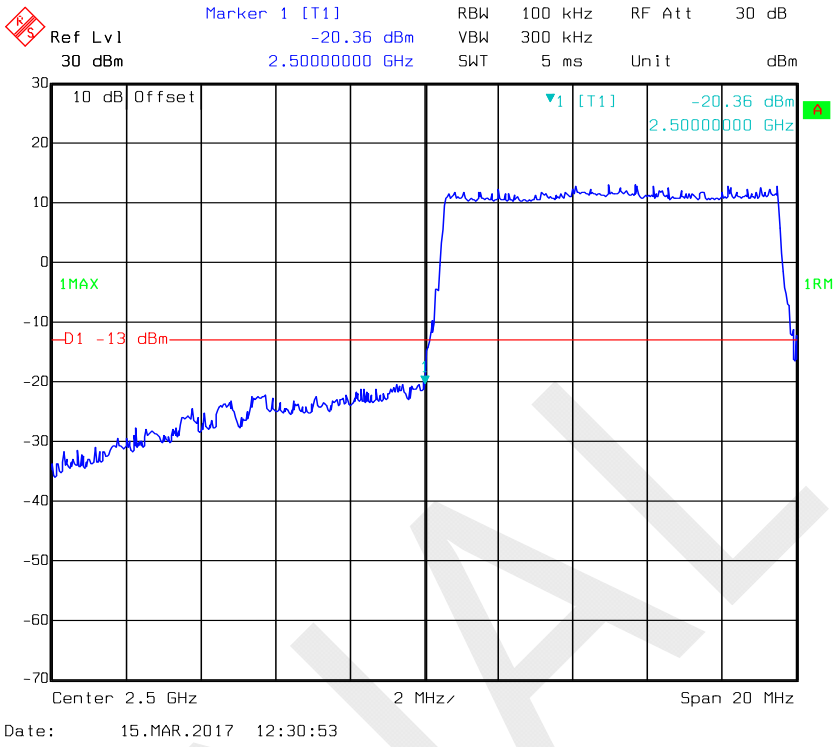
16QAM_5MHz_ 25 RB_ Left



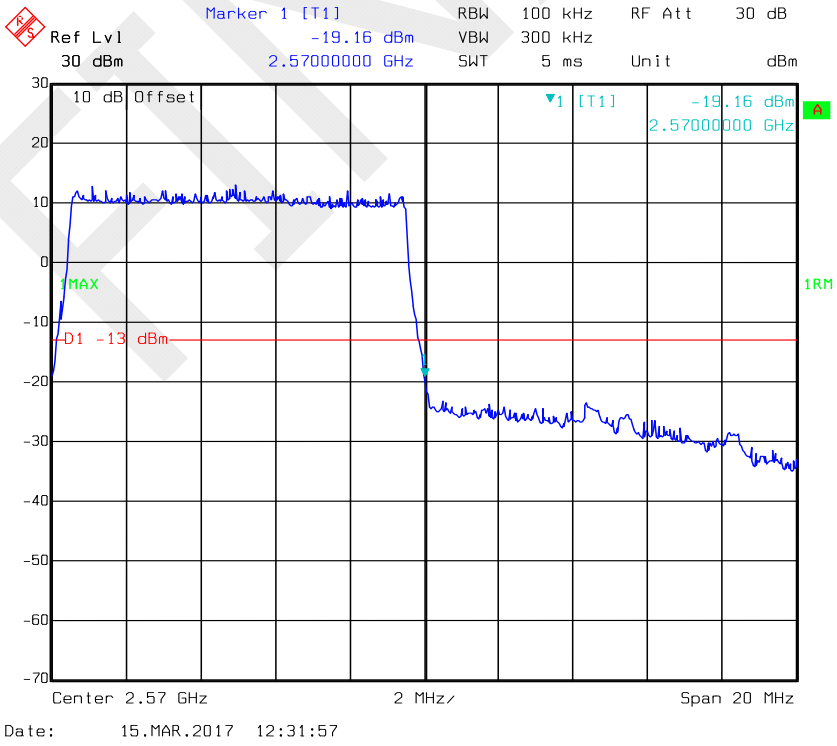
16QAM_5MHz_ 25 RB_ Right



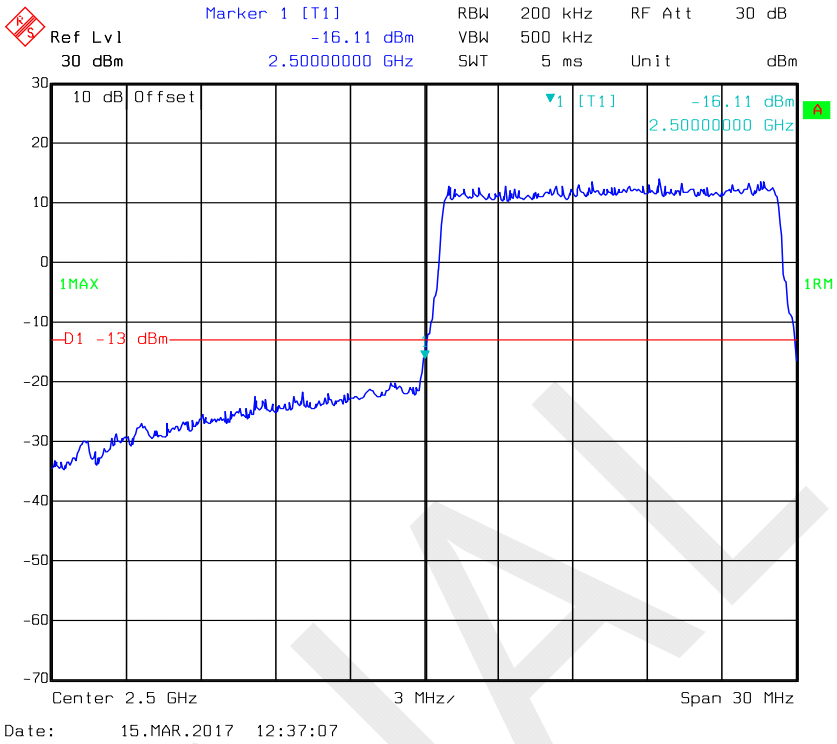
16QAM_10MHz_ 50 RB_ Left



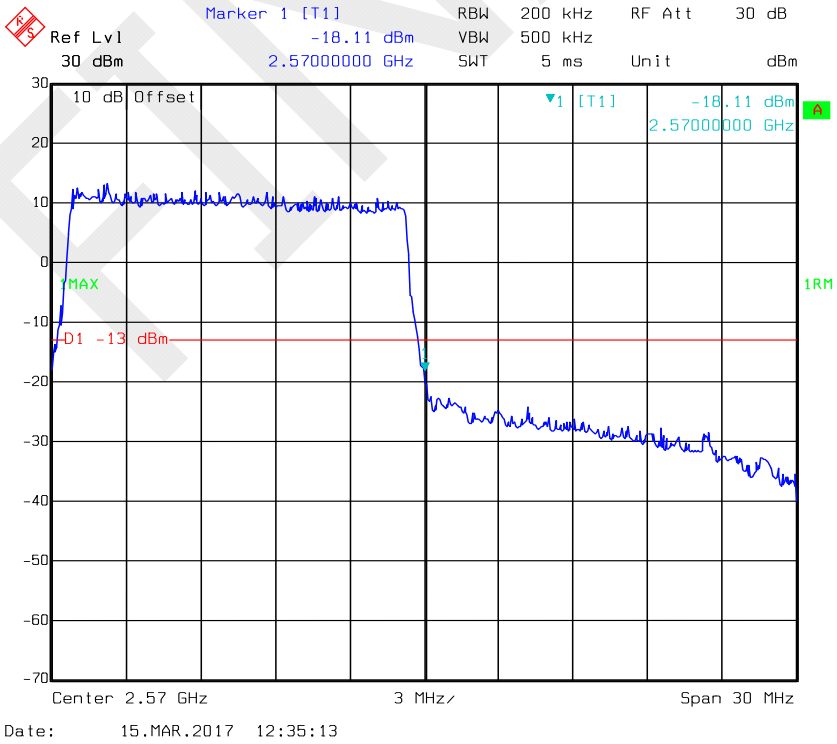
16QAM_10MHz_ 50 RB_ Right



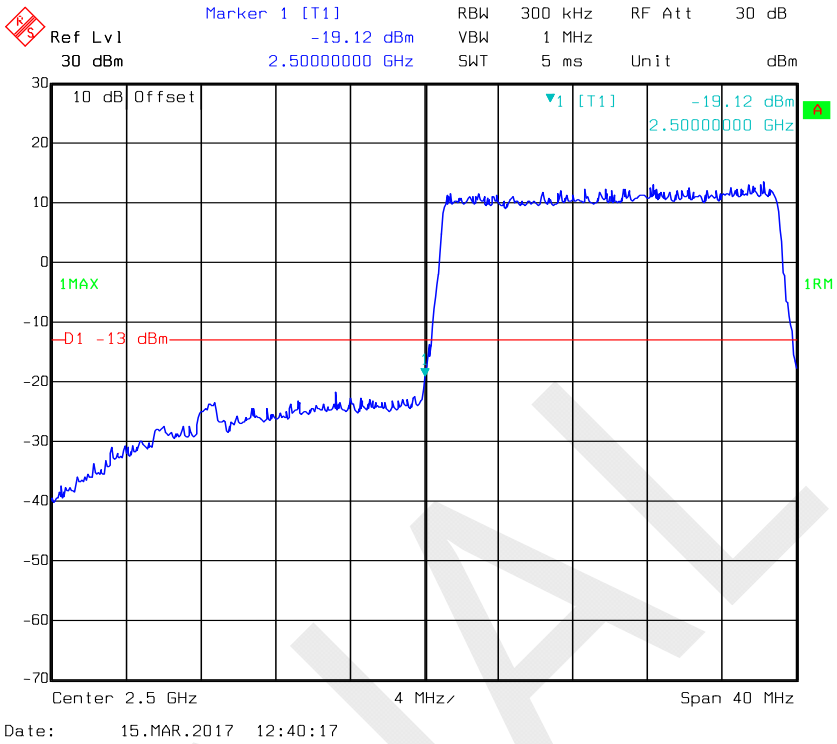
16QAM_15MHz_ 75 RB_ Left



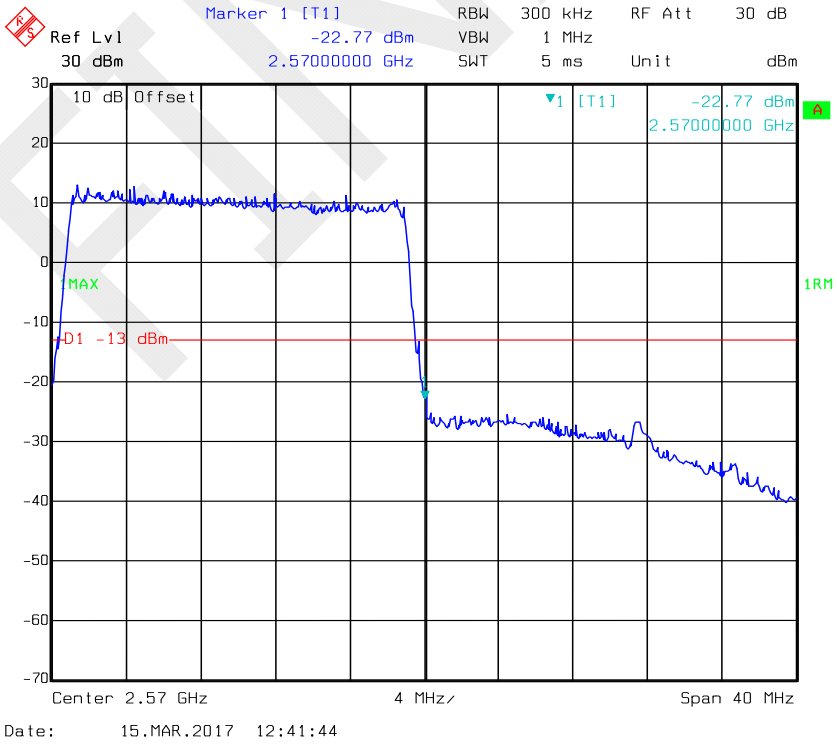
16QAM_15MHz_ 75 RB_ Right



16QAM_20MHz_ FULL RB_ Left



16QAM_20MHz_ FULL RB_ Right



FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235，§27.54

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 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/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

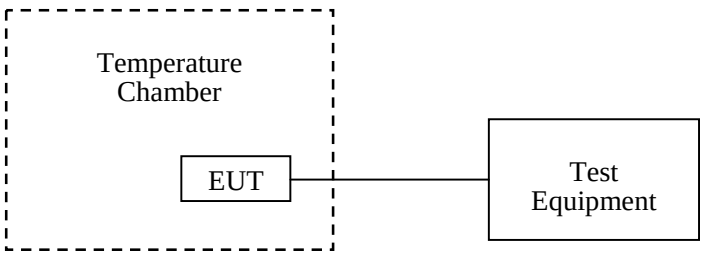
According to §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01
FLUKE	Multimeter	1587	27870099	2016-12-30	2017-12-29
R&S	Universal Radio Communication Tester	CMU200	11-9435686-111	2016-07-28	2017-07-27
R&S	Wideband Radio Communication Tester	CMW500	106891	2016-11-23	2017-11-23
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	20.5 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

The testing was performed by Lorin Bian on 2017-03-28.

Cellular Band (Part 22H)

GPRS, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30	12	-3	-0.004	2.5
-25	12	-7	-0.008	2.5
-20	12	-4	-0.005	2.5
-10	12	-7	-0.008	2.5
0	12	-2	-0.002	2.5
10	12	-7	-0.008	2.5
20	12	-6	-0.007	2.5
30	12	-4	-0.005	2.5
40	12	-7	-0.008	2.5
50	12	-1	-0.001	2.5
60	12	-1	-0.001	2.5
65	12	-4	-0.005	2.5
25	8	-3	-0.004	2.5
25	36	-3	-0.004	2.5

Cellular Band (Part 22H)

EDGE, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30	12	-3	-0.004	2.5
-25	12	-5	-0.006	2.5
-20	12	-5	-0.006	2.5
-10	12	0	0.000	2.5
0	12	-2	-0.002	2.5
10	12	-3	-0.004	2.5
20	12	0	0.000	2.5
30	12	-4	-0.005	2.5
40	12	-5	-0.006	2.5
50	12	1	0.001	2.5
60	12	-3	-0.004	2.5
65	12	0	0.000	2.5
25	8	-5	-0.006	2.5
25	36	-5	-0.006	2.5

PCS Band (Part 24E)

GPRS, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	-4	-0.002	Pass
-25	12	-1	-0.001	Pass
-20	12	-2	-0.001	Pass
-10	12	-1	-0.001	Pass
0	12	-5	-0.003	Pass
10	12	-3	-0.002	Pass
20	12	-2	-0.001	Pass
30	12	-4	-0.002	Pass
40	12	-2	-0.001	Pass
50	12	-6	-0.003	Pass
60	12	-4	-0.002	Pass
65	12	-2	-0.001	Pass
25	8	-2	-0.001	Pass
25	36	-5	-0.003	Pass

PCS Band (Part 24E)

EDGE, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	1	0.001	Pass
-25	12	2	0.001	Pass
-20	12	2	0.001	Pass
-10	12	2	0.001	Pass
0	12	4	0.002	Pass
10	12	3	0.002	Pass
20	12	2	0.001	Pass
30	12	5	0.003	Pass
40	12	-1	-0.001	Pass
50	12	3	0.002	Pass
60	12	5	0.003	Pass
65	12	-1	-0.001	Pass
25	8	4	0.002	Pass
25	36	2	0.001	Pass

WCDMA Band V :

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	**Hz**	**ppm**	**ppm**
-30	12	-3	-0.002	2.5
-25	12	-1	-0.001	2.5
-20	12	1	0.001	2.5
-10	12	-1	-0.001	2.5
0	12	-3	-0.002	2.5
10	12	-1	-0.001	2.5
20	12	-1	-0.001	2.5
30	12	-1	-0.001	2.5
40	12	0	0.000	2.5
50	12	-4	-0.002	2.5
60	12	0	0.000	2.5
65	12	-4	-0.002	2.5
25	8	-1	-0.001	2.5
25	36	-5	-0.003	2.5

WCDMA Band II :

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	**Hz**	**ppm**	
-30	12	-4	-0.002	Pass
-25	12	-1	-0.001	Pass
-20	12	0	0.000	Pass
-10	12	-1	-0.001	Pass
0	12	0	0.000	Pass
10	12	-1	-0.001	Pass
20	12	2	0.001	Pass
30	12	1	0.001	Pass
40	12	1	0.001	Pass
50	12	-1	-0.001	Pass
60	12	2	0.001	Pass
65	12	1	0.001	Pass
25	8	1	0.001	Pass
25	36	-4	-0.002	Pass

LTE Band II:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	1.90	0.0010	Pass
-25	12	1.90	0.0010	Pass
-20	12	0.19	0.0001	Pass
-10	12	1.39	0.0007	Pass
0	12	-2.11	-0.0011	Pass
10	12	1.99	0.0011	Pass
20	12	0.59	0.0003	Pass
30	12	-0.81	-0.0004	Pass
40	12	1.89	0.0010	Pass
50	12	-2.21	-0.0012	Pass
60	12	1.89	0.0010	Pass
65	12	-2.21	-0.0012	Pass
25	8	-1.51	-0.0008	Pass
25	36	1.49	0.0008	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	2.70	0.0014	Pass
-25	12	2.85	0.0015	Pass
-20	12	2.85	0.0015	Pass
-10	12	1.85	0.0010	Pass
0	12	3.75	0.0020	Pass
10	12	-1.05	-0.0006	Pass
20	12	1.25	0.0007	Pass
30	12	-1.05	-0.0006	Pass
40	12	3.85	0.0020	Pass
50	12	3.95	0.0021	Pass
60	12	-1.05	-0.0006	Pass
65	12	3.85	0.0020	Pass
25	8	-1.15	-0.0006	Pass
25	36	0.45	0.0002	Pass

LTE Band IV:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1732.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	12	2.20	0.0013	2.5
-25	12	-4.85	-0.0028	2.5
-20	12	-3.45	-0.0020	2.5
-10	12	-4.85	-0.0028	2.5
0	12	-4.05	-0.0023	2.5
10	12	-0.75	-0.0004	2.5
20	12	-2.25	-0.0013	2.5
30	12	-0.65	-0.0004	2.5
40	12	-5.35	-0.0031	2.5
50	12	-5.25	-0.0030	2.5
60	12	-0.75	-0.0004	2.5
65	12	-2.25	-0.0013	2.5
25	8	-2.55	-0.0015	2.5
25	36	0.12	0.0001	2.5

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c = 1732.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	12	1.40	0.0008	2.5
-25	12	2.19	0.0013	2.5
-20	12	-1.41	-0.0008	2.5
-10	12	2.19	0.0013	2.5
0	12	-1.11	-0.0006	2.5
10	12	1.98	0.0011	2.5
20	12	1.59	0.0009	2.5
30	12	3.02	0.0017	2.5
40	12	0.19	0.0001	2.5
50	12	-1.01	-0.0006	2.5
60	12	3.02	0.0017	2.5
65	12	0.19	0.0001	2.5
25	8	2.14	0.0012	2.5
25	36	1.52	0.0009	2.5

LTE Band V:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 836.5 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	-0.90	-0.0011	Pass
-25	12	2.17	0.0026	Pass
-20	12	2.17	0.0026	Pass
-10	12	-0.33	-0.0004	Pass
0	12	1.03	0.0012	Pass
10	12	1.00	0.0012	Pass
20	12	0.57	0.0007	Pass
30	12	2.97	0.0036	Pass
40	12	0.07	0.0001	Pass
50	12	-1.02	-0.0012	Pass
60	12	0.07	0.0001	Pass
65	12	-1.02	-0.0012	Pass
25	8	-1.73	-0.0021	Pass
25	36	0.41	0.0005	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =836.5 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	2.4	0.0029	Pass
-25	12	1.19	0.0014	Pass
-20	12	1.19	0.0014	Pass
-10	12	1.03	0.0012	Pass
0	12	-0.23	-0.0003	Pass
10	12	1.25	0.0015	Pass
20	12	0.69	0.0008	Pass
30	12	-0.21	-0.0003	Pass
40	12	-2.01	-0.0024	Pass
50	12	1.23	0.0015	Pass
60	12	-0.21	-0.0003	Pass
65	12	-2.01	-0.0024	Pass
25	8	-0.21	-0.0003	Pass
25	36	-0.54	-0.0006	Pass

LTE Band VII:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 2535 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	-0.40	-0.0002	Pass
-25	12	-0.55	-0.0002	Pass
-20	12	0.62	0.0002	Pass
-10	12	-0.55	-0.0002	Pass
0	12	1.82	0.0007	Pass
10	12	-0.65	-0.0003	Pass
20	12	1.02	0.0004	Pass
30	12	-0.58	-0.0002	Pass
40	12	-0.78	-0.0003	Pass
50	12	1.92	0.0008	Pass
60	12	-0.78	-0.0003	Pass
65	12	1.92	0.0008	Pass
25	8	0.52	0.0002	Pass
25	36	-1.00	-0.0004	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =2535 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	12	-0.10	0.0000	Pass
-25	12	-2.14	-0.0008	Pass
-20	12	-2.14	-0.0008	Pass
-10	12	-0.57	-0.0002	Pass
0	12	-0.33	-0.0001	Pass
10	12	-1.31	-0.0005	Pass
20	12	-1.84	-0.0007	Pass
30	12	0.06	0.0000	Pass
40	12	0.96	0.0004	Pass
50	12	-2.03	-0.0008	Pass
60	12	0.06	0.0000	Pass
65	12	0.96	0.0004	Pass
25	8	-2.31	-0.0009	Pass
25	36	-2.74	-0.0011	Pass

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

***** *END OF REPORT* *****