



FCC PART 27
FCC PART 22H, PART 24E
TEST REPORT

For

TP-Link Technologies Co., Ltd.

Building 24 (floors 1,3,4,5) and 28 (floors1-4),Central Science and Technology
Park,Nanshan,Shenzhen,China

FCC ID:TE7C7SV1

Report Type: Original Report	Product Type: C7s FDD-LTE Smartphone
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	C7s FDD-LTE Smartphone
Tested Model	TP7051C
Multiple Model [#]	TP7051CXYZZ
Frequency Range	Cellular: 824-849 MHz PCS: 1850-1910 MHz WCDMA B2/LTE B2: 1850-1910 MHz WCDMA B5: 824-849 MHz WCDMA B4/LTE B4: 1710- 1755 MHz LTE B7: 2500-2570 MHz
Transmit Power (Maximum Conducted Target Power)	GSM850: 33dBm(GMSK), 25.5dBm(GMSK), PCS1900: 29dBm(GMSK), 24.3dBm(GMSK), WCDMA Band 2: 22.8dBm WCDMA Band 4: 22.6dBm WCDMA Band 5: 22.9dBm LTE Band 2/Band 4: 22.3dBm LTE Band 7: 24dBm
Modulation Technique	2G: GMSK,8PSK 3G: BPSK, QPSK, 16QAM 4G: QPSK, 16QAM
Antenna Specification	2G/3G/4G: Internal Antenna
Voltage Range	DC 3.8V from battery or DC 5.0V from adapter
Date of Test	2019-04-02~2019-04-10
Sample serial number	190327003
Received date	2019-03-27
Sample/EUT Status	Good condition
Adapter information	Model: A8-501000 Input: AC 100-240V, 50/60Hz, 0.2A Output: DC 5V, 1A

Notes: This series products model: TP7051C and TP7051CXYZZ are electrically identical, the differences between them are the model number. Model TP7051C was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.

Objective

This test report is prepared on behalf of *TP-Link Technologies Co., Ltd.* in accordance with Part 2-Subpart J, Part 22-Subpart H and Part 24-Subpart E and Subpart 27 of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS & DTS and Part 15B JBP submissions with FCC ID: TE7C7SV1.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±0.73dB
Unwanted Emission, conducted		±1.6dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1°C
Humidity		±6%
Supply voltages		±0.4%

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

The final qualification test was performed with the EUT operating at normal mode.

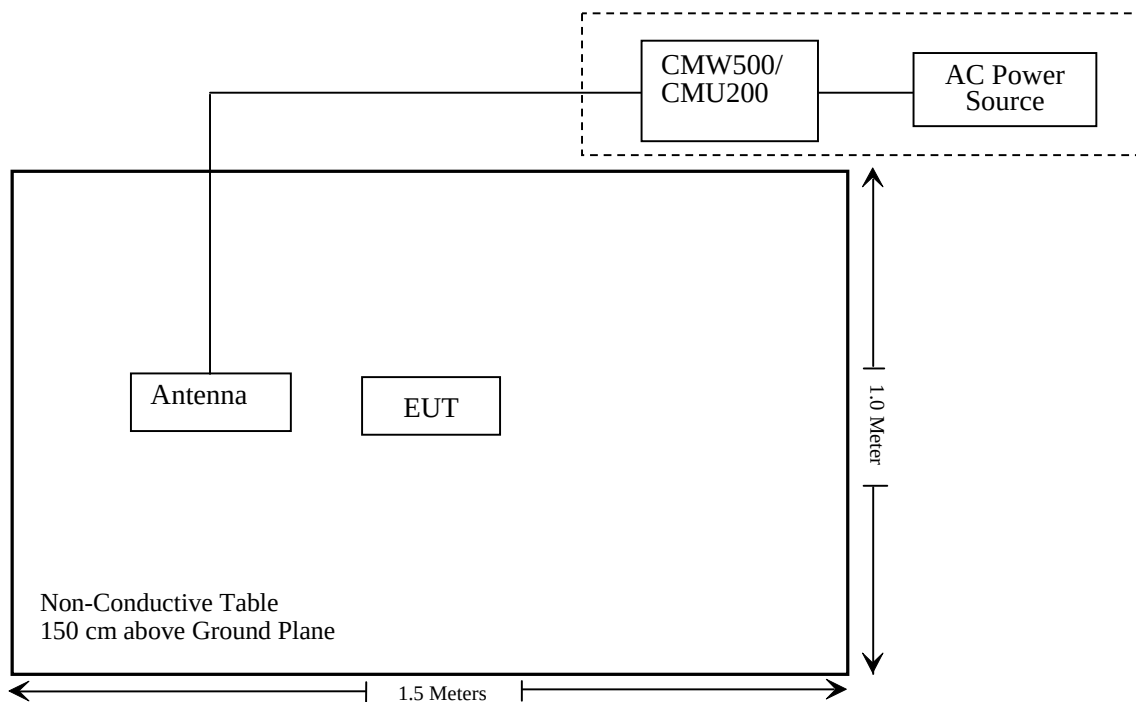
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-116218-UY
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 1.1307 , §2.1093	RF Exposure (SAR)	Compliance*
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h)	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 (h)(m)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliance

Note: * Please refer to SAR report released by BACL, report number: RSZ190327003-SA.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-22	2020-12-21
Rohde & Schwarz	Signal Analyzer	FSV40	101473	2019-01-09	2020-01-08
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-11-12
Sonoma Instrument	Amplifier	310N	186238	2018-11-12	2019-11-12
Anritsu	Signal Generator	68369B	004114	2018-12-24	2019-12-24
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2018-07-11	2019-07-11
COM-POWER	Dipole Antenna	AD-100	41000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-07-11	2021-07-10
Ducommun Technologies	RF Cable	104PEA	218124002	2018-11-12	2019-11-12
Ducommun Technologies	RF Cable	RG-214	1	2018-11-19	2019-05-21
Ducommun Technologies	RF Cable	RG-214	2	2018-11-12	2019-11-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-03	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-11-12	2019-11-12

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2018-12-24	2019-12-24
ESPEC	Temperature & Humidity Chamber	EL-10KA	9107726	2018-12-21	2019-12-21
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2018-12-14	2019-12-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2018-06-23	2019-06-23
Ducommun Technologies	RF Cable	RG-214	3	Each Time	
WEINSCHTEL	10dB Attenuator	5324	AU 3842	Each Time	
WEINSCHTEL	3dB Attenuator	6231	666	Each Time	
Unknown	Power Splitter	1620	129	Each Time	

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ190327003-SA.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E & 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 (d) (h) - 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.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

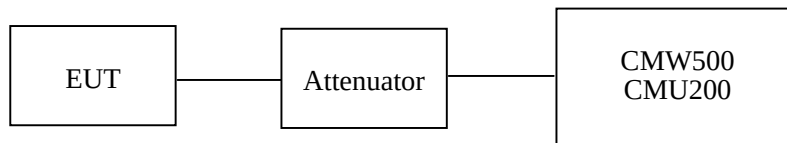
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2500-2570MHz.

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the CMW500/CMU200 through sufficient attenuation.



Radiated method:

TIA 603-D section 2.2.17

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Moon Tan on 2019-04-02.

Conducted Power**Cellular Band (Part 22H)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.26	38.45
	190	836.6	32.54	38.45
	251	848.8	32.98	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	33.18	32.18	30.07	28.67	38.45
	190	836.6	33.35	32.34	30.23	28.91	38.45
	251	848.8	33.44	32.44	30.30	28.95	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	25.01	24.56	23.15	20.41	38.45
	190	836.6	25.36	24.94	23.38	20.95	38.45
	251	848.8	25.24	24.85	23.24	20.85	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC12.2k		22.72	22.56	21.97
		HSDPA	1	20.87	20.69	21.12
			2	21.12	21.24	21.24
			3	21.39	21.58	21.14
			4	21.83	21.59	21.42
		HSUPA	1	20.97	21.25	21.29
			2	21.66	21.33	21.18
			3	21.53	21.14	21.60
			4	21.18	21.60	21.93
			5	21.64	21.57	22.03
		HSPA+	1	21.65	21.66	20.90

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.28	33
	661	1880.0	28.15	33
	810	1909.8	28.21	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.74	27.79	25.71	24.65	33
	661	1880.0	28.39	27.52	25.52	24.49	33
	810	1909.8	28.08	27.27	25.35	24.29	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	24.02	23.10	21.10	20.32	33
	661	1880.0	24.12	23.16	21.15	20.35	33
	810	1909.8	24.15	23.20	21.17	20.33	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	RMC12.2k		22.67	22.70	21.88
		HSDPA	1	21.41	20.95	21.01
			2	21.67	21.85	21.34
			3	22.02	21.15	21.10
			4	21.77	20.92	21.67
		HSUPA	1	21.39	21.08	21.30
			2	21.03	21.60	21.31
			3	21.20	21.55	22.02
			4	21.79	21.19	21.73
			5	21.58	21.89	22.00
		HSPA+	1	20.68	21.45	21.16

AWS Band (Part 27)

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band IV)	Normal	RMC12.2k		22.49	21.75	22.11
		HSDPA	1	20.89	21.26	21.40
			2	21.94	21.81	21.43
			3	21.63	21.17	21.05
			4	21.42	20.95	21.20
		HSUPA	1	21.42	21.25	21.05
			2	21.85	21.31	21.47
			3	21.85	21.61	21.12
			4	21.69	21.78	20.88
			5	21.10	22.05	21.22
		HSPA+	1	21.57	21.22	20.73

Peak-to-average ratio (PAR)**Cellular Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.25	13
	Middle	1.23	13
	High	1.28	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.31	13
	Middle	1.42	13
	High	1.56	13

Mode	Channel	PAR(dB)	Limit(dBm)
WCDMA (BPSK)	Low	3.24	13
	Middle	3.50	13
	High	3.73	13
HSDPA (16QAM)	Low	3.62	13
	Middle	3.75	13
	High	3.43	13
HSUPA (BPSK)	Low	3.23	13
	Middle	3.14	13
	High	3.21	13
HSPA+	Low	3.29	13
	Middle	3.34	13
	High	3.42	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.43	13
	Middle	1.48	13
	High	1.44	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.37	13
	Middle	1.58	13
	High	1.64	13

Mode	Channel	PAR(dB)	Limit(dBm)
WCDMA (BPSK)	Low	3.43	13
	Middle	3.30	13
	High	3.46	13
HSDPA (16QAM)	Low	3.79	13
	Middle	3.68	13
	High	3.82	13
HSUPA (BPSK)	Low	3.76	13
	Middle	3.91	13
	High	3.86	13
HSPA+	Low	3.25	13
	Middle	3.61	13
	High	3.27	13

AWS Band

Mode	Channel	PAR(dB)	Limit(dBm)
WCDMA (BPSK)	Low	3.24	13
	Middle	3.38	13
	High	3.11	13
HSDPA (16QAM)	Low	3.51	13
	Middle	3.36	13
	High	3.43	13
HSUPA (BPSK)	Low	3.22	13
	Middle	3.29	13
	High	3.47	13
HSPA+	Low	3.18	13
	Middle	3.23	13
	High	3.28	13

Radiated Power
GSM Mode:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dBi)			
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	93.24	339	1.4	H	30.8	0.7	0	30.10	38.45	8.35
836.6	88.31	54	2.4	V	27.9	0.7	0	27.20	38.45	11.25
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	88.71	18	2.1	H	18.7	1.30	9.40	26.80	33	6.20
1880.00	82.45	141	2.3	V	12.2	1.30	9.40	20.30	33	12.70

EDGE Mode:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dBi)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	87.62	41	2.3	H	25.2	0.7	0	24.50	38.45	13.95
836.6	81.58	154	2.5	V	21.1	0.7	0	20.40	38.45	18.05
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	84.52	203	1.2	H	14.5	1.30	9.40	22.60	33	10.40
1880.00	79.62	147	1.4	V	9.4	1.30	9.40	17.50	33	15.50

WCDMA Mode:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dBi)			
ERP for WCDMA Band V (Part 22H), Middle Channel										
836.6	83.51	38	2.0	H	21.1	0.7	0	20.40	38.45	18.05
836.6	77.24	62	1.5	V	16.8	0.7	0	16.10	38.45	22.35
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	83.86	89	2.2	H	13.8	1.30	9.40	21.90	33	11.10
1880.00	77.61	286	1.6	V	7.3	1.30	9.40	15.40	33	17.60
EIRP for WCDMA Band IV (Part 27), Middle Channel										
1732.60	86.22	10	1.9	H	13.1	1.30	8.90	20.70	30	9.30
1732.60	79.38	62	1.5	V	6.8	1.30	8.90	14.40	30	15.60

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

LTE Band 2:**Maximum Output Power**

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	21.77	20.45	21.08
		RB Size=1, RB Offset=2	21.44	21.37	21.79
		RB Size=1, RB Offset=5	21.26	20.57	21.10
		RB Size=3, RB Offset=0	21.27	21.39	20.61
		RB Size=3, RB Offset=1	21.14	21.41	21.62
		RB Size=3, RB Offset=2	21.37	21.72	21.34
		RB Size=6, RB Offset=0	21.04	21.75	20.99
	16QAM	RB Size=1, RB Offset=0	21.14	20.83	21.46
		RB Size=1, RB Offset=2	20.94	21.07	21.91
		RB Size=1, RB Offset=5	21.46	21.15	21.11
		RB Size=3, RB Offset=0	21.28	21.04	20.72
		RB Size=3, RB Offset=1	20.83	21.95	20.55
		RB Size=3, RB Offset=2	20.27	21.28	21.13
		RB Size=6, RB Offset=0	20.63	21.58	20.91
3.0	QPSK	RB Size=1, RB Offset=0	22.10	21.38	20.86
		RB Size=1, RB Offset=7	21.90	21.53	20.79
		RB Size=1, RB Offset=14	21.61	20.61	21.48
		RB Size=8, RB Offset=0	21.73	21.64	20.38
		RB Size=8, RB Offset=4	21.54	21.06	21.01
		RB Size=8, RB Offset=7	21.38	20.94	21.40
		RB Size=15, RB Offset=0	21.12	22.06	20.23
	16QAM	RB Size=1, RB Offset=0	21.11	21.07	21.05
		RB Size=1, RB Offset=7	20.99	21.41	20.95
		RB Size=1, RB Offset=14	21.14	21.14	20.43
		RB Size=8, RB Offset=0	21.20	20.76	21.48
		RB Size=8, RB Offset=4	21.46	20.45	21.28
		RB Size=8, RB Offset=7	20.71	20.55	22.02
		RB Size=15, RB Offset=0	21.25	21.37	20.35

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	21.24	20.79	21.55
		RB Size=1, RB Offset=12	21.92	21.83	20.80
		RB Size=1, RB Offset=24	21.64	20.65	21.08
		RB Size=12, RB Offset=0	21.19	21.75	20.71
		RB Size=12, RB Offset=6	21.18	20.81	22.10
		RB Size=12, RB Offset=11	21.32	20.86	21.61
		RB Size=25, RB Offset=0	21.55	21.21	20.83
	16QAM	RB Size=1, RB Offset=0	21.58	21.15	20.94
		RB Size=1, RB Offset=12	21.12	21.17	21.66
		RB Size=1, RB Offset=24	20.72	21.15	21.94
		RB Size=12, RB Offset=0	20.70	20.93	21.96
		RB Size=12, RB Offset=6	20.93	21.68	20.53
		RB Size=12, RB Offset=11	20.81	20.56	21.72
		RB Size=25, RB Offset=0	20.23	21.37	21.62
10.0	QPSK	RB Size=1, RB Offset=0	21.72	20.97	20.54
		RB Size=1, RB Offset=24	21.90	20.56	21.56
		RB Size=1, RB Offset=49	21.17	20.80	20.65
		RB Size=25, RB Offset=0	21.78	21.12	21.27
		RB Size=25, RB Offset=12	21.32	21.69	21.54
		RB Size=25, RB Offset=24	21.34	20.73	20.80
		RB Size=50, RB Offset=0	21.82	21.37	20.77
	16QAM	RB Size=1, RB Offset=0	21.40	21.21	21.02
		RB Size=1, RB Offset=24	21.29	20.70	21.54
		RB Size=1, RB Offset=49	21.15	21.46	20.77
		RB Size=25, RB Offset=0	21.27	21.94	21.13
		RB Size=25, RB Offset=12	20.65	21.99	21.78
		RB Size=25, RB Offset=24	21.09	20.83	21.23
		RB Size=50, RB Offset=0	20.56	21.36	21.72

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15.0	QPSK	RB Size=1, RB Offset=0	22.00	20.94	20.79
		RB Size=1, RB Offset=37	22.02	21.58	21.38
		RB Size=1, RB Offset=74	22.06	20.74	20.49
		RB Size=36, RB Offset=0	21.58	21.74	20.92
		RB Size=36, RB Offset=18	21.05	21.73	21.17
		RB Size=36, RB Offset=37	21.59	20.53	21.35
		RB Size=75, RB Offset=0	21.62	21.90	20.70
	16QAM	RB Size=1, RB Offset=0	21.32	20.95	21.78
		RB Size=1, RB Offset=37	21.52	21.12	21.02
		RB Size=1, RB Offset=74	21.02	21.18	21.20
		RB Size=36, RB Offset=0	20.74	20.85	20.60
		RB Size=36, RB Offset=18	21.09	20.97	20.92
		RB Size=36, RB Offset=37	20.72	21.55	21.82
		RB Size=75, RB Offset=0	20.96	21.69	21.07
20.0	QPSK	RB Size=1, RB Offset=0	21.81	21.53	21.28
		RB Size=1, RB Offset=49	22.08	21.51	21.67
		RB Size=1, RB Offset=99	21.03	21.13	20.94
		RB Size=50, RB Offset=0	21.21	21.85	21.20
		RB Size=50, RB Offset=24	21.39	21.16	21.70
		RB Size=50, RB Offset=49	20.94	20.84	21.22
		RB Size=100, RB Offset=0	21.01	21.71	21.73
	16QAM	RB Size=1, RB Offset=0	21.20	20.78	20.70
		RB Size=1, RB Offset=49	20.74	21.41	20.70
		RB Size=1, RB Offset=99	20.81	21.58	21.97
		RB Size=50, RB Offset=0	20.72	21.03	21.79
		RB Size=50, RB Offset=24	21.09	21.58	20.71
		RB Size=50, RB Offset=49	20.97	21.11	20.93
		RB Size=100, RB Offset=0	20.67	21.47	20.57

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	7.76	13	Pass
QPSK (100RB Size)	7.62	13	Pass
16QAM (1RB Size)	7.47	13	Pass
16QAM (100RB Size)	7.56	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1880.00	83.14	110	1.6	H	13.1	1.30	9.40	21.20	33
1880.00	78.62	263	1.7	V	8.4	1.30	9.40	16.50	33
3 MHz Bandwidth									
1880.00	82.81	11	1.0	H	12.8	1.30	9.40	20.90	33
1880.00	78.34	195	1.2	V	8.1	1.30	9.40	16.20	33
5 MHz Bandwidth									
1880.00	82.43	250	2.2	H	12.4	1.30	9.40	20.50	33
1880.00	77.68	42	2.2	V	7.4	1.30	9.40	15.50	33
10 MHz Bandwidth									
1880.00	82.14	30	2.1	H	12.1	1.30	9.40	20.20	33
1880.00	77.82	182	1.1	V	7.6	1.30	9.40	15.70	33
15 MHz Bandwidth									
1880.00	81.84	14	1.7	H	11.8	1.30	9.40	19.90	33
1880.00	77.38	348	1.8	V	7.1	1.30	9.40	15.20	33
20 MHz Bandwidth									
1880.00	81.52	195	2.3	H	11.5	1.30	9.40	19.60	33
1880.00	77.23	352	1.4	V	7.0	1.30	9.40	15.10	33

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1880.00	83.62	104	2.1	H	13.6	1.30	9.40	21.70	33
1880.00	78.52	146	1.5	V	8.3	1.30	9.40	16.40	33
3 MHz Bandwidth									
1880.00	83.21	166	2.4	H	13.2	1.30	9.40	21.30	33
1880.00	77.28	187	1.5	V	7.0	1.30	9.40	15.10	33
5 MHz Bandwidth									
1880.00	82.88	267	2.2	H	12.8	1.30	9.40	20.90	33
1880.00	78.07	212	1.1	V	7.8	1.30	9.40	15.90	33
10 MHz Bandwidth									
1880.00	82.49	198	1.1	H	12.4	1.30	9.40	20.50	33
1880.00	78.13	328	1.2	V	7.9	1.30	9.40	16.00	33
15 MHz Bandwidth									
1880.00	82.01	253	1.5	H	12.0	1.30	9.40	20.10	33
1880.00	77.38	162	2.2	V	7.1	1.30	9.40	15.20	33
20 MHz Bandwidth									
1880.00	81.53	280	1.8	H	11.5	1.30	9.40	19.60	33
1880.00	76.93	115	1.3	V	6.7	1.30	9.40	14.80	33

LTE Band 4:**Maximum Output Power**

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	21.56	20.54	21.41
		RB Size=1, RB Offset=2	21.23	21.38	20.99
		RB Size=1, RB Offset=5	21.03	21.26	21.67
		RB Size=3, RB Offset=0	21.14	20.83	20.72
		RB Size=3, RB Offset=1	21.63	21.21	20.96
		RB Size=3, RB Offset=2	21.37	20.97	21.27
		RB Size=6, RB Offset=0	20.80	21.36	21.11
	16QAM	RB Size=1, RB Offset=0	21.23	21.19	22.12
		RB Size=1, RB Offset=2	21.52	20.85	21.11
		RB Size=1, RB Offset=5	21.19	20.80	21.10
		RB Size=3, RB Offset=0	20.42	20.34	21.93
		RB Size=3, RB Offset=1	20.49	21.27	21.13
		RB Size=3, RB Offset=2	20.54	20.39	20.54
		RB Size=6, RB Offset=0	20.57	21.68	21.79
3.0	QPSK	RB Size=1, RB Offset=0	22.13	21.58	20.71
		RB Size=1, RB Offset=7	21.63	21.49	20.85
		RB Size=1, RB Offset=14	21.37	21.42	21.46
		RB Size=8, RB Offset=0	21.72	21.06	21.63
		RB Size=8, RB Offset=4	21.98	20.96	21.25
		RB Size=8, RB Offset=7	21.59	20.52	20.95
		RB Size=15, RB Offset=0	21.53	21.75	21.26
	16QAM	RB Size=1, RB Offset=0	20.91	21.82	21.87
		RB Size=1, RB Offset=7	21.45	21.13	21.09
		RB Size=1, RB Offset=14	20.97	21.26	21.72
		RB Size=8, RB Offset=0	20.92	20.57	21.50
		RB Size=8, RB Offset=4	21.33	21.34	20.56
		RB Size=8, RB Offset=7	21.27	21.05	21.66
		RB Size=15, RB Offset=0	20.60	20.63	21.25

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	21.13	21.40	21.24
		RB Size=1, RB Offset=12	21.16	20.99	21.22
		RB Size=1, RB Offset=24	21.50	20.60	20.81
		RB Size=12, RB Offset=0	21.28	21.16	21.04
		RB Size=12, RB Offset=6	21.33	20.87	21.68
		RB Size=12, RB Offset=11	21.33	21.33	21.43
		RB Size=25, RB Offset=0	21.09	21.33	21.17
	16QAM	RB Size=1, RB Offset=0	21.42	20.60	21.00
		RB Size=1, RB Offset=12	21.31	20.59	21.27
		RB Size=1, RB Offset=24	21.02	20.60	21.07
		RB Size=12, RB Offset=0	20.58	21.45	21.79
		RB Size=12, RB Offset=6	20.81	21.46	21.81
		RB Size=12, RB Offset=11	21.15	21.32	21.21
		RB Size=25, RB Offset=0	21.20	21.27	21.67
10.0	QPSK	RB Size=1, RB Offset=0	21.64	21.22	21.64
		RB Size=1, RB Offset=24	21.69	21.38	21.42
		RB Size=1, RB Offset=49	21.63	20.74	21.70
		RB Size=25, RB Offset=0	21.19	21.45	21.23
		RB Size=25, RB Offset=12	20.91	21.01	21.58
		RB Size=25, RB Offset=24	21.74	21.59	20.53
		RB Size=50, RB Offset=0	21.68	21.61	21.93
	16QAM	RB Size=1, RB Offset=0	21.35	20.89	20.83
		RB Size=1, RB Offset=24	21.60	21.56	21.53
		RB Size=1, RB Offset=49	21.25	20.85	21.63
		RB Size=25, RB Offset=0	21.18	21.36	21.56
		RB Size=25, RB Offset=12	21.30	20.88	20.60
		RB Size=25, RB Offset=24	20.57	21.55	20.38
		RB Size=50, RB Offset=0	20.22	20.93	20.81

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15.0	QPSK	RB Size=1, RB Offset=0	21.73	21.19	21.54
		RB Size=1, RB Offset=37	21.93	21.21	20.88
		RB Size=1, RB Offset=74	21.65	20.73	21.33
		RB Size=36, RB Offset=0	21.67	21.18	21.21
		RB Size=36, RB Offset=18	21.62	21.94	20.77
		RB Size=36, RB Offset=37	21.80	21.35	21.10
		RB Size=75, RB Offset=0	21.17	20.84	21.26
	16QAM	RB Size=1, RB Offset=0	21.34	21.25	21.21
		RB Size=1, RB Offset=37	21.60	21.19	20.97
		RB Size=1, RB Offset=74	20.98	20.63	21.07
		RB Size=36, RB Offset=0	21.28	21.40	21.80
		RB Size=36, RB Offset=18	21.30	20.72	21.68
		RB Size=36, RB Offset=37	20.88	20.91	21.04
		RB Size=75, RB Offset=0	20.69	21.93	21.27
20.0	QPSK	RB Size=1, RB Offset=0	21.73	21.19	21.54
		RB Size=1, RB Offset=49	21.93	21.21	20.88
		RB Size=1, RB Offset=99	21.65	20.73	21.33
		RB Size=50, RB Offset=0	21.67	21.18	21.21
		RB Size=50, RB Offset=24	21.62	21.94	20.77
		RB Size=50, RB Offset=49	21.80	21.35	21.10
		RB Size=100, RB Offset=0	21.17	20.84	21.26
	16QAM	RB Size=1, RB Offset=0	21.34	21.25	21.21
		RB Size=1, RB Offset=49	21.60	21.19	20.97
		RB Size=1, RB Offset=99	20.98	20.63	21.07
		RB Size=50, RB Offset=0	21.28	21.40	21.80
		RB Size=50, RB Offset=24	21.30	20.72	21.68
		RB Size=50, RB Offset=49	20.88	20.91	21.04
		RB Size=100, RB Offset=0	20.69	21.93	21.27

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	8.13	13	Pass
QPSK (100RB Size)	7.66	13	Pass
16QAM (1RB Size)	7.47	13	Pass
16QAM (100RB Size)	7.56	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	85.32	158	2.4	H	12.2	1.30	8.90	19.80	30
1732.50	79.92	44	2.2	V	7.4	1.30	8.90	15.00	30
3 MHz Bandwidth									
1732.50	85.03	289	2.4	H	11.9	1.30	8.90	19.50	30
1732.50	79.25	44	1.3	V	6.7	1.30	8.90	14.30	30
5 MHz Bandwidth									
1732.50	84.81	126	1.7	H	11.6	1.30	8.90	19.20	30
1732.50	78.68	170	1.2	V	6.1	1.30	8.90	13.70	30
10 MHz Bandwidth									
1732.50	84.42	84	2.2	H	11.3	1.30	8.90	18.90	30
1732.50	78.13	280	2.4	V	5.6	1.30	8.90	13.20	30
15 MHz Bandwidth									
1732.50	84.01	196	1.4	H	10.8	1.30	8.90	18.40	30
1732.50	78.24	211	2.0	V	5.7	1.30	8.90	13.30	30
20 MHz Bandwidth									
1732.50	83.69	90	1.2	H	10.5	1.30	8.90	18.10	30
1732.50	78.36	253	1.2	V	5.8	1.30	8.90	13.40	30

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	86.93	204	1.9	H	13.8	1.30	8.90	21.40	30
1732.50	81.31	16	1.8	V	8.7	1.30	8.90	16.30	30
3 MHz Bandwidth									
1732.50	85.29	232	1.4	H	12.1	1.30	8.90	19.70	30
1732.50	80.62	216	1.3	V	8.1	1.30	8.90	15.70	30
5 MHz Bandwidth									
1732.50	85.12	48	1.9	H	12.0	1.30	8.90	19.60	30
1732.50	80.53	197	2.3	V	8.0	1.30	8.90	15.60	30
10 MHz Bandwidth									
1732.50	84.81	198	1.1	H	11.6	1.30	8.90	19.20	30
1732.50	79.53	351	2.3	V	7.0	1.30	8.90	14.60	30
15 MHz Bandwidth									
1732.50	84.28	96	2.4	H	11.1	1.30	8.90	18.70	30
1732.50	80.11	300	1.2	V	7.5	1.30	8.90	15.10	30
20 MHz Bandwidth									
1732.50	84.11	192	2.4	H	10.9	1.30	8.90	18.50	30
1732.50	79.21	25	2.3	V	6.6	1.30	8.90	14.20	30

LTE Band 7:

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5	QPSK	RB Size=1, RB Offset=0	23.25	23.37	22.78
		RB Size=1, RB Offset=12	22.42	22.10	22.29
		RB Size=1, RB Offset=24	23.42	23.24	22.70
		RB Size=12, RB Offset=0	22.36	21.25	20.74
		RB Size=12, RB Offset=6	22.31	21.39	21.52
		RB Size=12, RB Offset=11	21.56	21.97	21.60
		RB Size=25, RB Offset=0	21.91	21.53	21.88
	16QAM	RB Size=1, RB Offset=0	22.21	21.40	22.03
		RB Size=1, RB Offset=12	22.51	21.33	22.09
		RB Size=1, RB Offset=24	22.63	22.29	22.39
		RB Size=12, RB Offset=0	22.04	20.96	21.59
		RB Size=12, RB Offset=6	21.31	21.32	20.85
		RB Size=12, RB Offset=11	21.42	21.25	21.57
		RB Size=25, RB Offset=0	21.04	20.80	20.63
10	QPSK	RB Size=1, RB Offset=0	22.49	21.88	23.10
		RB Size=1, RB Offset=24	22.77	22.10	22.65
		RB Size=1, RB Offset=49	23.03	21.85	22.80
		RB Size=25, RB Offset=0	21.61	21.86	22.02
		RB Size=25, RB Offset=12	21.37	22.23	21.67
		RB Size=25, RB Offset=24	21.56	21.40	22.11
		RB Size=50, RB Offset=0	21.94	21.05	21.65
	16QAM	RB Size=1, RB Offset=0	21.56	21.78	21.97
		RB Size=1, RB Offset=24	21.46	22.33	21.99
		RB Size=1, RB Offset=49	21.38	22.52	21.92
		RB Size=25, RB Offset=0	20.61	20.74	21.37
		RB Size=25, RB Offset=12	20.90	21.16	21.50
		RB Size=25, RB Offset=24	20.62	21.74	21.52
		RB Size=50, RB Offset=0	20.59	20.58	20.13

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15	QPSK	RB Size=1, RB Offset=0	22.50	22.71	23.68
		RB Size=1, RB Offset=37	22.63	23.01	23.57
		RB Size=1, RB Offset=74	23.13	22.56	23.82
		RB Size=36, RB Offset=0	22.23	22.30	22.96
		RB Size=36, RB Offset=18	21.79	21.42	22.68
		RB Size=36, RB Offset=37	21.79	21.42	22.81
		RB Size=75, RB Offset=0	22.49	20.81	21.94
	16QAM	RB Size=1, RB Offset=0	22.25	21.91	22.17
		RB Size=1, RB Offset=37	21.48	21.37	23.12
		RB Size=1, RB Offset=74	21.79	21.62	22.32
		RB Size=36, RB Offset=0	20.68	20.85	22.34
		RB Size=36, RB Offset=18	21.57	21.42	22.19
		RB Size=36, RB Offset=37	21.32	21.14	21.69
		RB Size=75, RB Offset=0	20.34	20.17	21.41
20	QPSK	RB Size=1, RB Offset=0	22.45	23.00	23.15
		RB Size=1, RB Offset=49	23.14	22.64	23.46
		RB Size=1, RB Offset=99	22.82	22.86	23.20
		RB Size=50, RB Offset=0	21.53	21.74	22.27
		RB Size=50, RB Offset=24	22.34	21.81	22.38
		RB Size=50, RB Offset=49	22.10	22.53	22.65
		RB Size=100, RB Offset=0	22.69	21.69	22.80
	16QAM	RB Size=1, RB Offset=0	22.13	21.97	23.26
		RB Size=1, RB Offset=49	21.73	22.70	22.65
		RB Size=1, RB Offset=99	22.36	22.43	23.36
		RB Size=50, RB Offset=0	20.79	21.34	22.26
		RB Size=50, RB Offset=24	21.23	21.43	22.26
		RB Size=50, RB Offset=49	20.97	21.83	21.57
		RB Size=100, RB Offset=0	21.07	20.68	21.60

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	7.41	13	Pass
QPSK (100RB Size)	7.43	13	Pass
16QAM (1RB Size)	7.69	13	Pass
16QAM (100RB Size)	7.52	13	Pass

EIRP:**QPSK:**

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
2535.00	82.37	332	2.4	H	12.9	2.60	10.20	20.50	33
2535.00	78.34	289	2.2	V	9.5	2.60	10.20	17.10	33
10 MHz Bandwidth									
2535.00	82.12	111	1.4	H	12.6	2.60	10.20	20.20	33
2535.00	78.05	186	1.4	V	9.2	2.60	10.20	16.80	33
15 MHz Bandwidth									
2535.00	81.52	14	2.2	H	12.0	2.60	10.20	19.60	33
2535.00	77.69	52	1.6	V	8.8	2.60	10.20	16.40	33
20 MHz Bandwidth									
2535.00	80.64	208	1.5	H	11.2	2.60	10.20	18.80	33
2535.00	77.28	14	1.1	V	8.4	2.60	10.20	16.00	33

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
2535.00	78.29	69	1.1	H	8.8	2.60	10.20	16.40	33
2535.00	81.31	78	1.9	V	12.4	2.60	10.20	20.00	33
10 MHz Bandwidth									
2535.00	78.96	65	2.2	H	9.5	2.60	10.20	17.10	33
2535.00	82.18	13	1.2	V	13.3	2.60	10.20	20.90	33
15 MHz Bandwidth									
2535.00	78.49	342	1.3	H	9.0	2.60	10.20	16.60	33
2535.00	81.18	265	1.2	V	12.3	2.60	10.20	19.90	33
20 MHz Bandwidth									
2535.00	78.39	58	1.8	H	8.9	2.60	10.20	16.50	33
2535.00	81.02	179	2.2	V	12.1	2.60	10.20	19.70	33

Note:

All above data were tested with no amplifier

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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

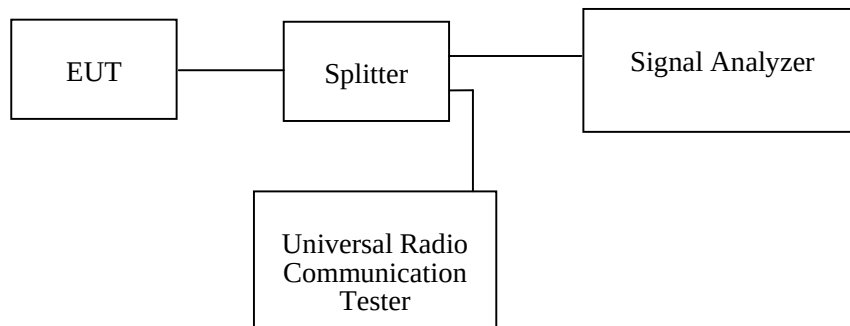
Applicable Standard

FCC 47 §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 resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	24~25 °C
Relative Humidity:	50~55 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Moon Tan from 2019-04-02 to 2019-04-04.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables and plots.

Cellular Band (Part 22H)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	243.59	315.71
EGPRS(8PSK)	836.6	243.59	312.50

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.15	4.70
HSUPA (BPSK)	836.6	4.17	4.70
HSDPA (16QAM)	836.6	4.15	4.66

PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	243.59	314.10
EGPRS(8PSK)	1880.0	246.79	312.50

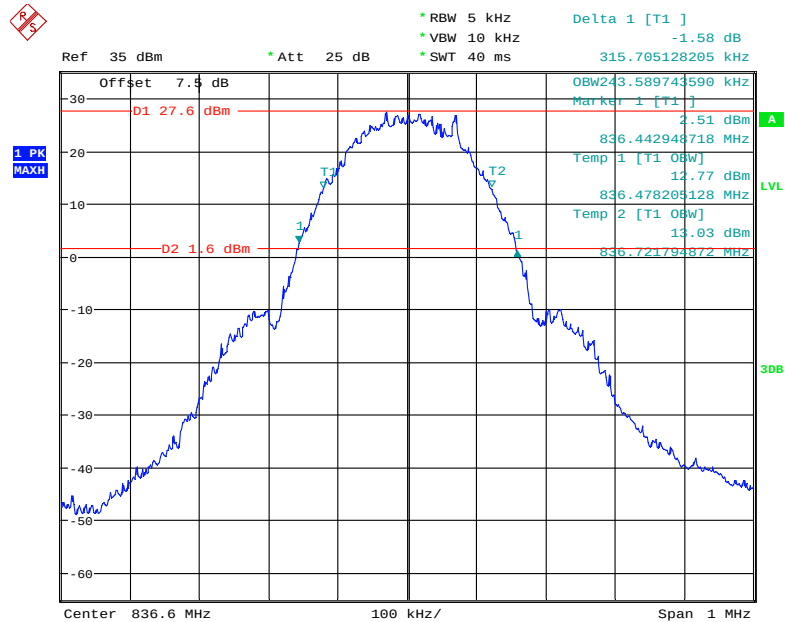
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.15	4.70
HSUPA (BPSK)	1880.0	4.15	4.68
HSDPA (16QAM)	1880.0	4.15	4.68

AWS Band (Part 27)

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1732.6	4.13	4.70
HSUPA (BPSK)	1732.6	4.15	4.68
HSDPA (16QAM)	1732.6	4.13	4.68

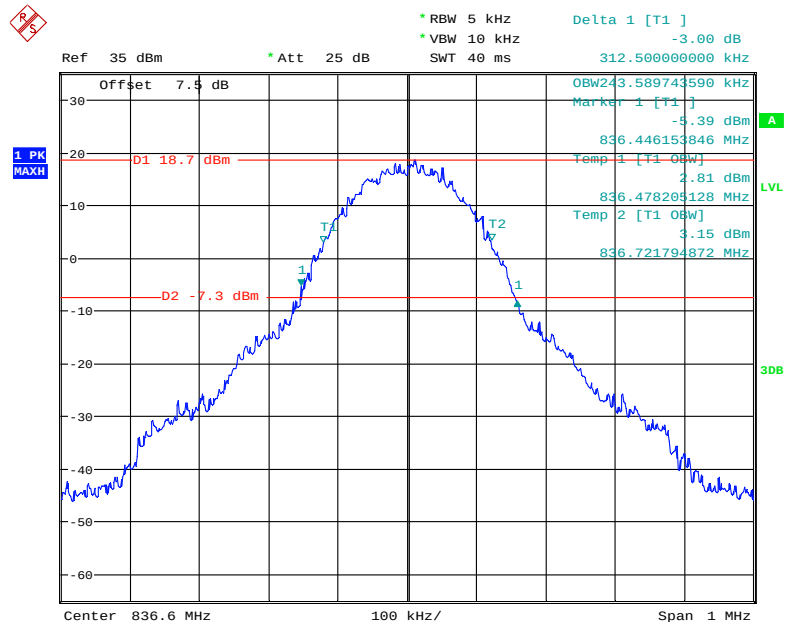
Cellular Band (Part 22H)

26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



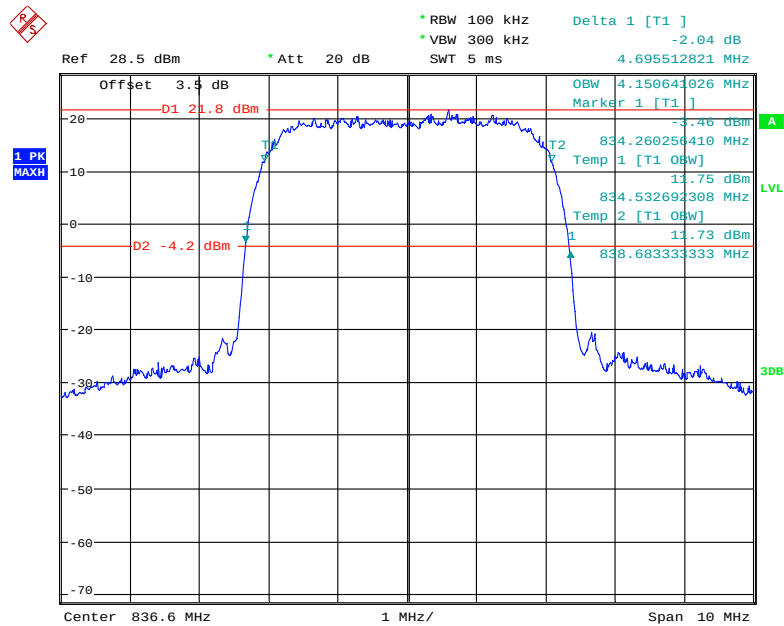
Date: 3.APR.2019 11:24:49

26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode



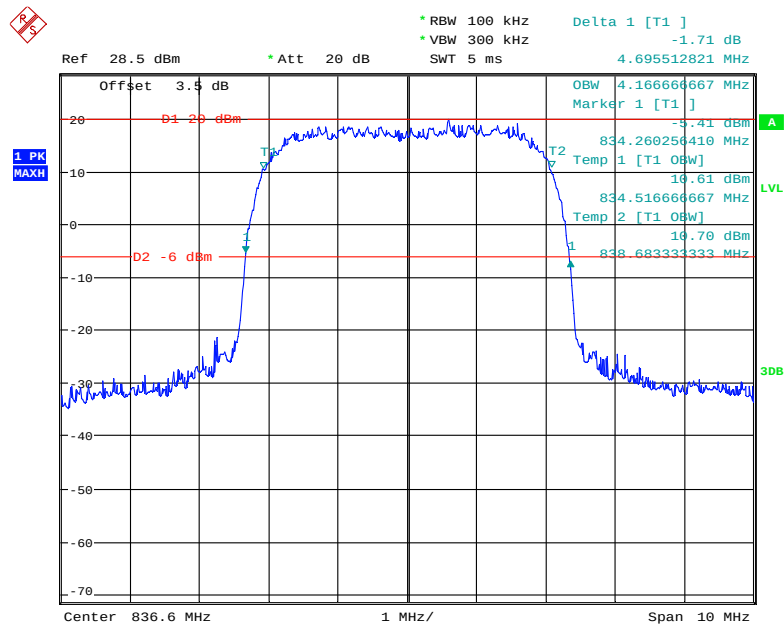
Date: 3.APR.2019 11:54:41

26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode

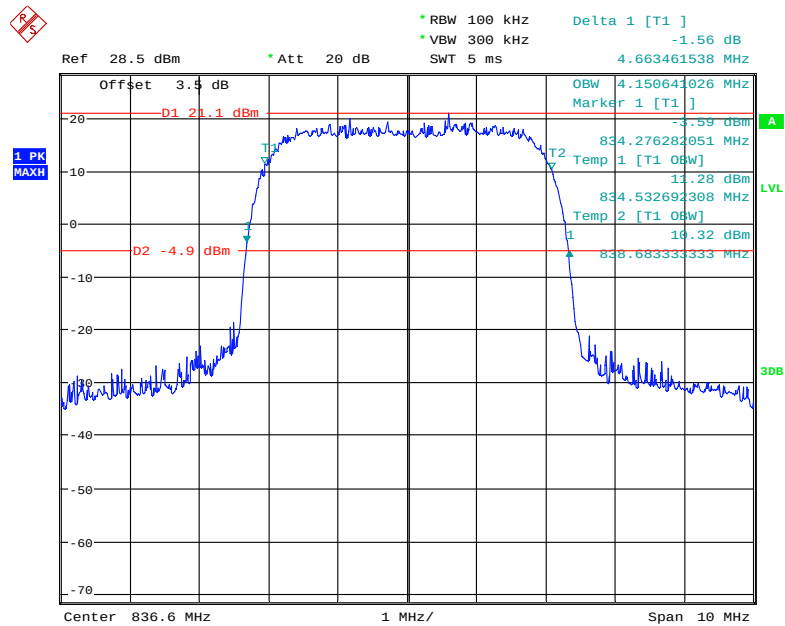


Date: 2.APR.2019 17:31:09

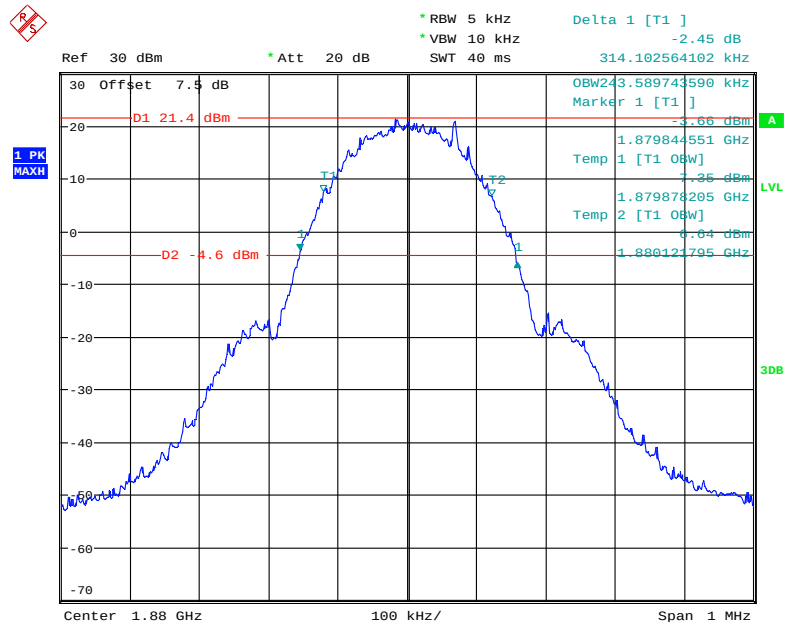
26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



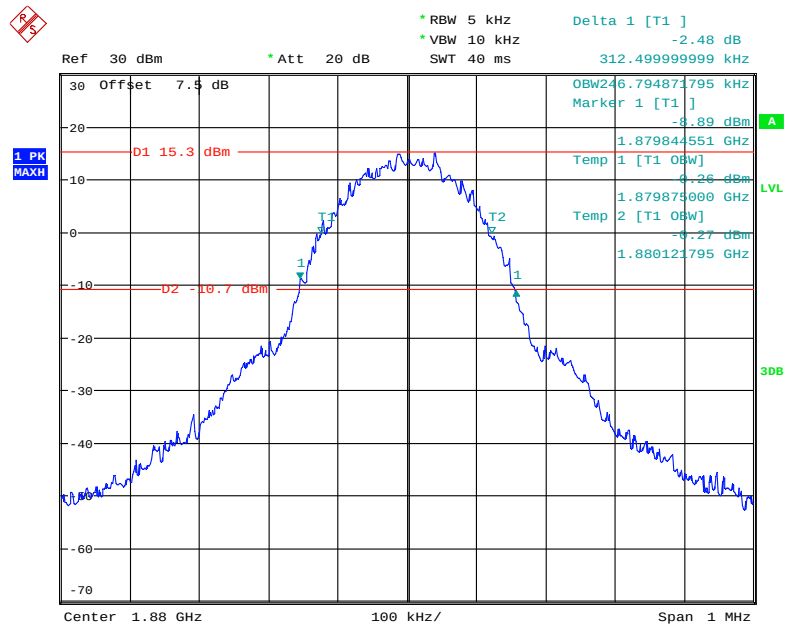
Date: 2.APR.2019 17:33:21

26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode

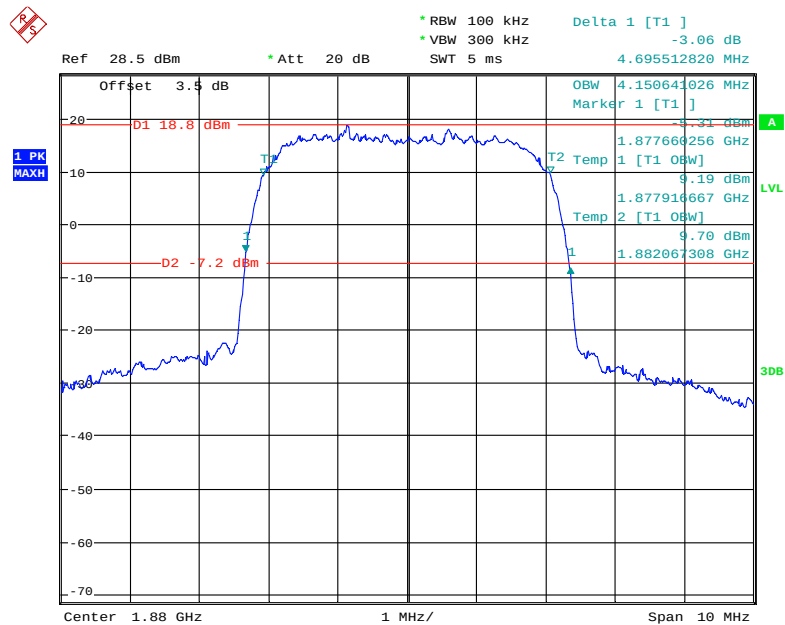
Date: 2.APR.2019 17:32:31

PCS Band (Part 24E)**26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode**

Date: 4.APR.2019 15:05:34

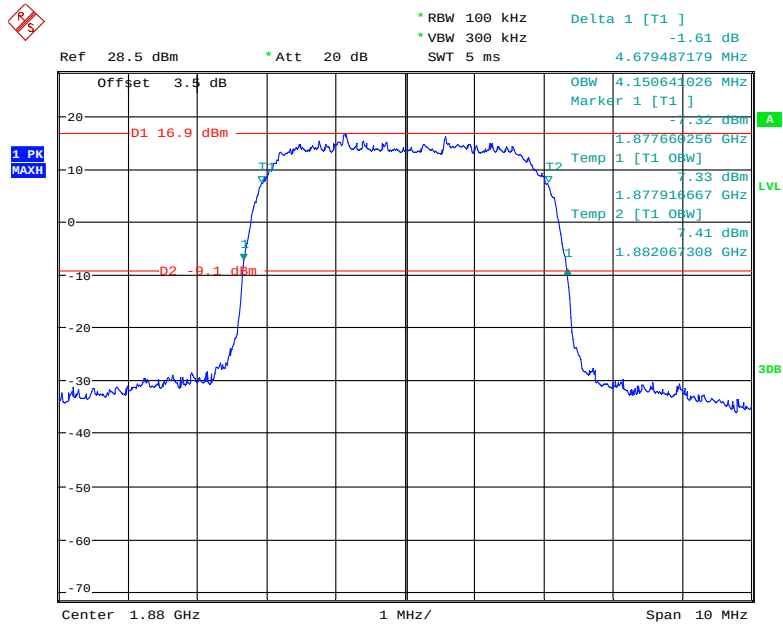
26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode

Date: 4.APR.2019 15:21:29

26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode

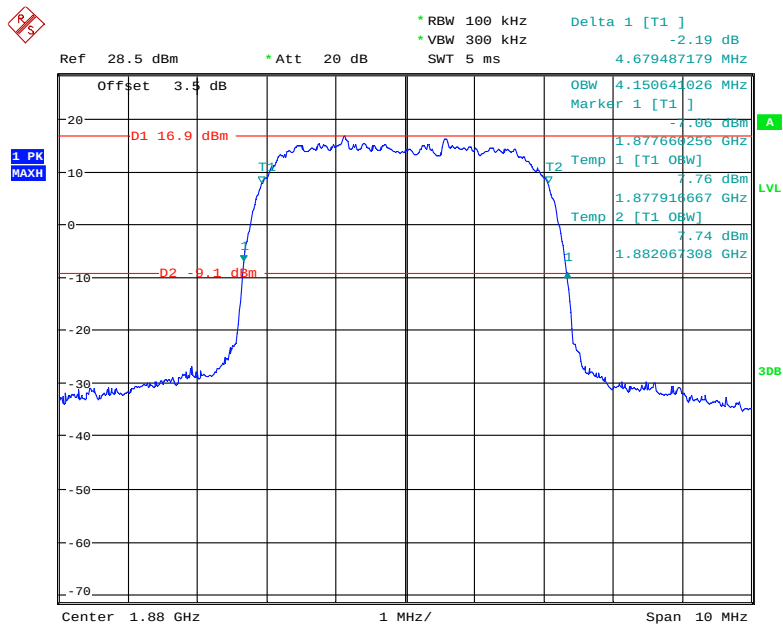
Date: 2.APR.2019 16:52:10

26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



Date: 2.APR.2019 17:03:51

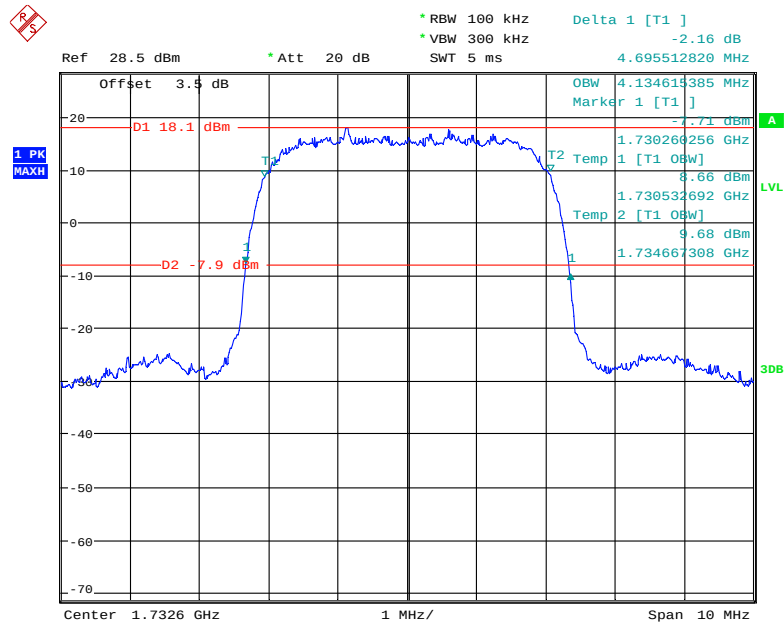
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 2.APR.2019 17:01:36

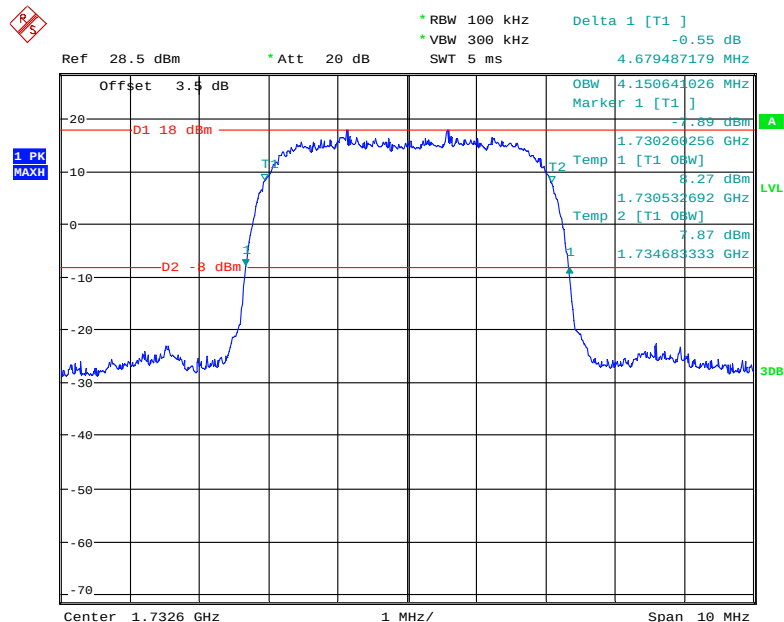
AWS Band (Part 27)

26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode

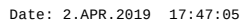


Date: 2.APR.2019 17:45:34

26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



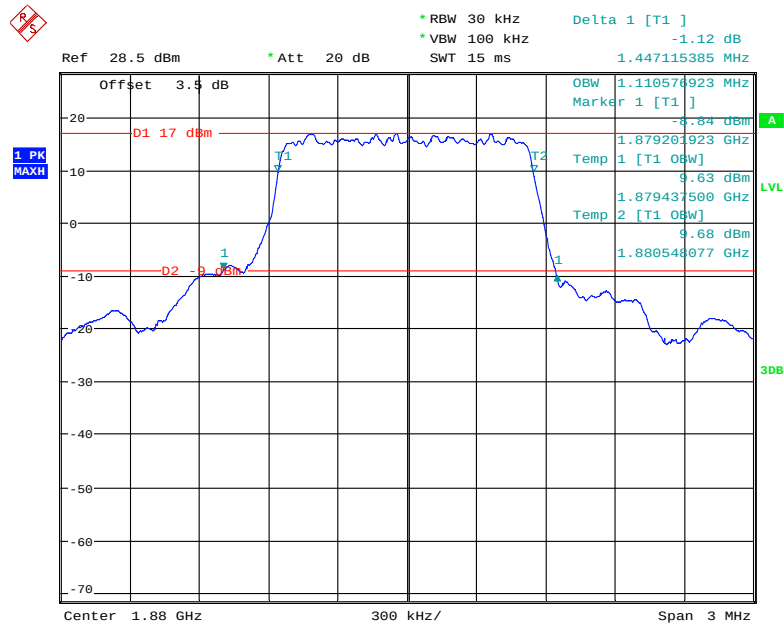
Date: 2.APR.2019 17:48:04



LTE Band 2: (Middle Channel)

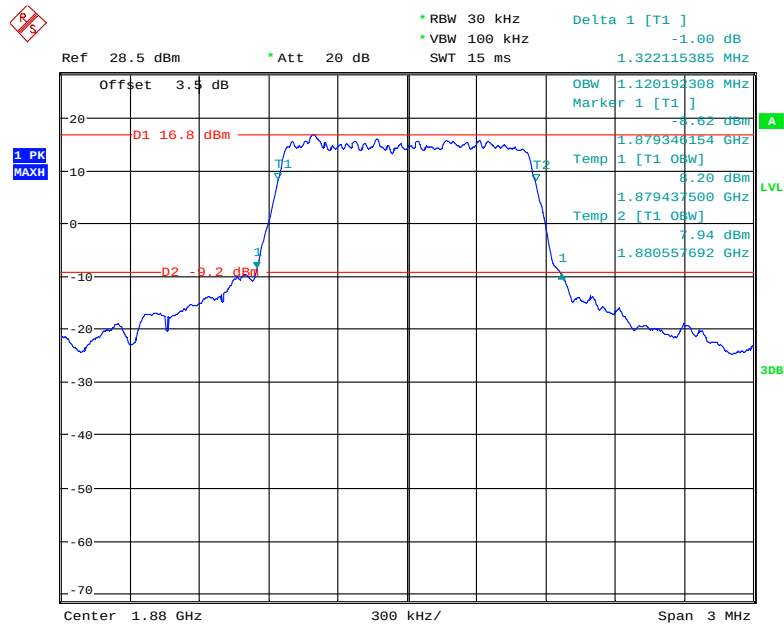
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.11	1.45
	16QAM	1.12	1.32
3.0	QPSK	2.71	3.04
	16QAM	2.70	3.04
5.0	QPSK	4.57	5.38
	16QAM	4.55	5.33
10.0	QPSK	8.97	9.80
	16QAM	8.97	9.83
15.0	QPSK	13.51	15.12
	16QAM	13.51	15.02
20.0	QPSK	17.95	19.69
	16QAM	18.01	19.88

QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



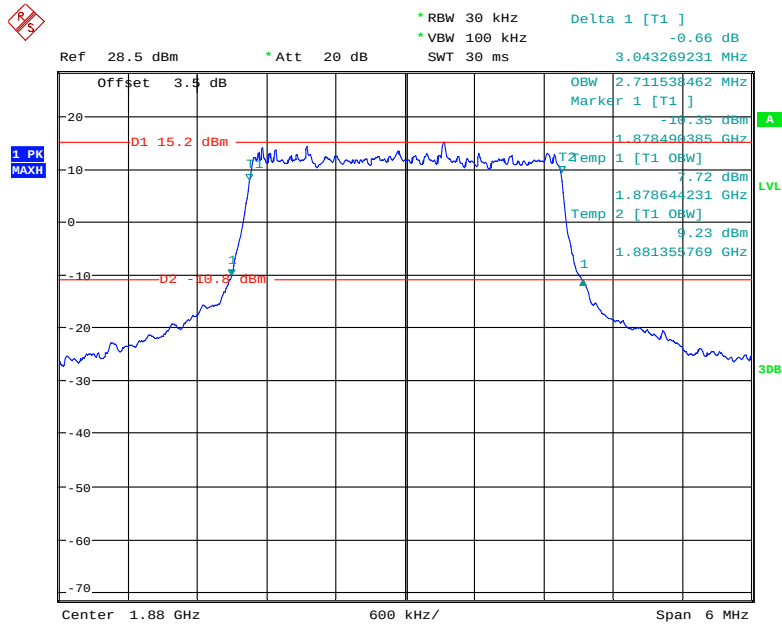
Date: 2.APR.2019 10:58:24

16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



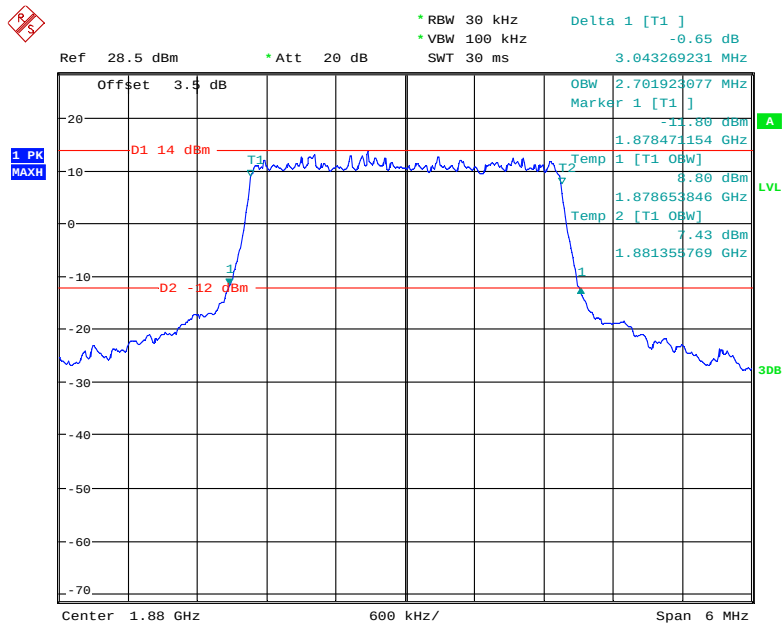
Date: 2.APR.2019 11:00:22

QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 2.APR.2019 11:02:07

16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 2.APR.2019 11:03:08

The screenshot displays a spectrum analyzer interface with the following details:

- Top Bar:**
 - Left: A red diamond icon with 'R' and 'S' inside.
 - Center: 'Ref 28.5 dBm', '* Att 20 dB'.
 - Right: '* RBW 100 kHz', '* VBW 300 kHz', 'SWT 5 ms', 'Delta 1 [T1] -0.58 dB', and '5.376602564 MHz'.
- Plot Area:**
 - Top Left: 'Offset 3.5 dB'.
 - Y-axis: Power in dBm, ranging from -70 to -20.
 - X-axis: Frequency in GHz, ranging from 1.88 to 1.89.
 - Signal: A blue trace showing a signal that rises from -20 dBm at 1.88 GHz to a plateau around -10 dBm, then falls back to -20 dBm at 1.89 GHz.
 - Markers:
 - D1: 16.8 dBm at approximately 1.881 GHz.
 - D2: -9.7 dBm at approximately 1.882 GHz.
 - T1: A point on the rising edge of the signal.
 - T2: A point on the falling edge of the signal.
 - Grid: A 10x10 grid is visible.
- Bottom Bar:**
 - Center: '1.88 GHz'.
 - Span: '1 MHz /'.
 - Right: 'Span 10 MHz'.
- Side Bar (Left):**
 - Top: '1 PK'.
 - Bottom: 'MAXH'.
- Side Bar (Right):**
 - Top: 'OBW 4.567307692 MHz'.
 - Marker 1 [T1]: -8.74 dBm.
 - 1.877275641 GHz: 9.99 dBm.
 - 1 [T1 OBW]: 1.877708333 GHz.
 - Temp 2 [T1 OBW]: 11.02 dBm.
 - 1.882275641 GHz: 1.882275641 GHz.
 - Bottom: '3DB'.

The screenshot displays a spectrum analyzer interface with a blue trace on a grid. The y-axis represents power in dBm, ranging from -70 to -20. The x-axis represents frequency in GHz, with a center frequency of 1.88 GHz and a span of 10 MHz. Two red horizontal lines indicate power levels: D1 at -8.94 dBm and D2 at -9.08 dBm. The signal trace shows a peak at approximately 1.877 GHz. Various measurement parameters are displayed on the right side, including RBW, VBW, and SWT. The top left corner shows a small icon of a signal source.

Ref 28.5 dBm * Att 20 dB Delta 1 [T1] -0.17 dB
 * RBW 100 kHz 5.328525641 MHz
 * VBW 300 kHz
 SWT 5 ms

Offset 3.5 dB

OBW 4.551281051 MHz
 Marker 1 [T1]

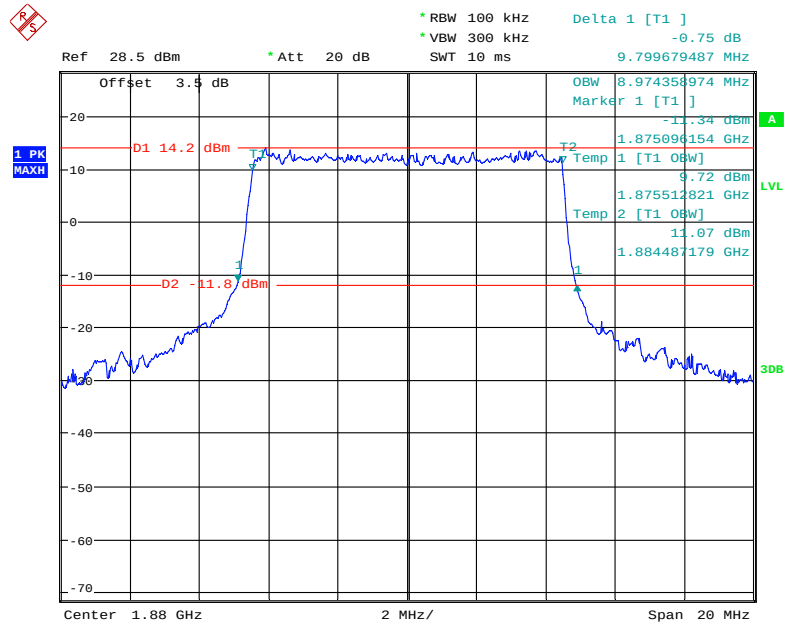
D1 16.9 dBm -8.94 dBm
 1.877387821 GHz
 1 [T1 OBW]

Temp 1 9.46 dBm
 1.877724359 GHz
 Temp 2 [T1 OBW]

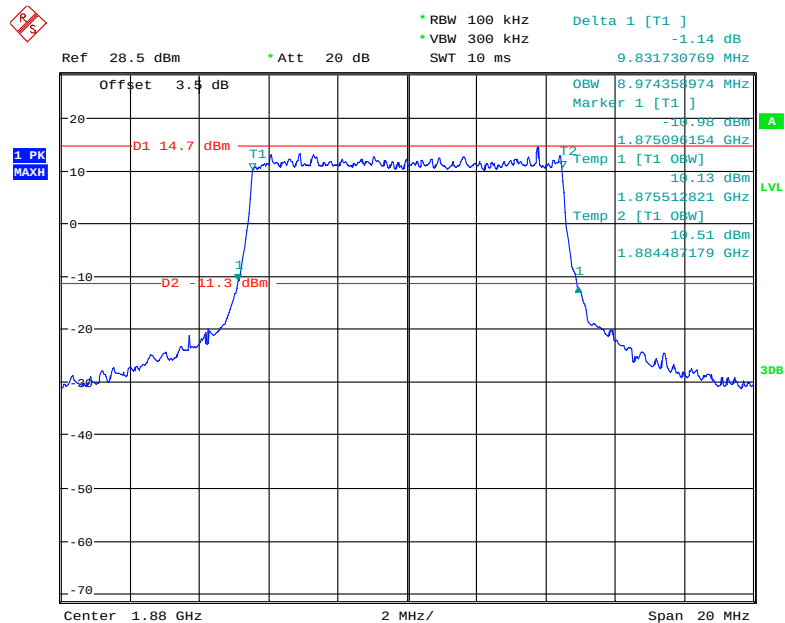
D2 -9.08 dBm 1.882275641 GHz

Center 1.88 GHz 1 MHz/ Span 10 MHz

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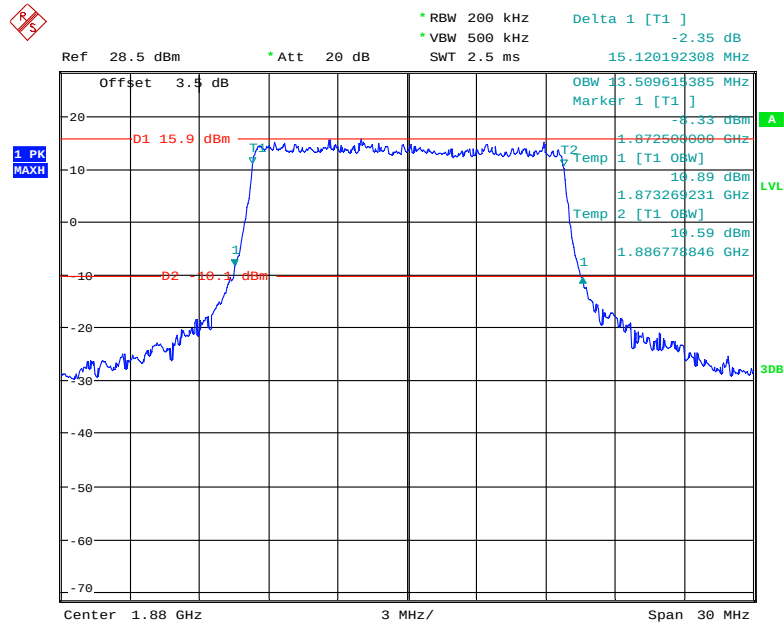
QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:06:41

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

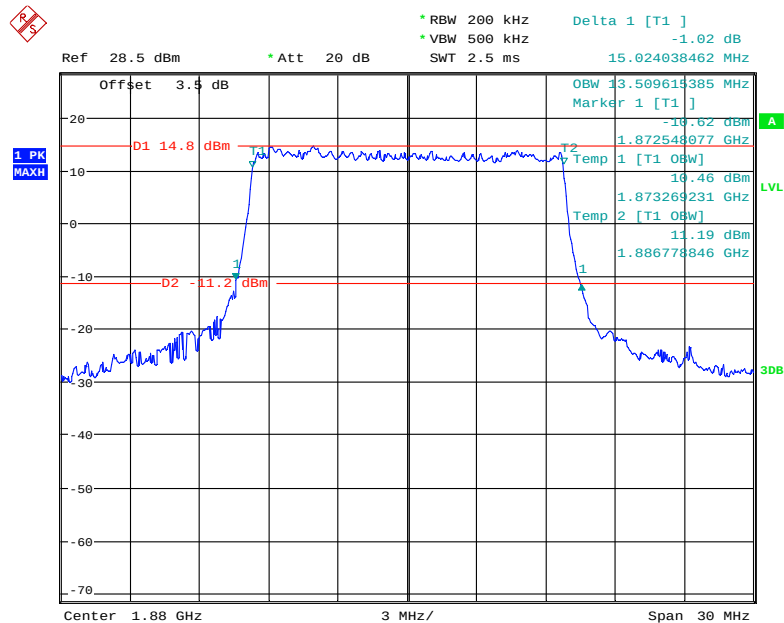
Date: 2.APR.2019 11:08:12

QPSK (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

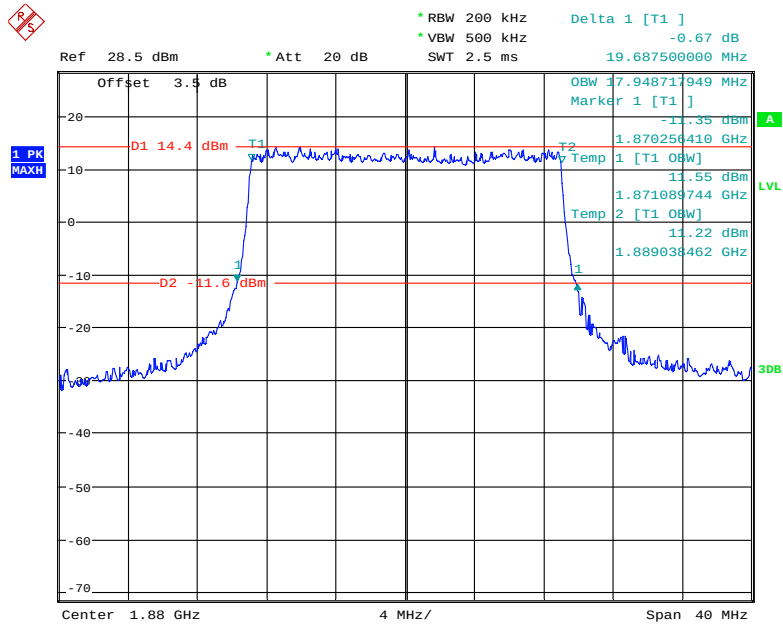


Date: 2.APR.2019 11:09:28

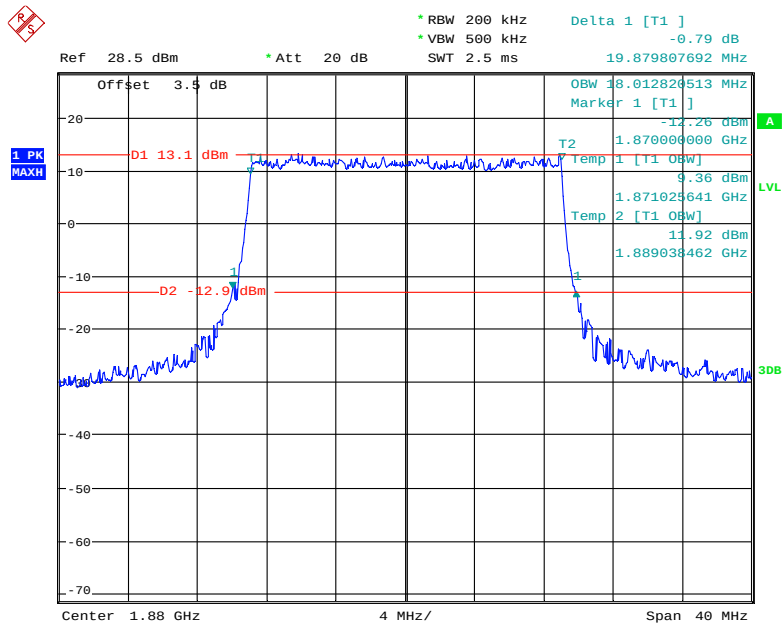
16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 2.APR.2019 11:10:43

QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

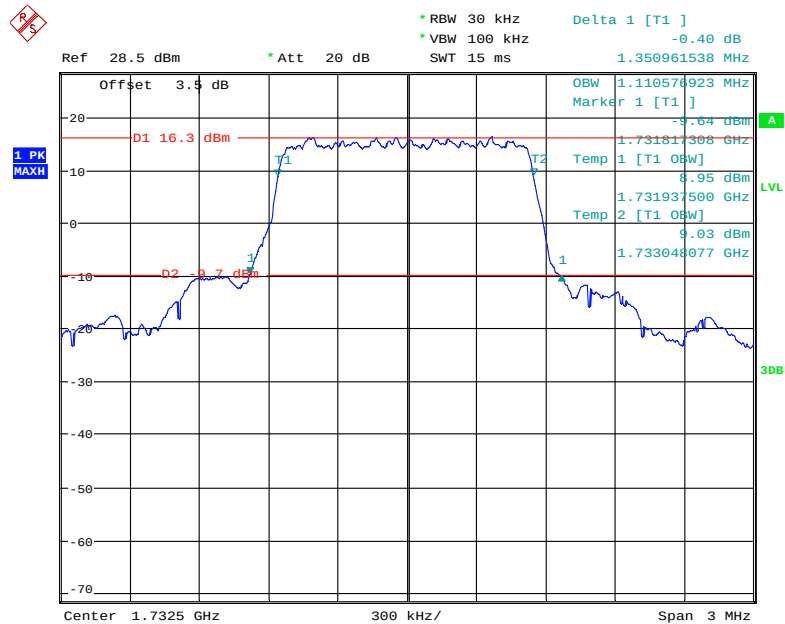
Date: 2.APR.2019 11:12:39

16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

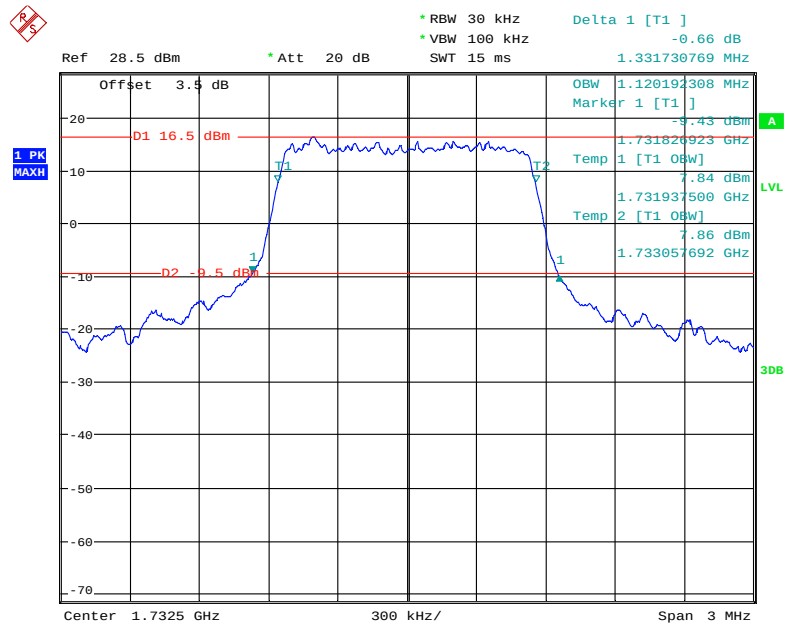
Date: 2.APR.2019 11:14:08

LTE Band 4: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.11	1.35
	16QAM	1.12	1.33
3.0	QPSK	2.70	3.02
	16QAM	2.70	3.06
5.0	QPSK	4.57	5.37
	16QAM	4.55	5.27
10.0	QPSK	8.97	9.89
	16QAM	8.97	9.89
15.0	QPSK	13.51	15.29
	16QAM	13.51	14.90
20.0	QPSK	17.95	19.62
	16QAM	17.95	19.68

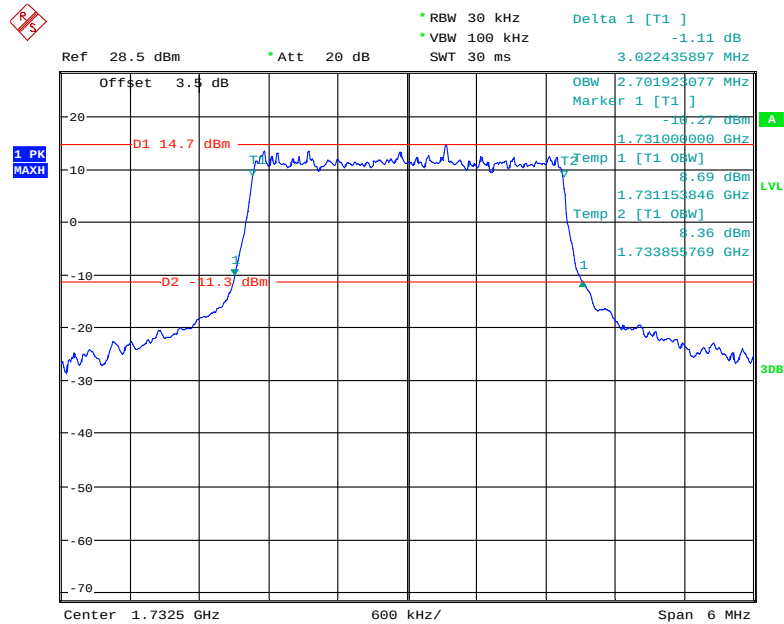
QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:37:40

16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

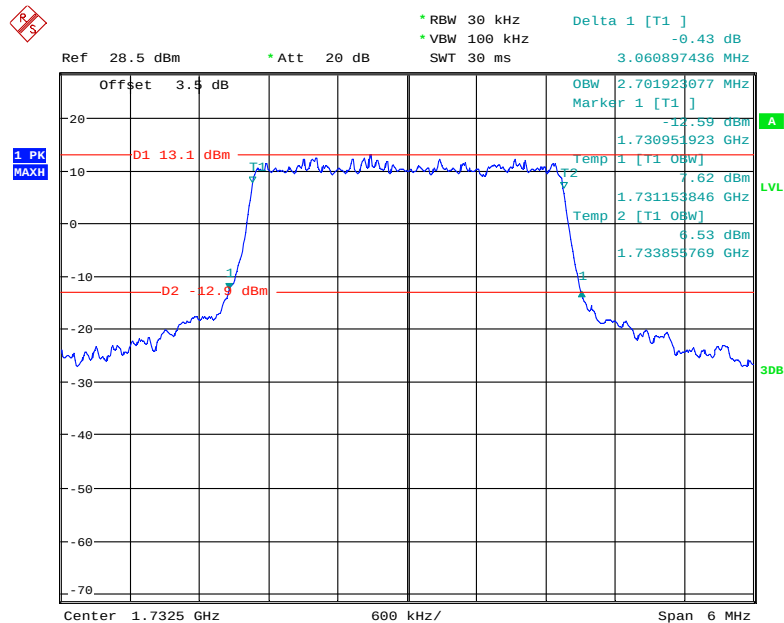
Date: 2.APR.2019 11:36:49

QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



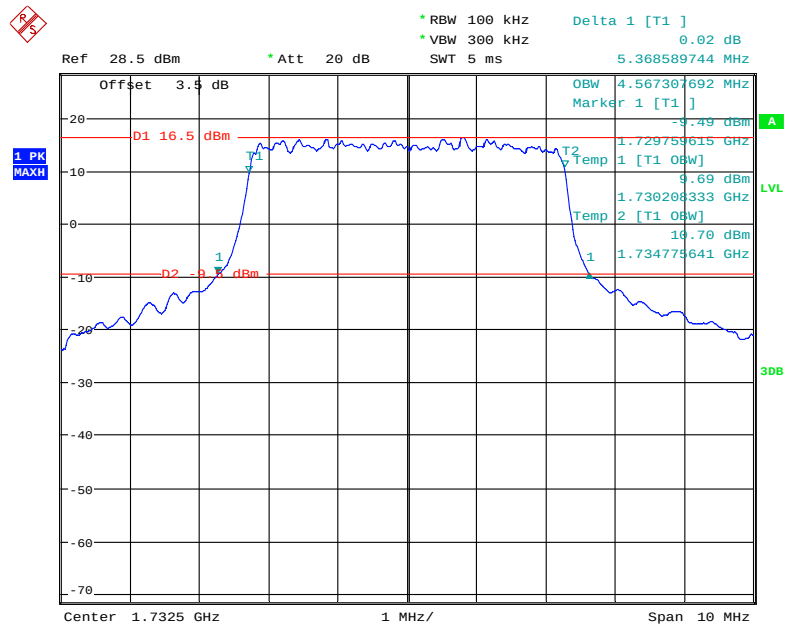
Date: 2.APR.2019 11:35:46

16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



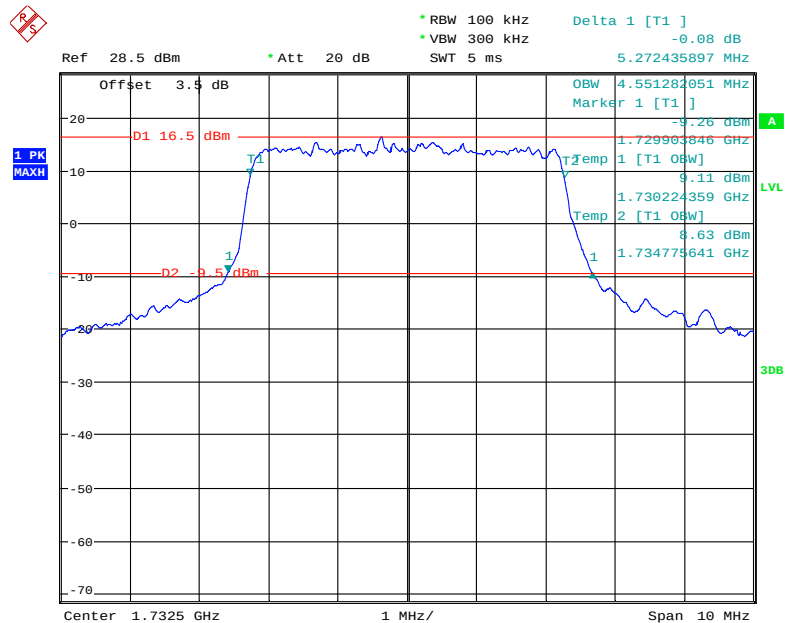
Date: 2.APR.2019 11:34:55

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



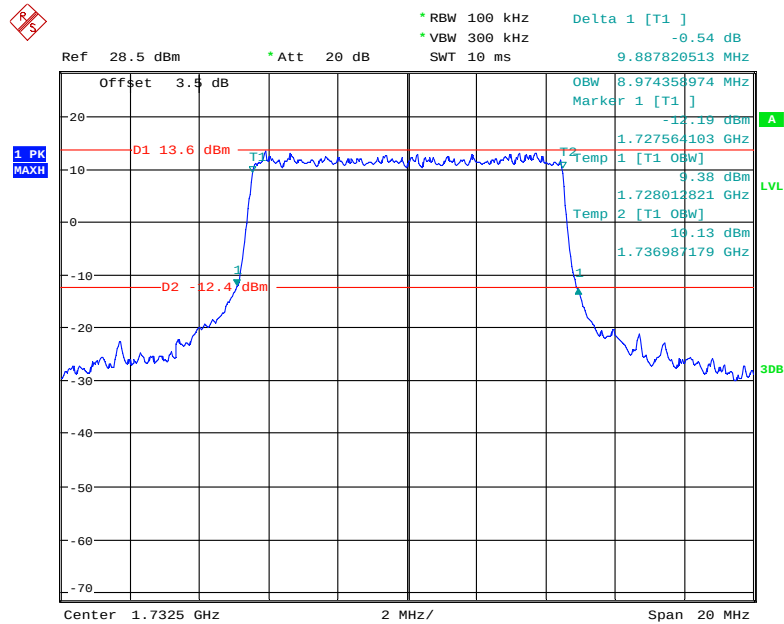
Date: 2.APR.2019 11:33:19

16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



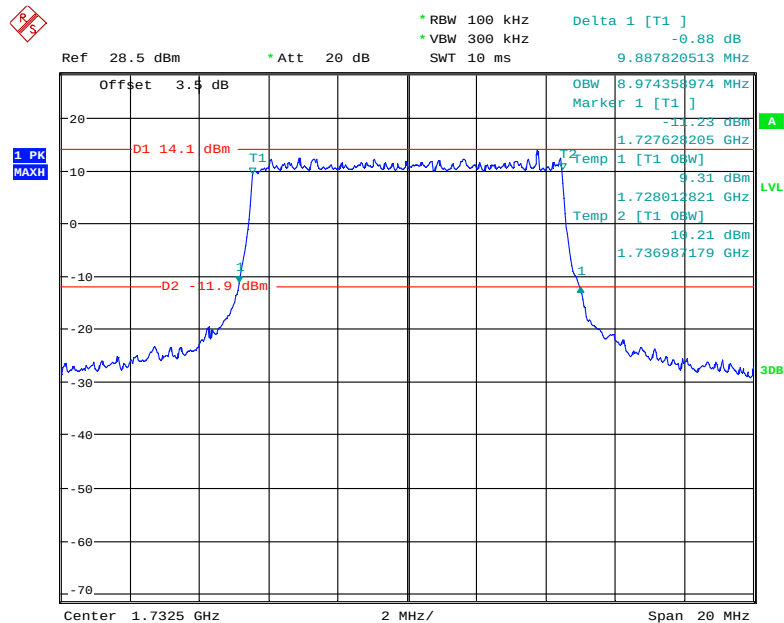
Date: 2.APR.2019 11:28:54

QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

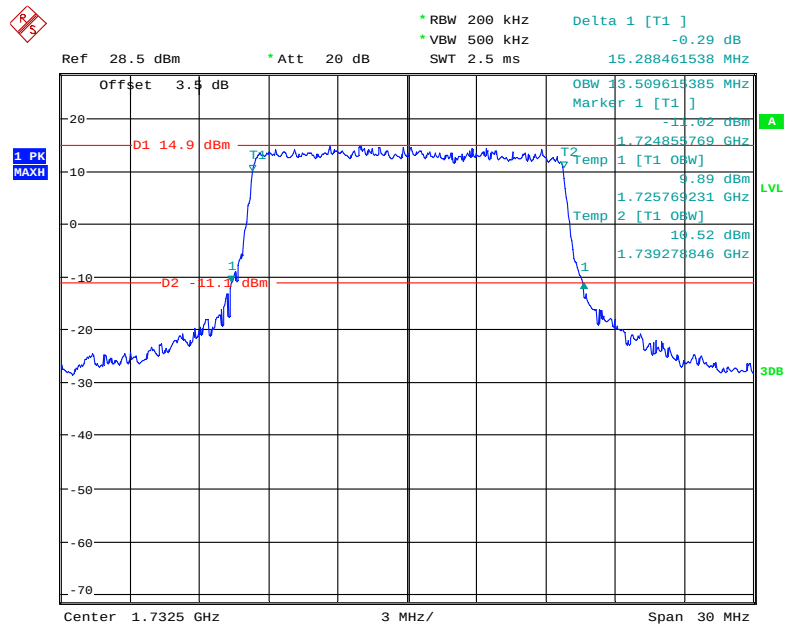


Date: 2.APR.2019 11:26:07

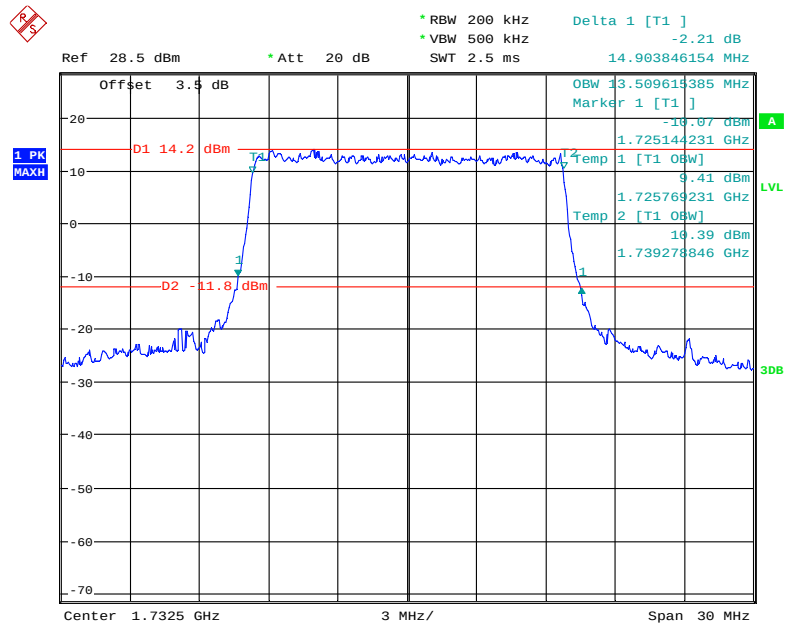
16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



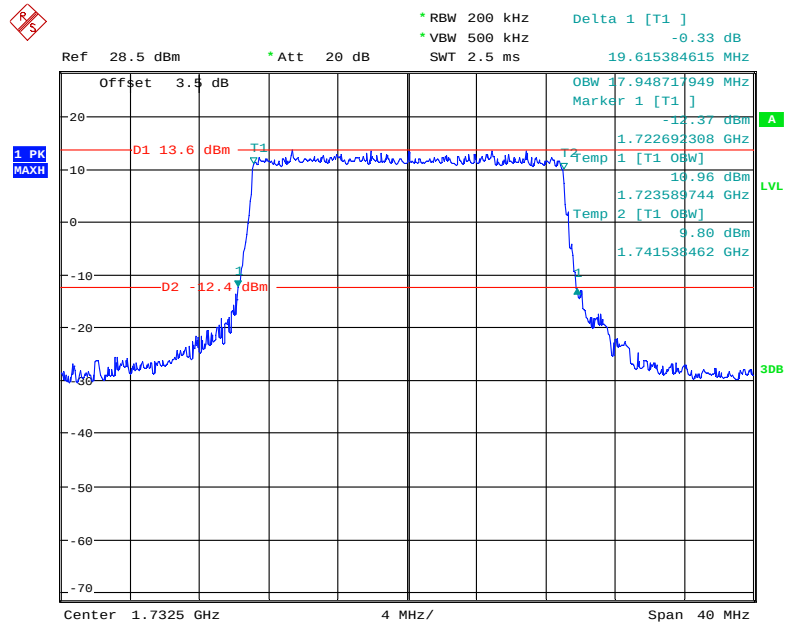
Date: 2.APR.2019 11:24:34

QPSK (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

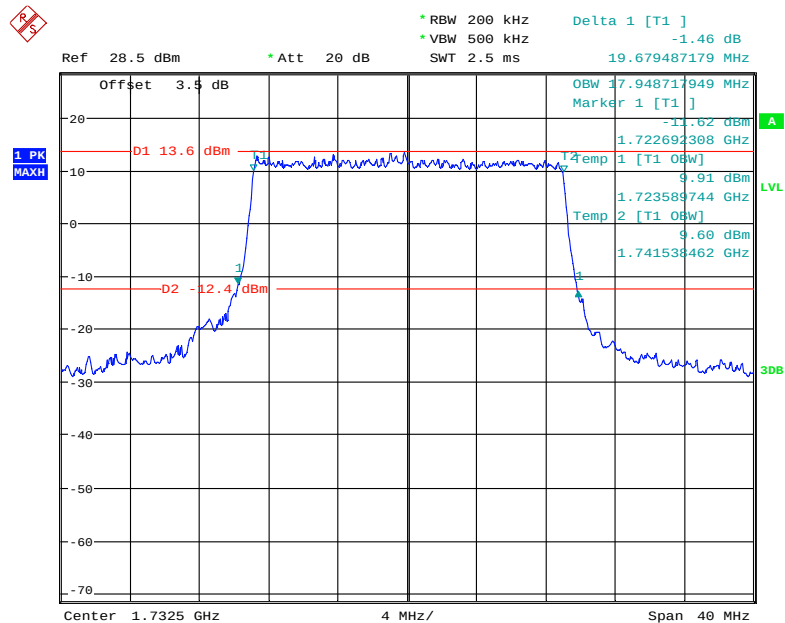
Date: 2.APR.2019 11:22:50

16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:21:11

QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:19:29

16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:17:40

LTE Band 7: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.55	5.31
	16QAM	4.54	5.33
10.0	QPSK	9.01	9.88
	16QAM	8.94	9.78
15.0	QPSK	13.51	15.17
	16QAM	13.51	14.97
20.0	QPSK	17.88	19.41
	16QAM	17.95	19.54

1 PK
MAXH

Ref 28.5 dBm * Att 20 dB * RBW 100 kHz * VBW 300 kHz Delta 1 [T1] -0.47 dB
SWT 5 ms 5.310897436 MHz

Offset 3.5 dB

OBW 4.551282051 MHz
Marker 1 [T1] -9.71 dBm
2.53239744 GHz
Temp 1 [T1 OBW] 9.67 dBm
2.532724359 GHz
Temp 2 [T1 OBW] 10.84 dBm
2.537275641 GHz

D1 16.1 dBm
D2 0.0 dBm

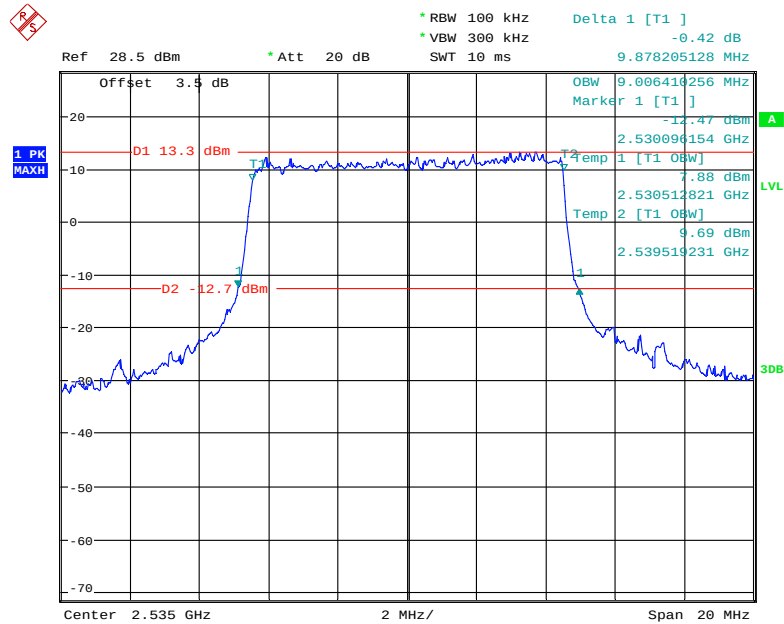
1
2

Center 2.535 GHz 1 MHz/ Span 10 MHz

[illegible]

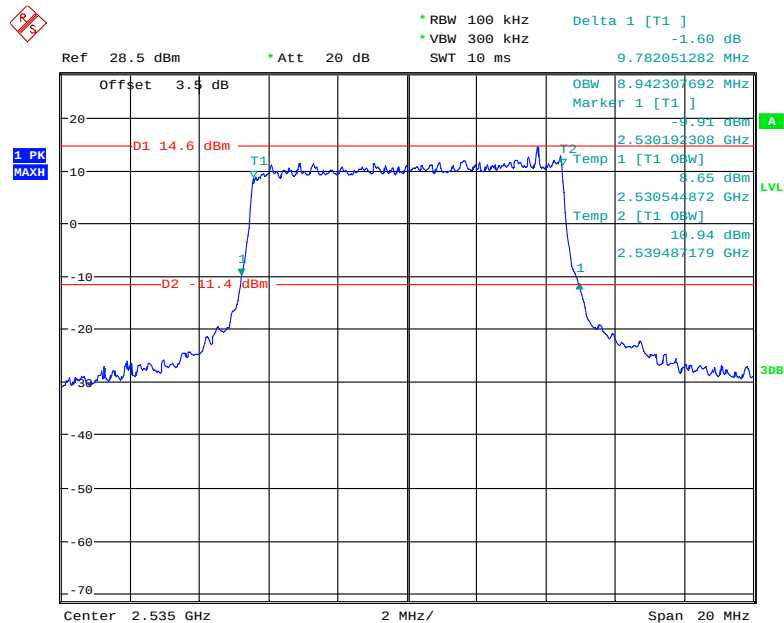
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QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 2.APR.2019 11:48:05

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 2.APR.2019 11:50:04

Ref 28.5 dBm * Att 20 dB * RBW 200 kHz Delta 1 [T1] -1.84 dB
 SWT 2.5 ms 15.166666667 MHz

Offset 3.4 dB

OBW 13.50961385 MHz
 Marker 1 [T1]

D1 15.2 dBm -10.09 dBm
 2.527590154 GHz 1 [T1 OBW]

9.78 dBm
 2.528317308 GHz 2 [T1 OBW]

9.09 dBm
 2.541826923 GHz

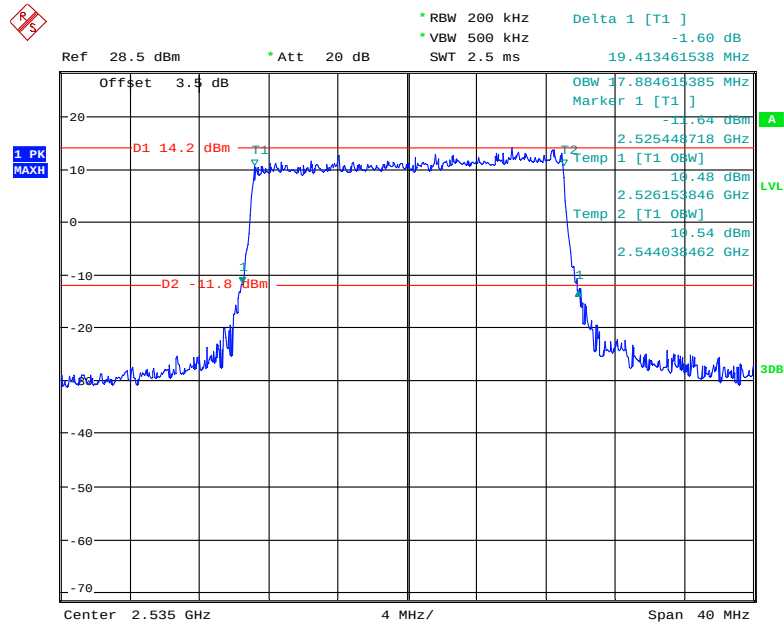
1 PK
 MAXH

Center 2.535 GHz 3 MHz/ Span 30 MHz

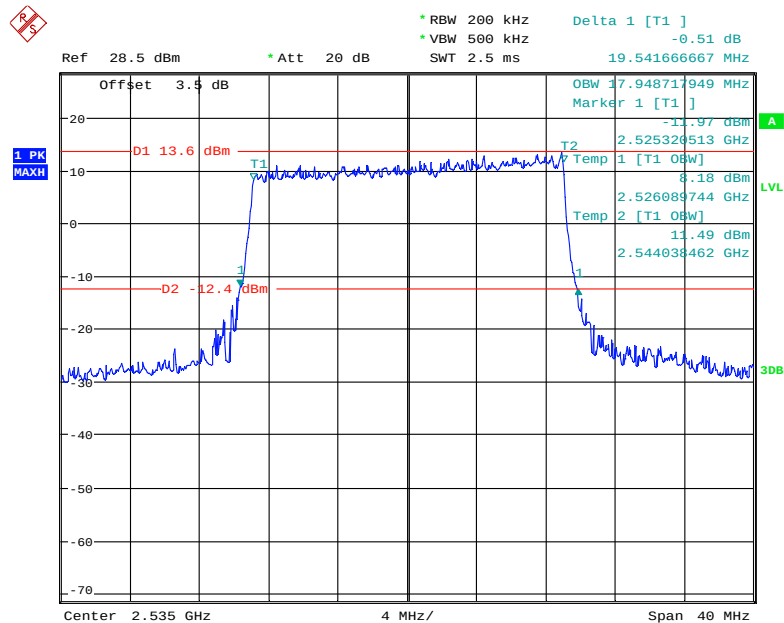
The screenshot displays a spectrum analyzer interface with the following details:

- Top Bar:**
 - Left: A red square icon with a white 'X' and a blue square icon with a white 'R'.
 - Center: "Ref 28.5 dBm" and "* Att 20 dB".
 - Right: "* RBW 200 kHz", "Delta 1 [T1]", "-0.93 dB", "* VBW 500 kHz", "SWT 2.5 ms", and "14.974358974 MHz".
- Plot Area:**
 - Top Left: "Offset 3.5 dB".
 - Top Right: "OBW 13.509613385 MHz" and "Marker 1 [T1]".
 - Left Y-axis: A blue box labeled "1 PK MAXH".
 - Right Y-axis: Labels "A", "LVL", and "3DB" are visible.
 - Plot: A blue trace shows a signal with two markers:
 - Marker D1: Red line at 13.9 dBm.
 - Marker D2: Red line at -12.1 dBm.
 - Marker T1: Green line at 13.509613385 MHz.
 - Marker T2: Green line at 14.974358974 MHz.
- Bottom Bar:**
 - Center: "Center 2.535 GHz" and "3 MHz/".
 - Right: "Span 30 MHz".

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QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:57:51

16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 2.APR.2019 11:59:28

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

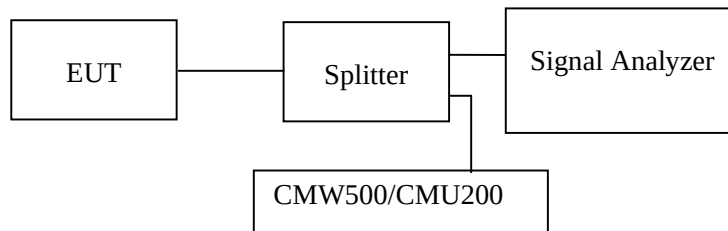
Applicable Standard

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

The spectrum was to be investigated to the tenth harmonics 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. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Moon Tan from 2019-04-02 to 2019-04-04.

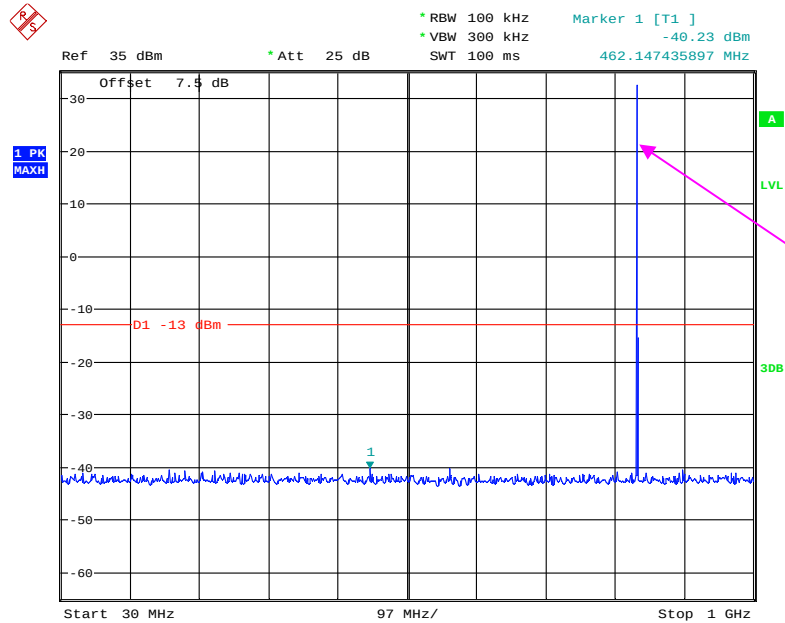
Test result: Compliance.

EUT operation mode: transmitting

Please refer to the following plots.

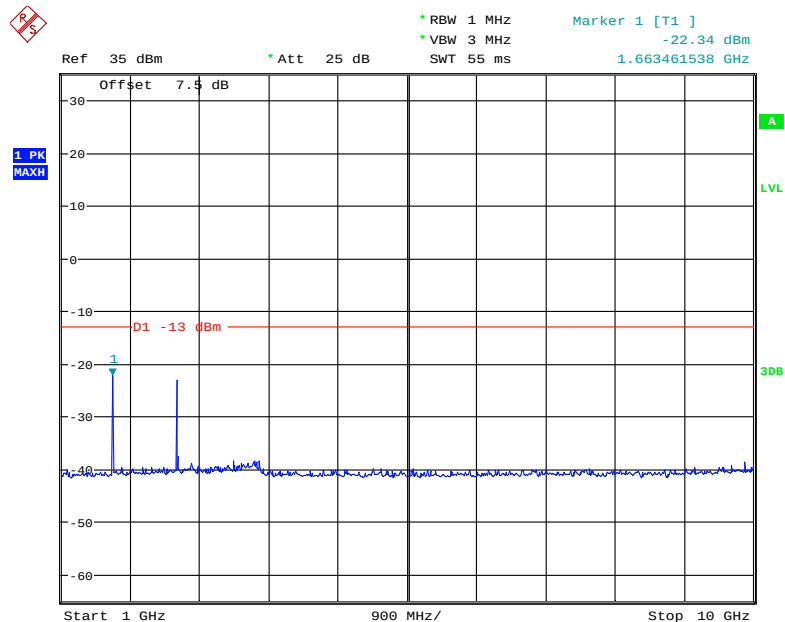
Cellular Band (Part 22H)

30 MHz – 1 GHz (GSM Mode)



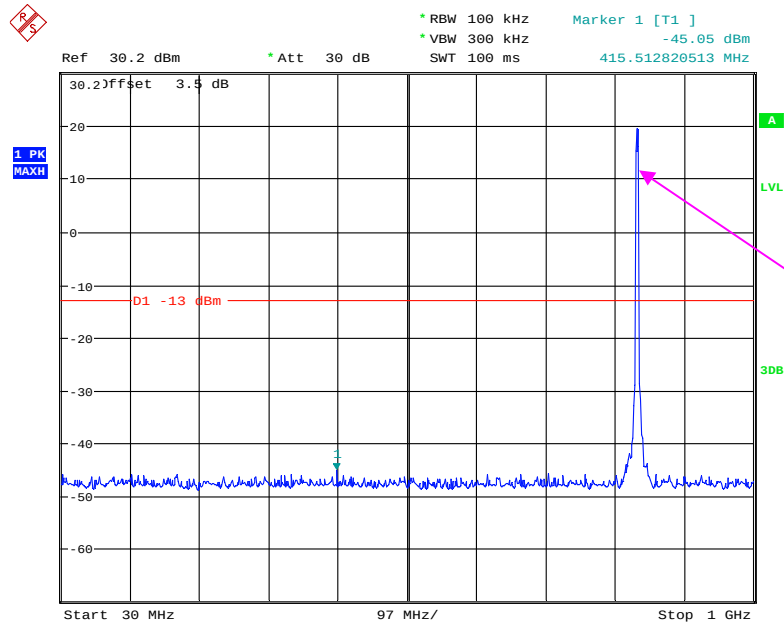
Date: 3.APR.2019 11:34:11

1 GHz – 10 GHz (GSM Mode)



Date: 3.APR.2019 11:32:11

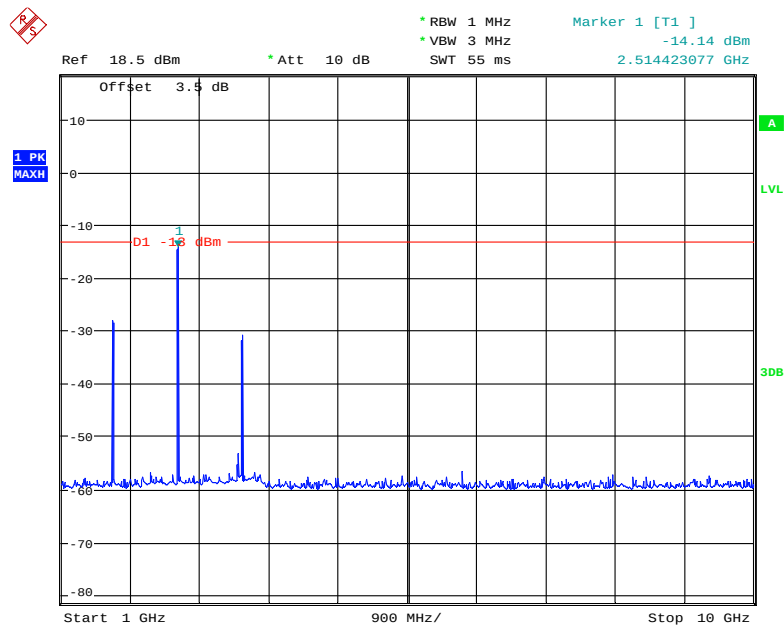
30 MHz – 1 GHz (WCDMA Mode)



Fundamental test

Date: 2.APR.2019 17:24:46

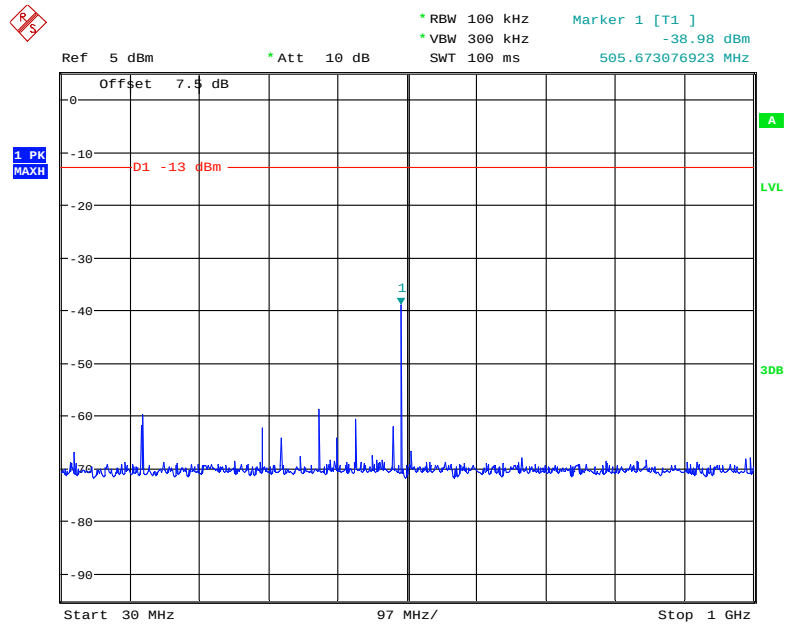
1 GHz – 10 GHz (WCDMA Mode)



Date: 2.APR.2019 17:26:46

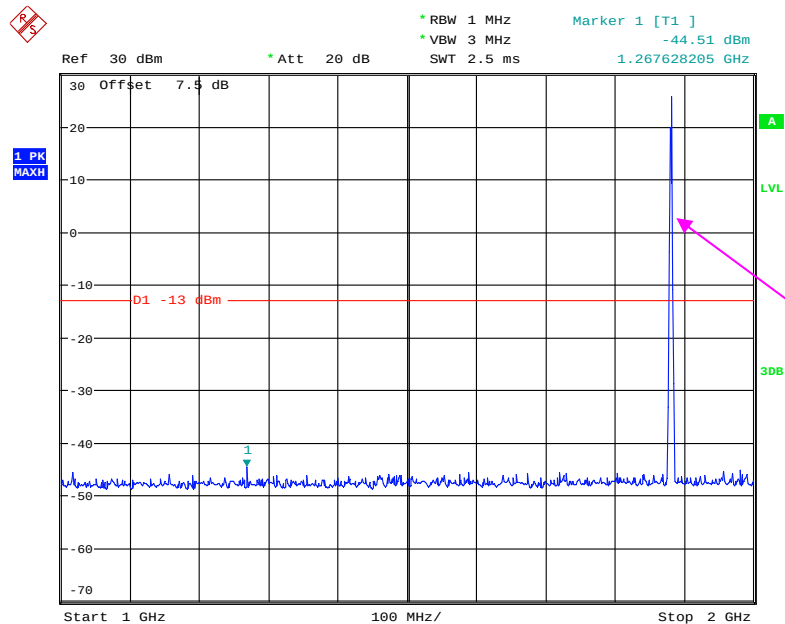
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



Date: 4.APR.2019 15:08:09

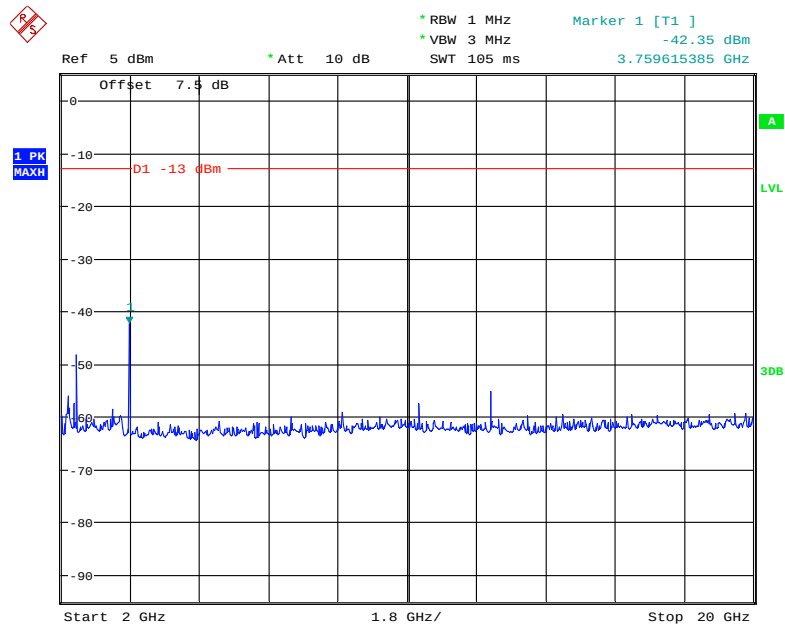
1 GHz – 2 GHz (GSM Mode)



Fundamental test

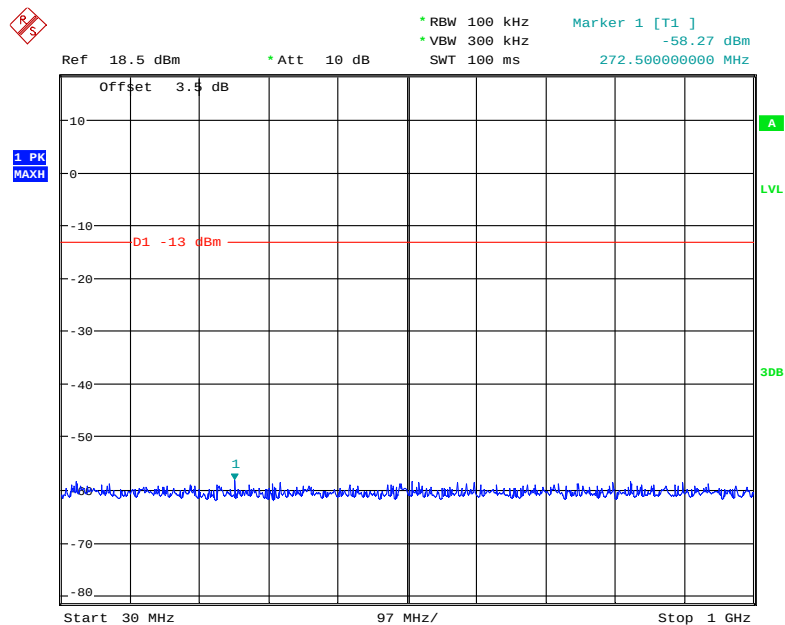
Date: 4.APR.2019 15:06:51

2 GHz – 20 GHz (GSM Mode)



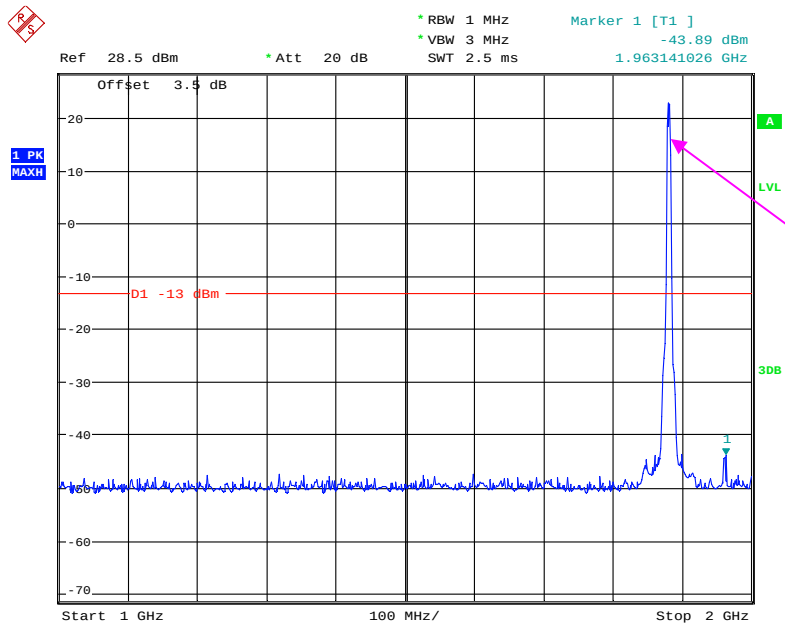
Date: 4.APR.2019 15:07:38

30 MHz – 1 GHz (WCDMA Mode)



Date: 2.APR.2019 17:13:40

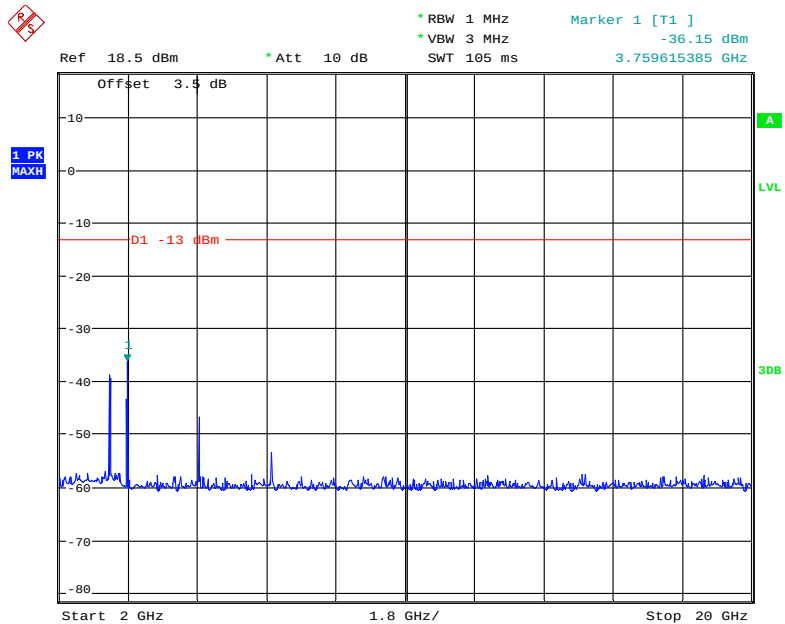
1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 2.APR.2019 17:12:38

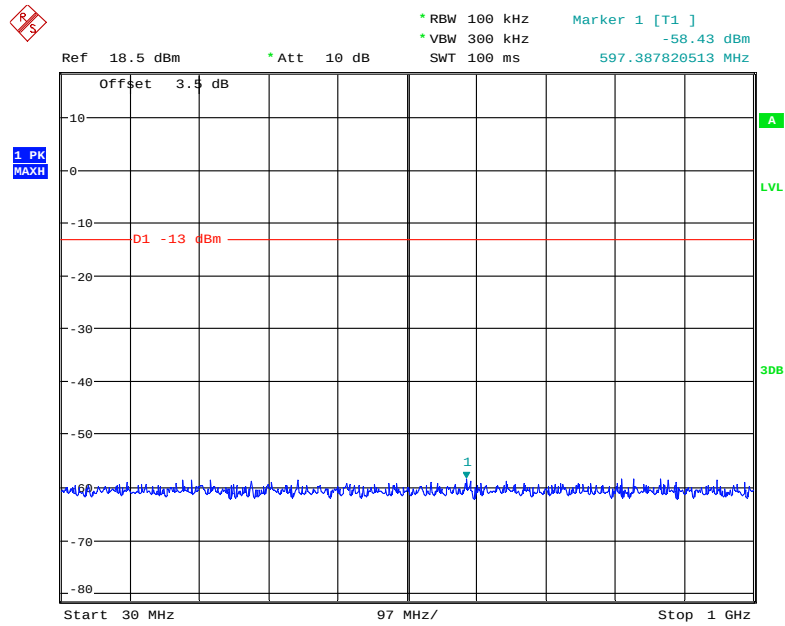
2 GHz – 20 GHz (WCDMA Mode)



Date: 2.APR.2019 17:13:23

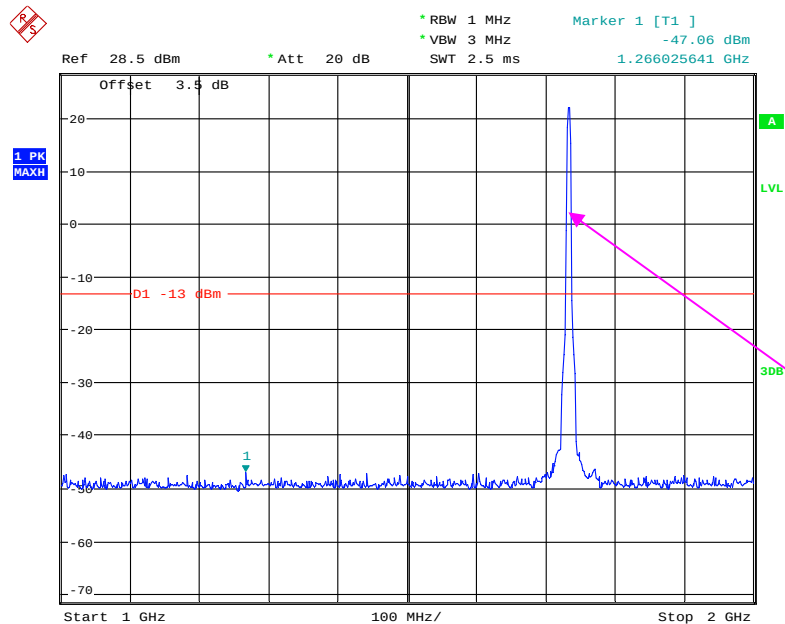
AWS Band (Part 27)

30 MHz – 1 GHz (WCDMA Mode)



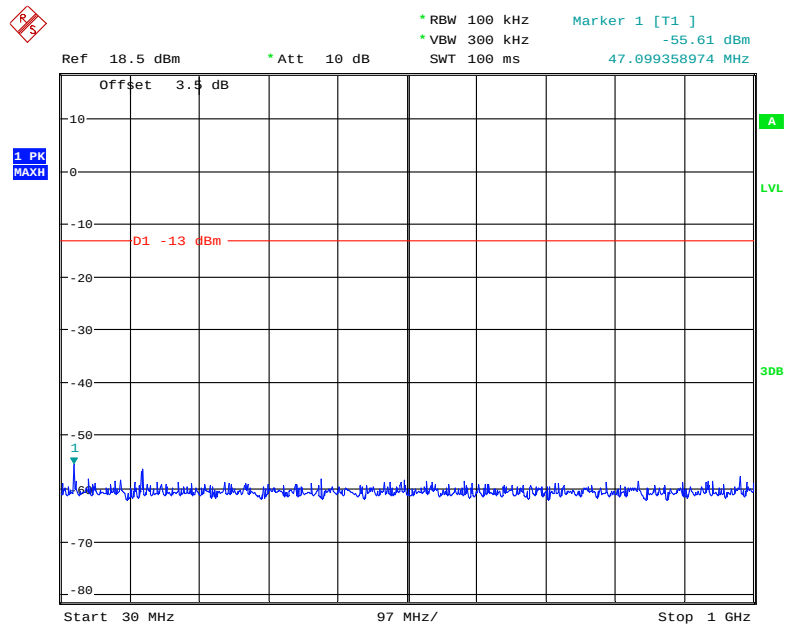
Date: 2.APR.2019 17:43:03

1 GHz – 2 GHz (WCDMA Mode)



Date: 2.APR.2019 17:43:44

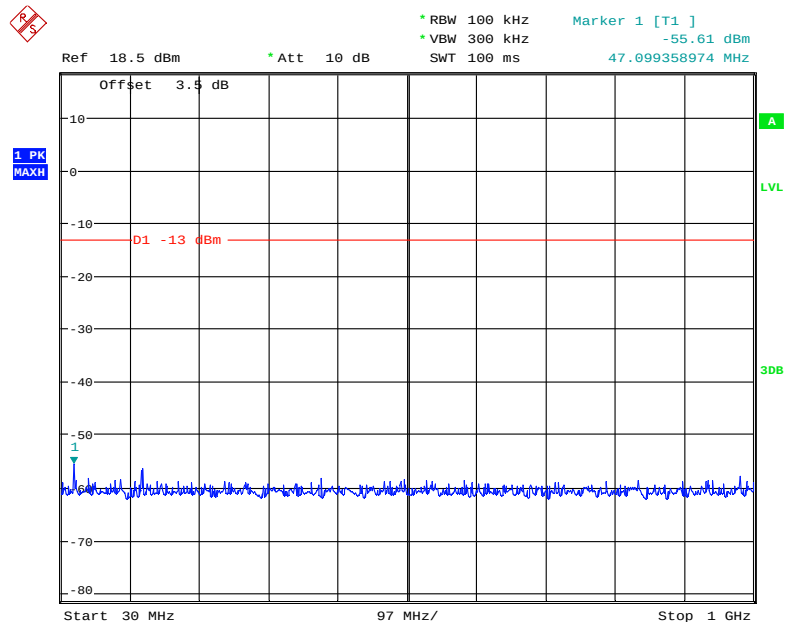
2 GHz – 20 GHz (WCDMA Mode)



Date: 2.APR.2019 12:23:12

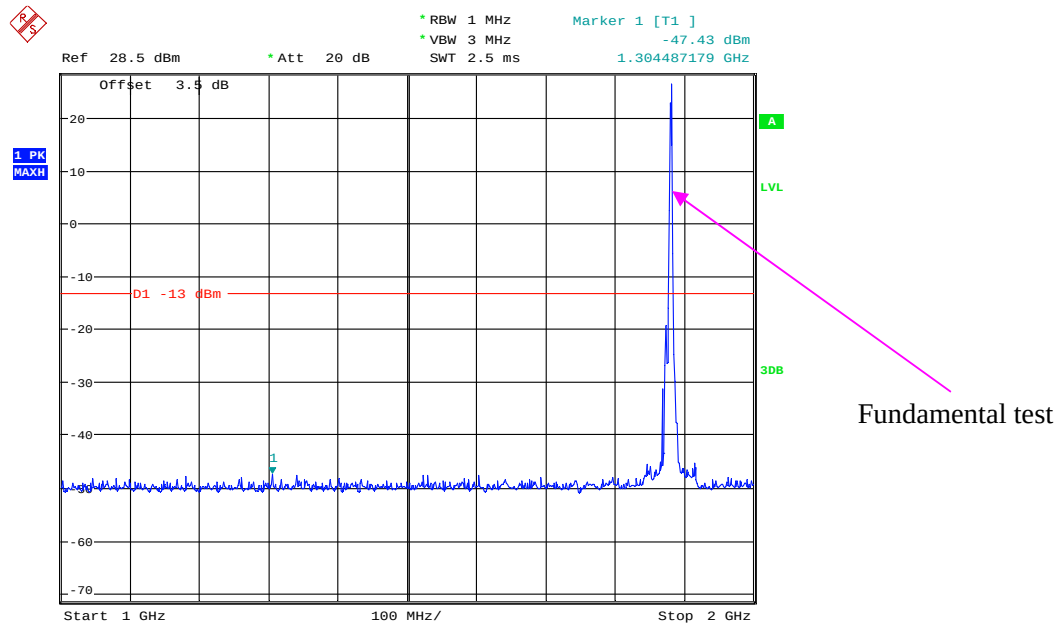
LTE Band 2:

30 MHz - 1 GHz (1.4 MHz, Middle Channel)



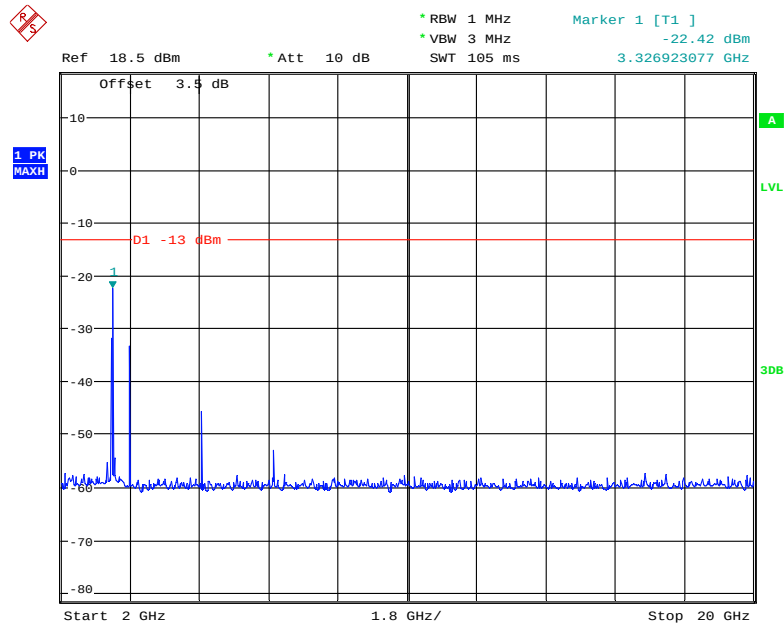
Date: 2.APR.2019 12:23:12

1 GHz – 2 GHz (1.4 MHz, Middle Channel)



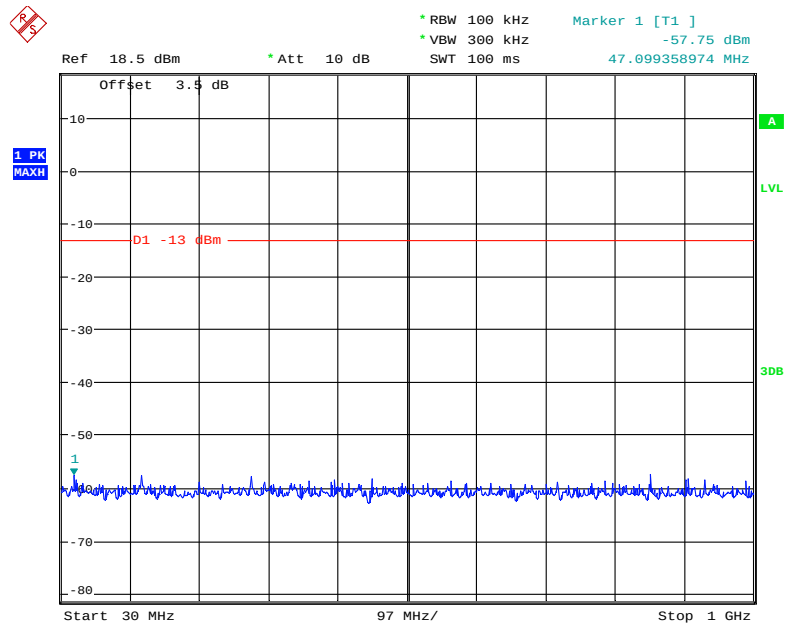
Date: 2.APR.2019 12:24:45

2 GHz – 20 GHz (1.4 MHz, Middle Channel)



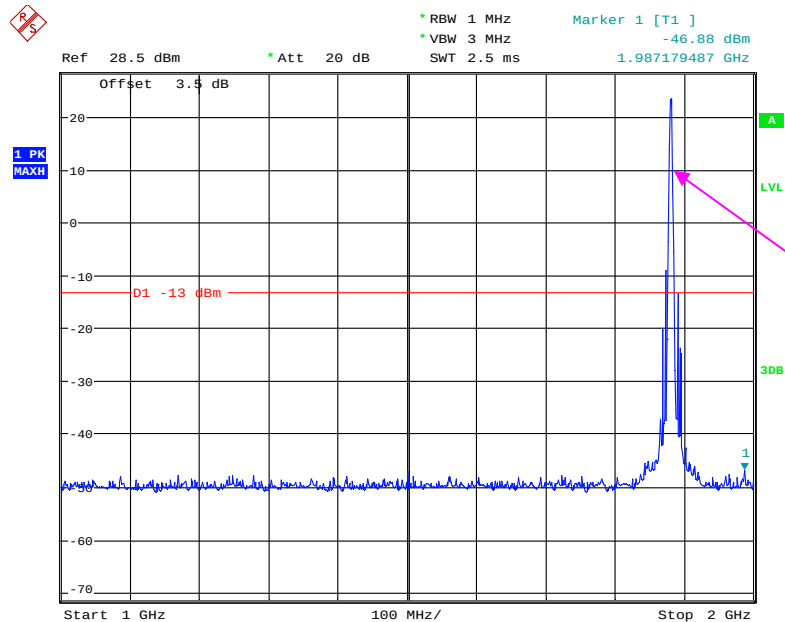
Date: 2.APR.2019 12:29:10

30 MHz - 1 GHz (3.0 MHz, Middle Channel)



Date: 2.APR.2019 12:23:32

1 GHz - 2 GHz (3.0 MHz, Middle Channel)



Fundamental test

Date: 2.APR.2019 12:25:08

Ref 18.5 dBm * Att 10 dB

* RBW 1 MHz * VBW 3 MHz

SWT 105 ms

Marker 1 [T1] -29.18 dBm

3.326923077 GHz

Offset 3.5 dB

1 PK MAXH

D1 -13 dBm

Start 2 GHz

1.8 GHz/

Stop 20 GHz

Ref 18.5 dBm * Att 10 dB * RBW 100 kHz * VBW 300 kHz * SWT 100 ms Marker 1 [T1] -57.90 dBm 972.019230769 MHz

Offset 3.5 dB

1 PK MAXH

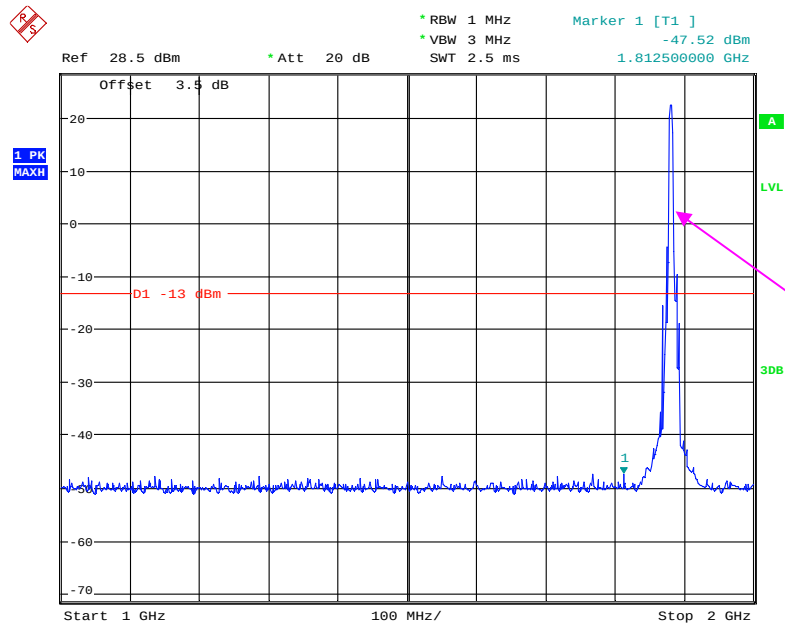
D1 -13 dBm

1

Start 30 MHz 97 MHz/ Stop 1 GHz

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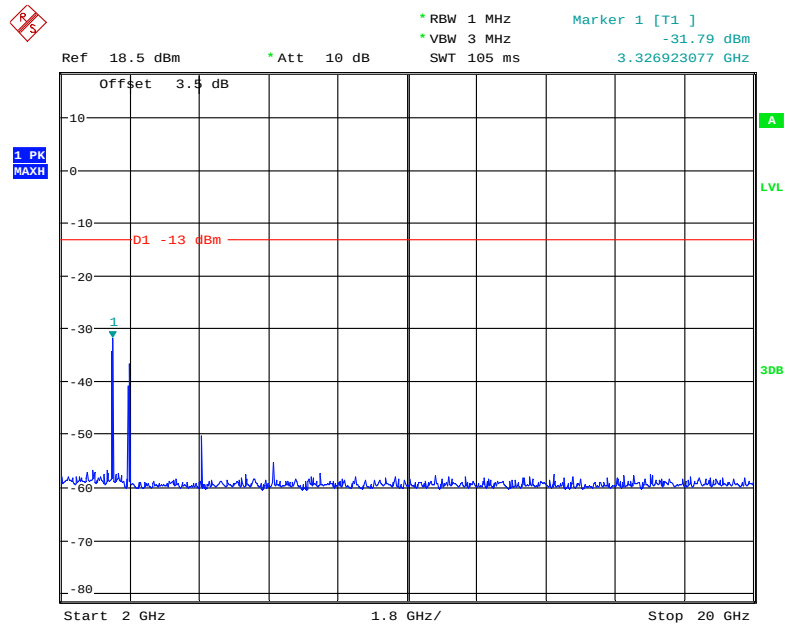
1 GHz – 2 GHz (5.0 MHz, Middle Channel)



Fundamental test

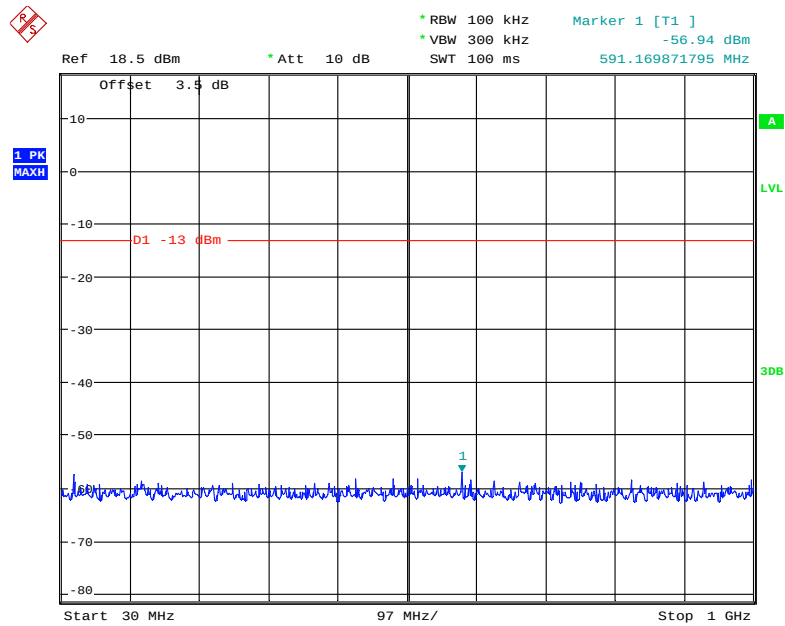
Date: 2.APR.2019 12:25:23

2 GHz – 20 GHz (5.0 MHz, Middle Channel)



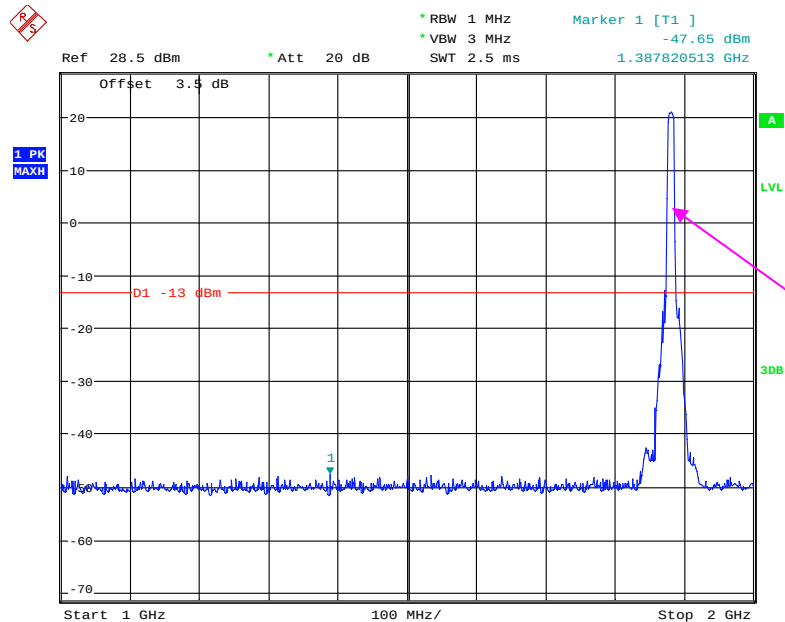
Date: 2.APR.2019 12:27:16

30 MHz - 1 GHz (10.0 MHz, Middle Channel)



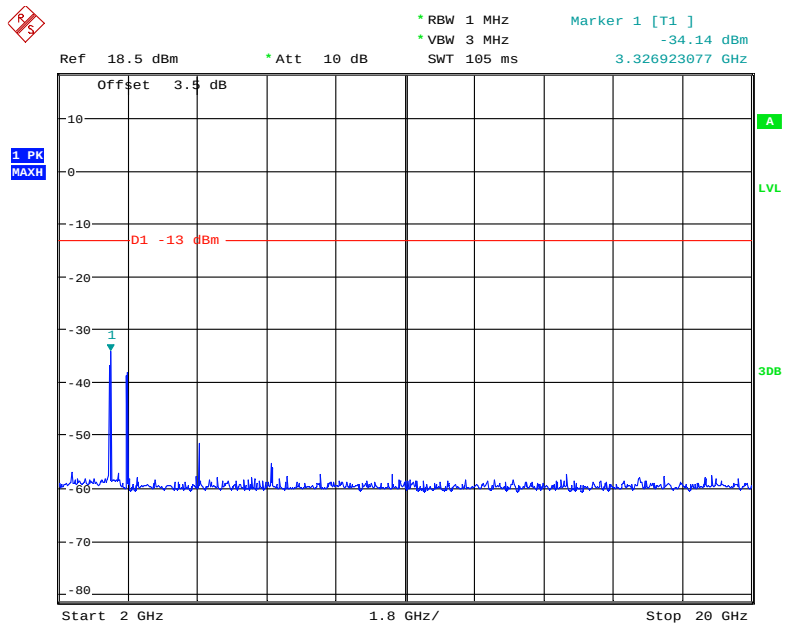
Date: 2.APR.2019 12:23:52

1 GHz - 2 GHz (10.0 MHz, Middle Channel)



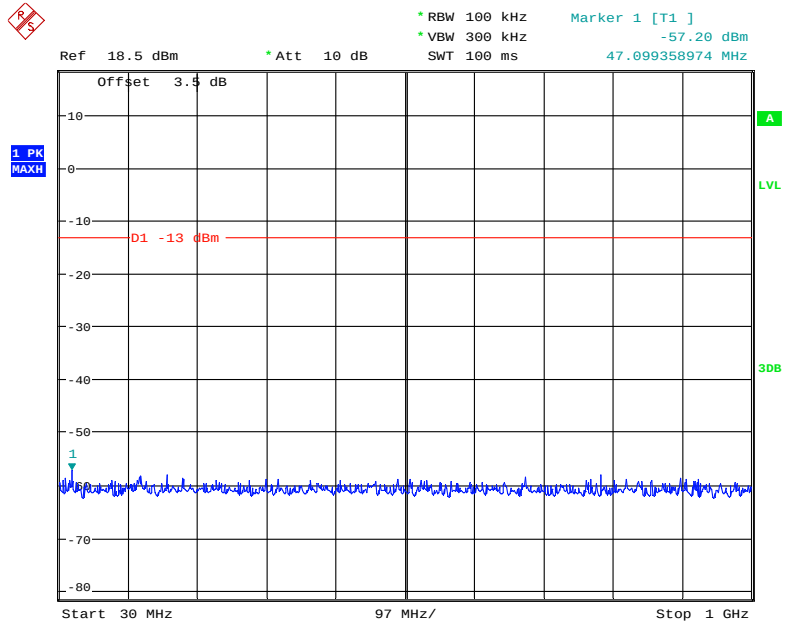
Date: 2.APR.2019 12:25:38

2 GHz – 20 GHz (10.0 MHz, Middle Channel)



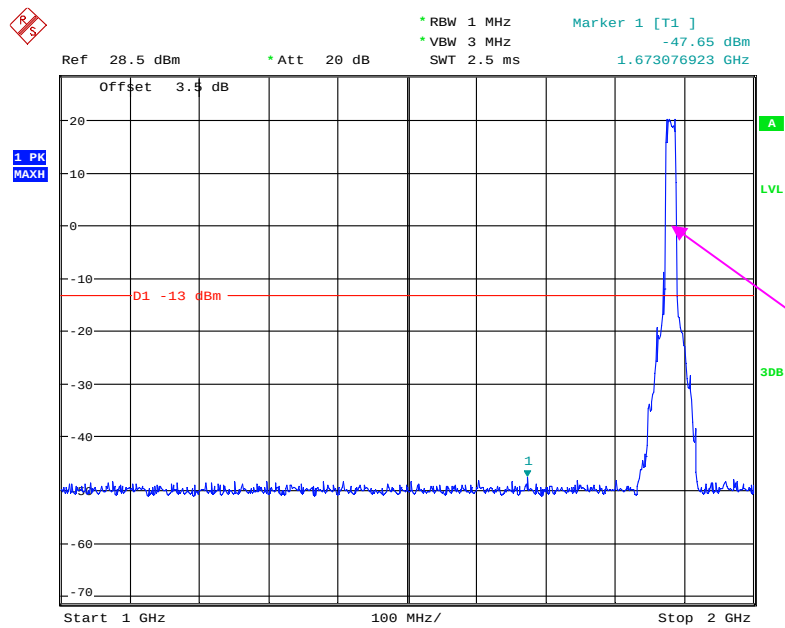
Date: 2.APR.2019 12:27:03

30 MHz - 1 GHz (15.0 MHz, Middle Channel)



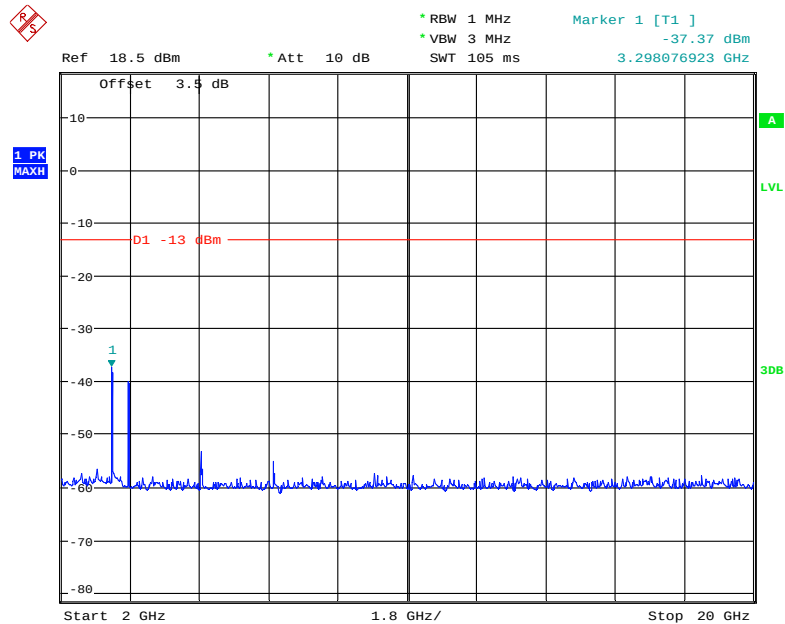
Date: 2.APR.2019 12:24:01

1 GHz – 2 GHz (15.0 MHz, Middle Channel)



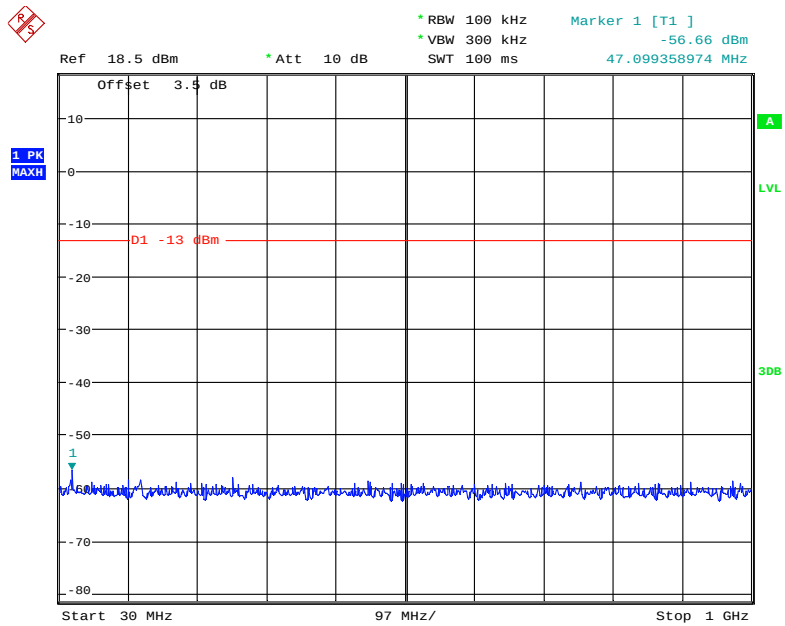
Date: 2.APR.2019 12:25:53

2 GHz – 20 GHz (15.0 MHz, Middle Channel)



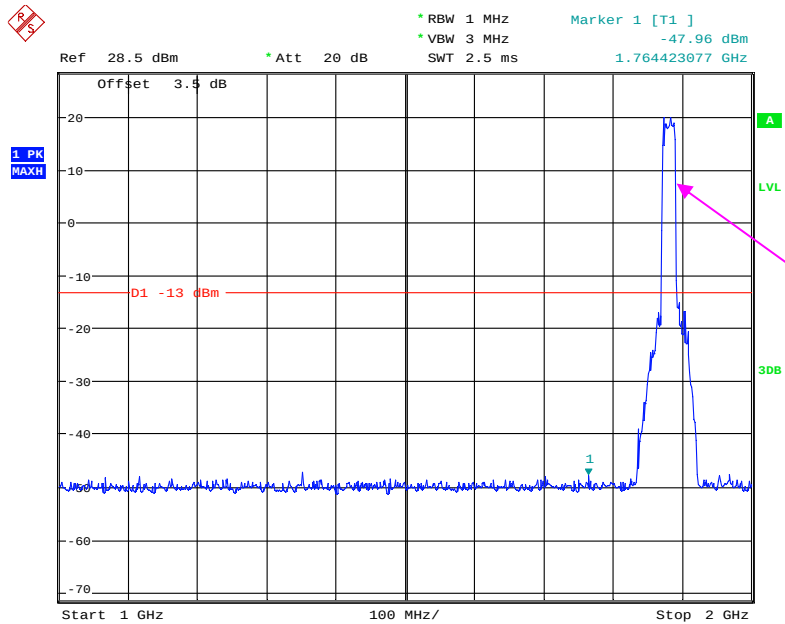
Date: 2.APR.2019 12:26:50

30 MHz - 1 GHz (20.0 MHz, Middle Channel)



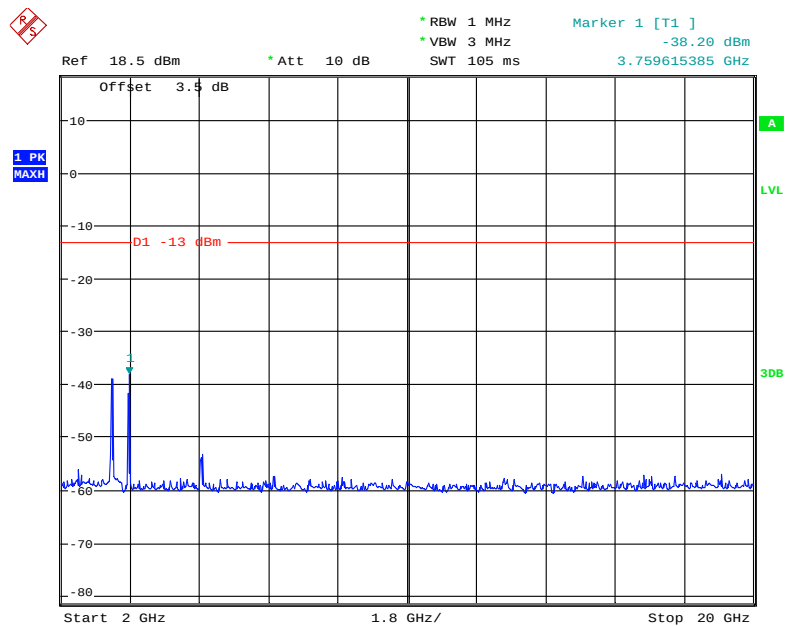
Date: 2.APR.2019 12:24:09

1 GHz - 2 GHz (20.0 MHz, Middle Channel)



Date: 2.APR.2019 12:26:07

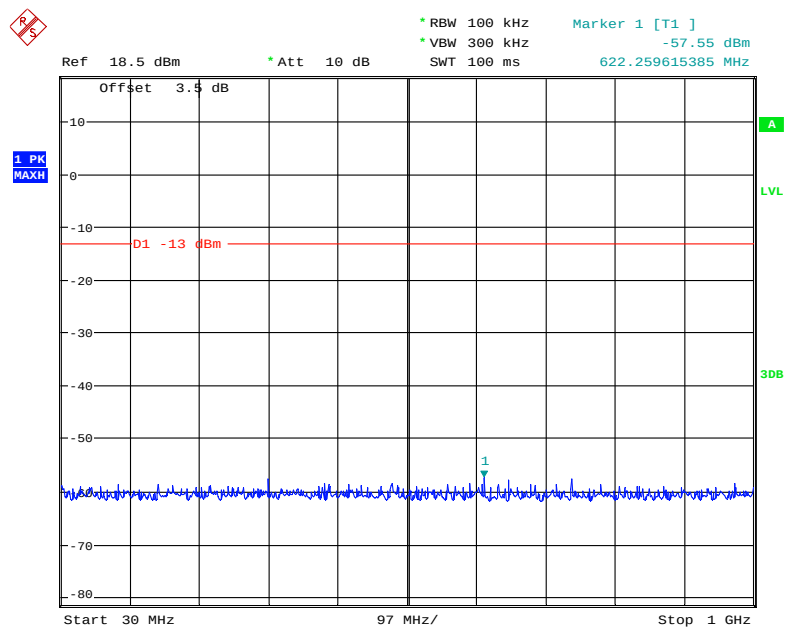
2 GHz – 20 GHz (20.0 MHz, Middle Channel)



Date: 2.APR.2019 12:26:33

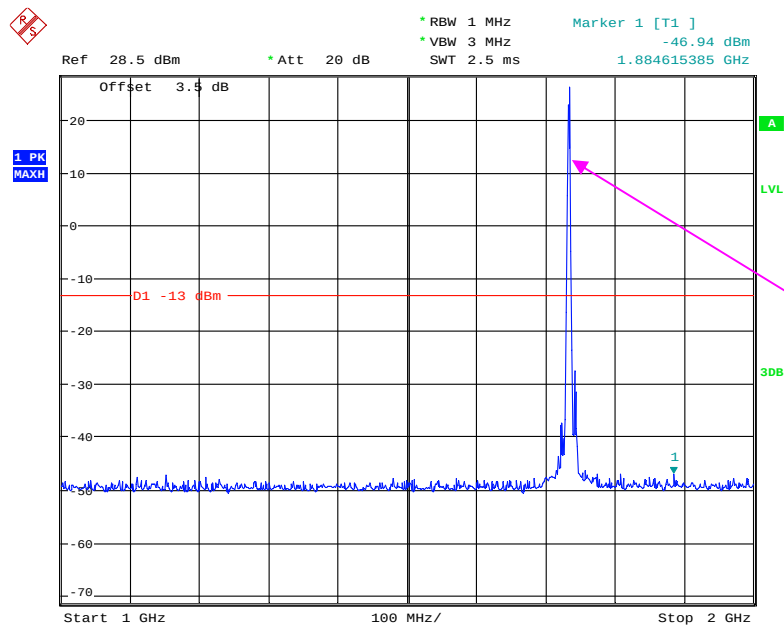
LTE Band 4:

30 MHz - 1 GHz (1.4 MHz, Middle Channel)



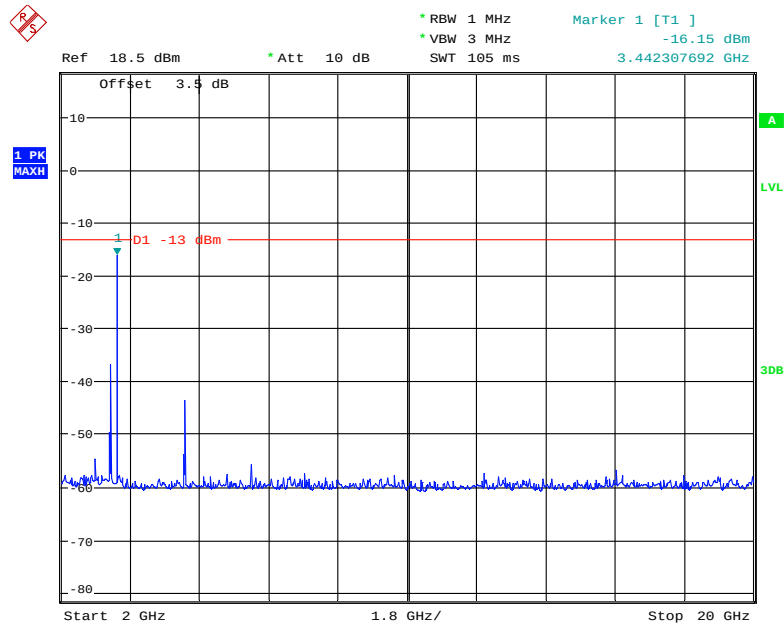
Date: 2.APR.2019 12:21:36

1 GHz – 2 GHz (1.4 MHz, Middle Channel)



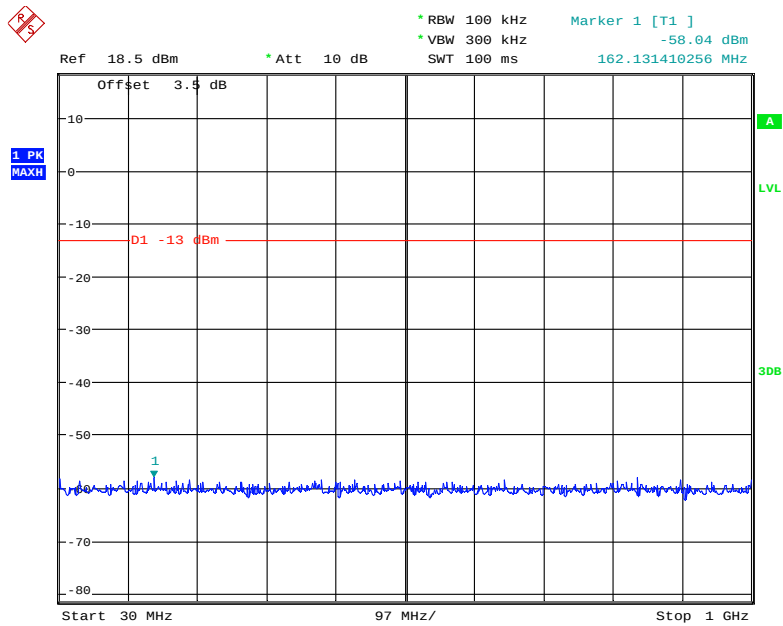
Date: 2.APR.2019 12:17:21

2 GHz – 20 GHz (1.4 MHz, Middle Channel)



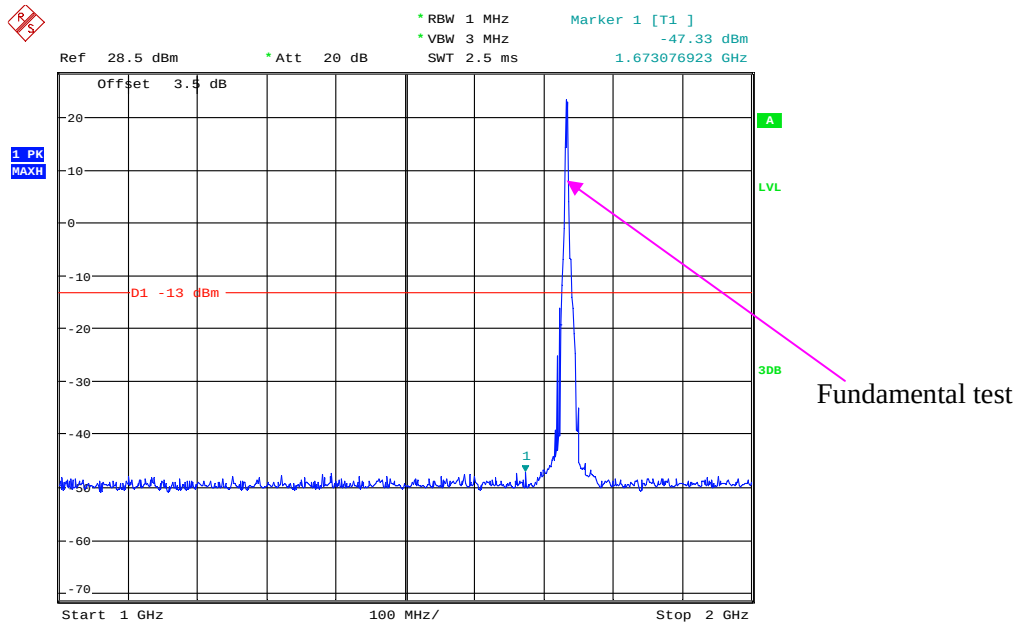
Date: 2.APR.2019 12:16:28

30 MHz - 1 GHz (3.0 MHz, Middle Channel)



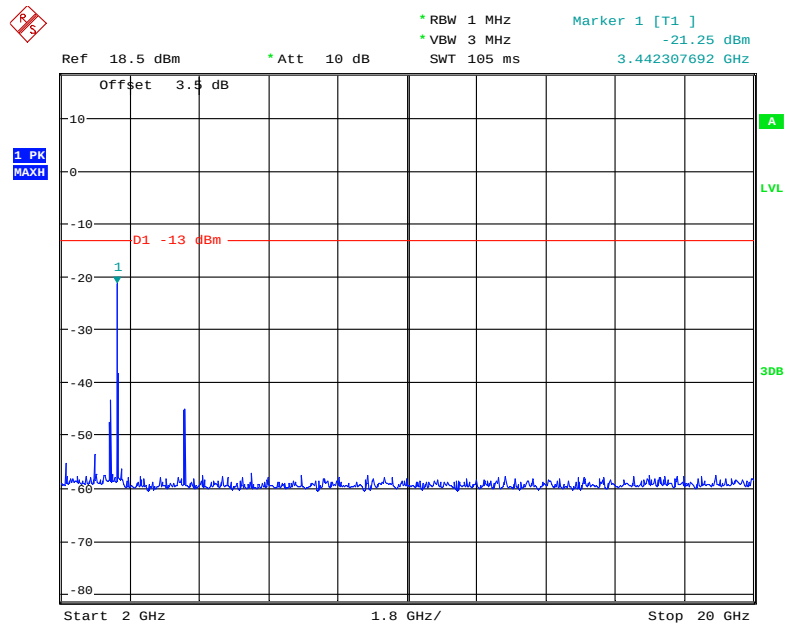
Date: 2.APR.2019 12:21:27

1 GHz - 2 GHz (3.0 MHz, Middle Channel)



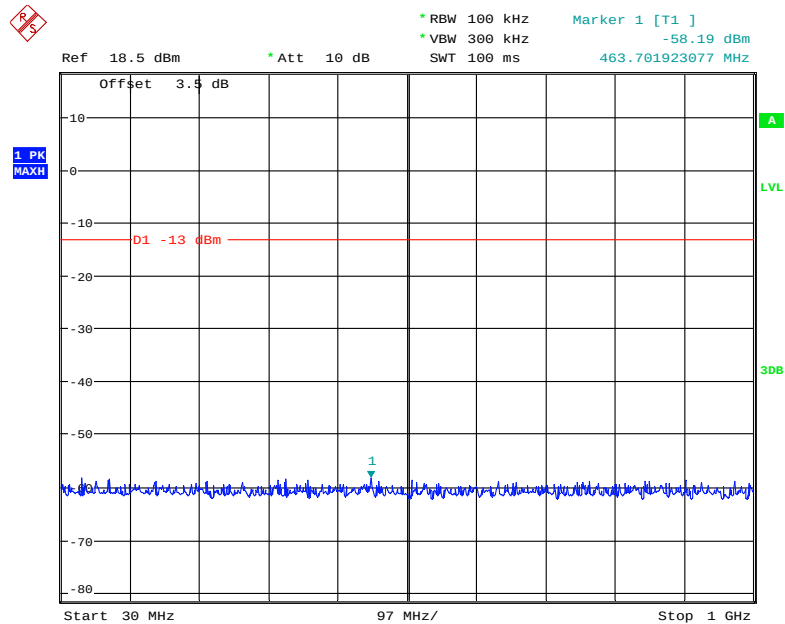
Date: 2.APR.2019 12:18:12

2 GHz – 20 GHz (3.0 MHz, Middle Channel)



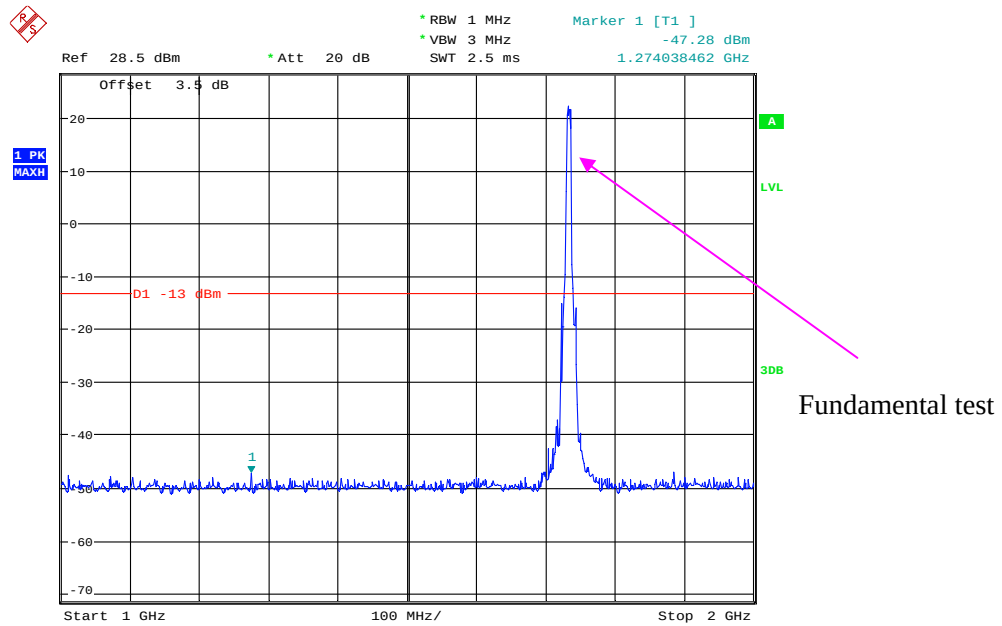
Date: 2.APR.2019 12:16:15

30 MHz - 1 GHz (5.0 MHz, Middle Channel)



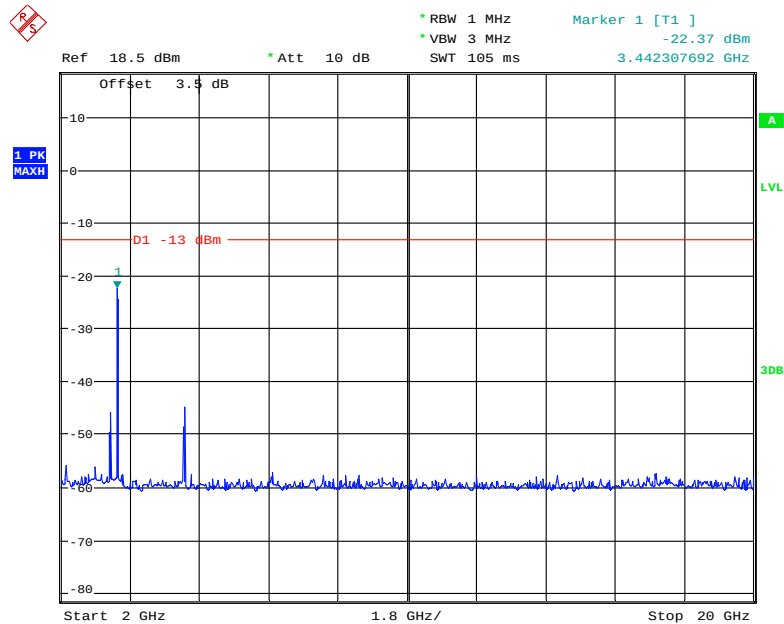
Date: 2.APR.2019 12:21:10

1 GHz – 2 GHz (5.0 MHz, Middle Channel)



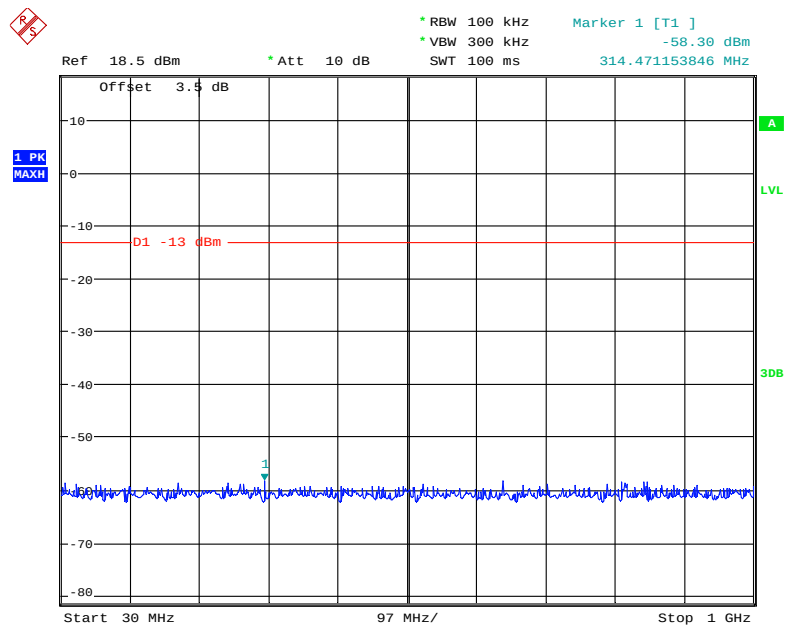
Date: 2.APR.2019 12:18:33

2 GHz – 20 GHz (5.0 MHz, Middle Channel)



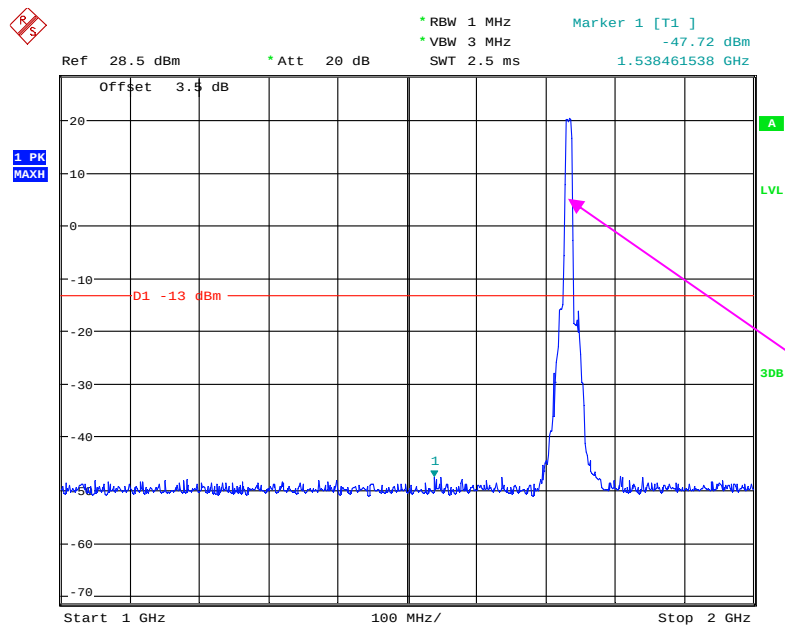
Date: 2.APR.2019 12:15:58

30 MHz - 1 GHz (10.0 MHz, Middle Channel)



Date: 2.APR.2019 12:20:57

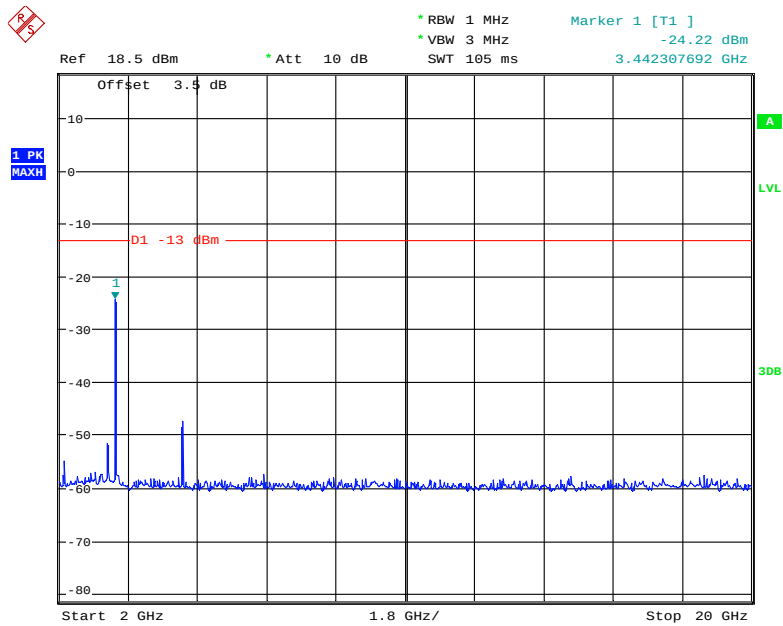
1 GHz - 2 GHz (10.0 MHz, Middle Channel)



Fundamental test

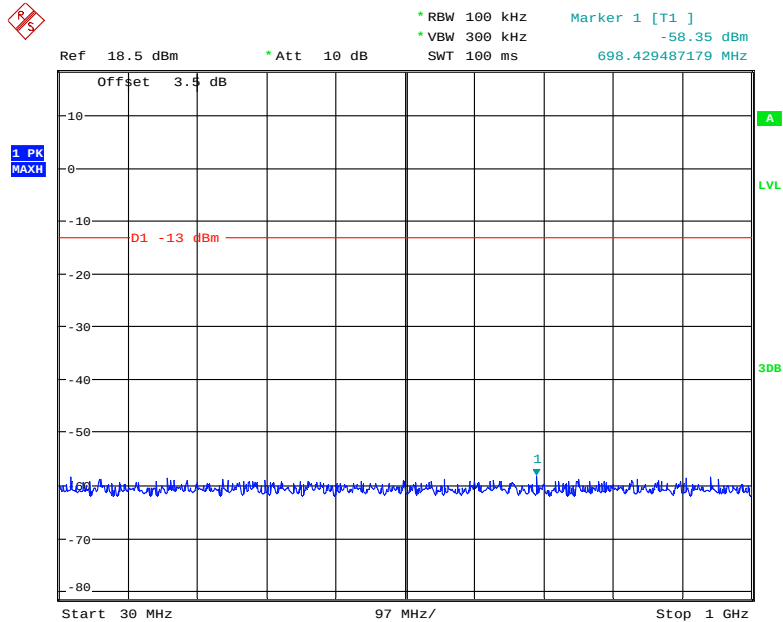
Date: 2.APR.2019 12:18:57

2 GHz – 20 GHz (10.0 MHz, Middle Channel)



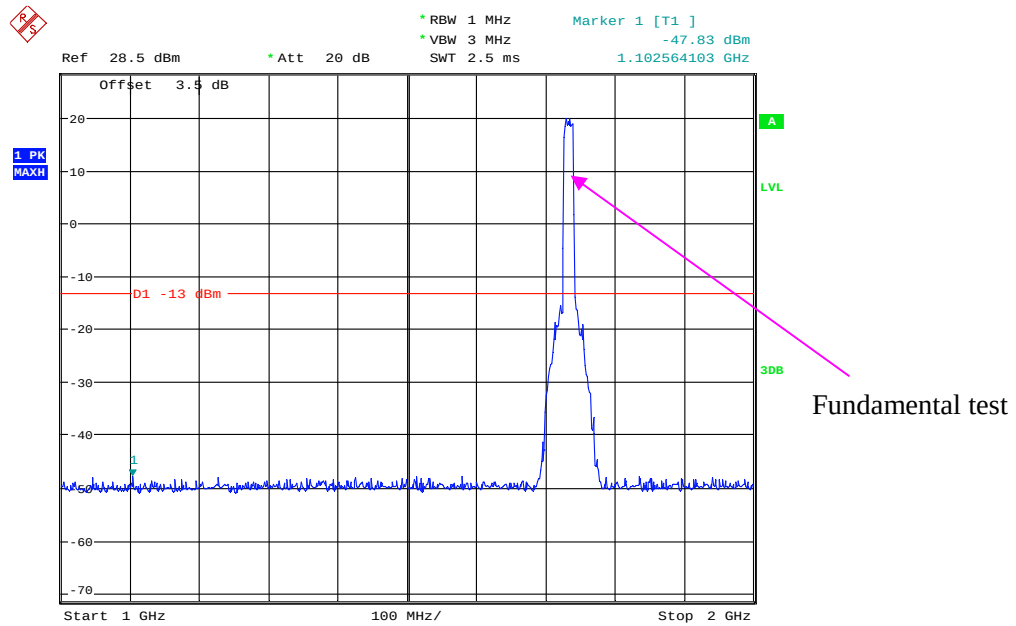
Date: 2.APR.2019 12:15:45

30 MHz - 1 GHz (15.0 MHz, Middle Channel)



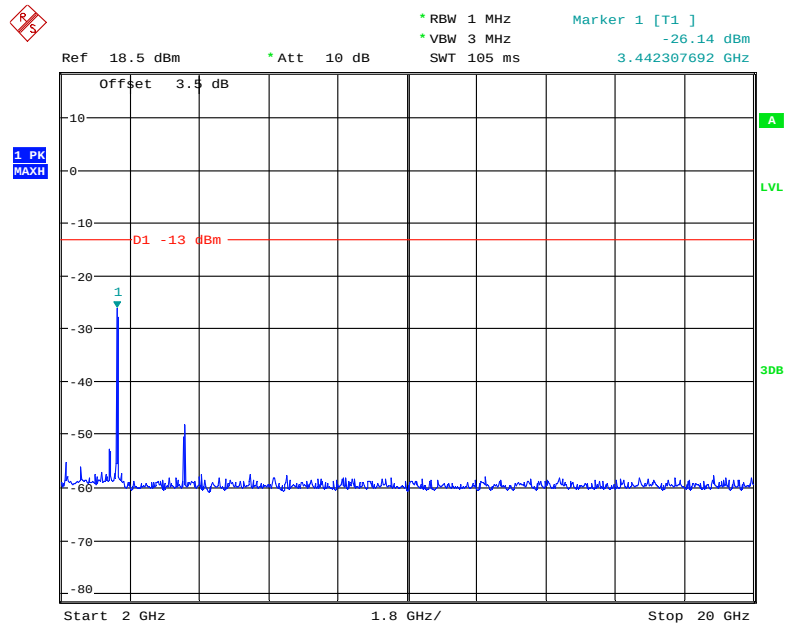
Date: 2.APR.2019 12:20:39

1 GHz – 2 GHz (15.0 MHz, Middle Channel)



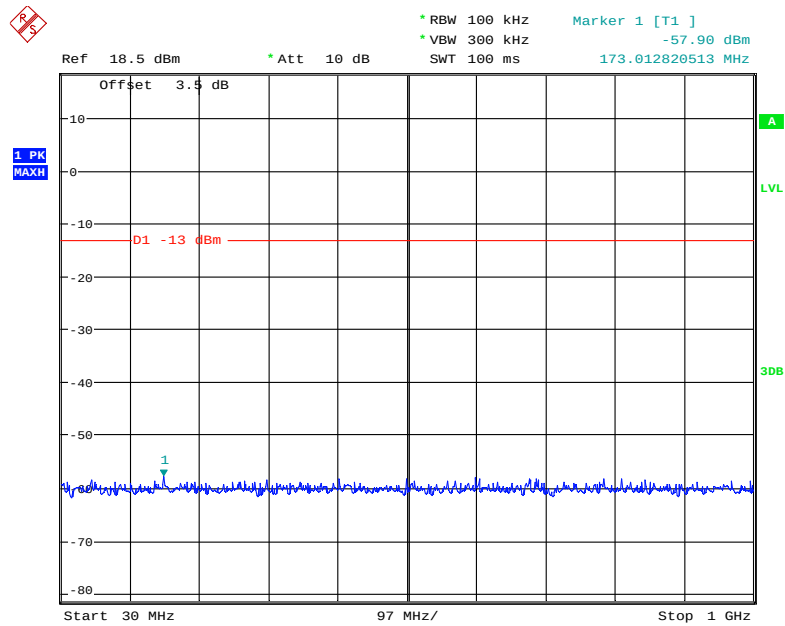
Date: 2.APR.2019 12:19:27

2 GHz – 20 GHz (15.0 MHz, Middle Channel)



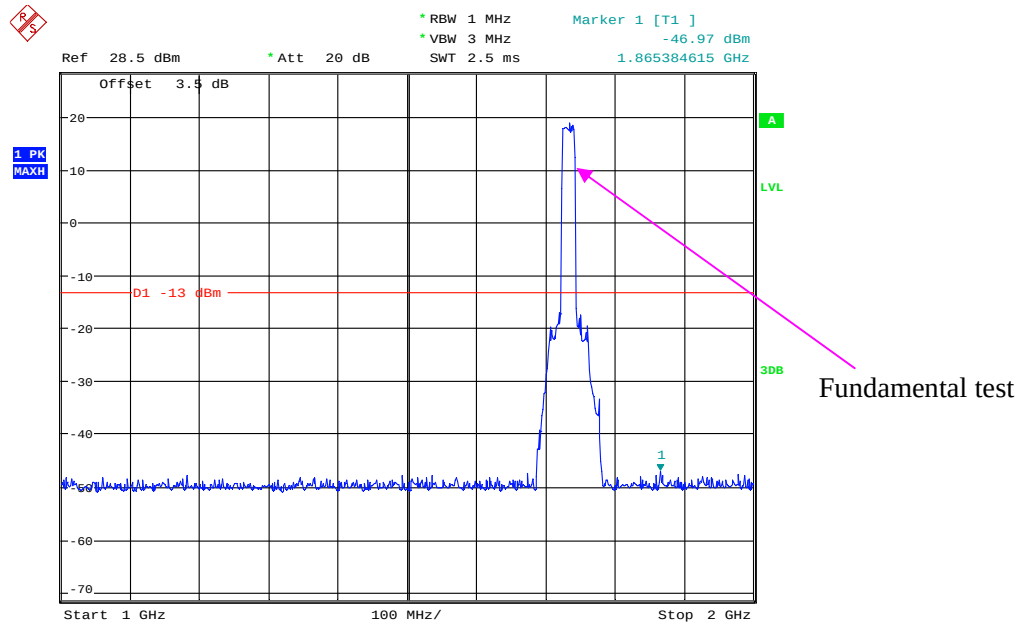
Date: 2.APR.2019 12:15:30

30 MHz - 1 GHz (20.0 MHz, Middle Channel)



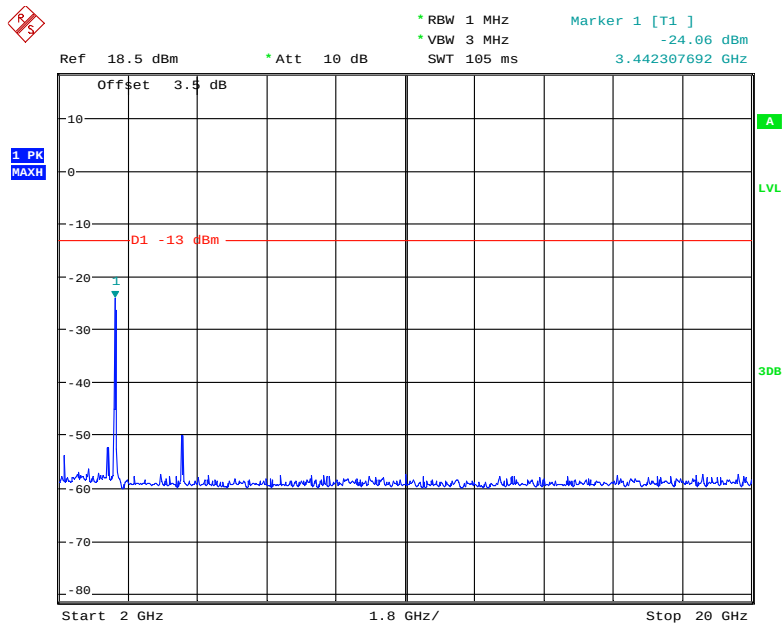
Date: 2.APR.2019 12:20:24

1 GHz - 2 GHz (20.0 MHz, Middle Channel)



Date: 2.APR.2019 12:19:46

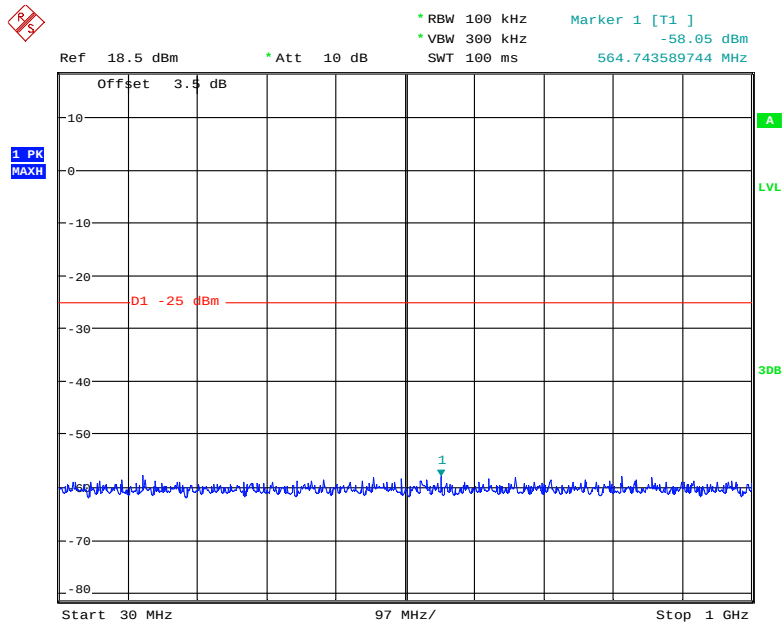
2 GHz – 20 GHz (20.0 MHz, Middle Channel)



Date: 2.APR.2019 12:14:59

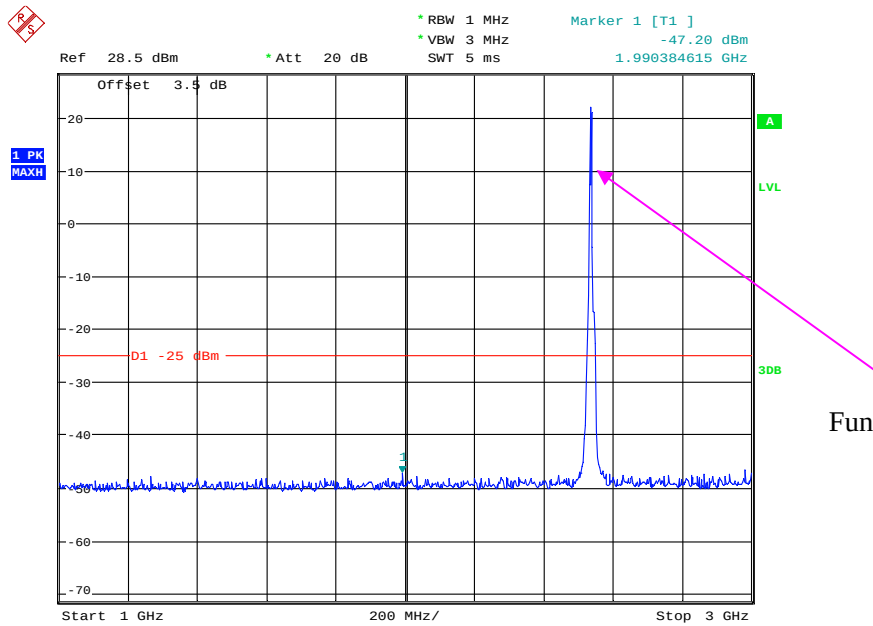
LTE Band 7:

30 MHz – 1 GHz (5.0 MHz, Middle Channel)



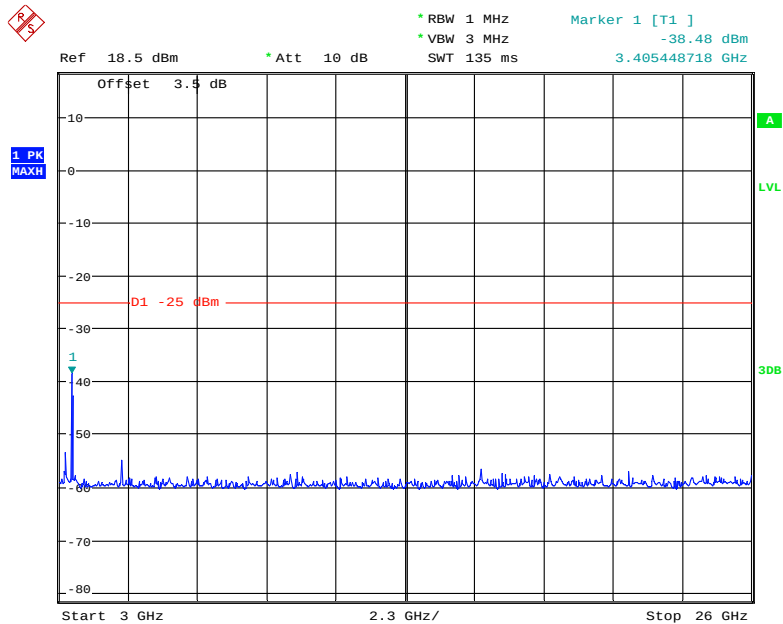
Date: 2.APR.2019 12:07:12

1 GHz – 3.0 GHz (5.0 MHz, Middle Channel)



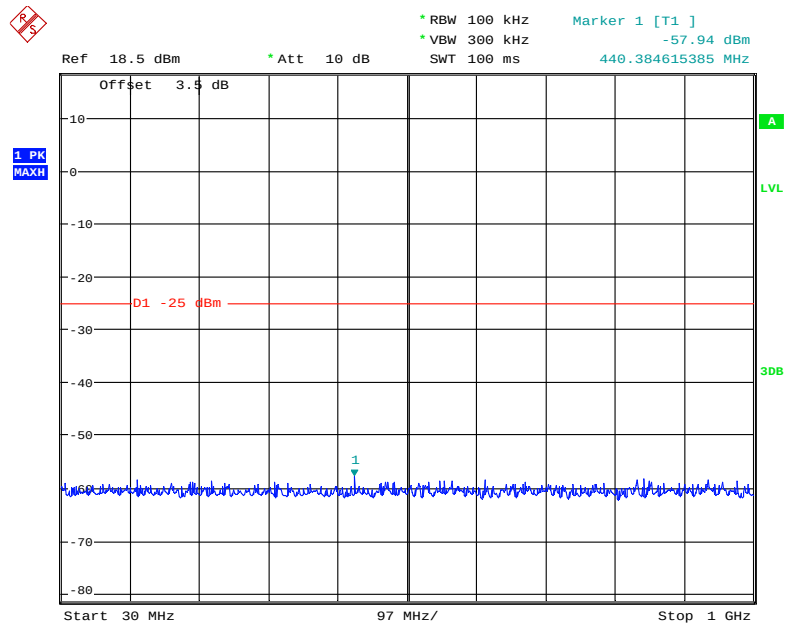
Date: 2.APR.2019 12:09:28

3.0 GHz – 26 GHz (5.0 MHz, Middle Channel)



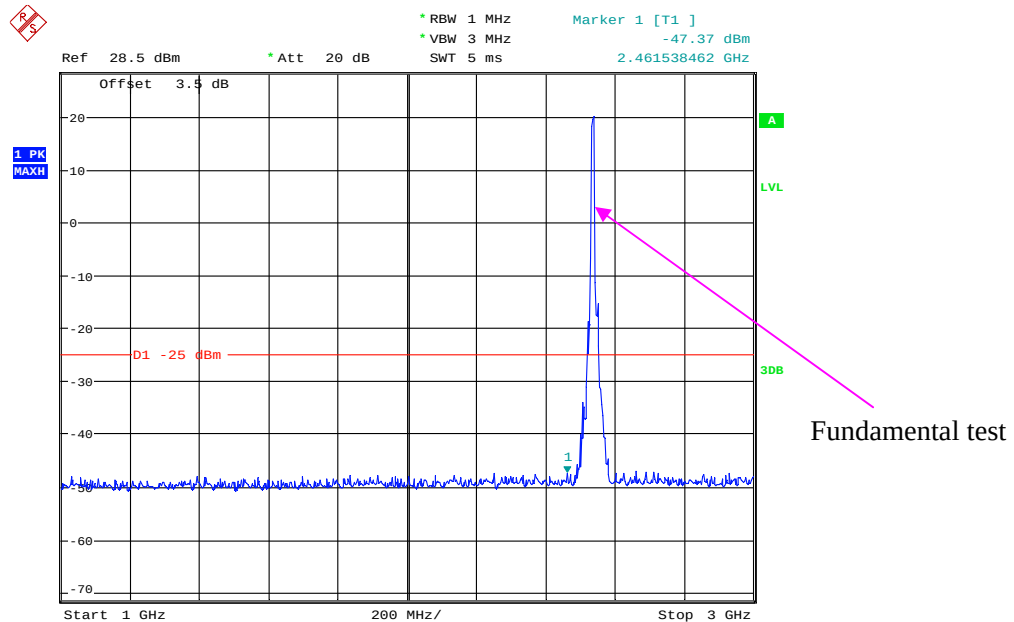
Date: 2.APR.2019 12:12:27

30 MHz – 1.0 GHz (10.0 MHz, Middle Channel)



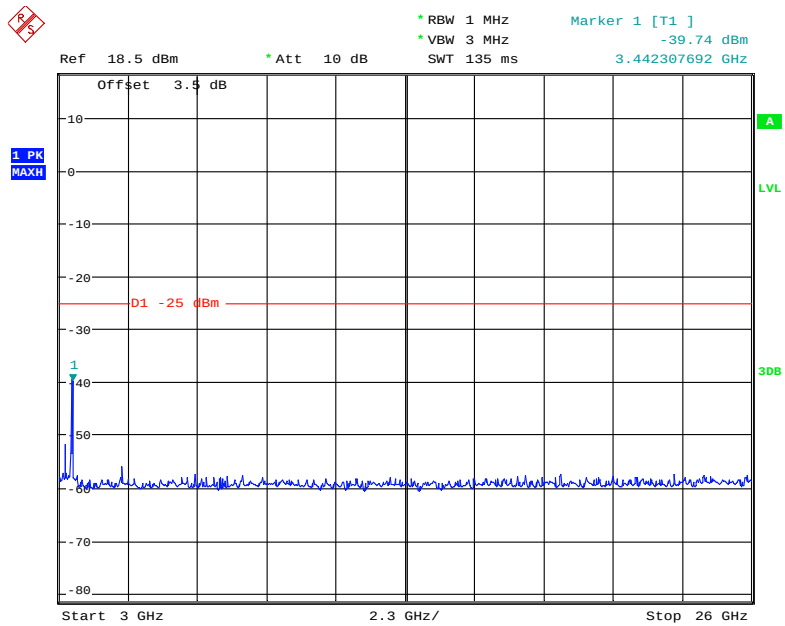
Date: 2.APR.2019 12:06:51

1 GHz – 3 GHz (10.0 MHz, Middle Channel)



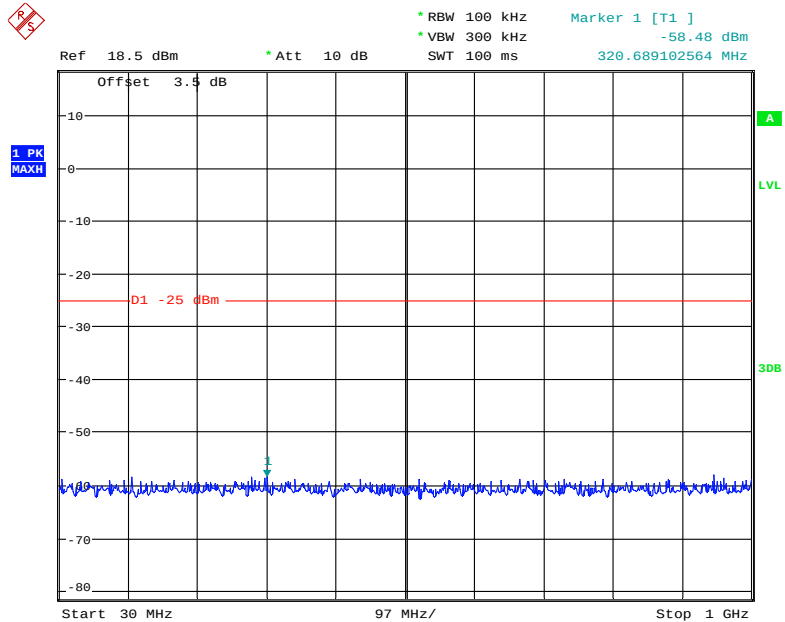
Date: 2.APR.2019 12:08:52

3 GHz – 26 GHz (10.0 MHz, Middle Channel)



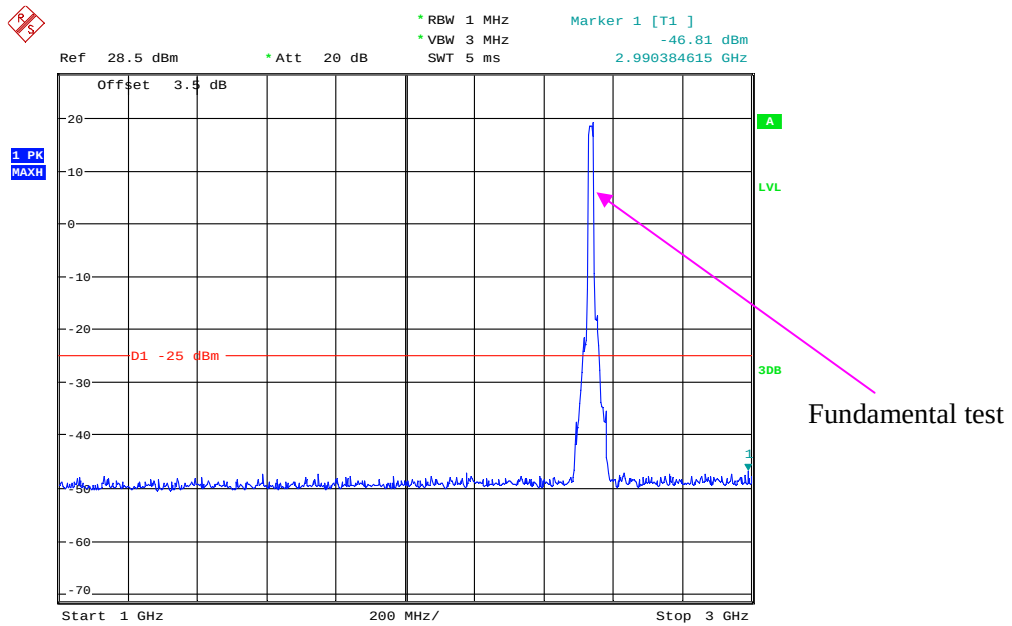
Date: 2.APR.2019 12:12:49

30 MHz – 1 GHz (15.0 MHz, Middle Channel)



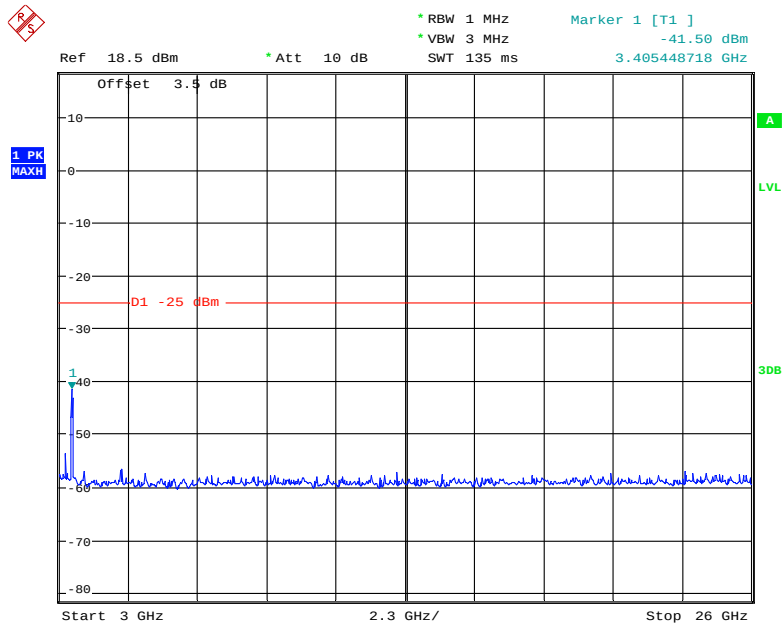
Date: 2.APR.2019 12:06:40

1 GHz – 3 GHz (15.0 MHz, Middle Channel)



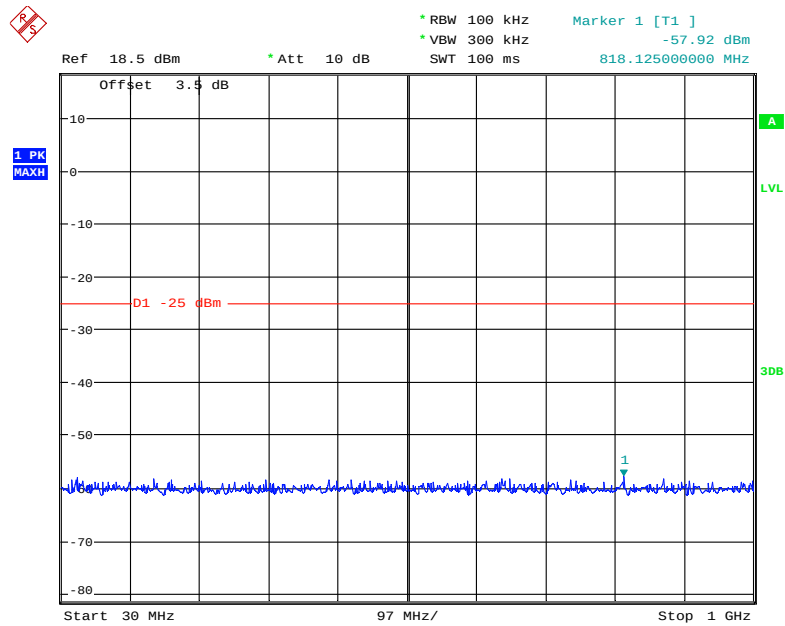
Date: 2.APR.2019 12:09:48

3 GHz – 26 GHz (15.0 MHz, Middle Channel)



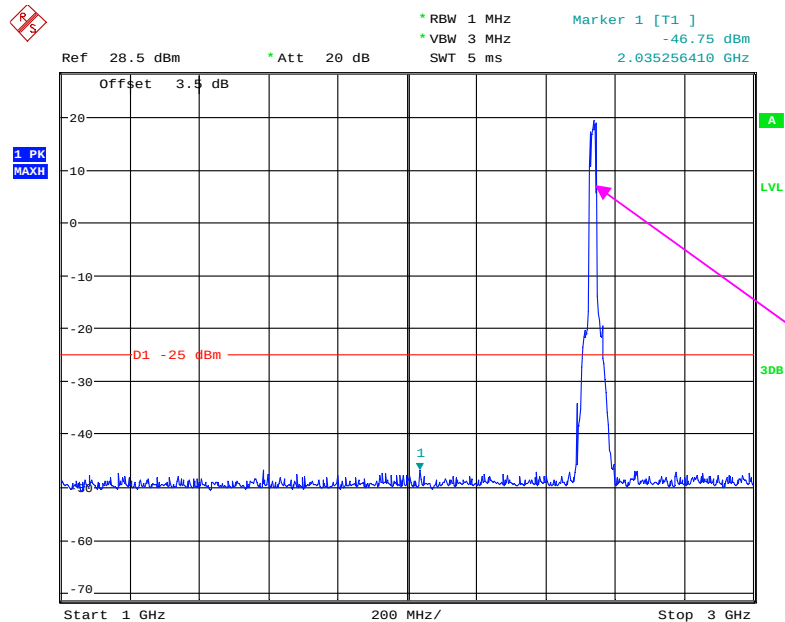
Date: 2.APR.2019 12:13:06

30 MHz – 1 GHz (20.0 MHz, Middle Channel)



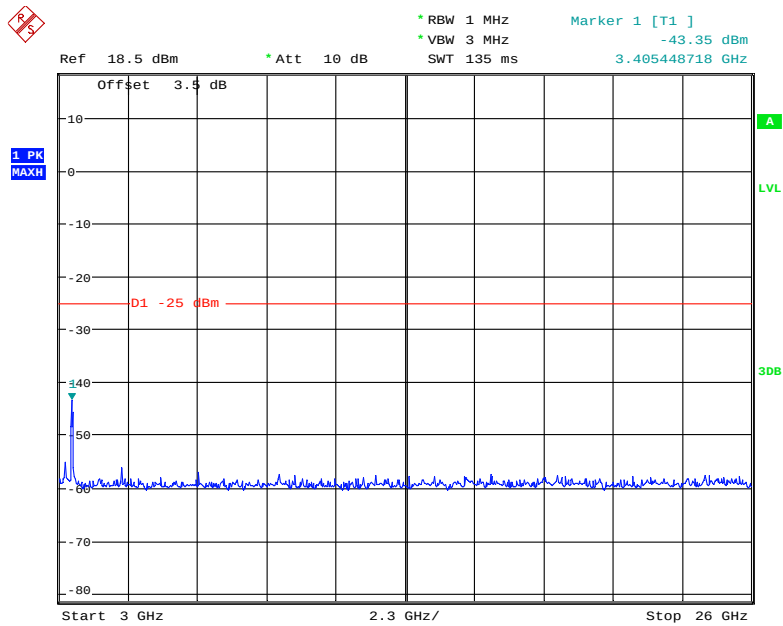
Date: 2.APR.2019 12:05:59

1 GHz – 3 GHz (20.0 MHz, Middle Channel)



Date: 2.APR.2019 12:08:32

3 GHz – 26 GHz (20.0 MHz, Middle Channel)



Date: 2.APR.2019 12:13:20

FCC § 2.1053; § 22.917 (a); § 24.238 (a); § 27.53 (h)(m) SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, § 22.917(a) and § 24.238(a) and § 27.53(h)(m)

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 receiving 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.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Huang on 2019-04-10.

EUT operation mode: Transmitting

Pre-scan with Low, Middle and High channel, the worst case as below:

30 MHz ~ 10 GHz:

Cellular Band (Part 22H)

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
245.38	32.20	69	1.1	H	-64.8	0.31	0	-65.11	-13	52.11
245.38	32.21	62	1.8	V	-64.8	0.31	0	-65.11	-13	52.11
1673.20	50.72	7	1.5	H	-56.4	1.30	8.90	-48.80	-13	35.80
1673.20	64.10	233	1.0	V	-42.4	1.30	8.90	-34.80	-13	21.80
2509.80	53.82	48	2.1	H	-49.7	2.60	10.20	-42.10	-13	29.10
2509.80	54.69	246	1.3	V	-48.2	2.60	10.20	-40.60	-13	27.60
3346.40	42.91	101	1.2	H	-57.4	1.50	11.70	-47.20	-13	34.20
3346.40	43.08	350	1.8	V	-57.3	1.50	11.70	-47.10	-13	34.10
WCDMA Mode, Middle channel										
245.38	33.79	216	2.3	H	-63.2	0.31	0	-63.51	-13	50.51
245.38	32.80	357	1.8	V	-64.2	0.31	0	-64.51	-13	51.51
1673.20	49.15	88	1.2	H	-57.9	1.30	8.90	-50.30	-13	37.30
1673.20	46.57	301	2.3	V	-59.9	1.30	8.90	-52.30	-13	39.30
2509.80	48.58	164	1.7	H	-54.9	2.60	10.20	-47.30	-13	34.30
2509.80	47.55	324	2.2	V	-55.4	2.60	10.20	-47.80	-13	34.80
3346.40	43.15	97	2.3	H	-57.2	1.50	11.70	-47.00	-13	34.00
3346.40	42.89	295	2.2	V	-57.5	1.50	11.70	-47.30	-13	34.30

30 MHz ~ 20 GHz:**PCS Band (Part 24E)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
245.38	32.22	66	1.5	H	-64.8	0.31	0	-65.11	-13	52.11
245.38	32.23	228	2.0	V	-64.8	0.31	0	-65.11	-13	52.11
3760.00	45.33	356	2.4	H	-55.9	1.50	11.80	-45.60	-13	32.60
3760.00	44.72	79	2.5	V	-56.0	1.50	11.80	-45.70	-13	32.70
5640.00	42.22	233	1.8	H	-55.4	1.70	12.40	-44.70	-13	31.70
5640.00	42.62	282	2.5	V	-54.6	1.70	12.40	-43.90	-13	30.90
WCDMA Mode Band II, Middle channel										
245.38	32.99	51	2.1	H	-64.0	0.31	0	-64.31	-13	51.31
245.38	32.70	252	2.0	V	-64.3	0.31	0	-64.61	-13	51.61
3760.00	49.52	29	2.0	H	-51.7	1.50	11.80	-41.40	-13	28.40
3760.00	48.12	70	1.8	V	-52.6	1.50	11.80	-42.30	-13	29.30

30 MHz ~ 20 GHz:**AWS Band (Part 27)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 27	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
WCDMA Mode Band IV, Middle channel										
245.38	33.74	319	2.0	H	-63.3	0.31	0	-63.61	-13	50.61
245.38	32.22	331	1.1	V	-64.8	0.31	0	-65.11	-13	52.11
3465.00	50.73	27	1.2	H	-49.7	1.50	12.00	-39.20	-13	26.20
3465.00	49.67	86	2.3	V	-51.5	1.50	12.00	-41.00	-13	28.00

LTE Band: (Pre-scan with all the bandwidth, and worse case as below)

Frequency	Receiver	Turntable	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
(MHz)	Reading (dBμV)	Angle Degree	Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)			
Band 2										
Test frequency range:30 MHz ~ 20 GHz										
245.38	32.30	194	2.2	H	-64.7	0.31	0	-65.01	-13	52.01
245.38	32.66	60	1.9	V	-64.3	0.31	0	-64.61	-13	51.61
3760.00	46.35	303	1.9	H	-54.9	1.50	11.80	-44.60	-13	31.60
3760.00	45.40	20	1.1	V	-55.4	1.50	11.80	-45.10	-13	32.10
Band 4										
Test frequency range:30 MHz ~ 20 GHz										
245.38	33.54	326	2.2	H	-63.5	0.31	0	-63.81	-13	50.81
245.38	32.17	217	2.2	V	-64.8	0.31	0	-65.11	-13	52.11
3465.00	46.50	213	1.4	H	-53.9	1.50	12.00	-43.40	-13	30.40
3465.00	46.04	213	1.4	V	-55.1	1.50	12.00	-44.60	-13	31.60
Band 7										
Test frequency range: 30 MHz ~ 26GHz										
245.38	33.95	356	1.7	H	-63.0	0.31	0	-63.31	-25	38.31
245.38	33.82	4	1.4	V	-63.2	0.31	0	-63.51	-25	38.51
5070.00	43.09	247	2.4	H	-54.8	1.60	12.10	-44.30	-25	19.30
5070.00	41.92	210	2.0	V	-56.0	1.60	12.10	-45.50	-25	20.50

Note:

- 1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level

FCC § 22.917 (a); § 24.238 (a); § 27.53 (h)(m) - 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.

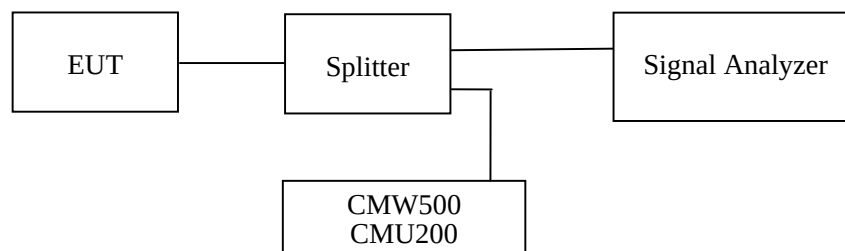
According to § 24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to FCC § 27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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 Data****Environmental Conditions**

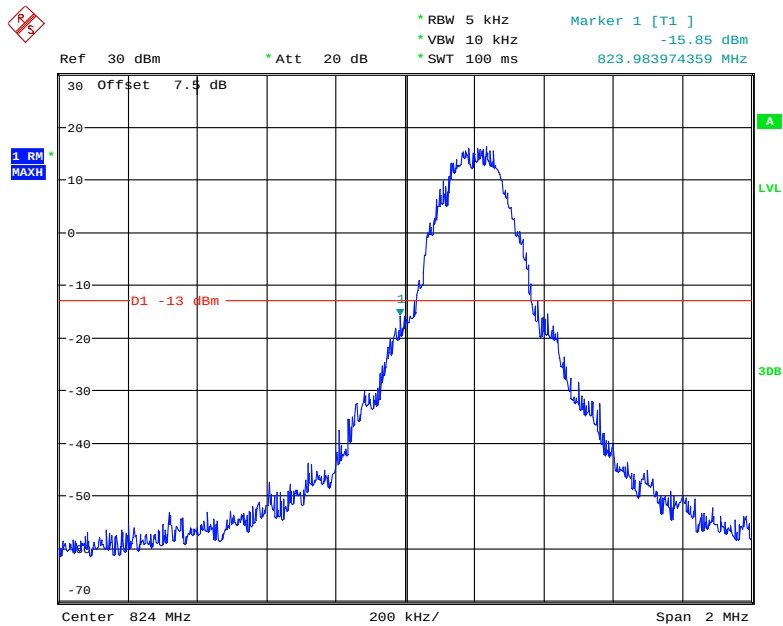
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Moon Tan from 2019-04-02 to 2019-04-04.

EUT operation mode: Transmitting

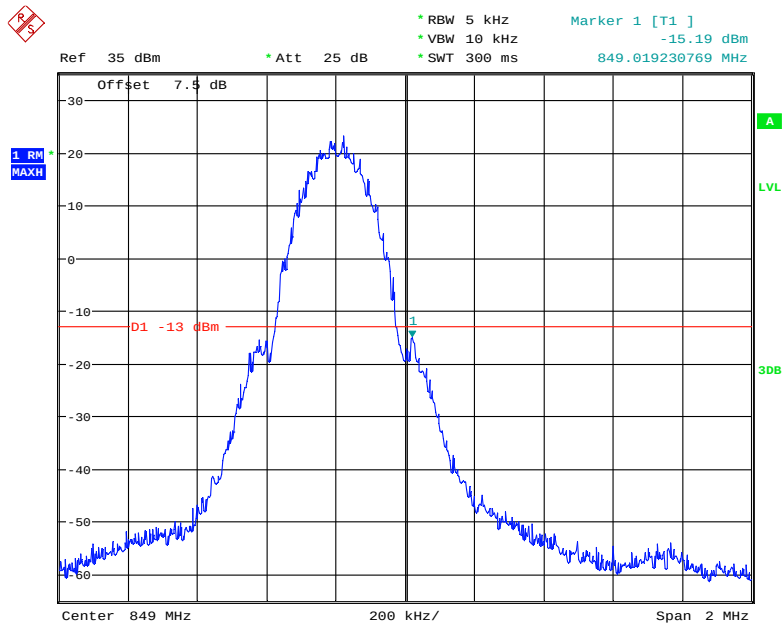
Test Result: Compliance. Please refer to the following plots.

Cellular Band, Left Band Edge for GSM (GMSK) Mode



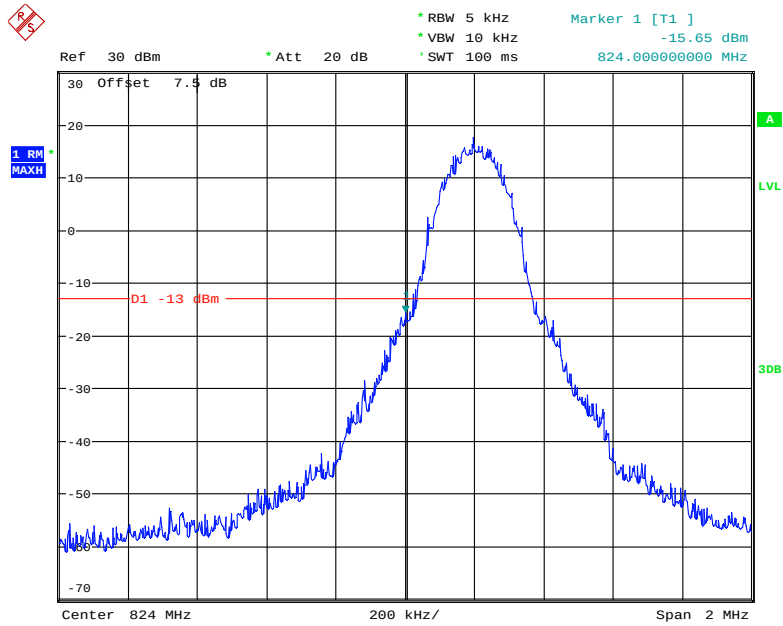
Date: 4.APR.2019 14:49:12

Cellular Band, Right Band Edge for GSM (GMSK) Mode



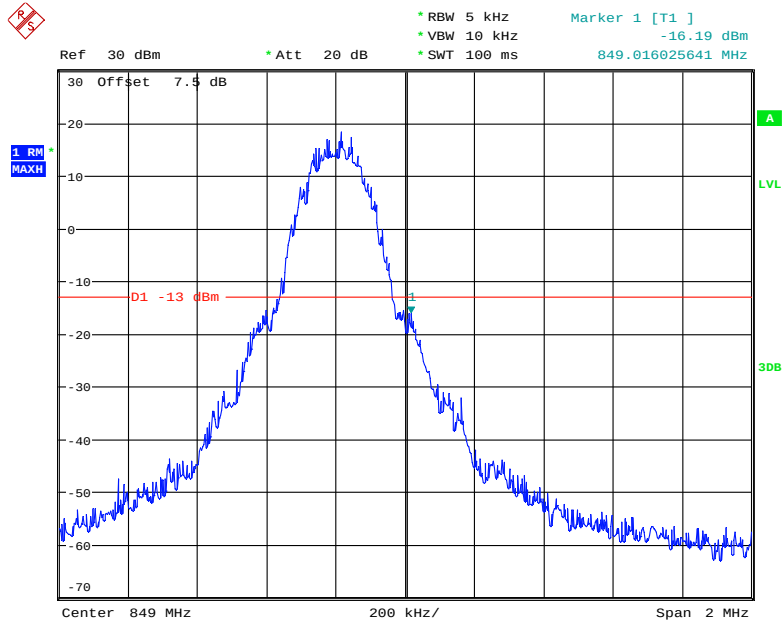
Date: 3.APR.2019 11:18:35

Cellular Band, Left Band Edge for EDGE Mode



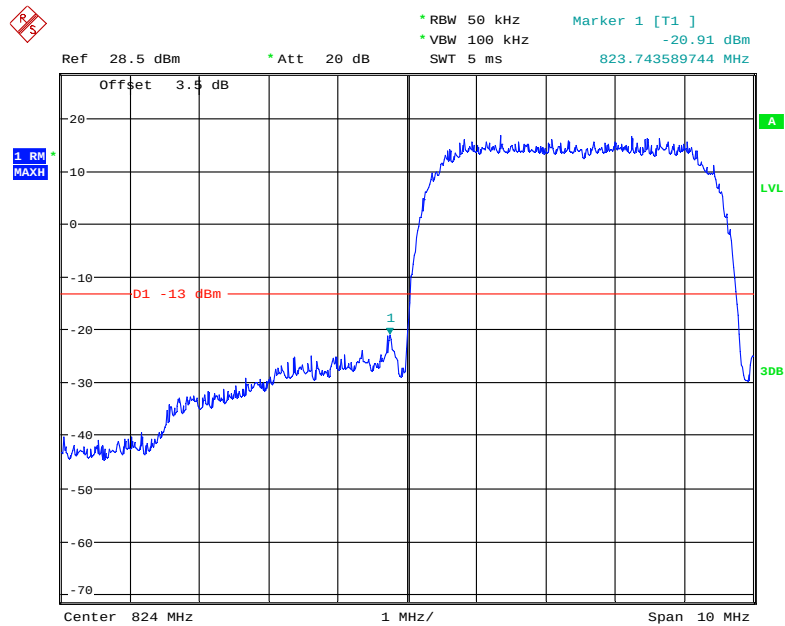
Date: 4.APR.2019 14:45:48

Cellular Band, Right Band Edge for EDGE Mode



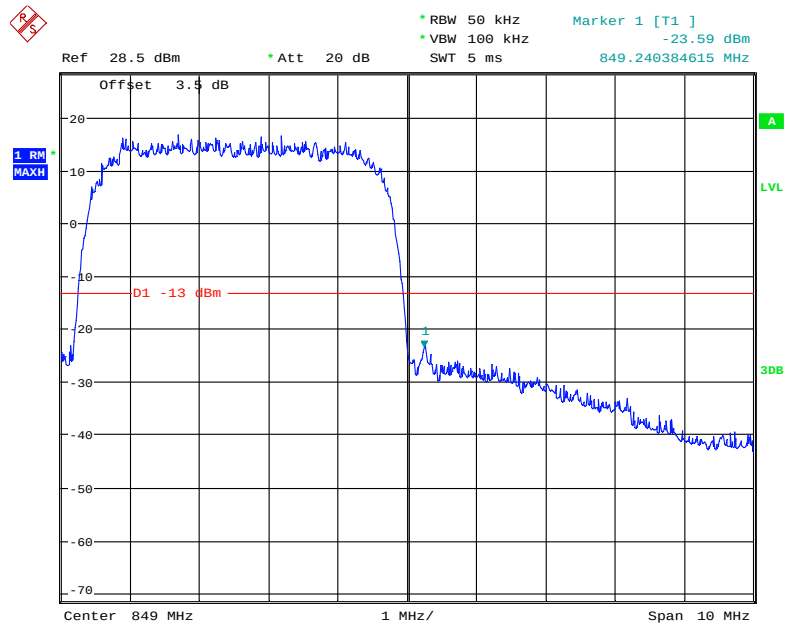
Date: 4.APR.2019 14:47:50

Cellular Band, Left Band Edge for WCDMA (BPSK) Mode



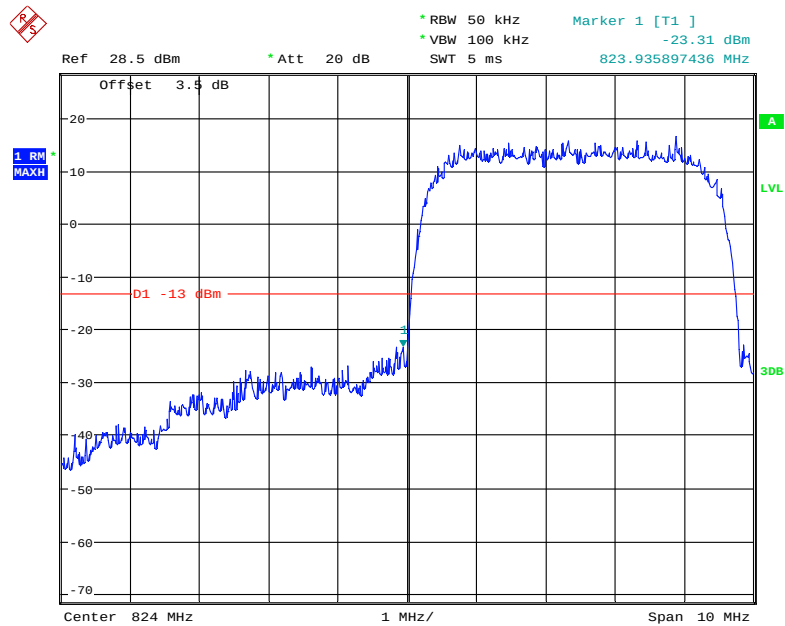
Date: 2.APR.2019 17:36:44

Cellular Band, Right Band Edge for WCDMA (BPSK) Mode



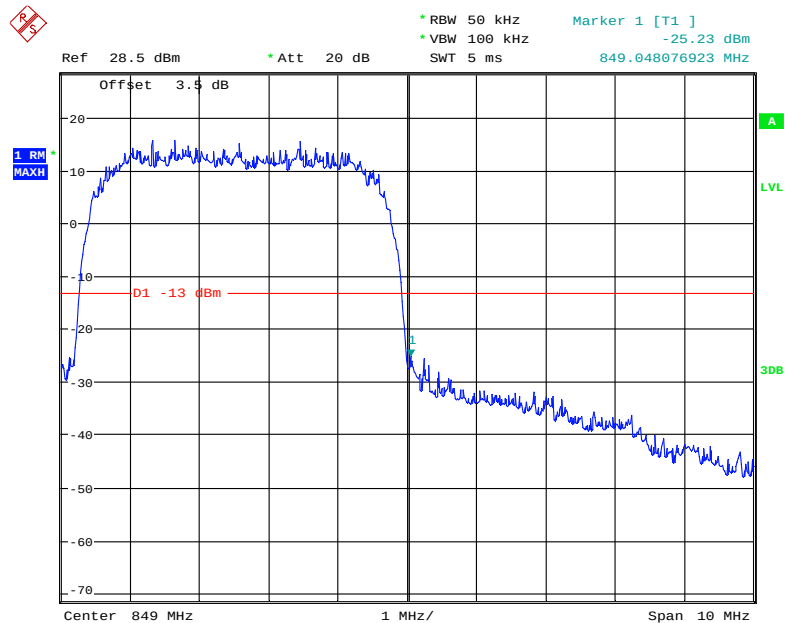
Date: 2.APR.2019 17:37:09

Cellular Band, Left Band Edge for HSDPA (16QAM) Mode



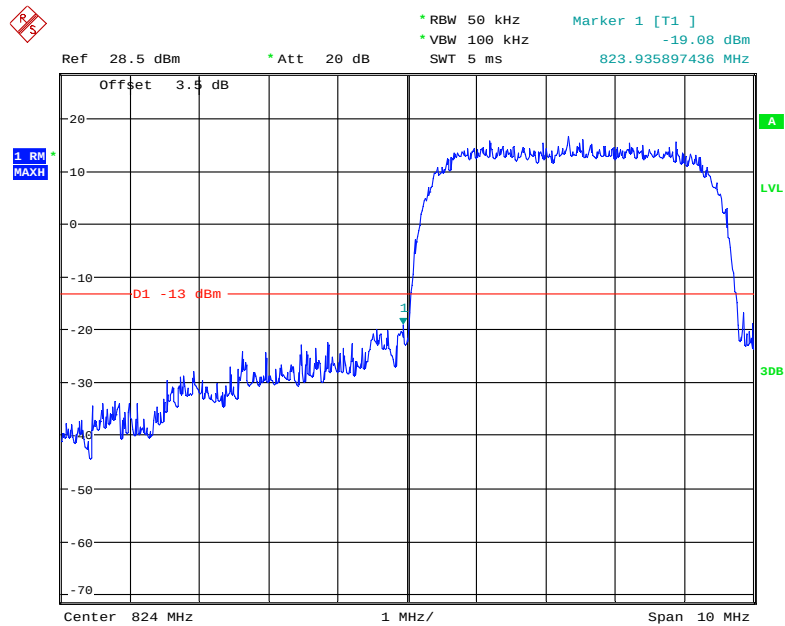
Date: 2.APR.2019 17:36:17

Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



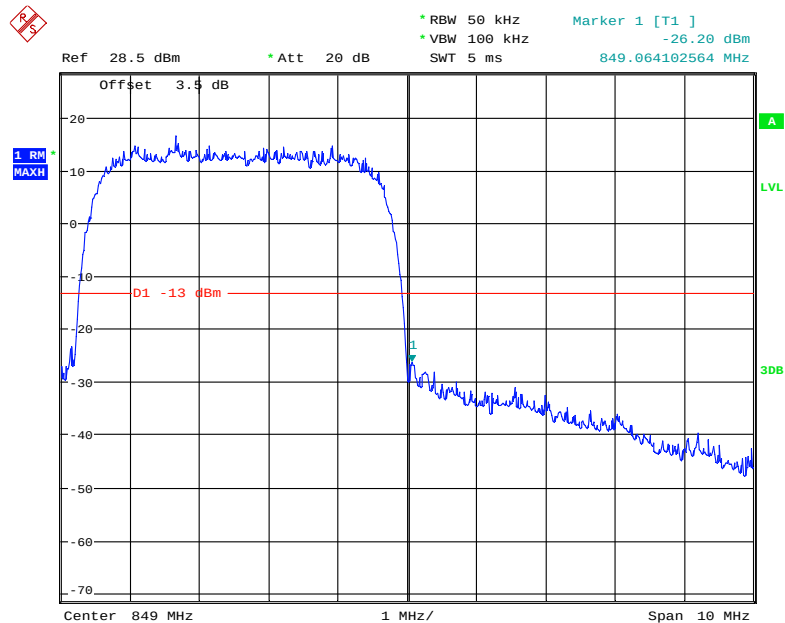
Date: 2.APR.2019 17:35:53

Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



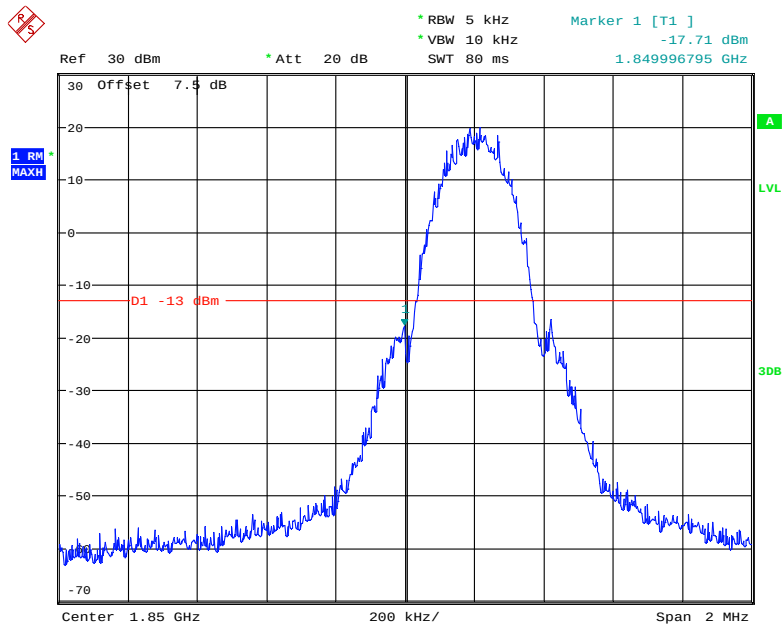
Date: 2.APR.2019 17:34:38

Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



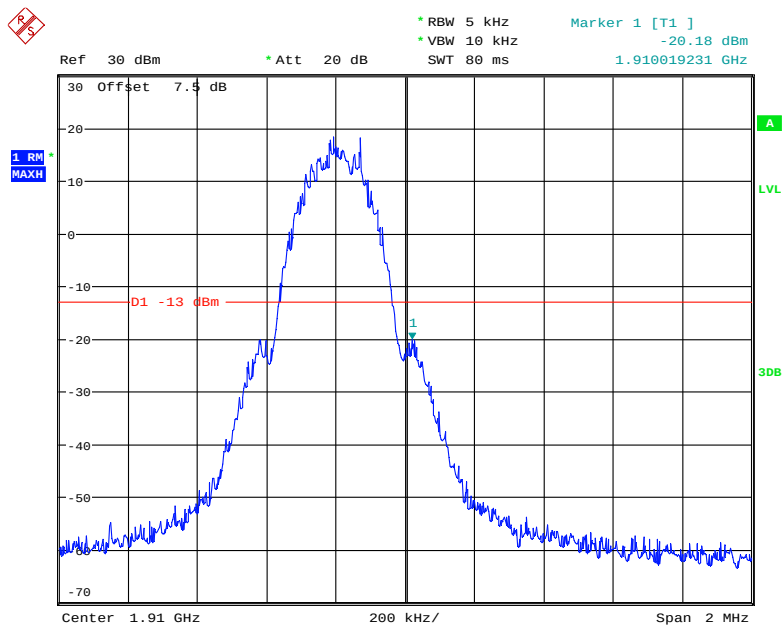
Date: 2.APR.2019 17:35:15

PCS Band, Left Band Edge for GSM (GMSK) Mode



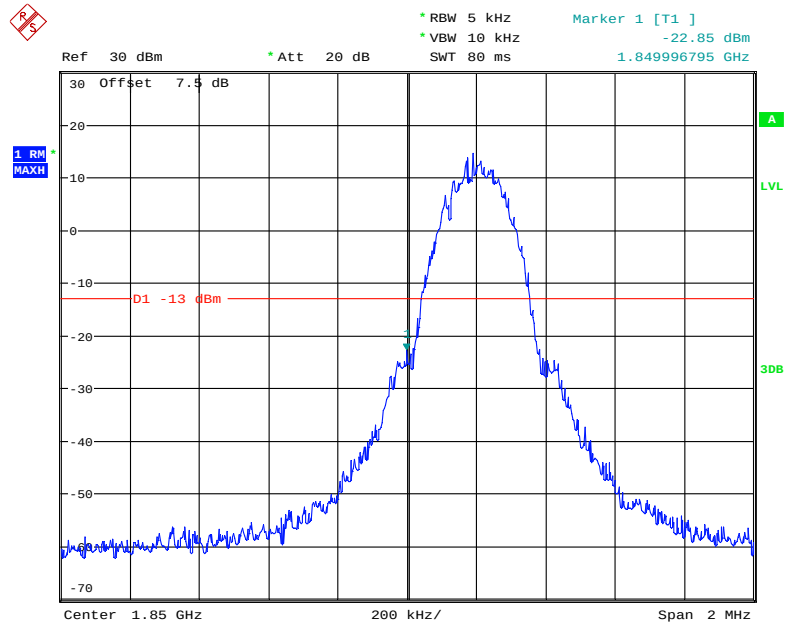
Date: 4.APR.2019 14:58:17

PCS Band, Right Band Edge for GSM (GMSK) Mode



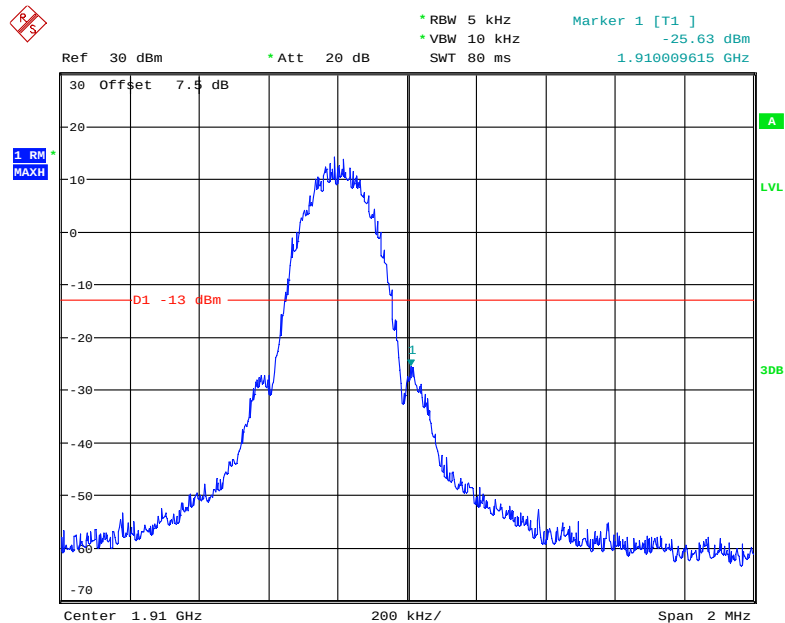
Date: 4.APR.2019 14:59:30

PCS Band, Left Band Edge for EDGE Mode



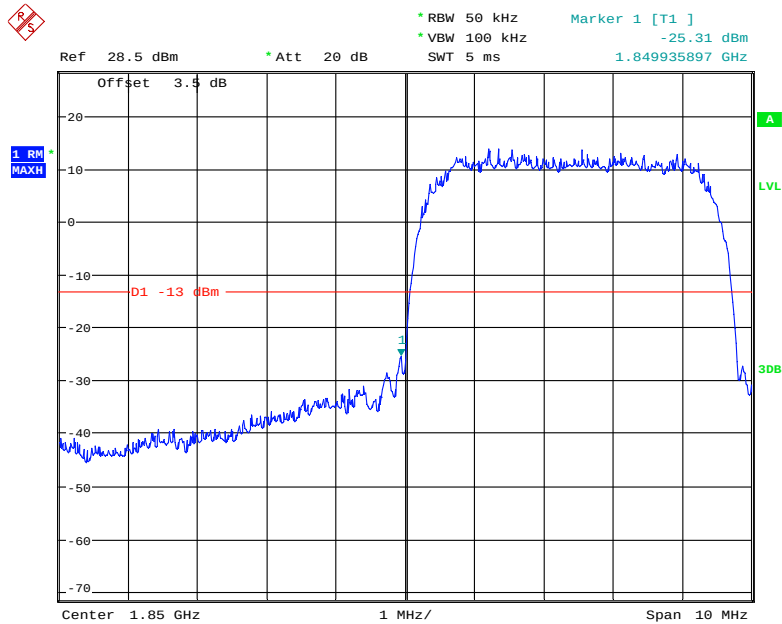
Date: 4.APR.2019 15:23:09

PCS Band, Right Band Edge for EDGE Mode



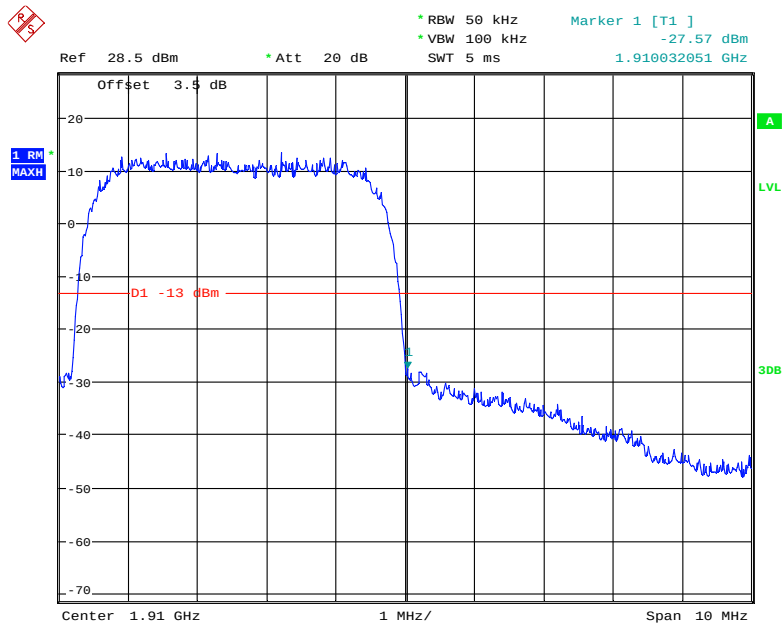
Date: 4.APR.2019 15:24:19

PCS Band, Left Band Edge for WCDMA (BPSK) Mode



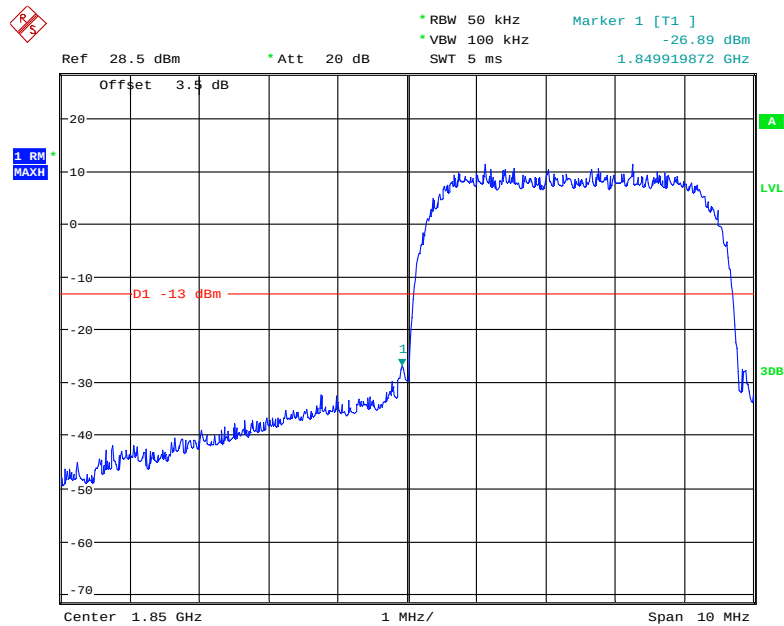
Date: 2.APR.2019 17:09:38

PCS Band, Right Band Edge for WCDMA (BPSK) Mode



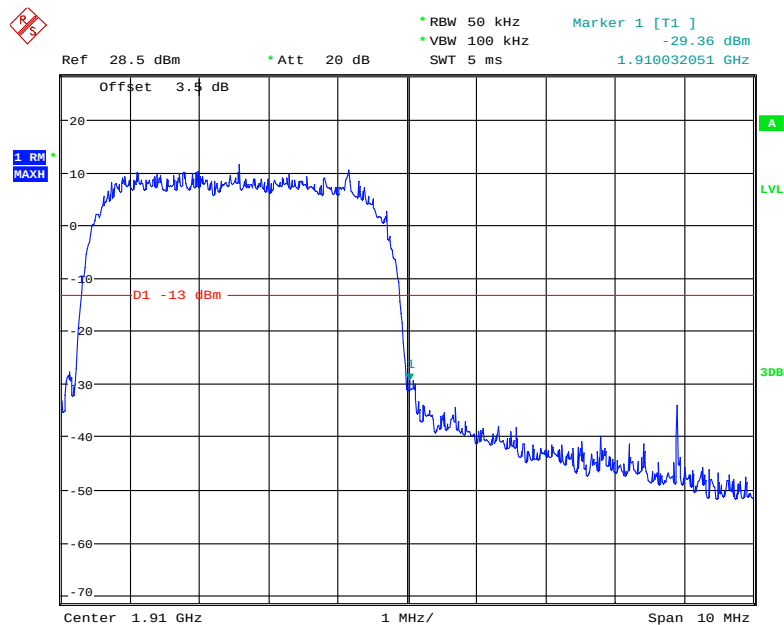
Date: 2.APR.2019 17:10:12

PCS Band, Left Band Edge for HSDPA (16QAM) Mode



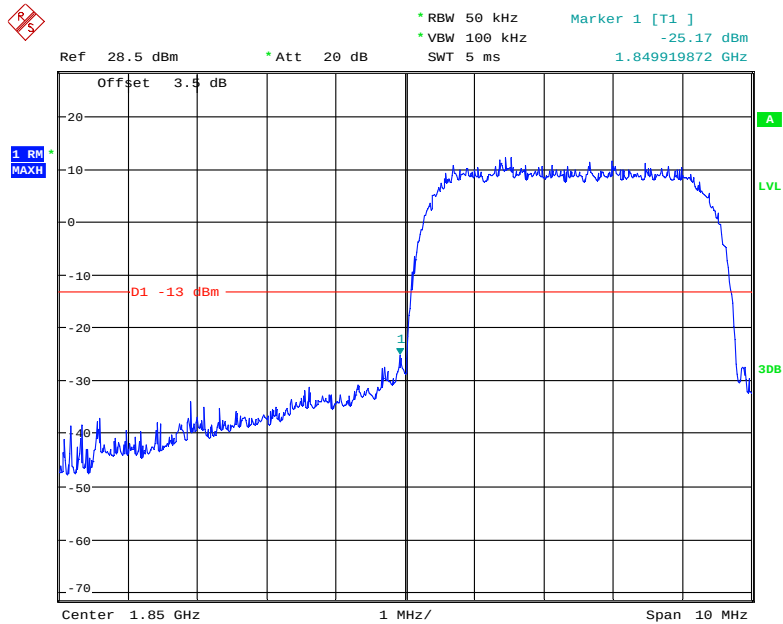
Date: 2.APR.2019 17:09:10

PCS Band, Right Band Edge for HSDPA (16QAM) Mode



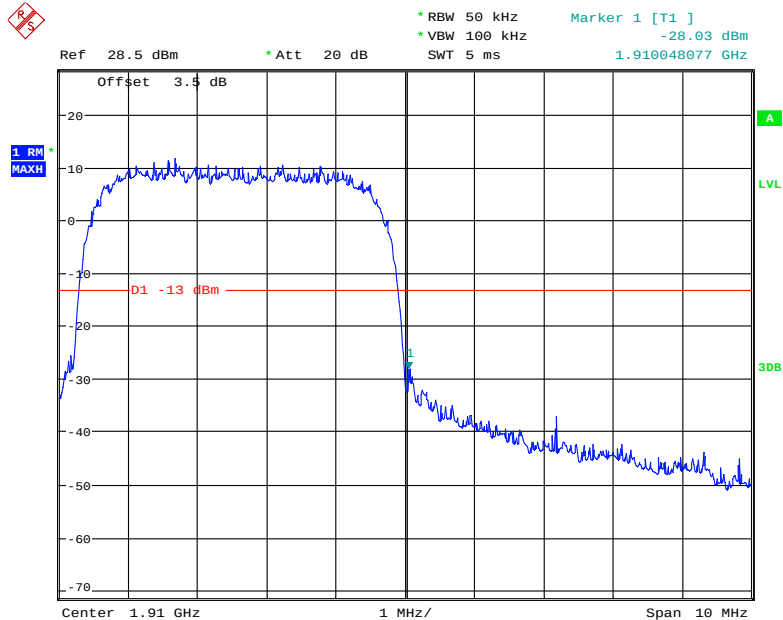
Date: 2.APR.2019 17:08:39

PCS Band, Left Band Edge for HSUPA (BPSK) Mode



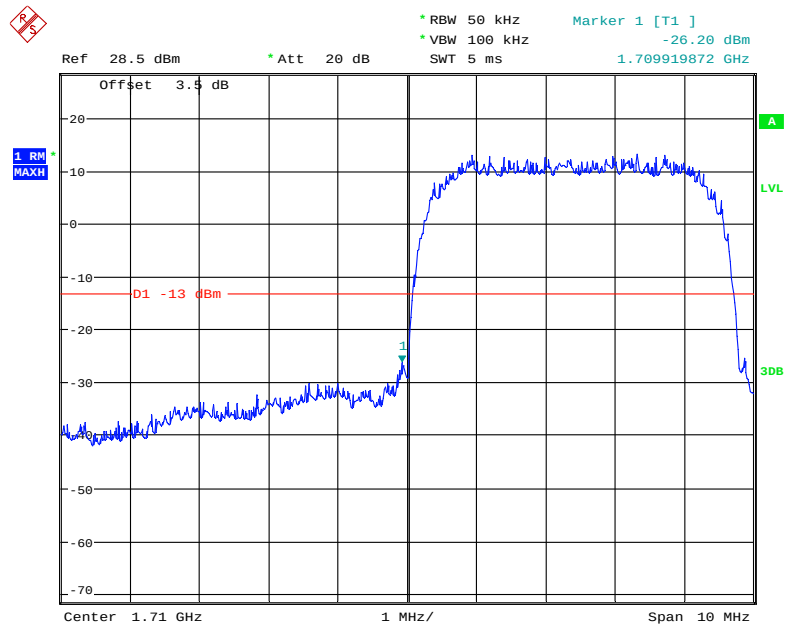
Date: 2.APR.2019 17:07:11

PCS Band, Right Band Edge for HSUPA (BPSK) Mode



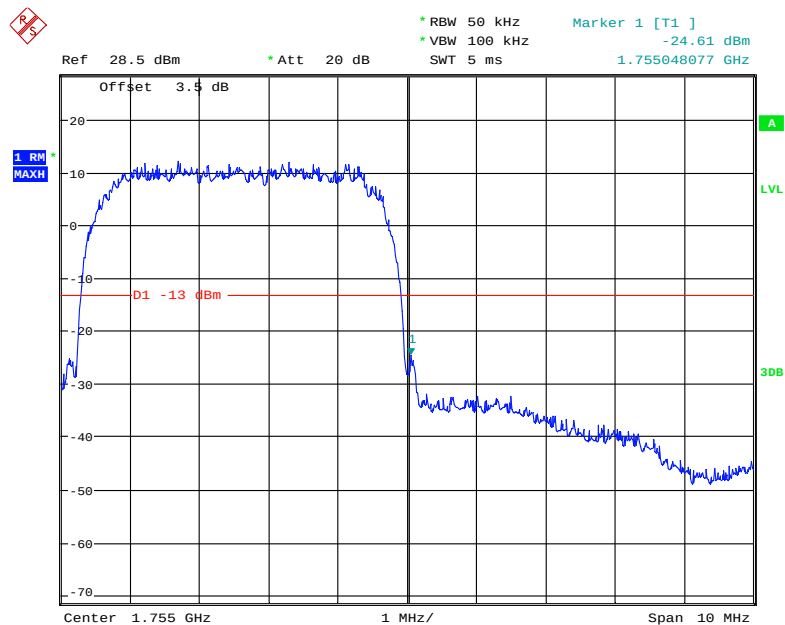
Date: 2.APR.2019 17:08:03

AWS Band, Left Band Edge for WCDMA (BPSK) Mode



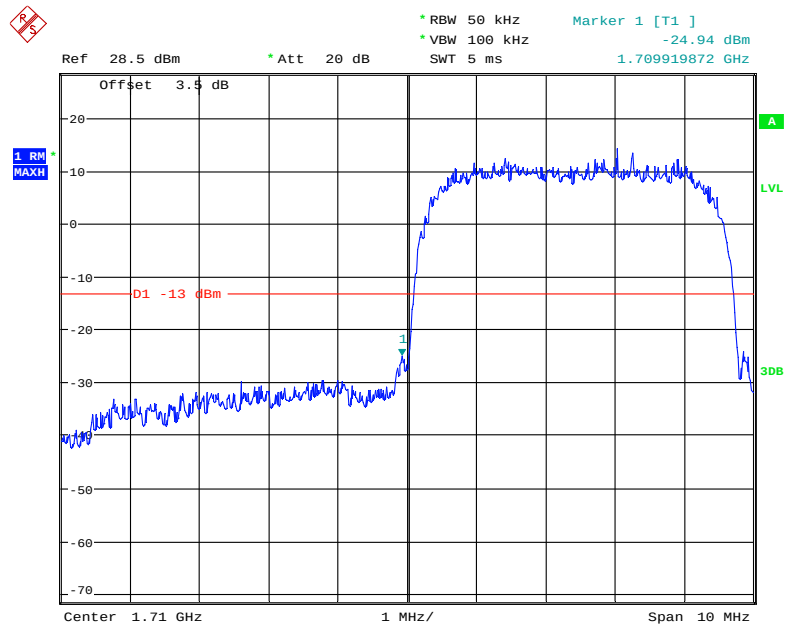
Date: 2.APR.2019 17:50:35

AWS Band, Right Band Edge for WCDMA (BPSK) Mode



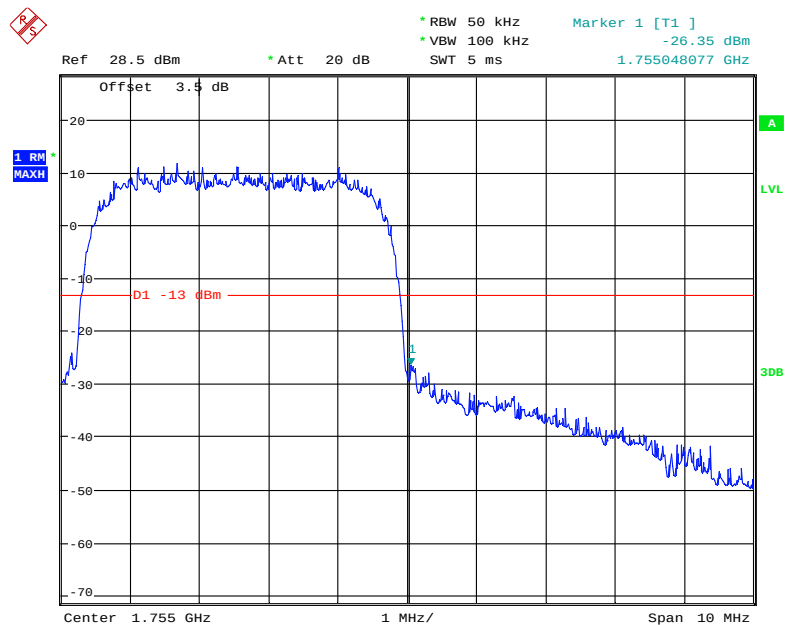
Date: 2.APR.2019 17:50:57

AWS Band, Left Band Edge for HSDPA (16QAM) Mode



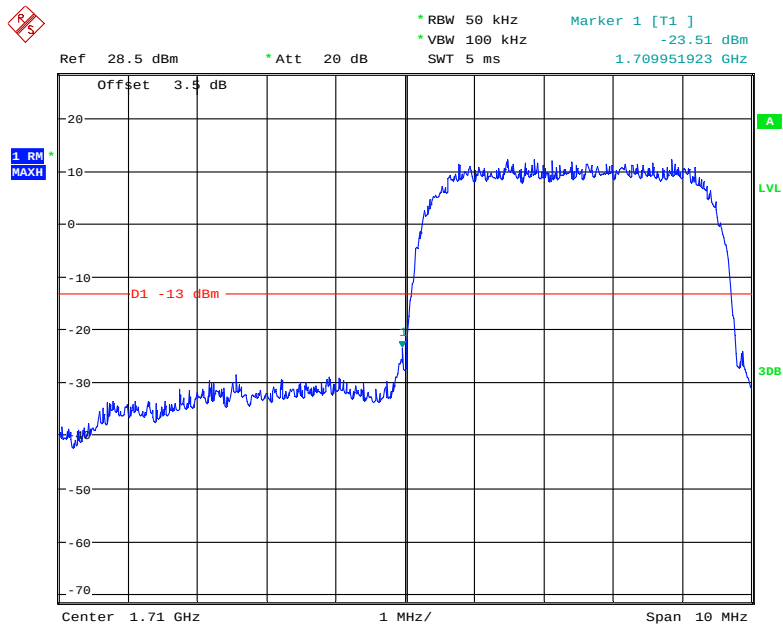
Date: 2.APR.2019 17:50:11

AWS Band, Right Band Edge for HSDPA (16QAM) Mode



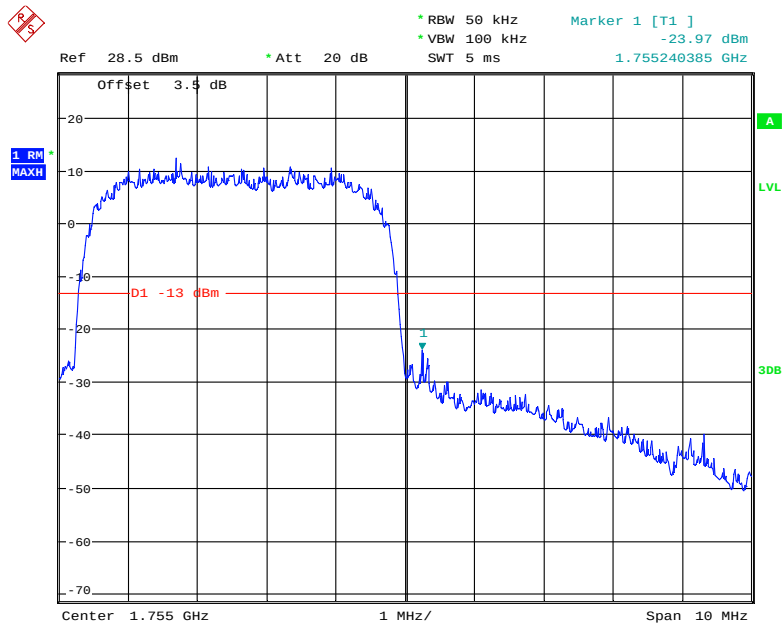
Date: 2.APR.2019 17:49:51

AWS Band, Left Band Edge for HSUPA (BPSK) Mode

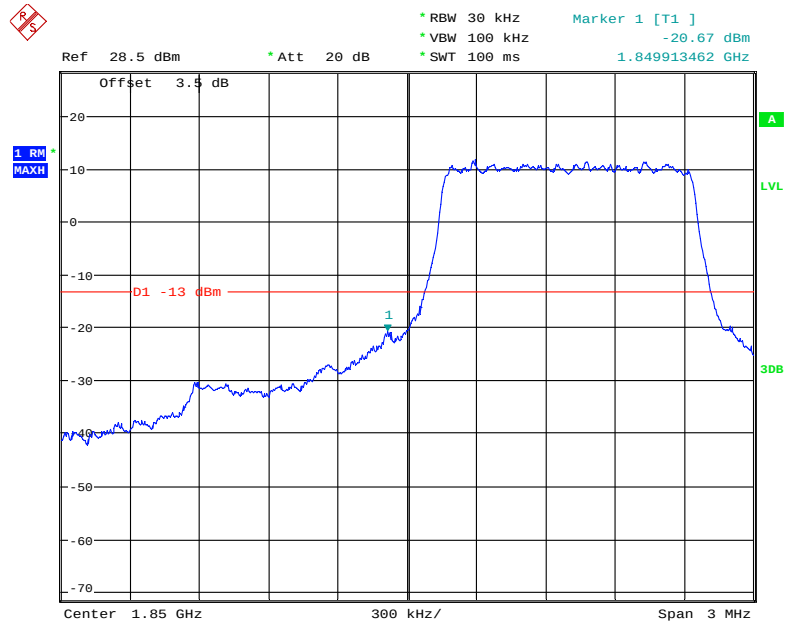


Date: 2.APR.2019 17:49:05

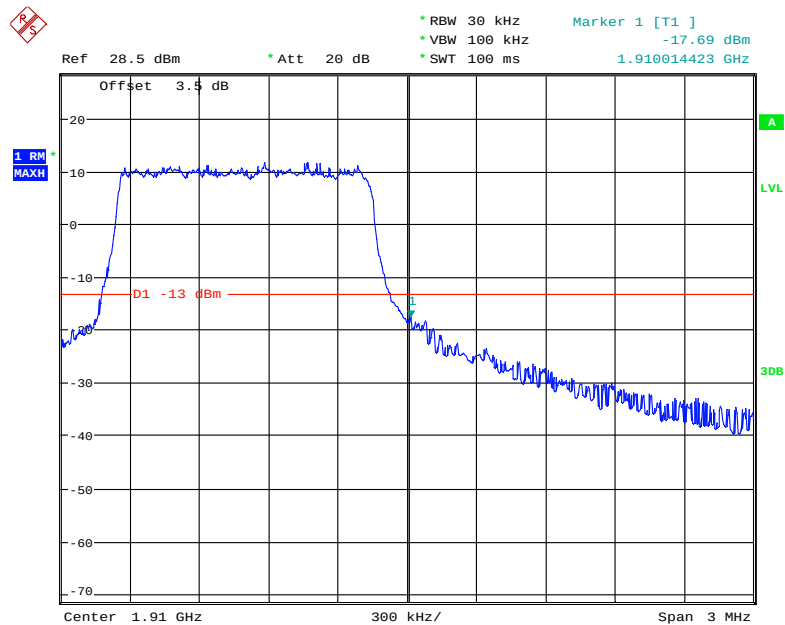
AWS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 2.APR.2019 17:49:25

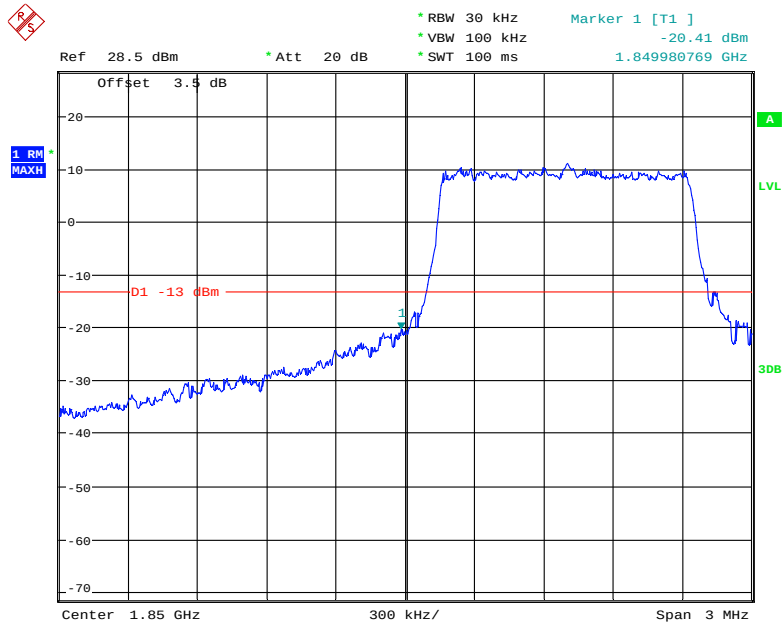
Band 2:**QPSK (1.4 MHz, FULL RB) - Left Band Edge**

Date: 2.APR.2019 12:38:44

QPSK (1.4 MHz, FULL RB) - Right Band Edge

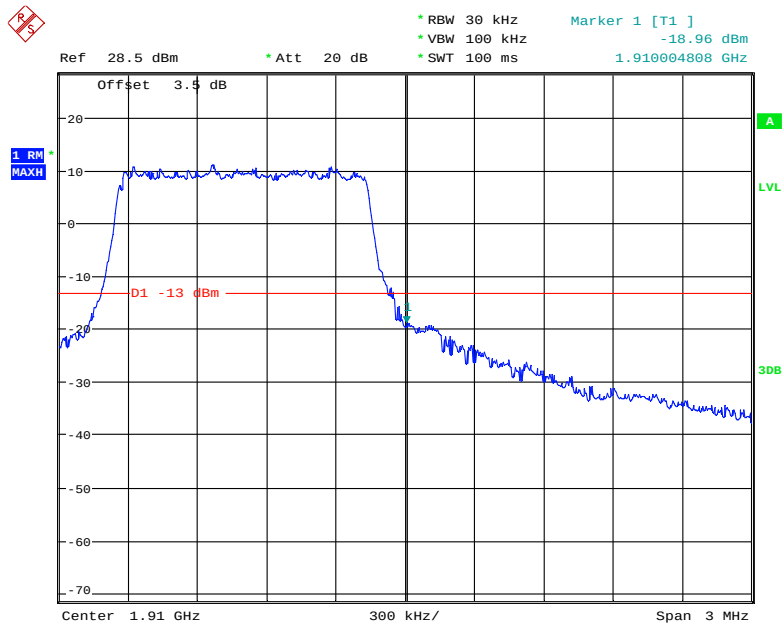
Date: 2.APR.2019 12:42:57

16-QAM (1.4 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2019 12:39:20

16-QAM (1.4 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2019 12:42:28

Ref 28.5 dBm * Att 20 dB

* RBW 30 kHz * VBW 100 kHz * SWT 100 ms

Marker 1 [T1] -20.34 dBm 1.849990385 GHz

Offset 3.5 dB

1 RM MAX

D1 -13 dBm

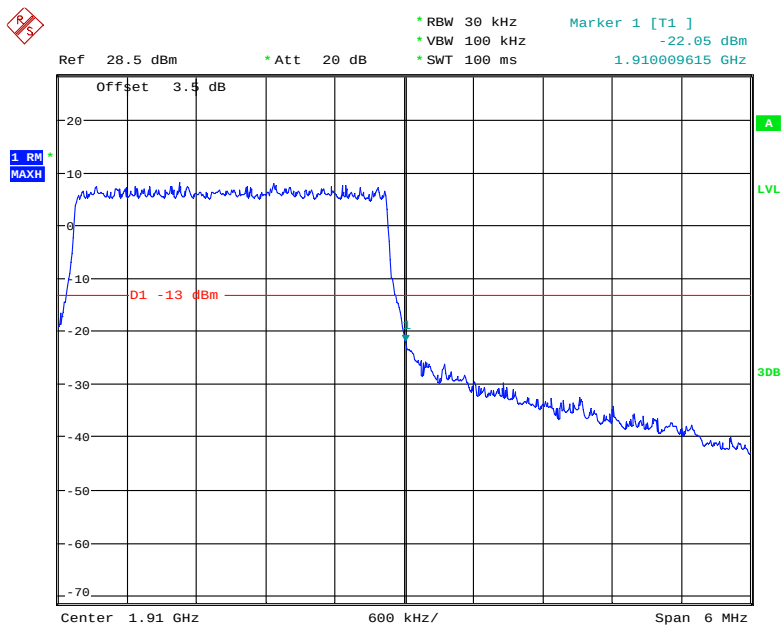
Center 1.85 GHz 600 kHz/ Span 6 MHz

A

LVL

3DB

QPSK (3.0 MHz, FULL RB) - Right Band Edge



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Ref 28.5 dBm * Att 20 dB

- * RBW 30 kHz
- * VBW 100 kHz
- * SWT 100 ms

Marker 1 [T1] -21.51 dBm
1.849990385 GHz

Offset 3.5 dB

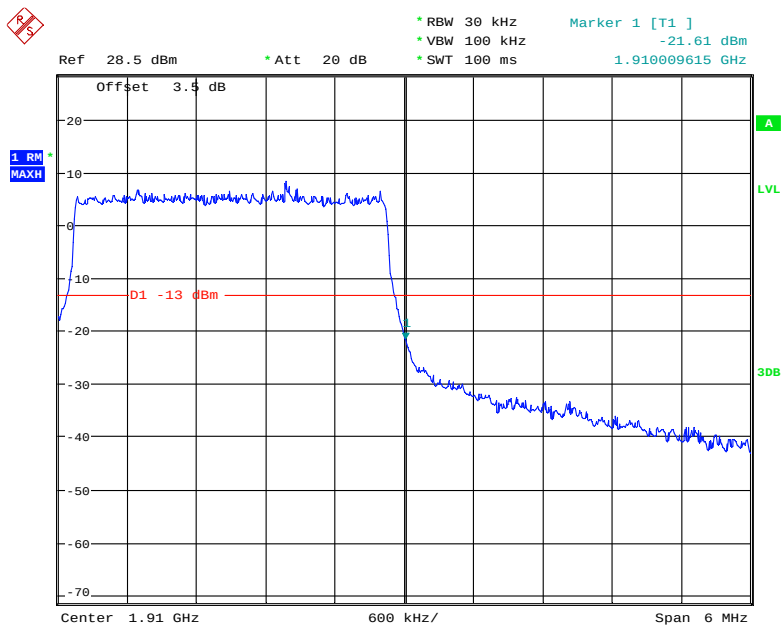
1 RM MAXH

D1 -13 dBm

Center 1.85 GHz 600 kHz/ Span 6 MHz

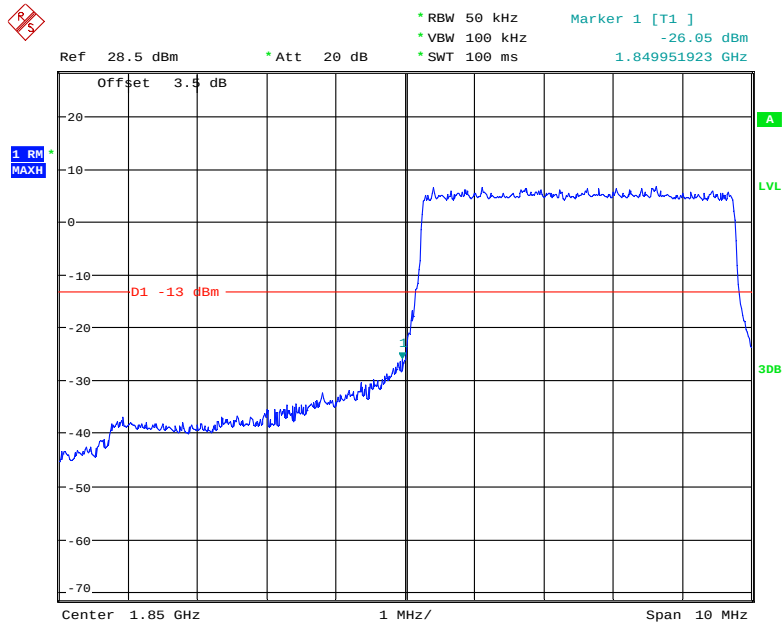
LVL 3DB

16-QAM (3.0 MHz, FULL RB) - Right Band Edge



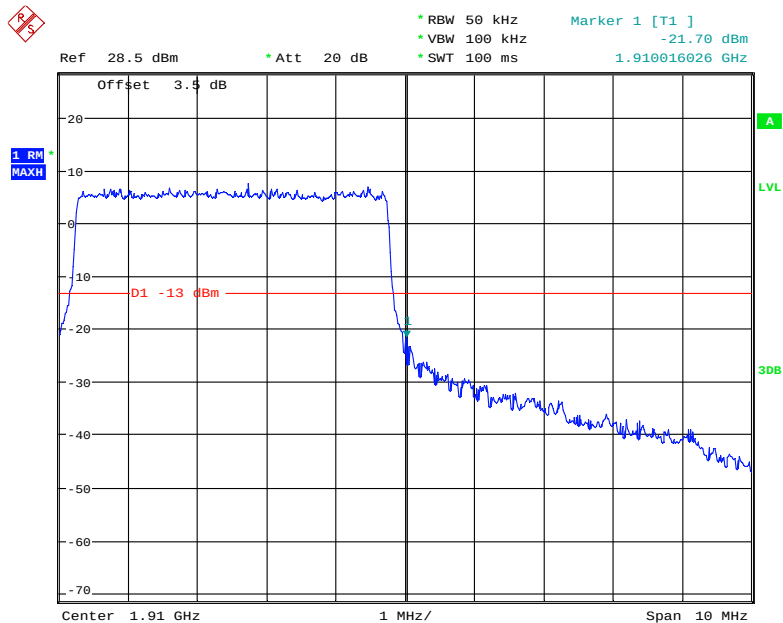
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QPSK (5.0 MHz, FULL RB) - Left Band Edge



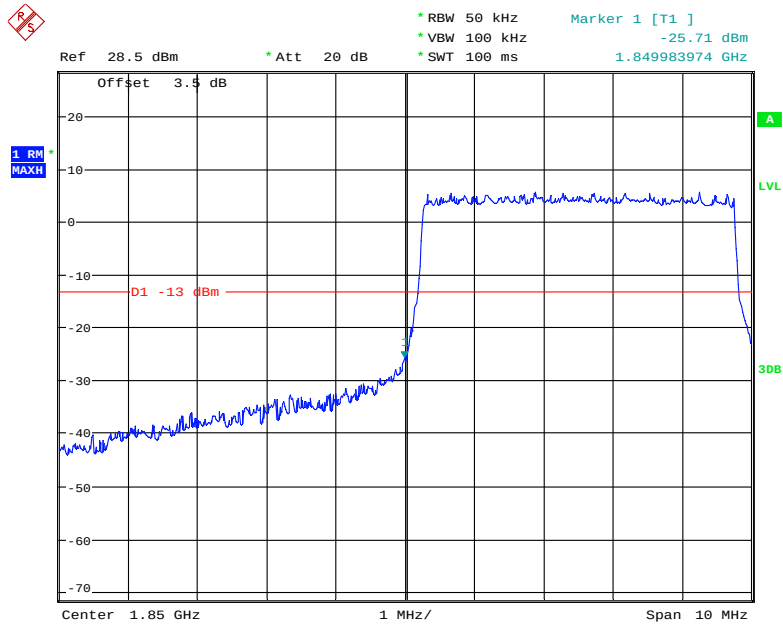
Date: 2.APR.2019 12:55:33

QPSK (5.0 MHz, FULL RB) - Right Band Edge



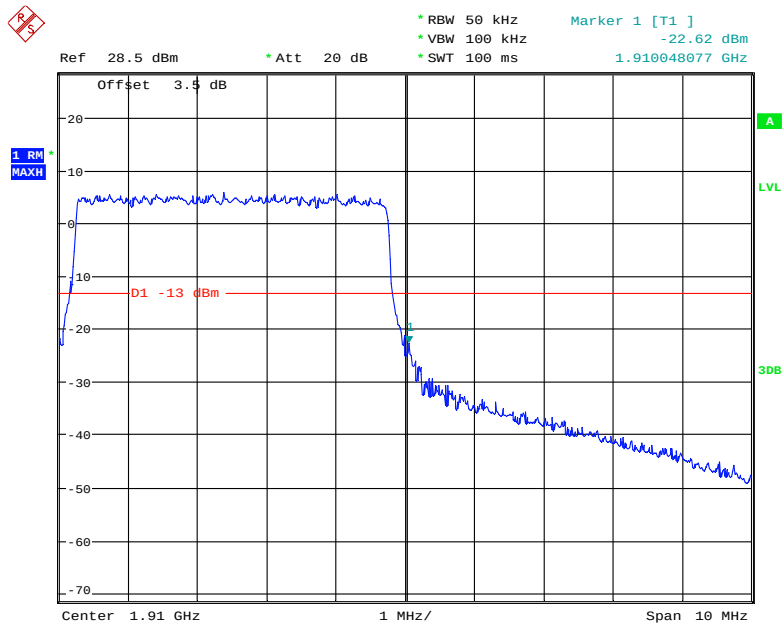
Date: 2.APR.2019 12:57:32

16-QAM (5.0 MHz, FULL RB) - Left Band Edge



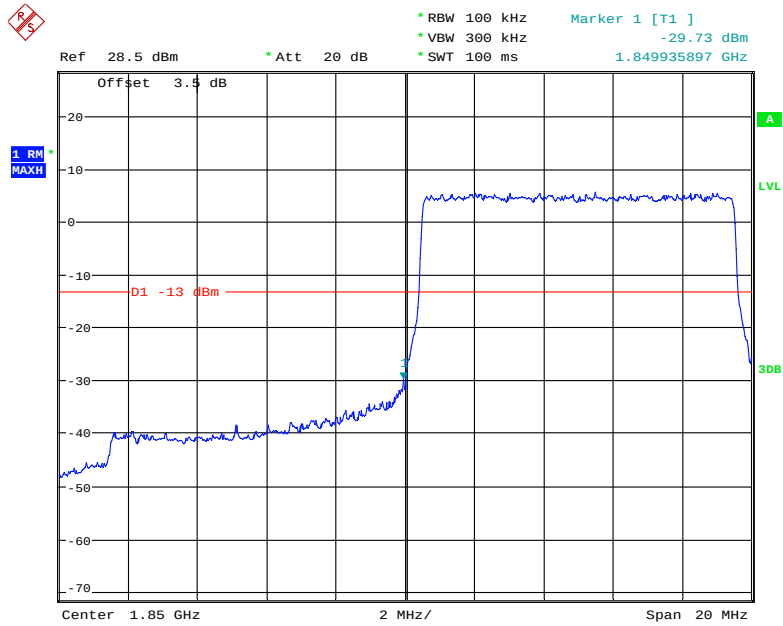
Date: 2.APR.2019 12:55:59

16-QAM (5.0 MHz, FULL RB) - Right Band Edge



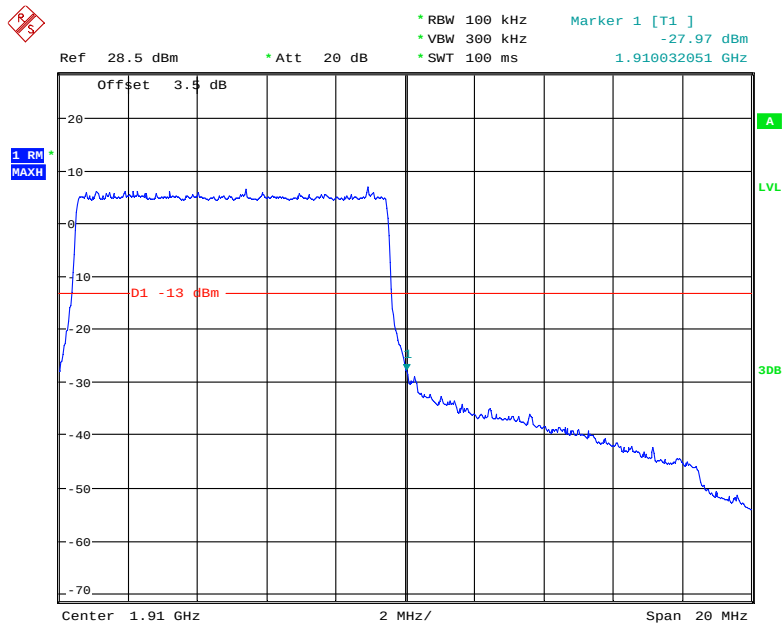
Date: 2.APR.2019 12:56:34

QPSK (10.0 MHz, FULL RB) - Left Band Edge



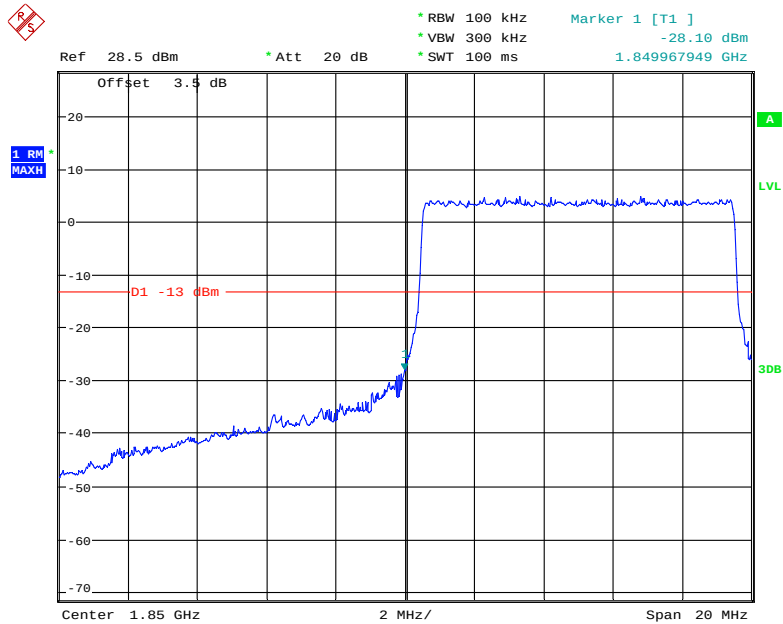
Date: 2.APR.2019 13:01:38

QPSK (10.0 MHz, FULL RB) - Right Band Edge



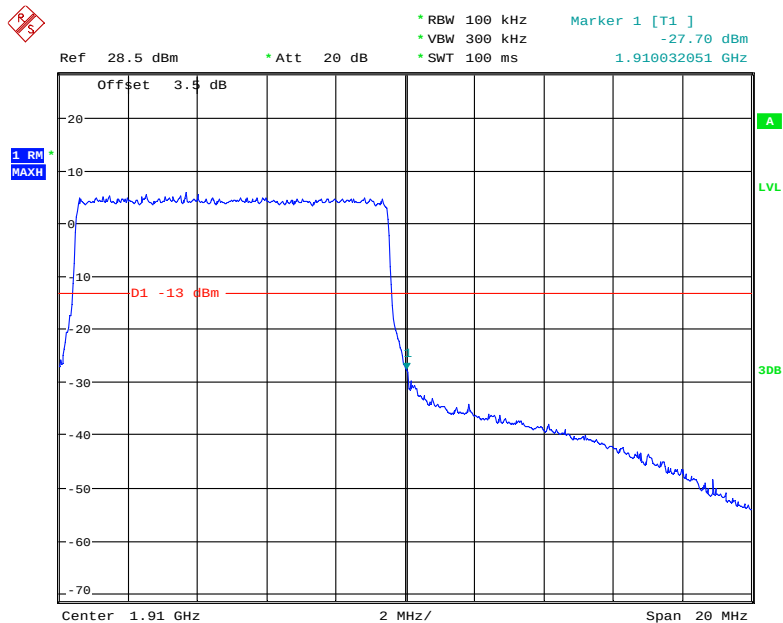
Date: 2.APR.2019 12:59:27

16-QAM (10.0 MHz, FULL RB) - Left Band Edge



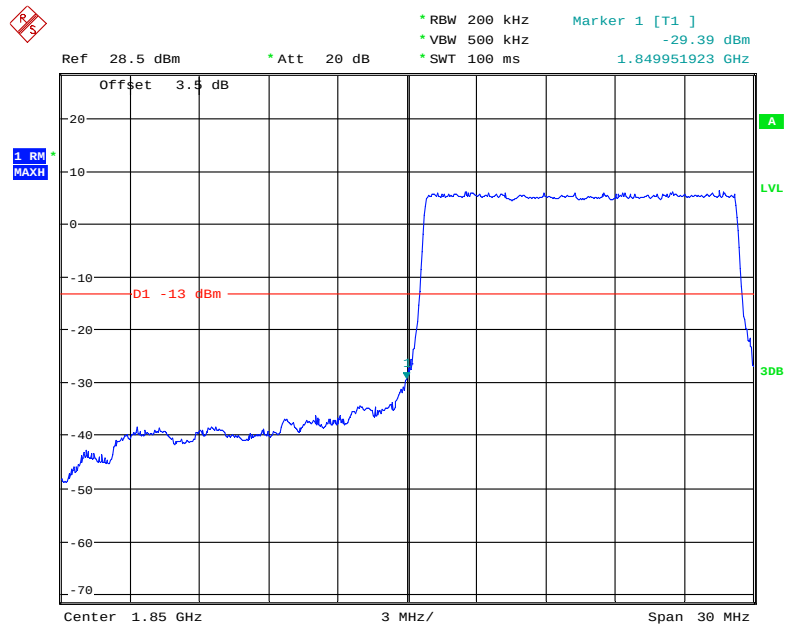
Date: 2.APR.2019 13:01:04

16-QAM (10.0 MHz, FULL RB) - Right Band Edge



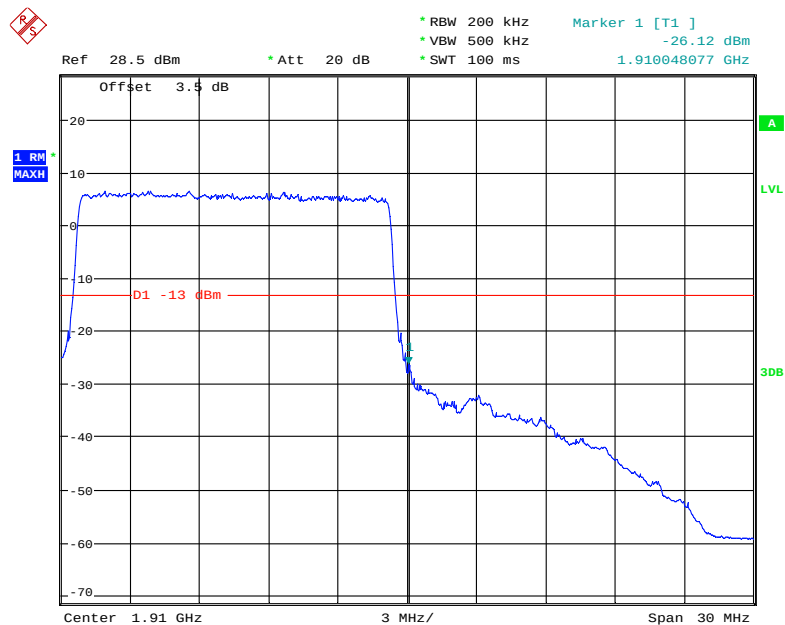
Date: 2.APR.2019 13:00:20

QPSK (15.0 MHz, FULL RB) - Left Band Edge



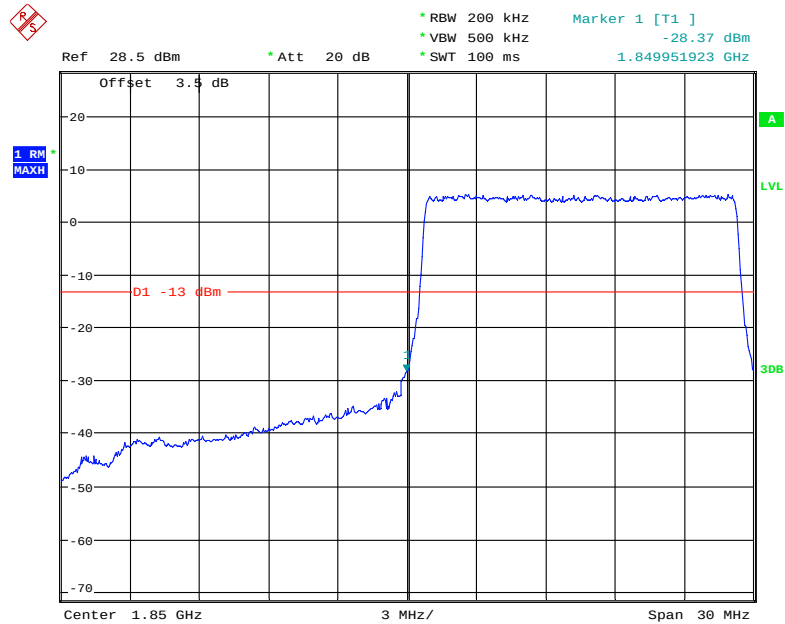
Date: 2.APR.2019 13:02:22

QPSK (15.0 MHz, FULL RB) - Right Band Edge



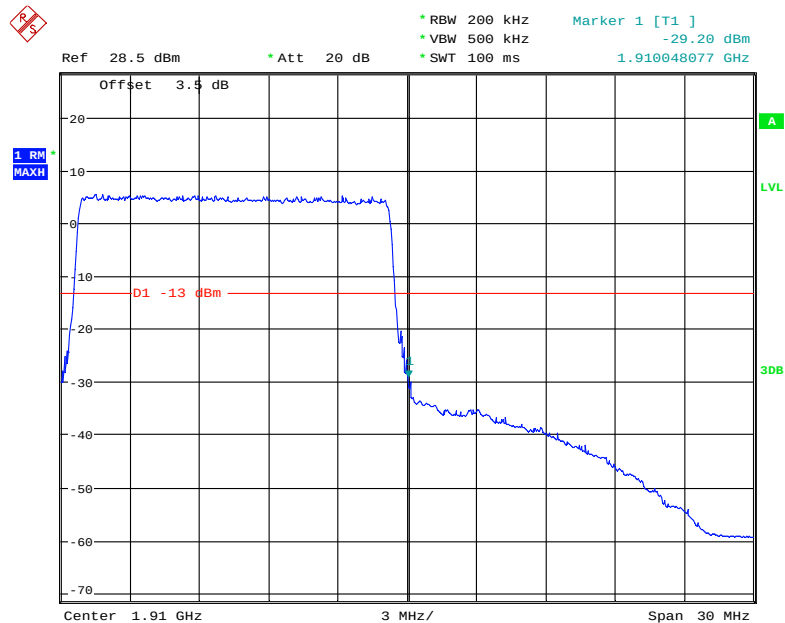
Date: 2.APR.2019 13:03:31

16-QAM (15.0 MHz, FULL RB) - Left Band Edge



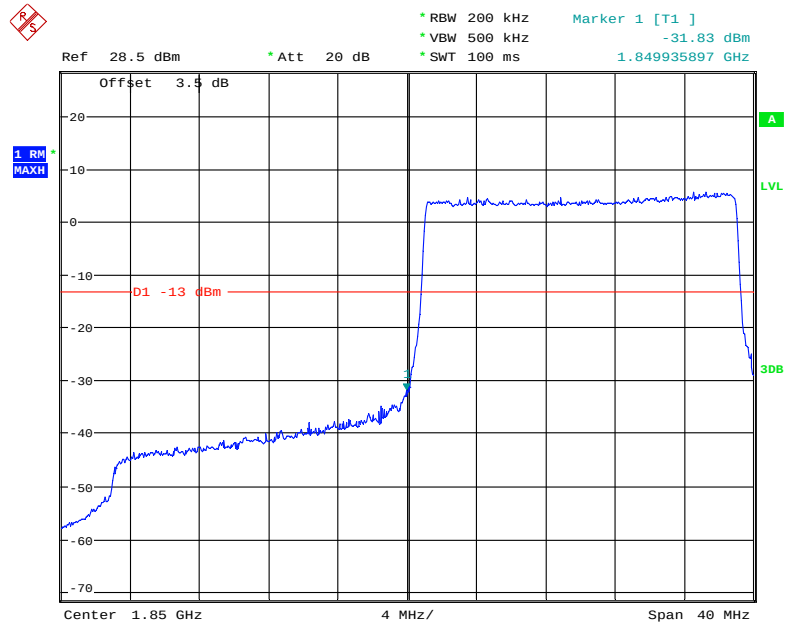
Date: 2.APR.2019 13:02:46

16-QAM (15.0 MHz, FULL RB) - Right Band Edge



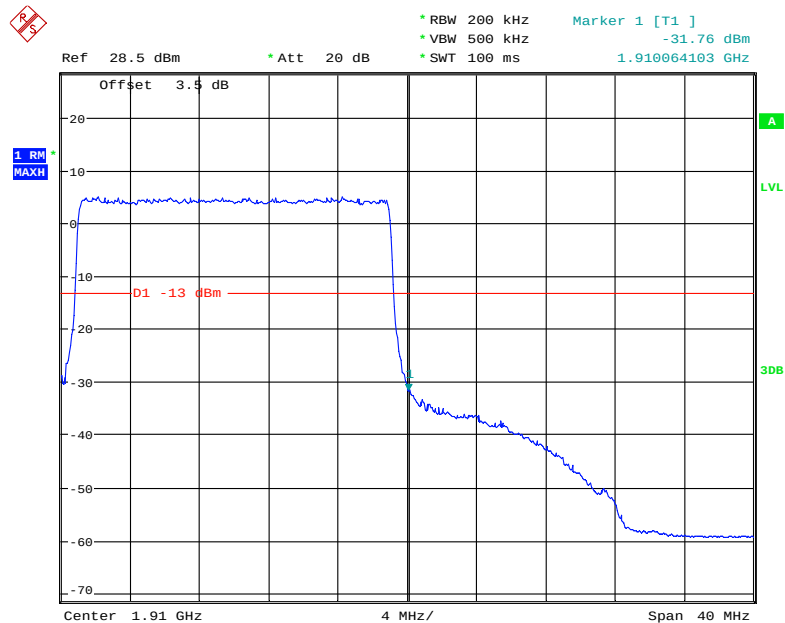
Date: 2.APR.2019 13:03:11

QPSK (20.0 MHz, FULL RB) - Left Band Edge



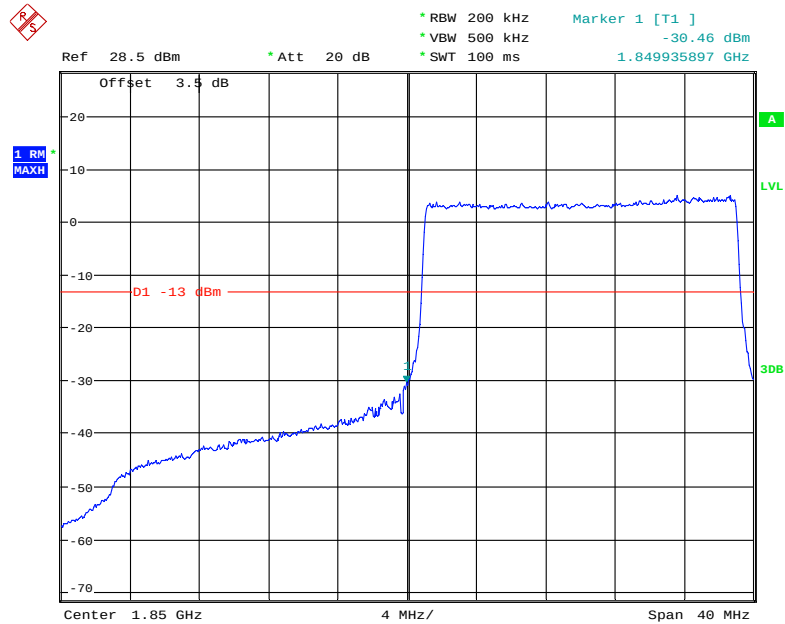
Date: 2.APR.2019 13:06:37

QPSK (20.0 MHz, FULL RB) - Right Band Edge



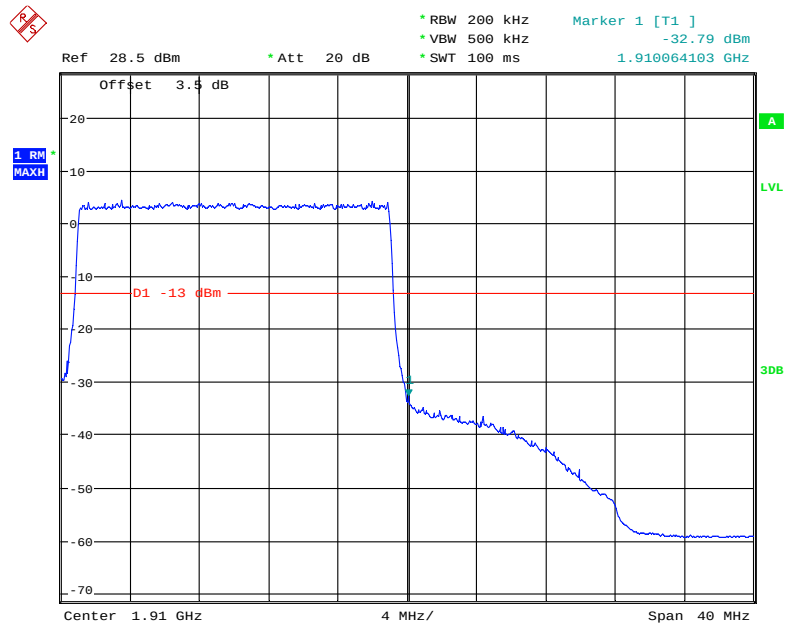
Date: 2.APR.2019 13:04:30

16-QAM (20.0 MHz, FULL RB) - Left Band Edge



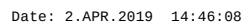
Date: 2.APR.2019 13:05:38

16-QAM (20.0 MHz, FULL RB) - Right Band Edge



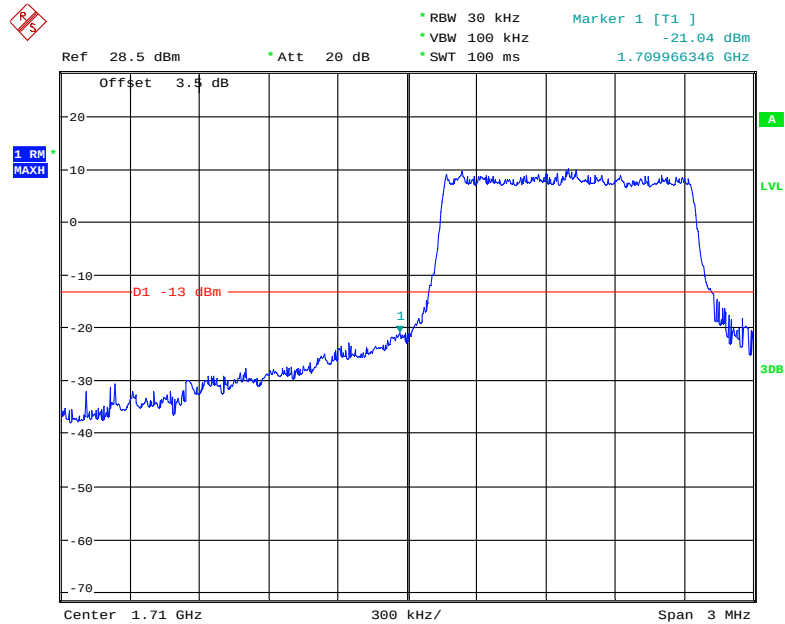
Date: 2.APR.2019 13:04:51

QPSK (1.4 MHz, FULL RB) - Left Band Edge



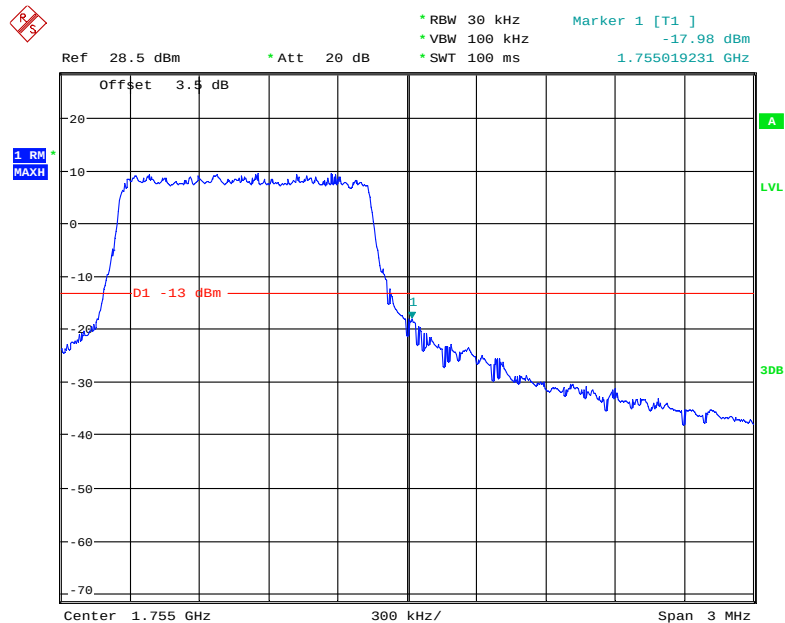
Date: 2.APR.2019 14:47:43

16-QAM (1.4 MHz, FULL RB) - Left Band Edge



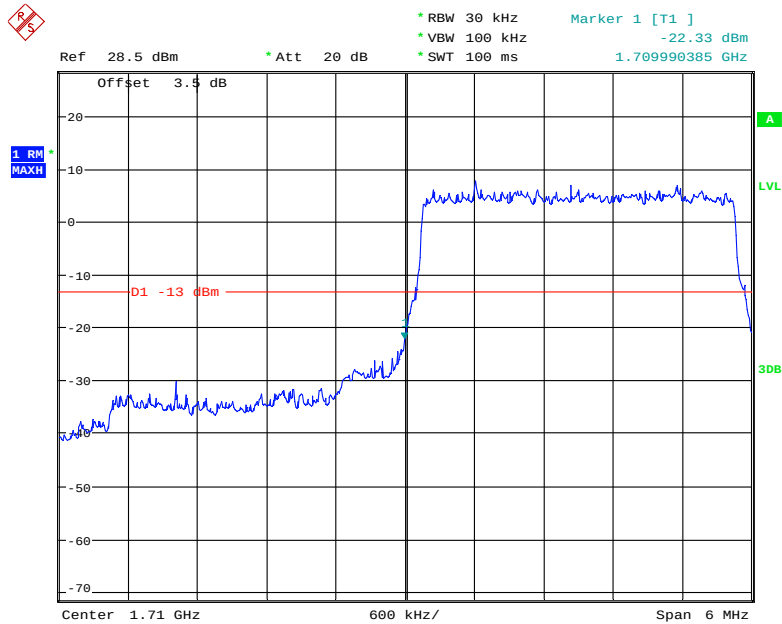
Date: 2.APR.2019 14:46:29

16-QAM (1.4 MHz, FULL RB) - Right Band Edge



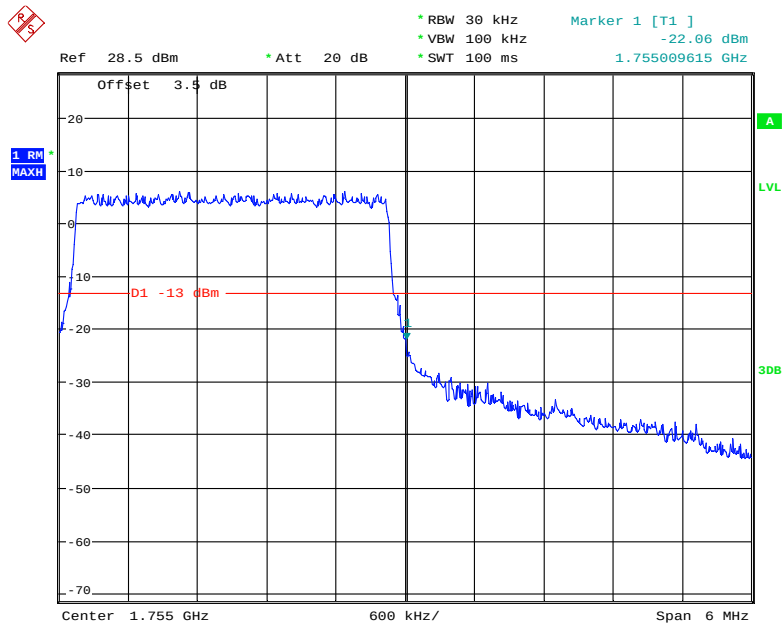
Date: 2.APR.2019 14:47:15

QPSK (3.0 MHz, FULL RB) - Left Band Edge



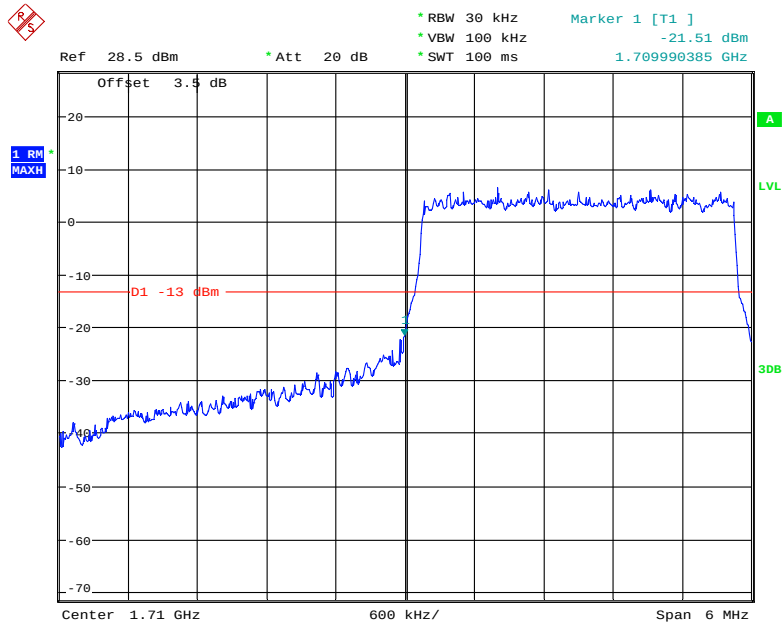
Date: 2.APR.2019 14:42:22

QPSK (3.0 MHz, FULL RB) - Right Band Edge



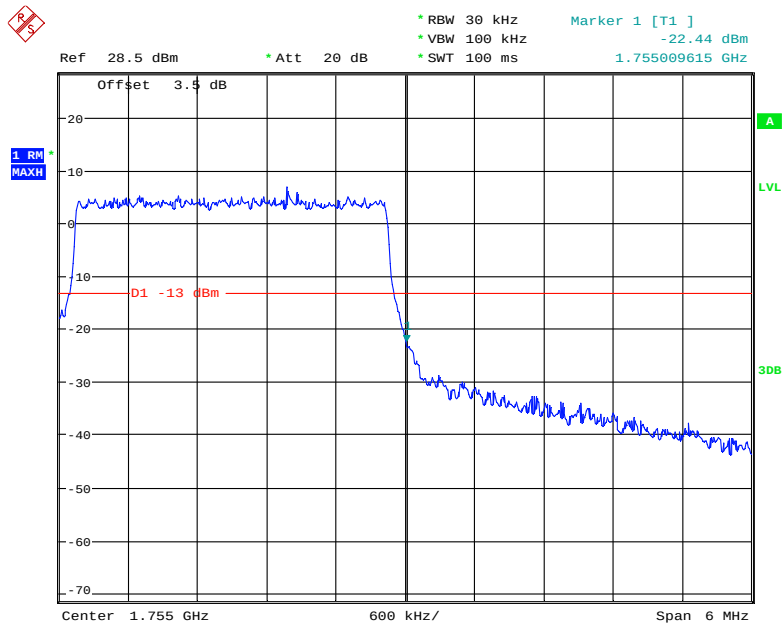
Date: 2.APR.2019 14:41:05

16-QAM (3.0 MHz, FULL RB) - Left Band Edge



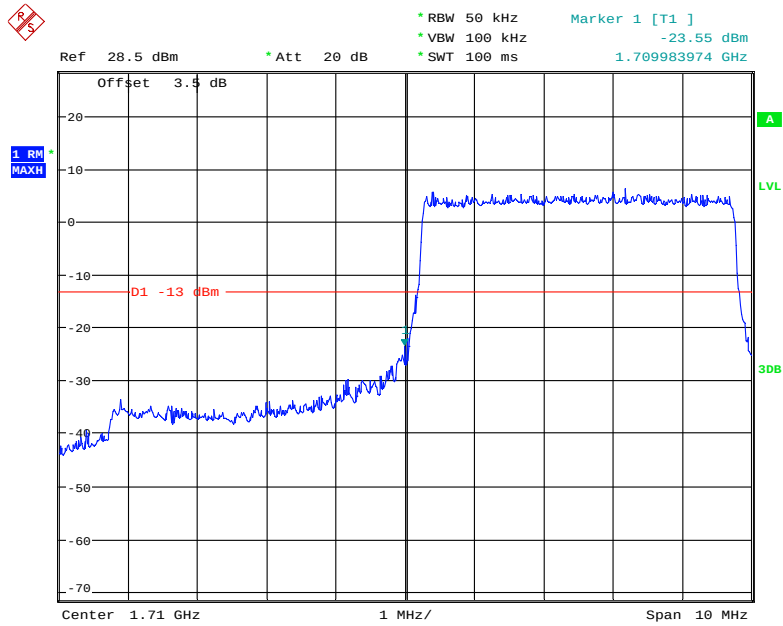
Date: 2.APR.2019 14:42:02

16-QAM (3.0 MHz, FULL RB) - Right Band Edge



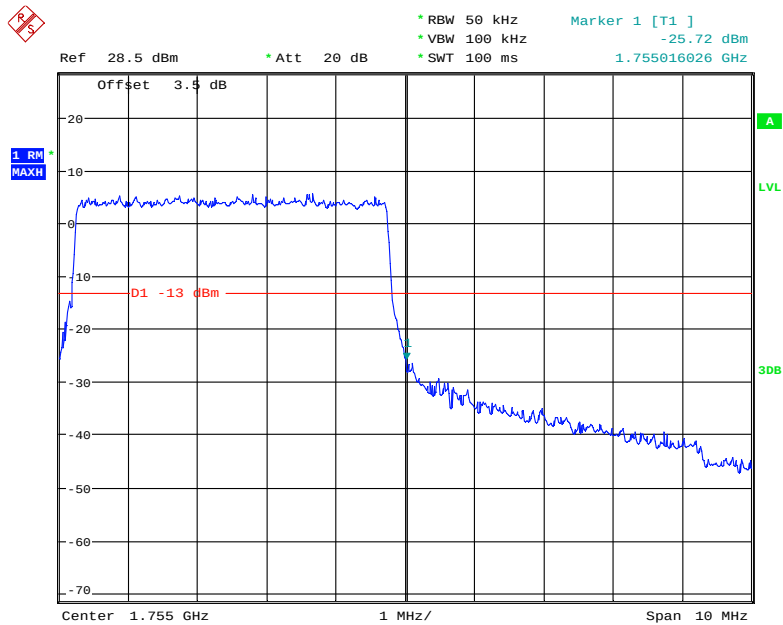
Date: 2.APR.2019 14:41:33

QPSK (5.0 MHz, FULL RB) - Left Band Edge



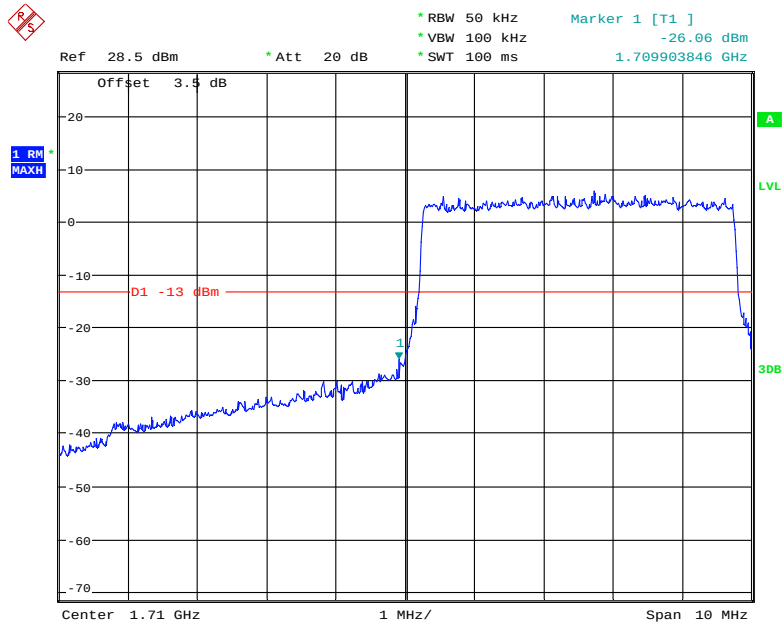
Date: 2.APR.2019 14:39:11

QPSK (5.0 MHz, FULL RB) - Right Band Edge



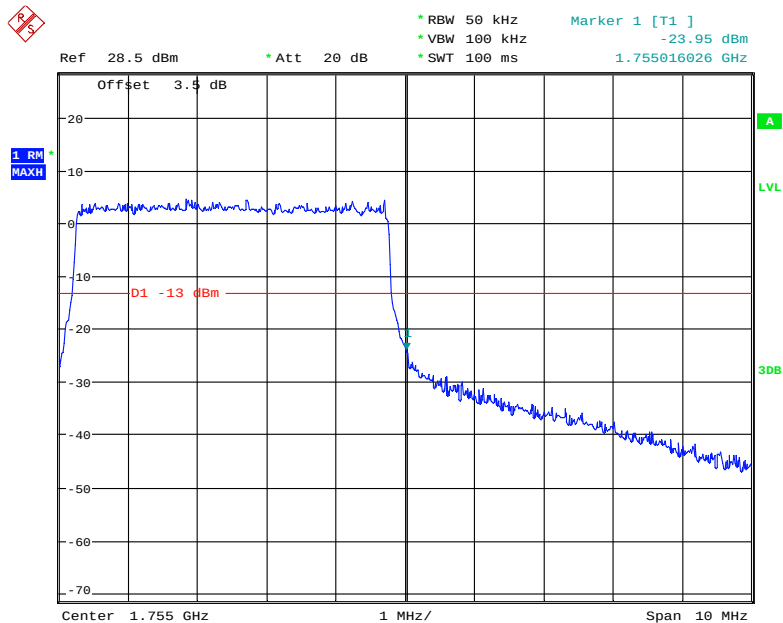
Date: 2.APR.2019 14:40:19

16-QAM (5.0 MHz, FULL RB) - Left Band Edge



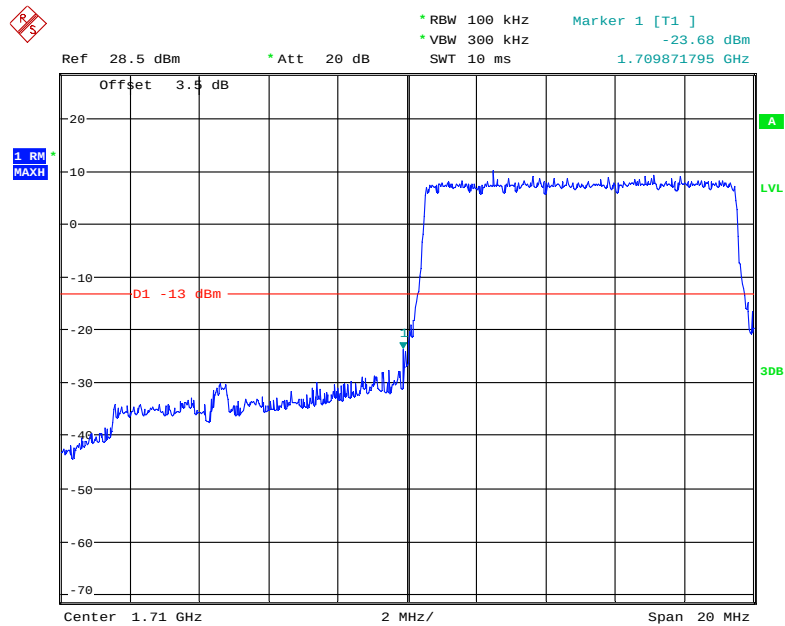
Date: 2.APR.2019 14:39:31

16-QAM (5.0 MHz, FULL RB) - Right Band Edge



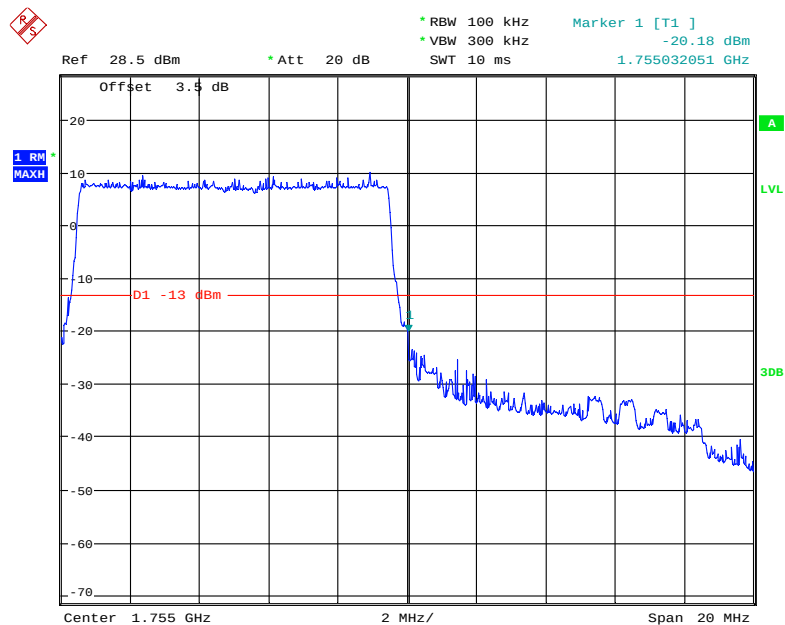
Date: 2.APR.2019 14:39:56

QPSK (10.0 MHz, FULL RB) - Left Band Edge



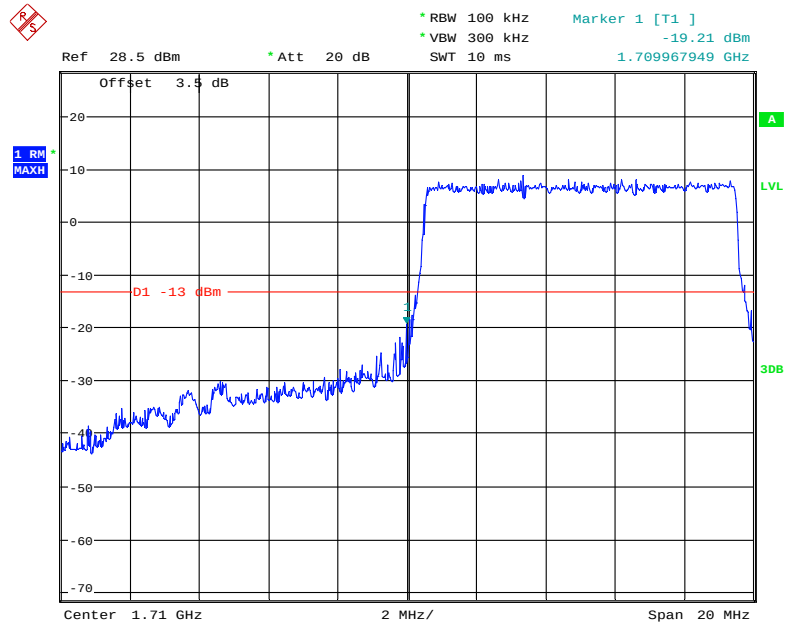
Date: 2.APR.2019 14:37:46

QPSK (10.0 MHz, FULL RB) - Right Band Edge



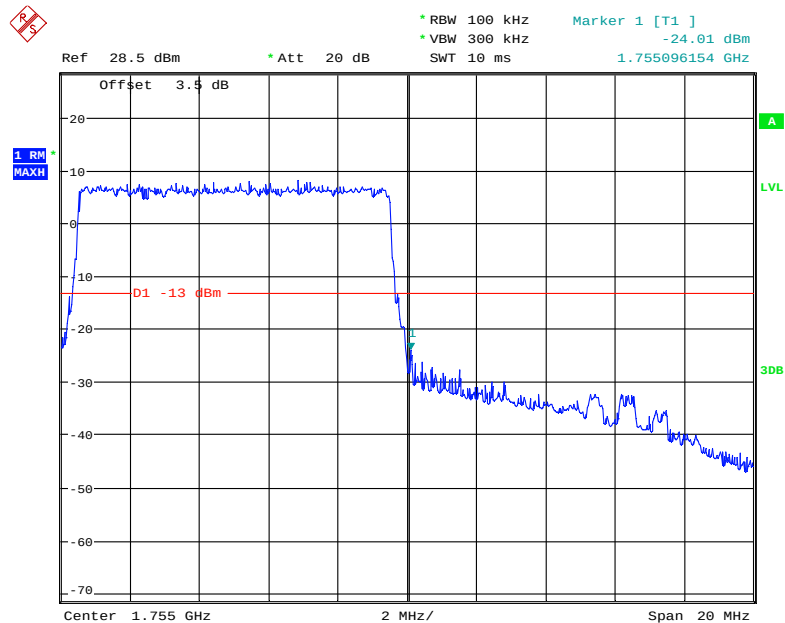
Date: 2.APR.2019 14:36:38

16-QAM (10.0 MHz, FULL RB) - Left Band Edge

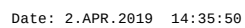
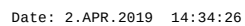


Date: 2.APR.2019 14:37:28

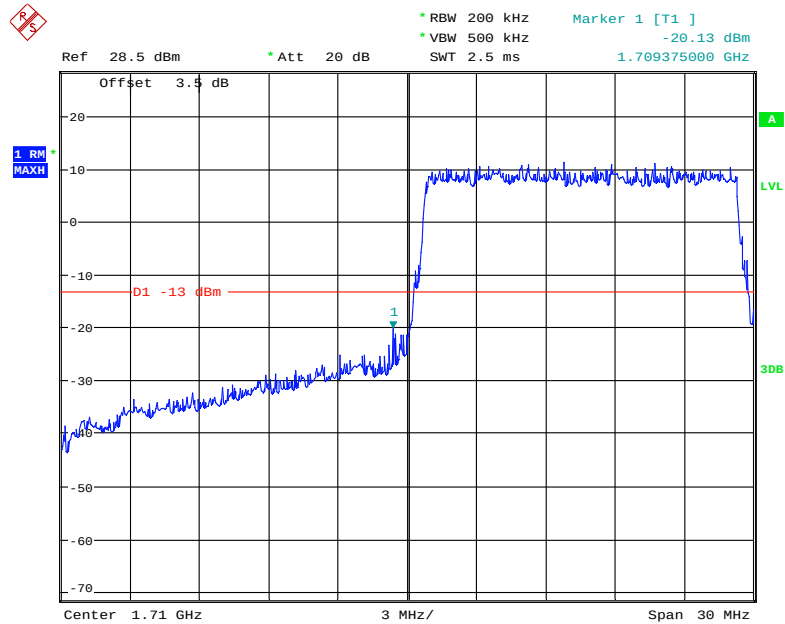
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2019 14:36:57

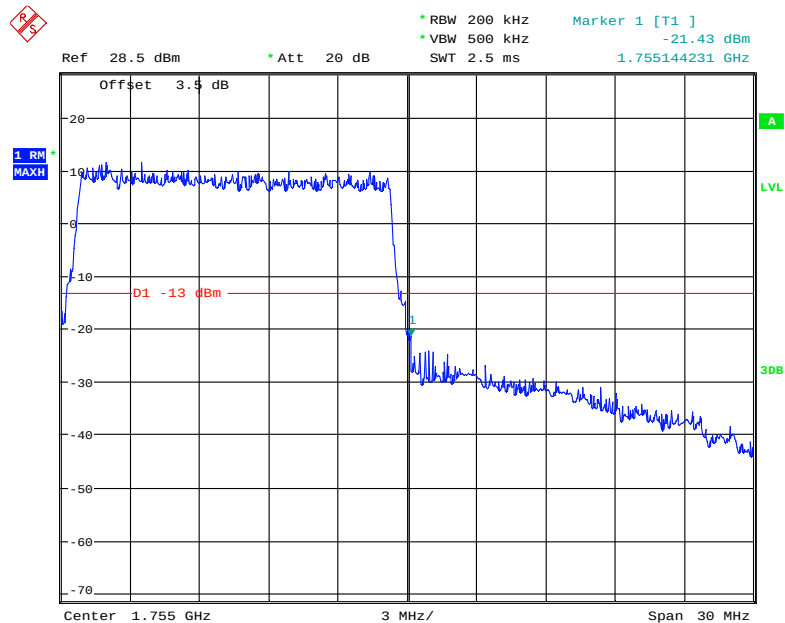


16-QAM (15.0 MHz, FULL RB) - Left Band Edge



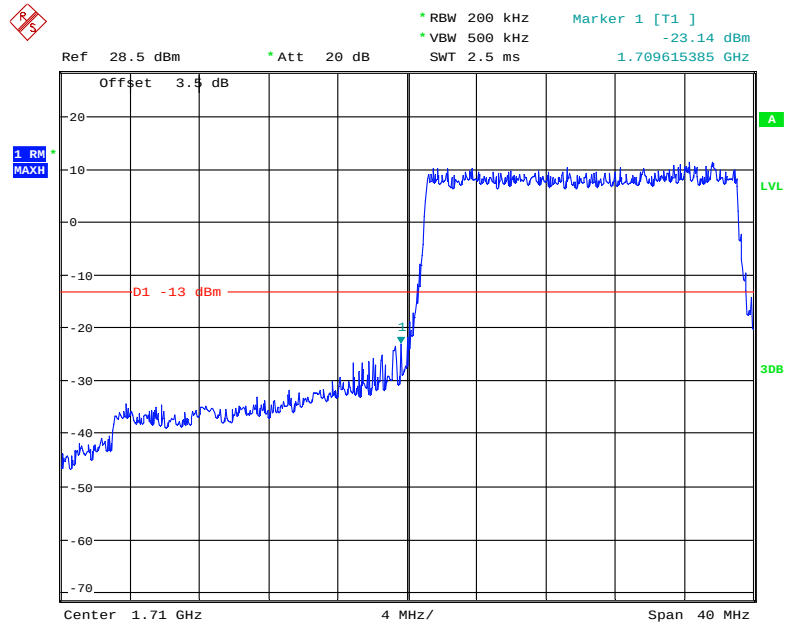
Date: 2.APR.2019 14:34:57

16-QAM (15.0 MHz, FULL RB) - Right Band Edge



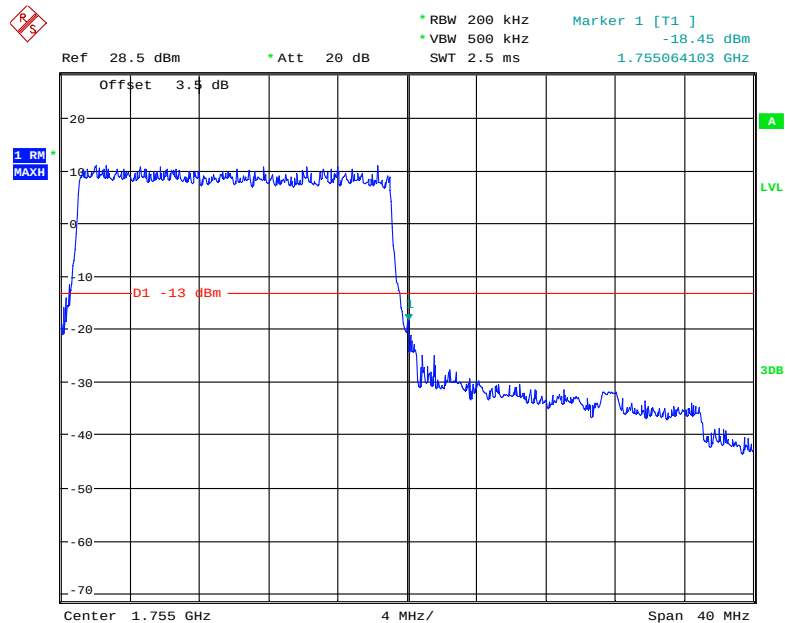
Date: 2.APR.2019 14:35:29

QPSK (20.0 MHz, FULL RB) - Left Band Edge



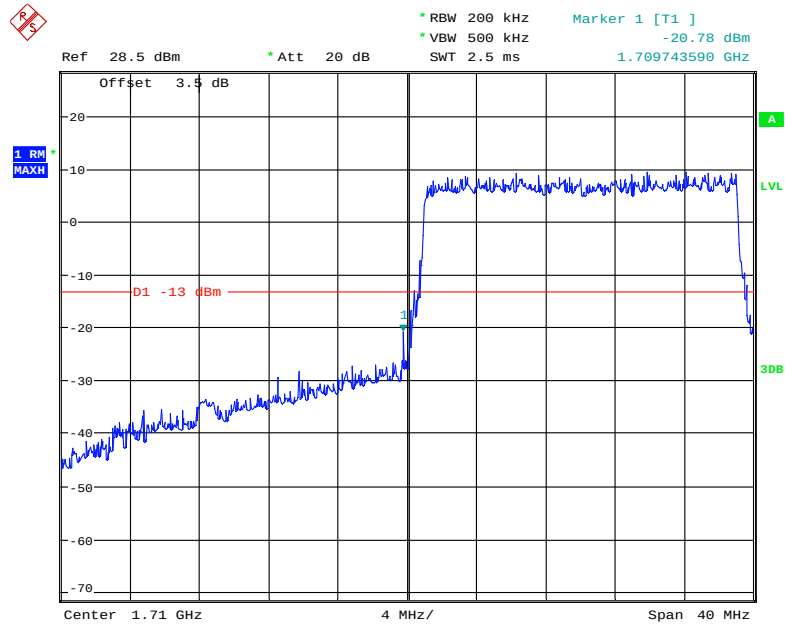
Date: 2.APR.2019 14:33:34

QPSK (20.0 MHz, FULL RB) - Right Band Edge



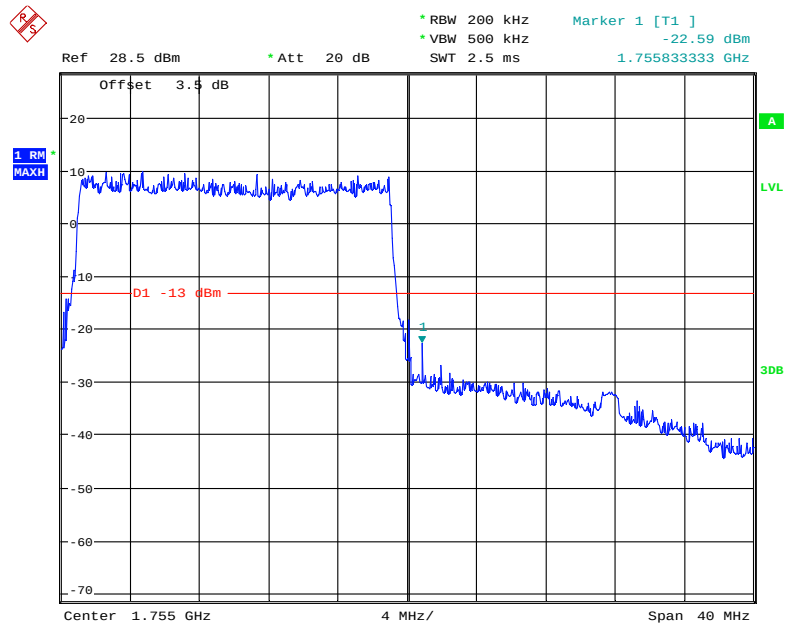
Date: 2.APR.2019 14:32:11

16-QAM (20.0 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2019 14:33:11

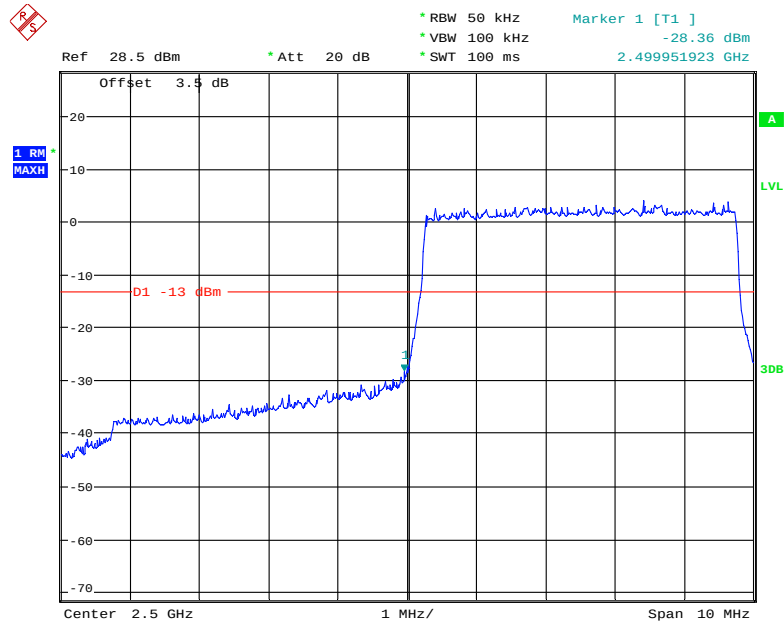
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2019 14:32:46

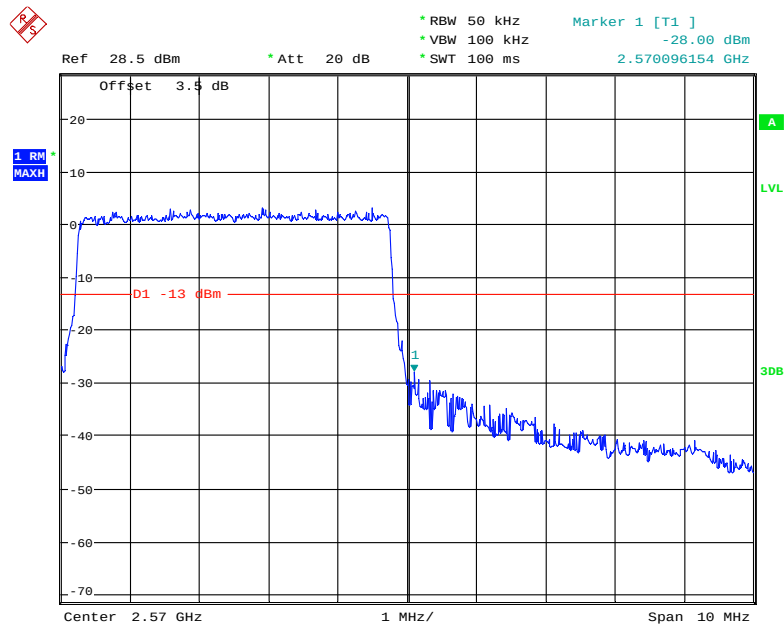
Band 7:

QPSK (5.0 MHz, FULL RB) - Left Band Edge



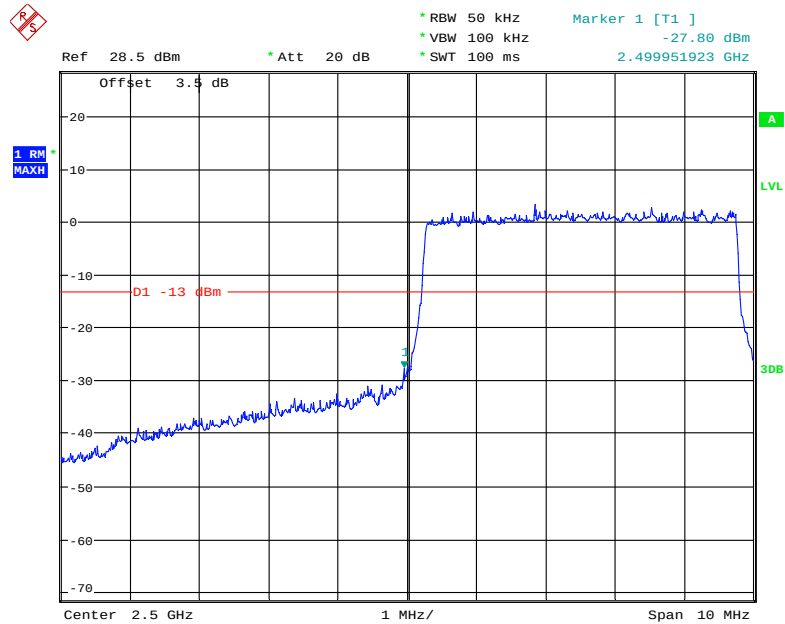
Date: 2.APR.2019 14:54:26

QPSK (5.0 MHz, FULL RB) - Right Band Edge



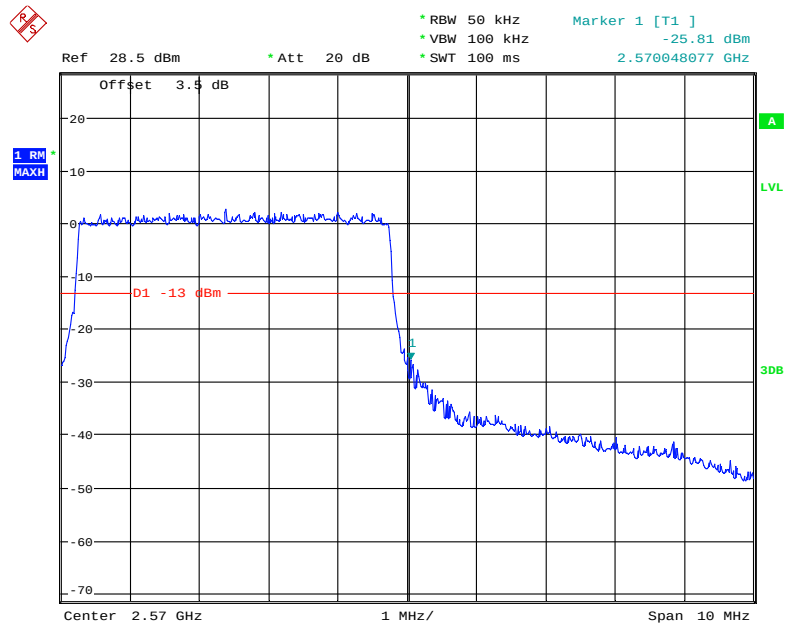
Date: 2.APR.2019 14:56:02

16-QAM (5.0 MHz, FULL RB) - Left Band Edge



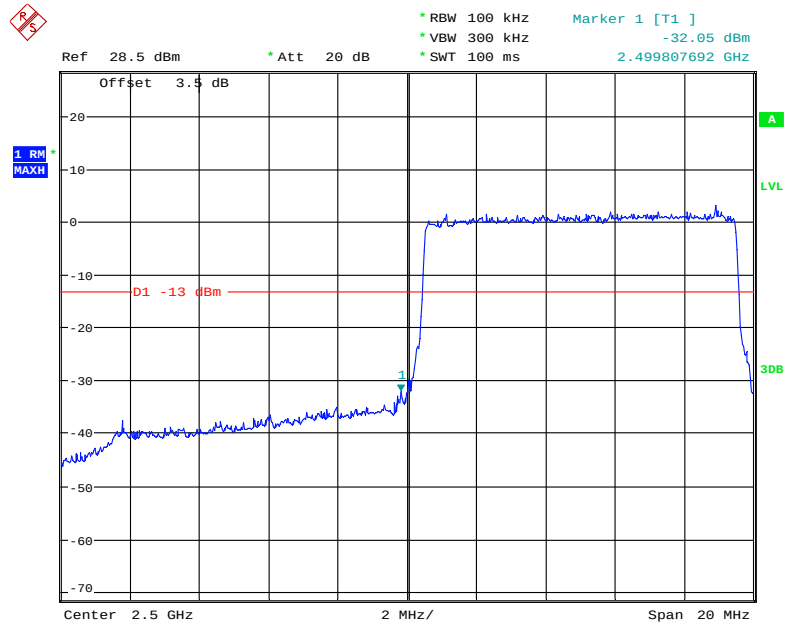
Date: 2.APR.2019 14:55:17

16-QAM (5.0 MHz, FULL RB) - Right Band Edge



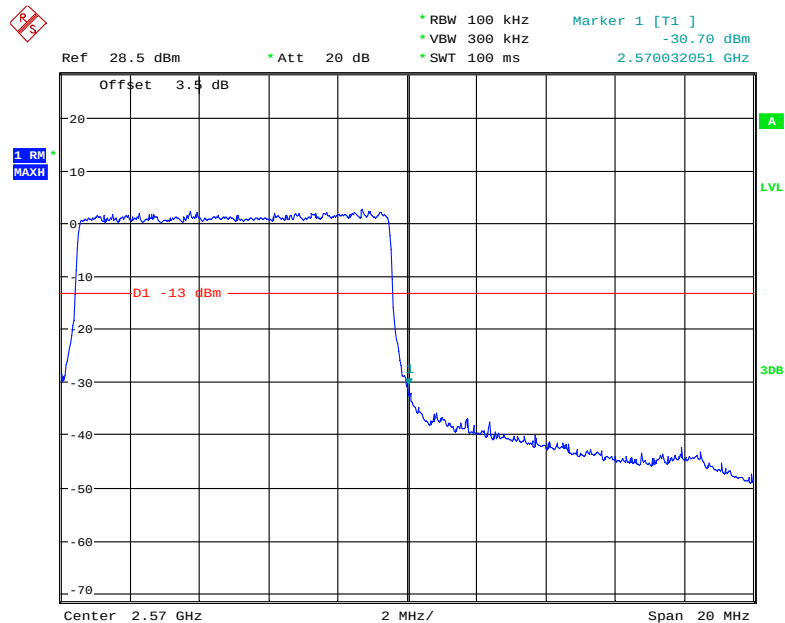
Date: 2.APR.2019 14:55:44

QPSK (10.0 MHz, FULL RB) - Left Band Edge



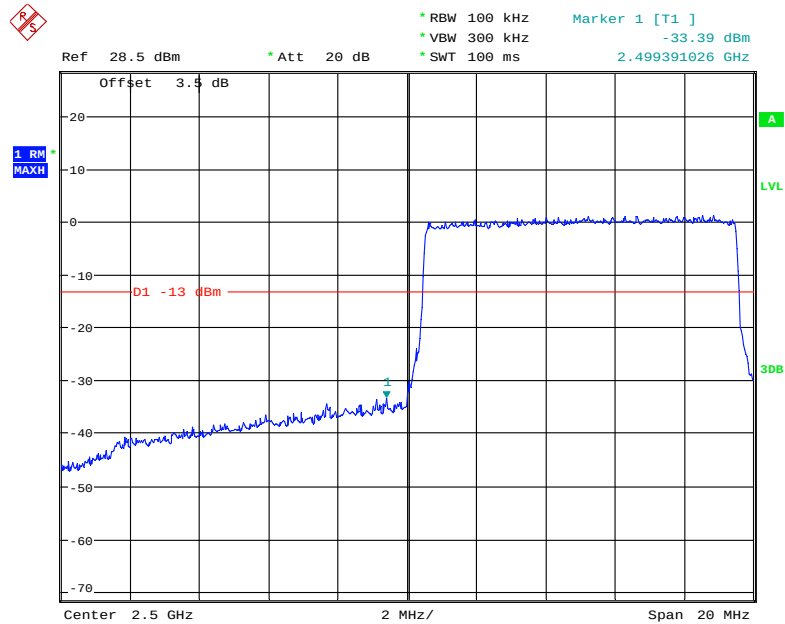
Date: 2.APR.2019 14:58:54

QPSK (10.0 MHz, FULL RB) - Right Band Edge



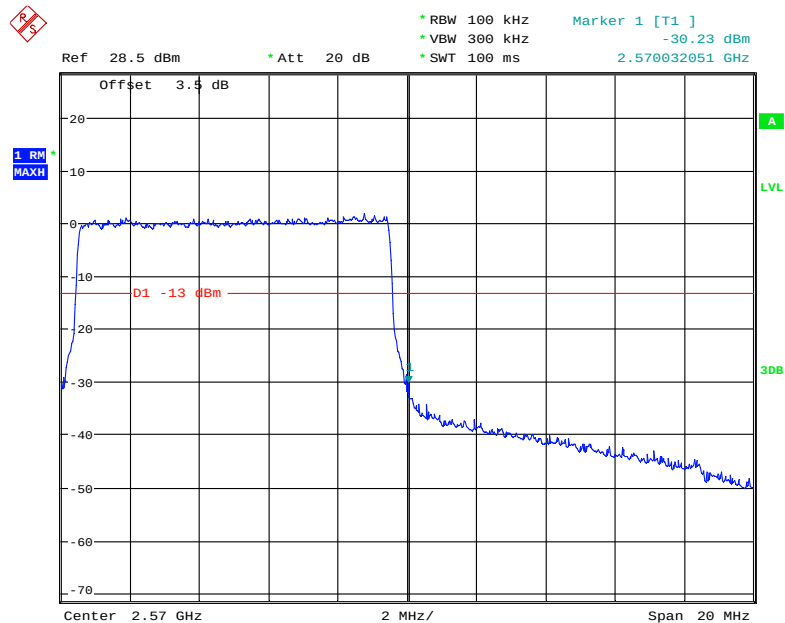
Date: 2.APR.2019 14:57:46

16-QAM (10.0 MHz, FULL RB) - Left Band Edge



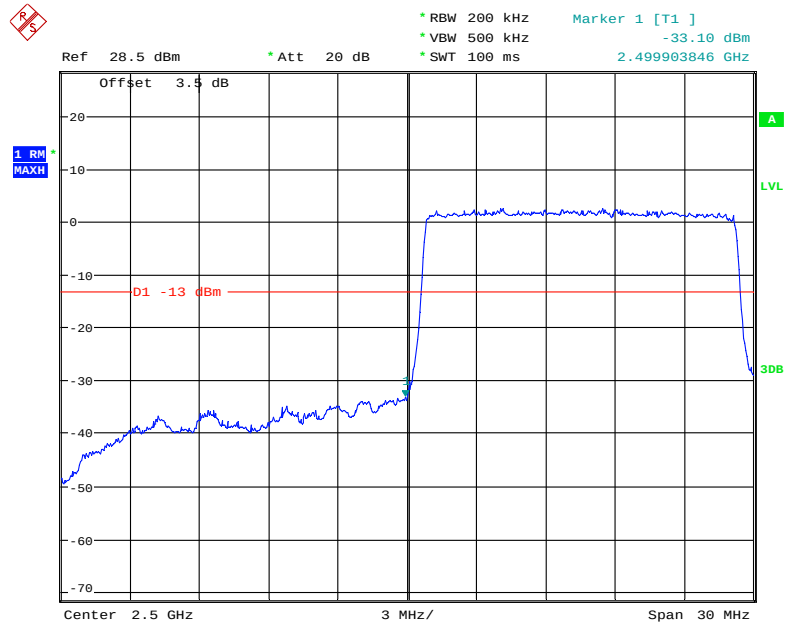
Date: 2.APR.2019 14:58:38

16-QAM (10.0 MHz, FULL RB) - Right Band Edge



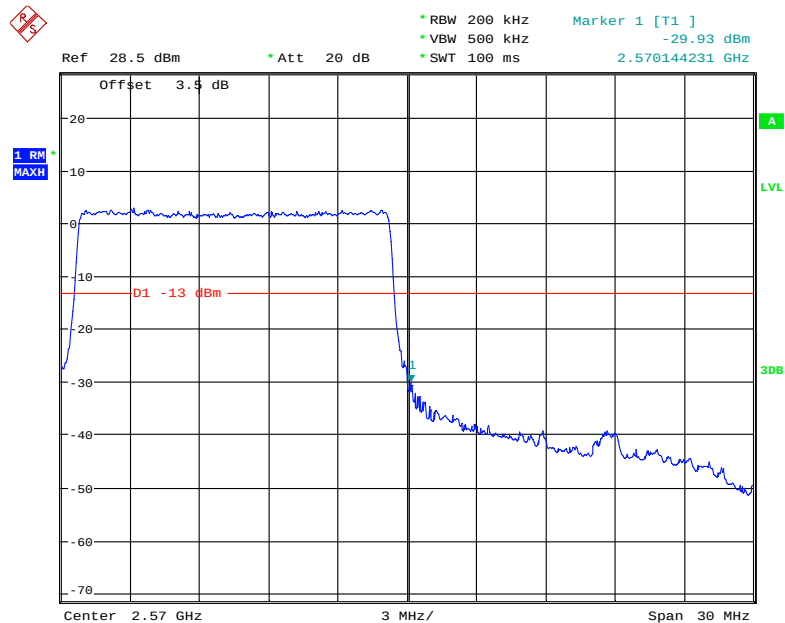
Date: 2.APR.2019 14:58:14

QPSK (15.0 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2019 14:59:35

QPSK (15.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2019 15:01:02

Ref 28.5 dBm * Att 20 dB

- * RBW 200 kHz
- * VBW 500 kHz
- * SWT 100 ms

Marker 1 [T1] -32.35 dBm
2.499951923 GHz

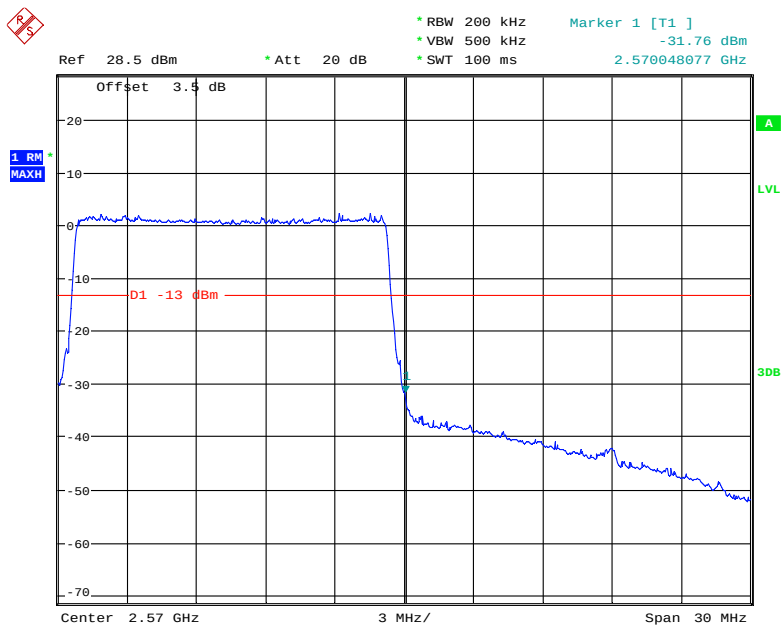
Offset 3.5 dB

1 RM MAXH

D1 -13 dBm

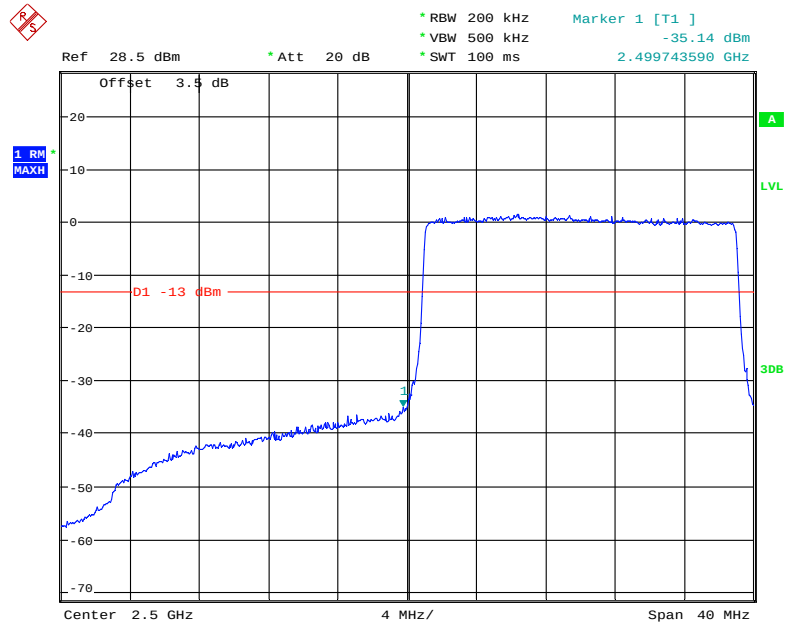
Center 2.5 GHz 3 MHz/ Span 30 MHz

16-QAM (15.0 MHz, FULL RB) - Right Band Edge



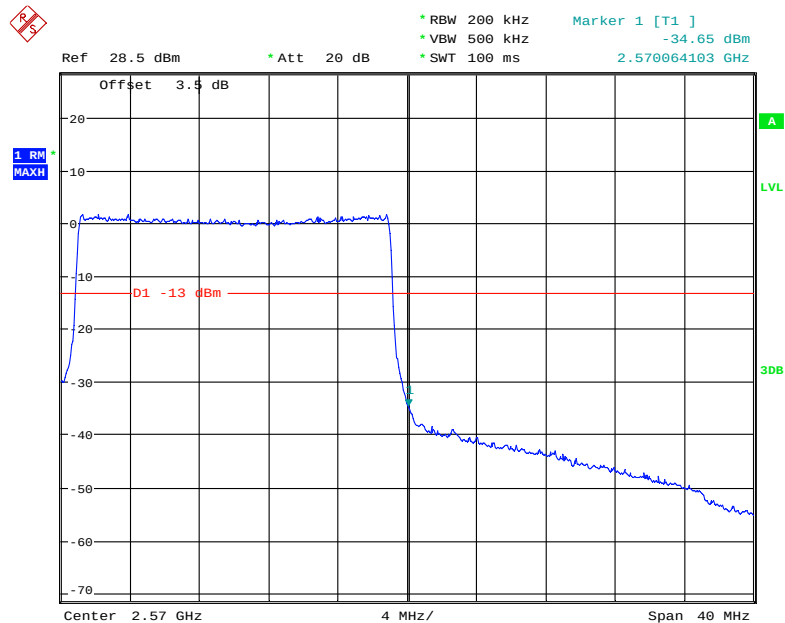
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QPSK (20.0 MHz, FULL RB) - Left Band Edge



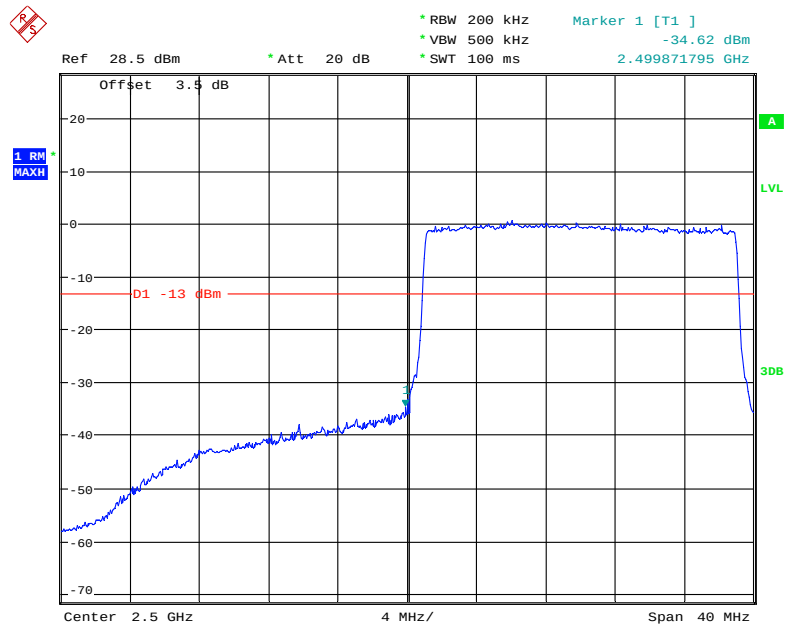
Date: 2.APR.2019 15:02:56

QPSK (20.0 MHz, FULL RB) - Right Band Edge



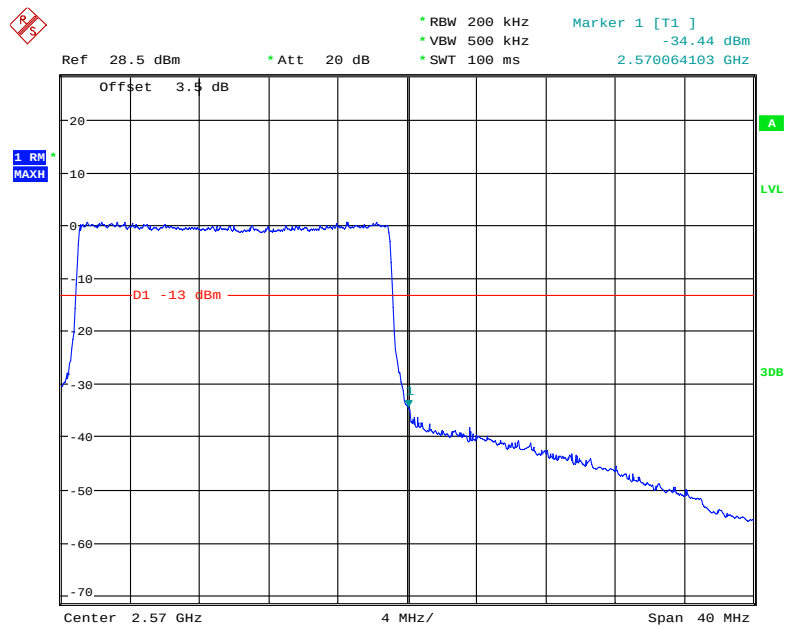
Date: 2.APR.2019 15:01:39

16-QAM (20.0 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2019 15:02:35

16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2019 15:02:11

FCC § 2.1055; § 22.355; § 24.235; §27.54 - FREQUENCY STABILITY**Applicable Standard**

FCC § 2.1055, §22.355, §24.235 and §27.54.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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

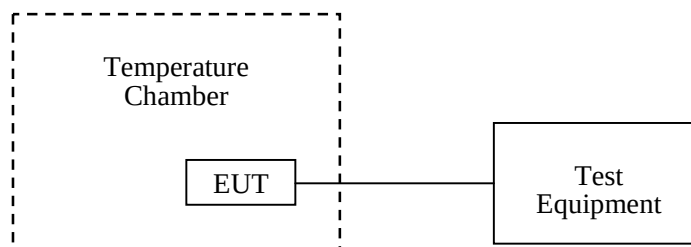
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Moon Tan on 2019-04-04.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

Cellular Band (Part 22H)**GSM Mode**

Middle Channel, $f_0 = 836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	2	0.002391	2.5
-20		-1	-0.001195	2.5
-10		1	0.001195	2.5
0		-2	-0.002391	2.5
10		-3	-0.003586	2.5
20		2	0.002391	2.5
30		1	0.001195	2.5
40		2	0.002391	2.5
50		-2	-0.002391	2.5
20	V min.= 3.6	1	0.001195	2.5
	V max.= 4.35	2	0.002391	2.5

EDGE Mode

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	5	0.005977	2.5
-20		3	0.003586	2.5
-10		4	0.004781	2.5
0		5	0.005977	2.5
10		9	0.010758	2.5
20		6	0.007172	2.5
30		5	0.005977	2.5
40		4	0.004781	2.5
50		8	0.009563	2.5
20	V min.= 3.6	8	0.009563	2.5
	V max.= 4.35	6	0.007172	2.5

WCDMA Mode

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-9	-0.010758	2.5
-20		3	0.003586	2.5
-10		-1	-0.001195	2.5
0		1	0.001195	2.5
10		0	0.000000	2.5
20		0	0.000000	2.5
30		-4	-0.004781	2.5
40		1	0.001195	2.5
50		5	0.005977	2.5
20	V min.= 3.6	1	0.001195	2.5
	V max.= 4.35	-6	-0.007172	2.5

PCS Band (Part 24E)**GSM Mode**

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	2	0.001064	pass
-20		4	0.002128	pass
-10		2	0.001064	pass
0		-4	-0.002128	pass
10		-3	-0.001596	pass
20		-3	-0.001596	pass
30		4	0.002128	pass
40		5	0.002660	pass
50		3	0.001596	pass
20	V min.= 3.6	2	0.001064	pass
	V max.= 4.35	-3	-0.001596	pass

EDGE Mode

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-1	-0.000532	pass
-20		3	0.001596	pass
-10		6	0.003191	pass
0		4	0.002128	pass
10		6	0.003191	pass
20		-2	-0.001064	pass
30		5	0.002660	pass
40		6	0.003191	pass
50		4	0.002128	pass
20	V min.= 3.6	2	0.001064	pass
	V max.= 4.35	-1	-0.000532	pass

WCDMA Mode

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	4	0.002128	pass
-20		10	0.005319	pass
-10		8	0.004255	pass
0		6	0.003191	pass
10		4	0.002128	pass
20		6	0.003191	pass
30		12	0.006383	pass
40		4	0.002128	pass
50		-1	-0.000532	pass
20	V min.= 3.6	8	0.004255	pass
	V max.= 4.35	1	0.000532	pass

AWS Band (Part 27)

Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8V	1710.0071	1754.9974	1710	1755
-20		1710.0032	1754.9977	1710	1755
-10		1710.0058	1754.9973	1710	1755
0		1710.0021	1754.9954	1710	1755
10		1710.0021	1754.9973	1710	1755
20		1710.0047	1754.9989	1710	1755
30		1710.0004	1754.9966	1710	1755
40		1710.0031	1754.9975	1710	1755
50		1710.0070	1754.9981	1710	1755
20	V min.= 3.6	1710.0045	1754.9960	1710	1755
	V max.= 4.35	1710.0015	1754.9981	1710	1755

LTE:
QPSK:

Band 2:

10.0 MHz Middle Channel, $f_o=1880\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-28	-0.014894	pass
-20		-37	-0.019681	pass
-10		-35	-0.018617	pass
0		-29	-0.015426	pass
10		-31	-0.016489	pass
20		-30	-0.015957	pass
30		-33	-0.017553	pass
40		-36	-0.019149	pass
50		-29	-0.015426	pass
20	V min.= 3.6	-35	-0.018617	pass
	V max.= 4.35	-34	-0.018085	pass

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1710.7751	1754.3405	1710	1755
-20		1710.8402	1754.6313	1710	1755
-10		1710.1577	1754.7048	1710	1755
0		1710.4831	1754.7895	1710	1755
10		1710.9362	1754.8967	1710	1755
20		1710.5769	1754.4231	1710	1755
30		1710.5797	1754.5920	1710	1755
40		1710.3629	1754.6547	1710	1755
50		1710.0922	1754.2919	1710	1755
20	V min.= 3.6	1710.5261	1754.8840	1710	1755
	V max.= 4.35	1710.1984	1754.8516	1710	1755

Band 7:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	2500.2583	2569.7691	2500	2570
-20		2500.2885	2569.6044	2500	2570
-10		2500.8200	2569.0409	2500	2570
0		2500.9069	2569.4329	2500	2570
10		2500.0244	2569.5713	2500	2570
20		2500.641	2569.4872	2500	2570
30		2500.0904	2569.1634	2500	2570
40		2500.9273	2569.0940	2500	2570
50		2500.8475	2569.8116	2500	2570
20	V min.= 3.6	2500.7234	2569.3894	2500	2570
	V max.= 4.35	2500.6665	2569.7858	2500	2570

16QAM:**Band 2:**

10.0 MHz Middle Channel, f ₀ =1880MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8V	-33	-0.017553	2.5
-20		-28	-0.014894	2.5
-10		-29	-0.015426	2.5
0		-31	-0.016489	2.5
10		-33	-0.017553	2.5
20		-32	-0.017021	2.5
30		-30	-0.015957	2.5
40		-31	-0.016489	2.5
50		-28	-0.014894	2.5
20	V min.= 3.6	-29	-0.015426	2.5
	V max.= 4.35	-30	-0.015957	2.5

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	1710.8468	1754.5896	1710	1755
-20		1710.7929	1754.0908	1710	1755
-10		1710.0858	1754.4460	1710	1755
0		1710.2158	1754.3348	1710	1755
10		1710.4314	1754.1026	1710	1755
20		1710.2723	1754.2544	1710	1755
30		1710.7359	1754.7654	1710	1755
40		1710.4665	1754.5334	1710	1755
50		1710.2850	1754.0127	1710	1755
20	V min.= 3.6	1710.9906	1754.8122	1710	1755
	V max.= 4.35	1710.4735	1754.2367	1710	1755

Band 7:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	3.8	2500.1394	2569.6310	2500	2570
-20		2500.3720	2569.0252	2500	2570
-10		2500.9733	2569.7716	2500	2570
0		2500.7080	2569.4396	2500	2570
10		2500.6339	2569.0663	2500	2570
20		2500.3002	2569.5110	2500	2570
30		2500.8264	2569.5685	2500	2570
40		2500.5310	2569.1030	2500	2570
50		2500.2217	2569.5924	2500	2570
20	V min.= 3.6	2500.2574	2569.5270	2500	2570
	V max.= 4.35	2500.0511	2569.9743	2500	2570

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