TESTING LABORATORY
CERTIFICATE # 4821.01

FCC PART 27

FCC PART 22H, PART 24E

TEST REPORT

For

SENWA MEXICO,S.A.DE C.V

CARRETERA MEXICO-TOLUCA No. 5324, INT. PLANTA BAJA COL. EL YAQUI, DELEGACION CUAJIMALPA DE MORELOS CIUDAD DE MEXICO, Mexico

FCC ID: 2AAA6-LS130PLUS

Report Type:	**Product Type:**
Original Report	Mobile Phone(Base Unit)

Report Number: RSZ181029004-00D

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Reviewed By: Rocky Kang
RF Engineer

Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen)
6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China
Tel: +86-755-33320018
Fax: +86-755-33320008
www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *SENWA MEXICO,S.A.DE C.V's* product, model number: *LS130PLUS (FCC ID: 2AAA6-LS130PLUS)* or the "EUT" in this report was a *Mobile Phone(Base Unit)*, which was measured approximately: 15.2 cm (L) × 7.2 cm (W) × 9.35 cm (H), rated with input voltage: DC 3.8V from battery or DC 5.0V from adapter.

Adapter Information:
Model: SENWAC1AM
Input: AC 100-240V, 50/60Hz, 0.25 A
Output: DC 5.0V, 1000mA

**All measurement and test data in this report was gathered from production sample serial number: 1810290040. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-10-29.*

Objective

This test report is prepared on behalf of *SENWA MEXICO,S.A.DE C.V* 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 submissions with FCC ID: 2AAA6-LS130PLUS and part of system FCC Part 15.247 DSS submissions with FCC ID: 2AAA6-LS130PLUS-BT.

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

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		±1.5dB
Unwanted Emission, conducted		±1.5dB
Emissions, radiated	Below 1GHz	±4.70dB
	Above 1GHz	±4.80dB
Temperature		±1℃
Supply voltages		±0.4%

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.

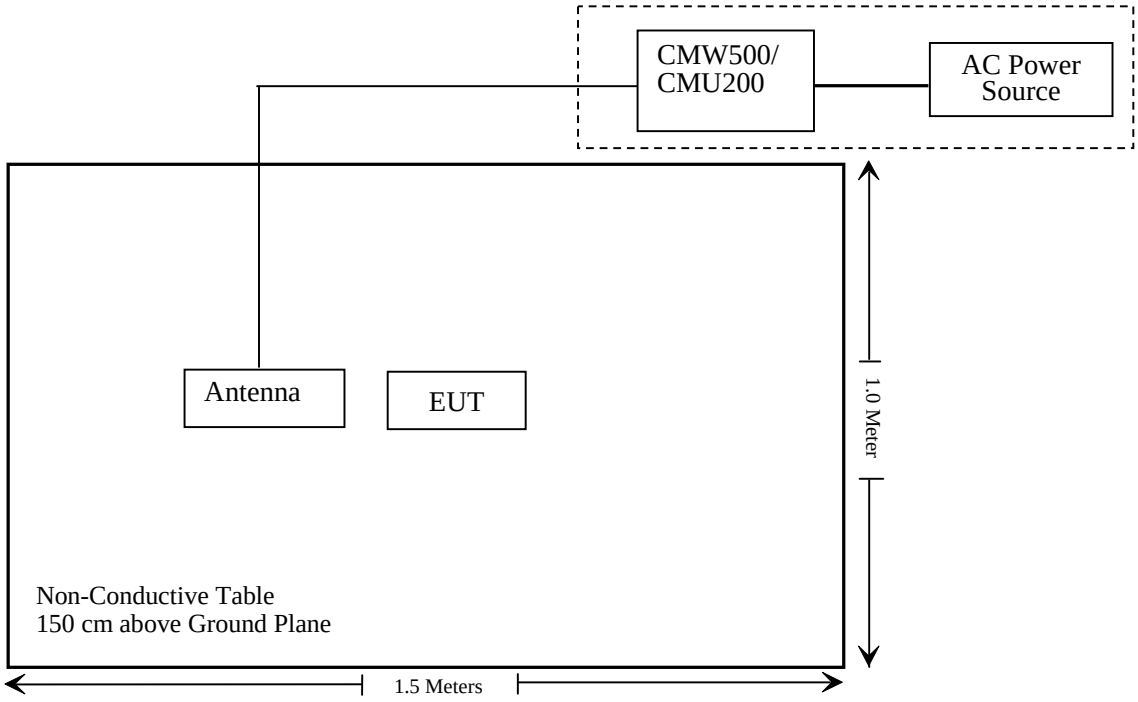
Equipment Modifications

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
§2.1091	Maximum Permissible Exposure(MPE)	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

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	FSEM	845987/005	2018-06-23	2019-06-23
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-05-22	2018-11-22
Sonoma instrument	Amplifier	310N	186238	2018-05-12	2018-11-12
Sonoma instrument	Amplifier	310N	186238	2018-11-12	2019-05-12
Anritsu	Signal Generator	68369B	004114	2017-12-24	2018-12-24
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
COM POWER	Dipole Antenna	AD-100	41000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-08-01	2019-02-01
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2018-11-21
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-22	2018-11-22
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	2018-08-01	2019-02-01

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2017-12-24	2018-12-24
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2017-12-21	2018-12-21
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2017-12-14	2018-12-14
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	
WEINSCHEL	10dB Attenuator	5324	AU 3842	Each Time	
Un-known	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 §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

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

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Operation mode	Frequency (MHz)	Antenna Gain		Max Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wifi	2412-2462	1.5	1.41	21.0	125.89	20	0.0353	1.0
BLE	2402-2480	1.5	1.41	0	1	20	0.0003	1.0
Bluetooth	2402-2480	1.5	1.41	8.0	6.31	20	0.0018	1.0
GSM	824-849	-1.09	0.78	32.5	1778.28	20	0.2761	0.55
PCS	1850-1910	0.38	1.09	29.5	891.25	20	0.1934	1.0
WCDMA B2	1850-1910	0.38	1.09	22.0	158.49	20	0.0344	1.0
WCDMA B5	824-849	-1.09	0.78	22.5	177.83	20	0.0276	0.55
LTE B2	1850-1910	0.38	1.09	23.5	223.87	20	0.0486	1.0
LTE B4	1710-1755	0.54	1.13	23.5	223.87	20	0.0504	1.0
LTE B5	824-849	-1.09	0.78	23.5	223.87	20	0.0348	0.55
LTE B7	2500-2570	1.20	1.32	23.0	199.53	20	0.0524	1.0
LTE B66	1710-1780	0.54	1.13	23.0	199.53	20	0.0449	1.0

Simultaneously consider:
The worst case is wifi and Bluetooth and GSM cellular band transmitting simultaneously:

The rate=0.0353/1.0+0.0018/1.0+0.2761/0.55=0.5392<1

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: compliance.

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.

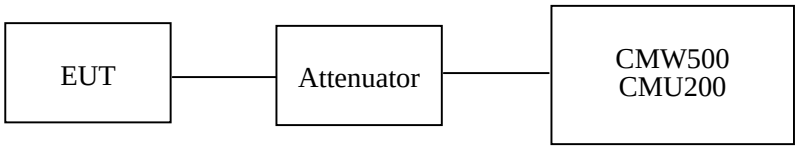
According to §27.50(d), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

According to §27.50(h), Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Kiki Kong on 2018-11-10.

Conducted Power

Cellular Band (Part 22H)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.24	38.45
	190	836.6	32.37	38.45
	251	848.8	32.40	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.21	30.07	28.34	26.14	38.45
	190	836.6	32.33	30.30	28.65	26.46	38.45
	251	848.8	32.40	30.41	28.75	26.63	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		21.98	22.06	22.07
		HSDPA	1	21.24	21.43	21.48
			2	21.17	21.38	21.43
			3	21.32	21.51	21.59
			4	21.17	21.36	21.35
		HSUPA	1	21.33	21.52	21.58
			2	21.30	21.40	21.51
			3	21.40	21.55	21.62
			4	21.21	21.40	21.51
			5	21.39	21.61	21.62

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	29.14	33
	661	1880.0	28.84	33
	810	1909.8	28.33	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.21	27.56	25.71	24.33	33
	661	1880.0	28.78	27.48	25.62	24.31	33
	810	1909.8	28.45	27.32	25.23	24.20	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		21.55	21.35	21.19
		HSDPA	1	20.42	20.46	20.35
			2	20.31	20.39	20.26
			3	20.46	20.53	20.44
			4	20.31	20.33	20.30
		HSUPA	1	20.51	20.47	20.45
			2	20.45	20.37	20.36
			3	20.61	20.51	20.53
			4	20.44	20.44	20.35
			5	20.60	20.54	20.51

Peak-to-average ratio (PAR)

Cellular Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.39	13
	Middle	1.42	13
	High	1.37	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.47	13
	Middle	3.31	13
	High	3.33	13
HSDPA (16QAM)	Low	3.51	13
	Middle	3.70	13
	High	3.39	13
HSUPA (BPSK)	Low	3.60	13
	Middle	3.36	13
	High	3.56	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.41	13
	Middle	1.47	13
	High	1.45	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	4.43	13
	Middle	4.62	13
	High	4.43	13
HSDPA (16QAM)	Low	4.46	13
	Middle	4.39	13
	High	4.57	13
HSUPA (BPSK)	Low	4.69	13
	Middle	4.33	13
	High	4.47	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 (dB)			
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	92.34	102	1.5	H	33.0	1.9	0.0	31.10	38.45	7.35
836.6	87.66	295	1.3	V	27.7	1.9	0.0	25.80	38.45	12.65
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	92.33	336	1.1	H	22.3	1.30	9.40	30.40	33	2.6
1880.00	91.00	16	1.2	V	20.7	1.30	9.40	28.80	33	4.2

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 (dB)			
ERP for WCDMA Band V (Part 22H), Middle Channel										
836.6	86.93	164	1.6	H	27.6	1.9	0.0	25.70	38.45	12.75
836.6	81.06	250	2.1	V	21.1	1.9	0.0	19.20	38.45	19.25
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	87.02	245	1.0	H	17.0	1.30	9.40	25.10	33.00	7.9
1880.00	86.40	242	1.8	V	16.1	1.30	9.40	24.20	33.00	8.8

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	22.48	22.43	22.39
		RB Size=1, RB Offset=2	21.74	21.73	21.62
		RB Size=1, RB Offset=5	21.94	21.92	21.88
		RB Size=3, RB Offset=0	22.52	22.51	22.40
		RB Size=3, RB Offset=1	22.52	22.47	22.37
		RB Size=3, RB Offset=2	21.81	21.76	21.68
		RB Size=6, RB Offset=0	22.91	22.88	22.76
	16QAM	RB Size=1, RB Offset=0	22.34	22.22	22.10
		RB Size=1, RB Offset=2	21.58	21.52	21.40
		RB Size=1, RB Offset=5	21.78	21.73	21.63
		RB Size=3, RB Offset=0	22.36	22.24	22.16
		RB Size=3, RB Offset=1	22.25	22.14	22.05
		RB Size=3, RB Offset=2	21.61	21.57	21.49
		RB Size=6, RB Offset=0	22.72	22.68	22.59
3.0	QPSK	RB Size=1, RB Offset=0	22.70	22.70	22.57
		RB Size=1, RB Offset=7	22.56	22.55	22.44
		RB Size=1, RB Offset=14	22.99	22.98	22.92
		RB Size=8, RB Offset=0	22.54	22.56	22.50
		RB Size=8, RB Offset=4	22.55	22.49	22.37
		RB Size=8, RB Offset=7	22.62	22.62	22.53
		RB Size=15, RB Offset=0	22.21	22.16	22.04
	16QAM	RB Size=1, RB Offset=0	22.54	22.49	22.44
		RB Size=1, RB Offset=7	22.34	22.25	22.14
		RB Size=1, RB Offset=14	22.88	22.82	22.78
		RB Size=8, RB Offset=0	22.47	22.40	22.29
		RB Size=8, RB Offset=4	22.25	22.16	22.07
		RB Size=8, RB Offset=7	22.46	22.43	22.33
		RB Size=15, RB Offset=0	21.94	21.83	21.77

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	22.26	22.4	22.15
		RB Size=1, RB Offset=12	22.21	22.35	22.05
		RB Size=1, RB Offset=24	22.37	22.47	22.24
		RB Size=12, RB Offset=0	21.87	22.06	21.82
		RB Size=12, RB Offset=6	21.80	22.02	21.69
		RB Size=12, RB Offset=11	21.98	22.19	21.92
		RB Size=25, RB Offset=0	21.45	21.79	21.54
	16QAM	RB Size=1, RB Offset=0	22.22	22.43	22.11
		RB Size=1, RB Offset=12	22.12	22.34	22.05
		RB Size=1, RB Offset=24	22.29	22.56	22.16
		RB Size=12, RB Offset=0	21.89	22.15	21.86
		RB Size=12, RB Offset=6	21.82	22.05	21.74
		RB Size=12, RB Offset=11	21.96	22.21	21.99
		RB Size=25, RB Offset=0	21.54	21.83	21.57
10.0	QPSK	RB Size=1, RB Offset=0	21.95	22.12	21.87
		RB Size=1, RB Offset=24	21.86	22.07	21.75
		RB Size=1, RB Offset=49	21.99	22.21	21.90
		RB Size=25, RB Offset=0	21.83	22.07	21.85
		RB Size=25, RB Offset=12	21.80	22.00	21.74
		RB Size=25, RB Offset=24	21.88	22.15	21.97
		RB Size=50, RB Offset=0	21.75	22.00	21.84
	16QAM	RB Size=1, RB Offset=0	21.92	22.08	21.84
		RB Size=1, RB Offset=24	21.83	22.03	21.71
		RB Size=1, RB Offset=49	21.97	22.19	21.89
		RB Size=25, RB Offset=0	21.72	21.95	21.71
		RB Size=25, RB Offset=12	21.64	21.84	21.65
		RB Size=25, RB Offset=24	21.85	22.06	21.78
		RB Size=50, RB Offset=0	21.45	21.86	21.57

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	21.43	21.73	21.37
		RB Size=1, RB Offset=37	21.35	21.65	21.26
		RB Size=1, RB Offset=74	21.55	21.78	21.47
		RB Size=36, RB Offset=0	21.42	21.68	21.48
		RB Size=36, RB Offset=18	21.34	21.60	21.41
		RB Size=36, RB Offset=37	21.51	21.80	21.54
		RB Size=75, RB Offset=0	21.42	21.65	21.34
	16QAM	RB Size=1, RB Offset=0	21.45	21.70	21.32
		RB Size=1, RB Offset=37	21.40	21.58	21.26
		RB Size=1, RB Offset=74	21.51	21.83	21.42
		RB Size=36, RB Offset=0	21.34	21.51	21.37
		RB Size=36, RB Offset=18	21.24	21.42	21.34
		RB Size=36, RB Offset=37	21.45	21.63	21.42
		RB Size=75, RB Offset=0	21.15	21.37	21.18
20.0	QPSK	RB Size=1, RB Offset=0	22.75	23.03	22.81
		RB Size=1, RB Offset=49	22.63	22.99	22.76
		RB Size=1, RB Offset=99	22.79	23.11	22.93
		RB Size=50, RB Offset=0	21.57	21.84	21.59
		RB Size=50, RB Offset=24	21.52	21.72	21.52
		RB Size=50, RB Offset=49	21.64	21.89	21.69
		RB Size=100, RB Offset=0	21.34	21.59	21.24
	16QAM	RB Size=1, RB Offset=0	22.74	23.02	22.72
		RB Size=1, RB Offset=49	22.71	22.94	22.63
		RB Size=1, RB Offset=99	22.86	23.12	22.76
		RB Size=50, RB Offset=0	22.26	22.51	22.17
		RB Size=50, RB Offset=24	22.22	22.39	22.14
		RB Size=50, RB Offset=49	22.29	22.63	22.26
		RB Size=100, RB Offset=0	21.54	21.83	21.45

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.95	13	Pass
QPSK (100RB Size)	7.66	13	Pass
16QAM (1RB Size)	7.75	13	Pass
16QAM (100RB Size)	7.38	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1880.00	80.17	39	1.7	H	10.1	1.30	9.40	18.20	33
1880.00	82.32	337	1.3	V	12.1	1.30	9.40	20.20	33
3 MHz Bandwidth									
1880.00	80.22	325	2.4	H	10.2	1.30	9.40	18.30	33
1880.00	82.36	301	1.6	V	12.1	1.30	9.40	20.20	33
5 MHz Bandwidth									
1880.00	79.94	4	1.7	H	9.9	1.30	9.40	18.00	33
1880.00	81.86	43	1.6	V	11.6	1.30	9.40	19.70	33
10 MHz Bandwidth									
1880.00	80.12	136	2.1	H	10.1	1.30	9.40	18.20	33
1880.00	82.54	31	1.2	V	12.3	1.30	9.40	20.40	33
12 MHz Bandwidth									
1880.00	79.64	158	1.5	H	9.6	1.30	9.40	17.70	33
1880.00	82.14	232	1.9	V	11.9	1.30	9.40	20.00	33
20 MHz Bandwidth									
1880.00	80.38	218	2.2	H	10.3	1.30	9.40	18.40	33
1880.00	82.98	5	1.7	V	12.7	1.30	9.40	20.80	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1880.00	79.11	138	2.4	H	9.1	1.30	9.40	17.20	33
1880.00	82.23	75	2.1	V	12.0	1.30	9.40	20.10	33
3 MHz Bandwidth									
1880.00	78.76	3	2.1	H	8.7	1.30	9.40	16.80	33
1880.00	81.66	155	1.6	V	11.4	1.30	9.40	19.50	33
5 MHz Bandwidth									
1880.00	78.89	243	2.4	H	8.8	1.30	9.40	16.90	33
1880.00	81.86	89	1.9	V	11.6	1.30	9.40	19.70	33
10 MHz Bandwidth									
1880.00	79.19	68	1.9	H	9.1	1.30	9.40	17.20	33
1880.00	82.13	90	2.0	V	11.9	1.30	9.40	20.00	33
15 MHz Bandwidth									
1880.00	79.58	117	1.2	H	9.5	1.30	9.40	17.60	33
1880.00	81.96	283	1.6	V	11.7	1.30	9.40	19.80	33
20 MHz Bandwidth									
1880.00	79.81	99	2.3	H	9.8	1.30	9.40	17.90	33
1880.00	82.53	342	1.4	V	12.3	1.30	9.40	20.40	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	22.38	22.32	22.25
		RB Size=1, RB Offset=2	22.29	22.24	22.15
		RB Size=1, RB Offset=5	21.99	21.93	21.85
		RB Size=3, RB Offset=0	22.59	22.53	22.46
		RB Size=3, RB Offset=1	22.71	22.66	22.58
		RB Size=3, RB Offset=2	21.87	21.87	21.83
		RB Size=6, RB Offset=0	22.53	22.49	22.39
	16QAM	RB Size=1, RB Offset=0	22.22	22.14	22.02
		RB Size=1, RB Offset=2	22.12	22.03	21.93
		RB Size=1, RB Offset=5	21.72	21.62	21.54
		RB Size=3, RB Offset=0	22.34	22.21	22.08
		RB Size=3, RB Offset=1	22.49	22.36	22.29
		RB Size=3, RB Offset=2	21.77	21.67	21.59
		RB Size=6, RB Offset=0	22.26	22.21	22.10
3.0	QPSK	RB Size=1, RB Offset=0	22.30	22.31	22.23
		RB Size=1, RB Offset=7	22.09	22.10	22.00
		RB Size=1, RB Offset=14	22.72	22.72	22.60
		RB Size=8, RB Offset=0	22.32	22.25	22.17
		RB Size=8, RB Offset=4	21.84	21.85	21.74
		RB Size=8, RB Offset=7	21.52	21.53	21.46
		RB Size=15, RB Offset=0	21.62	21.57	21.51
	16QAM	RB Size=1, RB Offset=0	22.38	22.32	22.43
		RB Size=1, RB Offset=7	22.93	22.25	22.56
		RB Size=1, RB Offset=14	22.89	22.11	22.73
		RB Size=8, RB Offset=0	22.91	21.84	22.61
		RB Size=8, RB Offset=4	22.78	21.94	22.62
		RB Size=8, RB Offset=7	22.51	22.21	23.02
		RB Size=15, RB Offset=0	22.49	22.31	22.86

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	22.21	22.32	22.36
		RB Size=1, RB Offset=12	22.30	21.99	22.49
		RB Size=1, RB Offset=24	22.56	22.26	22.46
		RB Size=12, RB Offset=0	22.77	21.84	22.62
		RB Size=12, RB Offset=6	22.49	21.97	22.75
		RB Size=12, RB Offset=11	22.67	21.91	23.08
		RB Size=25, RB Offset=0	22.60	21.86	22.80
	16QAM	RB Size=1, RB Offset=0	22.25	22.18	22.33
		RB Size=1, RB Offset=12	22.55	21.95	22.68
		RB Size=1, RB Offset=24	22.79	21.72	22.33
		RB Size=12, RB Offset=0	22.45	22.17	22.46
		RB Size=12, RB Offset=6	22.28	21.95	22.69
		RB Size=12, RB Offset=11	22.36	22.05	22.72
		RB Size=25, RB Offset=0	22.77	21.72	22.50
10.0	QPSK	RB Size=1, RB Offset=0	22.15	22.13	22.28
		RB Size=1, RB Offset=24	22.52	21.87	22.76
		RB Size=1, RB Offset=49	22.38	21.86	22.49
		RB Size=25, RB Offset=0	22.31	21.94	22.58
		RB Size=25, RB Offset=12	22.23	21.83	22.46
		RB Size=25, RB Offset=24	22.63	22.10	22.87
		RB Size=50, RB Offset=0	22.38	21.78	22.77
	16QAM	RB Size=1, RB Offset=0	22.24	22.17	22.24
		RB Size=1, RB Offset=24	21.93	21.98	21.92
		RB Size=1, RB Offset=49	21.92	22.01	21.90
		RB Size=25, RB Offset=0	21.89	21.82	22.03
		RB Size=25, RB Offset=12	22.09	21.75	21.93
		RB Size=25, RB Offset=24	21.90	22.05	21.62
		RB Size=50, RB Offset=0	21.83	21.71	21.78

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	22.11	22.13	22.21
		RB Size=1, RB Offset=37	21.78	21.84	22.13
		RB Size=1, RB Offset=74	21.86	21.77	21.89
		RB Size=36, RB Offset=0	21.84	21.76	22.17
		RB Size=36, RB Offset=18	21.71	21.82	21.94
		RB Size=36, RB Offset=37	21.78	21.69	21.85
		RB Size=75, RB Offset=0	22.06	21.82	22.07
	16QAM	RB Size=1, RB Offset=0	21.89	22.05	22.13
		RB Size=1, RB Offset=37	21.41	21.71	21.68
		RB Size=1, RB Offset=74	21.50	21.57	21.92
		RB Size=36, RB Offset=0	21.73	22.00	22.09
		RB Size=36, RB Offset=18	21.73	21.57	21.71
		RB Size=36, RB Offset=37	21.60	21.62	21.23
		RB Size=75, RB Offset=0	21.71	21.82	21.78
20.0	QPSK	RB Size=1, RB Offset=0	21.85	21.85	22.07
		RB Size=1, RB Offset=49	21.42	21.81	21.92
		RB Size=1, RB Offset=99	21.69	21.73	21.86
		RB Size=50, RB Offset=0	21.43	21.77	21.70
		RB Size=50, RB Offset=24	21.38	21.39	21.94
		RB Size=50, RB Offset=49	21.56	21.35	21.93
		RB Size=100, RB Offset=0	21.70	21.44	21.60
	16QAM	RB Size=1, RB Offset=0	21.89	21.93	22.01
		RB Size=1, RB Offset=49	21.84	21.87	21.63
		RB Size=1, RB Offset=99	21.63	21.59	21.79
		RB Size=50, RB Offset=0	21.84	21.46	21.86
		RB Size=50, RB Offset=24	21.80	21.68	21.55
		RB Size=50, RB Offset=49	21.56	21.47	21.23
		RB Size=100, RB Offset=0	21.80	21.63	21.97

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.73	13	Pass
QPSK (100RB Size)	6.84	13	Pass
16QAM (1RB Size)	7.30	13	Pass
16QAM (100RB Size)	7.32	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	79.88	31	2.1	H	6.7	1.30	8.90	14.30	30
1732.50	85.19	341	1.7	V	12.6	1.30	8.90	20.20	30
3 MHz Bandwidth									
1732.50	79.97	10	1.9	H	6.8	1.30	8.90	14.40	30
1732.50	86.21	249	1.4	V	13.6	1.30	8.90	21.20	30
5 MHz Bandwidth									
1732.50	80.11	357	1.7	H	6.9	1.30	8.90	14.50	30
1732.50	86.76	225	2.1	V	14.2	1.30	8.90	21.80	30
10 MHz Bandwidth									
1732.50	79.84	105	2.3	H	6.7	1.30	8.90	14.30	30
1732.50	86.96	360	1.6	V	14.4	1.30	8.90	22.00	30
15 MHz Bandwidth									
1732.50	79.63	146	1.2	H	6.5	1.30	8.90	14.10	30
1732.50	87.26	92	1.2	V	14.7	1.30	8.90	22.30	30
20 MHz Bandwidth									
1732.50	80.14	297	2.5	H	7.0	1.30	8.90	14.60	30
1732.50	87.47	310	1.1	V	14.9	1.30	8.90	22.50	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	79.26	324	1.2	H	6.1	1.30	8.90	13.70	30
1732.50	86.19	309	1.8	V	13.6	1.30	8.90	21.20	30
3 MHz Bandwidth									
1732.50	79.62	246	1.3	H	6.5	1.30	8.90	14.10	30
1732.50	86.52	334	1.1	V	14.0	1.30	8.90	21.60	30
5 MHz Bandwidth									
1732.50	79.13	166	1.4	H	6.0	1.30	8.90	13.60	30
1732.50	86.33	173	1.8	V	13.8	1.30	8.90	21.40	30
10 MHz Bandwidth									
1732.50	78.66	313	1.7	H	5.5	1.30	8.90	13.10	30
1732.50	86.43	85	2.4	V	13.9	1.30	8.90	21.50	30
15 MHz Bandwidth									
1732.50	79.49	284	1.5	H	6.3	1.30	8.90	13.90	30
1732.50	86.96	262	1.3	V	14.4	1.30	8.90	22.00	30
20 MHz Bandwidth									
1732.50	79.86	173	1.8	H	6.7	1.30	8.90	14.30	30
1732.50	87.21	171	1.9	V	14.6	1.30	8.90	22.20	30

LTE Band 5:

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	22.05	22.22	22.07
		RB Size=1, RB Offset=2	21.98	22.13	21.99
		RB Size=1, RB Offset=5	22.11	22.31	22.12
		RB Size=3, RB Offset=0	22.78	23.02	22.81
		RB Size=3, RB Offset=1	22.74	22.98	22.72
		RB Size=3, RB Offset=2	22.89	23.09	22.88
		RB Size=6, RB Offset=0	20.78	21.00	20.74
	16QAM	RB Size=1, RB Offset=0	22.09	22.26	22.03
		RB Size=1, RB Offset=2	22.05	22.14	21.90
		RB Size=1, RB Offset=5	22.19	22.33	22.06
		RB Size=3, RB Offset=0	21.56	21.84	21.61
		RB Size=3, RB Offset=1	21.50	21.73	21.55
		RB Size=3, RB Offset=2	21.64	21.94	21.71
		RB Size=6, RB Offset=0	21.26	21.54	21.28
3.0	QPSK	RB Size=1, RB Offset=0	22.07	22.3	22.08
		RB Size=1, RB Offset=7	21.94	22.18	22.00
		RB Size=1, RB Offset=14	22.15	22.42	22.18
		RB Size=8, RB Offset=0	21.67	21.91	21.64
		RB Size=8, RB Offset=4	21.56	21.80	21.59
		RB Size=8, RB Offset=7	21.76	21.99	21.73
		RB Size=15, RB Offset=0	21.32	21.60	21.24
	16QAM	RB Size=1, RB Offset=0	22.01	22.28	22.03
		RB Size=1, RB Offset=7	21.91	22.16	21.93
		RB Size=1, RB Offset=14	22.13	22.33	22.12
		RB Size=8, RB Offset=0	21.64	21.97	21.69
		RB Size=8, RB Offset=4	21.55	21.85	21.62
		RB Size=8, RB Offset=7	21.71	22.05	21.80
		RB Size=15, RB Offset=0	21.35	21.62	21.42

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	22.15	22.36	22.16
		RB Size=1, RB Offset=12	22.03	22.26	22.07
		RB Size=1, RB Offset=24	22.27	22.43	22.26
		RB Size=12, RB Offset=0	21.67	21.95	21.62
		RB Size=12, RB Offset=6	21.62	21.82	21.51
		RB Size=12, RB Offset=11	21.73	22.00	21.67
		RB Size=25, RB Offset=0	21.32	21.66	21.27
	16QAM	RB Size=1, RB Offset=0	22.26	22.4	22.21
		RB Size=1, RB Offset=12	22.19	22.33	22.12
		RB Size=1, RB Offset=24	22.36	22.46	22.31
		RB Size=12, RB Offset=0	21.63	21.92	21.66
		RB Size=12, RB Offset=6	21.57	21.87	21.55
		RB Size=12, RB Offset=11	21.75	21.96	21.76
		RB Size=25, RB Offset=0	21.32	21.64	21.27
10.0	QPSK	RB Size=1, RB Offset=0	22.12	22.37	22.15
		RB Size=1, RB Offset=24	22.00	22.29	22.04
		RB Size=1, RB Offset=49	22.23	22.50	22.26
		RB Size=25, RB Offset=0	21.71	21.95	21.73
		RB Size=25, RB Offset=12	21.59	21.84	21.63
		RB Size=25, RB Offset=24	21.82	22.03	21.83
		RB Size=50, RB Offset=0	21.25	21.64	21.34
	16QAM	RB Size=1, RB Offset=0	22.15	22.31	22.17
		RB Size=1, RB Offset=24	22.06	22.19	22.12
		RB Size=1, RB Offset=49	22.19	22.39	22.25
		RB Size=25, RB Offset=0	21.61	21.94	21.63
		RB Size=25, RB Offset=12	21.49	21.82	21.54
		RB Size=25, RB Offset=24	21.70	22.02	21.75
		RB Size=50, RB Offset=0	21.24	21.56	21.34

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.73	13	Pass
QPSK (50RB Size)	7.14	13	Pass
16QAM (1RB Size)	7.08	13	Pass
16QAM (50RB Size)	7.82	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
836.5	83.18	153	2.4	H	23.8	1.9	0.0	21.90	38.45
836.5	84.61	202	2.3	V	24.6	1.9	0.0	22.70	38.45
3 MHz Bandwidth									
836.5	83.49	238	2.3	H	24.1	1.9	0.0	22.20	38.45
836.5	84.22	343	2.3	V	24.2	1.9	0.0	22.30	38.45
5 MHz Bandwidth									
836.5	83.57	293	1.6	H	24.2	1.9	0.0	22.30	38.45
836.5	84.19	164	2.3	V	24.2	1.9	0.0	22.30	38.45
10 MHz Bandwidth									
836.5	83.16	0	1.2	H	23.8	1.9	0.0	21.90	38.45
836.5	84.14	351	1.9	V	24.1	1.9	0.0	22.20	38.45

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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
836.5	82.64	182	2.0	H	23.3	1.9	0.0	21.40	38.45
836.5	83.77	272	1.2	V	23.8	1.9	0.0	21.90	38.45
3 MHz Bandwidth									
836.5	83.29	100	1.1	H	23.9	1.9	0.0	22.00	38.45
836.5	84.27	178	1.0	V	24.3	1.9	0.0	22.40	38.45
5 MHz Bandwidth									
836.5	83.49	224	1.5	H	24.1	1.9	0.0	22.20	38.45
836.5	84.54	254	2.0	V	24.5	1.9	0.0	22.60	38.45
10 MHz Bandwidth									
836.5	83.28	133	1.7	H	23.9	1.9	0.0	22.00	38.45
836.5	84.65	241	2.3	V	24.7	1.9	0.0	22.80	38.45

LTE Band 7:

Maximum Output Power

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	22.29	22.22	22.11
		RB Size=1, RB Offset=12	21.35	21.33	21.25
		RB Size=1, RB Offset=24	21.39	21.37	21.26
		RB Size=12, RB Offset=0	22.51	22.48	22.43
		RB Size=12, RB Offset=6	22.36	22.32	22.29
		RB Size=12, RB Offset=11	22.12	22.14	22.01
		RB Size=25, RB Offset=0	22.72	22.73	22.60
	16QAM	RB Size=1, RB Offset=0	22.02	21.96	21.86
		RB Size=1, RB Offset=12	21.14	21.04	20.97
		RB Size=1, RB Offset=24	21.19	21.14	21.04
		RB Size=12, RB Offset=0	22.38	22.27	22.15
		RB Size=12, RB Offset=6	22.17	22.04	21.98
		RB Size=12, RB Offset=11	21.96	21.89	21.84
		RB Size=25, RB Offset=0	22.53	22.47	22.35
10.0	QPSK	RB Size=1, RB Offset=0	22.54	22.48	22.39
		RB Size=1, RB Offset=24	22.13	22.10	22.05
		RB Size=1, RB Offset=49	22.93	22.95	22.90
		RB Size=25, RB Offset=0	22.44	22.40	22.34
		RB Size=25, RB Offset=12	22.41	22.36	22.28
		RB Size=25, RB Offset=24	21.81	21.80	21.75
		RB Size=50, RB Offset=0	22.57	22.55	22.46
	16QAM	RB Size=1, RB Offset=0	22.29	22.17	22.08
		RB Size=1, RB Offset=24	21.94	21.86	21.78
		RB Size=1, RB Offset=49	22.82	22.76	22.70
		RB Size=25, RB Offset=0	22.24	22.11	22.01
		RB Size=25, RB Offset=12	22.15	22.07	22.01
		RB Size=25, RB Offset=24	21.63	21.52	21.47
		RB Size=50, RB Offset=0	22.41	22.33	22.23

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	21.76	21.74	21.61
		RB Size=1, RB Offset=37	21.41	21.38	21.32
		RB Size=1, RB Offset=74	21.26	21.27	21.20
		RB Size=36, RB Offset=0	22.02	21.98	21.92
		RB Size=36, RB Offset=18	22.16	22.10	22.02
		RB Size=36, RB Offset=37	21.61	21.57	21.54
		RB Size=75, RB Offset=0	22.14	22.13	22.05
	16QAM	RB Size=1, RB Offset=0	21.52	21.45	21.33
		RB Size=1, RB Offset=37	21.27	21.18	21.10
		RB Size=1, RB Offset=74	21.11	21.05	21.00
		RB Size=36, RB Offset=0	21.87	21.81	21.77
		RB Size=36, RB Offset=18	21.92	21.86	21.82
		RB Size=36, RB Offset=37	21.49	21.42	21.31
		RB Size=75, RB Offset=0	21.94	21.90	21.86
20.0	QPSK	RB Size=1, RB Offset=0	22.13	22.13	22.05
		RB Size=1, RB Offset=49	22.07	22.07	21.97
		RB Size=1, RB Offset=99	22.40	22.34	22.26
		RB Size=50, RB Offset=0	21.76	21.78	21.68
		RB Size=50, RB Offset=24	21.47	21.42	21.33
		RB Size=50, RB Offset=49	21.26	21.23	21.16
		RB Size=100, RB Offset=0	21.28	21.26	21.15
	16QAM	RB Size=1, RB Offset=0	22.00	21.97	21.92
		RB Size=1, RB Offset=49	21.88	21.83	21.78
		RB Size=1, RB Offset=99	22.15	22.06	21.99
		RB Size=50, RB Offset=0	21.64	21.54	21.45
		RB Size=50, RB Offset=24	21.25	21.16	21.04
		RB Size=50, RB Offset=49	21.13	21.06	21.02
		RB Size=100, RB Offset=0	21.04	20.97	20.93

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.76	13	Pass
QPSK (100RB Size)	6.17	13	Pass
16QAM (1RB Size)	7.15	13	Pass
16QAM (100RB Size)	7.89	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 (dB)		
Middle Channel									
5 MHz Bandwidth									
2535.00	77.69	1	1.5	H	8.8	2.60	10.20	16.40	33
2535.00	84.62	228	2.3	V	15.1	2.60	10.20	22.70	33
10 MHz Bandwidth									
2535.00	77.73	250	1.8	H	8.9	2.60	10.20	16.50	33
2535.00	84.56	138	2.4	V	15.1	2.60	10.20	22.70	33
15 MHz Bandwidth									
2535.00	77.43	144	1.3	H	8.6	2.60	10.20	16.20	33
2535.00	84.29	123	1.7	V	14.8	2.60	10.20	22.40	33
20 MHz Bandwidth									
2535.00	77.98	220	1.1	H	9.1	2.60	10.20	16.70	33
2535.00	84.91	78	2.1	V	15.4	2.60	10.20	23.00	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 (dB)		
Middle Channel									
5 MHz Bandwidth									
2535.00	77.43	248	1.2	H	8.6	2.60	10.20	16.20	33
2535.00	84.12	210	1.6	V	14.6	2.60	10.20	22.20	33
10 MHz Bandwidth									
2535.00	77.52	9	1.8	H	8.6	2.60	10.20	16.20	33
2535.00	84.31	78	1.2	V	14.8	2.60	10.20	22.40	33
15 MHz Bandwidth									
2535.00	77.49	43	2.1	H	8.6	2.60	10.20	16.20	33
2535.00	84.36	62	1.1	V	14.9	2.60	10.20	22.50	33
20 MHz Bandwidth									
2535.00	77.73	277	1.3	H	8.9	2.60	10.20	16.50	33
2535.00	84.52	345	1.5	V	15.0	2.60	10.20	22.60	33

LTE Band 66:

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	22.36	22.36	22.28
		RB Size=1, RB Offset=2	22.24	22.17	22.09
		RB Size=1, RB Offset=5	22.00	22.02	21.98
		RB Size=3, RB Offset=0	22.56	22.57	22.50
		RB Size=3, RB Offset=1	22.44	22.42	22.30
		RB Size=3, RB Offset=2	22.32	22.30	22.20
		RB Size=6, RB Offset=0	22.75	22.71	22.60
	16QAM	RB Size=1, RB Offset=0	22.25	22.20	22.14
		RB Size=1, RB Offset=2	21.99	21.95	21.88
		RB Size=1, RB Offset=5	21.91	21.87	21.80
		RB Size=3, RB Offset=0	22.38	22.34	22.24
		RB Size=3, RB Offset=1	22.26	22.20	22.16
		RB Size=3, RB Offset=2	22.13	22.02	21.94
		RB Size=6, RB Offset=0	22.53	22.41	22.30
3	QPSK	RB Size=1, RB Offset=0	22.75	22.78	22.73
		RB Size=1, RB Offset=7	22.12	22.11	22.08
		RB Size=1, RB Offset=14	22.91	22.88	22.79
		RB Size=8, RB Offset=0	22.44	22.42	22.35
		RB Size=8, RB Offset=4	22.41	22.41	22.30
		RB Size=8, RB Offset=7	21.89	21.86	21.73
		RB Size=15, RB Offset=0	21.94	21.93	21.87
	16QAM	RB Size=1, RB Offset=0	22.62	22.56	22.50
		RB Size=1, RB Offset=7	22.04	22.01	21.94
		RB Size=1, RB Offset=14	22.75	22.71	22.64
		RB Size=8, RB Offset=0	22.30	22.27	22.17
		RB Size=8, RB Offset=4	22.25	22.17	22.09
		RB Size=8, RB Offset=7	21.60	21.56	21.52
		RB Size=15, RB Offset=0	21.84	21.80	21.73

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5	QPSK	RB Size=1, RB Offset=0	22.18	22.19	22.07
		RB Size=1, RB Offset=12	21.21	21.14	21.10
		RB Size=1, RB Offset=24	21.59	21.60	21.54
		RB Size=12, RB Offset=0	22.55	22.49	22.44
		RB Size=12, RB Offset=6	22.54	22.52	22.45
		RB Size=12, RB Offset=11	22.16	22.10	22.04
		RB Size=25, RB Offset=0	22.40	22.34	22.28
	16QAM	RB Size=1, RB Offset=0	21.97	21.86	21.76
		RB Size=1, RB Offset=12	20.97	20.94	20.91
		RB Size=1, RB Offset=24	21.44	21.34	21.26
		RB Size=12, RB Offset=0	22.40	22.34	22.28
		RB Size=12, RB Offset=6	22.37	22.29	22.21
		RB Size=12, RB Offset=11	21.96	21.84	21.72
		RB Size=25, RB Offset=0	20.75	20.73	20.79
10	QPSK	RB Size=1, RB Offset=0	22.42	22.38	22.32
		RB Size=1, RB Offset=24	22.26	22.29	22.18
		RB Size=1, RB Offset=49	21.92	21.87	21.75
		RB Size=25, RB Offset=0	22.62	22.60	22.50
		RB Size=25, RB Offset=12	22.52	22.53	22.42
		RB Size=25, RB Offset=24	22.09	22.08	21.96
		RB Size=50, RB Offset=0	22.68	22.68	22.56
	16QAM	RB Size=1, RB Offset=0	21.70	21.66	21.66
		RB Size=1, RB Offset=24	21.63	21.55	21.67
		RB Size=1, RB Offset=49	21.44	21.42	21.72
		RB Size=25, RB Offset=0	22.64	20.69	20.78
		RB Size=25, RB Offset=12	22.55	20.51	20.57
		RB Size=25, RB Offset=24	22.63	20.30	20.36
		RB Size=50, RB Offset=0	20.51	20.52	20.56

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15	QPSK	RB Size=1, RB Offset=0	22.15	22.07	22.39
		RB Size=1, RB Offset=37	22.05	21.95	22.24
		RB Size=1, RB Offset=74	22.06	22.04	22.26
		RB Size=36, RB Offset=0	22.03	22.04	22.04
		RB Size=36, RB Offset=18	22.10	21.99	21.93
		RB Size=36, RB Offset=37	22.12	21.69	21.63
		RB Size=75, RB Offset=0	21.91	21.94	22.04
	16QAM	RB Size=1, RB Offset=0	22.19	22.14	22.04
		RB Size=1, RB Offset=37	22.05	21.98	21.89
		RB Size=1, RB Offset=74	21.64	21.54	21.46
		RB Size=36, RB Offset=0	22.38	22.27	22.21
		RB Size=36, RB Offset=18	22.33	22.27	22.17
		RB Size=36, RB Offset=37	21.91	21.85	21.76
		RB Size=75, RB Offset=0	22.53	22.50	22.41
20	QPSK	RB Size=1, RB Offset=0	22.49	22.50	22.43
		RB Size=1, RB Offset=49	22.56	22.53	22.44
		RB Size=1, RB Offset=99	22.70	22.64	22.54
		RB Size=50, RB Offset=0	22.53	22.49	22.44
		RB Size=50, RB Offset=24	22.27	22.29	22.22
		RB Size=50, RB Offset=49	21.93	21.88	21.80
		RB Size=100, RB Offset=0	21.89	21.85	21.73
	16QAM	RB Size=1, RB Offset=0	22.32	22.20	22.17
		RB Size=1, RB Offset=49	22.40	22.35	22.29
		RB Size=1, RB Offset=99	22.42	22.35	22.29
		RB Size=50, RB Offset=0	22.36	22.33	22.27
		RB Size=50, RB Offset=24	22.10	21.98	21.94
		RB Size=50, RB Offset=49	21.76	21.67	21.55
		RB Size=100, RB Offset=0	21.68	21.65	21.59

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.66	13	Pass
QPSK (100RB Size)	6.44	13	Pass
16QAM (1RB Size)	7.10	13	Pass
16QAM (100RB Size)	7.25	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1745.00	82.43	273	1.8	H	9.9	1.30	8.90	17.50	30
1745.00	88.86	90	2.5	V	15.7	1.30	8.90	23.30	30
3 MHz Bandwidth									
1745.00	82.86	109	1.4	H	10.3	1.30	8.90	17.90	30
1745.00	88.94	31	1.5	V	15.8	1.30	8.90	23.40	30
5 MHz Bandwidth									
1745.00	82.65	327	2.4	H	10.1	1.30	8.90	17.70	30
1745.00	88.79	230	2.2	V	15.6	1.30	8.90	23.20	30
10 MHz Bandwidth									
1745.00	82.66	173	2.2	H	10.1	1.30	8.90	17.70	30
1745.00	89.09	23	1.6	V	15.9	1.30	8.90	23.50	30
15 MHz Bandwidth									
1745.00	82.84	189	1.7	H	10.3	1.30	8.90	17.90	30
1745.00	88.73	249	1.7	V	15.6	1.30	8.90	23.20	30
20 MHz Bandwidth									
1745.00	83.04	43	2.1	H	10.5	1.30	8.90	18.10	30
1745.00	89.44	286	1.1	V	16.3	1.30	8.90	23.90	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 (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1745.00	82.55	147	2.2	H	10.0	1.30	8.90	17.60	30
1745.00	88.72	1	1.4	V	15.6	1.30	8.90	23.20	30
3 MHz Bandwidth									
1745.00	82.37	117	2.0	H	9.8	1.30	8.90	17.40	30
1745.00	87.54	305	1.3	V	14.4	1.30	8.90	22.00	30
5 MHz Bandwidth									
1745.00	82.32	123	1.2	H	9.8	1.30	8.90	17.40	30
1745.00	88.61	121	2.2	V	15.4	1.30	8.90	23.00	30
10 MHz Bandwidth									
1745.00	82.27	102	2.4	H	9.7	1.30	8.90	17.30	30
1745.00	88.46	267	2.5	V	15.3	1.30	8.90	22.90	30
15 MHz Bandwidth									
1745.00	82.62	179	2.5	H	10.1	1.30	8.90	17.70	30
1745.00	88.67	151	1.8	V	15.5	1.30	8.90	23.10	30
20 MHz Bandwidth									
1745.00	82.98	148	2.4	H	10.4	1.30	8.90	18.00	30
1745.00	89.26	290	1.2	V	16.1	1.30	8.90	23.70	30

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

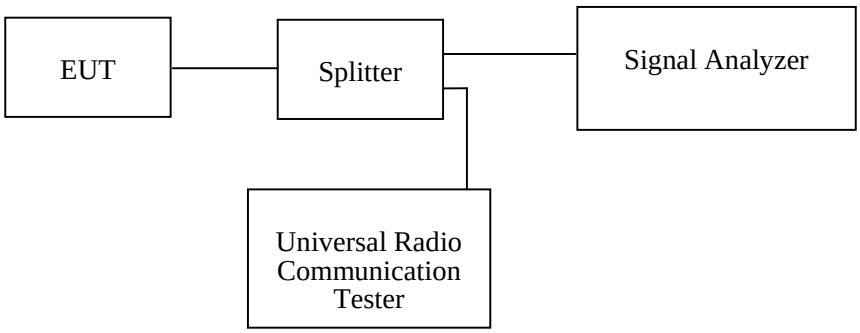
Applicable Standard

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 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Kiki Kong from 2018-11-06 to 2018-11-10.

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	248.40	317.31

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.160	4.679
HSUPA (BPSK)	836.6	4.160	4.696
HSDPA (16QAM)	836.6	4.160	4.679

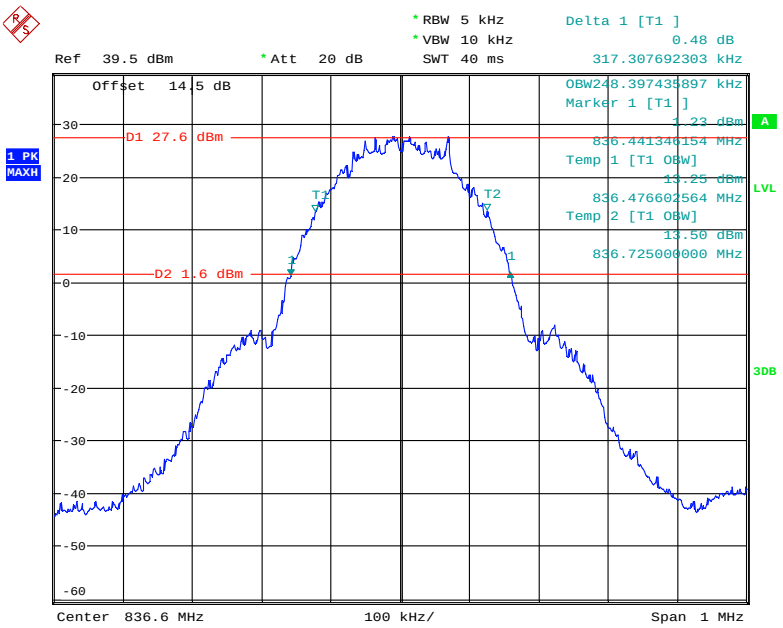
PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	245.19	315.71

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.160	4.696
HSUPA (BPSK)	1880.0	4.160	4.696
HSDPA (16QAM)	1880.0	4.160	4.712

Cellular Band (Part 22H)

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



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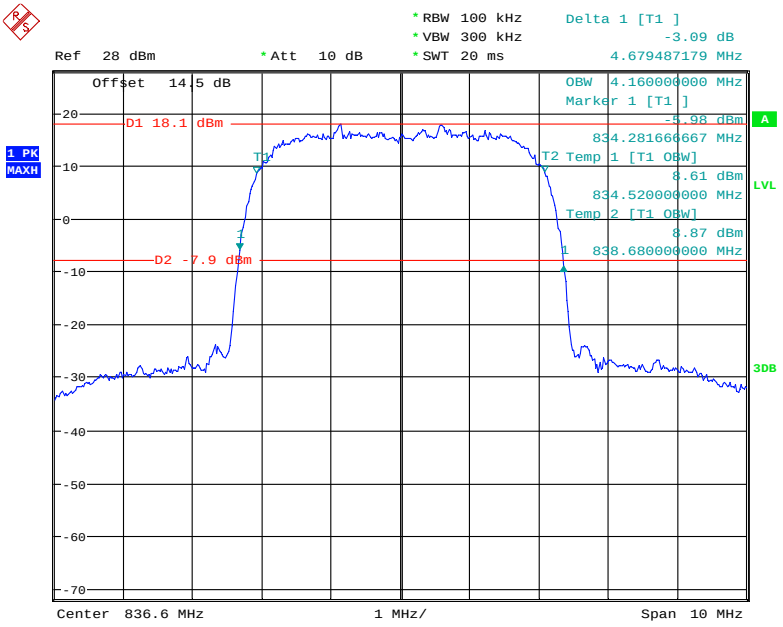
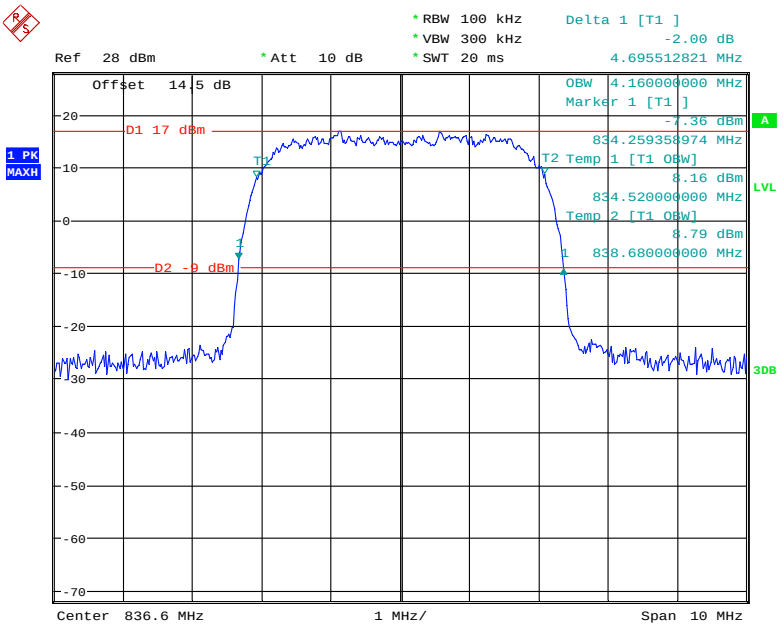
26 dB Emissions &99% Occupied Bandwidth for RMC (BPSK) Mode



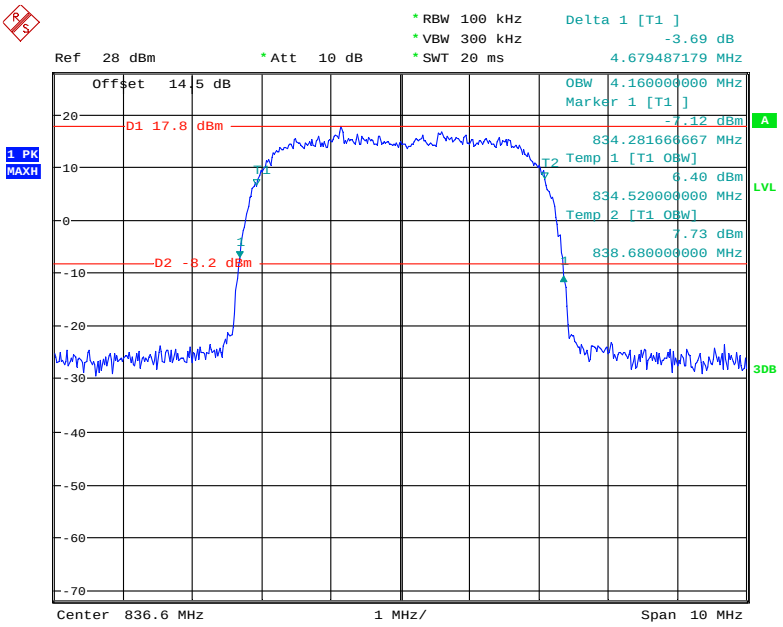
Date: 6.NOV.2018 22:10:00

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



Date: 6.NOV.2018 22:33:14

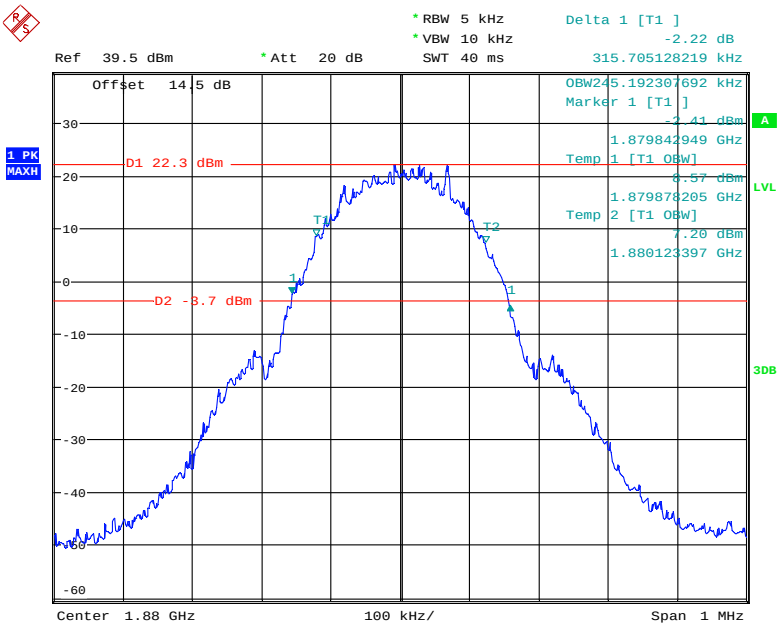
26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 6.NOV.2018 22:21:23

PCS Band (Part 24E)

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



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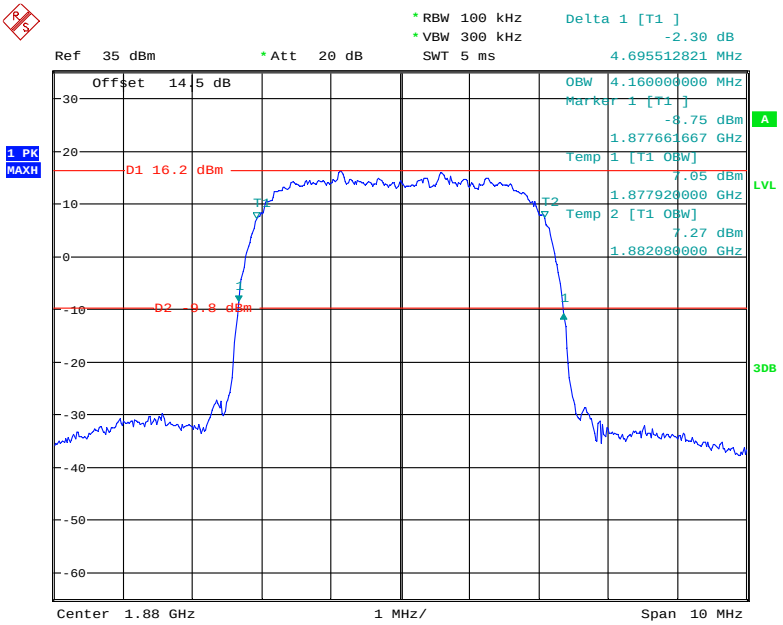
26 dB Emissions &99% Occupied Bandwidth for RMC (BPSK) Mode



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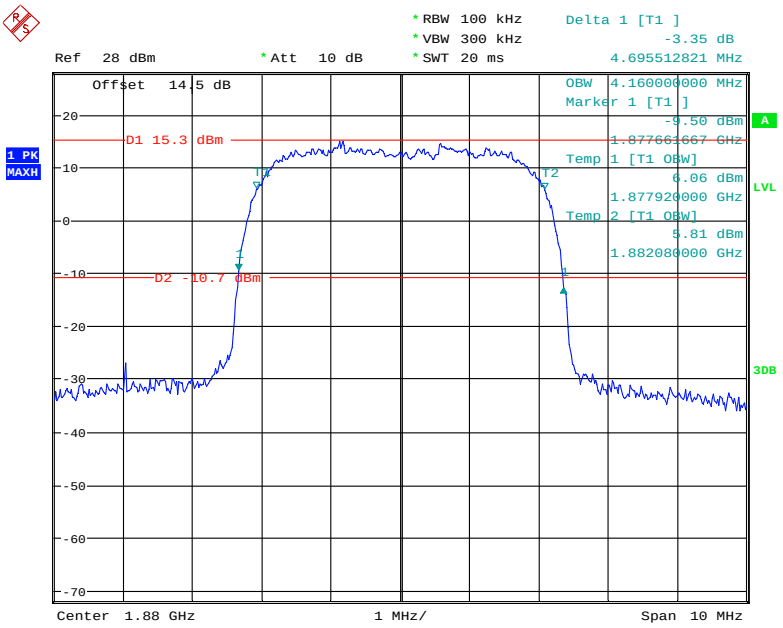
26 dB Emissions &99% Occupied Bandwidth for HSUPA (BPSK) Mode



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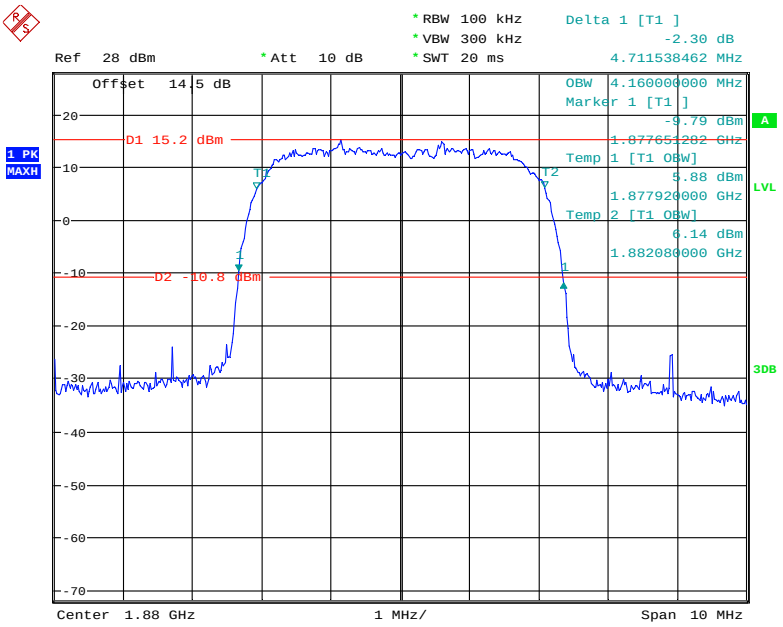
26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode

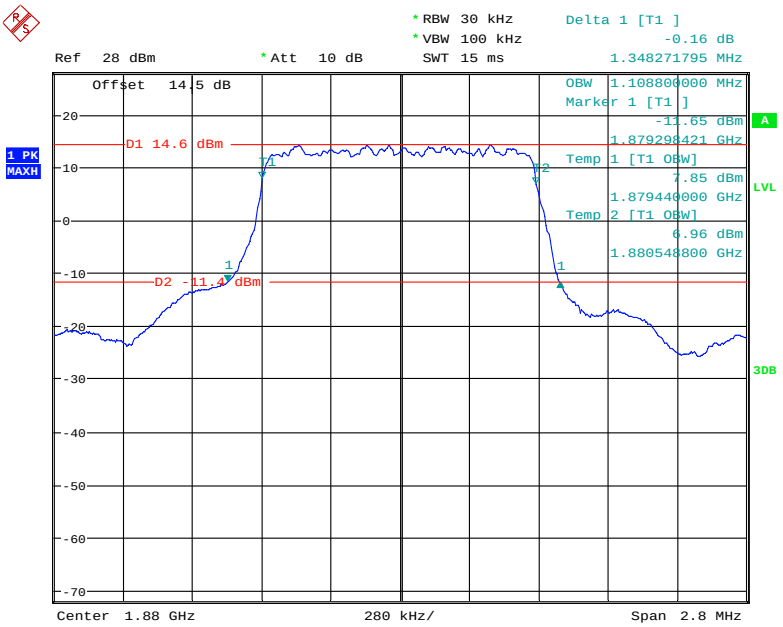


Date: 6.NOV.2018 22:16:29

LTE Band 2: (Middle Channel)

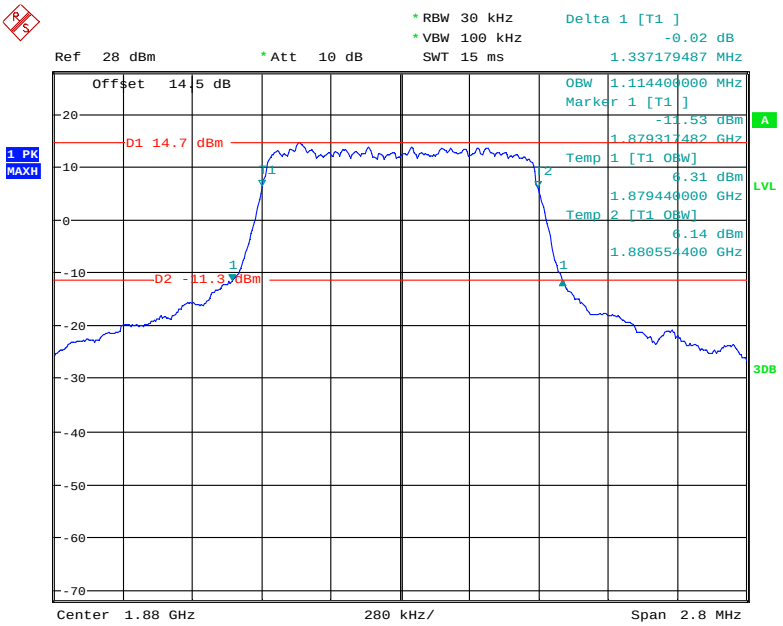
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.109	1.348
	16QAM	1.114	1.337
3.0	QPSK	2.712	3.019
	16QAM	2.700	3.048
5.0	QPSK	4.560	5.449
	16QAM	4.540	5.326
10.0	QPSK	8.960	9.857
	16QAM	8.960	9.867
15.0	QPSK	13.500	15.048
	16QAM	13.500	14.904
20.0	QPSK	18.000	19.685
	16QAM	18.000	19.817

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



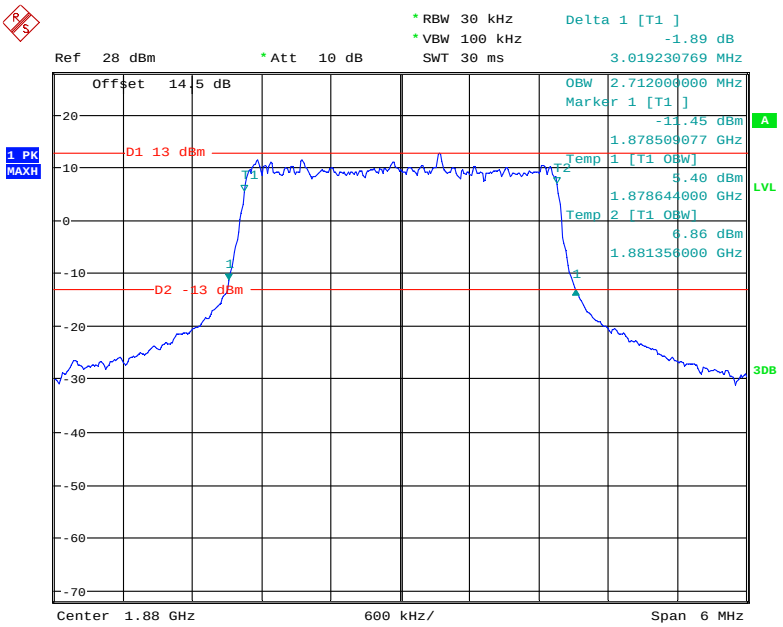
Date: 6.NOV.2018 23:20:03

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



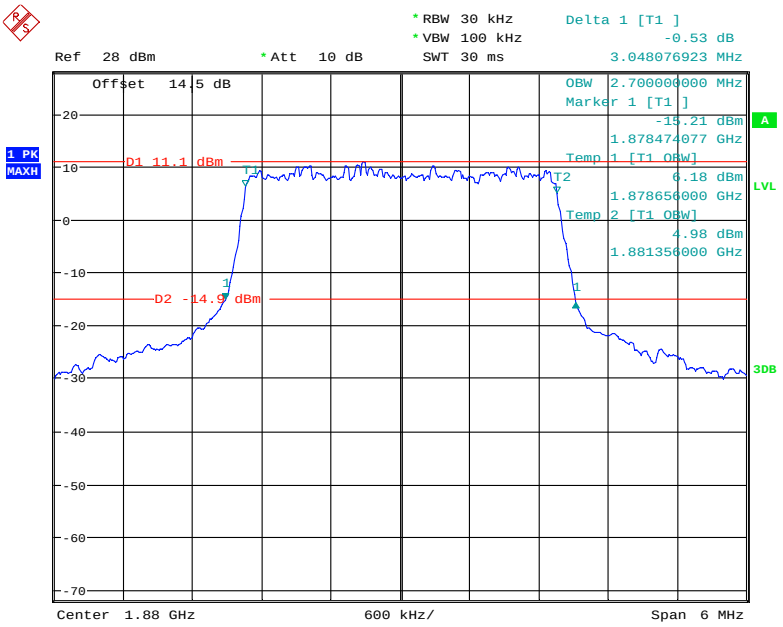
Date: 6.NOV.2018 23:23:41

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



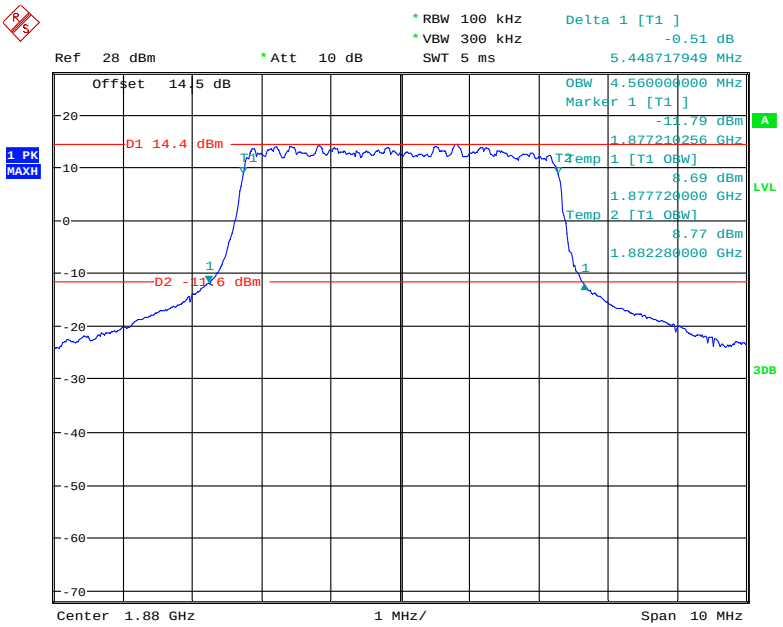
Date: 6.NOV.2018 23:25:53

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



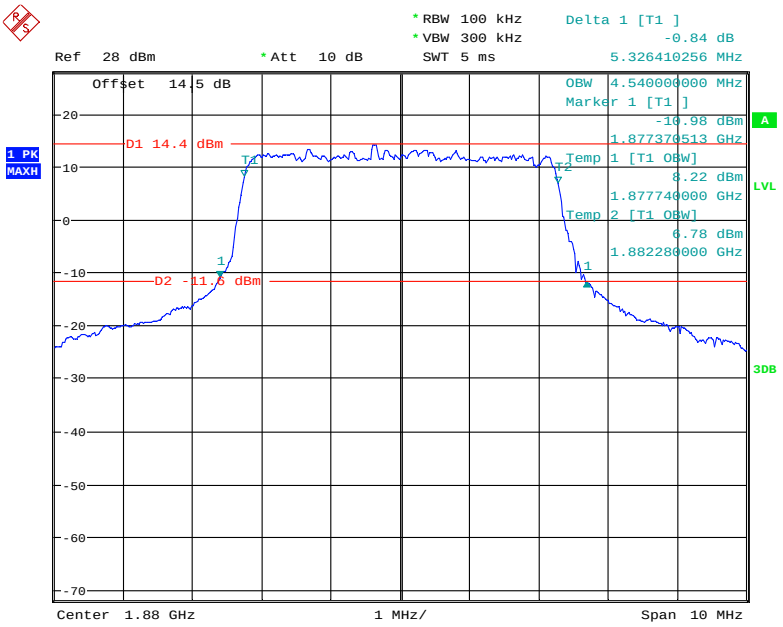
Date: 6.NOV.2018 23:27:22

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



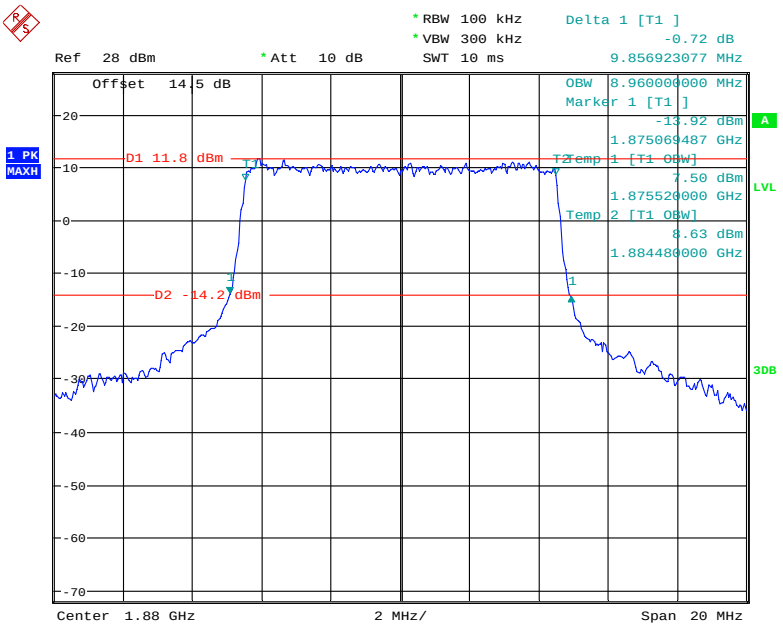
Date: 6.NOV.2018 23:29:50

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



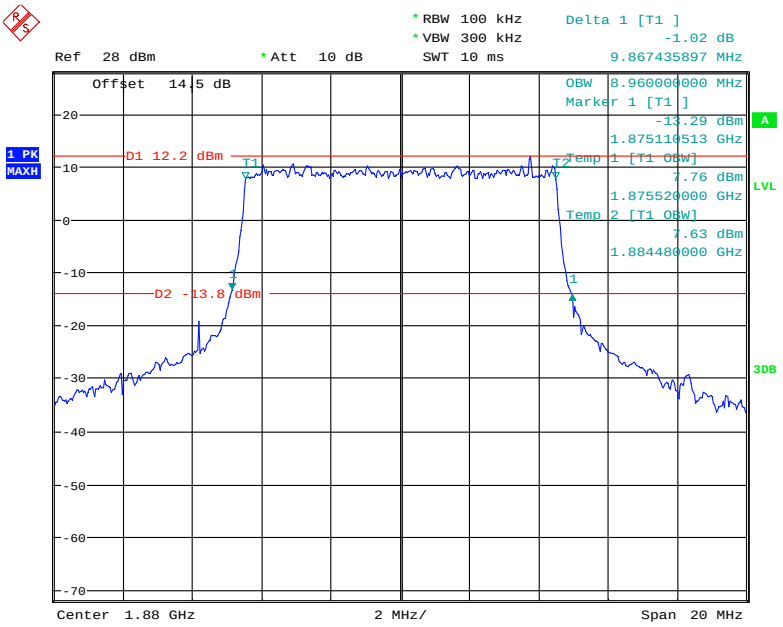
Date: 6.NOV.2018 23:31:24

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



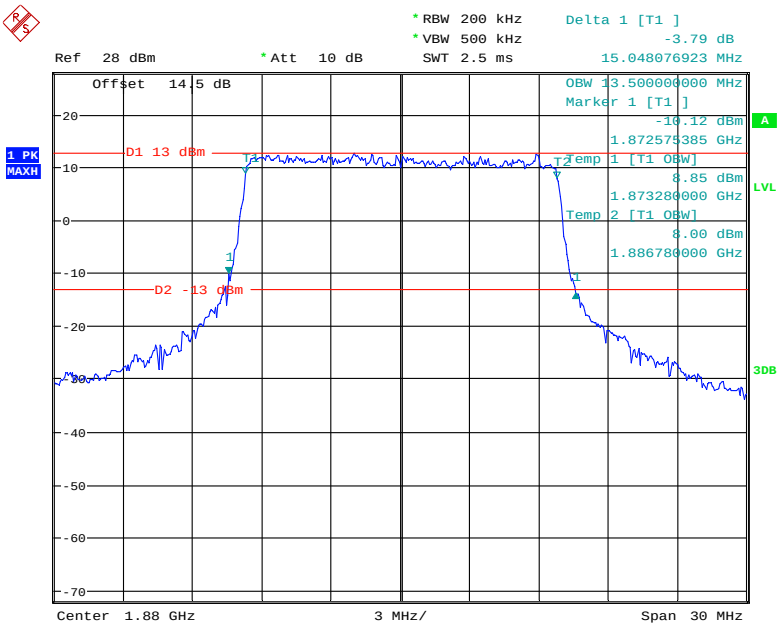
Date: 6.NOV.2018 23:33:05

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



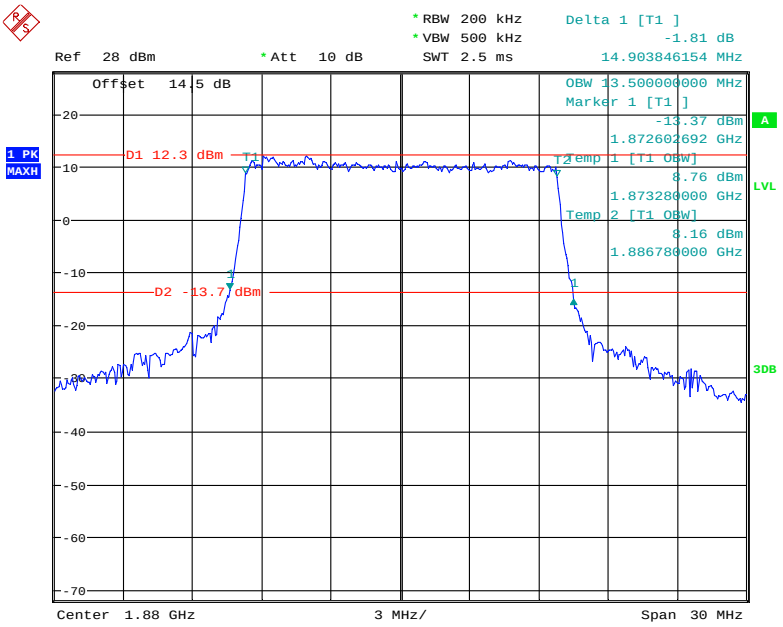
Date: 6.NOV.2018 23:34:39

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



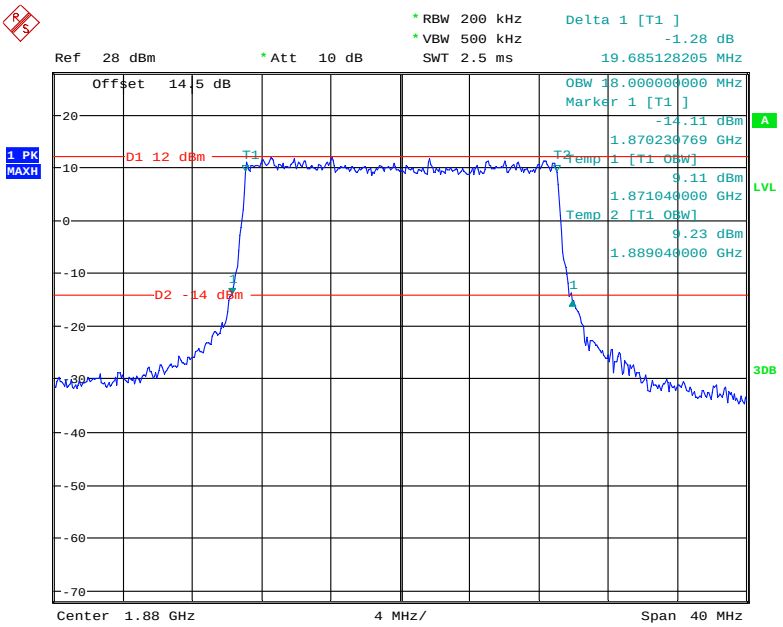
Date: 6.NOV.2018 23:36:29

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



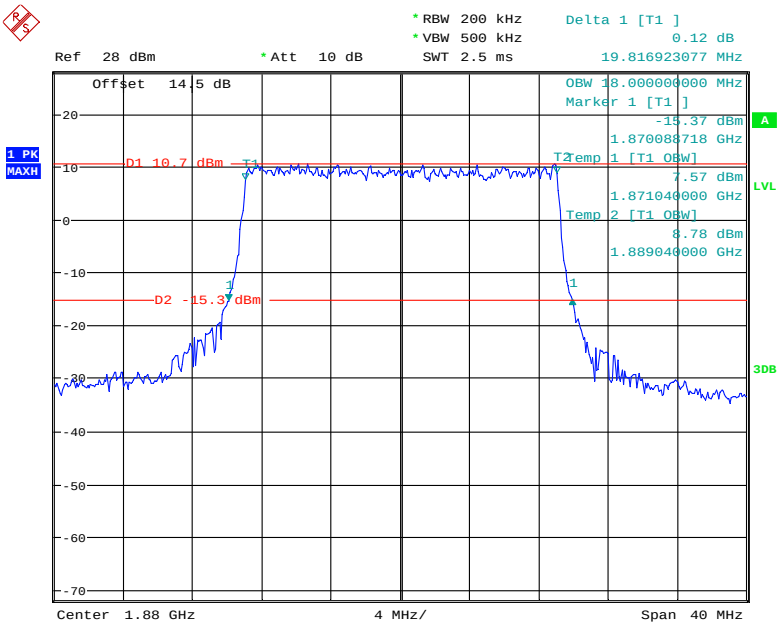
Date: 6.NOV.2018 23:37:58

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



Date: 6.NOV.2018 23:40:38

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

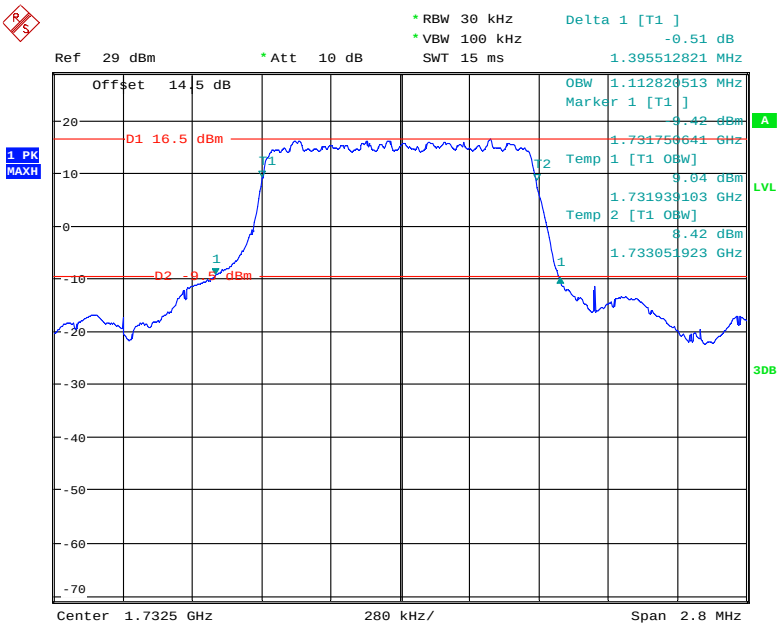


Date: 6.NOV.2018 23:42:29

LTE Band 4: (Middle Channel)

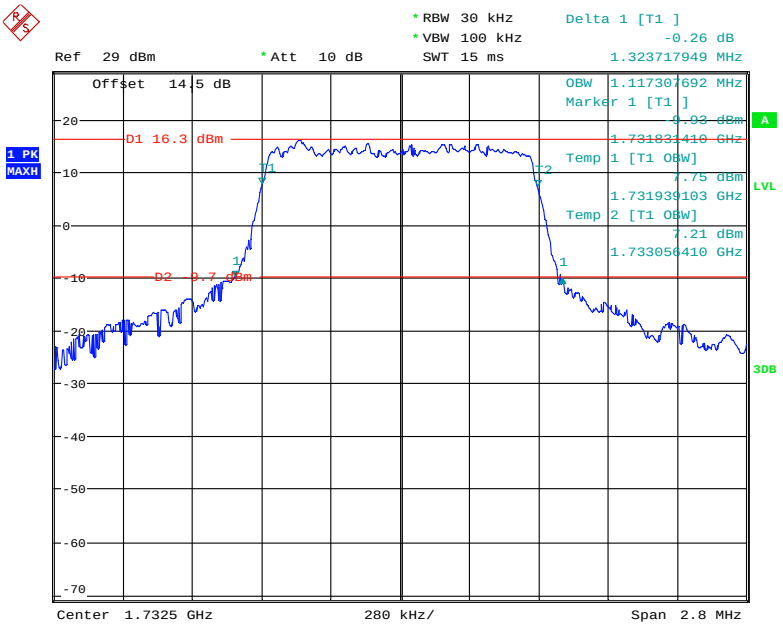
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.113	1.396
	16QAM	1.117	1.324
3.0	QPSK	2.702	3.019
	16QAM	2.702	3.019
5.0	QPSK	4.540	5.511
	16QAM	4.580	5.369
10.0	QPSK	9.000	9.816
	16QAM	9.000	9.808
15.0	QPSK	13.500	15.037
	16QAM	13.440	14.871
20.0	QPSK	17.920	19.492
	16QAM	18.000	19.808

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



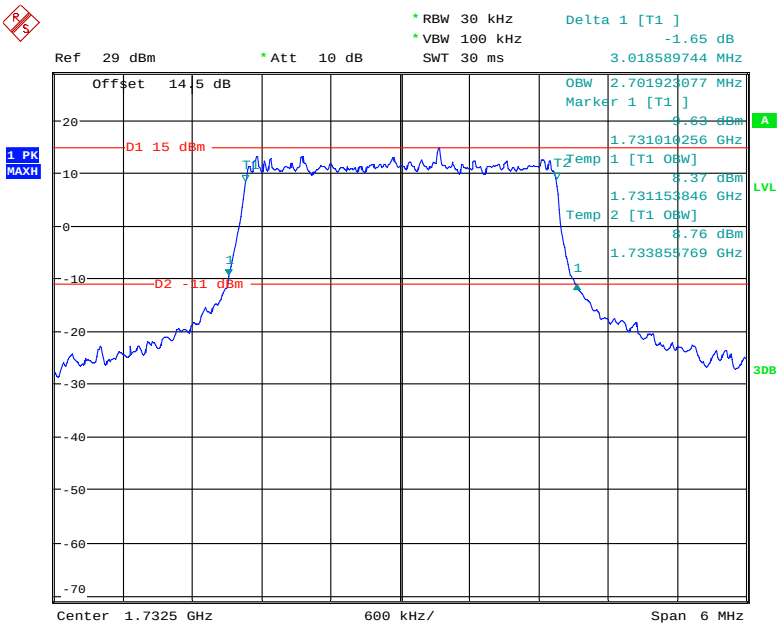
Date: 7.NOV.2018 23:49:40

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



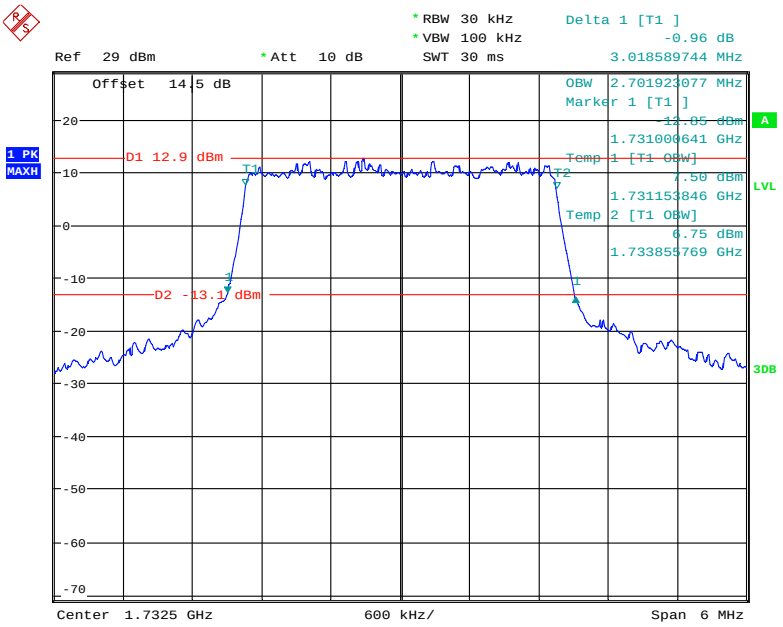
Date: 7.NOV.2018 23:47:50

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



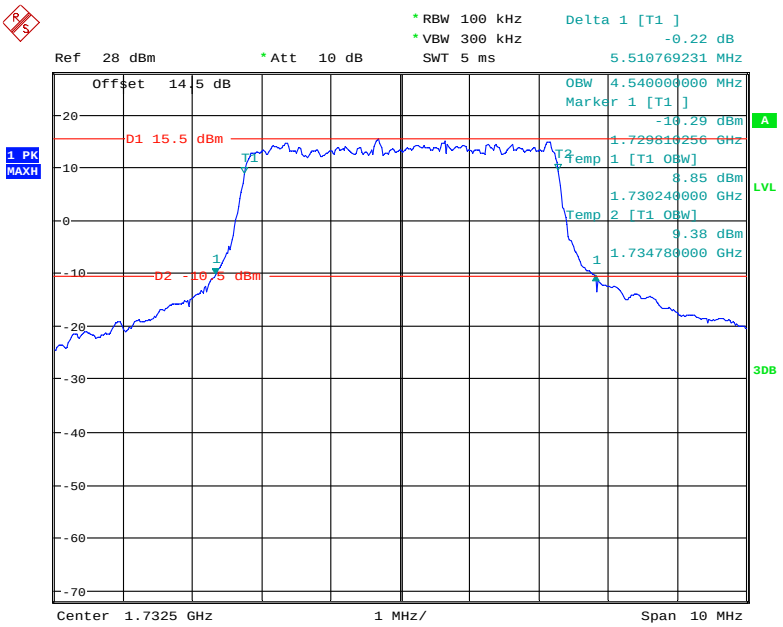
Date: 7.NOV.2018 23:51:05

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



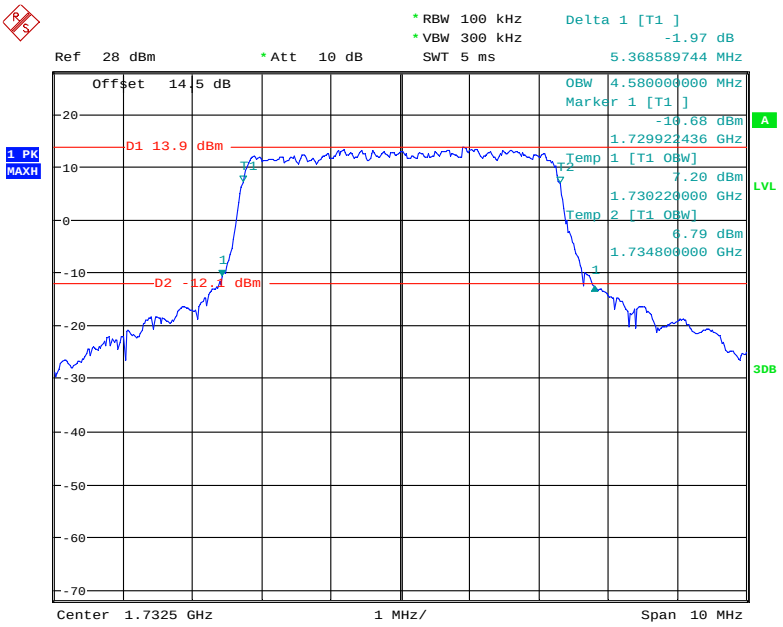
Date: 7.NOV.2018 23:52:05

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



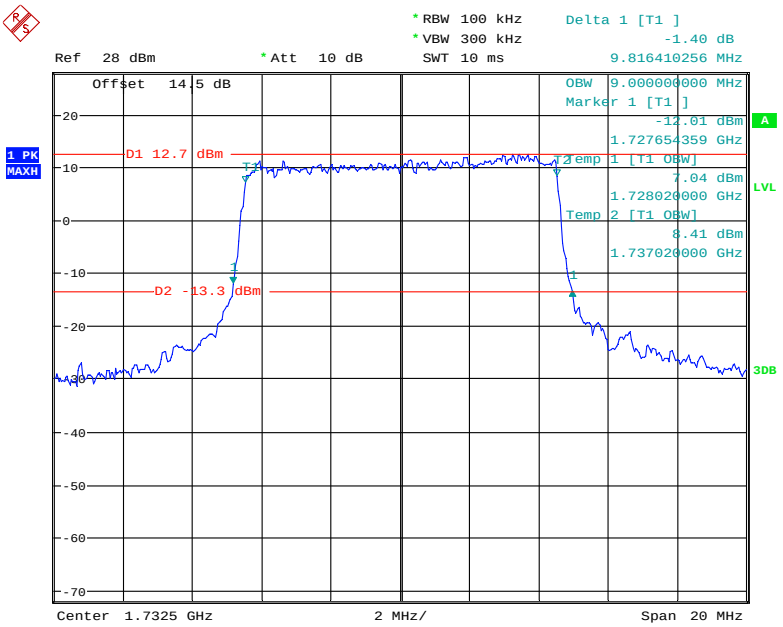
Date: 6.NOV.2018 23:49:40

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



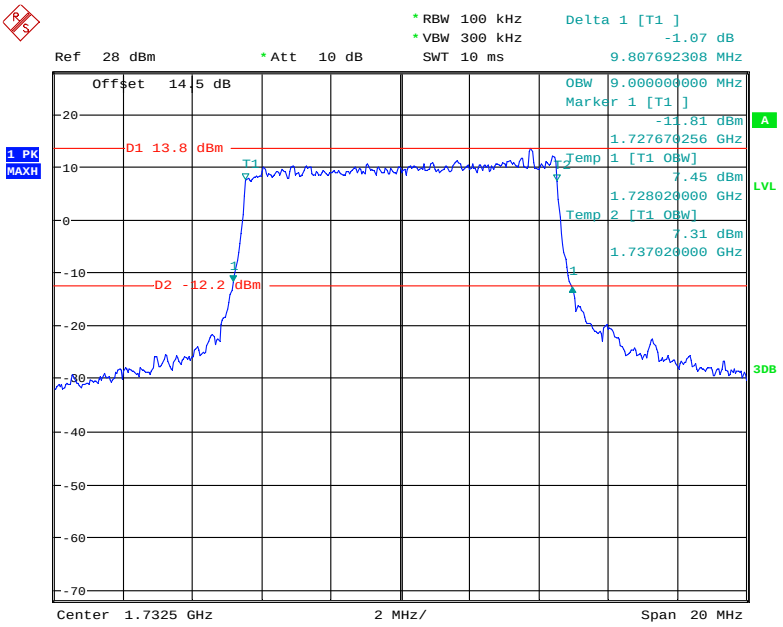
Date: 6.NOV.2018 23:47:30

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



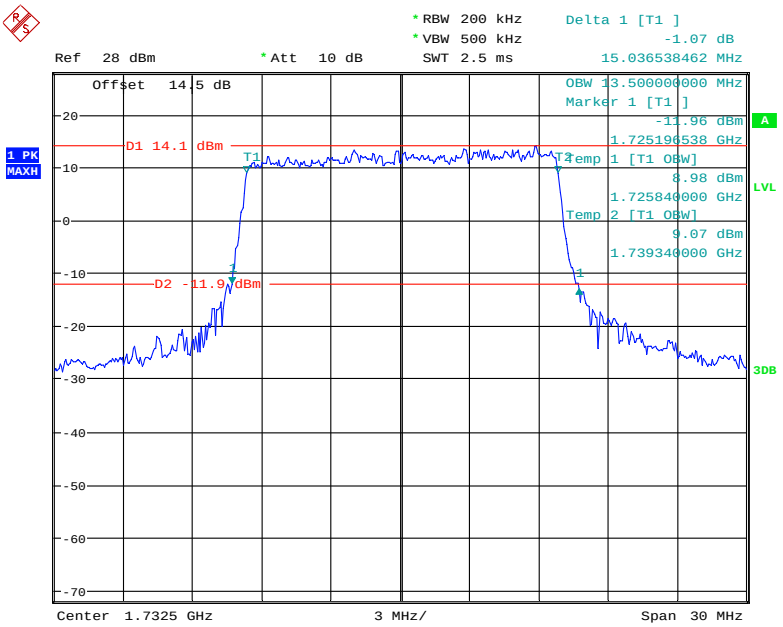
Date: 6.NOV.2018 23:52:18

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



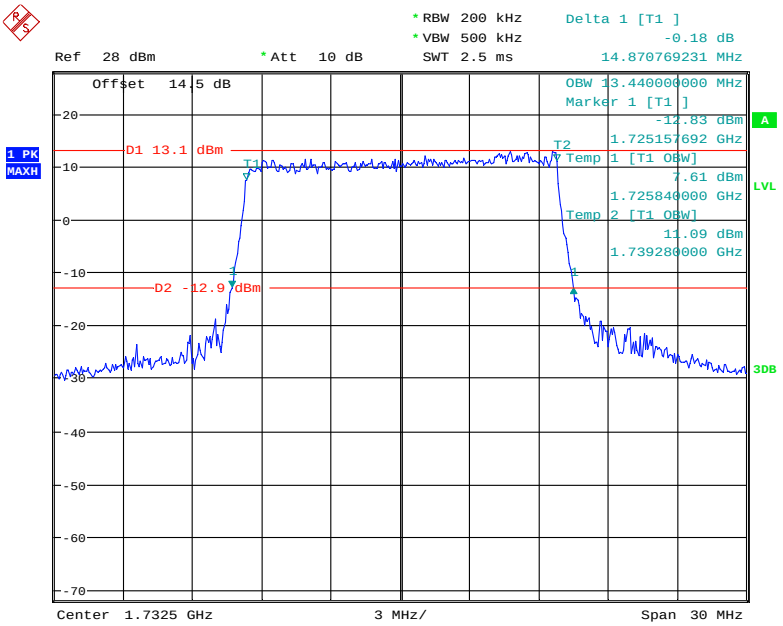
Date: 6.NOV.2018 23:50:57

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



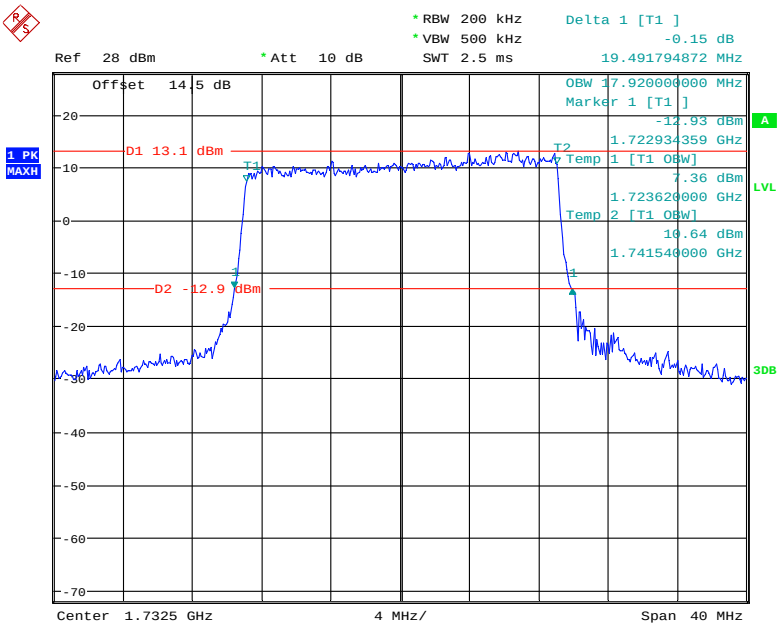
Date: 6.NOV.2018 23:55:47

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



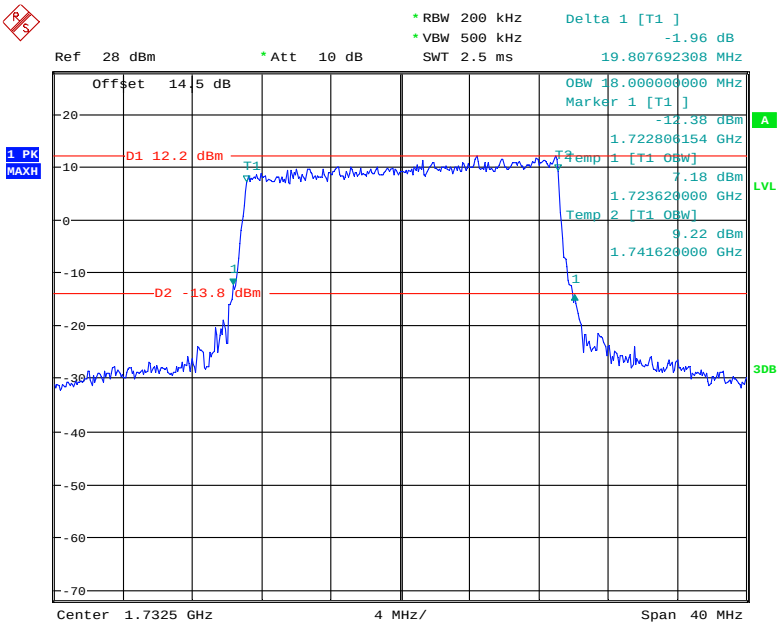
Date: 6.NOV.2018 23:53:34

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



Date: 6.NOV.2018 23:57:49

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

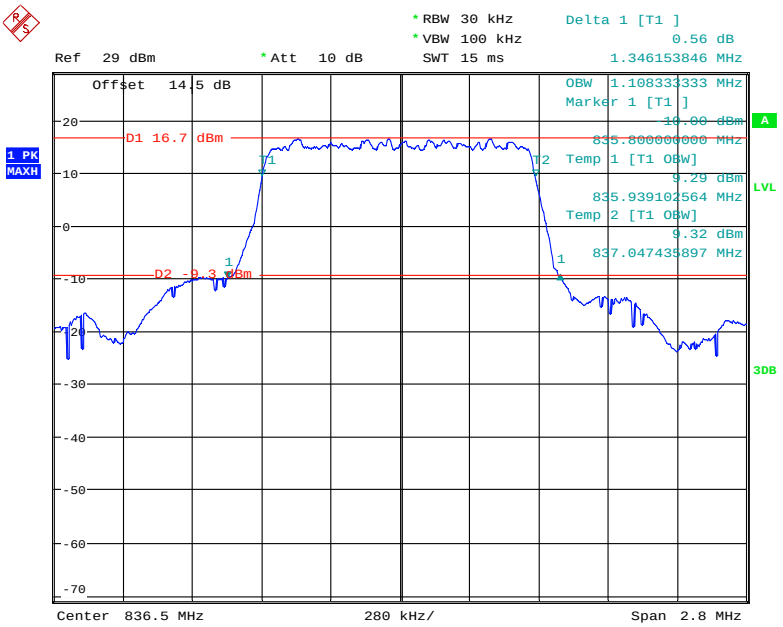


Date: 6.NOV.2018 23:56:52

LTE Band 5: (Middle Channel)

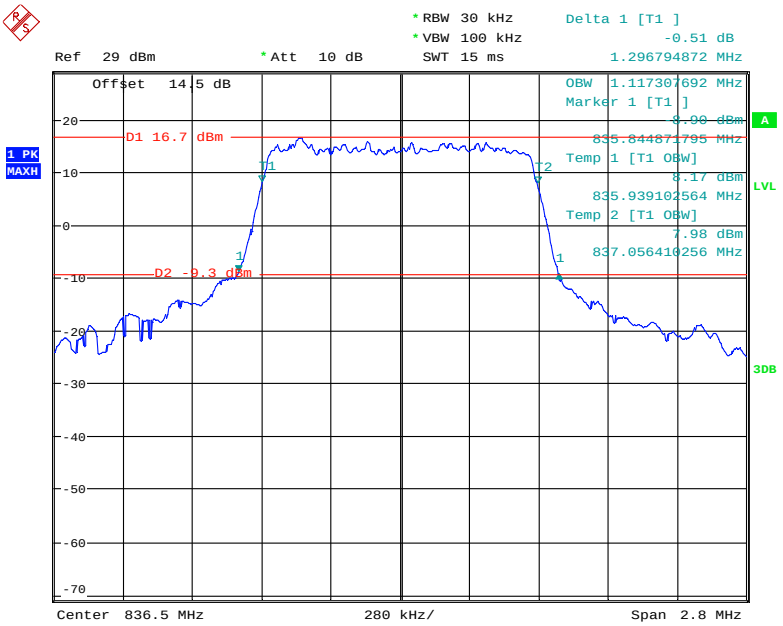
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.108	1.346
	16QAM	1.117	1.297
3.0	QPSK	2.702	3.038
	16QAM	2.692	3.058
5.0	QPSK	4.551	5.337
	16QAM	4.535	5.304
10.0	QPSK	8.974	9.936
	16QAM	8.974	9.904

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



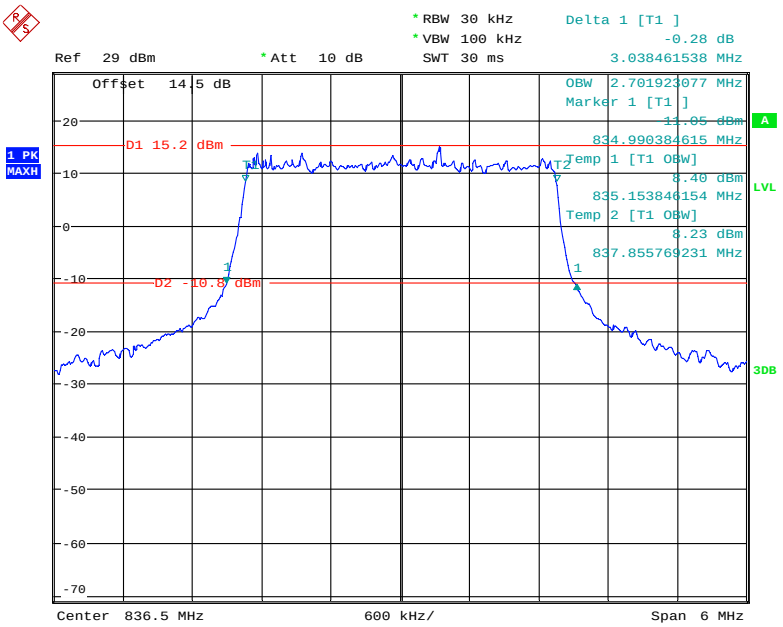
Date: 7.NOV.2018 20:13:03

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



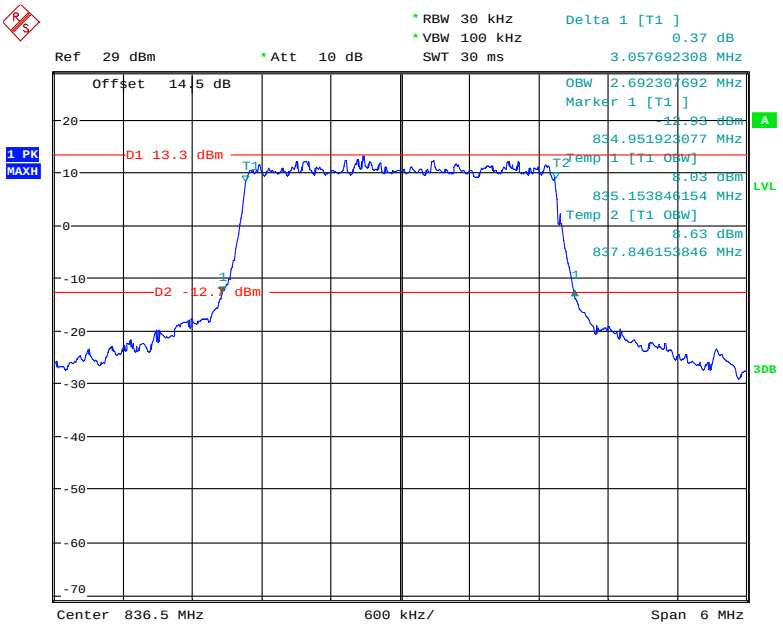
Date: 7.NOV.2018 20:14:47

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



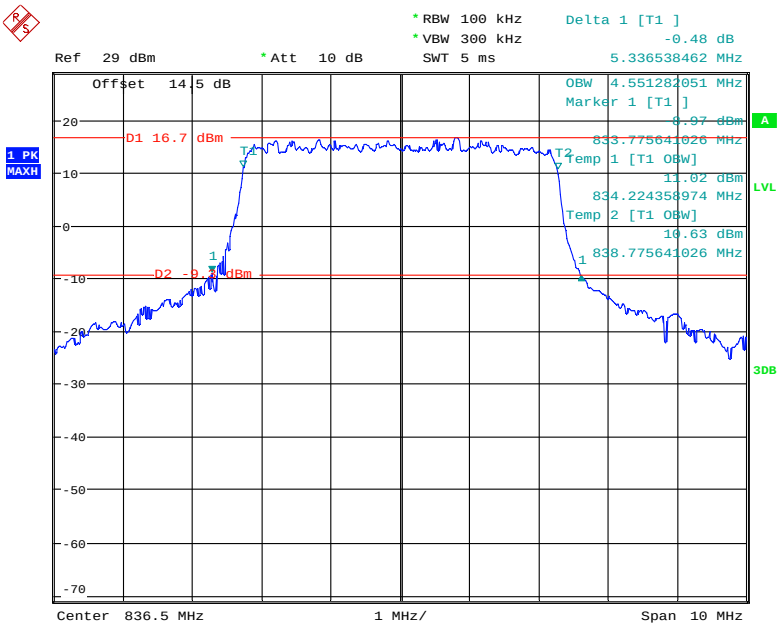
Date: 7.NOV.2018 20:08:07

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



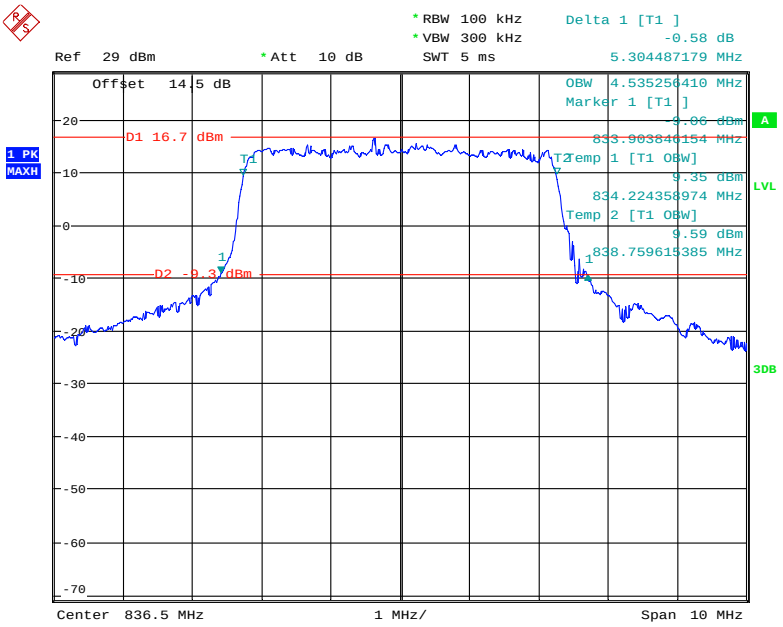
Date: 7.NOV.2018 20:09:09

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



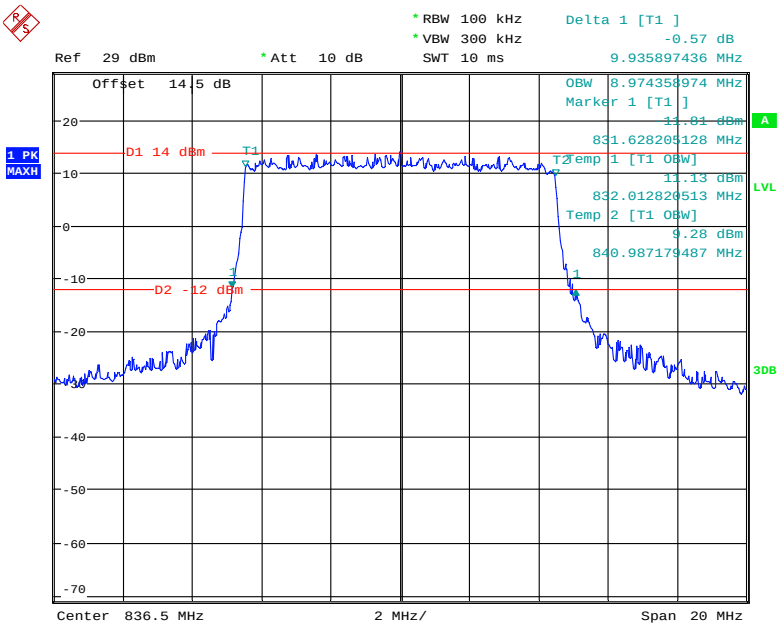
Date: 7.NOV.2018 20:03:49

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



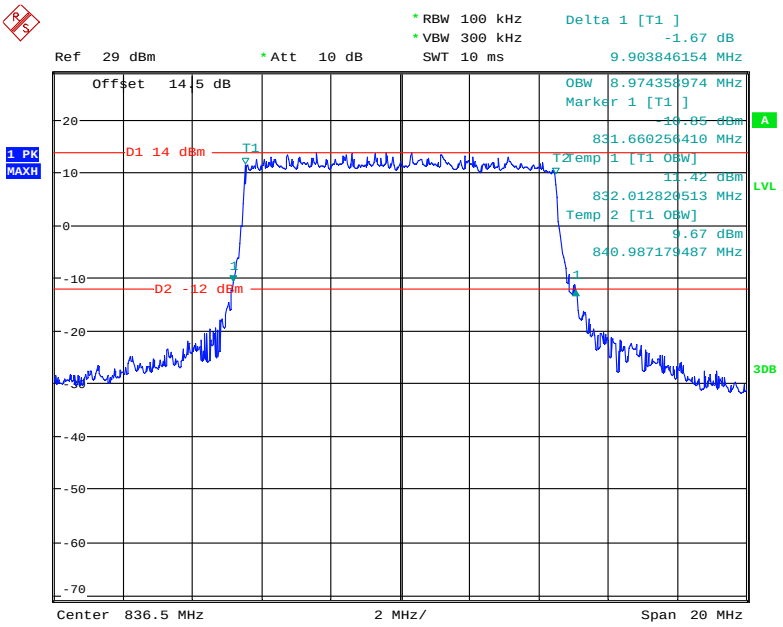
Date: 7.NOV.2018 20:06:35

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



Date: 7.NOV.2018 19:56:47

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

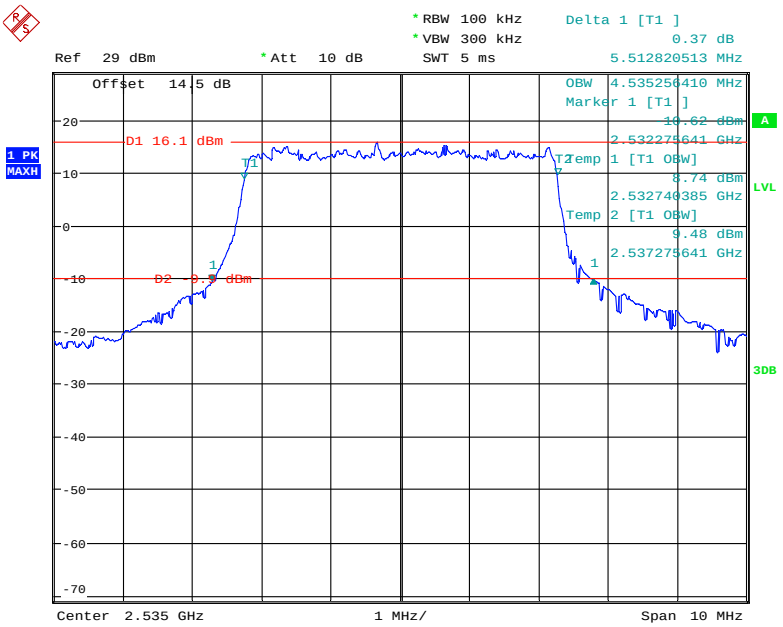


Date: 7.NOV.2018 19:58:29

LTE Band 7: (Middle Channel)

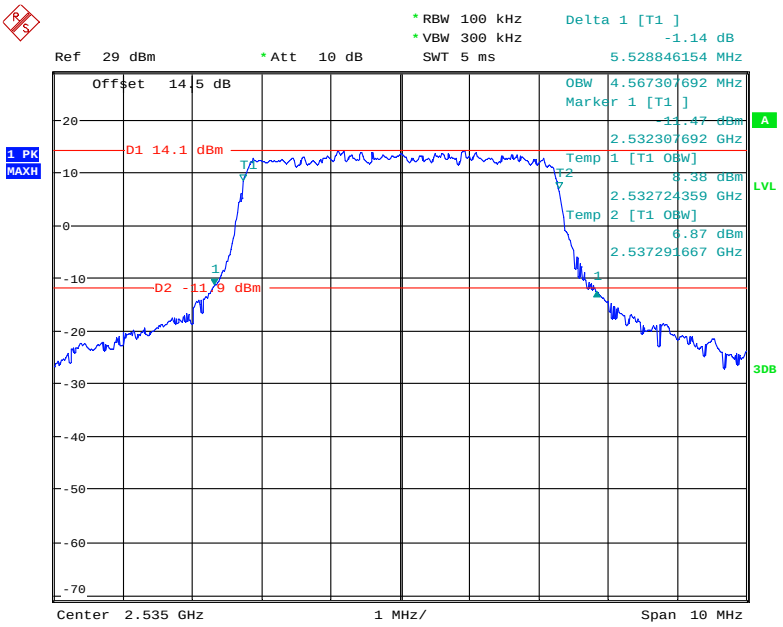
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.535	5.513
	16QAM	4.567	5.529
10.0	QPSK	8.974	9.744
	16QAM	8.942	9.808
15.0	QPSK	13.462	15.048
	16QAM	13.462	14.904
20.0	QPSK	17.949	19.551
	16QAM	17.949	19.487

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



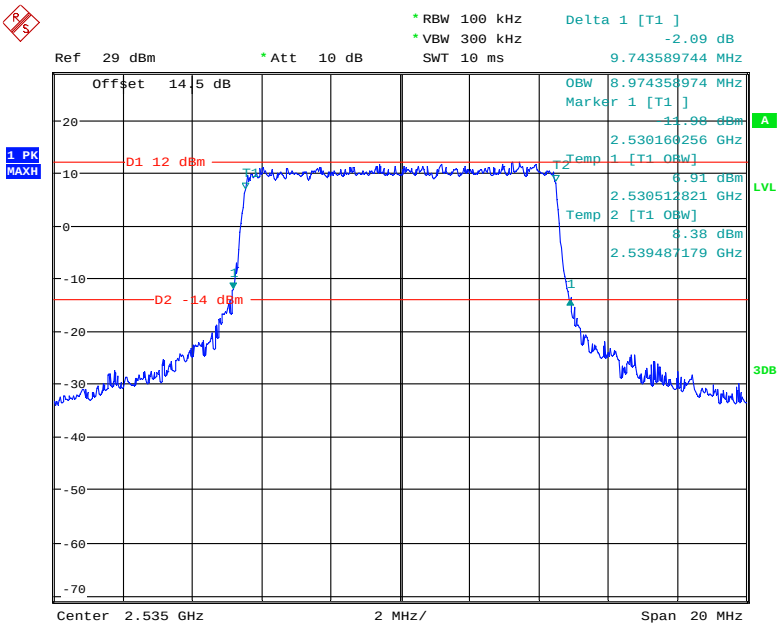
Date: 7.NOV.2018 20:22:12

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



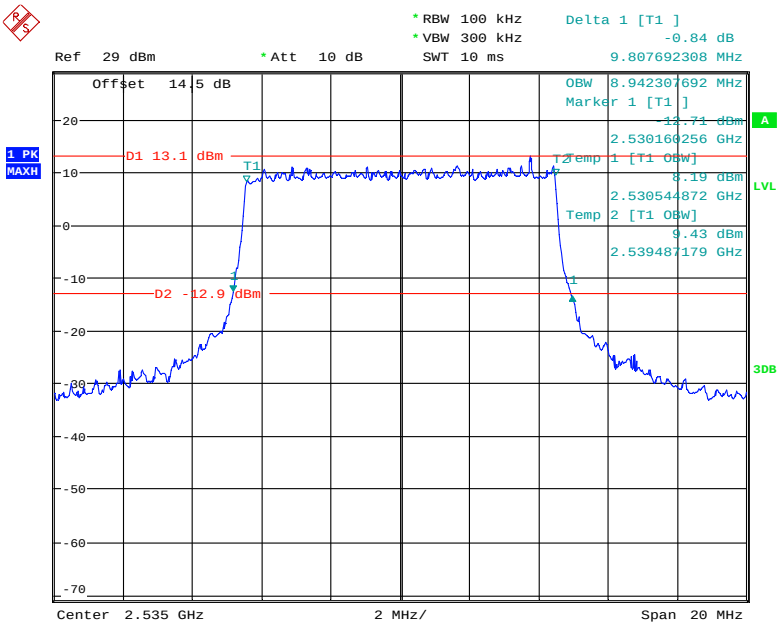
Date: 7.NOV.2018 20:19:10

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



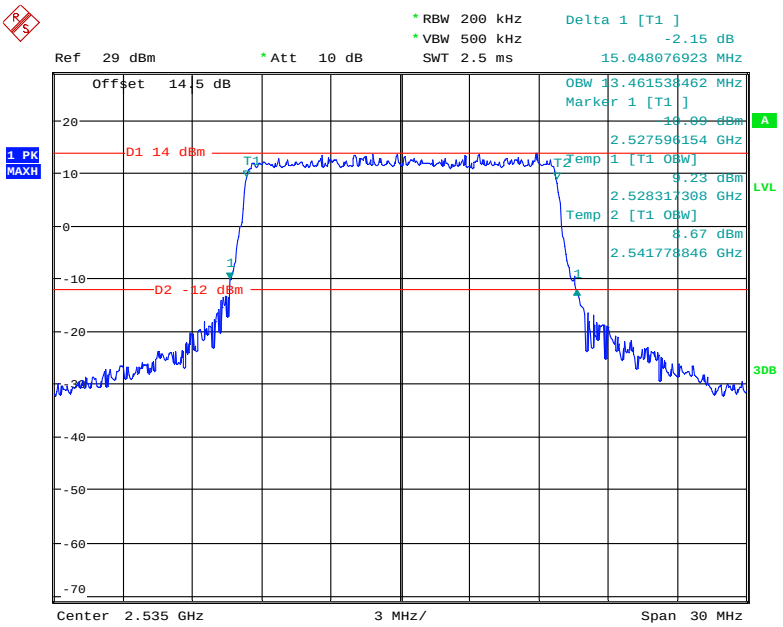
Date: 7.NOV.2018 20:24:06

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



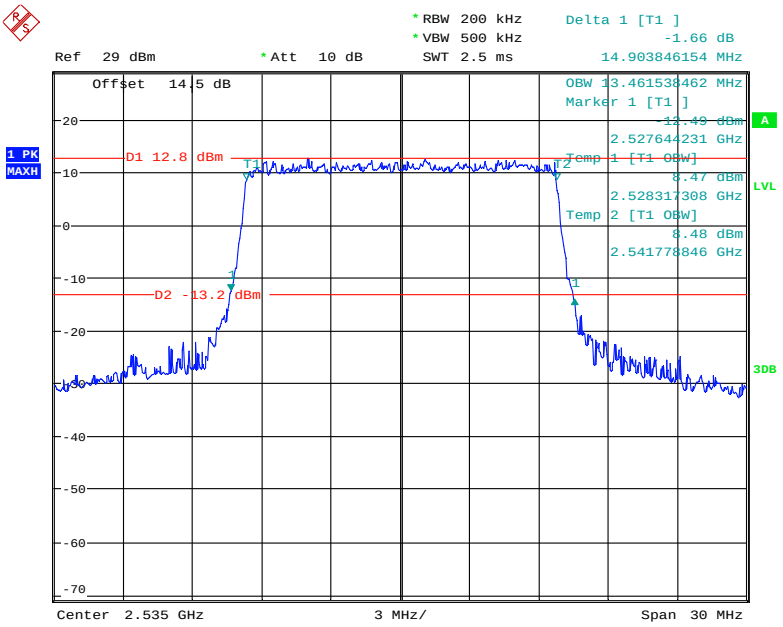
Date: 7.NOV.2018 20:25:51

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



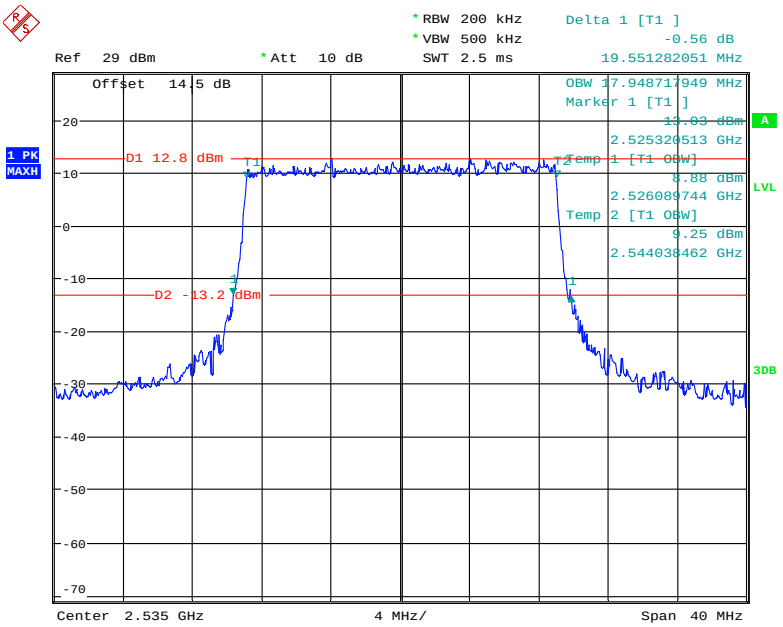
Date: 7.NOV.2018 20:28:31

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



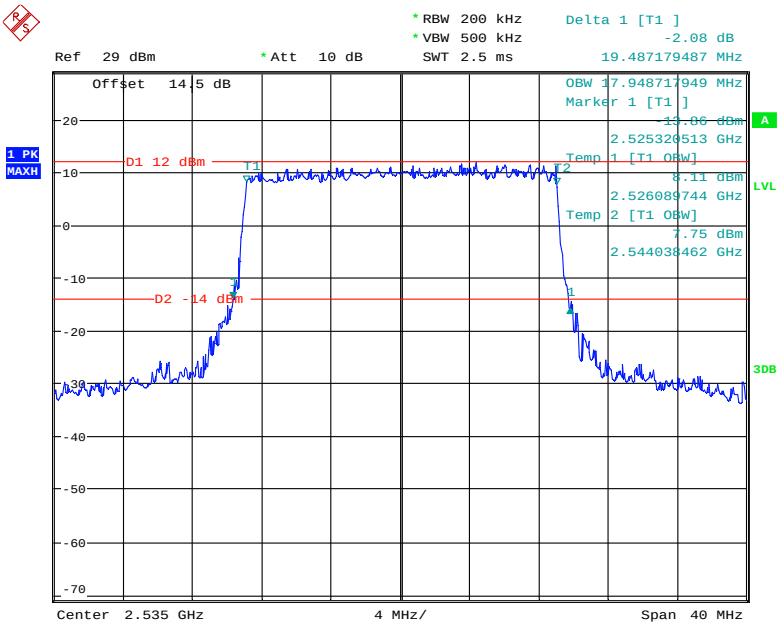
Date: 7.NOV.2018 20:30:17

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



Date: 7.NOV.2018 20:32:54

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

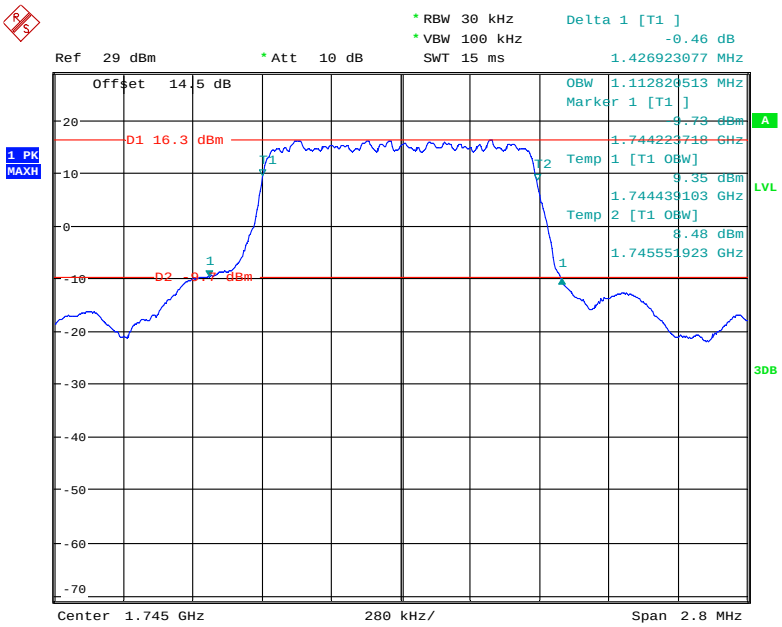


Date: 7.NOV.2018 20:36:00

LTE Band 66: (Middle Channel)

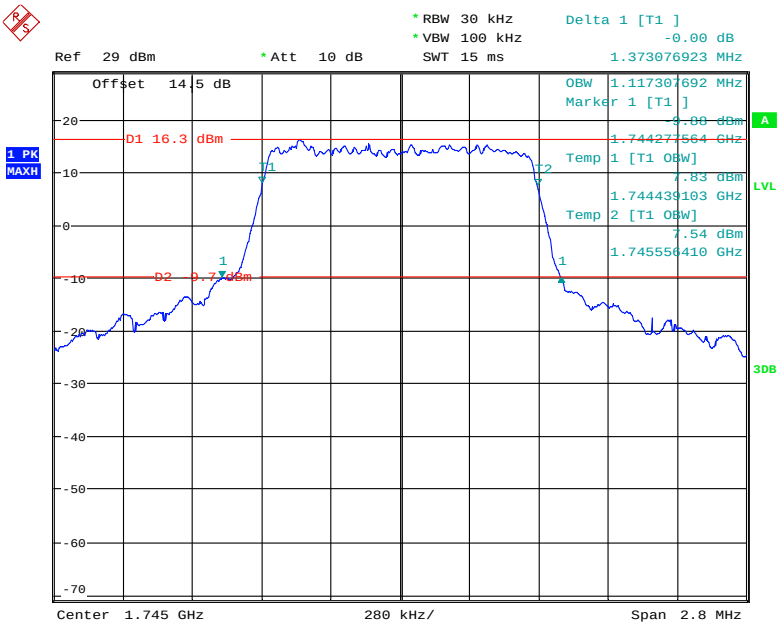
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.113	1.427
	16QAM	1.117	1.373
3.0	QPSK	2.702	3.038
	16QAM	2.702	3.010
5.0	QPSK	4.551	5.369
	16QAM	4.520	5.321
10.0	QPSK	8.974	9.872
	16QAM	8.974	9.808
15.0	QPSK	13.462	15.064
	16QAM	13.462	14.872
20.0	QPSK	17.885	19.551
	16QAM	17.949	19.487

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



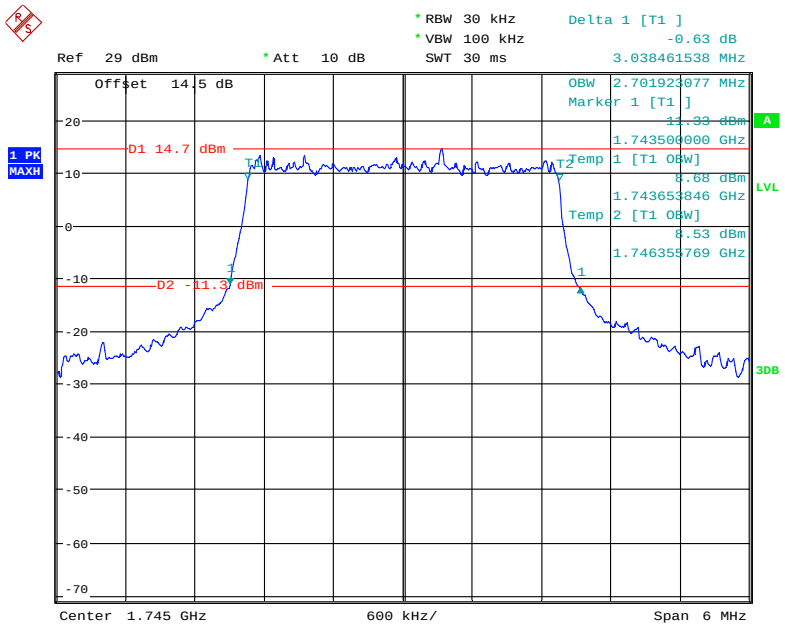
Date: 7.NOV.2018 21:25:32

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



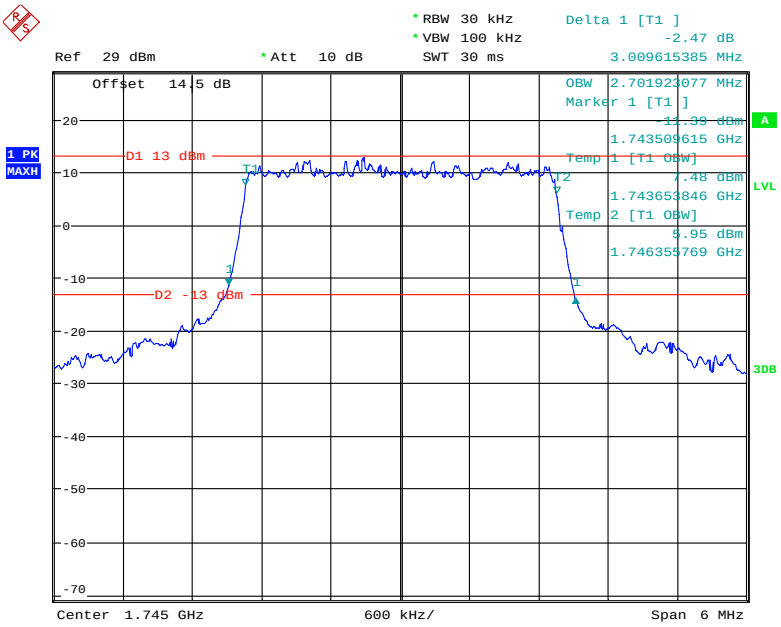
Date: 7.NOV.2018 21:30:13

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



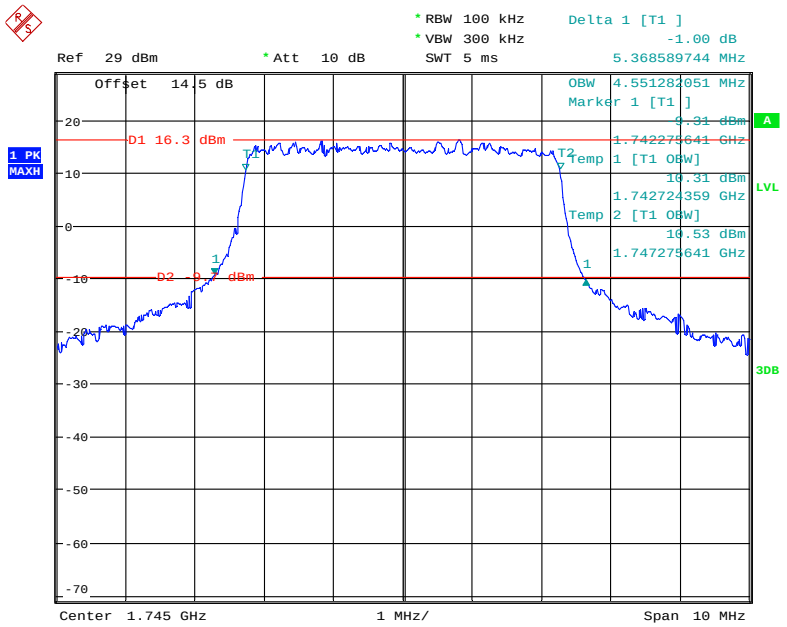
Date: 7.NOV.2018 21:23:11

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



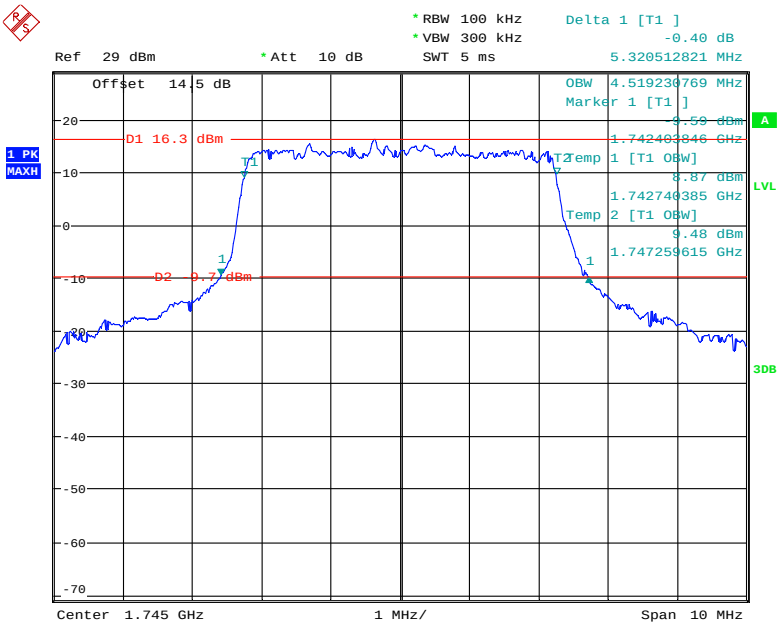
Date: 7.NOV.2018 21:21:47

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



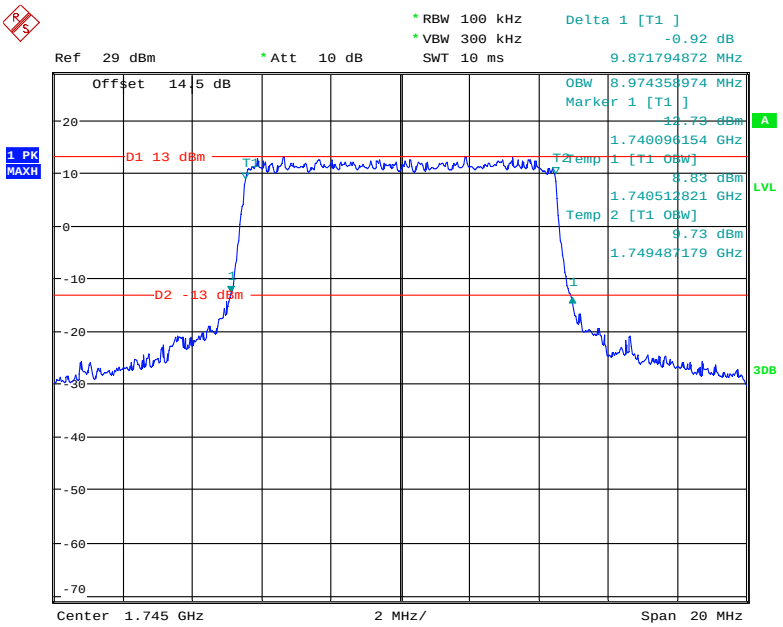
Date: 7.NOV.2018 21:18:27

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



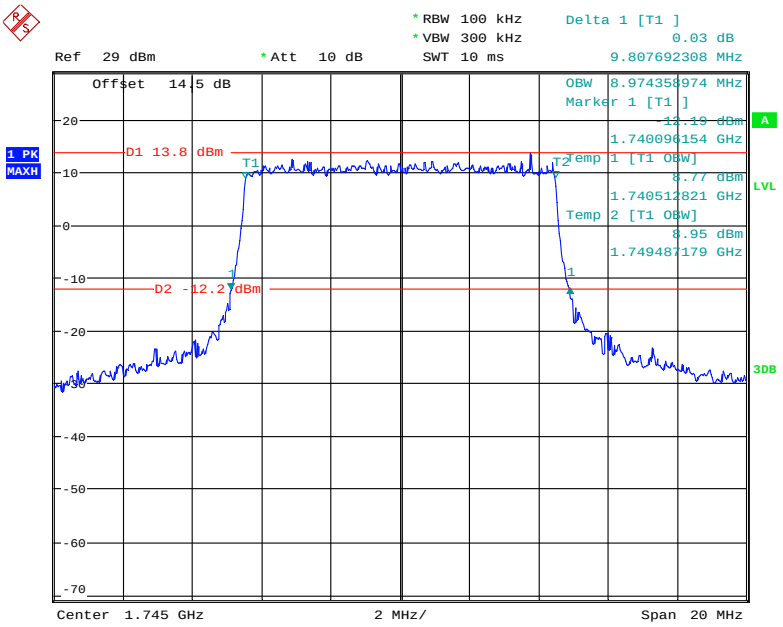
Date: 7.NOV.2018 21:20:29

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



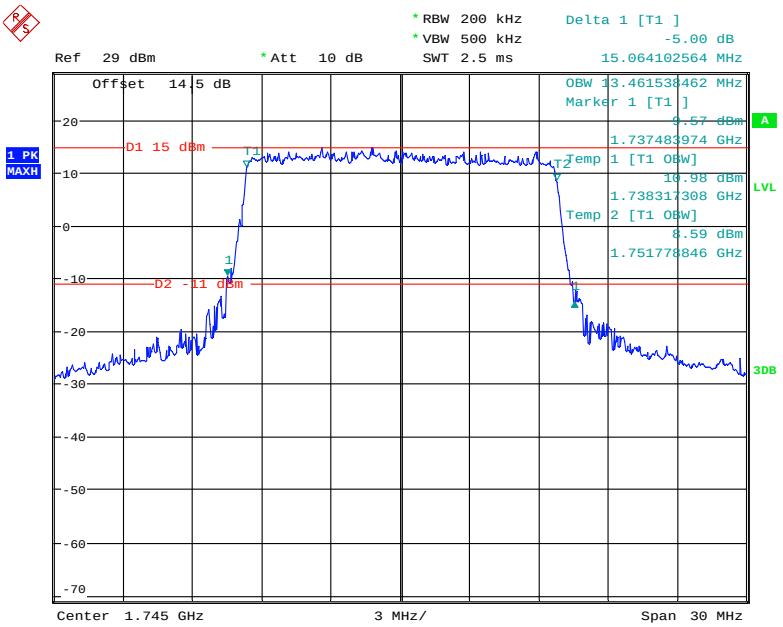
Date: 7.NOV.2018 21:15:26

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



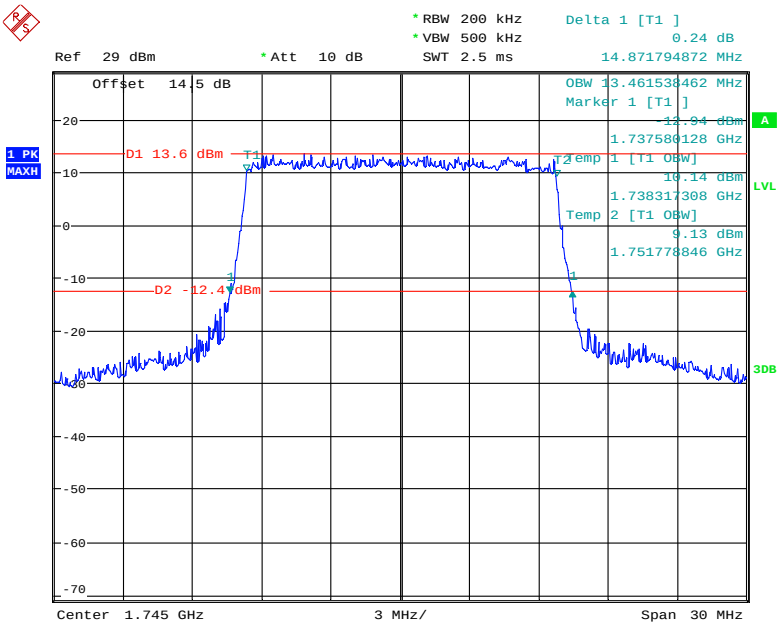
Date: 7.NOV.2018 21:16:30

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



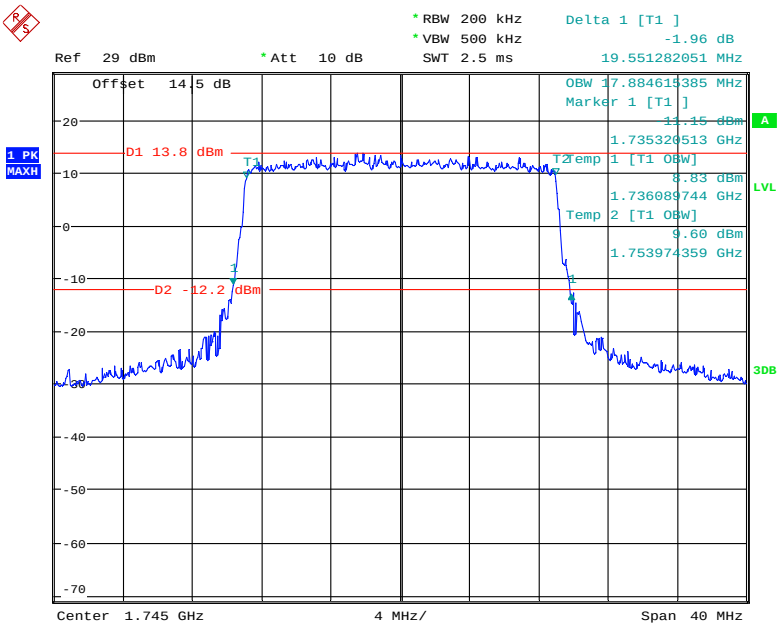
Date: 7.NOV.2018 21:14:11

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



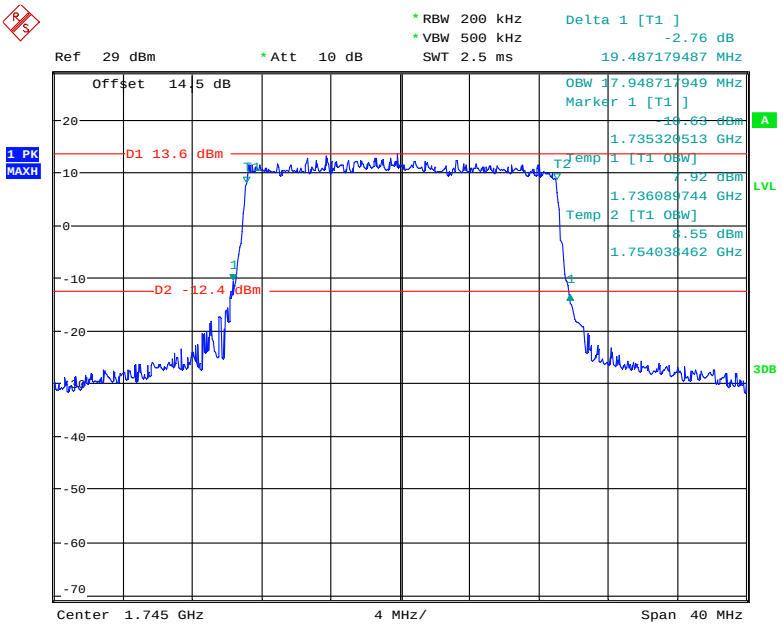
Date: 7.NOV.2018 21:12:50

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



Date: 7.NOV.2018 21:10:05

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



Date: 7.NOV.2018 21:11:33

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

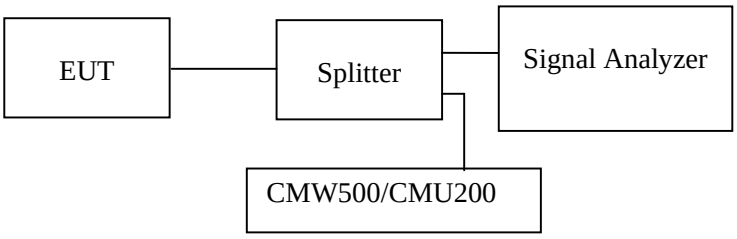
Applicable Standard

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 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	24~25 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Kiki Kong from 2018-11-06 to 2018-11-12.

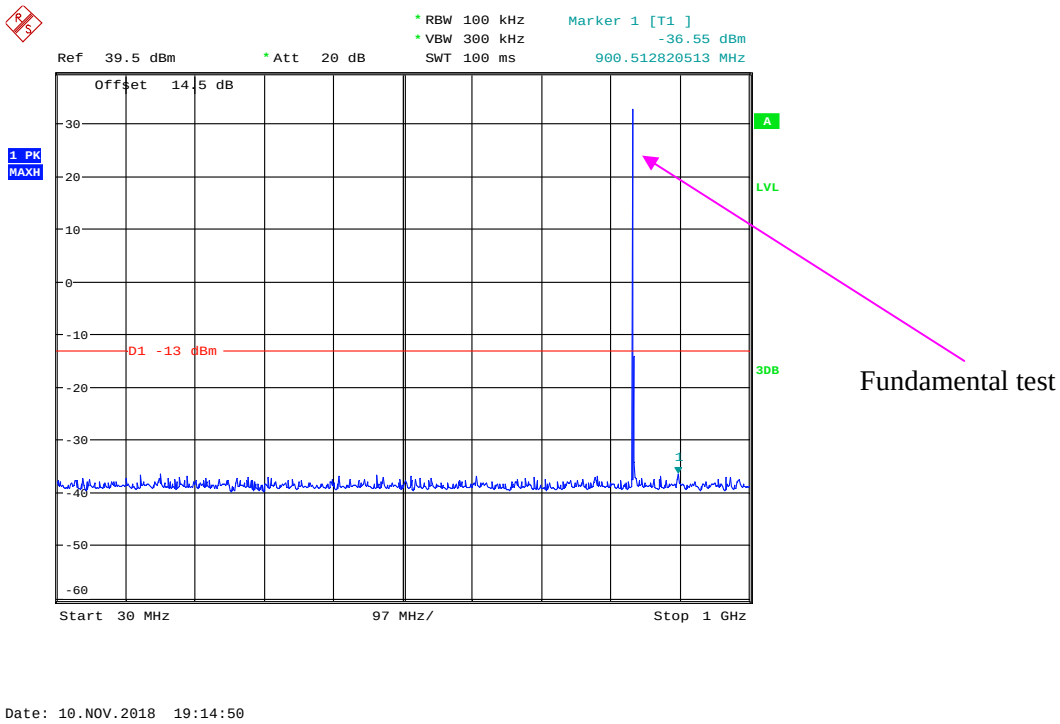
Test result: Compliance.

EUT operation mode: transmitting

Please refer to the following plots.

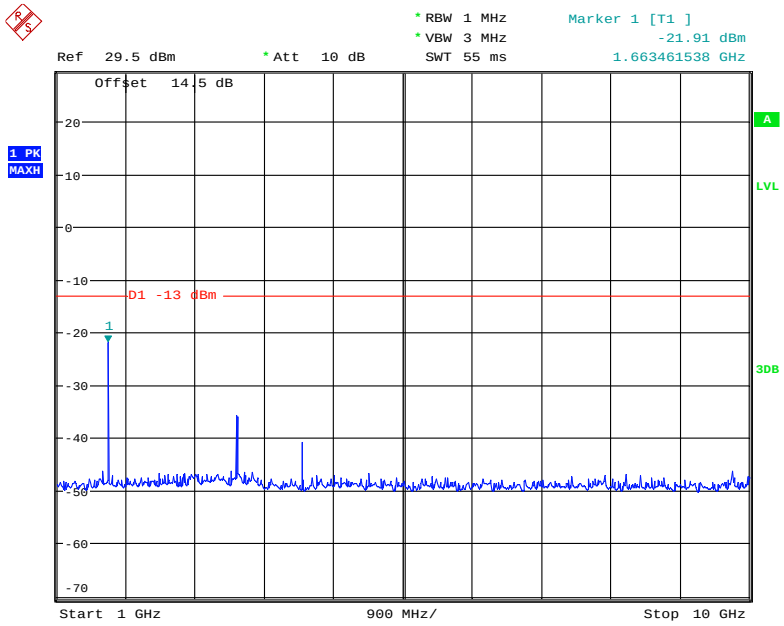
Cellular Band (Part 22H)

30 MHz – 1 GHz (GSM Mode)



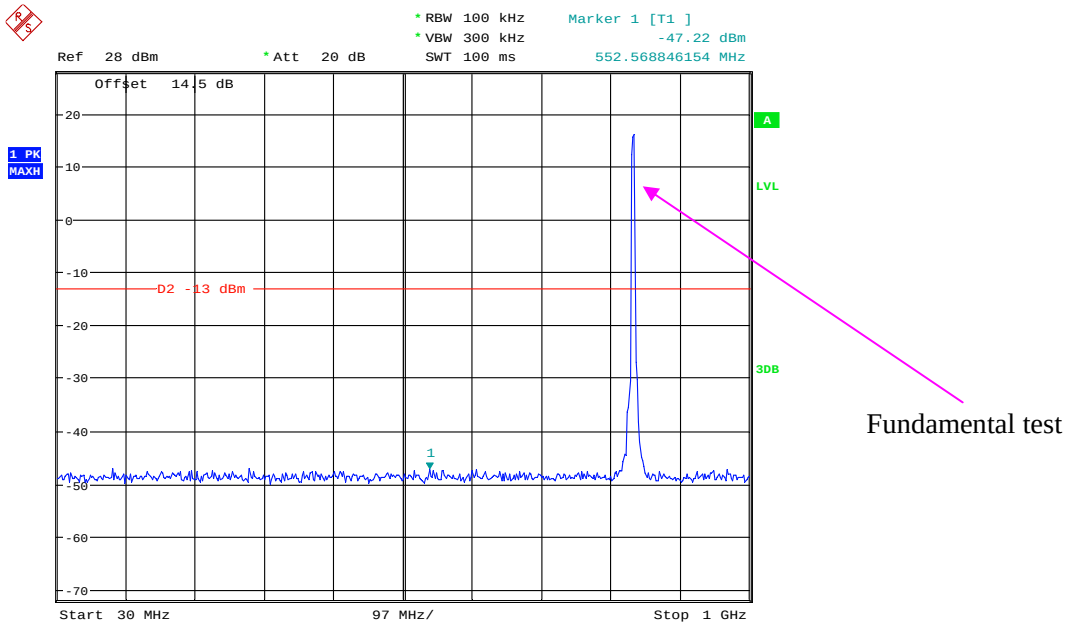
Date: 10.NOV.2018 19:14:50

1 GHz – 10 GHz (GSM Mode)



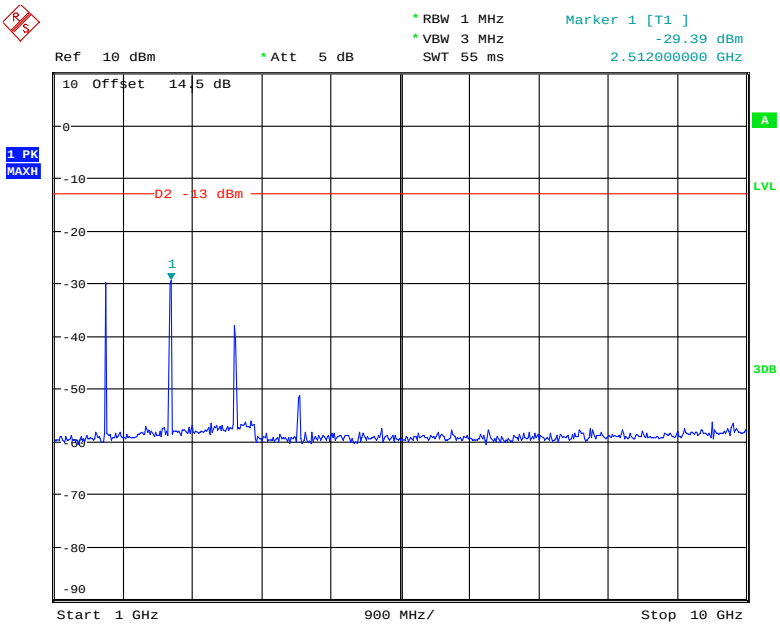
Date: 10.NOV.2018 19:13:06

30 MHz – 1 GHz (WCDMA Mode)



Date: 6.NOV.2018 22:03:15

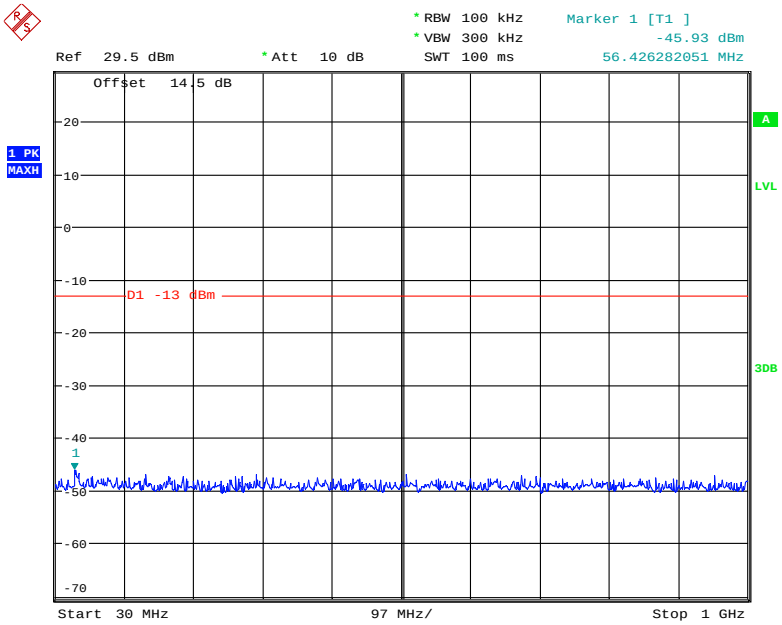
1 GHz – 10 GHz (WCDMA Mode)



Date: 6.NOV.2018 22:04:13

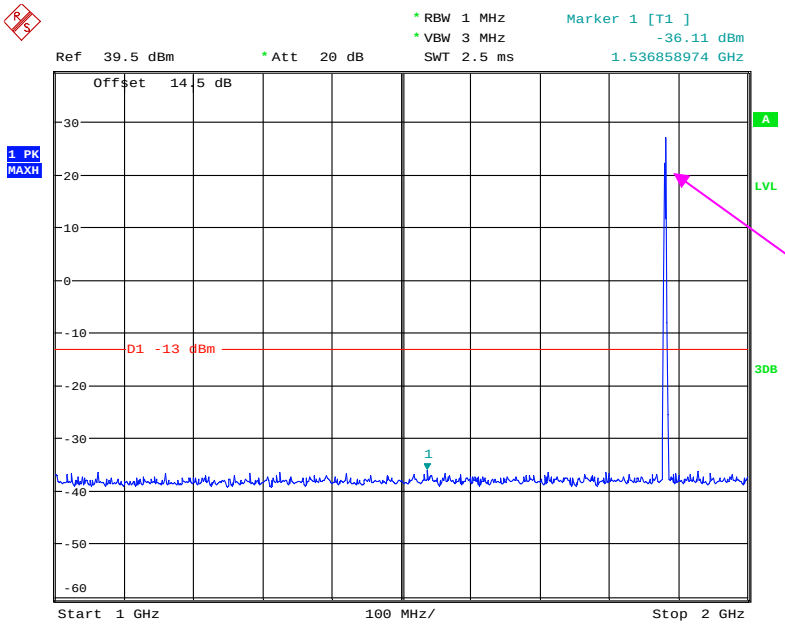
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



Date: 10.NOV.2018 19:08:40

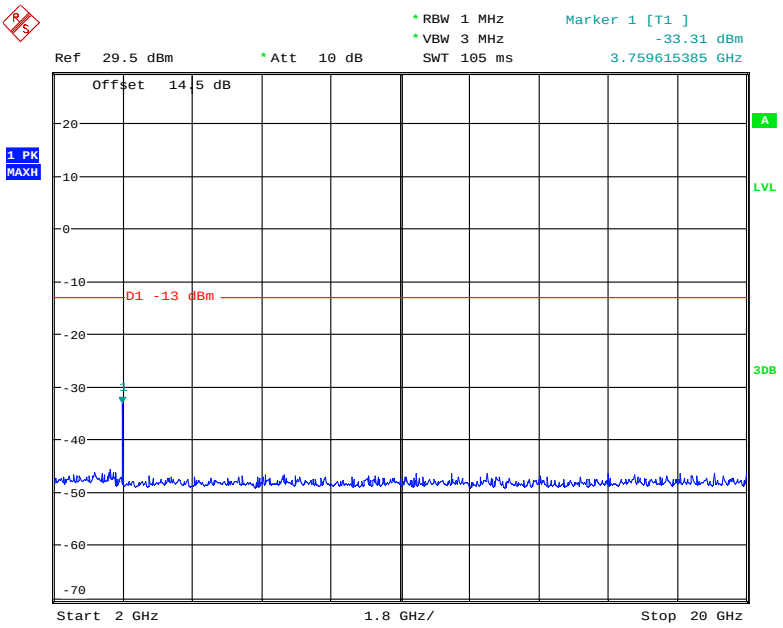
1 GHz – 2 GHz (GSM Mode)



Fundamental test

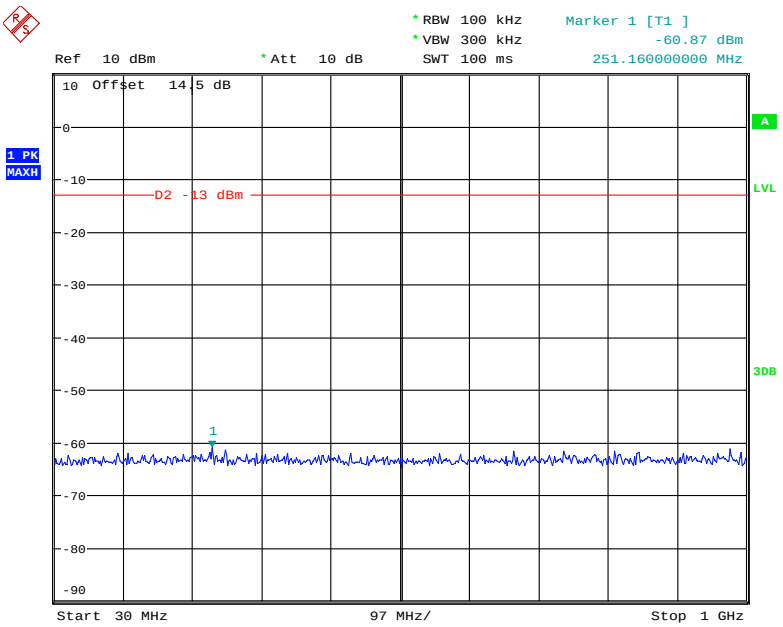
Date: 10.NOV.2018 19:09:47

2 GHz – 20 GHz (GSM Mode)



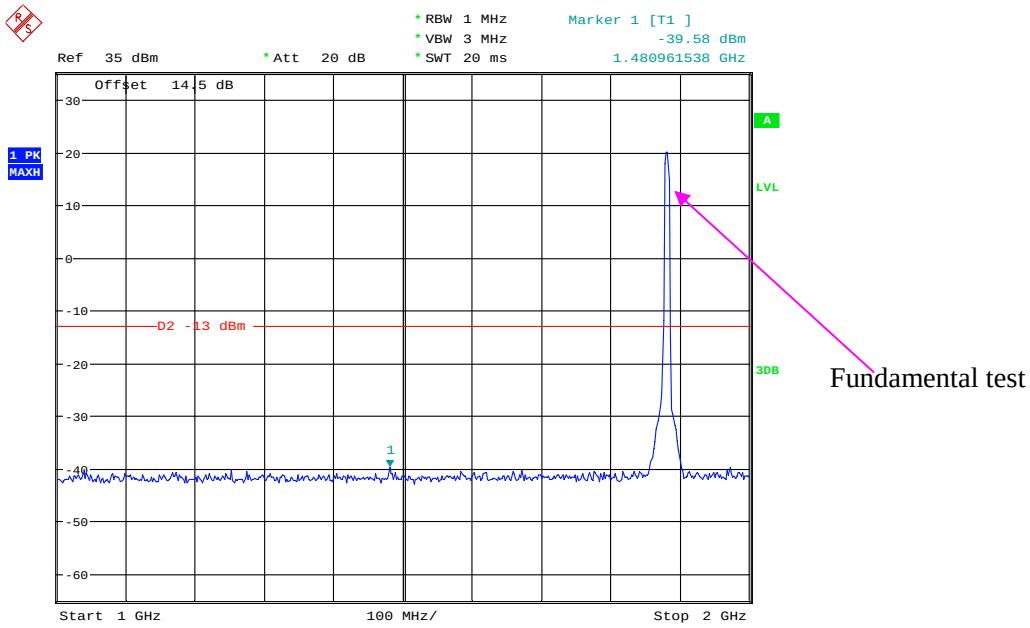
Date: 10.NOV.2018 19:10:46

30 MHz – 1 GHz (WCDMA Mode)



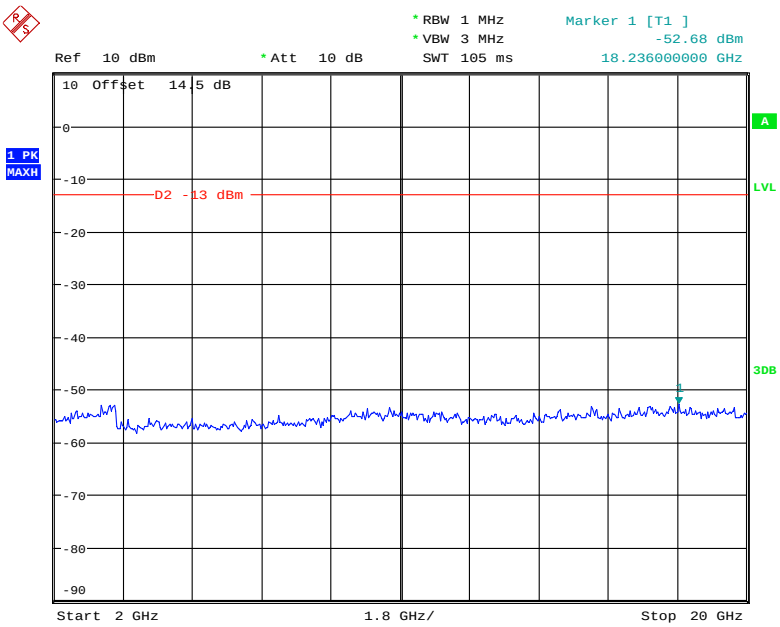
Date: 6.NOV.2018 22:01:47

1 GHz – 2 GHz (WCDMA Mode)



Date: 6.NOV.2018 21:57:17

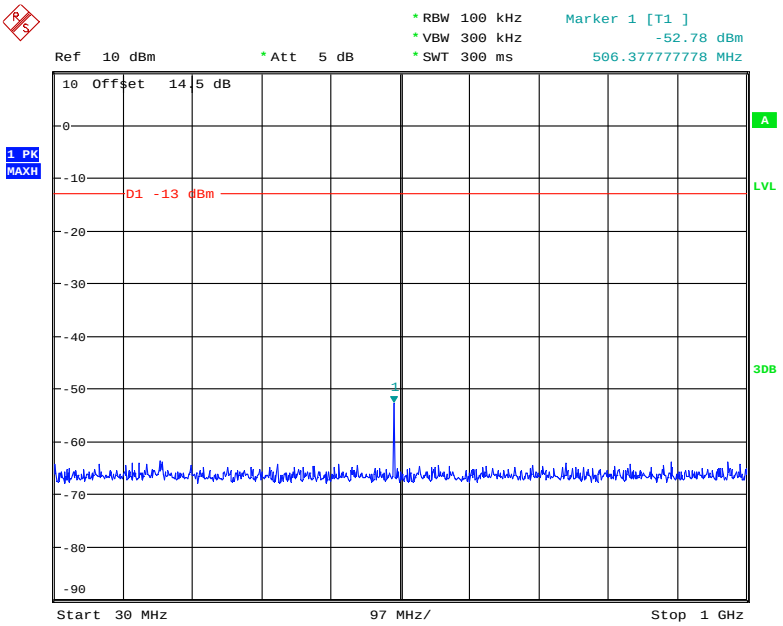
2 GHz – 20 GHz (WCDMA Mode)



Date: 6.NOV.2018 21:59:59

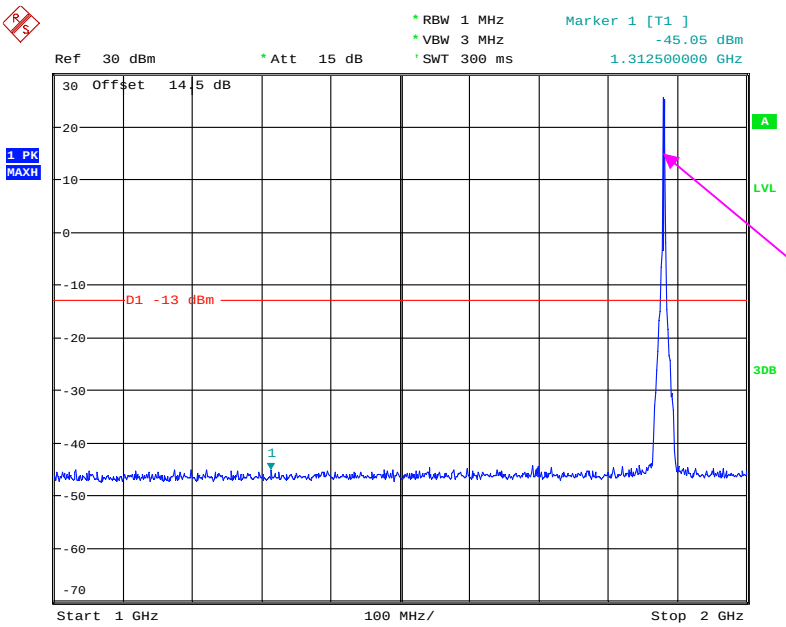
LTE Band 2:

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



Date: 12.NOV.2018 19:36:59

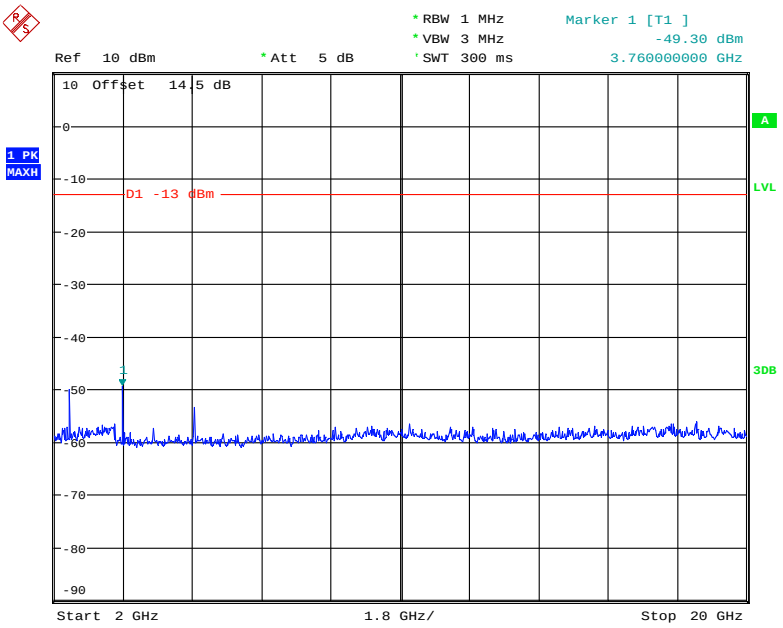
1 GHz – 2 GHz (1.4 MHz, Middle Channel)



Fundamental test

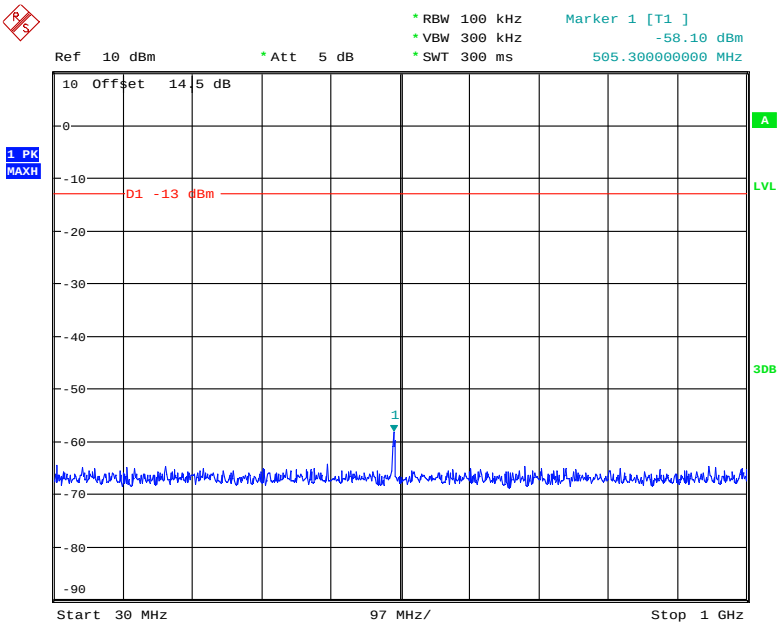
Date: 12.NOV.2018 19:23:05

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



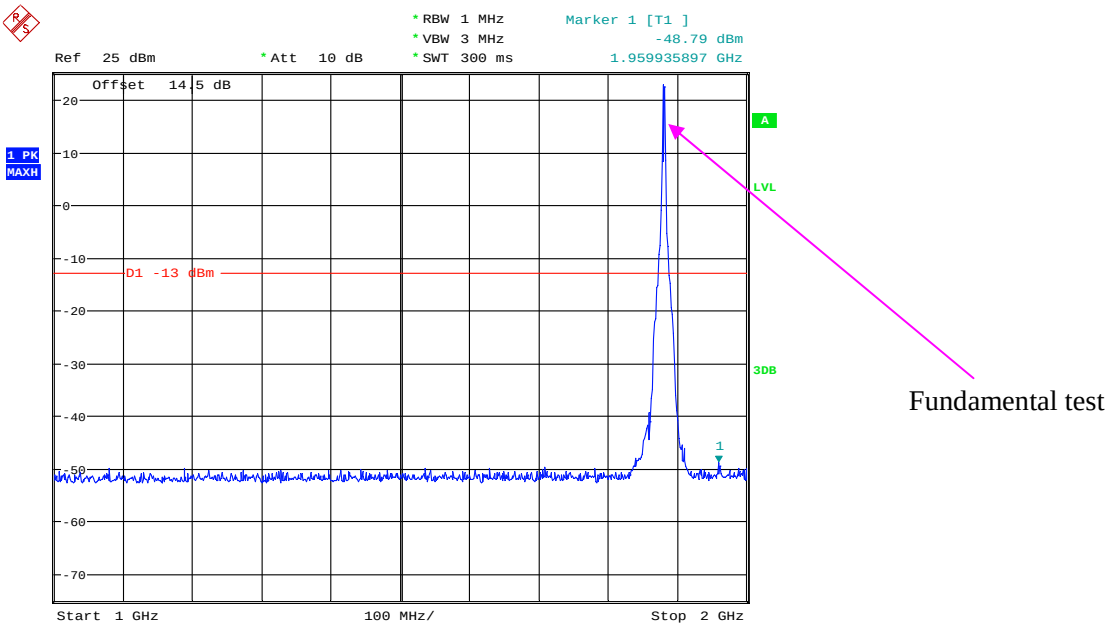
Date: 12.NOV.2018 19:35:38

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



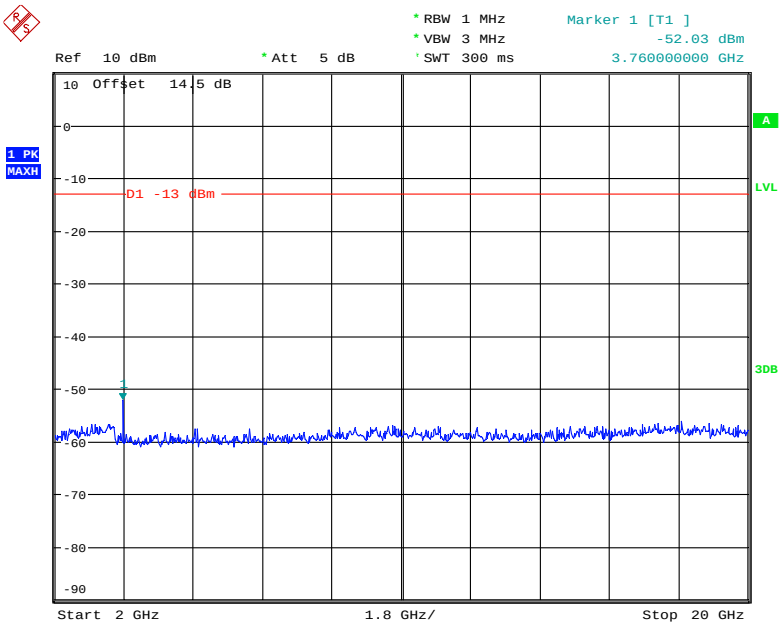
Date: 12.NOV.2018 19:37:33

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



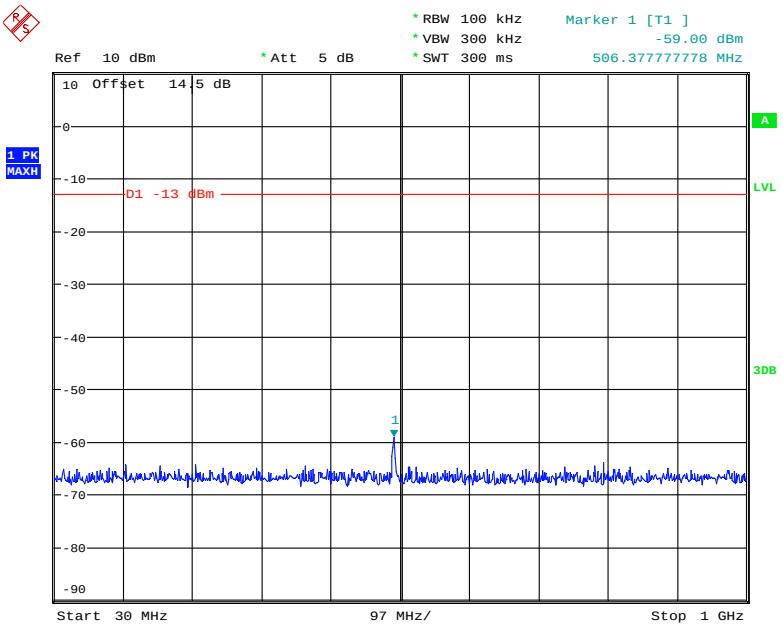
Date: 12.NOV.2018 19:22:13

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



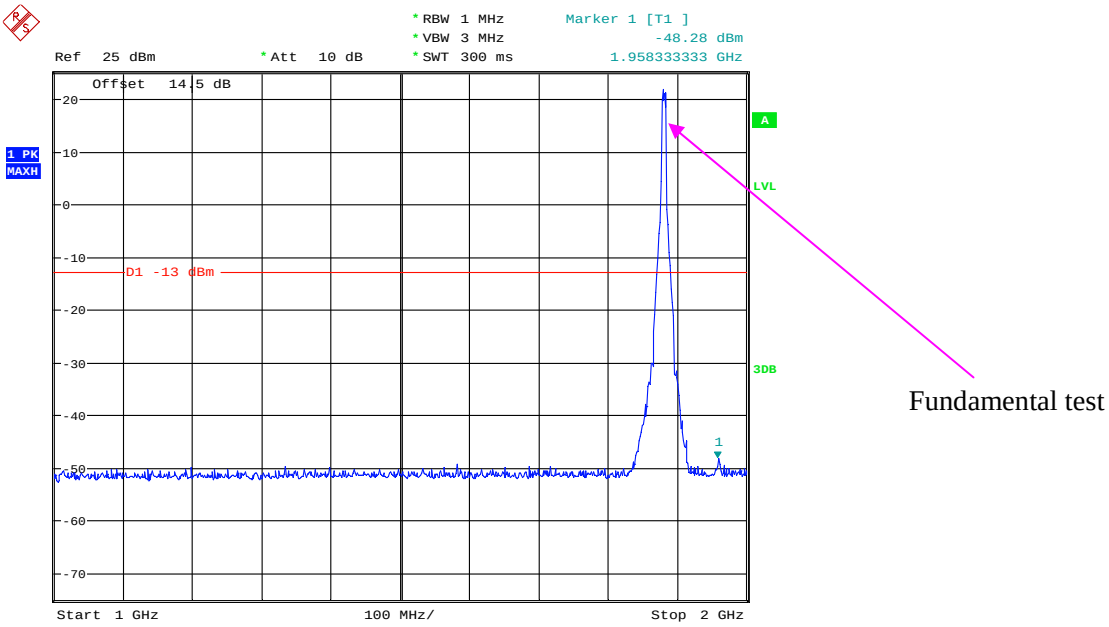
Date: 12.NOV.2018 19:35:24

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



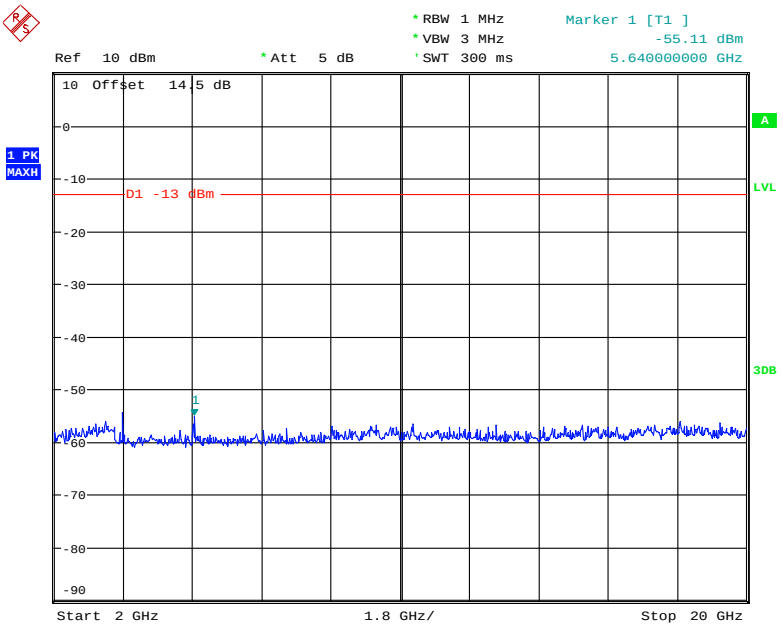
Date: 12.NOV.2018 19:37:50

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



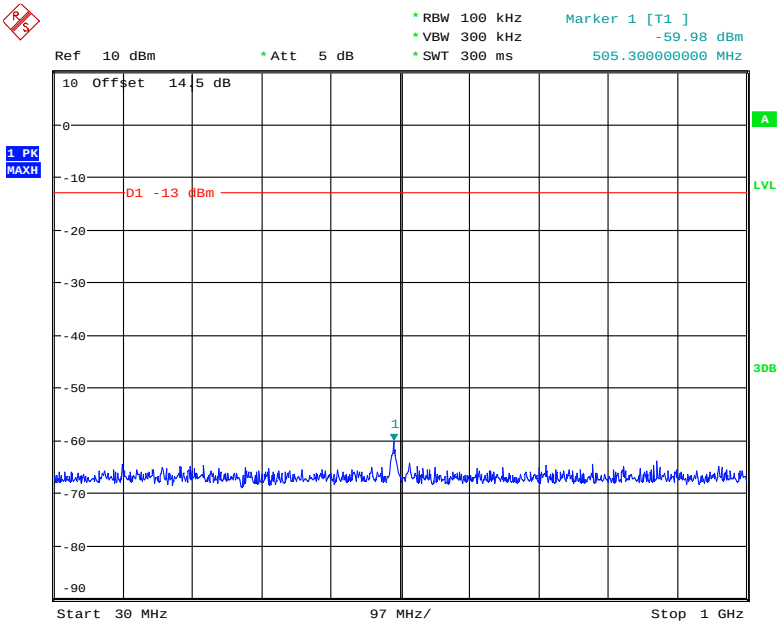
Date: 12.NOV.2018 19:21:18

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



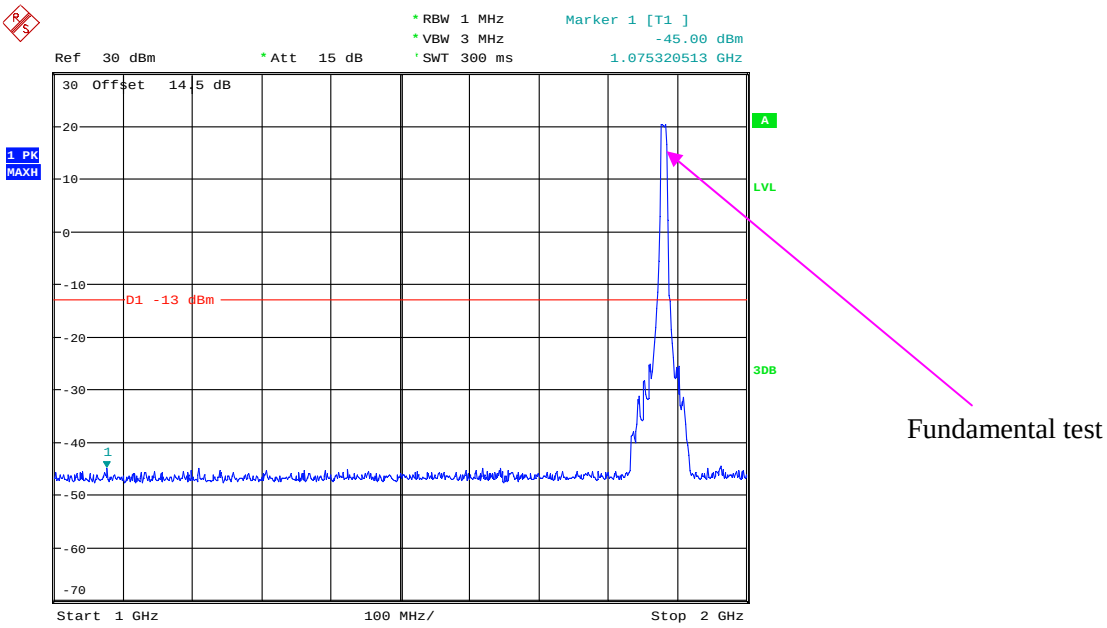
Date: 12.NOV.2018 19:35:06

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



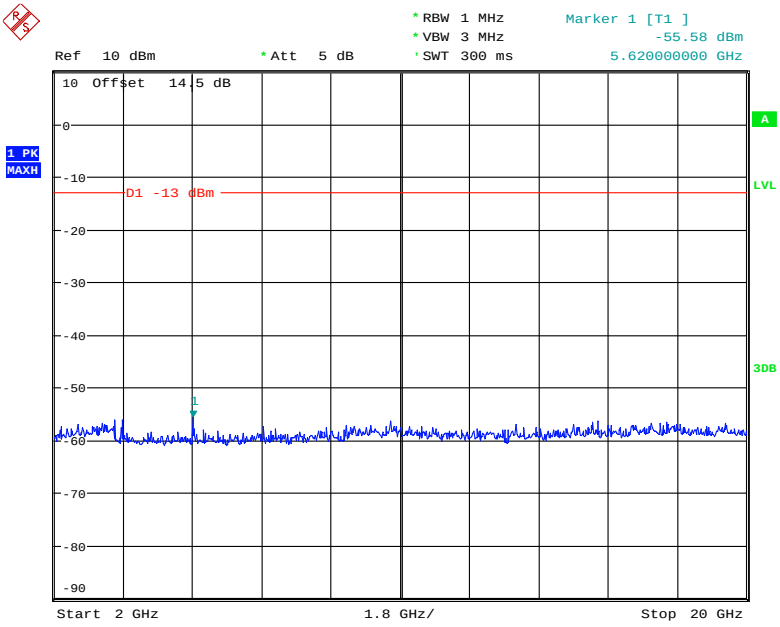
Date: 12.NOV.2018 19:38:05

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



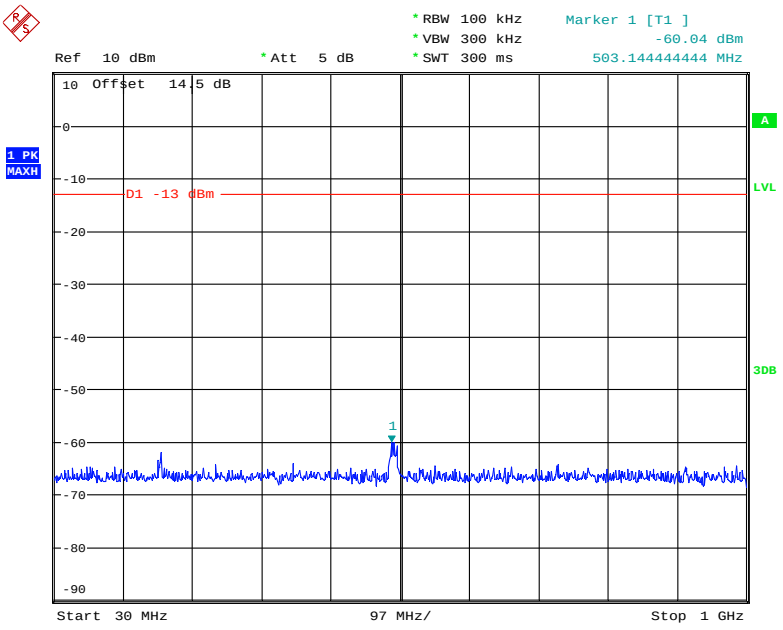
Date: 12.NOV.2018 19:27:06

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



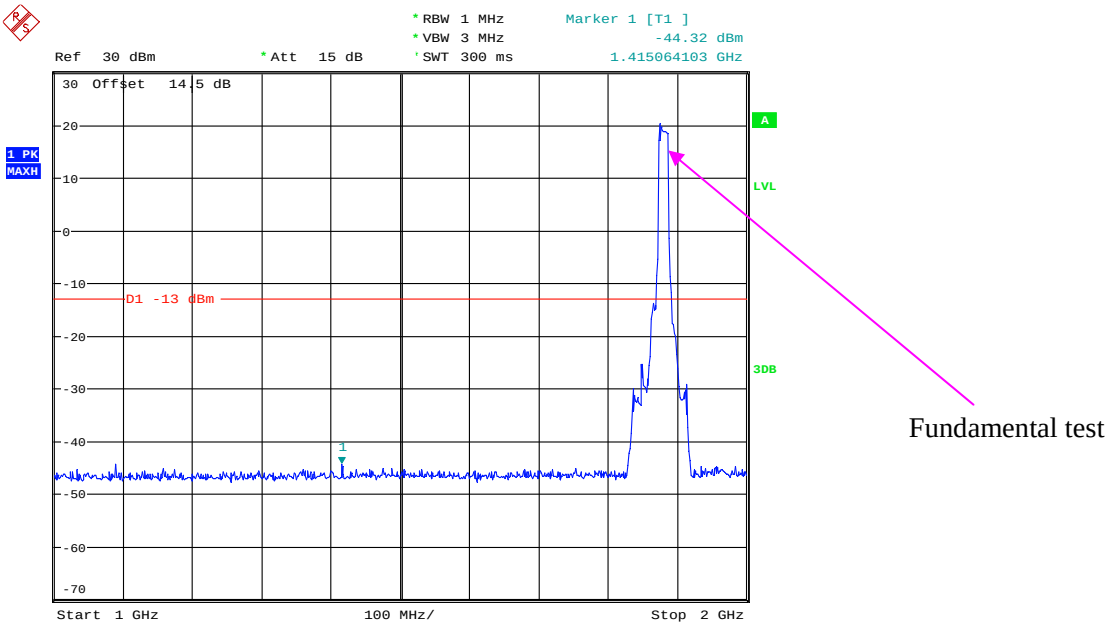
Date: 12.NOV.2018 19:34:44

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



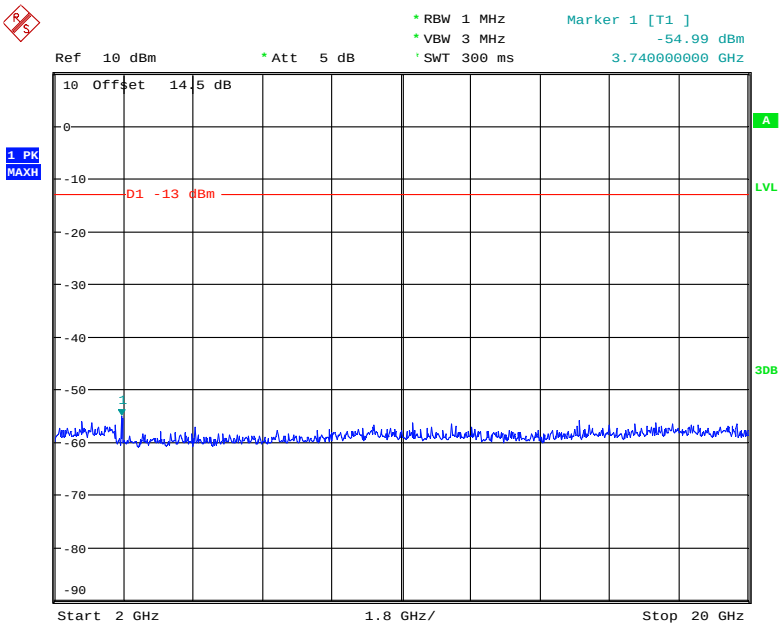
Date: 12.NOV.2018 19:39:55

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



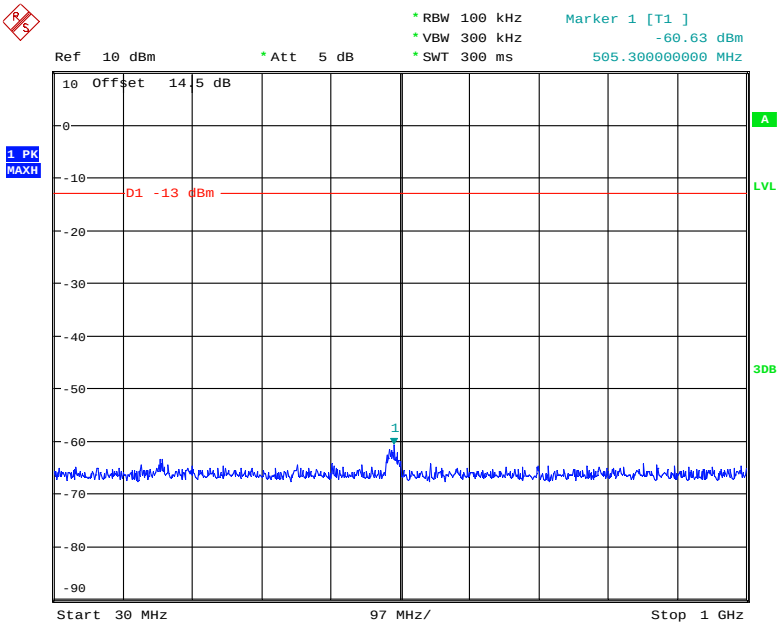
Date: 12.NOV.2018 19:28:41

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



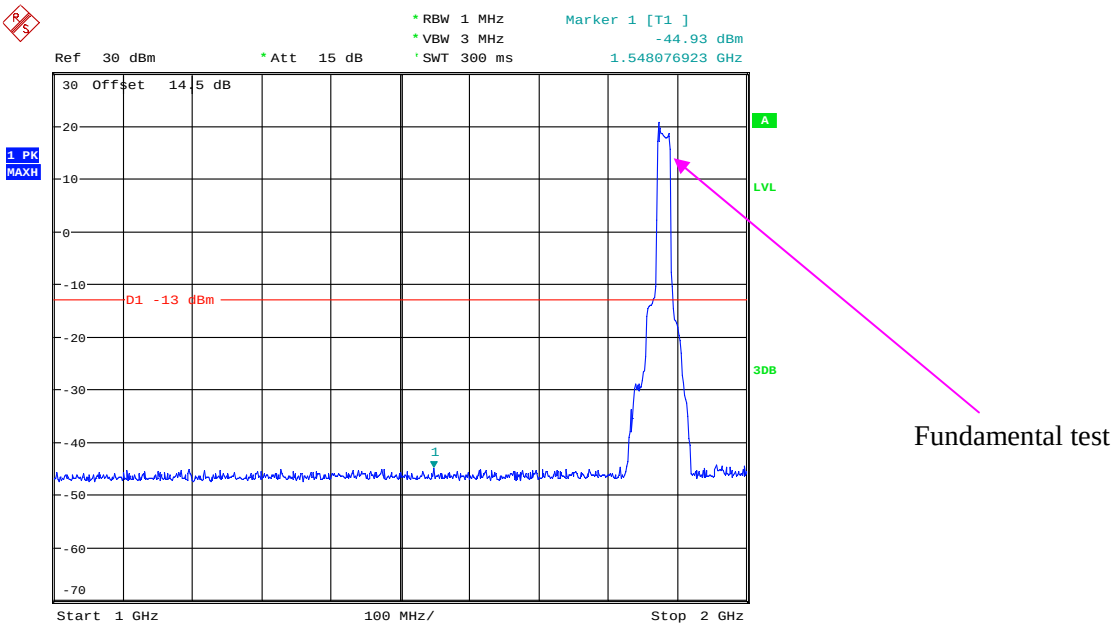
Date: 12.NOV.2018 19:34:28

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



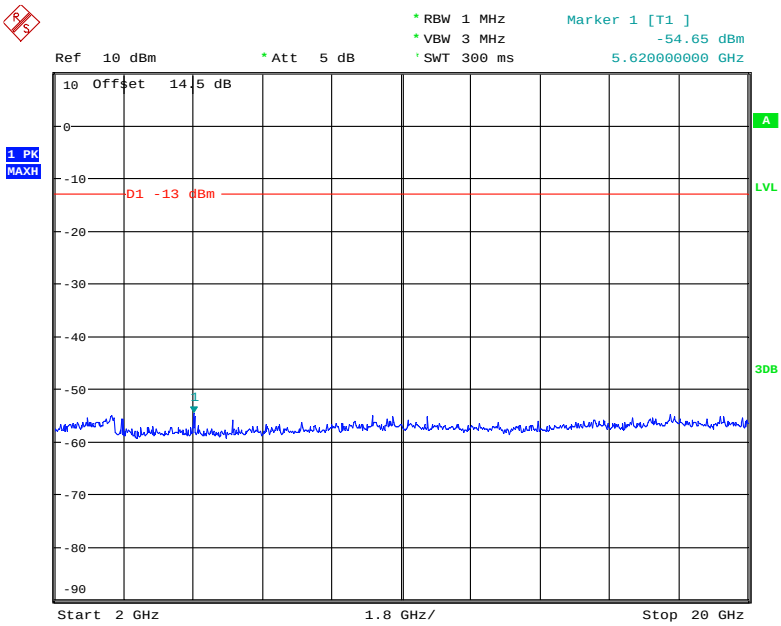
Date: 12.NOV.2018 19:40:18

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



Date: 12.NOV.2018 19:29:33

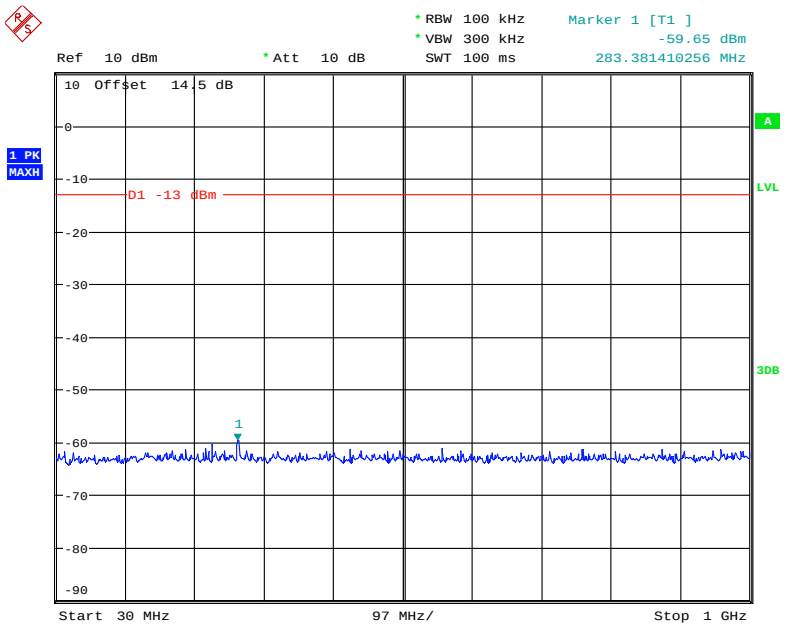
2 GHz – 20 GHz (20.0 MHz, Middle Channel)



Date: 12.NOV.2018 19:33:52

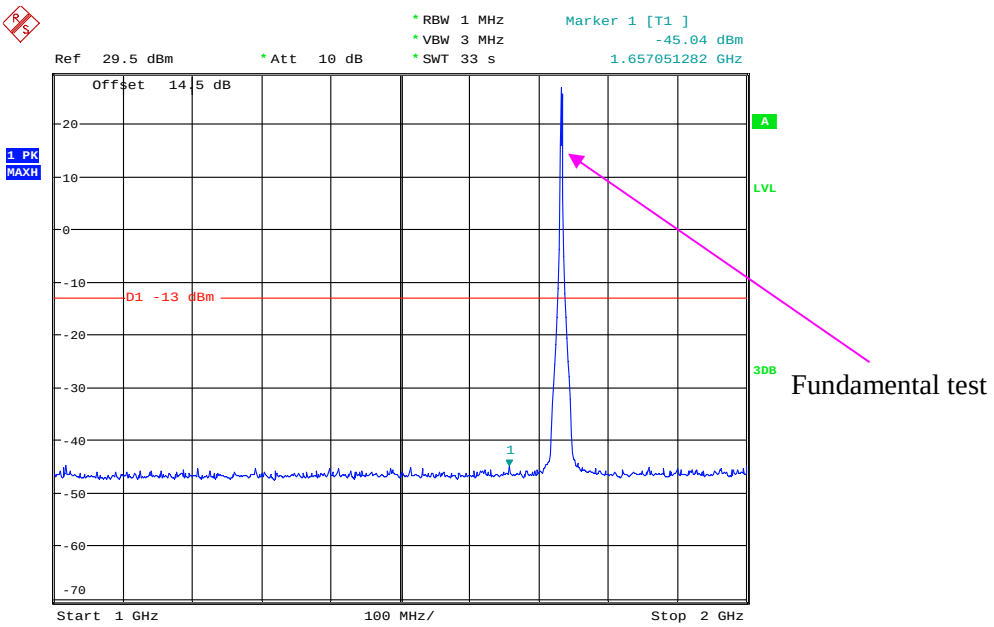
LTE Band 4:

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



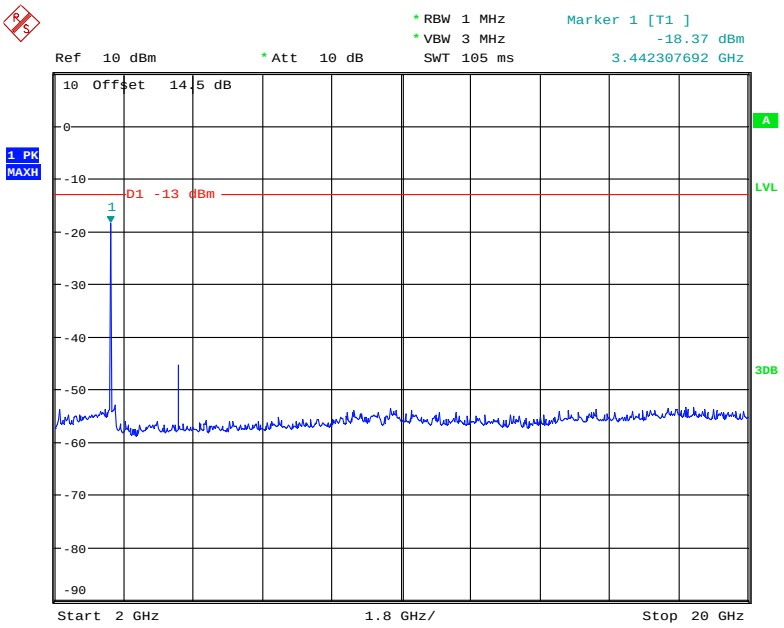
Date: 12.NOV.2018 20:57:48

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



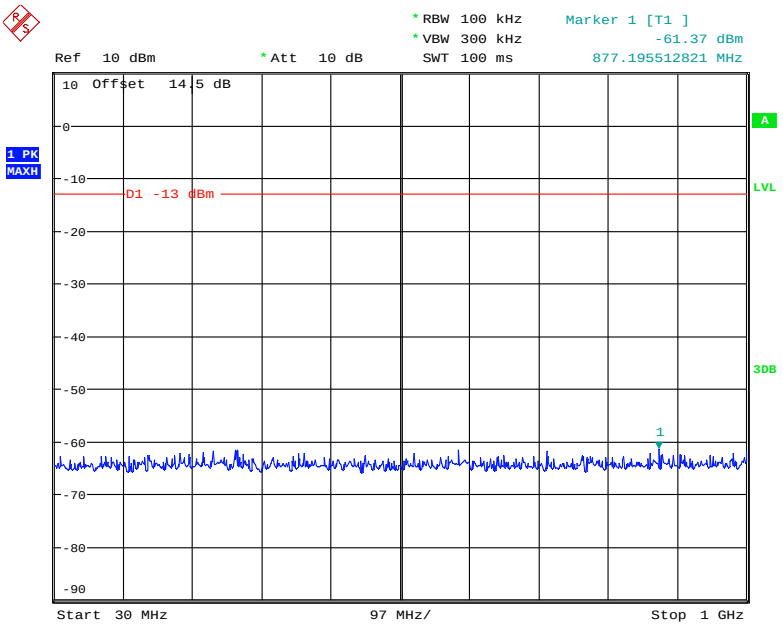
Date: 12.NOV.2018 20:51:33

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



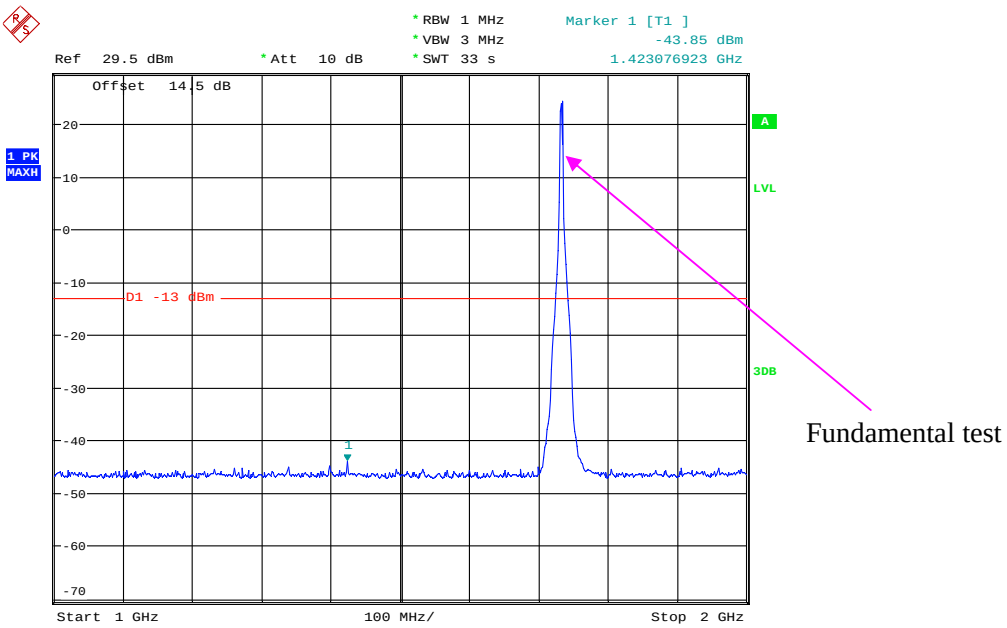
Date: 12.NOV.2018 20:52:48

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



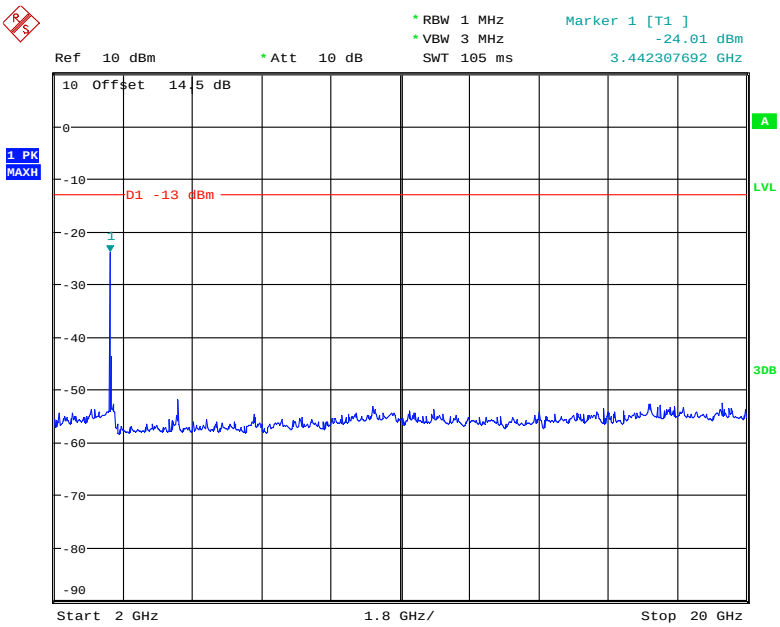
Date: 12.NOV.2018 20:57:17

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



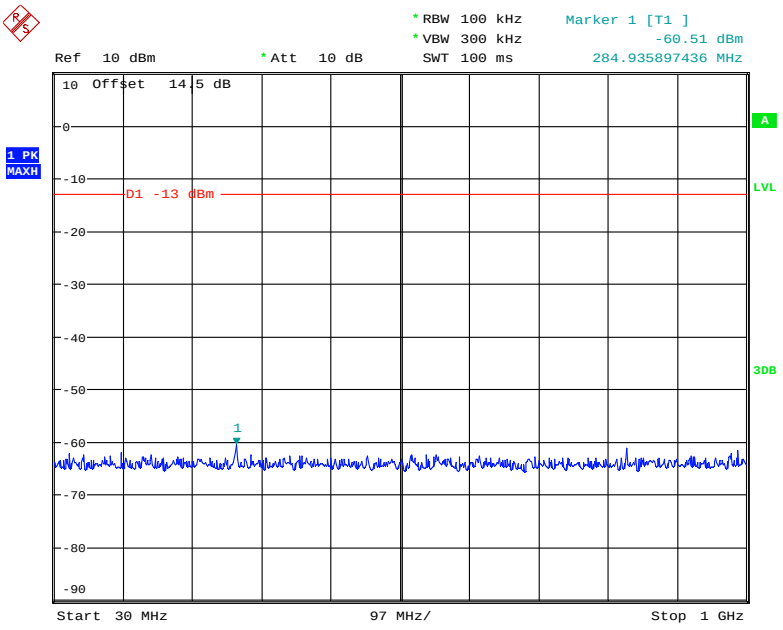
Date: 12.NOV.2018 20:50:38

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



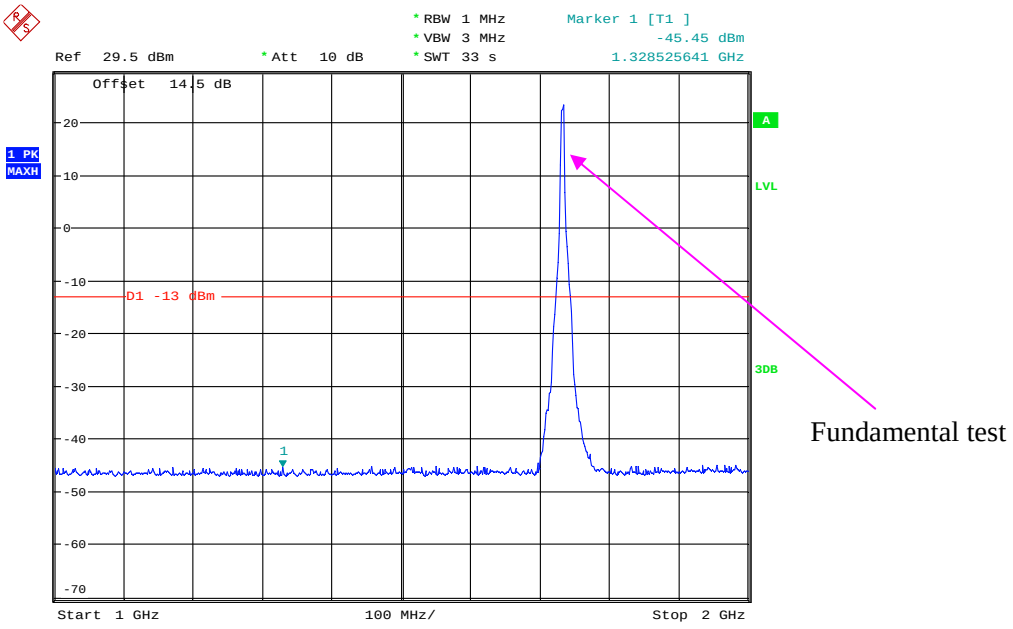
Date: 12.NOV.2018 20:54:15

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



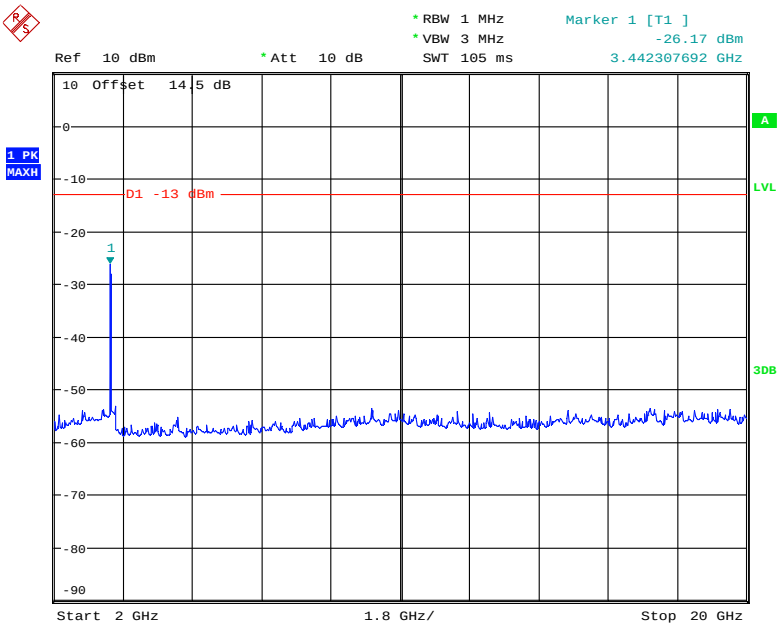
Date: 12.NOV.2018 20:57:06

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



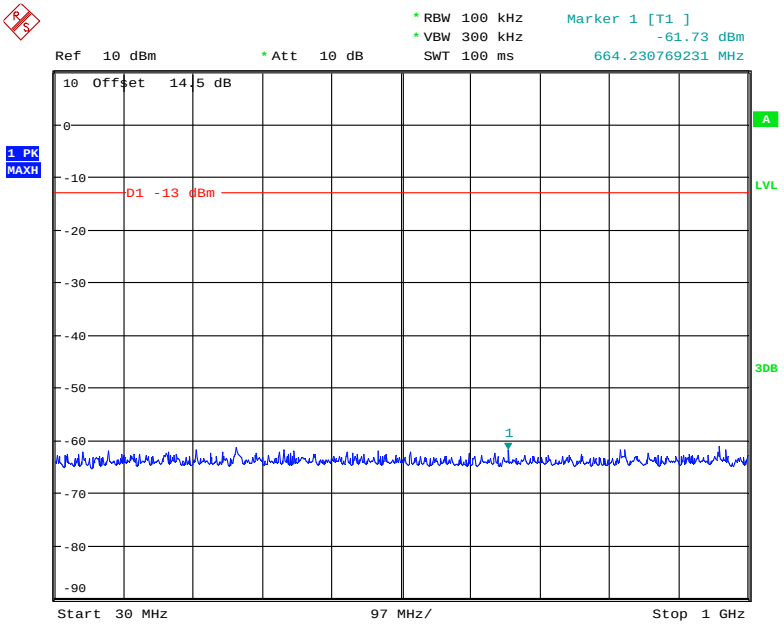
Date: 12.NOV.2018 20:49:29

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



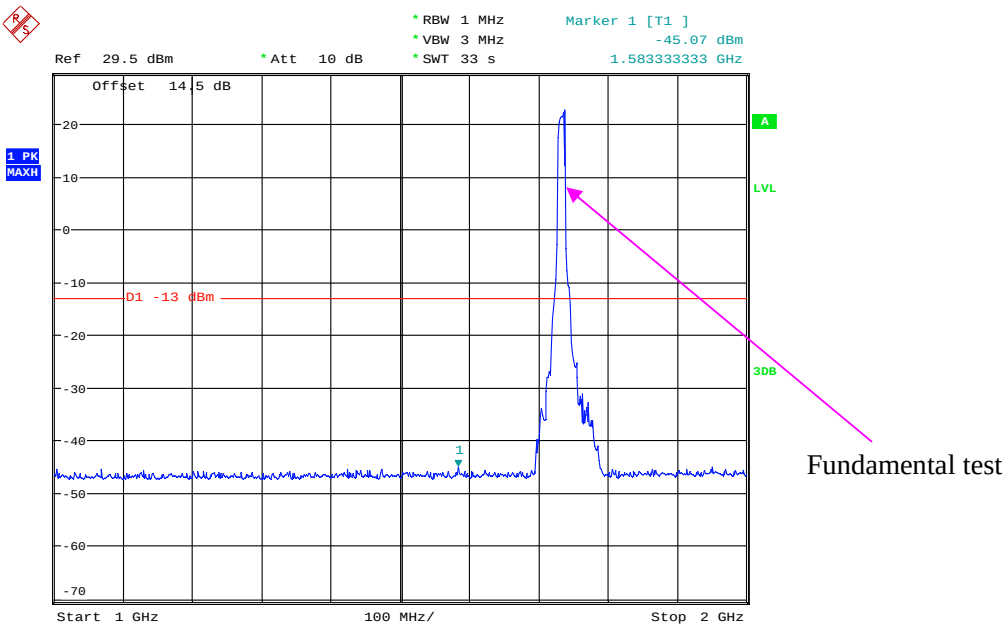
Date: 12.NOV.2018 20:54:36

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



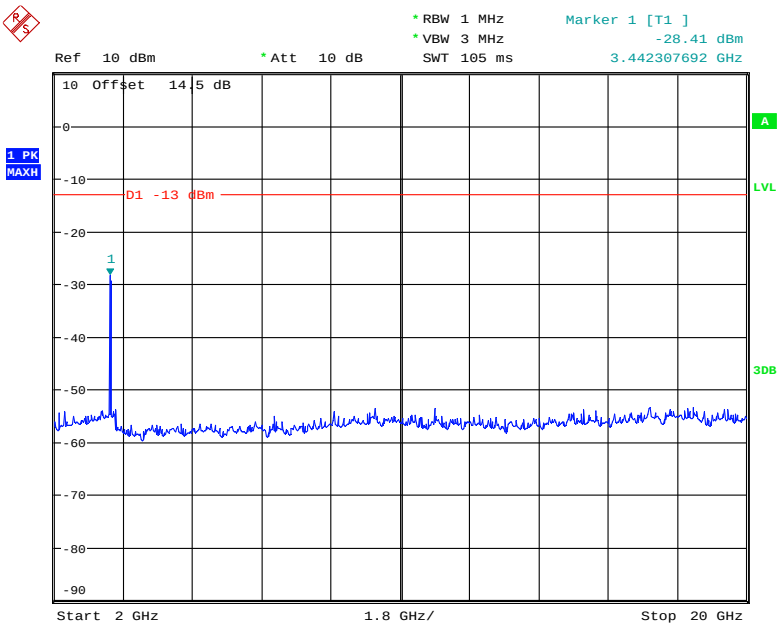
Date: 12.NOV.2018 20:56:51

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



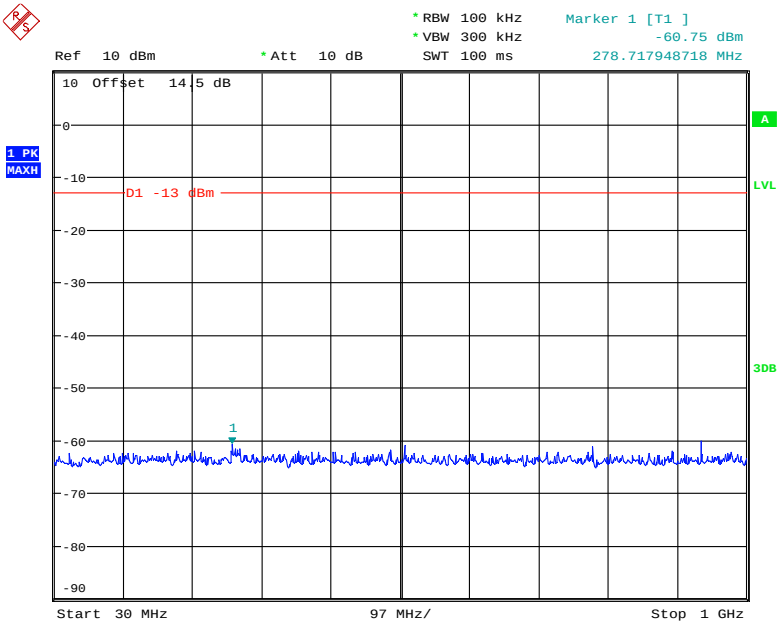
Date: 12.NOV.2018 20:48:01

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



Date: 12.NOV.2018 20:55:00

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



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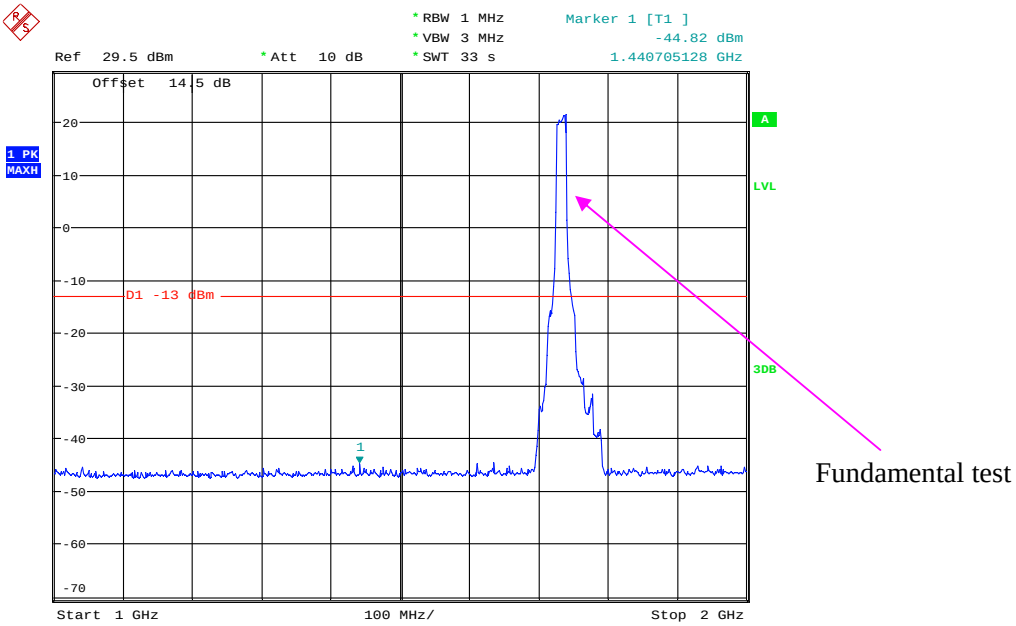
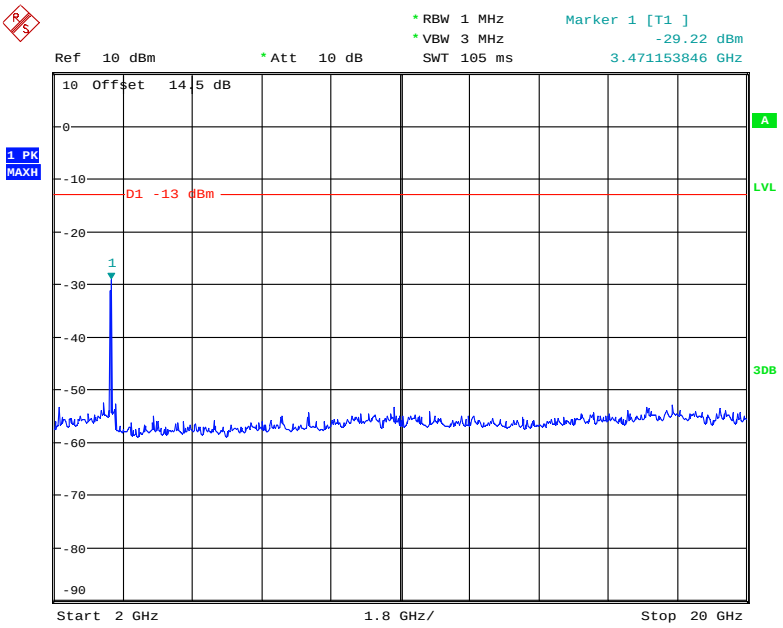
1 GHz – 2 GHz (15.0 MHz, Middle Channel)



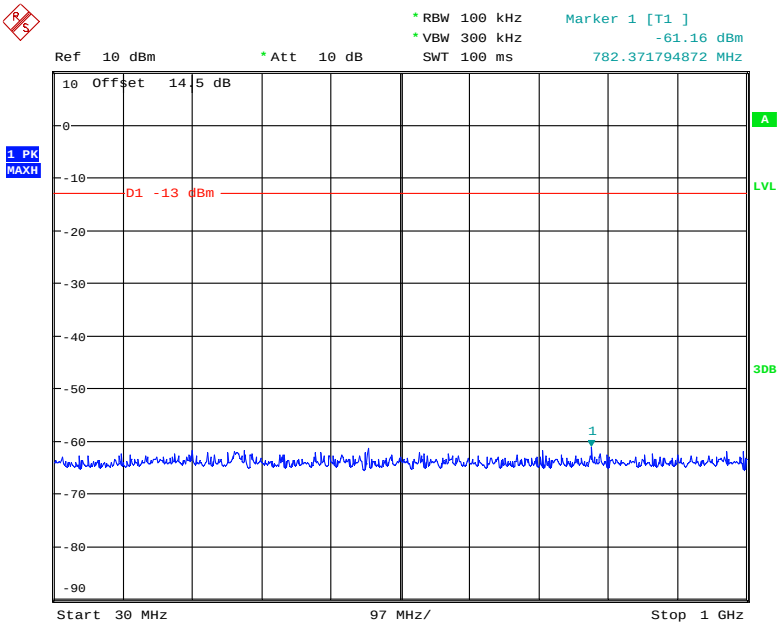
Date: 12.NOV.2018 20:47:08

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



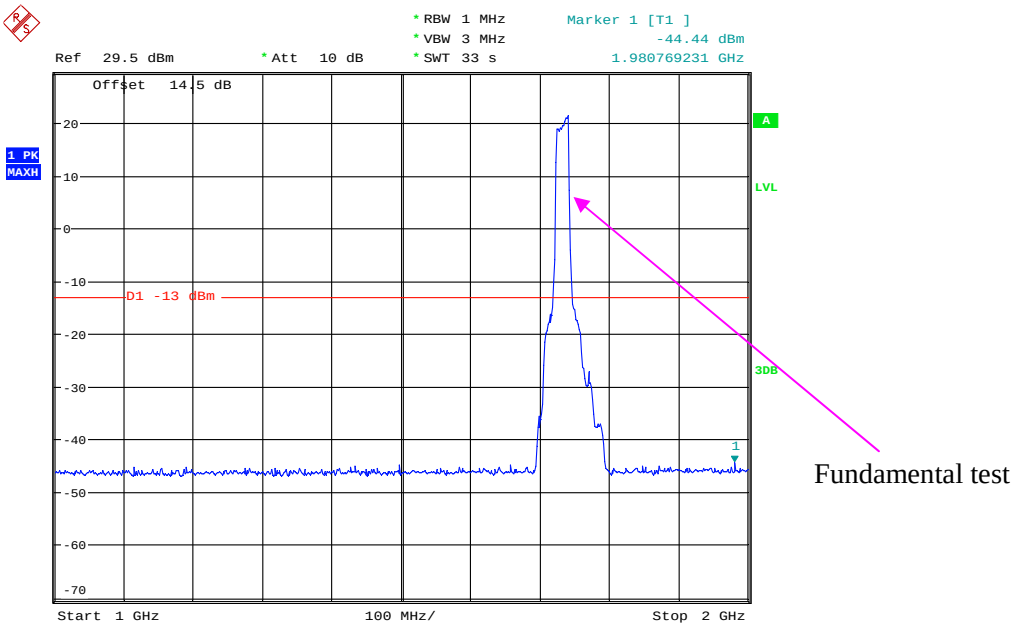
Date: 12.NOV.2018 20:55:19

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



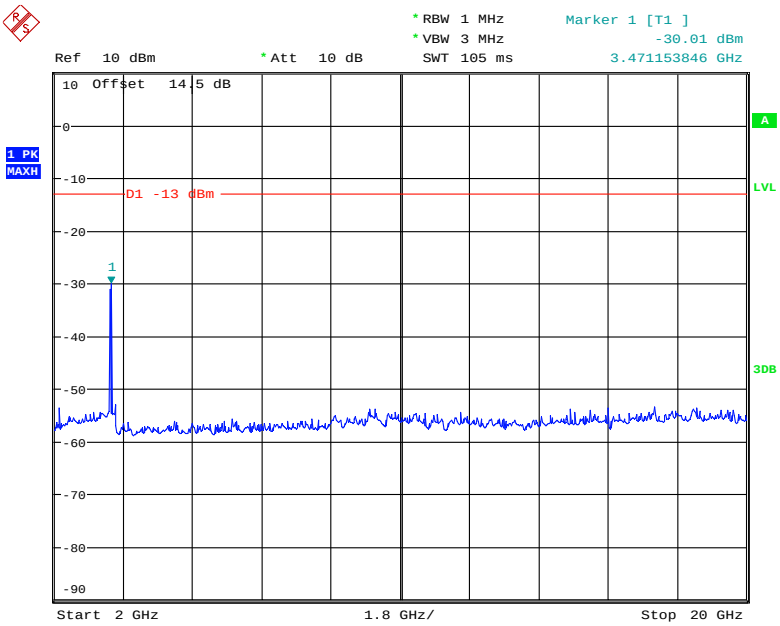
Date: 12.NOV.2018 20:56:05

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



Date: 12.NOV.2018 20:45:38

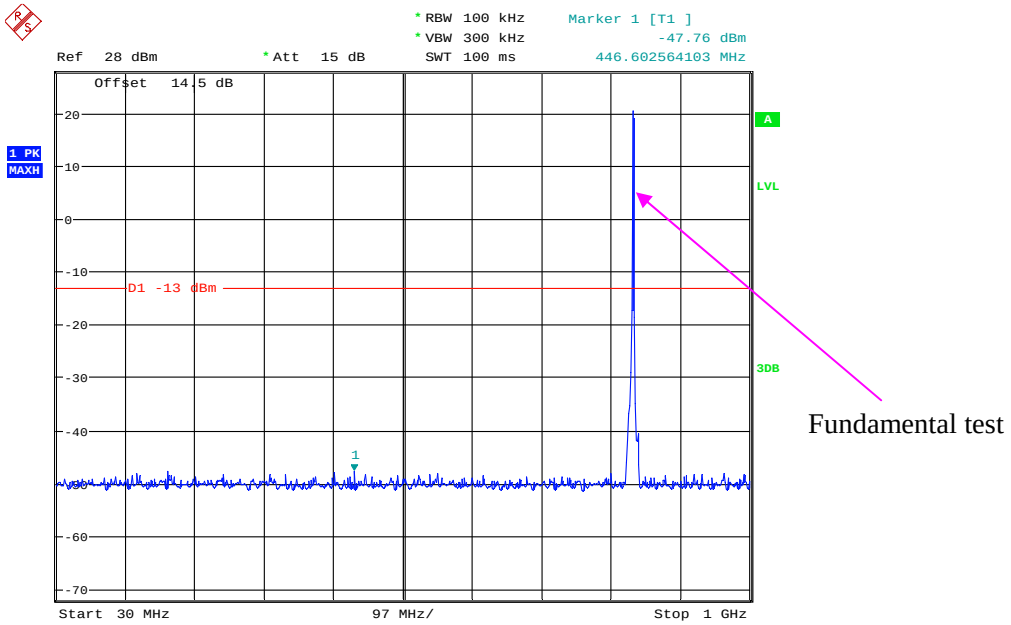
2 GHz – 20 GHz (20.0 MHz, Middle Channel)



Date: 12.NOV.2018 20:55:36

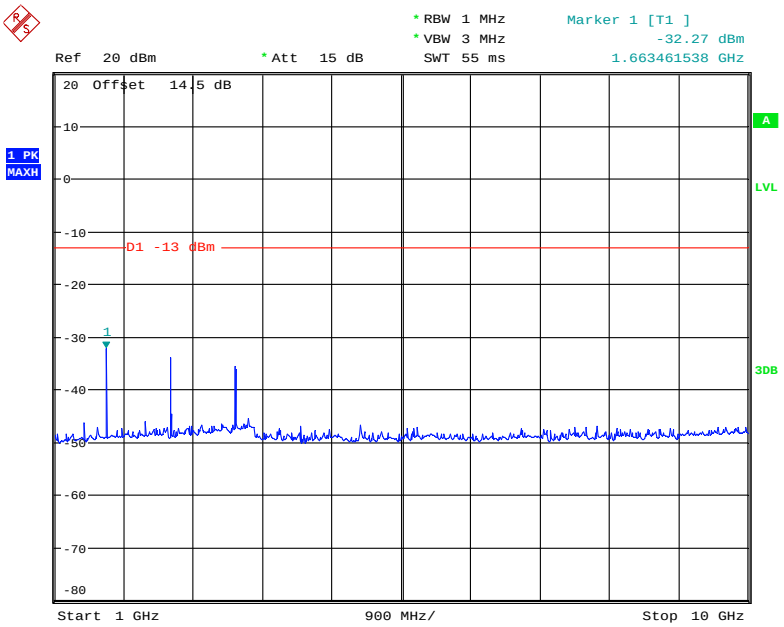
LTE Band 5:

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



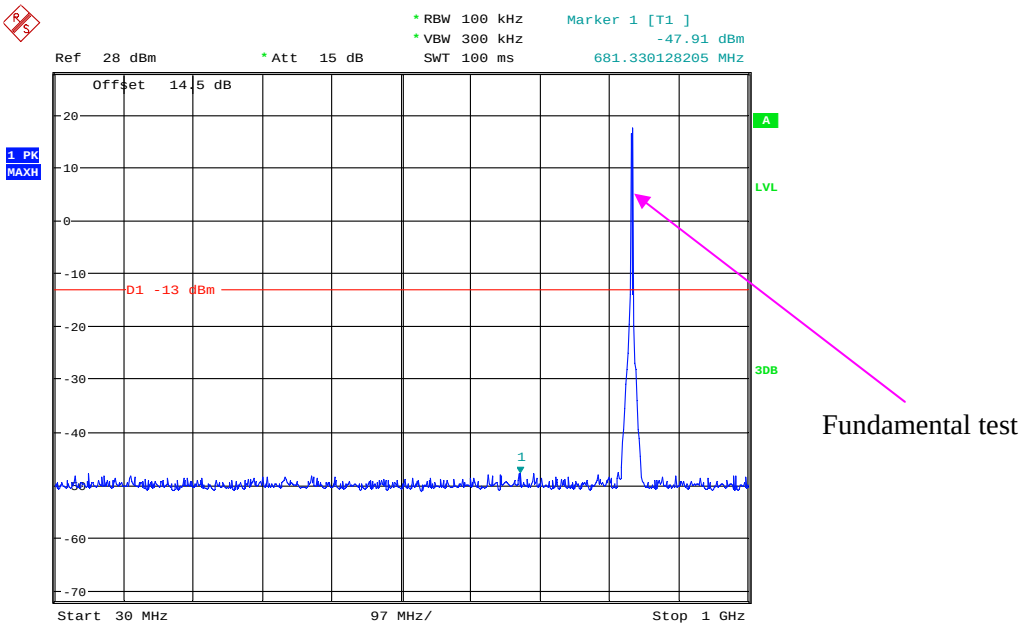
Date: 12.NOV.2018 20:59:49

1 GHz – 10 GHz (1.4 MHz, Middle Channel)



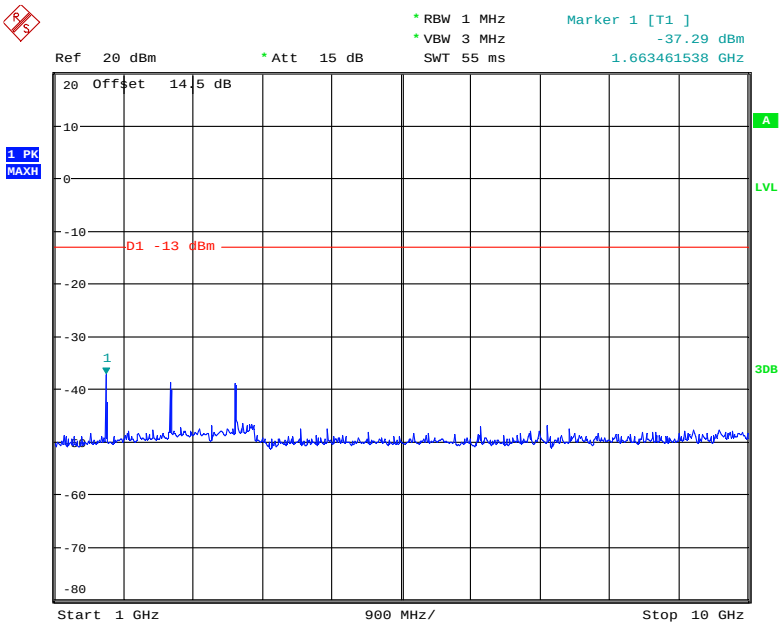
Date: 12.NOV.2018 21:01:06

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



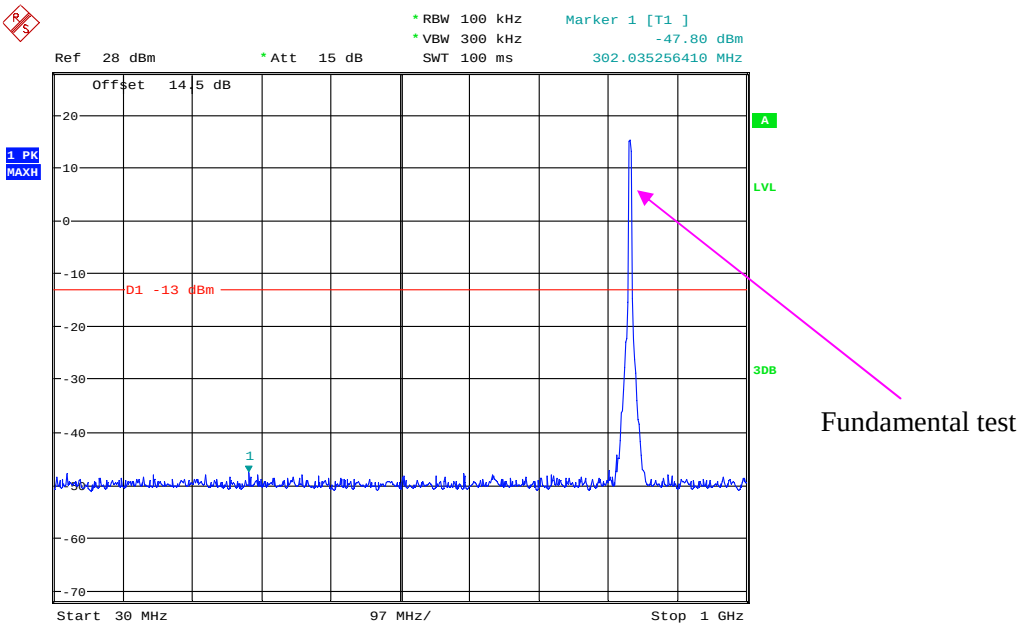
Date: 12.NOV.2018 20:59:30

1 GHz – 10 GHz (3.0 MHz, Middle Channel)



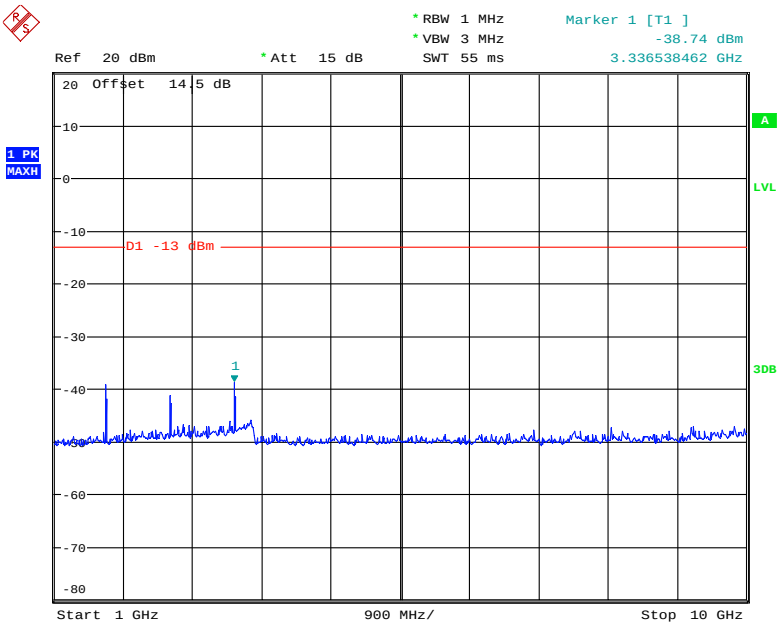
Date: 12.NOV.2018 21:01:25

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



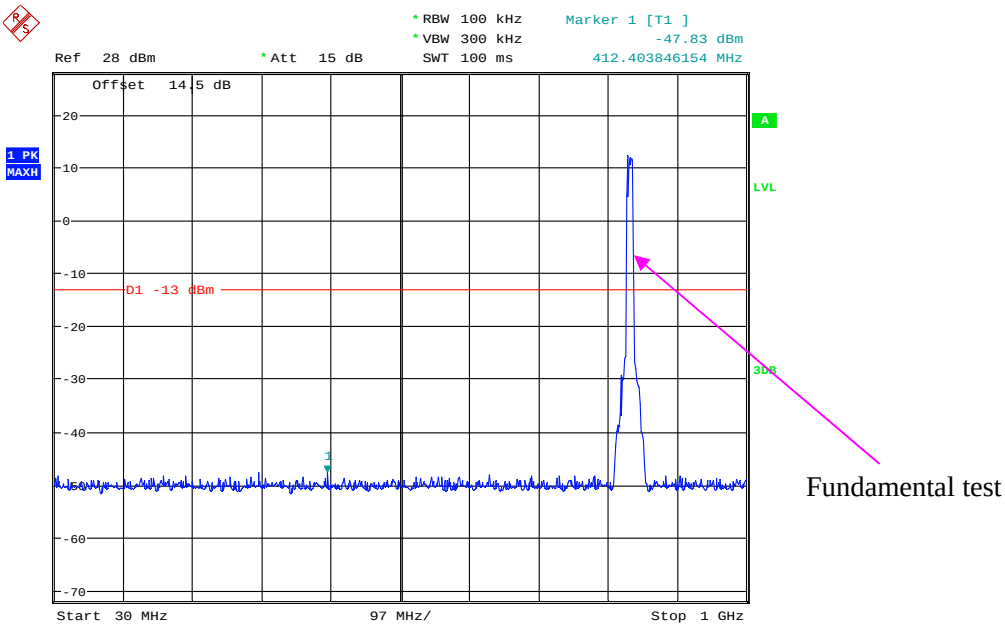
Date: 12.NOV.2018 20:58:35

1 GHz – 10 GHz (5.0 MHz, Middle Channel)



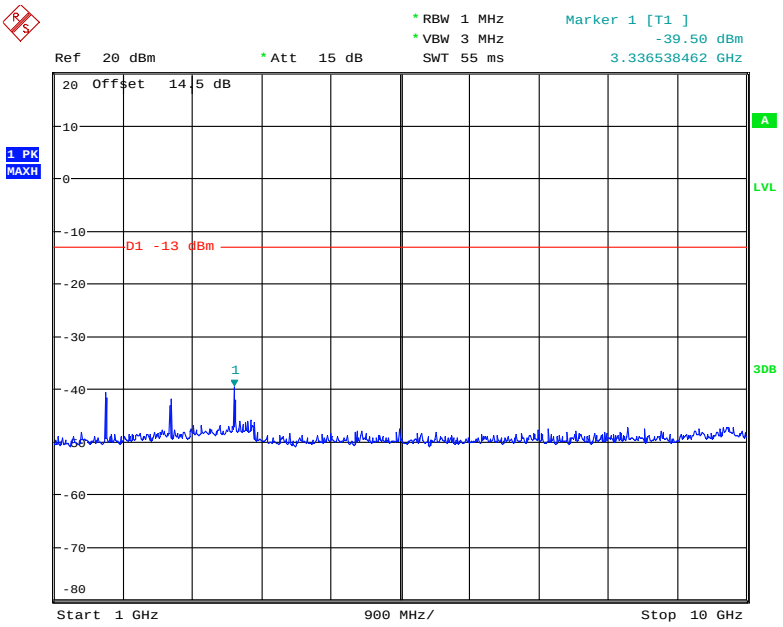
Date: 12.NOV.2018 21:01:47

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



Date: 12.NOV.2018 20:59:04

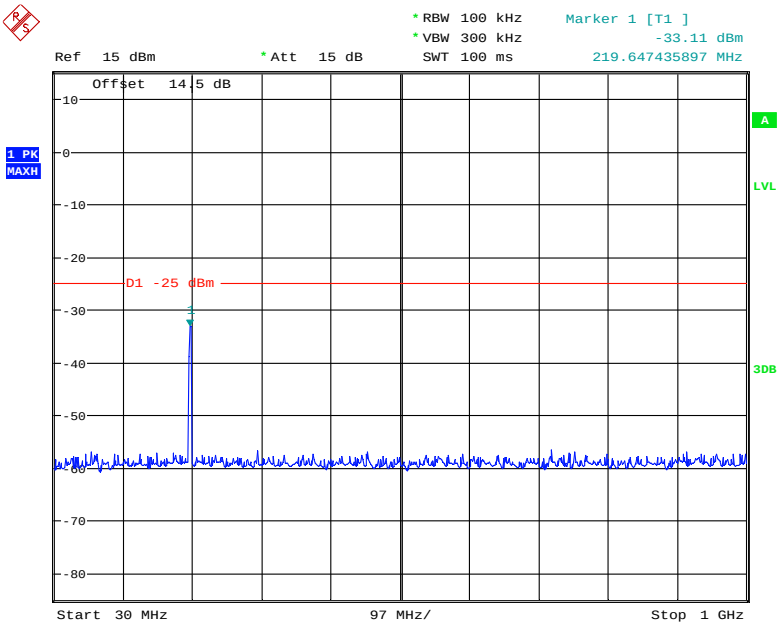
1 GHz – 10 GHz (10.0 MHz, Middle Channel)



Date: 12.NOV.2018 21:02:05

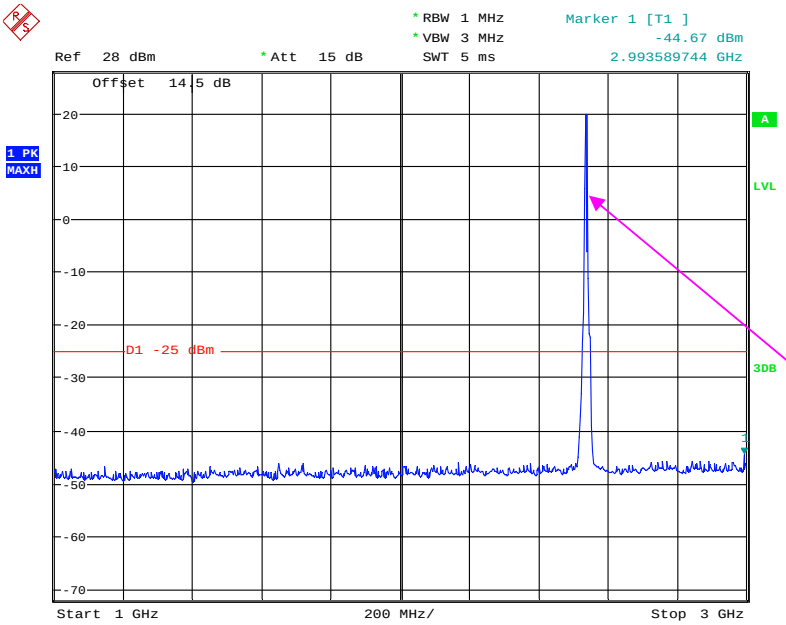
LTE Band 7:

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



Date: 12.NOV.2018 21:11:48

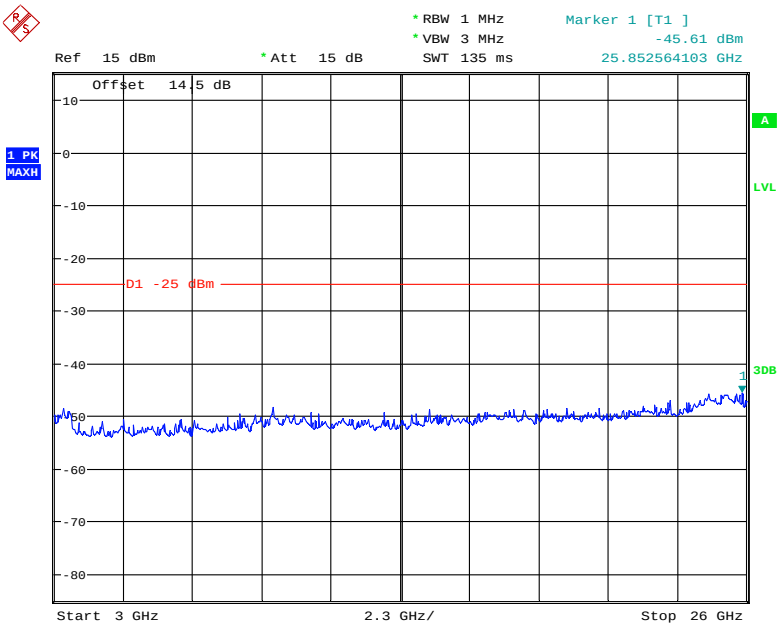
1 GHz – 3 GHz (5.0 MHz, Middle Channel)



Fundamental test

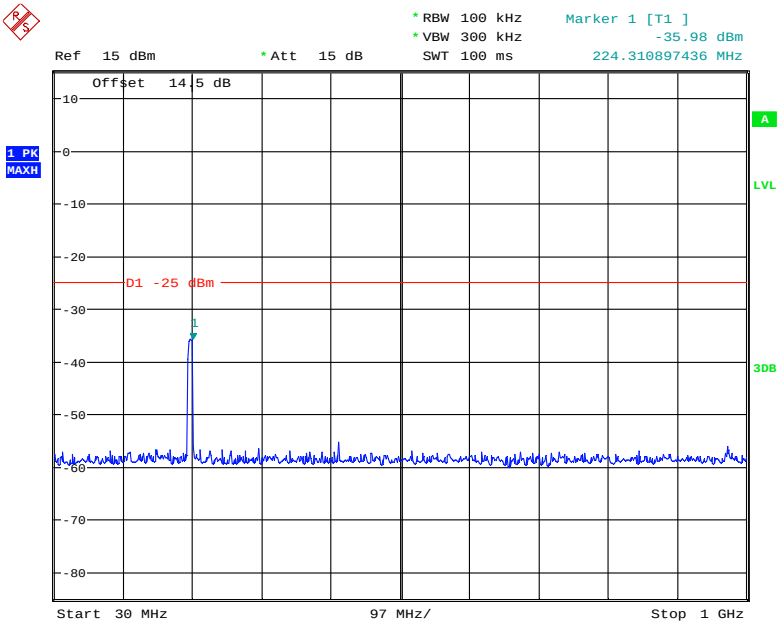
Date: 12.NOV.2018 21:06:09

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



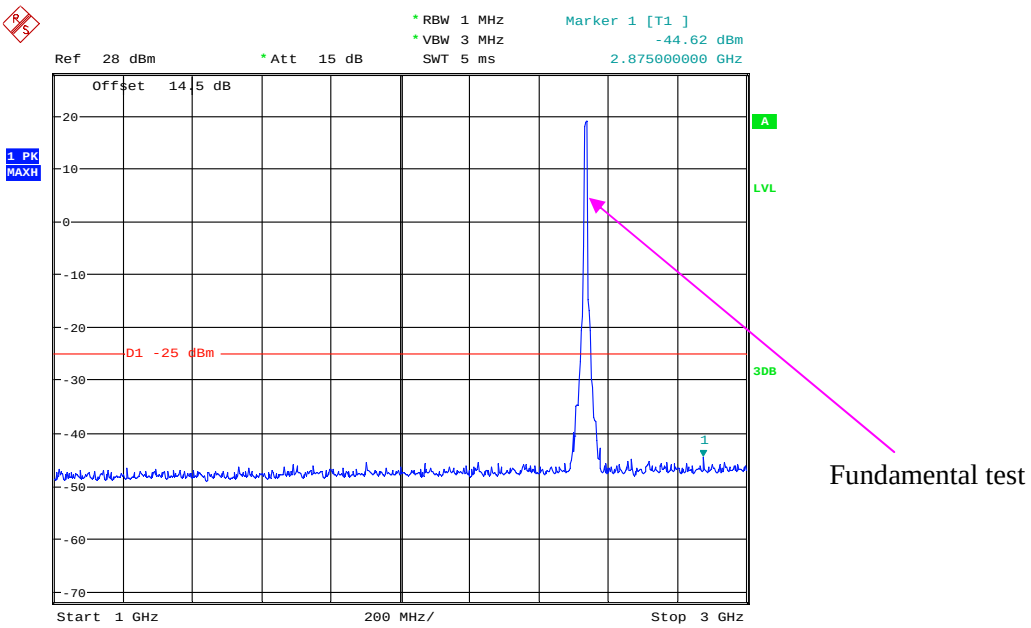
Date: 12.NOV.2018 21:10:15

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



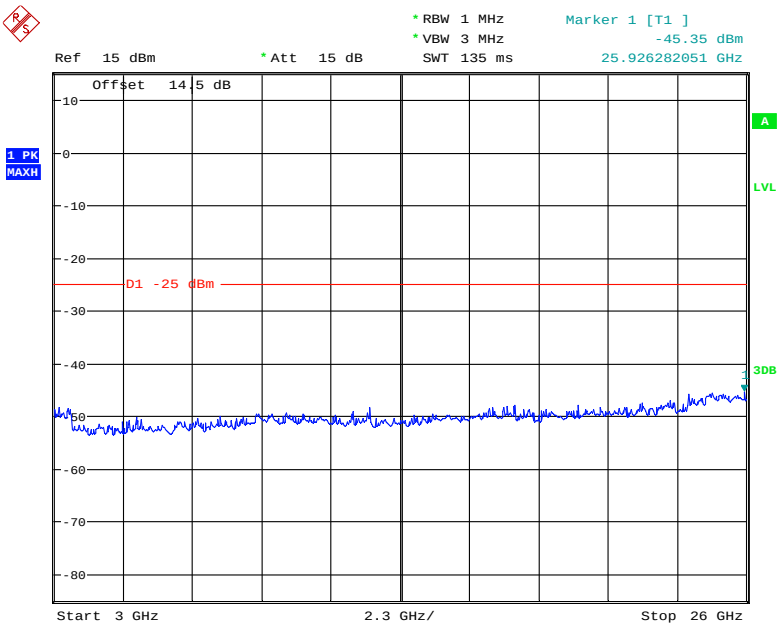
Date: 12.NOV.2018 21:11:10

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



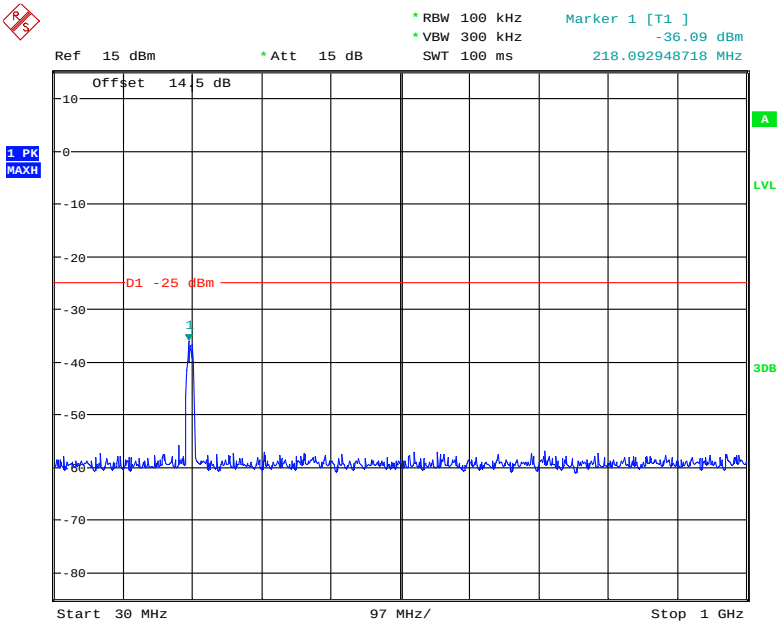
Date: 12.NOV.2018 21:04:47

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



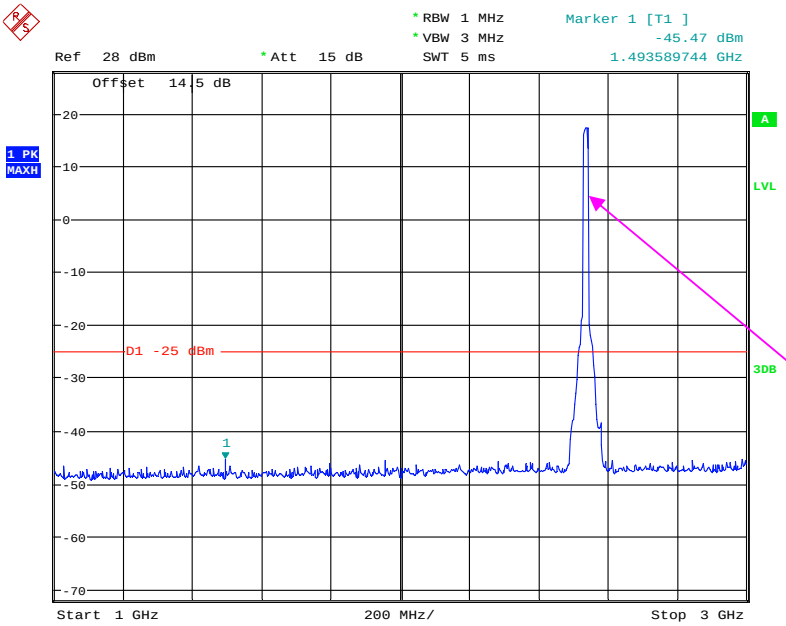
Date: 12.NOV.2018 21:09:59

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



Date: 12.NOV.2018 21:12:09

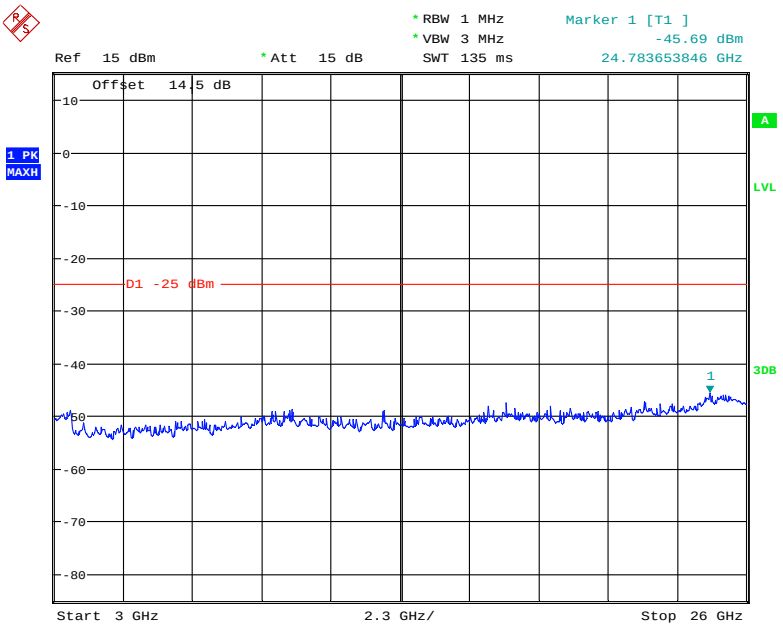
1 GHz – 3 GHz (15.0 MHz, Middle Channel)



Fundamental test

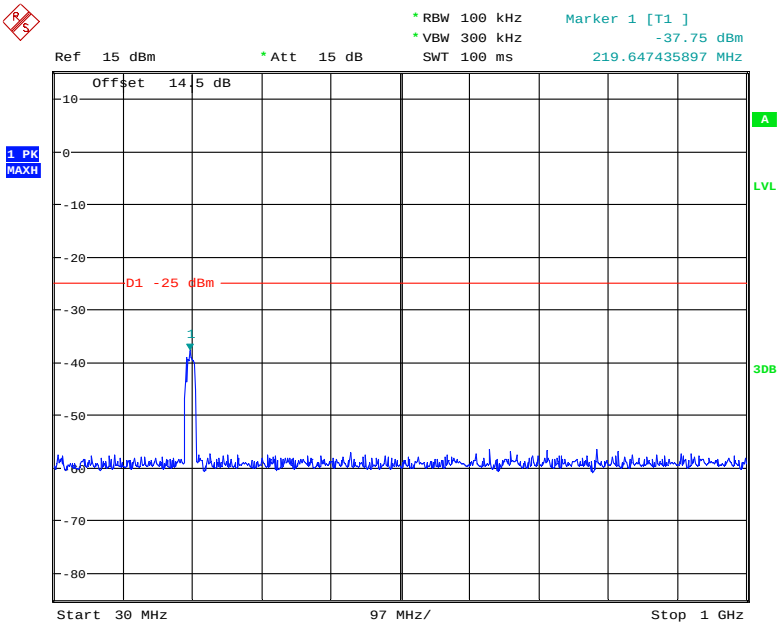
Date: 12.NOV.2018 21:06:35

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



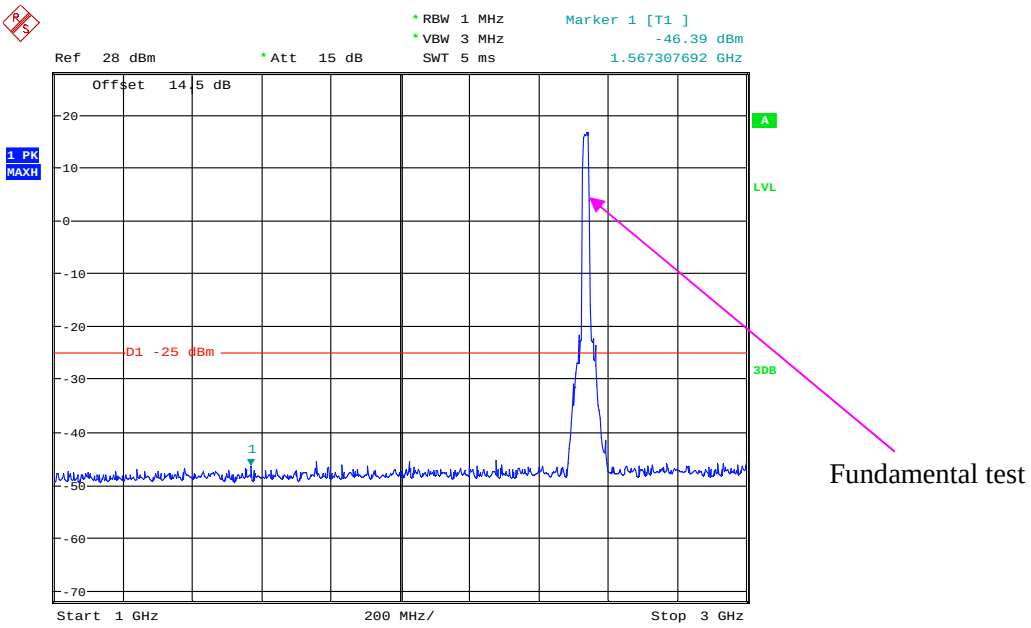
Date: 12.NOV.2018 21:09:41

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



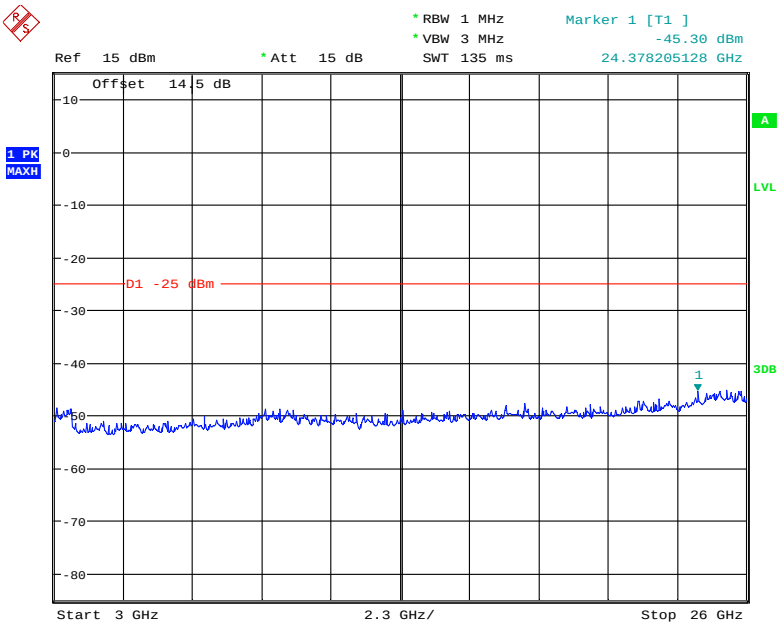
Date: 12.NOV.2018 21:12:23

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



Date: 12.NOV.2018 21:06:54

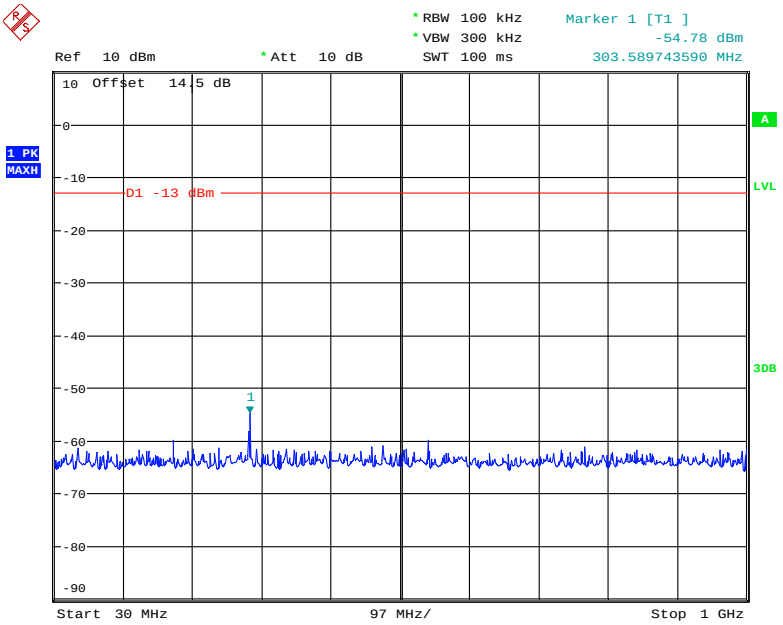
3 GHz – 26 GHz (20.0 MHz, Middle Channel)



Date: 12.NOV.2018 21:09:20

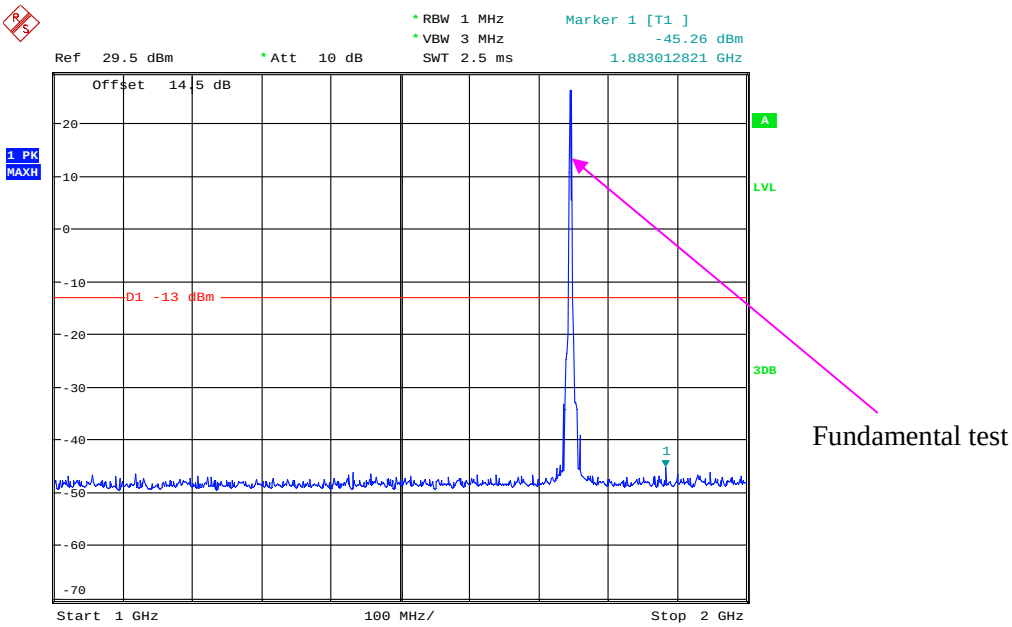
LTE Band 66:

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



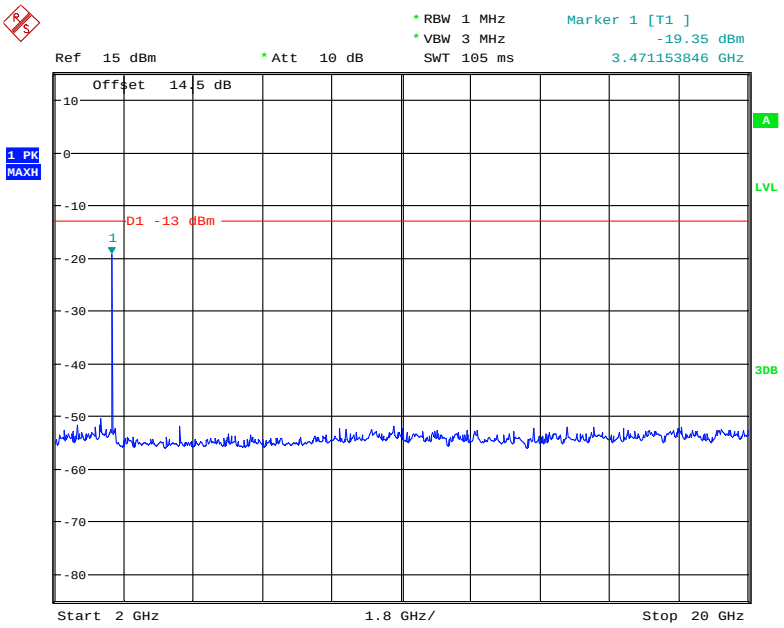
Date: 12.NOV.2018 21:51:56

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



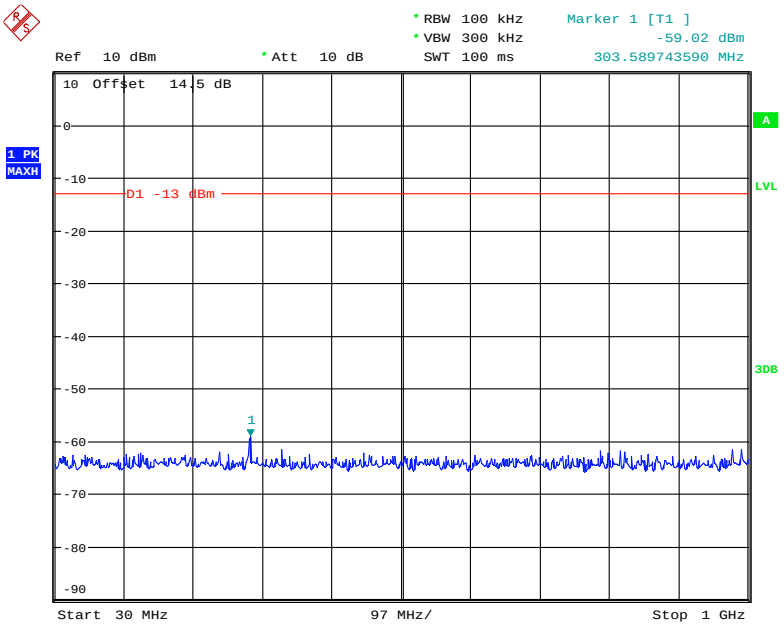
Date: 12.NOV.2018 21:45:30

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



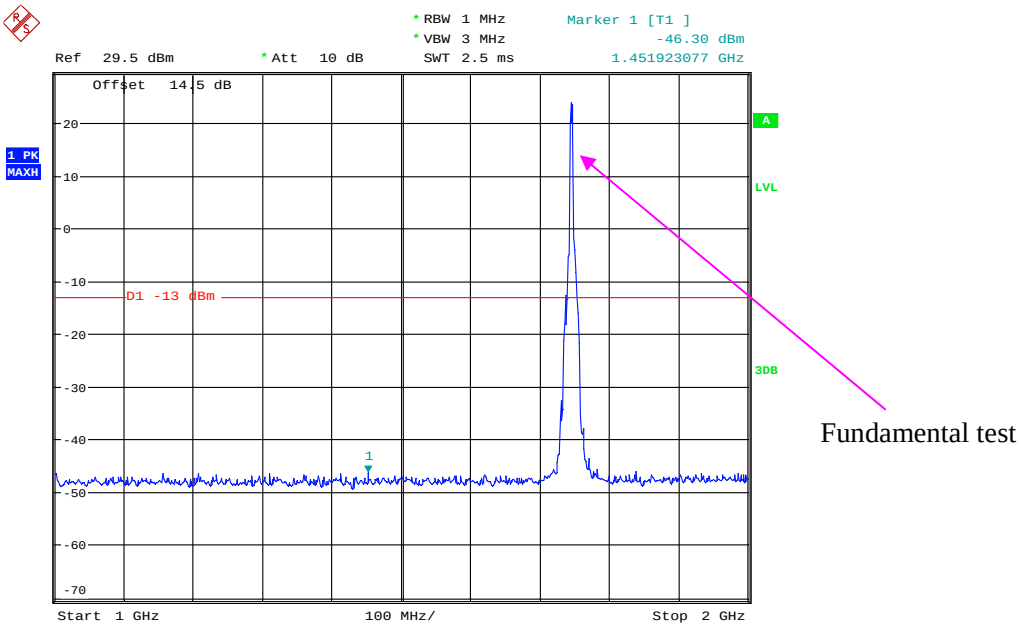
Date: 12.NOV.2018 21:51:13

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



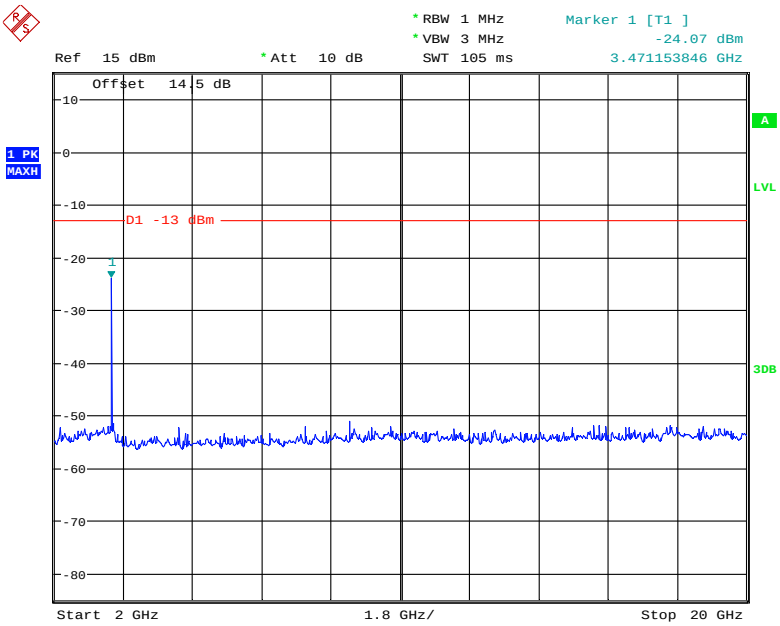
Date: 12.NOV.2018 21:52:18

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



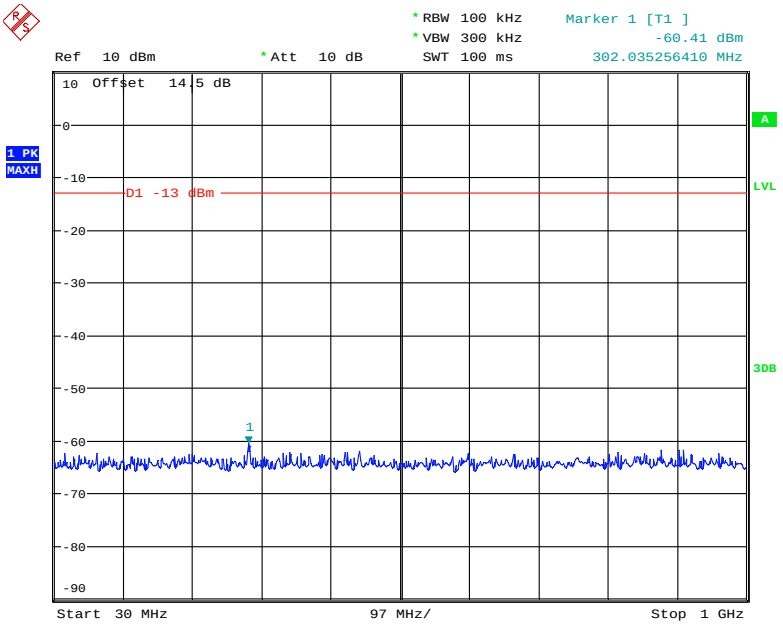
Date: 12.NOV.2018 21:47:08

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



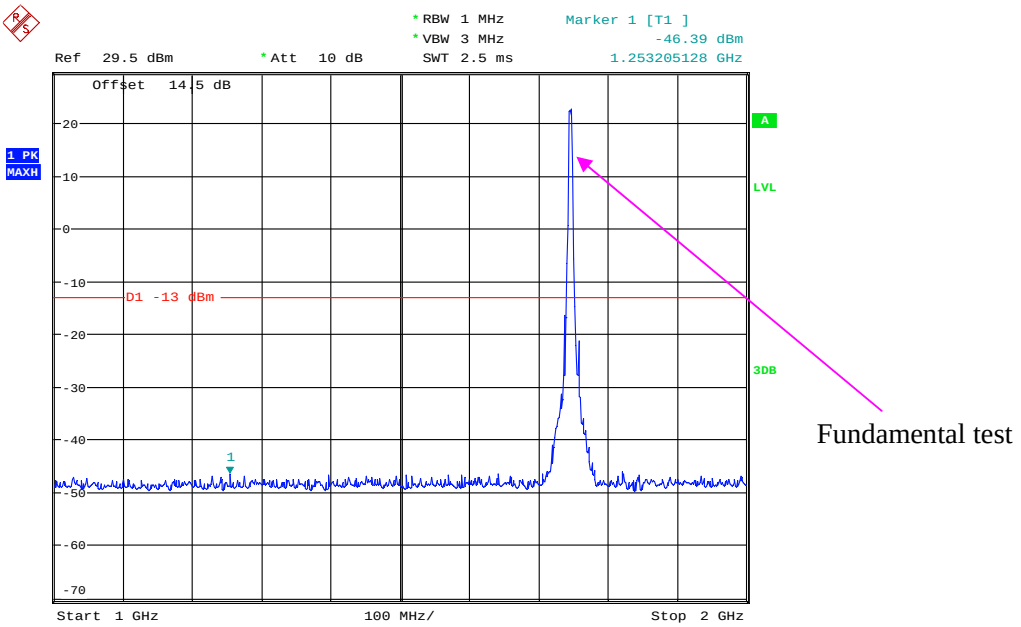
Date: 12.NOV.2018 21:50:56

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



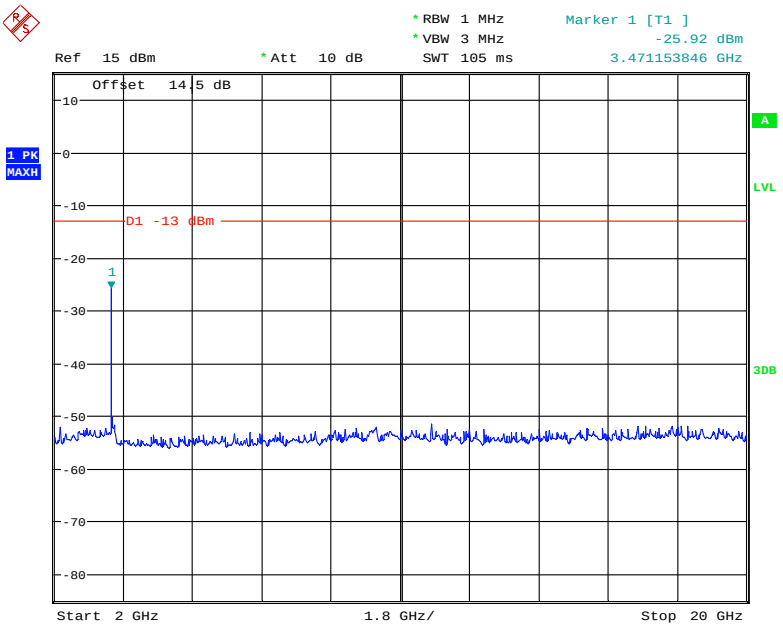
Date: 12.NOV.2018 21:52:36

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



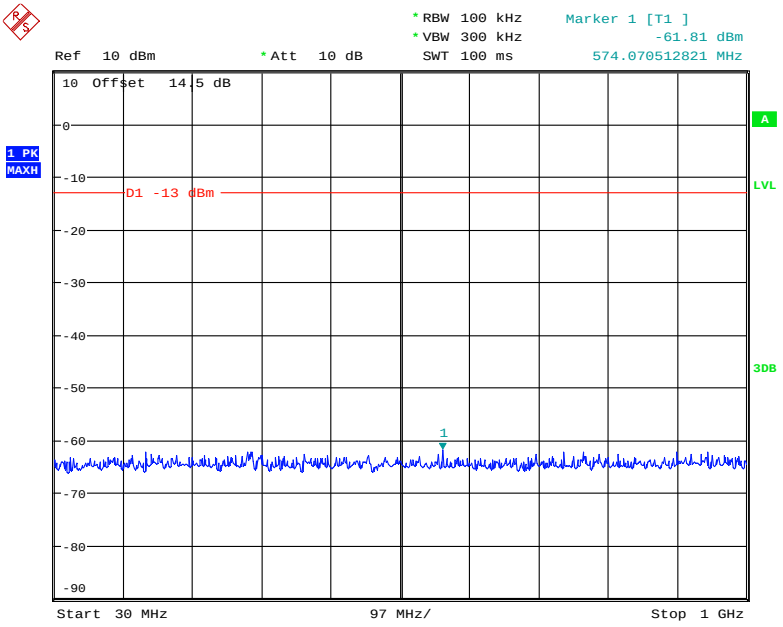
Date: 12.NOV.2018 21:47:47

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



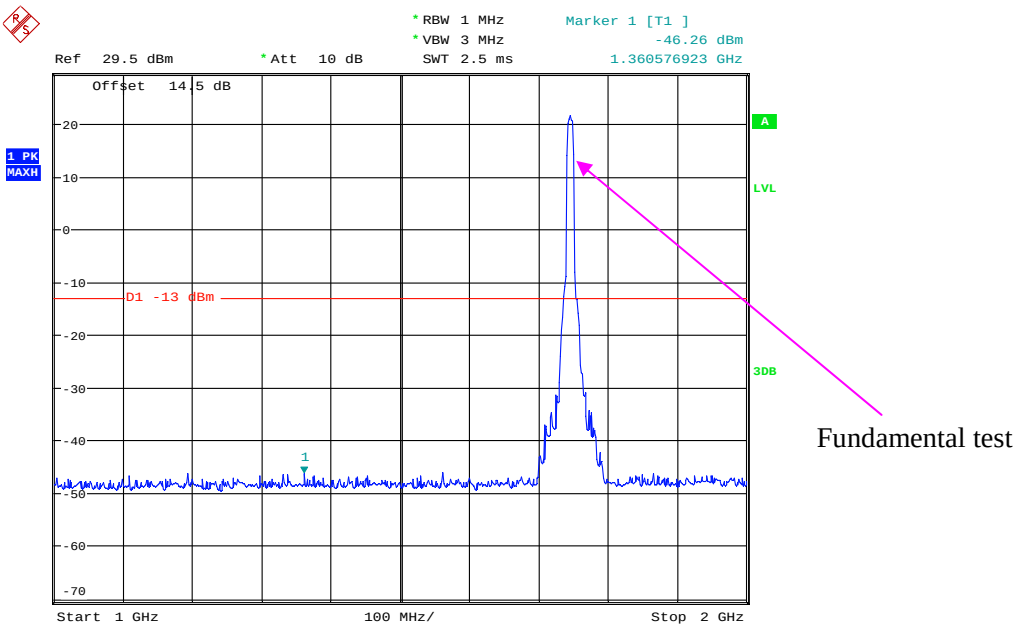
Date: 12.NOV.2018 21:50:42

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



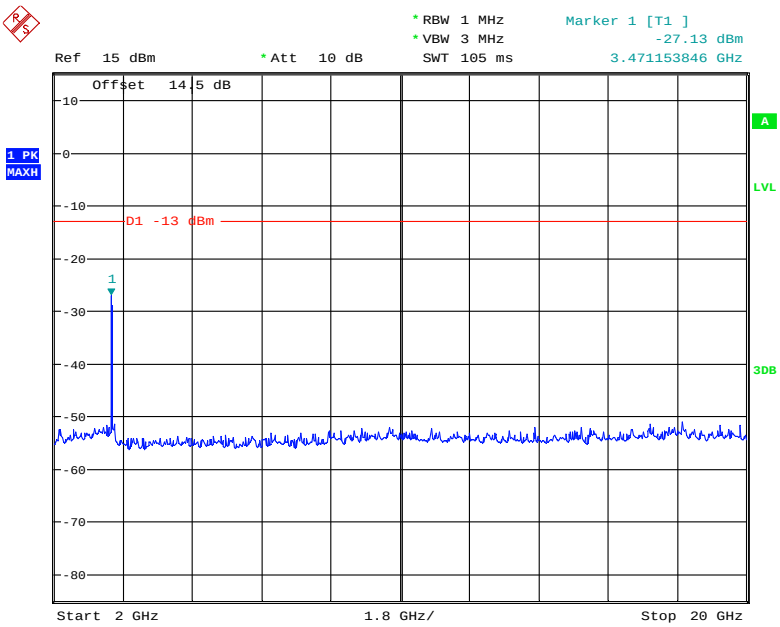
Date: 12.NOV.2018 21:52:50

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



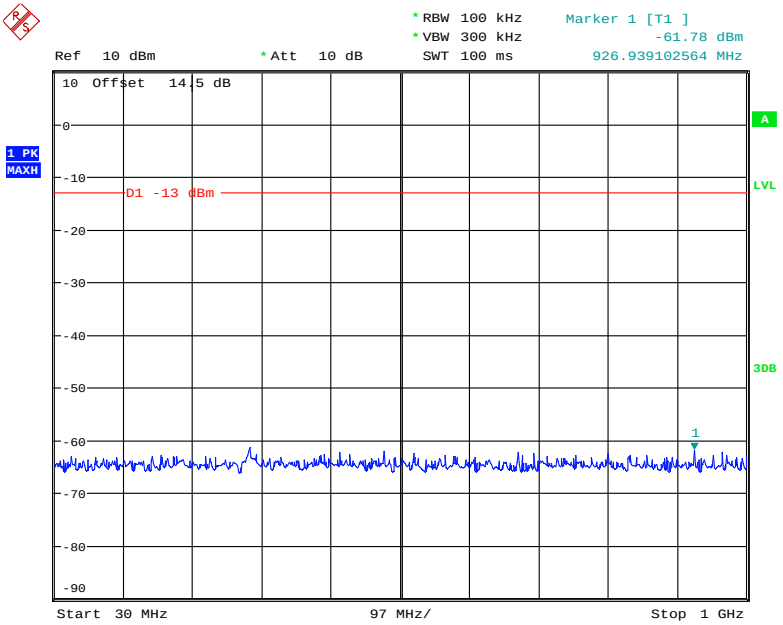
Date: 12.NOV.2018 21:48:26

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



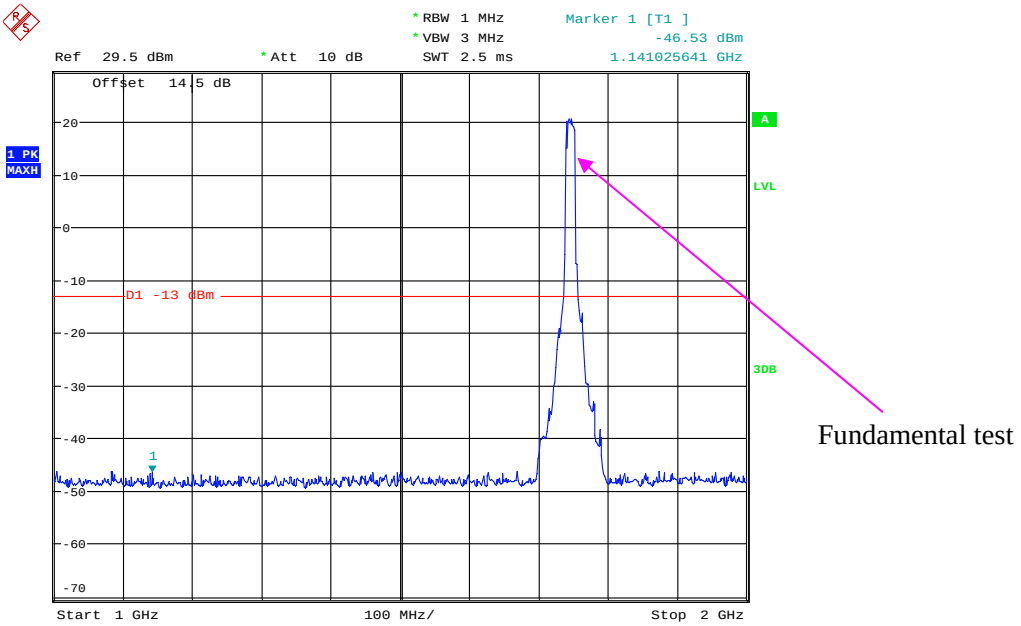
Date: 12.NOV.2018 21:50:25

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



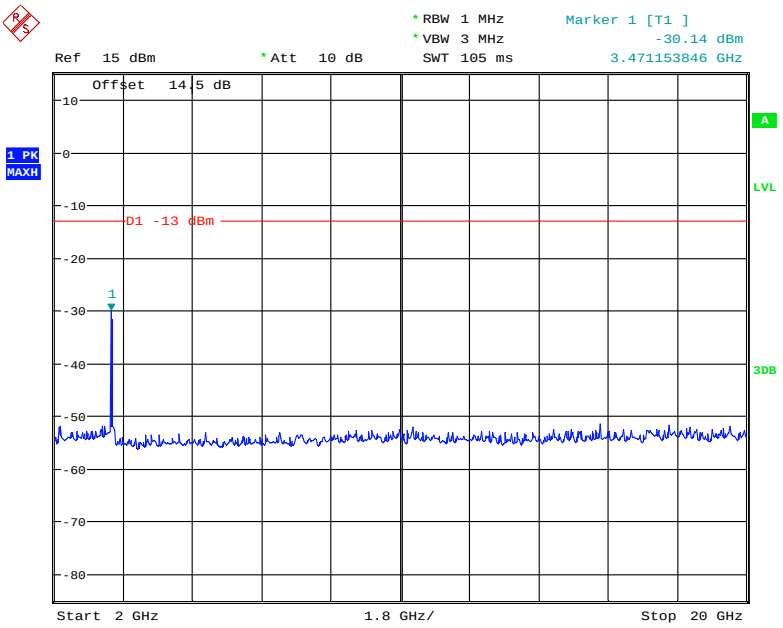
Date: 12.NOV.2018 21:53:02

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



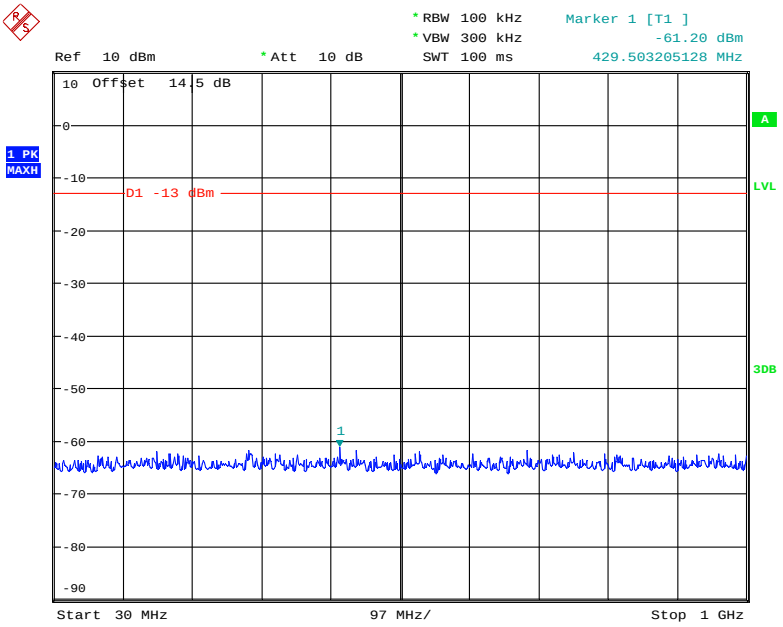
Date: 12.NOV.2018 21:48:55

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



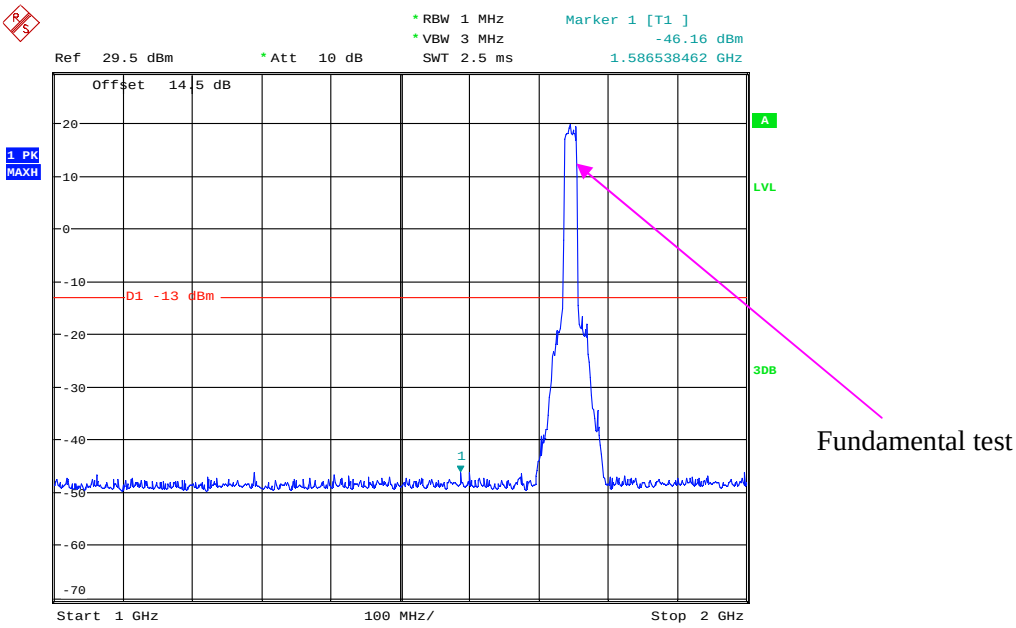
Date: 12.NOV.2018 21:50:11

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



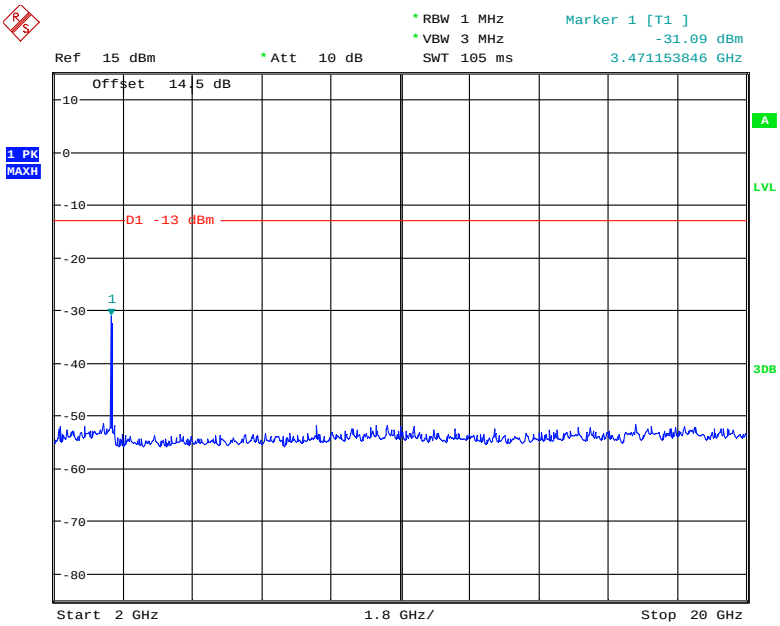
Date: 12.NOV.2018 21:53:11

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



Date: 12.NOV.2018 21:49:21

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



Date: 12.NOV.2018 21:49:51

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:	24~25 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Kiki Kong from 2018-11-08 to 2018-11-13.

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 (dB)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
436.25	32.15	253	1.7	H	-64.9	0.44	0	-65.34	-13	52.34
436.25	31.24	232	1.7	V	-65.8	0.44	0	-66.24	-13	53.24
1673.20	58.31	246	2.0	H	-48.8	1.30	8.90	-41.20	-13	28.20
1673.20	67.66	234	1.0	V	-38.8	1.30	8.90	-31.20	-13	18.20
2509.80	49.71	285	2.5	H	-53.8	2.60	10.20	-46.20	-13	33.20
2509.80	48.04	189	1.4	V	-54.9	2.60	10.20	-47.30	-13	34.30
3346.40	47.23	282	1.4	H	-53.1	1.50	11.70	-42.90	-13	29.90
3346.40	50.52	136	1.1	V	-49.9	1.50	11.70	-39.70	-13	26.70
WCDMA Mode, Middle channel										
436.25	33.01	69	2.4	H	-64.0	0.44	0	-64.44	-13	51.44
436.25	32.12	120	2.5	V	-64.9	0.44	0	-65.34	-13	52.34
1673.20	47.65	179	1.4	H	-59.4	1.30	8.90	-51.80	-13	38.80
1673.20	48.38	15	1.8	V	-58.1	1.30	8.90	-50.50	-13	37.50
2509.80	46.1	11	2.1	H	-57.4	2.60	10.20	-49.80	-13	36.80
2509.80	47.59	340	1.8	V	-55.3	2.60	10.20	-47.70	-13	34.70
3346.40	47.71	224	1.2	H	-52.6	1.50	11.70	-42.40	-13	29.40
3346.40	50.64	84	1.9	V	-49.7	1.50	11.70	-39.50	-13	26.50

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 (dB)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
436.25	32.98	308	2.0	H	-64.0	0.44	0	-64.44	-13	51.44
436.25	31.75	71	1.2	V	-65.3	0.44	0	-65.74	-13	52.74
3760.00	49.85	31	2.3	H	-51.4	1.50	11.80	-41.10	-13	28.10
3760.00	52.28	240	2.1	V	-48.5	1.50	11.80	-38.20	-13	25.20
WCDMA Mode Band II, Middle channel										
436.25	32.47	86	1.0	H	-64.5	0.44	0	-64.94	-13	51.94
436.25	31.24	299	1.9	V	-65.8	0.44	0	-66.24	-13	53.24
3760.00	45.56	119	1.6	H	-54.8	1.50	11.80	-44.50	-13	31.50
3760.00	44.85	312	1.2	V	-56.3	1.50	11.80	-46.00	-13	33.00

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 (dB)			
Band 2 QPSK 20MHz										
Test frequency range:30 MHz ~ 20 GHz										
436.25	33.01	119	1.7	H	-64.0	0.44	0	-64.44	-13	51.44
436.25	32.14	243	1.0	V	-64.9	0.44	0	-65.34	-13	52.34
3760.00	44.53	229	1.2	H	-56.7	1.50	11.80	-46.40	-13	33.40
3760.00	45.24	342	2.4	V	-55.5	1.50	11.80	-45.20	-13	32.20
Band 4 QPSK 20MHz										
Test frequency range:30 MHz ~ 20 GHz										
436.25	32.75	140	2.2	H	-64.3	0.44	0	-64.74	-13	51.74
436.25	31.95	101	2.2	V	-65.1	0.44	0	-65.54	-13	52.54
3465.00	45.05	239	1.7	H	-55.3	1.50	12.00	-44.80	-13	31.80
3465.00	45.19	158	2.4	V	-56.0	1.50	12.00	-45.50	-13	32.50
Band 5 QPSK 10MHz										
Test frequency range:30 MHz ~ 10 GHz										
436.25	32.47	196	1.3	H	-64.5	0.44	0	-64.94	-13	51.94
436.25	31.58	341	1.7	V	-65.4	0.44	0	-65.84	-13	52.84
1673.00	44.83	114	2.5	H	-62.2	1.30	8.90	-54.60	-13	41.60
1673.00	43.92	264	1.9	V	-62.6	1.30	8.90	-55.00	-13	42.00
2509.50	47.21	61	1.1	H	-56.3	2.60	10.20	-48.70	-13	35.70
2509.50	46.8	51	1.4	V	-56.1	2.60	10.20	-48.50	-13	35.50
3346.00	44.15	161	1.3	H	-56.2	1.50	11.70	-46.00	-13	33.00
3346.00	46.91	158	2.5	V	-53.5	1.50	11.70	-43.30	-13	30.30
Band 7 QPSK 20MHz										
Test frequency range:30 MHz ~ 26 GHz										
436.25	32.86	304	1.6	H	-64.1	0.44	0	-64.54	-25	39.54
436.25	31.17	135	1.5	V	-65.8	0.44	0	-66.24	-25	41.24
5070.00	48.9	330	1.9	H	-49.0	1.60	12.10	-38.50	-25	13.5
5070.00	54.89	215	1.0	V	-43.0	1.60	12.10	-32.50	-25	7.5
Band 66 QPSK 20MHz										
Test frequency range: 30 MHz ~ 20GHz										
436.25	32.01	88	1.1	H	-65.0	0.44	0	-65.44	-13	52.44
436.25	31.24	230	2.4	V	-65.8	0.44	0	-66.24	-13	53.24
3490.00	47.91	326	1.0	H	-52.5	1.50	12.00	-42.00	-13	29.00
3490.00	48.35	101	1.7	V	-52.8	1.50	12.00	-42.30	-13	29.30

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.

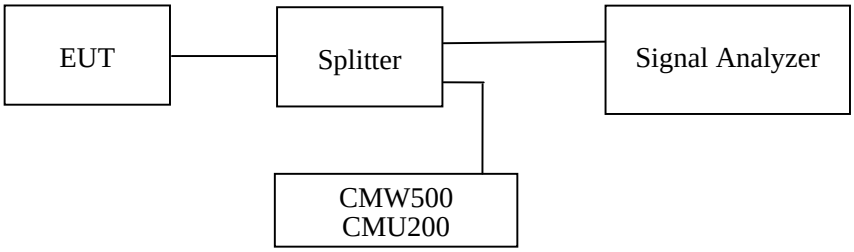
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

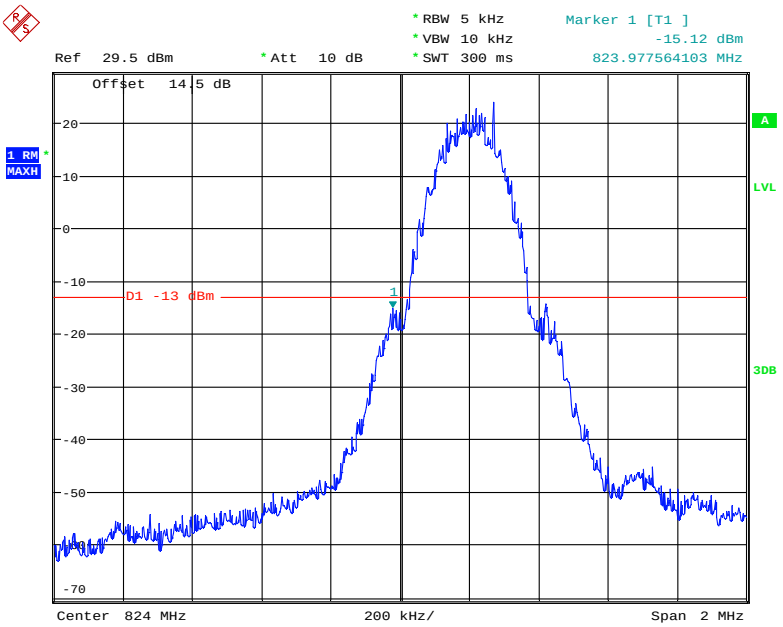
Temperature:	24~25 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Kiki Kong from 2018-11-06 to 2018-11-12.

EUT operation mode: Transmitting

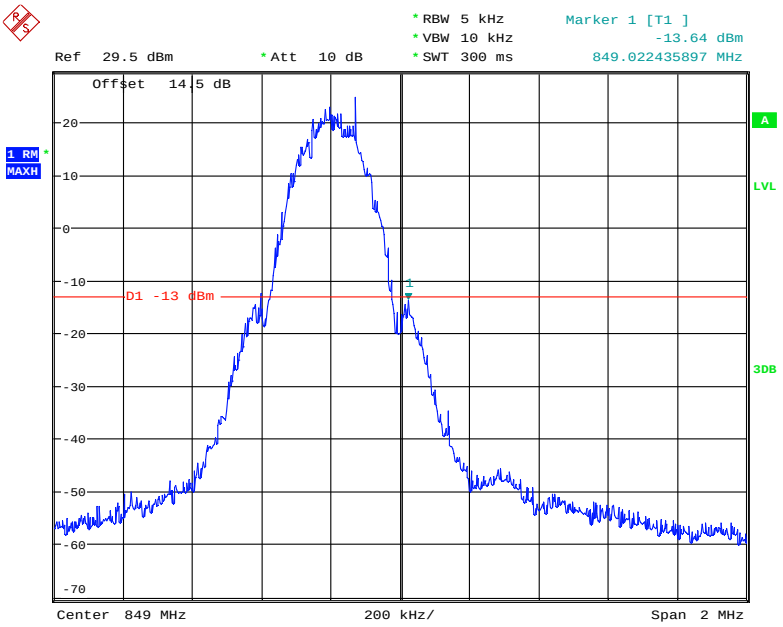
Test Result: Compliance. Please refer to the following plots.

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



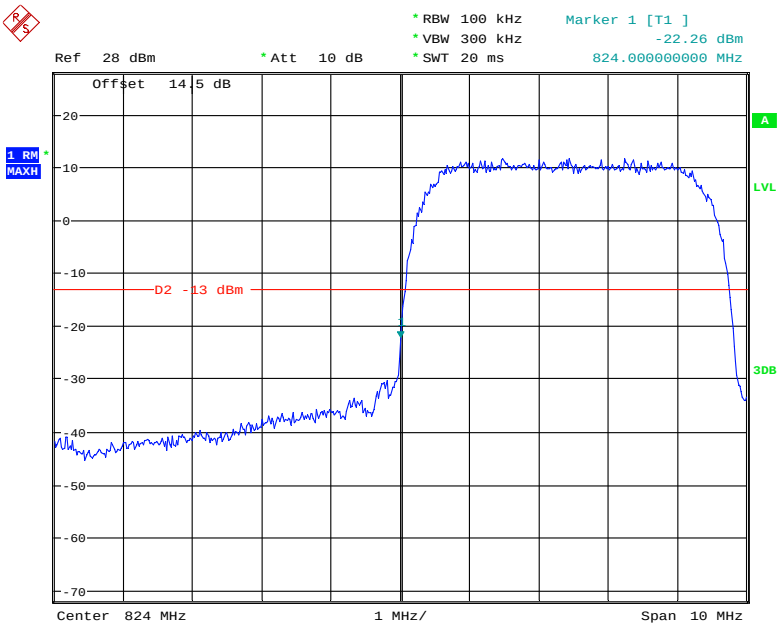
Date: 10.NOV.2018 19:22:45

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



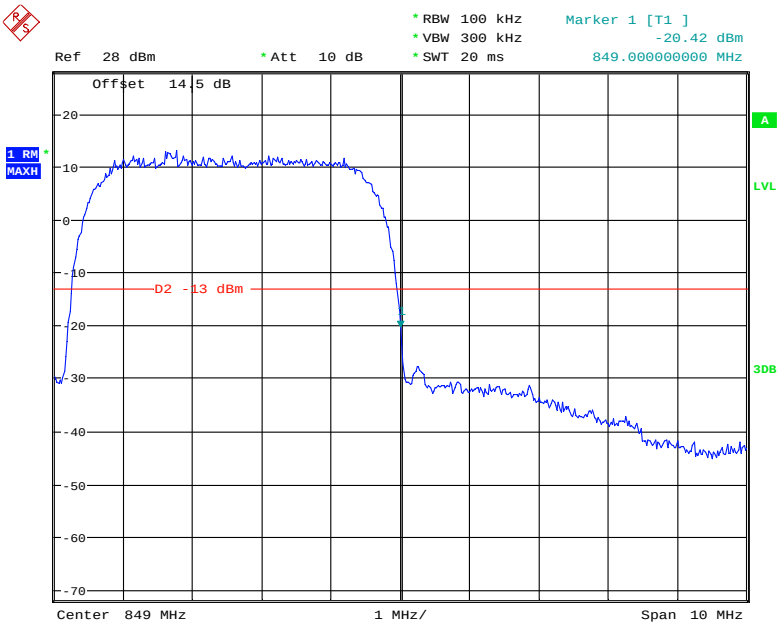
Date: 10.NOV.2018 19:23:41

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



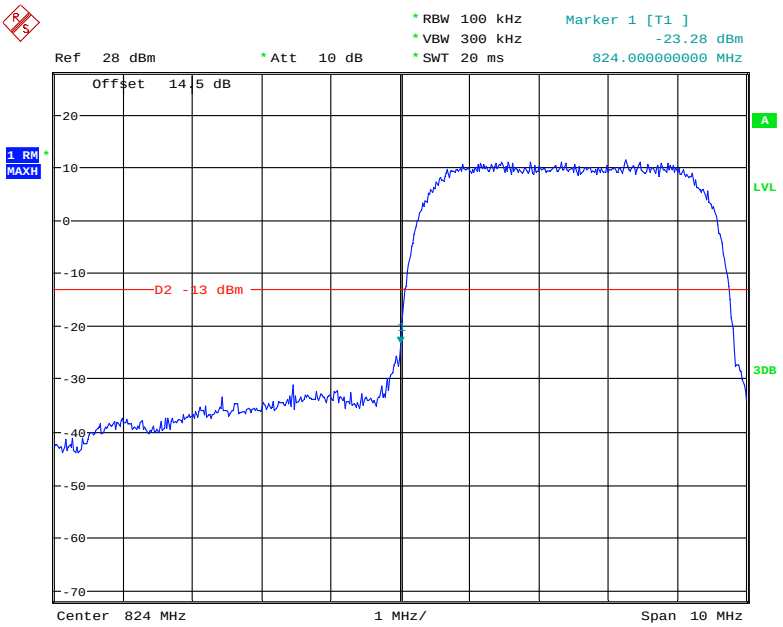
Date: 6.NOV.2018 22:06:22

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



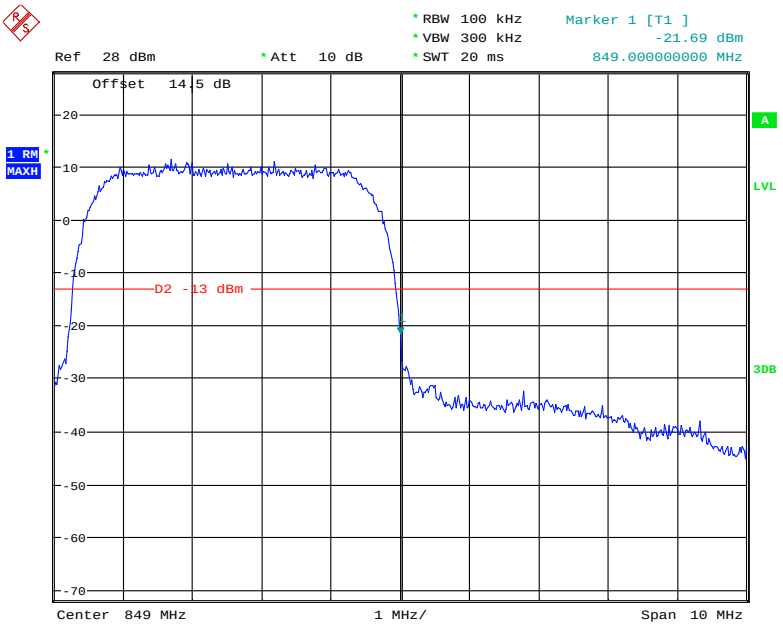
Date: 6.NOV.2018 22:07:47

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



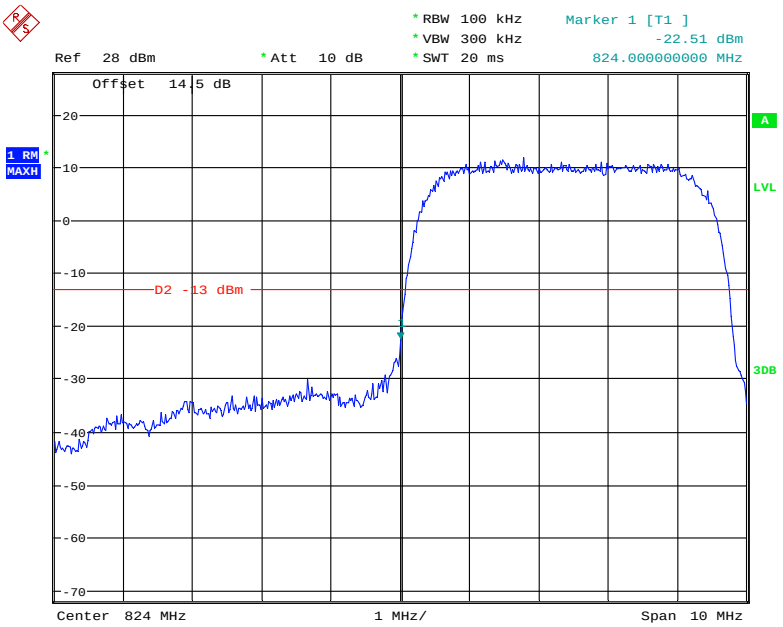
Date: 6.NOV.2018 22:22:34

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



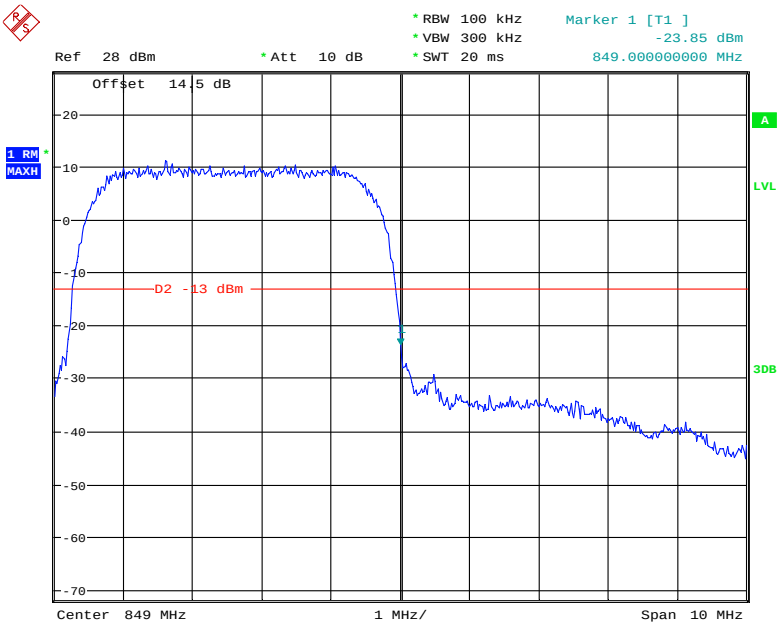
Date: 6.NOV.2018 22:23:44

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



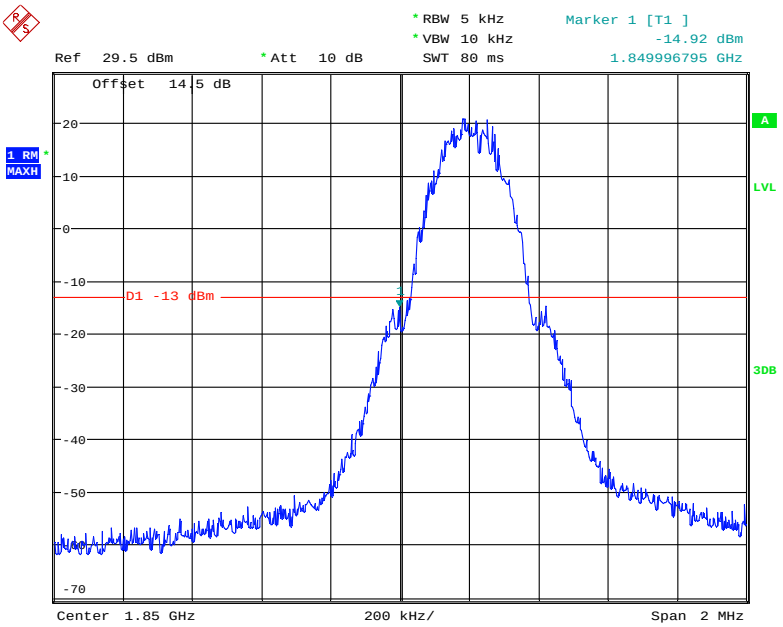
Date: 6.NOV.2018 22:31:18

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



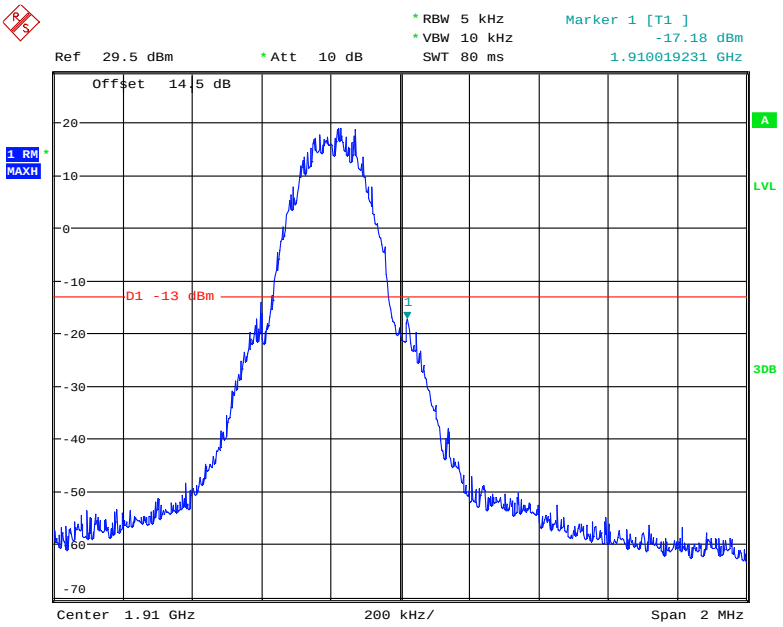
Date: 6.NOV.2018 22:30:14

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



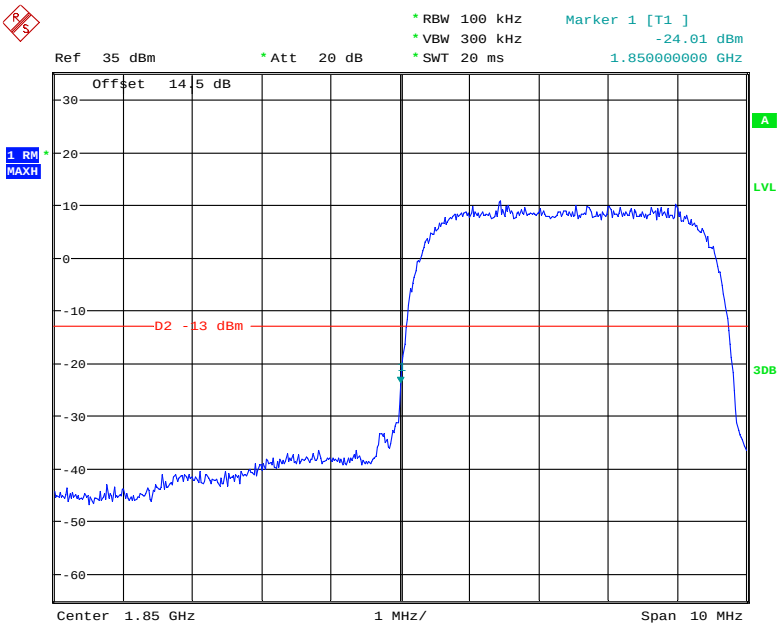
Date: 10.NOV.2018 19:04:08

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



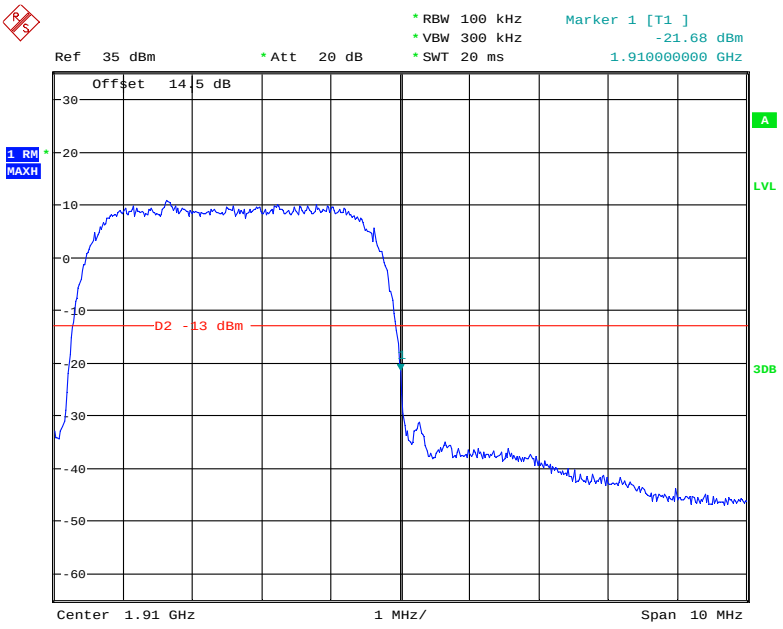
Date: 10.NOV.2018 19:04:51

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



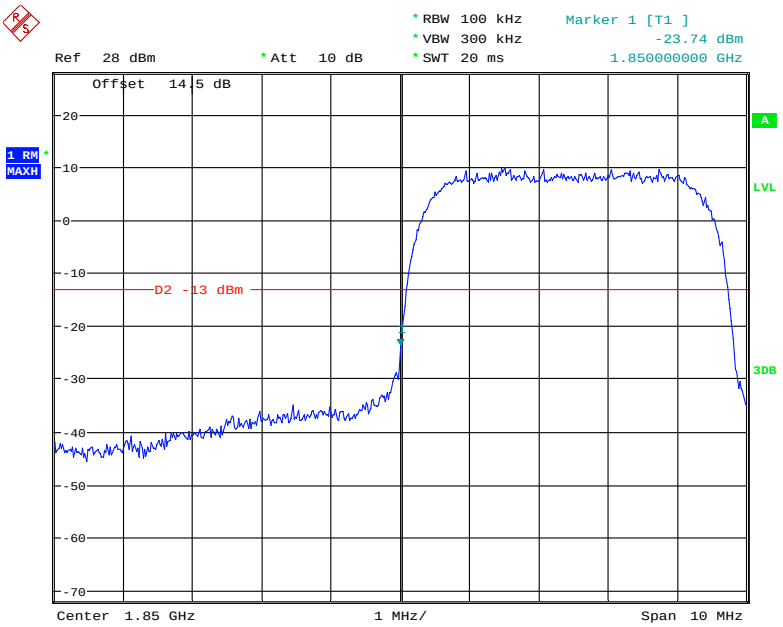
Date: 6.NOV.2018 21:53:08

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



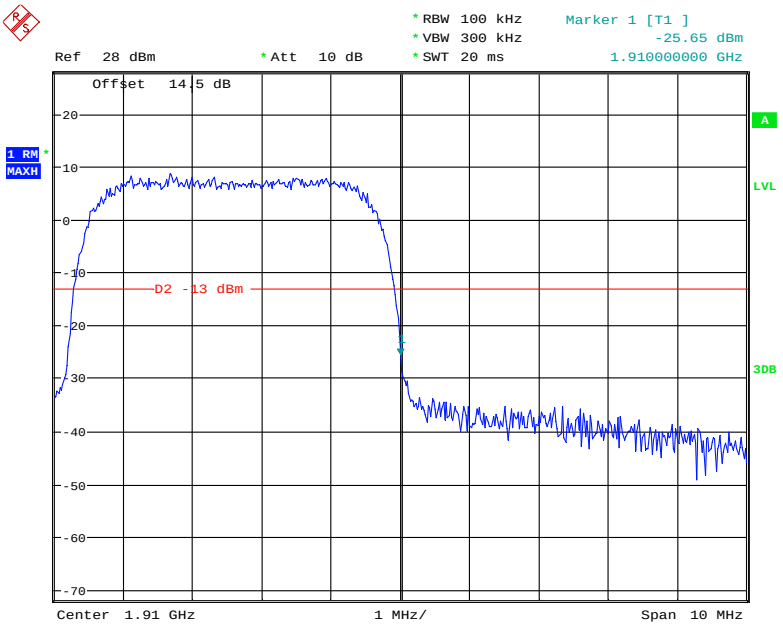
Date: 6.NOV.2018 21:54:20

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



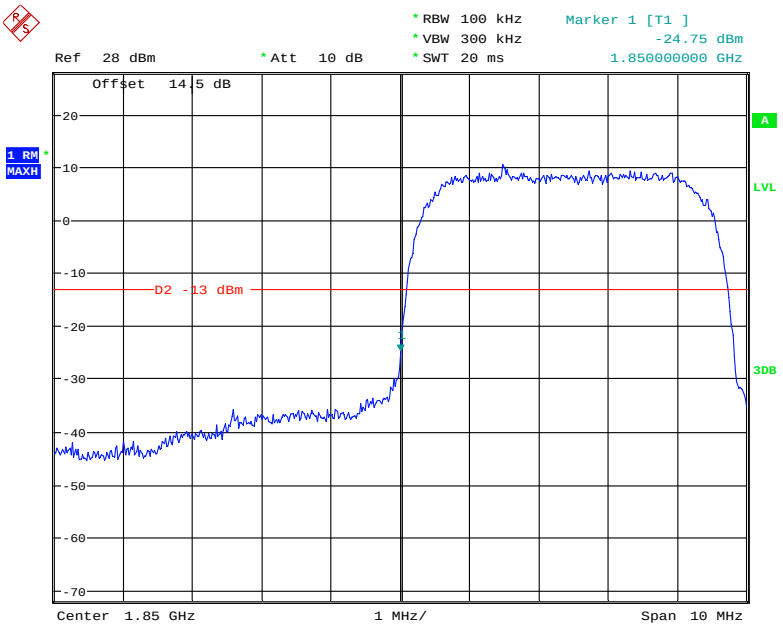
Date: 6.NOV.2018 22:24:53

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



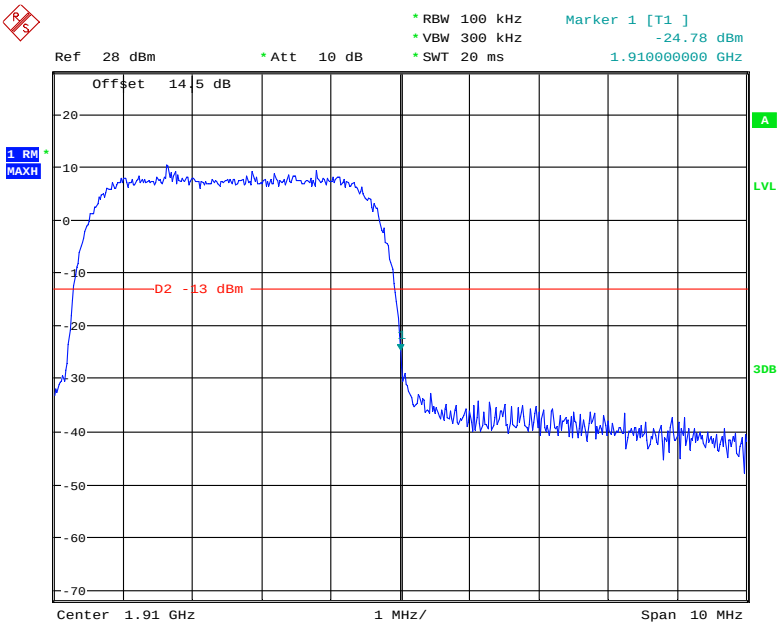
Date: 6.NOV.2018 22:25:48

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



Date: 6.NOV.2018 22:29:23

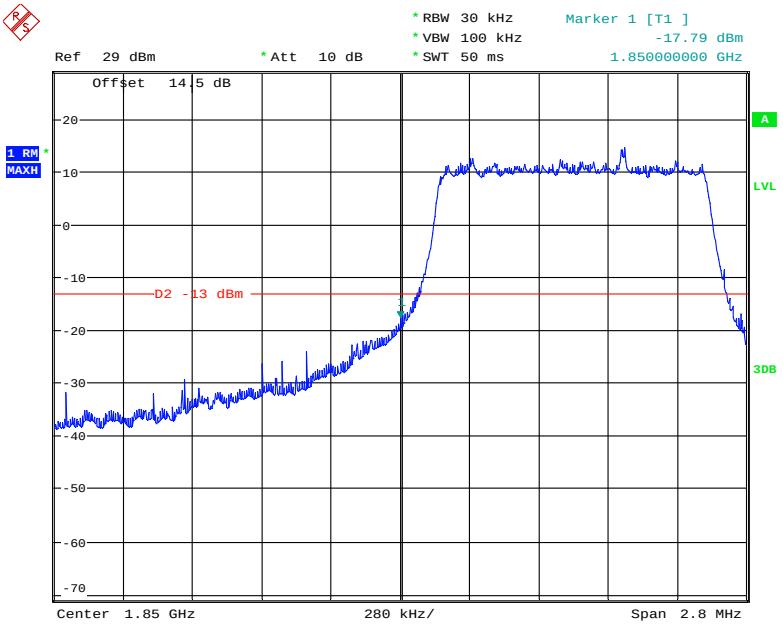
PCS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 6.NOV.2018 22:28:33

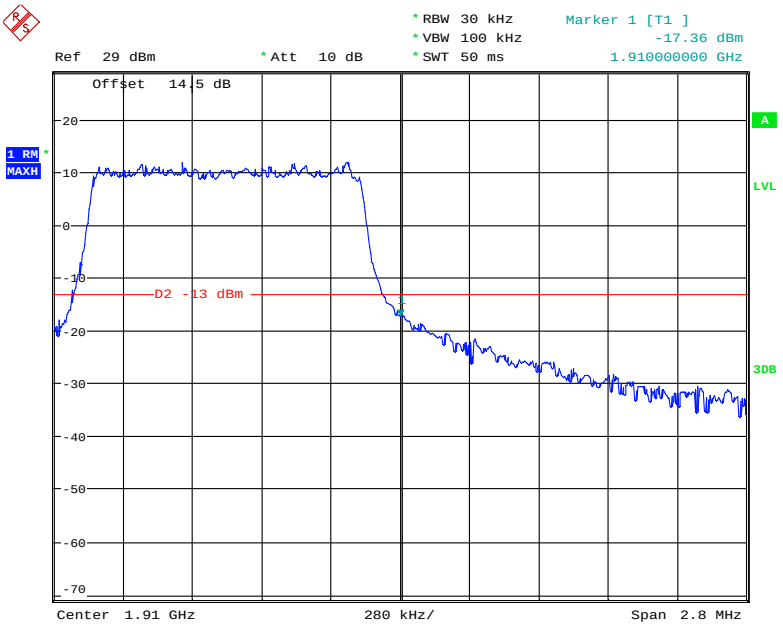
Band 2:

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



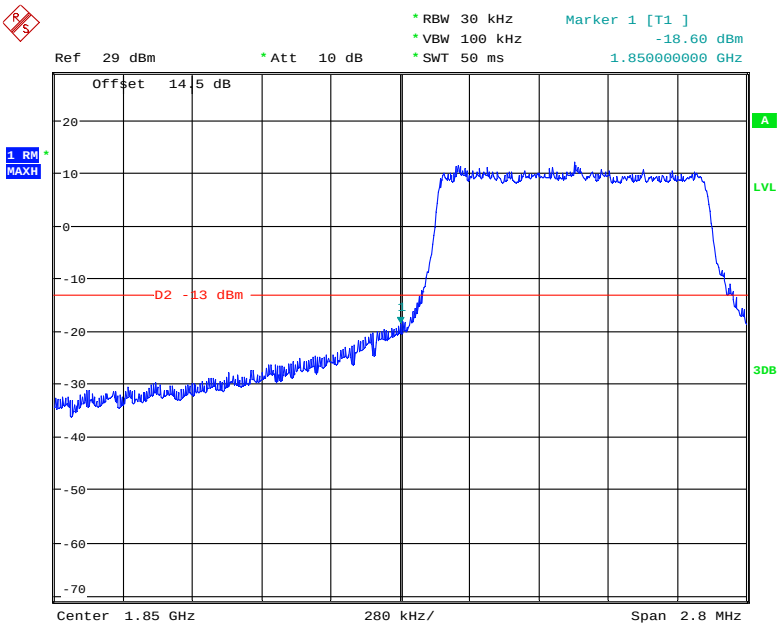
Date: 7.NOV.2018 21:40:21

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



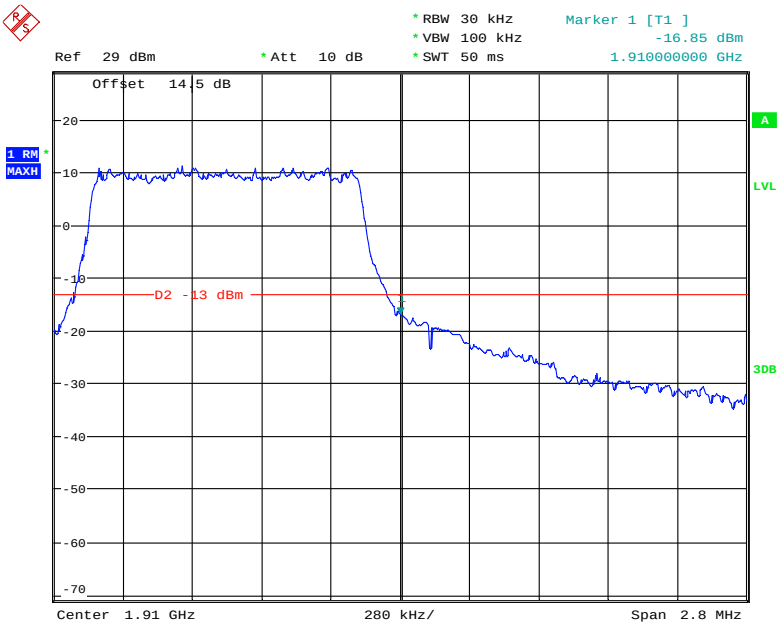
Date: 7.NOV.2018 21:41:35

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



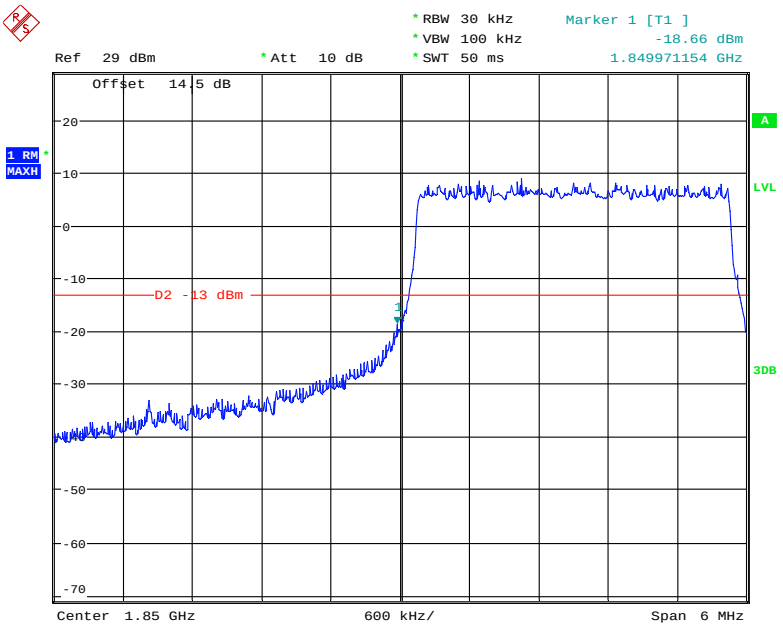
Date: 7.NOV.2018 21:37:47

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



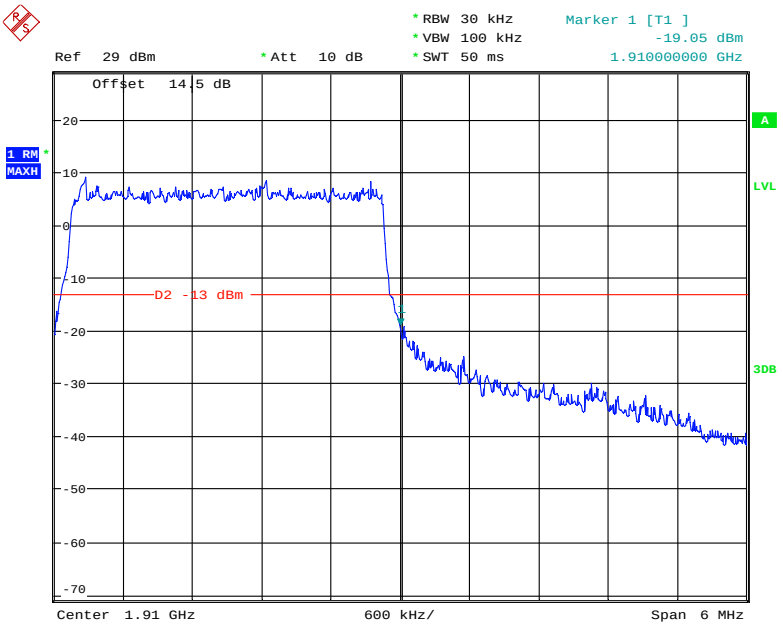
Date: 7.NOV.2018 21:42:30

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



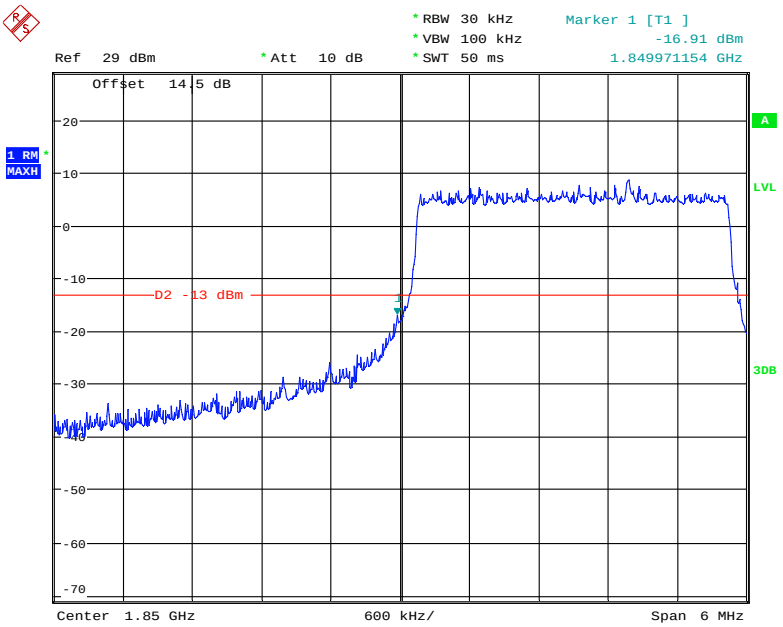
Date: 7.NOV.2018 21:46:24

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



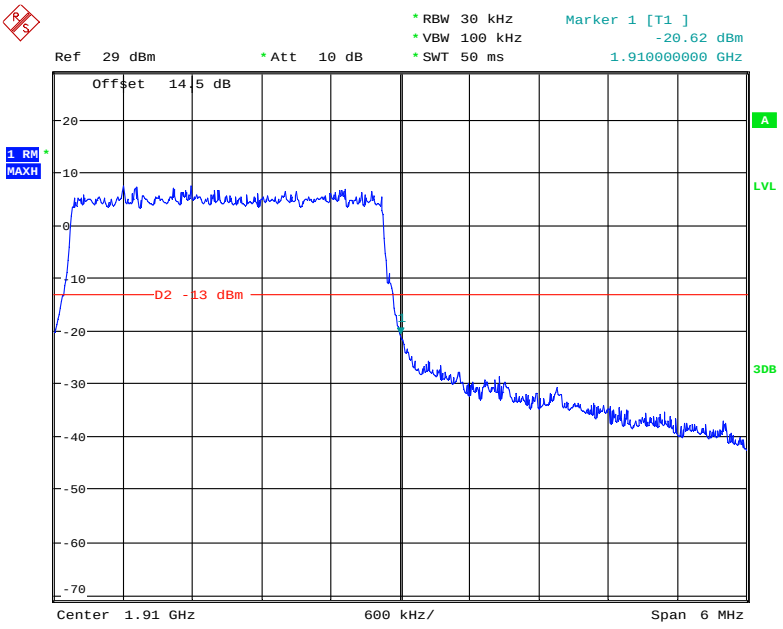
Date: 7.NOV.2018 21:44:16

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



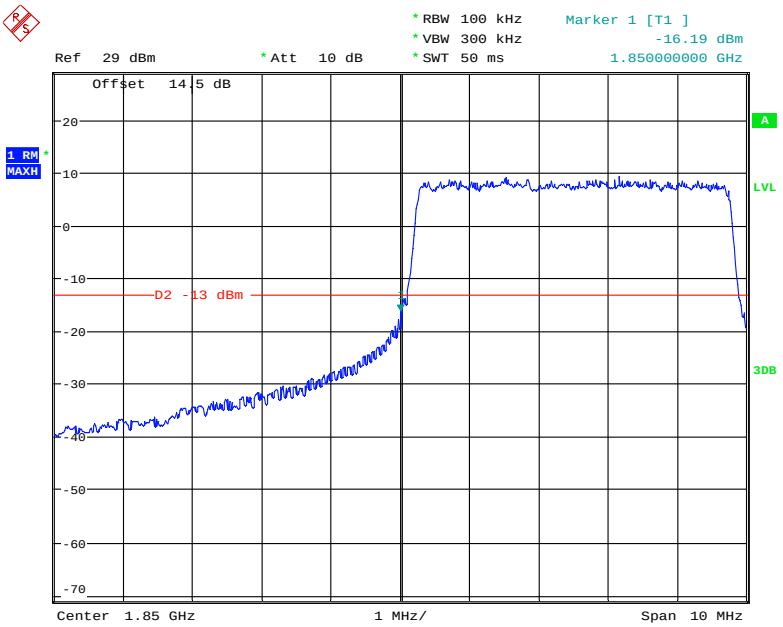
Date: 7.NOV.2018 21:45:42

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



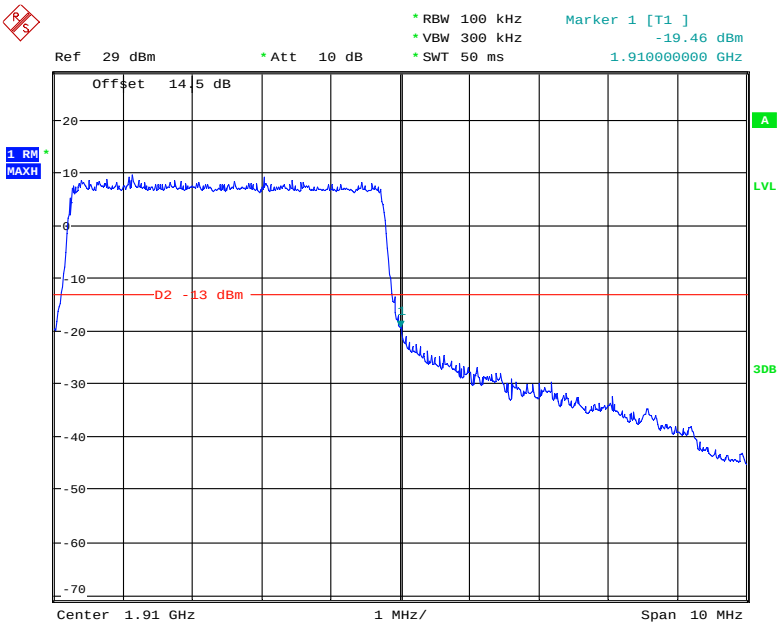
Date: 7.NOV.2018 21:44:58

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



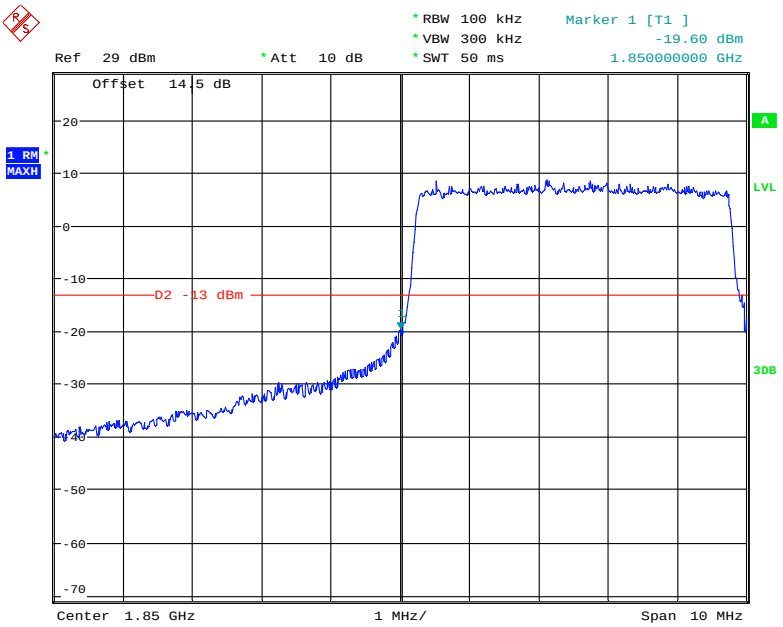
Date: 7.NOV.2018 21:48:28

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



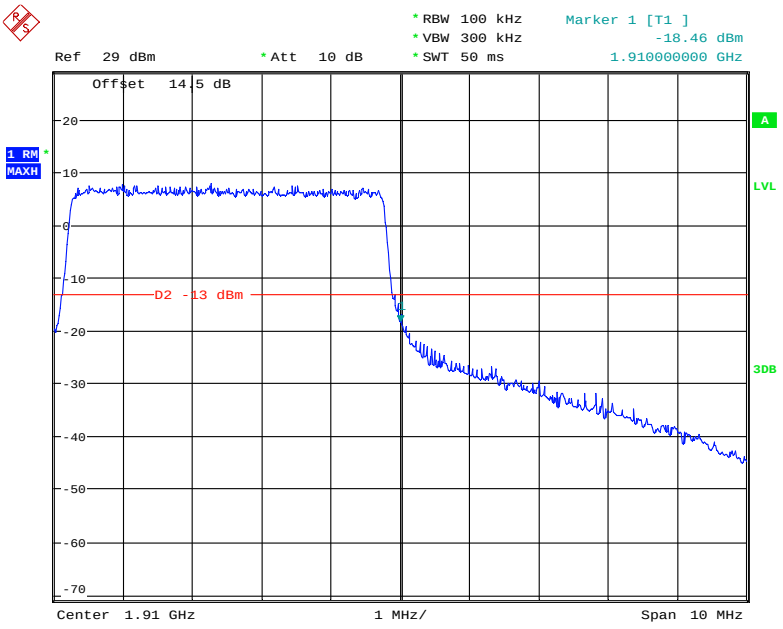
Date: 7.NOV.2018 21:49:39

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



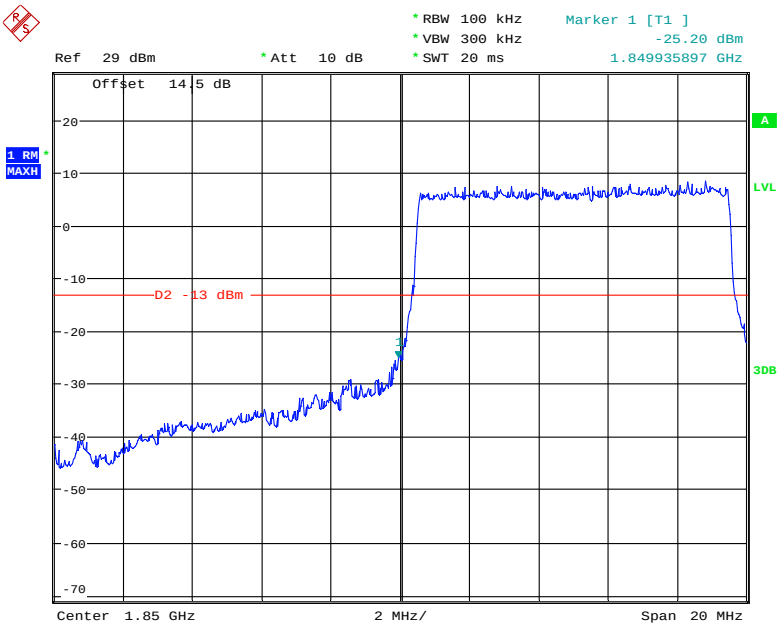
Date: 7.NOV.2018 21:47:29

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



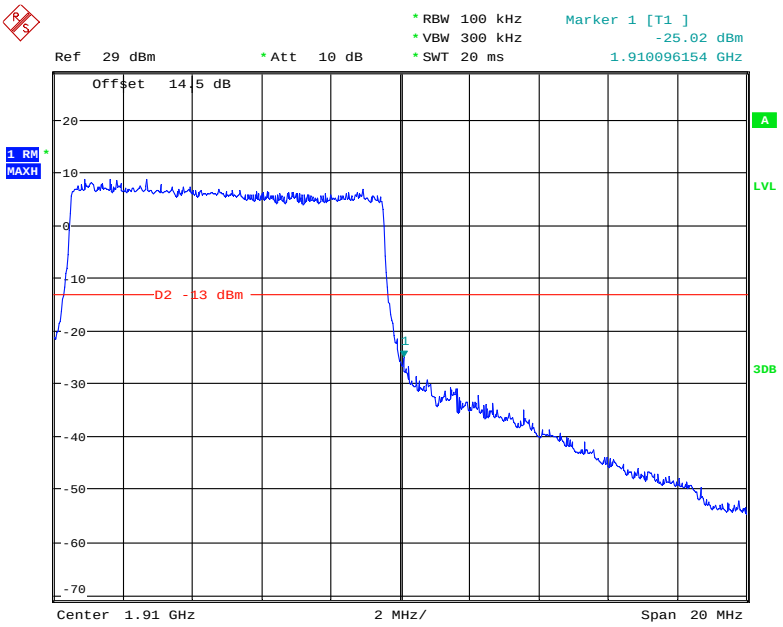
Date: 7.NOV.2018 21:50:12

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



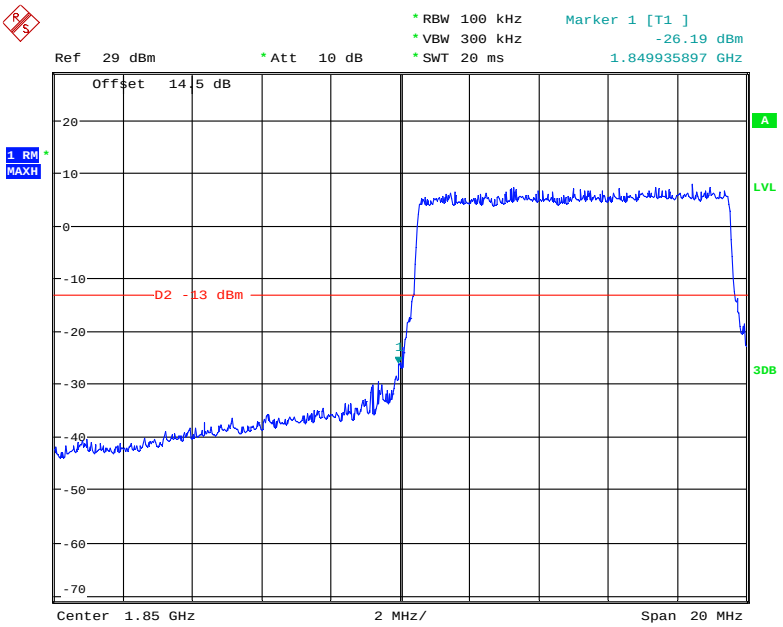
Date: 7.NOV.2018 21:53:17

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



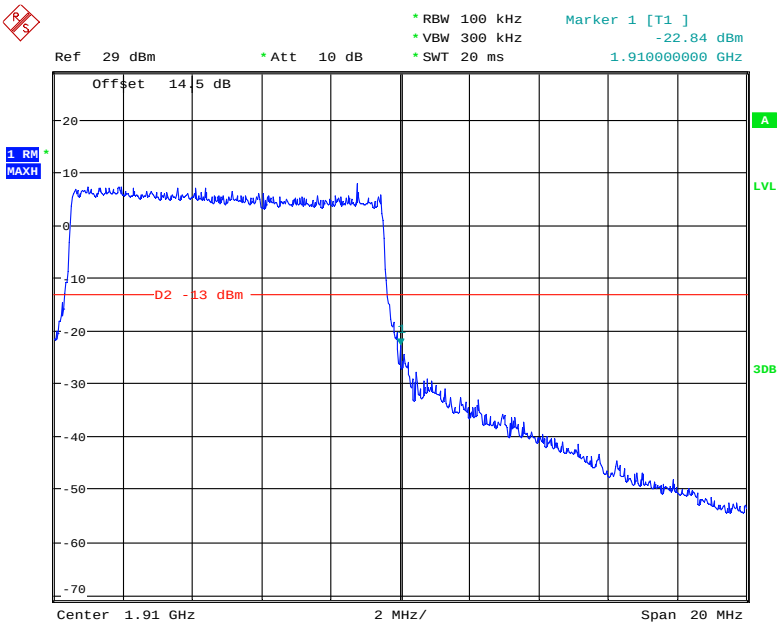
Date: 7.NOV.2018 21:52:25

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



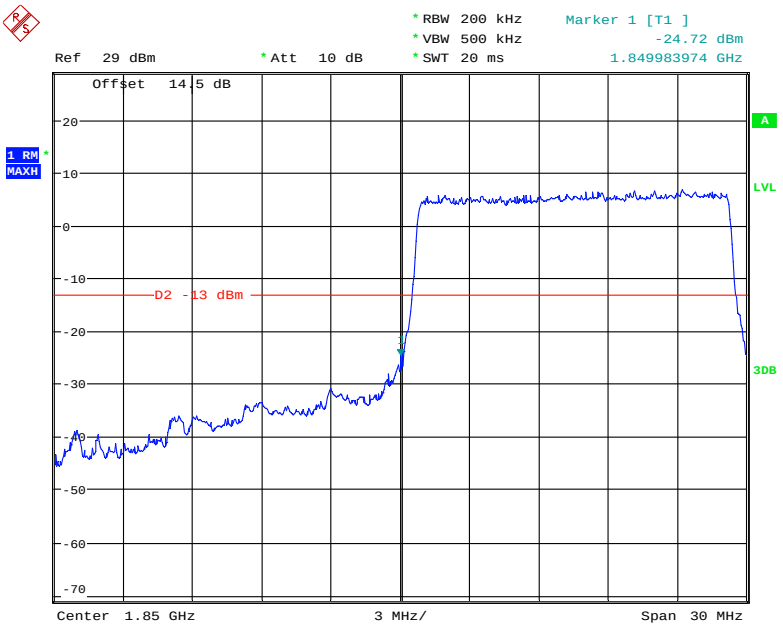
Date: 7.NOV.2018 21:54:01

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



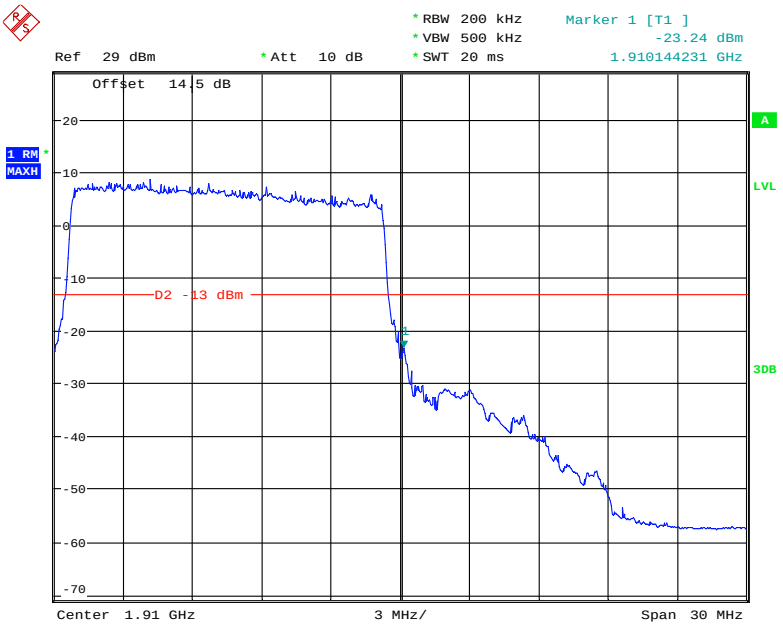
Date: 7.NOV.2018 21:51:34

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



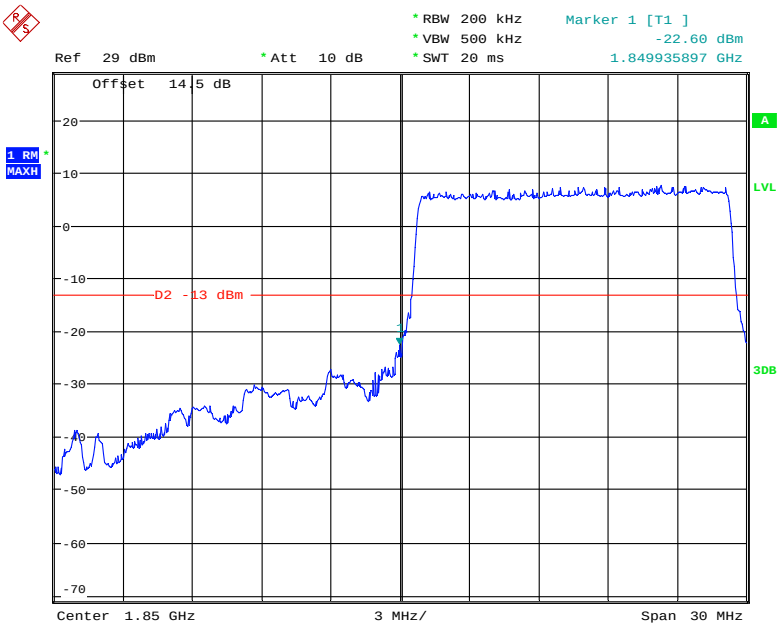
Date: 7.NOV.2018 21:55:59

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



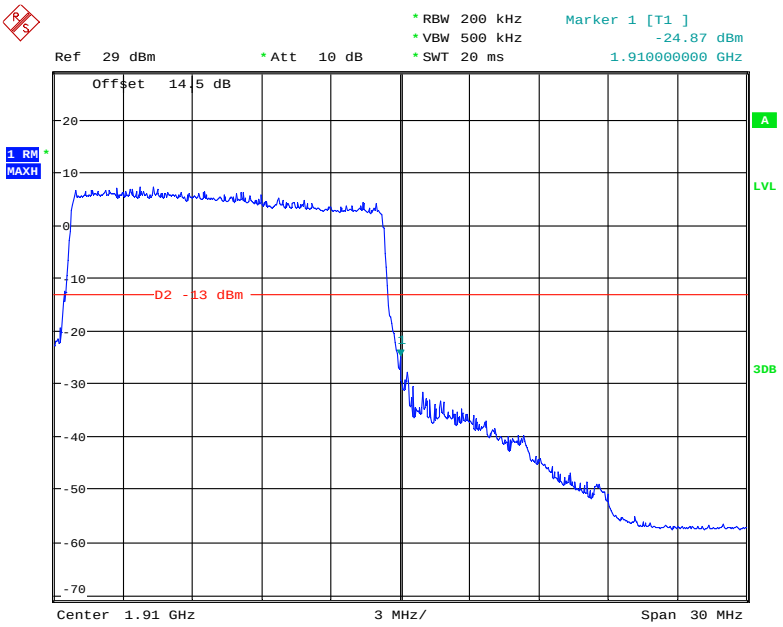
Date: 7.NOV.2018 21:57:42

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



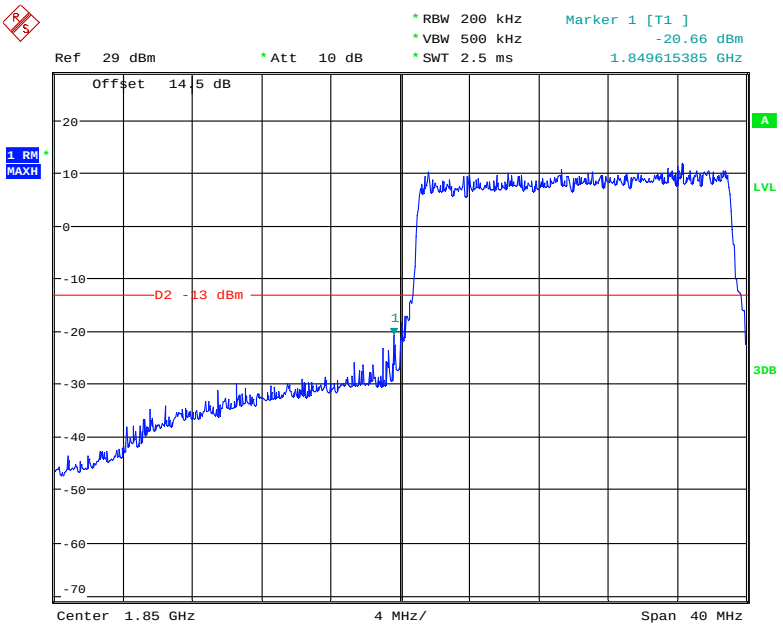
Date: 7.NOV.2018 21:55:16

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



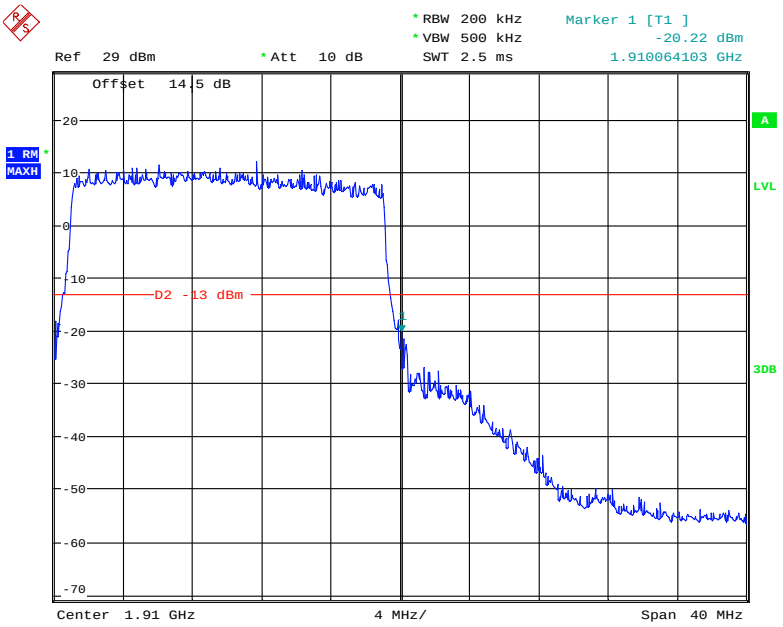
Date: 7.NOV.2018 21:56:56

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



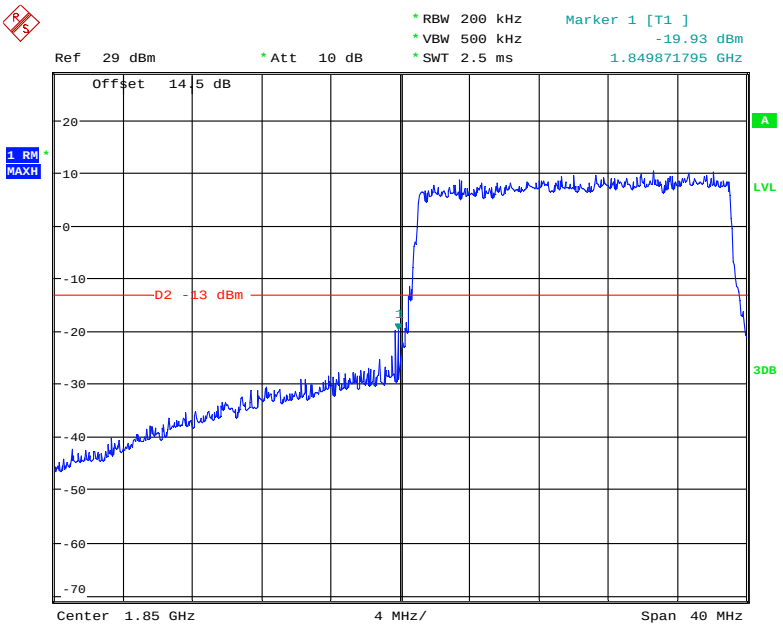
Date: 7.NOV.2018 22:01:11

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



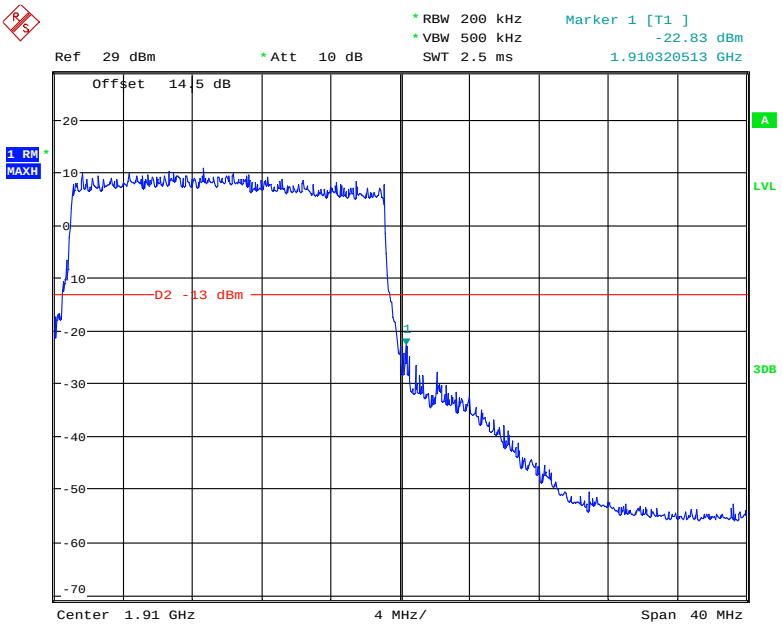
Date: 7.NOV.2018 22:00:07

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



Date: 7.NOV.2018 22:02:02

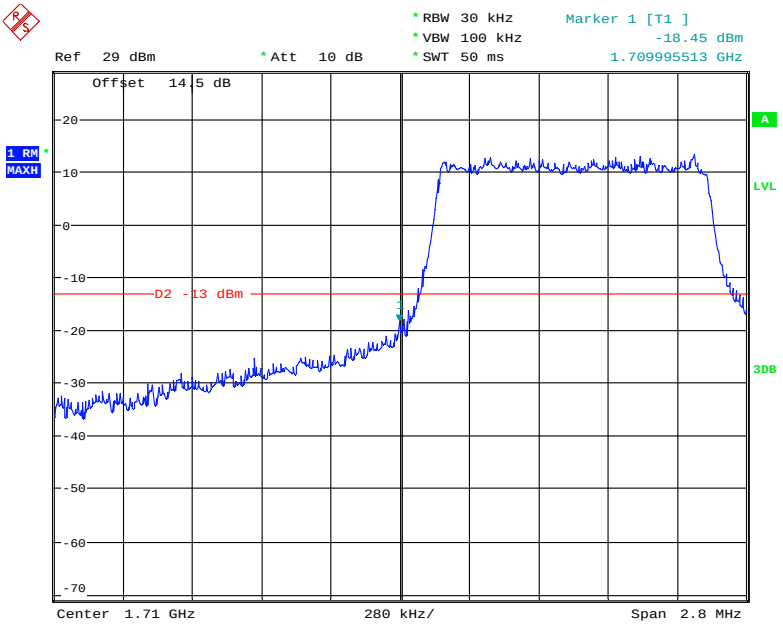
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 7.NOV.2018 21:59:13

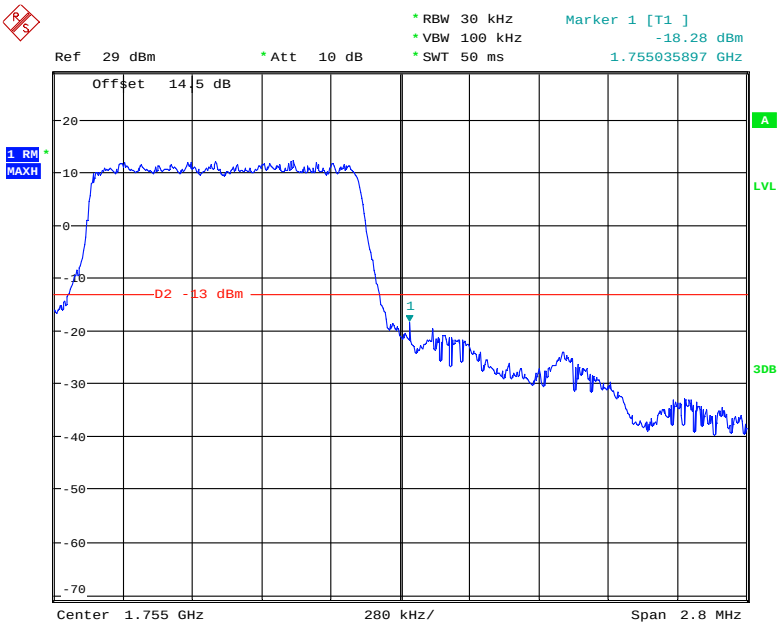
Band 4:

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



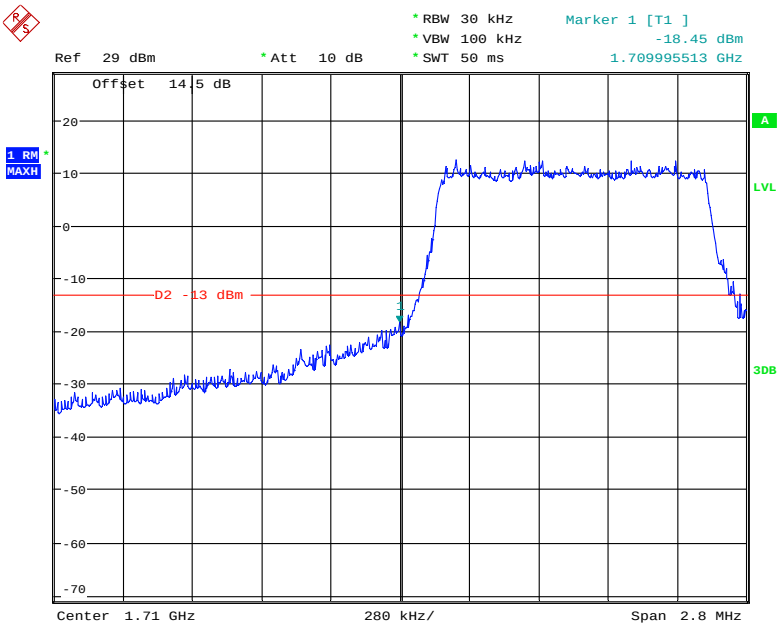
Date: 7.NOV.2018 22:22:29

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



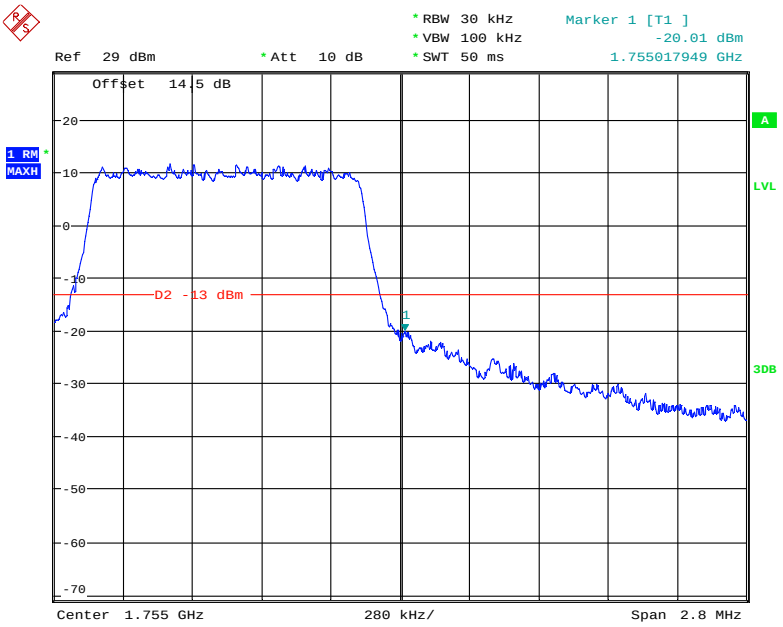
Date: 7.NOV.2018 22:23:15

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



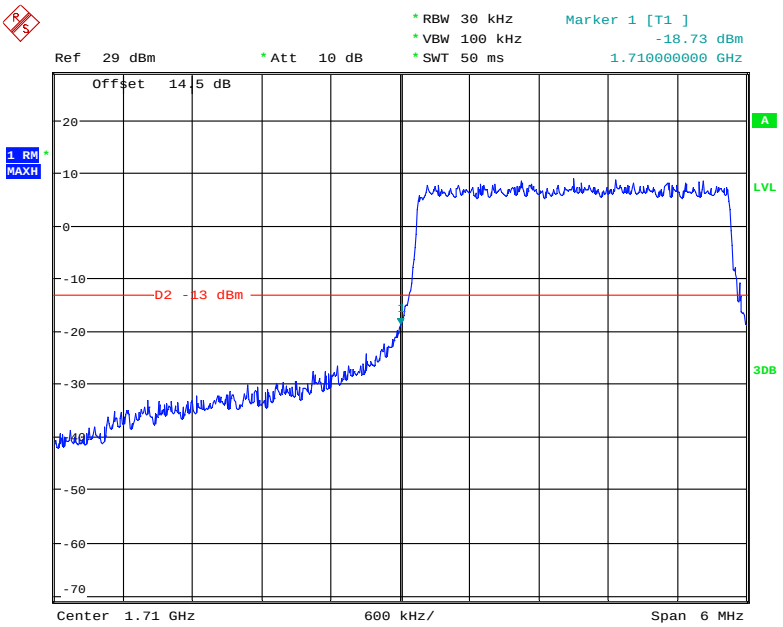
Date: 7.NOV.2018 22:21:38

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



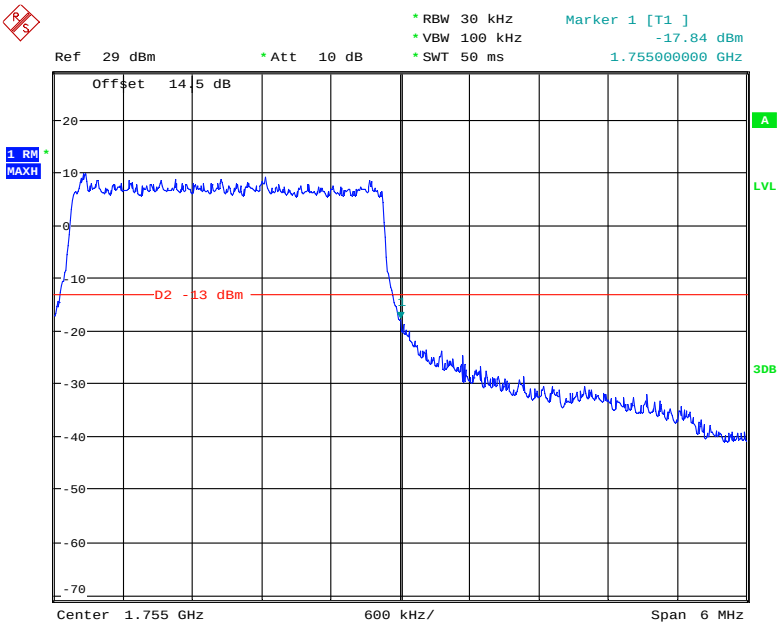
Date: 7.NOV.2018 22:23:49

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



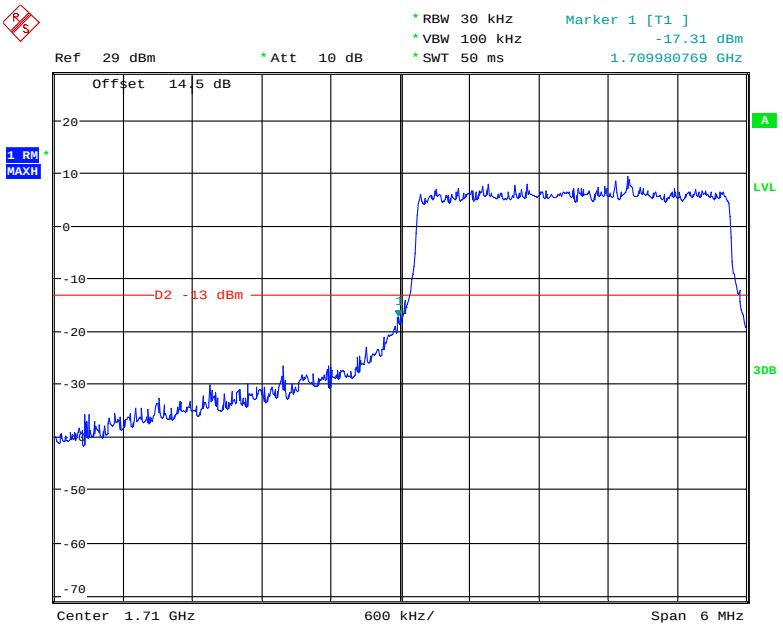
Date: 7.NOV.2018 22:27:50

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



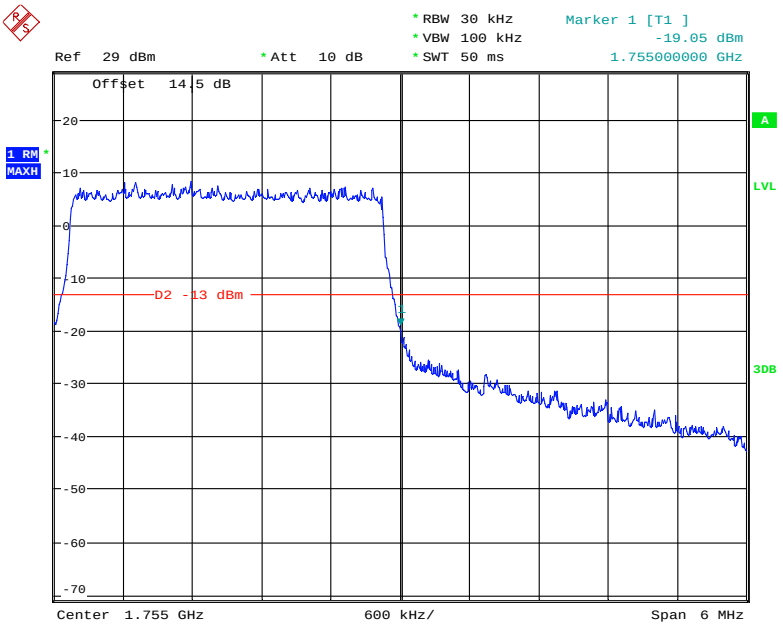
Date: 7.NOV.2018 22:24:50

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



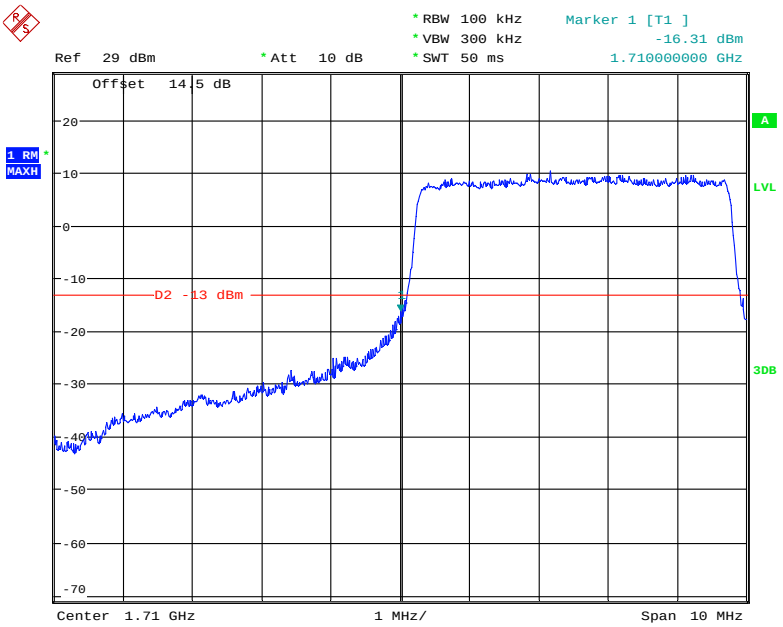
Date: 7.NOV.2018 22:27:08

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



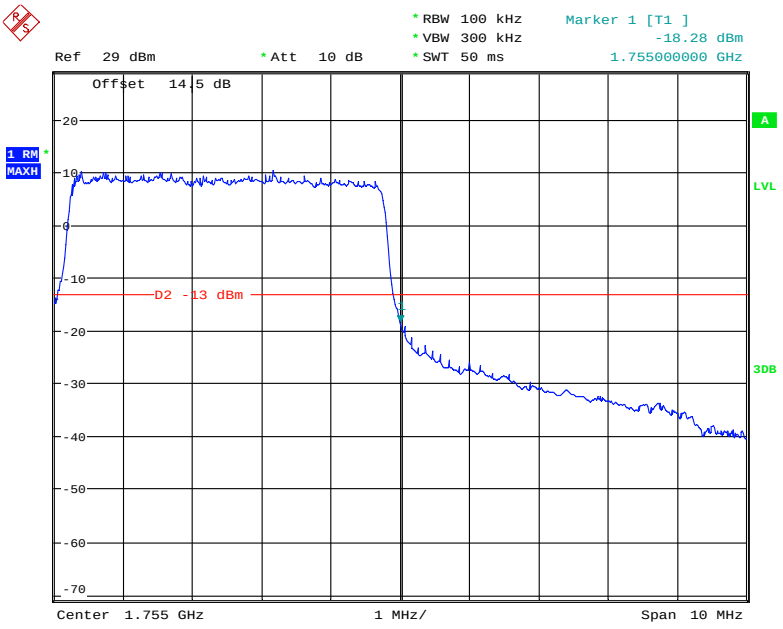
Date: 7.NOV.2018 22:25:41

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



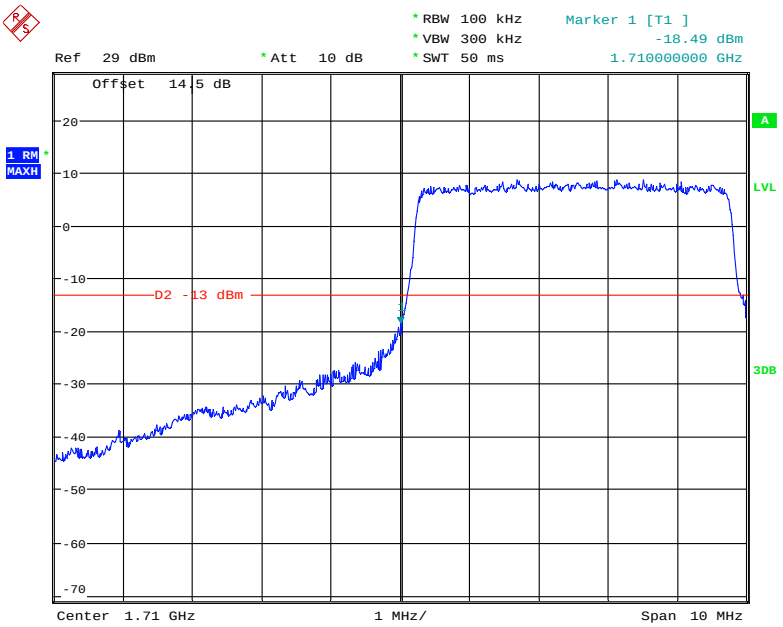
Date: 7.NOV.2018 22:05:40

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



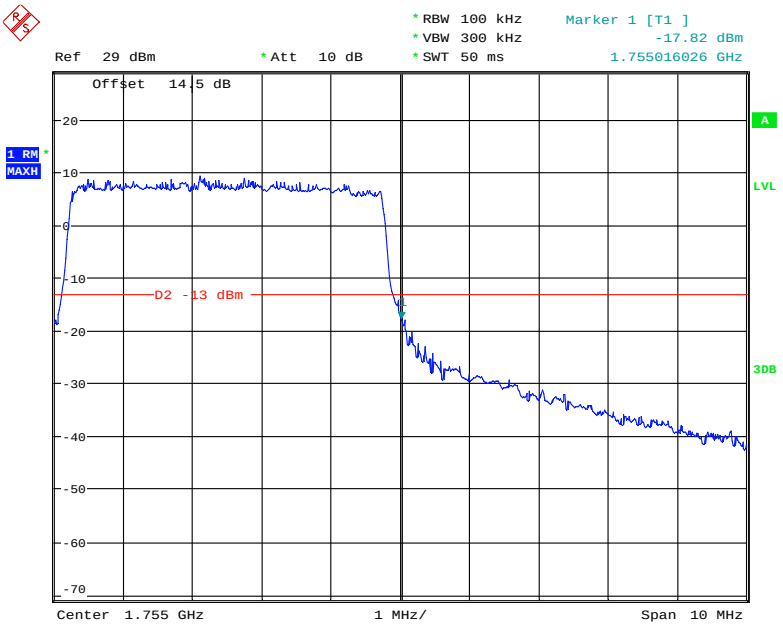
Date: 7.NOV.2018 22:09:38

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



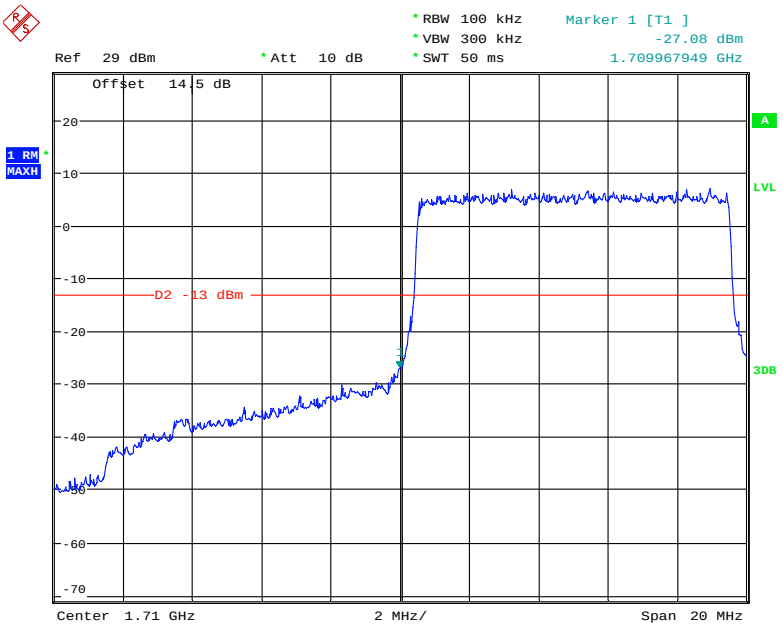
Date: 7.NOV.2018 22:04:51

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



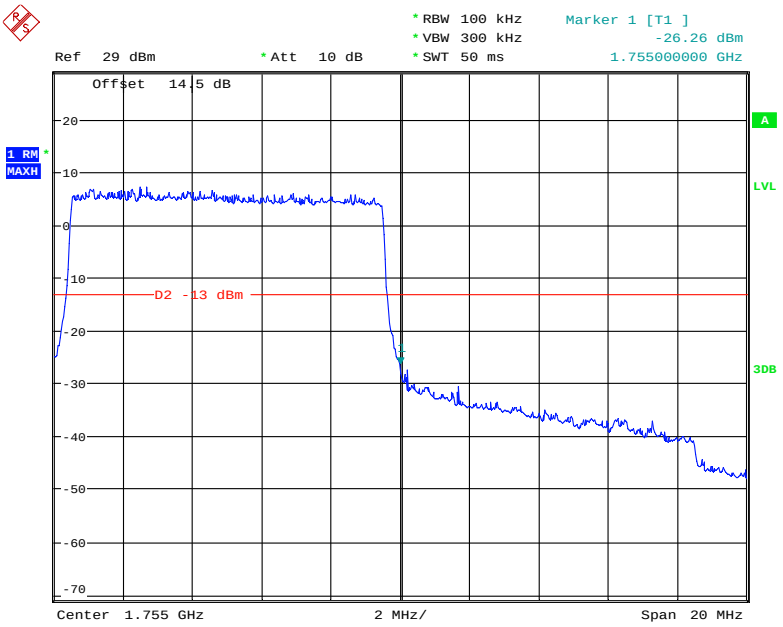
Date: 7.NOV.2018 22:10:18

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



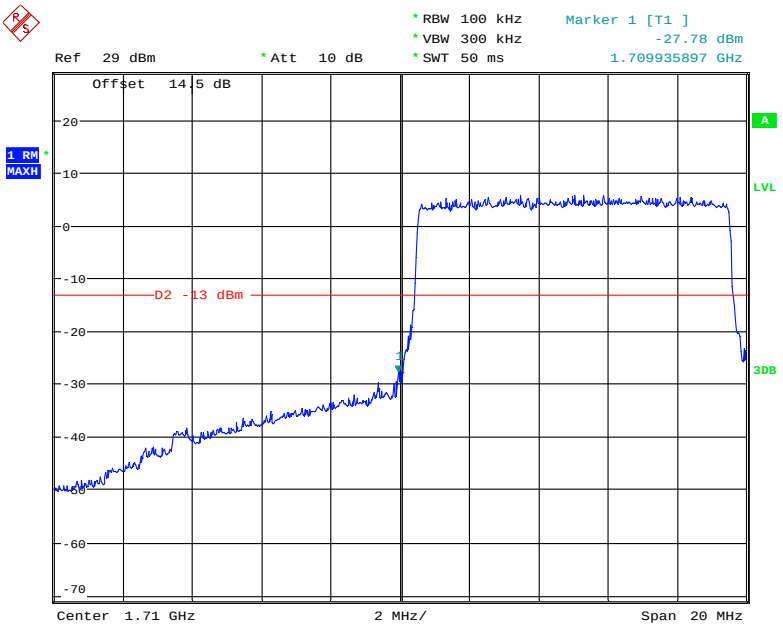
Date: 7.NOV.2018 22:13:16

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



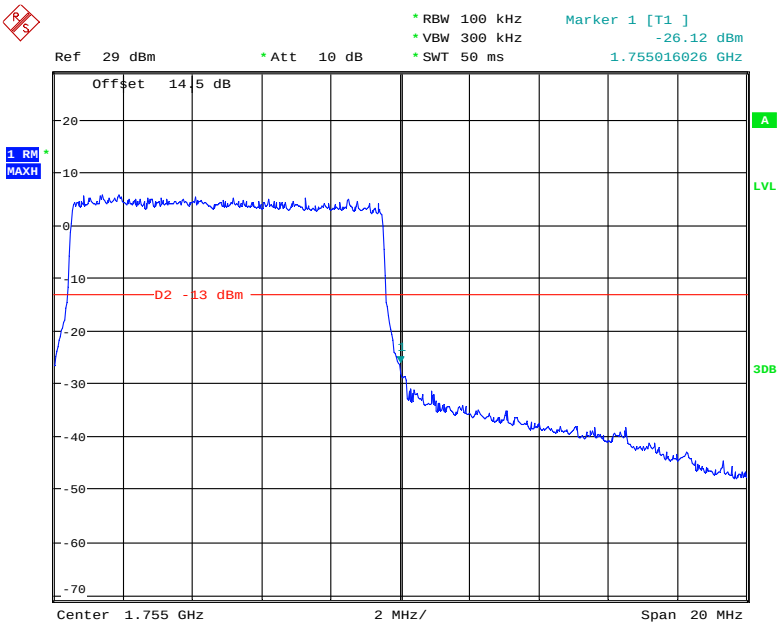
Date: 7.NOV.2018 22:12:17

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



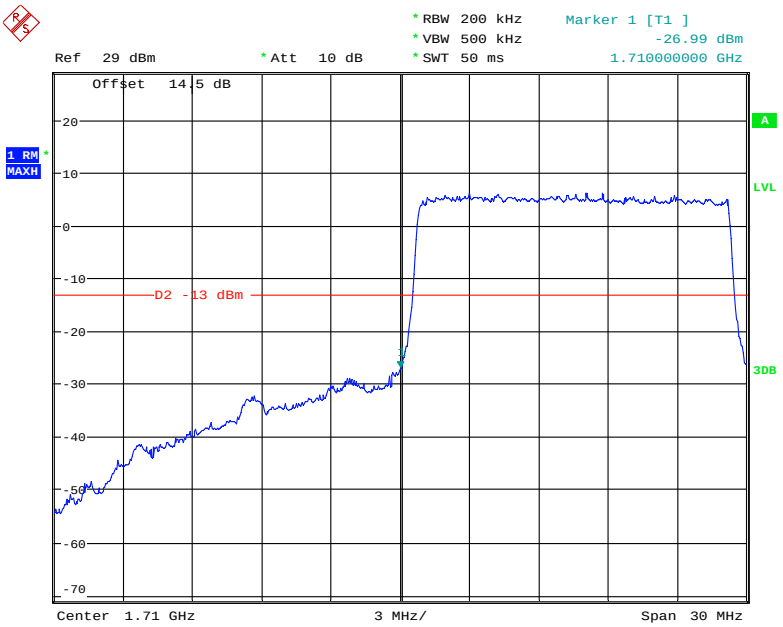
Date: 7.NOV.2018 22:13:50

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



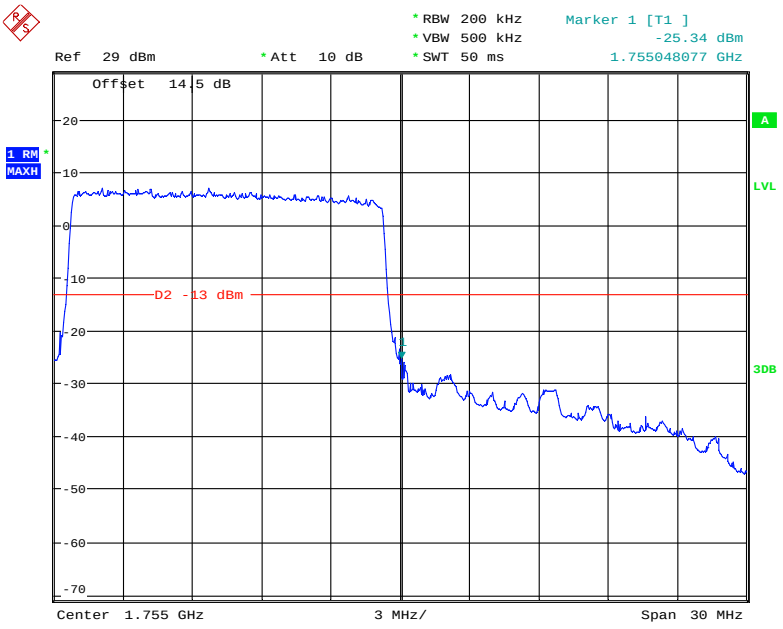
Date: 7.NOV.2018 22:11:28

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



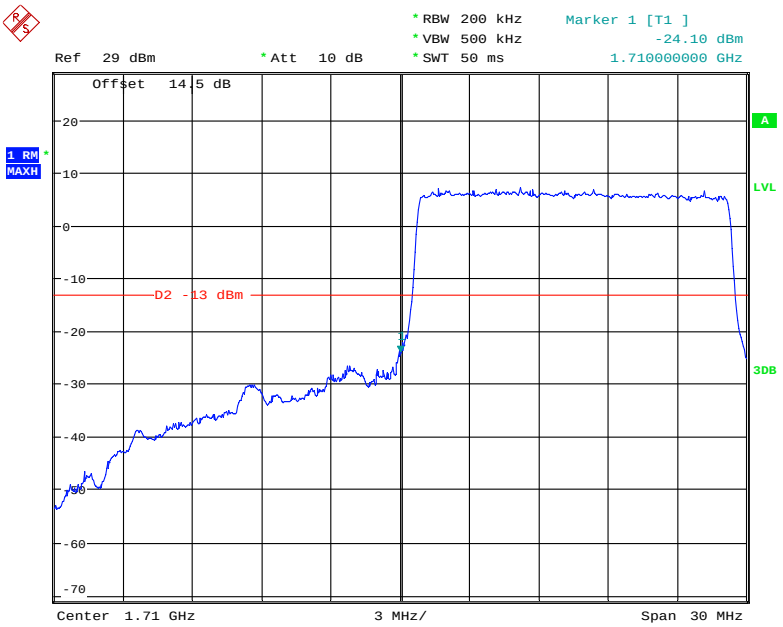
Date: 7.NOV.2018 22:15:48

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



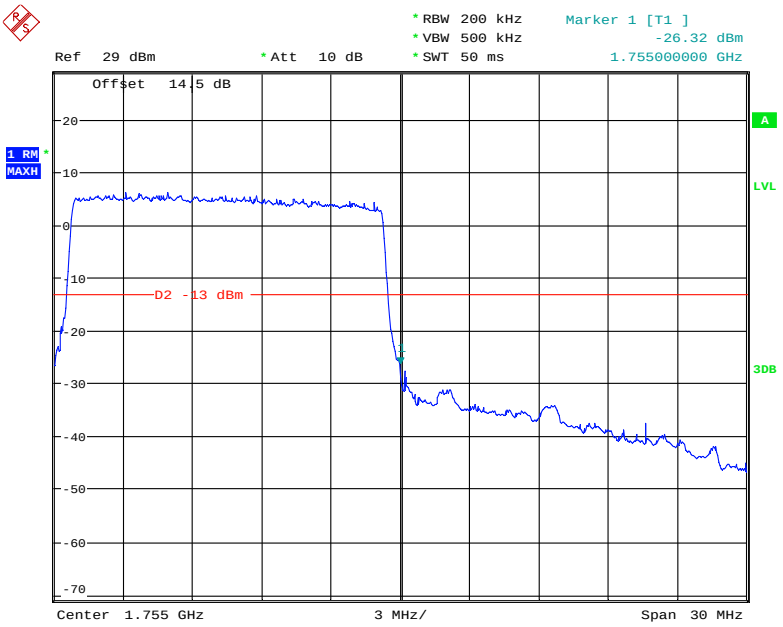
Date: 7.NOV.2018 22:17:16

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



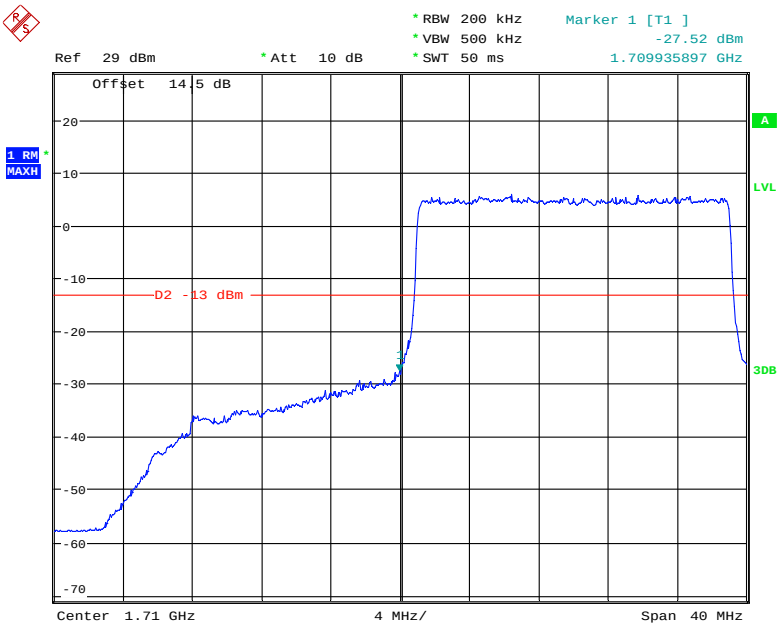
Date: 7.NOV.2018 22:15:12

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



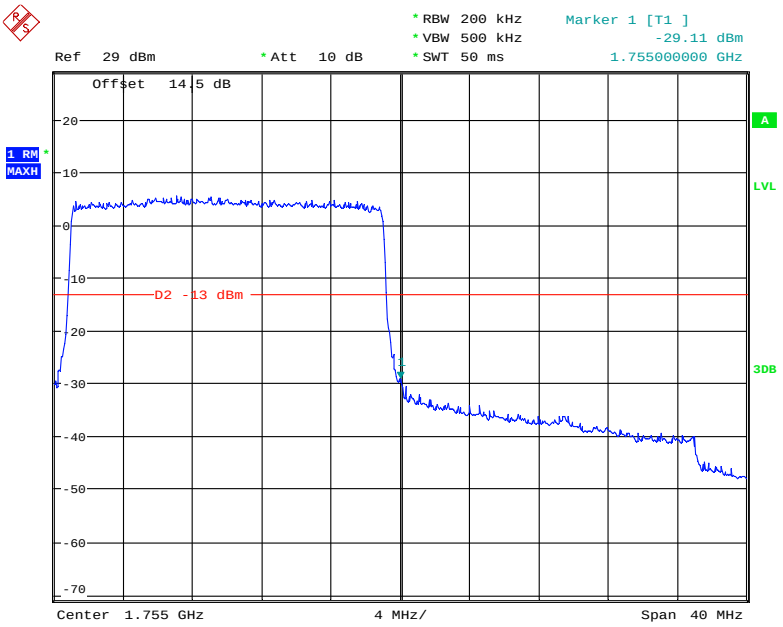
Date: 7.NOV.2018 22:16:43

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



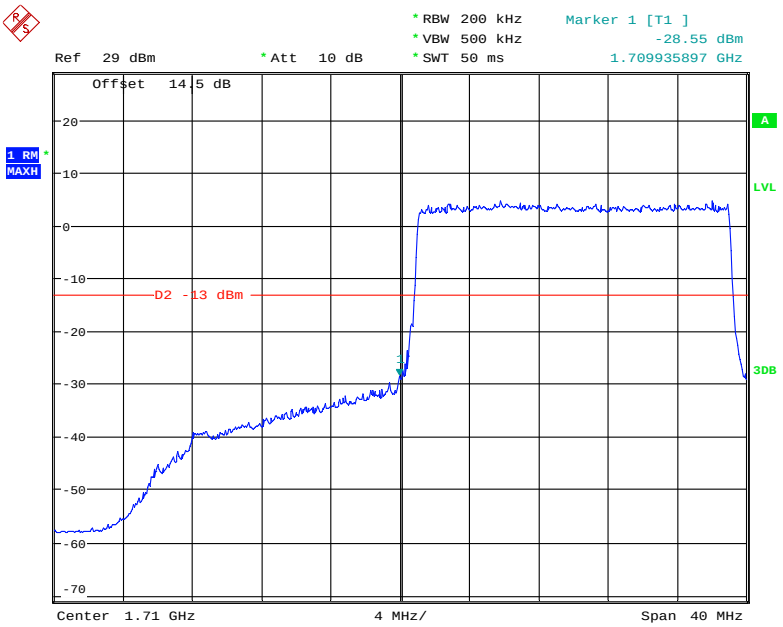
Date: 7.NOV.2018 22:19:56

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



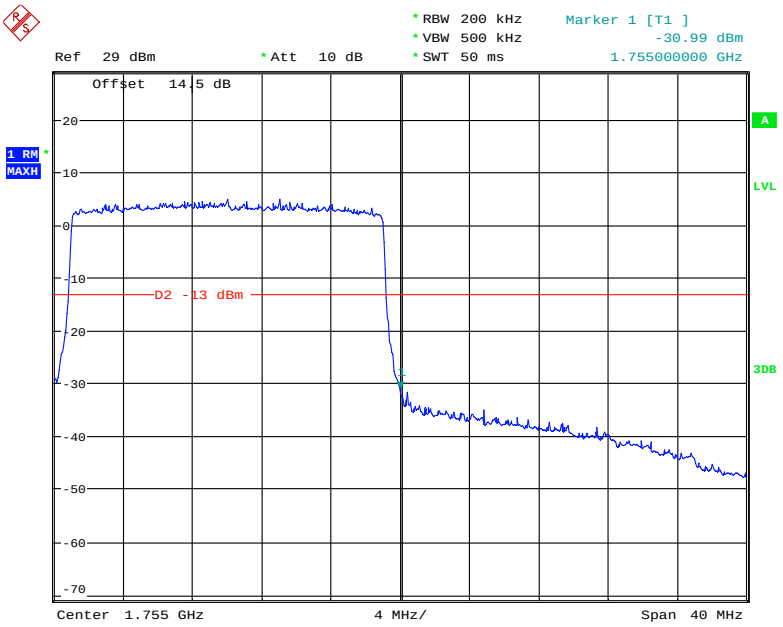
Date: 7.NOV.2018 22:18:49

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



Date: 7.NOV.2018 22:20:18

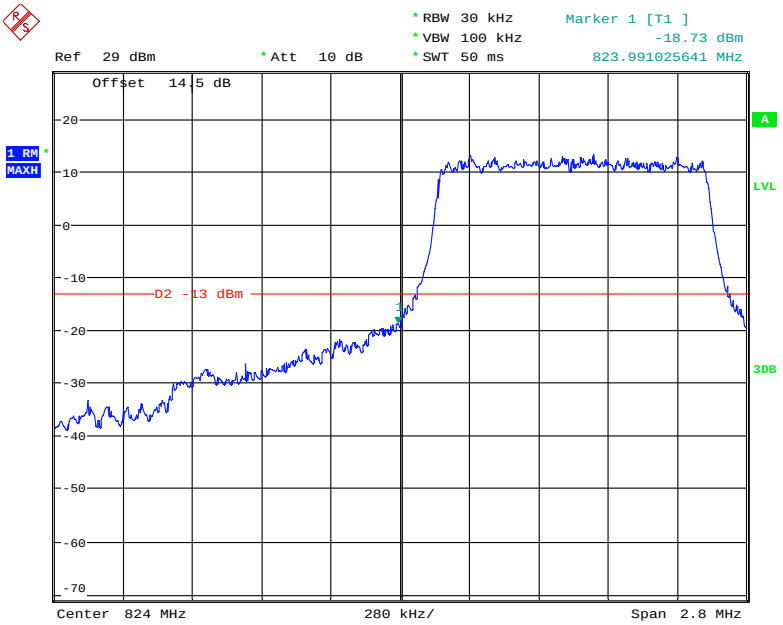
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 7.NOV.2018 22:18:12

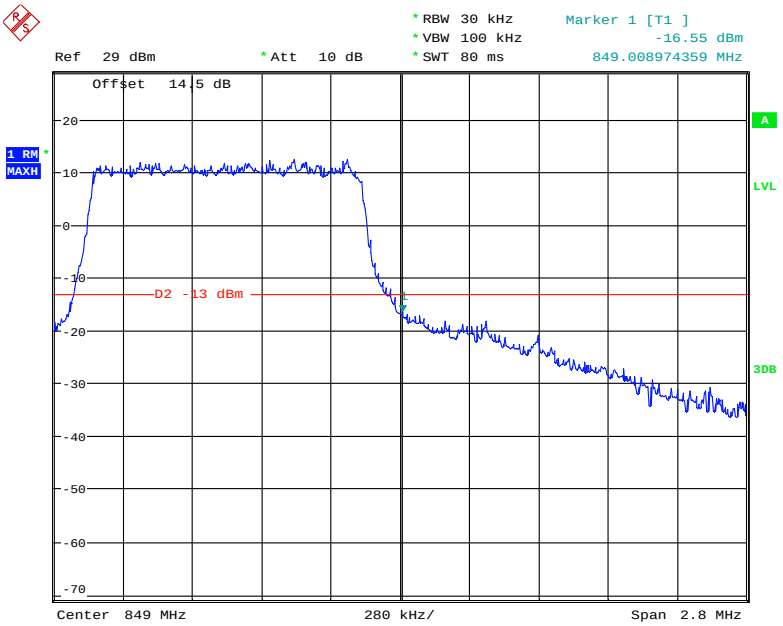
Band 5:

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



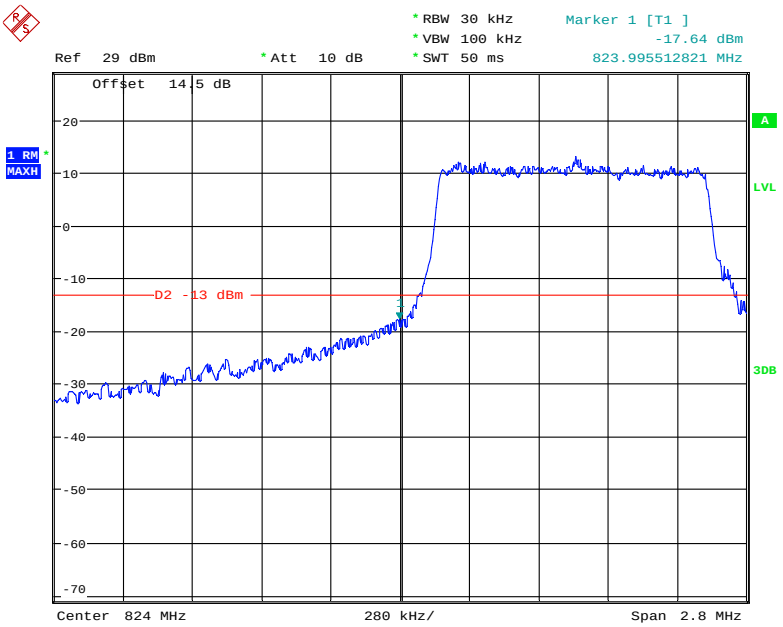
Date: 7.NOV.2018 22:31:17

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



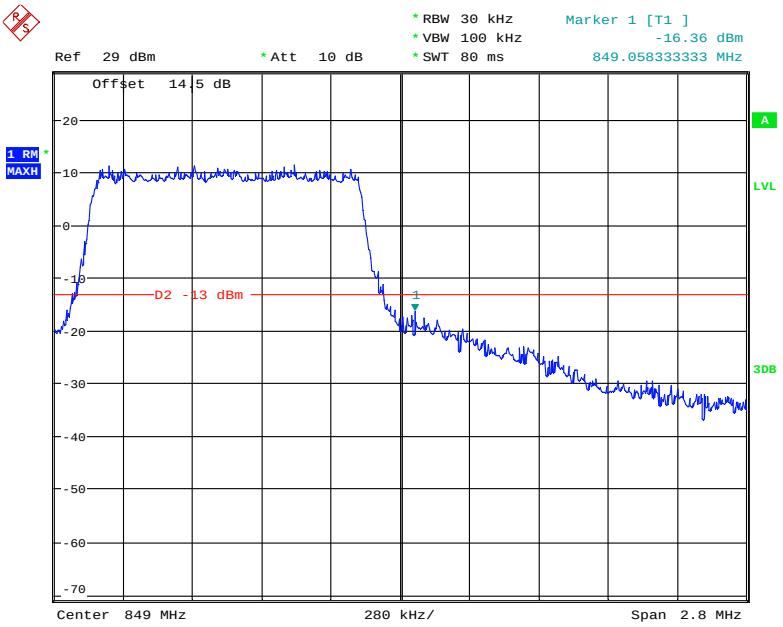
Date: 7.NOV.2018 22:32:28

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



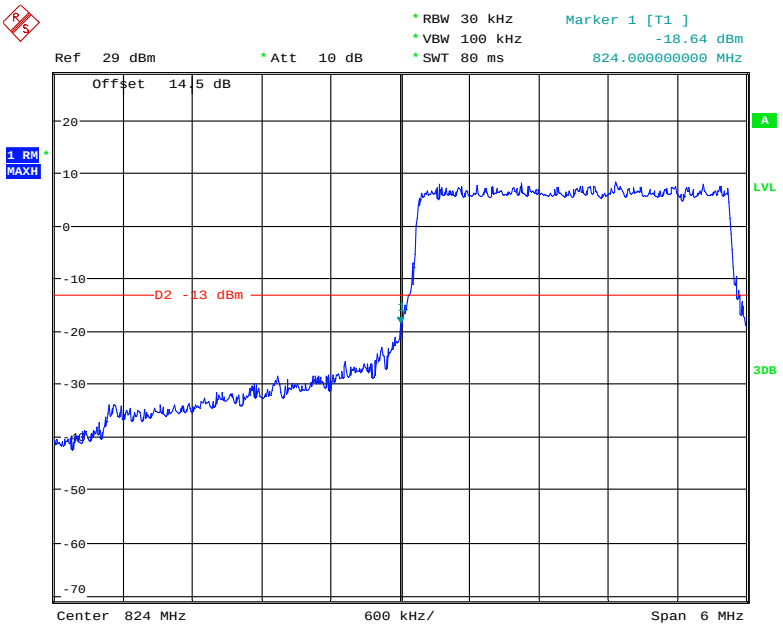
Date: 7.NOV.2018 22:30:08

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



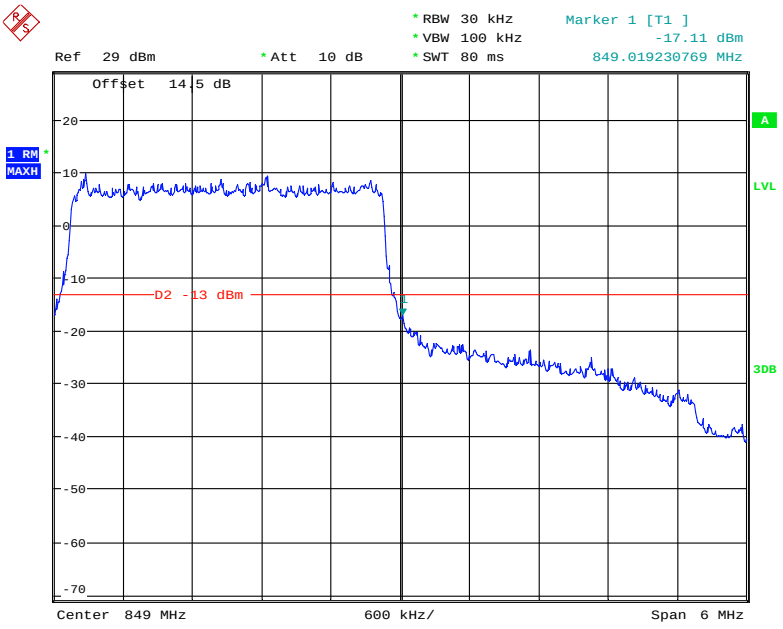
Date: 7.NOV.2018 22:32:53

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



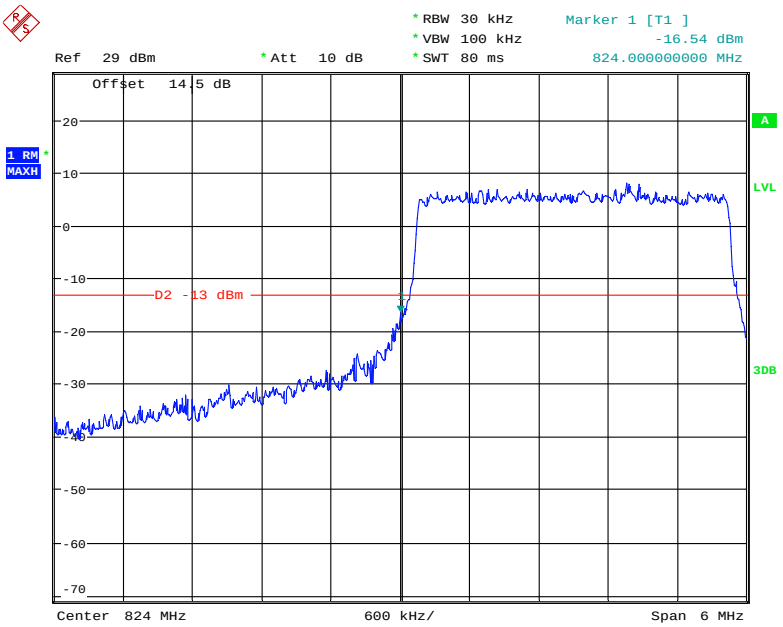
Date: 7.NOV.2018 22:35:55

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



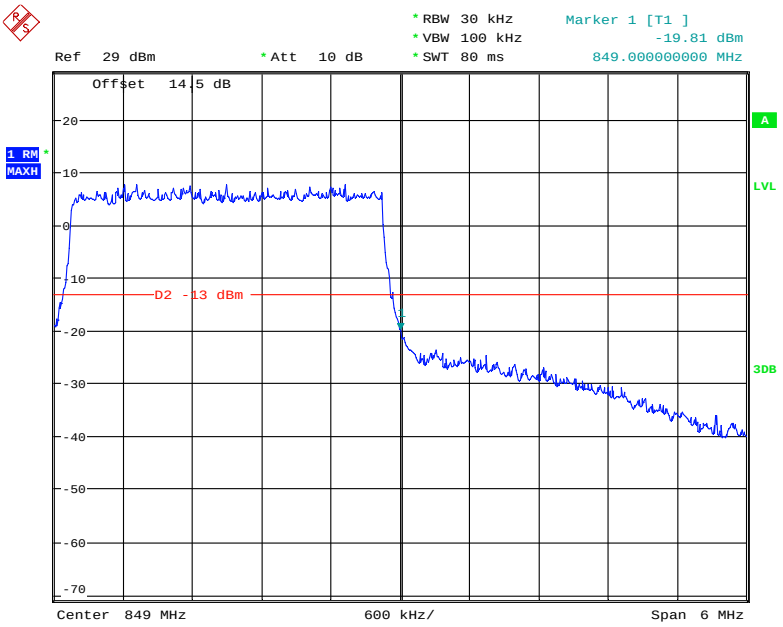
Date: 7.NOV.2018 22:34:01

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



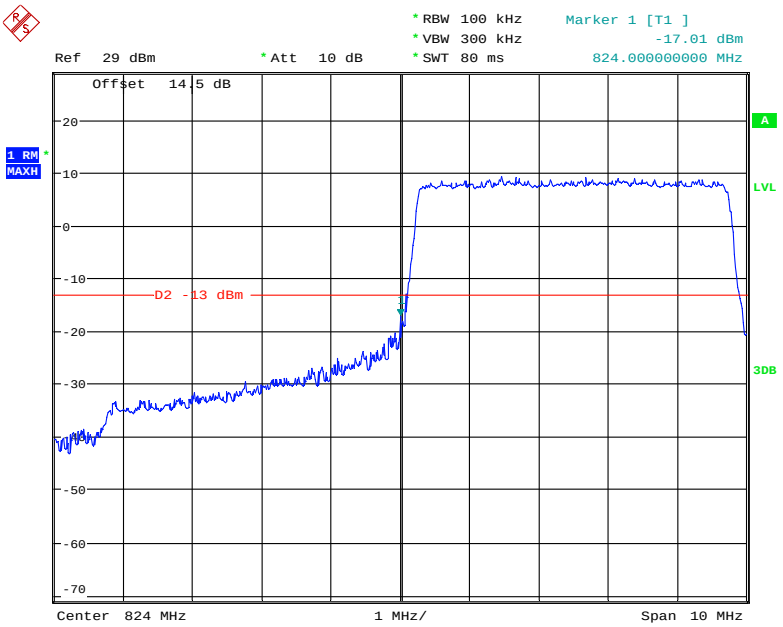
Date: 7.NOV.2018 22:35:23

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



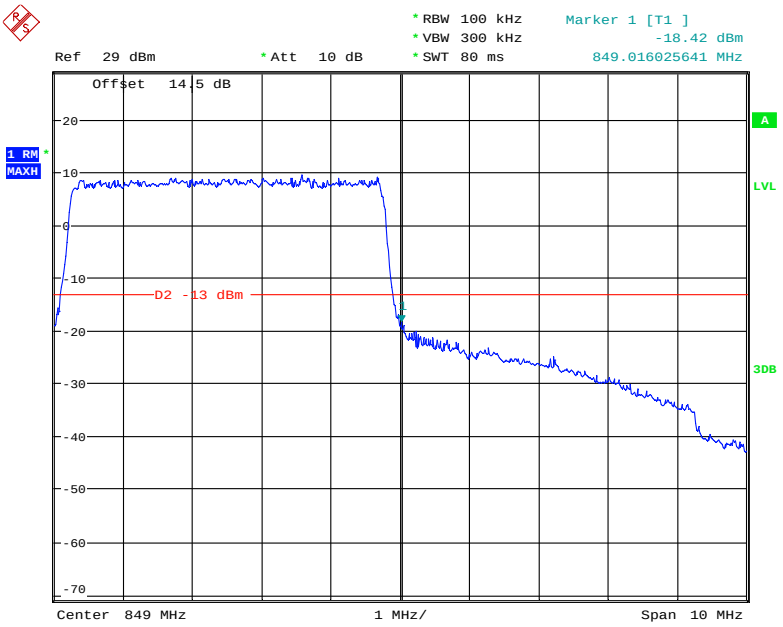
Date: 7.NOV.2018 22:34:45

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



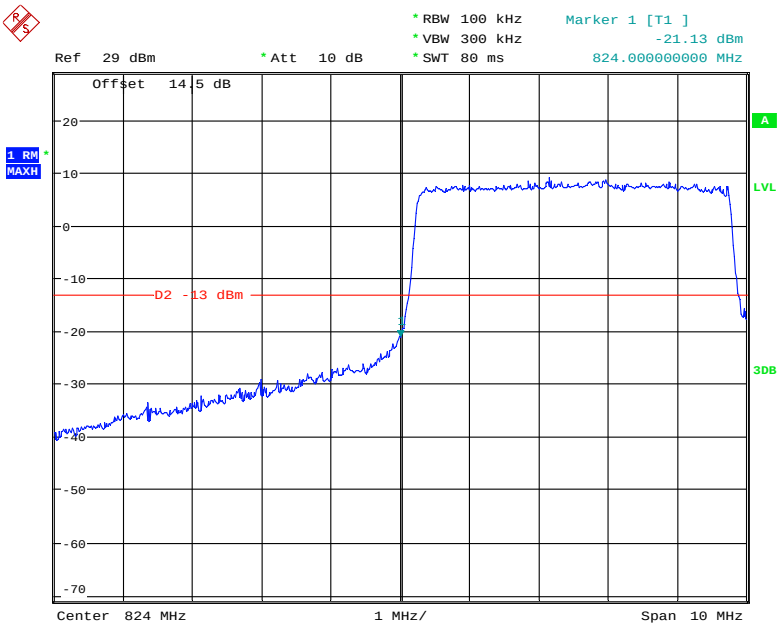
Date: 7.NOV.2018 22:37:31

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



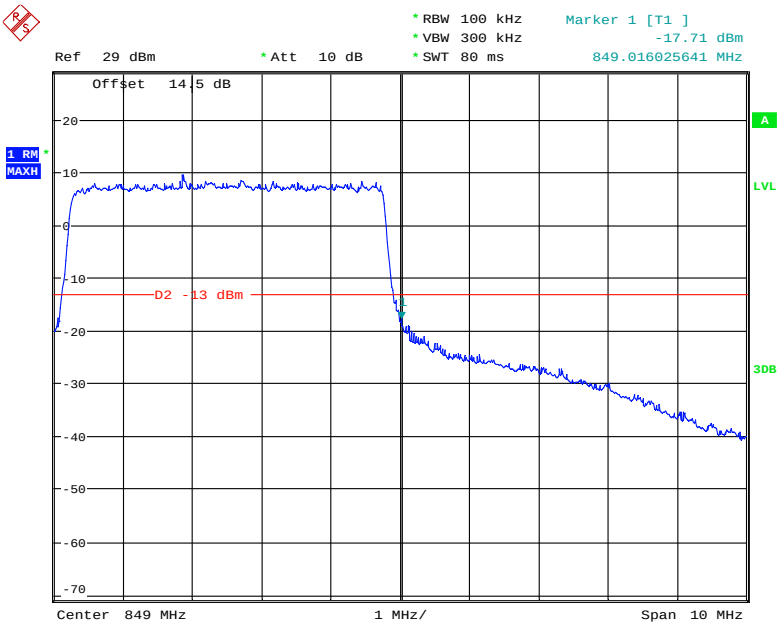
Date: 7.NOV.2018 22:38:15

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



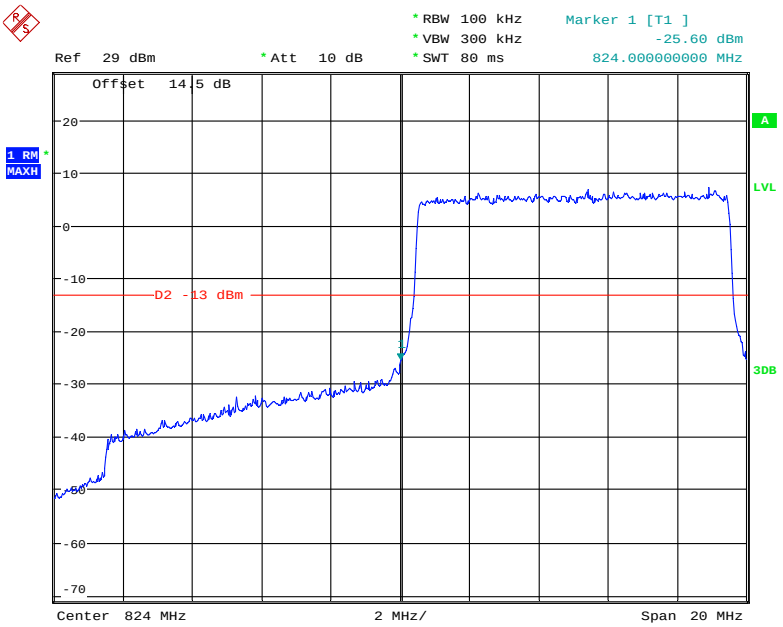
Date: 7.NOV.2018 22:36:55

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



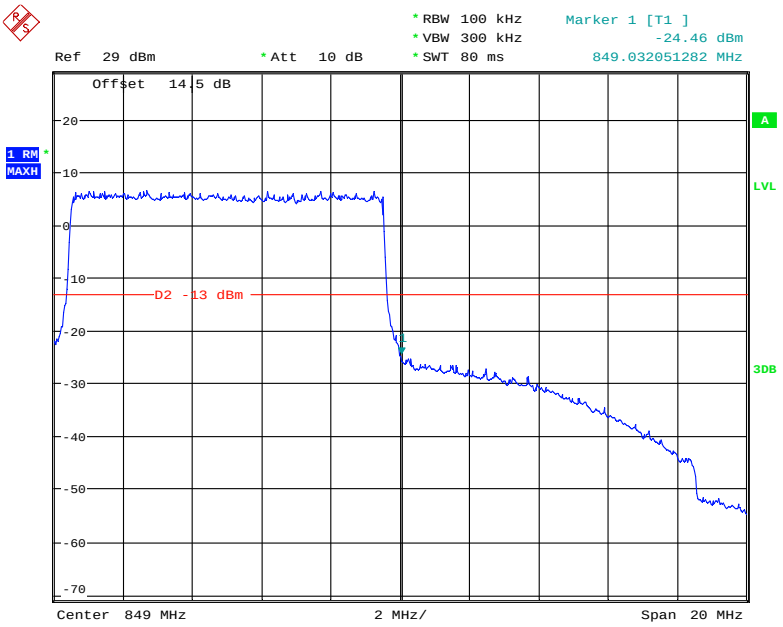
Date: 7.NOV.2018 22:38:46

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



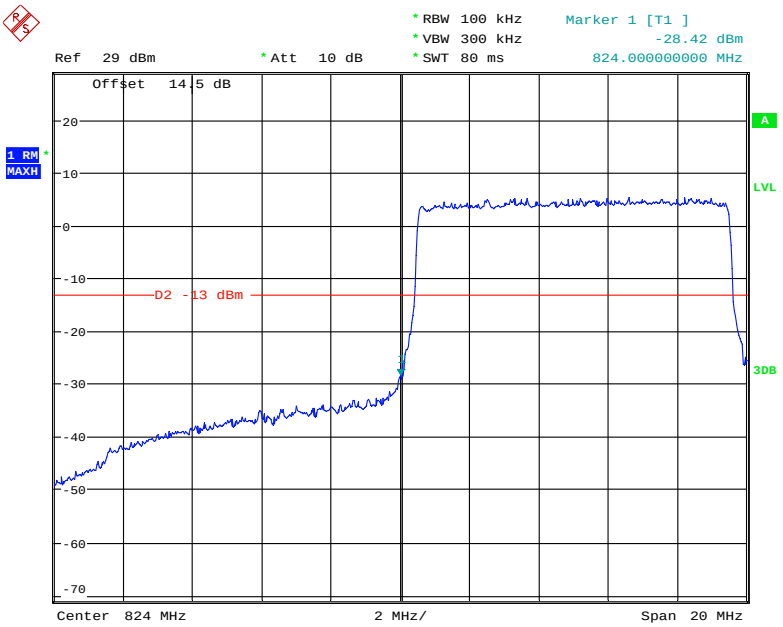
Date: 7.NOV.2018 22:41:02

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



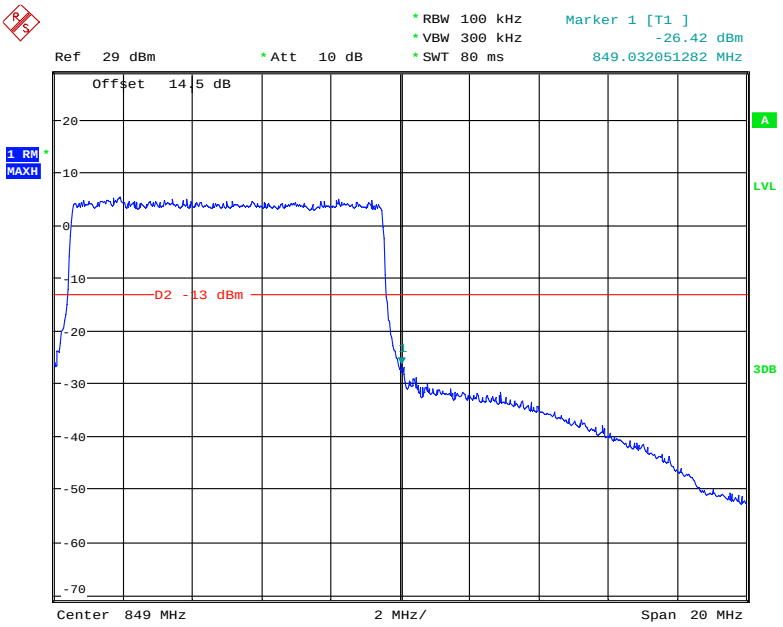
Date: 7.NOV.2018 22:40:24

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



Date: 7.NOV.2018 22:41:30

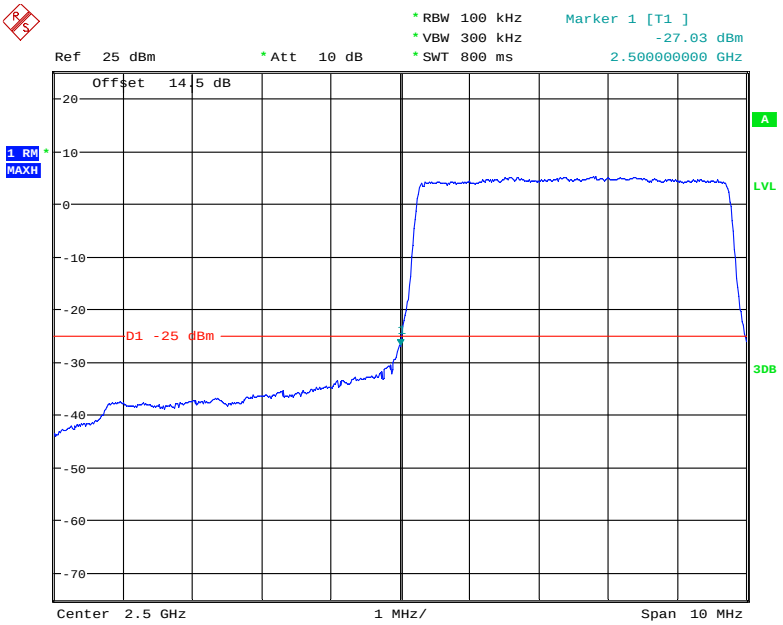
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



Date: 7.NOV.2018 22:39:49

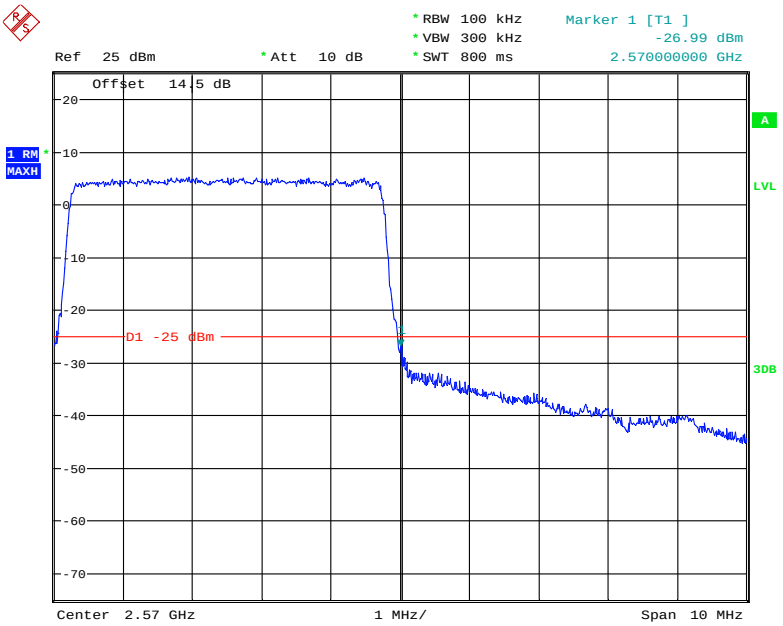
Band 7:

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



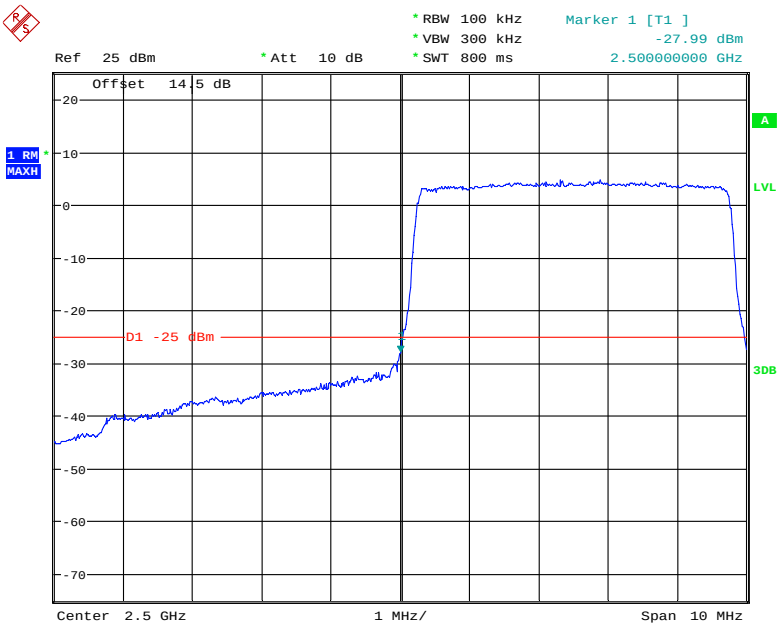
Date: 12.NOV.2018 18:44:39

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



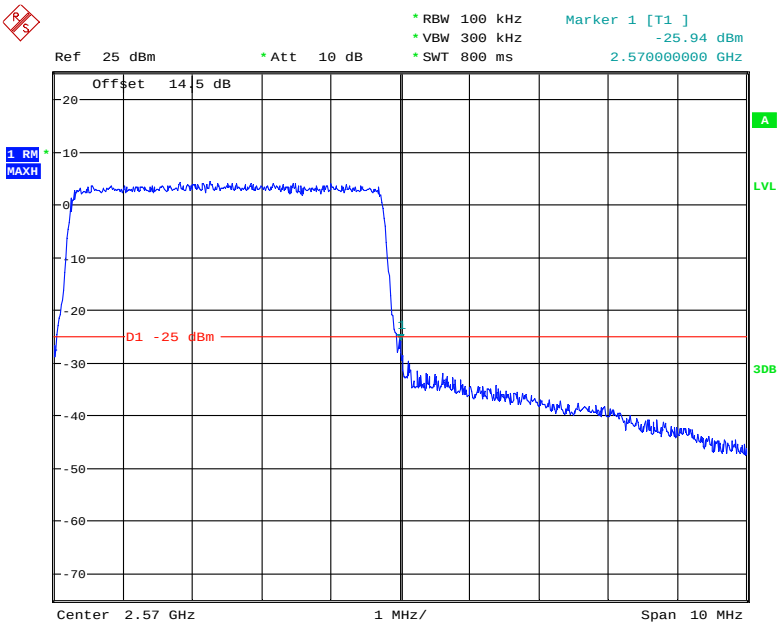
Date: 12.NOV.2018 18:48:28

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



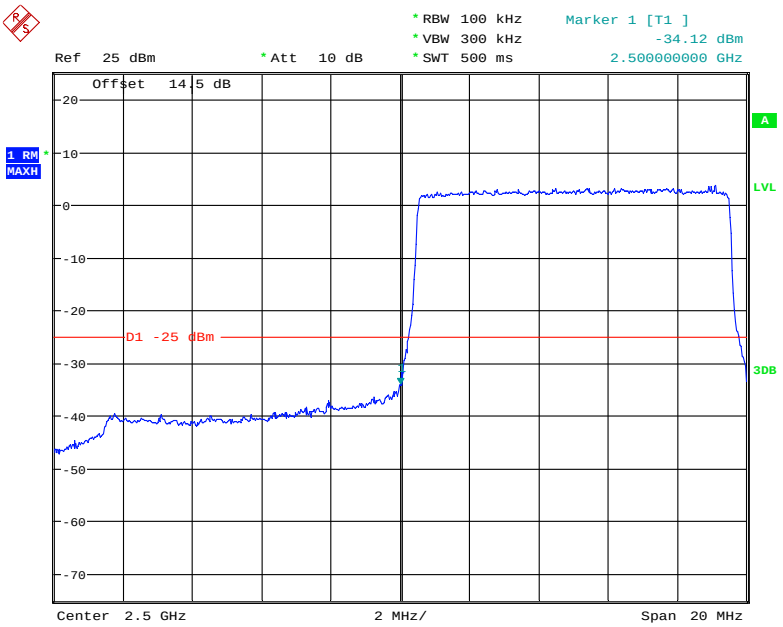
Date: 12.NOV.2018 18:46:22

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



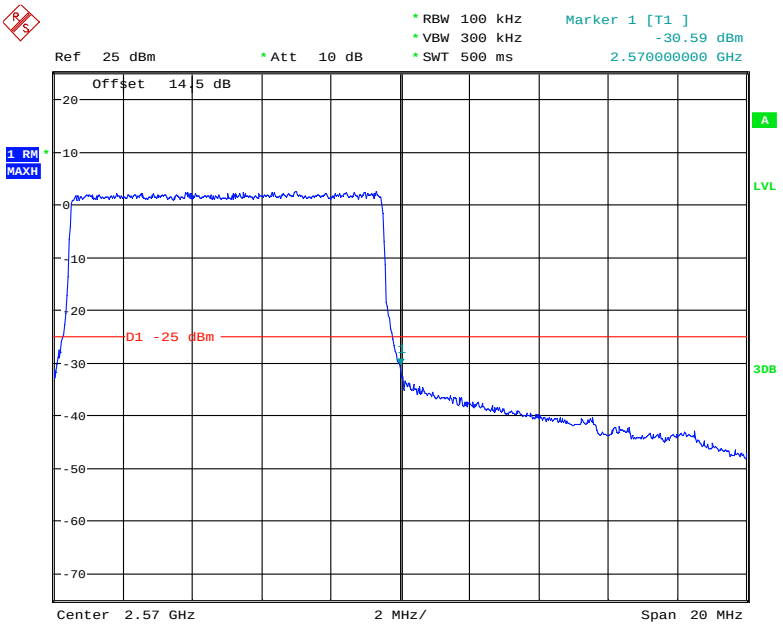
Date: 12.NOV.2018 18:49:25

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



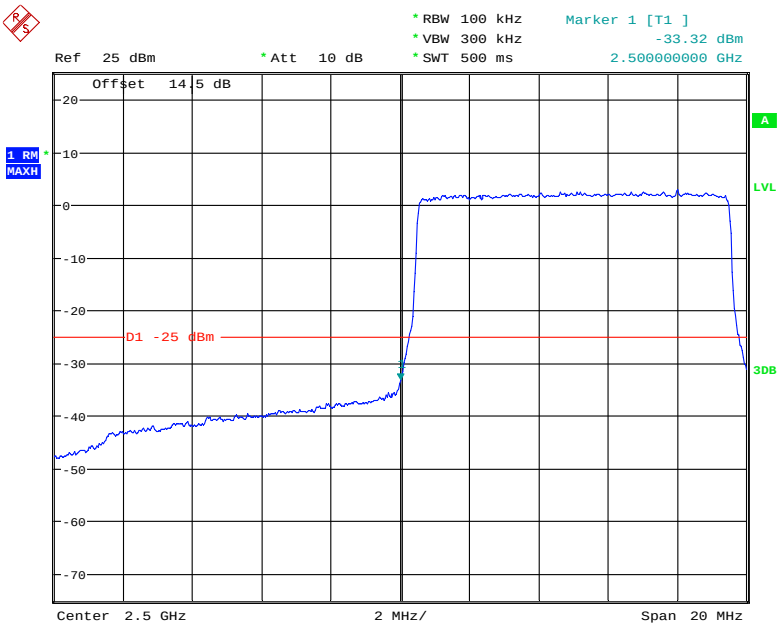
Date: 12.NOV.2018 18:53:59

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



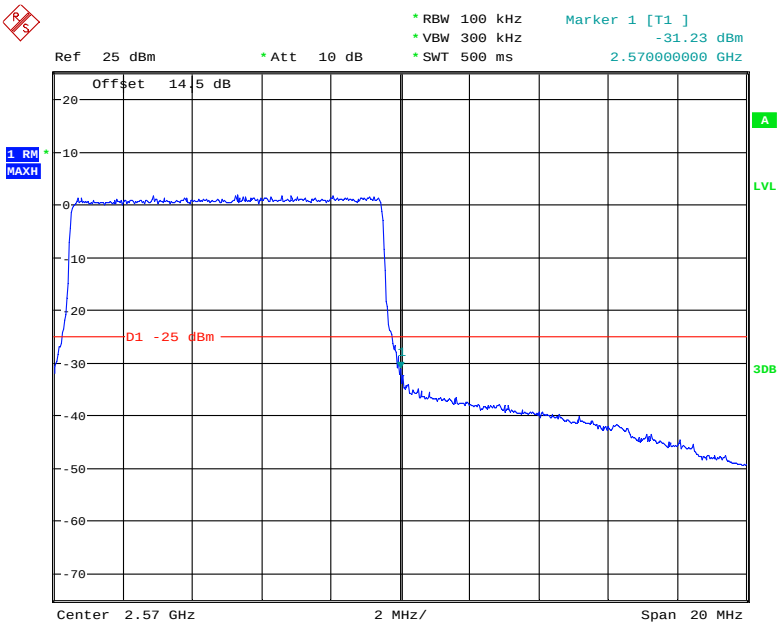
Date: 12.NOV.2018 18:56:28

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



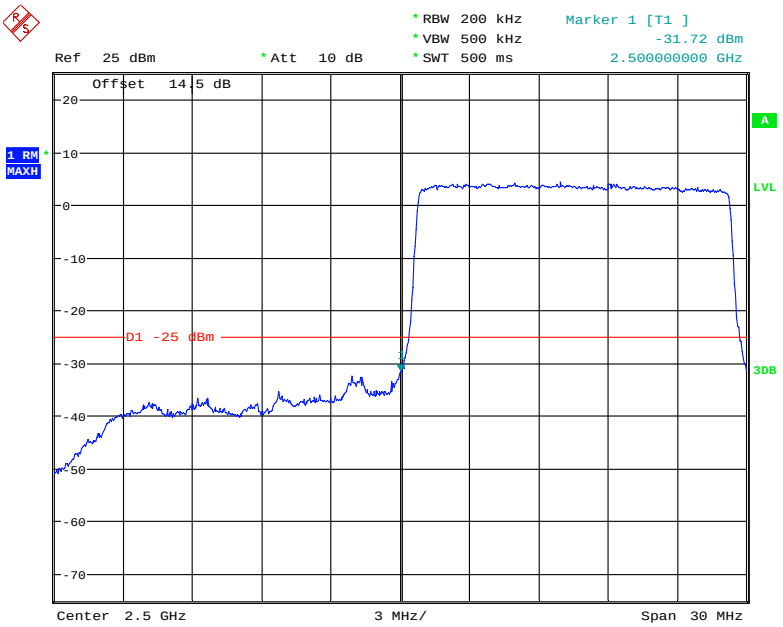
Date: 12.NOV.2018 18:55:03

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



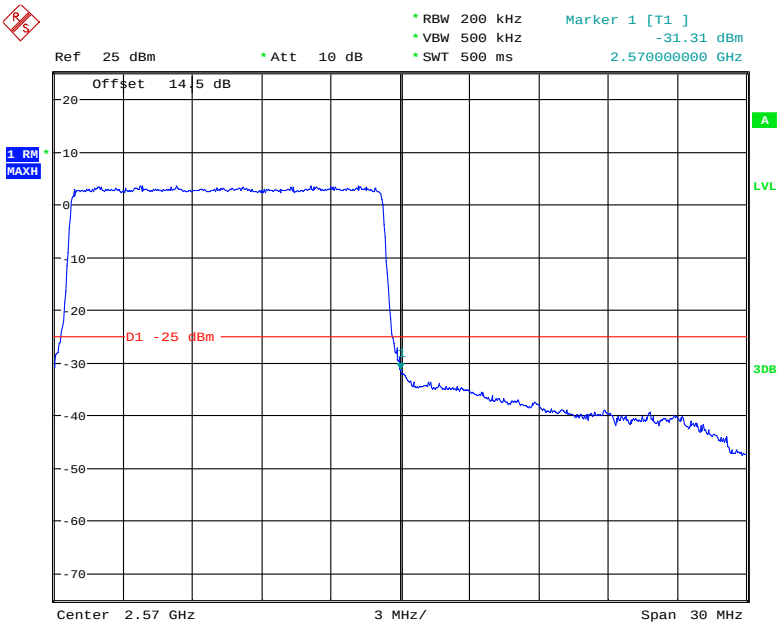
Date: 12.NOV.2018 18:55:57

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



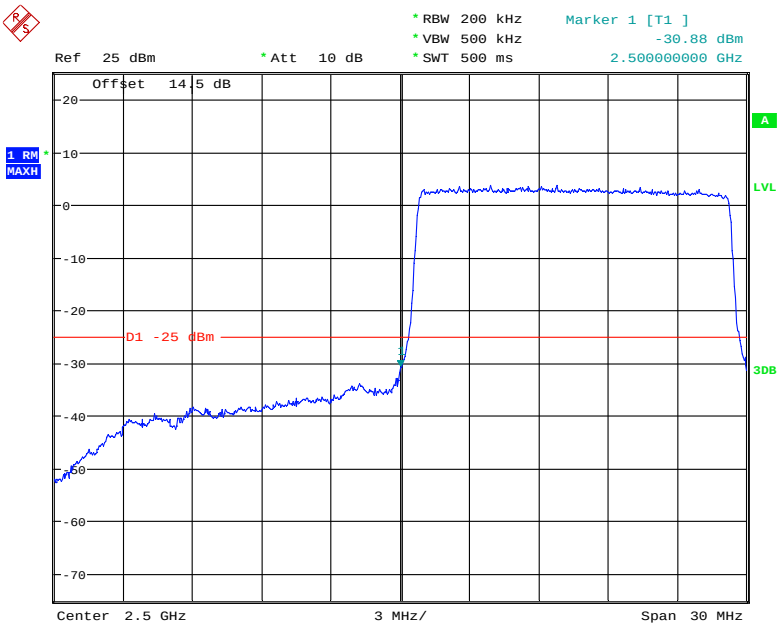
Date: 12.NOV.2018 19:00:09

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



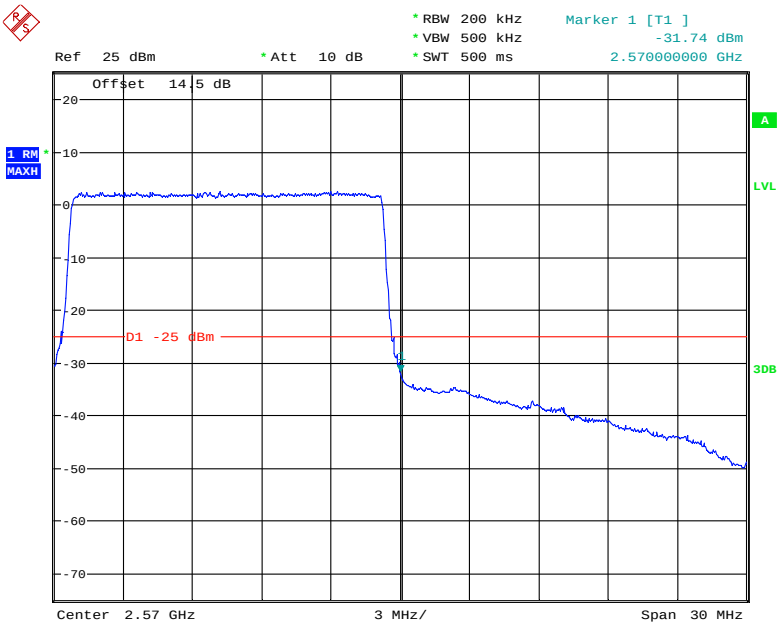
Date: 12.NOV.2018 18:58:34

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



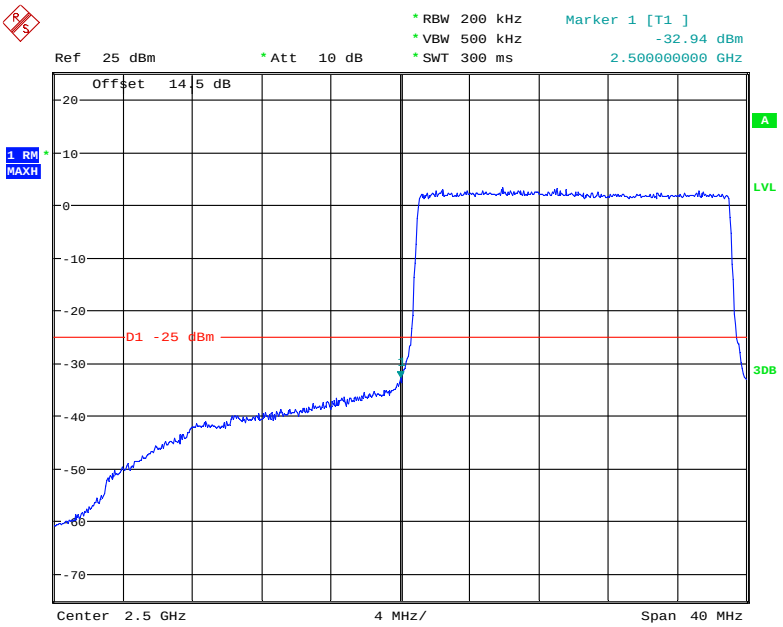
Date: 12.NOV.2018 18:59:44

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



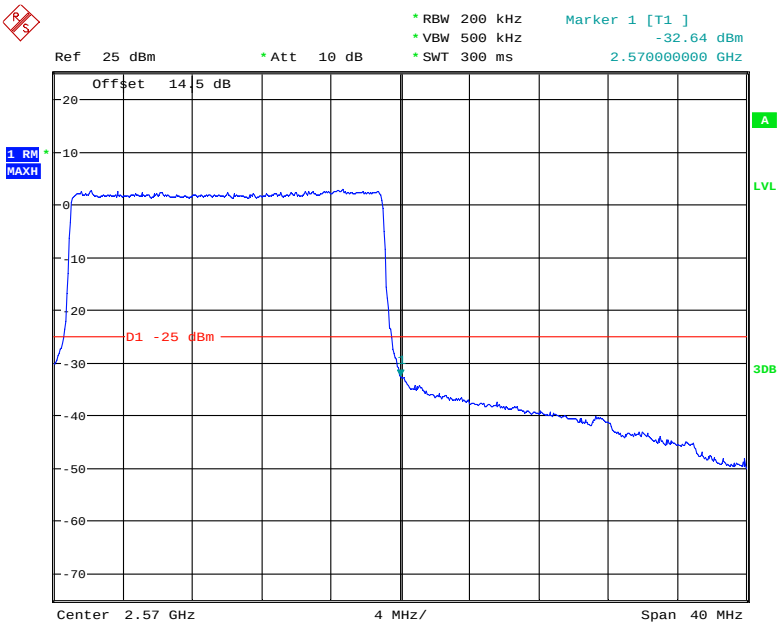
Date: 12.NOV.2018 18:58:57

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



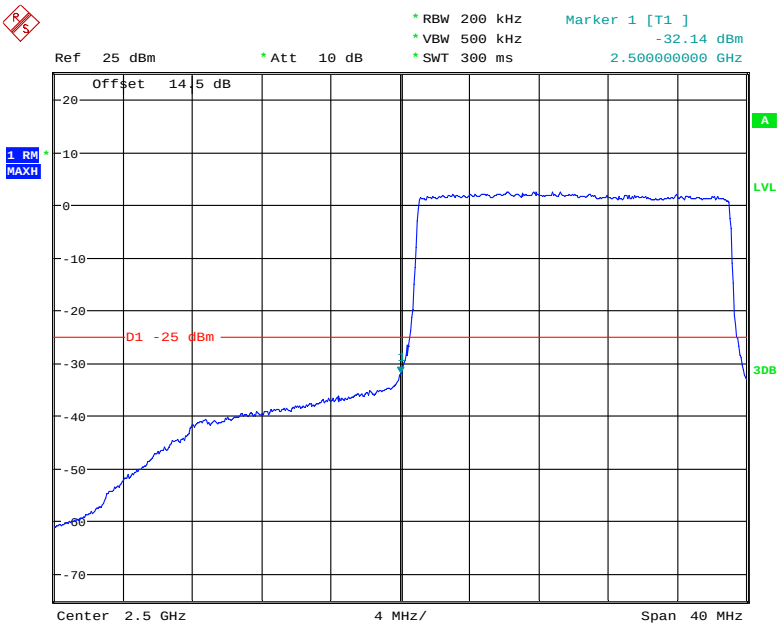
Date: 12.NOV.2018 19:01:09

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



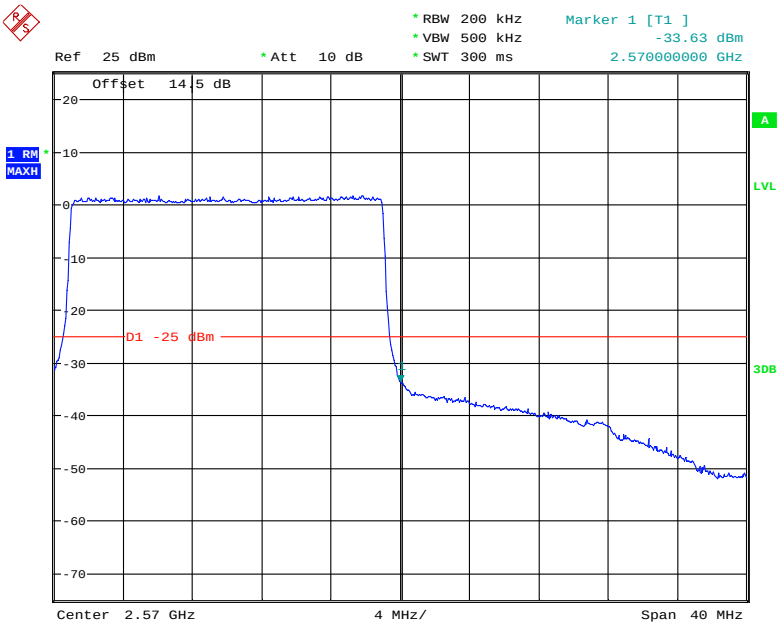
Date: 12.NOV.2018 19:04:09

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



Date: 12.NOV.2018 19:02:00

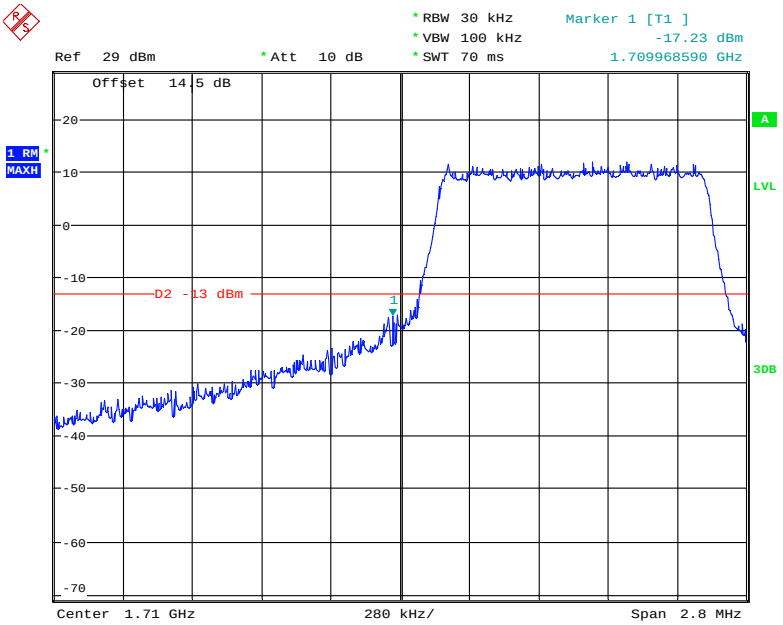
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 12.NOV.2018 19:03:04

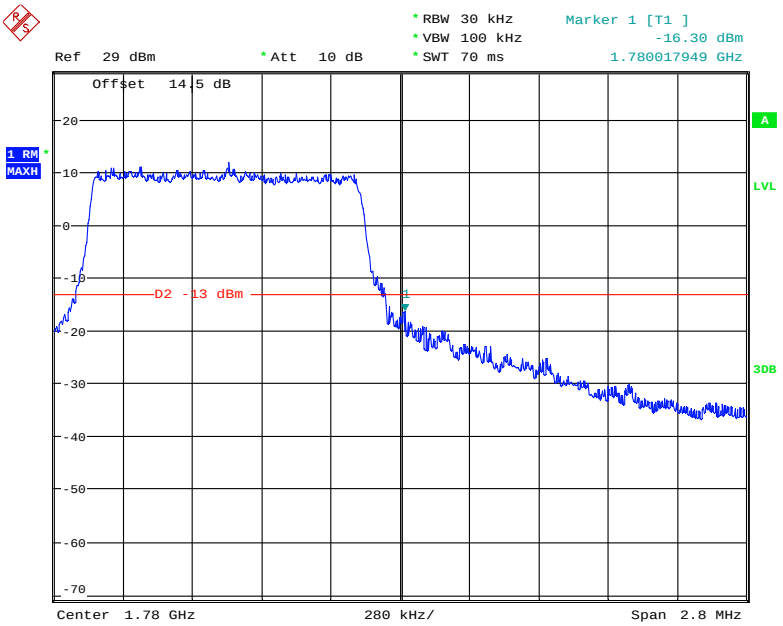
Band 66:

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



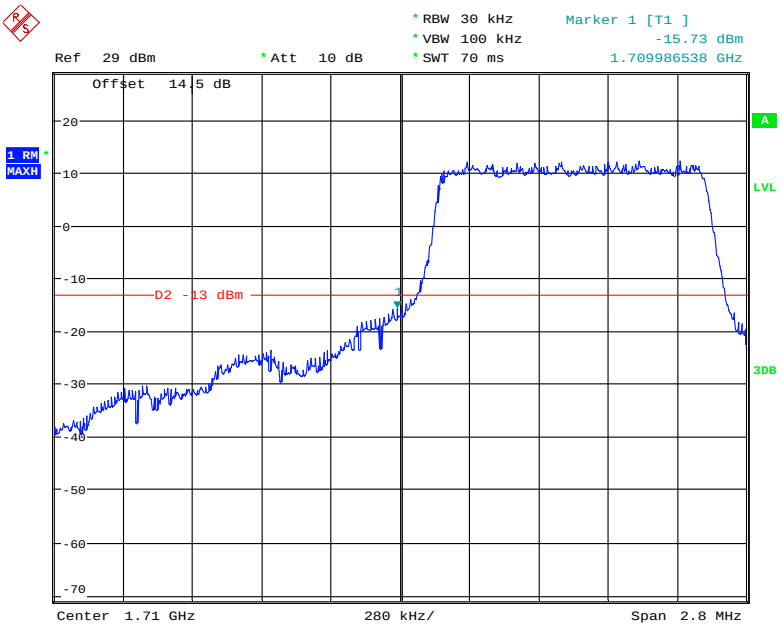
Date: 7.NOV.2018 23:21:51

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



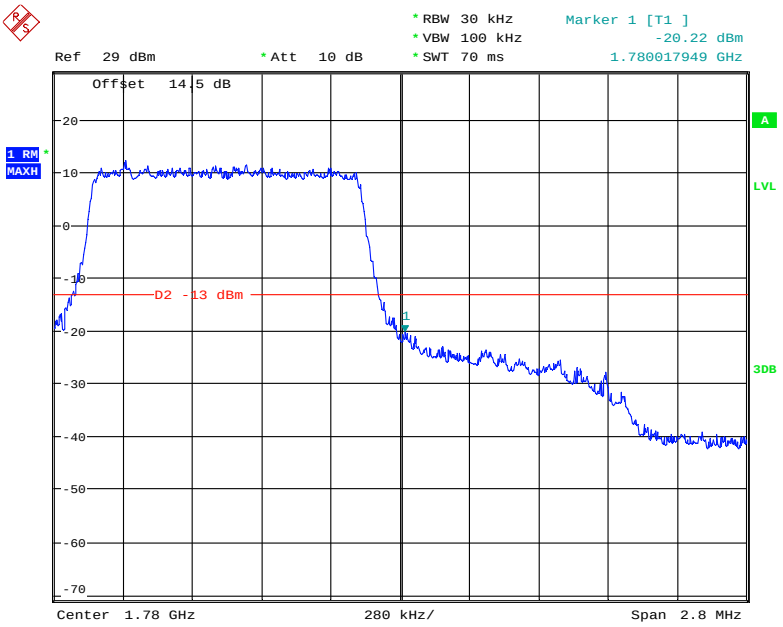
Date: 7.NOV.2018 23:24:48

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



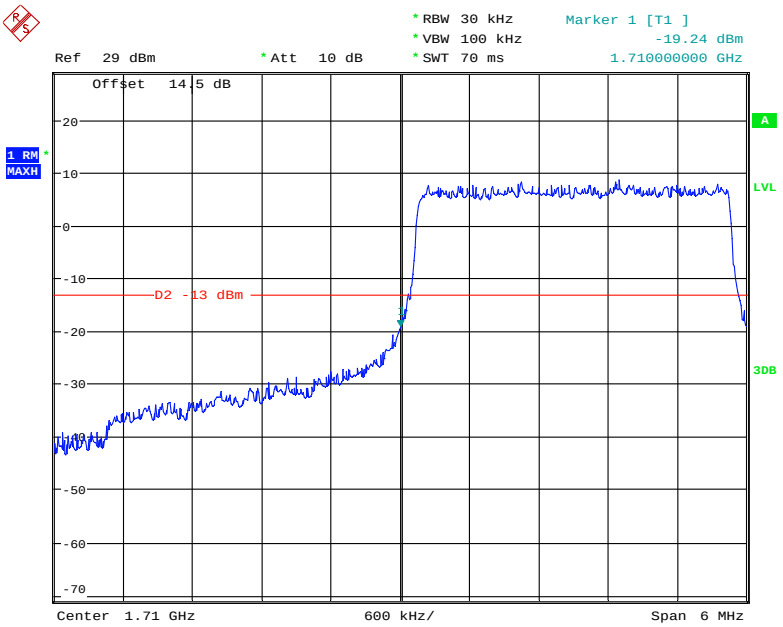
Date: 7.NOV.2018 23:22:55

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



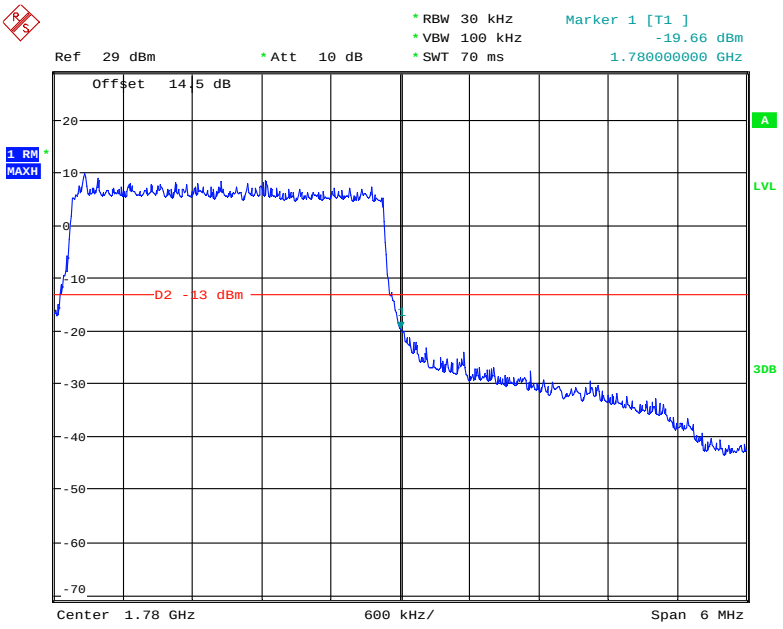
Date: 7.NOV.2018 23:24:19

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



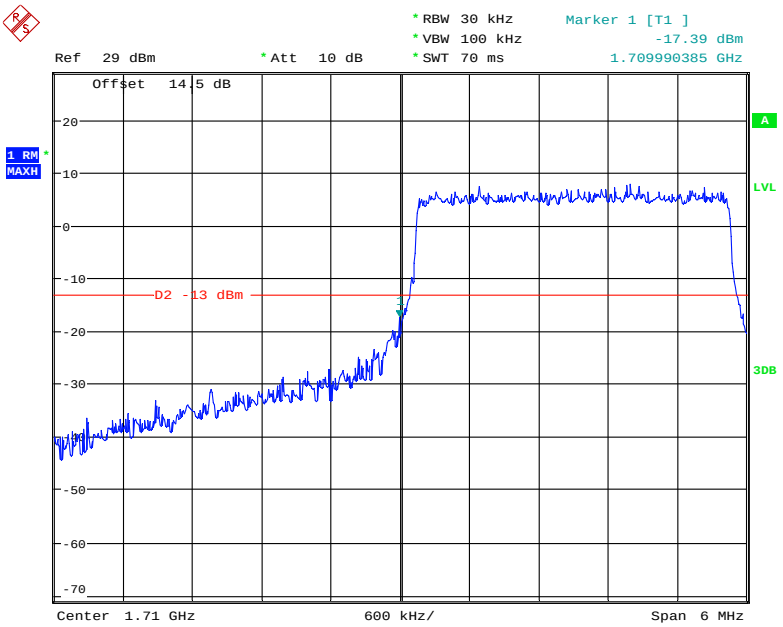
Date: 7.NOV.2018 23:28:05

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



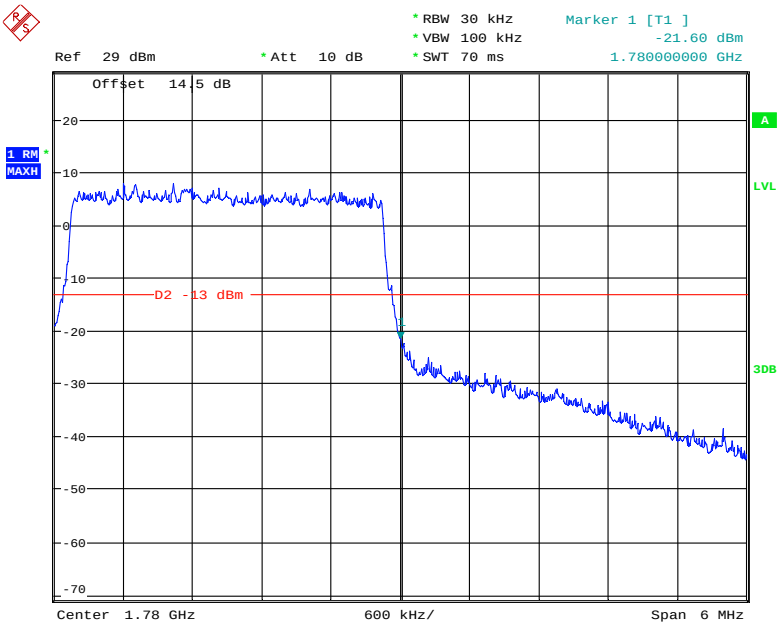
Date: 7.NOV.2018 23:26:18

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



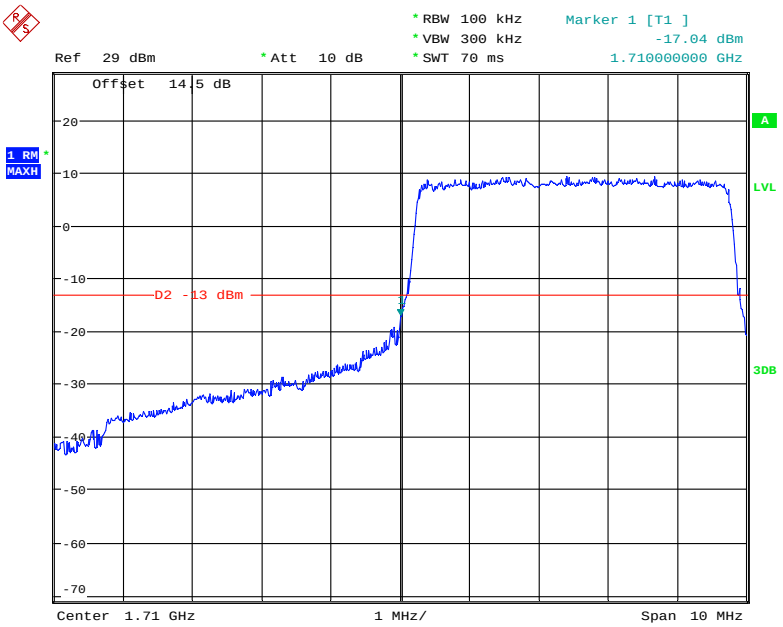
Date: 7.NOV.2018 23:27:37

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



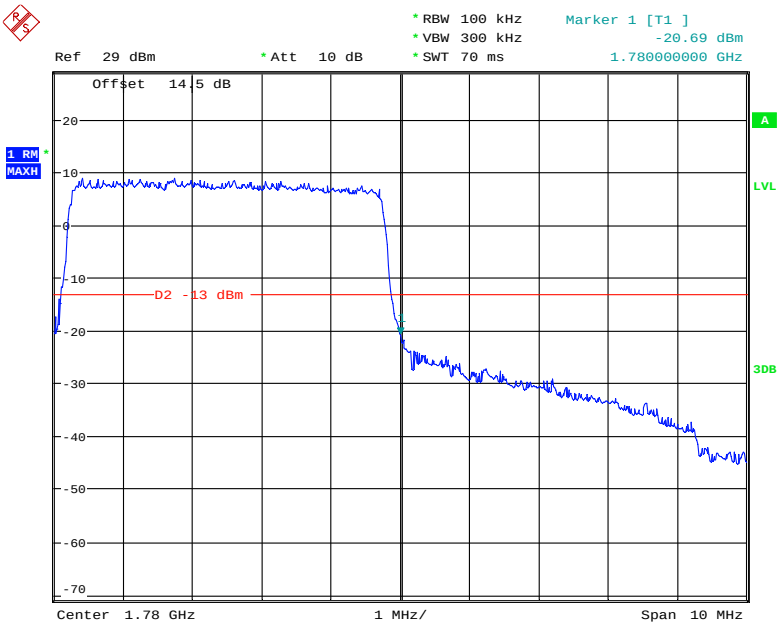
Date: 7.NOV.2018 23:26:56

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



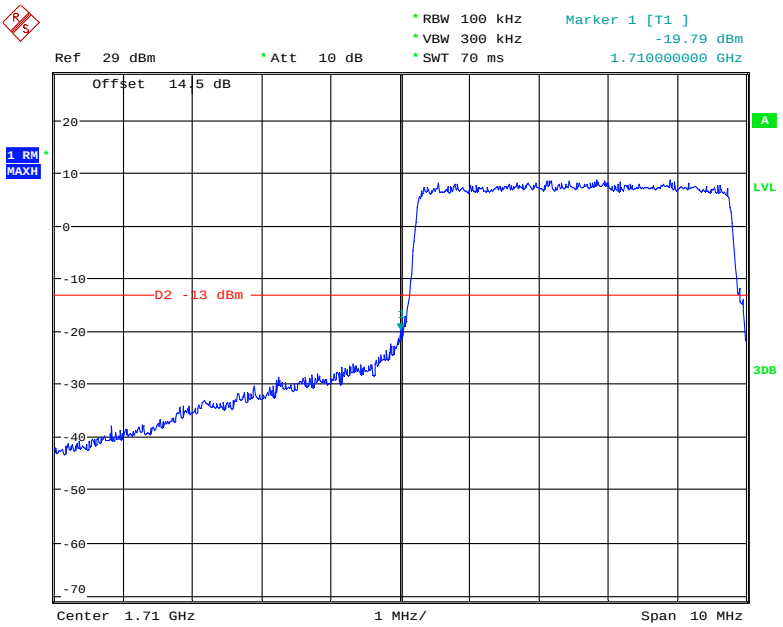
Date: 7.NOV.2018 23:29:35

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



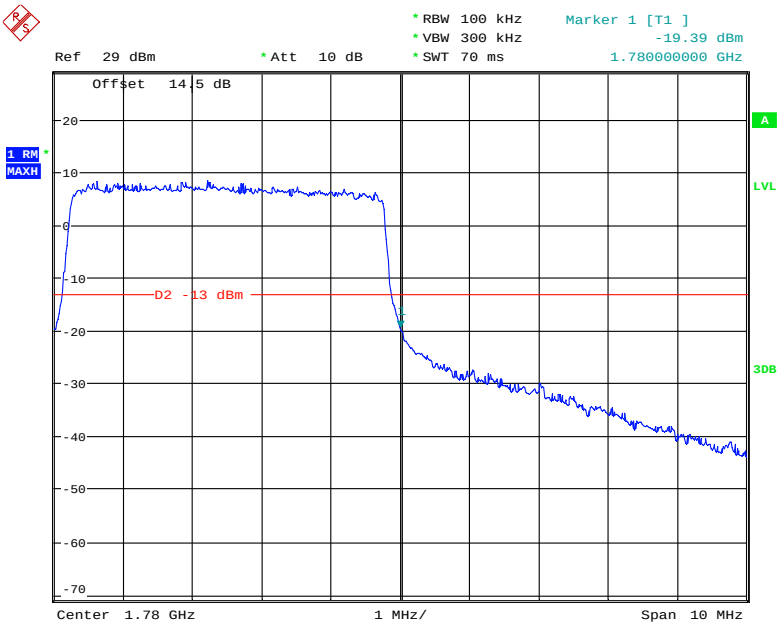
Date: 7.NOV.2018 23:30:26

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



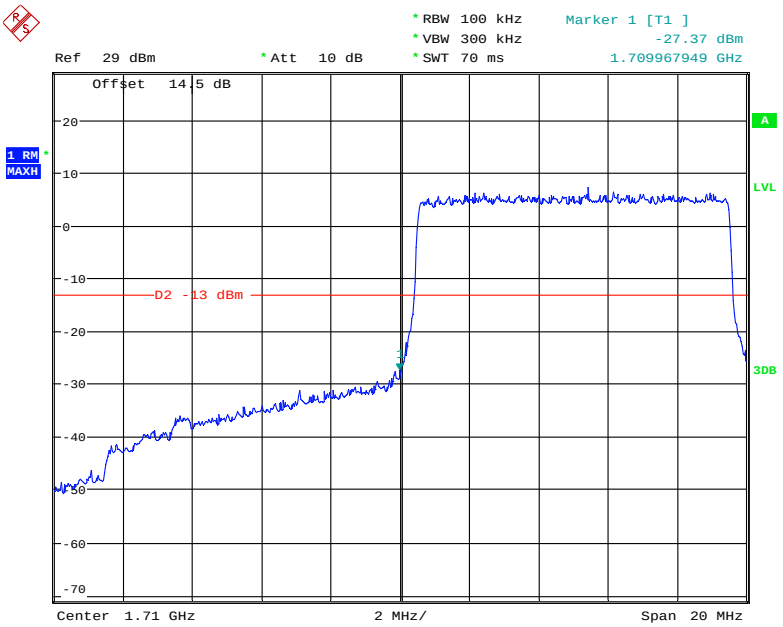
Date: 7.NOV.2018 23:29:00

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



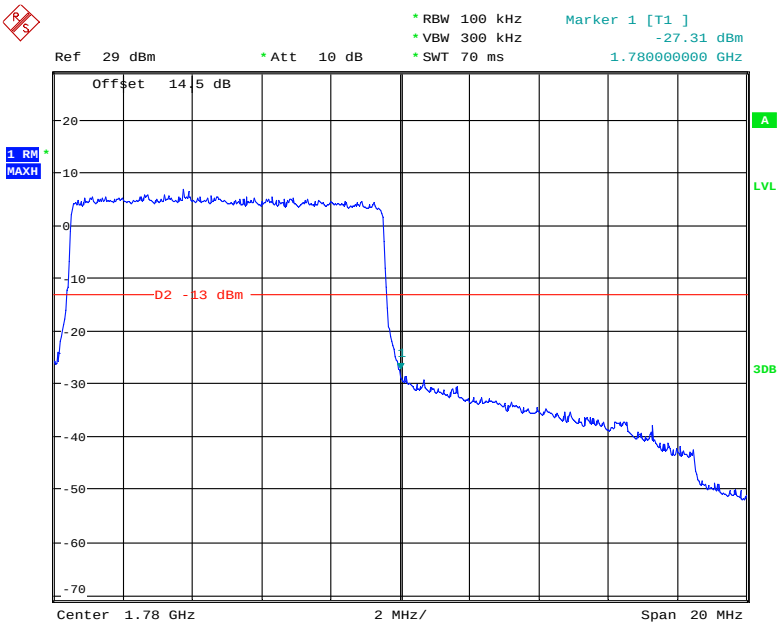
Date: 7.NOV.2018 23:30:51

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



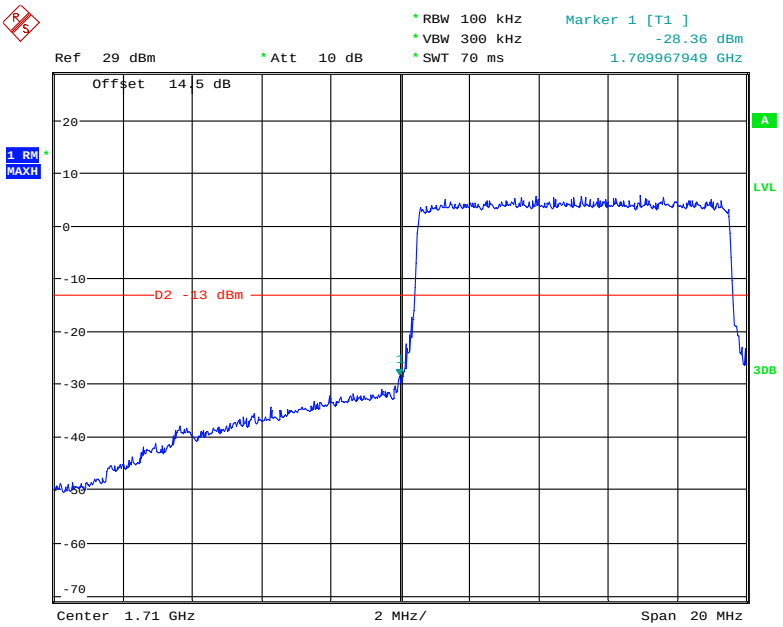
Date: 7.NOV.2018 23:32:48

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



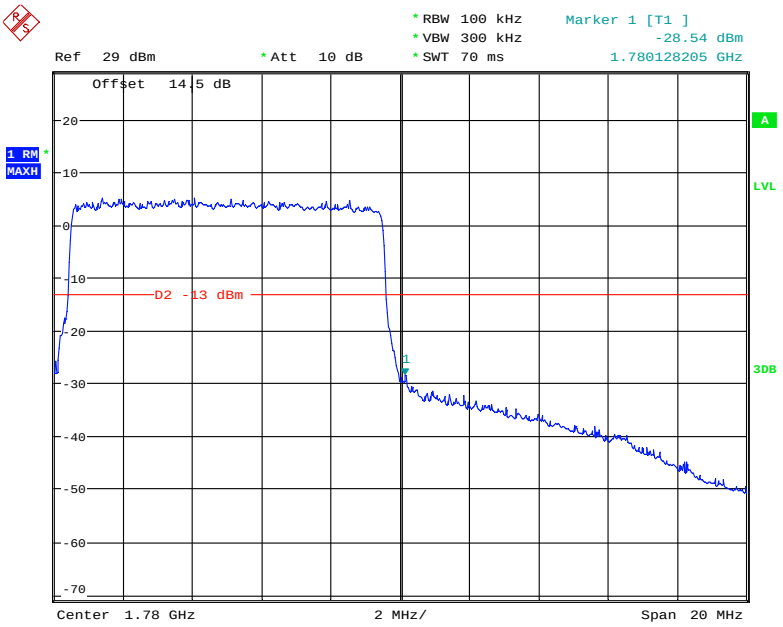
Date: 7.NOV.2018 23:32:15

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



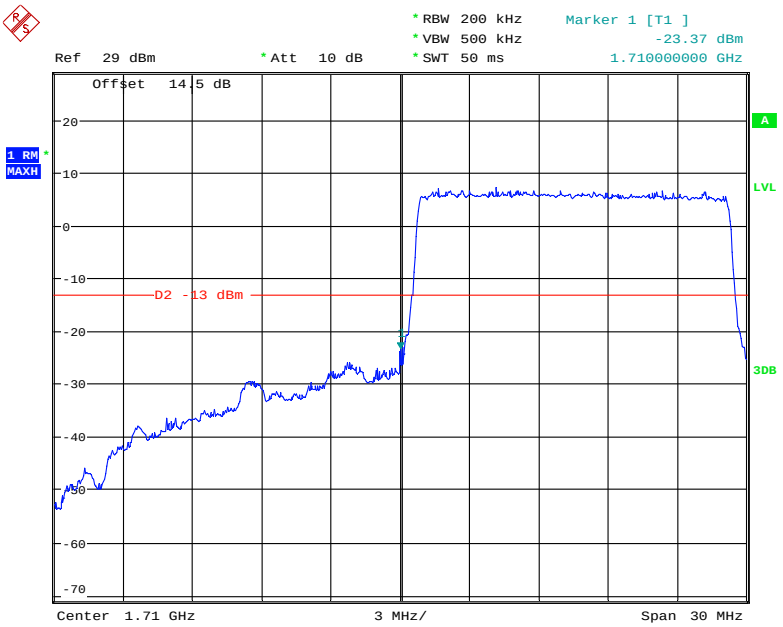
Date: 7.NOV.2018 23:33:07

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



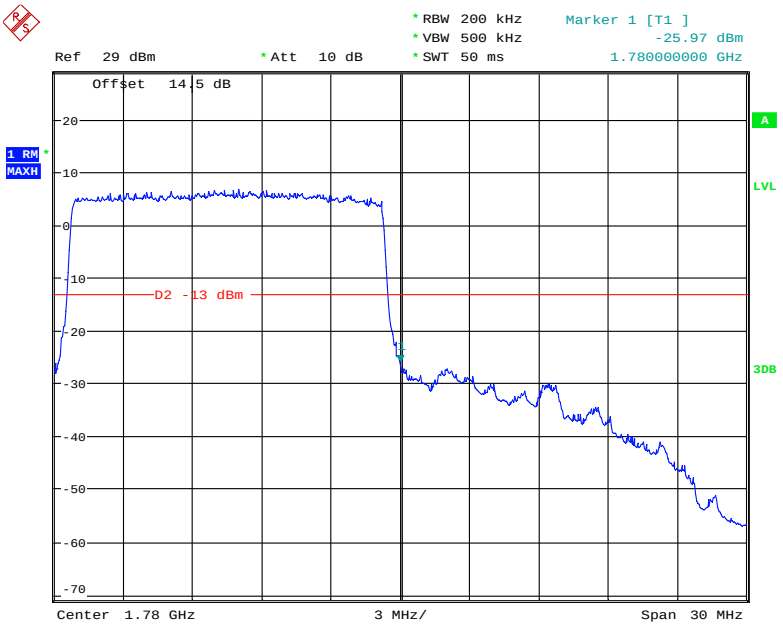
Date: 7.NOV.2018 23:31:45

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



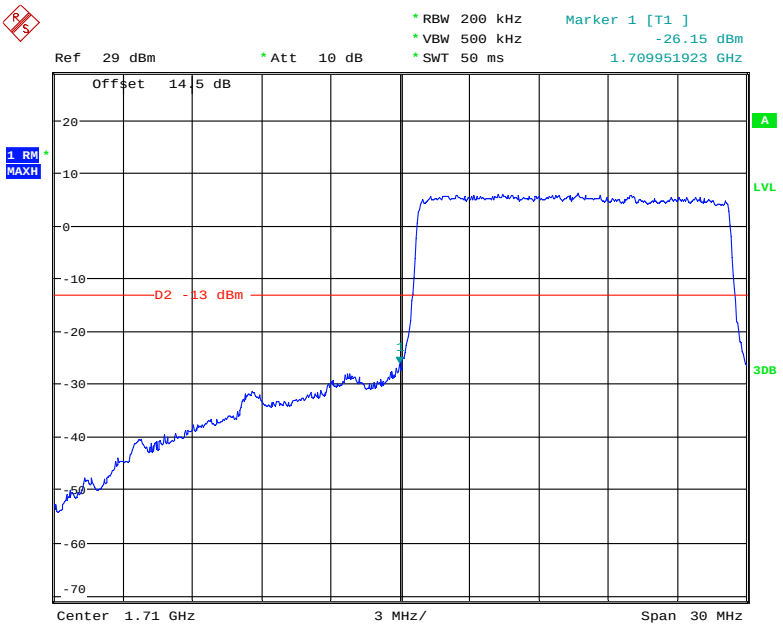
Date: 7.NOV.2018 23:42:17

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



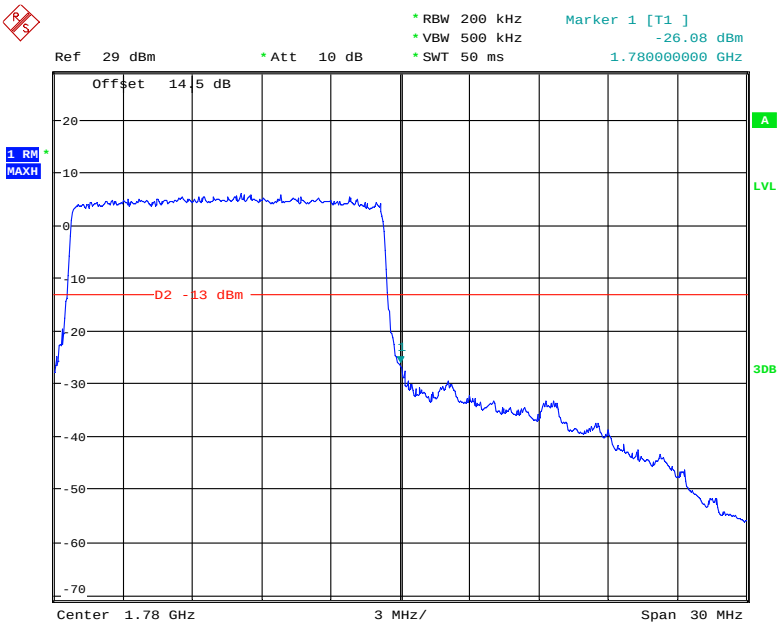
Date: 7.NOV.2018 23:44:09

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



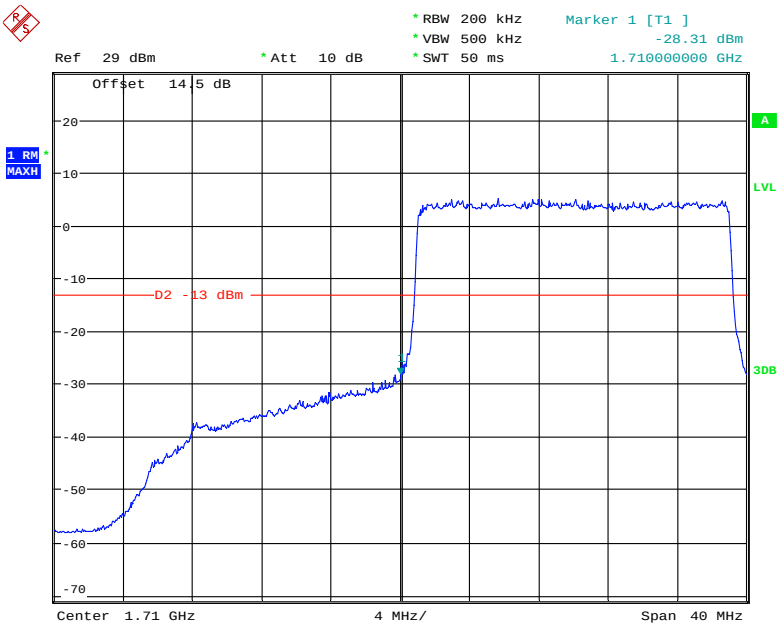
Date: 7.NOV.2018 23:42:45

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



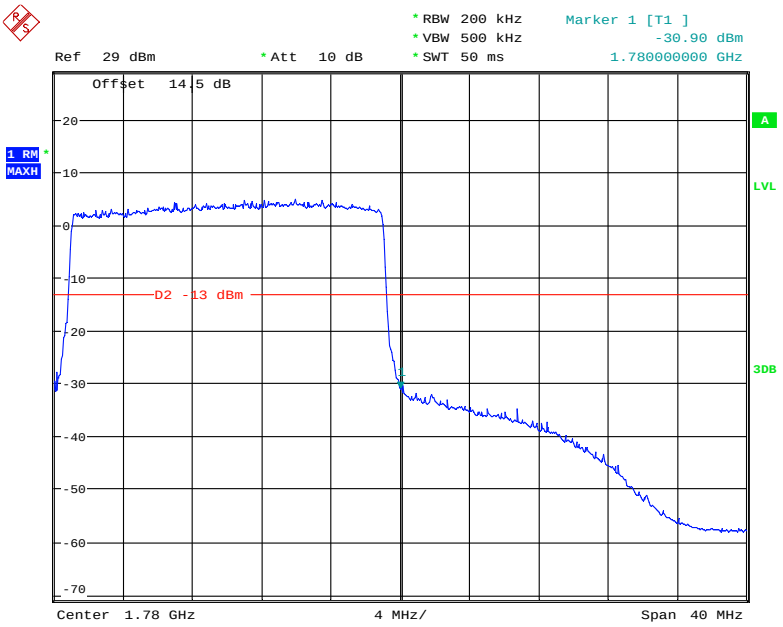
Date: 7.NOV.2018 23:43:45

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



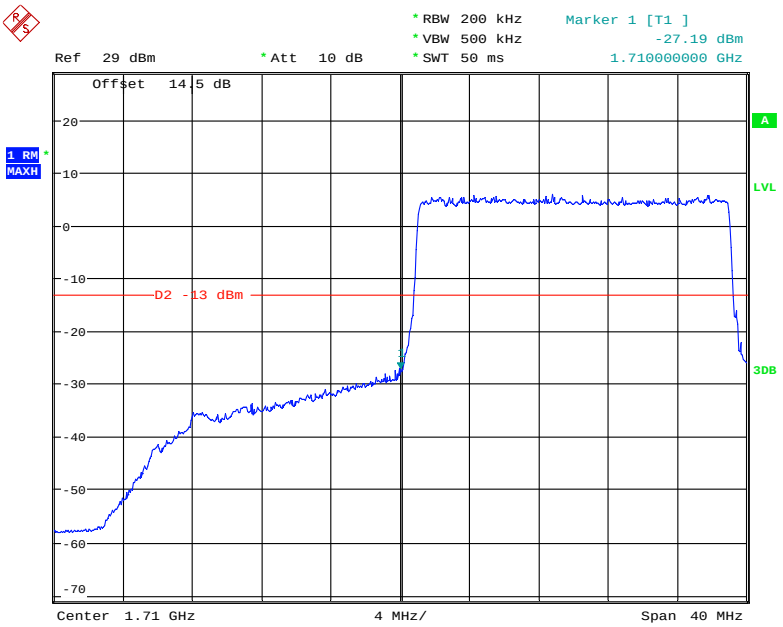
Date: 7.NOV.2018 23:41:27

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



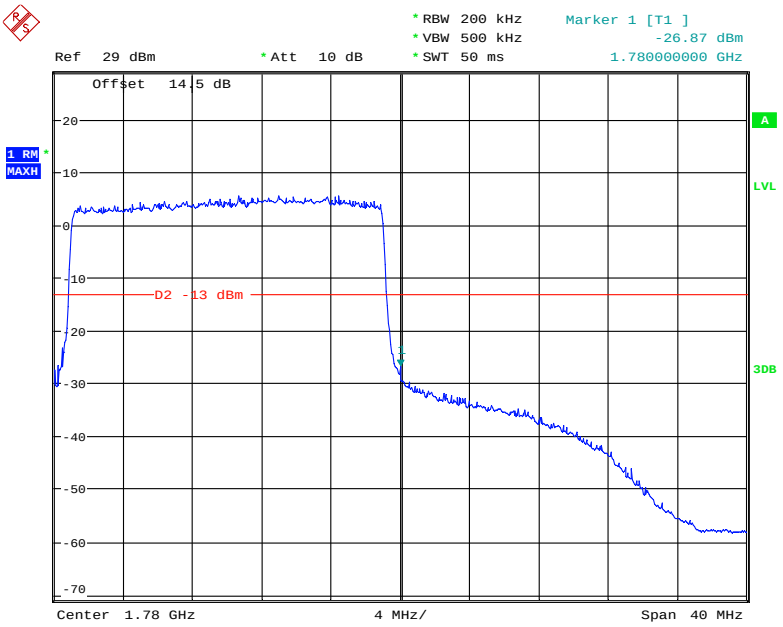
Date: 7.NOV.2018 23:40:02

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



Date: 7.NOV.2018 23:41:04

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



Date: 7.NOV.2018 23:40:30

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

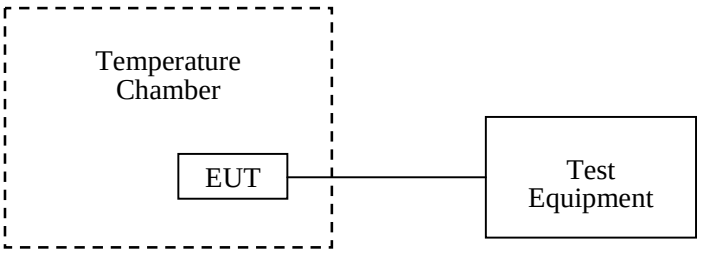
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Kiki Kong on 2018-11-17.

EUT operation mode: Transmitting

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

Cellular Band (Part 22H)

GSM Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.8	-15	-0.017930	2.5
-20		-12	-0.014344	2.5
-10		-11	-0.013148	2.5
0		-8	-0.009563	2.5
10		-6	-0.007172	2.5
20		-7	-0.008367	2.5
30		-4	-0.004781	2.5
40		-2	-0.002391	2.5
50		1	0.001195	2.5
20	V min.= 3.6	4	0.004781	2.5
	V max.= 4.35	7	0.008367	2.5

WCDMA Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.8	1	0.001195	2.5
-20		-3	-0.003586	2.5
-10		-4	-0.004781	2.5
0		-2	-0.002391	2.5
10		-5	-0.005977	2.5
20		-1	-0.001195	2.5
30		0	0.000000	2.5
40		2	0.002391	2.5
50		4	0.004781	2.5
20	V min.= 3.6	3	0.003586	2.5
	V max.= 4.35	-6	-0.007172	2.5

PCS Band (Part 24E)

GSM Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-9	-0.004787	pass
-20		-6	-0.003191	pass
-10		-8	-0.004255	pass
0		-7	-0.003723	pass
10		-5	-0.002660	pass
20		-3	-0.001596	pass
30		-1	-0.000532	pass
40		2	0.001064	pass
50		3	0.001596	pass
20	V min.= 3.6	5	0.002660	pass
	V max.= 4.35	8	0.004255	pass

WCDMA Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	3	0.001596	pass
-20		2	0.001064	pass
-10		-1	-0.000532	pass
0		-5	-0.002660	pass
10		-4	-0.002128	pass
20		-2	-0.001064	pass
30		-1	-0.000532	pass
40		-8	-0.004255	pass
50		-7	-0.003723	pass
20	V min.= 3.6	1	0.000532	pass
	V max.= 4.35	-3	-0.001596	pass

LTE:
QPSK:

Band 2:

10.0 MHz Middle Channel				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	-4	-0.0021	pass
-20		-2	-0.0011	pass
-10		-3	-0.0016	pass
0		-2	-0.0011	pass
10		-3	-0.0016	pass
20		-2	-0.0011	pass
30		-1	-0.0005	pass
40		-2	-0.0011	pass
50		-2	-0.0011	pass
20	V min.= 3.6	-3	-0.0016	pass
	V max.= 4.35	-1	-0.0005	pass

Band 4(5MHz Band width):

Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.8	1710.1125	1754.8717	1710.0000	1755.0000
-20		1710.0647	1754.8564	1710.0000	1755.0000
-10		1710.1127	1754.8714	1710.0000	1755.0000
0		1710.0436	1754.8032	1710.0000	1755.0000
10		1710.0432	1754.7580	1710.0000	1755.0000
20		1710.1128	1754.8728	1710.0000	1755.0000
30		1710.0790	1754.8758	1710.0000	1755.0000
40		1710.0677	1754.8315	1710.0000	1755.0000
50		1710.1125	1754.8718	1710.0000	1755.0000
20	V min.= 3.6	1710.0896	1754.8836	1710.0000	1755.0000
	V max.= 4.35	1710.1025	1754.8485	1710.0000	1755.0000

Band 5:

10.0 MHz Middle Channel, f_o = 836.5MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.8	-6	-0.0072	2.5
-20		-4	-0.0048	2.5
-10		-1	-0.0012	2.5
0		-4	-0.0048	2.5
10		-3	-0.0036	2.5
20		-3	-0.0036	2.5
30		-3	-0.0036	2.5
40		-3	-0.0036	2.5
50		-4	-0.0048	2.5
20	V min.= 3.6	-1	-0.0012	2.5
	V max.= 4.35	-3	-0.0036	2.5

Band 7:

5 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.8	2500.128335	2569.85568	2500	2570
-20		2500.128337	2569.855671	2500	2570
-10		2500.128331	2569.855678	2500	2570
0		2500.128337	2569.855676	2500	2570
10		2500.12833	2569.85567	2500	2570
20		2500.128325	2569.855665	2500	2570
30		2500.128323	2569.855659	2500	2570
40		2500.128319	2569.855658	2500	2570
50		2500.128314	2569.85565	2500	2570
20	V min.= 3.6	2500.128335	2569.85568	2500	2570
	V max.= 4.35	2500.128337	2569.855671	2500	2570

Band 66:

5 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.8	1710.128549	1779.855082	1710	1780
-20		1710.128541	1779.855081	1710	1780
-10		1710.128543	1779.855084	1710	1780
0		1710.128550	1779.855086	1710	1780
10		1710.128540	1779.855080	1710	1780
20		1710.128538	1779.855074	1710	1780
30		1710.128534	1779.855073	1710	1780
40		1710.128533	1779.855071	1710	1780
50		1710.128525	1779.855064	1710	1780
20	V min.= 3.6	1710.128549	1779.855082	1710	1780
	V max.= 4.35	1710.128541	1779.855081	1710	1780

16QAM:

Band 2:

10.0 MHz Middle Channel				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	-5	-0.0027	pass
-20		-2	-0.0011	pass
-10		-3	-0.0016	pass
0		-6	-0.0032	pass
10		-3	-0.0016	pass
20		-2	-0.0011	pass
30		-2	-0.0011	pass
40		-2	-0.0011	pass
50		-1	-0.0005	pass
20	V min.= 3.6	3	0.003586	pass
	V max.= 4.35	7	0.008368	pass

Band 4(5MHz Band width):

Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	3.8	1710.1125	1754.8717	1710.0000	1755.0000
-20		1710.0647	1754.8564	1710.0000	1755.0000
-10		1710.1127	1754.8717	1710.0000	1755.0000
0		1710.0438	1754.8032	1710.0000	1755.0000
10		1710.0431	1754.7580	1710.0000	1755.0000
20		1710.1122	1754.8718	1710.0000	1755.0000
30		1710.0790	1754.8758	1710.0000	1755.0000
40		1710.0687	1754.8313	1710.0000	1755.0000
50		1710.1120	1754.8718	1710.0000	1755.0000
20	V min.= 3.6	1710.0295	1754.7905	1710.0000	1755.0000
	V max.= 4.35	1710.0299	1754.7822	1710.0000	1755.0000

Band 5:

10.0 MHz Middle Channel, f_o=836.5MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.8	-6	-0.0072	2.5
-20		-4	-0.0048	2.5
-10		-1	-0.0012	2.5
0		-4	-0.0048	2.5
10		-3	-0.0036	2.5
20		-3	-0.0036	2.5
30		-5	-0.0060	2.5
40		-3	-0.0036	2.5
50		-1	-0.0012	2.5
20	V min.= 3.6	-5	-0.0060	2.5
	V max.= 4.35	-6	-0.0072	2.5

Band 7:

5 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.8	2500.128219	2569.855776	2500	2570
-20		2500.128220	2569.855779	2500	2570
-10		2500.128212	2569.855777	2500	2570
0		2500.128213	2569.855775	2500	2570
10		2500.128210	2569.85577	2500	2570
20		2500.128204	2569.855764	2500	2570
30		2500.128199	2569.855756	2500	2570
40		2500.128195	2569.855749	2500	2570
50		2500.128185	2569.855741	2500	2570
20	V min.= 3.6	2500.128219	2569.855776	2500	2570
	V max.= 4.35	2500.128220	2569.855779	2500	2570

Band 66:

5 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.8	1710.128211	1779.855789	1710	1780
-20		1710.128213	1779.855782	1710	1780
-10		1710.128216	1779.855787	1710	1780
0		1710.128215	1779.855789	1710	1780
10		1710.12821	1779.85578	1710	1780
20		1710.128205	1779.855772	1710	1780
30		1710.128202	1779.855768	1710	1780
40		1710.128195	1779.85576	1710	1780
50		1710.128189	1779.855758	1710	1780
20	V min.= 3.6	1710.128211	1779.855789	1710	1780
	V max.= 4.35	1710.128213	1779.855782	1710	1780

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