

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

For

Sky Phone LLC

1348 Washington Av. Suite 350, Miami Beach, Florida, United States

FCC ID: 2ABOSSKYELITE50T

Report Type: Original Report	Product Type: Smart Phone
Report Number: RSZ171205004-00D	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Sky Phone LLC*'s product, model number: Elite 5.0T (*FCC ID: 2ABOSSKYELITE50T*) or the "EUT" in this report was a *Smart Phone*, which was measured approximately: 14.52 cm (L) × 7.21 cm (W) × 0.95 cm (H), rated with input voltage: DC 3.8 V battery or DC 5V from adapter.

Adapter Information:

Model: D31-02051000

Input: AC 100-240V, 50/60Hz, 0.2 A

Output: DC 5V, 1 A

**All measurement and test data in this report was gathered from production sample serial number: 1702663 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2017-12-05.*

Objective

This test report is prepared on behalf of *Sky Phone LLC* 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 DTS & DSS and Part 15B JBP submissions with FCC ID: 2ABOSSKYELITE50T.

Test Methodology

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

Part 22 Subpart H - Public Mobile Services

Part 24 Subpart E - Personal Communication Services

Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D and KDB 971168 D01 v03.

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 °C
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. : 382179, the FCC Designation No. : CN5001.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing according to TIA/EIA-603-D.
The final qualification test was performed with the EUT operating at normal mode.

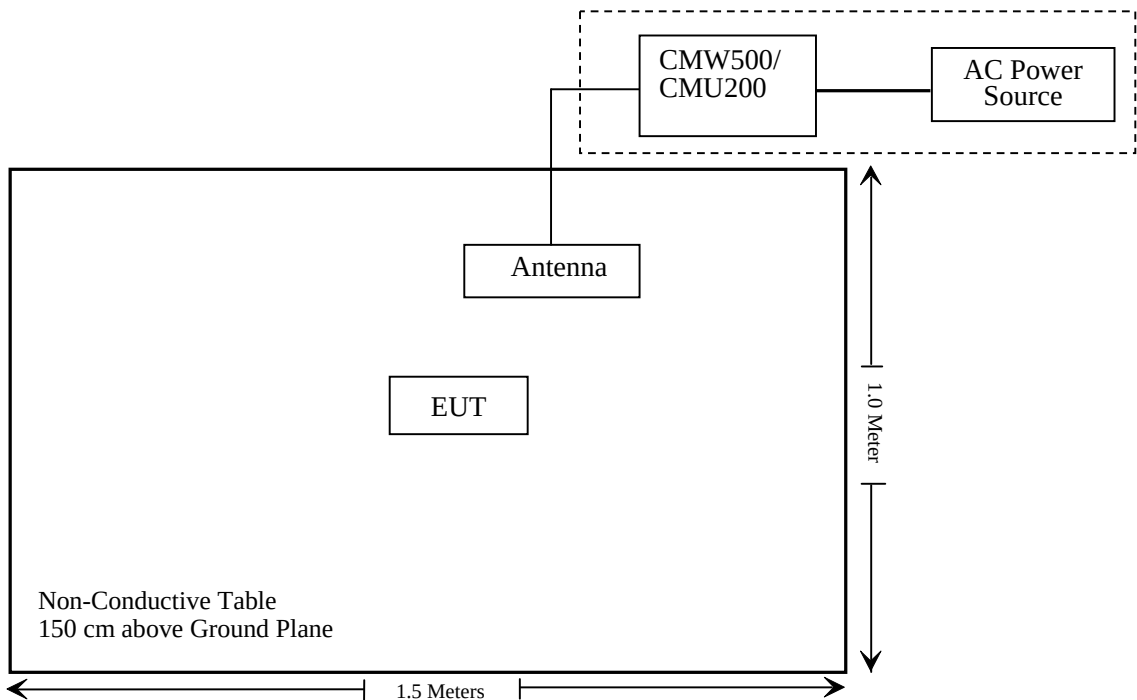
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

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

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307, §2.1093	RF Exposure (SAR)	Compliance*
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliance

Note: * Please refer to SAR report released by BACL, report number: RSZ171205004-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal ANALYZER	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-05-21	2018-05-21
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-21
Anritsu	Signal Generator	68369B	004114	2017-12-07	2018-12-07
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2017-12-07	2018-12-07
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	1	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	2	2017-11-22	2018-05-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2014-12-29	2017-12-29
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2014-12-29	2017-12-29
Ducommun technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2017-12-05	2018-12-05
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2017-11-22	2018-11-22
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Aglient	ESG Vector Signal Generator	E4438C	MY42080875	2017-05-09	2018-05-09
Rohde & Schwarz	Wideband Radio Communication Tester	CMU200	106891	2017-12-14	2018-12-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2017-04-24	2018-04-24
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2017-08-19	2018-08-19
Ducommun technologies	RF Cable	RG-214	3	2017-11-22	2018-05-22
WEINSCHTEL	3dB Attenuator	N/A	N/A	2017-11-22	2018-05-23
WEINSCHTEL	10dB Attenuator	5324	AU 3842	2017-11-22	2018-05-23
N/A	Power Splitter	N/A	N/A	2017-05-21	2018-05-21

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

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

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ171205004-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

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

Applicable Standard

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

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

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

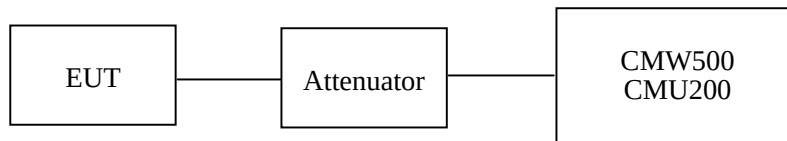
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

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

Test Procedure

Conducted method:

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



Radiated method:

TIA 603-D section 2.2.17

Test Data

Environmental Conditions

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

The testing was performed by Dylan Li on 2017-12-14.

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

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.54	38.45
	190	836.6	32.51	38.45
	251	848.8	32.35	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.51	31.69	29.87	28.62	38.45
	190	836.6	32.53	31.71	29.76	28.59	38.45
	251	848.8	32.34	31.43	29.61	28.42	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	26.66	25.67	23.56	21.22	38.45
	190	836.6	26.83	25.73	23.73	21.25	38.45
	251	848.8	26.82	25.73	23.52	21.31	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC12.2k		22.57	22.52	22.37
		HSDPA	1	21.45	21.26	21.33
			2	21.50	21.37	21.45
			3	21.36	21.28	21.25
			4	21.49	21.42	21.42
		HSUPA	1	21.47	21.36	21.49
			2	21.41	21.26	21.45
			3	21.51	21.43	21.61
			4	21.35	21.29	21.43
			5	21.50	21.45	21.52
		HSPA+	1	21.12	21.19	21.11

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	29.01	33
	661	1880.0	28.74	33
	810	1909.8	28.63	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.01	28.58	26.59	25.37	33
	661	1880.0	28.72	27.96	26.18	25.01	33
	810	1909.8	28.53	27.81	26.08	24.88	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	25.87	24.56	21.56	20.85	33
	661	1880.0	25.91	24.62	21.59	20.67	33
	810	1909.8	25.86	24.67	21.68	20.71	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	RMC12.2k		22.46	22.17	22.07
		HSDPA	1	21.26	21.31	21.32
			2	21.27	21.20	21.24
			3	21.36	21.39	21.36
			4	21.19	21.22	21.28
		HSUPA	1	21.01	21.16	21.11
			2	21.01	21.06	20.99
			3	21.10	21.21	21.23
			4	20.91	21.07	21.05
			5	21.13	21.20	21.21
		HSPA+	1	21.02	21.06	21.03

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

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.24	13
	Middle	0.17	13
	High	0.26	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.32	13
	Middle	0.38	13
	High	0.24	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	5.21	13
	Middle	3.38	13
	High	3.09	13
HSDPA (16QAM)	Low	5.96	13
	Middle	3.94	13
	High	3.60	13
HSUPA (BPSK)	Low	5.60	13
	Middle	3.34	13
	High	3.73	13
HSPA+	Low	2.63	13
	Middle	3.15	13
	High	3.08	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.21	13
	Middle	0.09	13
	High	0.15	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.37	13
	Middle	0.22	13
	High	0.41	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.04	13
	Middle	3.53	13
	High	4.11	13
HSDPA (16QAM)	Low	2.95	13
	Middle	2.92	13
	High	2.89	13
HSUPA (BPSK)	Low	3.13	13
	Middle	3.57	13
	High	3.81	13
HSPA+	Low	3.25	13
	Middle	2.95	13
	High	2.77	13

Radiated Power**GSM Mode:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H/24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	87.15	119	1.3	H	27.1	0.7	0.0	26.4	38.45	12.05
836.6	91.25	1	2.1	V	32.0	0.7	0.0	31.3	38.45	7.15
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	84.59	141	1.9	H	14.5	1.30	8.50	21.70	33	11.3
1880.00	90.12	310	1.8	V	19.9	1.30	8.50	27.10	33	5.9

EDGE Mode:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	75.65	38	1.1	H	15.6	0.70	0.0	14.90	38.45	23.55
836.6	85.26	275	1.8	V	26.0	0.70	0.0	25.29	38.45	13.16
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	82.62	112	2.2	H	12.4	1.30	8.50	19.60	33	13.4
1880.00	86.21	148	1.2	V	16.2	1.30	8.50	23.40	33	9.6

WCDMA Mode:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H/24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
ERP for WCDMA Band V (Part 22H), Middle Channel										
836.6	79.21	345	1.4	H	19.2	0.7	0.0	18.5	38.45	19.95
836.6	83.12	64	1.7	V	23.9	0.7	0.0	23.2	38.45	15.25
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	85.12	40	2.0	H	15.1	1.30	8.50	22.30	33	10.7
1880.00	80.23	148	1.3	V	10.0	1.30	8.50	17.20	33	15.8

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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	22.31	22.45	22.51
		RB Size=1, RB Offset=2	22.43	22.51	22.38
		RB Size=1, RB Offset=5	22.35	22.63	22.51
		RB Size=3, RB Offset=0	22.38	22.45	22.53
		RB Size=3, RB Offset=1	22.46	22.52	22.38
		RB Size=3, RB Offset=2	22.40	22.61	22.49
		RB Size=6, RB Offset=0	21.82	21.88	21.63
	16QAM	RB Size=1, RB Offset=0	21.81	21.95	21.74
		RB Size=1, RB Offset=2	21.83	21.94	21.72
		RB Size=1, RB Offset=5	21.70	21.86	21.81
		RB Size=3, RB Offset=0	21.68	21.85	21.68
		RB Size=3, RB Offset=1	21.86	21.91	21.65
		RB Size=3, RB Offset=2	21.72	21.92	21.76
		RB Size=6, RB Offset=0	21.18	21.41	21.23
3.0	QPSK	RB Size=1, RB Offset=0	22.54	22.75	22.54
		RB Size=1, RB Offset=7	22.46	22.53	22.42
		RB Size=1, RB Offset=14	22.48	22.71	22.41
		RB Size=8, RB Offset=0	21.75	21.84	21.93
		RB Size=8, RB Offset=4	21.86	21.92	21.79
		RB Size=8, RB Offset=7	21.84	21.88	21.72
		RB Size=15, RB Offset=0	21.83	21.86	21.75
	16QAM	RB Size=1, RB Offset=0	21.86	21.94	21.74
		RB Size=1, RB Offset=7	21.74	21.98	21.83
		RB Size=1, RB Offset=14	21.83	21.85	21.75
		RB Size=8, RB Offset=0	21.35	21.43	21.24
		RB Size=8, RB Offset=4	21.22	21.41	21.22
		RB Size=8, RB Offset=7	21.31	21.38	21.28
		RB Size=15, RB Offset=0	21.38	21.44	21.23

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	22.54	22.69	22.48
		RB Size=1, RB Offset=12	22.55	22.65	22.45
		RB Size=1, RB Offset=24	22.58	22.74	22.57
		RB Size=12, RB Offset=0	21.83	21.94	21.73
		RB Size=12, RB Offset=6	21.75	22.02	21.70
		RB Size=12, RB Offset=11	21.79	21.95	21.75
		RB Size=25, RB Offset=0	21.87	22.02	21.74
	16QAM	RB Size=1, RB Offset=0	21.92	21.98	21.70
		RB Size=1, RB Offset=12	21.93	21.92	21.87
		RB Size=1, RB Offset=24	21.91	22.03	21.73
		RB Size=12, RB Offset=0	21.25	21.45	21.35
		RB Size=12, RB Offset=6	21.32	21.38	21.31
		RB Size=12, RB Offset=11	21.37	21.52	21.34
		RB Size=25, RB Offset=0	21.23	21.50	21.25
10.0	QPSK	RB Size=1, RB Offset=0	22.44	22.64	22.42
		RB Size=1, RB Offset=24	22.45	22.65	22.46
		RB Size=1, RB Offset=49	22.52	22.68	22.43
		RB Size=25, RB Offset=0	21.84	21.83	21.75
		RB Size=25, RB Offset=12	21.79	21.97	21.83
		RB Size=25, RB Offset=24	21.86	21.98	21.79
		RB Size=50, RB Offset=0	21.71	22.05	21.85
	16QAM	RB Size=1, RB Offset=0	21.72	21.97	21.82
		RB Size=1, RB Offset=24	21.86	21.98	21.81
		RB Size=1, RB Offset=49	21.72	22.06	21.79
		RB Size=25, RB Offset=0	21.21	21.38	21.28
		RB Size=25, RB Offset=12	21.34	21.39	21.22
		RB Size=25, RB Offset=24	21.38	21.41	21.34
		RB Size=50, RB Offset=0	21.33	21.40	21.31

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	22.54	22.66	22.59
		RB Size=1, RB Offset=37	22.47	22.51	22.41
		RB Size=1, RB Offset=74	22.57	22.63	22.43
		RB Size=36, RB Offset=0	21.76	21.81	21.75
		RB Size=36, RB Offset=18	21.86	21.93	21.72
		RB Size=36, RB Offset=37	21.90	21.95	21.74
		RB Size=75, RB Offset=0	21.76	21.91	21.77
	16QAM	RB Size=1, RB Offset=0	21.84	21.98	21.89
		RB Size=1, RB Offset=37	21.71	21.92	21.75
		RB Size=1, RB Offset=74	21.87	21.92	21.76
		RB Size=36, RB Offset=0	21.32	21.38	21.35
		RB Size=36, RB Offset=18	21.36	21.45	21.24
		RB Size=36, RB Offset=37	21.27	21.44	21.32
		RB Size=75, RB Offset=0	21.27	21.49	21.29
20.0	QPSK	RB Size=1, RB Offset=0	22.55	22.59	22.45
		RB Size=1, RB Offset=49	22.43	22.44	22.43
		RB Size=1, RB Offset=99	22.39	22.49	22.51
		RB Size=50, RB Offset=0	21.71	21.87	21.74
		RB Size=50, RB Offset=24	21.73	21.76	21.75
		RB Size=50, RB Offset=49	21.81	21.77	21.88
		RB Size=100, RB Offset=0	21.88	21.88	21.75
	16QAM	RB Size=1, RB Offset=0	21.86	21.78	21.89
		RB Size=1, RB Offset=49	21.82	21.77	21.81
		RB Size=1, RB Offset=99	21.74	21.80	21.92
		RB Size=50, RB Offset=0	21.27	21.28	21.39
		RB Size=50, RB Offset=24	21.29	21.38	21.36
		RB Size=50, RB Offset=49	21.24	21.36	21.32
		RB Size=100, RB Offset=0	21.24	21.40	21.34

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	3.83	13	Pass
QPSK (100RB Size)	4.76	13	Pass
16QAM (1RB Size)	3.92	13	Pass
16QAM (100%RB Size)	4.84	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	86.15	288	1.6	H	13.0	1.30	9.10	20.80	30
1732.50	83.17	326	1.6	V	10.6	1.30	9.10	18.40	30
3 MHz Bandwidth									
1732.50	85.97	355	2.4	H	12.8	1.30	9.10	20.60	30
1732.50	82.74	223	2.5	V	10.2	1.30	9.10	18.00	30
5 MHz Bandwidth									
1732.50	86.17	301	2.4	H	13.0	1.30	9.10	20.80	30
1732.50	83.41	246	1.5	V	10.8	1.30	9.10	18.60	30
10 MHz Bandwidth									
1732.50	86.34	9	2.0	H	13.2	1.30	9.10	21.00	30
1732.50	83.24	55	1.8	V	10.7	1.30	9.10	18.50	30
15 MHz Bandwidth									
1732.50	86.17	329	2.0	H	13.0	1.30	9.10	20.80	30
1732.50	83.49	318	2.1	V	10.9	1.30	9.10	18.70	30
20 MHz Bandwidth									
1732.50	86.85	142	1.5	H	13.7	1.30	9.10	21.50	30
1732.50	83.26	287	2.3	V	10.7	1.30	9.10	18.50	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	85.63	102	2.2	H	12.5	1.30	9.10	20.30	30
1732.50	82.12	60	1.2	V	9.6	1.30	9.10	17.40	30
3 MHz Bandwidth									
1732.50	85.31	344	2.1	H	12.1	1.30	9.10	19.90	30
1732.50	82.19	204	1.3	V	9.6	1.30	9.10	17.40	30
5 MHz Bandwidth									
1732.50	85.58	223	1.2	H	12.4	1.30	9.10	20.20	30
1732.50	83.01	114	1.3	V	10.4	1.30	9.10	18.20	30
10 MHz Bandwidth									
1732.50	85.87	49	1.9	H	12.7	1.30	9.10	20.50	30
1732.50	82.68	12	1.9	V	10.1	1.30	9.10	17.90	30
15 MHz Bandwidth									
1732.50	86.01	26	1.5	H	12.8	1.30	9.10	20.60	30
1732.50	82.55	180	2.4	V	10.0	1.30	9.10	17.80	30
20 MHz Bandwidth									
1732.50	85.91	99	1.6	H	12.7	1.30	9.10	20.50	30
1732.50	82.46	13	1.4	V	9.9	1.30	9.10	17.70	30

LTE Band 7:

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5	QPSK	RB Size=1, RB Offset=0	22.70	22.53	22.33
		RB Size=1, RB Offset=12	22.65	22.71	22.26
		RB Size=1, RB Offset=24	22.61	22.68	22.36
		RB Size=12, RB Offset=0	21.90	21.80	21.66
		RB Size=12, RB Offset=6	21.86	22.02	21.65
		RB Size=12, RB Offset=11	21.83	21.99	21.61
		RB Size=25, RB Offset=0	21.84	21.88	21.62
	16QAM	RB Size=1, RB Offset=0	21.96	22.01	21.60
		RB Size=1, RB Offset=12	21.83	22.02	21.56
		RB Size=1, RB Offset=24	21.96	22.01	21.62
		RB Size=12, RB Offset=0	21.47	21.40	21.05
		RB Size=12, RB Offset=6	21.38	21.46	21.12
		RB Size=12, RB Offset=11	21.41	21.42	21.10
		RB Size=25, RB Offset=0	21.42	21.51	21.14
10	QPSK	RB Size=1, RB Offset=0	22.59	22.49	22.36
		RB Size=1, RB Offset=24	22.52	22.51	22.18
		RB Size=1, RB Offset=49	22.56	22.49	22.30
		RB Size=25, RB Offset=0	21.93	21.85	21.51
		RB Size=25, RB Offset=12	21.78	21.81	21.52
		RB Size=25, RB Offset=24	21.85	21.65	21.48
		RB Size=50, RB Offset=0	21.92	21.89	21.54
	16QAM	RB Size=1, RB Offset=0	21.78	21.76	21.60
		RB Size=1, RB Offset=24	21.84	21.79	21.61
		RB Size=1, RB Offset=49	21.79	21.74	21.52
		RB Size=25, RB Offset=0	21.24	21.30	21.14
		RB Size=25, RB Offset=12	21.37	21.25	21.03
		RB Size=25, RB Offset=24	21.25	21.33	21.04
		RB Size=50, RB Offset=0	21.42	21.22	21.15

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15	QPSK	RB Size=1, RB Offset=0	22.68	22.17	22.01
		RB Size=1, RB Offset=37	22.55	22.24	22.12
		RB Size=1, RB Offset=74	22.59	22.14	22.14
		RB Size=36, RB Offset=0	21.90	21.58	21.30
		RB Size=36, RB Offset=18	22.01	21.54	21.32
		RB Size=36, RB Offset=37	22.04	21.45	21.43
		RB Size=75, RB Offset=0	22.06	21.48	21.40
	16QAM	RB Size=1, RB Offset=0	21.84	21.46	21.31
		RB Size=1, RB Offset=37	21.91	21.47	21.38
		RB Size=1, RB Offset=74	21.95	21.53	21.40
		RB Size=36, RB Offset=0	21.47	21.08	20.82
		RB Size=36, RB Offset=18	21.42	20.92	20.93
		RB Size=36, RB Offset=37	21.48	20.94	20.76
		RB Size=75, RB Offset=0	21.50	20.91	20.74
20	QPSK	RB Size=1, RB Offset=0	22.51	22.25	22.28
		RB Size=1, RB Offset=49	22.64	22.39	22.27
		RB Size=1, RB Offset=99	22.55	22.28	22.23
		RB Size=50, RB Offset=0	21.81	21.67	21.61
		RB Size=50, RB Offset=24	21.82	21.56	21.53
		RB Size=50, RB Offset=49	21.95	21.51	21.48
		RB Size=100, RB Offset=0	21.96	21.60	21.53
	16QAM	RB Size=1, RB Offset=0	21.84	21.63	21.46
		RB Size=1, RB Offset=49	21.96	21.70	21.54
		RB Size=1, RB Offset=99	21.84	21.52	21.45
		RB Size=50, RB Offset=0	21.42	21.06	21.01
		RB Size=50, RB Offset=24	21.47	21.07	20.92
		RB Size=50, RB Offset=49	21.36	21.04	20.94
		RB Size=100, RB Offset=0	21.35	21.18	20.93

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	3.62	13	Pass
QPSK (100RB Size)	4.65	13	Pass
16QAM (1RB Size)	3.76	13	Pass
16QAM (100%RB Size)	4.38	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									
5 MHz Bandwidth									
2535.00	82.61	287	2.1	H	13.1	2.60	9.30	19.80	33
2535.00	83.10	6	1.0	V	14.2	2.60	9.30	20.90	33
10 MHz Bandwidth									
2535.00	82.94	2	1.3	H	13.5	2.60	9.30	20.20	33
2535.00	83.25	169	2.4	V	14.4	2.60	9.30	21.10	33
15 MHz Bandwidth									
2535.00	82.84	65	2.2	H	13.4	2.60	9.30	20.10	33
2535.00	83.17	13	2.0	V	14.3	2.60	9.30	21.00	33
20 MHz Bandwidth									
2535.00	82.78	312	2.1	H	13.3	2.60	9.30	20.00	33
2535.00	83.26	142	2.5	V	14.4	2.60	9.30	21.10	33

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
5 MHz Bandwidth									
2535.00	82.01	344	2.1	H	12.5	2.60	9.30	19.20	33
2535.00	84.12	214	2.4	V	15.2	2.60	9.30	21.90	33
10 MHz Bandwidth									
2535.00	82.40	124	1.2	H	12.9	2.60	9.30	19.60	33
2535.00	83.68	160	2.1	V	14.8	2.60	9.30	21.50	33
15 MHz Bandwidth									
2535.00	82.26	9	2.4	H	12.8	2.60	9.30	19.50	33
2535.00	83.12	46	1.2	V	14.2	2.60	9.30	20.90	33
20 MHz Bandwidth									
2535.00	82.31	108	1.7	H	12.8	2.60	9.30	19.50	33
2535.00	83.19	52	1.5	V	14.3	2.60	9.30	21.00	33

Note:

All above data were tested with no amplifier

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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

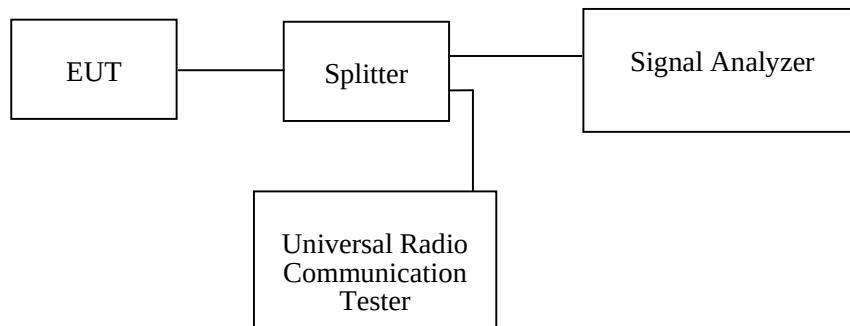
Applicable Standard

FCC 47 §2.1049, §22.917, §22.905, §24.238 and §27.53.

Test Procedure

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

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



Test Data

Environmental Conditions

Temperature:	24~25 °C
Relative Humidity:	48~50 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Dylan Li from 2017-12-07 to 2017-12-29.

EUT operation mode: Transmitting

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

Cellular Band (Part 22H)

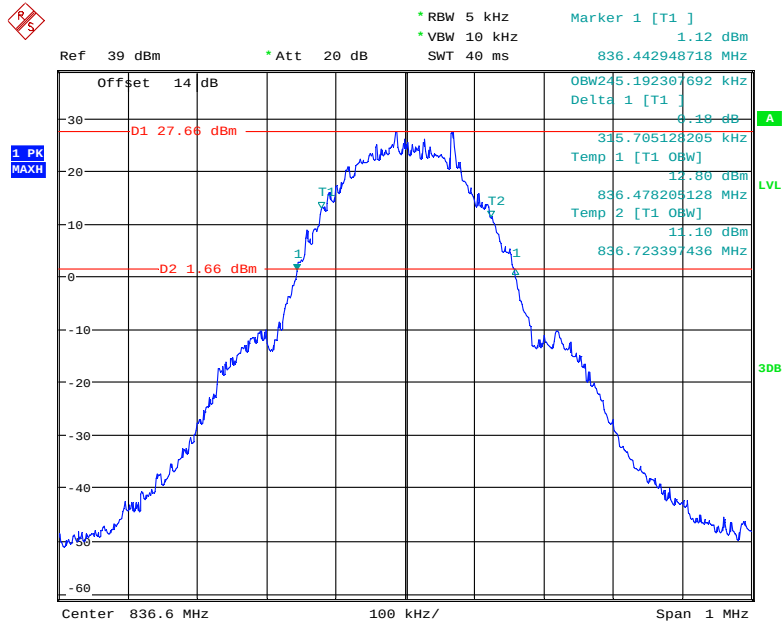
Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	245.2	315.7
EGPRS(8PSK)	836.6	245.2	312.5

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.087	4.679
HSUPA (BPSK)	836.6	4.087	4.696
HSDPA (16QAM)	836.6	4.103	4.711

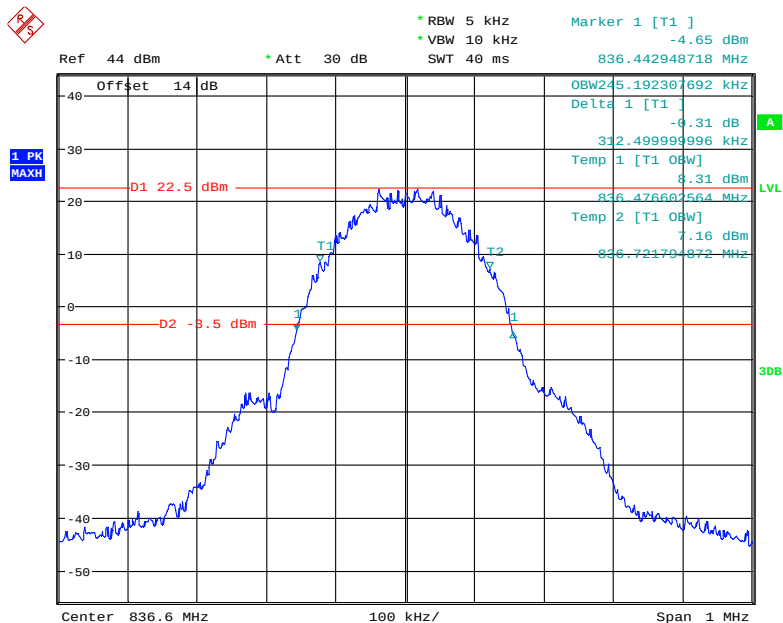
PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	242.0	314.1
EGPRS(8PSK)	1880.0	242.0	309.3

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.103	4.679
HSUPA (BPSK)	1880.0	4.103	4.696
HSDPA (16QAM)	1880.0	4.103	4.728

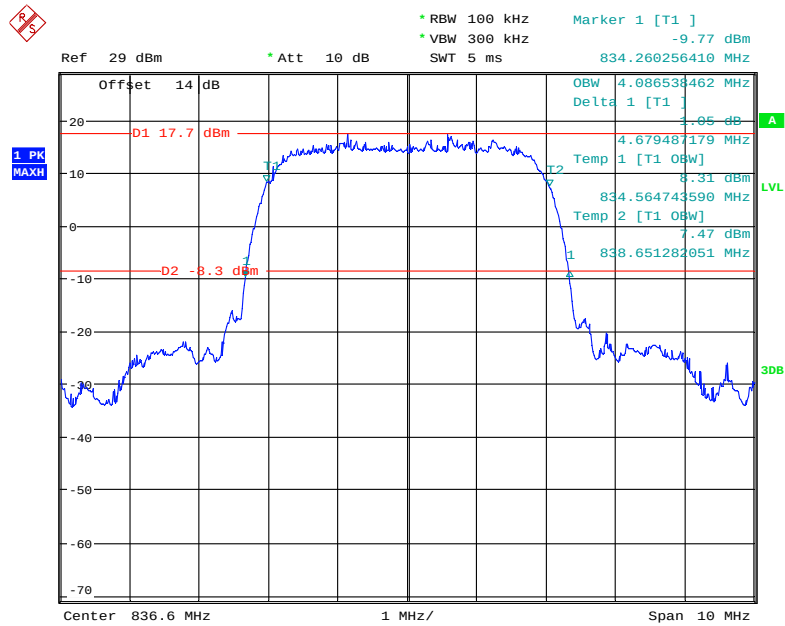
Cellular Band (Part 22H)**26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode**

Date: 7.DEC.2017 22:37:22

26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode

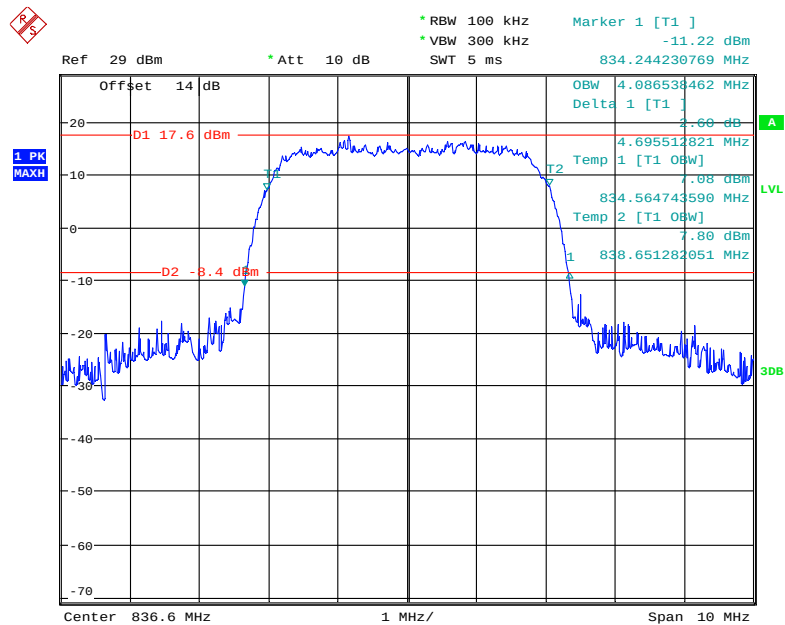
Date: 29.DEC.2017 19:43:32

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



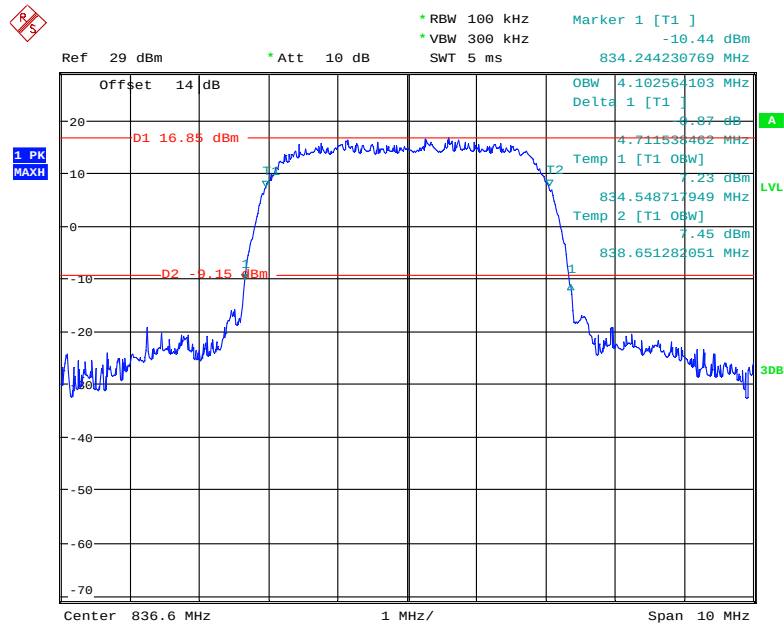
Date: 7.DEC.2017 22:08:39

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



Date: 7.DEC.2017 22:16:03

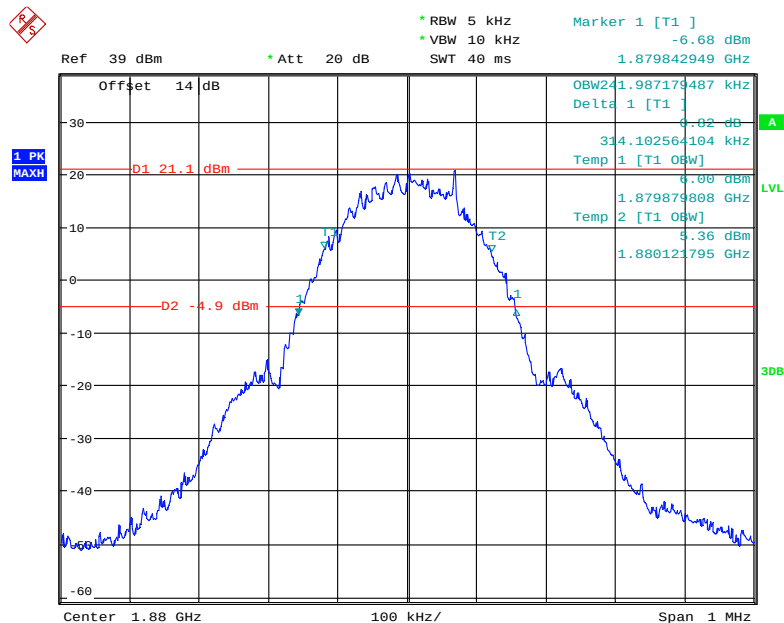
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 7.DEC.2017 22:10:50

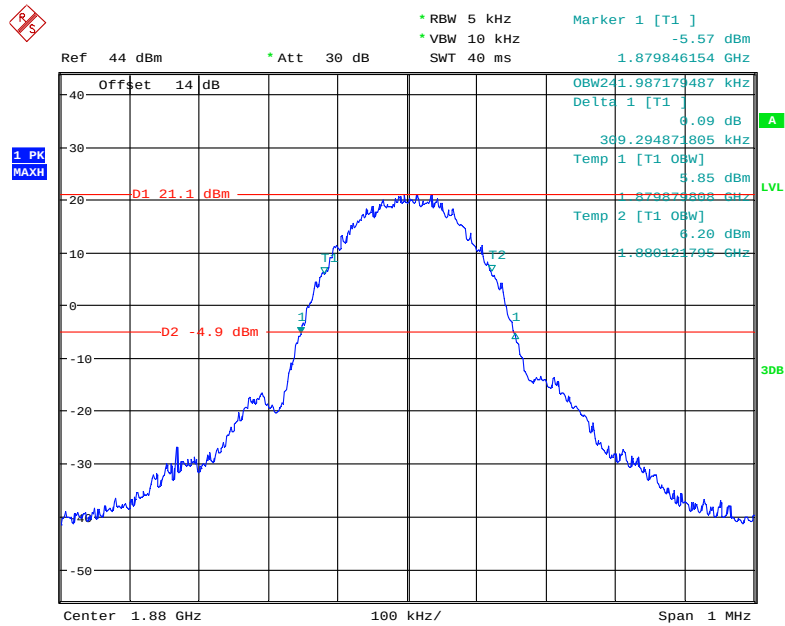
PCS Band (Part 24E)

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



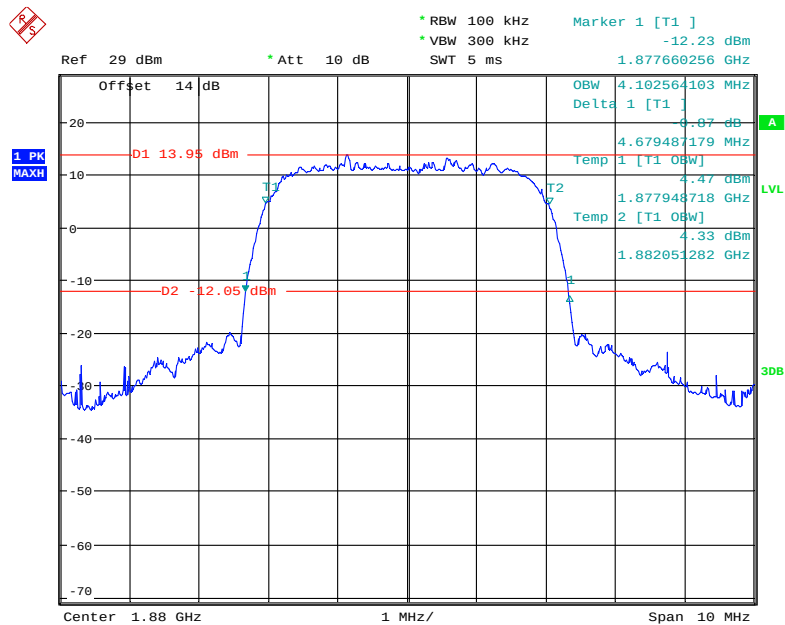
Date: 7.DEC.2017 22:39:23

26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode

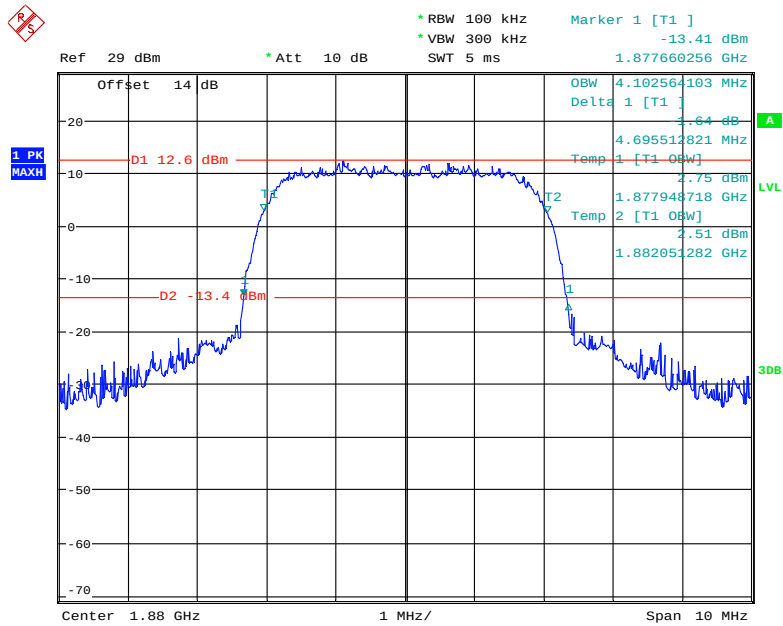


Date: 29.DEC.2017 19:29:14

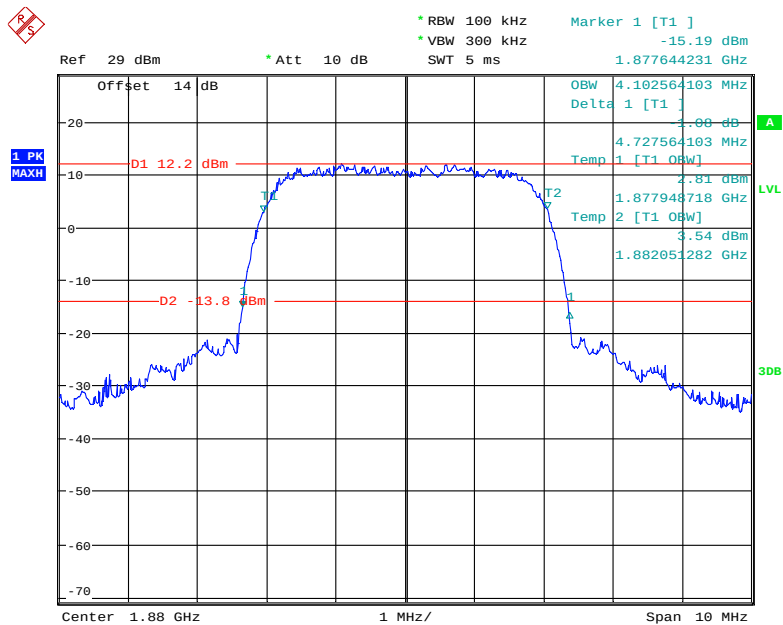
26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode



Date: 7.DEC.2017 22:06:23

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

Date: 7.DEC.2017 22:13:59

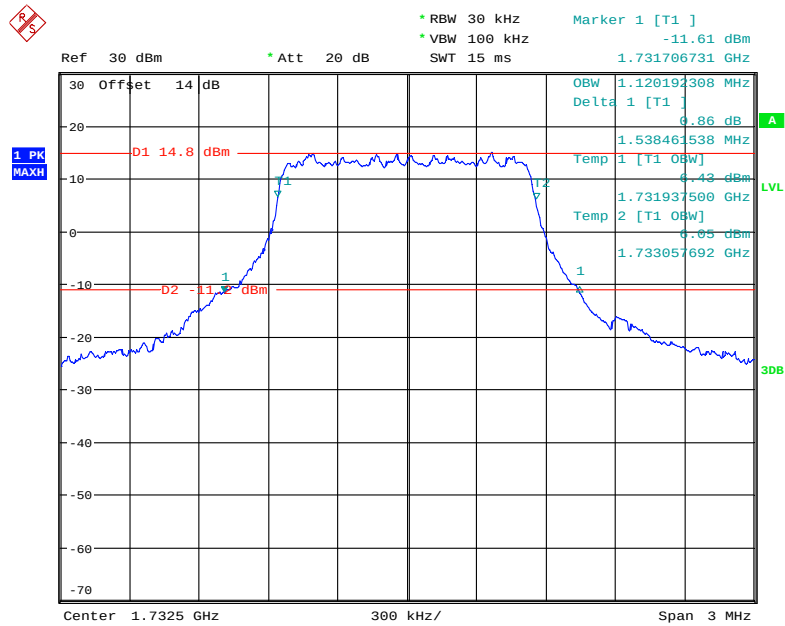
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode

Date: 7.DEC.2017 22:12:27

LTE Band 4: (Middle Channel)

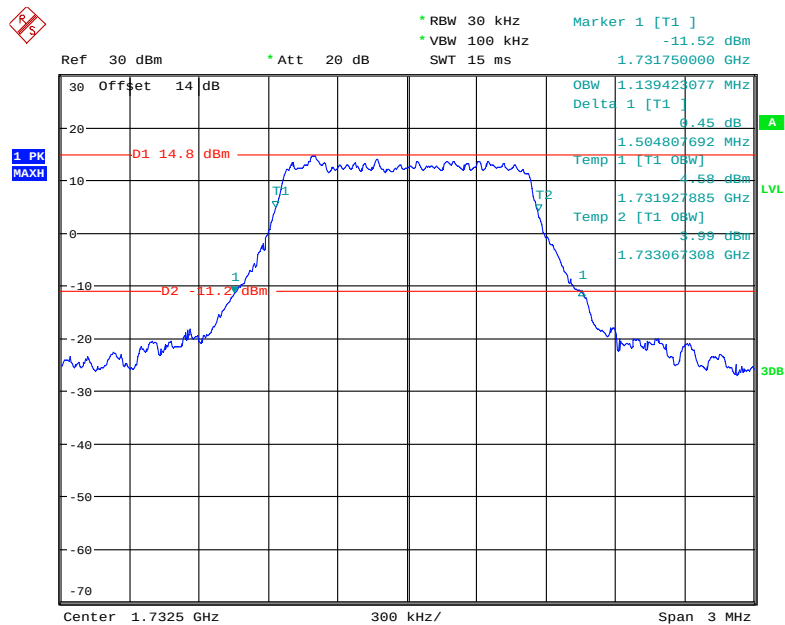
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.120	1.538
	16QAM	1.139	1.505
3.0	QPSK	2.692	3.082
	16QAM	2.692	3.120
5.0	QPSK	4.551	5.399
	16QAM	4.551	5.383
10.0	QPSK	8.974	9.838
	16QAM	8.974	9.902
15.0	QPSK	13.462	15.014
	16QAM	13.462	14.918
20.0	QPSK	17.885	19.502
	16QAM	17.949	19.630

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



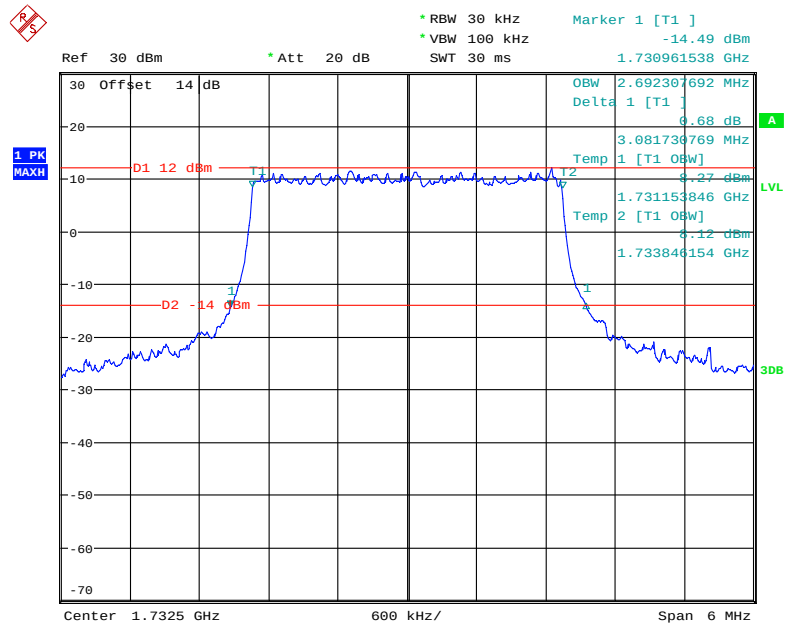
Date: 8.DEC.2017 21:44:59

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



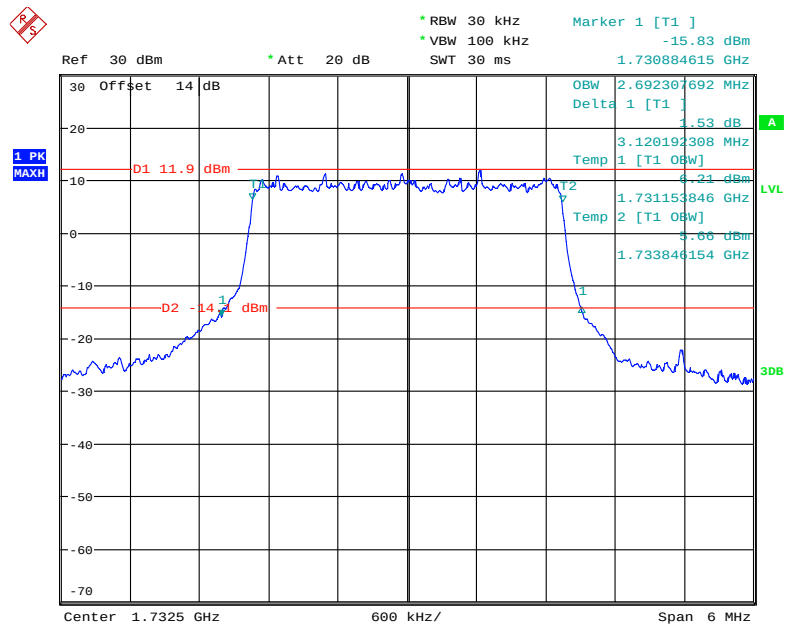
Date: 8.DEC.2017 21:46:33

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



Date: 8.DEC.2017 21:47:46

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



Date: 8.DEC.2017 21:48:51

* RBW 100 kHz
 * VBW 300 kHz
 SWT 5 ms

Ref 30 dBm
 * Att 20 dB

Marker 1 [T1]
 1.729727564 GHz
 -11.86 dBm

30 Offset 14 dB

1 PK
 MAXH

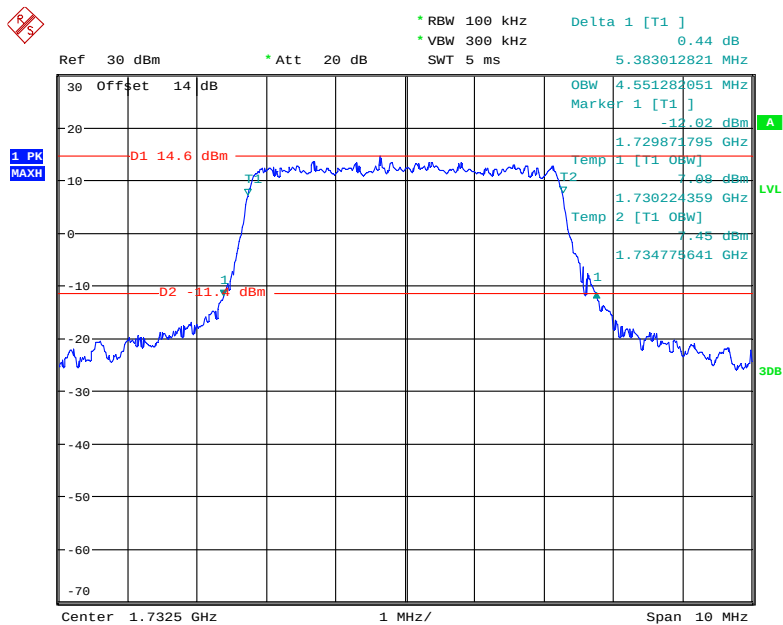
D1 14.8 dBm
 D2 -11.2 dBm

1.730224359 GHz
 Temp 1 [T1 BW]
 1.734775641 GHz
 Temp 2 [T1 BW]

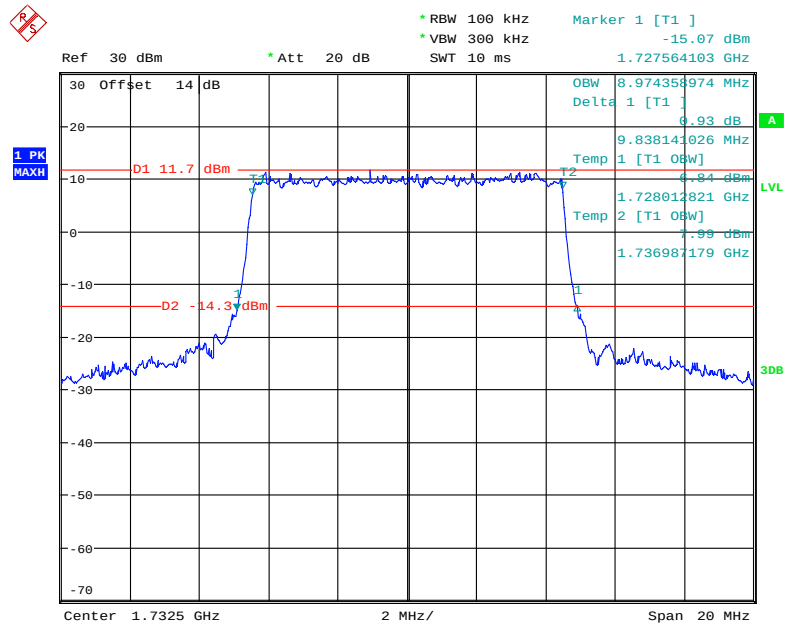
1.729727564 GHz
 Delta 1 [T1]

1.7325 GHz
 1 MHz/
 Span 10 MHz

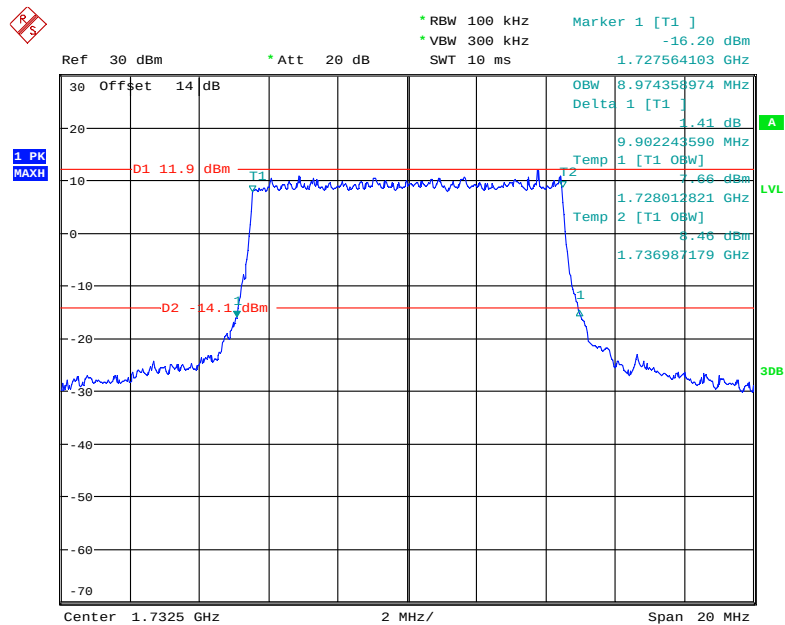
16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



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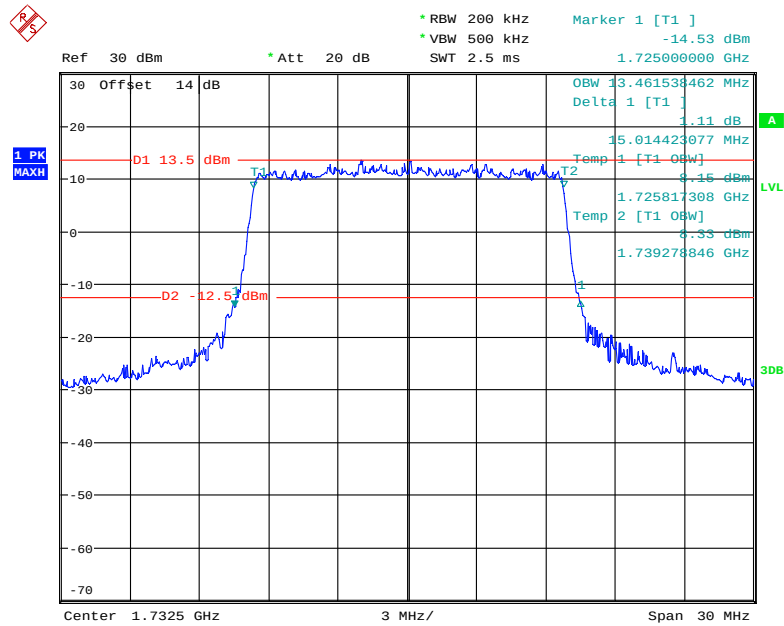
QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 8.DEC.2017 22:02:19

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

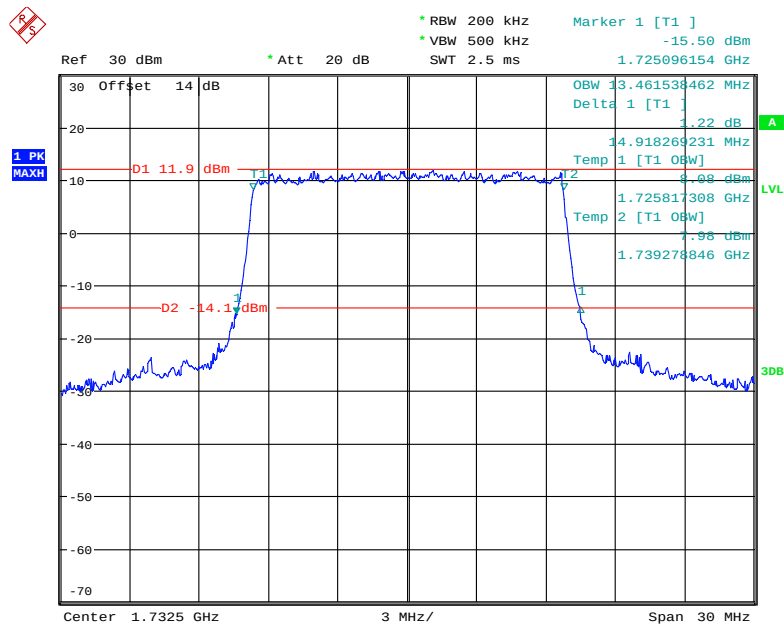
Date: 8.DEC.2017 22:03:33

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

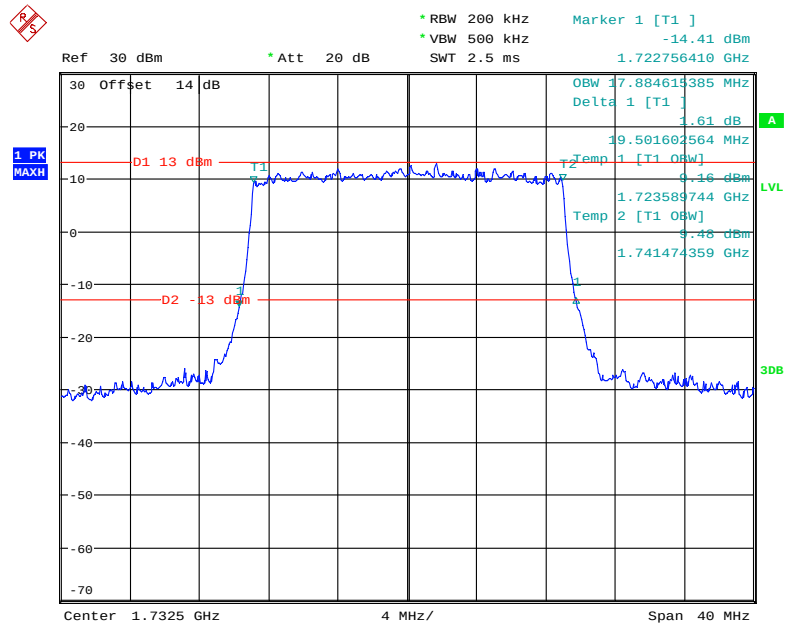


Date: 8.DEC.2017 22:05:09

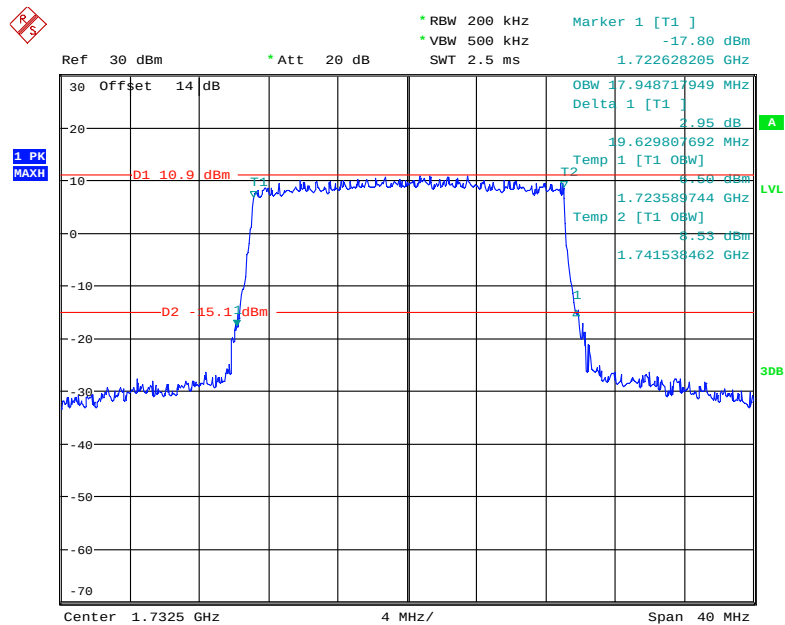
16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 8.DEC.2017 22:07:30

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

Date: 8.DEC.2017 22:17:08

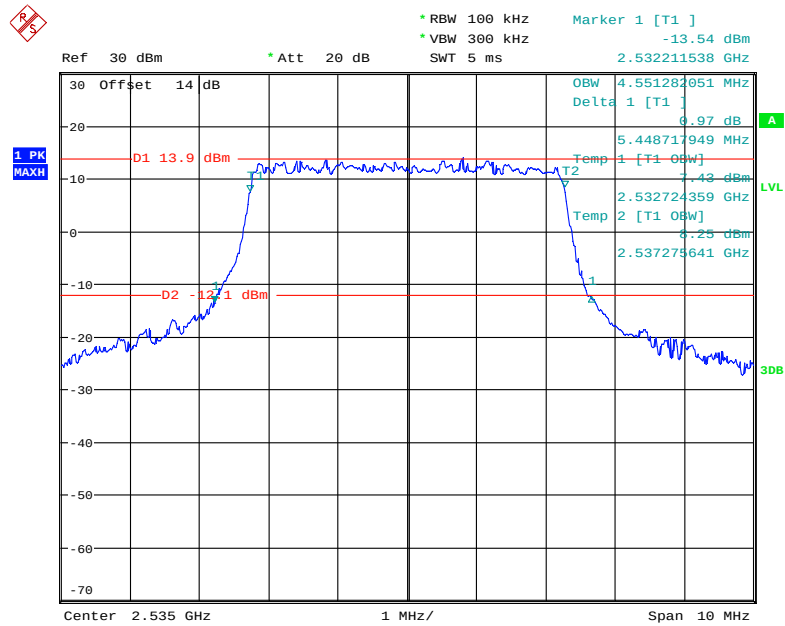
16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 8.DEC.2017 22:09:24

LTE Band 7: (Middle Channel)

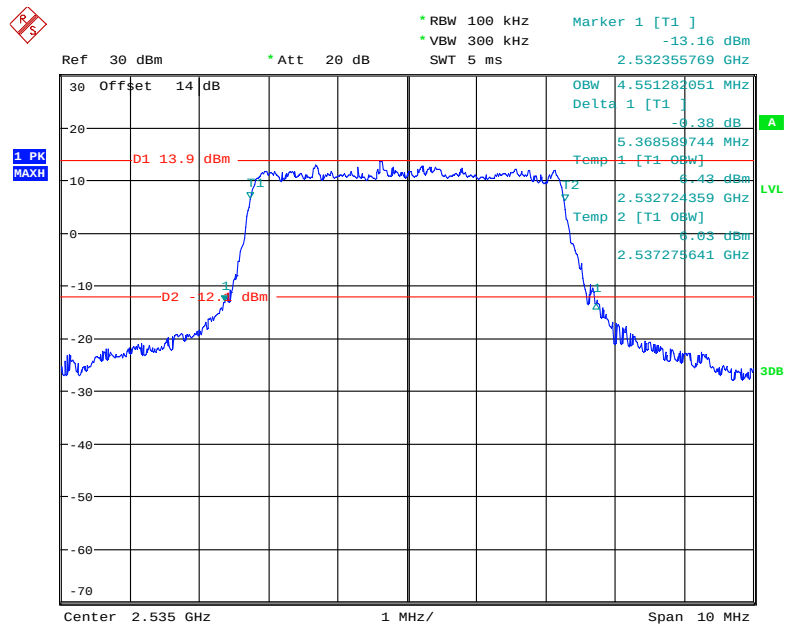
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.551	5.449
	16QAM	4.551	5.369
10.0	QPSK	8.974	9.904
	16QAM	8.974	9.872
15.0	QPSK	13.510	15.272
	16QAM	13.510	14.888
20.0	QPSK	18.013	19.808
	16QAM	18.013	19.744

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

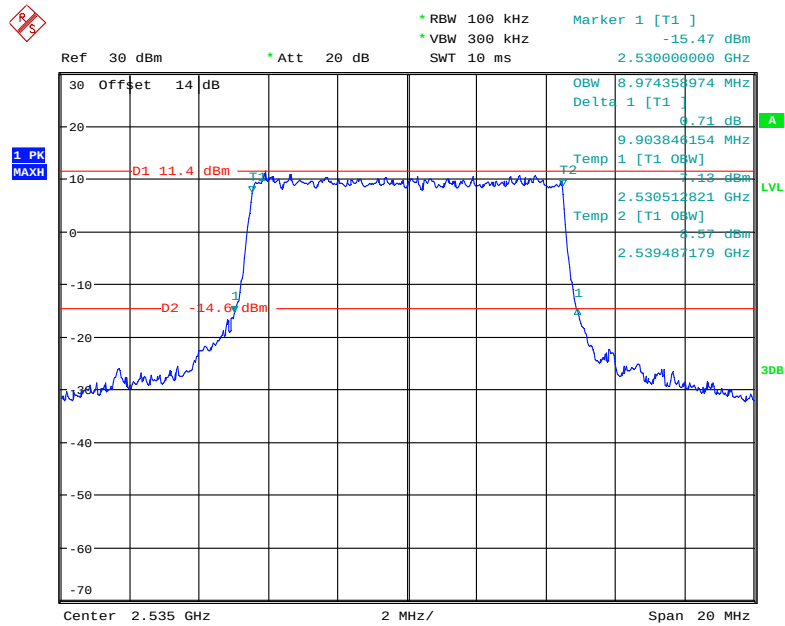


Date: 8.DEC.2017 22:35:47

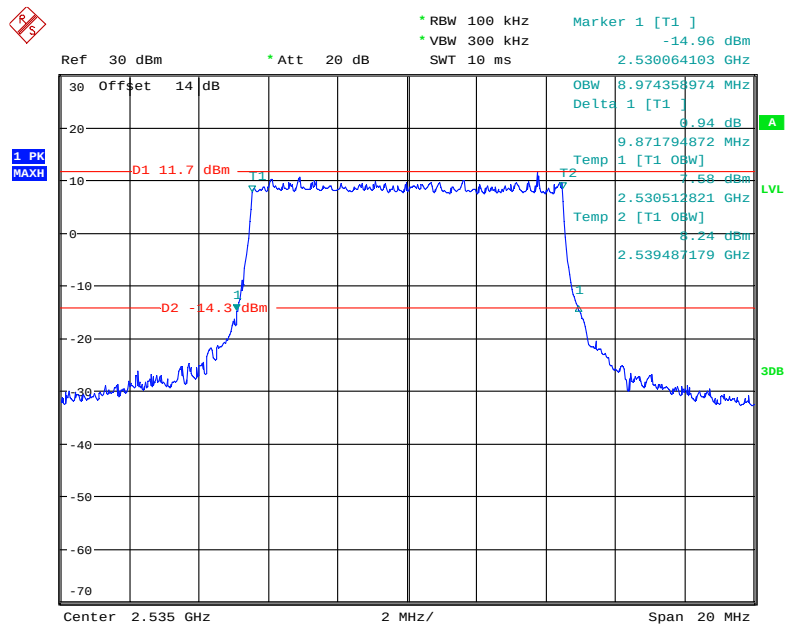
16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



Date: 8.DEC.2017 22:37:07

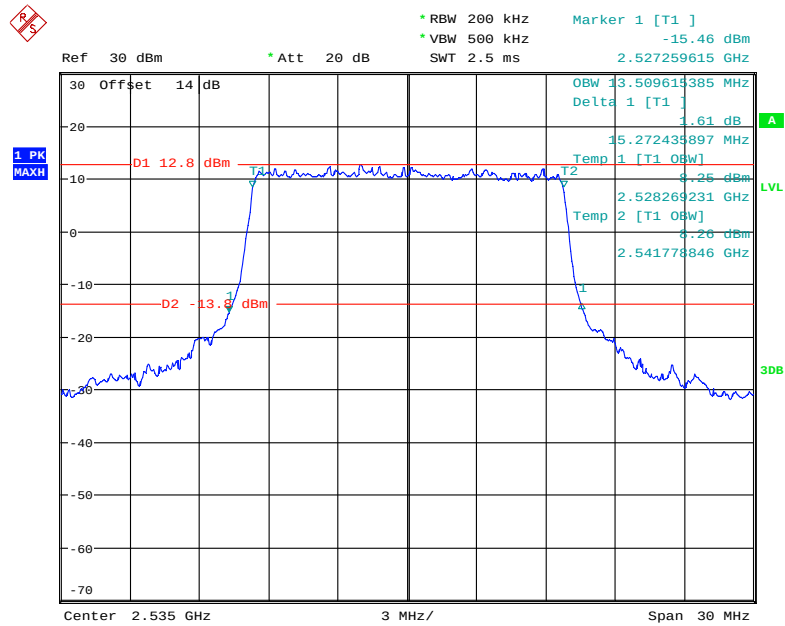
QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel

Date: 8.DEC.2017 22:33:39

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

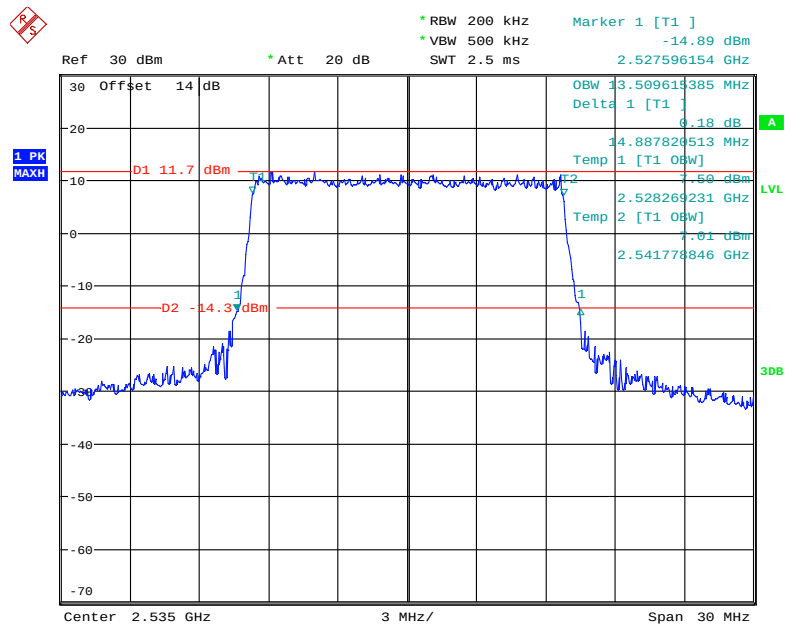
Date: 8.DEC.2017 22:31:33

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



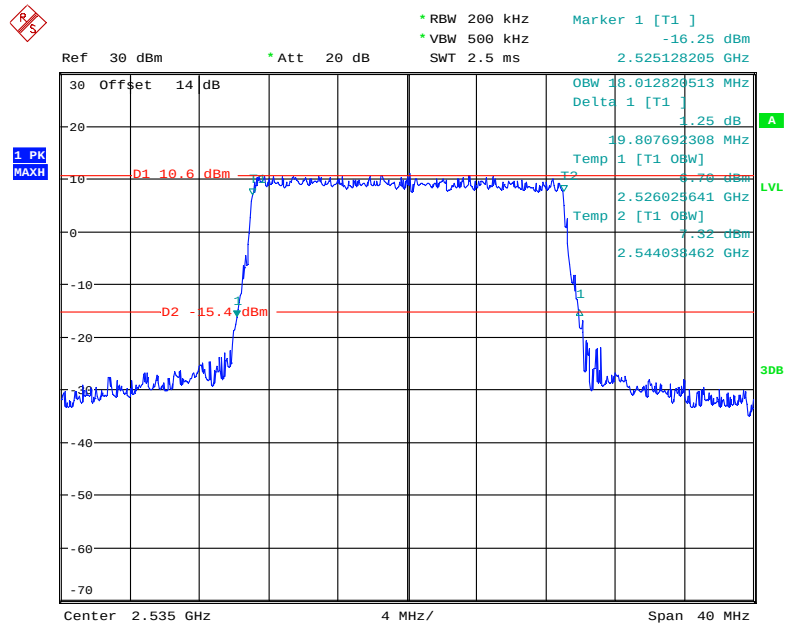
Date: 8.DEC.2017 22:29:39

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



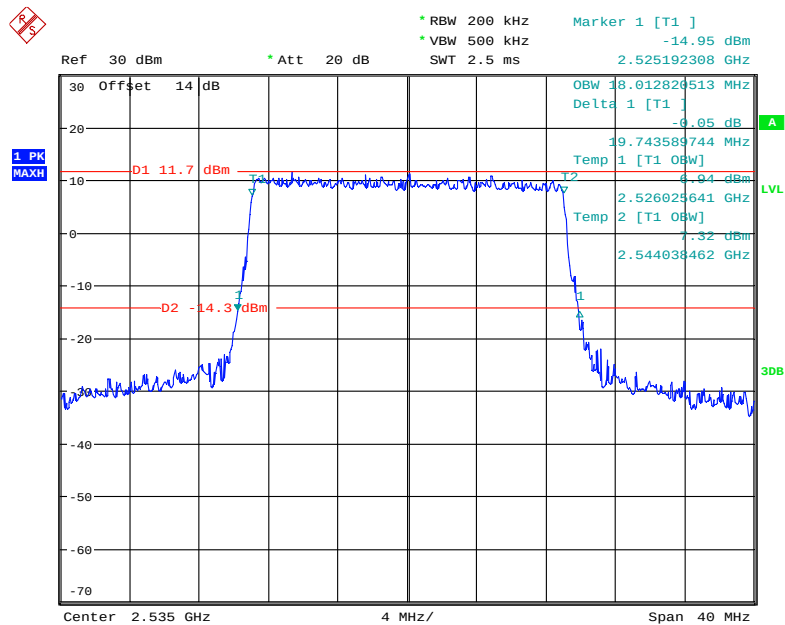
Date: 8.DEC.2017 22:20:37

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



Date: 8.DEC.2017 22:18:29

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



Date: 8.DEC.2017 22:19:03

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

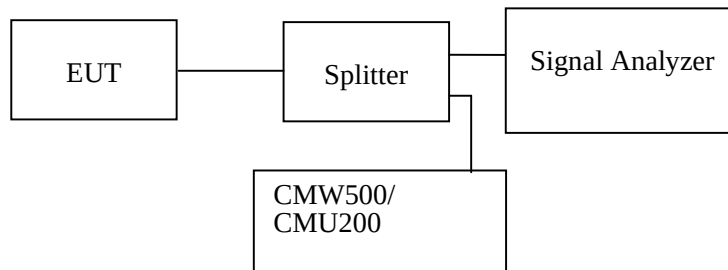
Applicable Standard

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 °C
Relative Humidity:	50~55 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Dylan Li from 2017-12-07 to 2018-01-26.

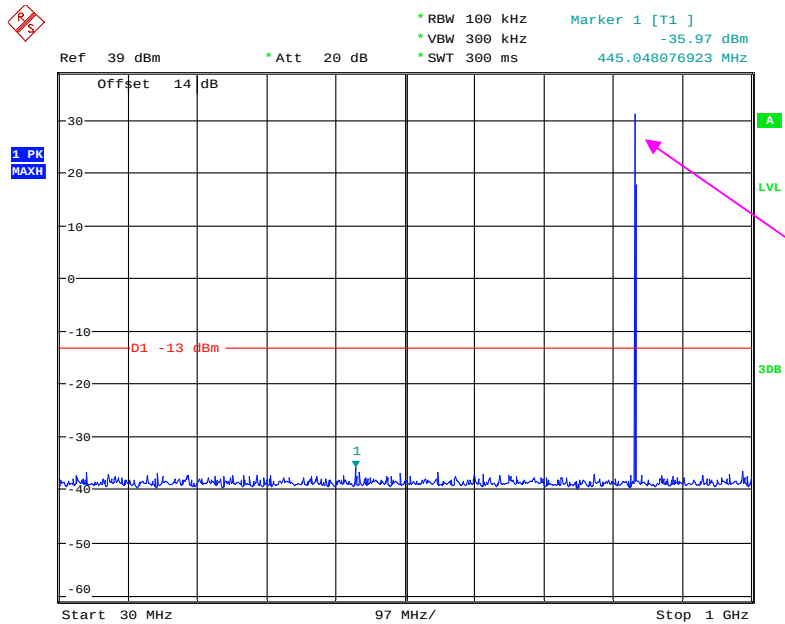
Test result: Compliance,

EUT operation mode: transmitting

Please refer to the following plots.

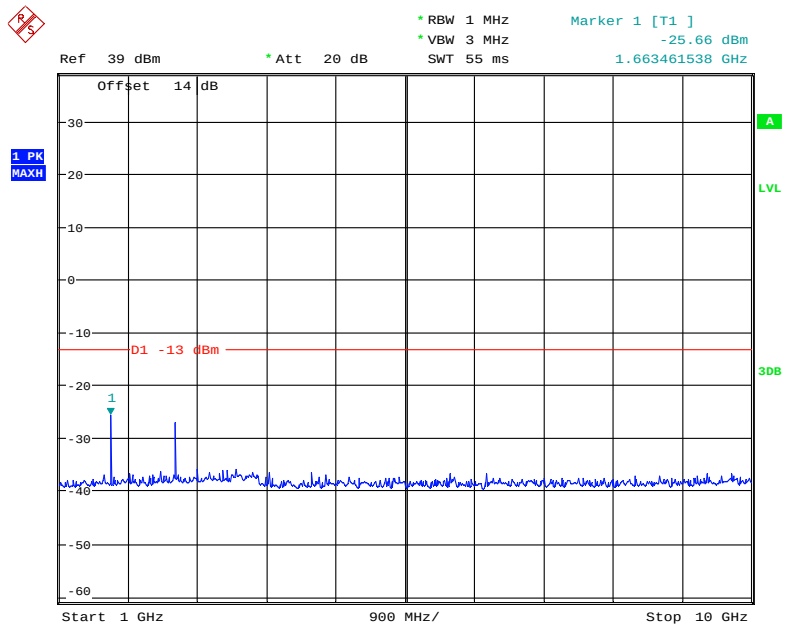
Cellular Band (Part 22H)

30 MHz – 1 GHz (GSM Mode)



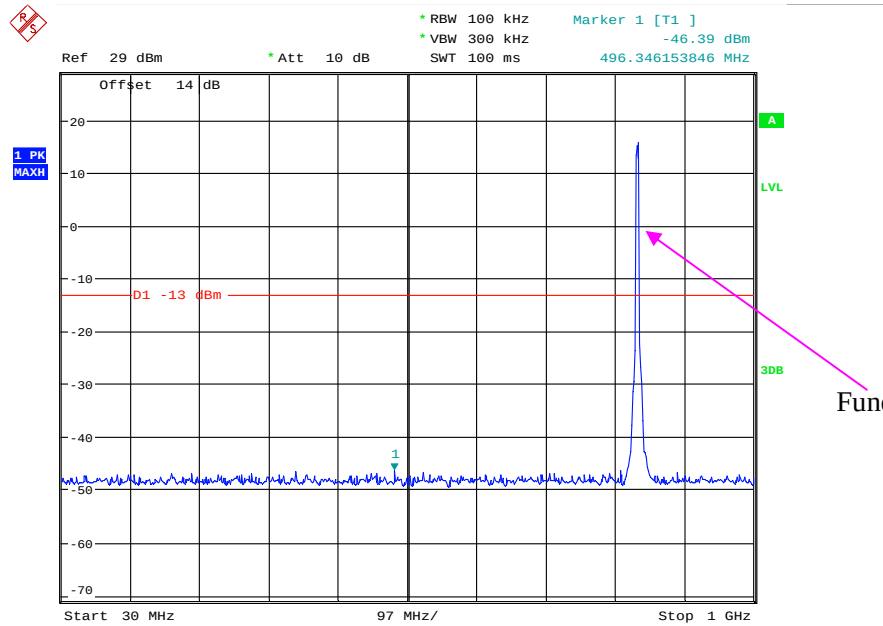
Date: 7.DEC.2017 22:45:46

1 GHz – 10 GHz (GSM Mode)



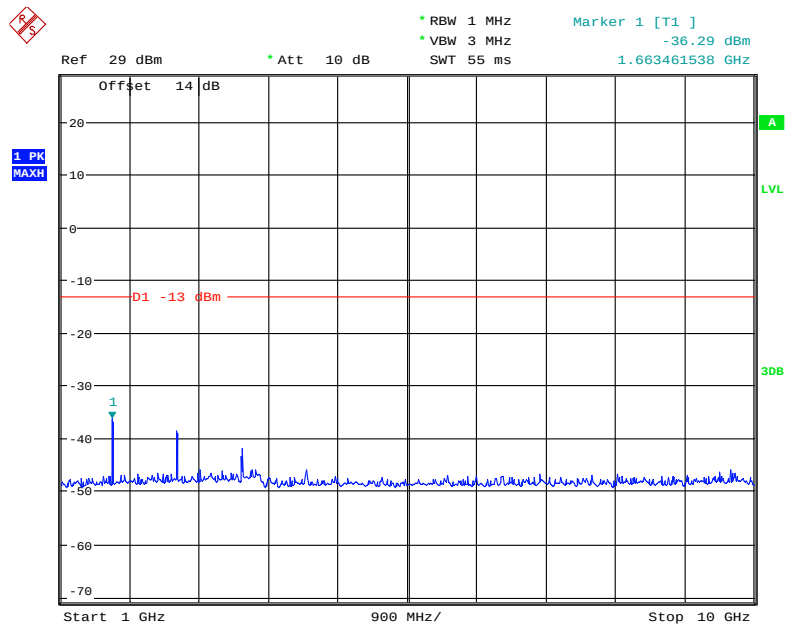
Date: 7.DEC.2017 22:48:08

30 MHz – 1 GHz (WCDMA Mode)



Date: 7.DEC.2017 22:30:47

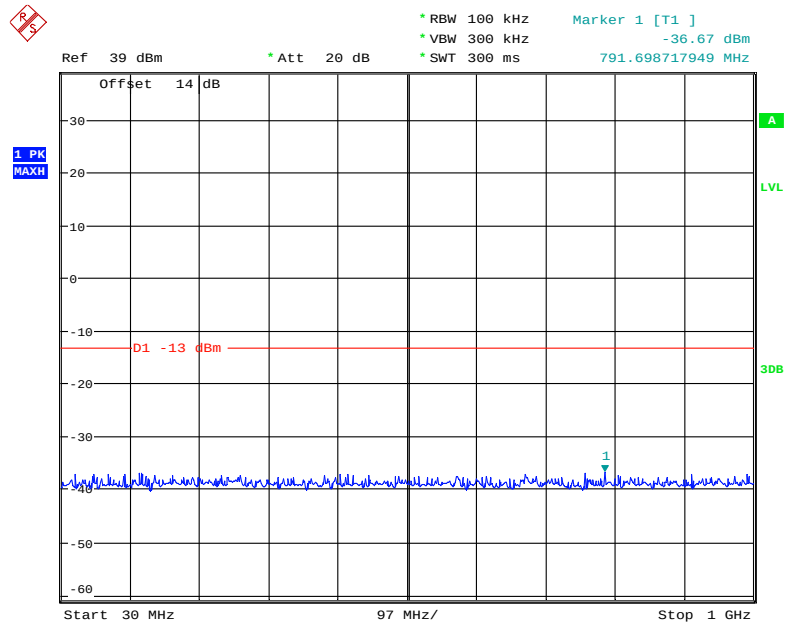
1 GHz – 10 GHz (WCDMA Mode)



Date: 7.DEC.2017 22:31:29

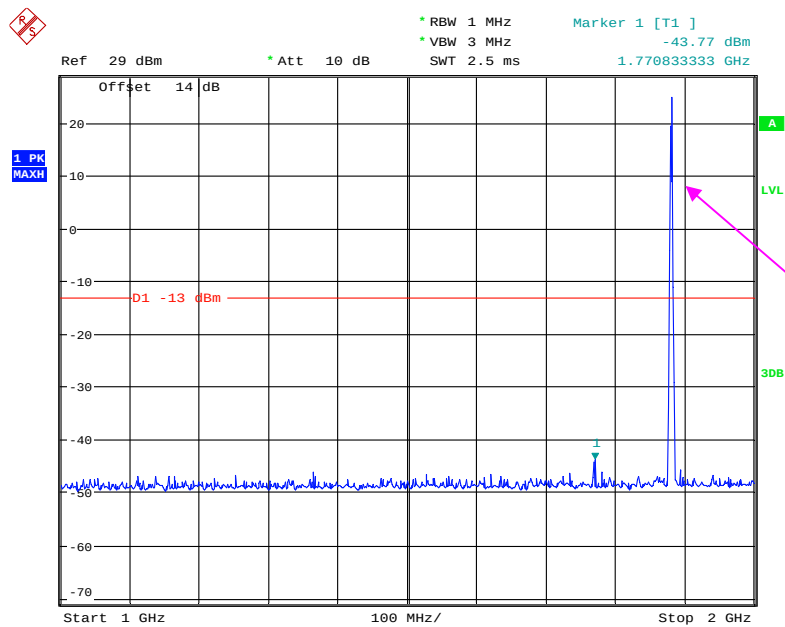
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



Date: 7.DEC.2017 22:46:36

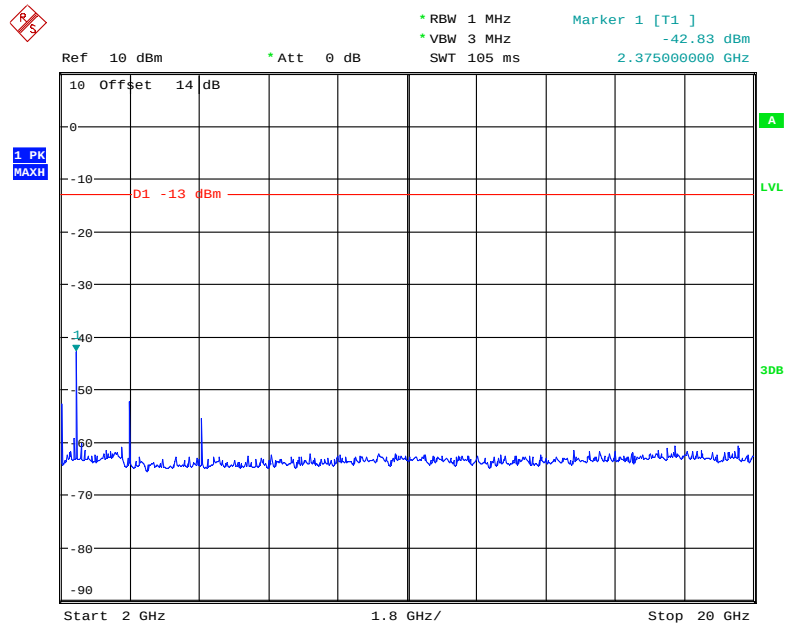
1 GHz – 2 GHz (GSM Mode)



Fundamental test

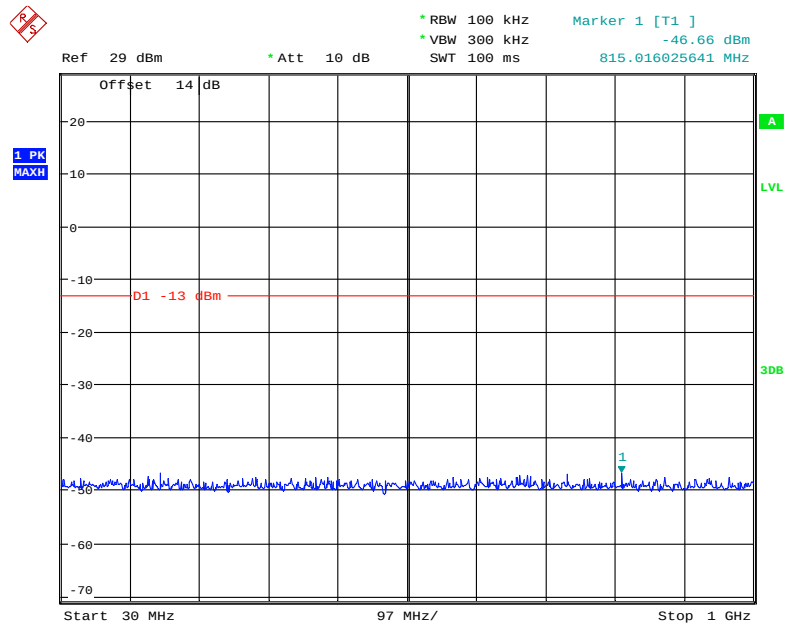
Date: 7.DEC.2017 22:50:44

2 GHz – 20 GHz (GSM Mode)



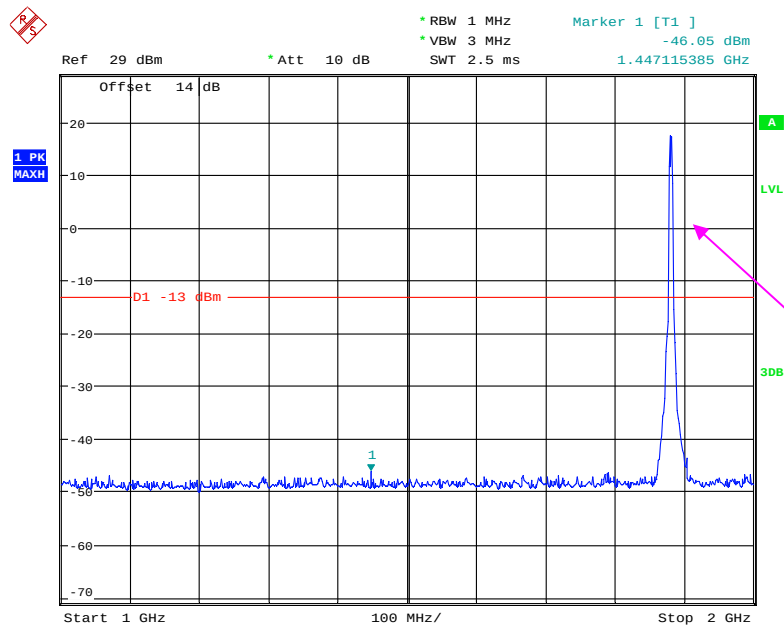
Date: 7.DEC.2017 22:49:24

30 MHz – 1 GHz (WCDMA Mode)



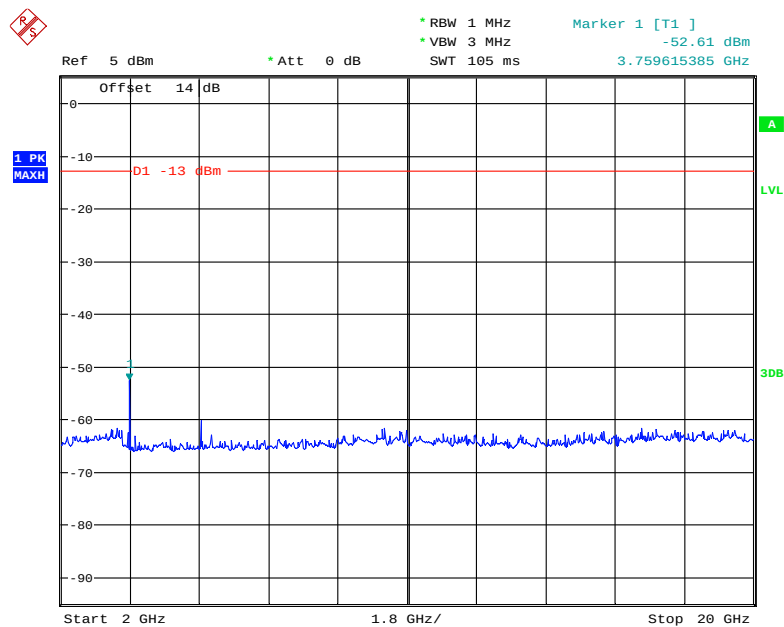
Date: 7.DEC.2017 22:28:59

1 GHz – 2 GHz (WCDMA Mode)



Date: 7.DEC.2017 22:34:02

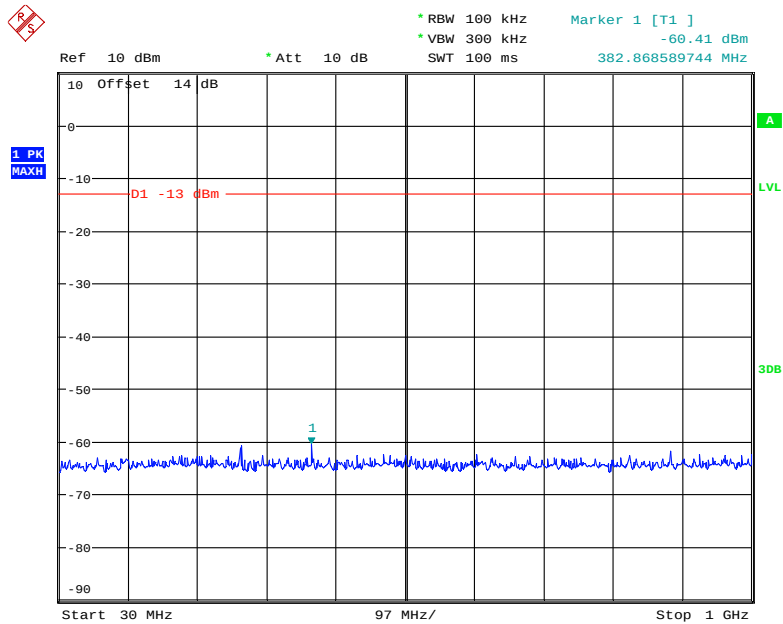
2 GHz – 20 GHz (WCDMA Mode)



Date: 7.DEC.2017 22:32:43

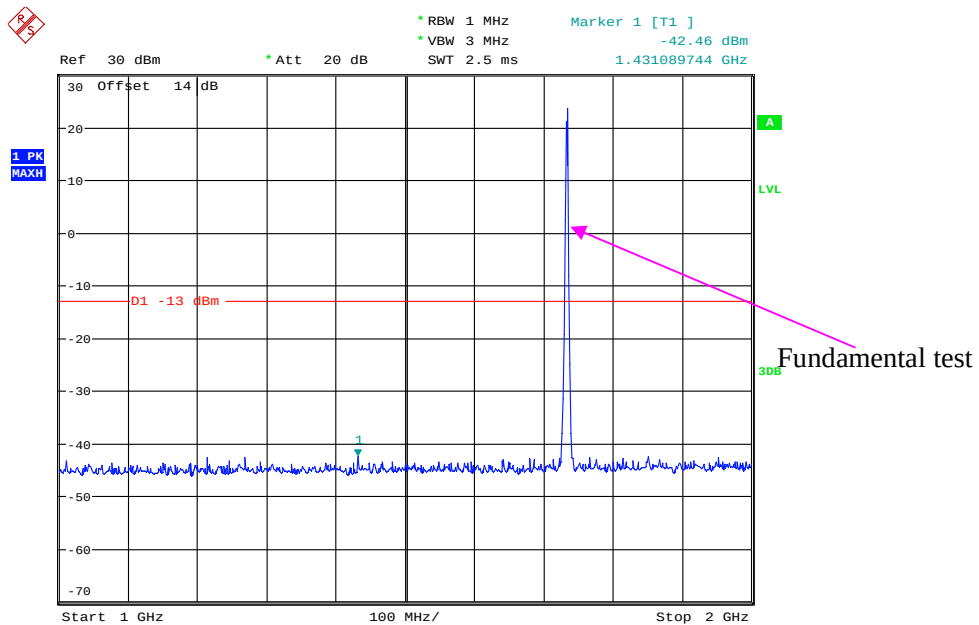
LTE Band 4: (QPSK)

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



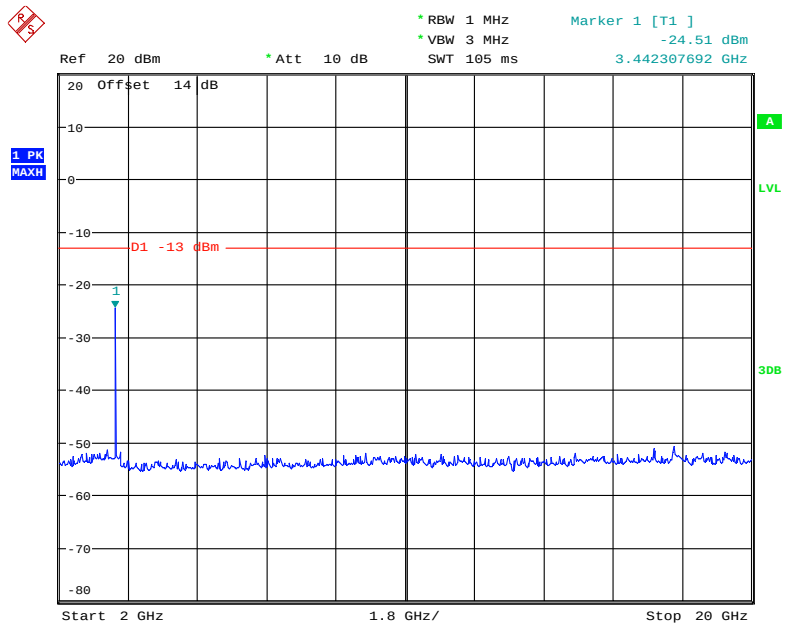
Date: 8.DEC.2017 21:26:23

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



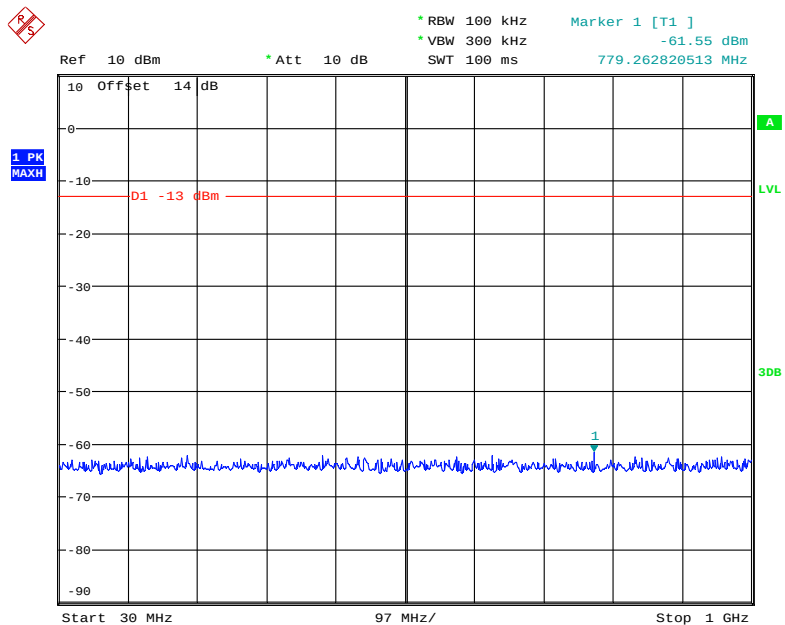
Date: 8.DEC.2017 21:27:18

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



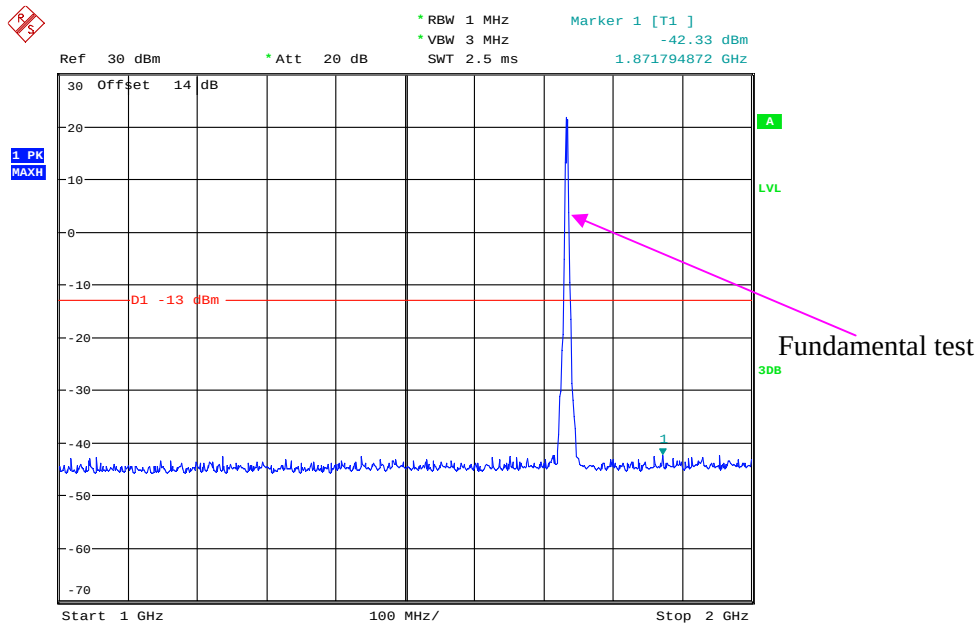
Date: 8.DEC.2017 21:32:16

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



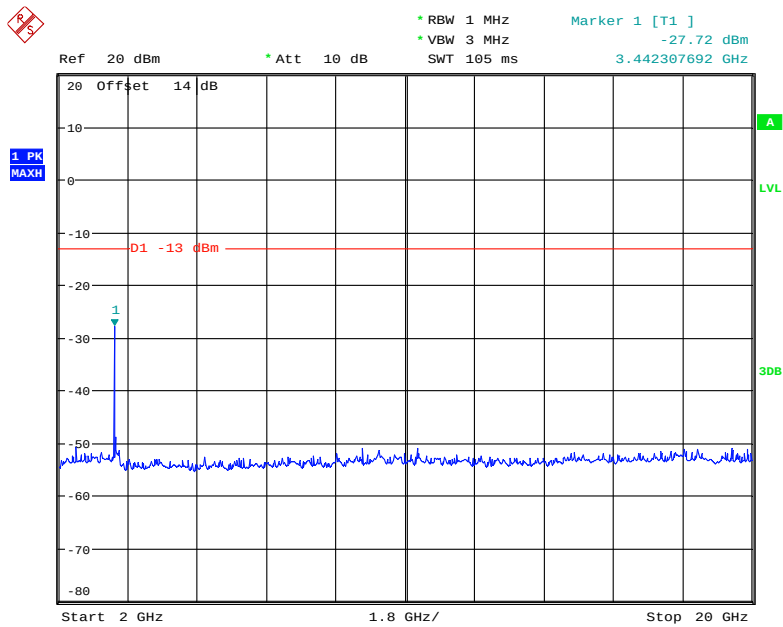
Date: 8.DEC.2017 21:19:12

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



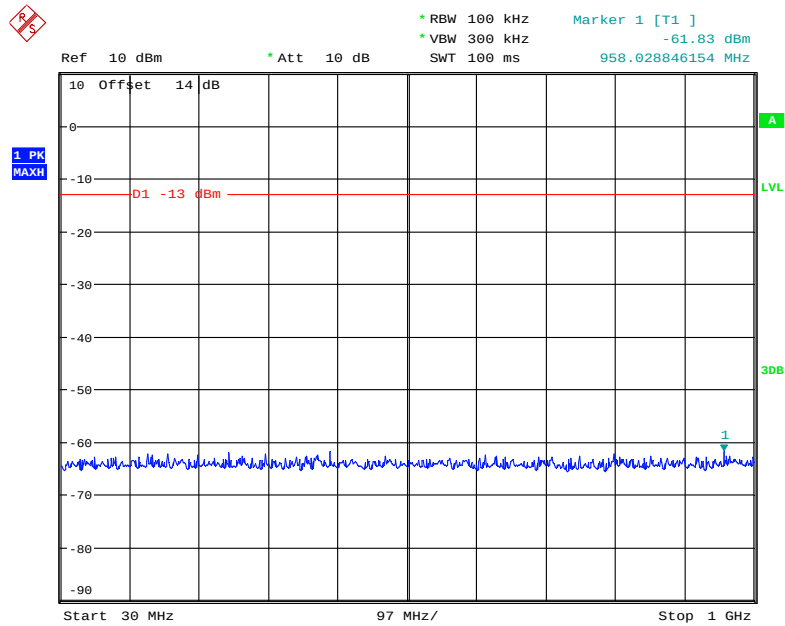
Date: 8.DEC.2017 21:27:52

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



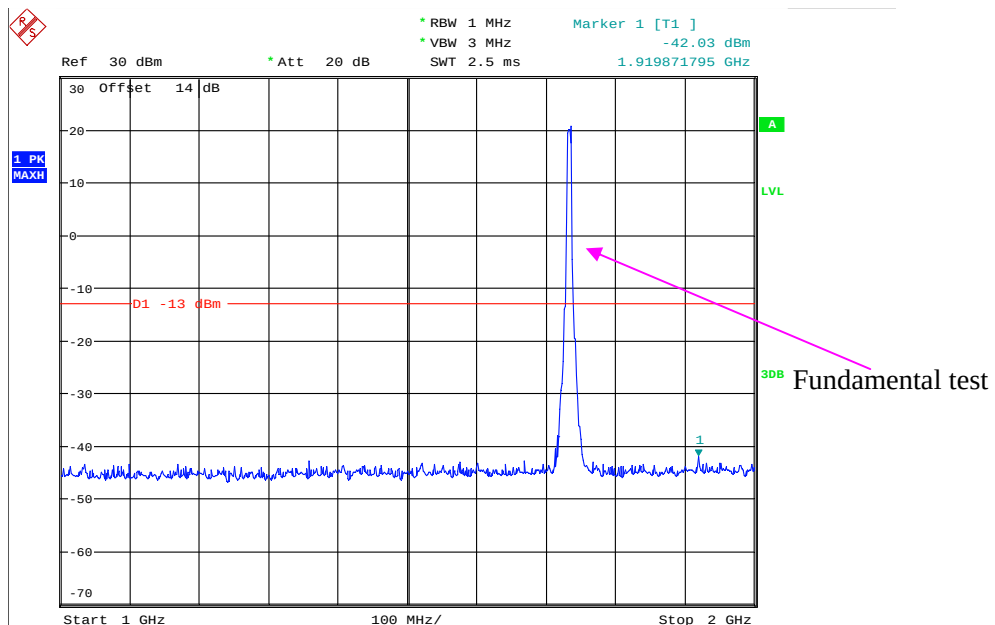
Date: 8.DEC.2017 21:32:04

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



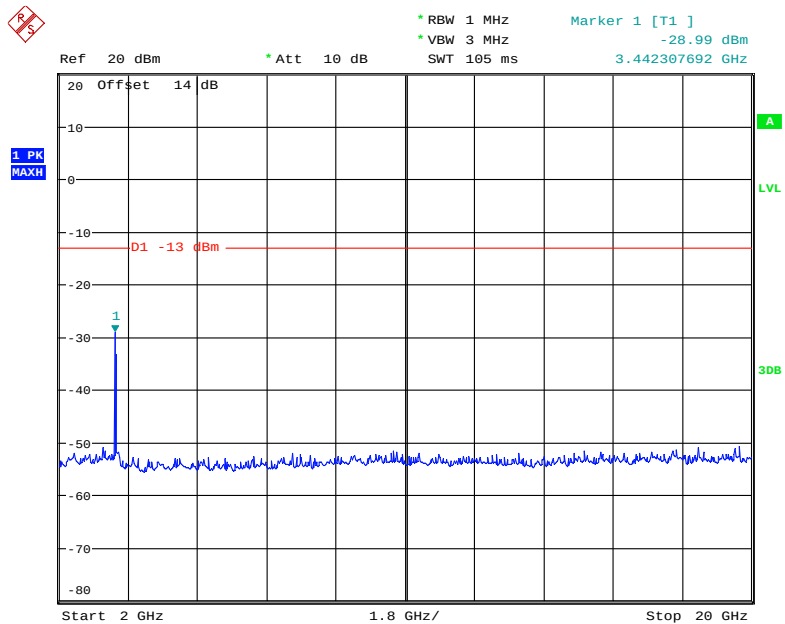
Date: 8.DEC.2017 21:19:30

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



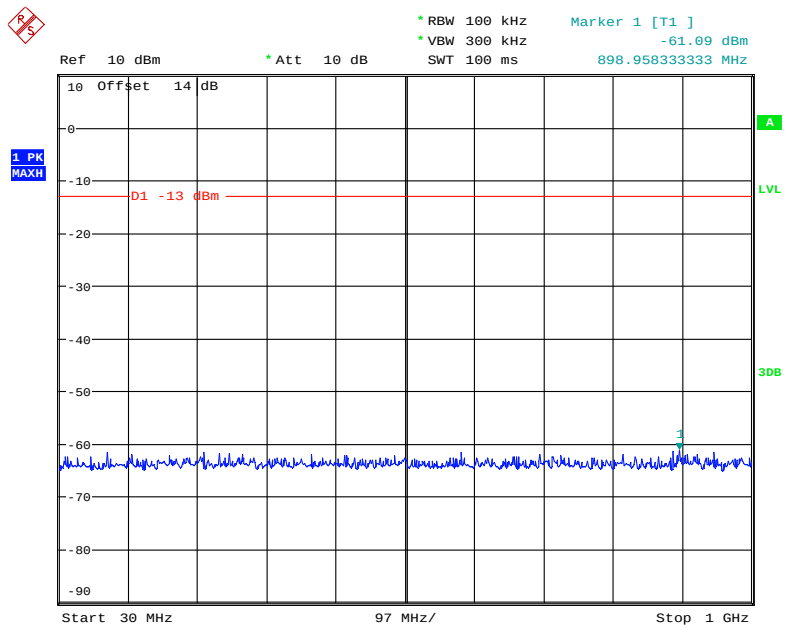
Date: 8.DEC.2017 21:28:12

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



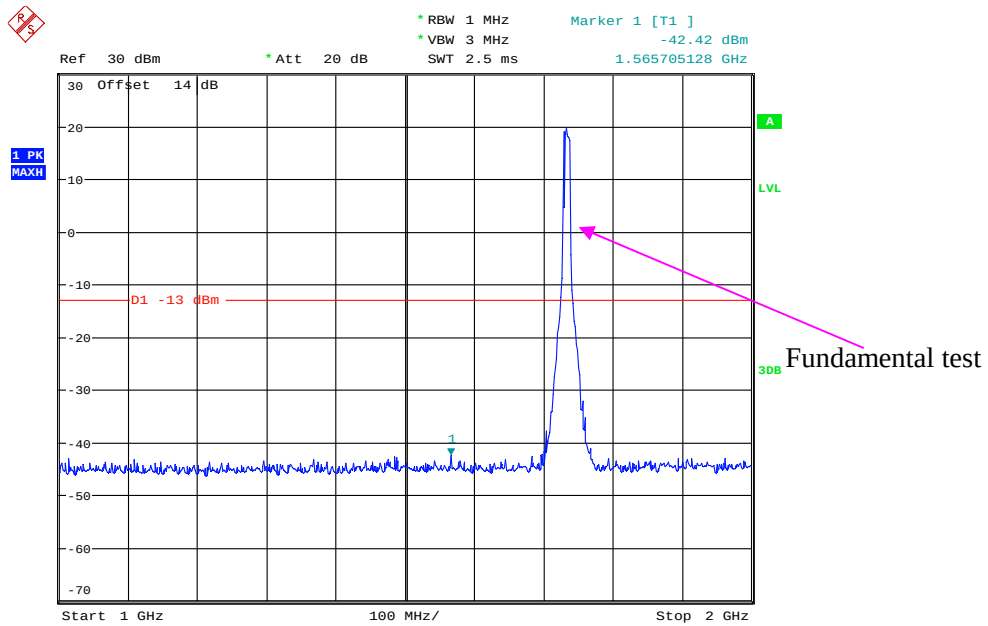
Date: 8.DEC.2017 21:31:49

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



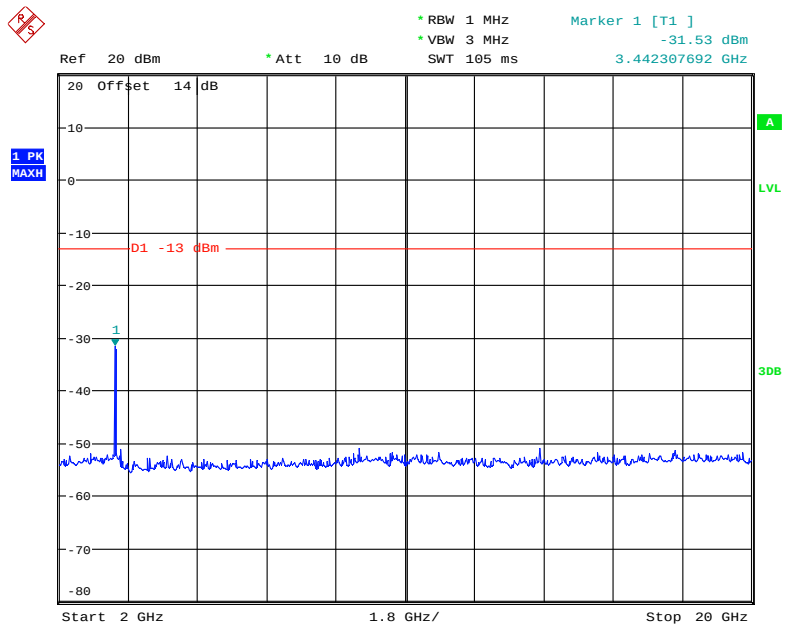
Date: 8.DEC.2017 21:19:53

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



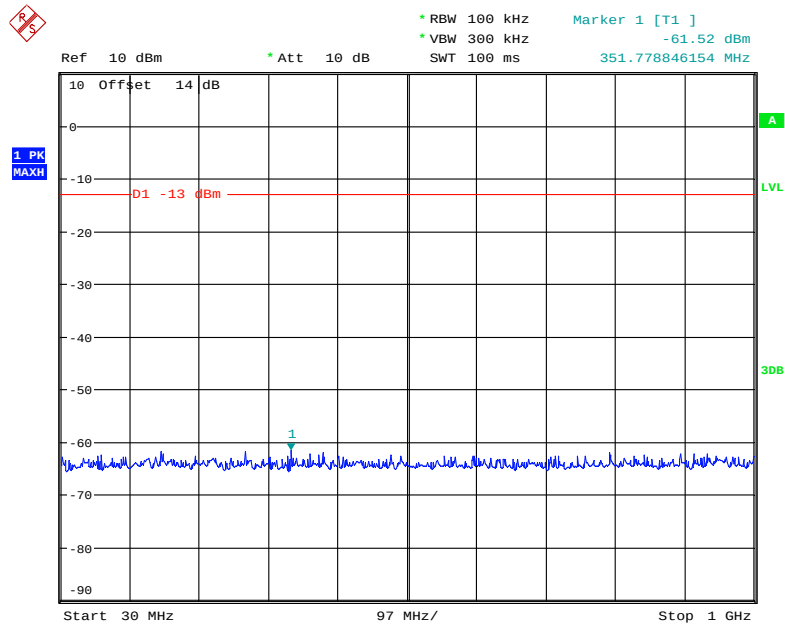
Date: 8.DEC.2017 21:28:35

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



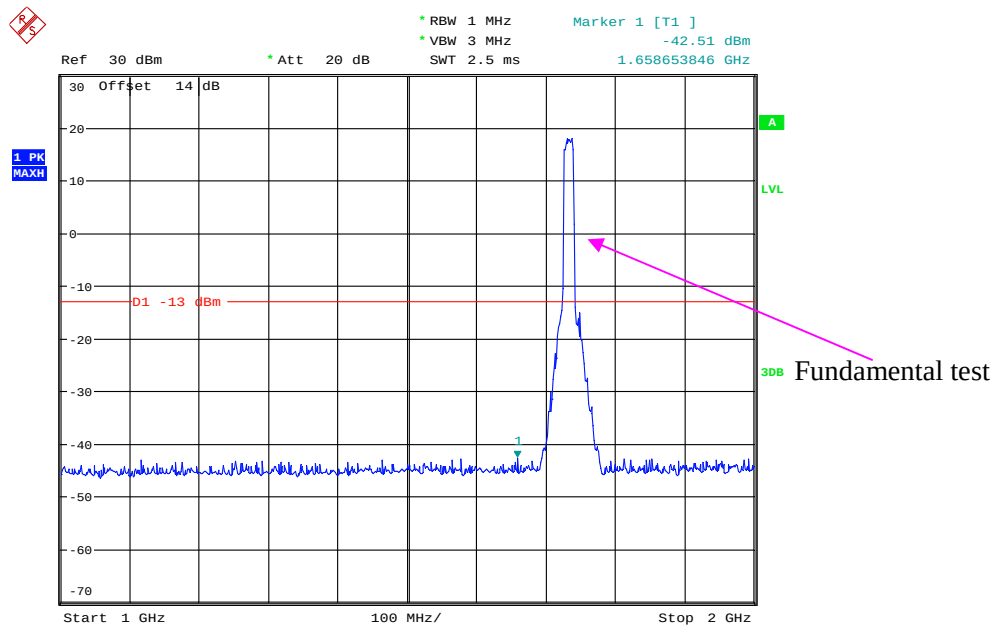
Date: 8.DEC.2017 21:31:35

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



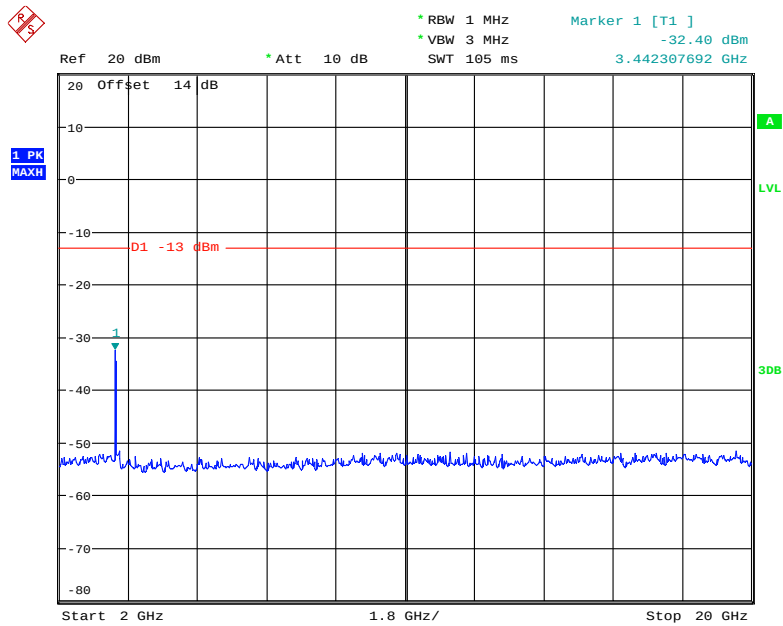
Date: 8.DEC.2017 21:20:07

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



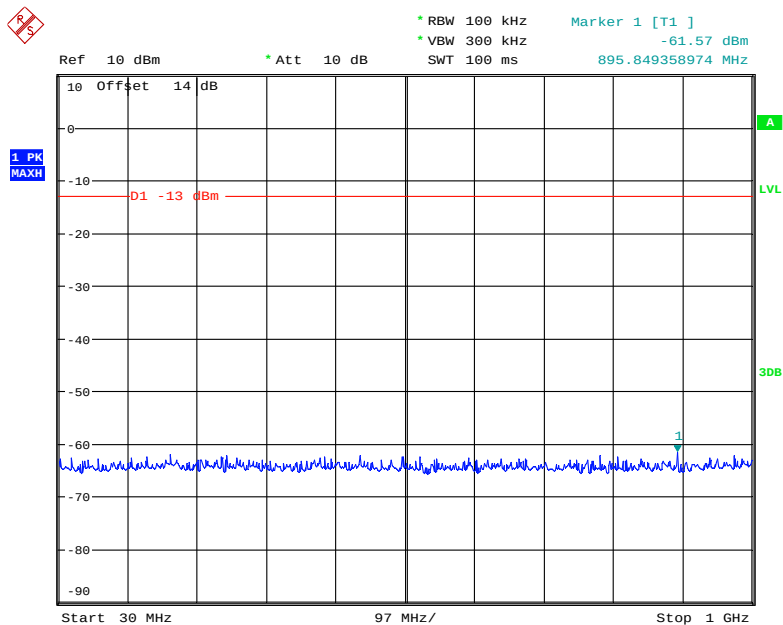
Date: 8.DEC.2017 21:28:57

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



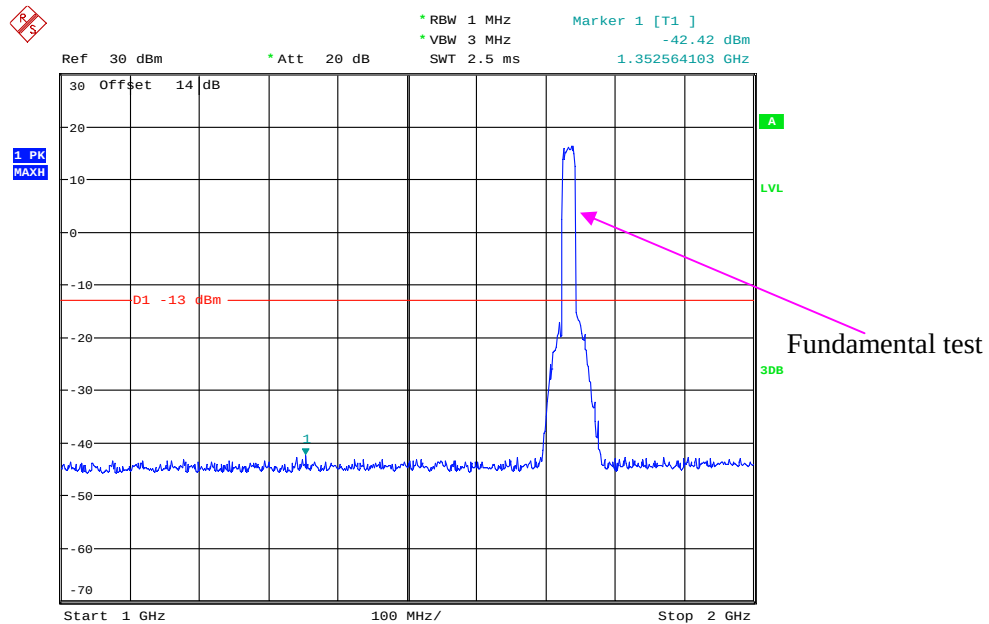
Date: 8.DEC.2017 21:31:20

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



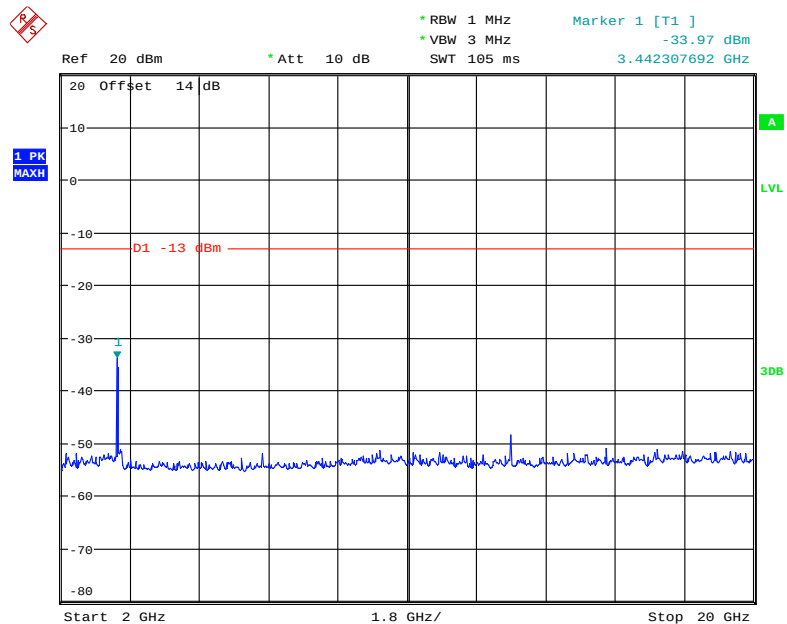
Date: 8.DEC.2017 21:20:21

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



Date: 8.DEC.2017 21:29:35

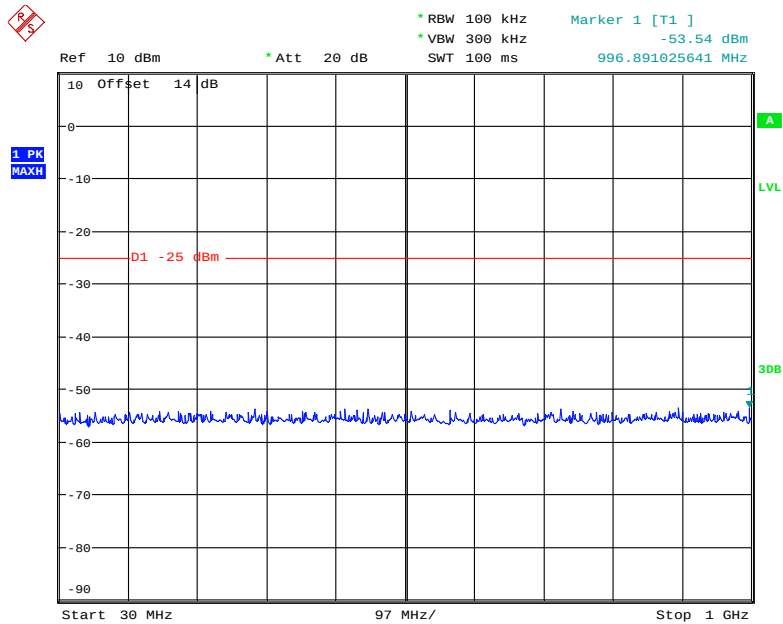
2 GHz - 20 GHz (20.0 MHz, Middle Channel)



Date: 8.DEC.2017 21:31:10

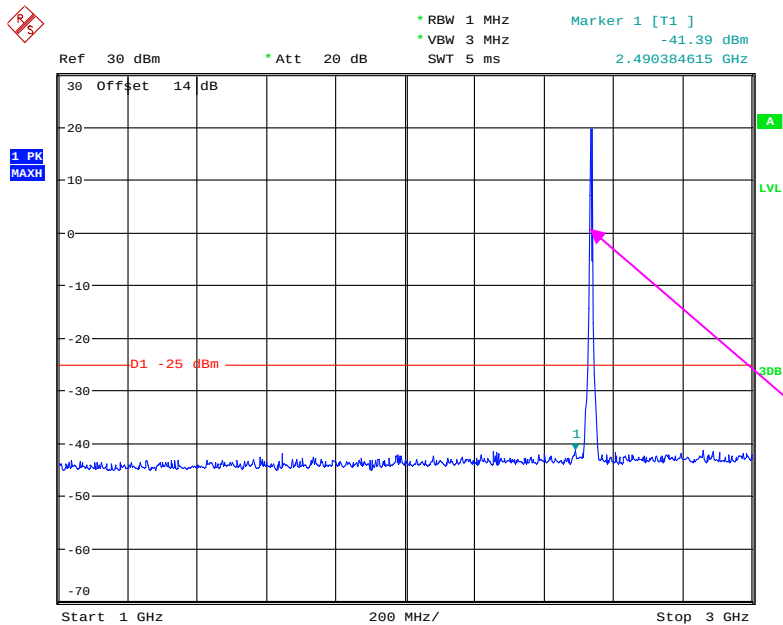
LTE Band 7: (QPSK)

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



Date: 26.JAN.2018 19:12:50

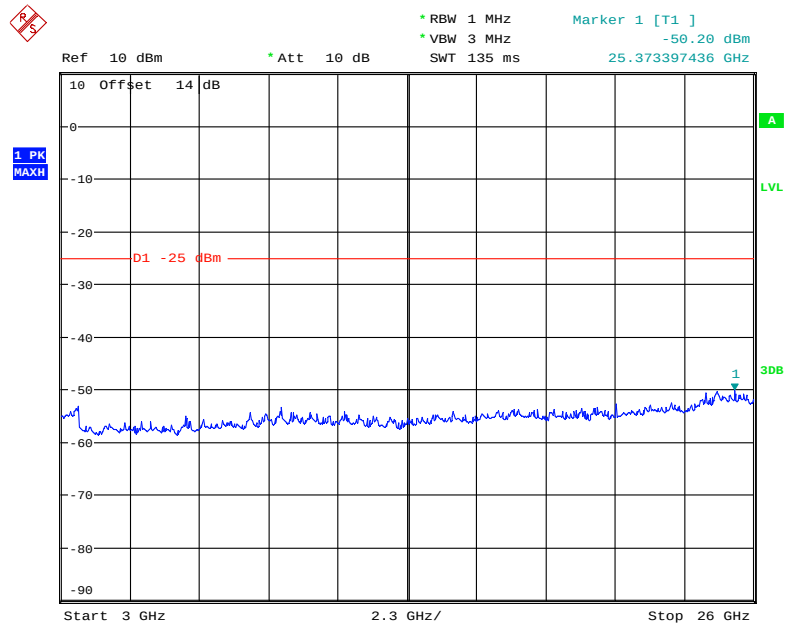
1 GHz – 3.0 GHz (5.0 MHz, Middle Channel)



Fundamental test

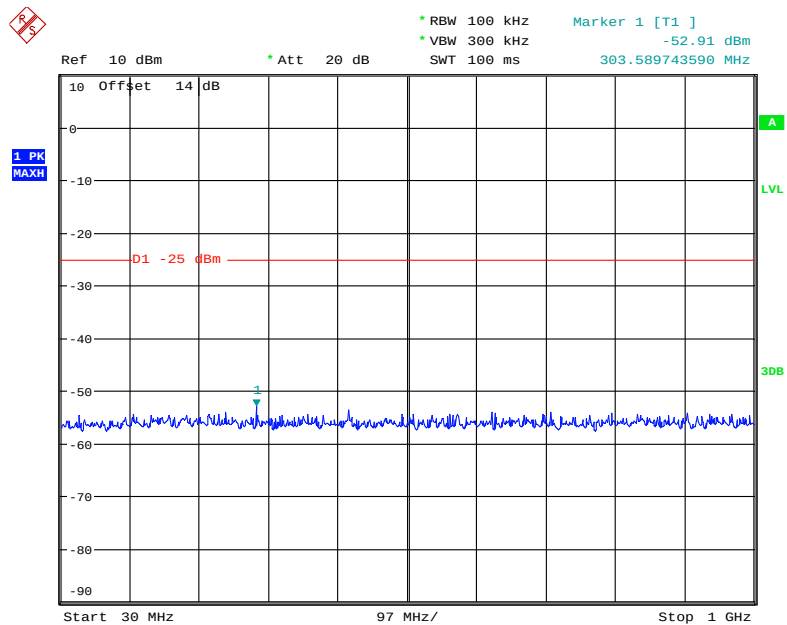
Date: 8.DEC.2017 21:39:32

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



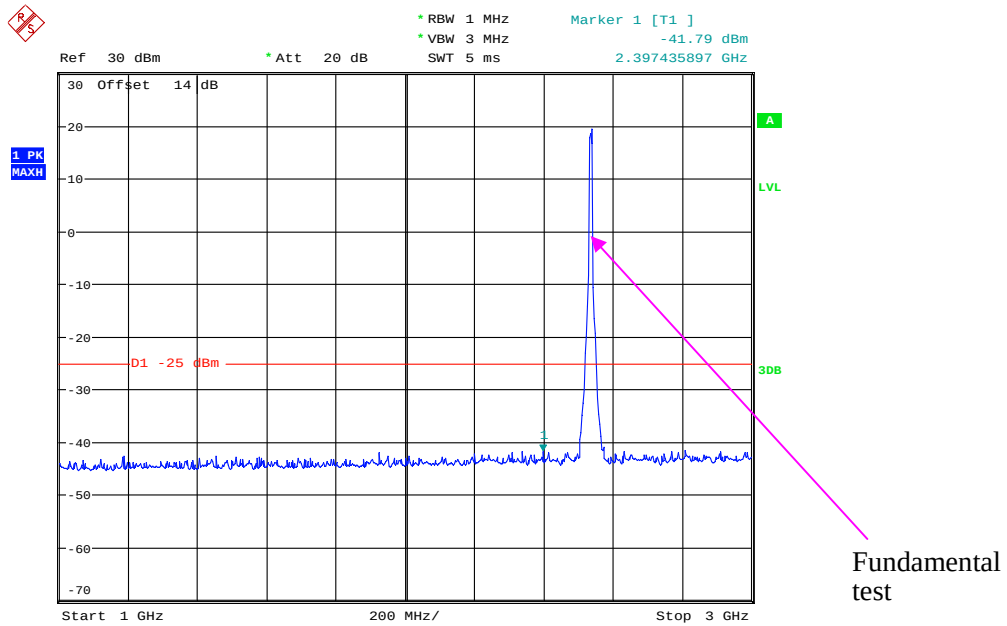
Date: 8.DEC.2017 21:40:11

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



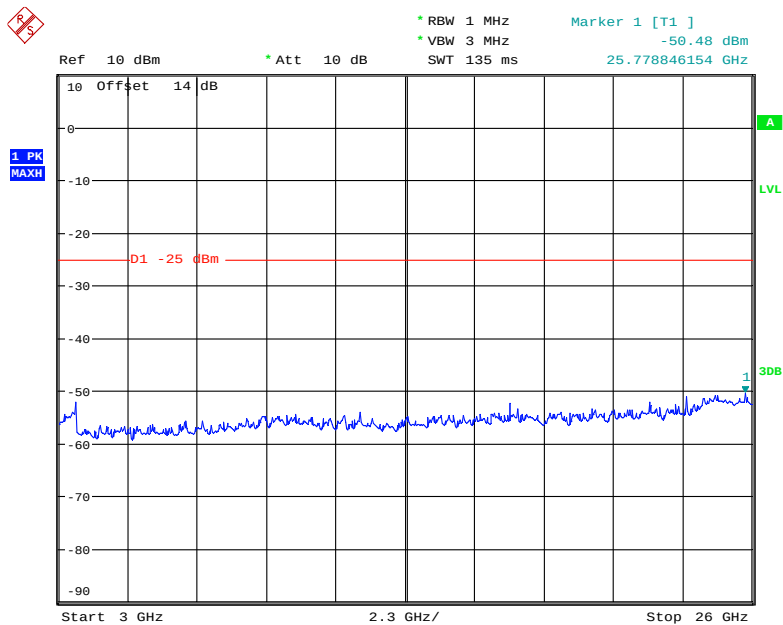
Date: 26.JAN.2018 19:13:04

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



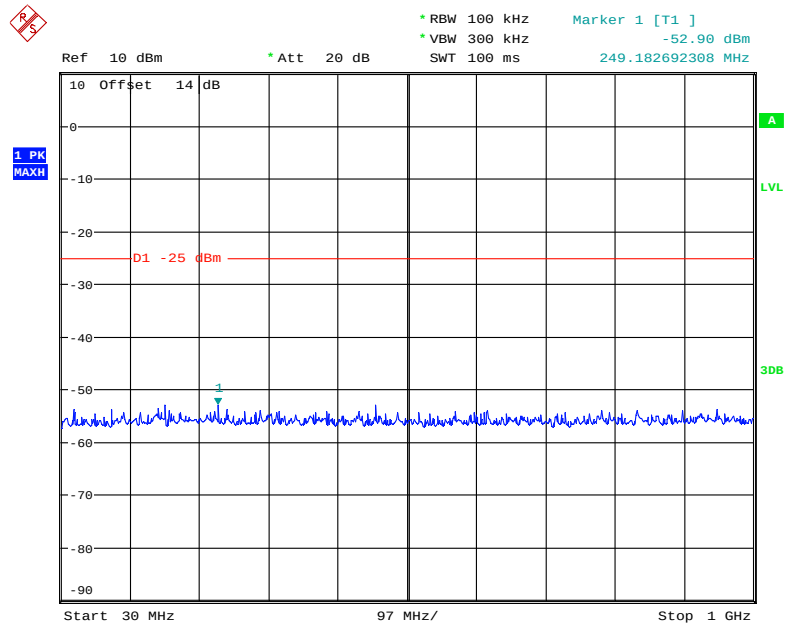
Date: 8.DEC.2017 21:38:45

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



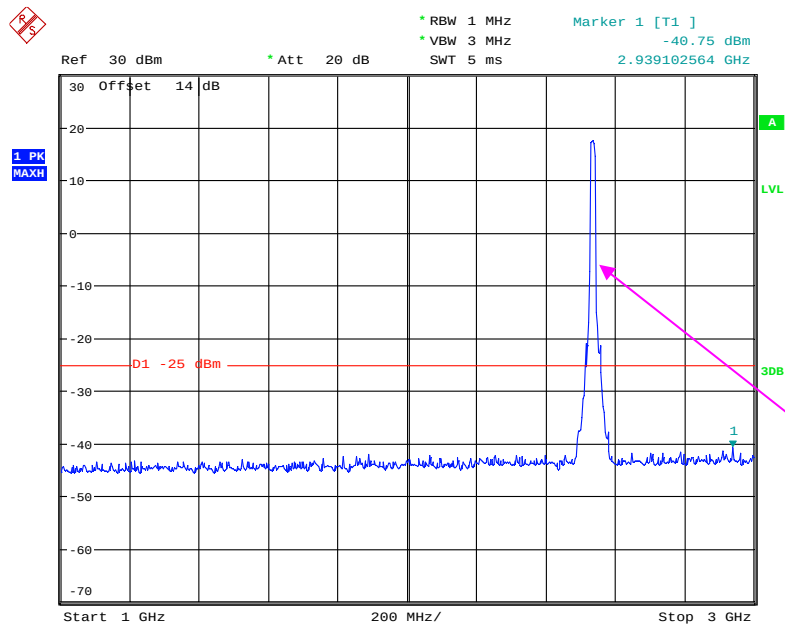
Date: 8.DEC.2017 21:40:31

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



Date: 26.JAN.2018 19:13:17

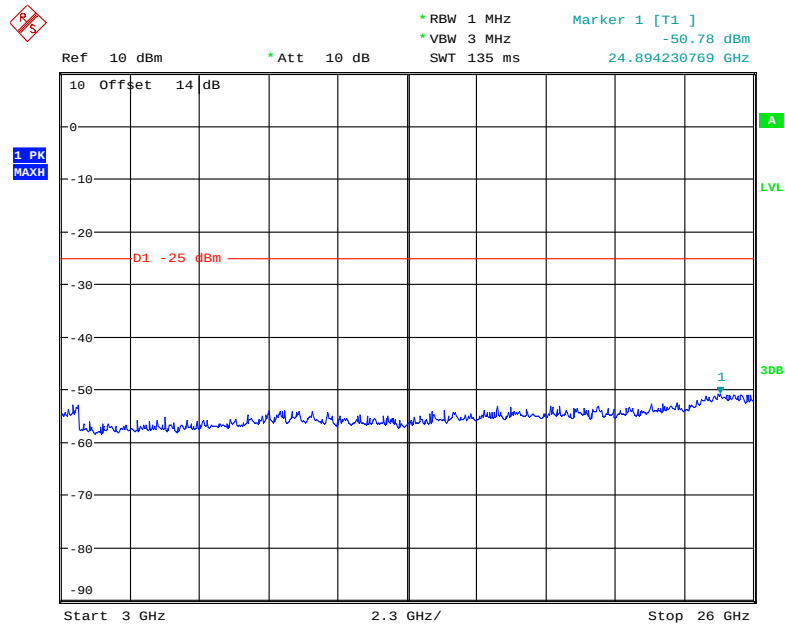
1 GHz – 3 GHz (15.0 MHz, Middle Channel)



Fundamental test

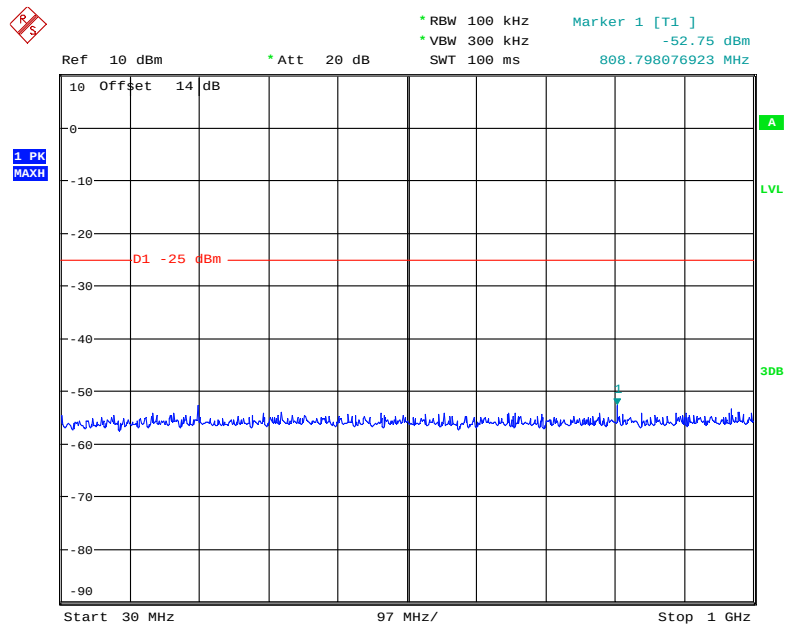
Date: 8.DEC.2017 21:38:11

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



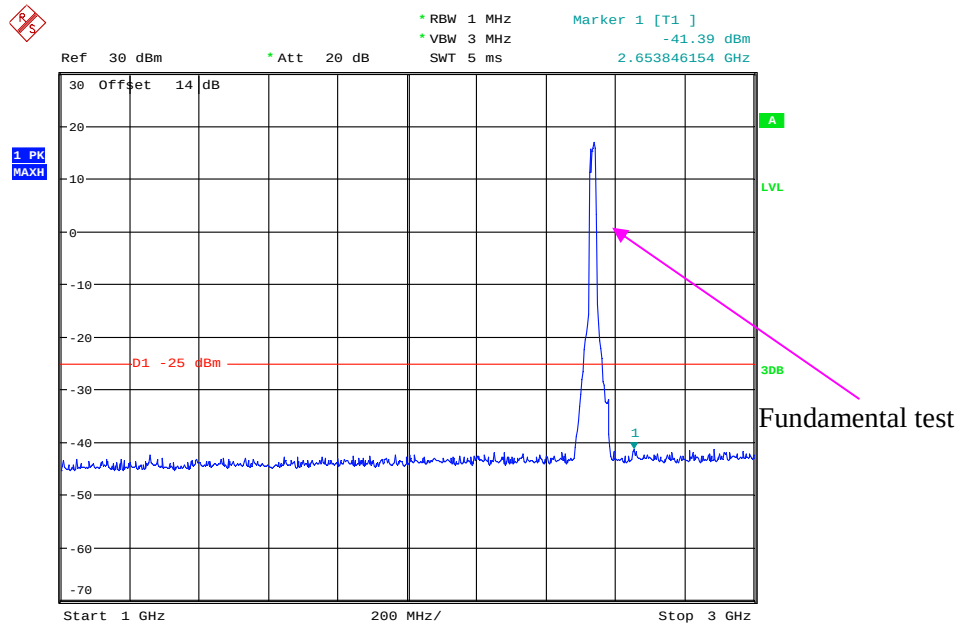
Date: 8.DEC.2017 21:41:00

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



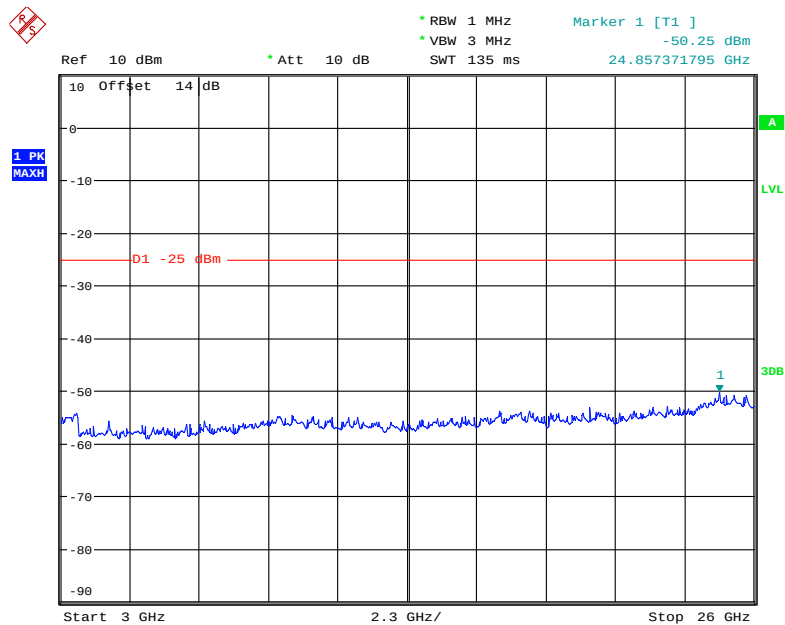
Date: 26.JAN.2018 19:13:32

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



Date: 8.DEC.2017 21:37:44

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



Date: 8.DEC.2017 21:41:15

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 °C
Relative Humidity:	48 %
ATM Pressure:	110.0 kPa

The testing was performed by Dylan Li on 2018-01-06.

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										
256.68	35.98	259	2.0	V	-59.0	0.32	0.0	-59.32	-13	46.32
256.68	37.24	77	1.9	H	-57.8	0.32	0.0	-58.12	-13	45.12
1673.20	62.58	154	2.0	H	-44.5	1.30	9.10	-36.70	-13	23.70
1673.20	61.21	225	1.7	V	-45.3	1.30	9.10	-37.50	-13	24.50
2509.80	53.21	317	1.9	H	-50.3	2.60	9.30	-43.60	-13	30.60
2509.80	51.02	213	2.3	V	-51.9	2.60	9.30	-45.20	-13	32.20
WCDMA Mode, Middle channel										
231.24	35.47	81	1.4	V	-59.5	0.31	0.0	-59.81	-13	46.81
231.24	36.68	7	1.7	H	-58.3	0.31	0.0	-58.61	-13	45.61
1673.20	56.24	182	2.3	H	-50.8	1.30	9.10	-43.00	-13	30.00
1673.20	59.12	58	2.4	V	-47.4	1.30	9.10	-39.60	-13	26.60
2509.80	52.12	72	1.2	H	-51.4	2.60	9.30	-44.70	-13	31.70
2509.80	53.62	8	1.9	V	-49.3	2.60	9.30	-42.60	-13	29.60
3346.40	46.59	286	2.0	H	-53.8	1.50	9.60	-45.70	-13	32.70
3346.40	48.57	318	1.8	V	-51.8	1.50	9.60	-43.70	-13	30.70

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										
256.68	36.12	175	1.8	V	-58.9	0.32	0.0	-59.22	-13	46.22
256.68	37.48	84	1.7	H	-57.5	0.32	0.0	-57.82	-13	44.82
3760.00	56.38	73	1.2	H	-44.8	1.50	9.70	-36.60	-13	23.60
3760.00	61.25	170	1.0	V	-39.5	1.50	9.70	-31.30	-13	18.30
5640.00	54.12	131	1.7	H	-43.5	1.70	11.20	-34.00	-13	21.00
5640.00	59.24	100	2.0	V	-38.0	1.70	11.20	-28.50	-13	15.50
WCDMA Mode, Middle channel										
231.24	35.42	100	2.2	V	-59.6	0.31	0.0	-59.91	-13	46.91
231.24	36.71	27	2.4	H	-58.3	0.31	0.0	-58.61	-13	45.61
3760.00	55.21	4	1.4	H	-46.0	1.50	9.70	-37.80	-13	24.80
3760.00	57.85	151	2.1	V	-42.9	1.50	9.70	-34.70	-13	21.70

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

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)			
Band 4, Middle channel, QPSK, 1.4MHz										
Test frequency range:30 MHz ~ 18 GHz										
221.21	35.65	68	2.1	V	-59.4	0.3	0.0	-59.7	-13	46.7
221.12	36.14	12	1.4	H	-58.9	0.3	0.0	-59.2	-13	46.2
3465.00	43.09	203	1.1	H	-57.3	1.50	9.70	-49.10	-13	36.10
3465.00	43.58	27	1.8	V	-57.6	1.50	9.70	-49.40	-13	36.40
Band 7, Middle channel, QPSK, 5MHz										
Test frequency range:30 MHz ~ 26 GHz										
221.21	56.12	316	2.2	V	-38.9	0.3	0.0	-39.2	-25	14.2
221.12	56.45	38	2.3	H	-38.6	0.3	0.0	-38.9	-25	13.9
5070.00	50.99	7	2.0	H	-46.9	1.60	11.20	-37.30	-25	12.30
5070.00	49.89	335	1.9	V	-48.0	1.60	11.20	-38.40	-25	13.40
7605.00	57.76	33	1.0	H	-37.4	2.10	11.60	-27.90	-25	2.90
7605.00	59.87	335	2.5	V	-35.1	2.10	11.60	-25.60	-25	0.60

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.

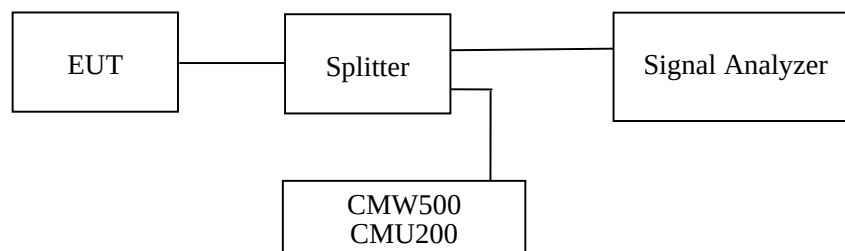
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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**

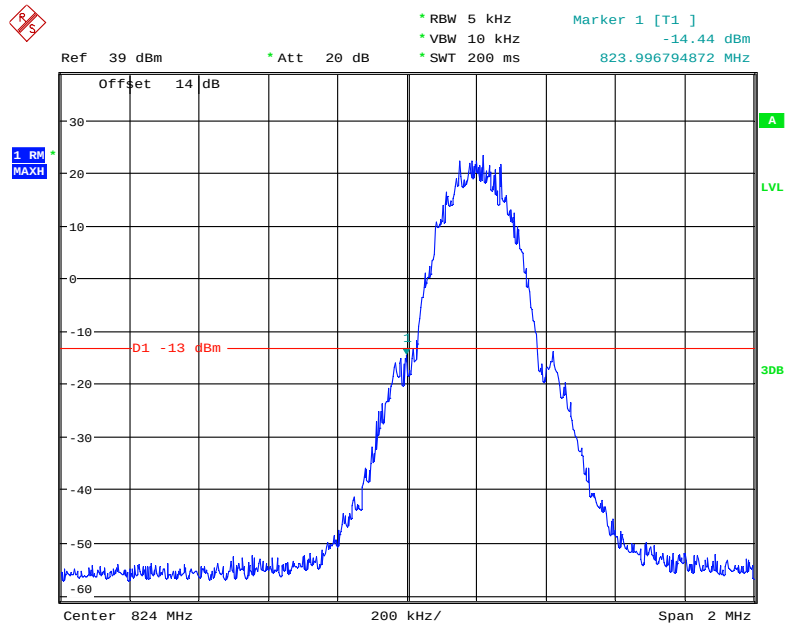
Temperature:	24~25 °C
Relative Humidity:	48~50 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Dylan Li from 2017-12-07 to 2017-12-29.

EUT operation mode: Transmitting

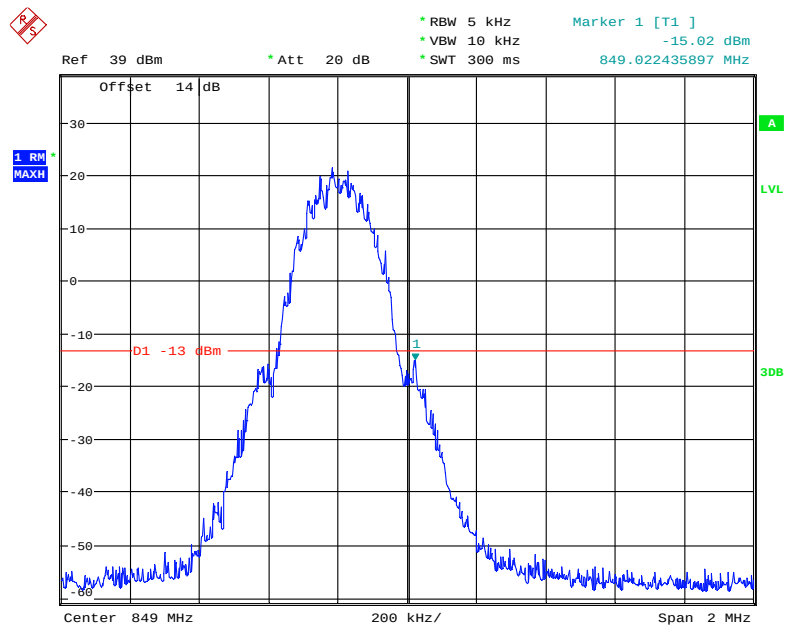
Test Result: Compliance. Please refer to the following plots.

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



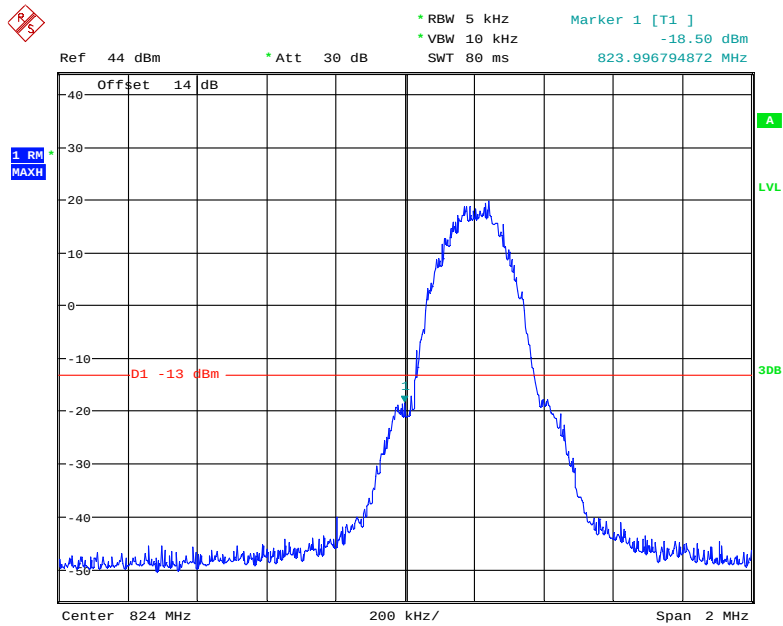
Date: 7.DEC.2017 22:43:11

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



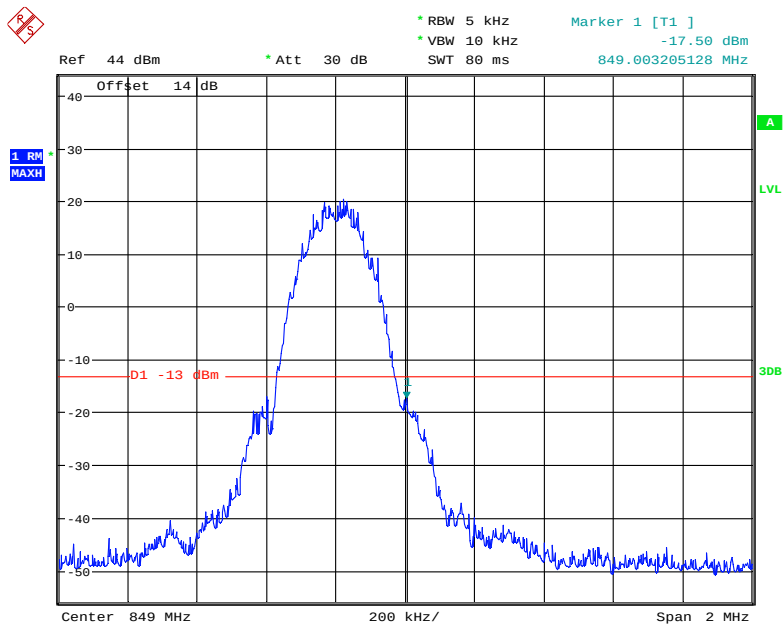
Date: 7.DEC.2017 22:44:32

Cellular Band, Left Band Edge for EDGE Mode



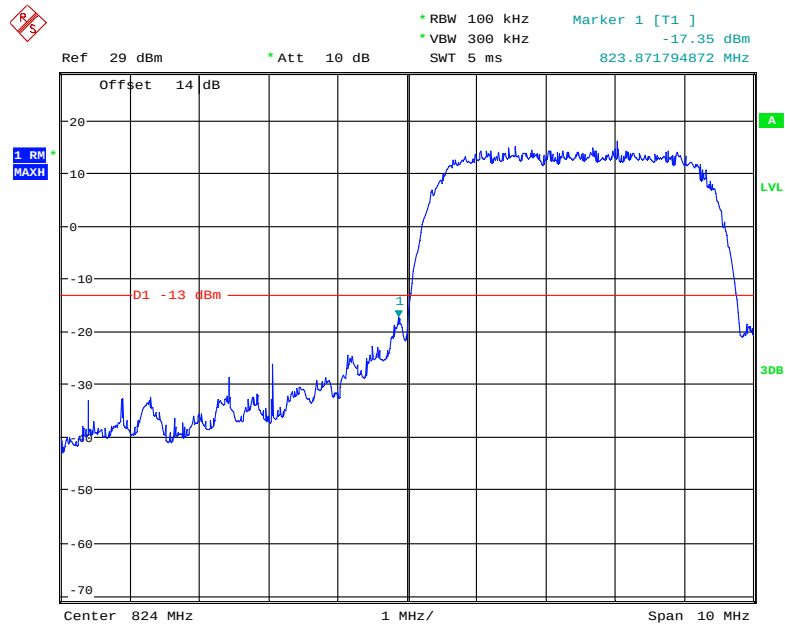
Date: 29.DEC.2017 19:39:30

Cellular Band, Right Band Edge for EDGE Mode



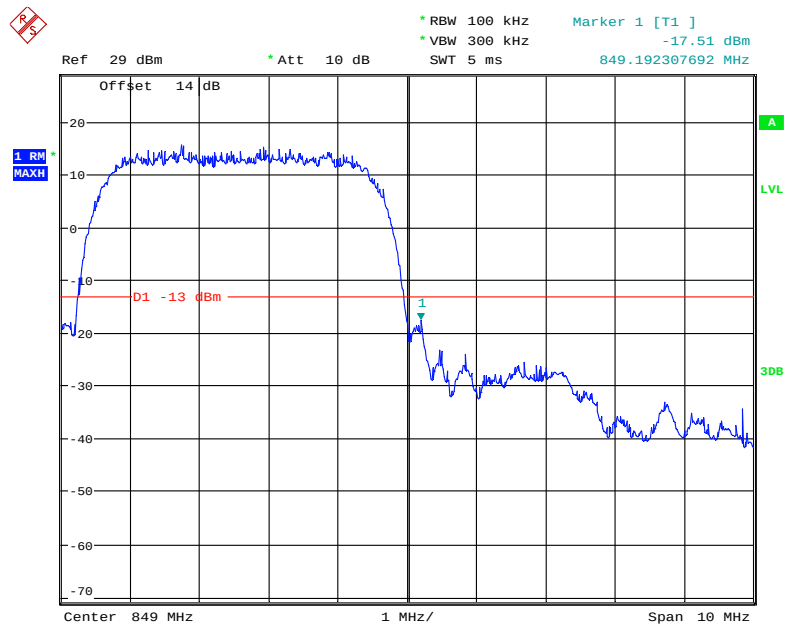
Date: 29.DEC.2017 19:40:32

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



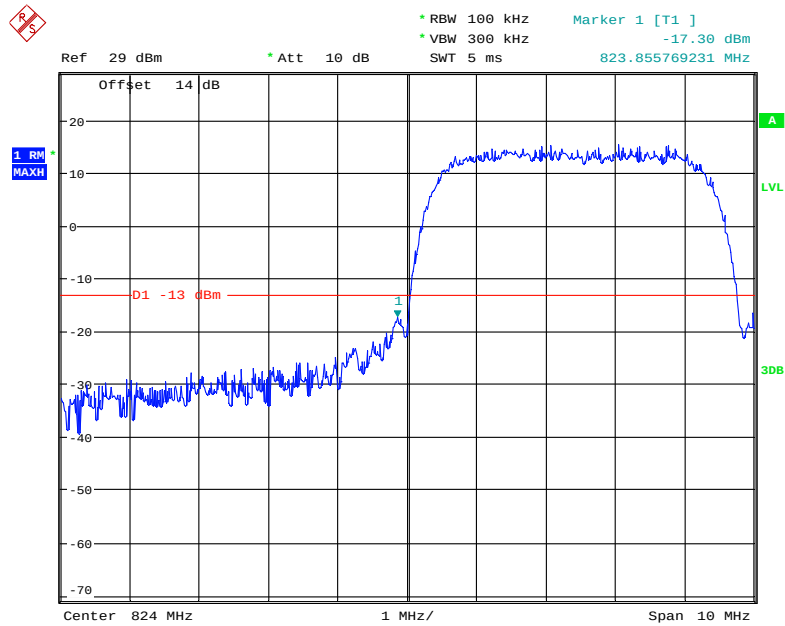
Date: 7.DEC.2017 22:25:33

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



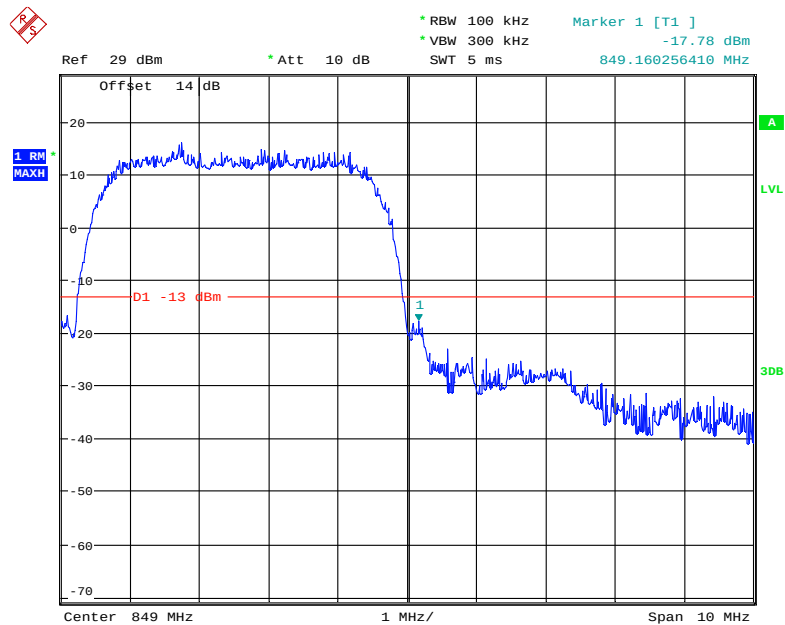
Date: 7.DEC.2017 22:26:37

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



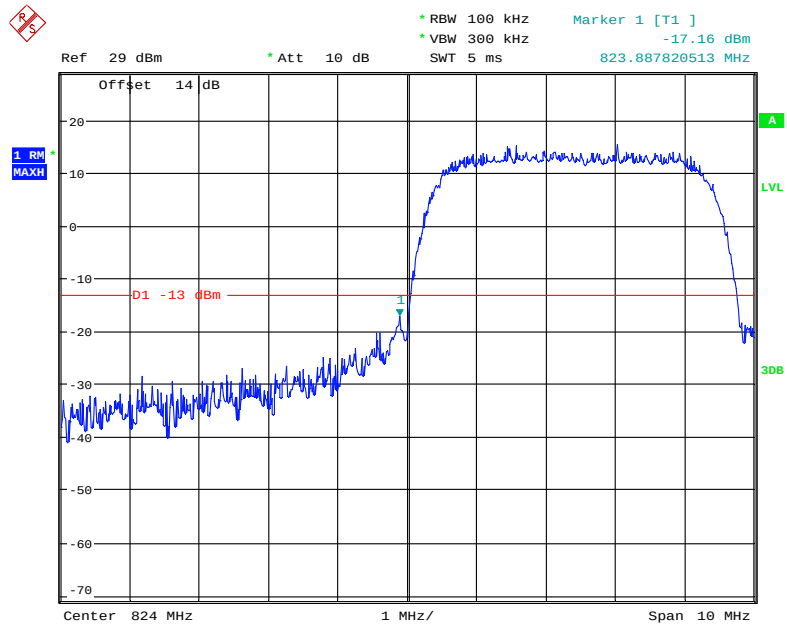
Date: 7.DEC.2017 22:24:35

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



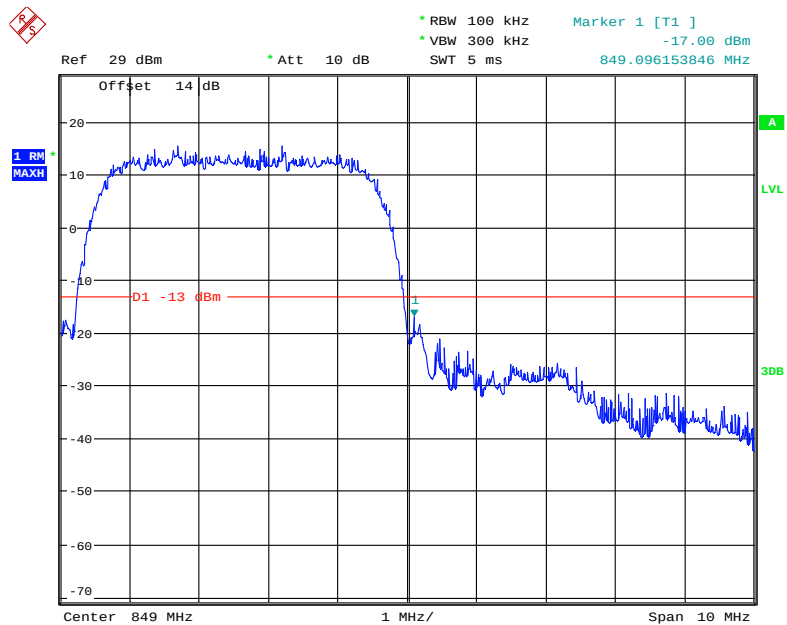
Date: 7.DEC.2017 22:23:30

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



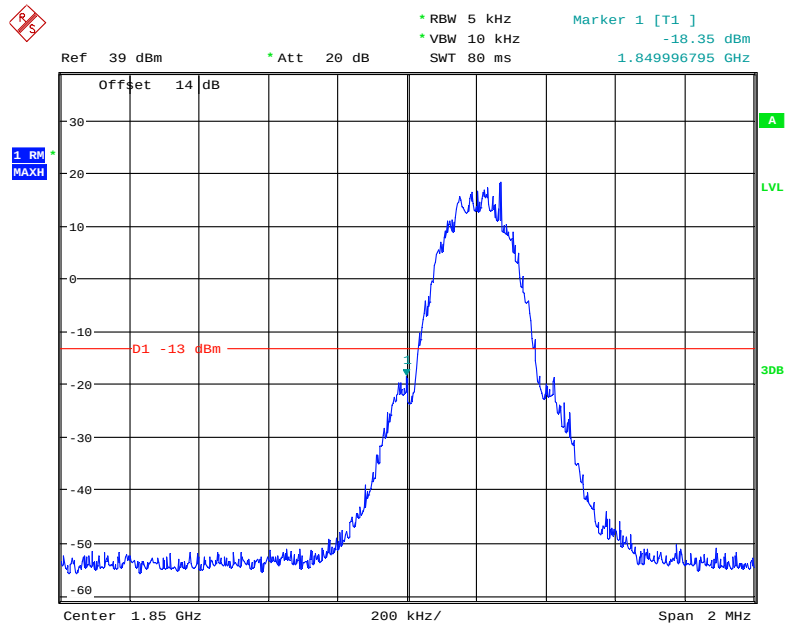
Date: 7.DEC.2017 22:18:36

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



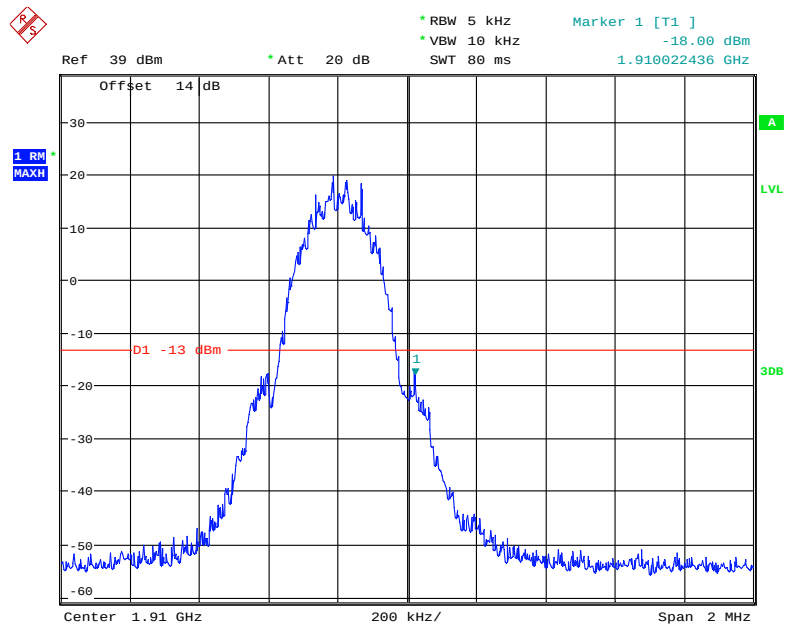
Date: 7.DEC.2017 22:19:29

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



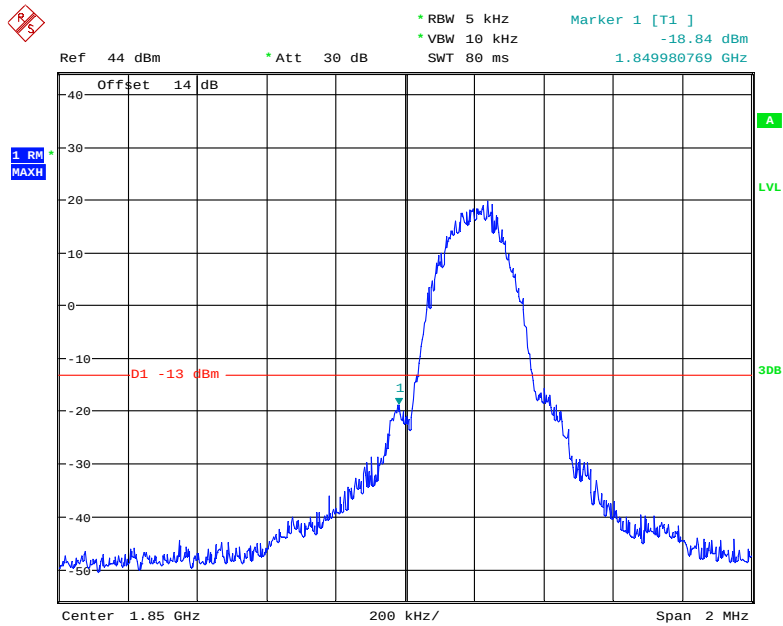
Date: 7.DEC.2017 22:40:53

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



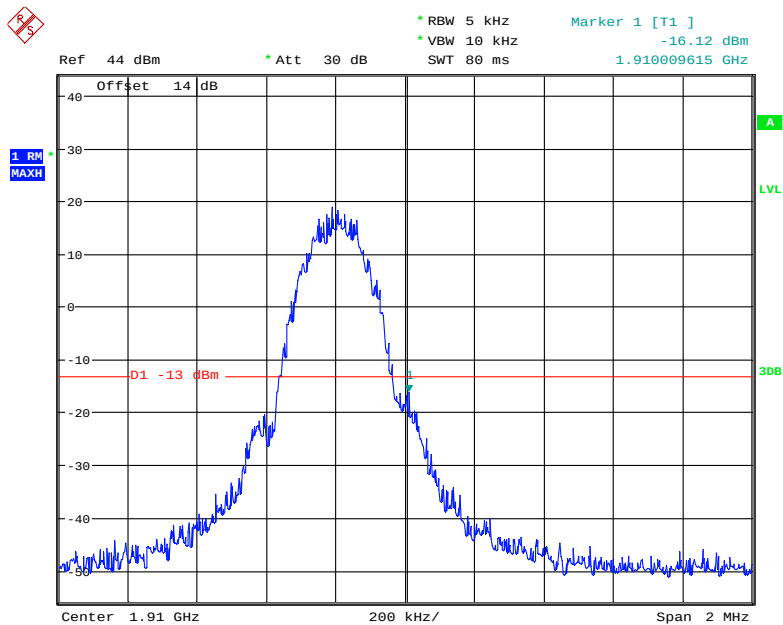
Date: 7.DEC.2017 22:41:36

PCS Band, Left Band Edge for EDGE Mode



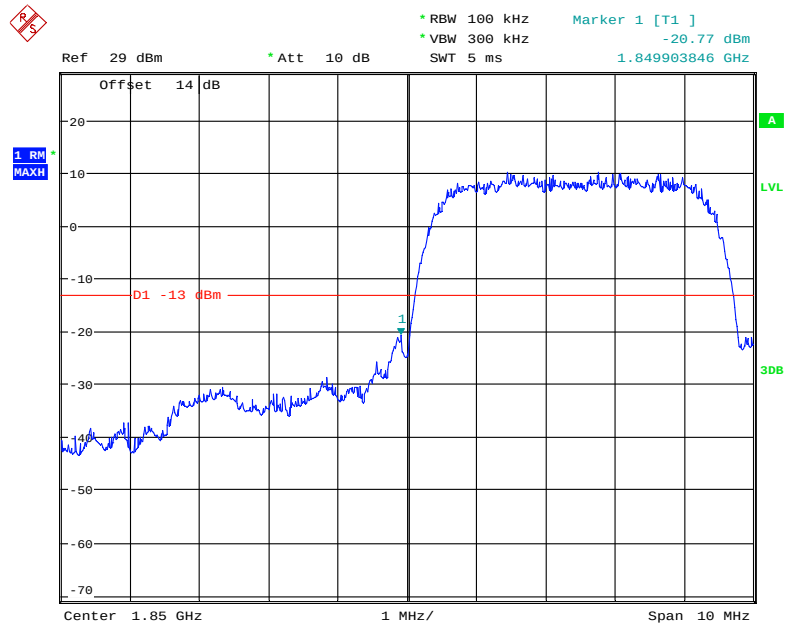
Date: 29.DEC.2017 19:31:30

PCS Band, Right Band Edge for EDGE Mode



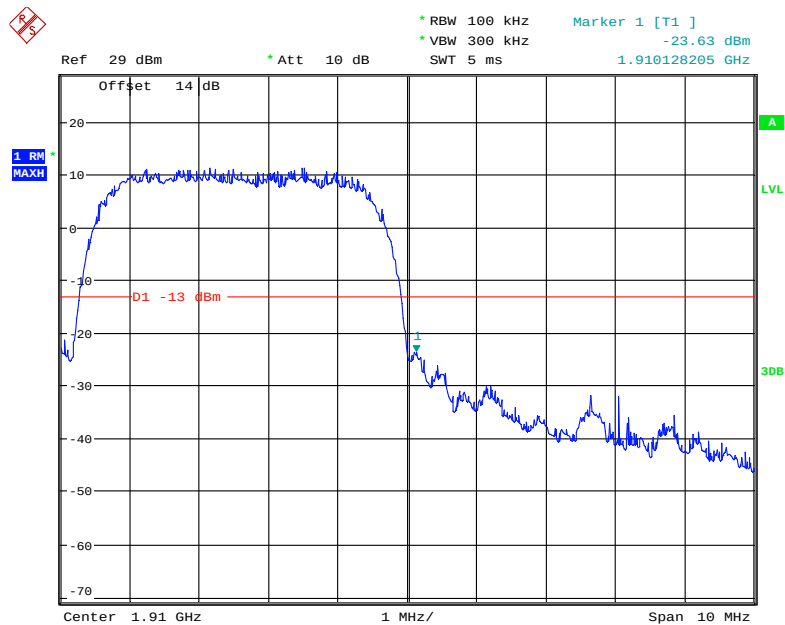
Date: 29.DEC.2017 19:32:39

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



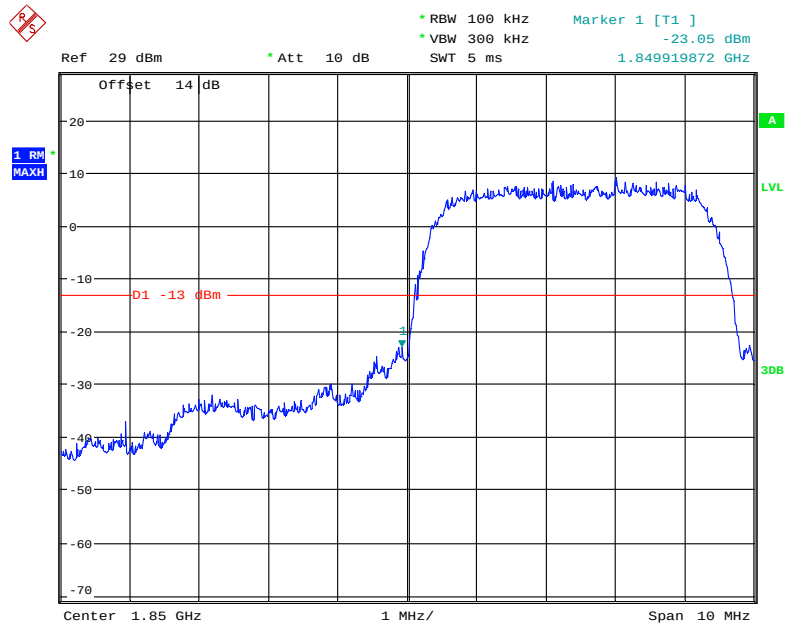
Date: 7.DEC.2017 22:27:25

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



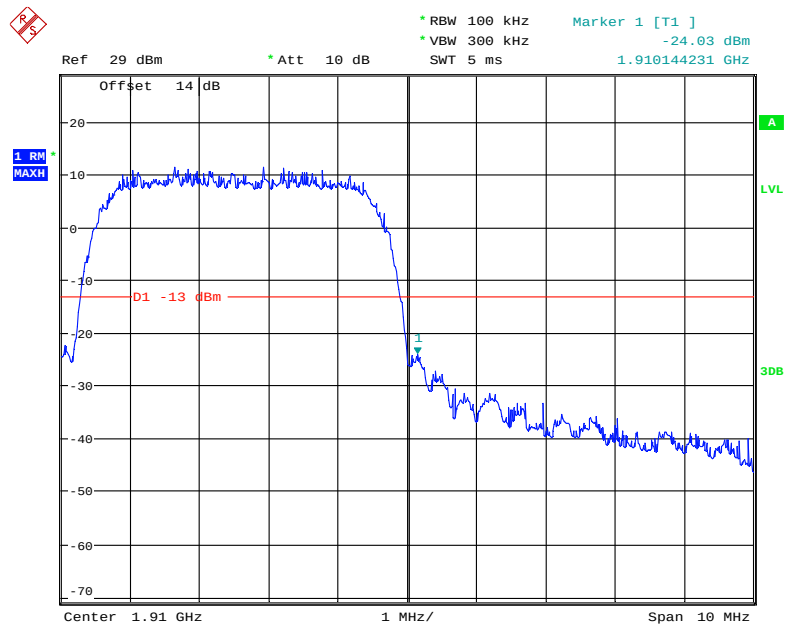
Date: 7.DEC.2017 22:28:01

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



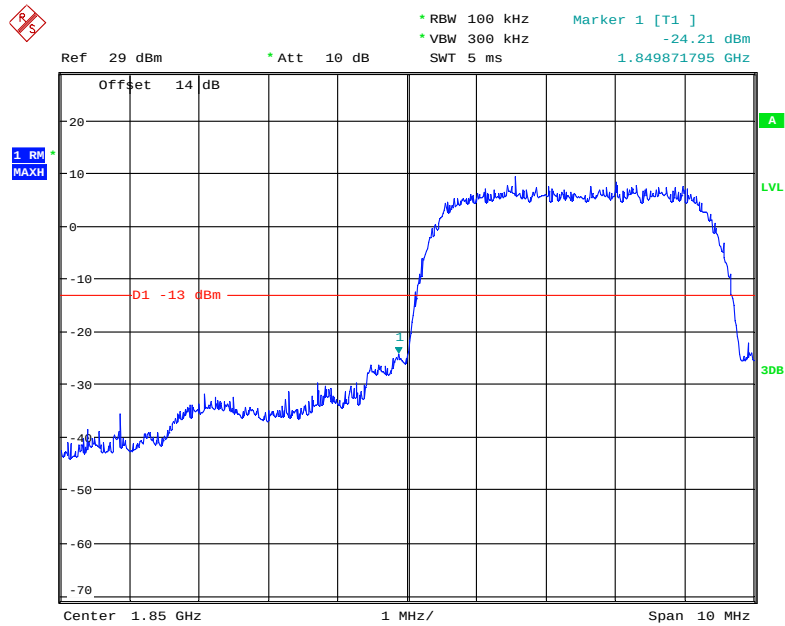
Date: 7.DEC.2017 22:22:40

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



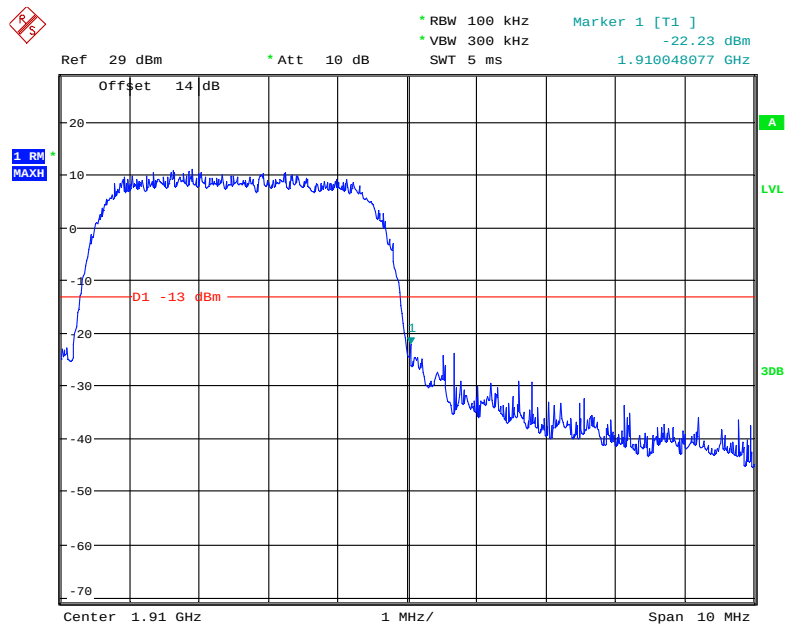
Date: 7.DEC.2017 22:21:56

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



Date: 7.DEC.2017 22:20:18

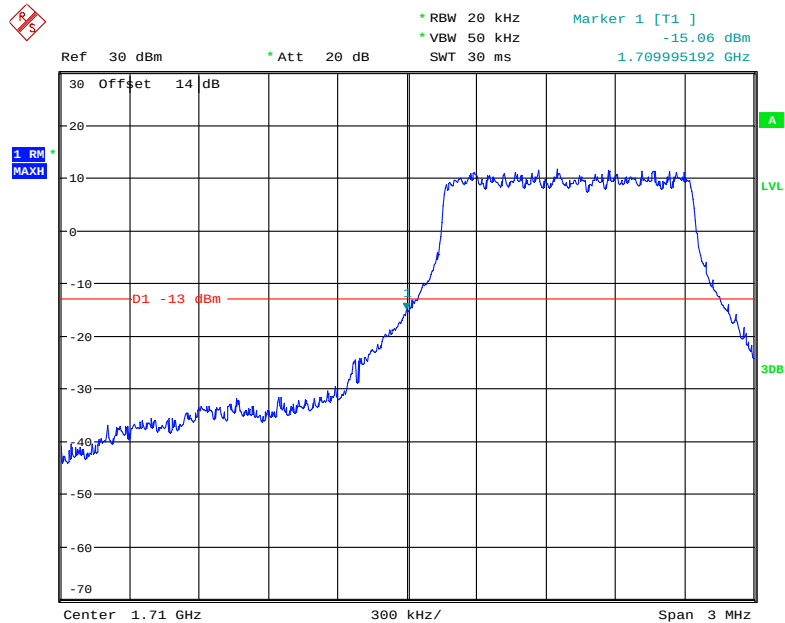
PCS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 7.DEC.2017 22:21:03

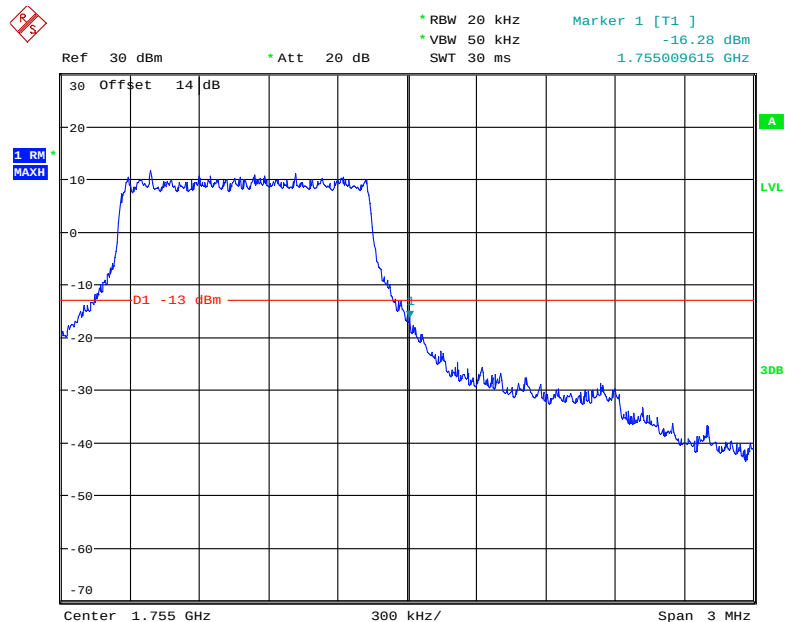
Band 4:

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



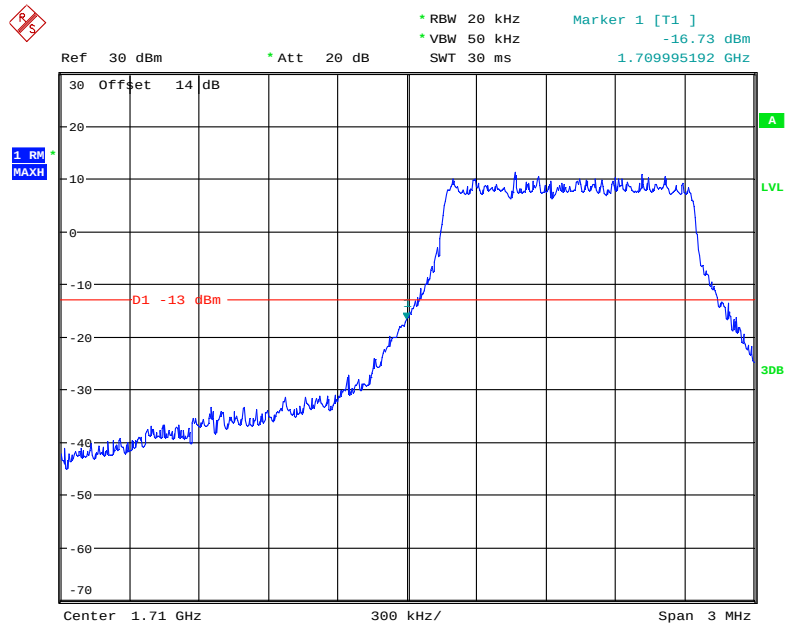
Date: 8.DEC.2017 22:50:42

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



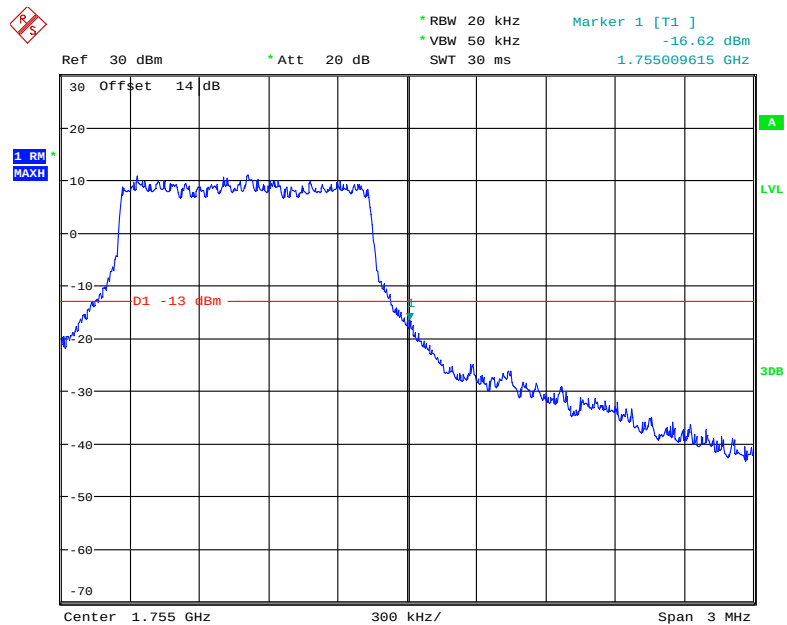
Date: 8.DEC.2017 22:54:51

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



Date: 8.DEC.2017 22:52:49

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



Date: 8.DEC.2017 22:54:23

Ref 30 dBm * Att 20 dB * RBW 30 kHz * VBW 100 kHz * Marker 1 [T1] -20.57 dBm
SWT 30 ms 1.709990385 GHz

30 Offset 14 dB

1 RM *
MAXH

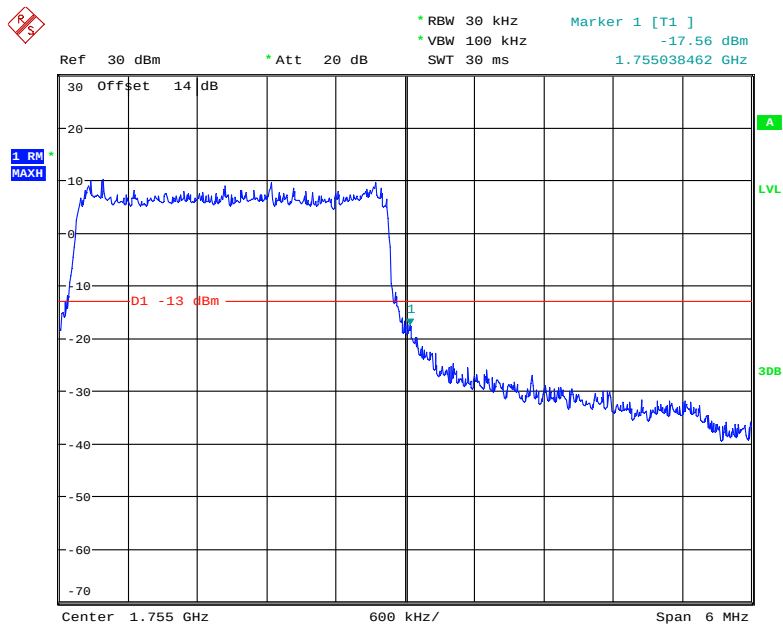
D1 -13 dBm

1

30dB

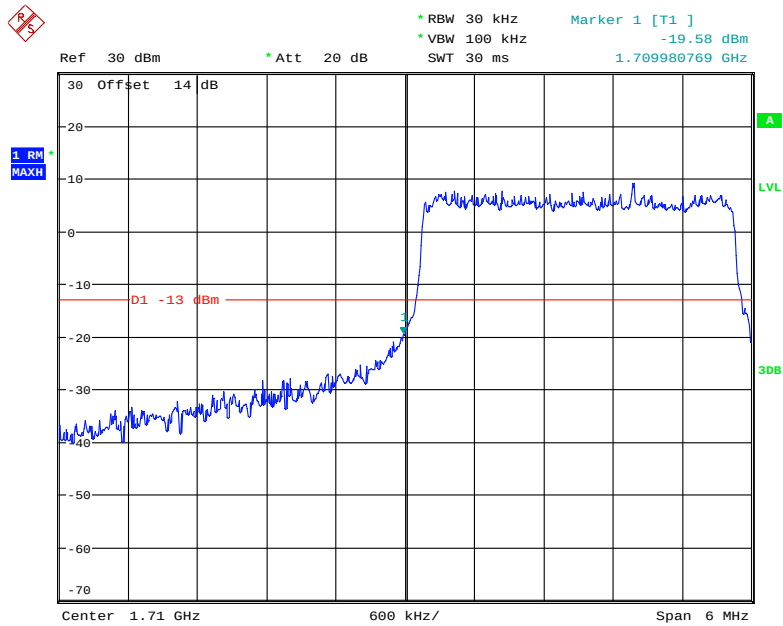
Center 1.71 GHz 600 kHz/ Span 6 MHz

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



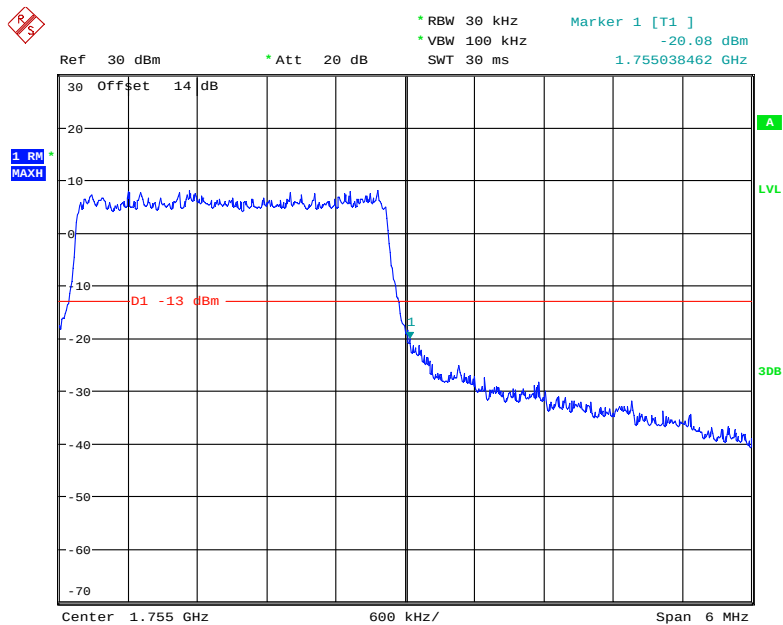
Page 84 of 108

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



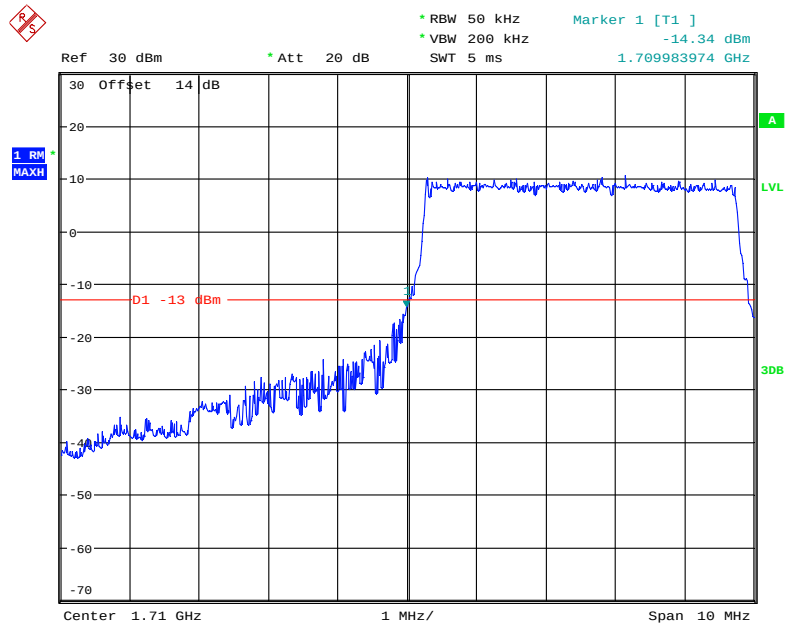
Date: 8.DEC.2017 22:58:50

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



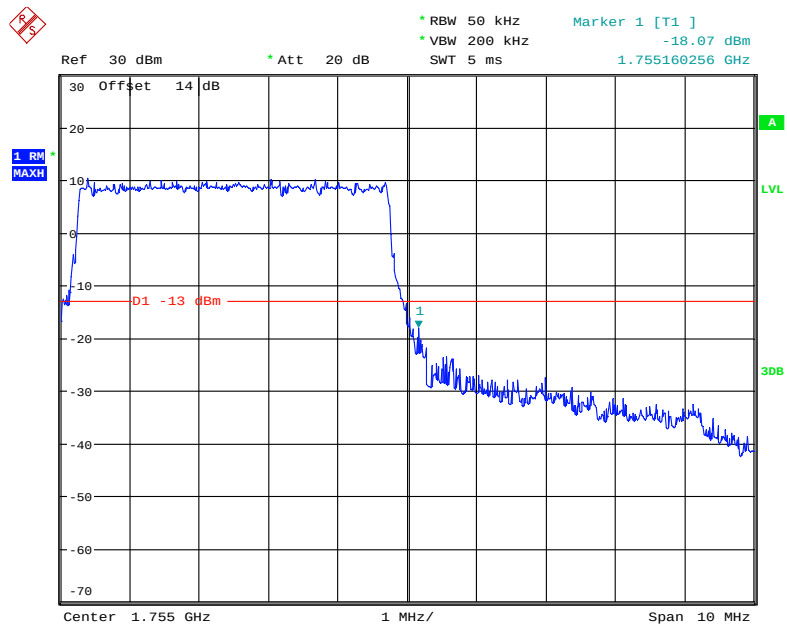
Date: 8.DEC.2017 22:57:52

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



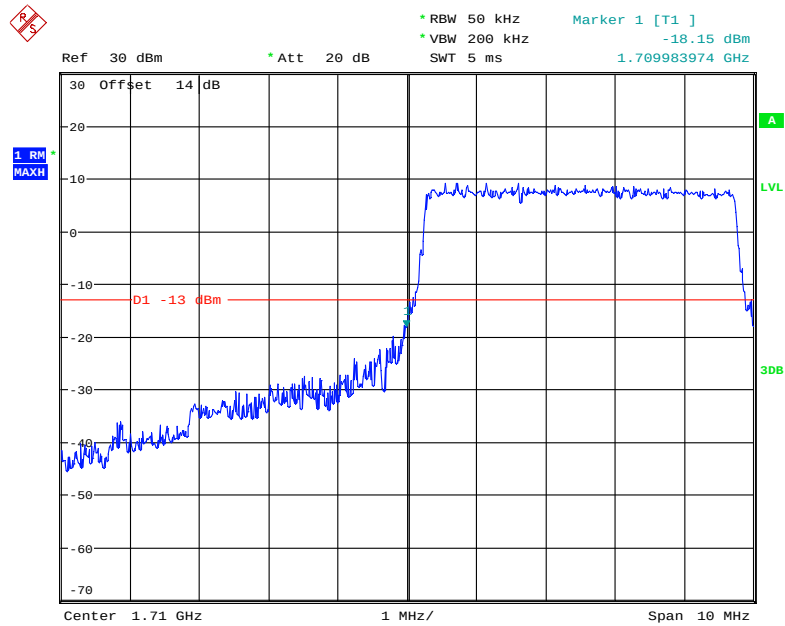
Date: 8.DEC.2017 23:01:31

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



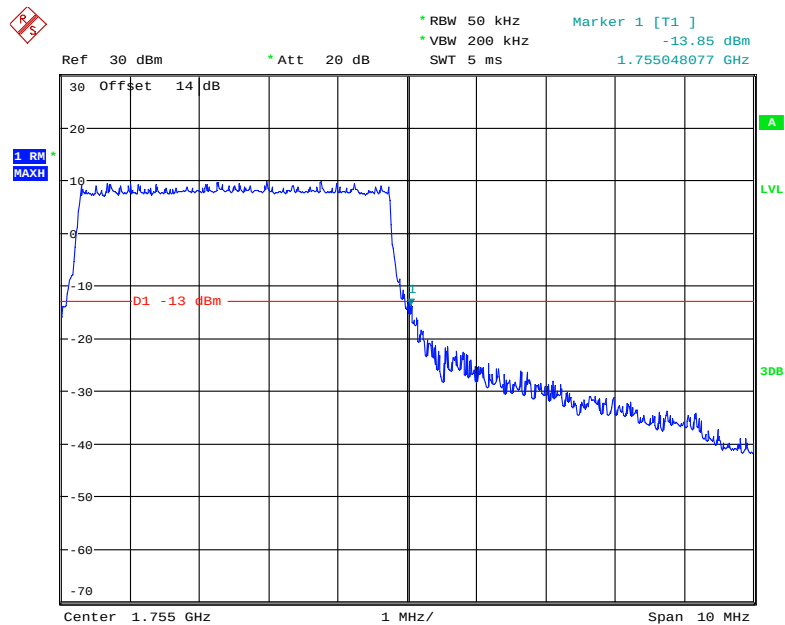
Date: 8.DEC.2017 23:03:55

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



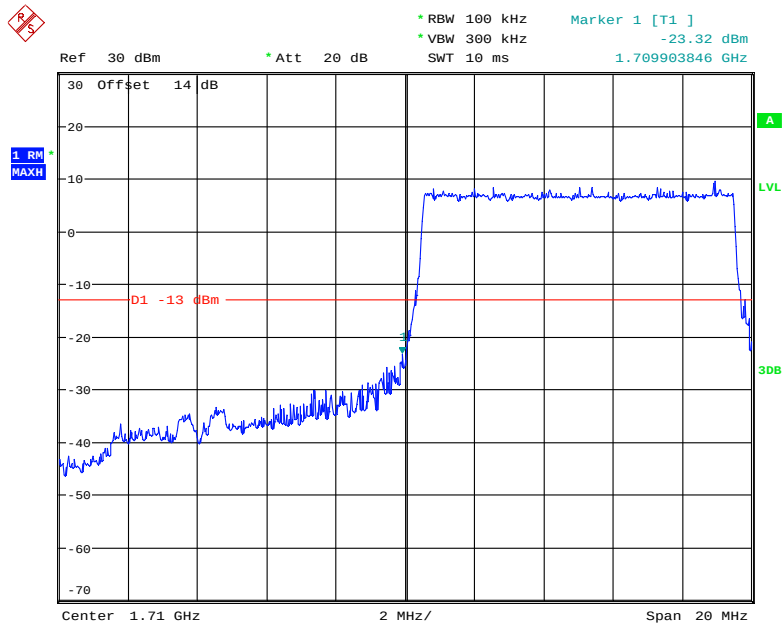
Date: 8.DEC.2017 23:02:21

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



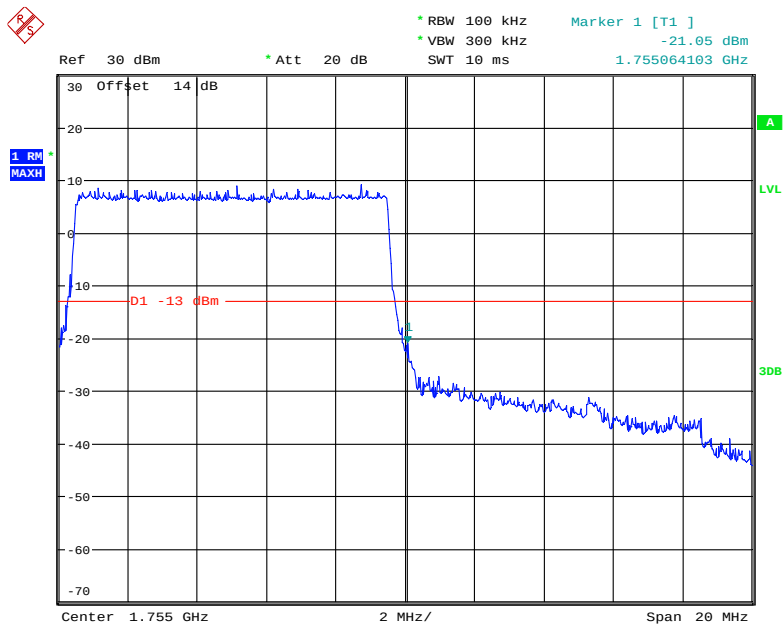
Date: 8.DEC.2017 23:03:29

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



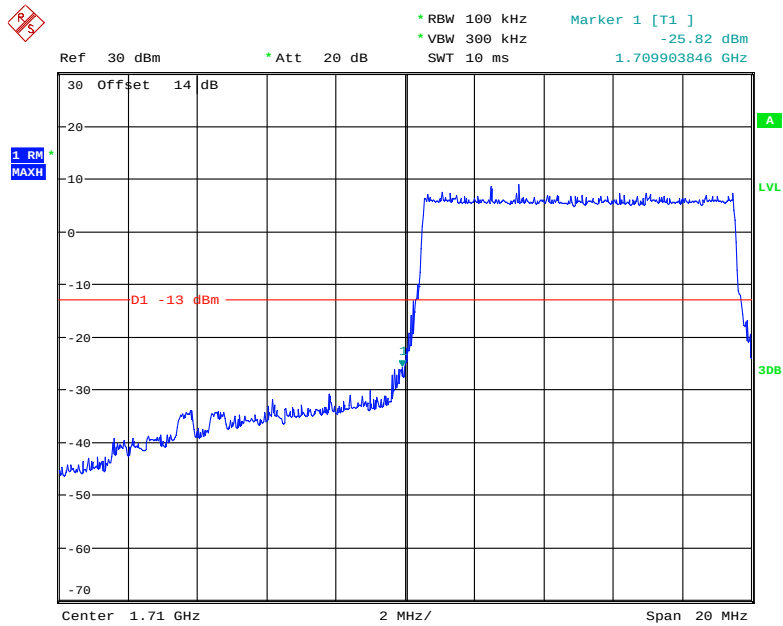
Date: 8.DEC.2017 23:07:16

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



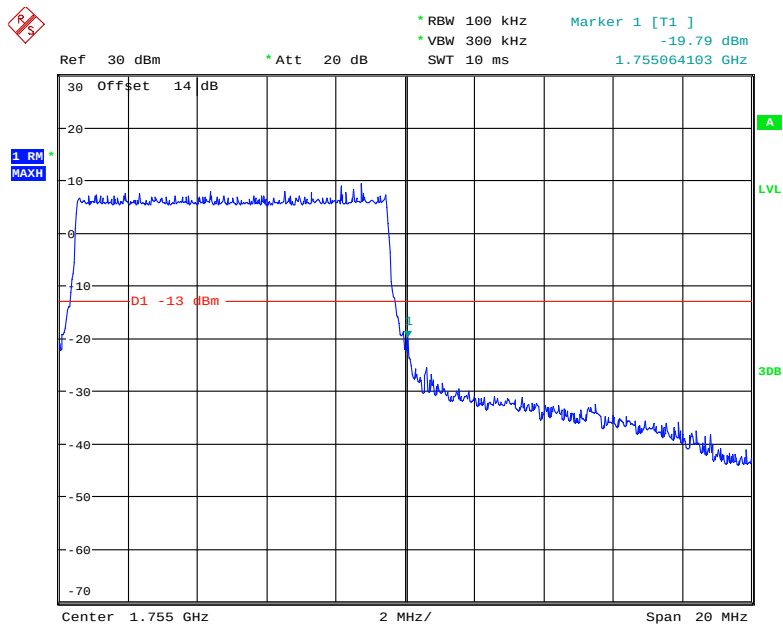
Date: 8.DEC.2017 23:04:58

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



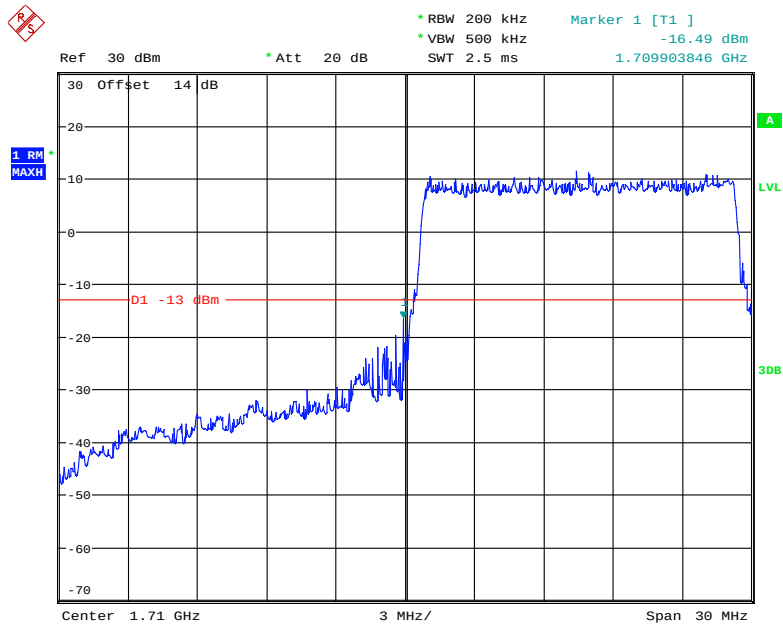
Date: 8.DEC.2017 23:06:30

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



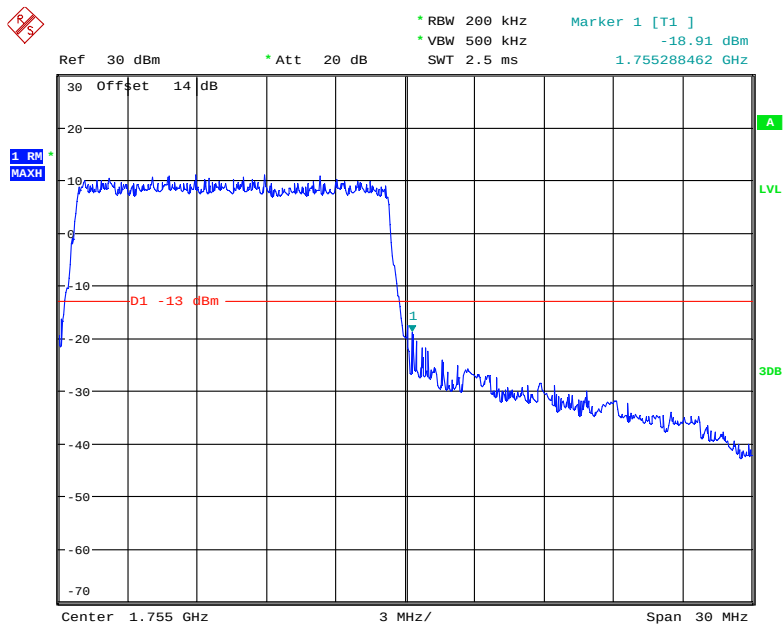
Date: 8.DEC.2017 23:05:47

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



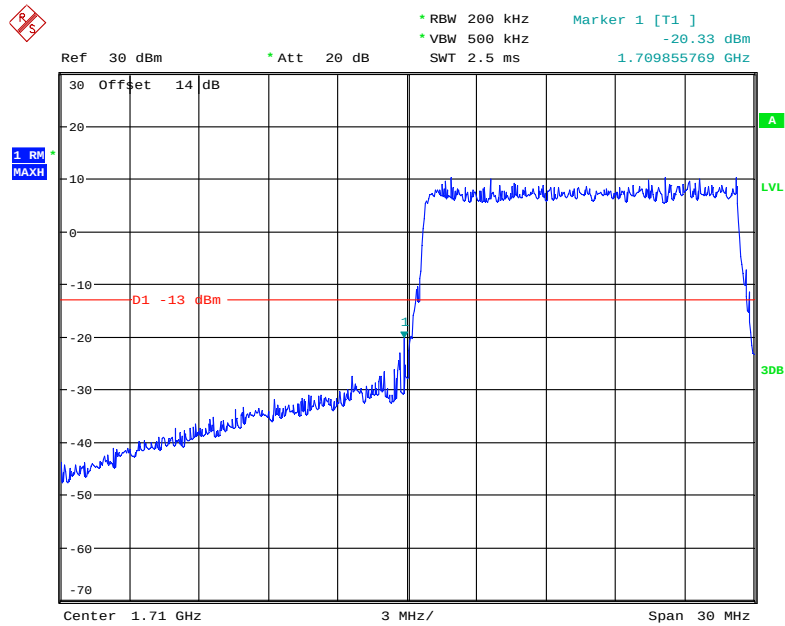
Date: 8.DEC.2017 23:08:15

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



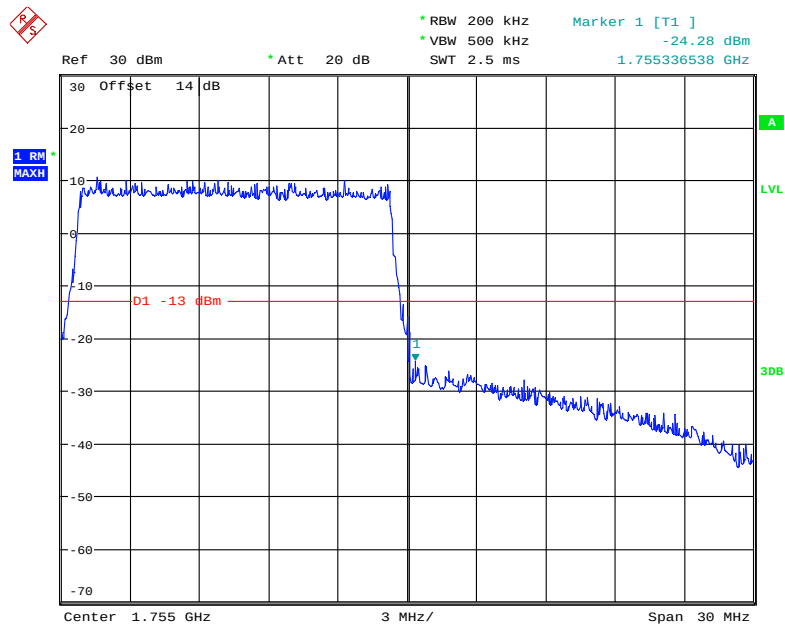
Date: 8.DEC.2017 23:10:39

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



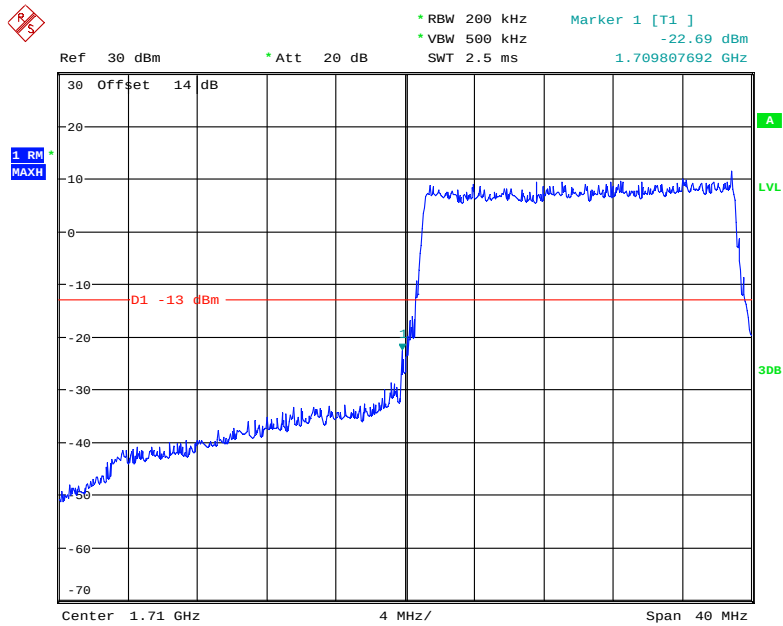
Date: 8.DEC.2017 23:08:46

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



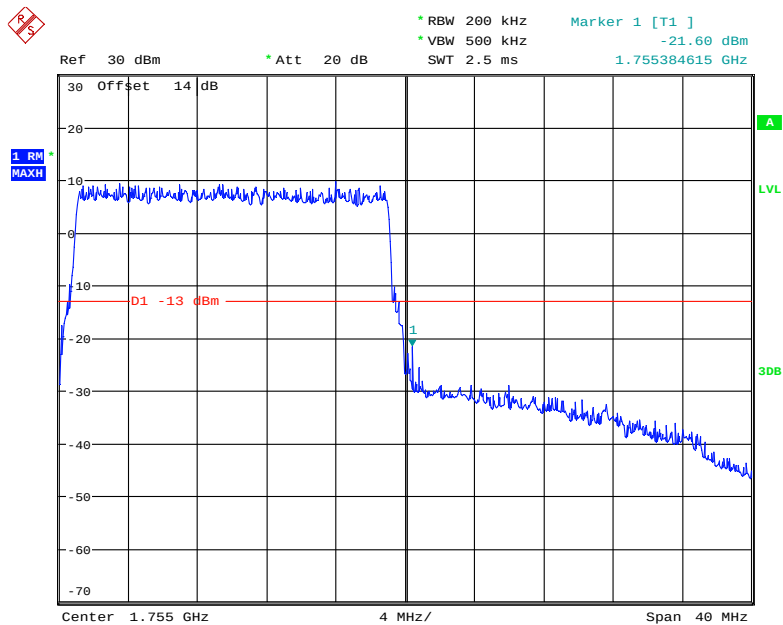
Date: 8.DEC.2017 23:10:01

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



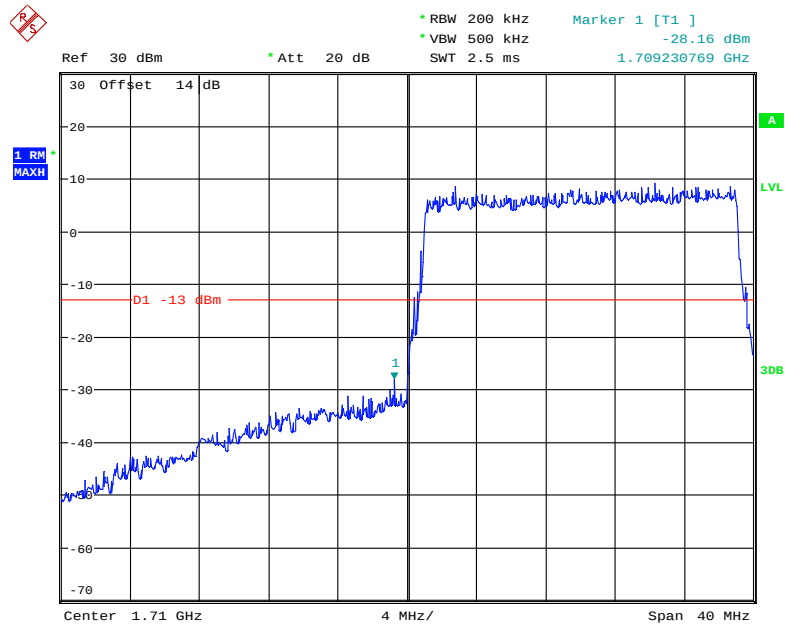
Date: 8.DEC.2017 23:13:59

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



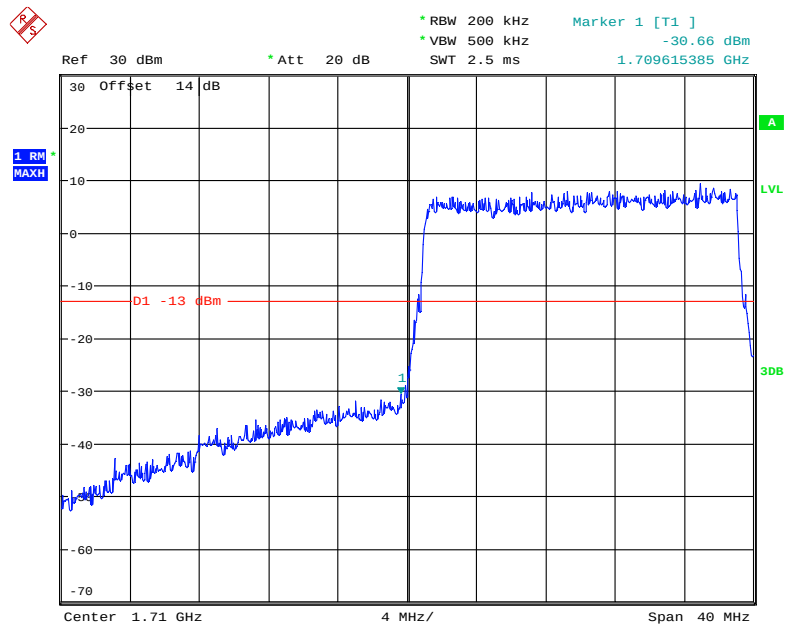
Date: 8.DEC.2017 23:11:18

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



Date: 8.DEC.2017 23:13:10

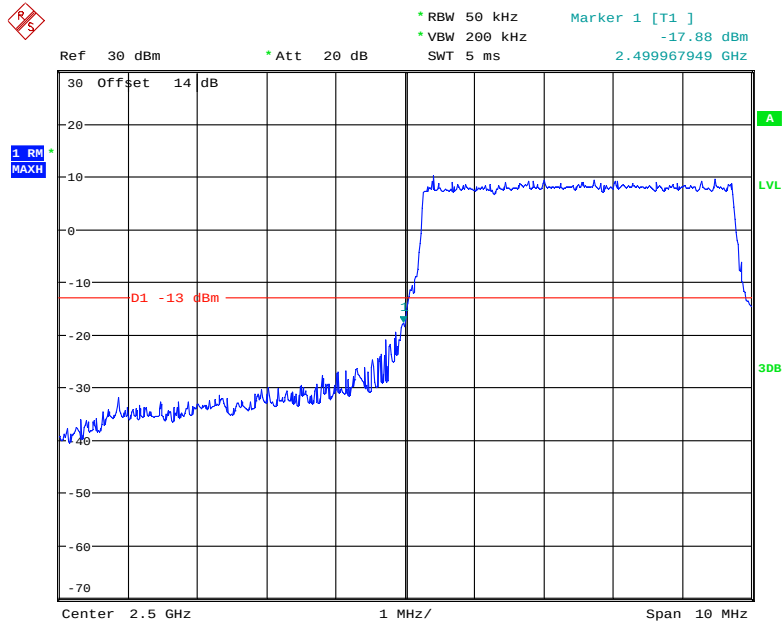
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 8.DEC.2017 23:12:13

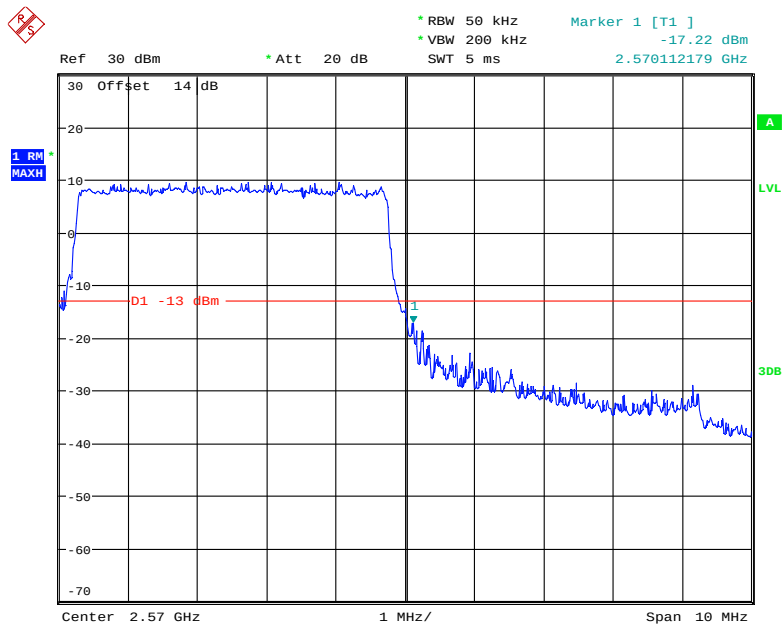
Band 7:

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



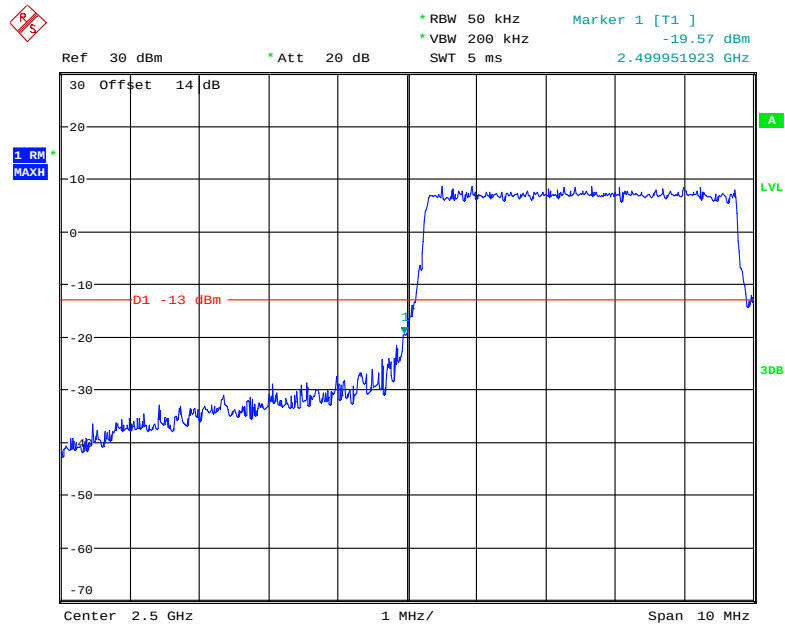
Date: 8.DEC.2017 23:37:30

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



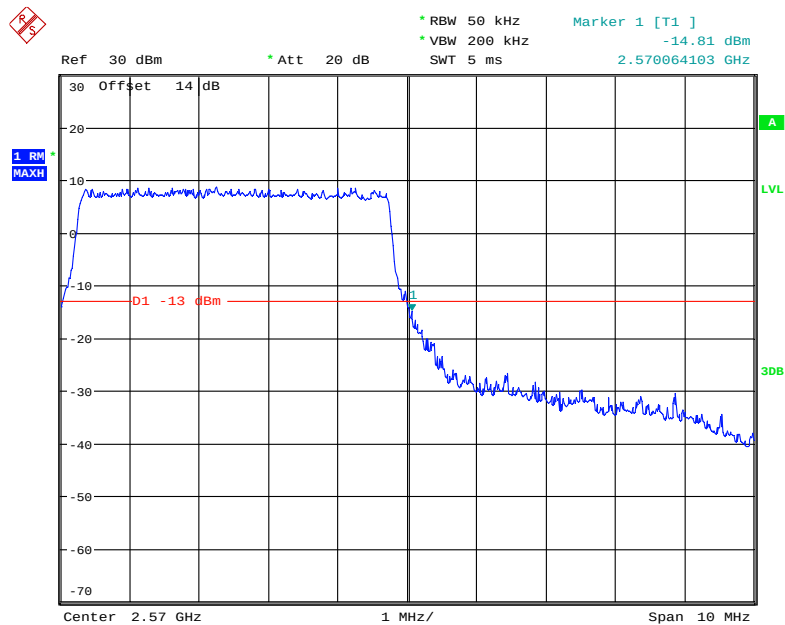
Date: 8.DEC.2017 23:40:15

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



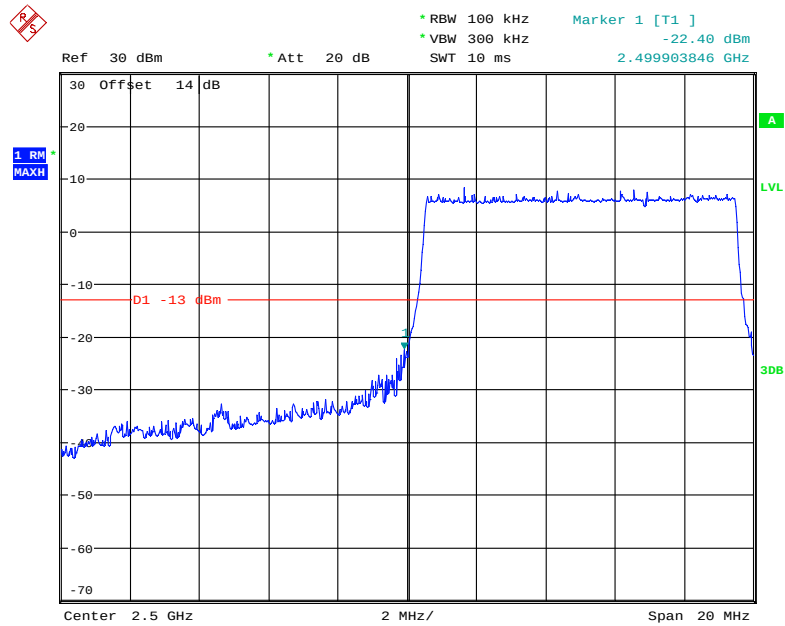
Date: 8.DEC.2017 23:38:06

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



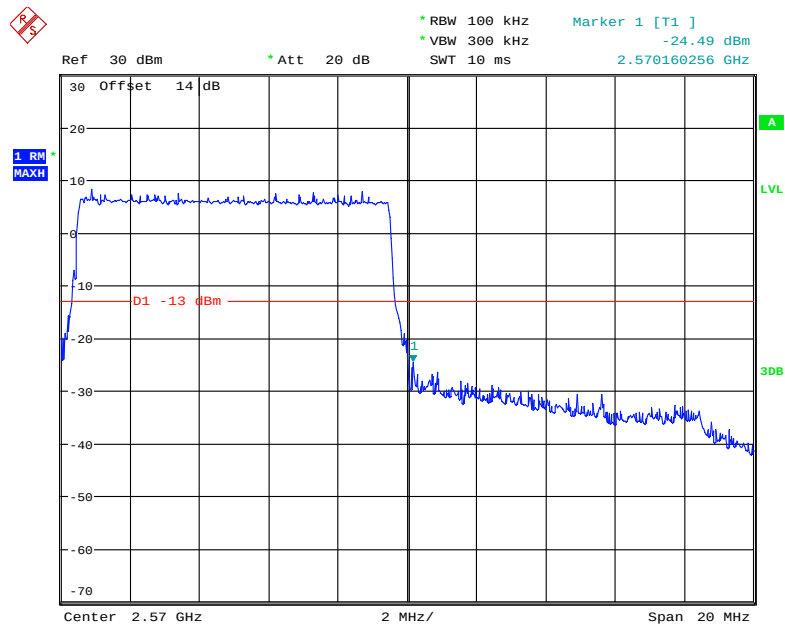
Date: 8.DEC.2017 23:39:43

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



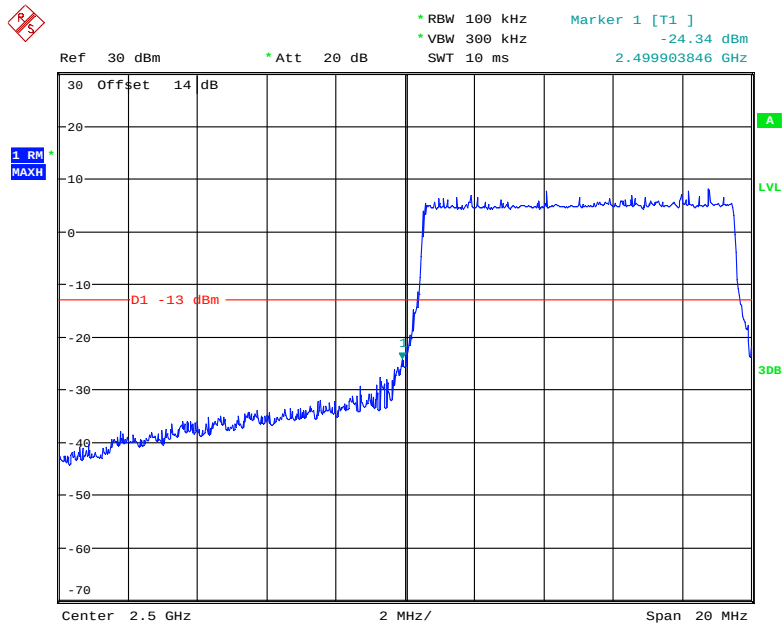
Date: 8.DEC.2017 23:35:42

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



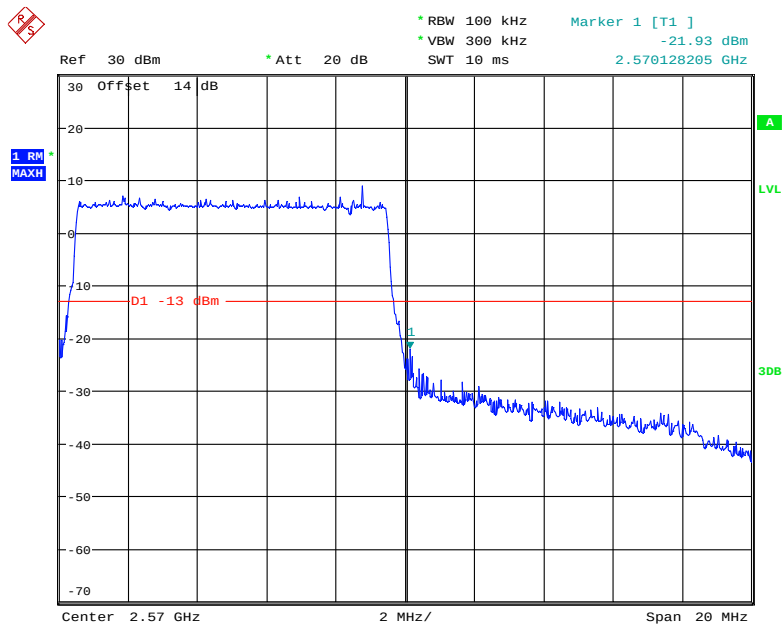
Date: 8.DEC.2017 23:28:03

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



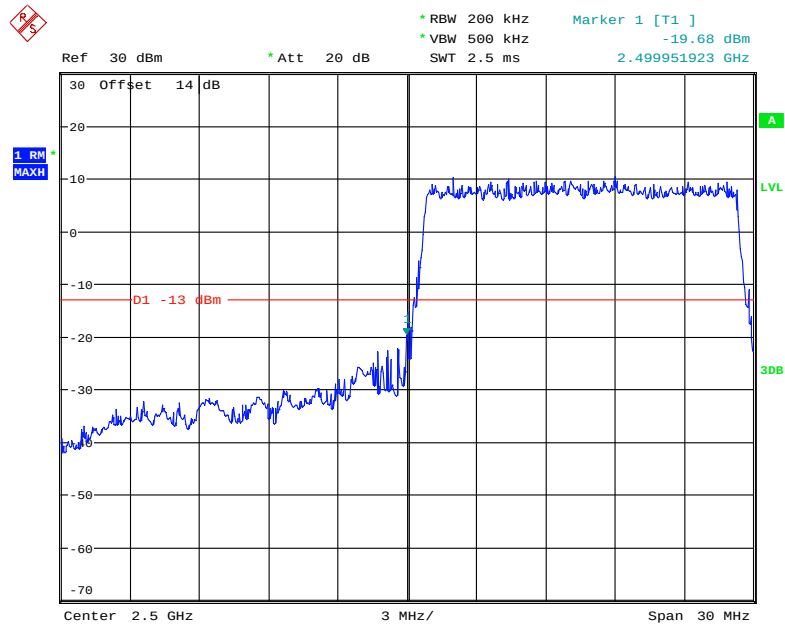
Date: 8.DEC.2017 23:36:29

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



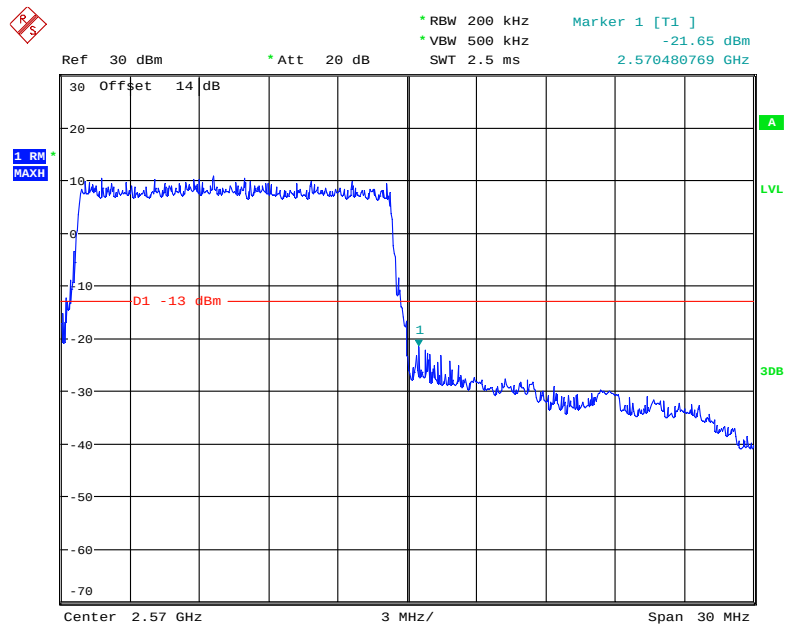
Date: 8.DEC.2017 23:28:41

QPSK (15 MHz, FULL RB) - Left Band Edge



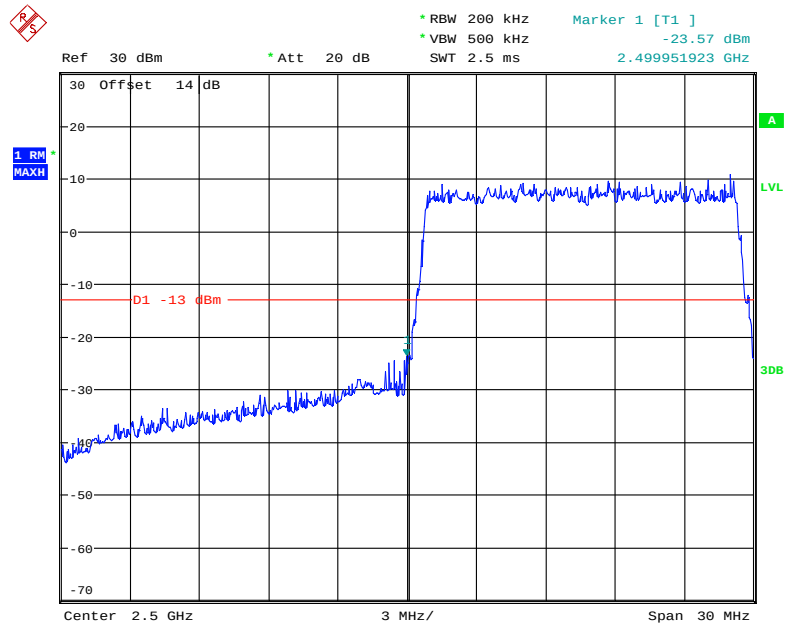
Date: 8.DEC.2017 23:24:03

QPSK (15 MHz, FULL RB) - Right Band Edge



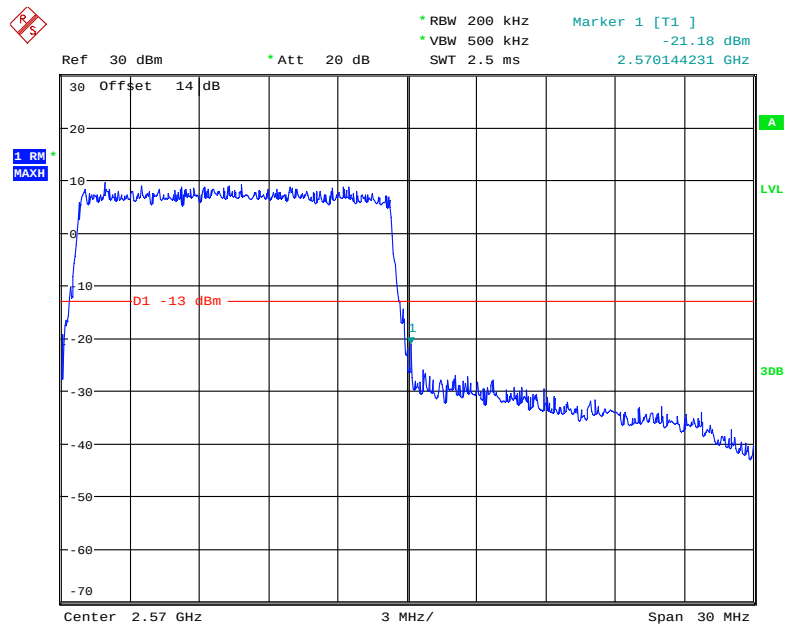
Date: 8.DEC.2017 23:27:08

16-QAM (15 MHz, FULL RB) - Left Band Edge



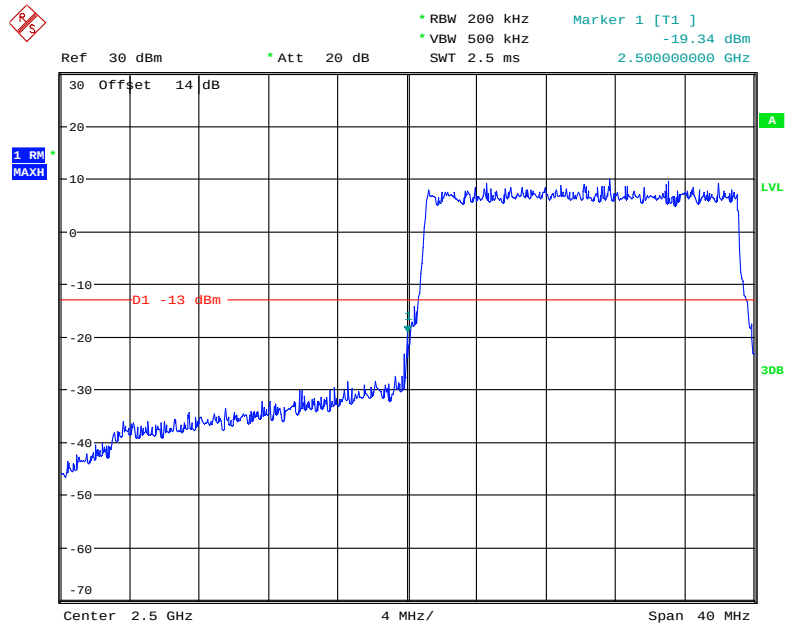
Date: 8.DEC.2017 23:25:22

16-QAM (15 MHz, FULL RB) - Right Band Edge



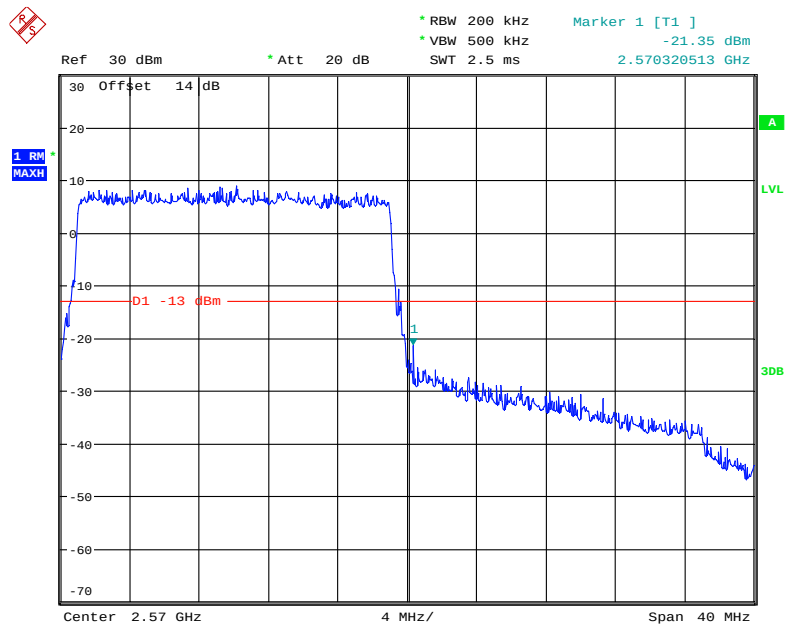
Date: 8.DEC.2017 23:26:33

QPSK (20 MHz, FULL RB) - Left Band Edge



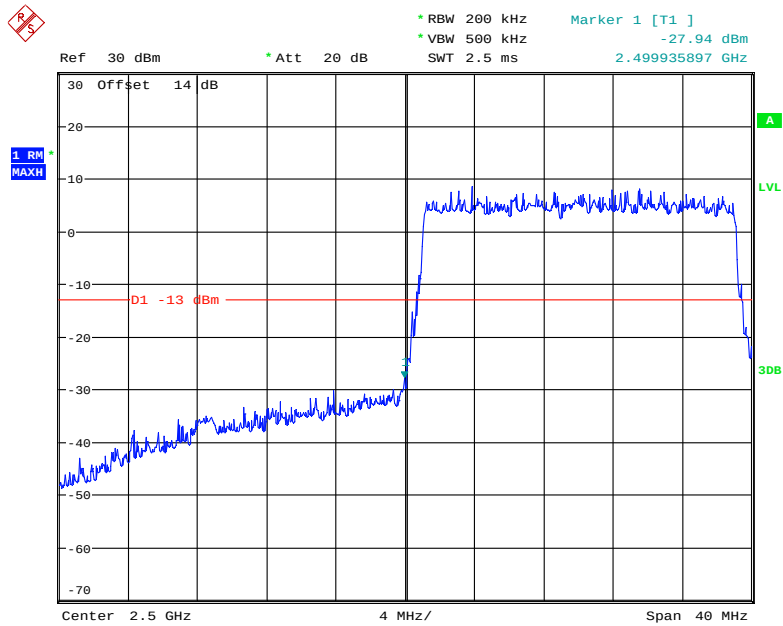
Date: 8.DEC.2017 23:17:57

QPSK (20 MHz, FULL RB) - Right Band Edge



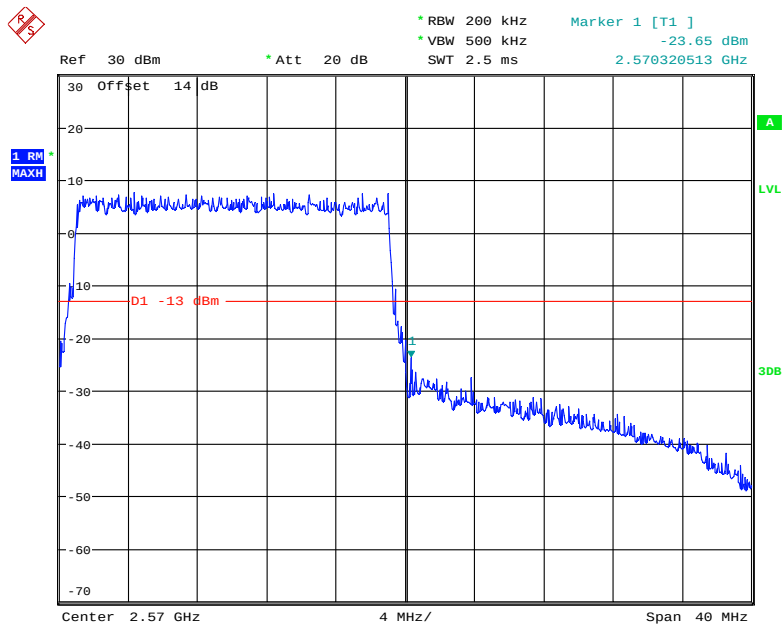
Date: 8.DEC.2017 23:20:49

16-QAM (20 MHz, FULL RB) - Left Band Edge



Date: 8.DEC.2017 23:18:25

16-QAM (20 MHz, FULL RB) - Right Band Edge



Date: 8.DEC.2017 23:20:15

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

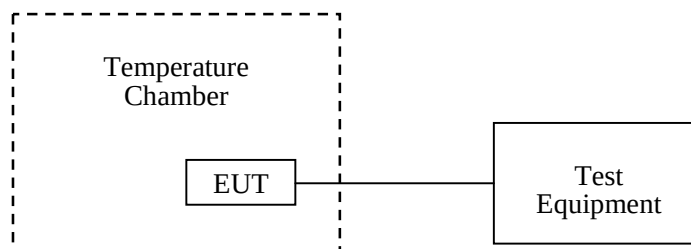
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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:	24 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-12-25.

EUT operation mode: Transmitting

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

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

Middle Channel, $f_0 = 836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-4	-0.0048	2.5
-20		-4	-0.0048	2.5
-10		-1	-0.0012	2.5
0		-2	-0.0024	2.5
10		-6	-0.0072	2.5
20		1	0.0012	2.5
30		-3	-0.0036	2.5
40		-3	-0.0036	2.5
50		5	0.0060	2.5
25	V min.= 3.5	-4	-0.0048	2.5
	V max.= 4.2	-1	-0.0012	2.5

EDGE Mode

Middle Channel, $f_0 = 836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	9	0.0108	2.5
-20		8	0.0096	2.5
-10		0	0.0000	2.5
0		3	0.0036	2.5
10		-3	-0.0036	2.5
20		0	0.0000	2.5
30		-5	-0.0060	2.5
40		-4	-0.0048	2.5
50		4	0.0048	2.5
25	V min.= 3.5	-2	-0.0024	2.5
	V max.= 4.2	1	0.0012	2.5

WCDMA Mode

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	27	0.0323	2.5
-20		29	0.0347	2.5
-10		25	0.0299	2.5
0		26	0.0311	2.5
10		24	0.0287	2.5
20		3	0.0036	2.5
30		23	0.0275	2.5
40		26	0.0311	2.5
50		25	0.0299	2.5
25	V min.= 3.5	27	0.0323	2.5
	V max.= 4.2	28	0.0335	2.5

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

Middle Channel, $f_0=1880.0\text{ MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	15	0.0080	pass
-20		9	0.0048	pass
-10		17	0.0090	pass
0		11	0.0059	pass
10		9	0.0048	pass
20		3	0.0016	pass
30		7	0.0037	pass
40		9	0.0048	pass
50		6	0.0032	pass
25	V min.= 3.5	5	0.0027	pass
	V max.= 4.2	6	0.0032	pass

EDGE Mode

Middle Channel, $f_o = 1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-14	-0.0074	pass
-20		-13	-0.0069	pass
-10		-9	-0.0048	pass
0		-10	-0.0053	pass
10		-8	-0.0043	pass
20		8	0.0043	pass
30		-5	-0.0027	pass
40		-8	-0.0043	pass
50		-3	-0.0016	pass
25	V min.= 3.5	-4	-0.0021	pass
	V max.= 4.2	-5	-0.0027	pass

WCDMA Mode

Middle Channel, $f_o = 1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	29	0.0154	pass
-20		28	0.0149	pass
-10		24	0.0128	pass
0		25	0.0133	pass
10		26	0.0138	pass
20		1	0.0005	pass
30		24	0.0128	pass
40		24	0.0128	pass
50		27	0.0144	pass
25	V min.= 3.5	23	0.0122	pass
	V max.= 4.2	27	0.0144	pass

LTE:
QPSK:

Band 4:

10.0 MHz Middle Channel, $f_0=1732.5$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	1	0.00058	pass
-20		0	0.00000	pass
-10		2	0.00115	pass
0		-3	-0.00173	pass
10		-2	-0.00115	pass
20		0	0.00000	pass
30		-1	-0.00058	pass
40		3	0.00173	pass
50		2	0.00115	pass
20	V min.= 3.5	5	0.00289	pass
	V max.= 4.2	8	0.00462	pass

Band 7:

10.0 MHz Middle Channel, $f_0=2535$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	3	0.00118	pass
-20		1	0.00039	pass
-10		2	0.00079	pass
0		-3	-0.00118	pass
10		1	0.00039	pass
20		0	0.00000	pass
30		-2	-0.00079	pass
40		3	0.00118	pass
50		6	0.00237	pass
20	V min.= 3.5	4	0.00158	pass
	V max.= 4.2	9	0.00355	pass

16QAM:**Band 4:**

10.0 MHz Middle Channel, $f_0 = 1732.5$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	2	0.00115	pass
-20		-3	-0.00173	pass
-10		1	0.00058	pass
0		.1	0.00006	pass
10		-2	-0.00115	pass
20		-3	-0.00173	pass
30		-1	-0.00058	pass
40		2	0.00115	pass
50		1	0.00058	pass
20	V min.= 3.5	4	0.00231	pass
	V max.= 4.2	3	0.00173	pass

Band 7:

10.0 MHz Middle Channel, $f_0 = 2535$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-2	-0.00079	pass
-20		2	0.00079	pass
-10		3	0.00118	pass
0		-2	-0.00079	pass
10		1	0.00039	pass
20		1	0.00039	pass
30		-2	-0.00079	pass
40		-2	-0.00079	pass
50		3	0.00118	pass
20	V min.= 3.5	3	0.00079	pass
	V max.= 4.2	2	0.00118	pass

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