

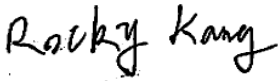
FCC PART 27
FCC PART 22H, PART 24E
TEST REPORT

For

Vonino Electronics Limited

Unit 1109, 11/F., Kowloon Centre, 33 Ashley Road, Tsim Sha Tsui, Kowloon, Hong Kong

FCC ID: 2AOGVXYLOV4FFF

Report Type: Original Report	Product Type: Smartphone XYLO Z
Report Number: RSZ180117004-00D	
Report Date: 2018-01-30	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Vonino Electronics Limited's* product, model number: *XYLO Z (FCC ID: 2AOGVXYLOV4FFF)* or the "EUT" in this report was a *Smartphone XYLO Z*, which was measured approximately: 125.4 mm (L) × 63.4 mm (W) × 10.95 mm(H), rated with input voltage: DC 3.8 V battery or DC 5V from adapter.

Adapter Information:

Model: RD0501000-USBA-18MG

Input: AC 100-240V, 50/60Hz, 0.25A MAX

Output: DC 5V, 1000 mA

Notes: This series products model: XYLO, V4F57, V4F55 and XYLO Z are identical; they have the same or similar appearance, structure, PCB, Material and function to the testing products, Model XYLO Z was selected for fully testing, the detailed information can be referred to the attached declaration which was stated and guaranteed by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: 1800071 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-01-17.*

Objective

This test report is prepared on behalf of *Vonino Electronics Limited* 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 submissions and Part 15B JBP with FCC ID: 2AOGVXYLOV4FFF.

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		$\pm 5\%$
RF output power, conducted		$\pm 1.5\text{dB}$
Unwanted Emission, conducted		$\pm 1.5\text{dB}$
Emissions, radiated	Below 1GHz	$\pm 4.70\text{dB}$
	Above 1GHz	$\pm 4.80\text{dB}$
Temperature		$\pm 1^\circ\text{C}$
Supply voltages		$\pm 0.4\%$

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.

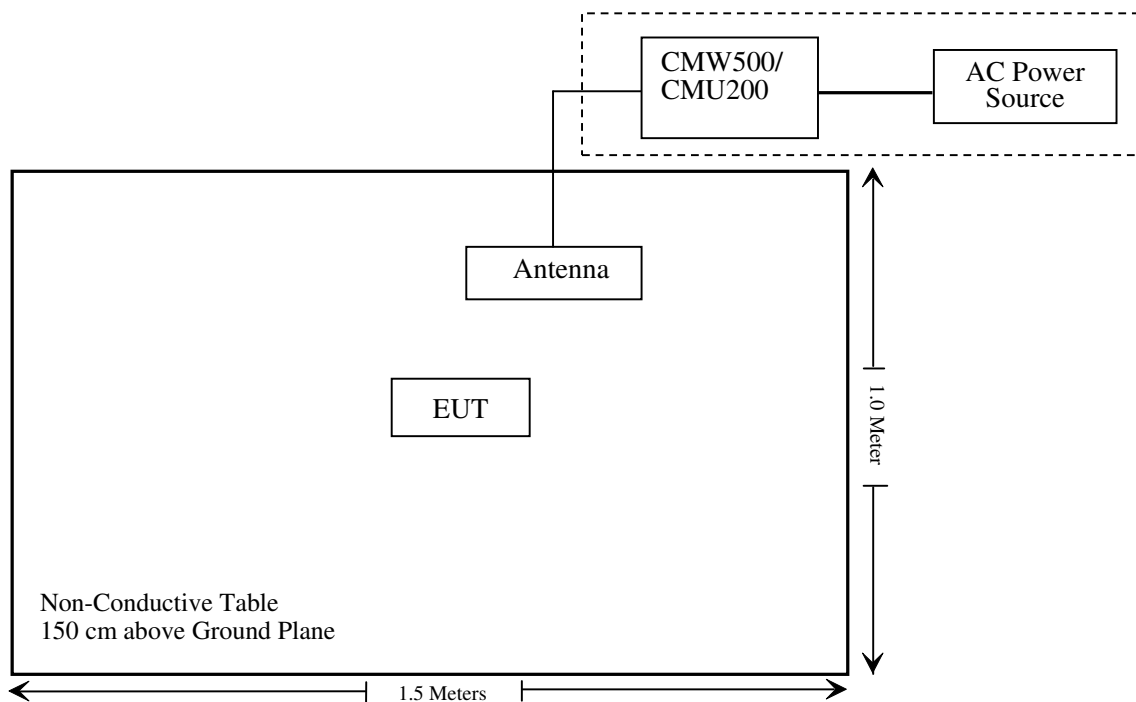
Equipment Modifications

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 (b) (c) (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: RSZ180117004-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-29	2020-12-28
Rohde & Schwarz	Signal ANALYZER	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2017-12-17	2020-12-16
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	2017-11-19	2018-05-21
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-29
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2017-12-29	2020-12-29
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	N/A	N/A	2017-11-23	2018-05-22
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: RSZ180117004-20.

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 (b) (c) (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.

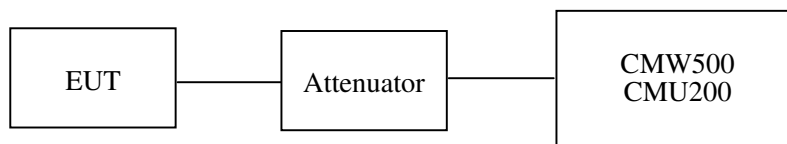
According to §27.50(b), Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

According to §27.50(c), Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP

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 Tracy Hu on 2017-12-11.

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

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.29	38.45
	190	836.6	32.37	38.45
	251	848.8	32.37	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.31	31.57	29.77	28.60	38.45
	190	836.6	32.37	31.63	29.85	28.72	38.45
	251	848.8	32.37	31.63	29.95	28.78	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	26.07	25.05	23.03	21.96	38.45
	190	836.6	26.11	25.11	23.07	22.01	38.45
	251	848.8	26.19	25.21	23.22	22.17	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		22.39	22.45	22.52
		HSDPA	1	21.34	21.49	21.51
			2	21.29	21.43	21.41
			3	21.39	21.53	21.57
			4	21.24	21.42	21.47
		HSUPA	1	21.33	21.44	21.52
			2	21.25	21.31	21.41
			3	21.45	21.50	21.58
			4	21.25	21.40	21.48
			5	21.39	21.52	21.56

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.72	33
	661	1880.0	28.68	33
	810	1909.8	28.48	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.74	27.51	25.95	24.81	33
	661	1880.0	28.70	27.46	25.86	24.73	33
	810	1909.8	28.51	27.26	25.66	24.59	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	25.55	24.72	23.12	22.20	33
	661	1880.0	25.64	24.74	23.18	22.36	33
	810	1909.8	25.45	24.64	23.04	22.29	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		22.44	22.50	22.28
		HSDPA	1	21.45	21.39	21.13
			2	21.36	21.36	21.02
			3	21.56	21.52	21.17
			4	21.34	21.28	21.08
		HSUPA	1	21.49	21.42	20.77
			2	21.39	21.37	20.69
			3	21.57	21.50	20.81
			4	21.38	21.29	20.66
			5	21.56	21.48	20.86

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

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.47	13
	Middle	0.35	13
	High	0.46	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.54	13
	Middle	2.42	13
	High	2.53	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.58	13
	Middle	3.41	13
	High	3.62	13
HSDPA (16QAM)	Low	3.54	13
	Middle	3.46	13
	High	3.67	13
HSUPA (BPSK)	Low	3.53	13
	Middle	3.45	13
	High	3.67	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.48	13
	Middle	0.34	13
	High	0.45	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.59	13
	Middle	2.42	13
	High	2.58	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	4.35	13
	Middle	4.27	13
	High	4.38	13
HSDPA (16QAM)	Low	4.35	13
	Middle	4.29	13
	High	4.35	13
HSUPA (BPSK)	Low	4.37	13
	Middle	4.22	13
	High	4.35	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	81.17	244	1.1	H	19.1	0.7	0.0	18.40	38.45	20.05
836.6	89.82	192	1.4	V	29.4	0.7	0.0	28.70	38.45	9.75
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	87.54	188	1.5	H	17.5	1.30	8.50	24.70	33	8.3
1880.00	83.90	225	2.1	V	13.6	1.30	8.50	20.80	33	12.2

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	79.39	73	1.5	H	17.0	0.7	0.0	16.30	38.45	22.15
836.6	84.21	143	2.1	V	23.8	0.7	0.0	23.10	38.45	15.35
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	84.39	75	1.4	H	14.3	1.30	8.50	21.50	33	11.5
1880.00	79.36	106	2.4	V	9.1	1.30	8.50	16.30	33	16.7

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	73.06	327	2.2	H	11.0	0.7	0.0	10.30	38.45	28.15
836.6	80.21	153	1.9	V	19.8	0.7	0.0	19.10	38.45	19.35
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	82.54	341	1.7	H	12.5	1.30	8.50	19.70	33	13.3
1880.00	81.67	6	2.1	V	11.4	1.30	8.50	18.60	33	14.4

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	22.15	22.49	22.24
		RB Size=1, RB Offset=2	22.10	22.44	22.17
		RB Size=1, RB Offset=5	22.20	22.57	22.33
		RB Size=3, RB Offset=0	21.75	22.01	21.65
		RB Size=3, RB Offset=1	21.66	21.96	21.61
		RB Size=3, RB Offset=2	21.82	22.05	21.70
		RB Size=6, RB Offset=0	21.16	21.49	21.15
	16QAM	RB Size=1, RB Offset=0	22.18	22.45	22.27
		RB Size=1, RB Offset=2	22.15	22.41	22.16
		RB Size=1, RB Offset=5	22.22	22.53	22.31
		RB Size=3, RB Offset=0	22.08	22.38	22.17
		RB Size=3, RB Offset=1	22.27	22.57	22.33
		RB Size=3, RB Offset=2	22.27	22.50	22.28
		RB Size=6, RB Offset=0	21.26	21.48	21.17
3.0	QPSK	RB Size=1, RB Offset=0	22.17	22.46	22.25
		RB Size=1, RB Offset=7	22.10	22.41	22.14
		RB Size=1, RB Offset=14	22.22	22.51	22.29
		RB Size=8, RB Offset=0	22.12	22.38	22.16
		RB Size=8, RB Offset=4	22.21	22.58	22.36
		RB Size=8, RB Offset=7	22.17	22.48	22.20
		RB Size=15, RB Offset=0	21.24	21.55	21.27
	16QAM	RB Size=1, RB Offset=0	22.14	22.46	22.27
		RB Size=1, RB Offset=7	22.03	22.40	22.14
		RB Size=1, RB Offset=14	22.23	22.54	22.31
		RB Size=8, RB Offset=0	22.05	22.40	22.16
		RB Size=8, RB Offset=4	22.20	22.52	22.38
		RB Size=8, RB Offset=7	22.14	22.47	22.20
		RB Size=15, RB Offset=0	21.32	21.54	21.24

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	22.34	22.61	22.37
		RB Size=1, RB Offset=12	22.31	22.57	22.26
		RB Size=1, RB Offset=24	22.41	22.67	22.43
		RB Size=12, RB Offset=0	22.31	22.54	22.31
		RB Size=12, RB Offset=6	22.42	22.71	22.46
		RB Size=12, RB Offset=11	22.40	22.63	22.31
		RB Size=25, RB Offset=0	21.24	21.59	21.23
	16QAM	RB Size=1, RB Offset=0	22.38	22.62	22.34
		RB Size=1, RB Offset=12	22.34	22.54	22.28
		RB Size=1, RB Offset=24	22.43	22.67	22.42
		RB Size=12, RB Offset=0	22.33	22.49	22.23
		RB Size=12, RB Offset=6	22.44	22.71	22.38
		RB Size=12, RB Offset=11	22.44	22.63	22.40
		RB Size=25, RB Offset=0	21.32	21.61	21.24
10.0	QPSK	RB Size=1, RB Offset=0	23.52	23.88	23.41
		RB Size=1, RB Offset=24	22.04	22.33	22.08
		RB Size=1, RB Offset=49	21.96	22.23	21.99
		RB Size=25, RB Offset=0	22.15	22.40	22.13
		RB Size=25, RB Offset=12	22.00	22.21	22.03
		RB Size=25, RB Offset=24	22.15	22.39	22.13
		RB Size=50, RB Offset=0	21.32	21.59	21.24
	16QAM	RB Size=1, RB Offset=0	22.14	22.44	22.17
		RB Size=1, RB Offset=24	22.07	22.32	22.07
		RB Size=1, RB Offset=49	22.25	22.49	22.21
		RB Size=25, RB Offset=0	22.05	22.35	22.12
		RB Size=25, RB Offset=12	22.18	22.49	22.25
		RB Size=25, RB Offset=24	22.15	22.38	22.20
		RB Size=50, RB Offset=0	21.32	21.61	21.24

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	22.27	22.56	22.14
		RB Size=1, RB Offset=37	22.17	22.45	22.07
		RB Size=1, RB Offset=74	22.30	22.68	22.27
		RB Size=36, RB Offset=0	22.15	22.50	22.09
		RB Size=36, RB Offset=18	22.32	22.69	22.26
		RB Size=36, RB Offset=37	22.23	22.51	22.17
		RB Size=75, RB Offset=0	21.52	21.78	21.72
	16QAM	RB Size=1, RB Offset=0	22.23	22.51	22.18
		RB Size=1, RB Offset=37	22.19	22.38	22.09
		RB Size=1, RB Offset=74	22.33	22.64	22.27
		RB Size=36, RB Offset=0	22.17	22.44	22.08
		RB Size=36, RB Offset=18	22.32	22.61	22.26
		RB Size=36, RB Offset=37	22.23	22.49	22.13
		RB Size=75, RB Offset=0	21.35	21.67	21.45
20.0	QPSK	RB Size=1, RB Offset=0	22.27	22.52	22.15
		RB Size=1, RB Offset=49	22.15	22.43	22.05
		RB Size=1, RB Offset=99	22.31	22.62	22.24
		RB Size=50, RB Offset=0	22.14	22.46	22.03
		RB Size=50, RB Offset=24	22.35	22.58	22.23
		RB Size=50, RB Offset=49	22.23	22.51	22.17
		RB Size=100, RB Offset=0	21.04	21.32	21.07
	16QAM	RB Size=1, RB Offset=0	22.21	22.41	22.13
		RB Size=1, RB Offset=49	22.12	22.31	22.04
		RB Size=1, RB Offset=99	22.28	22.46	22.23
		RB Size=50, RB Offset=0	22.13	22.37	22.09
		RB Size=50, RB Offset=24	22.31	22.46	22.24
		RB Size=50, RB Offset=49	22.21	22.38	22.12
		RB Size=100, RB Offset=0	21.12	21.43	21.15

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	5.95	13	Pass
QPSK (100RB Size)	5.50	13	Pass
16QAM (1RB Size)	6.52	13	Pass
16QAM (100%RB Size)	5.08	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	80.86	238	1.4	H	7.7	1.30	9.10	15.50	30
1732.50	82.16	307	2.5	V	9.6	1.30	9.10	17.40	30
3 MHz Bandwidth									
1732.50	80.12	146	1.2	H	7.0	1.30	9.10	14.80	30
1732.50	83.13	194	2.4	V	10.6	1.30	9.10	18.40	30
5 MHz Bandwidth									
1732.50	82.07	69	1.7	H	8.9	1.30	9.10	16.70	30
1732.50	83.02	111	2.1	V	10.5	1.30	9.10	18.30	30
10 MHz Bandwidth									
1732.50	80.44	142	2.2	H	7.3	1.30	9.10	15.10	30
1732.50	82.78	159	1.4	V	10.2	1.30	9.10	18.00	30
15 MHz Bandwidth									
1732.50	79.69	132	1.7	H	6.5	1.30	9.10	14.30	30
1732.50	81.38	337	1.8	V	8.8	1.30	9.10	16.60	30
20 MHz Bandwidth									
1732.50	80.32	97	1.4	H	7.1	1.30	9.10	14.90	30
1732.50	82.45	236	2.2	V	9.9	1.30	9.10	17.70	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	81.65	44	1.9	H	8.5	1.30	9.10	16.30	30
1732.50	82.78	319	1.8	V	10.2	1.30	9.10	18.00	30
3 MHz Bandwidth									
1732.50	80.65	303	2.3	H	7.5	1.30	9.10	15.30	30
1732.50	82.54	245	2.3	V	10.0	1.30	9.10	17.80	30
5 MHz Bandwidth									
1732.50	81.25	213	1.8	H	8.1	1.30	9.10	15.90	30
1732.50	83.29	92	1.3	V	10.7	1.30	9.10	18.50	30
10 MHz Bandwidth									
1732.50	80.11	17	1.3	H	6.9	1.30	9.10	14.70	30
1732.50	82.43	90	2.4	V	9.9	1.30	9.10	17.70	30
15 MHz Bandwidth									
1732.50	79.65	31	1.8	H	6.5	1.30	9.10	14.30	30
1732.50	81.74	42	1.4	V	9.2	1.30	9.10	17.00	30
20 MHz Bandwidth									
1732.50	80.23	322	2.2	H	7.1	1.30	9.10	14.90	30
1732.50	82.54	277	1.9	V	10.0	1.30	9.10	17.80	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	22.24	22.67	22.34
		RB Size=1, RB Offset=2	22.13	22.57	22.22
		RB Size=1, RB Offset=5	22.30	22.76	22.46
		RB Size=3, RB Offset=0	22.15	22.61	22.23
		RB Size=3, RB Offset=1	22.27	22.78	22.44
		RB Size=3, RB Offset=2	22.23	22.62	22.29
		RB Size=6, RB Offset=0	21.34	21.71	21.36
	16QAM	RB Size=1, RB Offset=0	22.18	22.45	22.27
		RB Size=1, RB Offset=2	22.15	22.41	22.16
		RB Size=1, RB Offset=5	22.22	22.53	22.31
		RB Size=3, RB Offset=0	22.08	22.38	22.17
		RB Size=3, RB Offset=1	22.27	22.57	22.33
		RB Size=3, RB Offset=2	22.27	22.50	22.28
		RB Size=6, RB Offset=0	21.26	21.48	21.17
3.0	QPSK	RB Size=1, RB Offset=0	22.42	22.91	22.54
		RB Size=1, RB Offset=7	22.33	22.87	22.44
		RB Size=1, RB Offset=14	22.51	23.01	22.66
		RB Size=8, RB Offset=0	22.38	22.81	22.50
		RB Size=8, RB Offset=4	22.48	22.97	22.59
		RB Size=8, RB Offset=7	22.40	22.96	22.53
		RB Size=15, RB Offset=0	21.14	21.74	21.35
	16QAM	RB Size=1, RB Offset=0	22.47	22.94	22.56
		RB Size=1, RB Offset=7	22.39	22.85	22.50
		RB Size=1, RB Offset=14	22.52	23.05	22.62
		RB Size=8, RB Offset=0	22.44	22.82	22.50
		RB Size=8, RB Offset=4	22.51	23.06	22.66
		RB Size=8, RB Offset=7	22.51	22.98	22.56
		RB Size=15, RB Offset=0	21.32	21.83	21.45

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	22.42	22.88	22.51
		RB Size=1, RB Offset=12	22.31	22.77	22.41
		RB Size=1, RB Offset=24	22.53	22.96	22.60
		RB Size=12, RB Offset=0	22.36	22.81	22.45
		RB Size=12, RB Offset=6	22.53	22.93	22.59
		RB Size=12, RB Offset=11	22.35	22.87	22.48
		RB Size=25, RB Offset=0	21.03	21.24	21.04
	16QAM	RB Size=1, RB Offset=0	22.47	22.86	22.53
		RB Size=1, RB Offset=12	22.40	22.77	22.44
		RB Size=1, RB Offset=24	22.58	22.94	22.63
		RB Size=12, RB Offset=0	22.37	22.80	22.45
		RB Size=12, RB Offset=6	22.53	22.95	22.63
		RB Size=12, RB Offset=11	22.44	22.81	22.50
		RB Size=25, RB Offset=0	21.04	21.30	21.05
10.0	QPSK	RB Size=1, RB Offset=0	22.44	22.96	22.57
		RB Size=1, RB Offset=24	22.40	22.84	22.46
		RB Size=1, RB Offset=49	22.56	23.08	22.64
		RB Size=25, RB Offset=0	22.41	22.84	22.44
		RB Size=25, RB Offset=12	22.54	23.04	22.67
		RB Size=25, RB Offset=24	22.45	22.90	22.58
		RB Size=50, RB Offset=0	21.15	21.30	21.05
	16QAM	RB Size=1, RB Offset=0	22.47	22.99	22.52
		RB Size=1, RB Offset=24	22.34	22.95	22.44
		RB Size=1, RB Offset=49	22.58	23.08	22.59
		RB Size=25, RB Offset=0	22.37	22.92	22.47
		RB Size=25, RB Offset=12	22.59	23.10	22.60
		RB Size=25, RB Offset=24	22.39	23.02	22.55
		RB Size=50, RB Offset=0	21.05	21.40	21.12

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	5.03	13	Pass
QPSK (100RB Size)	6.69	13	Pass
16QAM (1RB Size)	6.52	13	Pass
16QAM (100%RB Size)	5.08	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	74.61	135	1.8	H	12.6	0.7	0.0	11.90	38.45
836.5	83.29	60	1.7	V	23.3	0.7	0.0	22.60	38.45
3 MHz Bandwidth									
836.5	76.38	181	2.5	H	14.4	0.7	0.0	13.70	38.45
836.5	81.22	346	1.9	V	21.2	0.7	0.0	20.50	38.45
5 MHz Bandwidth									
836.5	76.54	115	1.9	H	14.5	0.7	0.0	13.80	38.45
836.5	80.37	175	2.1	V	20.4	0.7	0.0	19.70	38.45
10 MHz Bandwidth									
836.5	75.85	165	2.4	H	13.9	0.7	0.0	13.20	38.45
836.5	79.66	44	1.3	V	19.7	0.7	0.0	19.00	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	74.14	279	1.5	H	11.7	0.7	0.0	11.00	38.45
836.5	84.15	94	2.2	V	23.7	0.7	0.0	23.00	38.45
3 MHz Bandwidth									
836.5	75.53	88	2.1	H	13.1	0.7	0.0	12.40	38.45
836.5	81.23	203	1.3	V	20.8	0.7	0.0	20.10	38.45
5 MHz Bandwidth									
836.5	74.36	236	2.5	H	12.0	0.7	0.0	11.30	38.45
836.5	80.18	217	2.2	V	19.7	0.7	0.0	19.00	38.45
10 MHz Bandwidth									
836.5	74.33	76	2.2	H	11.9	0.7	0.0	11.20	38.45
836.5	79.09	357	1.3	V	18.7	0.7	0.0	18.00	38.45

LTE Band 13:**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	22.41	22.79	22.34
		RB Size=1, RB Offset=12	22.31	22.73	22.24
		RB Size=1, RB Offset=24	22.50	22.86	22.42
		RB Size=12, RB Offset=0	22.32	22.74	22.27
		RB Size=12, RB Offset=6	22.50	22.87	22.39
		RB Size=12, RB Offset=11	22.37	22.78	22.35
		RB Size=25, RB Offset=0	21.24	21.48	21.27
	16QAM	RB Size=1, RB Offset=0	22.34	22.68	22.38
		RB Size=1, RB Offset=12	22.26	22.60	22.29
		RB Size=1, RB Offset=24	22.37	22.75	22.47
		RB Size=12, RB Offset=0	22.30	22.64	22.28
		RB Size=12, RB Offset=6	22.41	22.77	22.51
		RB Size=12, RB Offset=11	22.31	22.67	22.38
		RB Size=25, RB Offset=0	21.04	21.28	21.08
10.0	QPSK	RB Size=1, RB Offset=0	21.56	21.92	21.72
		RB Size=1, RB Offset=24	21.47	21.85	21.67
		RB Size=1, RB Offset=49	21.68	22.00	21.79
		RB Size=25, RB Offset=0	21.48	21.80	21.60
		RB Size=25, RB Offset=12	21.68	22.00	21.80
		RB Size=25, RB Offset=24	21.52	21.97	21.77
		RB Size=50, RB Offset=0	20.85	21.03	20.75
	16QAM	RB Size=1, RB Offset=0	21.85	22.00	21.77
		RB Size=1, RB Offset=24	21.76	21.89	21.67
		RB Size=1, RB Offset=49	21.97	22.06	21.90
		RB Size=25, RB Offset=0	21.79	21.97	21.68
		RB Size=25, RB Offset=12	21.89	22.09	21.87
		RB Size=25, RB Offset=24	21.85	21.98	21.75
		RB Size=50, RB Offset=0	20.86	21.11	20.79

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	5.60	13	Pass
QPSK (100RB Size)	6.82	13	Pass
16QAM (1RB Size)	5.61	13	Pass
16QAM (100%RB Size)	7.10	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									
782	73.66	207	1.8	H	12.7	0.67	0.0	12.03	34.77
782	82.61	99	2.3	V	24.1	0.67	0.0	23.43	34.77
10 MHz Bandwidth									
782	74.62	254	1.3	H	13.6	0.67	0.0	12.93	34.77
782	80.24	34	1.7	V	21.7	0.67	0.0	21.03	34.77

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									
782	72.51	288	2.3	H	11.4	0.67	0.0	10.73	34.77
782	83.00	266	2.0	V	24.5	0.67	0.0	23.83	34.77
10 MHz Bandwidth									
782	73.68	315	2.0	H	12.5	0.67	0.0	11.83	34.77
782	80.62	54	1.3	V	22.1	0.67	0.0	21.43	34.77

LTE Band 17:**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	22.36	22.71	22.42
		RB Size=1, RB Offset=12	22.31	22.65	22.32
		RB Size=1, RB Offset=24	22.43	22.77	22.53
		RB Size=12, RB Offset=0	22.32	22.64	22.31
		RB Size=12, RB Offset=6	22.45	22.82	22.54
		RB Size=12, RB Offset=11	22.41	22.77	22.36
		RB Size=25, RB Offset=0	20.85	21.01	20.81
	16QAM	RB Size=1, RB Offset=0	22.34	22.67	22.45
		RB Size=1, RB Offset=12	22.27	22.60	22.40
		RB Size=1, RB Offset=24	22.44	22.75	22.52
		RB Size=12, RB Offset=0	22.26	22.60	22.35
		RB Size=12, RB Offset=6	22.46	22.74	22.52
		RB Size=12, RB Offset=11	22.33	22.65	22.49
		RB Size=25, RB Offset=0	20.68	21.08	20.75
10.0	QPSK	RB Size=1, RB Offset=0	21.85	22.01	21.72
		RB Size=1, RB Offset=24	21.81	21.93	21.69
		RB Size=1, RB Offset=49	21.90	22.08	21.76
		RB Size=25, RB Offset=0	21.73	21.98	21.61
		RB Size=25, RB Offset=12	21.89	22.13	21.75
		RB Size=25, RB Offset=24	21.93	22.00	21.72
		RB Size=50, RB Offset=0	20.58	20.79	20.63
	16QAM	RB Size=1, RB Offset=0	21.89	22.07	21.75
		RB Size=1, RB Offset=24	21.83	22.01	21.64
		RB Size=1, RB Offset=49	21.99	22.14	21.81
		RB Size=25, RB Offset=0	21.76	21.96	21.68
		RB Size=25, RB Offset=12	21.98	22.19	21.83
		RB Size=25, RB Offset=24	21.95	22.12	21.76
		RB Size=50, RB Offset=0	20.65	20.94	20.52

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.71	13	Pass
QPSK (100RB Size)	6.54	13	Pass
16QAM (1RB Size)	4.71	13	Pass
16QAM (100%RB Size)	6.54	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									
710	76.57	335	1.8	H	13.6	0.62	0.0	12.98	34.77
710	84.22	165	2.4	V	20.2	0.62	0.0	19.58	34.77
10 MHz Bandwidth									
710	77.93	162	1.2	H	14.9	0.62	0.0	14.28	34.77
710	82.81	64	1.4	V	18.8	0.62	0.0	18.18	34.77

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									
710	77.61	291	2.4	H	14.6	0.62	0.0	13.98	34.77
710	84.71	80	1.9	V	20.7	0.62	0.0	20.08	34.77
10 MHz Bandwidth									
710	78.62	169	2.0	H	15.6	0.62	0.0	14.98	34.77
710	82.31	0	2.0	V	18.3	0.62	0.0	17.68	34.77

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

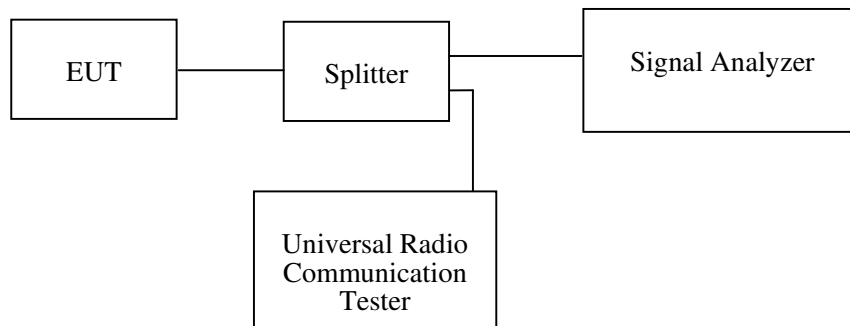
Applicable Standard

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

The testing was performed by Tracy Hu on 2018-01-25.

EUT operation mode: Transmitting

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

Cellular Band (Part 22H)

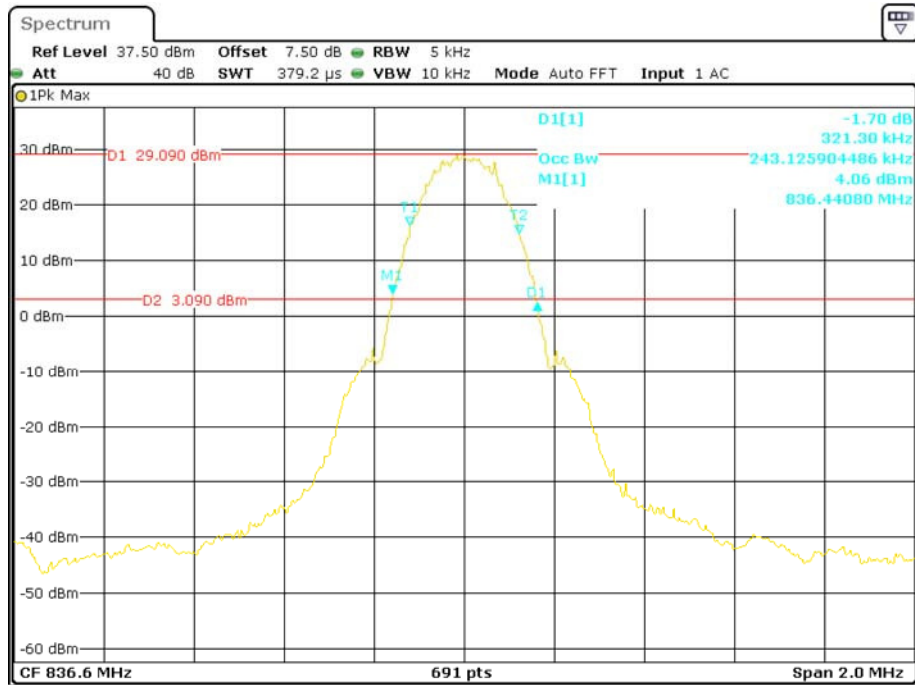
Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	243.13	321.30
EGPRS(8PSK)	836.6	251.81	324.20

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.182	4.863
HSUPA (BPSK)	836.6	4.197	4.863
HSDPA (16QAM)	836.6	4.182	4.863

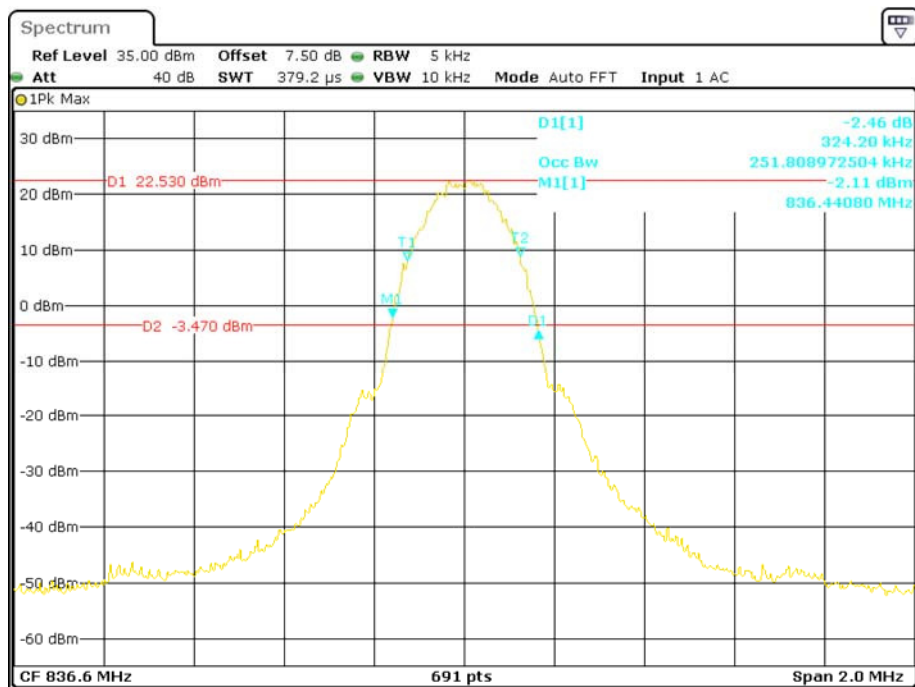
PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	246.02	318.40
EGPRS(8PSK)	1880.0	254.70	330.00

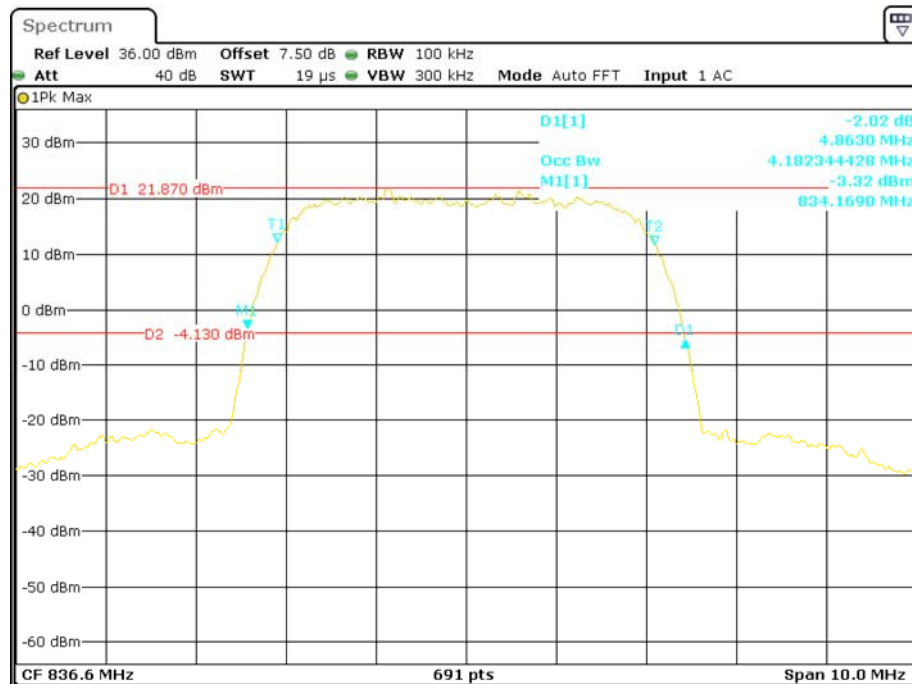
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.197	4.863
HSUPA (BPSK)	1880.0	4.211	4.891
HSDPA (16QAM)	1880.0	4.197	4.863

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

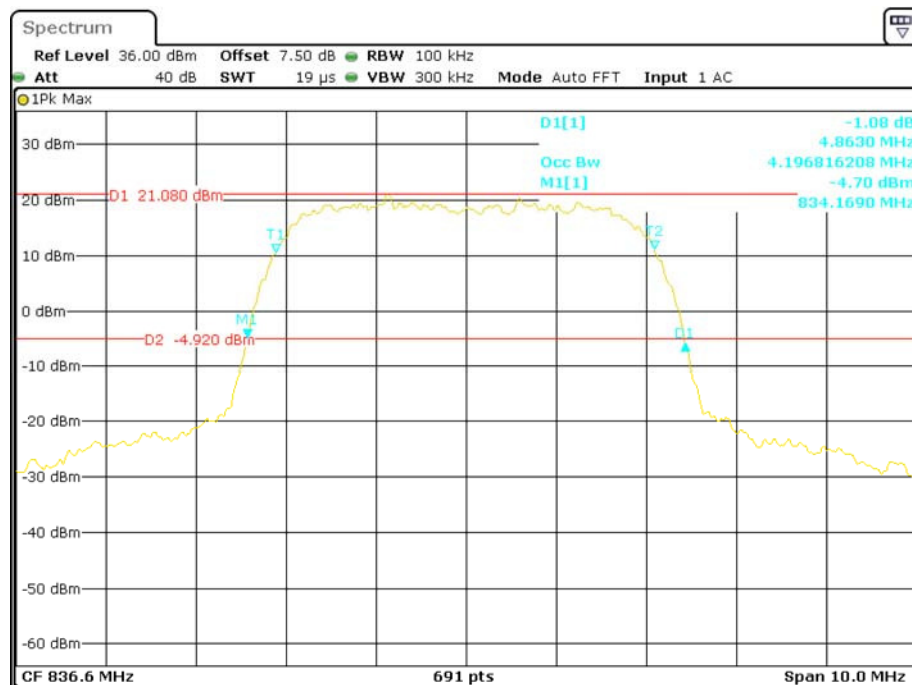
Date: 25.JAN.2018 15:12:43

26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode

Date: 25.JAN.2018 15:22:41

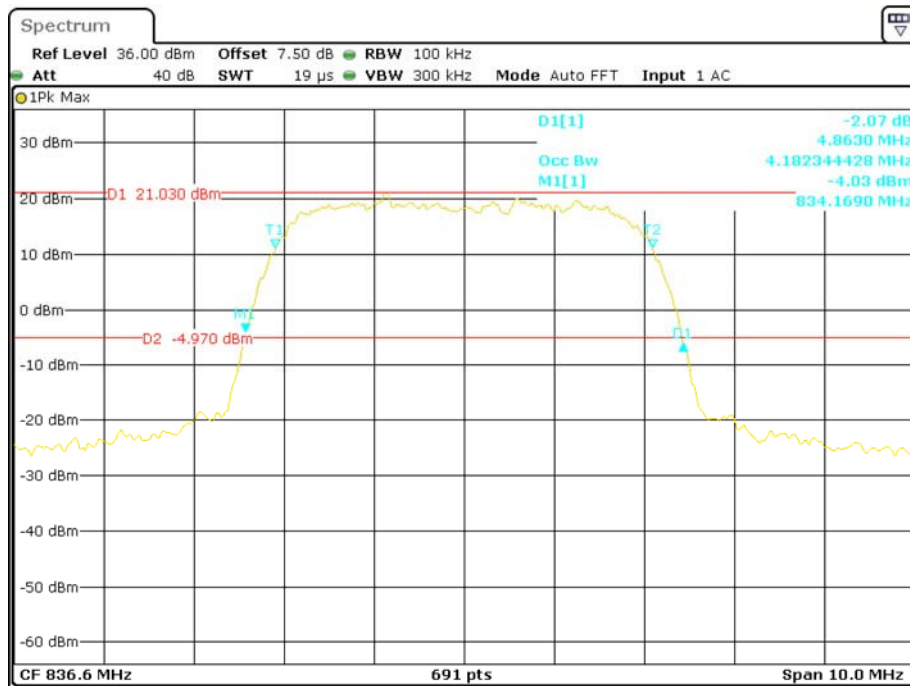
26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode

Date: 25.JAN.2018 15:59:52

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

Date: 25.JAN.2018 16:12:03

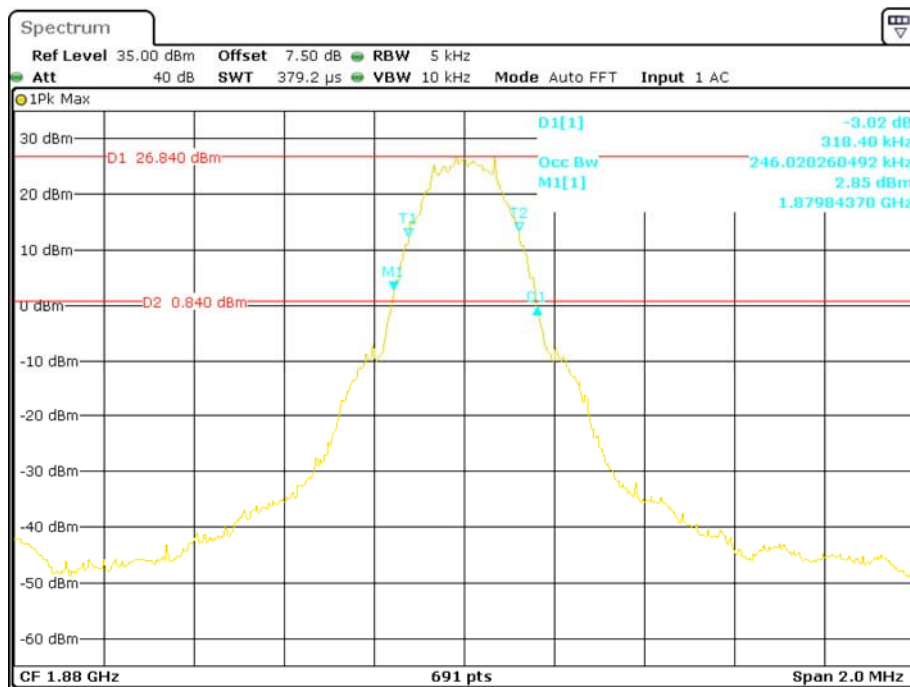
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



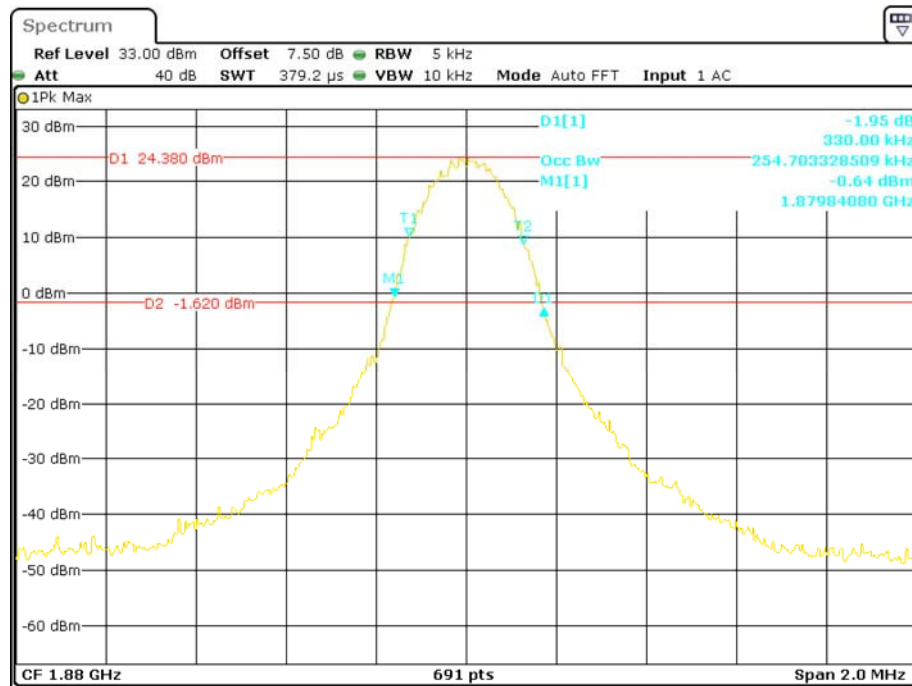
Date: 25.JAN.2018 16:14:51

PCS Band (Part 24E)

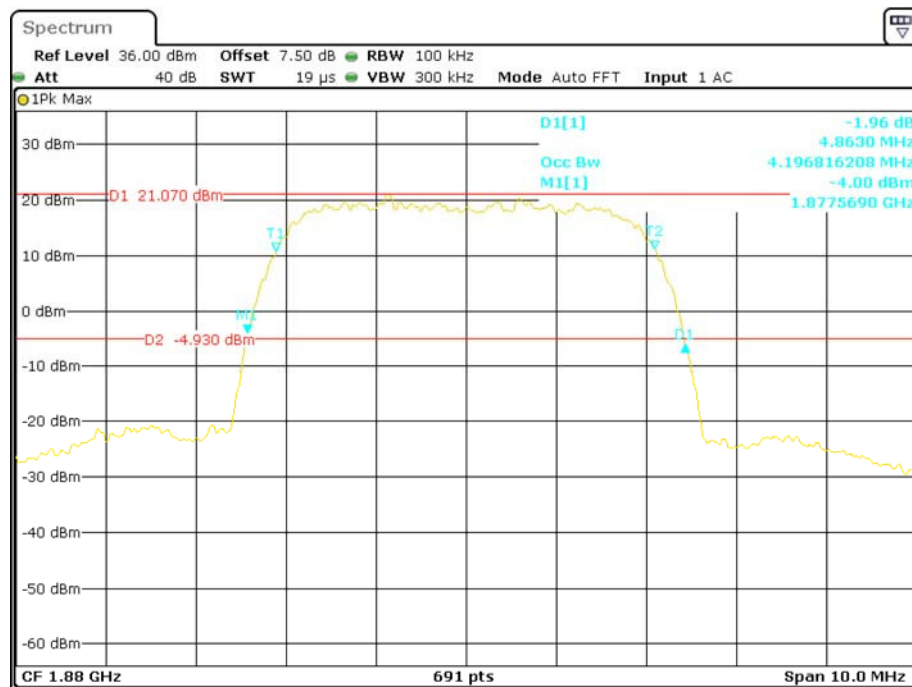
26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



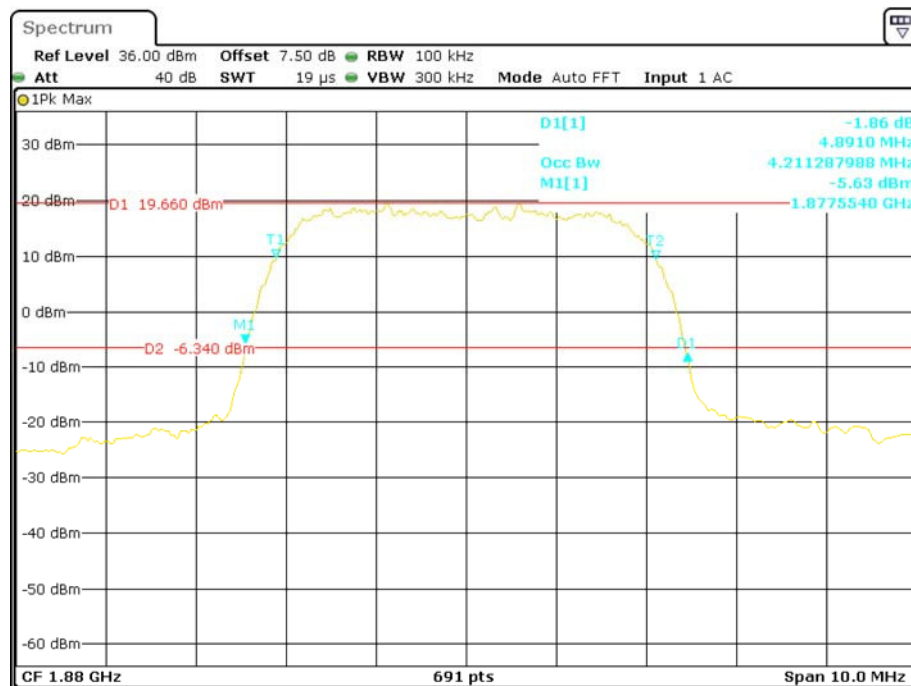
Date: 25.JAN.2018 15:30:39

26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode

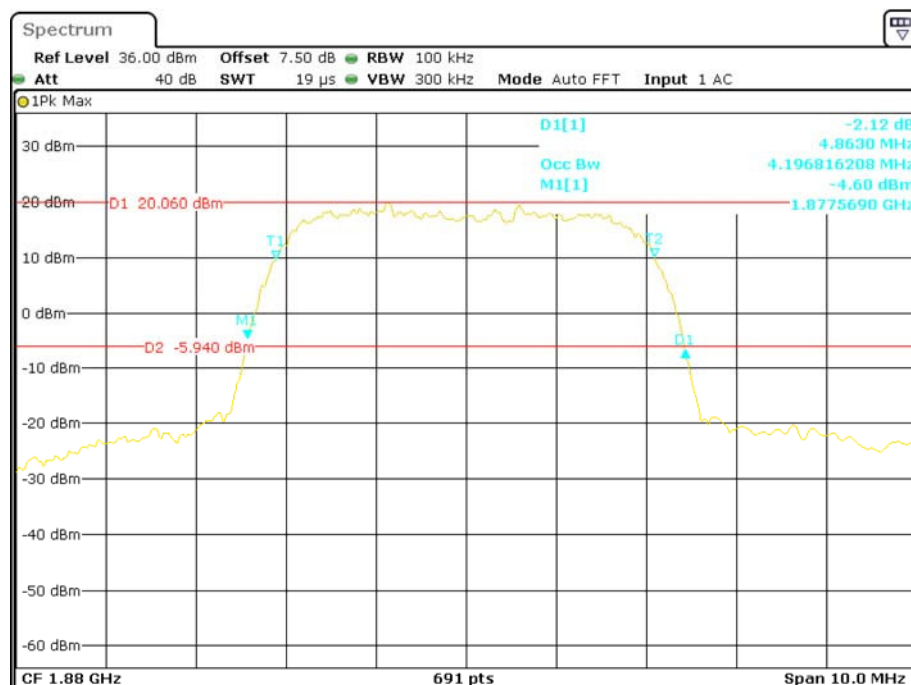
Date: 25.JAN.2018 15:43:49

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

Date: 25.JAN.2018 15:58:15

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

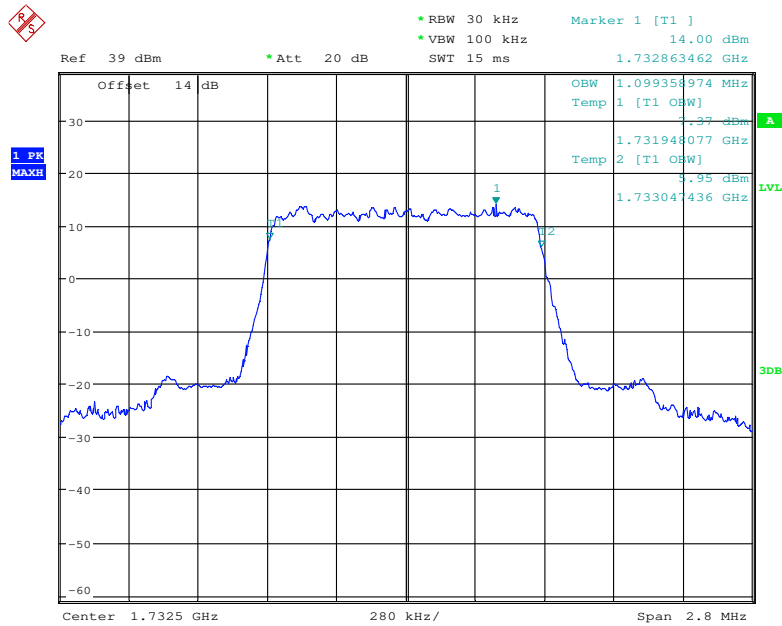
Date: 25.JAN.2018 16:10:22

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

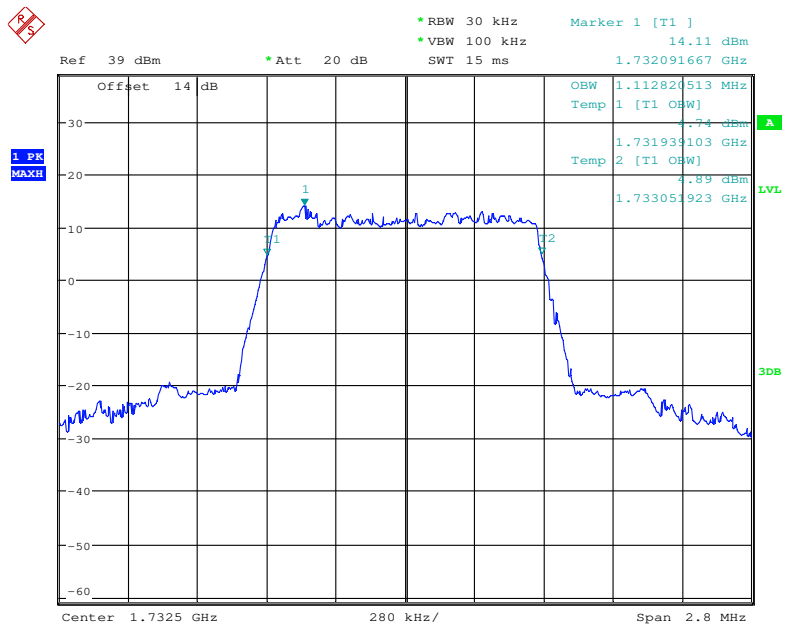
Date: 25.JAN.2018 16:16:19

LTE Band 4: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.099	1.283
	16QAM	1.113	1.288
3.0	QPSK	2.692	2.923
	16QAM	2.692	2.962
5.0	QPSK	4.551	5.096
	16QAM	4.519	5.048
10.0	QPSK	8.974	9.840
	16QAM	8.974	9.744
15.0	QPSK	13.558	15.000
	16QAM	13.558	15.000
20.0	QPSK	17.949	19.551
	16QAM	18.013	19.615

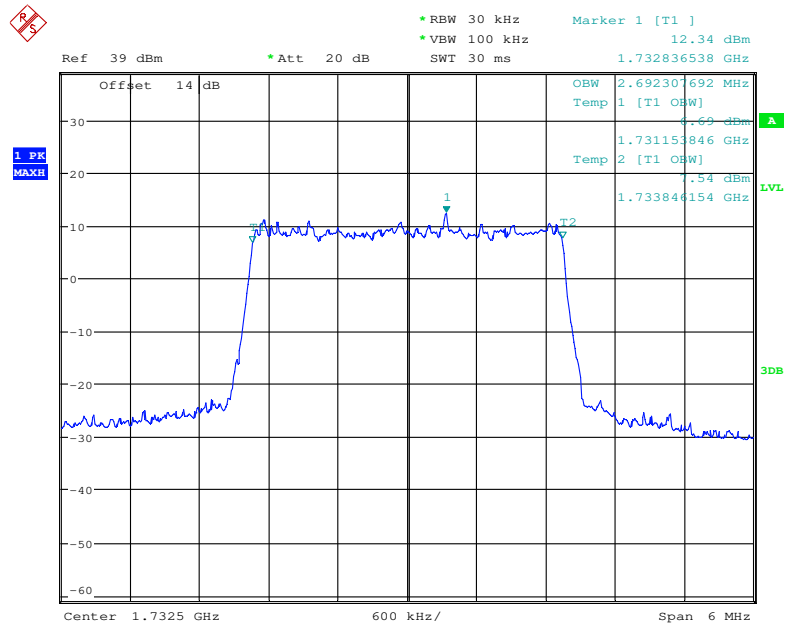
QPSK (1.4 MHz) - 99% Occupied Bandwidth, Middle channel

Date: 25.JAN.2018 20:37:09

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

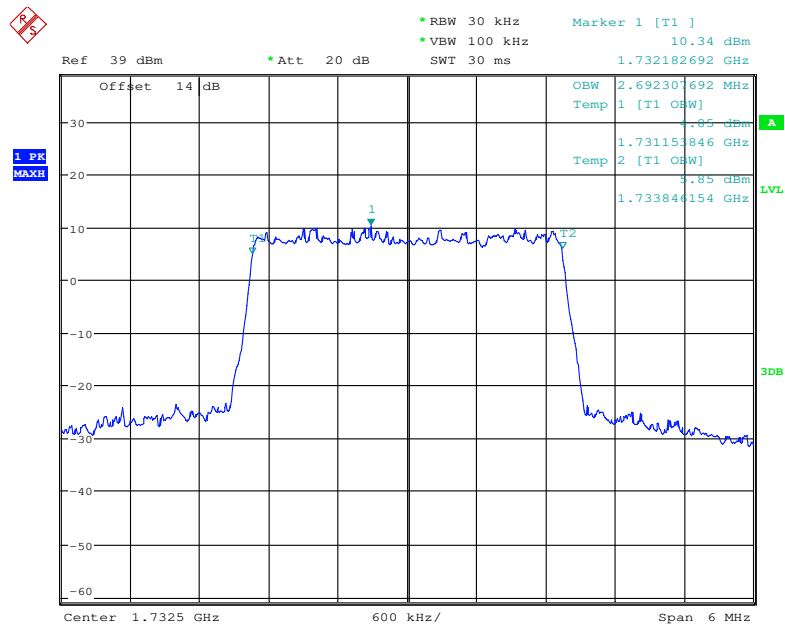
Date: 25.JAN.2018 20:36:16

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



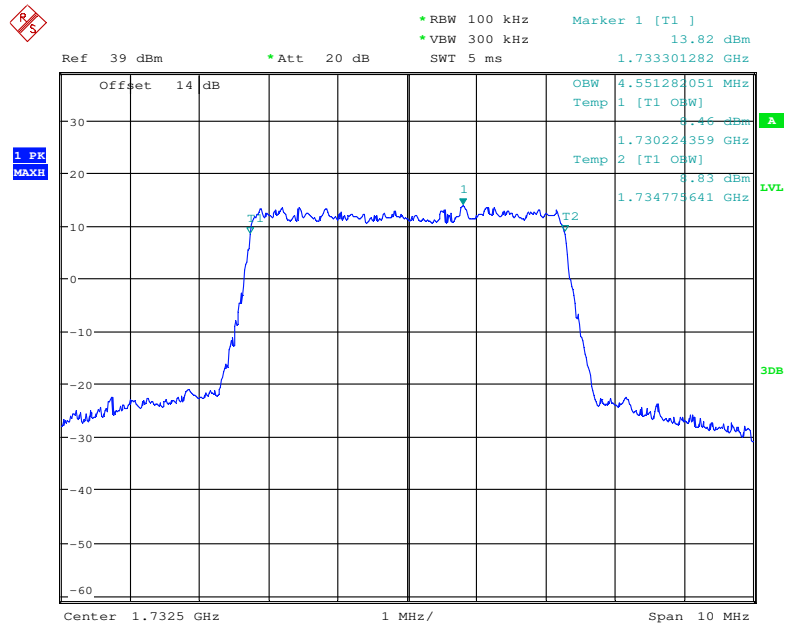
Date: 25.JAN.2018 20:43:12

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



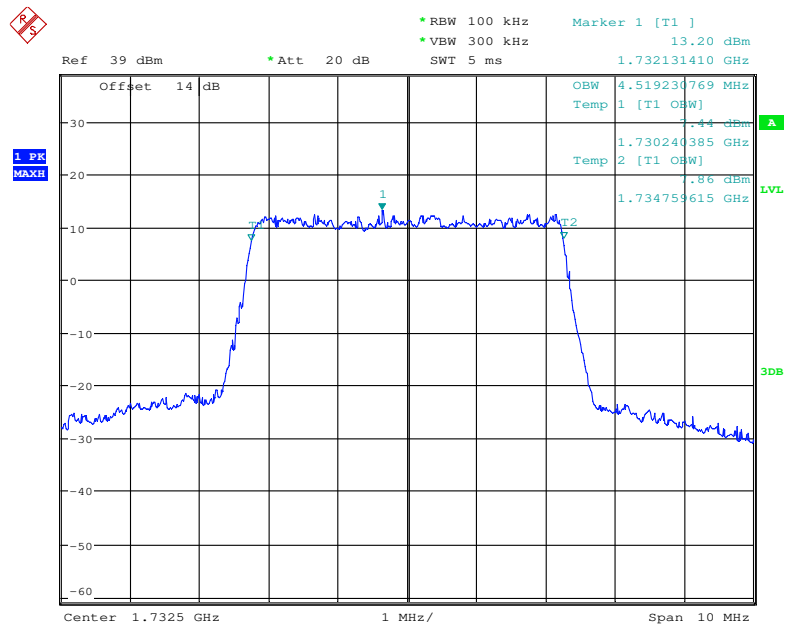
Date: 25.JAN.2018 20:42:04

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



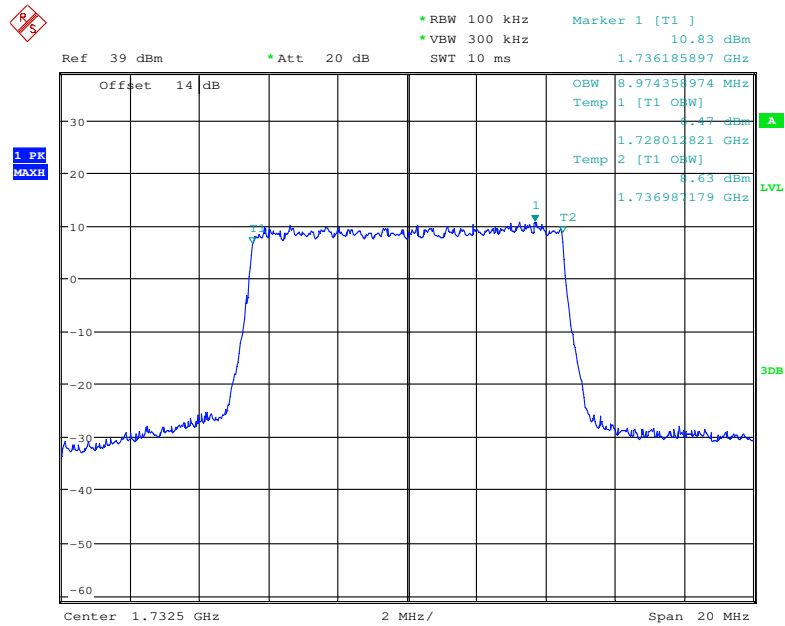
Date: 25.JAN.2018 20:44:41

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



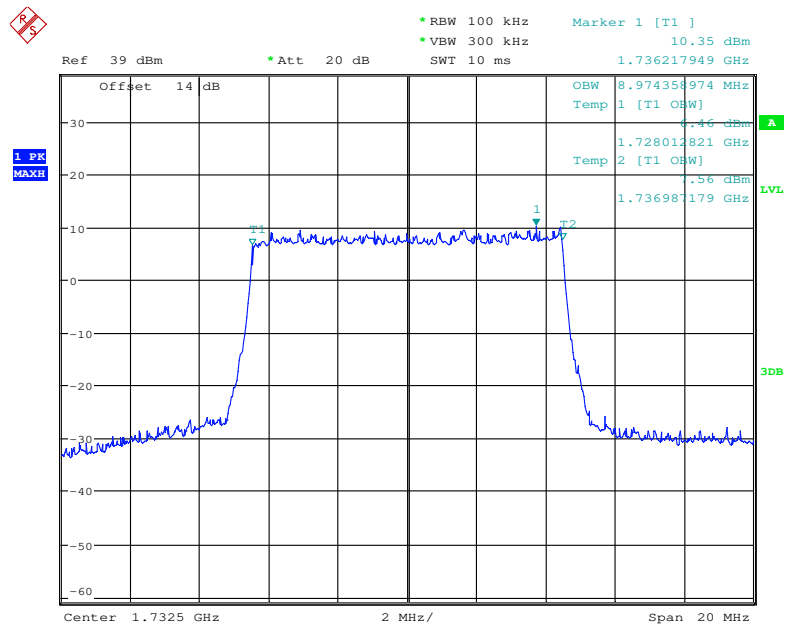
Date: 25.JAN.2018 20:45:31

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



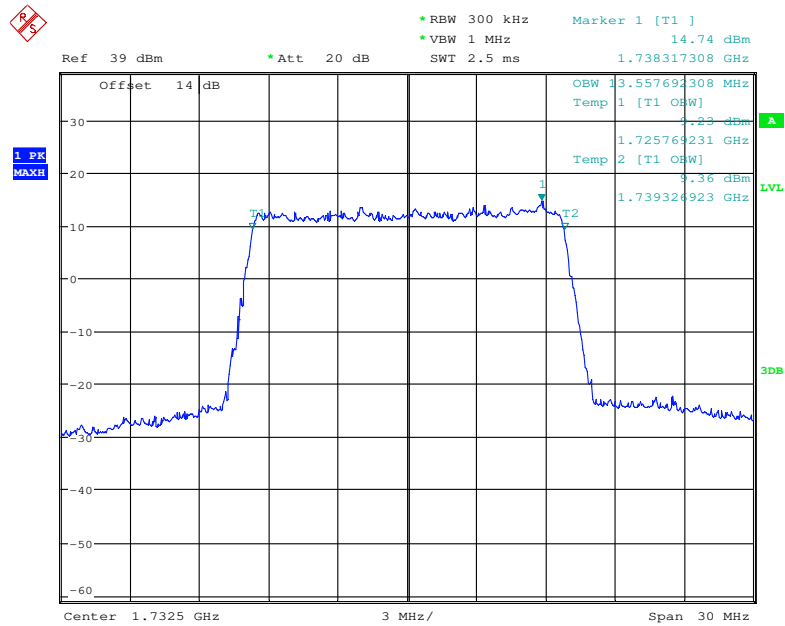
Date: 25.JAN.2018 20:51:48

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



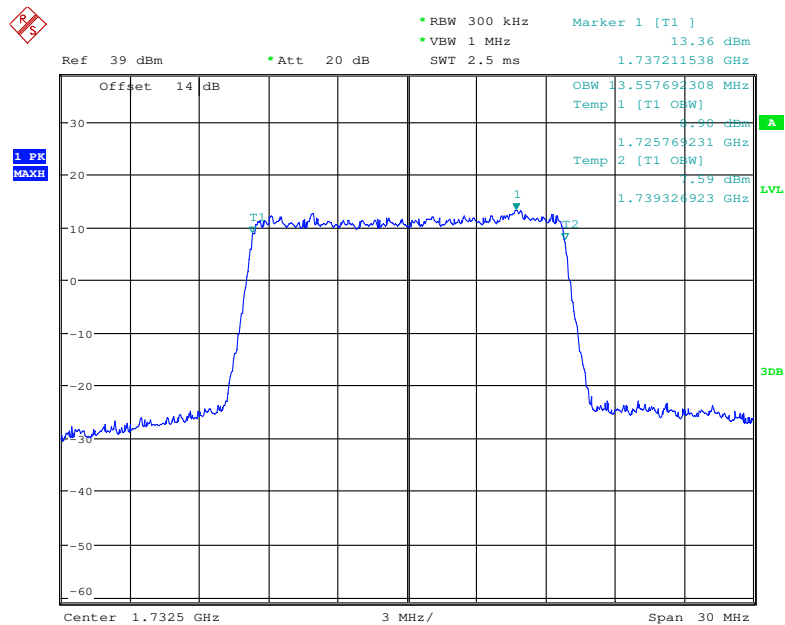
Date: 25.JAN.2018 20:52:56

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

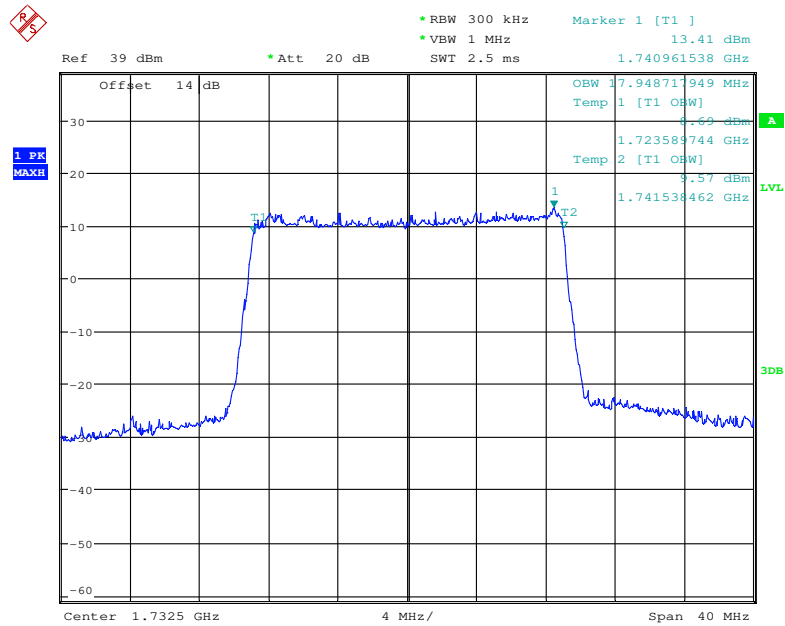


Date: 25.JAN.2018 20:54:40

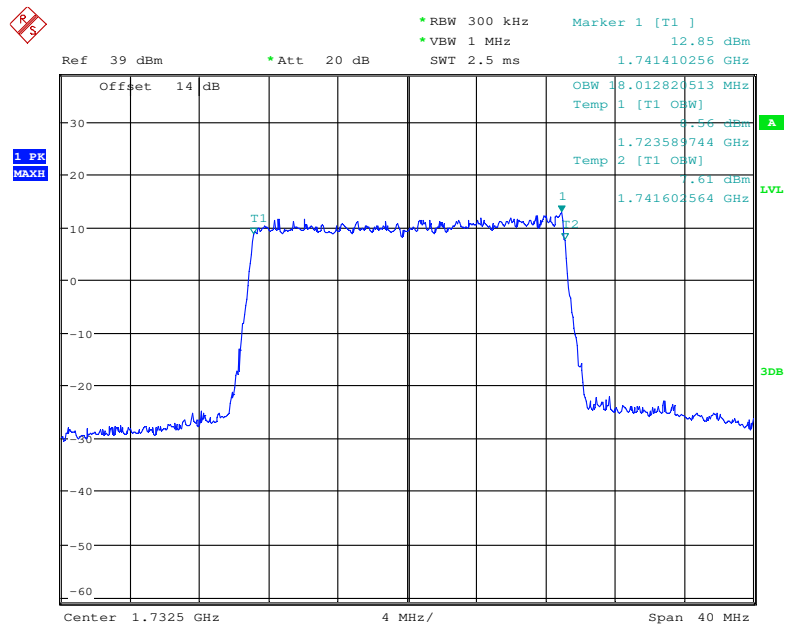
16-QAM (15.0 MHz) - 99% Occupied Bandwidth, Middle channel



Date: 25.JAN.2018 20:55:33

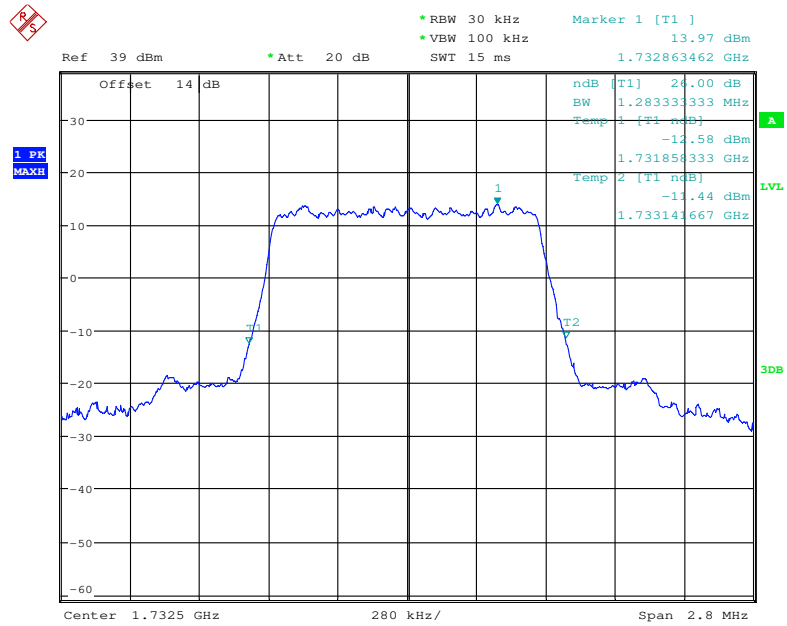
QPSK (20.0 MHz) - 99% Occupied Bandwidth, Middle channel

Date: 25.JAN.2018 21:00:41

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

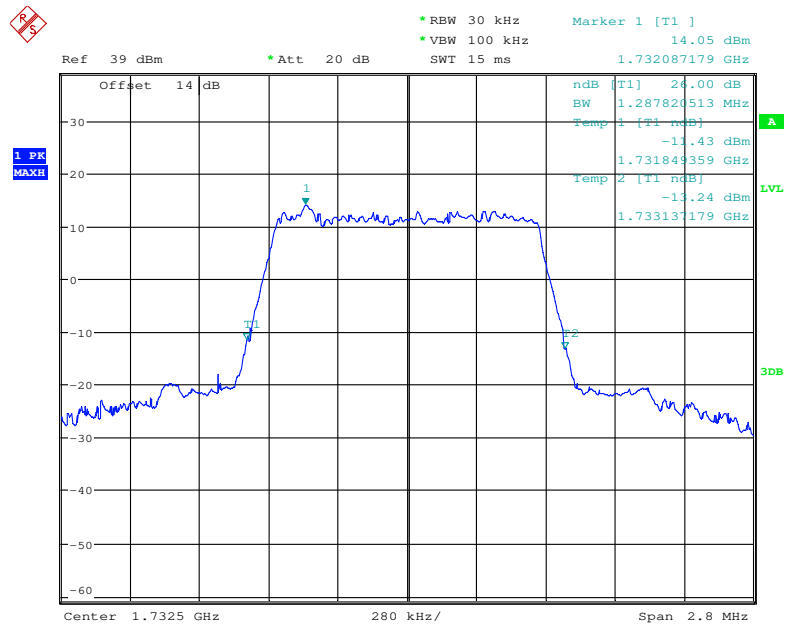
Date: 25.JAN.2018 20:59:53

QPSK (1.4 MHz) - 26 dB Bandwidth, Middle channel



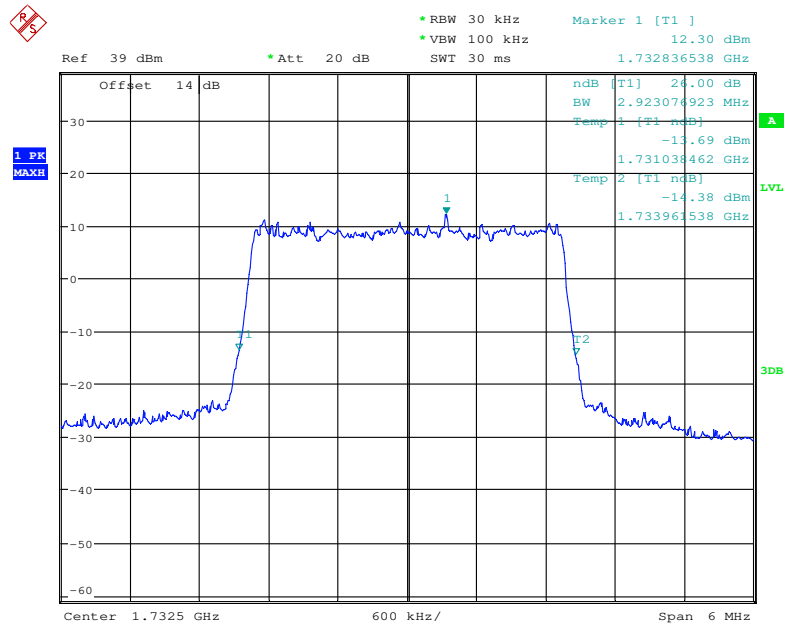
Date: 25.JAN.2018 20:38:09

16-QAM (1.4 MHz) - 26 dB Bandwidth, Middle channel



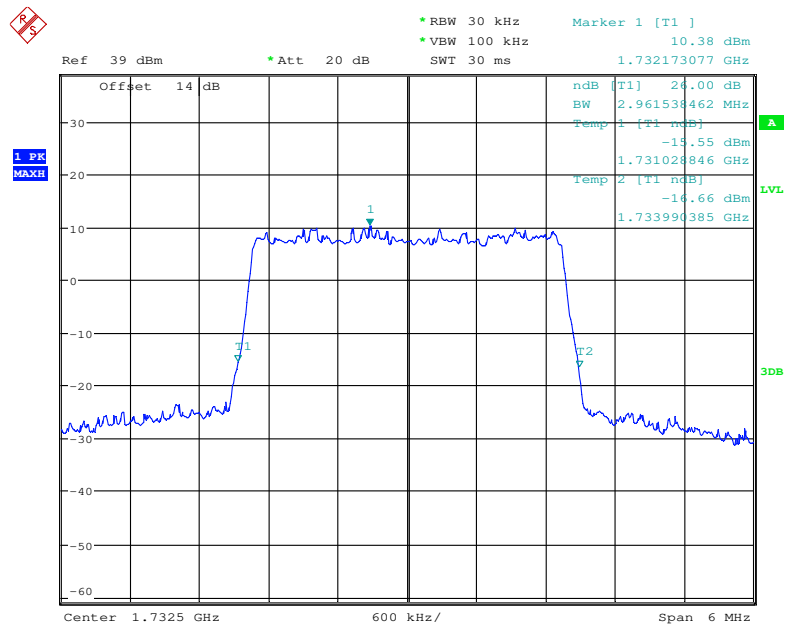
Date: 25.JAN.2018 20:38:53

QPSK (3.0 MHz) - 26 dB Bandwidth, Middle channel



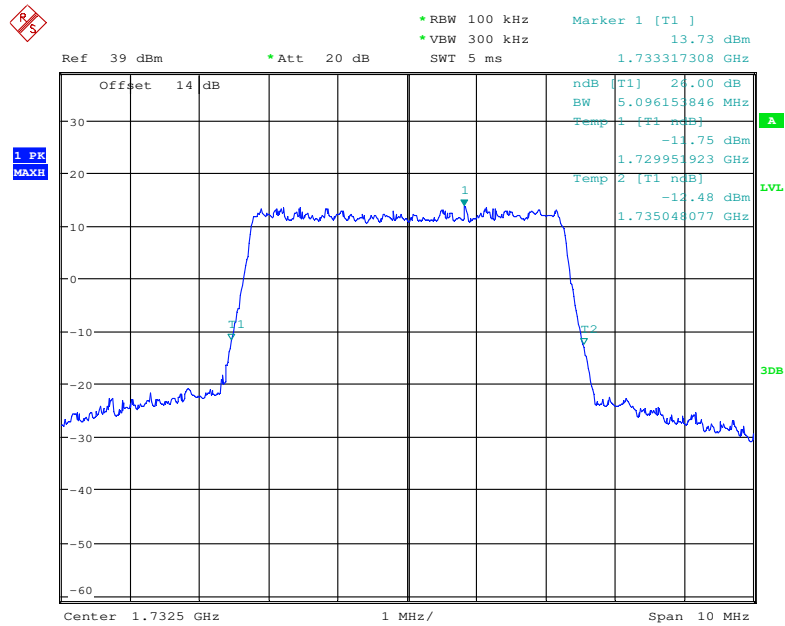
Date: 25.JAN.2018 20:40:08

16-QAM (3.0 MHz) - 26 dB Bandwidth, Middle channel



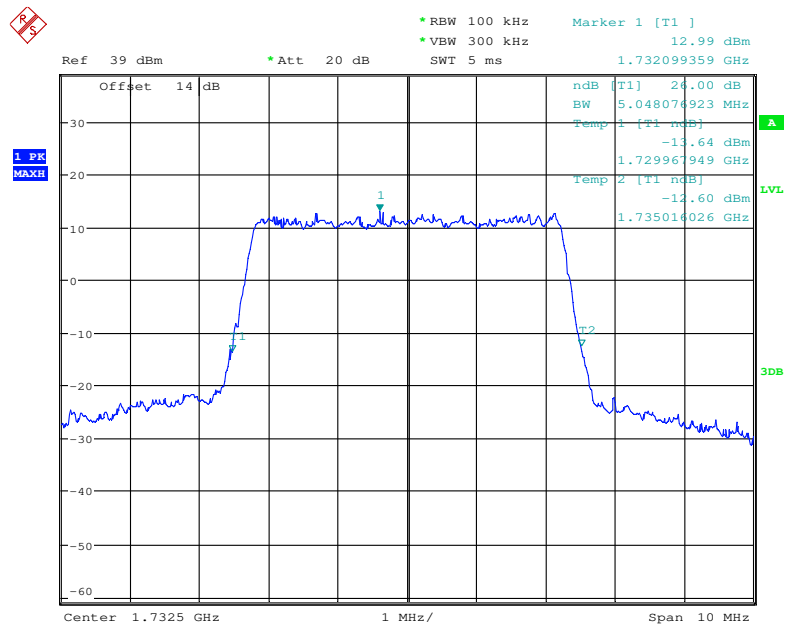
Date: 25.JAN.2018 20:41:19

QPSK (5.0 MHz) - 26 dB Bandwidth, Middle channel



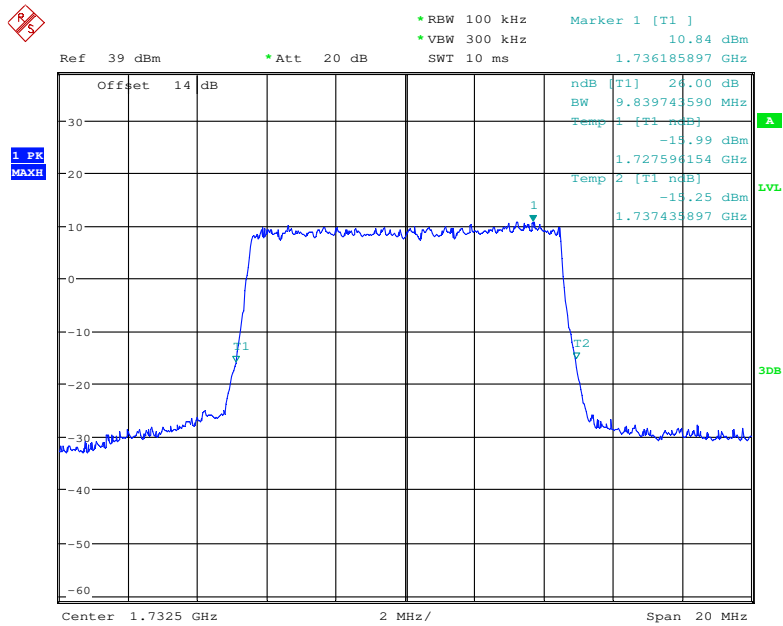
Date: 25.JAN.2018 20:47:15

16-QAM (5.0 MHz) - 26 dB Bandwidth, Middle channel



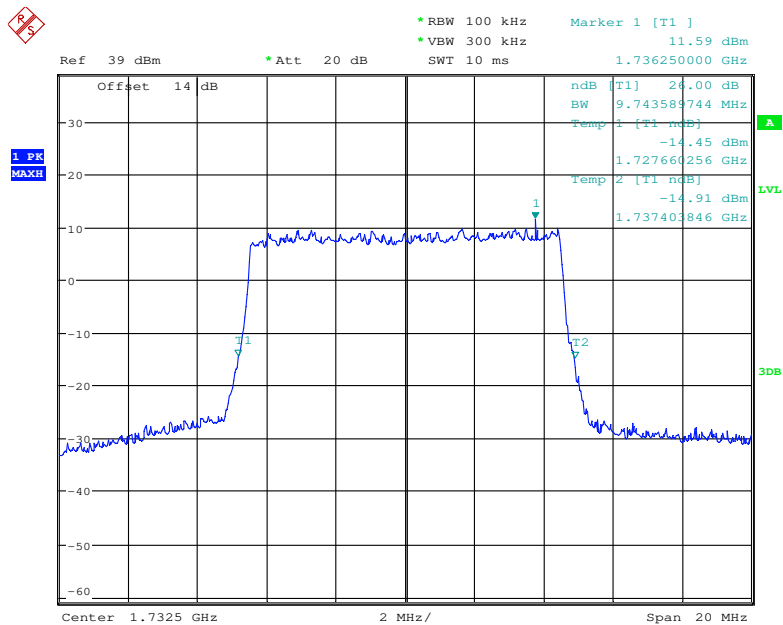
Date: 25.JAN.2018 20:46:18

QPSK (10.0 MHz) - 26 dB Bandwidth, Middle channel



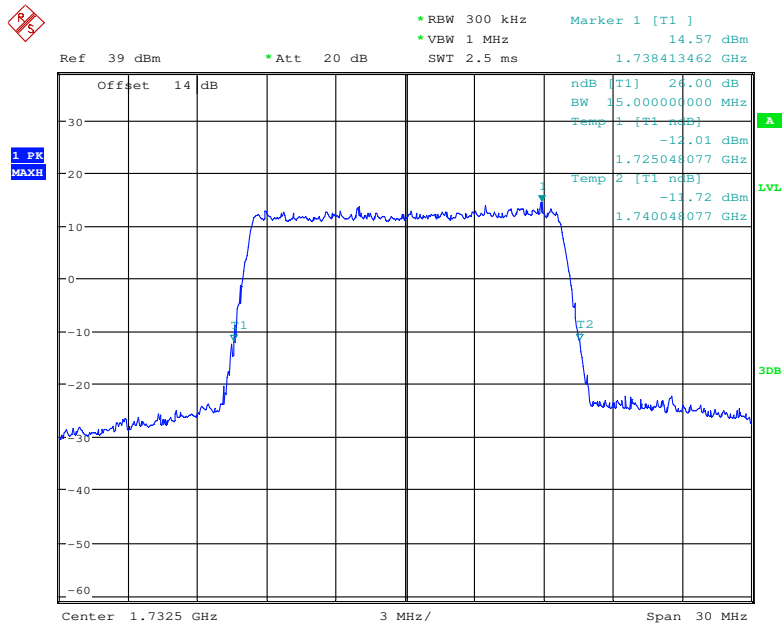
Date: 25.JAN.2018 20:50:57

16-QAM (10.0 MHz) - 26 dB Bandwidth, Middle channel



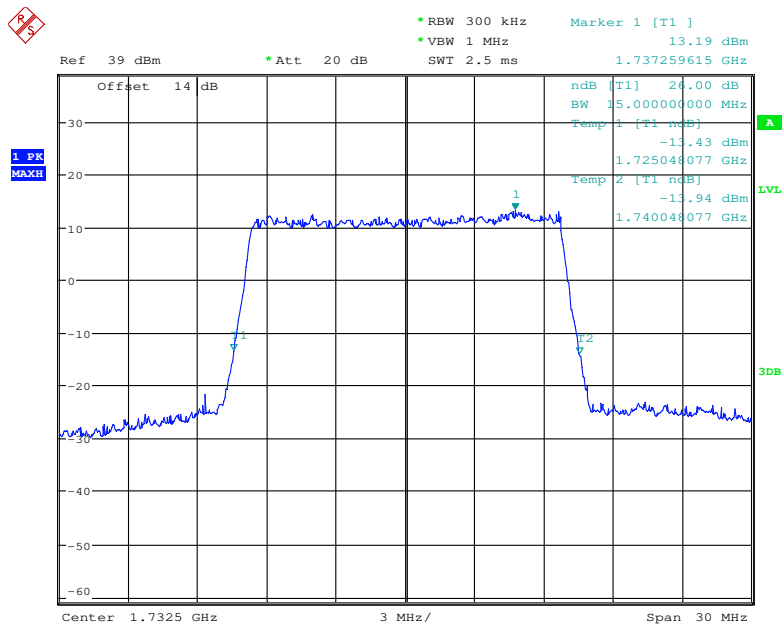
Date: 25.JAN.2018 20:49:39

QPSK (15.0 MHz) - 26 dB Bandwidth, Middle channel



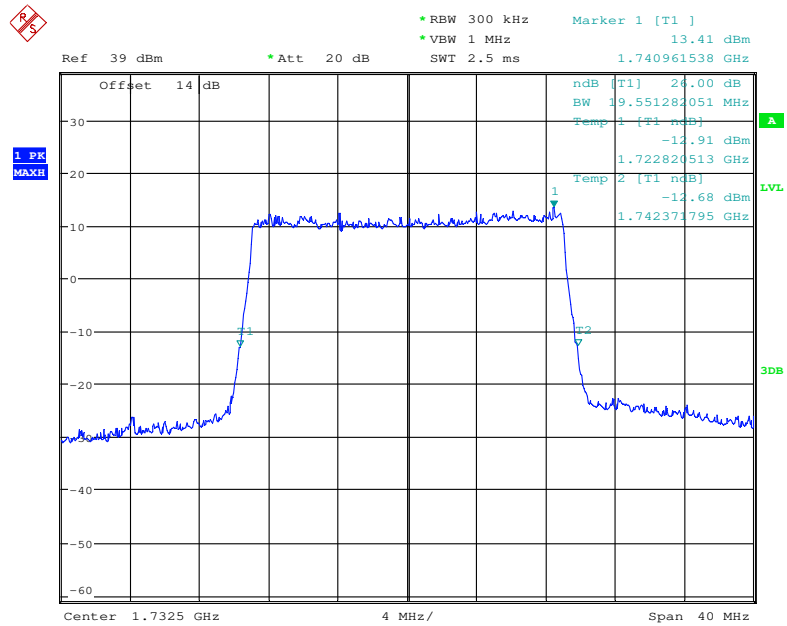
Date: 25.JAN.2018 20:56:56

16-QAM (15.0 MHz) - 26 dB Bandwidth, Middle channel



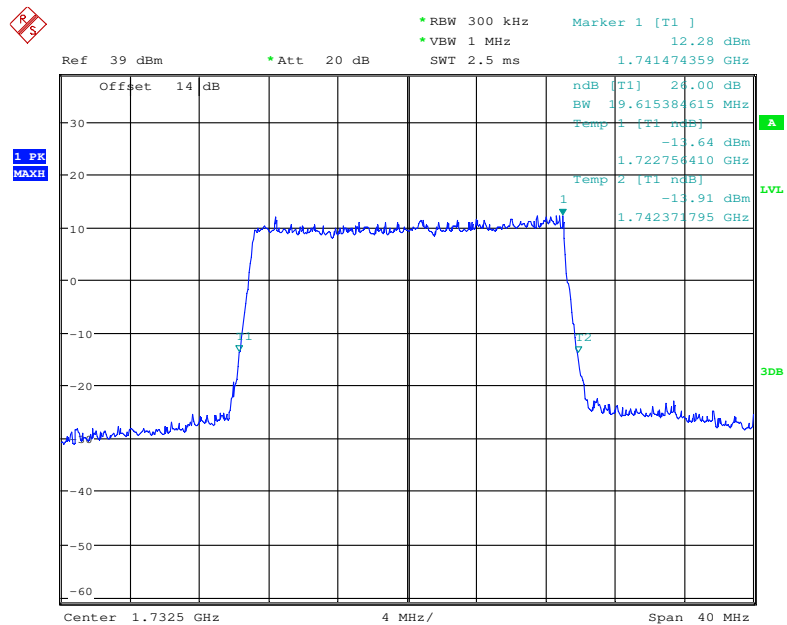
Date: 25.JAN.2018 20:56:13

QPSK (20.0 MHz) - 26 dB Bandwidth, Middle channel



Date: 25.JAN.2018 20:58:14

16-QAM (20.0 MHz) - 26 dB Bandwidth, Middle channel



Date: 25.JAN.2018 20:58:57

LTE Band 5: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.099	1.279
	16QAM	1.104	1.279
3.0	QPSK	2.692	2.913
	16QAM	2.692	2.952
5.0	QPSK	4.535	5.048
	16QAM	4.535	5.016
10.0	QPSK	8.974	9.808
	16QAM	8.974	9.744

Ref 39 dBm * Att 20 dB * RBW 30 kHz VBW 100 kHz SWT 15 ms Marker 1 [T1] 15.34 dBm 836.863461538 MHz

Offset 14 dB

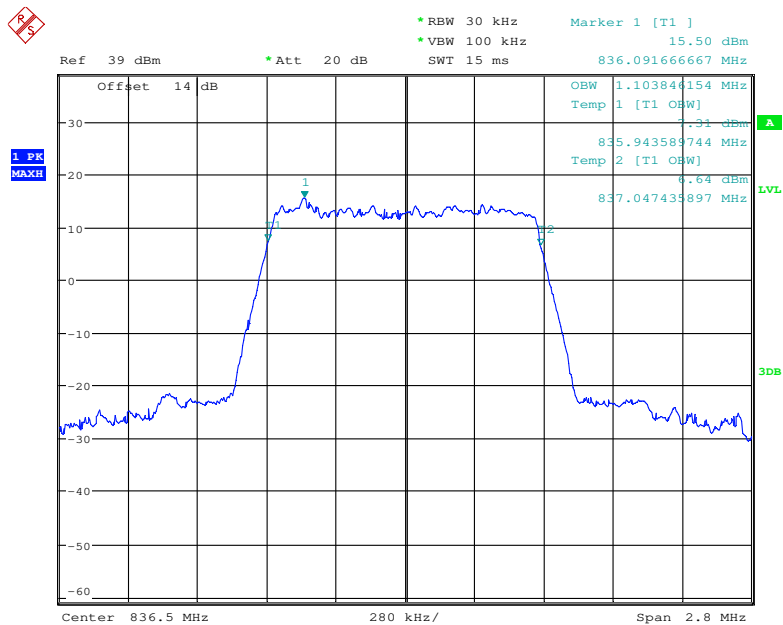
OBW 1.099358974 MHz
Temp 1 [T1 OBW] 4.75 dBm
835.948076923 MHz
Temp 2 [T1 OBW] .44 dBm
837.047435897 MHz

1 PK
MAXH

1
2

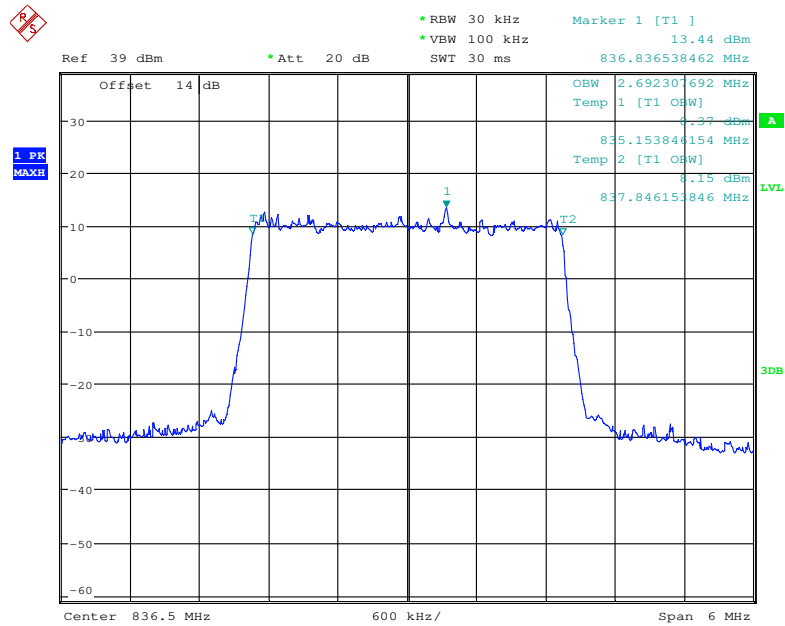
Center 836.5 MHz 280 kHz/ Span 2.8 MHz

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



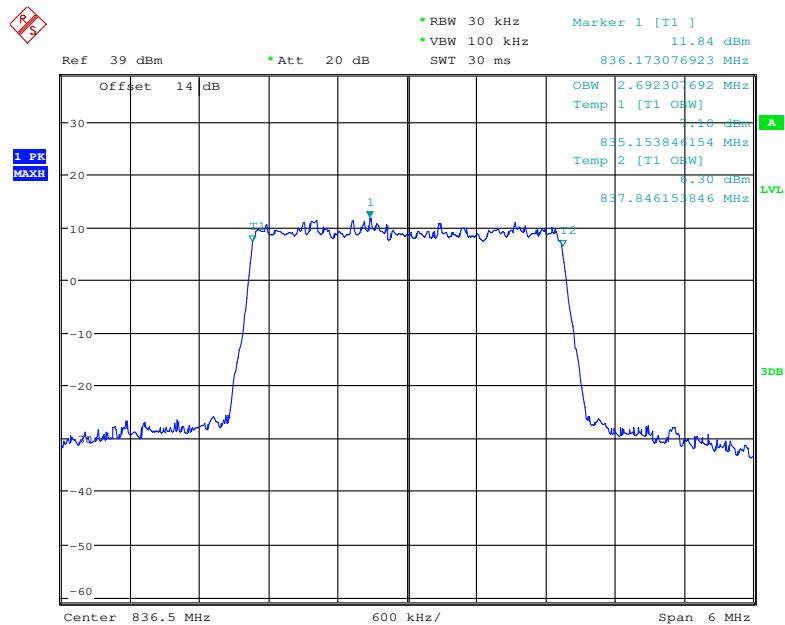
Page 53 of 145

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



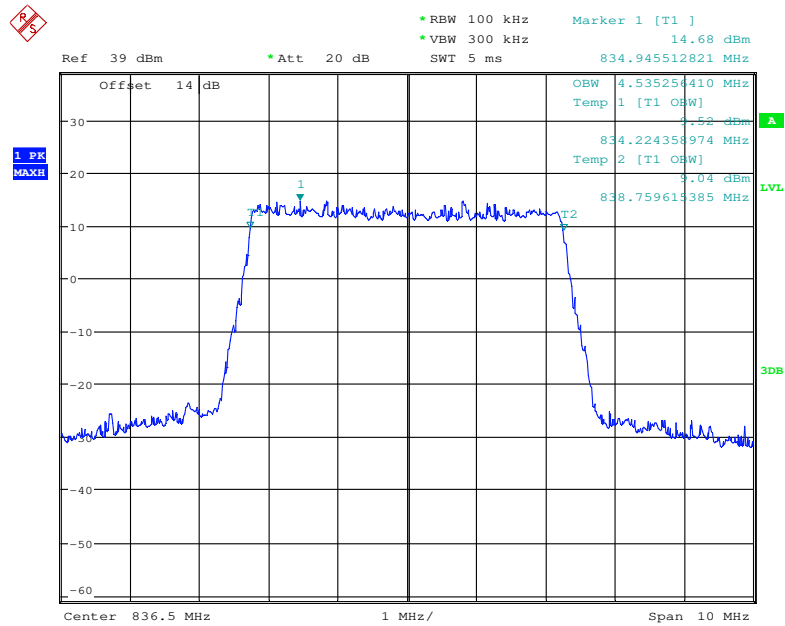
Date: 25.JAN.2018 21:12:42

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



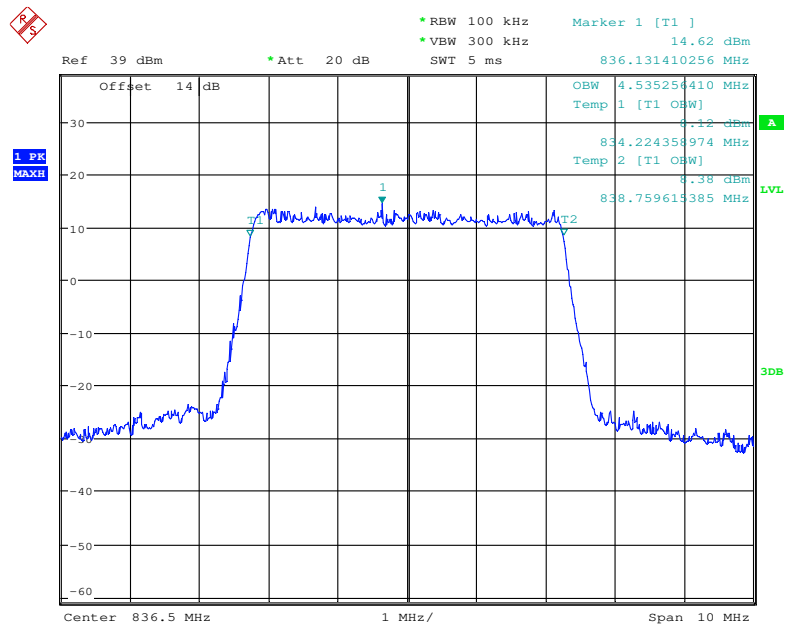
Date: 25.JAN.2018 21:11:31

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



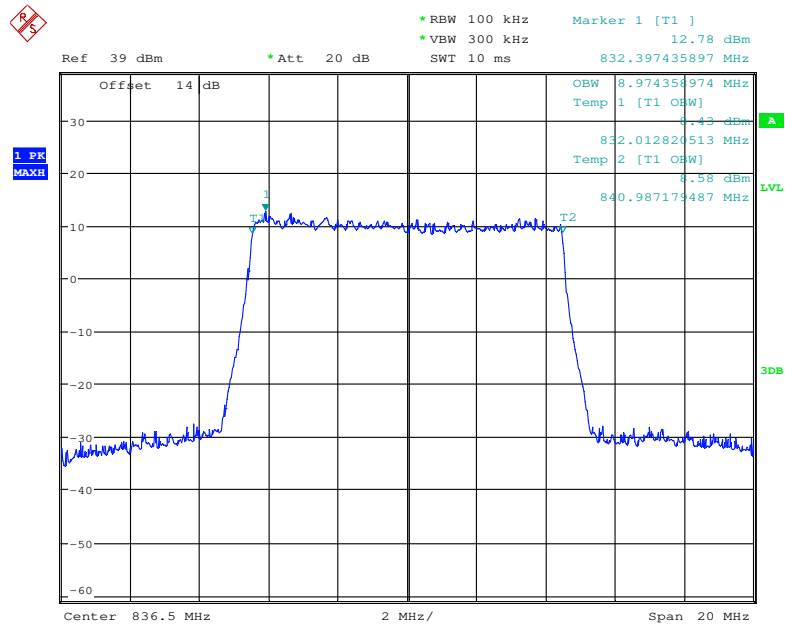
Date: 25.JAN.2018 21:14:07

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



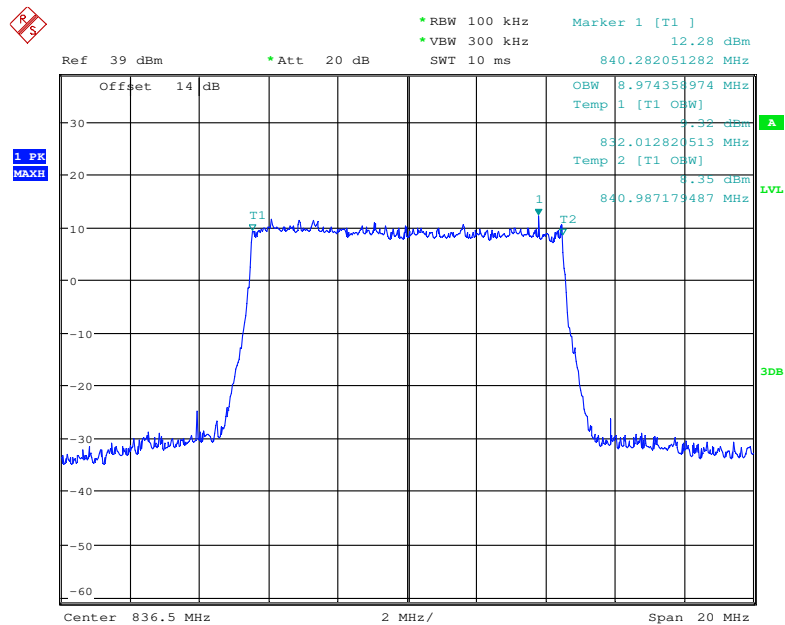
Date: 25.JAN.2018 21:15:17

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



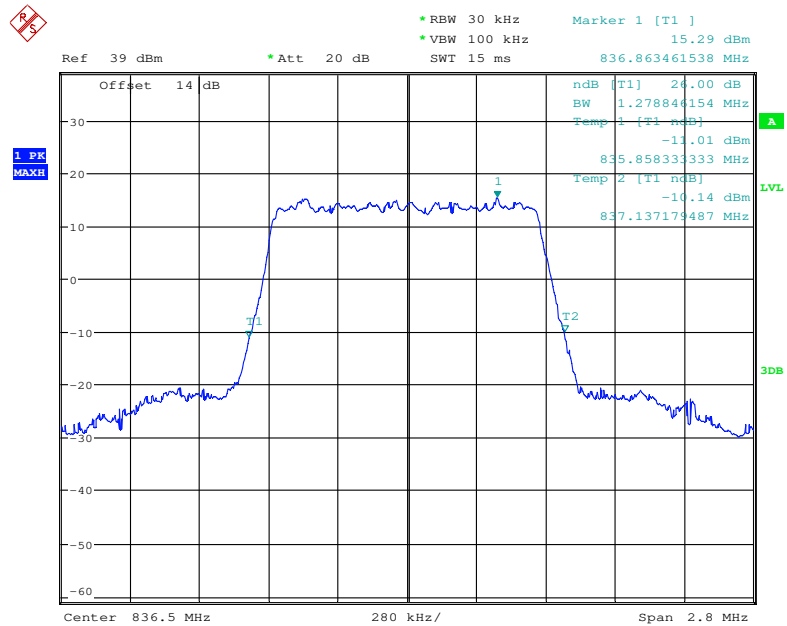
Date: 25.JAN.2018 21:22:35

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



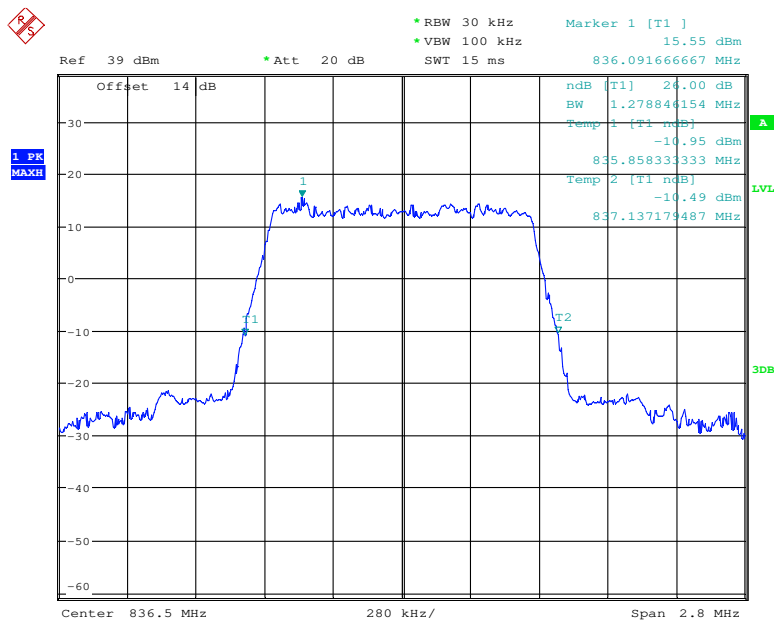
Date: 25.JAN.2018 21:24:06

QPSK (1.4 MHz) - 26 dB Bandwidth, Middle channel



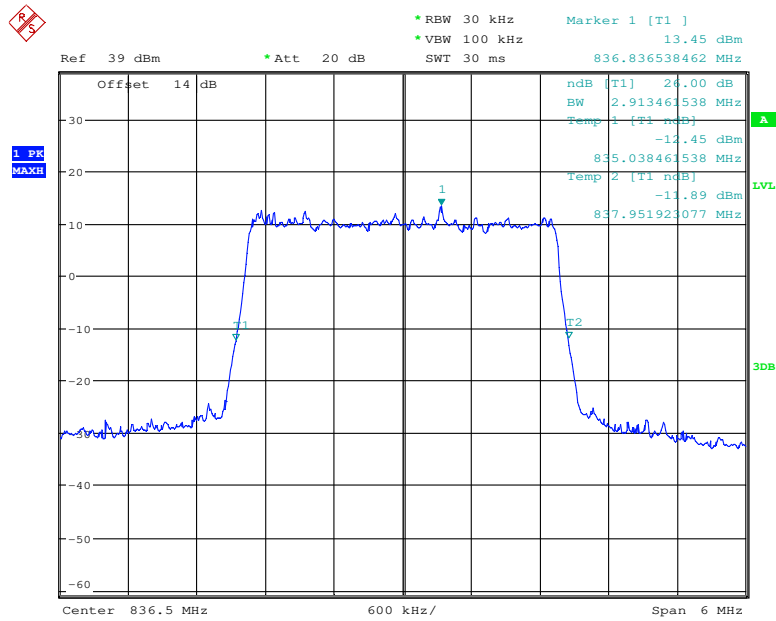
Date: 25.JAN.2018 21:06:21

16-QAM (1.4 MHz) - 26 dB Bandwidth, Middle channel



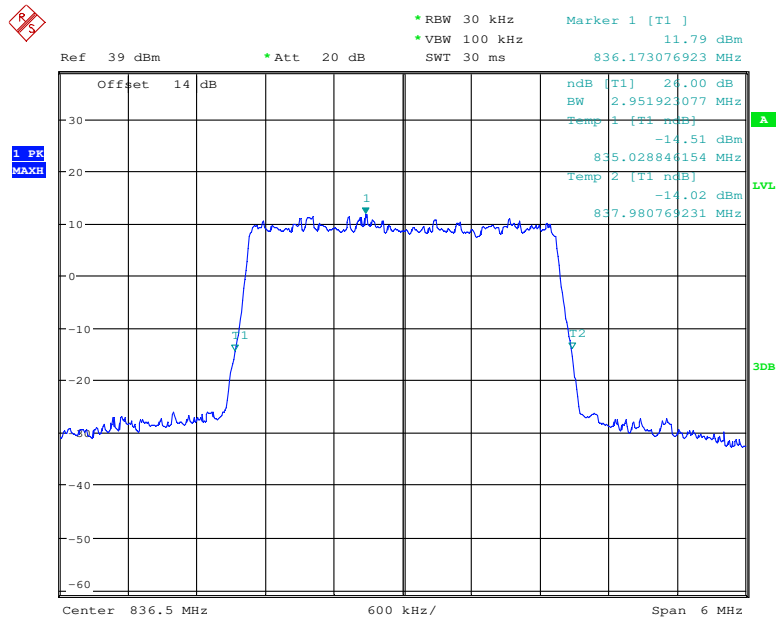
Date: 25.JAN.2018 21:07:43

QPSK (3.0 MHz) - 26 dB Bandwidth, Middle channel



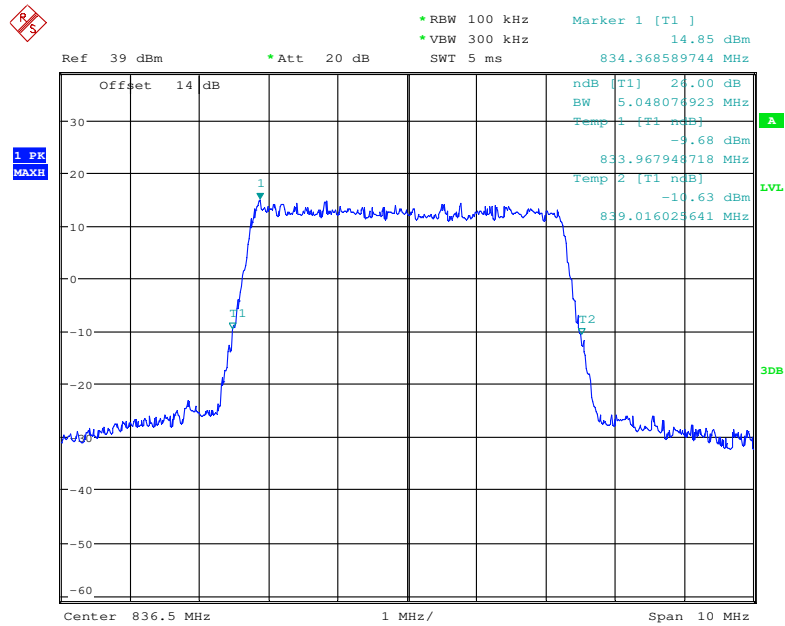
Date: 25.JAN.2018 21:09:14

16-QAM (3.0 MHz) - 26 dB Bandwidth, Middle channel



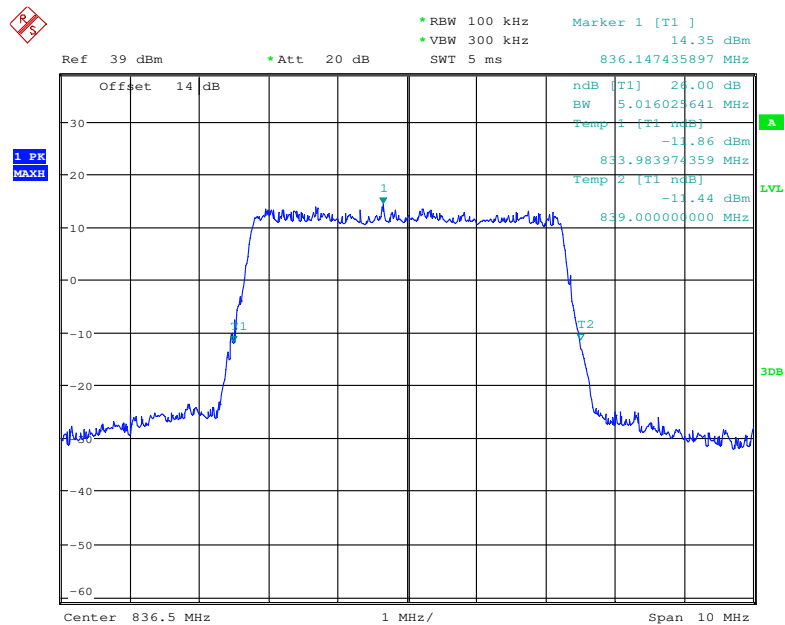
Date: 25.JAN.2018 21:10:41

QPSK (5.0 MHz) - 26 dB Bandwidth, Middle channel

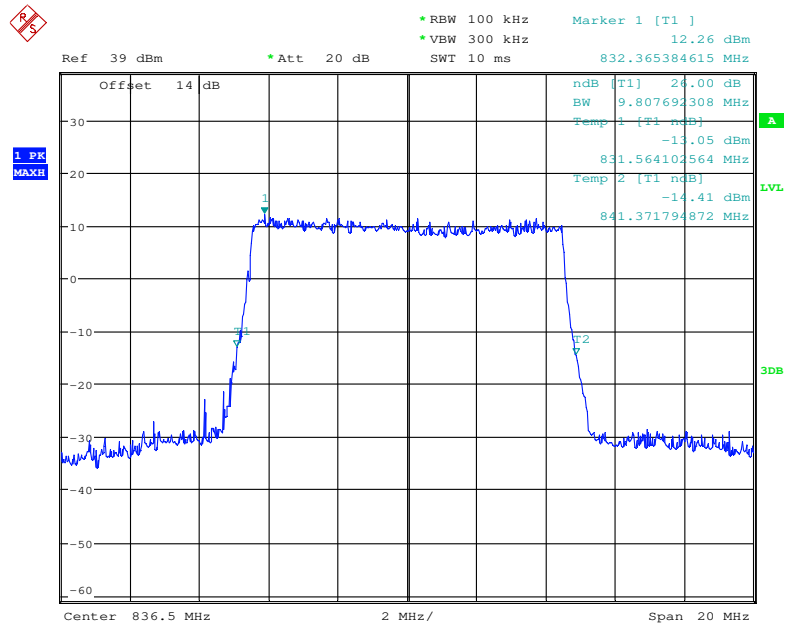


Date: 25.JAN.2018 21:17:11

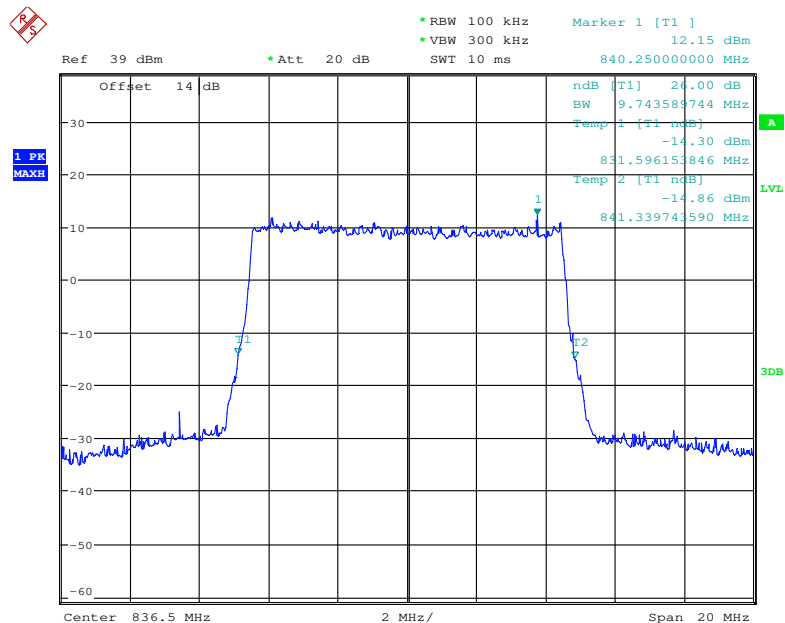
16-QAM (5.0 MHz) - 26 dB Bandwidth, Middle channel



Date: 25.JAN.2018 21:16:14

QPSK (10.0 MHz) - 26 dB Bandwidth, Middle channel

Date: 25.JAN.2018 21:19:46

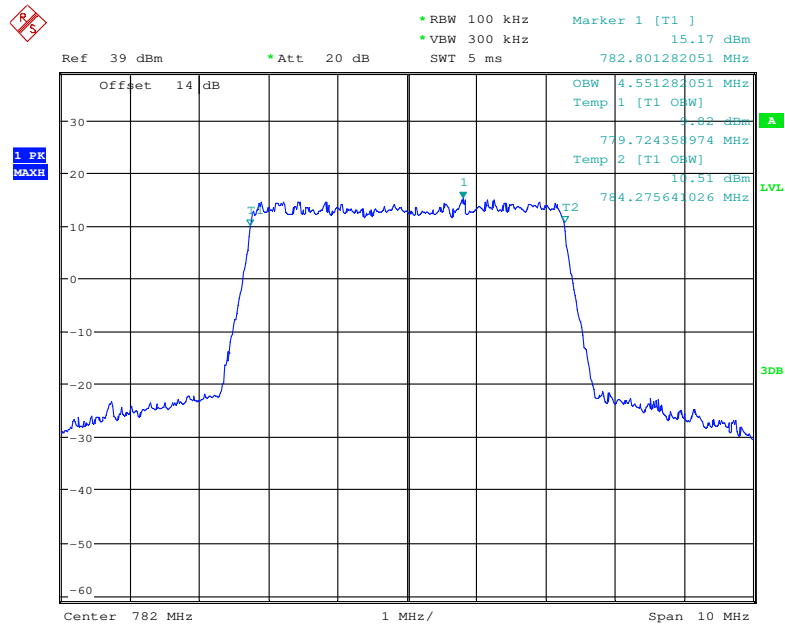
16-QAM (10.0 MHz) - 26 dB Bandwidth, Middle channel

Date: 25.JAN.2018 21:18:51

LTE Band 13: (Middle Channel)

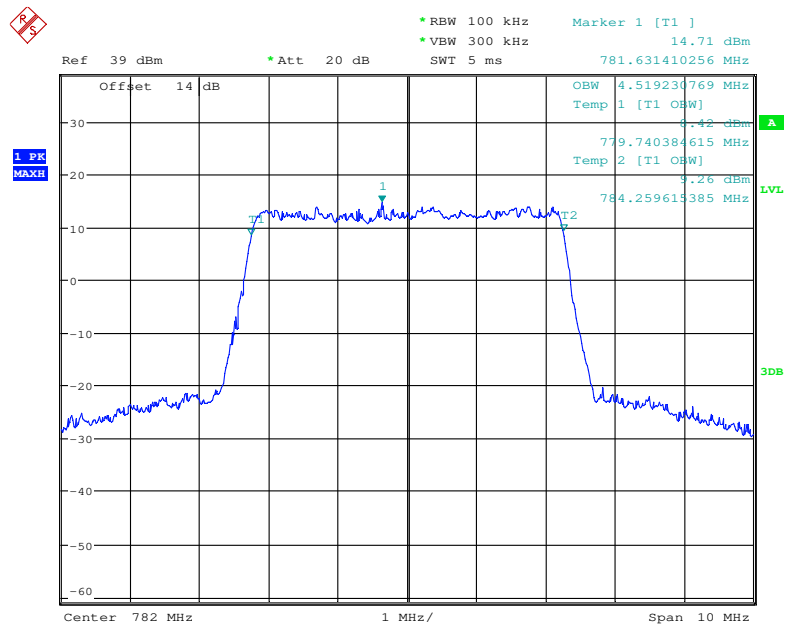
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.551	5.080
	16QAM	4.519	5.064
10.0	QPSK	8.974	9.776
	16QAM	8.974	9.808

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



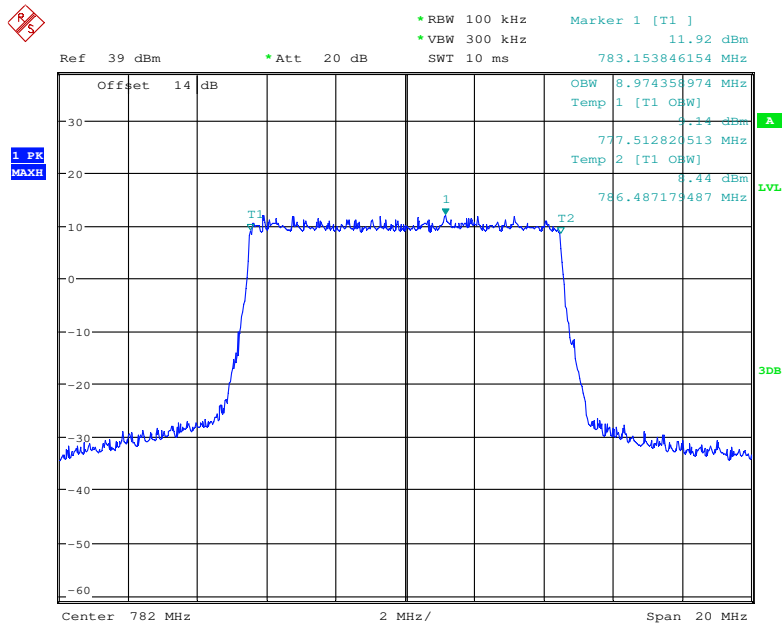
Date: 25.JAN.2018 21:32:43

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



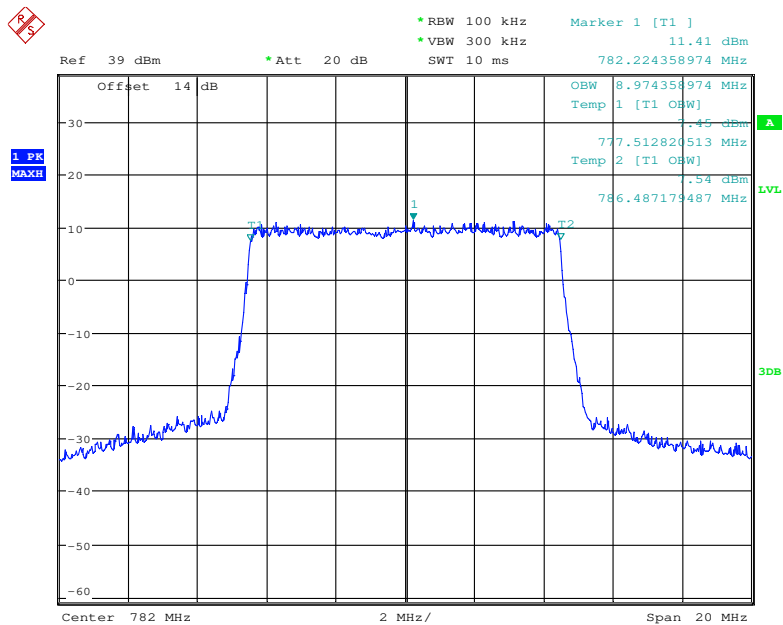
Date: 25.JAN.2018 21:31:38

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



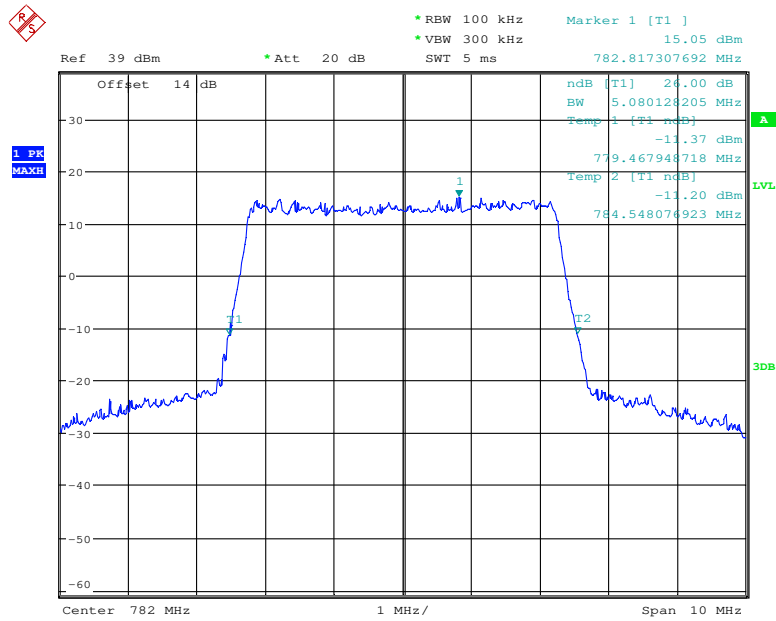
Date: 25.JAN.2018 21:27:20

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



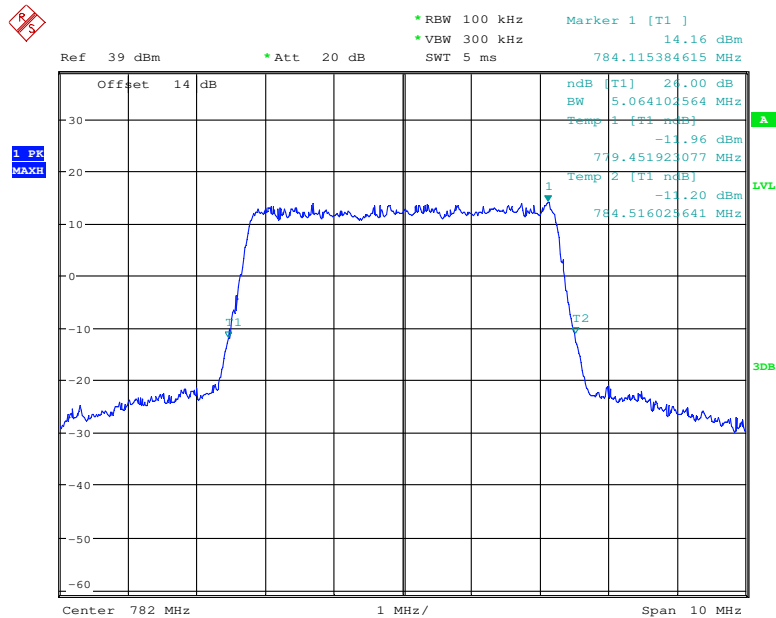
Date: 25.JAN.2018 21:26:37

QPSK (5.0 MHz) - 26 dB Bandwidth, Middle channel



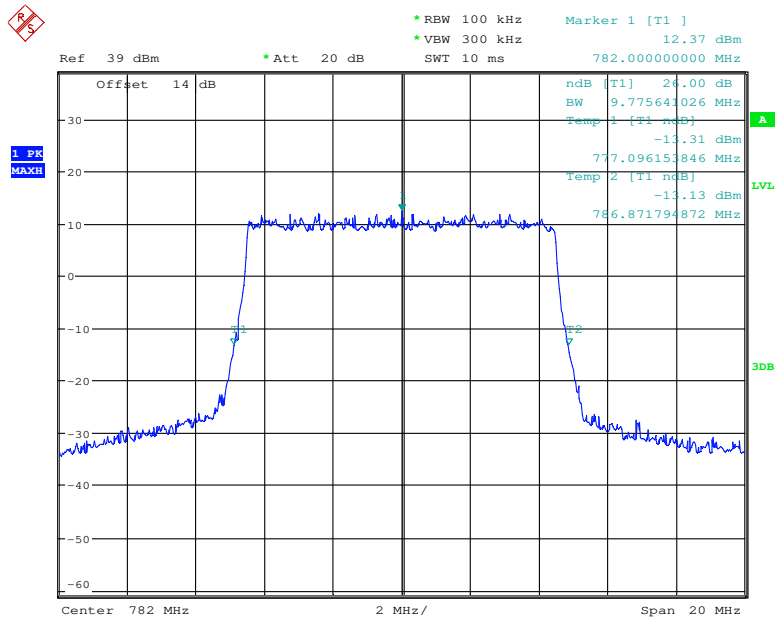
Date: 25.JAN.2018 21:29:46

16QAM (5.0 MHz) - 26 dB Bandwidth, Middle channel



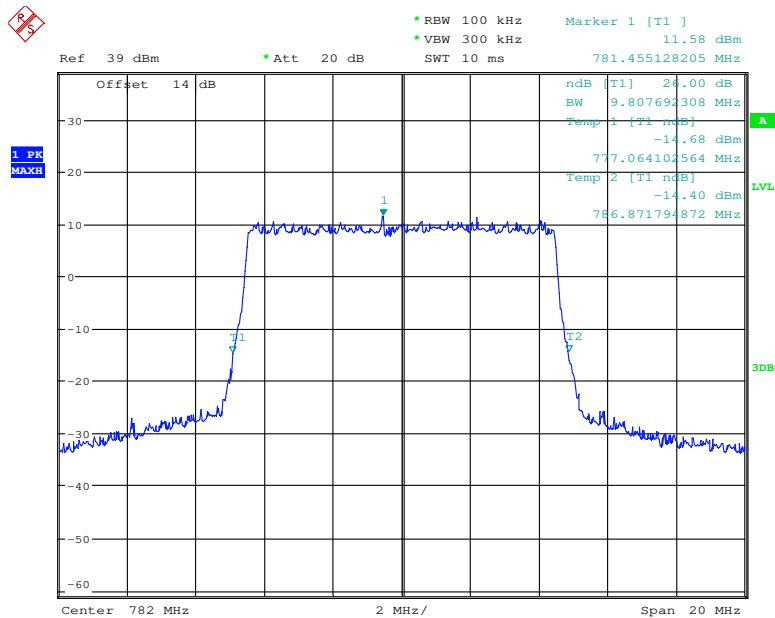
Date: 25.JAN.2018 21:30:37

QPSK (10.0 MHz) - 26 dB Bandwidth, Middle channel



Date: 25.JAN.2018 21:27:58

16QAM (10.0 MHz) - 26 dB Bandwidth, Middle channel

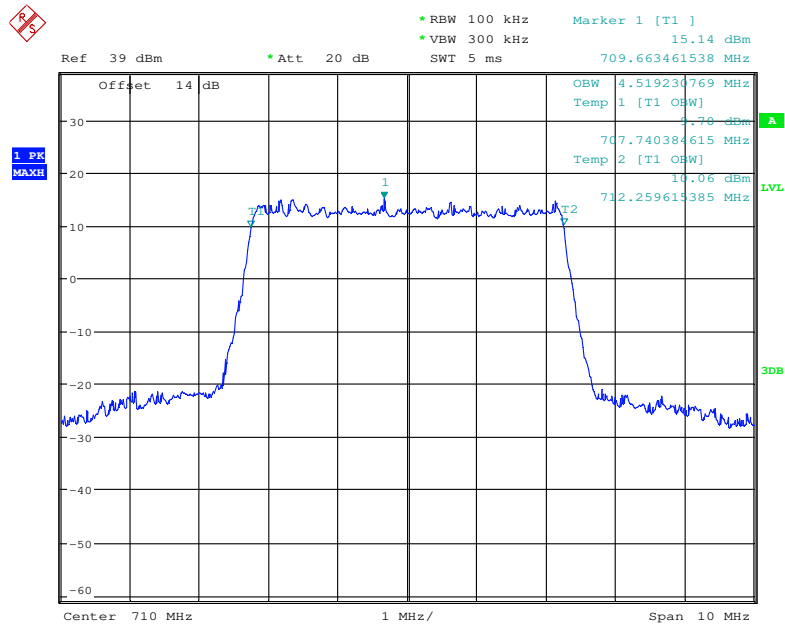


Date: 25.JAN.2018 21:28:39

LTE Band 17: (Middle Channel)

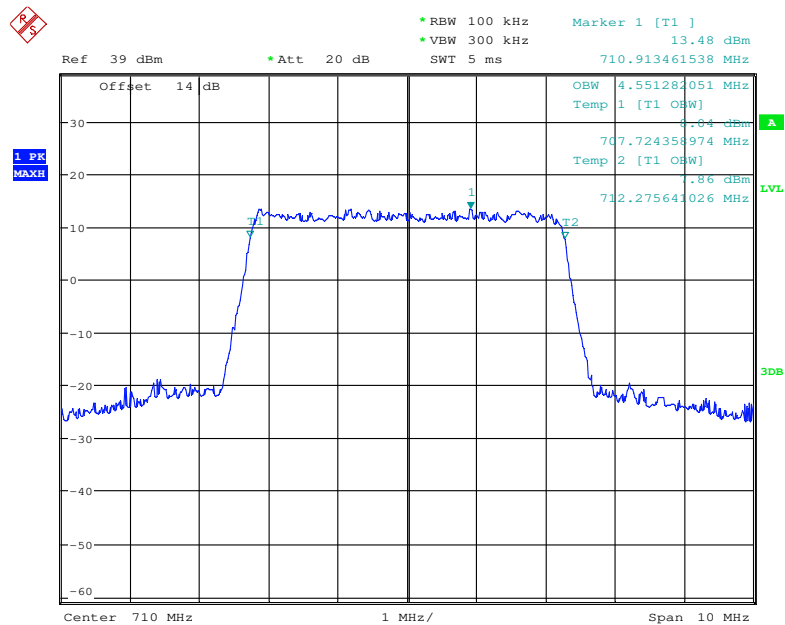
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.519	5.064
	16QAM	4.551	5.096
10.0	QPSK	8.974	9.712
	16QAM	8.974	9.712

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



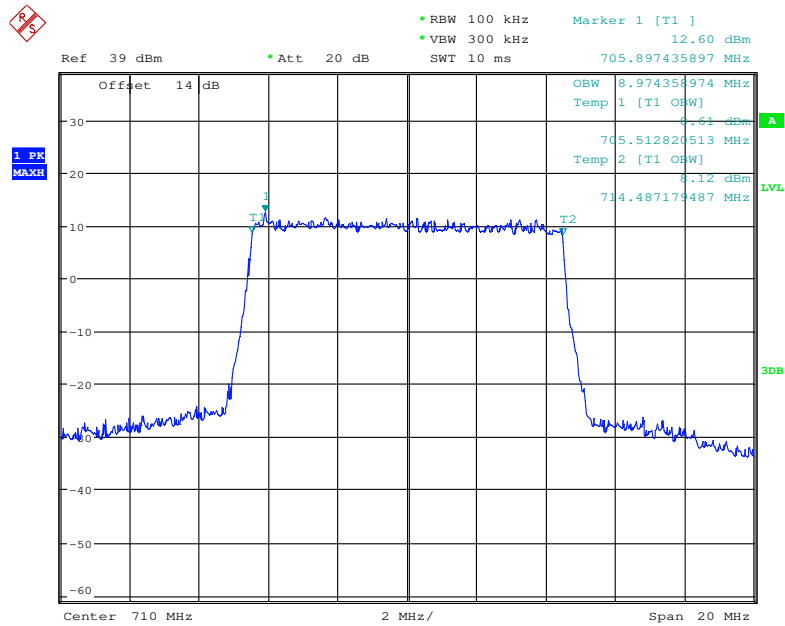
Date: 25.JAN.2018 21:34:18

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



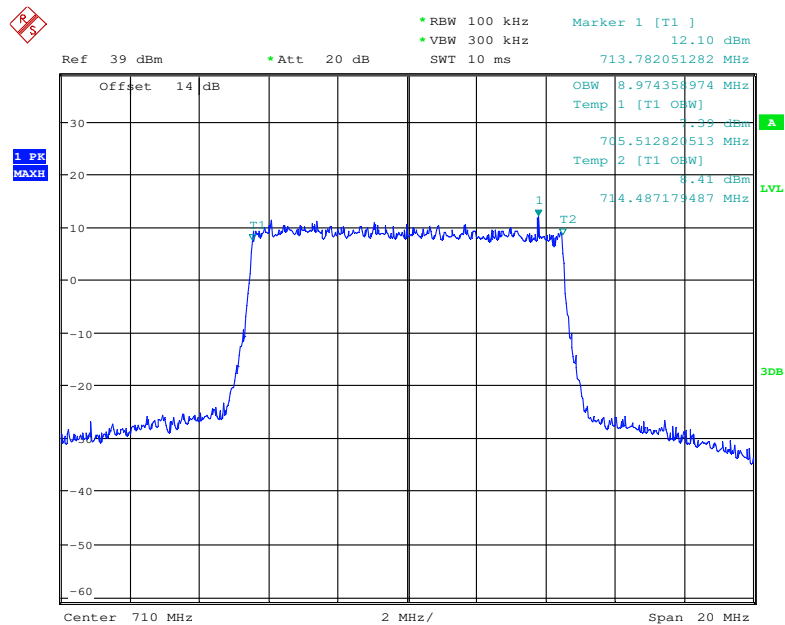
Date: 25.JAN.2018 21:35:22

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



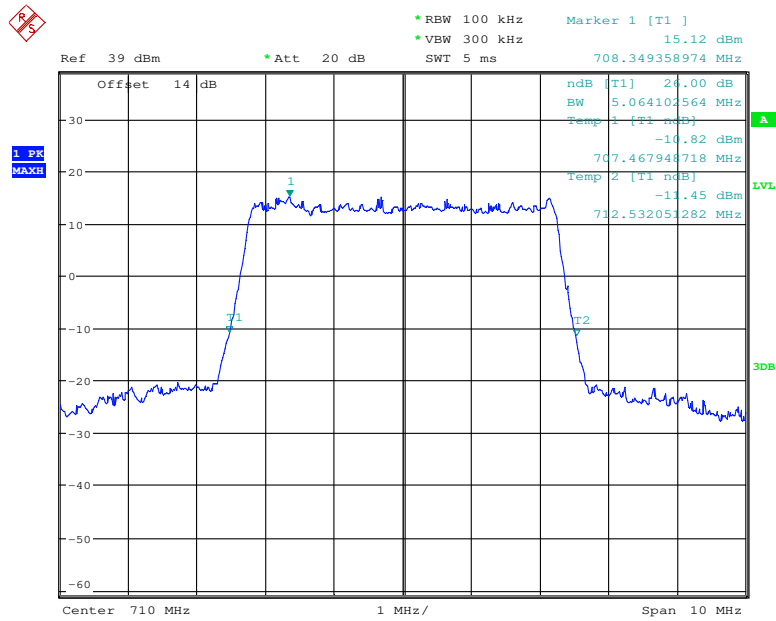
Date: 25.JAN.2018 21:40:29

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



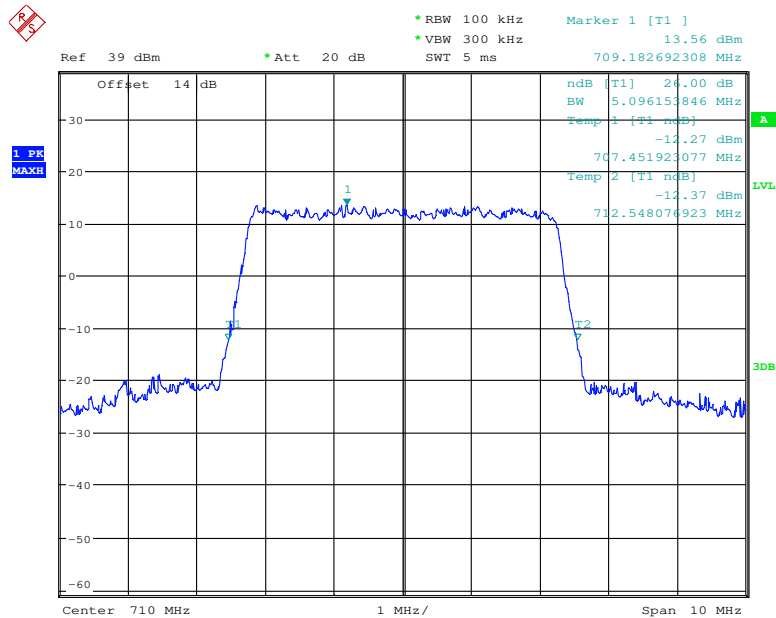
Date: 25.JAN.2018 21:41:16

QPSK (5.0 MHz) - 26 dB Bandwidth, Middle channel



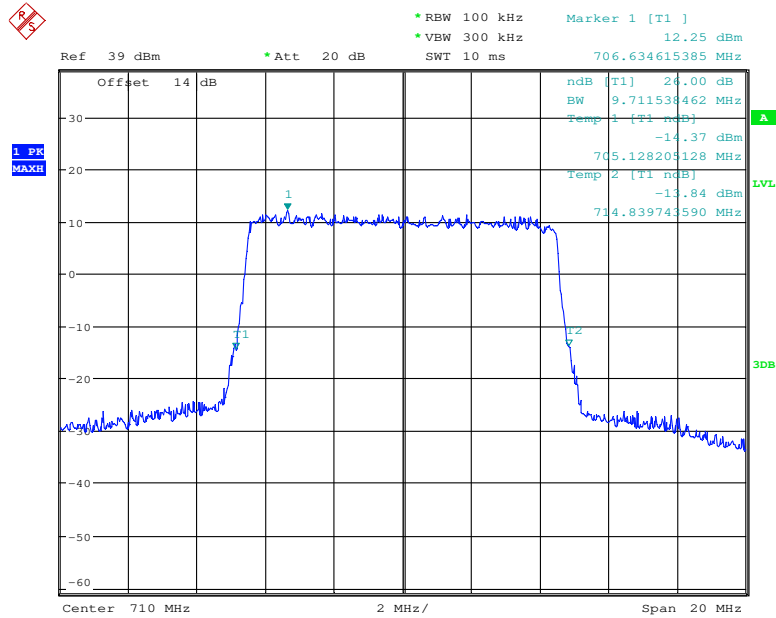
Date: 25.JAN.2018 21:37:20

16QAM (5.0 MHz) - 26 dB Bandwidth, Middle channel



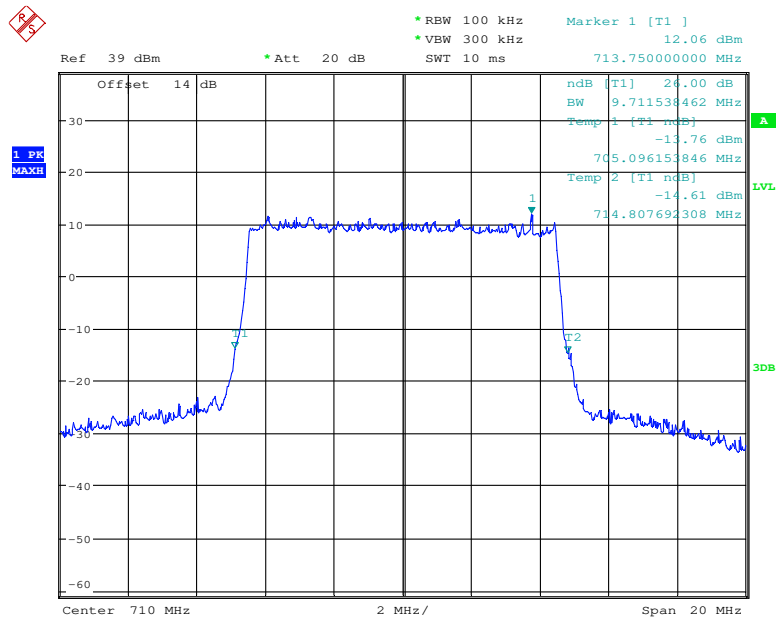
Date: 25.JAN.2018 21:36:09

QPSK (10.0 MHz) - 26 dB Bandwidth, Middle channel



Date: 25.JAN.2018 21:39:46

16QAM (10.0 MHz) - 26 dB Bandwidth, Middle channel



Date: 25.JAN.2018 21:38:51

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

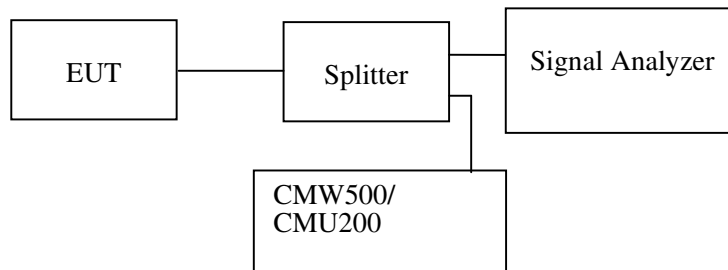
Applicable Standard

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 Tracy Hu from 2018-01-25 to 2018-01-26.

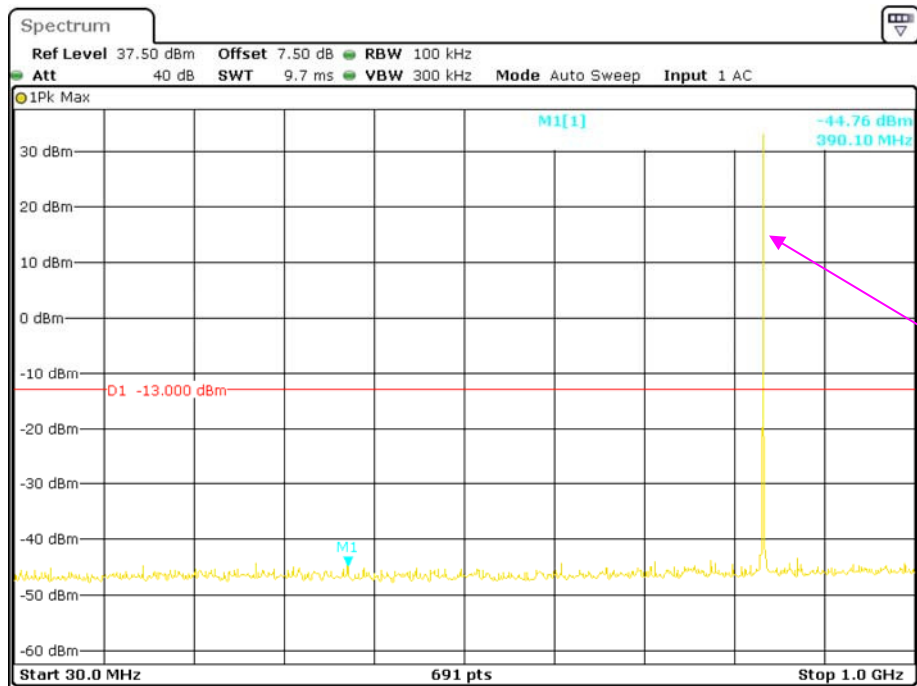
Test result: Compliance,

EUT operation mode: transmitting

Please refer to the following plots.

Cellular Band (Part 22H)

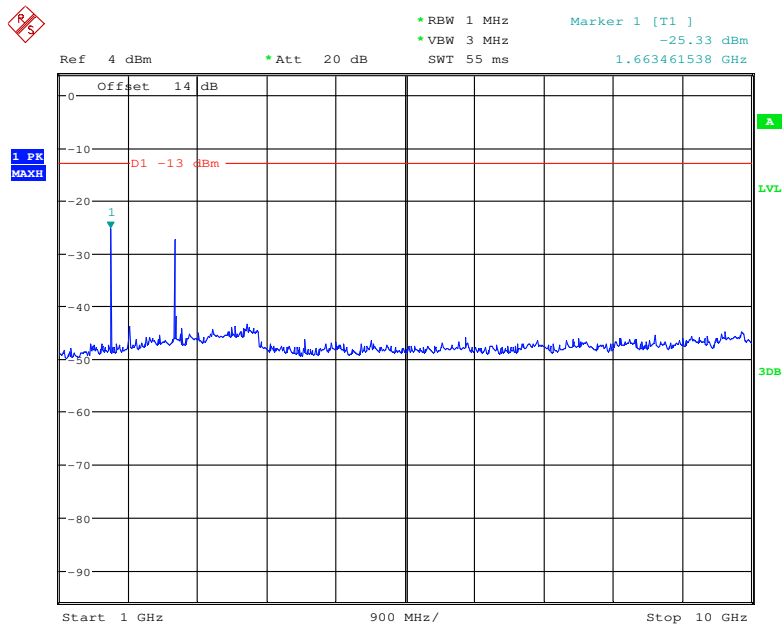
30 MHz – 1 GHz (GSM Mode)



Date: 25.JAN.2018 15:13:47

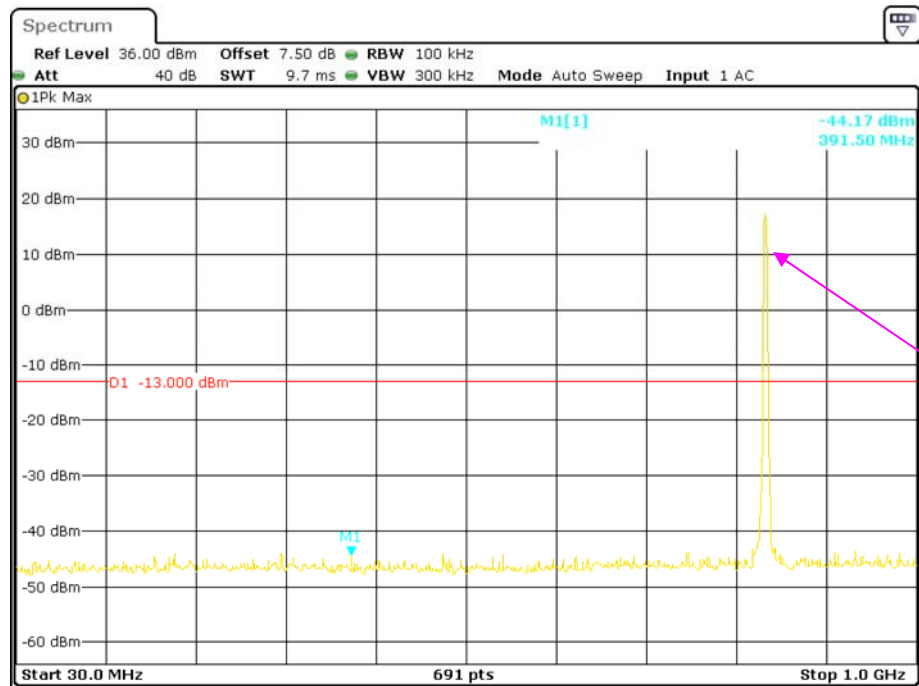
Fundamental test

1 GHz – 10 GHz (GSM Mode)



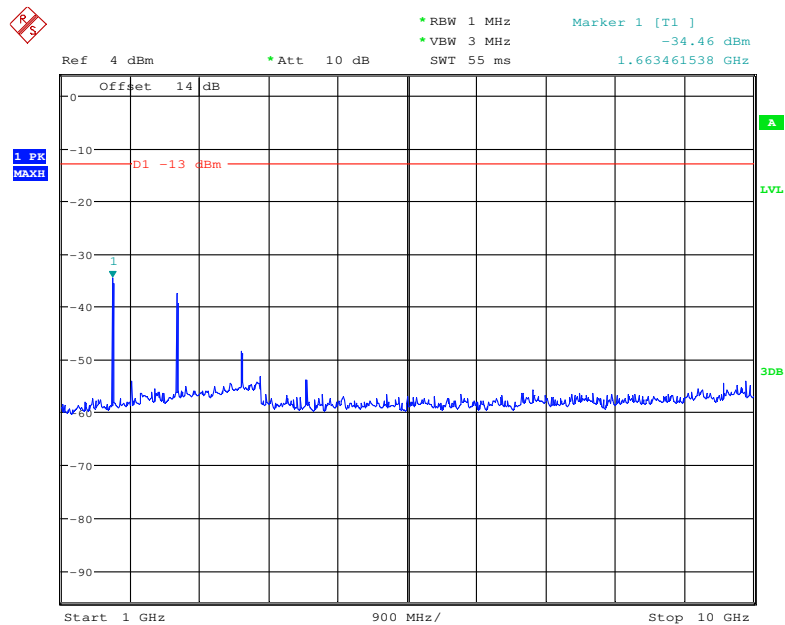
Date: 26.JAN.2018 22:24:35

30 MHz – 1 GHz (WCDMA Mode)



Date: 25.JAN.2018 16:00:38

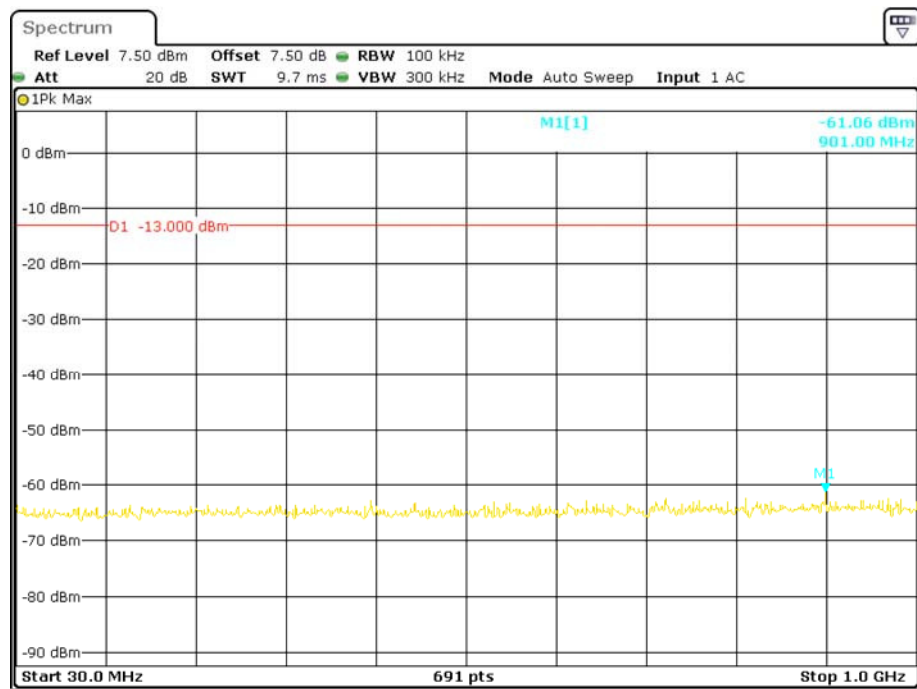
1 GHz – 10 GHz (WCDMA Mode)



Date: 26.JAN.2018 22:26:02

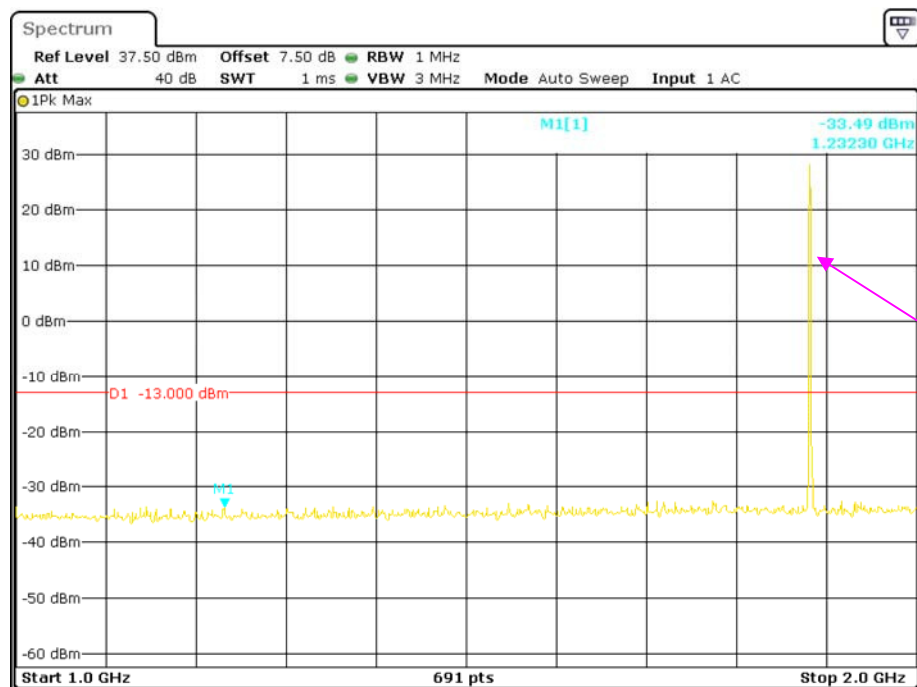
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



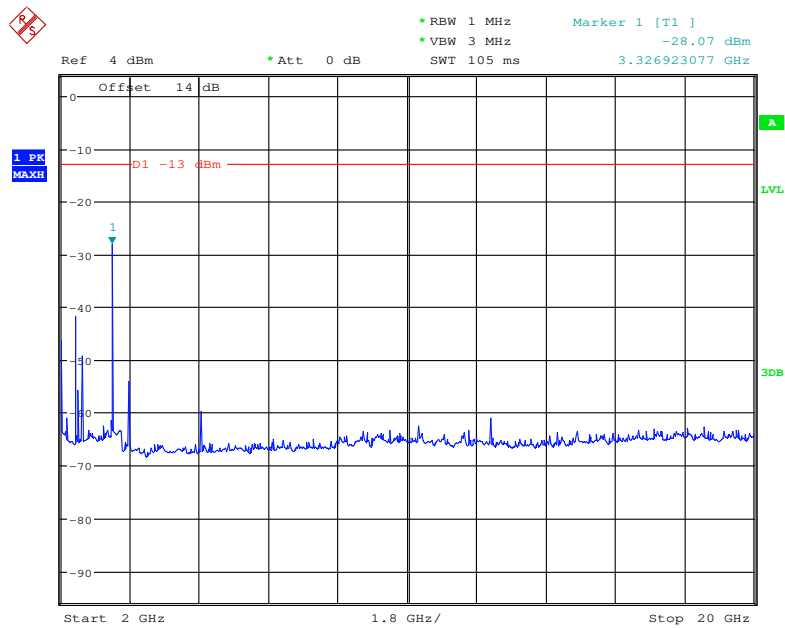
Date: 25.JAN.2018 15:32:06

1 GHz – 2 GHz (GSM Mode)



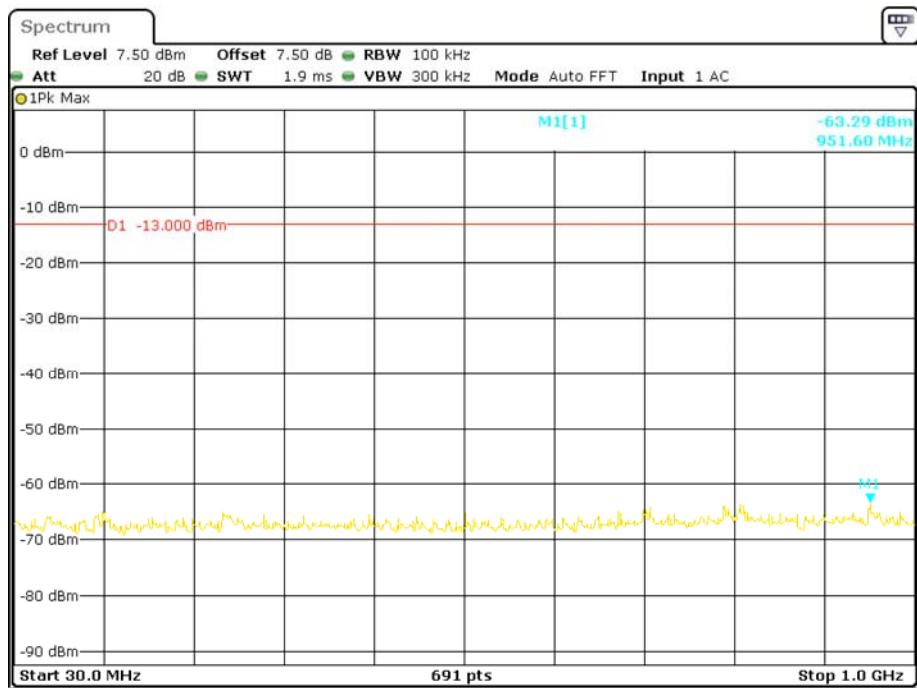
Date: 25.JAN.2018 15:32:54

2 GHz – 20 GHz (GSM Mode)



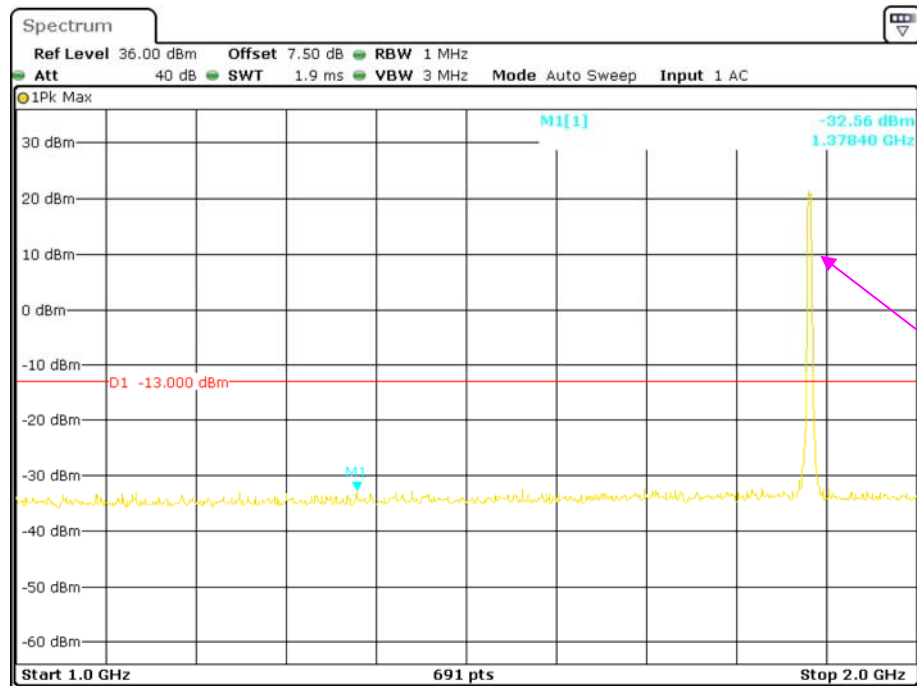
Date: 26.JAN.2018 22:21:53

30 MHz – 1 GHz (WCDMA Mode)



Date: 25.JAN.2018 15:51:42

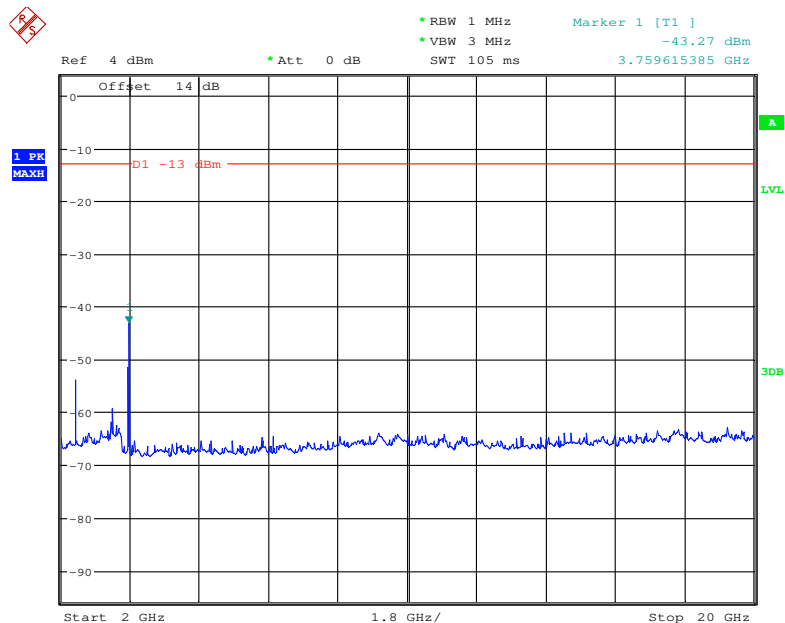
1 GHz – 2 GHz (WCDMA Mode)



Date: 25.JAN.2018 15:52:34

Fundamental test

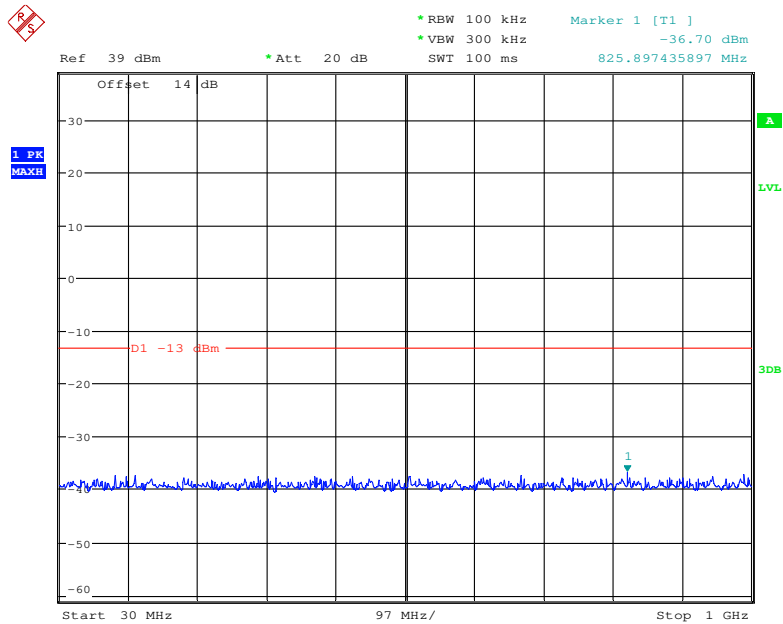
2 GHz – 20 GHz (WCDMA Mode)



Date: 26.JAN.2018 22:26:53

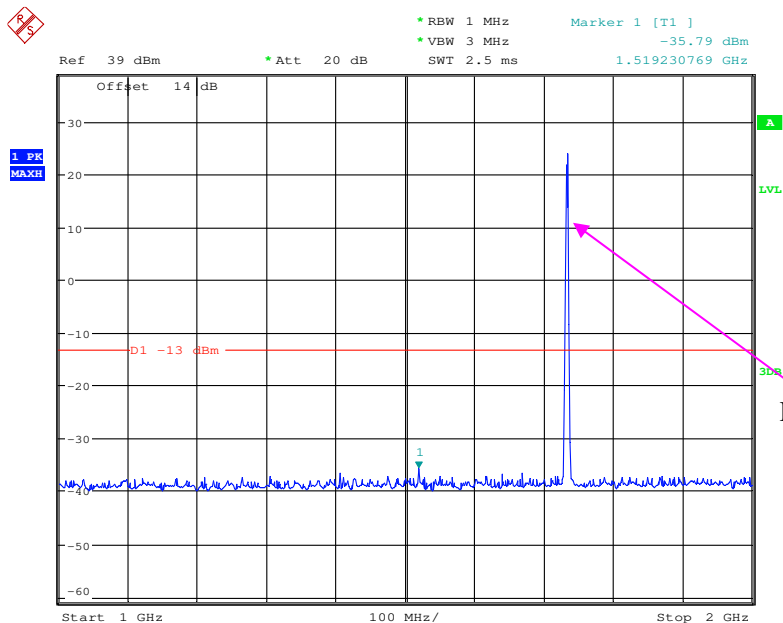
LTE Band 4: (QPSK)

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



Date: 25.JAN.2018 23:40:32

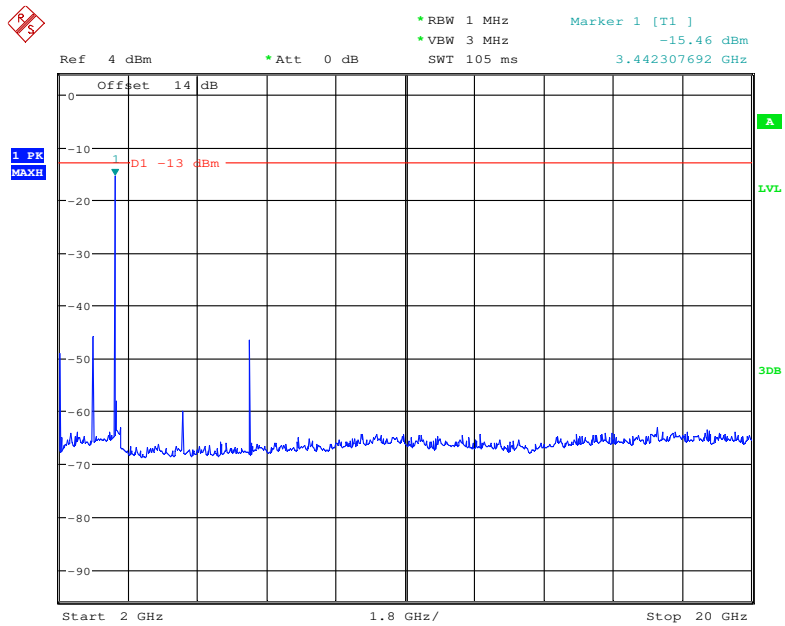
1 GHz - 2 GHz (1.4 MHz, Middle Channel)



Fundamental test

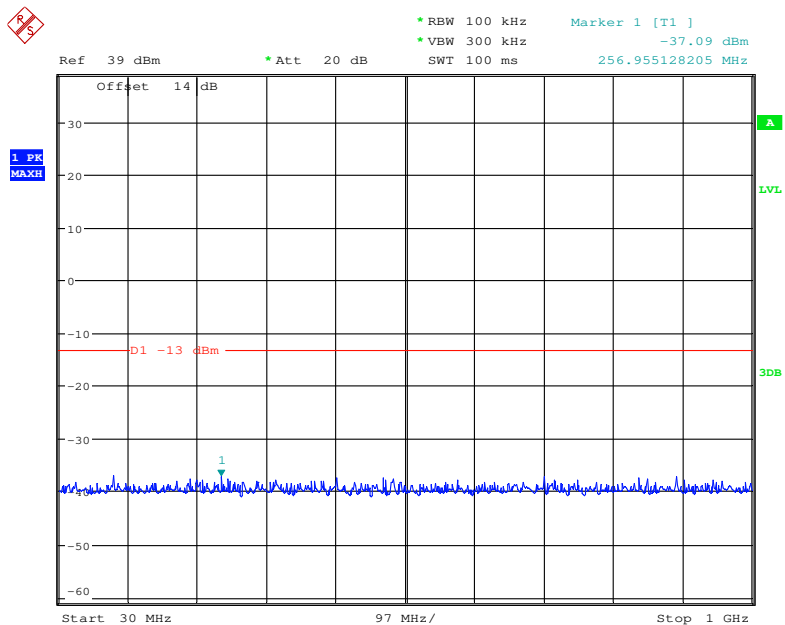
Date: 25.JAN.2018 23:45:43

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



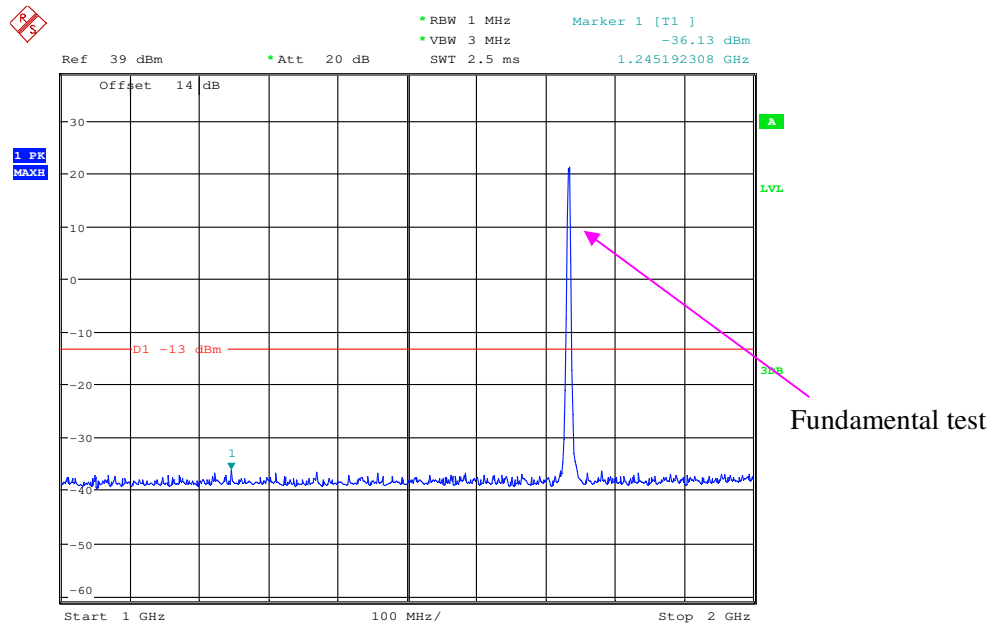
Date: 25.JAN.2018 23:44:20

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



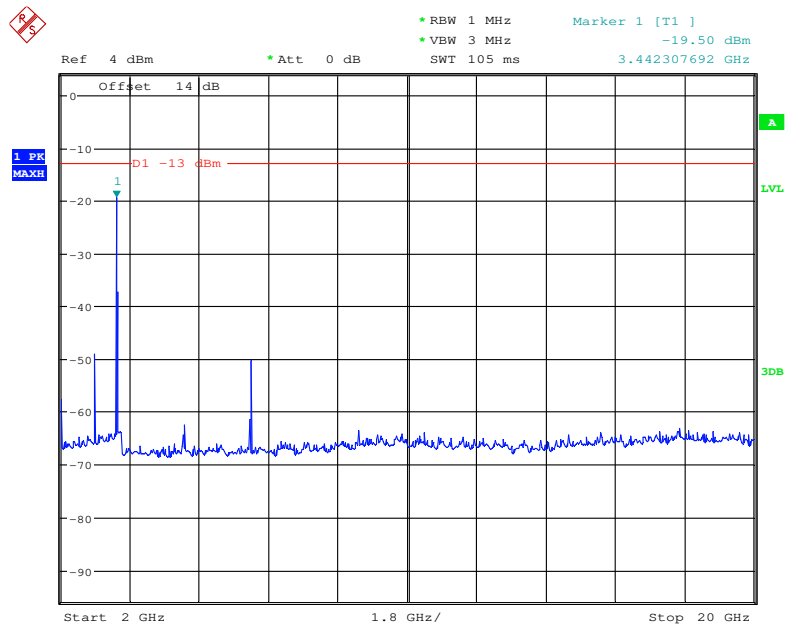
Date: 25.JAN.2018 23:41:00

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



Date: 25.JAN.2018 23:46:42

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



Date: 25.JAN.2018 23:44:04

Ref 39 dBm * Att 20 dB * RBW 100 kHz * VBW 300 kHz * SWT 100 ms Marker 1 [T1] -36.49 dBm 190.112179487 MHz

Offset 14 dB

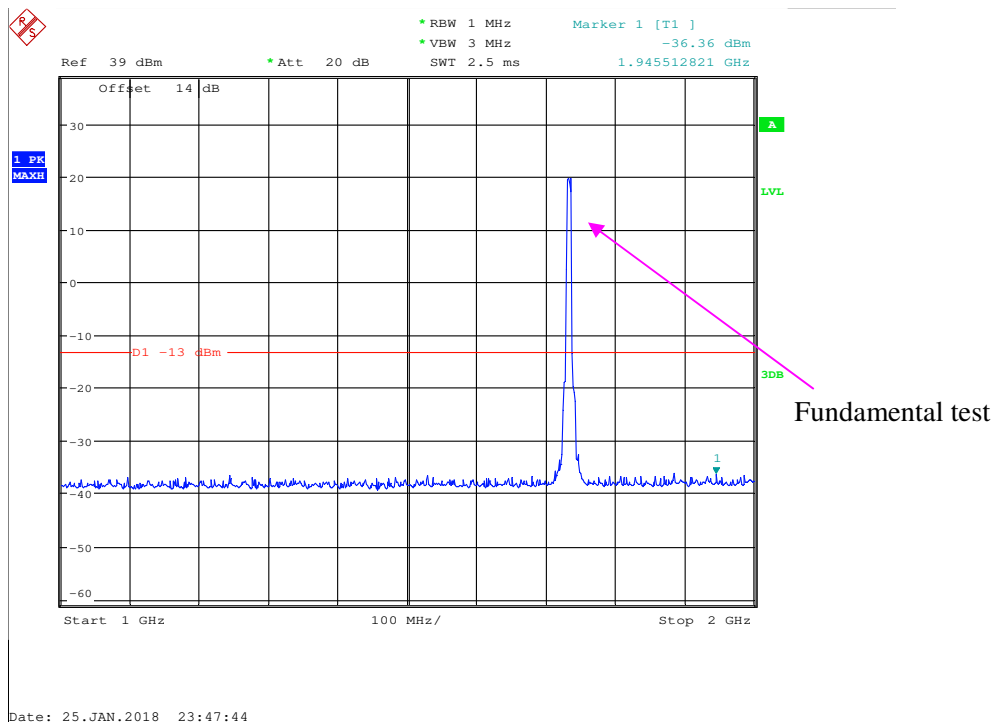
1 PK MAXH

D1 -13 dBm

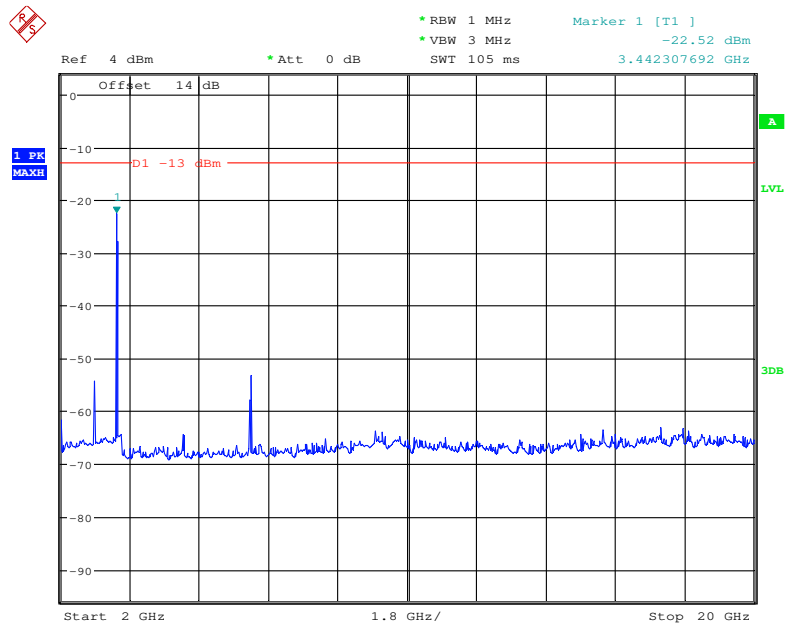
1

Start 30 MHz 97 MHz/ Stop 1 GHz

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

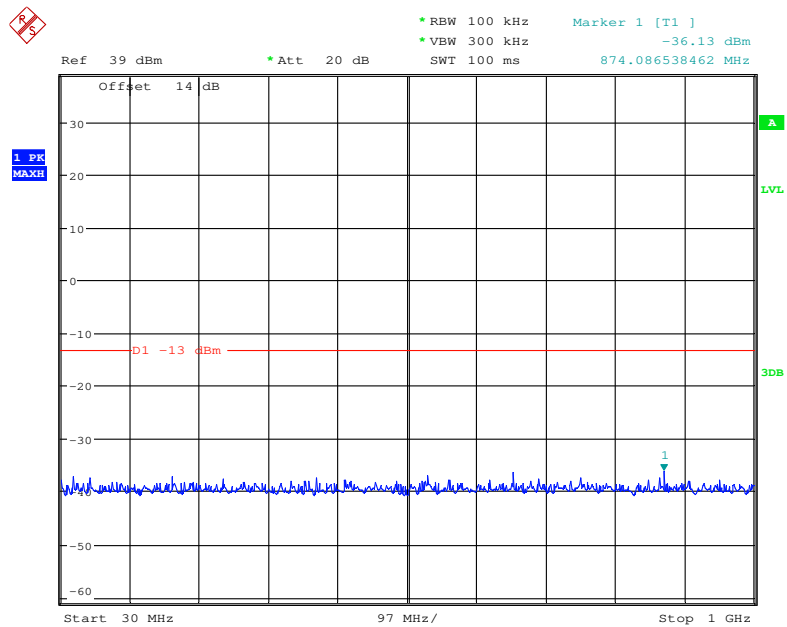


2 GHz - 20 GHz (5.0 MHz, Middle Channel)



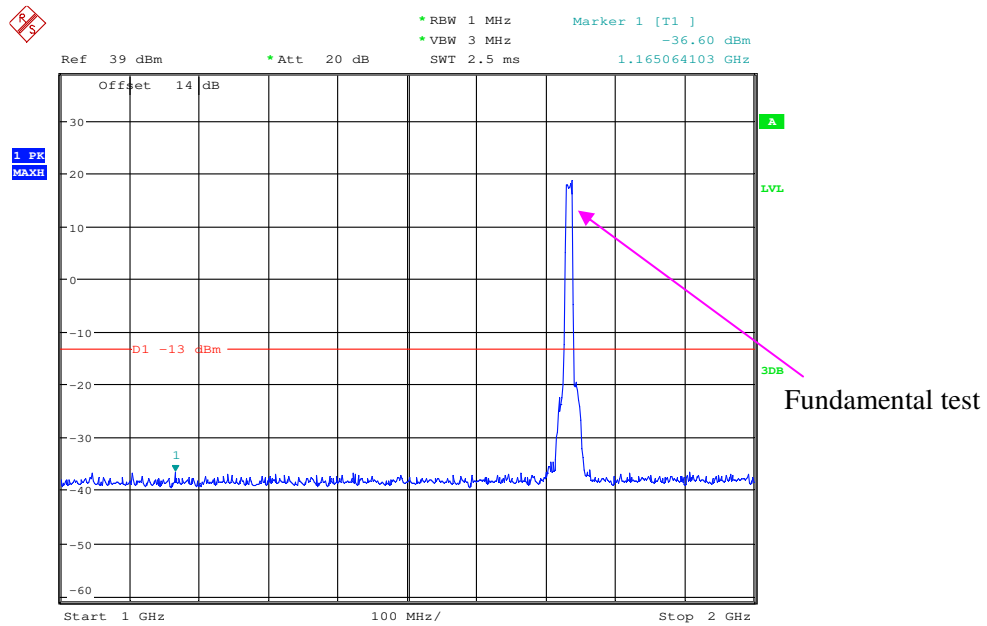
Date: 25.JAN.2018 23:43:49

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



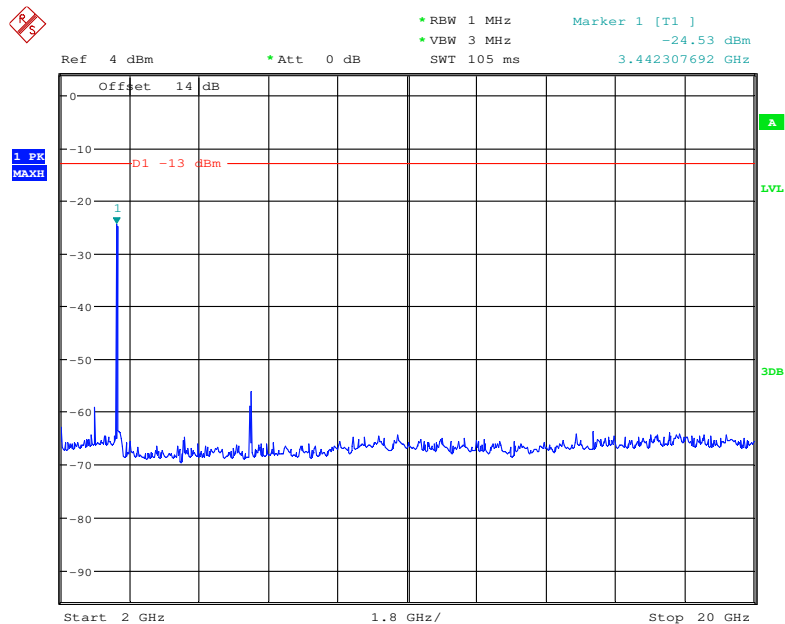
Date: 25.JAN.2018 23:41:34

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



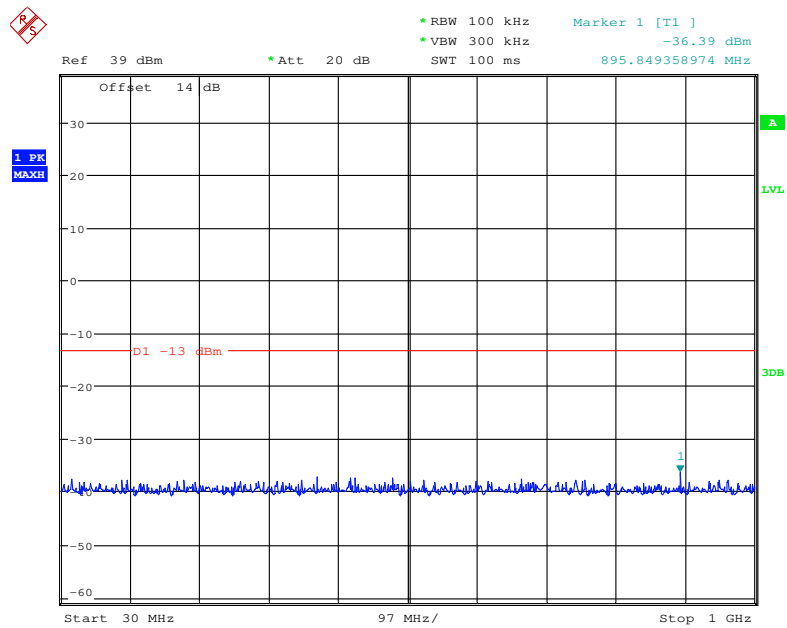
Date: 25.JAN.2018 23:48:52

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



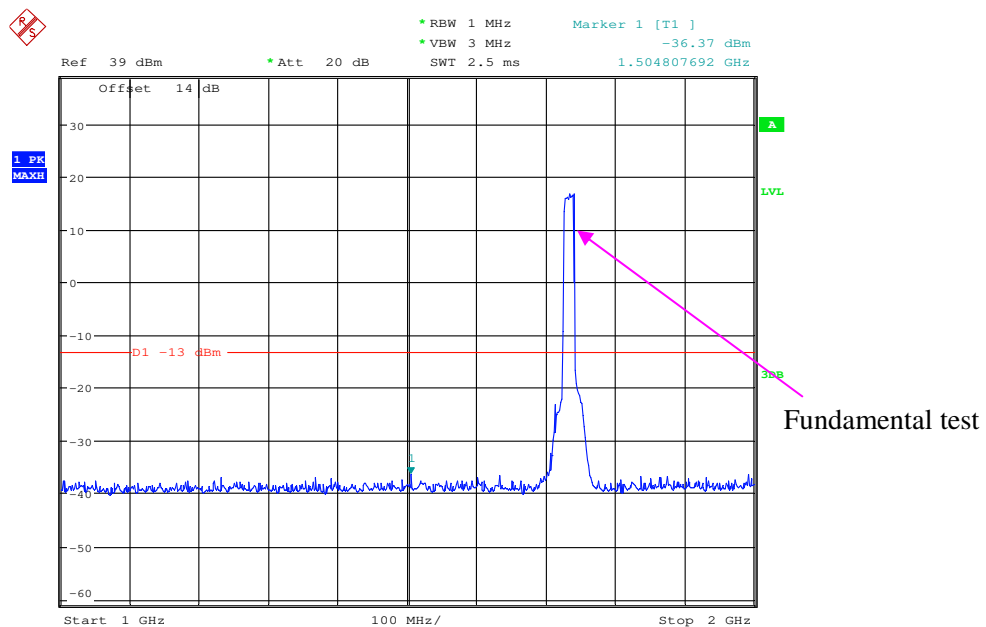
Date: 25.JAN.2018 23:43:35

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



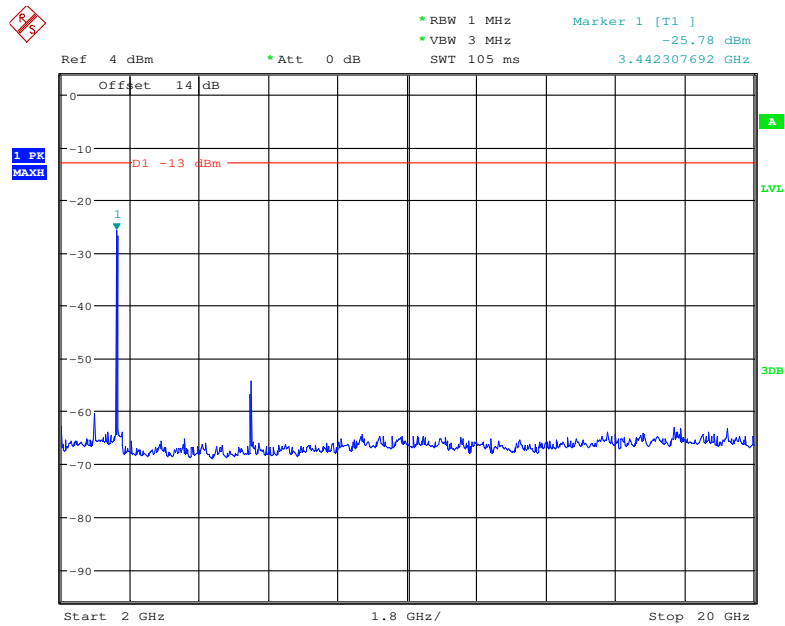
Date: 25.JAN.2018 23:42:03

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



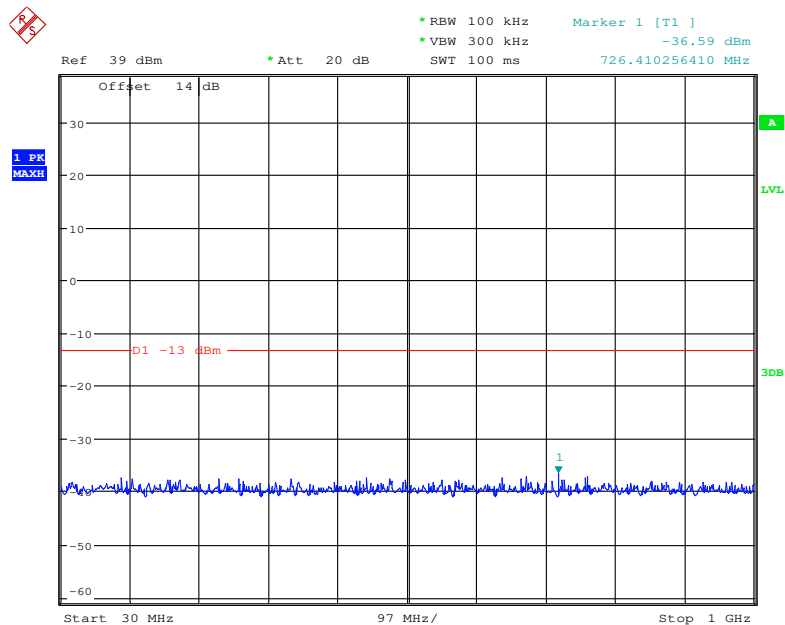
Date: 25.JAN.2018 23:49:25

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



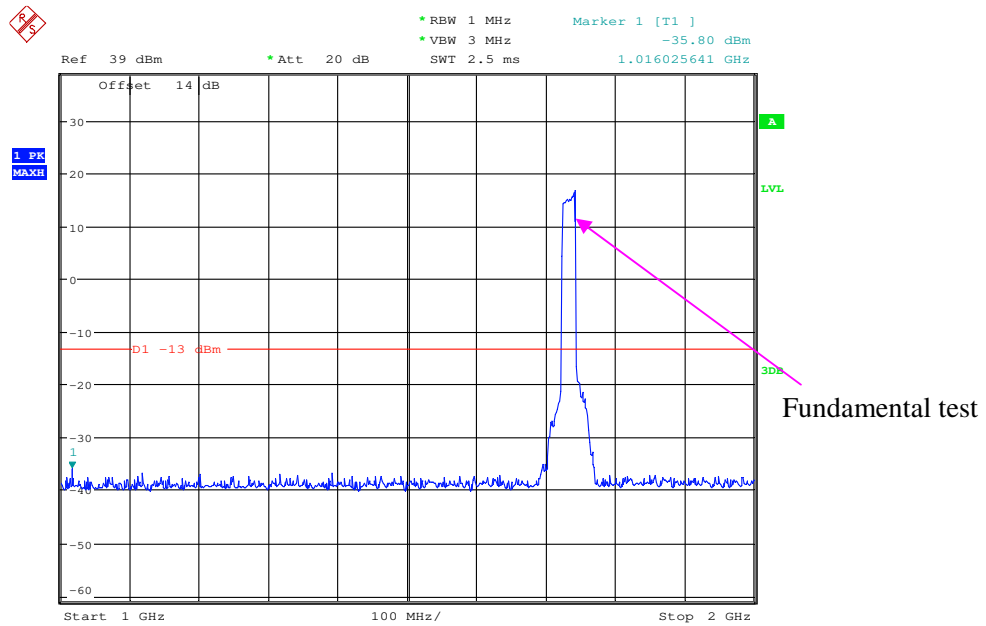
Date: 25.JAN.2018 23:43:23

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



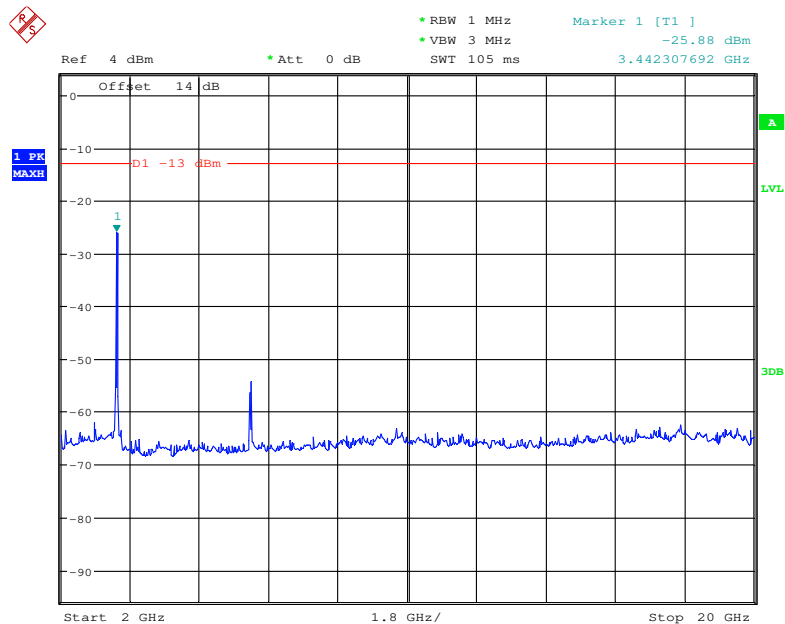
Date: 25.JAN.2018 23:42:16

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



Date: 25.JAN.2018 23:49:58

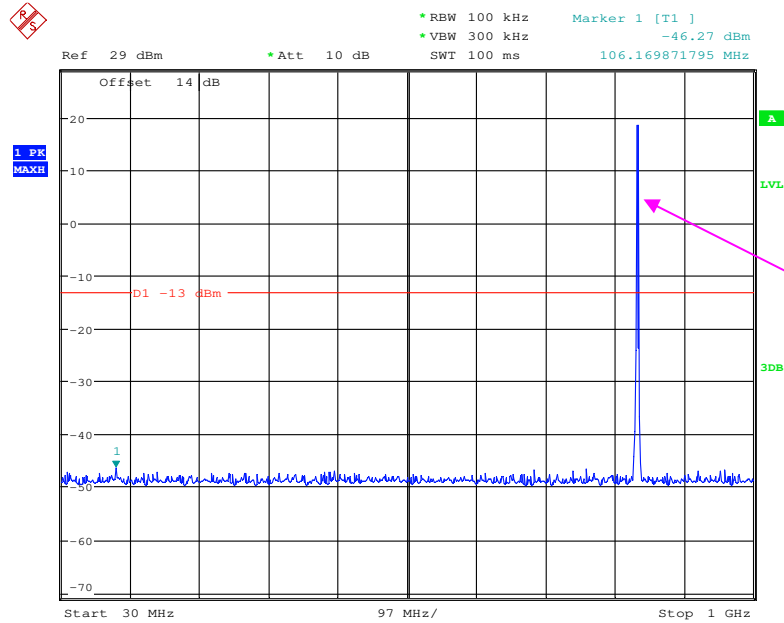
2 GHz - 20 GHz (20.0 MHz, Middle Channel)



Date: 25.JAN.2018 23:43:02

LTE Band 5: (QPSK)

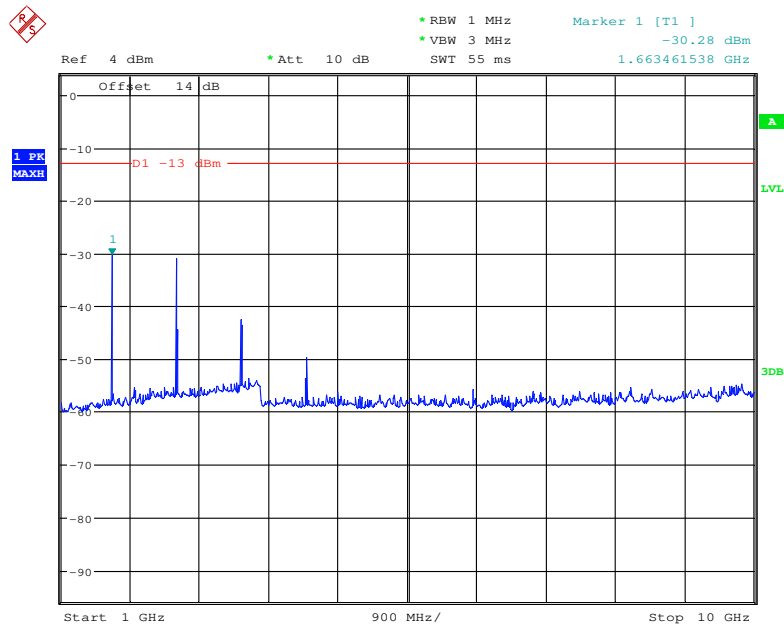
30 MHz - 1 GHz (1.4 MHz, Middle Channel)



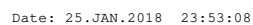
Fundamental test

Date: 25.JAN.2018 23:56:51

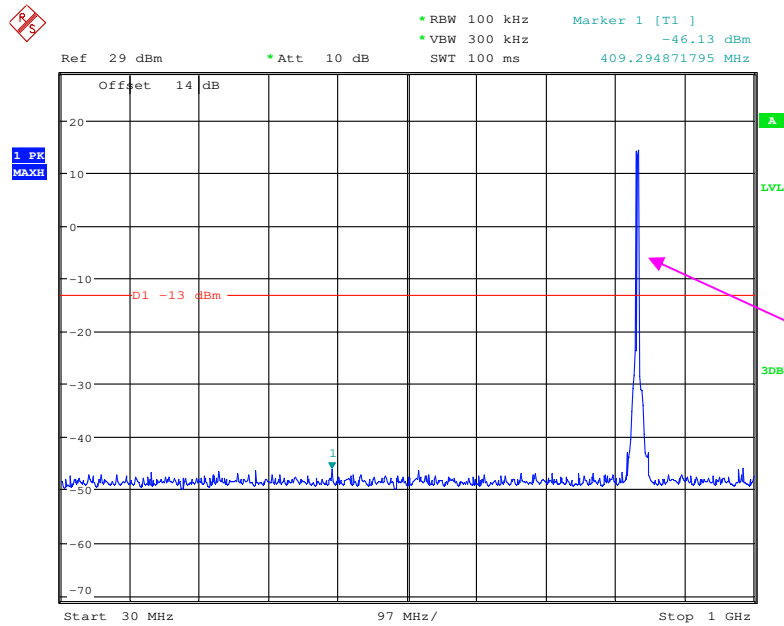
1 GHz - 10 GHz (1.4 MHz, Middle Channel)



Date: 25.JAN.2018 23:52:43

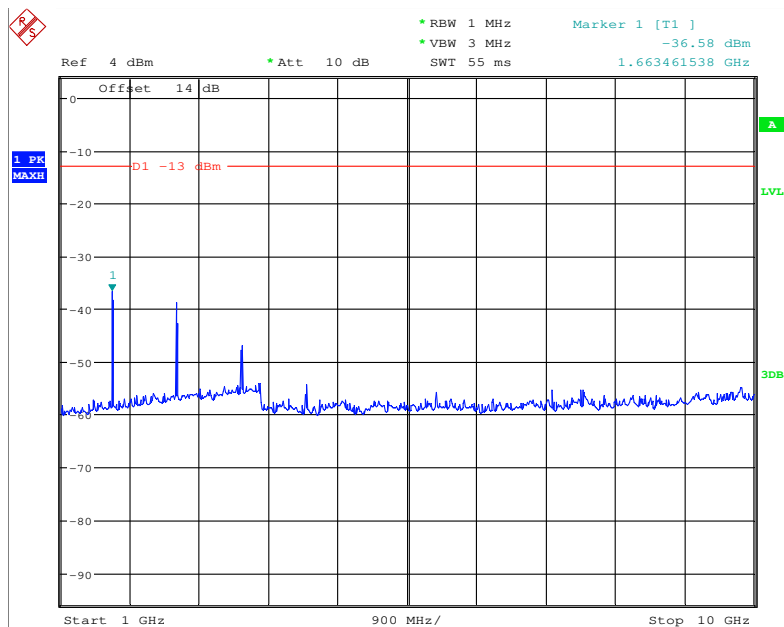


30 MHz - 1 GHz (5.0 MHz, Middle Channel)



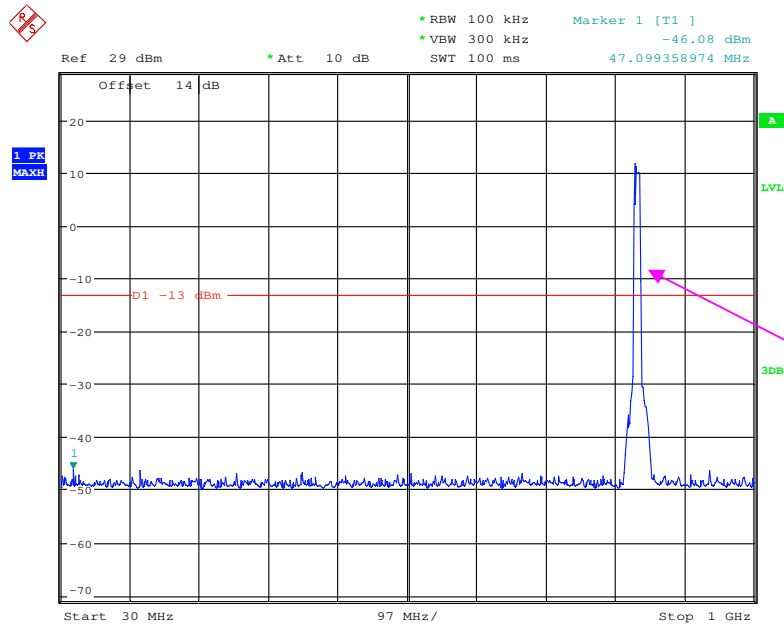
Date: 25.JAN.2018 23:55:38

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



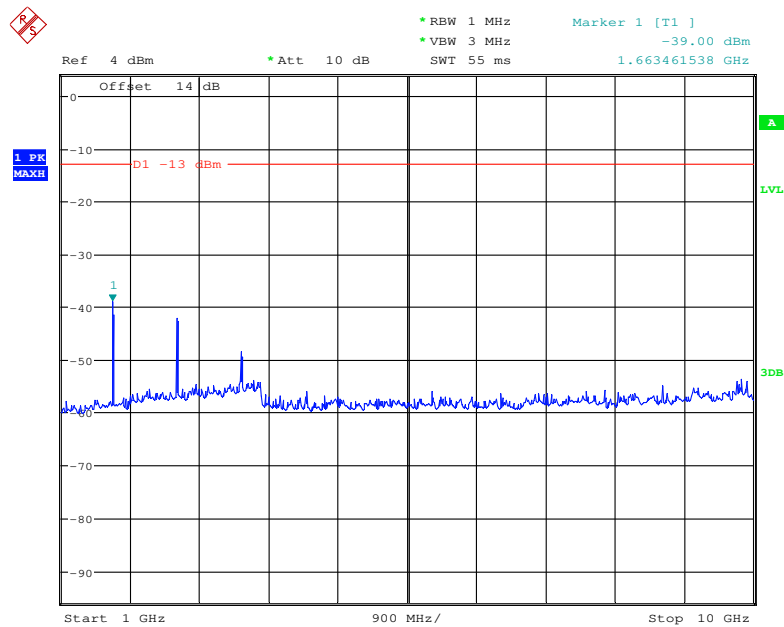
Date: 25.JAN.2018 23:53:21

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



Date: 25.JAN.2018 23:54:24

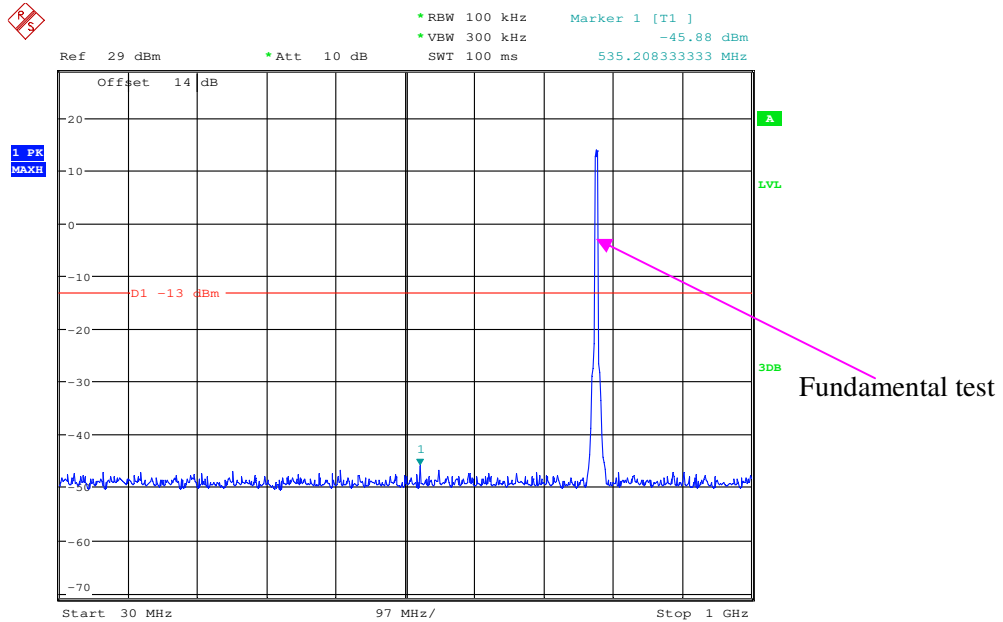
1 GHz - 10 GHz (10.0 MHz, Middle Channel)



Date: 25.JAN.2018 23:53:34

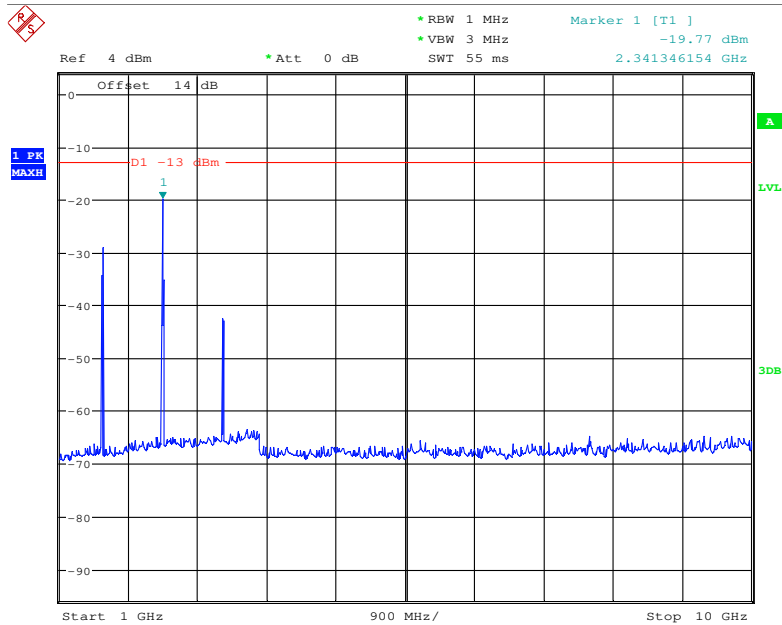
LTE Band 13: (QPSK)

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



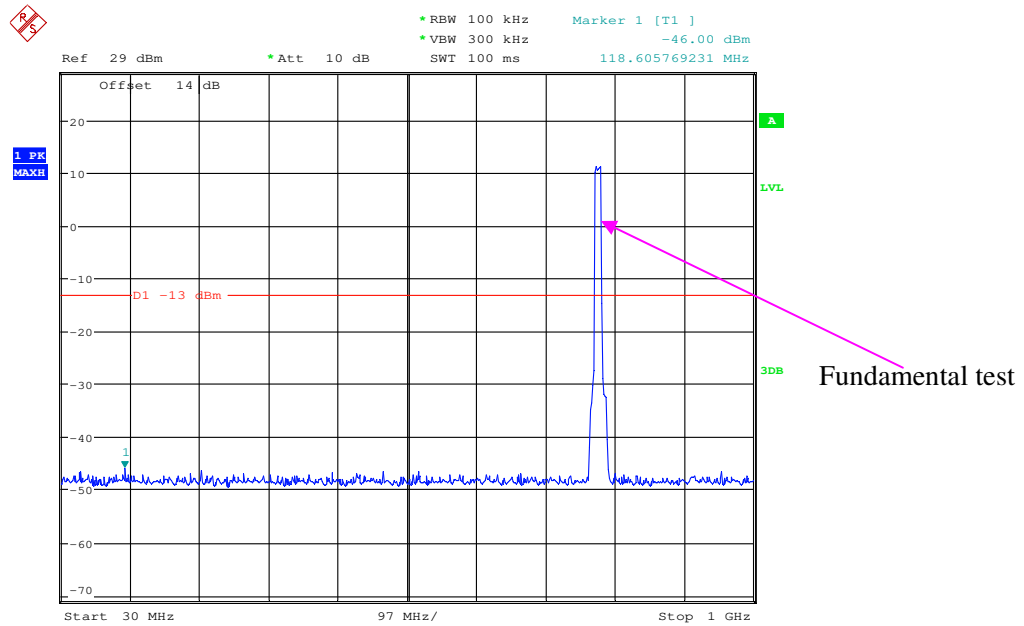
Date: 26.JAN.2018 00:00:04

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



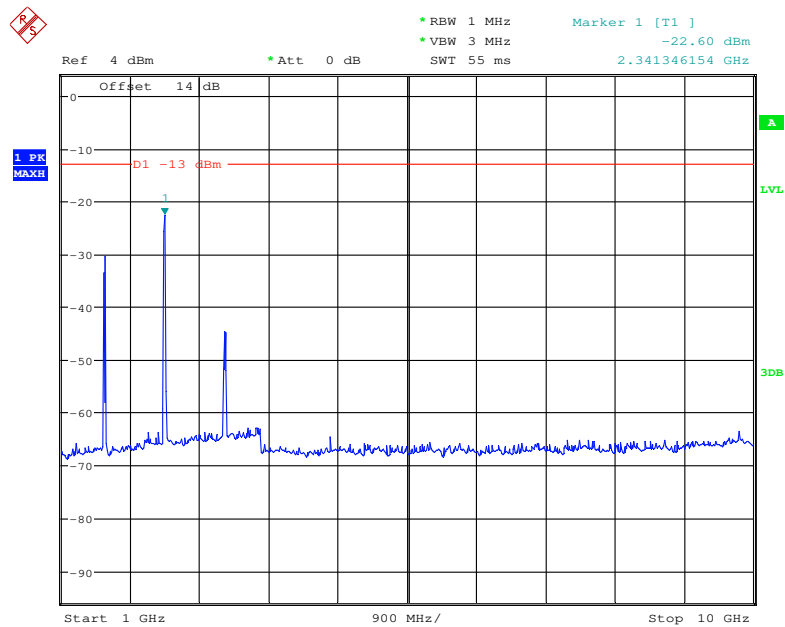
Date: 26.JAN.2018 00:02:52

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



Date: 26.JAN.2018 00:01:04

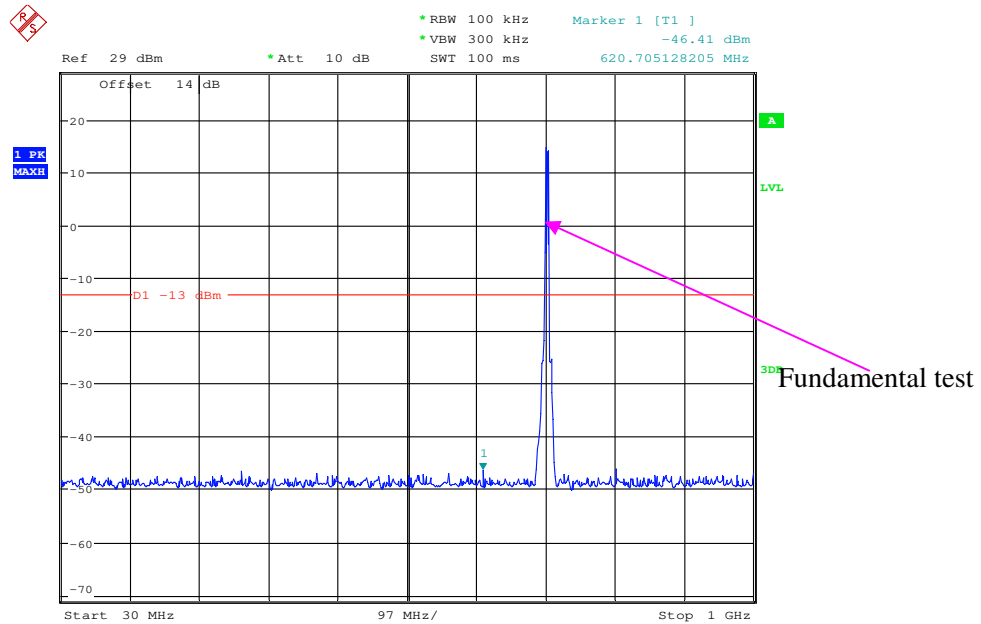
1 GHz - 10 GHz (10.0 MHz, Middle Channel)



Date: 26.JAN.2018 00:02:38

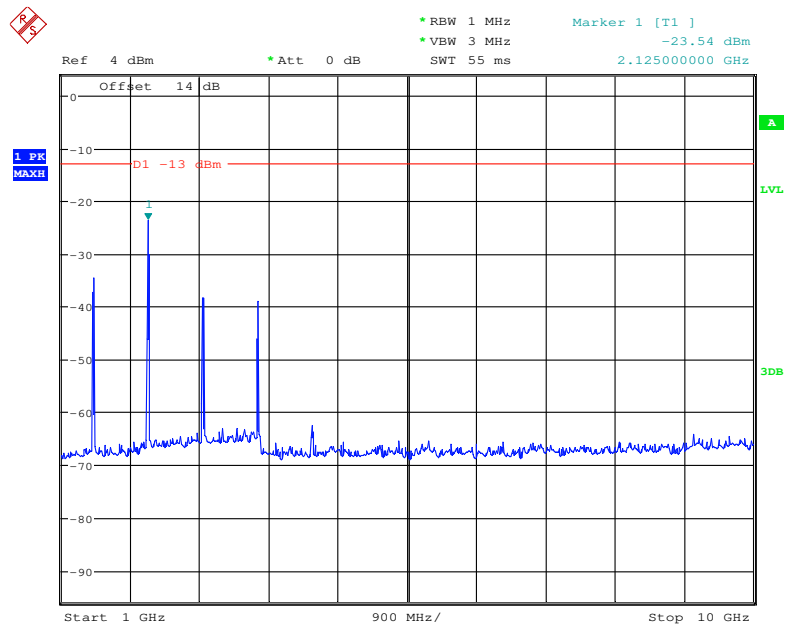
LTE Band 17: (QPSK)

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



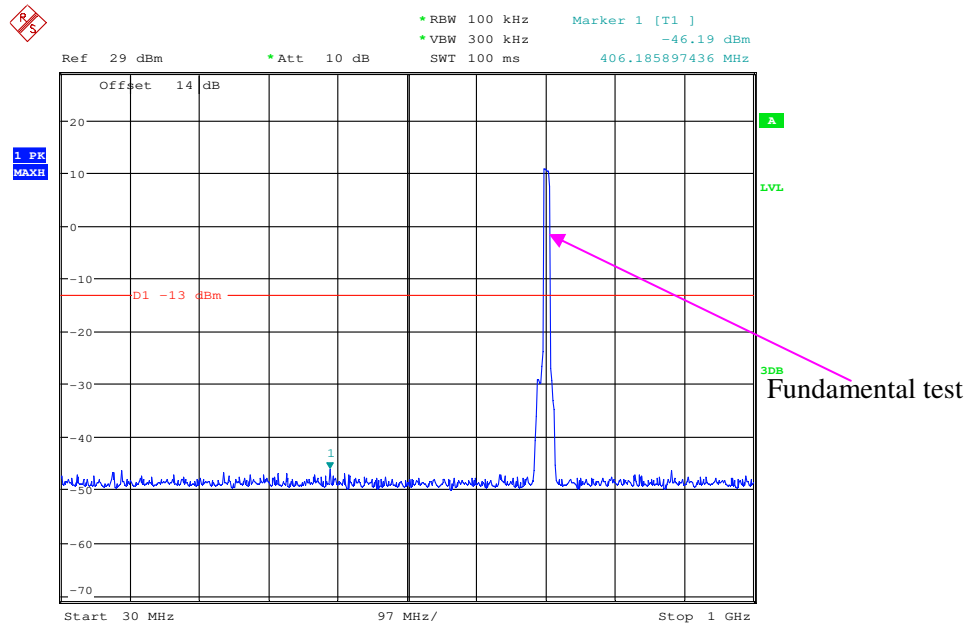
Date: 26.JAN.2018 00:06:54

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



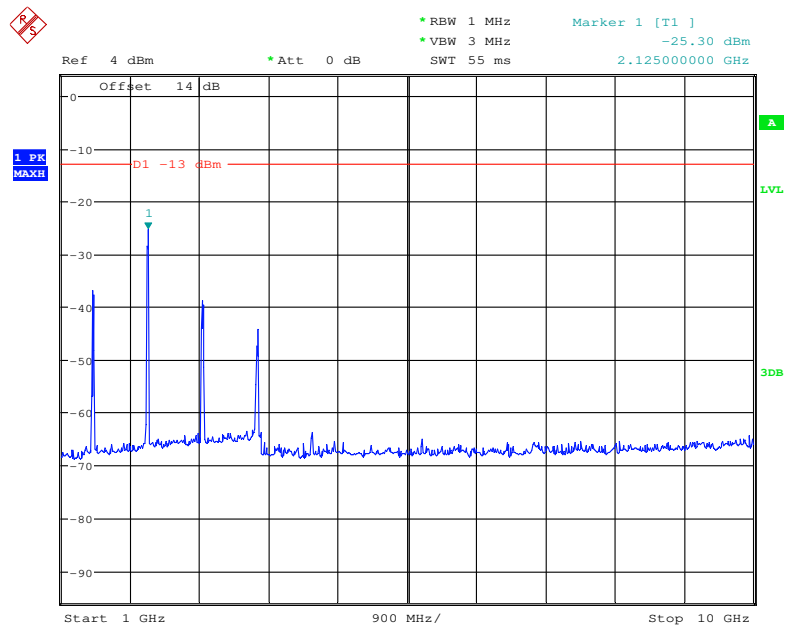
Date: 26.JAN.2018 00:03:49

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



Date: 26.JAN.2018 00:05:02

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



Date: 26.JAN.2018 00:04:09

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 °C
Relative Humidity:	48~49 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Tracy Hu from 2018-01-25 to 2018-01-26.

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										
417.88	36.78	134	1.5	H	-66.10	0.44	0	-66.54	-13	53.54
417.88	34.48	163	1.8	V	-65.50	0.44	0	-65.94	-13	52.94
1673.20	54.06	312	1.3	H	-53.0	1.30	9.10	-45.20	-13	32.20
1673.20	52.22	54	1.8	V	-54.3	1.30	9.10	-46.50	-13	33.50
2509.80	50.51	149	1.9	H	-53.0	2.60	9.30	-46.30	-13	33.30
2509.80	55.53	11	1.3	V	-47.4	2.60	9.30	-40.70	-13	27.70
WCDMA Mode, Middle channel										
417.88	35.85	222	1.8	H	-67.00	0.44	0	-67.44	-13	54.44
417.88	35.98	333	2.4	V	-64.00	0.44	0	-64.44	-13	51.44
1673.20	49.02	8	1.4	H	-58.1	1.30	9.10	-50.30	-13	37.30
1673.20	48.15	198	2.1	V	-58.3	1.30	9.10	-50.50	-13	37.50
2509.80	53.64	76	2.4	H	-49.9	2.60	9.30	-43.20	-13	30.20
2509.80	57.34	44	1.8	V	-45.6	2.60	9.30	-38.90	-13	25.90

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										
417.88	35.16	330	2.3	H	-67.70	0.44	0	-68.14	-13	55.14
417.88	34.26	340	2.1	V	-65.70	0.44	0	-66.14	-13	53.14
3760.00	44.63	3	1.6	H	-56.6	1.50	9.70	-48.40	-13	35.40
3760.00	44.49	129	2.1	V	-56.3	1.50	9.70	-48.10	-13	35.10
5640.00	51.51	333	2.4	H	-46.1	1.70	11.20	-36.60	-13	23.60
5640.00	55.4	325	2.5	V	-41.9	1.70	11.20	-32.40	-13	19.40
WCDMA Mode, Middle channel										
417.88	36.77	109	1.5	H	-66.10	0.44	0	-66.54	-13	53.54
417.88	35.89	202	2.3	V	-64.10	0.44	0	-64.54	-13	51.54
3760.00	43.09	311	1.2	H	-58.1	1.50	9.70	-49.90	-13	36.90
3760.00	42.63	337	1.1	V	-58.1	1.50	9.70	-49.90	-13	36.90
5640.00	44.67	248	2.1	H	-52.9	1.70	11.20	-43.40	-13	30.40
5640.00	46.61	354	2.0	V	-50.6	1.70	11.20	-41.10	-13	28.10

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 4, Middle channel, QPSK, 1.4MHz										
Test frequency range: 1732.5 MHz										
417.88	35.89	237	2.3	H	-67.00	0.44	0	-67.44	-13	54.44
417.88	34.40	56	1.4	V	-65.60	0.44	0	-66.04	-13	53.04
3465.00	42.84	13	2.0	H	-57.5	1.50	9.70	-49.30	-13	36.30
3465.00	42.63	19	2.2	V	-58.5	1.50	9.70	-50.30	-13	37.30
Band 5, Middle channel, QPSK, 1.4MHz										
Test frequency range: 836.5 MHz										
417.88	35.97	160	1.7	H	-66.90	0.44	0	-67.34	-13	54.34
417.88	35.69	93	1.1	V	-64.30	0.44	0	-64.74	-13	51.74
1673.00	43.51	42	1.8	H	-63.6	1.30	9.10	-55.80	-13	42.80
1673.00	44.14	186	1.7	V	-62.3	1.30	9.10	-54.50	-13	41.50
2509.50	45.62	157	2.4	H	-57.9	2.60	9.30	-51.20	-13	38.20
2509.50	46.91	242	2.4	V	-56.0	2.60	9.30	-49.30	-13	36.30
Band 13, Middle channel, QPSK, 5MHz										
Test frequency range: 30 MHz ~ 8 GHz										
417.88	36.15	216	1.7	H	-66.70	0.44	0	-67.14	-13	54.14
417.88	35.29	279	2.1	V	-64.70	0.44	0	-65.14	-13	52.14
1564.00	43.38	214	2.4	H	-64.7	1.40	8.90	-57.20	-13	44.20
1564.00	43.02	315	1.4	V	-64.8	1.40	8.90	-57.30	-13	44.30
2346.00	43.82	209	1.8	H	-60.7	1.30	9.10	-52.90	-13	39.90
2346.00	43.03	158	1.4	V	-61.4	1.30	9.10	-53.60	-13	40.60
Band 17, Middle channel, QPSK, 5MHz										
Test frequency range: 30 MHz ~ 8 GHz										
417.88	36.46	291	2.3	H	-66.40	0.44	0	-66.84	-13	53.84
417.88	34.63	69	1.2	V	-65.40	0.44	0	-65.84	-13	52.84
1420.00	44.35	330	1.6	H	-63.5	1.60	8.30	-56.80	-13	43.80
1420.00	46.65	146	1.3	V	-61.4	1.60	8.30	-54.70	-13	41.70
2130.00	45.51	169	2.2	H	-56.6	1.30	8.80	-49.10	-13	36.10
2130.00	46.13	330	1.3	V	-56.8	1.30	8.80	-49.30	-13	36.30

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.

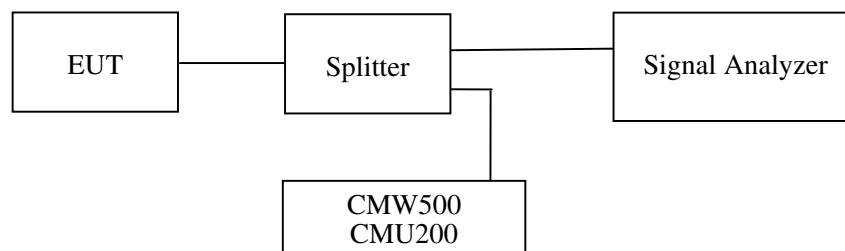
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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**

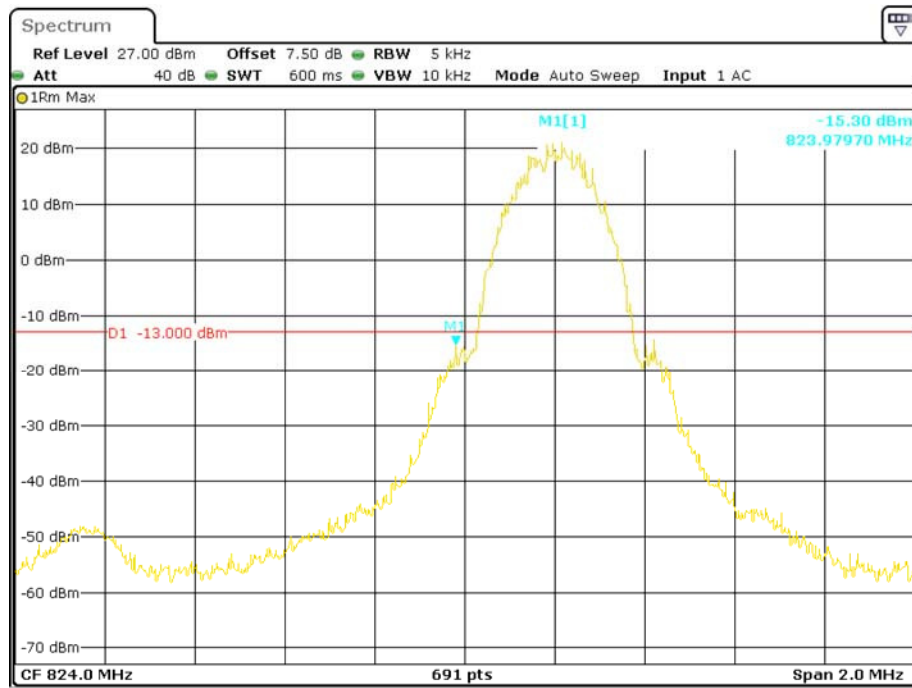
Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2018-01-25.

EUT operation mode: Transmitting

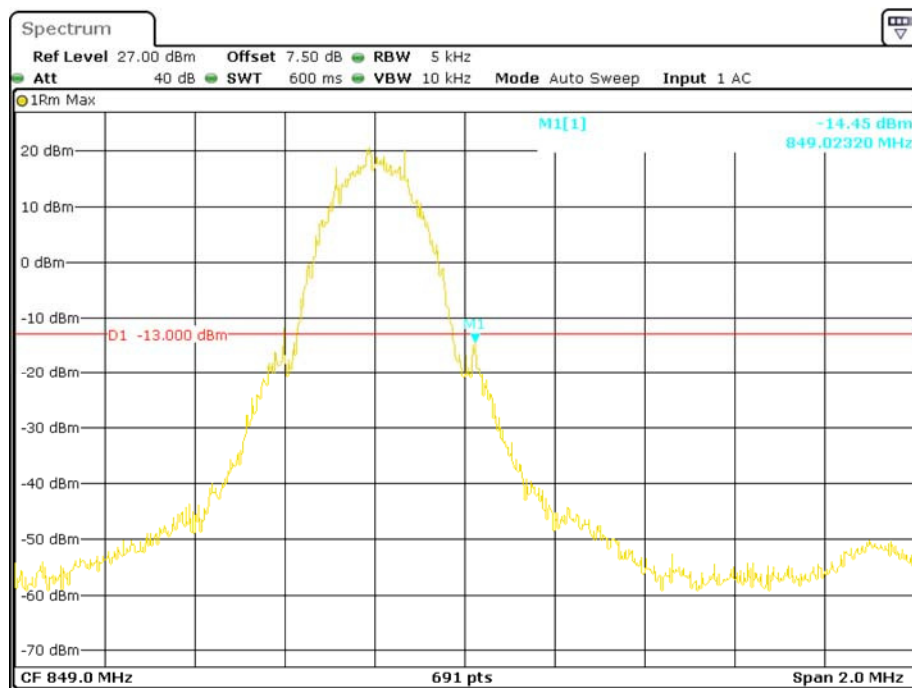
Test Result: Compliance. Please refer to the following plots.

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



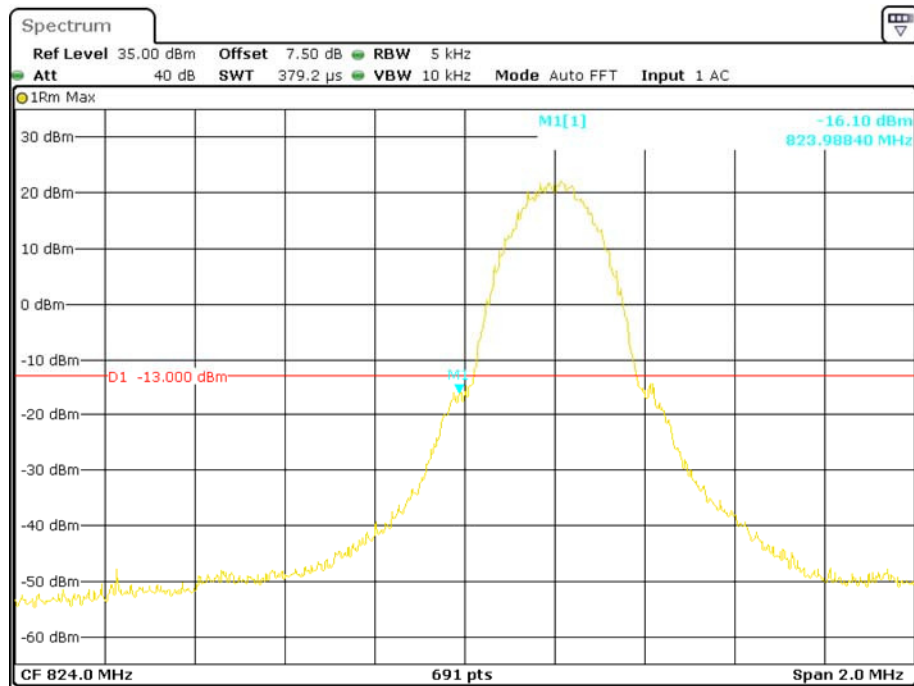
Date: 25.JAN.2018 15:18:05

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



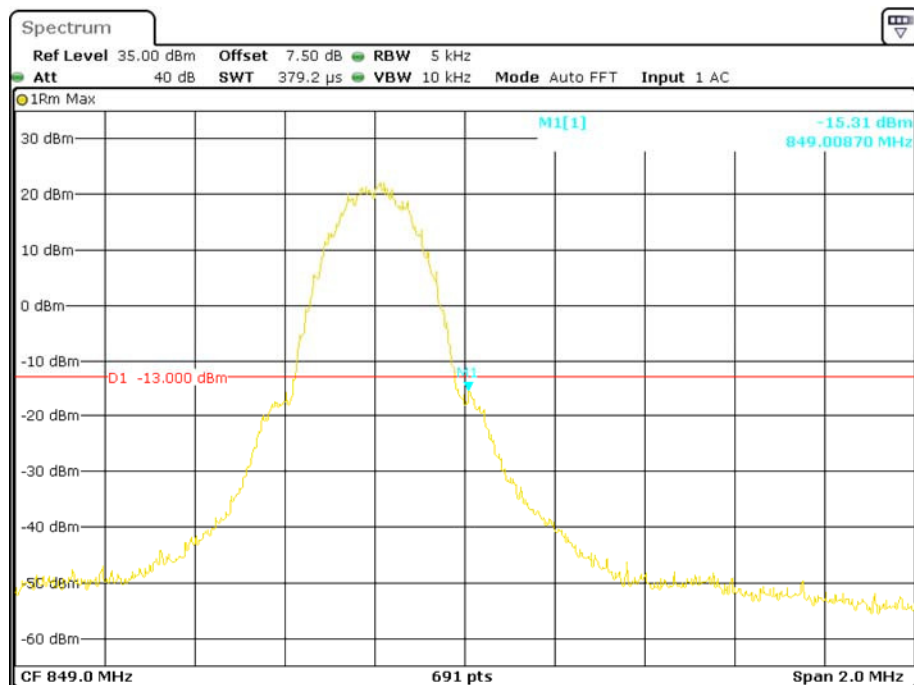
Date: 25.JAN.2018 15:19:12

Cellular Band, Left Band Edge for EDGE Mode



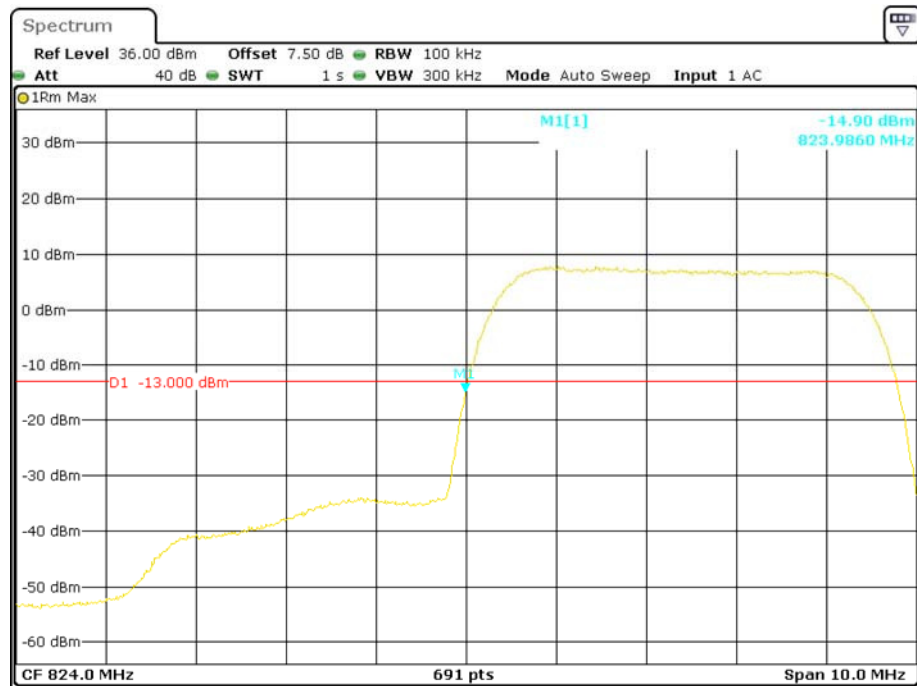
Date: 25.JAN.2018 15:23:43

Cellular Band, Right Band Edge for EDGE Mode



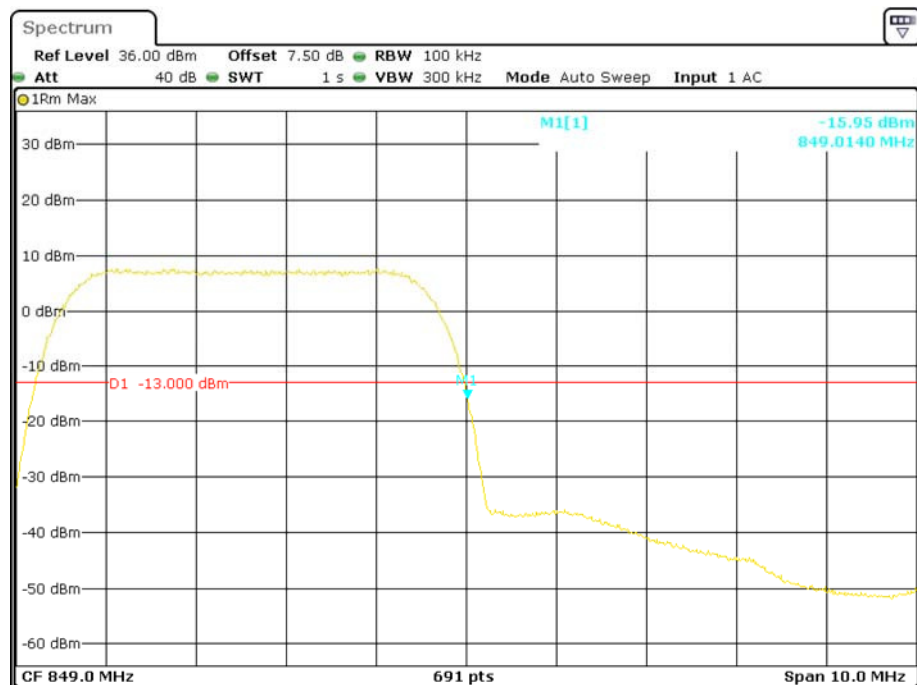
Date: 25.JAN.2018 15:24:23

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

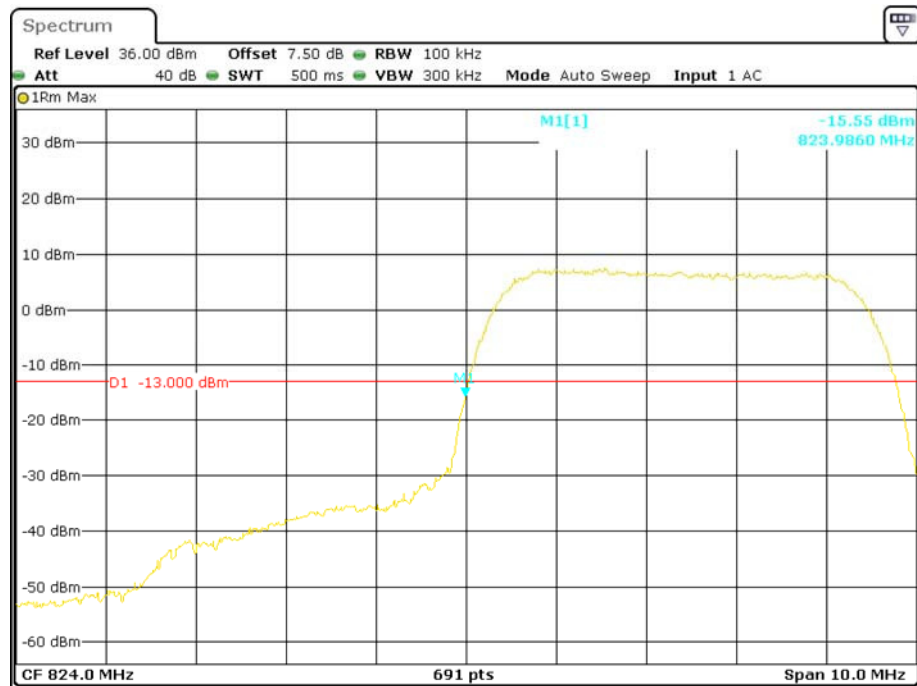


Date: 25.JAN.2018 16:04:40

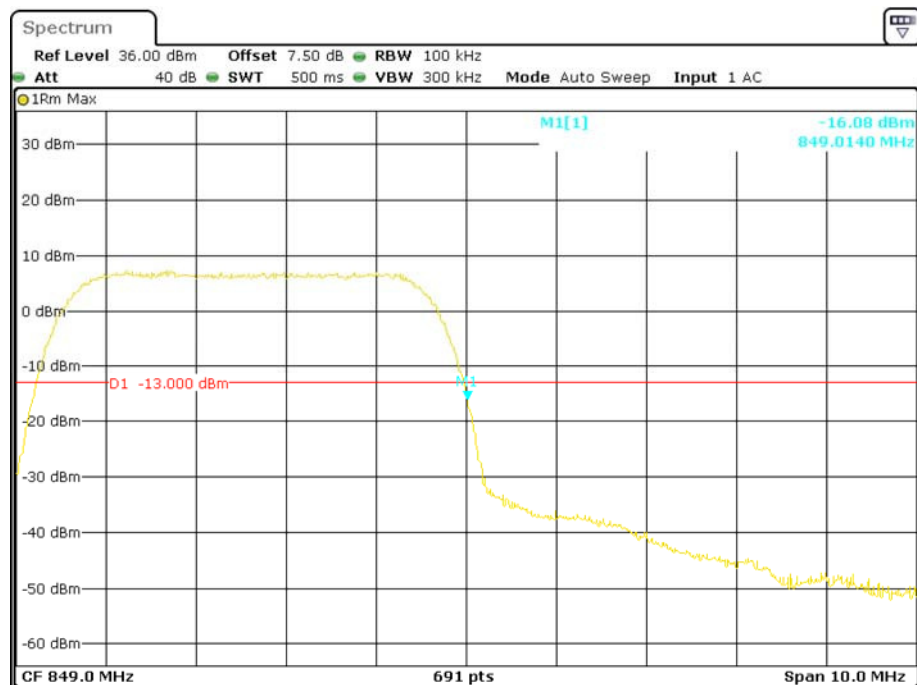
Cellular Band, Right Band Edge for WCDMA (BPSK) Mode



Date: 25.JAN.2018 16:03:56

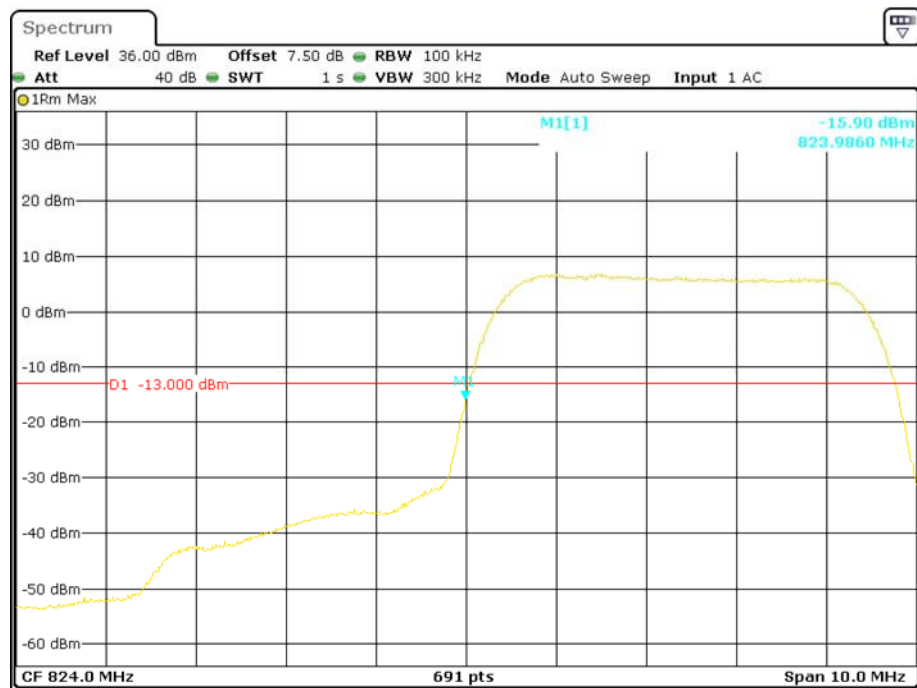
Cellular Band, Left Band Edge for HSDPA (16QAM) Mode

Date: 25.JAN.2018 16:18:45

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

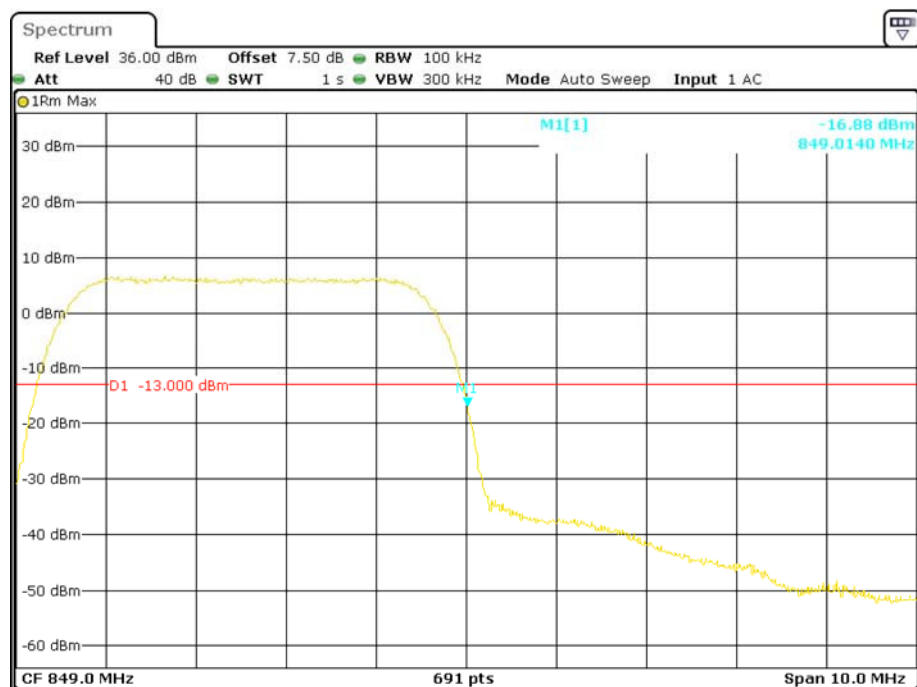
Date: 25.JAN.2018 16:19:15

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



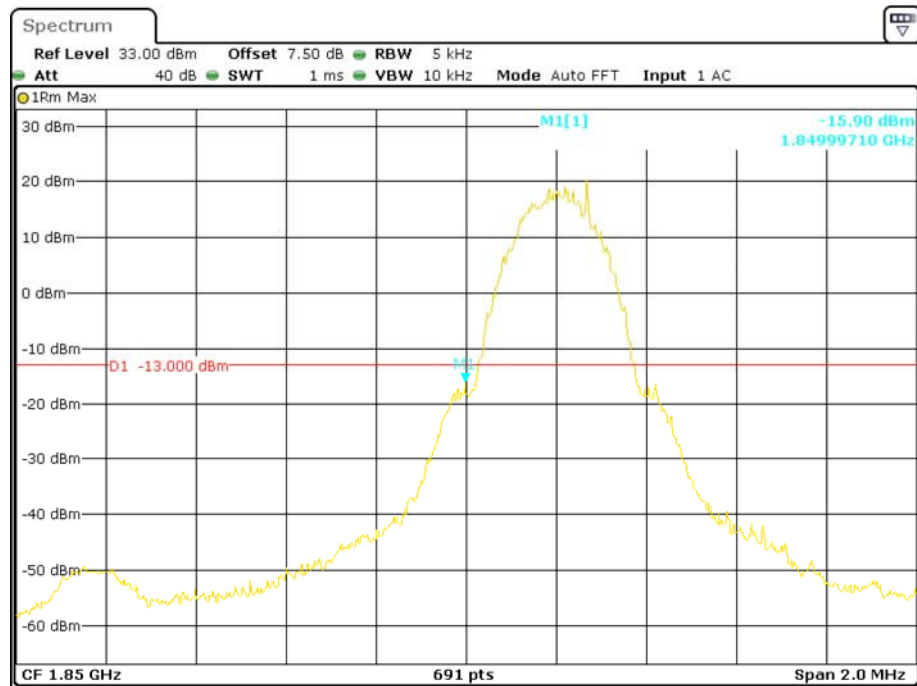
Date: 25.JAN.2018 16:06:38

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



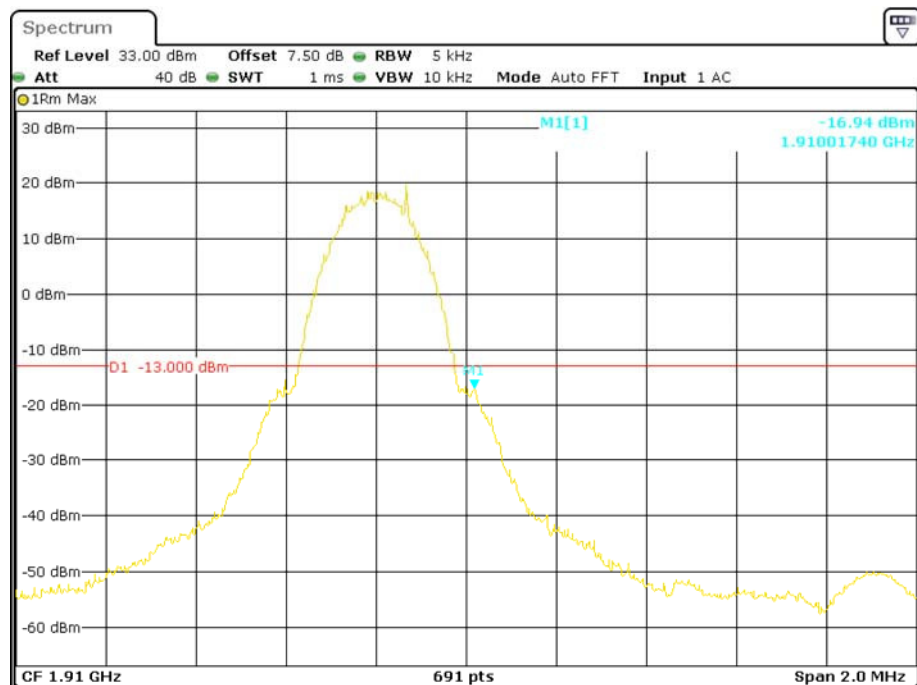
Date: 25.JAN.2018 16:07:18

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



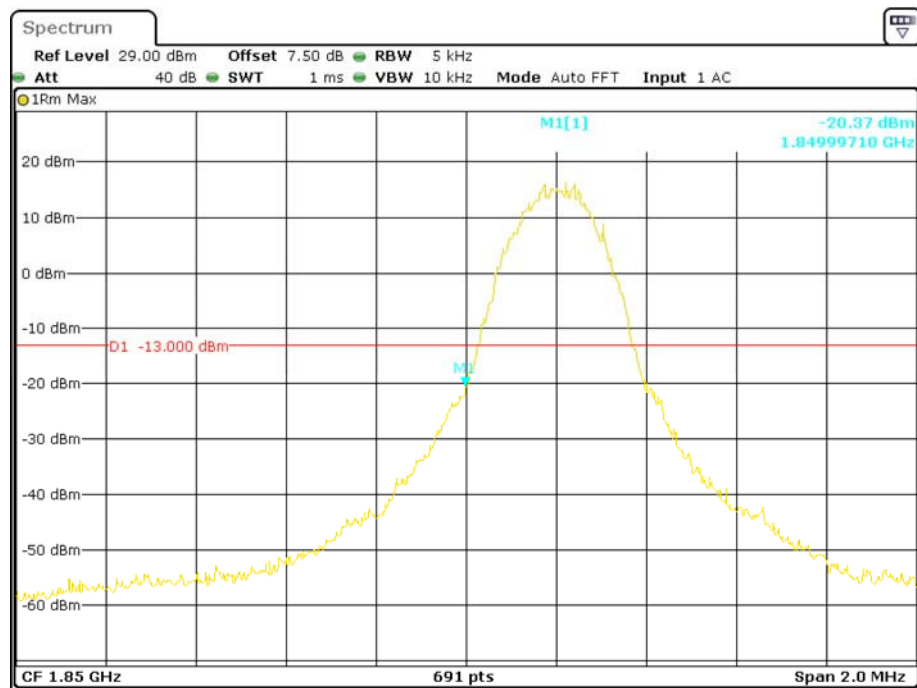
Date: 25.JAN.2018 15:45:50

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



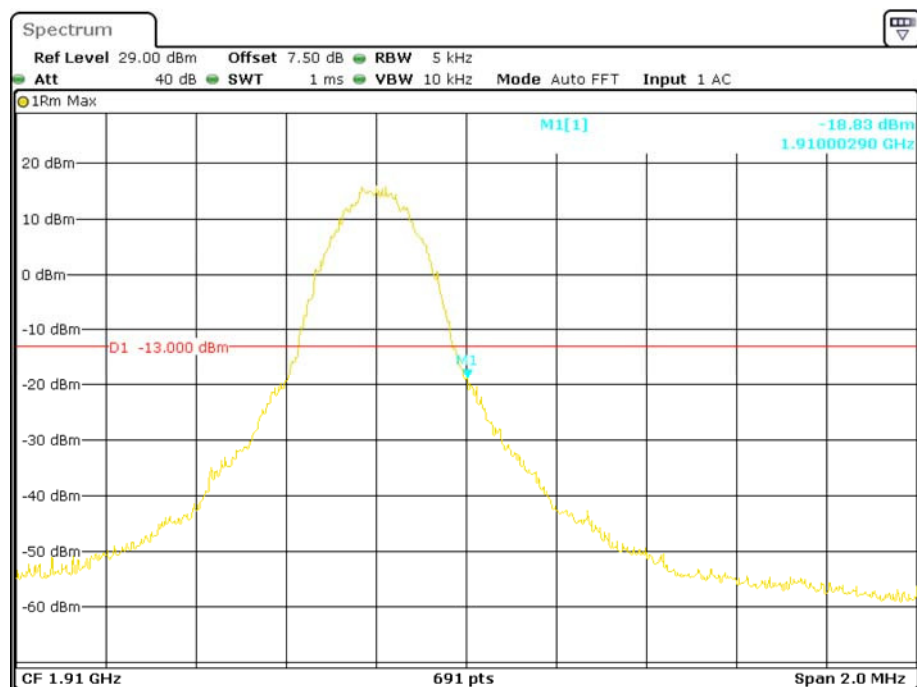
Date: 25.JAN.2018 15:46:54

PCS Band, Left Band Edge for EDGE Mode



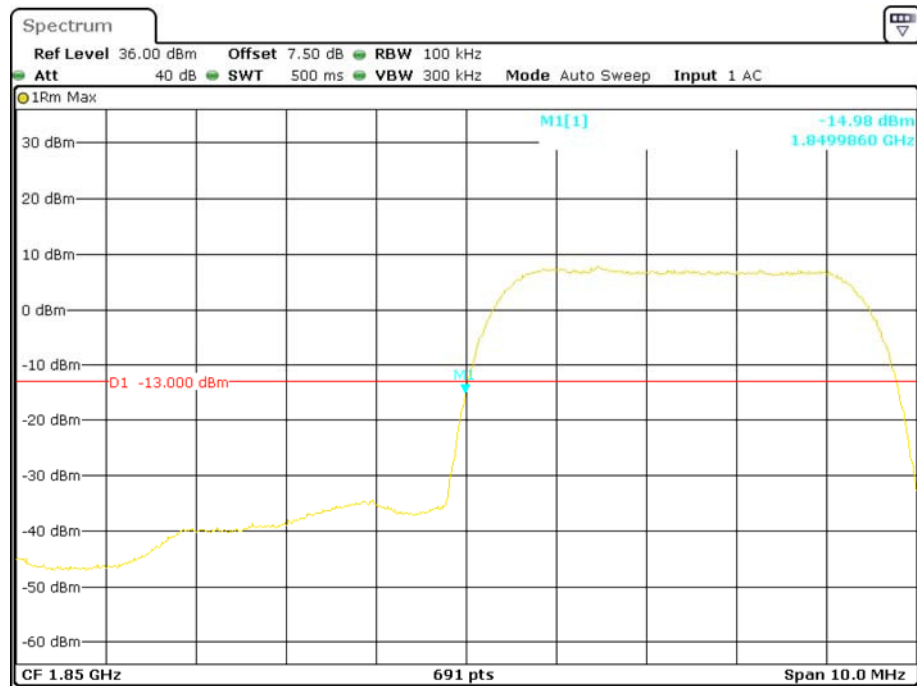
Date: 25.JAN.2018 15:40:51

PCS Band, Right Band Edge for EDGE Mode



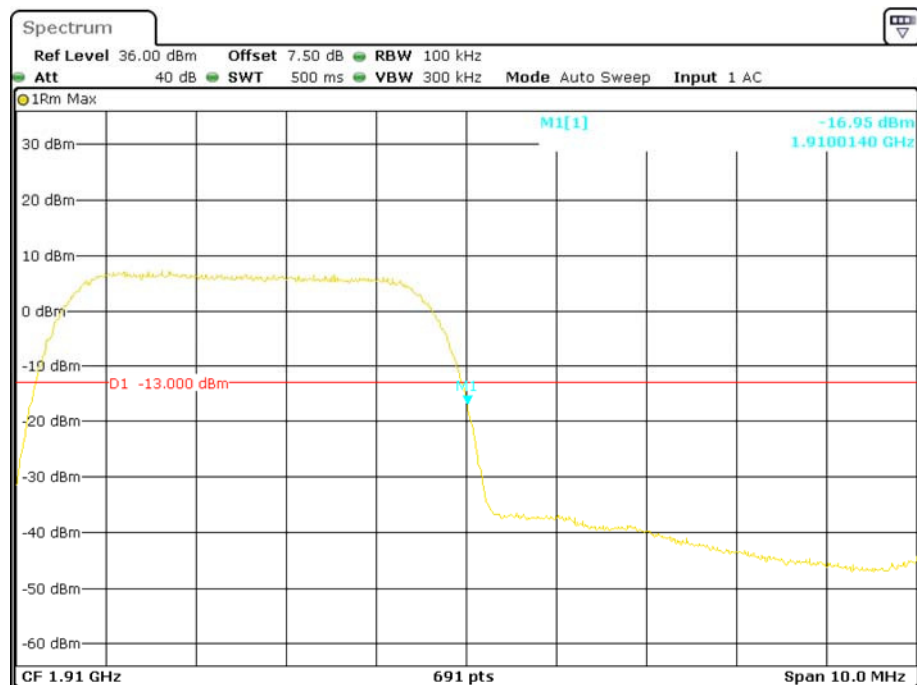
Date: 25.JAN.2018 15:41:35

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



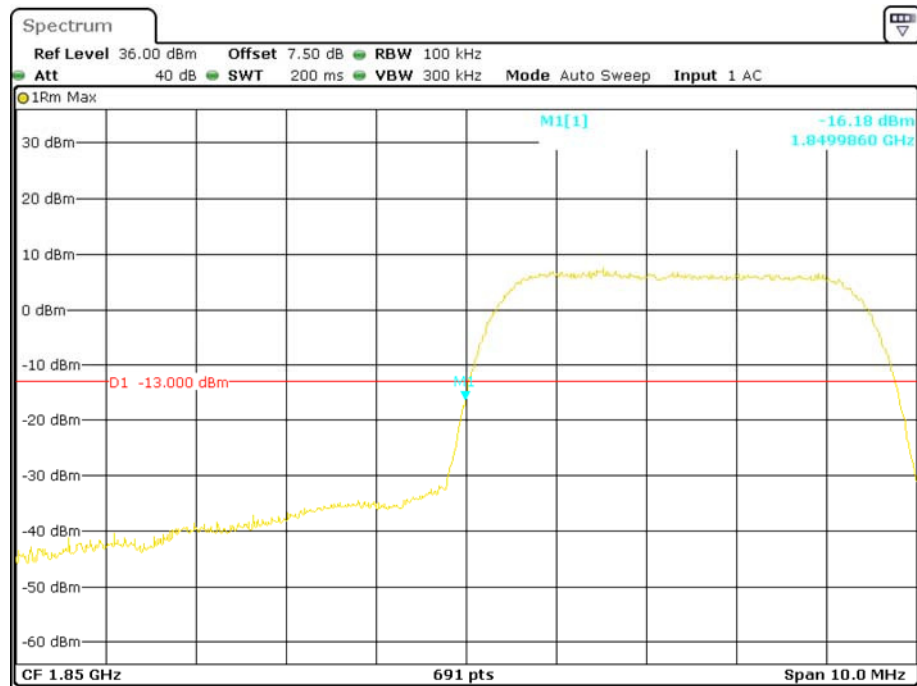
Date: 25.JAN.2018 15:55:34

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



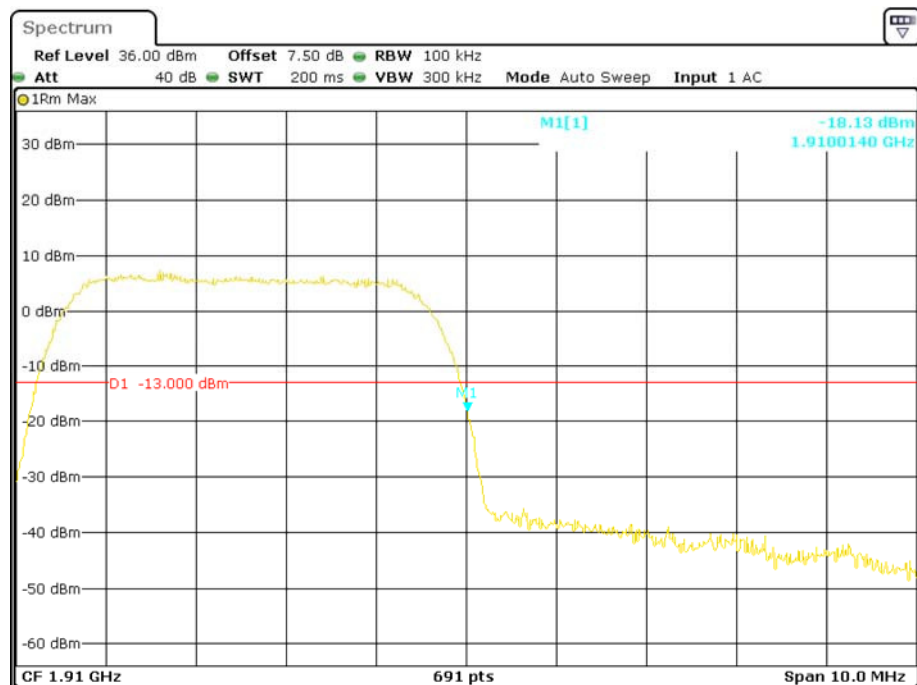
Date: 25.JAN.2018 15:56:13

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



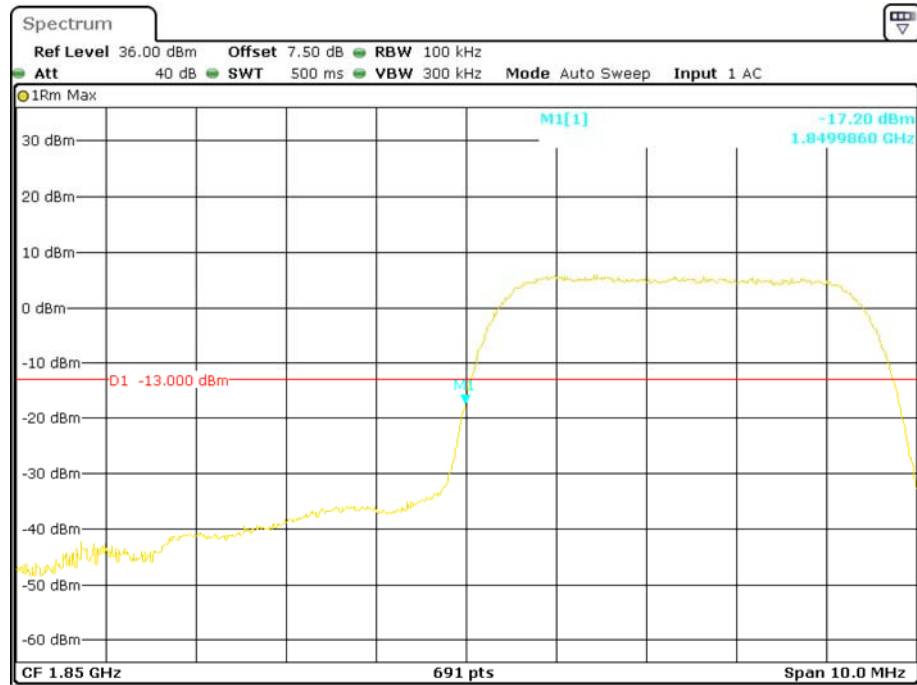
Date: 25.JAN.2018 16:17:20

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



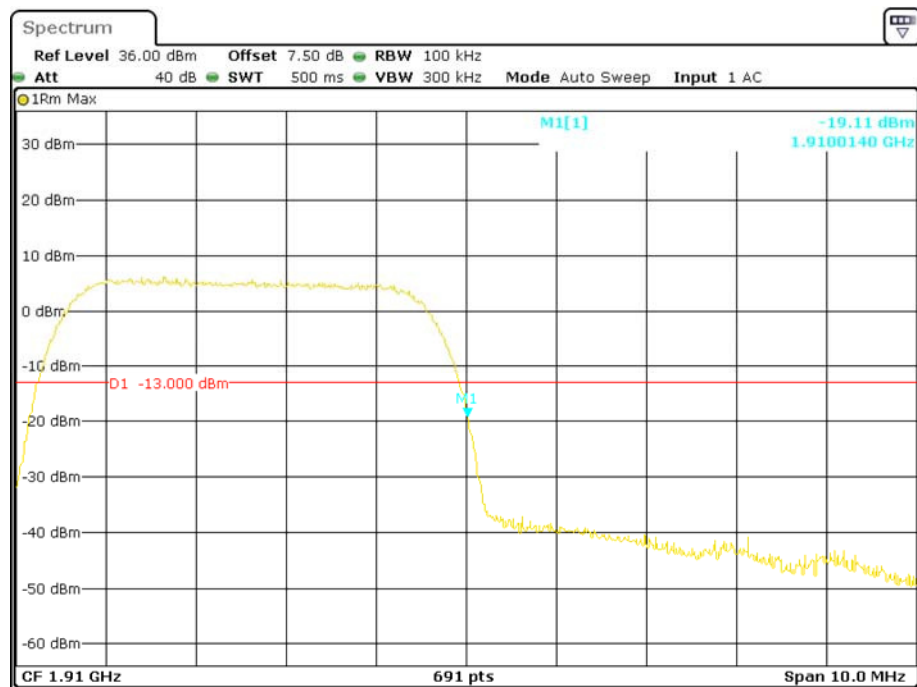
Date: 25.JAN.2018 16:17:55

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

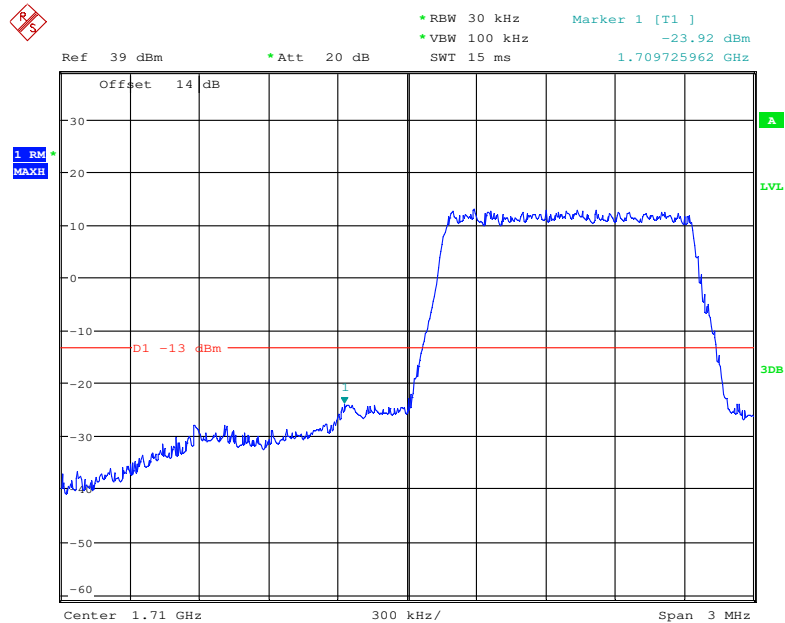


Date: 25.JAN.2018 16:08:14

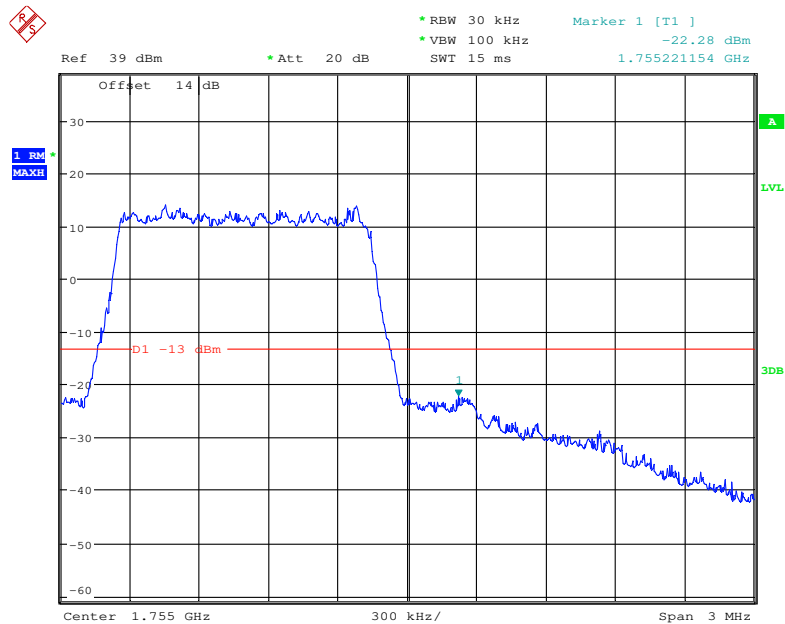
PCS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 25.JAN.2018 16:08:48

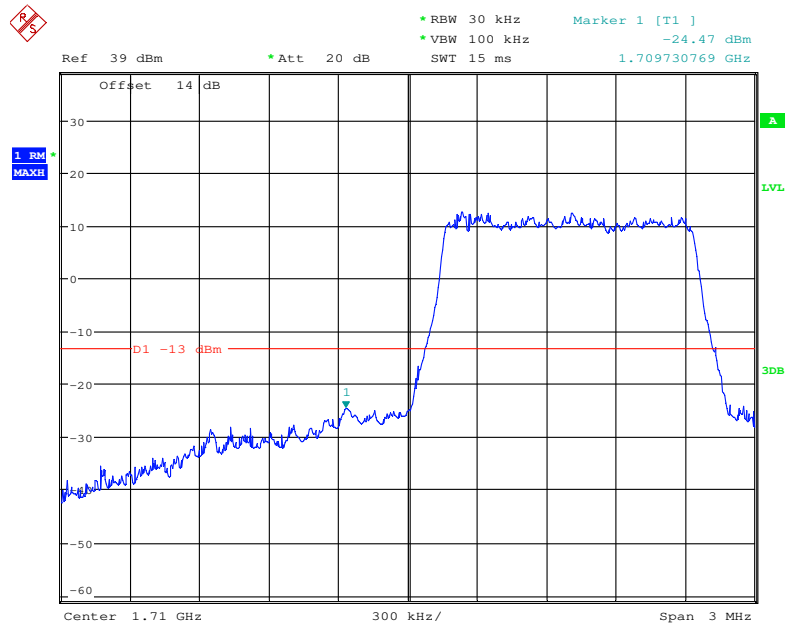
LTE Band 4:**QPSK (1.4 MHz, FULL RB) - Left Band Edge**

Date: 25.JAN.2018 21:55:36

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

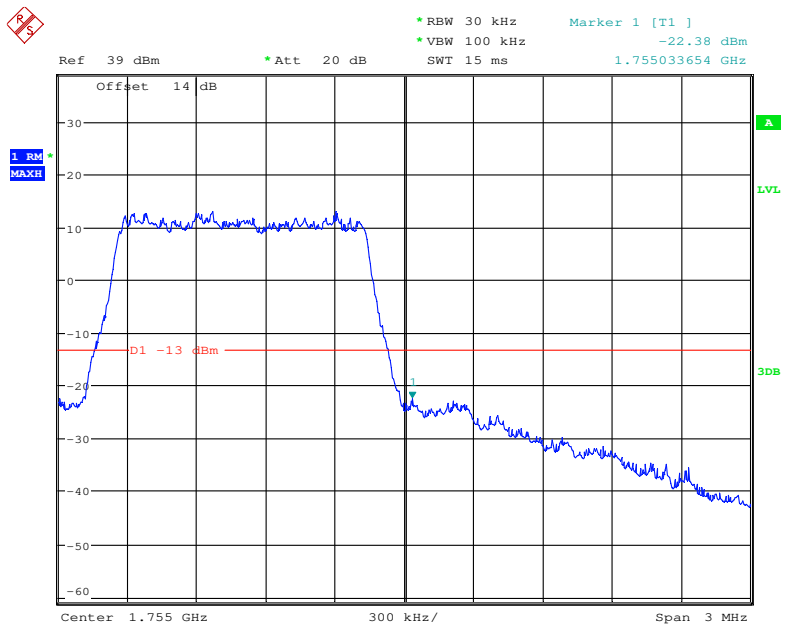
Date: 25.JAN.2018 21:56:51

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



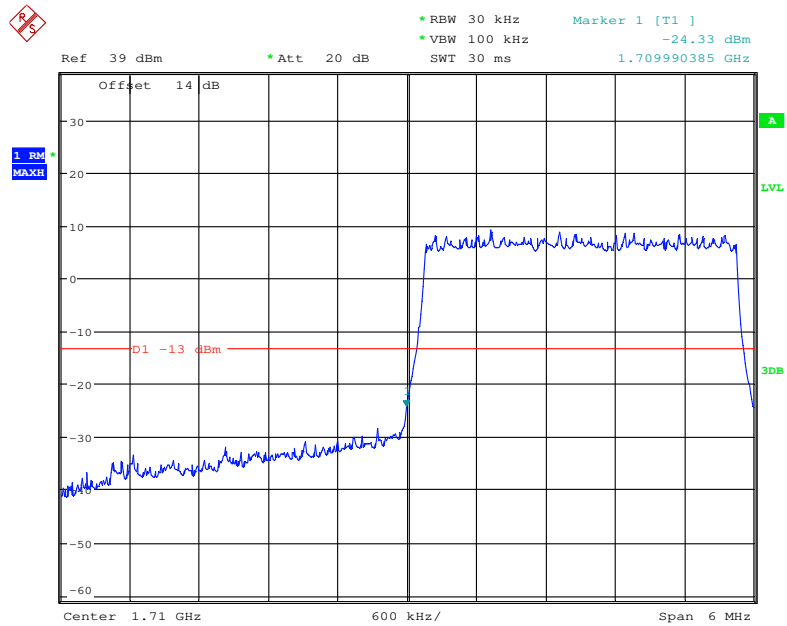
Date: 25.JAN.2018 21:53:59

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



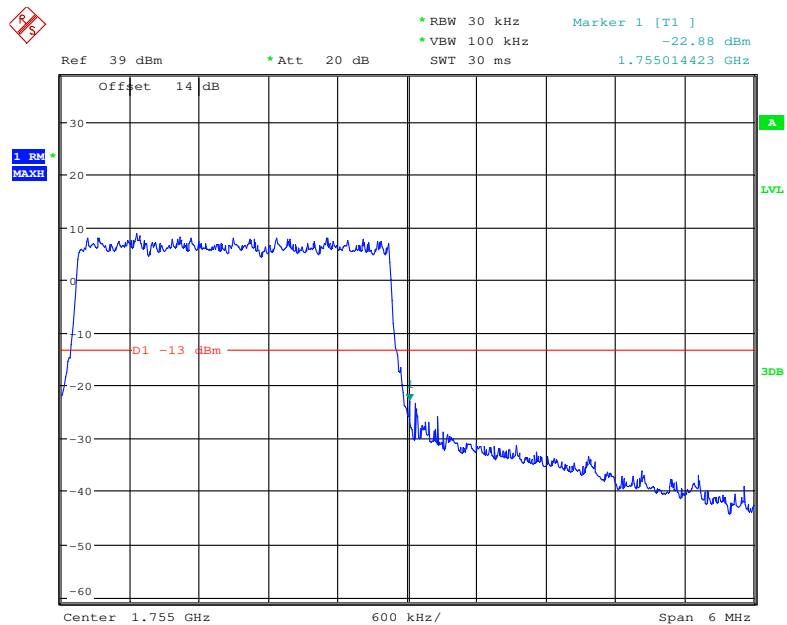
Date: 25.JAN.2018 21:59:14

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



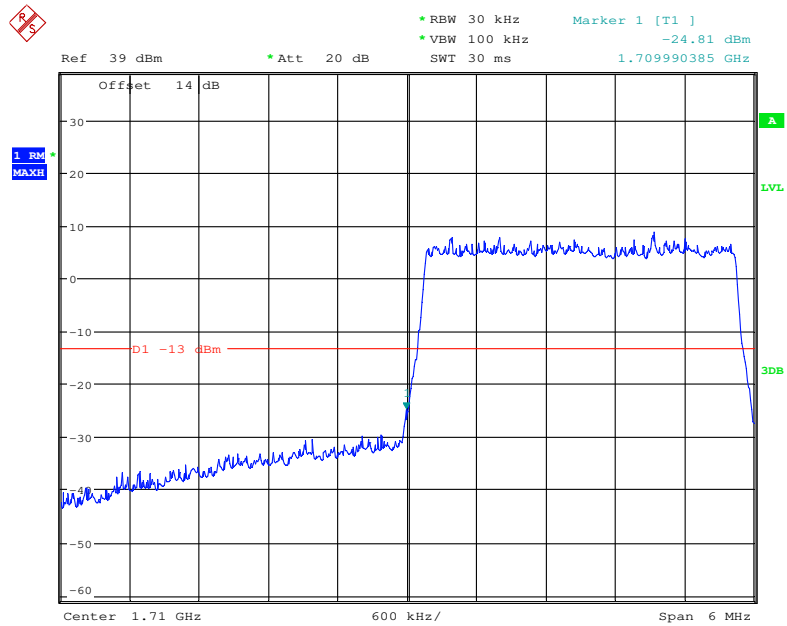
Date: 25.JAN.2018 22:07:13

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



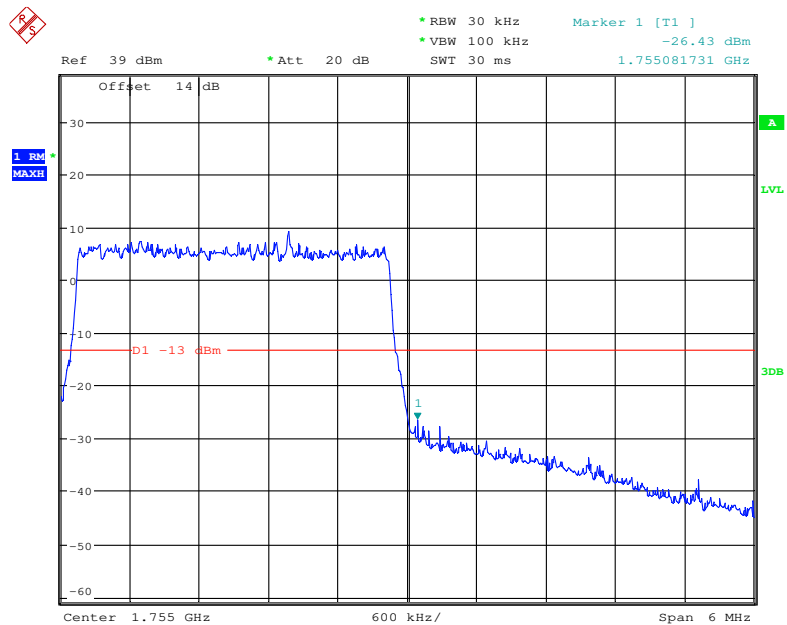
Date: 25.JAN.2018 22:02:13

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



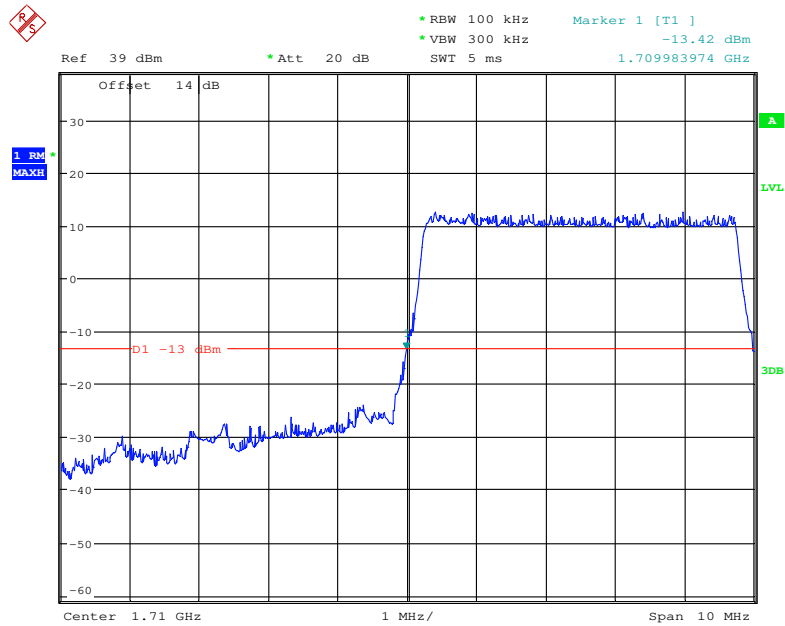
Date: 25.JAN.2018 22:04:52

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



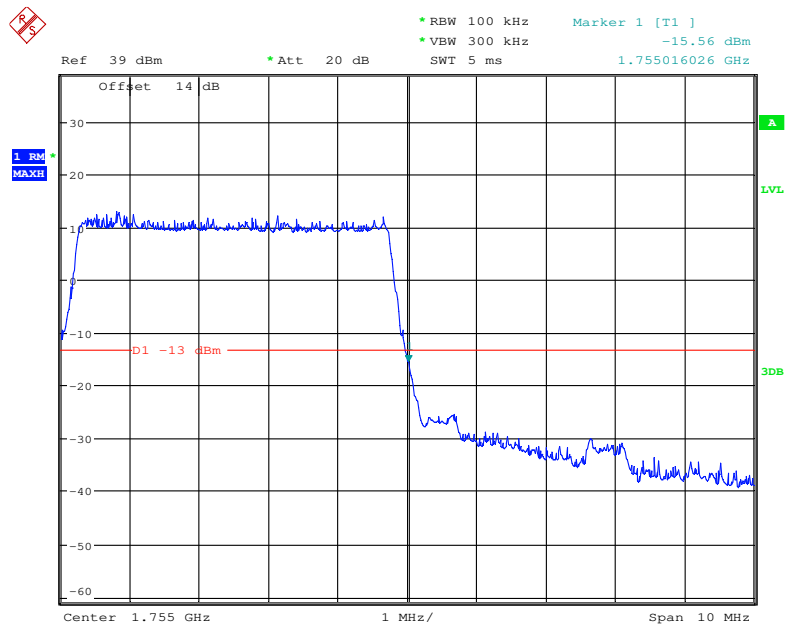
Date: 25.JAN.2018 22:03:47

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



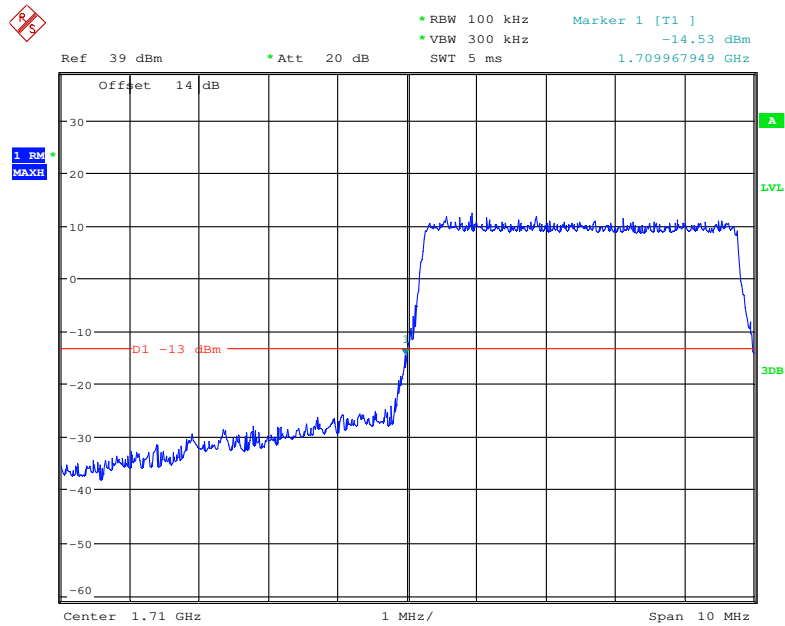
Date: 25.JAN.2018 22:11:18

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



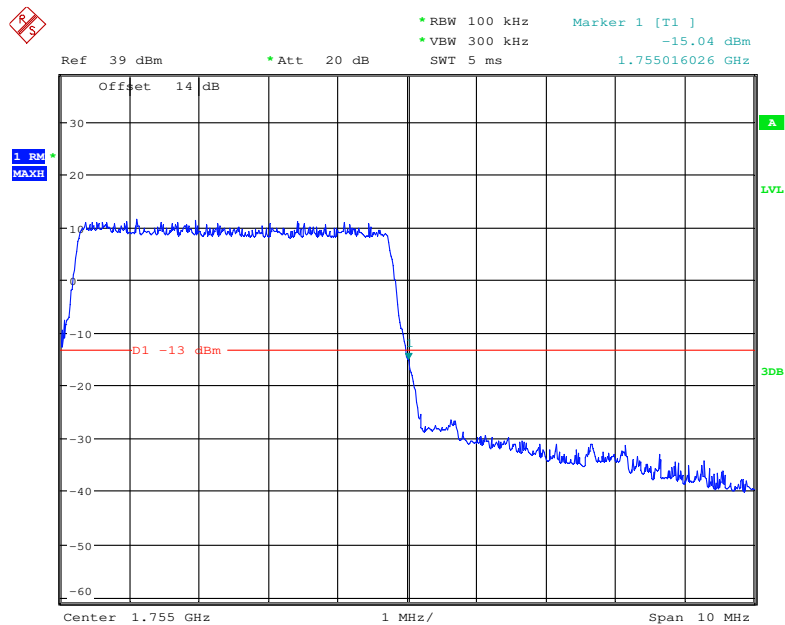
Date: 25.JAN.2018 22:14:23

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



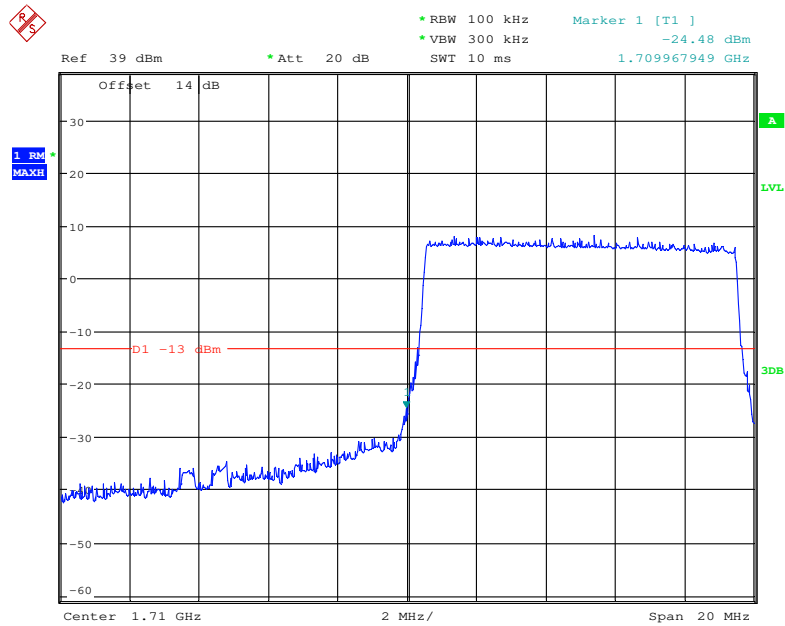
Date: 25.JAN.2018 22:12:22

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



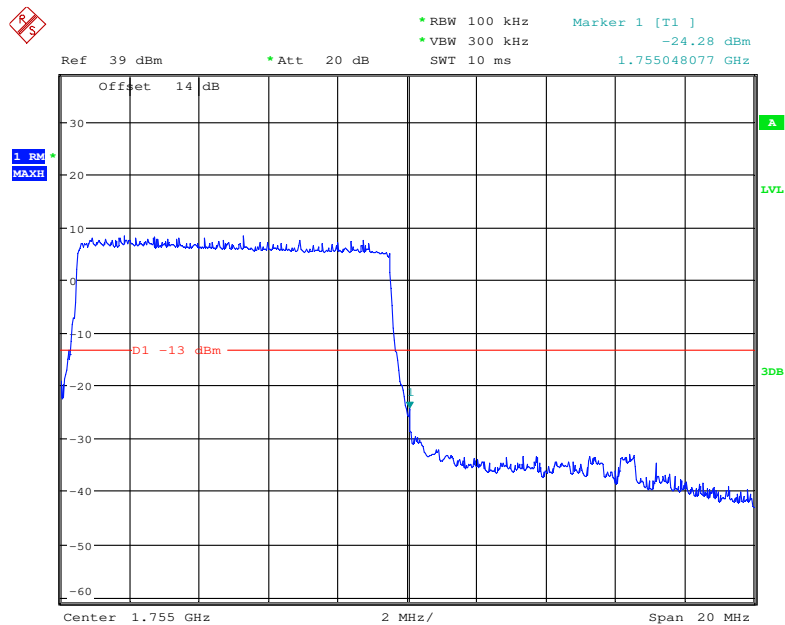
Date: 25.JAN.2018 22:13:34

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



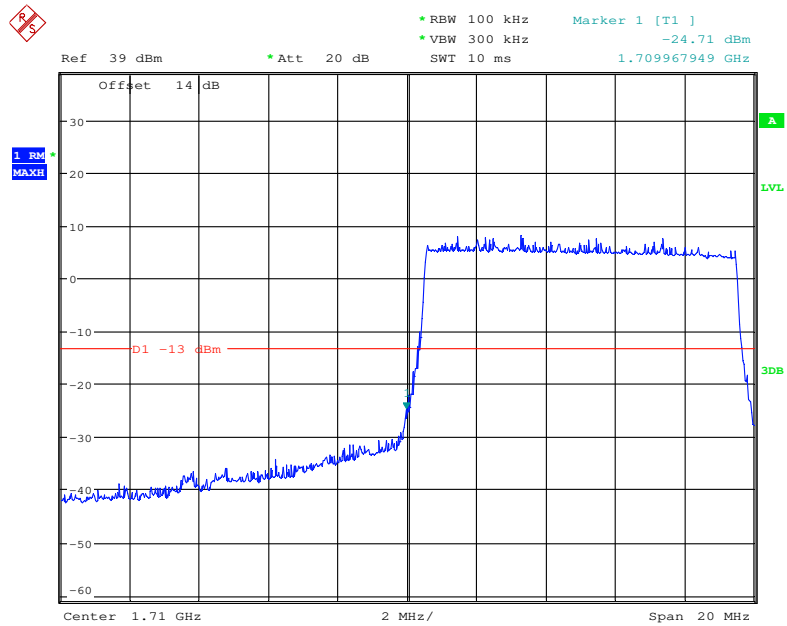
Date: 25.JAN.2018 22:18:31

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



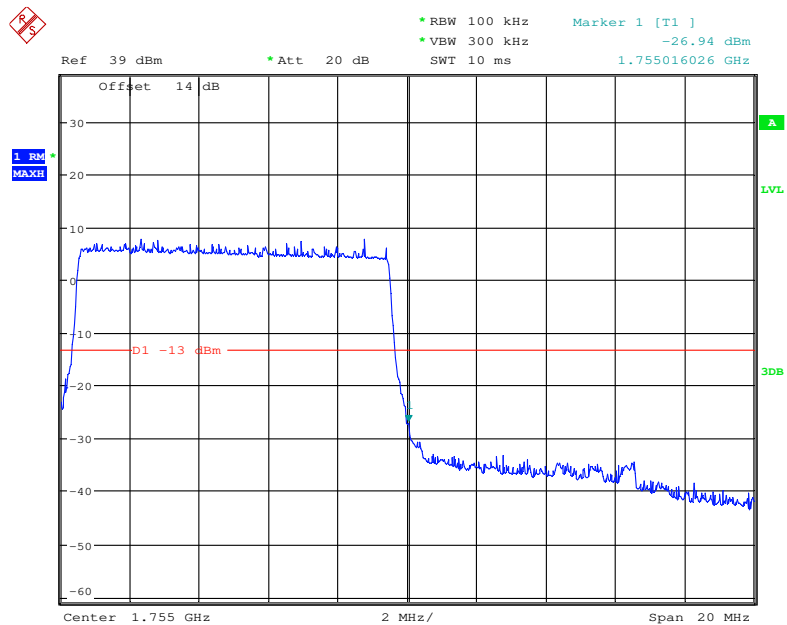
Date: 25.JAN.2018 22:17:27

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



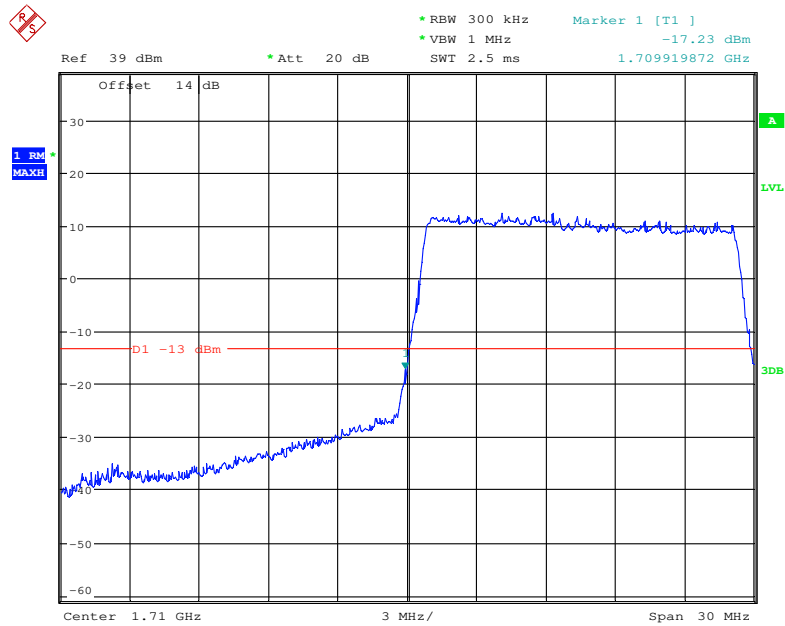
Date: 25.JAN.2018 22:19:38

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



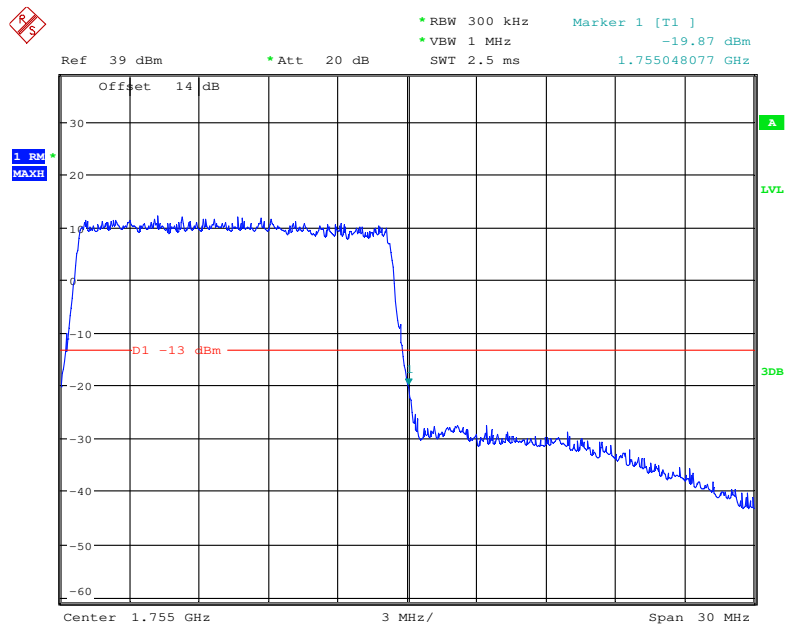
Date: 25.JAN.2018 22:16:06

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



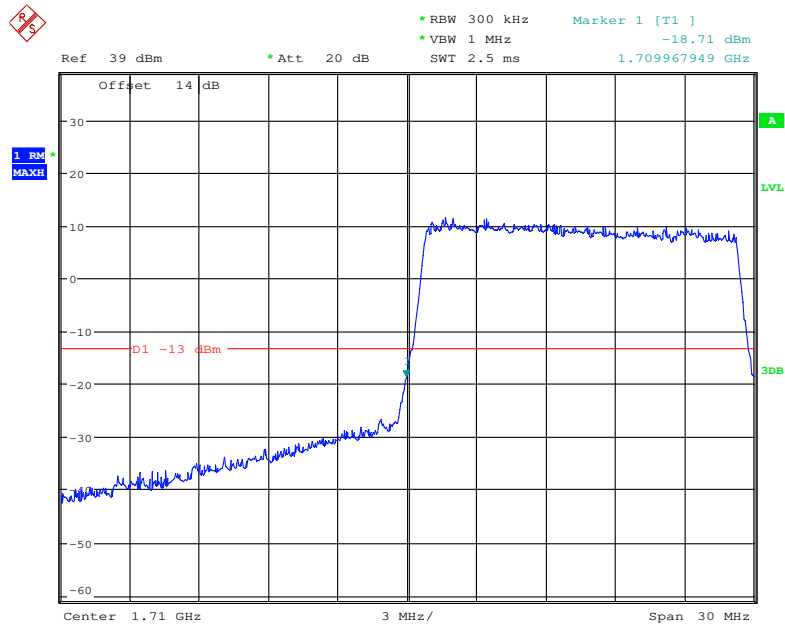
Date: 25.JAN.2018 22:22:09

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



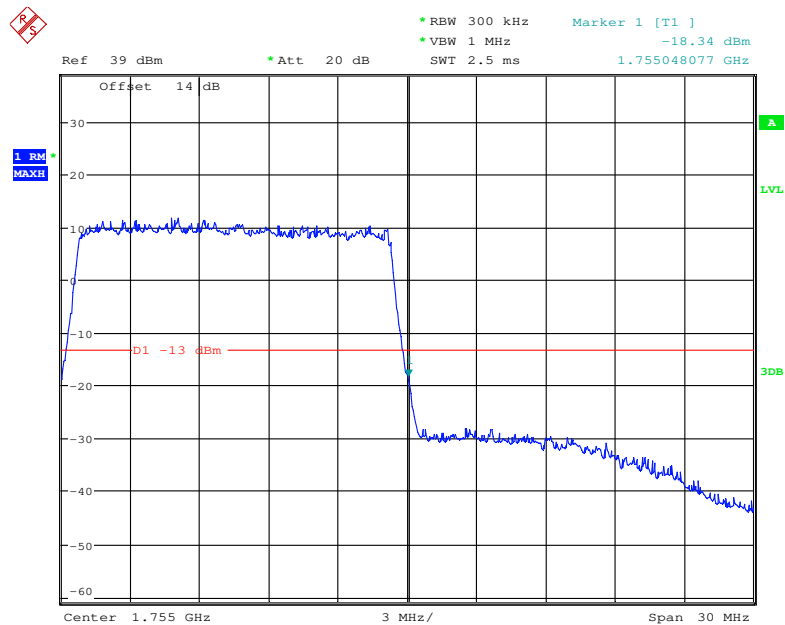
Date: 25.JAN.2018 22:25:56

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



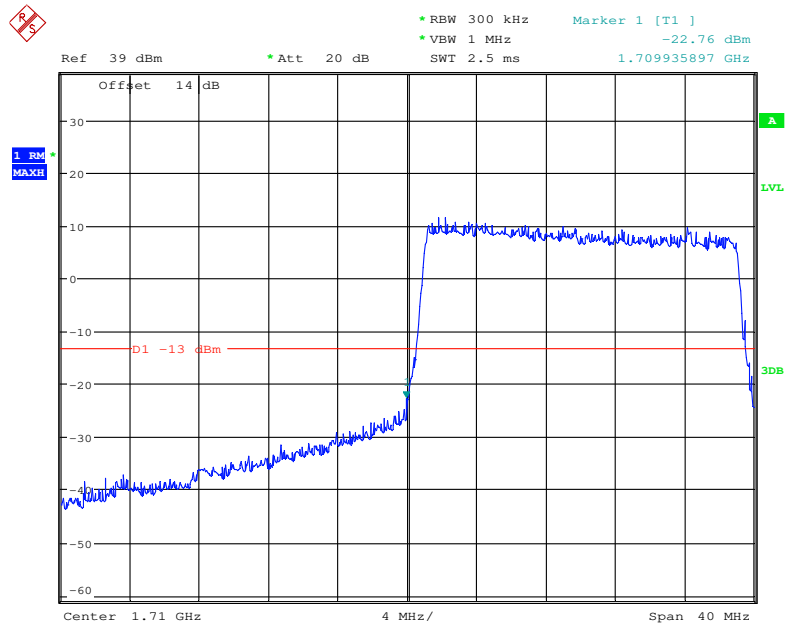
Date: 25.JAN.2018 22:24:02

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



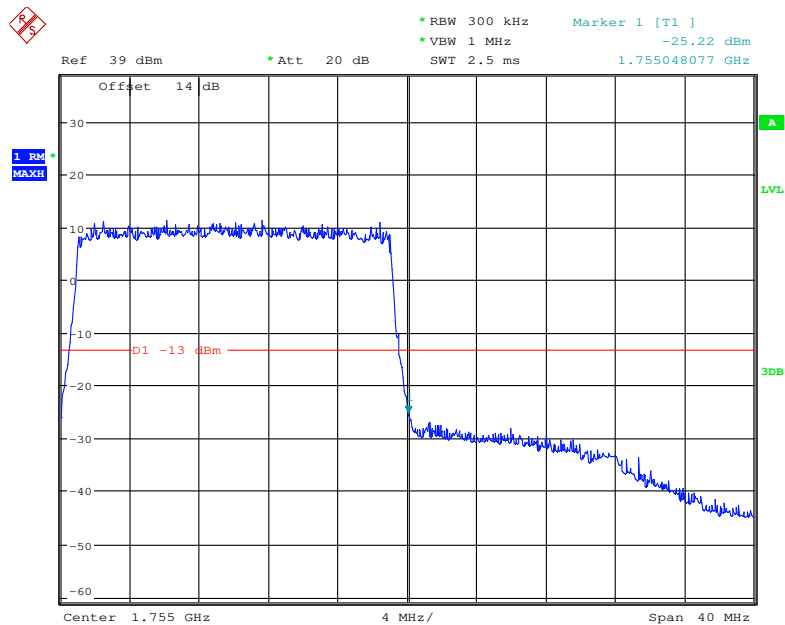
Date: 25.JAN.2018 22:25:16

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



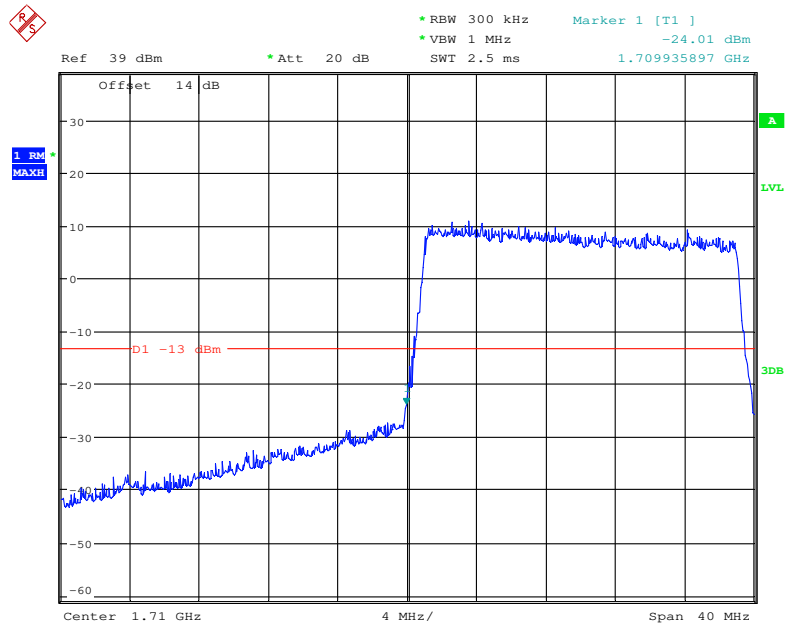
Date: 25.JAN.2018 22:31:36

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



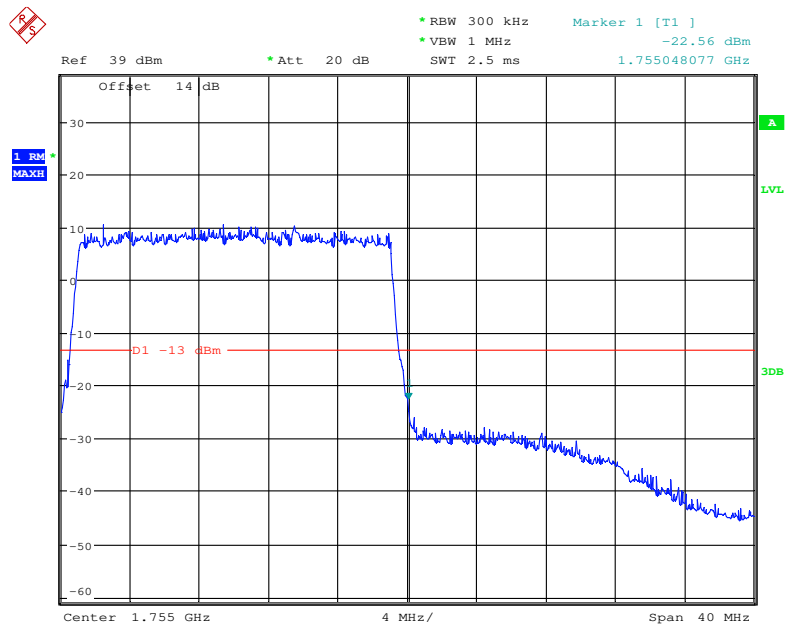
Date: 25.JAN.2018 22:28:32

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

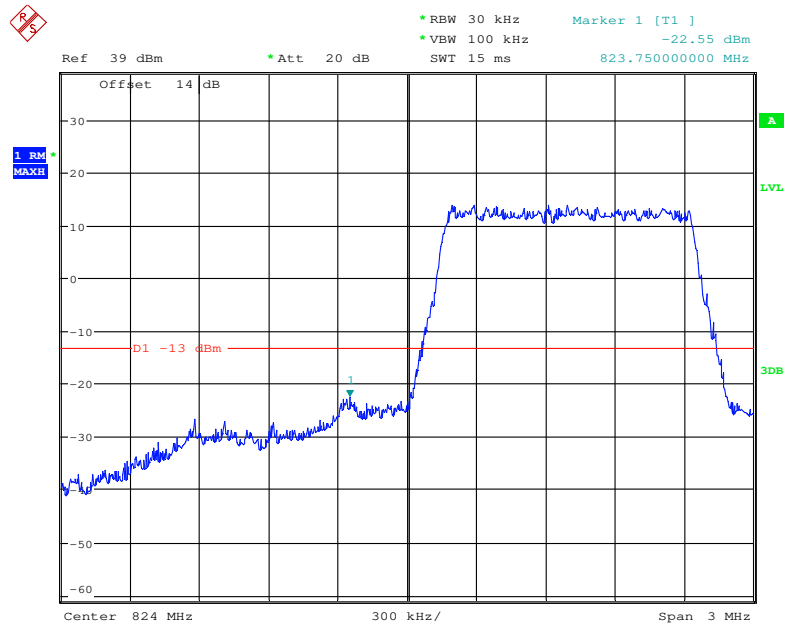


Date: 25.JAN.2018 22:30:54

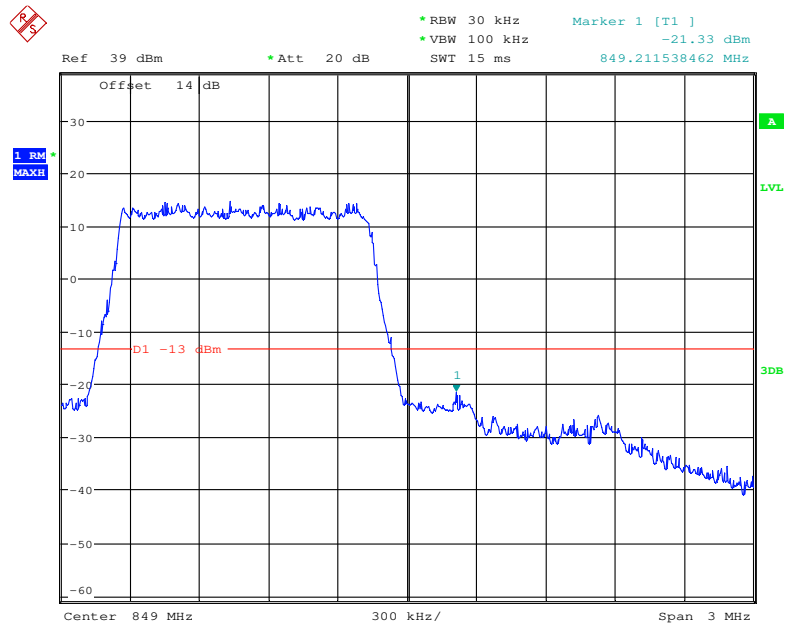
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 25.JAN.2018 22:29:45

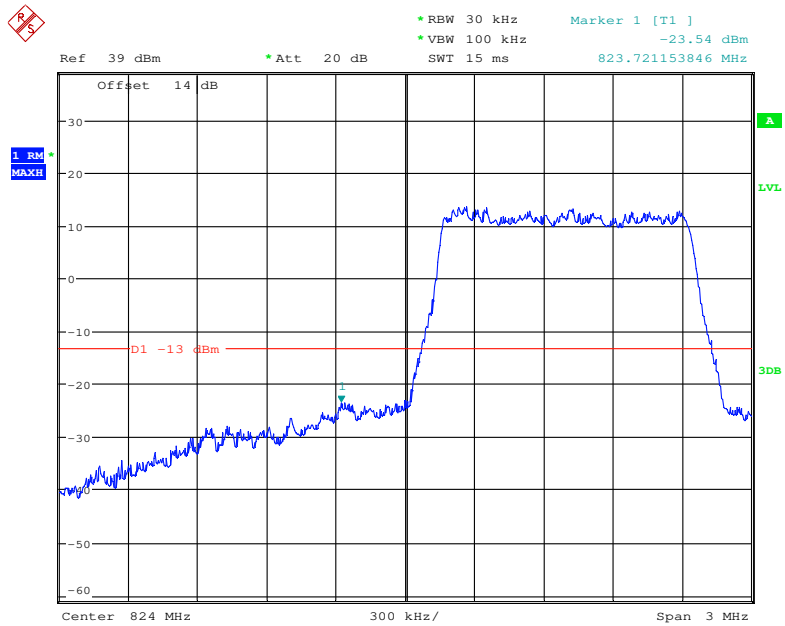
LTE Band 5:**QPSK (1.4 MHz, FULL RB) - Left Band Edge**

Date: 25.JAN.2018 22:39:23

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

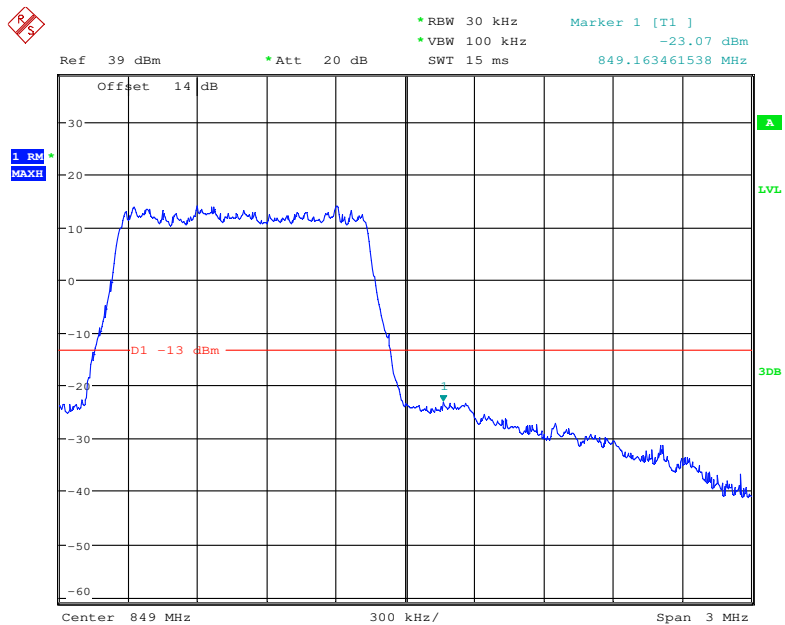
Date: 25.JAN.2018 22:40:15

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



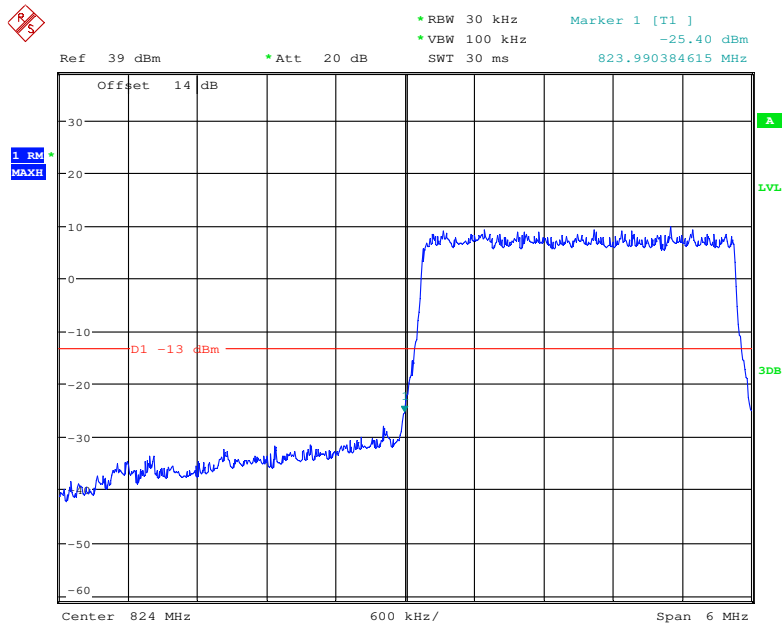
Date: 25.JAN.2018 22:36:57

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



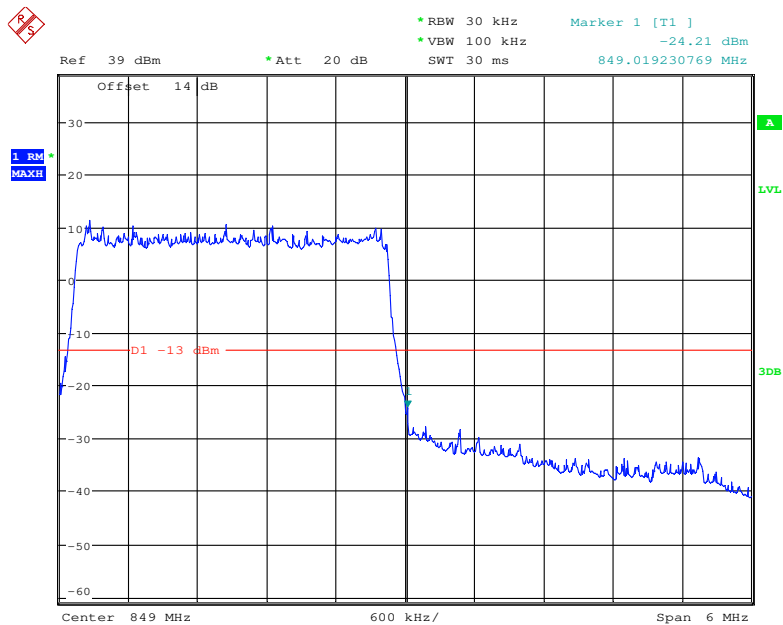
Date: 25.JAN.2018 22:41:45

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



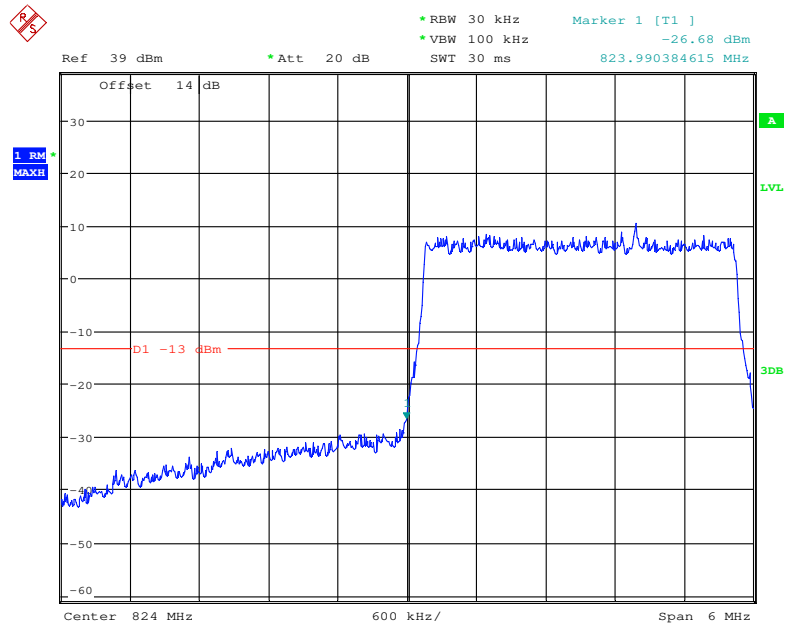
Date: 25.JAN.2018 22:48:44

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



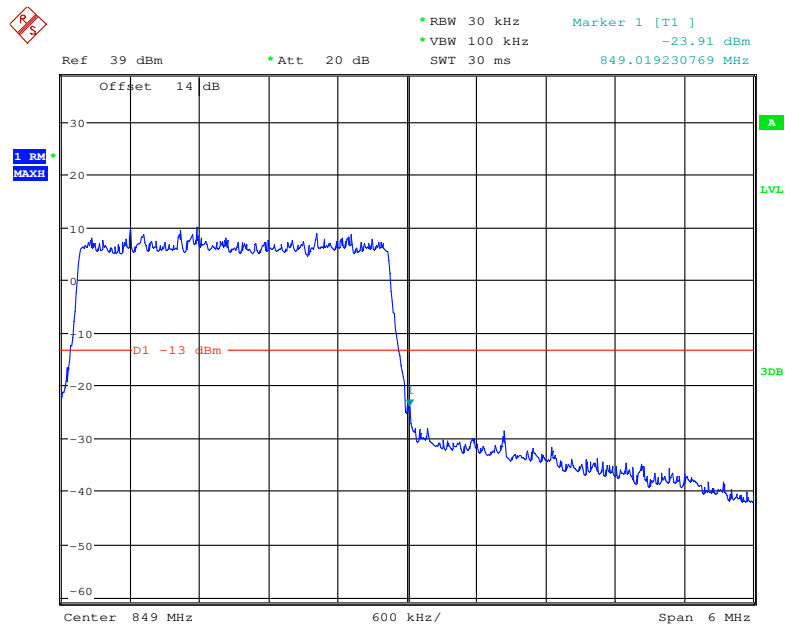
Date: 25.JAN.2018 22:44:56

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



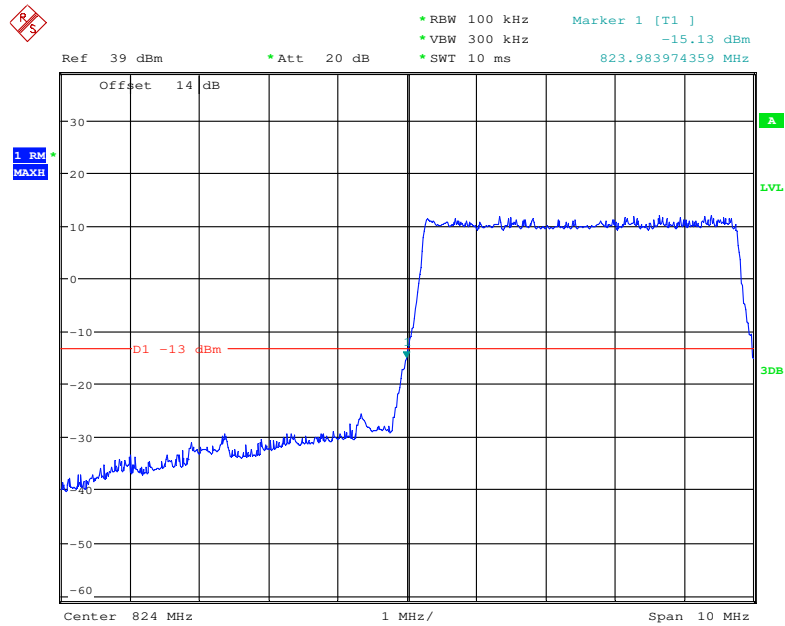
Date: 25.JAN.2018 22:47:51

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



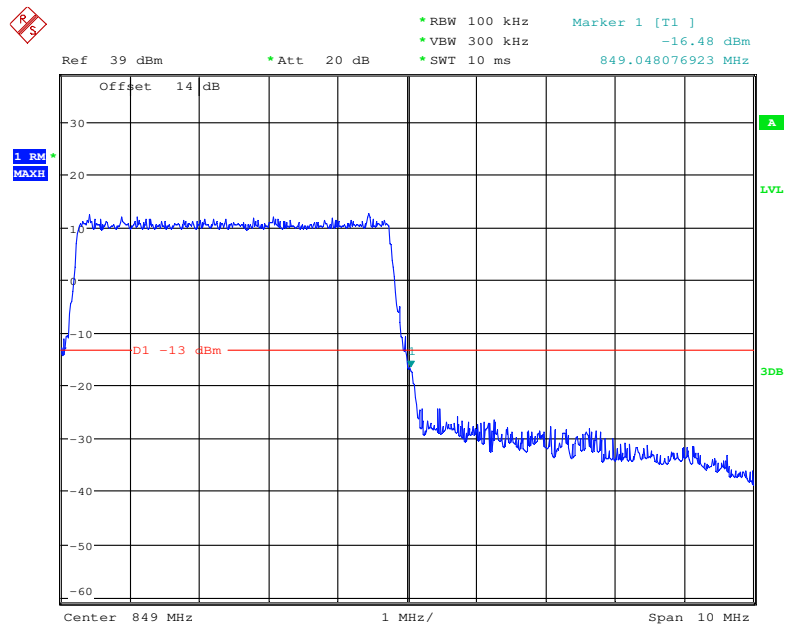
Date: 25.JAN.2018 22:46:05

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

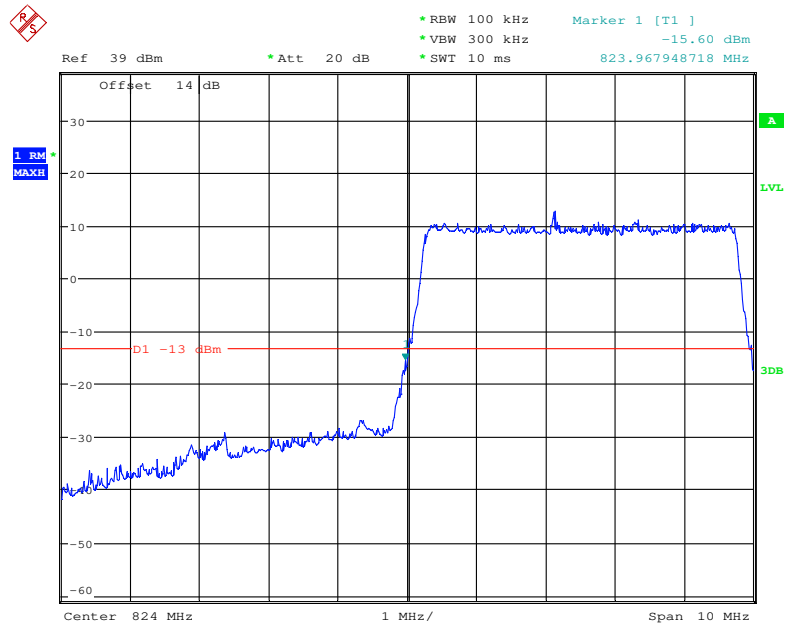


Date: 25.JAN.2018 22:52:02

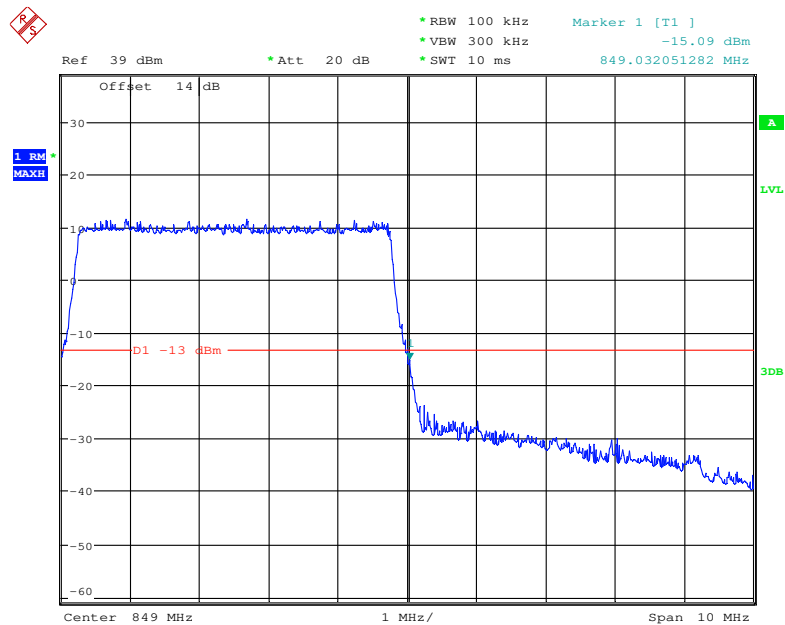
QPSK (5.0 MHz, FULL RB) - Right Band Edge



Date: 25.JAN.2018 22:56:43

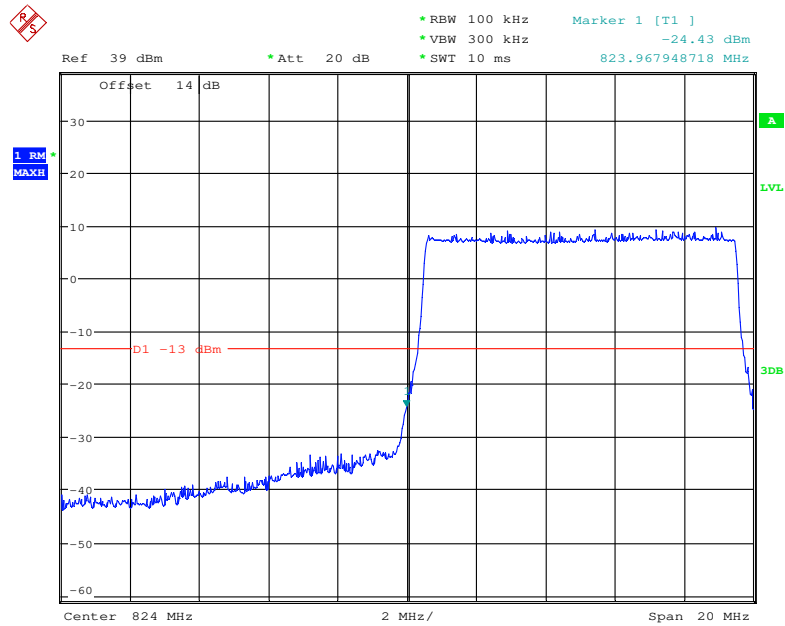
16-QAM (5.0 MHz, FULL RB) - Left Band Edge

Date: 25.JAN.2018 22:53:36

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

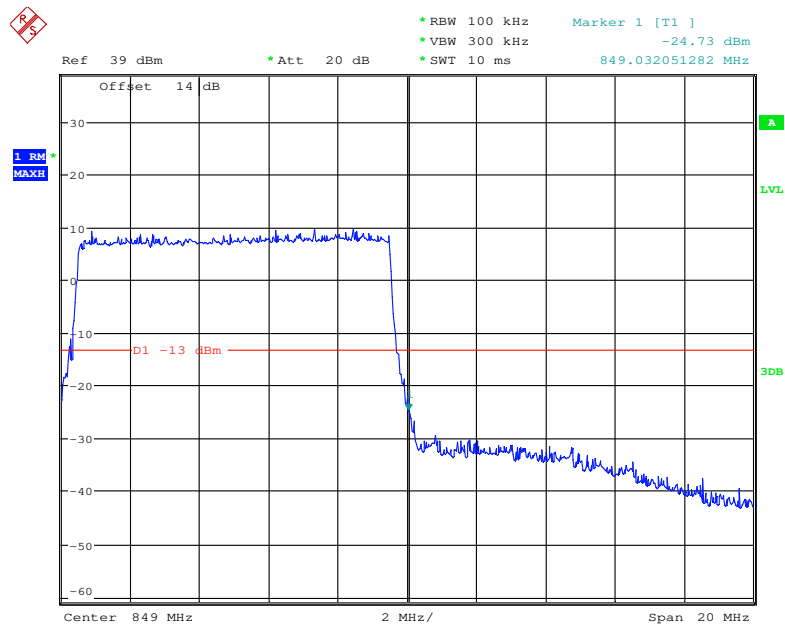
Date: 25.JAN.2018 22:55:36

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



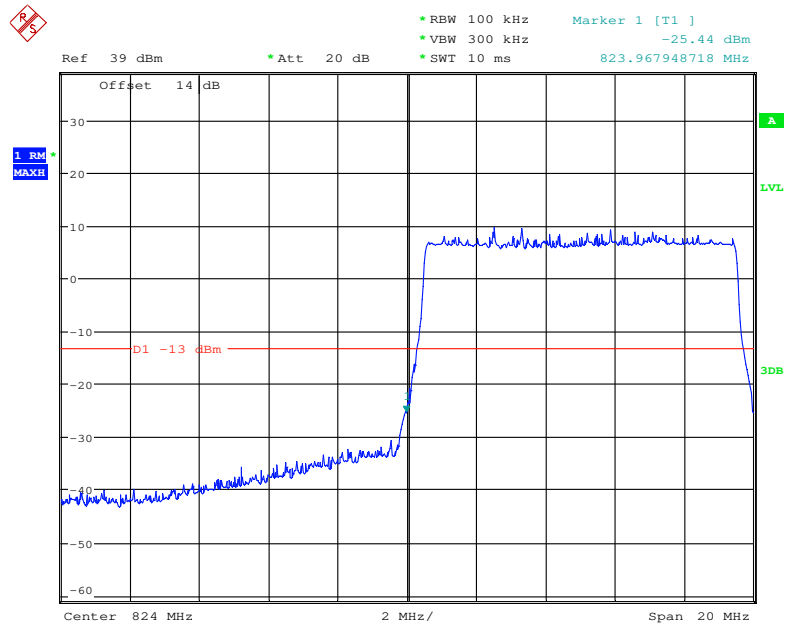
Date: 25.JAN.2018 23:02:12

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



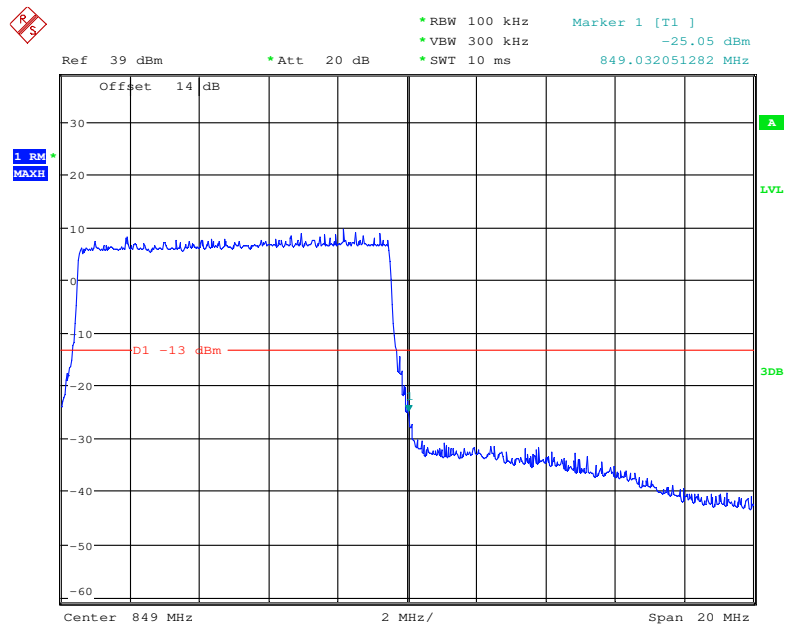
Date: 25.JAN.2018 23:00:17

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

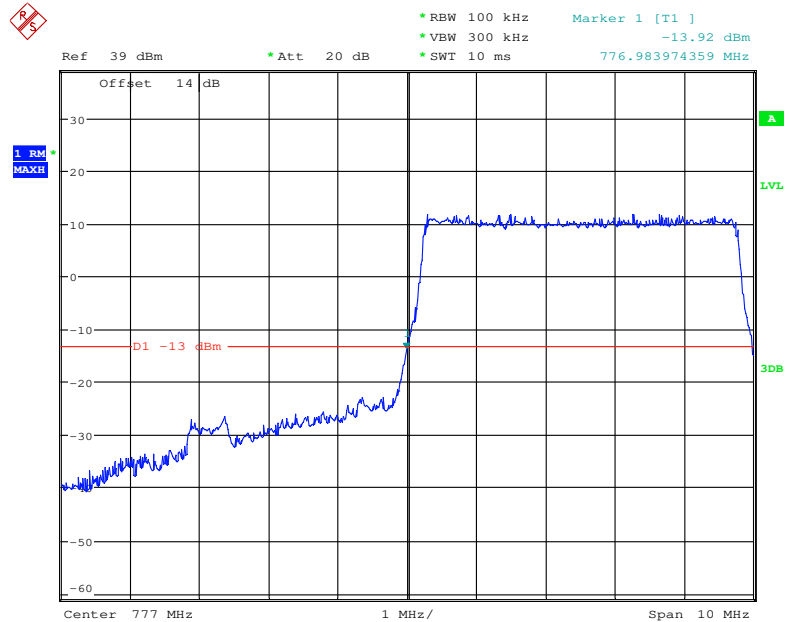


Date: 25.JAN.2018 23:03:41

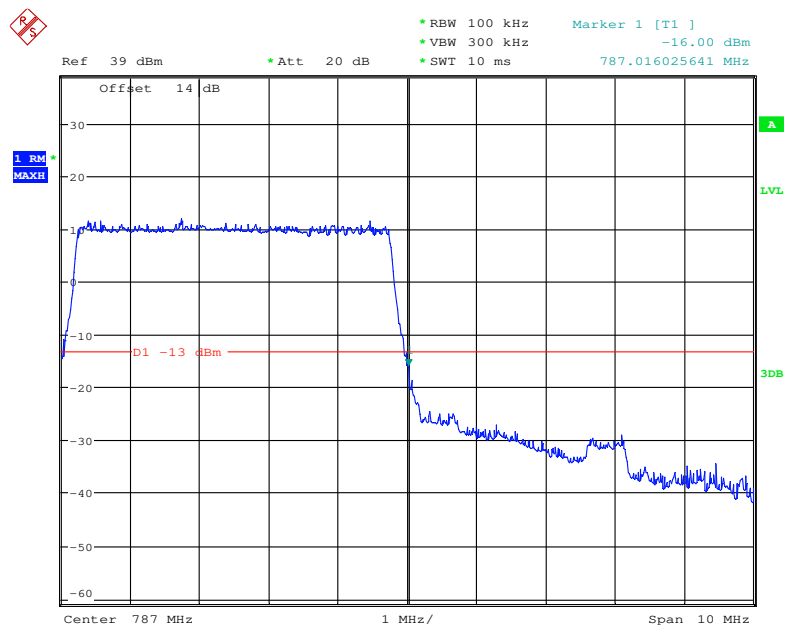
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



Date: 25.JAN.2018 22:59:00

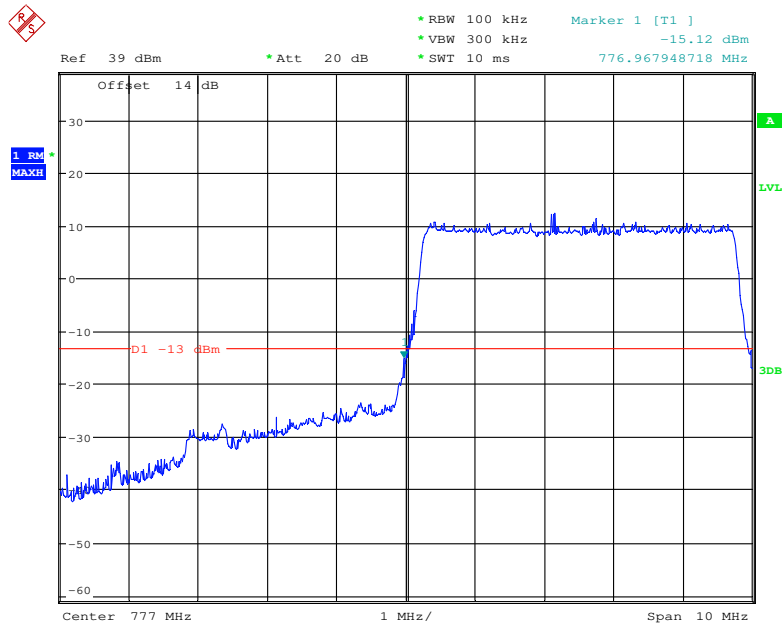
LTE Band 13:**QPSK (5.0 MHz, FULL RB) - Left Band Edge**

Date: 25.JAN.2018 23:15:52

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

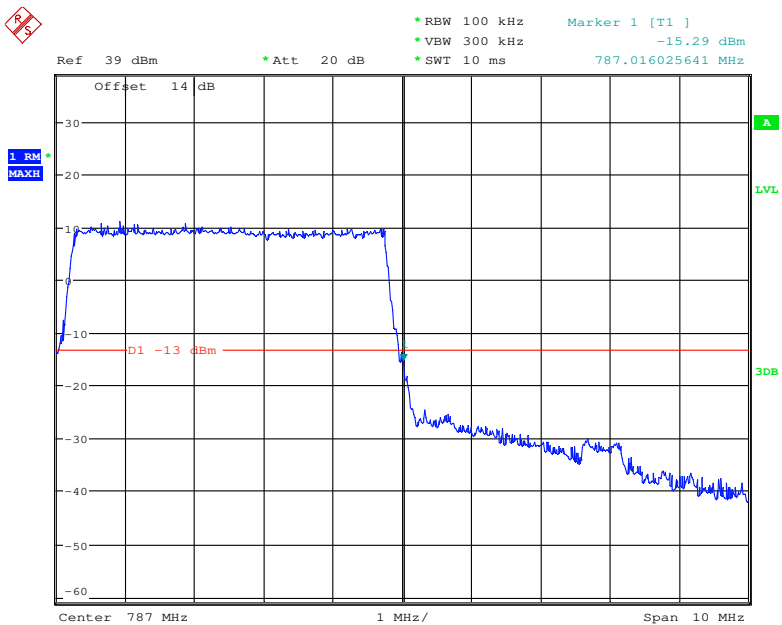
Date: 25.JAN.2018 23:18:57

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



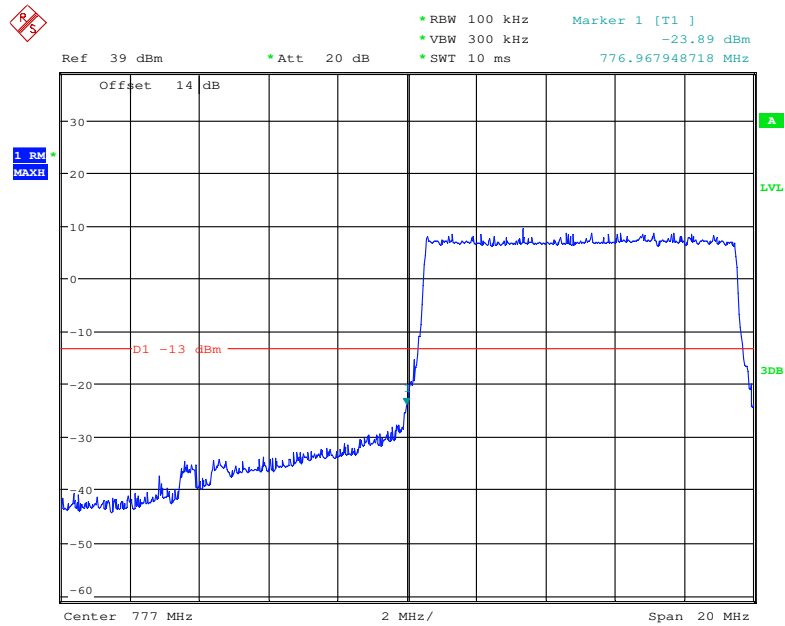
Date: 25.JAN.2018 23:16:42

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



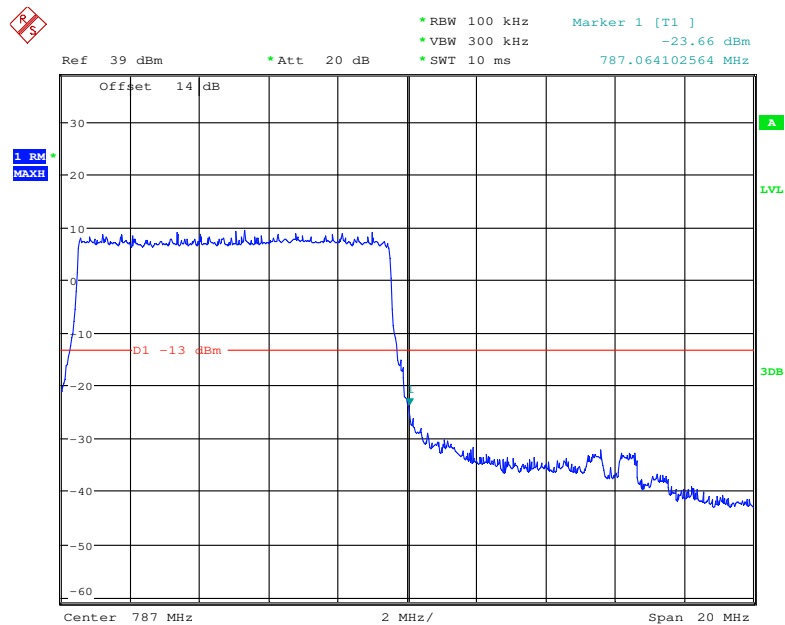
Date: 25.JAN.2018 23:17:53

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



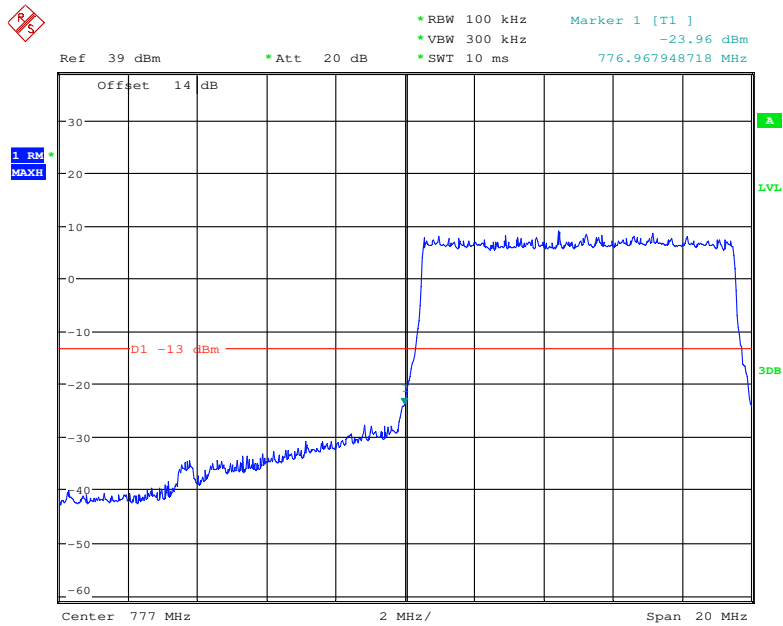
Date: 25.JAN.2018 23:12:34

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



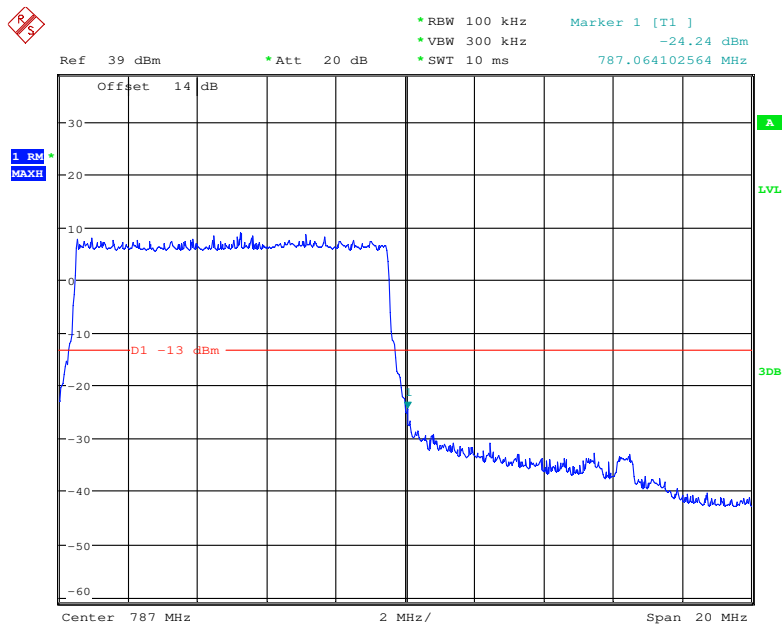
Date: 25.JAN.2018 23:11:56

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



Date: 25.JAN.2018 23:14:27

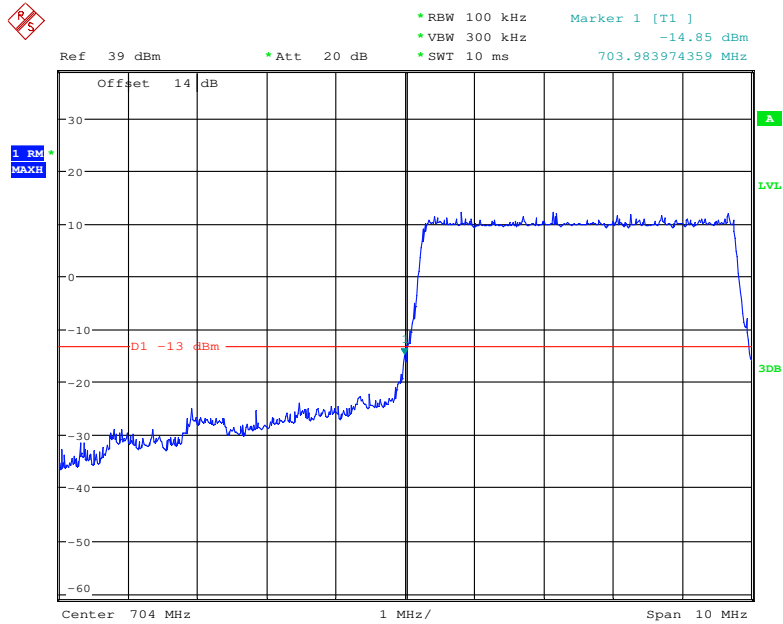
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



Date: 25.JAN.2018 23:10:42

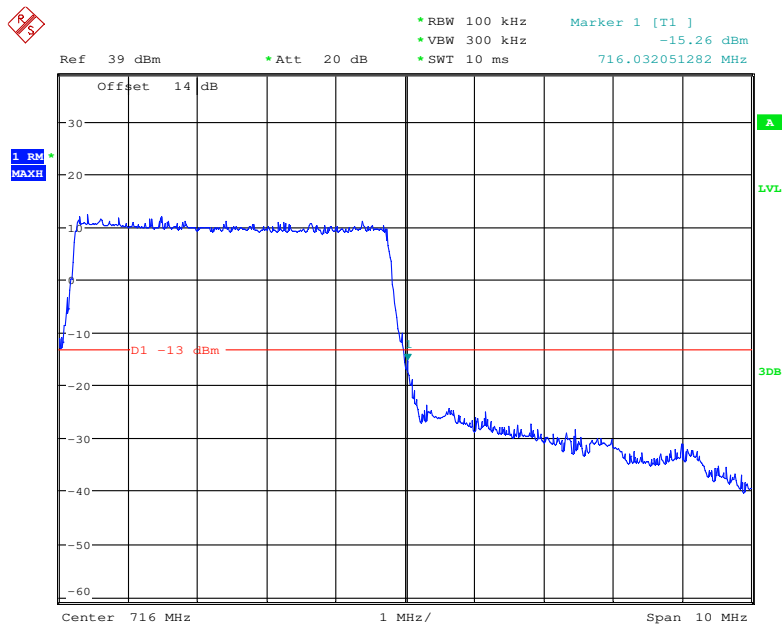
LTE Band 17:

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



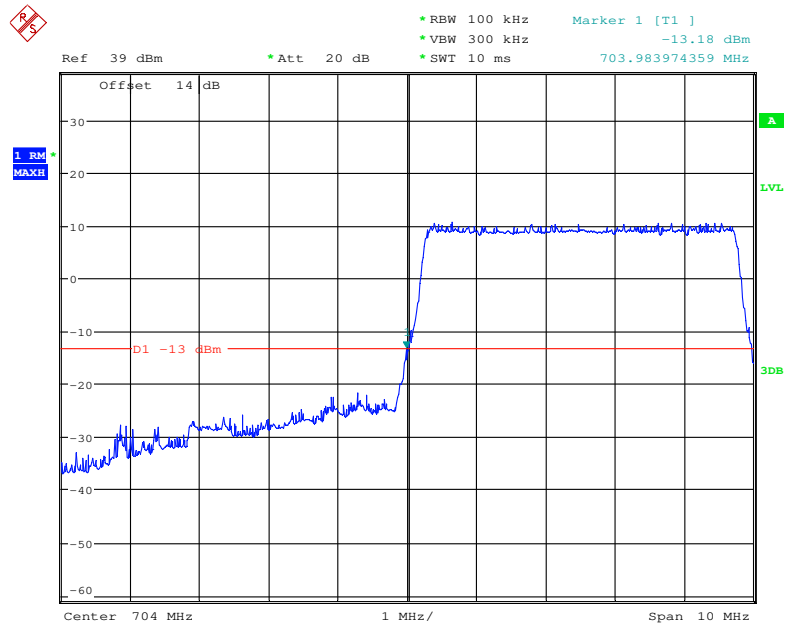
Date: 25.JAN.2018 23:21:15

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



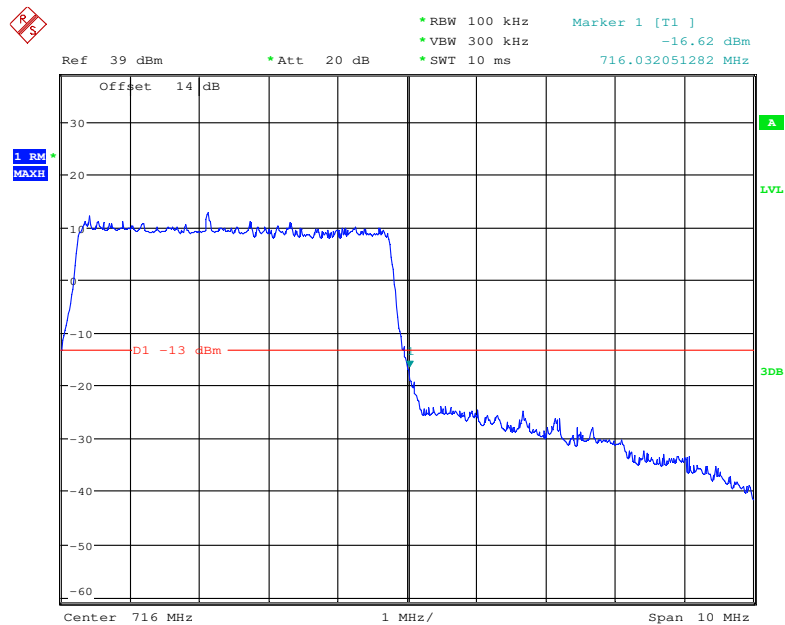
Date: 25.JAN.2018 23:24:13

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



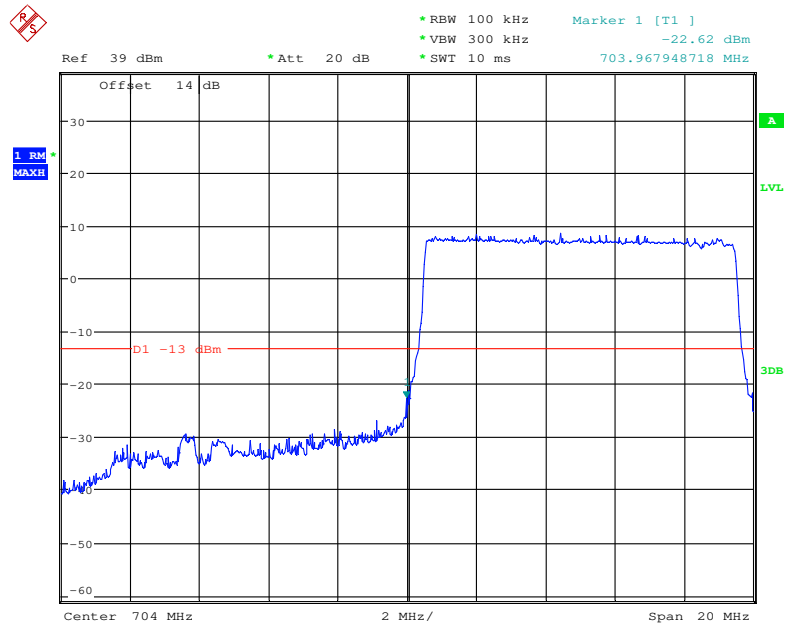
Date: 25.JAN.2018 23:22:04

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



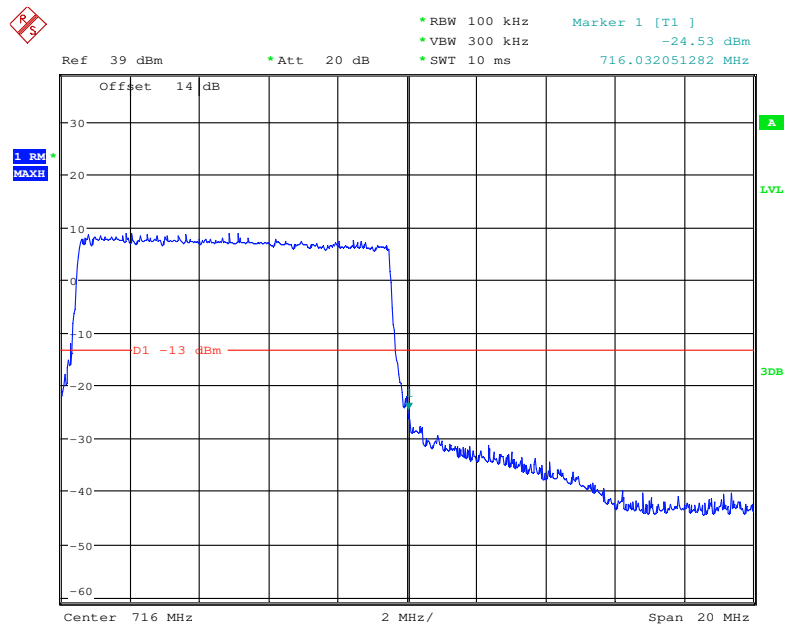
Date: 25.JAN.2018 23:23:43

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



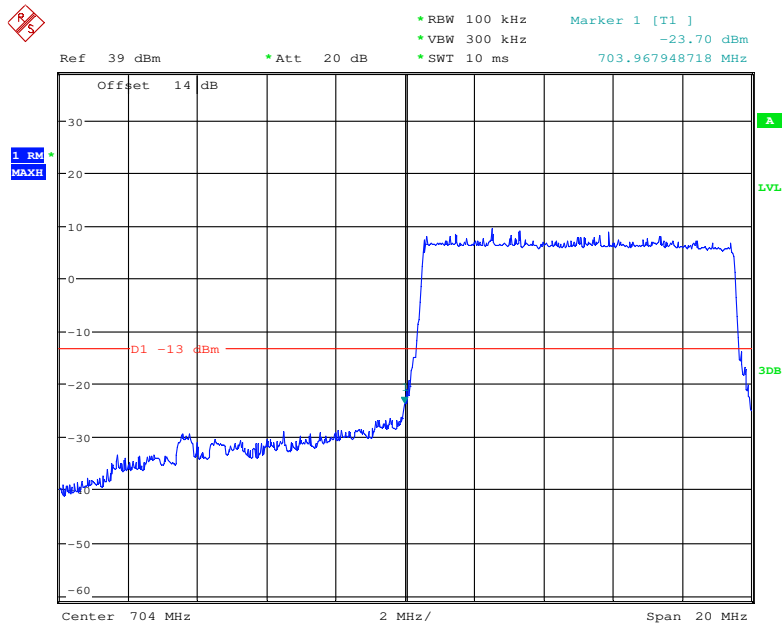
Date: 25.JAN.2018 23:26:41

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



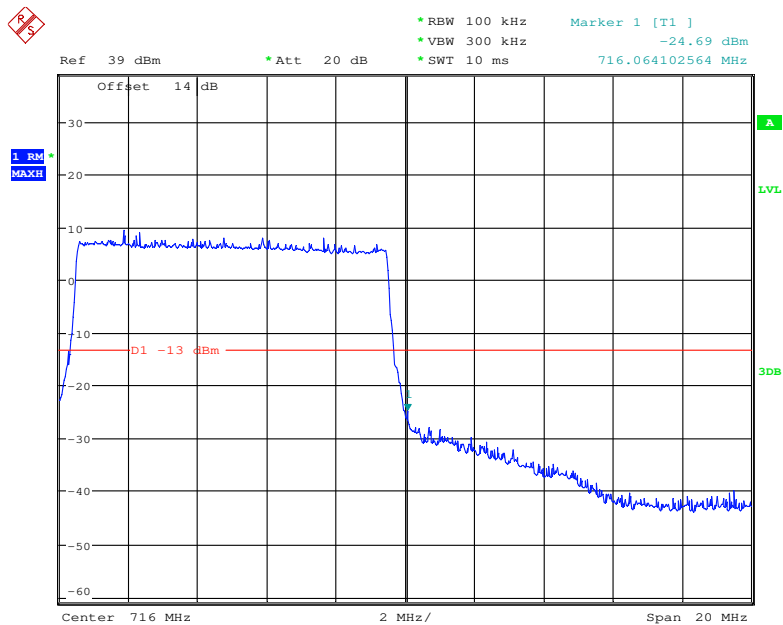
Date: 25.JAN.2018 23:25:50

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



Date: 25.JAN.2018 23:28:01

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



Date: 25.JAN.2018 23:25:19

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

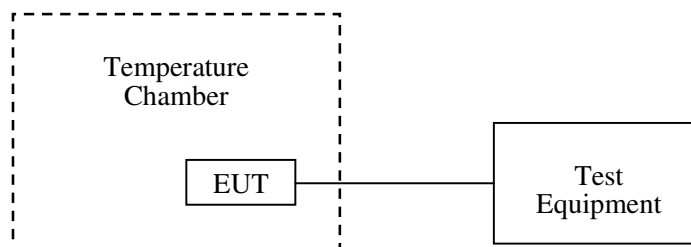
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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 Tracy Hu on 2018-01-25.

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	6	0.00717	2.5
-20		6	0.00717	2.5
-10		5	0.00598	2.5
0		5	0.00598	2.5
10		5	0.00598	2.5
20		4	0.00478	2.5
30		5	0.00598	2.5
40		6	0.00717	2.5
50		7	0.00837	2.5
25	V min.= 3.5	8	0.00956	2.5
	V max.= 4.2	9	0.01076	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	-6	-0.00717	2.5
-20		-6	-0.00717	2.5
-10		-4	-0.00478	2.5
0		-4	-0.00478	2.5
10		-4	-0.00478	2.5
20		-3	-0.00359	2.5
30		-5	-0.00598	2.5
40		-10	-0.01195	2.5
50		-12	-0.01434	2.5
25	V min.= 3.5	-15	-0.01793	2.5
	V max.= 4.2	-19	-0.02271	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	-12	-0.01434	2.5
-20		-12	-0.01434	2.5
-10		-11	-0.01315	2.5
0		-11	-0.01315	2.5
10		-11	-0.01315	2.5
20		-10	-0.01195	2.5
30		-11	-0.01315	2.5
40		-12	-0.01434	2.5
50		-12	-0.01434	2.5
25	V min.= 3.5	-13	-0.01554	2.5
	V max.= 4.2	-13	-0.01554	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	9	0.00479	pass
-20		9	0.00479	pass
-10		8	0.00426	pass
0		8	0.00426	pass
10		8	0.00426	pass
20		7	0.00372	pass
30		8	0.00426	pass
40		9	0.00479	pass
50		12	0.00638	pass
25	V min.= 3.5	15	0.00798	pass
	V max.= 4.2	19	0.01011	pass

EDGE Mode

Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-7	-0.00372	pass
-20		-7	-0.00372	pass
-10		-5	-0.00266	pass
0		-5	-0.00266	pass
10		-5	-0.00266	pass
20		-2	-0.00106	pass
30		-5	-0.00266	pass
40		-7	-0.00372	pass
50		-10	-0.00532	pass
25	V min.= 3.5	-12	-0.00638	pass
	V max.= 4.2	-15	-0.00798	pass

WCDMA Mode

Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-3	-0.00160	pass
-20		-3	-0.00160	pass
-10		-2	-0.00106	pass
0		-2	-0.00106	pass
10		-2	-0.00106	pass
20		-1	-0.00053	pass
30		-2	-0.00106	pass
40		-3	-0.00160	pass
50		-4	-0.00213	pass
25	V min.= 3.5	-5	-0.00266	pass
	V max.= 4.2	-6	-0.00319	pass

Band 4:**QPSK:**

10.0 MHz Middle Channel, $f_0 = 1732.5$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	5	0.00289	pass
-20		5	0.00289	pass
-10		2	0.00115	pass
0		2	0.00115	pass
10		2	0.00115	pass
20		1	0.00058	pass
30		2	0.00115	pass
40		5	0.00289	pass
50		5	0.00289	pass
20	V min.= 3.5	9	0.00519	pass
	V max.= 4.2	11	0.00635	pass

16QAM:

10.0 MHz Middle Channel, $f_0 = 1732.5$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	9	0.00519	pass
-20		13	0.00750	pass
-10		4	0.00231	pass
0		-7	-0.00404	pass
10		7	0.00404	pass
20		10	0.00577	pass
30		7	0.00404	pass
40		12	0.00693	pass
50		6	0.00346	pass
20	V min.= 3.5	2	0.00115	pass
	V max.= 4.2	-2	-0.00115	pass

Band 5:

QPSK:

10.0 MHz Middle Channel, $f_0 = 836.5$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	4	0.00478	2.5
-20		3	0.00359	2.5
-10		12	0.01435	2.5
0		8	0.00956	2.5
10		3	0.00359	2.5
20		1	0.00120	2.5
30		2	0.00239	2.5
40		-1	-0.00120	2.5
50		4	0.00478	2.5
20	V min.= 3.5	-9	-0.01076	2.5
	V max.= 4.2	-5	-0.00704	2.5

16QAM:

10.0 MHz Middle Channel, $f_0 = 836.5$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-7	-0.00837	2.5
-20		8	0.00956	2.5
-10		5	0.00598	2.5
0		-4	-0.00478	2.5
10		-3	-0.00359	2.5
20		4	0.00478	2.5
30		7	0.00837	2.5
40		6	0.00717	2.5
50		3	0.00359	2.5
20	V min.= 3.5	-6	-0.00717	2.5
	V max.= 4.2	12	0.01690	2.5

Band 13:

QPSK:

10.0 MHz Middle Channel, $f_0 = 782$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	5	0.00639	pass
-20		-3	-0.00384	pass
-10		-6	-0.00767	pass
0		4	0.00512	pass
10		2	0.00256	pass
20		5	0.00639	pass
30		3	0.00384	pass
40		8	0.01023	pass
50		6	0.00767	pass
20	V min.= 3.5	8	0.01023	pass
	V max.= 4.2	11	0.01407	pass

16QAM:

10.0 MHz Middle Channel, $f_0 = 782$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-8	-0.01023	pass
-20		12	0.01535	pass
-10		5	0.00639	pass
0		1	0.00128	pass
10		7	0.00895	pass
20		-2	-0.00256	pass
30		2	0.00256	pass
40		-1	-0.00128	pass
50		8	0.01023	pass
20	V min.= 3.5	6	0.00767	pass
	V max.= 4.2	10	0.01279	pass

Band 17:

QPSK:

10.0 MHz Middle Channel, $f_0 = 710$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	5	0.00704	pass
-20		-3	-0.00423	pass
-10		1	0.00141	pass
0		11	0.01549	pass
10		8	0.01127	pass
20		-3	-0.00423	pass
30		-2	-0.00282	pass
40		10	0.01408	pass
50		-7	-0.00986	pass
20	V min.= 3.5	-1	-0.00141	pass
	V max.= 4.2	7	0.00986	pass

16QAM:

10.0 MHz Middle Channel, $f_0 = 710$ MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	10	0.01408	pass
-20		8	0.01127	pass
-10		-2	-0.00282	pass
0		-2	-0.00282	pass
10		11	0.01549	pass
20		7	0.00986	pass
30		-1	-0.00141	pass
40		2	0.00282	pass
50		4	0.00563	pass
20	V min.= 3.5	9	0.01268	pass
	V max.= 4.2	-4	-0.00563	pass

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