

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

For

MeiG Smart Technology Co., Ltd

3/F, No.88, Qinqiang Road, Xuhui District, Shanghai, China.

FCC ID: 2APJ4-SLM756

Report Type: Original Report	Product Type: Smart Module
Test Engineer: Hope Zhang	Hope Zhang
Report Number: RSHA190110001-00A	
Report Date: 2019-03-28	
Reviewed By: Oscar Ye RF Leader	Oscar Ye
Prepared By: Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
JUSTIFICATION	5
CHANNEL LIST	5
EQUIPMENT MODIFICATIONS	8
SUPPORT EQUIPMENT LIST AND DETAILS	8
EXTERNAL I/O CABLE.....	8
BLOCK DIAGRAM OF TEST SETUP	9
SUMMARY OF TEST RESULTS	10
TEST EQUIPMENT LIST	11
FCC §1.1307 & §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)	13
CALCULATED DATA (WORST CASE):	14
FCC §2.1047 - MODULATION CHARACTERISTIC	16
FCC §2.1046; § 22.913 (A); § 24.232 (C); §27.50 (B) (C) (D); §27.50(H) (2); - RF OUTPUT POWER.....	17
APPLICABLE STANDARDS.....	17
TEST PROCEDURE	17
TEST DATA	18
FCC §2.1049, §22.917, §22.905 & §24.238; §27.53- OCCUPIED BANDWIDTH.....	37
APPLICABLE STANDARDS.....	37
TEST PROCEDURE	37
TEST DATA	37
FCC § 2.1051; § 22.917 (A); § 24.238 (A); §27.53(C) (F) (H) (M) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS	80
APPLICABLE STANDARDS.....	80
TEST PROCEDURE	80
TEST DATA	80
FCC § 2.1053; § 22.917 (A); § 24.238 (A); §27.53 (H) (M) - SPURIOUS RADIATED EMISSIONS.....	155
APPLICABLE STANDARDS.....	155
TEST PROCEDURE	155
TEST DATA	156
FCC § 22.917 (A); § 24.238 (A); §27.53 (H) (M) - BAND EDGES	162
APPLICABLE STANDARDS.....	162
TEST PROCEDURE	162
TEST DATA	162
FCC § 2.1055; § 22.355; § 24.235; §27.54- FREQUENCY STABILITY	231
APPLICABLE STANDARDS.....	231
TEST PROCEDURE	231
TEST DATA	232

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	MeiG Smart Technology Co., LTD
Tested Model	SLM756
Product Type	Smart Module
Dimension	44mm(L)*39mm(W)*3mm(H)
Power Supply	DC 3.8V

**All measurement and test data in this report was gathered from production sample serial number: 20190110001. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-01-10)*

Objective

This type approval report is prepared on behalf of MeiG Smart Technology Co., LTD in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS, Part 15.247 DTS submittals with FCC ID: 2APJ4-SLM756.

Test Methodology

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

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

Applicable Standards: TIA/EIA 603-D.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6GHz~18GHz	4.92dB
	18GHz~40GHz	5.21dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

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.

Channel List

Mode		Channel		Frequency (MHz)
WCDMA Band II		Low	9262	1852.4
		Middle	9400	1880.0
		High	9538	1907.6
WCDMA Band IV		Low	1312	1712.4
		Middle	1413	1732.6
		High	1513	1752.6
WCDMA Band V		Low	4132	826.4
		Middle	4183	836.6
		High	4233	846.6
LTE Band 2	1.4M	Low	18607	1850.7
		Middle	18900	1880.0
		High	19193	1909.3
	3M	Low	18615	1851.5
		Middle	18900	1880.0
		High	19185	1908.5
	5M	Low	18625	1852.5
		Middle	18900	1880.0
		High	19175	1907.5
	10M	Low	18650	1855.0
		Middle	18900	1880.0
		High	19150	1905.0
	15M	Low	18675	1857.5
		Middle	18900	1880.0
		High	19125	1902.5
	20M	Low	18700	1860.0
		Middle	18900	1880.0
		High	19100	1900.0

Mode		Channel		Frequency (MHz)
LTE Band 4	1.4M	Low	19957	1710.7
		Middle	20175	1732.5
		High	20393	1754.3
	3M	Low	19965	1711.5
		Middle	20175	1732.5
		High	20385	1753.5
	5M	Low	19975	1712.5
		Middle	20175	1732.5
		High	20375	1752.5
	10M	Low	20000	1715.0
		Middle	20175	1732.5
		High	20350	1750.0
	15M	Low	20025	1717.5
		Middle	20175	1732.5
		High	20325	1747.5
	20M	Low	20050	1720.0
		Middle	20175	1732.5
		High	20300	1745.0
LTE Band 5	1.4M	Low	20407	824.7
		Middle	20525	836.5
		High	20643	848.3
	3M	Low	20415	825.5
		Middle	20525	836.5
		High	20635	847.5
	5M	Low	20425	826.5
		Middle	20525	836.5
		High	20625	846.5
	10M	Low	20450	829.0
		Middle	20525	836.5
		High	20600	844.0
LTE Band 7	5M	Low	20775	2502.5
		Middle	21100	2535.0
		High	21425	2567.5
	10M	Low	20800	2505.0
		Middle	21100	2535.0
		High	21400	2565.0
	15M	Low	20825	2507.5
		Middle	21100	2535.0
		High	21375	2562.5
	20M	Low	20850	2510.0
		Middle	21100	2535.0
		High	21350	2560.0

Mode		Channel		Frequency (MHz)
LTE Band 12	1.4M	Low	23017	699.7
		Middle	23095	707.5
		High	23173	715.3
	3M	Low	23025	700.5
		Middle	23095	707.5
		High	23165	714.5
	5M	Low	23035	701.5
		Middle	23095	707.5
		High	23155	713.5
	10M	Low	23060	704.0
		Middle	23095	707.5
		High	23130	711.0
LTE Band 13	5M	Low	23205	779.5
		Middle	23230	782.0
		High	23255	784.5
	10M	Low	/	/
		Middle	23230	782.0
		High	/	/
LTE Band 17	5M	Low	23755	706.5
		Middle	23790	710.0
		High	23825	713.5
	10M	Low	23780	709.0
		Middle	23790	710.0
		High	23800	711.0

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

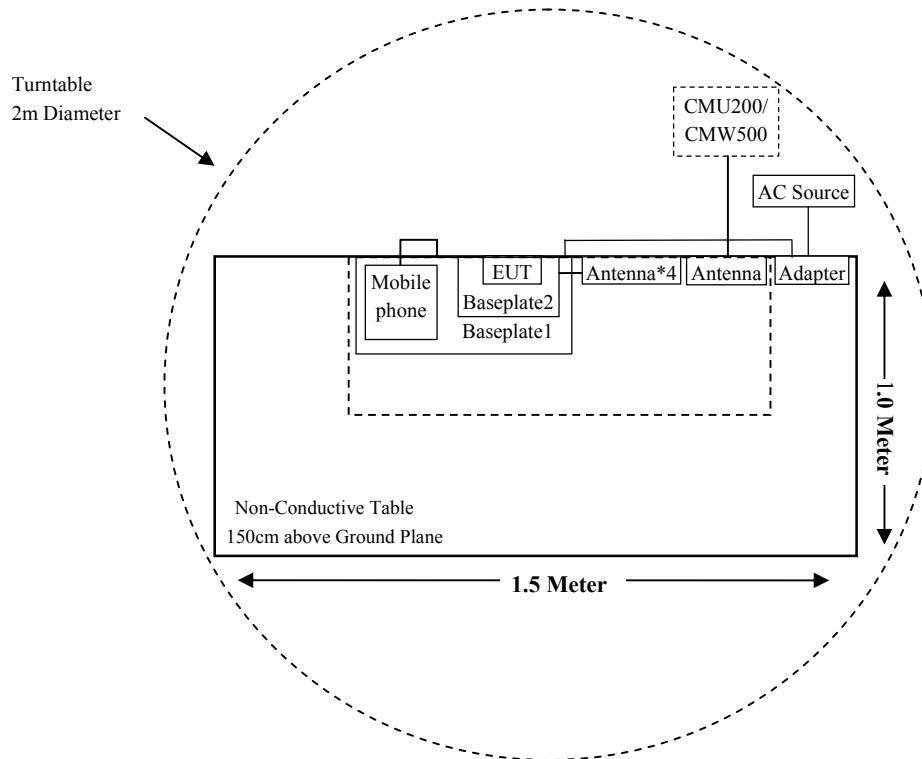
Manufacturer	Description	Model	Serial Number
HUAWEI	Mobile phone	EVA-TL00	862266039775394
Waylens Inc.	Antenna	/	/
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605
R & S	Wideband Radio Communication Tester	CMW500	104478
Dian Yuan Technology	Adapter	DYS-0502000C	/
MEIG	Baseplate1	MEIG_EVB_V1.03	/
MEIG	Baseplate2	SLM756_ZB_V1.03_PCB	/
MeiG Smart	Antenna*4	/	/

External I/O Cable

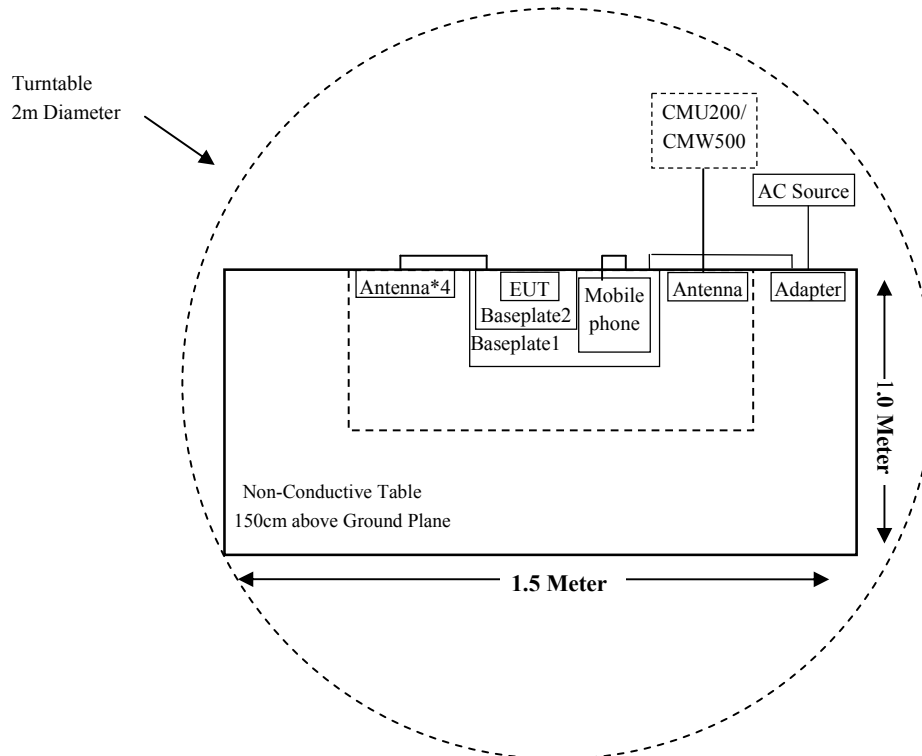
Cable Description	Length (m)	From Port	To
Power Cable	1.0	Baseplate1	Adapter
Data Cable	0.1	Baseplate1	Mobile phone
Antenna Cable*4	0.3	Baseplate2	MeiG Smart Antenna

Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 & §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§2.1046; § 22.913 (a);§ 24.232 (c); § 27.50 (b)(c)(d);§27.50(h) (2);	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53;	Occupied Bandwidth	Compliant
§ 2.1051; § 22.917 (a); § 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h) (m);	Spurious Radiated Emissions	Compliant
§ 22.917 (a); § 24.238 (a); §27.53 (h) (m);	Band Edge	Compliant
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2018-11-12	2019-11-11
HP	Signal Generator	HP 8341B	2624A00116	2018-08-29	2019-08-28
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2019-01-09	2022-01-08
Sonoma Instrument	Pre-amplifier	310N	171205	2018-08-15	2019-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2018-08-15	2019-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2018-11-12	2019-11-11
R & S	Wideband Radio Communication Tester	CMW500	104478	2018-07-21	2019-07-20
Radiated Emission Test (Chamber 2#)					
HP	Signal Generator	HP 8341B	2624A00116	2018-08-29	2019-08-28
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2018-08-27	2019-08-26
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2019-01-11	2022-01-10
ETS-LINDGREN	Horn Antenna	3115	6229	2019-01-11	2022-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
ETS-LINDGREN	Horn Antenna	3116	2516	2016-12-12	2019-12-12
Mini-Circuits	Amplifier	ZVA-183W-S+	220701818	2018-05-20	2019-05-19
EM Electronics Corporation	Amplifier	EM18G40G	060726	2018-03-22	2019-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2018-08-15	2019-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2018-11-12	2019-11-11
R & S	Wideband Radio Communication Tester	CMW500	104478	2018-07-21	2019-07-20

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2018-09-21	2019-09-20
Narda	Attenuator	2dB	002	2019-01-10	2020-01-09
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2018-11-12	2019-11-11
R & S	Wideband Radio Communication Tester	CMW500	104478	2018-07-21	2019-07-20
Mini-Circuits	Power splitter	ZFRSC-14-S+	SF019411452	2018-11-10	2019-11-09
BACL	Temperature & Humidity Chamber	BTH-150	30023	2018-10-10	2019-10-09
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2018-10-10	2019-10-09
MeiG Smart	RF Cable	MeiG SmartC01	C01	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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 & §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §2.1091 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

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

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

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

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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data (worst case):

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	MPE ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11b	2412-2462	0.00	1.00	18.00	63.0957	20	0.0126	1.00	0.0126
802.11g		0.00	1.00	17.00	50.1187	20	0.0100	1.00	0.0100
802.11n-HT20		0.00	1.00	17.00	50.1187	20	0.0100	1.00	0.0100
802.11n-HT40	2422-2452	0.00	1.00	17.00	50.1187	20	0.0100	1.00	0.0100
BLE	2402-2480	0.00	1.00	1.00	1.2589	20	0.0003	1.00	0.0003
BT 3.0	2402-2480	0.00	1.00	12.00	15.8489	20	0.0032	1.00	0.0032

Calculation of maximum antenna gain based on ERP/EIRP

Mode	Max Tune-up Power (dBm)	ERP/EIRP Limit (dBm)	Max Antenna Gain (dBd)	Max Antenna Gain (dBi)
WCDMA Band II	23.00	33.00	/	10.00
WCDMA Band IV	23.00	30.00	/	7.00
WCDMA Band V	24.00	38.45	14.45	16.60
LTE Band 2	22.00	33.00	/	11.00
LTE Band 4	23.00	30.00	/	7.00
LTE Band 5	23.00	38.45	15.45	17.60
LTE Band 7	23.00	33.00	/	10.00
LTE Band 12	25.00	34.77	9.77	11.92
LTE Band 13	23.00	34.77	11.77	13.92
LTE Band 17	25.00	34.77	9.77	11.92

Note:0dBd=2.15dBi

Calculation of maximum antenna gain based on MPE Ratio

Mode	Frequency Range	Tune-up Conducted Power		Power Density Limit	Maximum Power Density	Evaluation Distance	Maximum Antenna Gain Allowed based on MPE		MPE ratio
	(MHz)	(dBm)	(mW)	(mW/cm ²)	(mW/cm ²)	(cm)	(numeric)	(dBi)	
WCDMA Band II	1850.0-1910.0	23.00	199.5262	1.00	0.9855	20	24.83	13.95	0.9855
WCDMA Band IV	1710.0-1755.0	23.00	199.5262	1.00	0.9855	20	24.83	13.95	0.9855
WCDMA Band V	824.0-849.0	24.00	251.1886	0.55	0.5416	20	10.84	10.35	0.9847
LTE Band 2	1850.0-1910.0	22.00	158.4893	1.00	0.9855	20	31.26	14.95	0.9855
LTE Band 4	1710.0-1755.0	23.00	199.5262	1.00	0.9855	20	24.83	13.95	0.9855
LTE Band 5	824.0-849.0	23.00	199.5262	0.55	0.5416	20	13.65	11.35	0.9847
LTE Band 7	2500.0-2570.0	23.00	199.5262	1.00	0.9855	20	24.83	13.95	0.9855
LTE Band 12	699.0-716.0	25.00	316.2278	0.47	0.4631	20	7.36	8.67	0.9853
LTE Band 13	777.0-787.0	23.00	199.5262	0.52	0.5125	20	12.91	11.11	0.9856
LTE Band 17	704.0-716.0	25.00	316.2278	0.47	0.4631	20	7.36	8.67	0.9853

Note: Wi-Fi/ BLE/ BT 3.0& WCDMA/FDD can transmit simultaneously; the worst condition is 802.11b of Wi-Fi & FDD (Band13), as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0126 + 0.9856 = 0.9982 < 1.0$$

Mode	Max Allow Antenna Gain (dBi)
WCDMA Band II/LTE Band 2	10.0
WCDMA Band IV/ LTE Band 4	7.00
WCDMA Band V/ LTE Band 5	10.35
LTE Band 7	10.00
LTE Band 12/ LTE Band 17	8.67
LTE Band 13	11.11

Result: To meet RF exposure & ERP/ERIP, the maximum net gains of antennas allowed are 10dBi@ WCDMA Band II/LTE Band 2 , 7dBi@ WCDMA Band IV/ LTE Band 4 , 10.35dBi@ WCDMA Band V/ LTE Band 5 , 10.00dBi @LTE Band 7, 8.67dBi @ LTE Band 12/LTE Band 17, 11.11dBi @ LTE Band 13. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

FCC §2.1046; § 22.913 (a); § 24.232 (c); §27.50 (b) (c) (d); §27.50(h) (2); - RF OUTPUT POWER

Applicable Standards

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts (38.45dBm).

According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts (33dBm) EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

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

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..

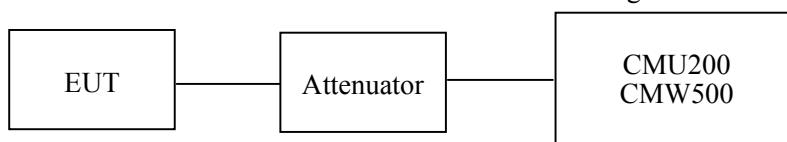
According to §27.50(h) (2), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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

Test Procedure

Conducted method:

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



Radiated Output Power:

The measurements procedures specified in ANSI/TIA-603-D were applied.

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360o azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.
 $\text{LOSS} = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:

$$\text{ERP (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$

f) The maximum ERP is the maximum value determined in the preceding step.

(Note: Effective Isotropic Radiated Power (EIRP) can be computed using the following:

$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.15 \text{ (dB)}$$

Test Data

Environmental Conditions

Temperature:	23.2°C
Relative Humidity:	51 %
ATM Pressure:	101.3kPa

The testing was performed by Hope Zhang on 2019-02-11.

Conducted Power:

WCDMA Band V

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	Rel 99	1	23.54	23.39	23.60
		HSDPA	1	22.69	22.72	22.73
			2	22.68	22.63	22.77
			3	22.67	22.74	22.70
			4	22.74	22.65	22.69
		HSUPA	1	21.75	21.69	21.56
			2	21.62	21.72	21.63
			3	21.78	21.73	21.80
			4	21.77	21.83	21.75
			5	20.71	20.60	20.67
		HSPA+	1	23.03	23.06	23.11

WCDMA Band II

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	Rel 99	1	22.61	22.65	22.73
		HSDPA	1	22.82	22.66	22.66
			2	22.77	22.85	22.83
			3	22.69	22.73	22.72
			4	22.15	22.07	21.99
		HSUPA	1	21.81	21.85	21.70
			2	21.75	21.59	21.85
			3	21.55	21.66	21.76
			4	21.85	21.74	21.65
			5	21.12	21.16	21.07
		HSPA+	1	22.81	22.84	22.60

WCDMA Band IV

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band IV)	Normal	Rel 99	1	22.35	22.56	22.41
		HSDPA	1	22.51	22.38	22.44
			2	22.34	22.48	22.31
			3	22.37	22.41	22.57
			4	22.52	22.37	22.60
		HSUPA	1	21.84	21.73	21.90
			2	21.72	21.82	21.61
			3	21.72	21.53	21.65
			4	21.86	21.63	21.79
			5	21.21	21.11	21.09
		HSPA+	1	22.73	22.56	22.84

Maximum Output Power:**LTE Band 2**

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	1#0	21.50	21.73	21.58
		1#3	21.44	21.47	21.56
		1#5	21.22	21.40	21.31
		3#0	21.51	21.50	21.49
		3#1	21.67	21.48	21.28
		3#3	21.25	21.29	21.09
		6#0	20.69	20.33	21.22
	16-QAM	1#0	21.09	21.17	21.18
		1#3	20.96	21.04	21.02
		1#5	21.05	21.06	20.92
		3#0	20.89	21.07	20.80
		3#1	20.86	20.92	20.78
		3#3	20.66	20.79	20.82
		6#0	20.57	20.85	20.71
3M	QPSK	1#0	21.55	21.55	21.67
		1#7	21.39	21.51	21.44
		1#14	21.30	21.31	21.41
		8#0	21.47	21.41	21.44
		8#4	21.47	21.47	21.48
		8#7	21.16	21.26	21.22
		15#0	20.61	20.55	21.17
	16-QAM	1#0	21.68	21.64	21.64
		1#7	21.37	21.27	21.48
		1#14	21.37	21.46	21.28
		8#0	21.60	21.53	21.63
		8#4	21.51	21.28	21.26
		8#7	21.21	21.07	21.28
		15#0	20.63	20.65	21.35

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	21.72	21.74	21.55
		1#12	21.57	21.43	21.28
		1#24	21.46	21.40	21.22
		12#0	21.71	21.58	21.61
		12#6	21.38	21.26	21.33
		12#11	21.35	21.30	21.29
		25#0	20.70	20.57	21.36
	16-QAM	1#0	21.53	21.71	21.74
		1#12	21.54	21.44	21.42
		1#24	21.55	21.51	21.43
		12#0	21.40	21.49	21.62
		12#6	21.55	21.45	21.39
		12#11	21.10	21.29	21.14
		25#0	20.44	20.46	21.09
10M	QPSK	1#0	21.57	21.73	21.49
		1#24	21.29	21.33	21.44
		1#49	21.25	21.42	21.30
		25#0	21.49	21.34	21.56
		25#12	21.54	21.35	21.54
		25#24	21.06	21.30	21.34
		50#0	20.40	20.58	21.22
	16-QAM	1#0	21.64	21.79	21.61
		1#24	21.39	21.35	21.57
		1#49	21.30	21.36	21.24
		25#0	21.44	21.80	21.53
		25#12	21.48	21.43	21.40
		25#24	21.35	21.46	21.42
		50#0	20.39	20.57	21.33

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15M	QPSK	1#0	21.59	21.82	21.86
		1#37	21.56	21.36	21.34
		1#74	21.26	21.42	21.15
		36#0	21.58	21.62	21.57
		36#17	21.51	21.57	21.56
		36#35	21.07	21.41	21.13
		75#0	20.58	20.44	21.14
	16-QAM	1#0	21.56	21.69	21.65
		1#37	21.47	21.22	21.32
		1#74	21.27	21.46	21.36
		36#0	21.69	21.66	21.55
		36#17	21.29	21.41	21.35
		36#35	21.23	21.08	21.26
		75#0	20.45	20.63	21.40
20M	QPSK	1#0	21.63	21.54	21.81
		1#49	21.36	21.51	21.46
		1#99	21.40	21.29	21.46
		50#0	21.77	21.49	21.34
		50#24	21.61	21.47	21.48
		50#49	21.42	21.26	21.10
		100#0	20.49	20.38	21.30
	16-QAM	1#0	21.74	21.55	21.73
		1#49	21.53	21.56	21.32
		1#99	21.20	21.20	21.52
		50#0	21.58	21.60	21.50
		50#24	21.47	21.54	21.38
		50#49	21.32	21.34	21.29
		100#0	20.49	20.62	21.25

LTE Band 4

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	1#0	22.71	22.63	22.65
		1#3	22.67	22.77	22.56
		1#5	22.70	22.66	22.55
		3#0	22.49	22.54	22.48
		3#1	22.00	22.04	21.87
		3#3	21.66	21.60	21.51
		6#0	21.48	21.30	21.29
	16-QAM	1#0	22.61	22.77	22.68
		1#3	22.65	22.55	22.58
		1#5	22.54	22.57	22.65
		3#0	22.55	22.66	22.62
		3#1	21.93	21.74	21.72
		3#3	21.70	21.58	21.63
		6#0	21.28	21.48	21.38
3M	QPSK	1#0	22.56	22.49	22.55
		1#7	22.61	22.63	22.48
		1#14	22.59	22.72	22.65
		8#0	22.56	22.61	22.54
		8#4	21.99	21.90	21.94
		8#7	21.76	21.52	21.56
		15#0	21.56	21.42	21.23
	16-QAM	1#0	22.53	22.79	22.57
		1#7	22.56	22.65	22.37
		1#14	22.53	22.65	22.63
		8#0	22.70	22.48	22.42
		8#4	21.85	21.79	22.00
		8#7	21.53	21.68	21.74
		15#0	21.35	21.48	21.08

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	22.62	22.46	22.73
		1#12	22.37	22.41	22.63
		1#24	22.49	22.40	22.45
		12#0	22.38	22.69	22.65
		12#6	21.92	21.74	21.70
		12#11	21.69	21.67	21.59
		25#0	21.51	21.56	21.26
	16-QAM	1#0	22.64	22.69	22.83
		1#12	22.63	22.57	22.60
		1#24	22.50	22.58	22.51
		12#0	22.57	22.50	22.54
		12#6	21.80	22.05	21.74
		12#11	21.77	21.70	21.48
		25#0	21.45	21.43	21.40
10M	QPSK	1#0	22.65	22.54	22.54
		1#24	22.51	22.45	22.47
		1#49	22.39	22.44	22.48
		25#0	22.48	22.55	22.51
		25#12	21.83	21.87	21.79
		25#24	21.70	21.55	21.81
		50#0	21.39	21.32	21.47
	16-QAM	1#0	22.46	22.85	22.54
		1#24	22.36	22.46	22.50
		1#49	22.63	22.72	22.58
		25#0	22.33	22.52	22.55
		25#12	21.94	22.01	21.88
		25#24	21.74	21.70	21.78
		50#0	21.34	21.37	21.17

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15M	QPSK	1#0	22.76	22.80	22.77
		1#37	22.46	22.59	22.41
		1#74	22.49	22.57	22.52
		36#0	22.43	22.43	22.48
		36#17	21.79	22.00	21.92
		36#35	21.71	21.78	21.63
		75#0	21.43	21.32	21.07
	16-QAM	1#0	22.83	22.85	22.66
		1#37	22.38	22.53	22.56
		1#74	22.62	22.54	22.53
		36#0	22.57	22.60	22.56
		36#17	21.78	21.85	21.67
		36#35	21.45	21.55	21.75
		75#0	21.34	21.31	21.36
20M	QPSK	1#0	22.59	22.73	22.53
		1#49	22.51	22.43	22.54
		1#99	22.72	22.56	22.57
		50#0	22.35	22.36	22.35
		50#24	21.86	21.90	21.76
		50#49	21.57	21.65	21.57
		100#0	21.34	21.62	21.31
	16-QAM	1#0	22.67	22.53	22.71
		1#49	22.54	22.55	22.73
		1#99	22.45	22.39	22.58
		50#0	22.60	22.41	22.66
		50#24	22.06	21.75	22.07
		50#49	21.70	21.85	21.54
		100#0	21.54	21.50	21.12

LTE Band 5

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	1#0	22.22	22.40	22.09
		1#3	22.00	21.95	22.08
		1#5	21.95	21.93	21.95
		3#0	22.28	22.32	22.30
		3#1	22.01	22.12	22.22
		3#3	21.76	21.80	21.97
		6#0	22.04	22.04	21.91
	16-QAM	1#0	22.25	22.16	22.35
		1#3	21.95	21.97	22.44
		1#5	21.86	21.92	21.94
		3#0	22.22	22.49	22.31
		3#1	21.96	22.12	21.98
		3#3	21.70	21.73	21.80
		6#0	21.89	22.19	22.03
3M	QPSK	1#0	22.29	22.31	22.41
		1#7	22.10	22.24	22.07
		1#14	21.96	21.62	21.87
		8#0	22.18	22.46	22.37
		8#4	21.98	22.03	22.02
		8#7	21.79	21.99	22.01
		15#0	22.04	21.93	22.24
	16-QAM	1#0	22.33	22.43	22.40
		1#7	22.15	22.15	22.12
		1#14	21.88	21.94	21.68
		8#0	22.18	22.30	22.27
		8#4	21.97	22.23	22.15
		8#7	22.04	21.92	21.65
		15#0	22.19	21.89	22.00

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	22.45	22.18	22.08
		1#12	22.10	21.99	22.39
		1#24	21.80	21.95	21.95
		12#0	22.25	22.18	22.26
		12#6	22.16	22.09	22.09
		12#11	21.76	21.95	21.98
		25#0	21.90	22.17	22.10
	16-QAM	1#0	22.20	22.14	22.30
		1#12	21.87	22.24	22.19
		1#24	21.77	21.94	21.71
		12#0	22.30	22.24	22.28
		12#6	22.07	22.20	22.09
		12#11	21.89	21.87	21.78
		25#0	22.08	21.94	22.00
10M	QPSK	1#0	22.18	22.17	22.23
		1#24	22.05	22.20	22.37
		1#49	22.02	21.95	21.78
		25#0	22.24	22.14	22.17
		25#12	21.86	21.99	21.94
		25#24	21.82	21.86	21.82
		50#0	22.03	22.23	22.05
	16-QAM	1#0	22.27	22.39	22.23
		1#24	22.18	22.15	22.34
		1#49	21.78	21.89	21.77
		25#0	22.45	22.42	22.21
		25#12	22.03	22.06	22.14
		25#24	21.70	21.99	21.74
		50#0	22.17	22.09	22.11

LTE Band 7

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	22.21	22.29	22.14
		1#12	22.07	22.14	22.28
		1#24	21.84	22.00	22.07
		12#0	22.24	22.25	22.17
		12#6	22.11	21.96	21.87
		12#11	21.77	21.86	22.02
		25#0	21.66	21.88	21.75
	16-QAM	1#0	22.43	22.43	22.38
		1#12	22.11	22.05	22.25
		1#24	22.00	21.81	21.92
		12#0	22.13	22.30	22.30
		12#6	22.06	22.10	22.12
		12#11	21.95	21.79	21.76
		25#0	21.62	21.95	21.97
10M	QPSK	1#0	22.20	22.33	22.28
		1#24	22.06	22.00	22.20
		1#49	21.89	21.98	21.91
		25#0	22.27	22.10	22.17
		25#12	22.02	21.87	22.03
		25#24	21.94	21.80	21.95
		50#0	21.79	21.86	22.00
	16-QAM	1#0	22.20	22.03	22.30
		1#24	22.16	22.04	22.10
		1#49	21.92	21.90	21.83
		25#0	22.05	22.31	22.34
		25#12	22.21	21.88	22.17
		25#24	22.05	21.81	21.84
		50#0	21.72	21.98	21.93

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15M	QPSK	1#0	22.23	22.33	22.16
		1#37	22.06	22.11	22.33
		1#74	22.05	21.88	21.96
		36#0	22.19	22.30	22.24
		36#17	22.00	22.11	22.09
		36#35	21.78	21.62	21.76
		75#0	22.07	22.12	22.01
	16-QAM	1#0	22.30	22.31	22.39
		1#37	22.12	22.12	22.24
		1#74	21.81	21.88	21.82
		36#0	22.36	22.04	22.42
		36#17	22.13	22.12	21.98
		36#35	21.93	21.84	21.86
		75#0	21.94	21.62	21.90
20M	QPSK	1#0	22.16	22.16	22.29
		1#49	22.00	21.91	22.19
		1#99	21.78	21.87	21.94
		50#0	22.14	22.43	22.04
		50#24	22.07	22.02	22.03
		50#49	21.85	21.75	21.82
		100#0	21.86	21.74	21.97
	16-QAM	1#0	22.29	22.22	22.14
		1#49	21.95	22.04	22.38
		1#99	21.99	21.89	22.05
		50#0	22.38	22.39	22.34
		50#24	22.05	22.06	21.93
		50#49	21.86	21.98	21.76
		100#0	21.78	22.02	21.88

LTE Band 12

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	1#0	24.09	23.92	24.03
		1#3	23.62	23.34	23.66
		1#5	21.63	21.50	21.47
		3#0	23.90	23.72	24.13
		3#1	23.49	23.45	23.62
		3#3	21.68	21.78	21.49
		6#0	23.37	23.50	23.57
	16-QAM	1#0	23.84	23.90	23.77
		1#3	23.47	23.72	23.57
		1#5	21.58	21.52	21.65
		3#0	24.03	23.88	23.82
		3#1	23.68	23.51	23.41
		3#3	21.68	21.56	21.53
		6#0	23.42	23.37	23.66
3M	QPSK	1#0	23.93	24.07	23.82
		1#7	23.54	23.70	23.76
		1#14	21.71	21.69	21.52
		8#0	23.92	23.82	23.75
		8#4	23.67	23.46	23.65
		8#7	21.77	21.54	21.68
		15#0	23.52	23.62	23.59
	16-QAM	1#0	23.82	23.95	23.99
		1#7	23.31	23.38	23.59
		1#14	21.63	21.61	21.49
		8#0	23.85	23.78	23.88
		8#4	23.40	23.39	23.57
		8#7	21.56	21.56	21.55
		15#0	23.51	23.64	23.57

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	23.91	23.90	23.95
		1#12	23.71	23.59	23.64
		1#24	21.77	21.35	21.40
		12#0	23.98	23.88	23.94
		12#6	23.52	23.59	23.67
		12#11	21.76	21.59	21.51
		25#0	23.56	23.46	23.77
	16-QAM	1#0	24.07	24.05	24.13
		1#12	23.68	23.59	23.70
		1#24	21.35	21.75	21.49
		12#0	23.99	24.15	23.77
		12#6	23.53	23.70	23.72
		12#11	21.49	21.61	21.67
		25#0	23.71	23.70	23.56
10M	QPSK	1#0	23.90	23.85	23.85
		1#24	23.46	23.40	23.67
		1#49	21.51	21.41	21.55
		25#0	23.86	24.02	24.17
		25#12	23.57	23.38	23.73
		25#24	21.62	21.68	21.63
		50#0	23.58	23.36	23.43
	16-QAM	1#0	24.01	24.10	24.00
		1#24	23.50	23.46	23.42
		1#49	21.64	21.41	21.41
		25#0	23.74	23.88	23.91
		25#12	23.53	23.48	23.65
		25#24	21.72	21.58	21.49
		50#0	23.60	23.55	23.61

LTE Band 13

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	22.45	22.73	22.47
		1#12	22.34	22.43	22.71
		1#24	21.86	21.89	21.58
		12#0	22.54	22.76	22.57
		12#6	22.37	22.37	22.70
		12#11	21.63	21.69	21.70
		25#0	22.42	22.64	22.39
	16-QAM	1#0	22.72	22.54	22.66
		1#12	22.37	22.45	22.67
		1#24	21.85	21.72	21.62
		12#0	22.69	22.69	22.41
		12#6	22.36	22.43	22.45
		12#11	21.78	21.80	21.83
		25#0	22.44	22.46	22.30
10M	QPSK	1#0	/	22.47	/
		1#24	/	22.14	/
		1#49	/	21.80	/
		25#0	/	22.63	/
		25#12	/	22.25	/
		25#24	/	21.80	/
		50#0	/	22.27	/
	16-QAM	1#0	/	22.71	/
		1#24	/	22.32	/
		1#49	/	21.77	/
		25#0	/	22.65	/
		25#12	/	22.39	/
		25#24	/	21.56	/
		50#0	/	22.34	/

LTE Band 17

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	23.98	24.04	24.02
		1#12	23.48	23.51	23.60
		1#24	21.46	21.57	21.59
		12#0	23.87	23.82	24.02
		12#6	23.68	23.53	23.57
		12#11	21.59	21.56	21.68
		25#0	23.50	23.61	23.48
	16-QAM	1#0	23.98	23.93	23.90
		1#12	23.63	23.57	23.51
		1#24	21.55	21.44	21.60
		12#0	24.03	24.00	23.97
		12#6	23.49	23.54	23.60
		12#11	21.52	21.60	21.72
		25#0	23.62	23.54	23.34
10M	QPSK	1#0	24.03	23.93	23.83
		1#24	23.67	23.45	23.65
		1#49	21.54	21.51	21.37
		25#0	23.95	23.93	23.89
		25#12	23.56	23.58	23.69
		25#24	21.49	21.66	21.54
		50#0	23.62	23.38	23.57
	16-QAM	1#0	23.77	24.12	23.94
		1#24	23.63	23.58	23.55
		1#49	21.62	21.46	21.38
		25#0	23.82	23.85	23.94
		25#12	23.57	23.47	23.42
		25#24	21.63	21.65	21.52
		50#0	23.55	23.46	23.40

Peak-to-average ratio (PAR):**WCDMA Band V:**

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	3.15	≤ 13
	Middle	3.21	≤ 13
	High	3.13	≤ 13
WCDMA (HSDPA)	Low	2.71	≤ 13
	Middle	2.67	≤ 13
	High	2.65	≤ 13
WCDMA (HSUPA)	Low	2.64	≤ 13
	Middle	2.69	≤ 13
	High	2.51	≤ 13
WCDMA (HSPA+)	Low	2.54	≤ 13
	Middle	2.46	≤ 13
	High	2.40	≤ 13

WCDMA Band II

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	2.67	≤ 13
	Middle	2.68	≤ 13
	High	2.44	≤ 13
WCDMA (HSDPA)	Low	2.58	≤ 13
	Middle	2.50	≤ 13
	High	2.52	≤ 13
WCDMA (HSUPA)	Low	2.64	≤ 13
	Middle	2.56	≤ 13
	High	2.36	≤ 13
WCDMA (HSPA+)	Low	2.47	≤ 13
	Middle	2.69	≤ 13
	High	2.38	≤ 13

WCDMA Band IV

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	2.73	≤ 13
	Middle	2.67	≤ 13
	High	2.66	≤ 13
WCDMA (HSDPA)	Low	2.56	≤ 13
	Middle	2.54	≤ 13
	High	2.50	≤ 13
WCDMA (HSUPA)	Low	2.43	≤ 13
	Middle	2.55	≤ 13
	High	2.41	≤ 13
WCDMA (HSPA+)	Low	2.37	≤ 13
	Middle	2.48	≤ 13
	High	2.56	≤ 13

LTE Band 2

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit (dB)
QPSK	1 RB	20M	3.55	3.71	3.74	13
	100 RB		5.49	5.47	5.78	13
16-QAM	1 RB	20M	4.40	4.87	4.80	13
	100 RB		6.19	6.75	6.78	13

LTE Band 4

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	3.40	3.55	3.61	13
	100 RB		5.42	5.70	5.71	13
16-QAM	1 RB	20M	4.27	4.52	4.63	13
	100 RB		6.36	6.71	6.62	13

LTE Band 5

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	3.35	3.63	3.43	13
	50 RB		5.42	5.64	5.47	13
16-QAM	1 RB	10M	4.46	4.60	4.60	13
	50 RB		6.34	6.49	6.72	13

LTE Band 7

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	3.21	3.63	3.53	13
	100 RB		5.35	5.65	5.59	13
16-QAM	1 RB	20M	4.38	4.76	4.75	13
	100 RB		6.28	6.67	6.73	13

LTE Band 12

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	3.43	3.58	3.46	13
	50 RB		5.38	5.69	5.71	13
16-QAM	1 RB	10M	4.31	4.77	4.61	13
	50 RB		6.57	6.68	6.62	13

LTE Band 13

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	/	3.68	/	13
	50 RB		/	5.68	/	13
16-QAM	1 RB	10M	/	4.75	/	13
	50 RB		/	6.90	/	13

LTE Band 17

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	3.56	3.62	3.53	13
	50 RB		5.22	5.68	5.80	13
16-QAM	1 RB	10M	4.22	4.63	4.73	13
	50 RB		6.48	6.69	6.75	13

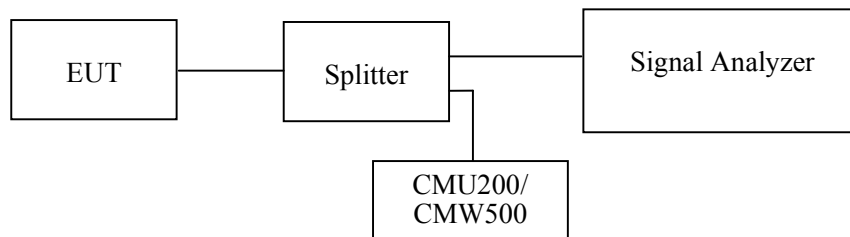
FCC §2.1049, §22.917, §22.905 & §24.238; §27.53- OCCUPIED BANDWIDTH**Applicable Standards**

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 5 kHz (Cellular /PCS) & 100 kHz (WCDMA), and the 26 dB & 99% bandwidth was recorded.

**Test Data****Environmental Conditions**

Temperature:	23.2°C-23.5°C
Relative Humidity:	51 %-53%
ATM Pressure:	101.1kPa-103.3kPa

The testing was performed by Hope Zhang from 2019-01-16 to 2019-01-24.

EUT operation mode: Transmitting

Test Result: Compliance.

WCDMA Band V

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (Rel 99)	836.6	4.669	4.128
WCDMA (HSDPA)	836.6	4.669	4.128
WCDMA (HSUPA)	836.6	4.689	4.128
WCDMA (HSPA+)	836.6	4.669	4.128

WCDMA Band II

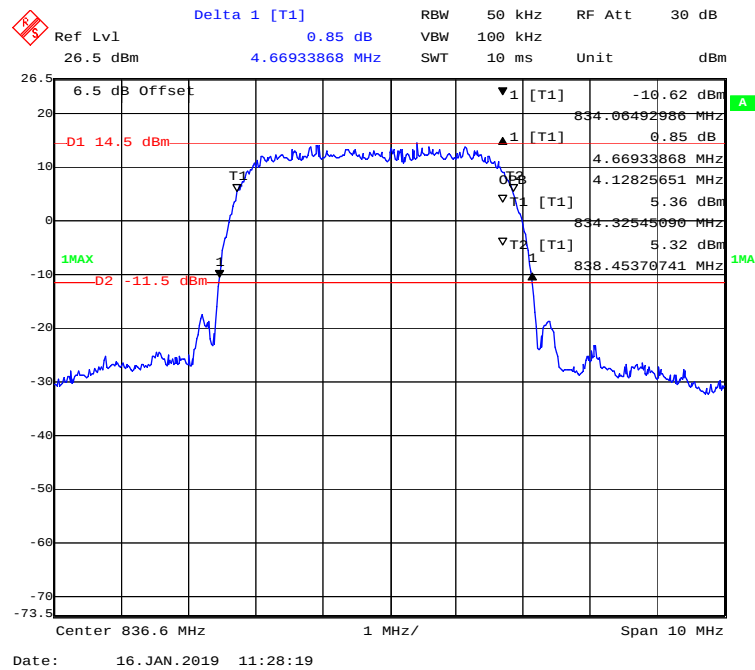
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (Rel 99)	1880	4.689	4.148
WCDMA (HSDPA)	1880	4.709	4.168
WCDMA (HSUPA)	1880	4.709	4.148
WCDMA (HSPA+)	1880	4.689	4.148

WCDMA Band IV

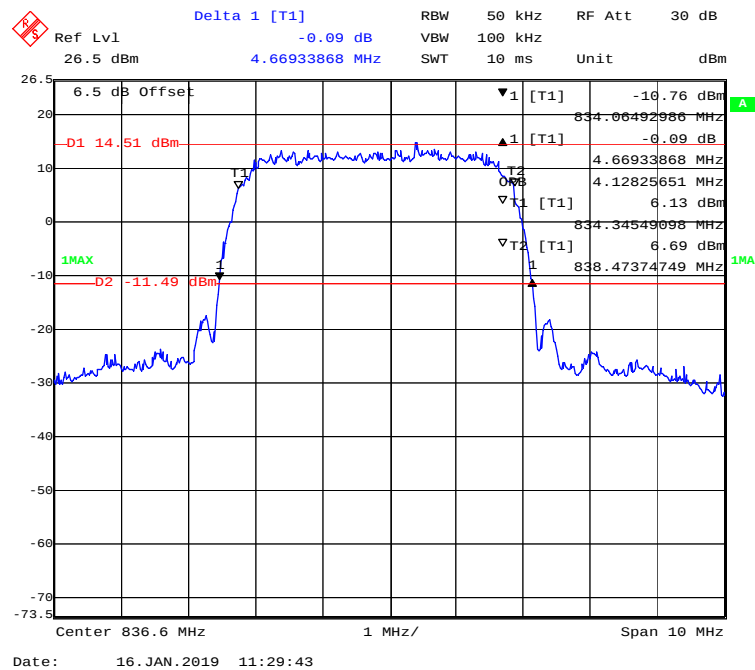
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (Rel 99)	1732.6	4.729	4.168
WCDMA (HSDPA)	1732.6	4.729	4.168
WCDMA (HSUPA)	1732.6	4.749	4.168
WCDMA (HSPA+)	1732.6	4.709	4.148

WCDMA Band V

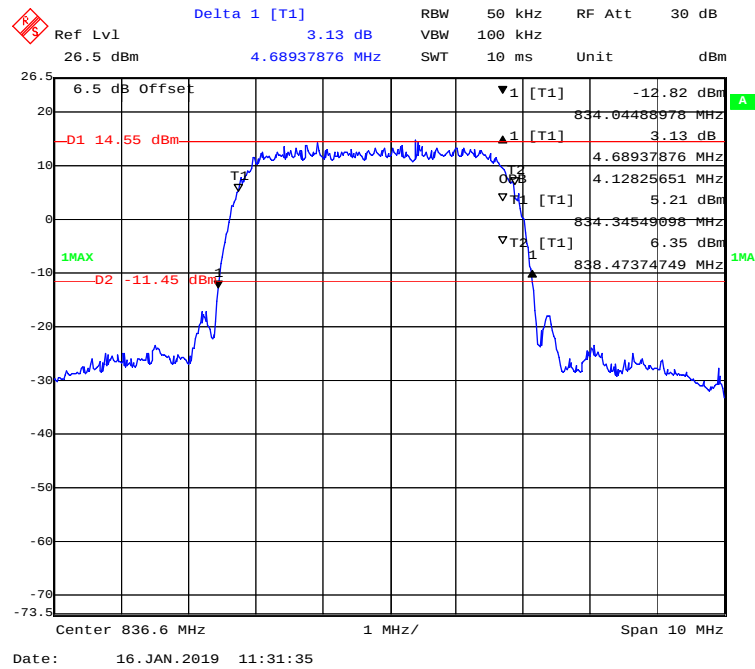
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



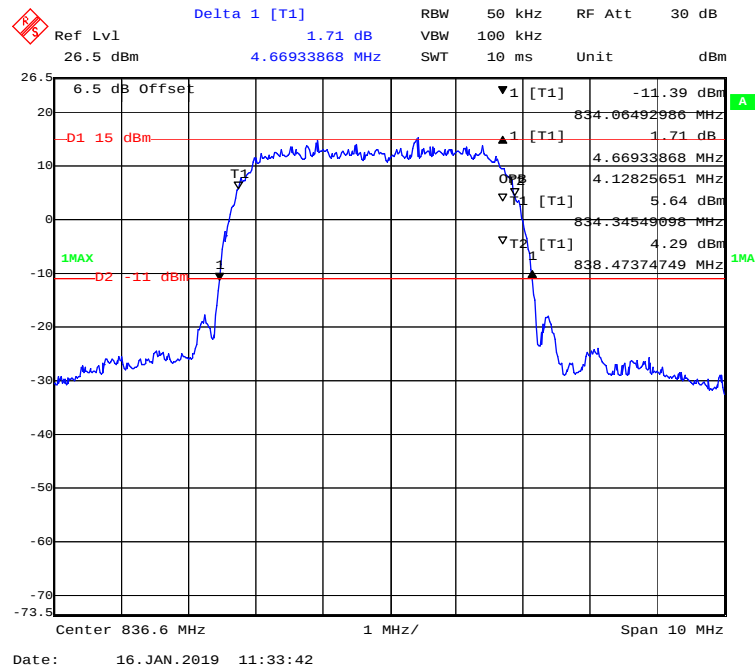
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



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

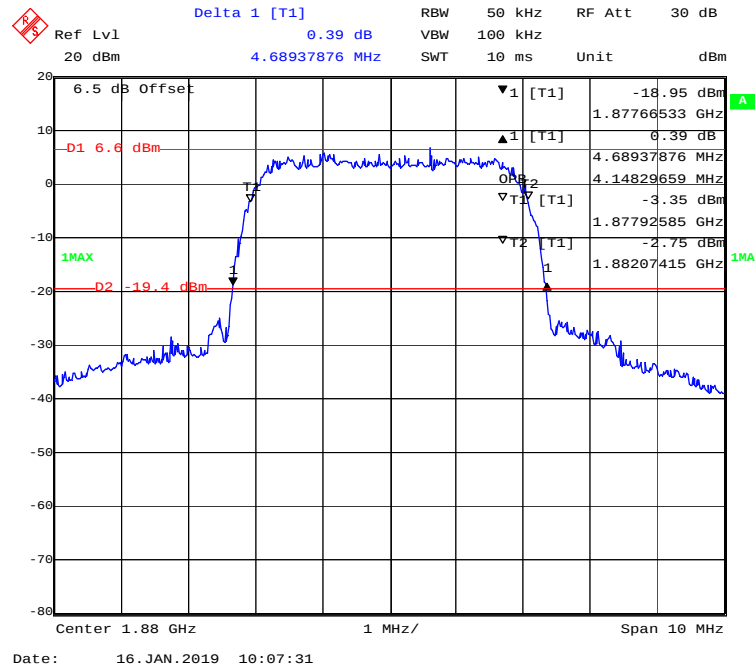


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode

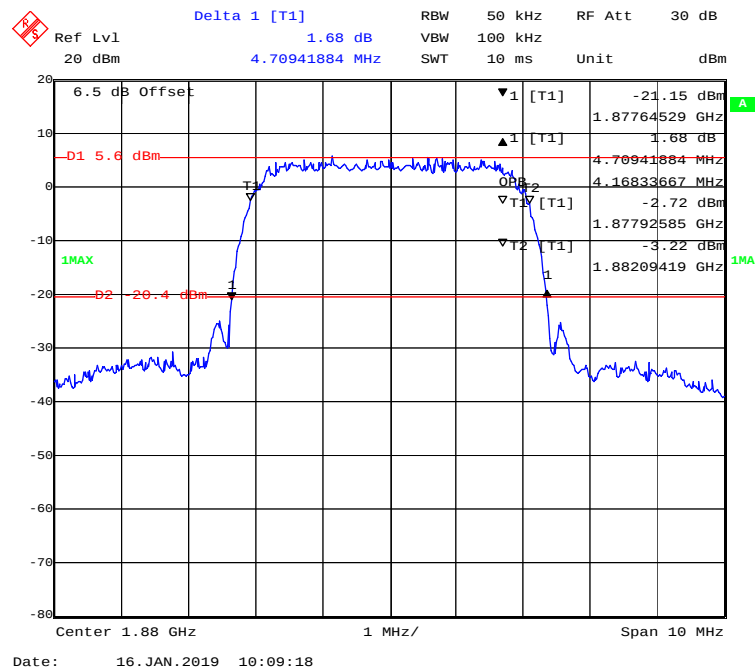


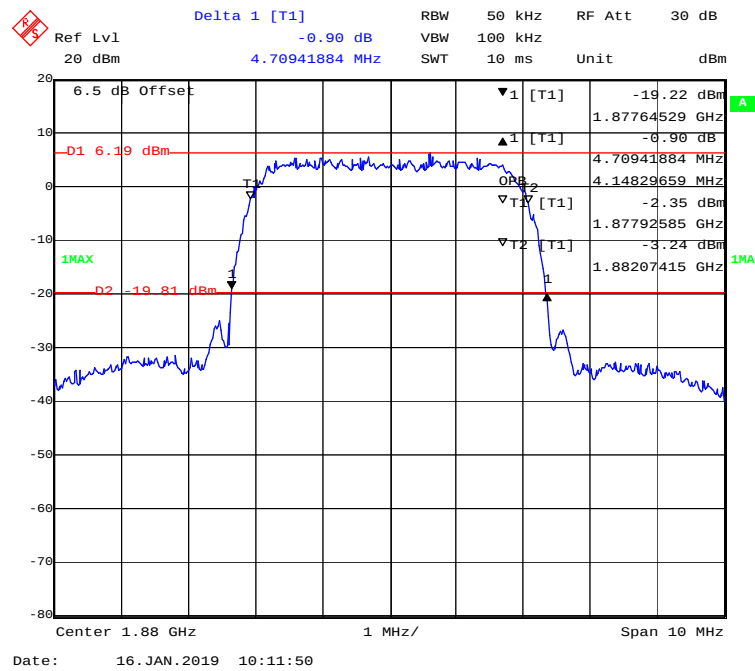
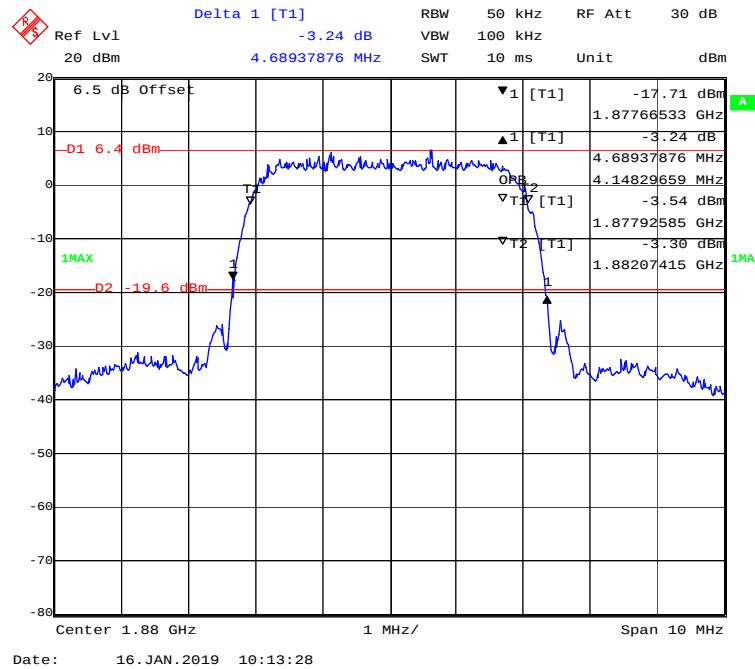
WCDMA Band II

99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



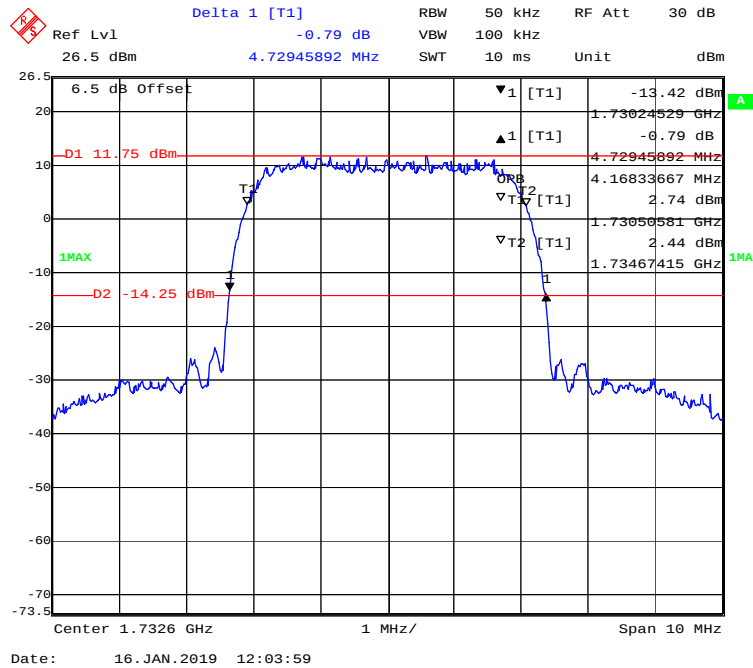
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



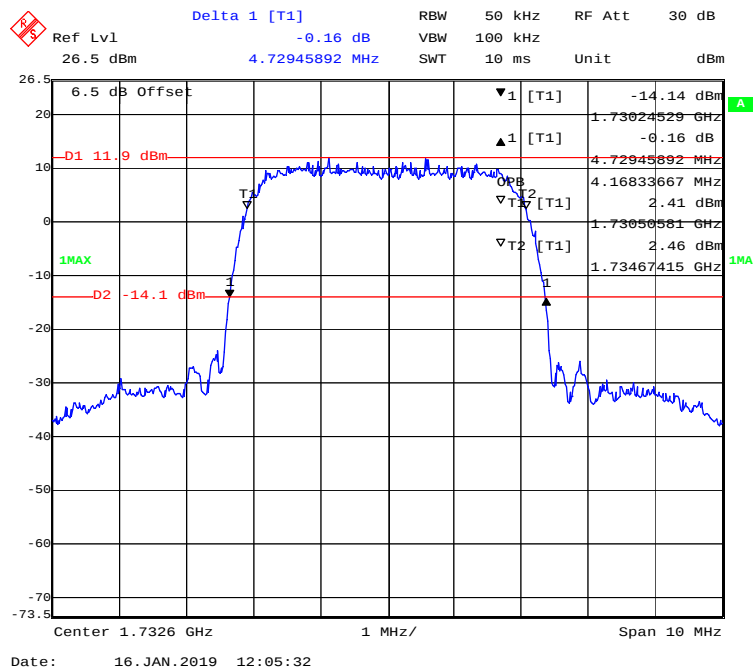
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode**99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode**

WCDMA Band IV

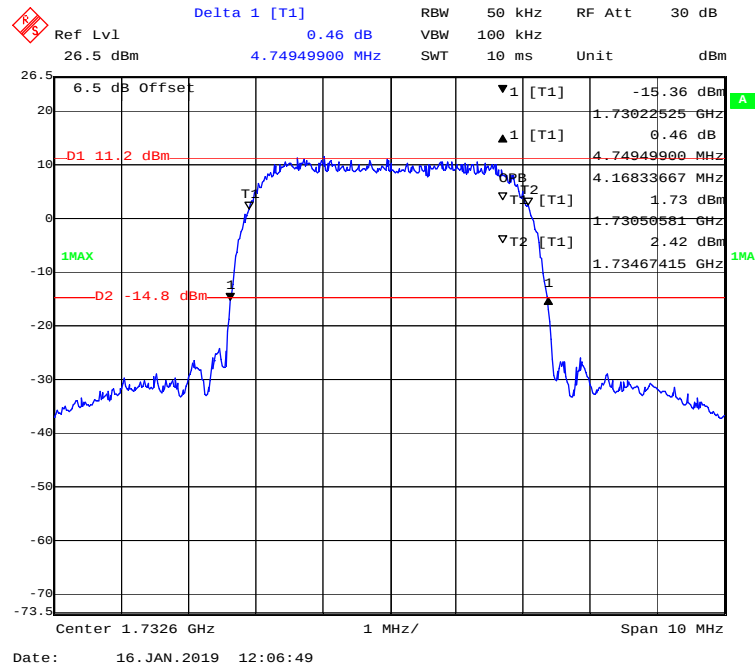
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



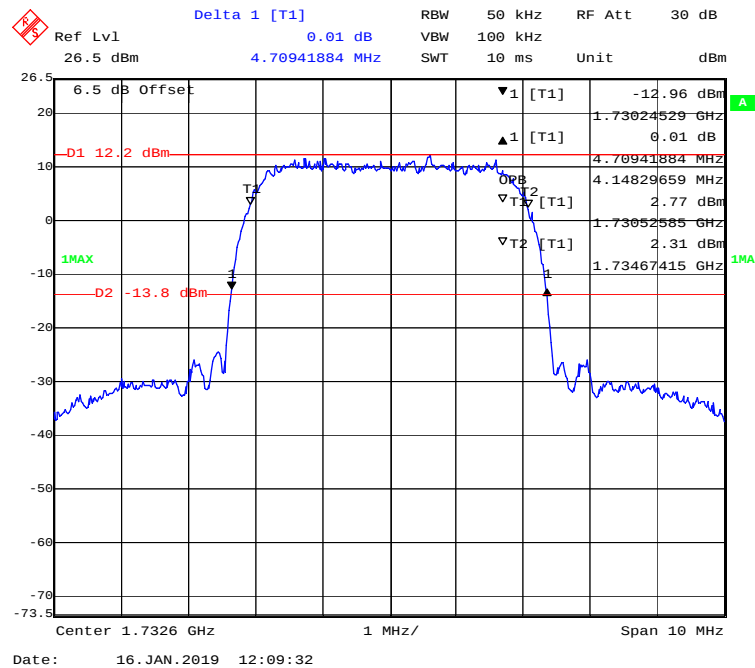
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



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



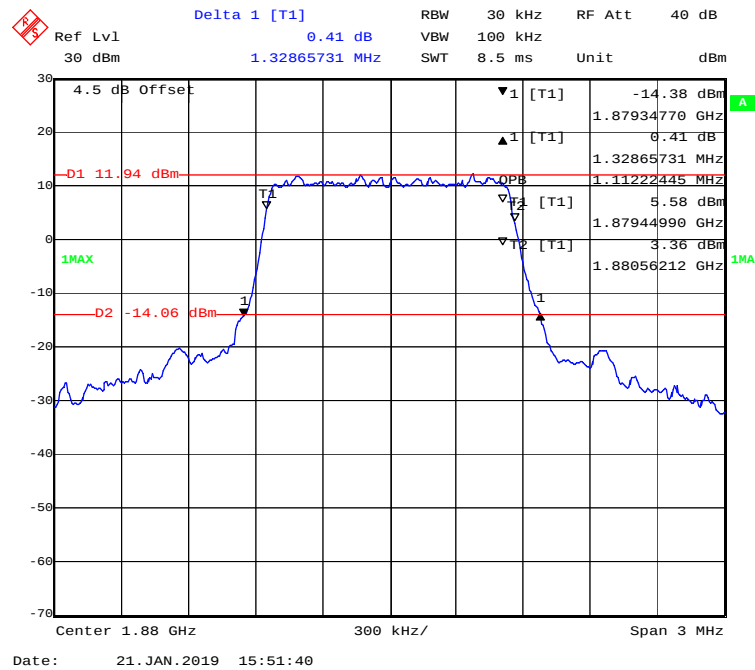
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode



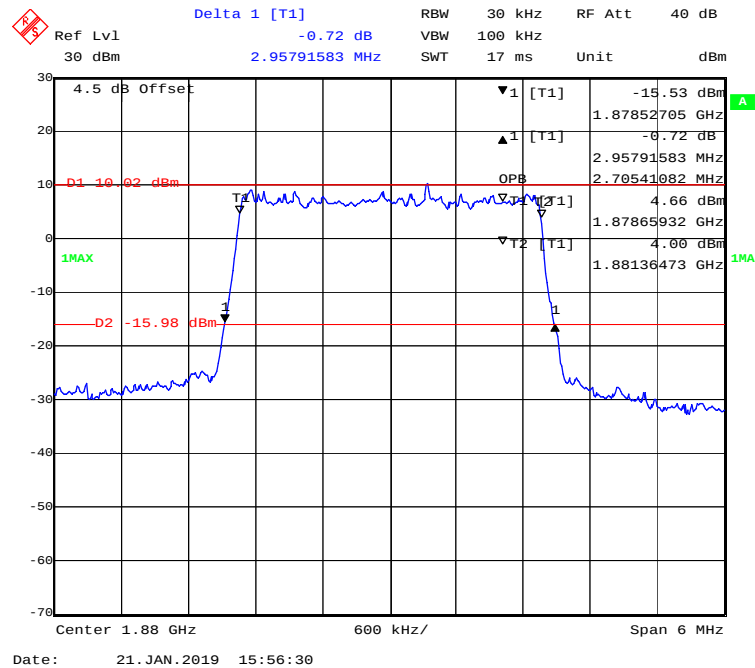
LTE Band 2:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.329	1.112
	3M		2.958	2.705
	5M		5.050	4.549
	10M		9.860	8.978
	15M		15.030	13.587
	20M		19.479	18.036
16-QAM	1.4M	Middle	1.311	1.118
	3M		2.970	2.705
	5M		5.050	4.549
	10M		9.780	8.978
	15M		14.970	13.587
	20M		19.559	18.116

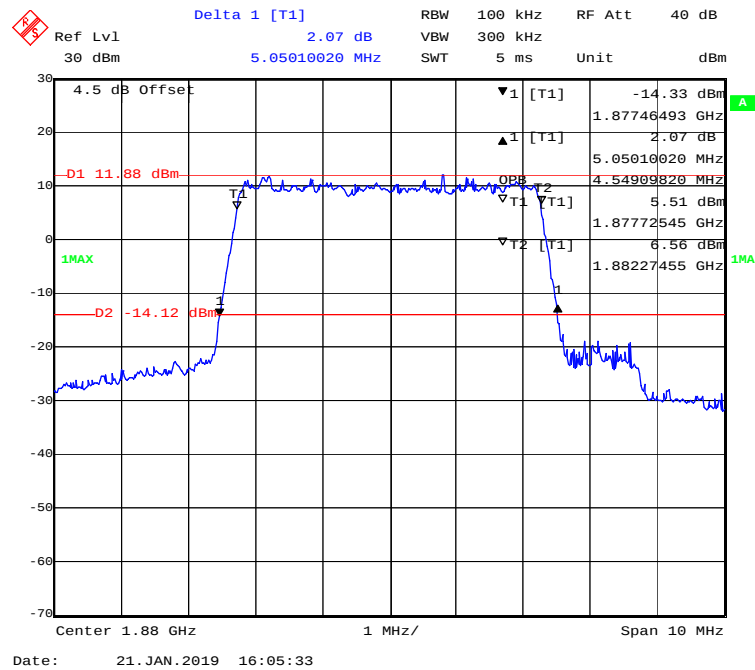
QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



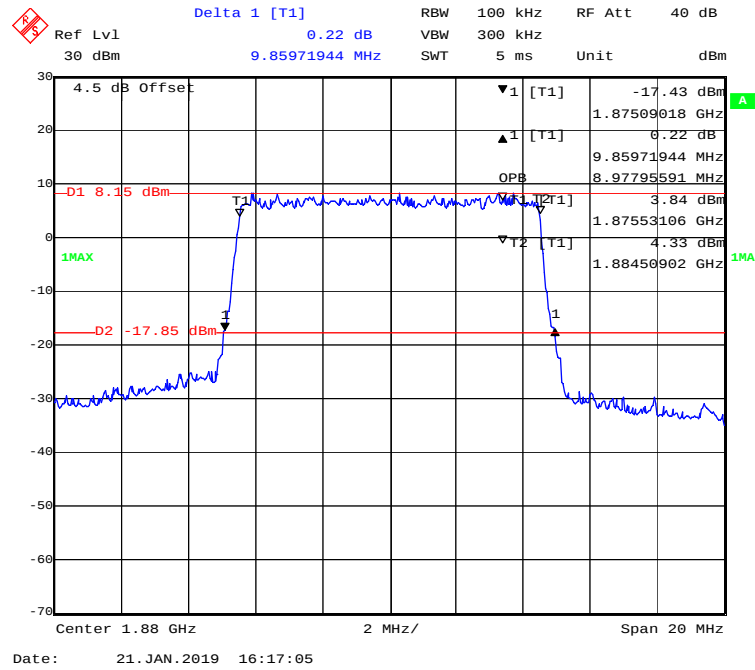
QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

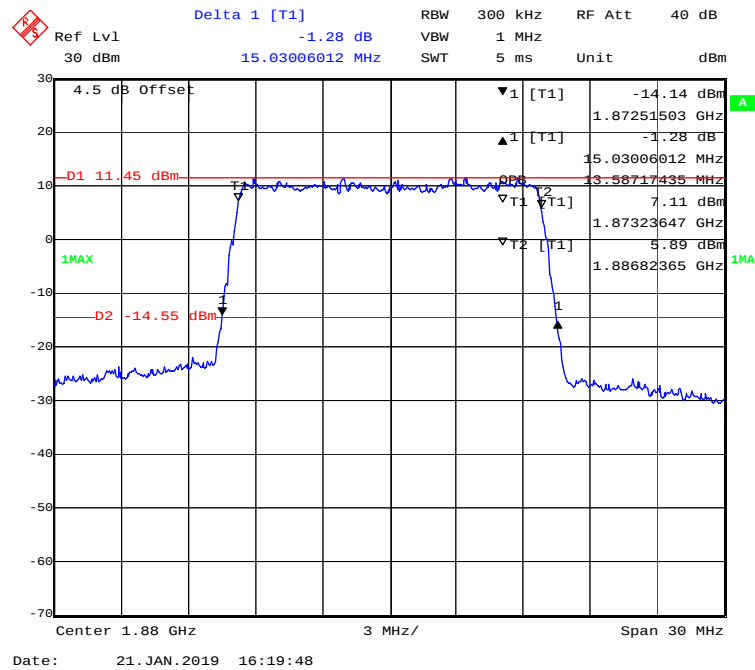
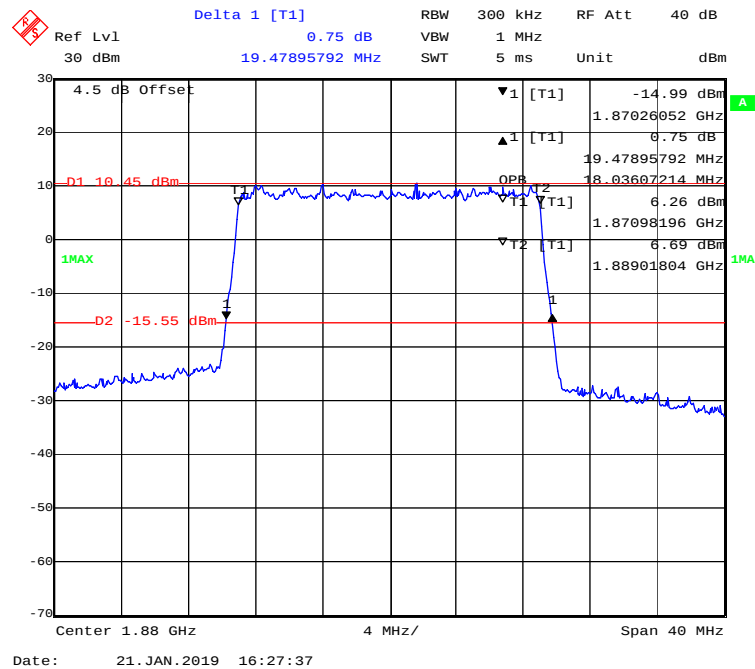


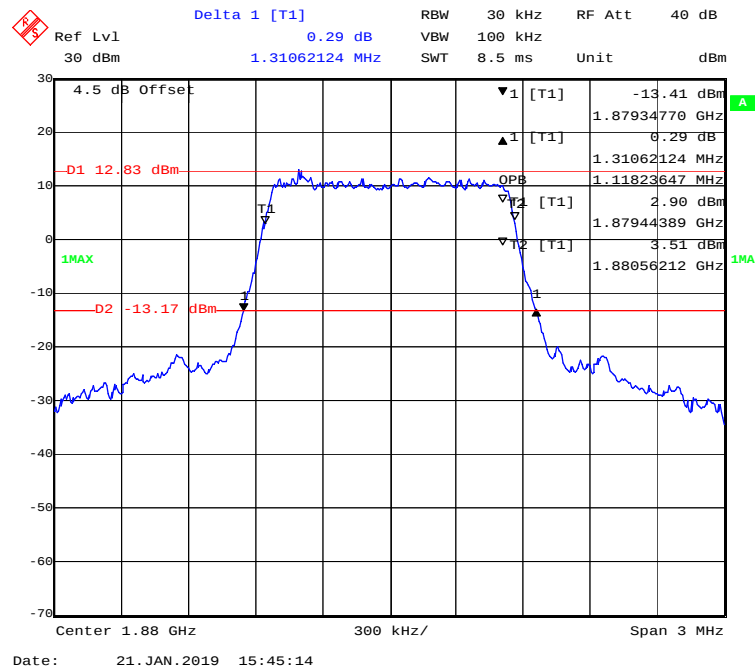
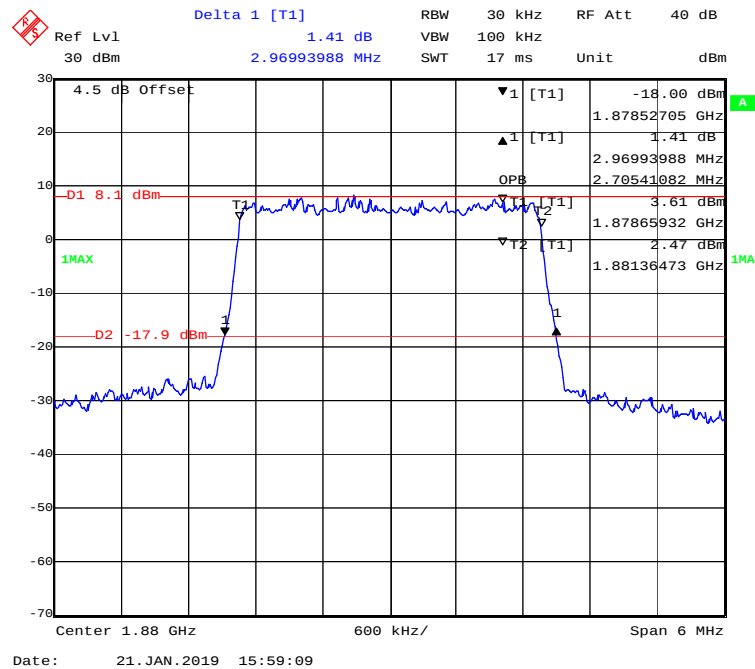
QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



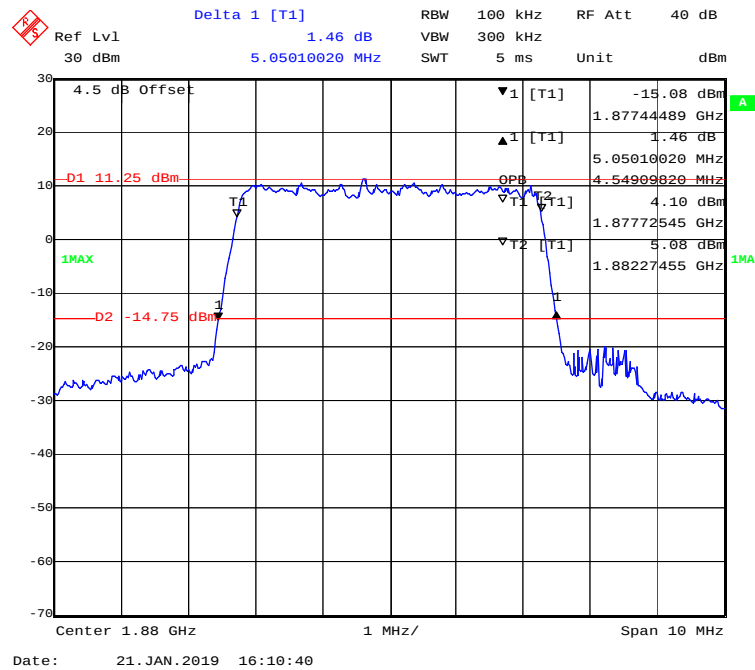
QPSK (10MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



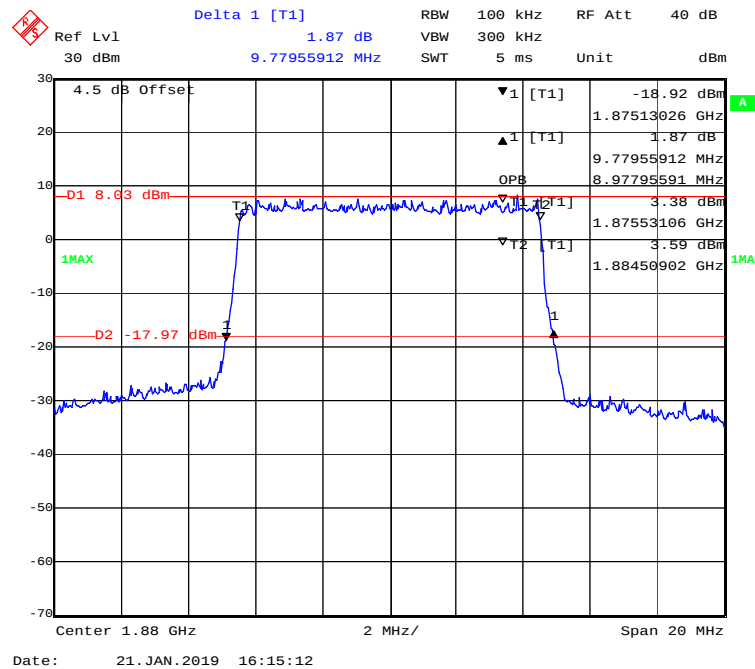
QPSK (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**QPSK (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

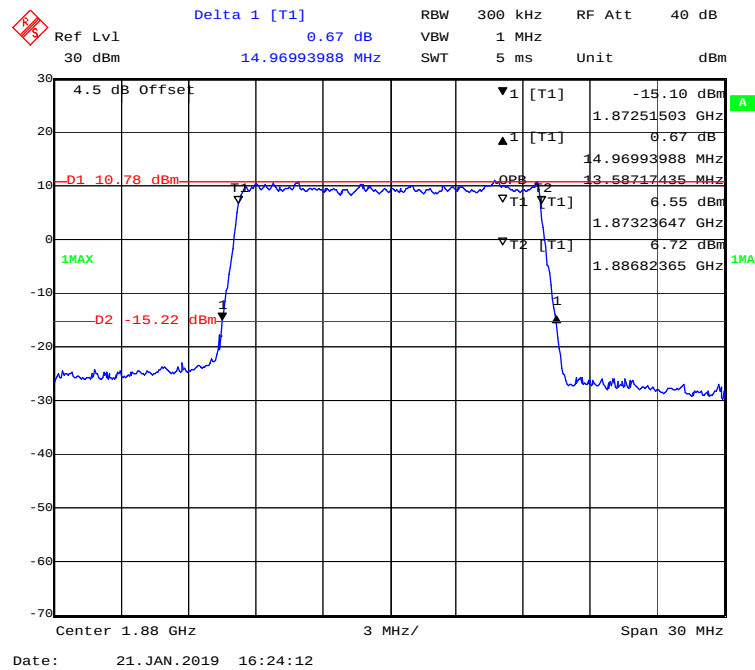
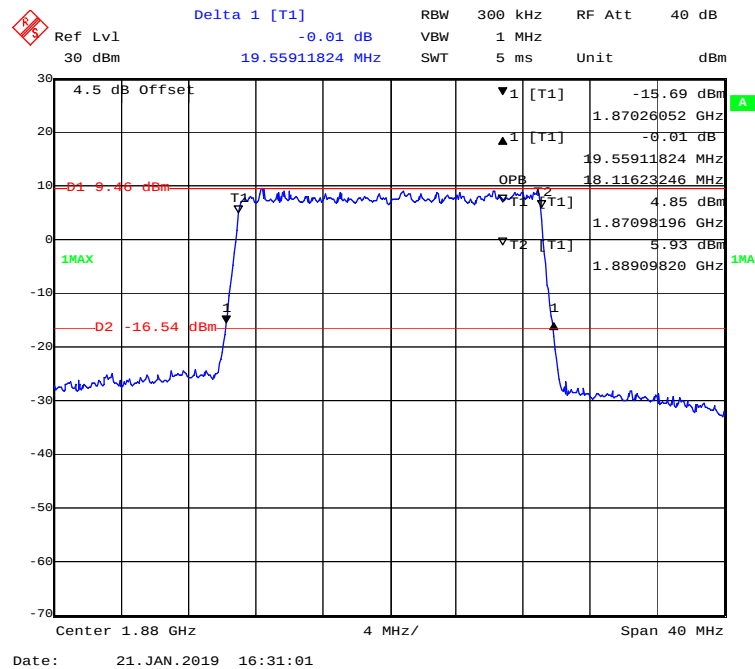
16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



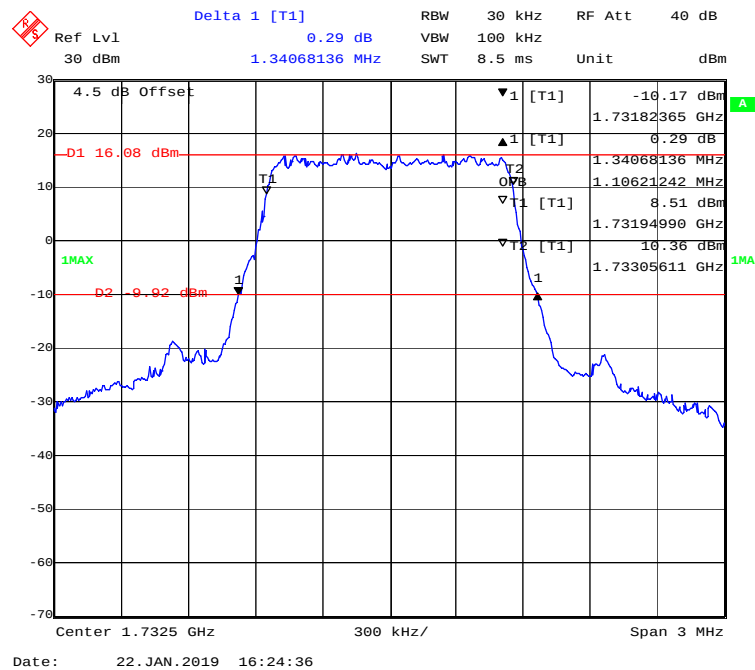
16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

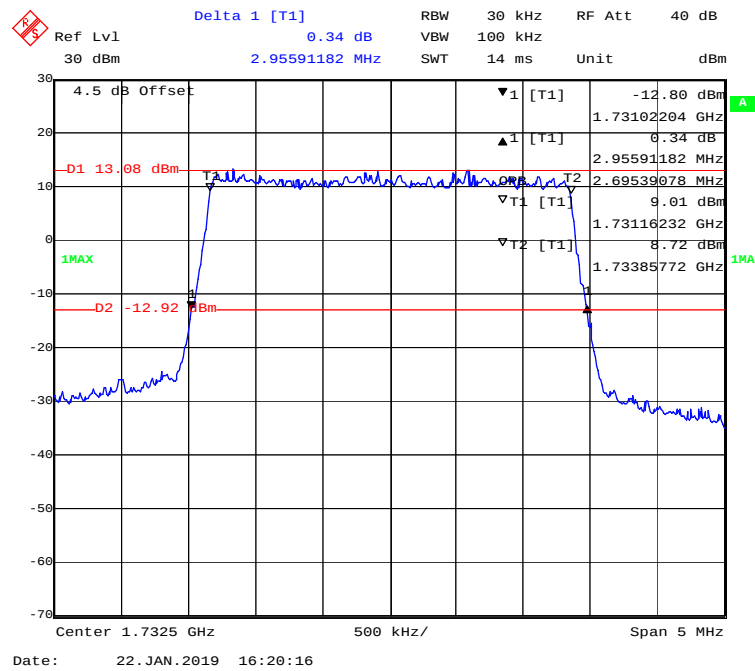
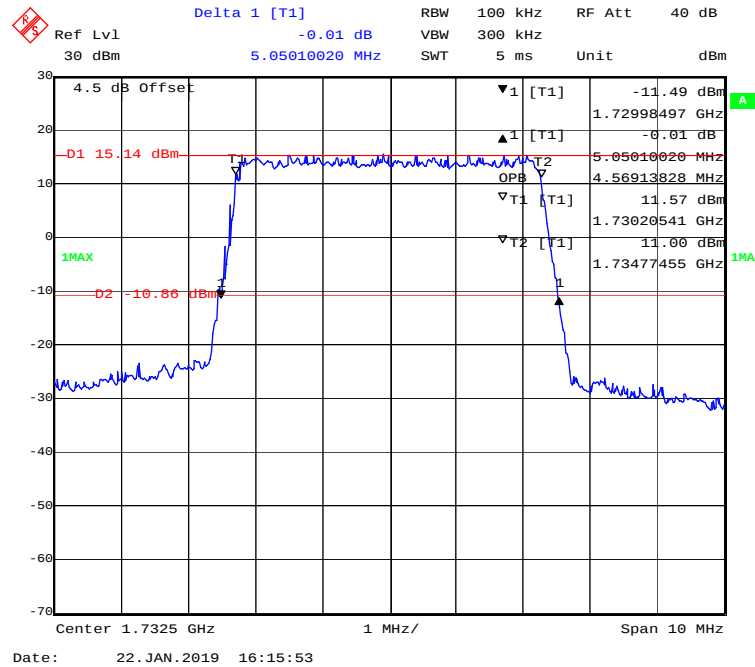


16-QAM (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

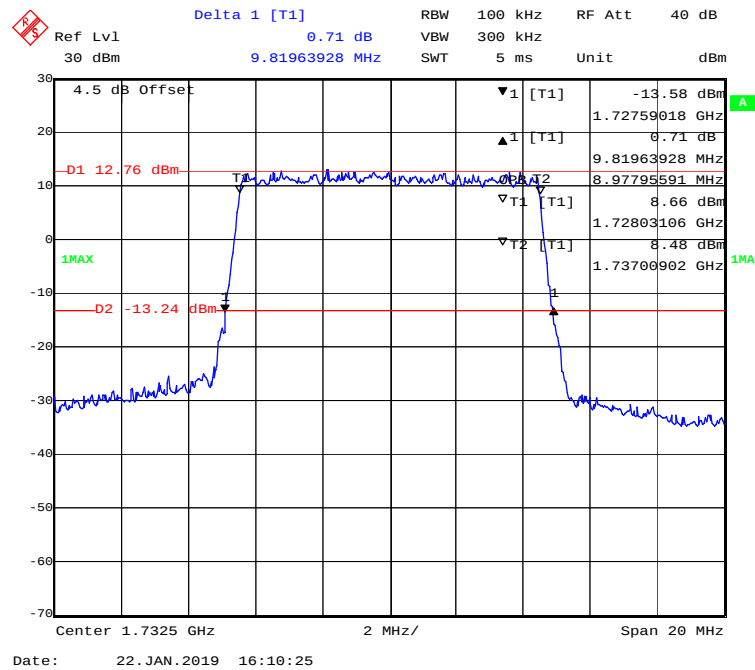
LTE Band 4:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.341	1.106
	3M		2.956	2.695
	5M		5.050	4.569
	10M		9.820	8.978
	15M		14.910	13.527
	20M		19.559	17.956
16-QAM	1.4M	Middle	1.317	1.112
	3M		2.956	2.695
	5M		5.070	4.529
	10M		9.820	8.978
	15M		14.850	13.527
	20M		19.479	17.956

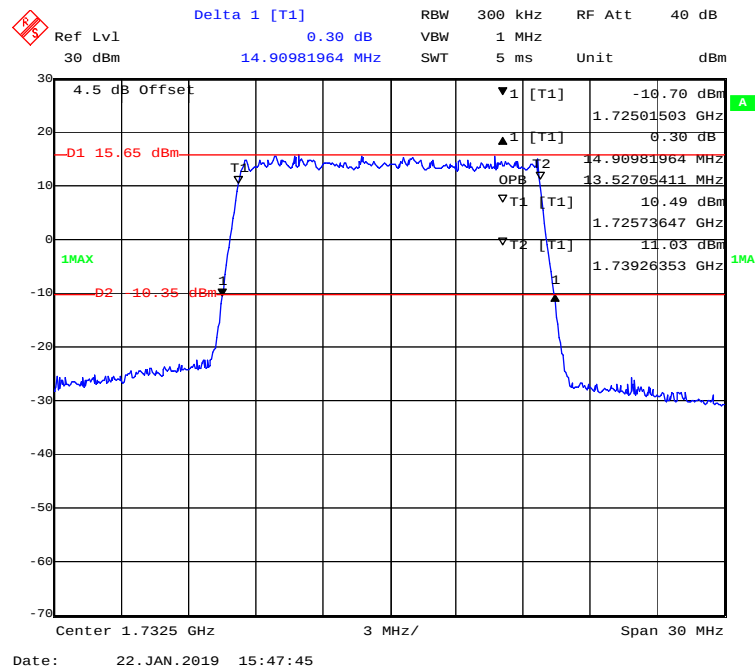
QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

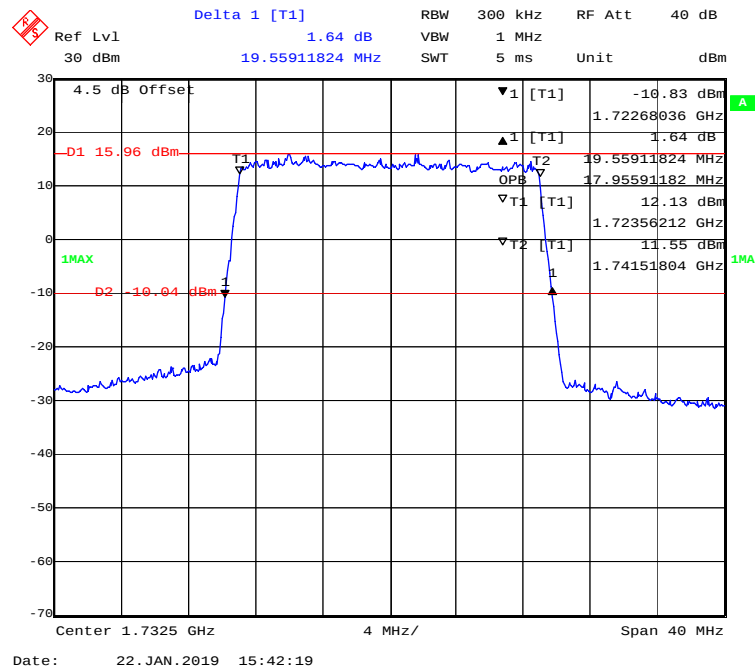
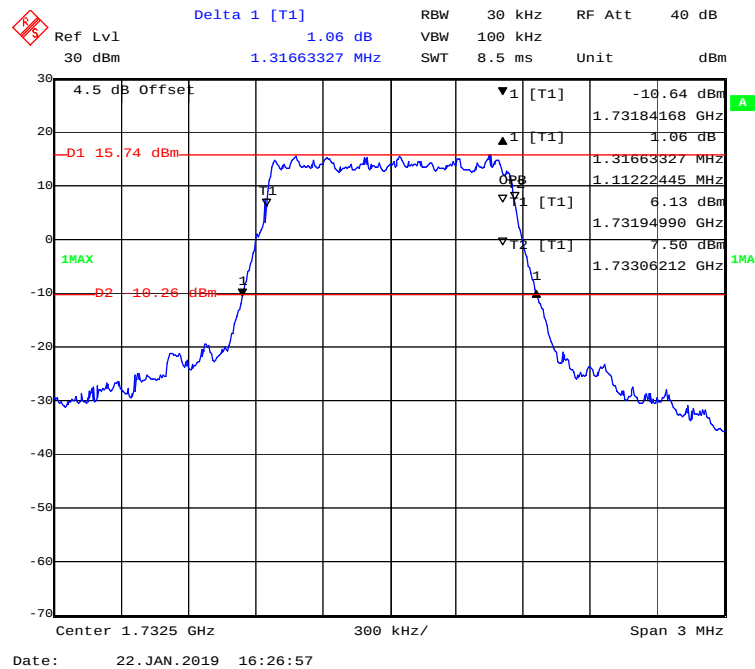
QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**QPSK (5MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

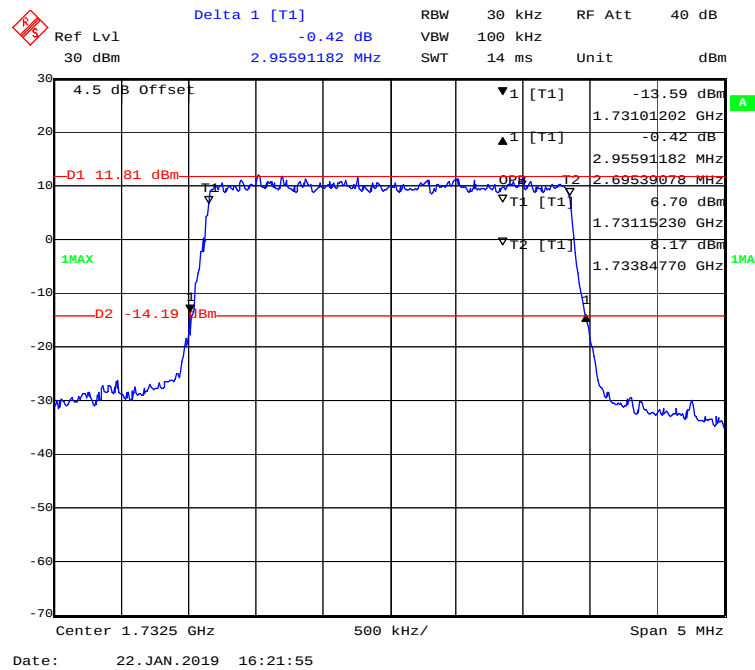
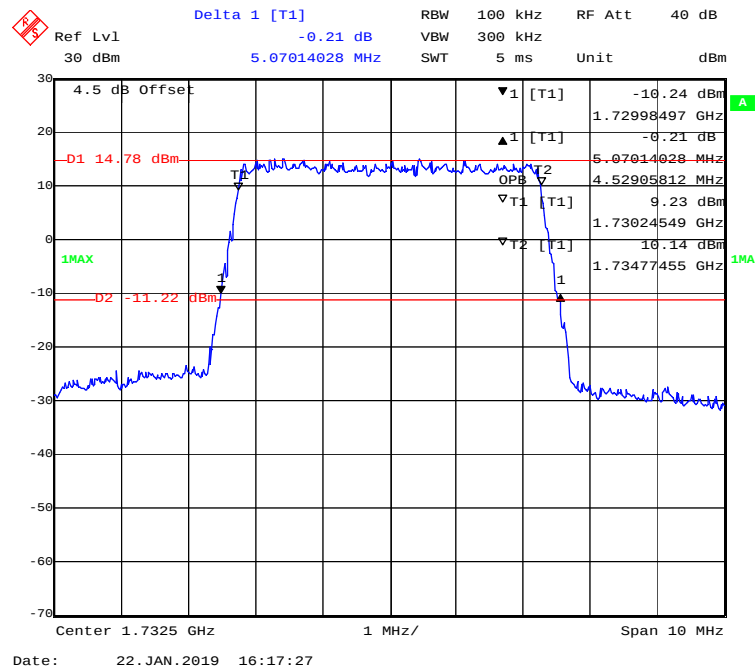
QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

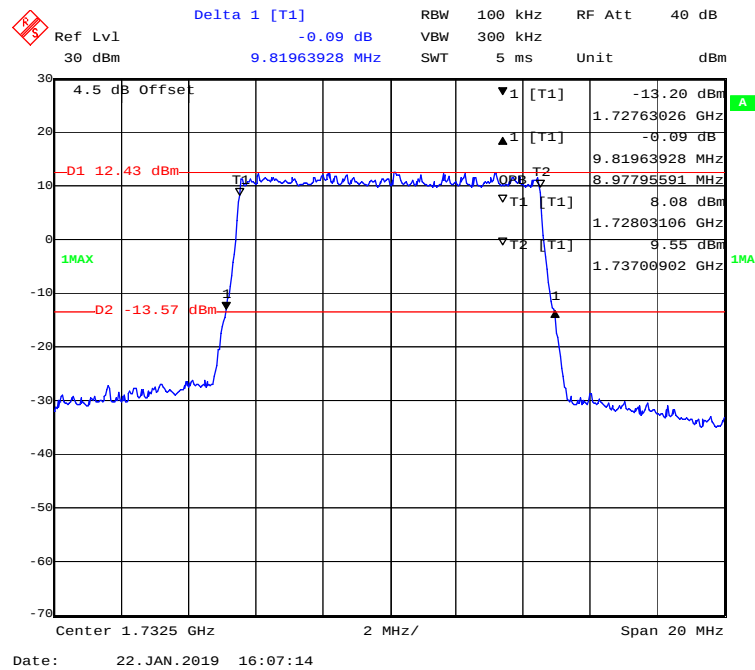
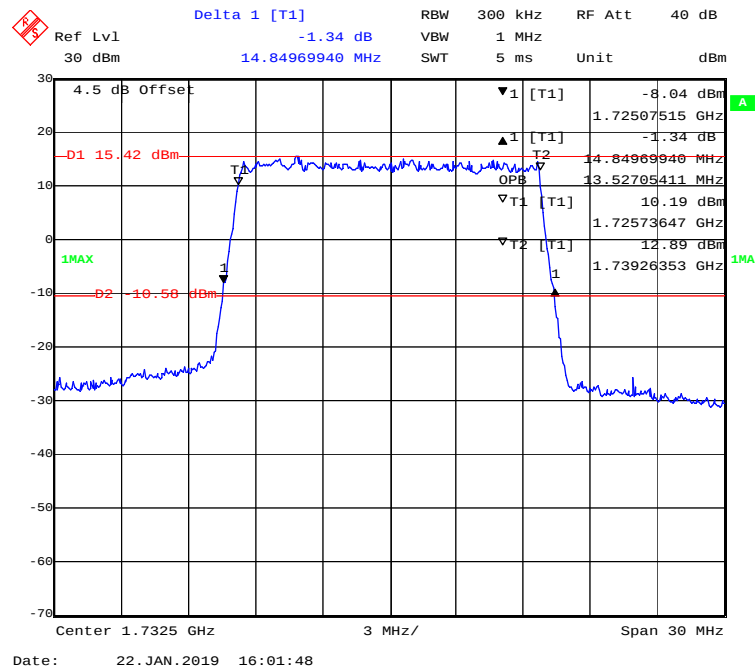


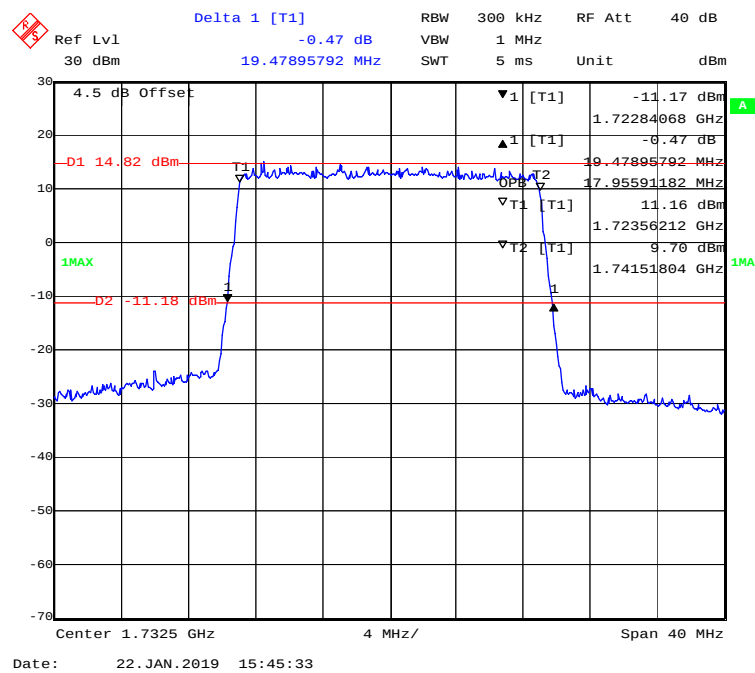
QPSK (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



QPSK (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

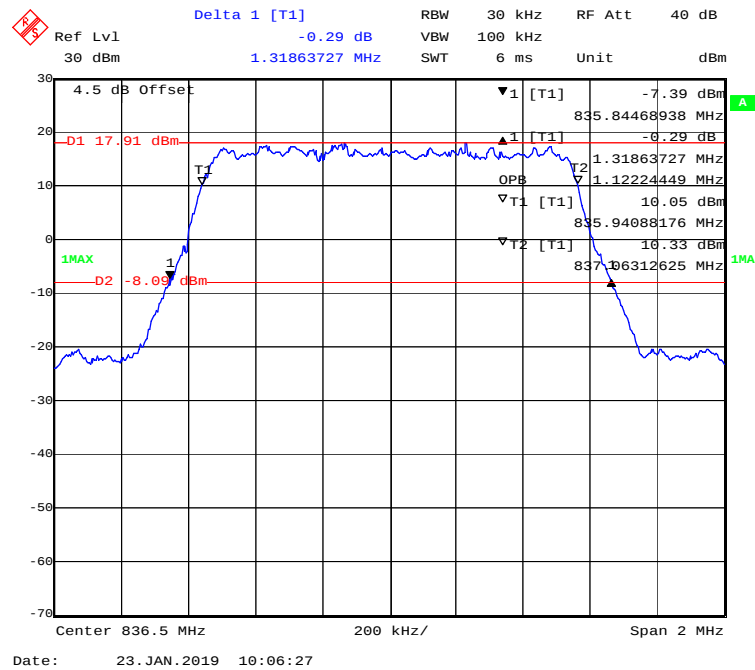
16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

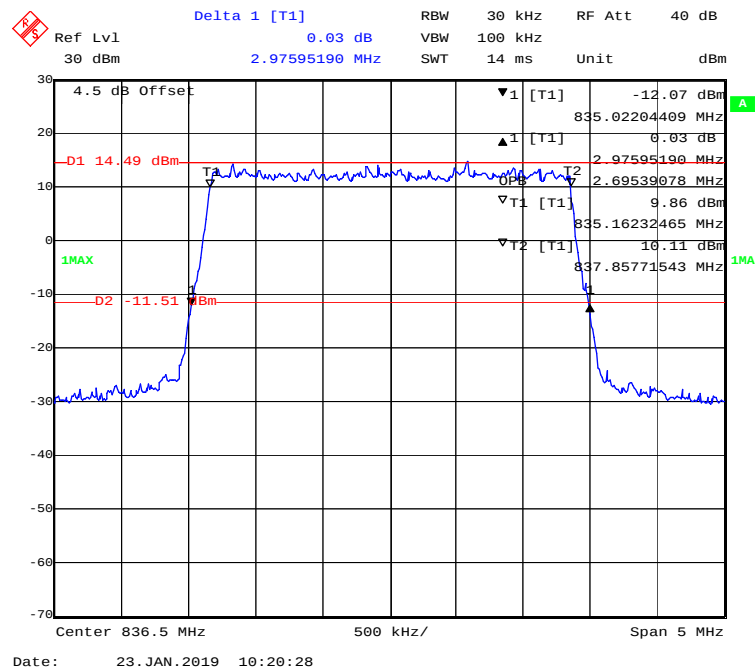
LTE Band 5:

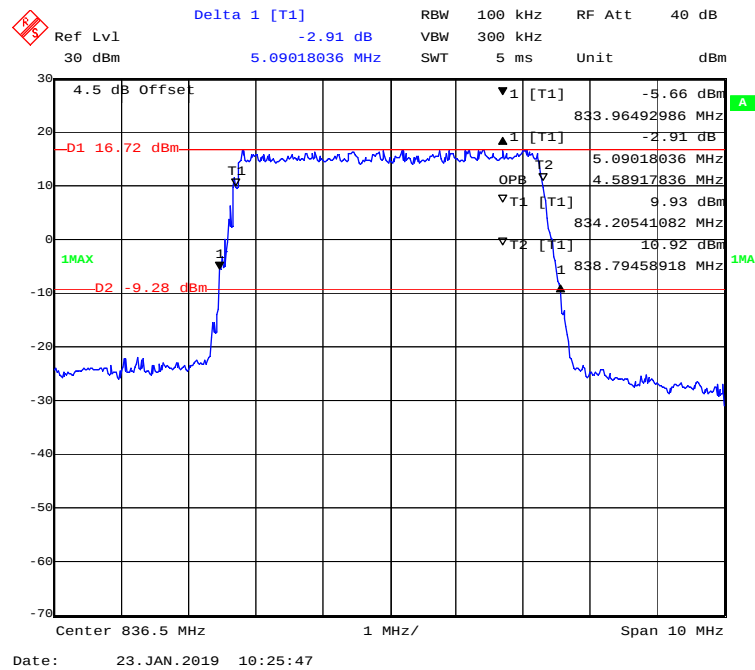
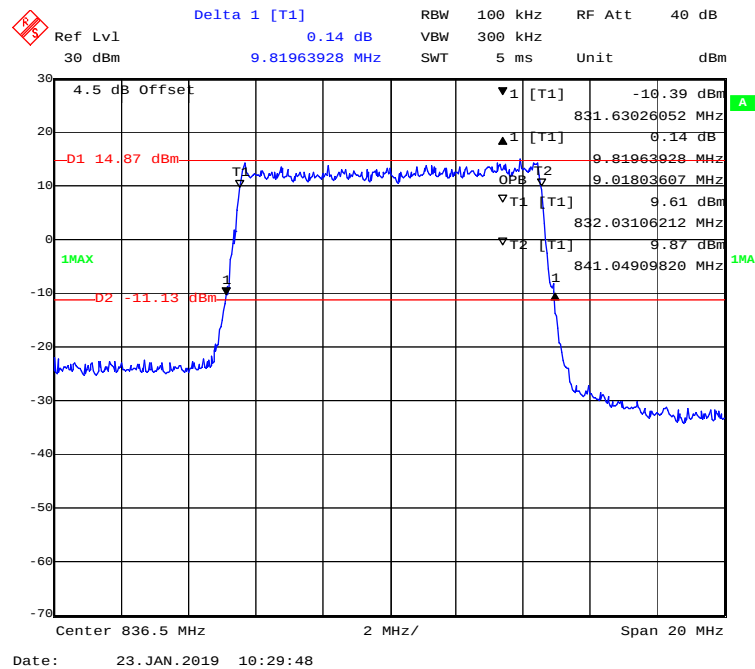
Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.319	1.122
	3M		2.976	2.695
	5M		5.090	4.589
	10M		9.820	9.018
16-QAM	1.4M	Middle	1.315	1.102
	3M		2.966	2.695
	5M		5.090	4.549
	10M		9.860	8.978

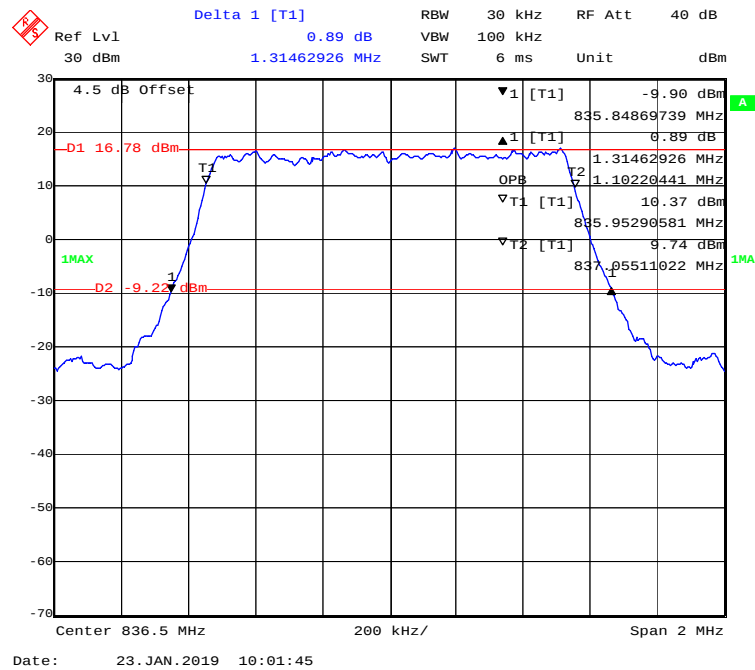
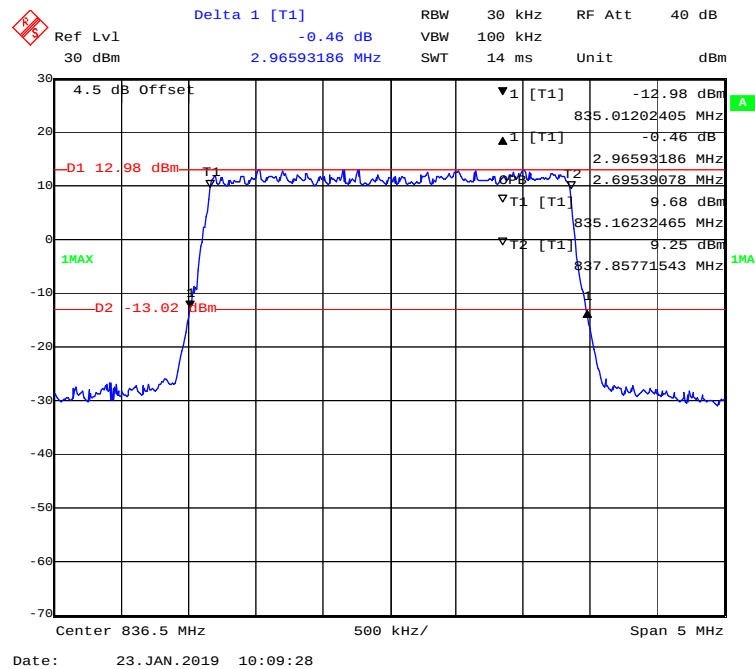
QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

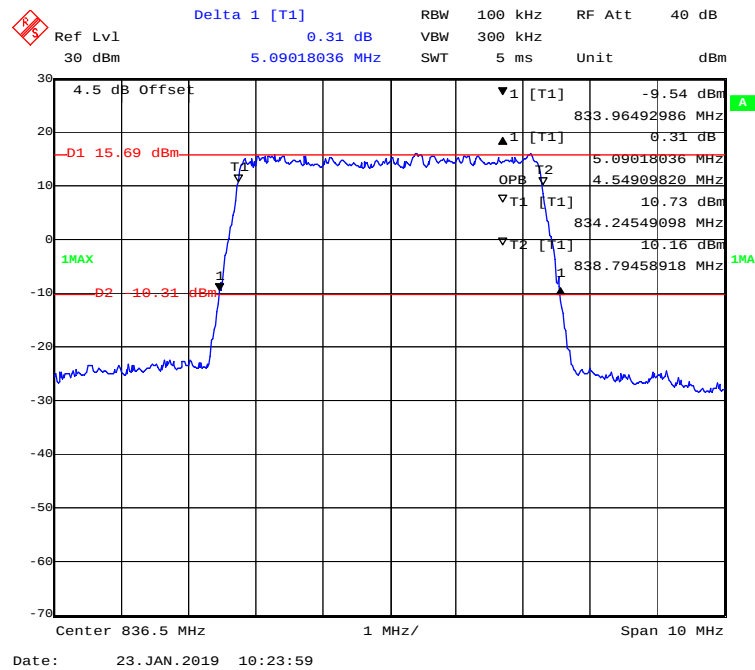
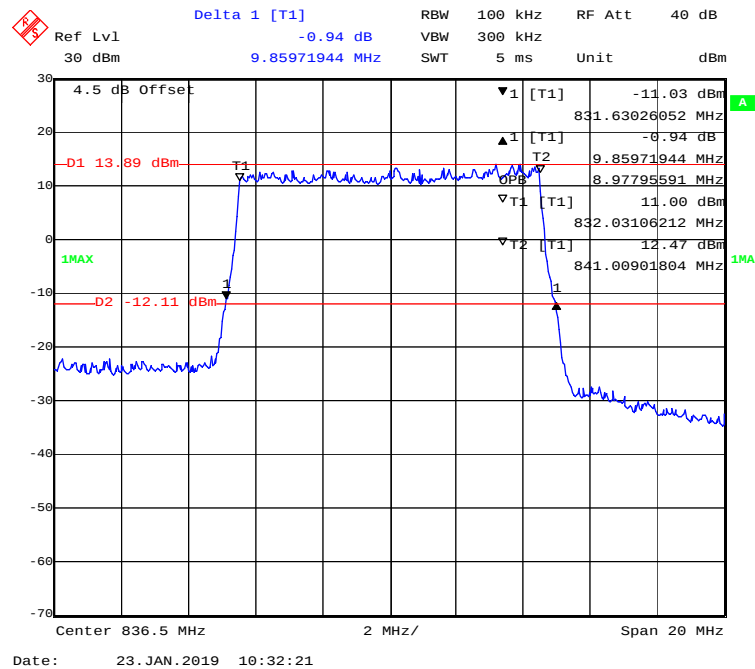


QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



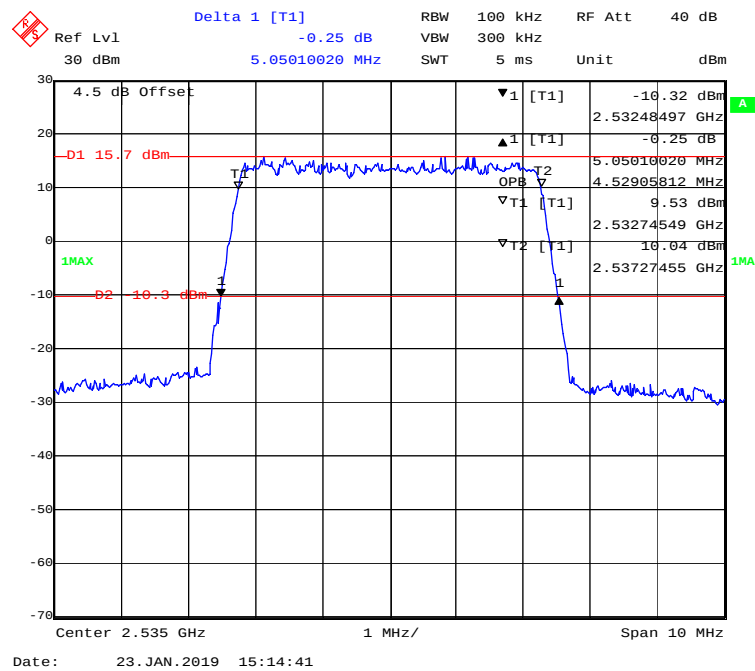
QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**QPSK (10MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

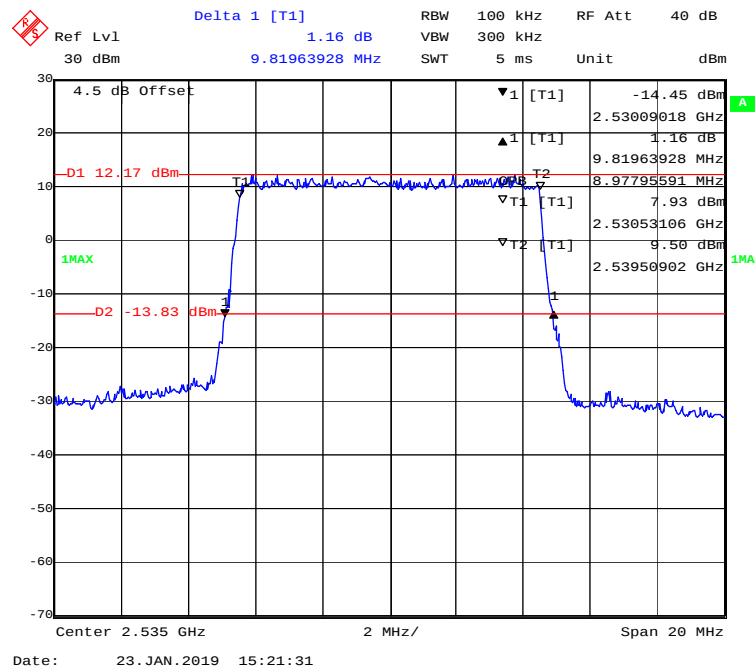
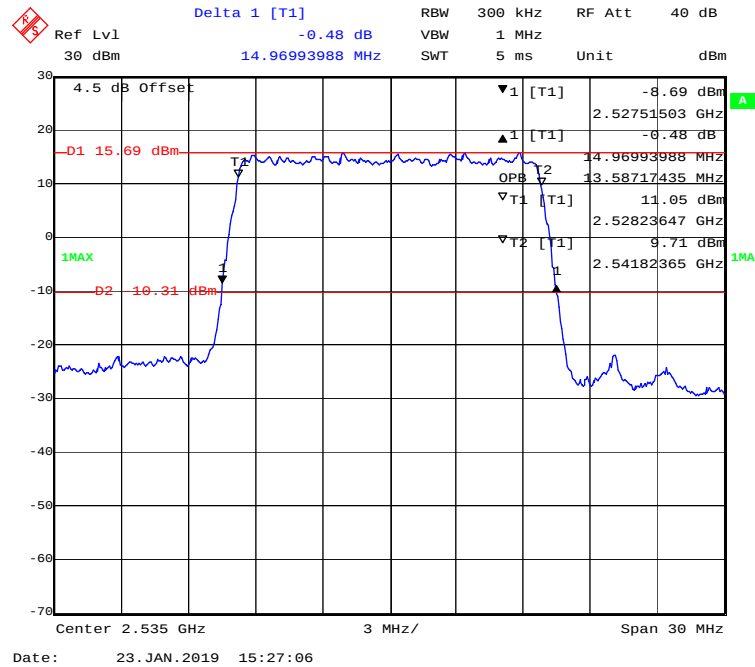
16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

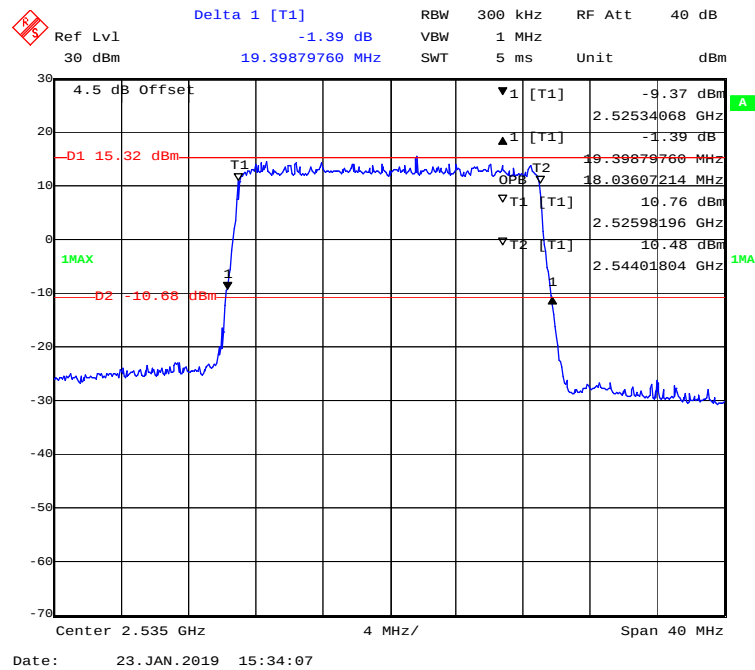
LTE Band 7:

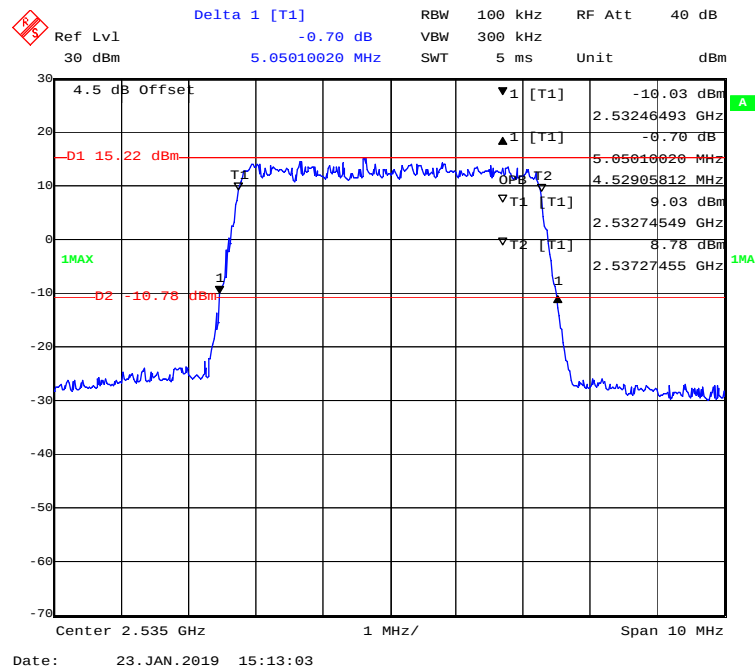
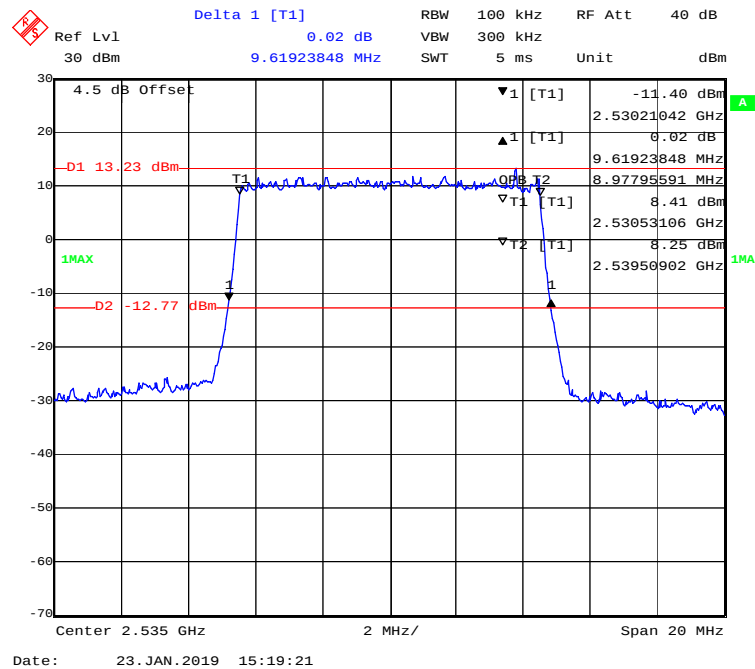
Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	5M	Middle	5.050	4.529
	10M		9.820	8.978
	15M		14.970	13.587
	20M		19.399	18.036
16-QAM	5M	Middle	5.050	4.529
	10M		9.619	8.978
	15M		14.970	13.527
	20M		19.559	18.036

QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

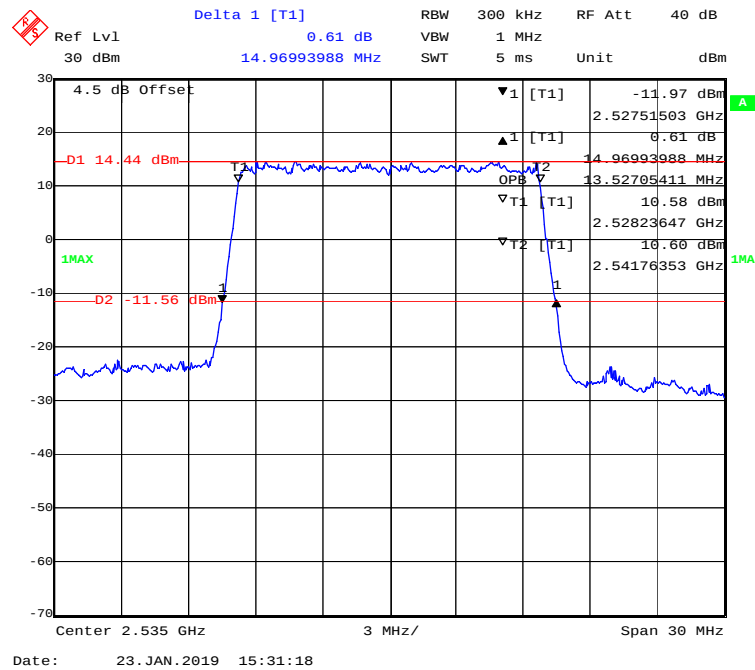
QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**QPSK (15MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

QPSK (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

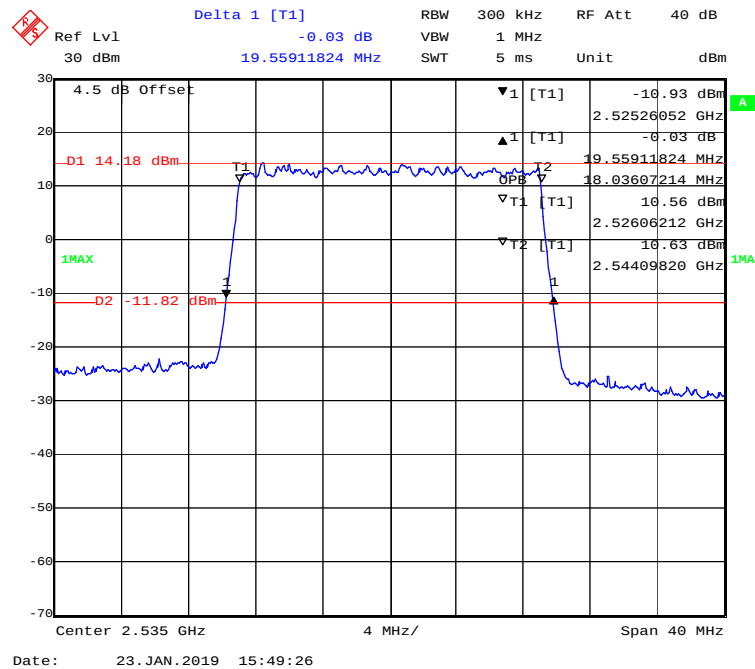


16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

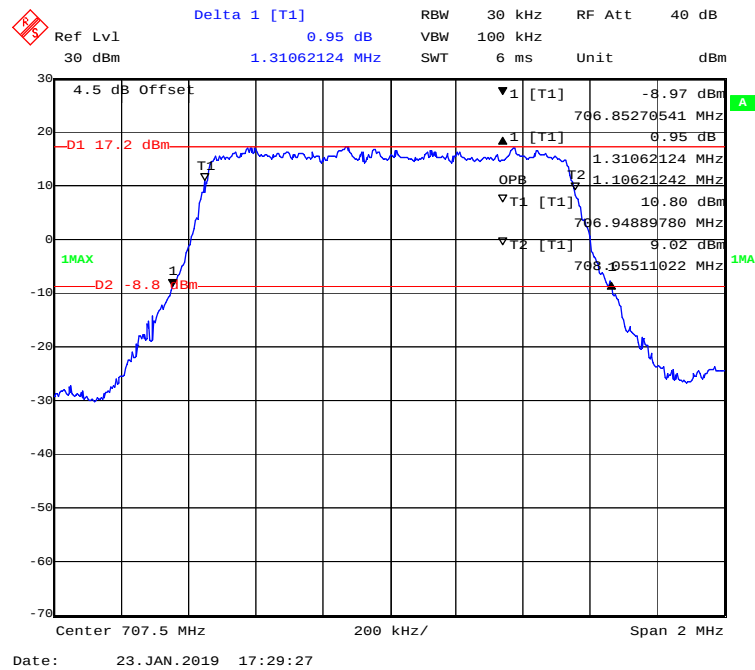
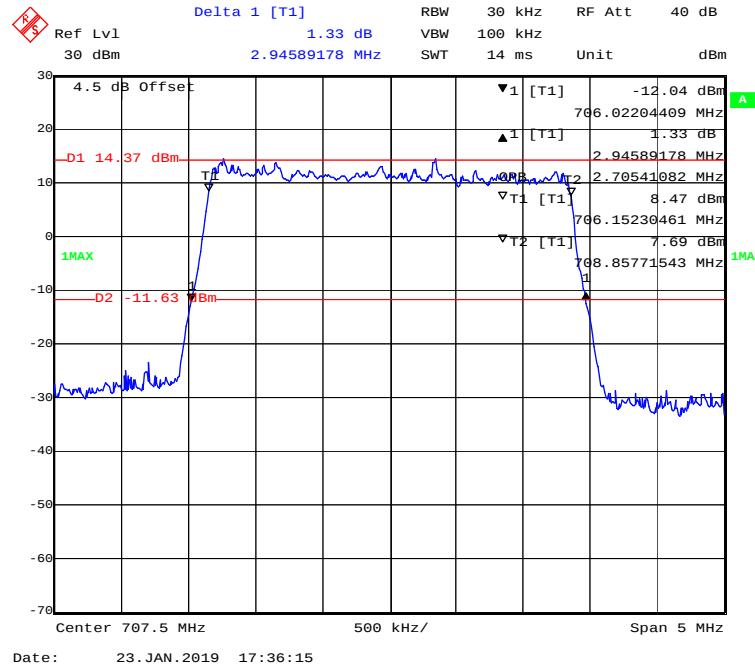


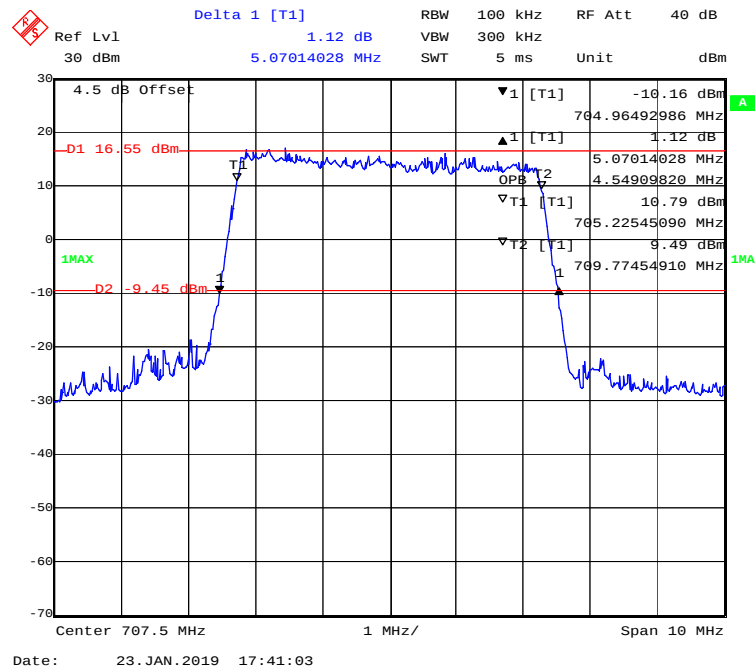
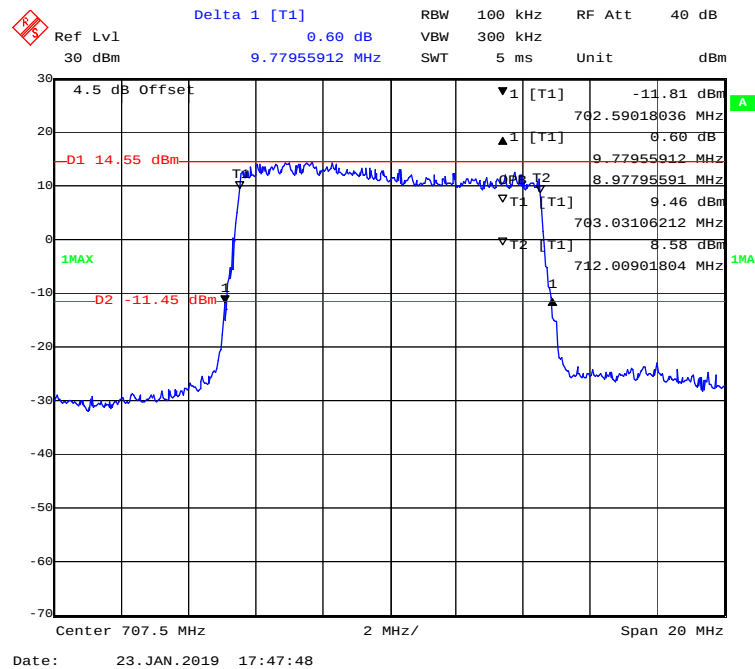
16-QAM (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

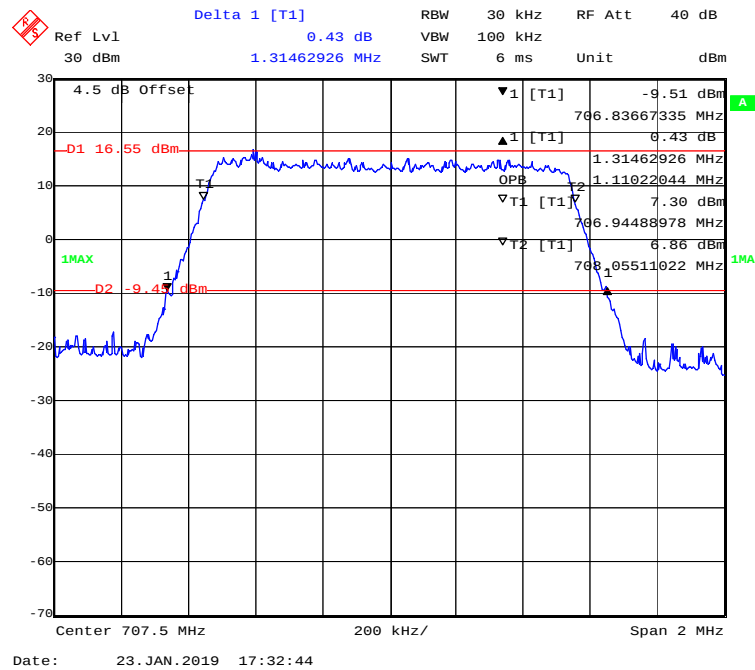
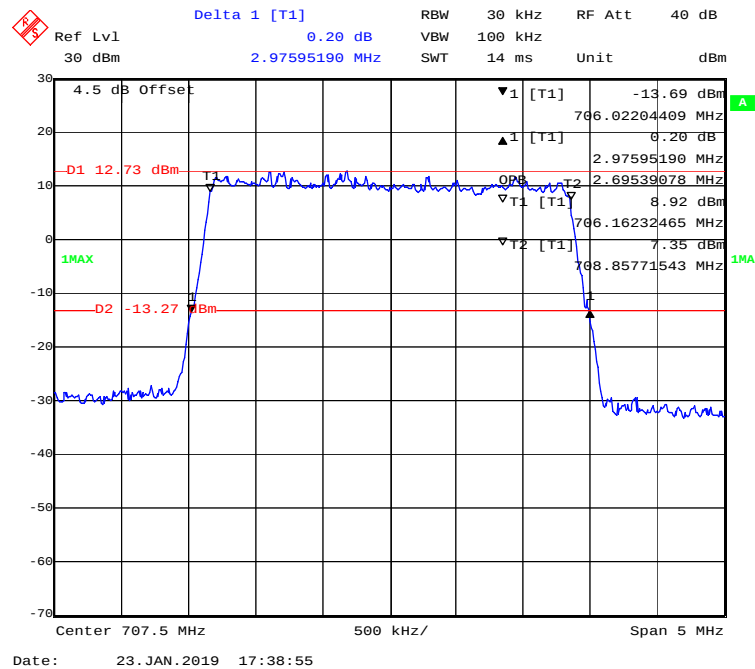


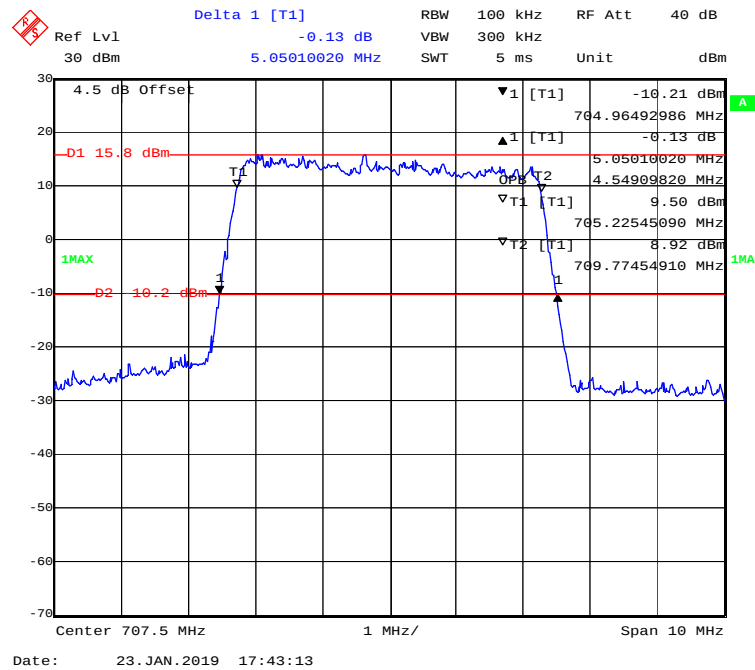
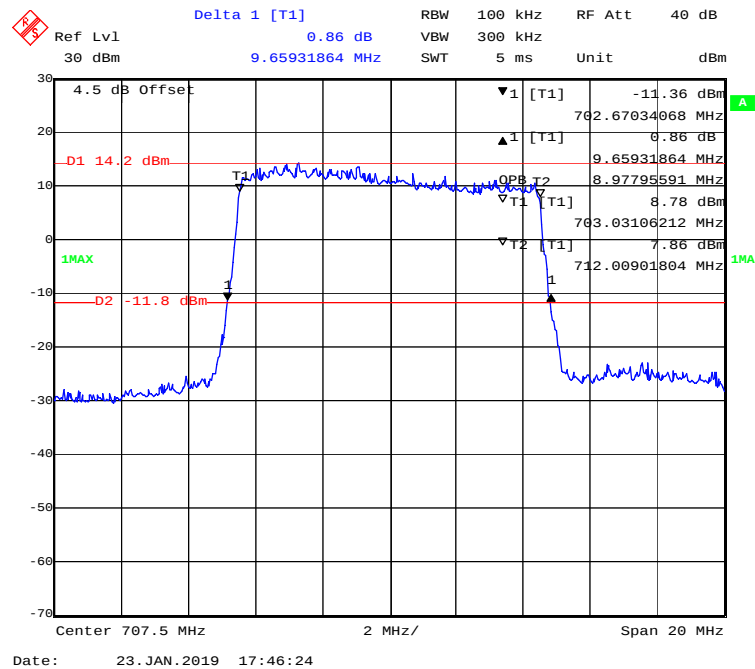
LTE Band 12:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.311	1.106
	3M		2.946	2.705
	5M		5.070	4.549
	10M		9.780	8.978
16-QAM	1.4M	Middle	1.315	1.110
	3M		2.976	2.695
	5M		5.050	4.549
	10M		9.659	8.978

QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

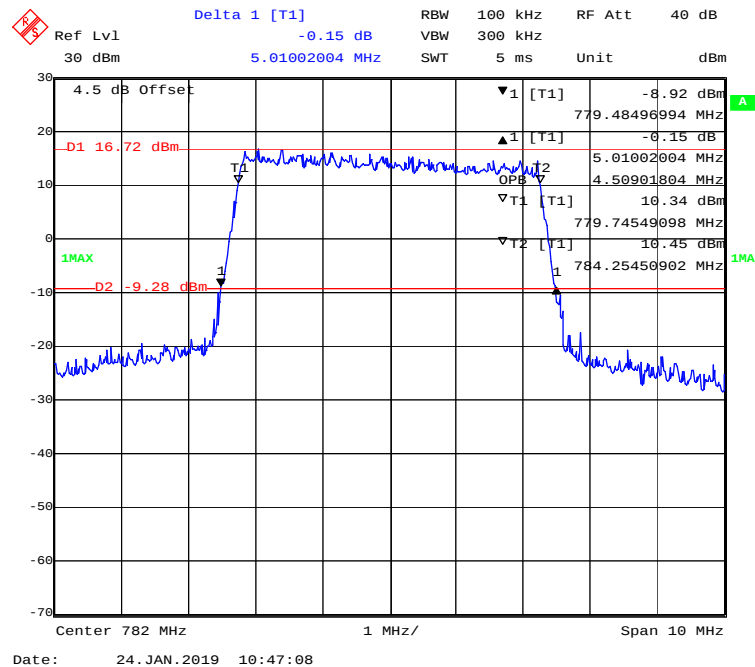
QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**QPSK (10MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

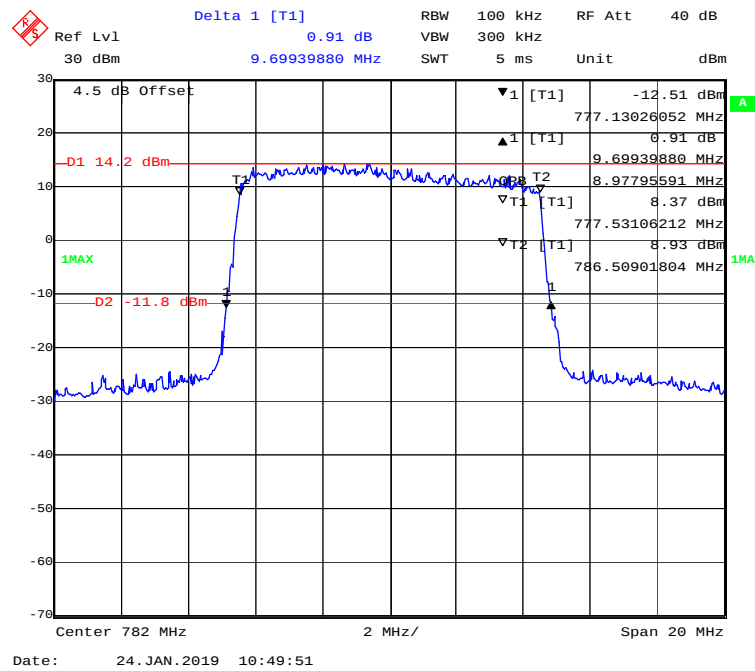
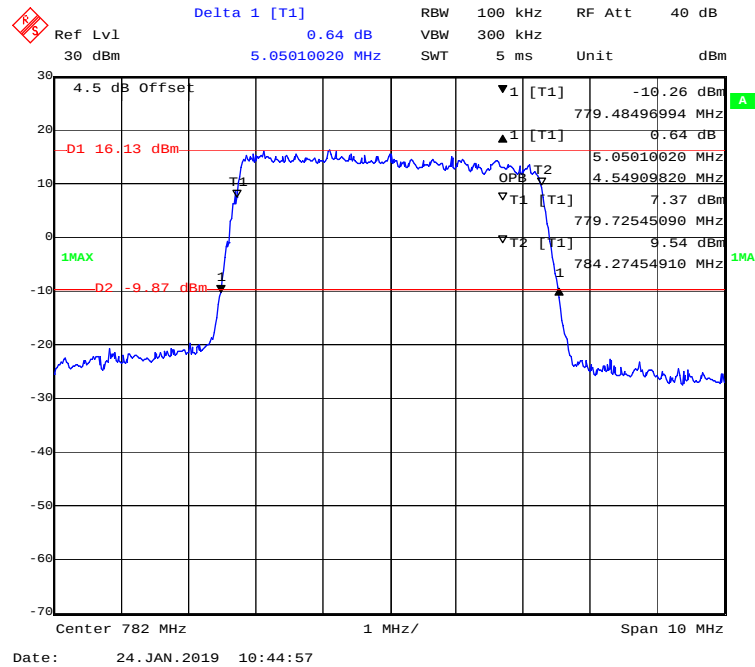
16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

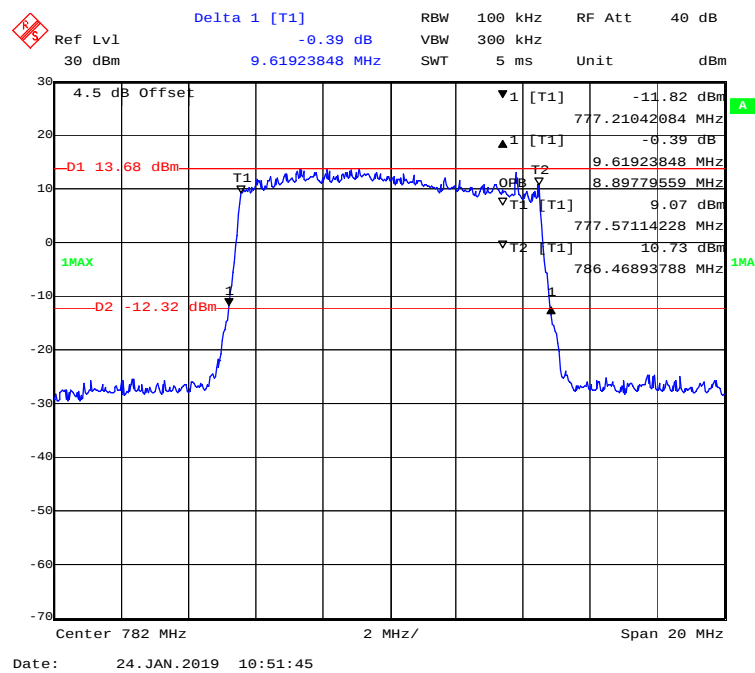
LTE Band 13:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	5M	Middle	5.010	4.509
	10M		9.699	8.978
16-QAM	5M	Middle	5.050	4.549
	10M		9.619	8.898

QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**16-QAM (5MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	5M	Middle	5.090	4.569
	10M		9.860	9.058
16-QAM	5M	Middle	5.090	4.569
	10M		9.739	9.018

Delta 1 [T1] 0.27 dB

Ref Lvl 30 dBm

RBW 100 kHz

VBW 300 kHz

SWT 5 ms

RF Att 40 dB

Unit dBm

4.5 dB Offset

D1 17.86 dBm

D2 -8.14 dBm

1MAX

1MA

▼1 [T1] -8.30 dBm

▲1 [T1] 0.27 dB

5.09018036 MHz

4.56913828 MHz

OPB

▽T1 [T1] 11.19 dBm

767.72545090 MHz

▽T2 [T1] 11.97 dBm

1 712.29458918 MHz

Center 710 MHz

1 MHz/

Span 10 MHz

Date: 24. JAN. 2019 13:51:06

Delta 1 [T1]

Ref Lvl -0.63 dB

30 dBm 9.85971944 MHz

RBW 100 kHz RF Att 40 dB

SWT 5 ms Unit dBm

4.5 dB Offset

-D1 15.26 dBm

1MAX

D2 -10.74 dBm

▼1 [T1] -10.01 dBm

▲1 [T1] -0.63 dBm

OPB ▼

▼T1 [T1] 8.94 dBm

▼T2 [T1] 11.06 dBm

765.05010020 MHz

9.85971944 MHz

9.05811623 MHz

765.49098196 MHz

714.54909820 MHz

Center 710 MHz

2 MHz/

Span 20 MHz

Date: 24. JAN. 2019 13:56:31

Delta 1 [T1] 1.16 dB

RBW 100 kHz RF Att 40 dB

Ref Lvl 30 dBm

SWT 5 ms Unit dBm

4.5 dB Offset

D1 16.64 dBm

D2 -9.36 dBm

1MAX

1MA

▼1 [T1] -9.88 dBm

▲1 [T1] 1.16 dB

OPB

▼2 [T1] 5.09018036 MHz

▼T1 [T1] 4.56913828 MHz

▼T2 [T1] 16.06 dBm

▼T2 [T1] 767.72545090 MHz

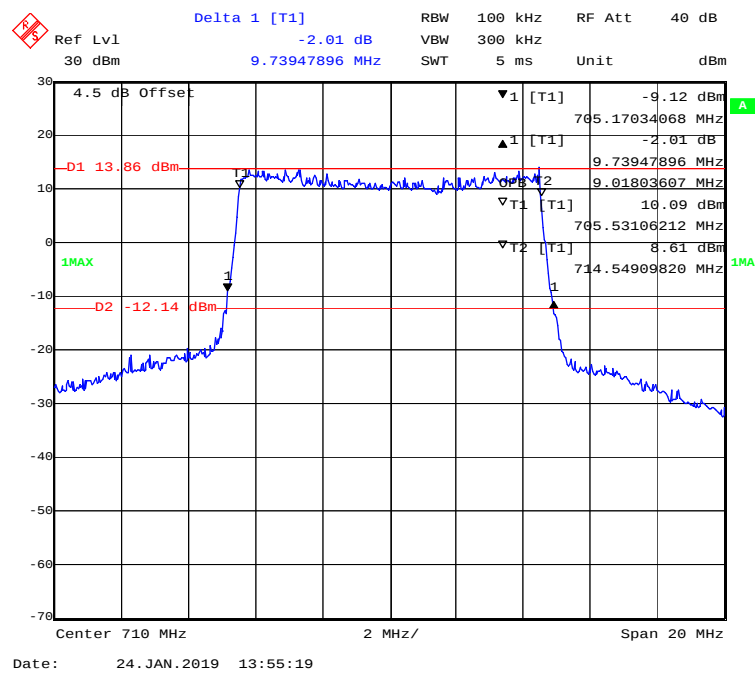
▼T2 [T1] 9.54 dBm

1 712.29458918 MHz

Center 710 MHz 1 MHz/ Span 10 MHz

Date: 24. JAN. 2019 13:53:18

16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



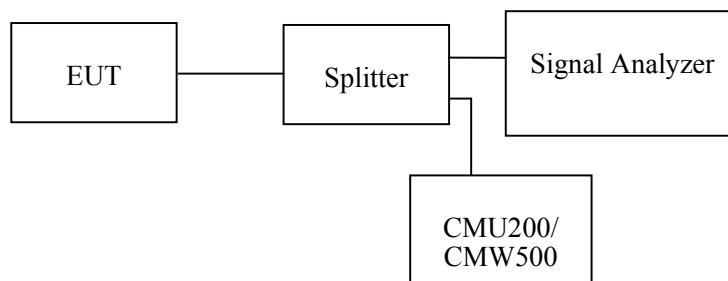
FCC § 2.1051; § 22.917 (a); § 24.238 (a); §27.53(c) (f) (h) (m) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**Applicable Standards**

FCC §2.1051, §22.917(a) and §24.238(a) and §27.53(c) (f) (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 100 kHz for below 1GHz & 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10th harmonic.

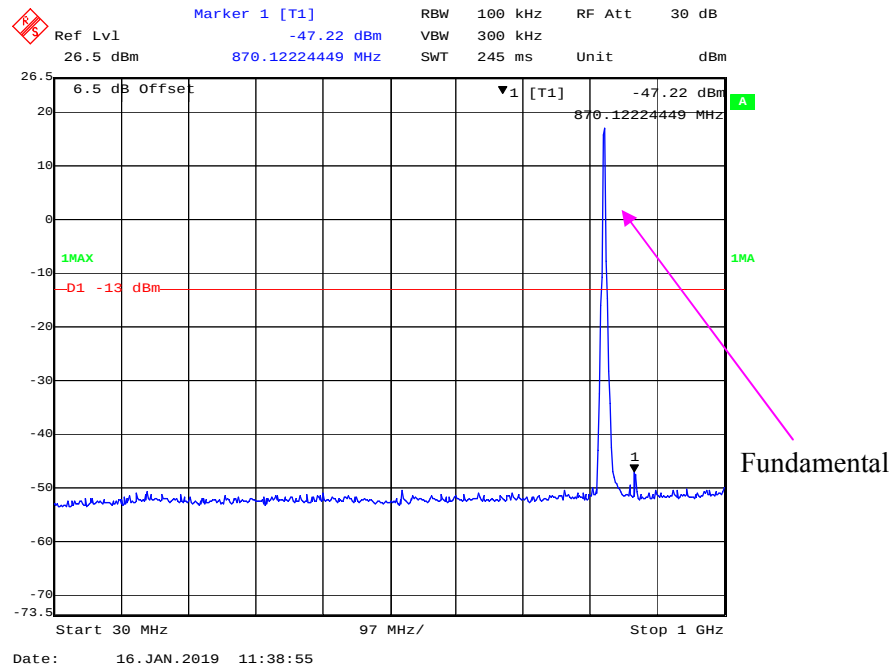
**Test Data****Environmental Conditions**

Temperature:	23.2°C-23.5°C
Relative Humidity:	51 %-23%
ATM Pressure:	101.1kPa-103.3kPa

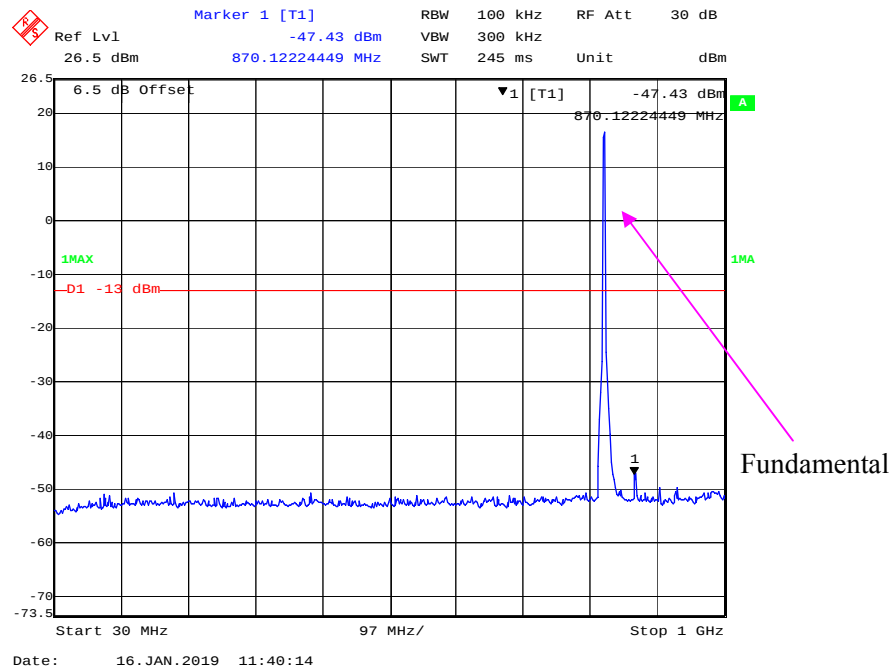
The testing was performed by Hope Zhang from 2019-01-16 to 2019-03-28.

EUT operation mode: Transmitting

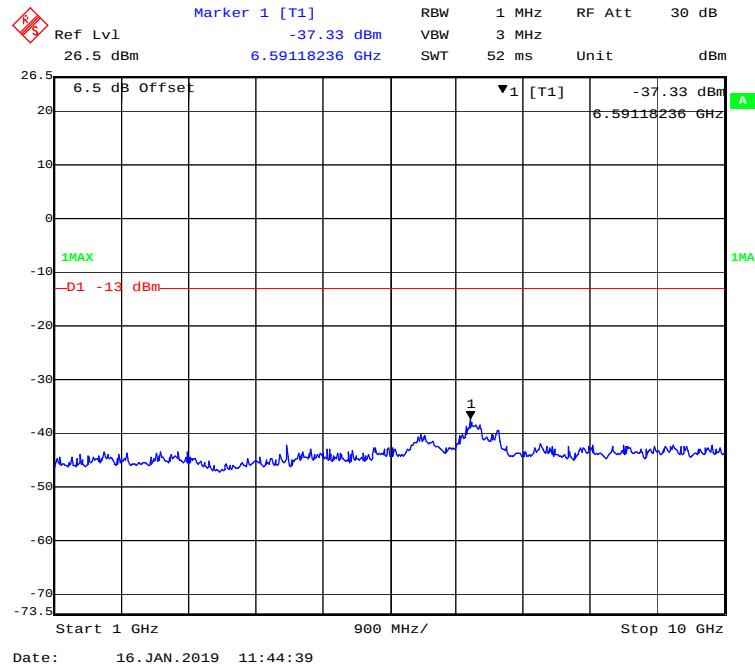
Test Result: Compliance.

WCDMA Band V:**30 MHz – 1GHz WCDMA (Rel 99) Mode, Middle channel****1 GHz – 10 GHz WCDMA (Rel 99) Mode, Middle channel**

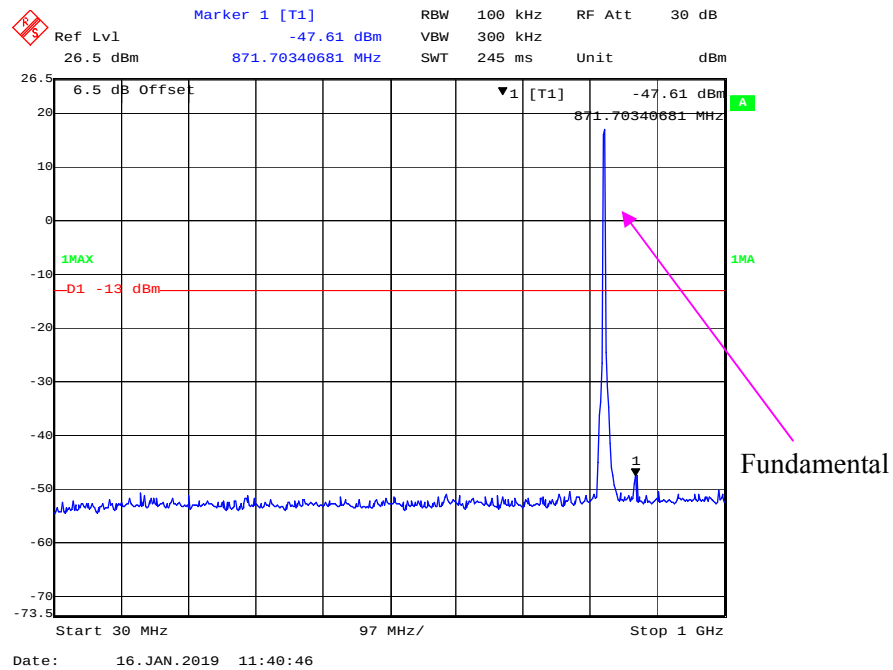
30 MHz – 1GHz WCDMA (HSDPA) Mode, Middle channel



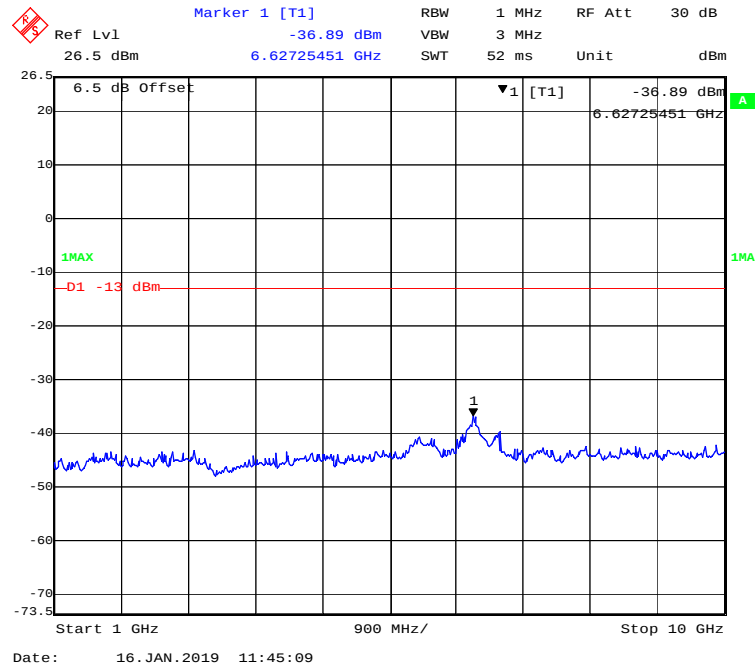
1 GHz – 10 GHz WCDMA (HSDPA) Mode, Middle channel



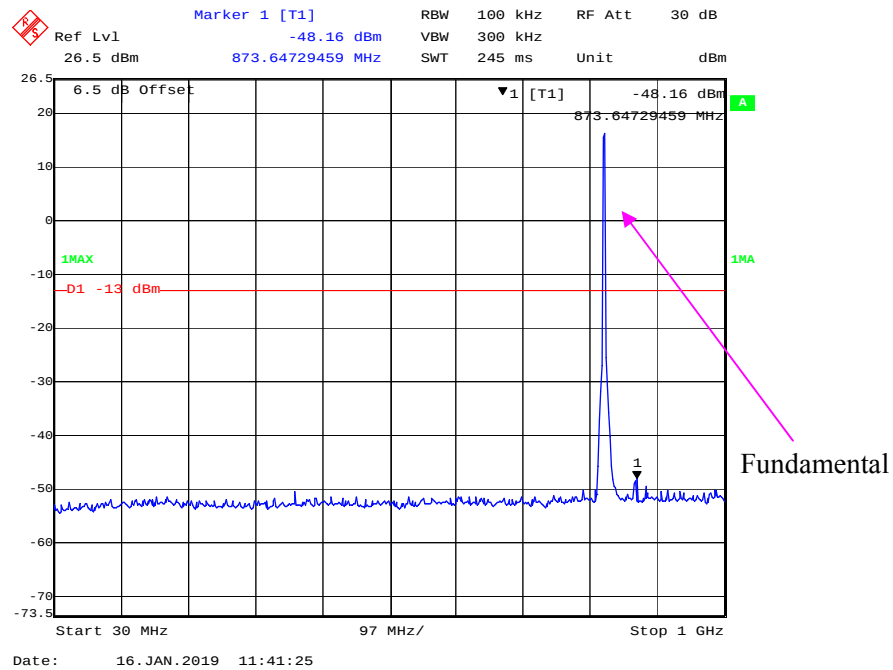
30 MHz – 1GHz WCDMA (HSUPA) Mode, Middle channel



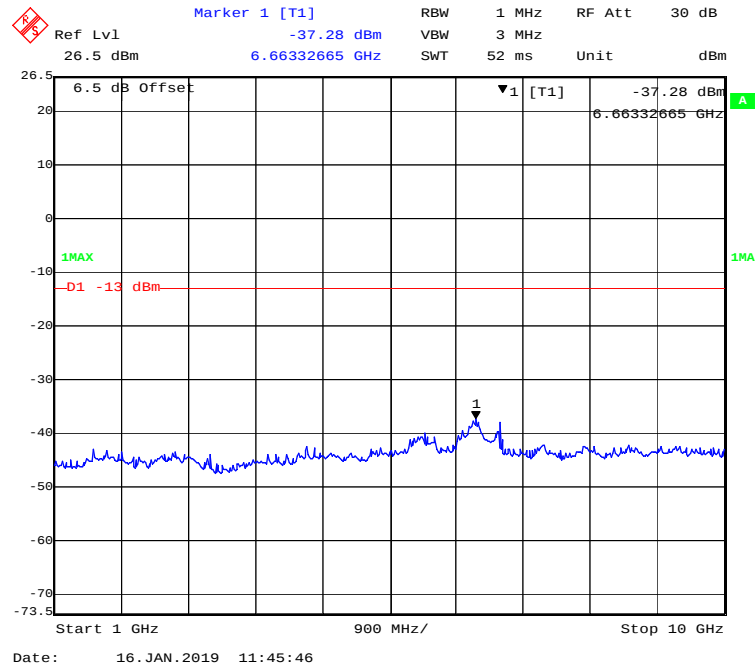
1 GHz – 10 GHz WCDMA (HSUPA) Mode, Middle channel

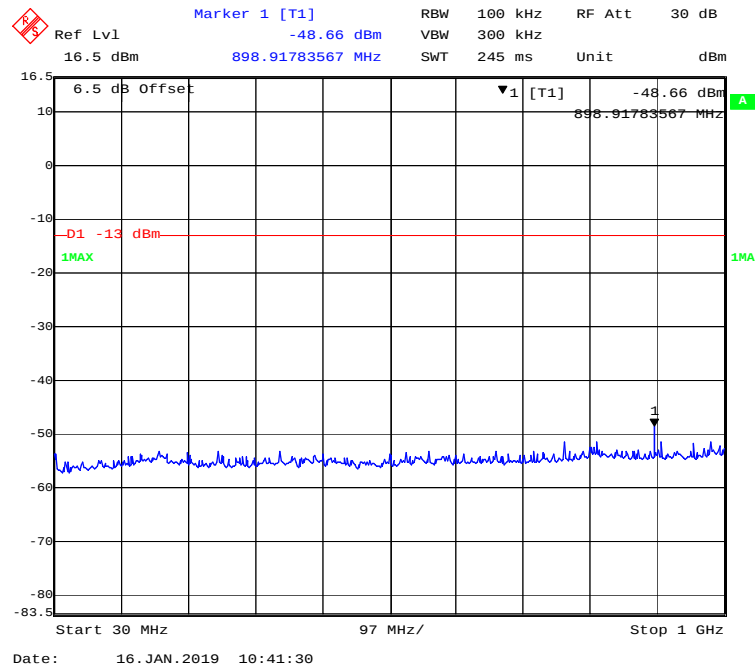
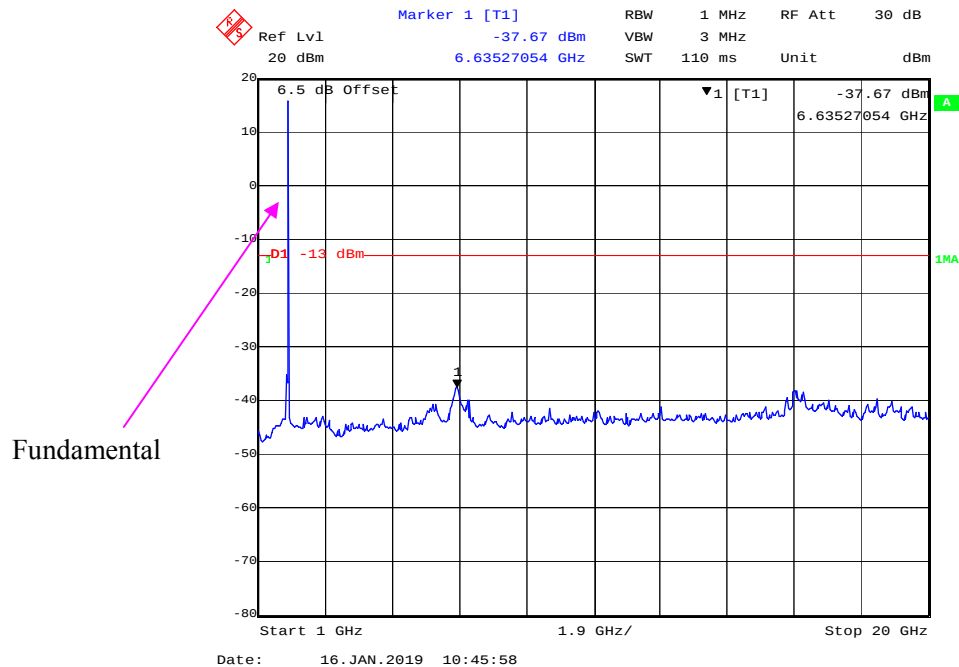


30 MHz – 1GHz WCDMA (HSPA+) Mode, Middle channel

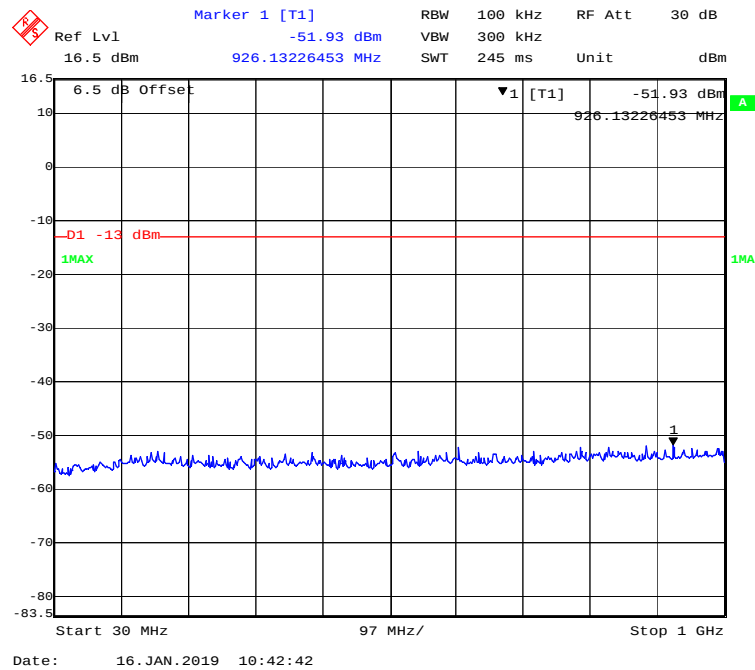


1 GHz – 10 GHz WCDMA (HSPA+) Mode, Middle channel

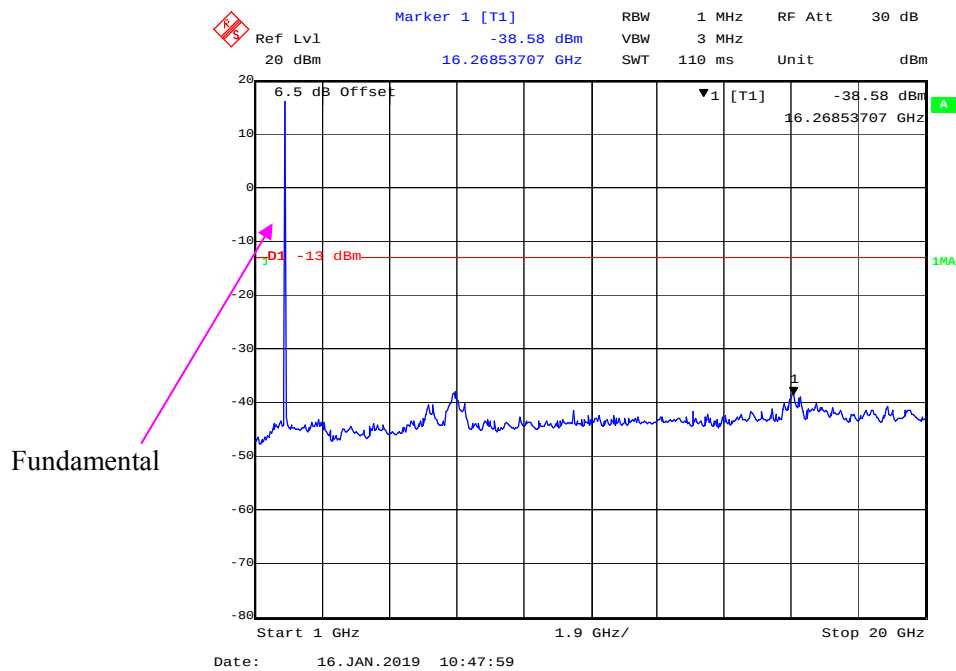


WCDMA Band II:**30 MHz – 1GHz WCDMA (Rel 99) Mode, Middle channel****1 GHz – 20 GHz WCDMA (Rel 99) Mode, Middle channel**

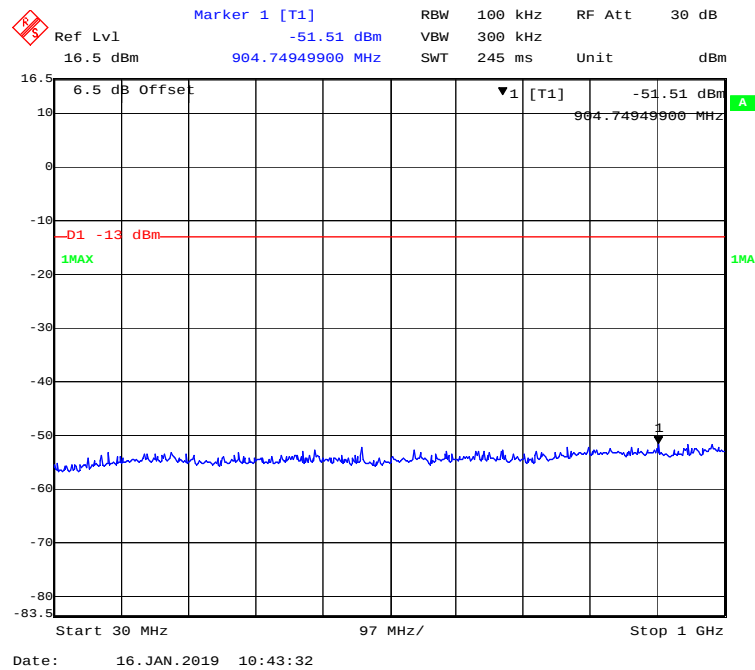
30 MHz – 1GHz WCDMA (HSDPA) Mode, Middle channel



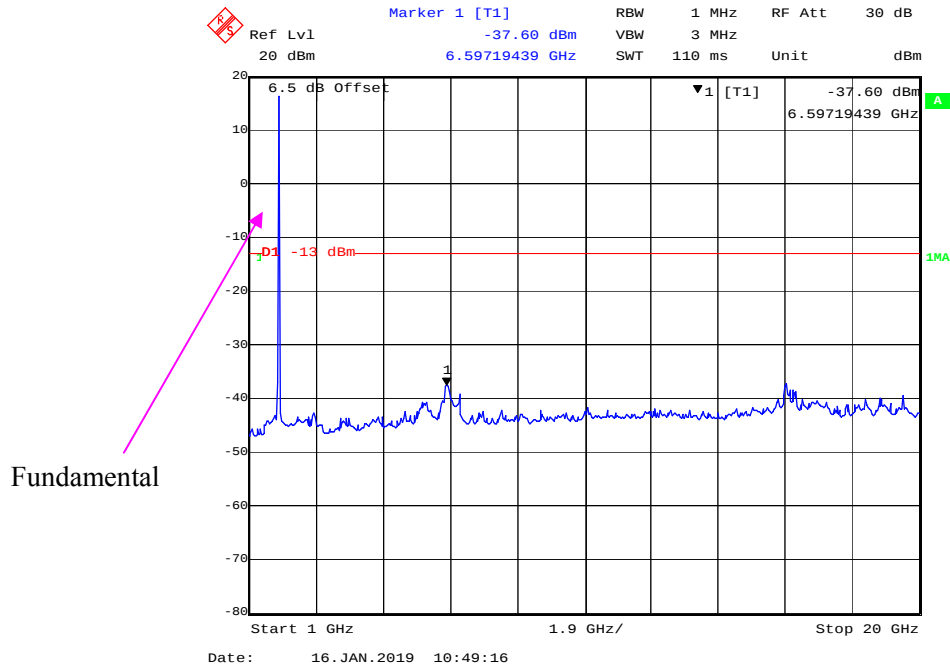
1 GHz – 20 GHz WCDMA (HSDPA) Mode, Middle channel



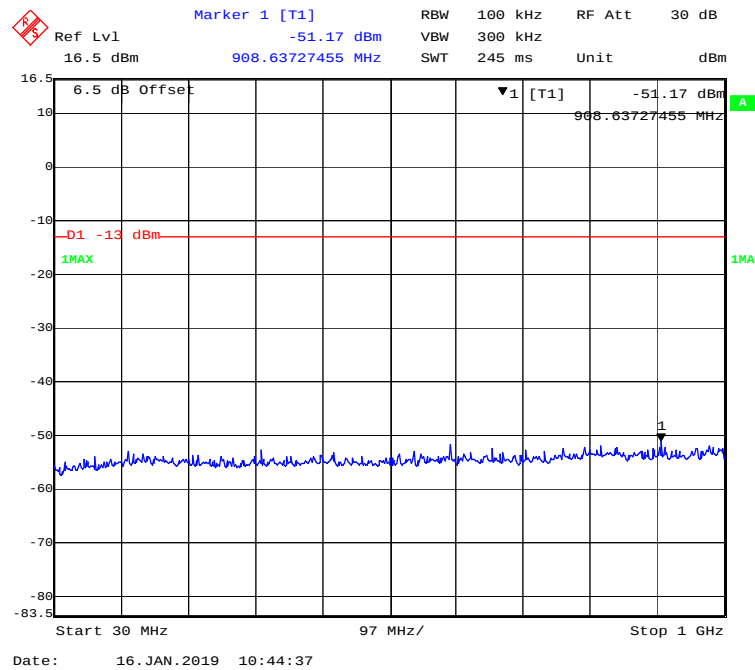
30 MHz – 1GHz WCDMA (HSUPA) Mode, Middle channel



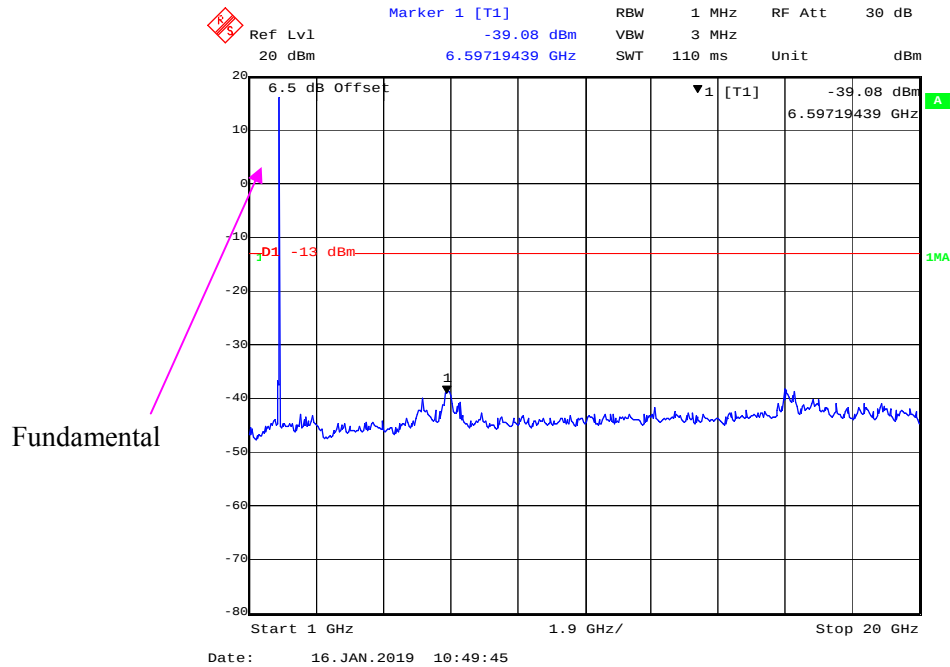
1 GHz – 20 GHz WCDMA (HSUPA) Mode, Middle channel

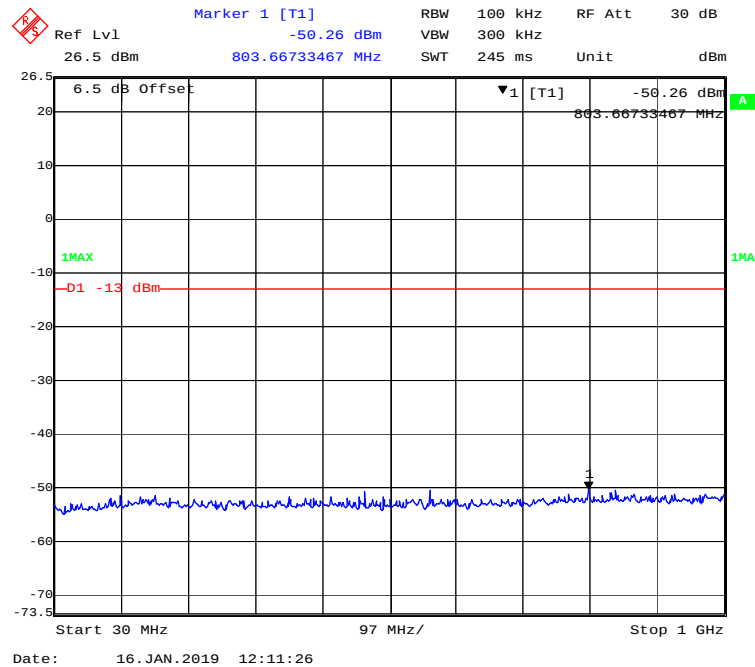
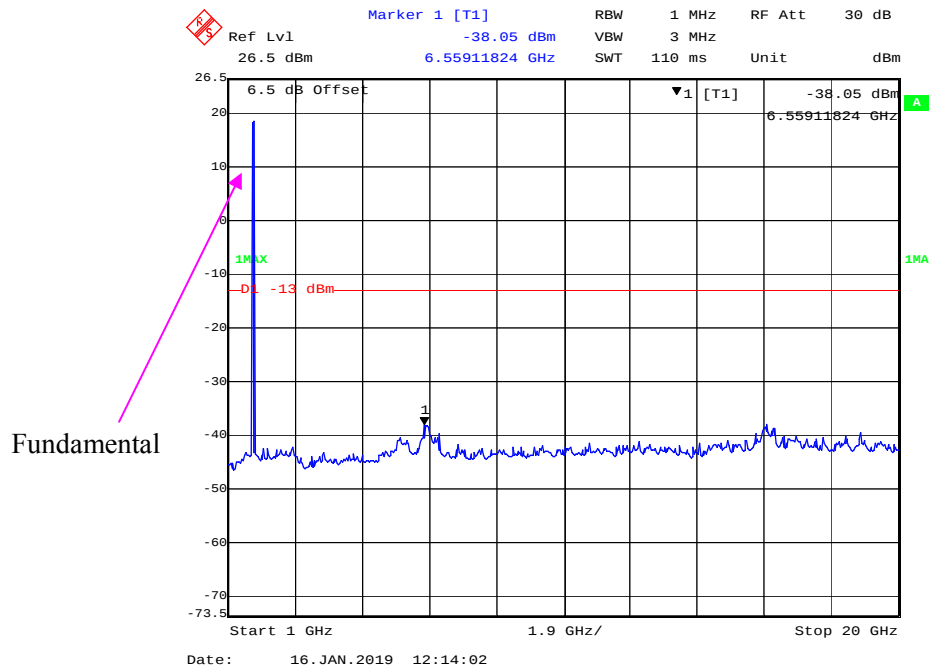


30 MHz – 1GHz WCDMA (HSPA+) Mode, Middle channel

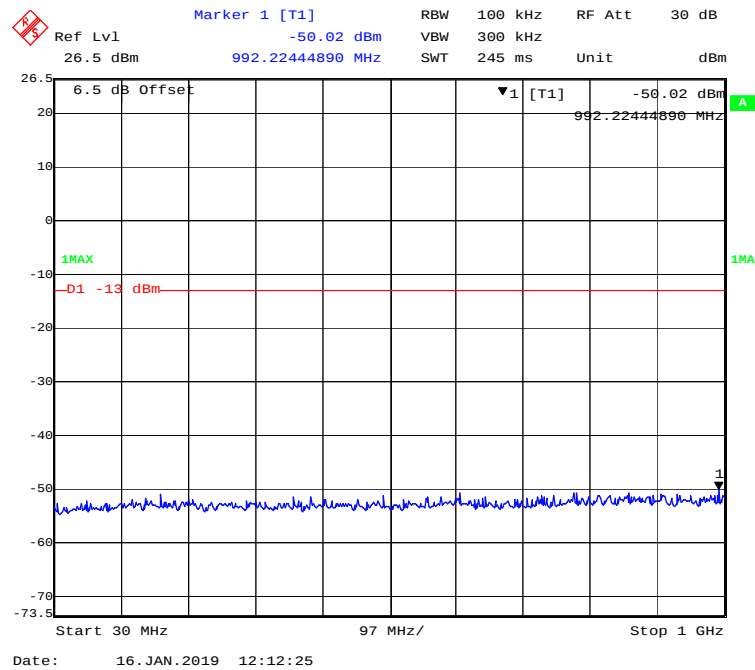


1 GHz – 20 GHz WCDMA (HSPA+) Mode, Middle channel

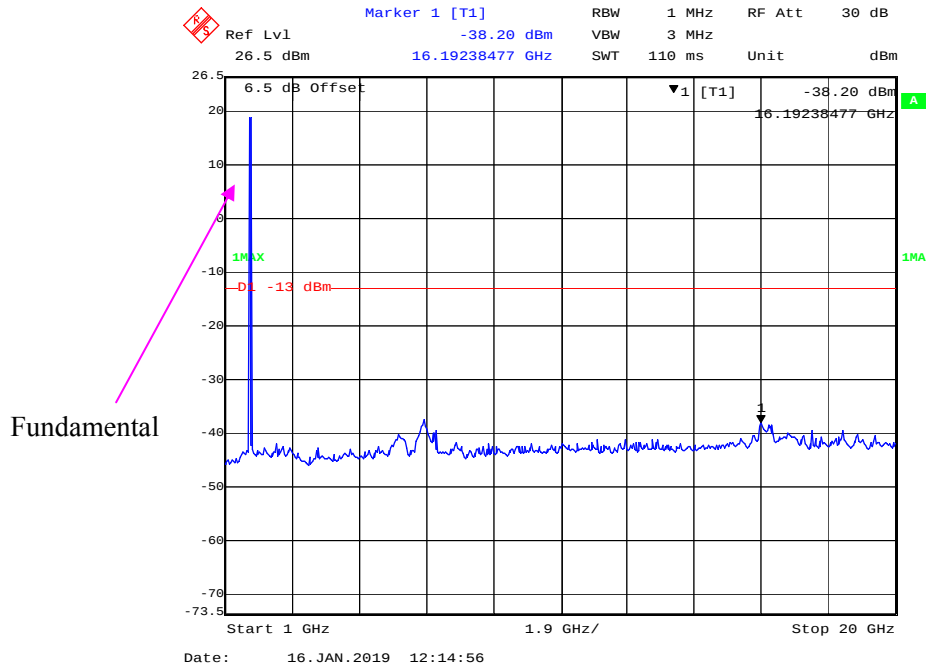


WCDMA Band IV:**30 MHz – 1GHz WCDMA (Rel 99) Mode, Middle channel****1 GHz – 20 GHz WCDMA (Rel 99) Mode, Middle channel**

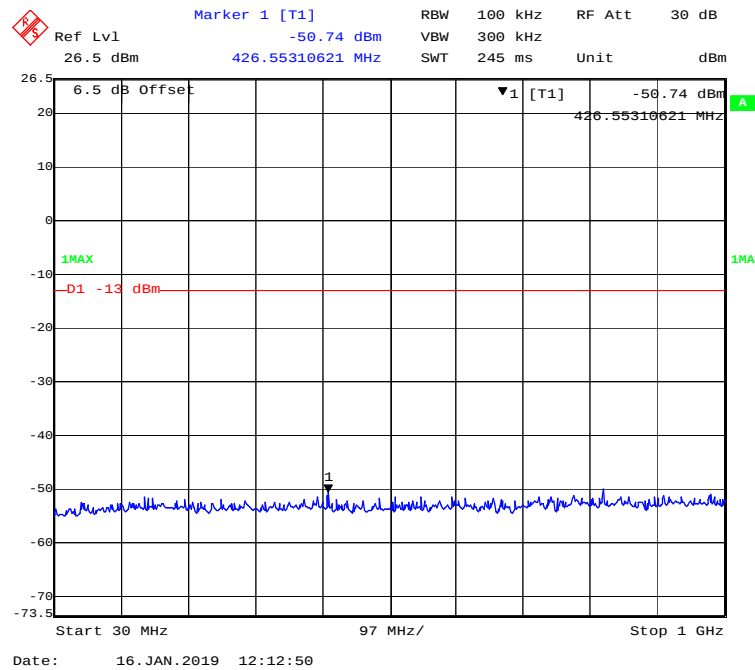
30 MHz – 1GHz WCDMA (HSDPA) Mode, Middle channel



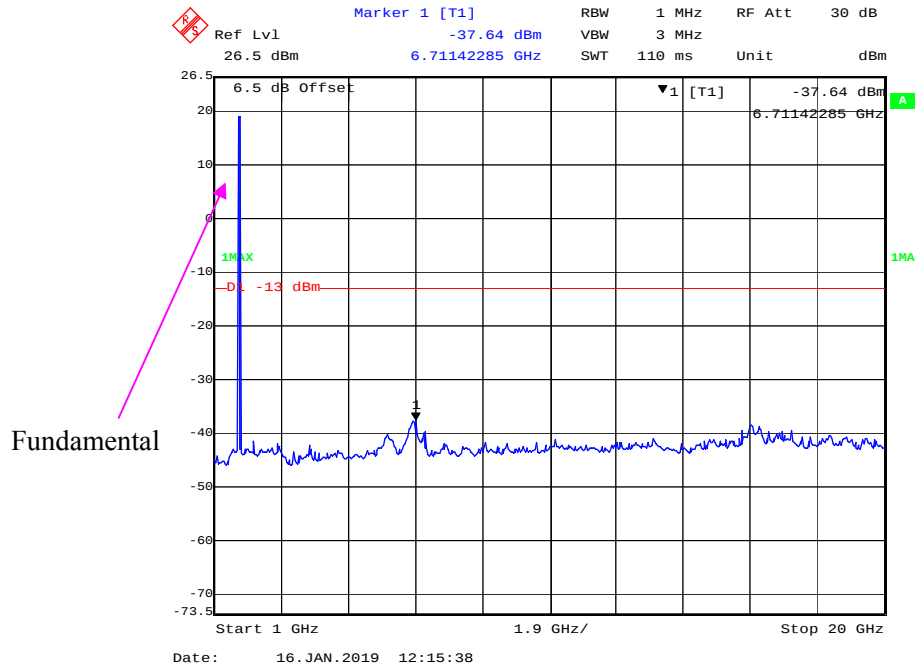
1 GHz – 20 GHz WCDMA (HSDPA) Mode, Middle channel



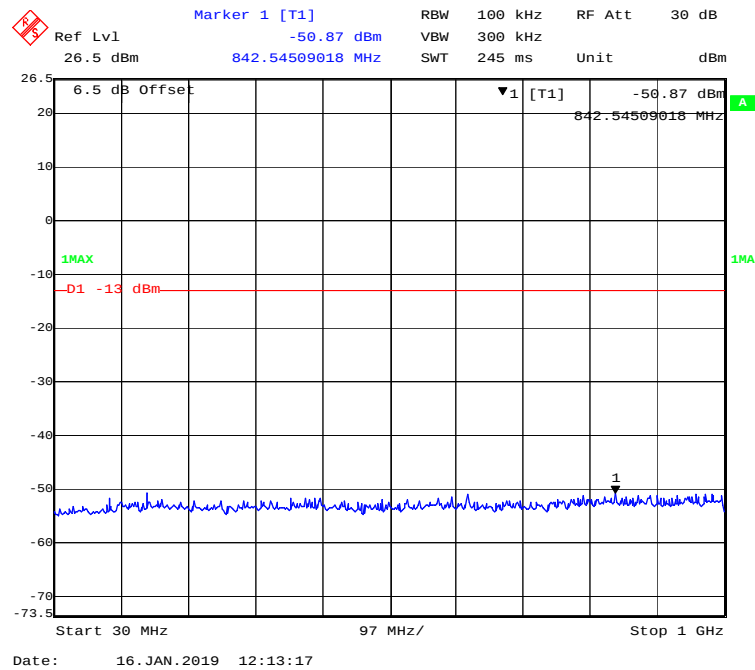
30 MHz – 1GHz WCDMA (HSUPA) Mode, Middle channel



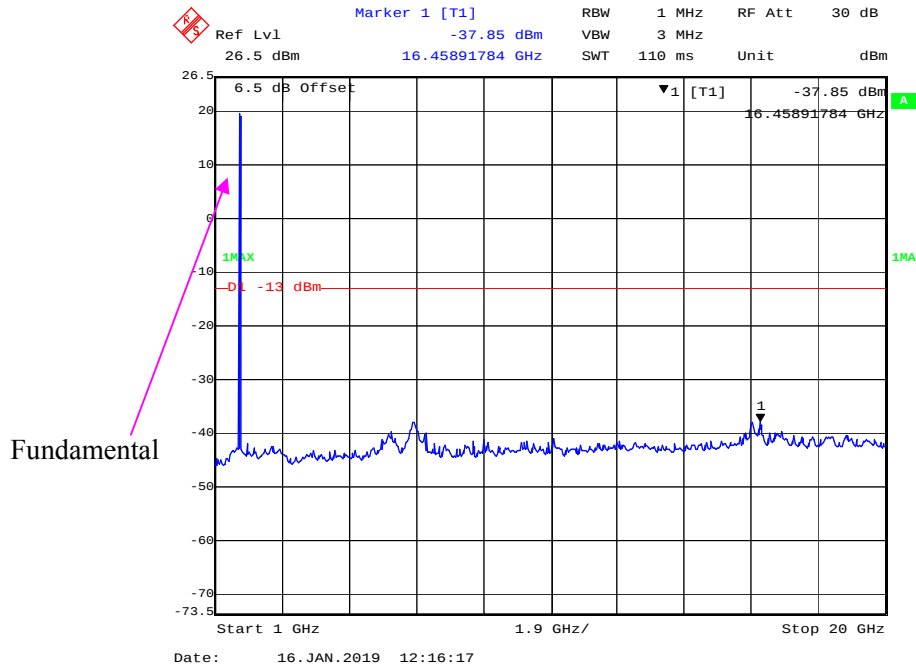
1 GHz – 20 GHz WCDMA (HSUPA) Mode, Middle channel



30 MHz – 1GHz WCDMA (HSPA+) Mode, Middle channel

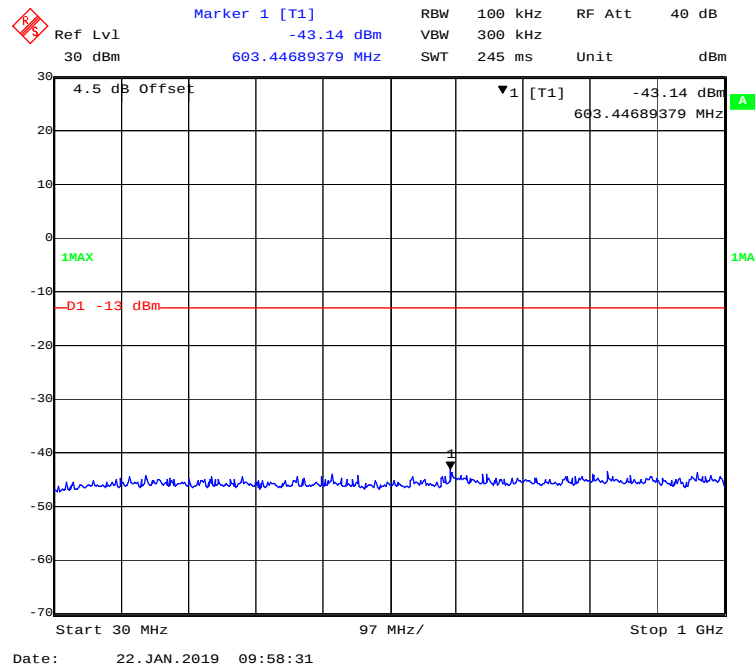


1 GHz – 20 GHz WCDMA (HSPA+) Mode, Middle channel

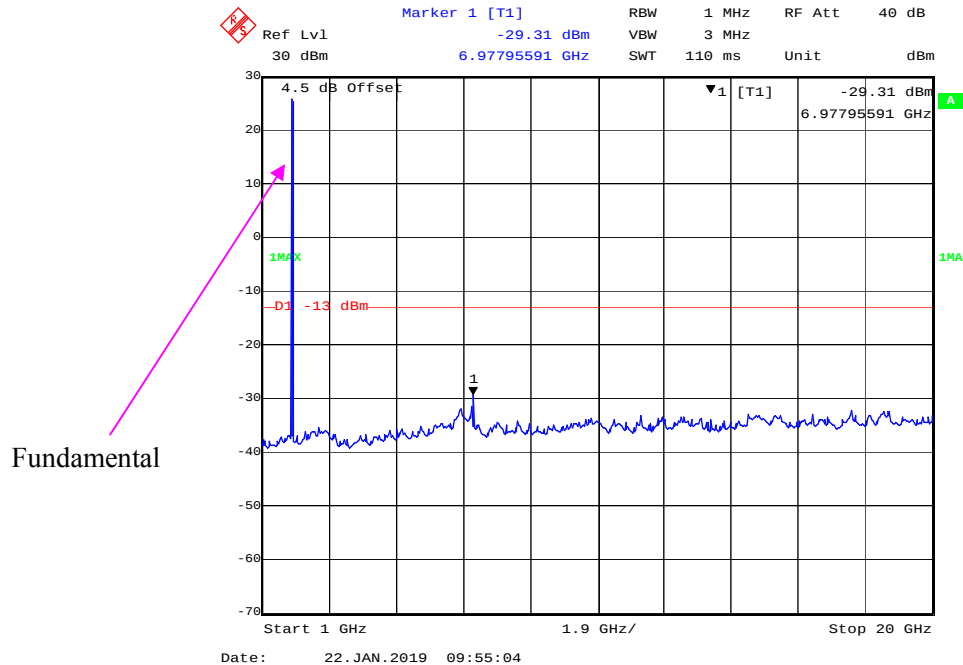


LTE Band 2:

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



1 GHz – 20 GHz (1.4 MHz, QPSK, Middle Channel)



Marker 1 [T1] -44.36 dBm

RBW 100 kHz RF Att 40 dB

Ref Lvl 30 dBm VBW 300 kHz

SWT 245 ms Unit dBm

4.5 dB Offset

▼1 [T1] -44.36 dBm

424.60921844 MHz

1MAX

-D1 -13 dBm

Start 30 MHz 97 MHz/ Stop 1 GHz

Date: 22. JAN. 2019 09:57:24

Ref Lvl 30 dBm

Marker 1 [T1] -31.80 dBm

RBW 1 MHz RF Att 40 dB

VBW 3 MHz

SWT 110 ms Unit dBm

4.5 dB Offset

▼1 [T1] -31.80 dBm

6.59719439 GHz

1MAX

-13 dBm

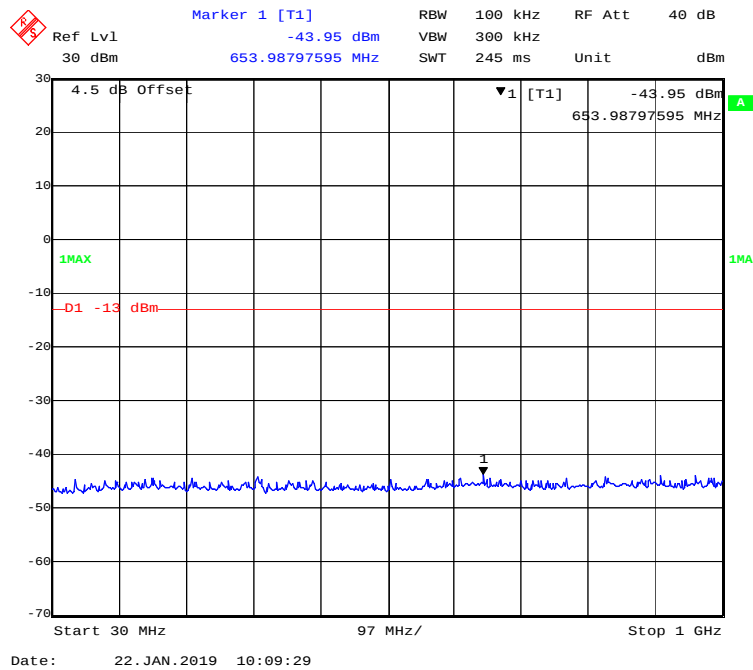
1

Start 1 GHz 1.9 GHz/ Stop 20 GHz

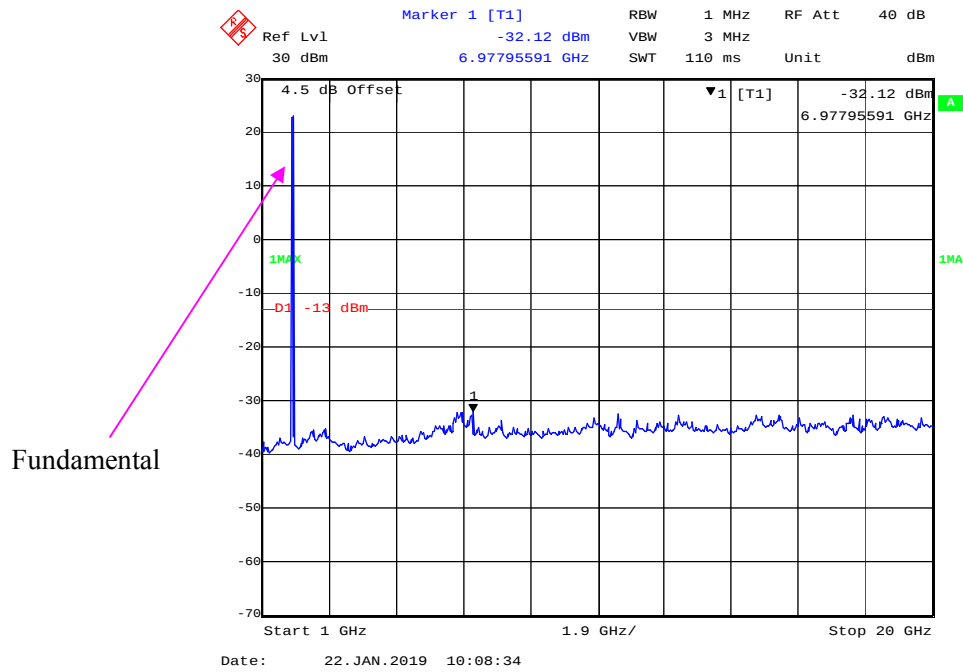
Date: 22. JAN. 2019 09:55:49

Fundamental

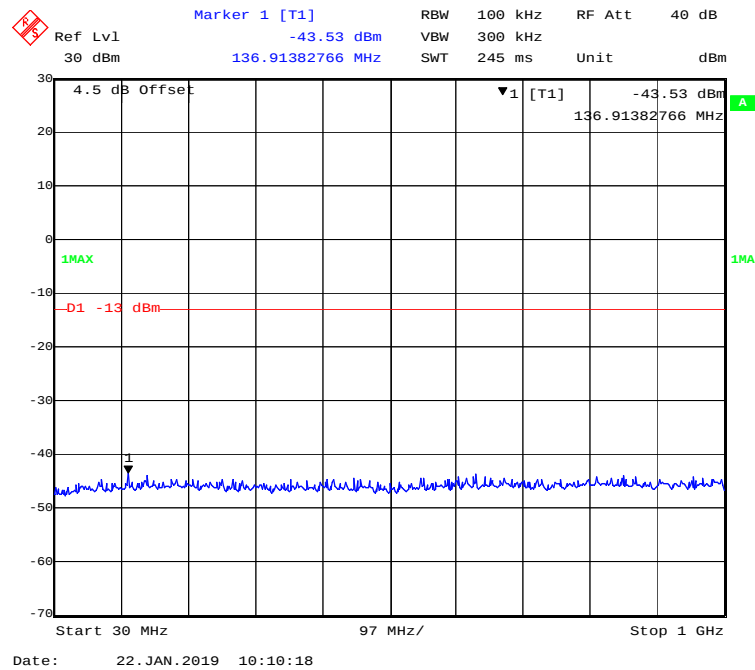
30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)



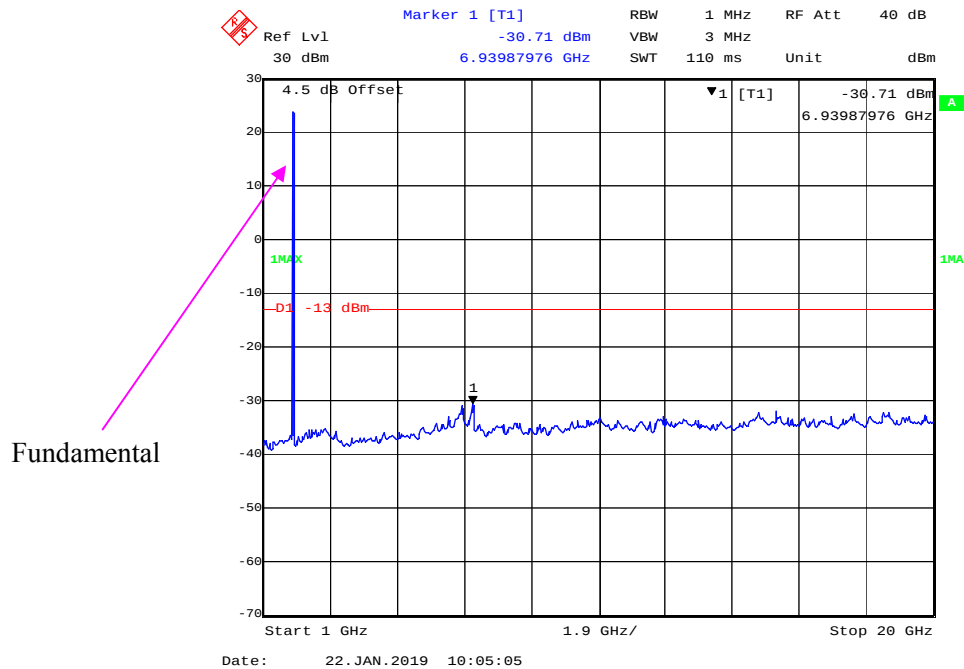
1 GHz – 20 GHz (3 MHz, QPSK, Middle Channel)



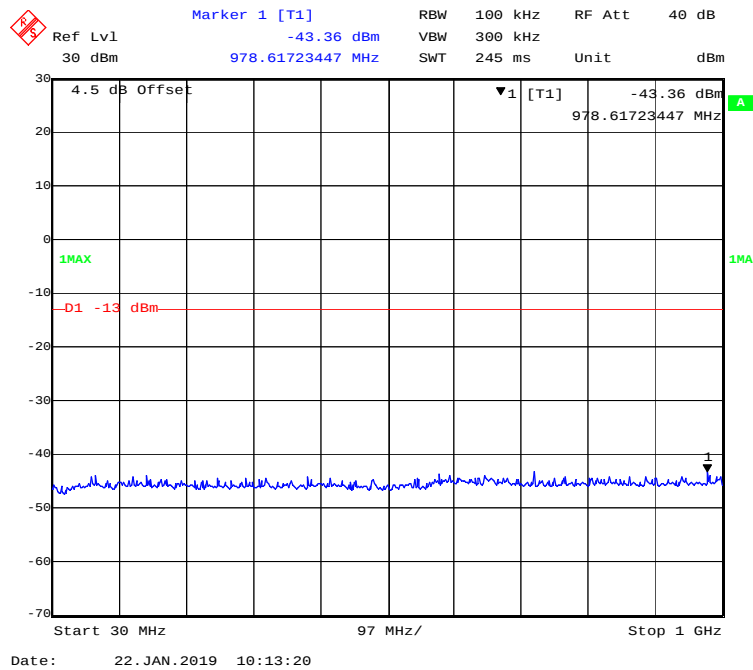
30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



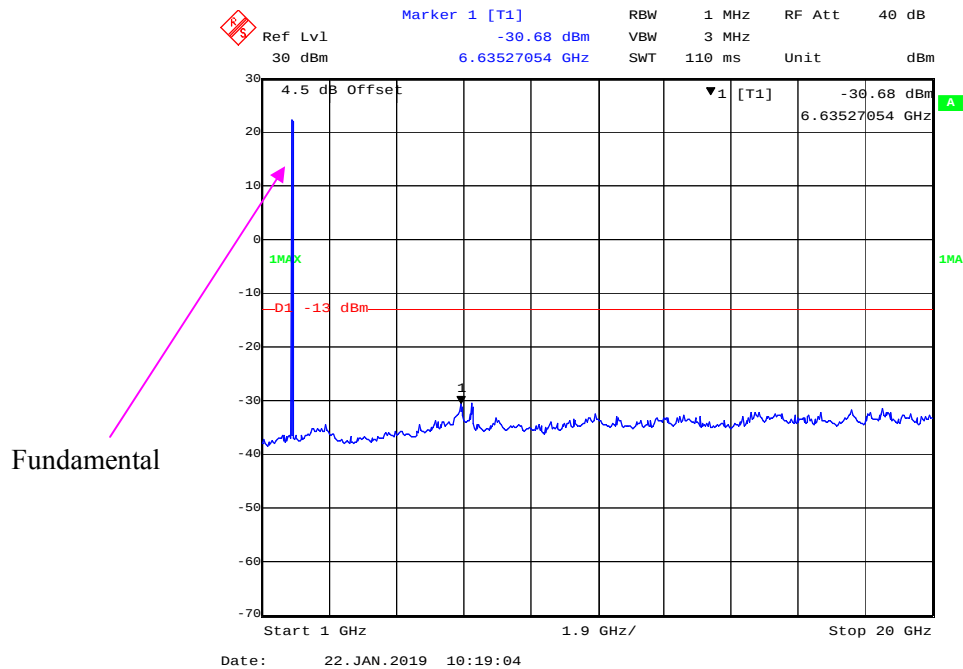
1 GHz – 20 GHz (3 MHz, 16-QAM, Middle Channel)



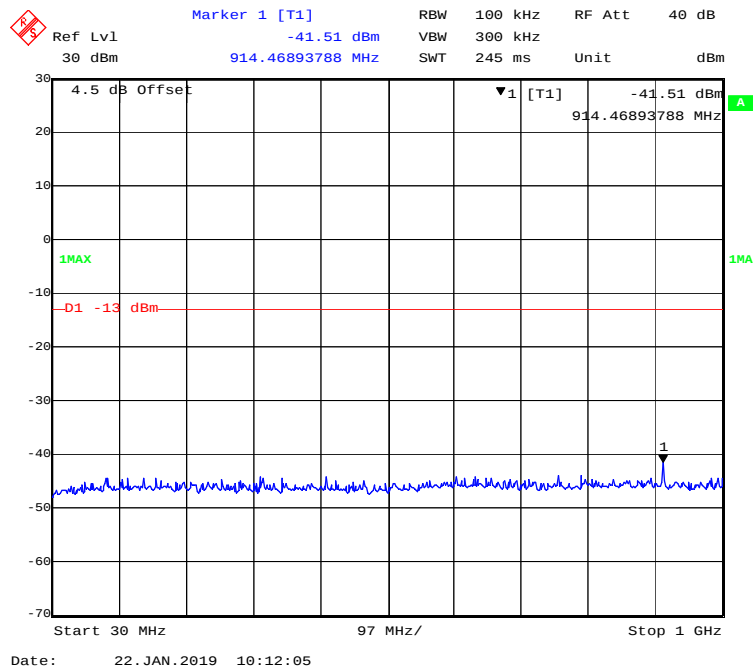
30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



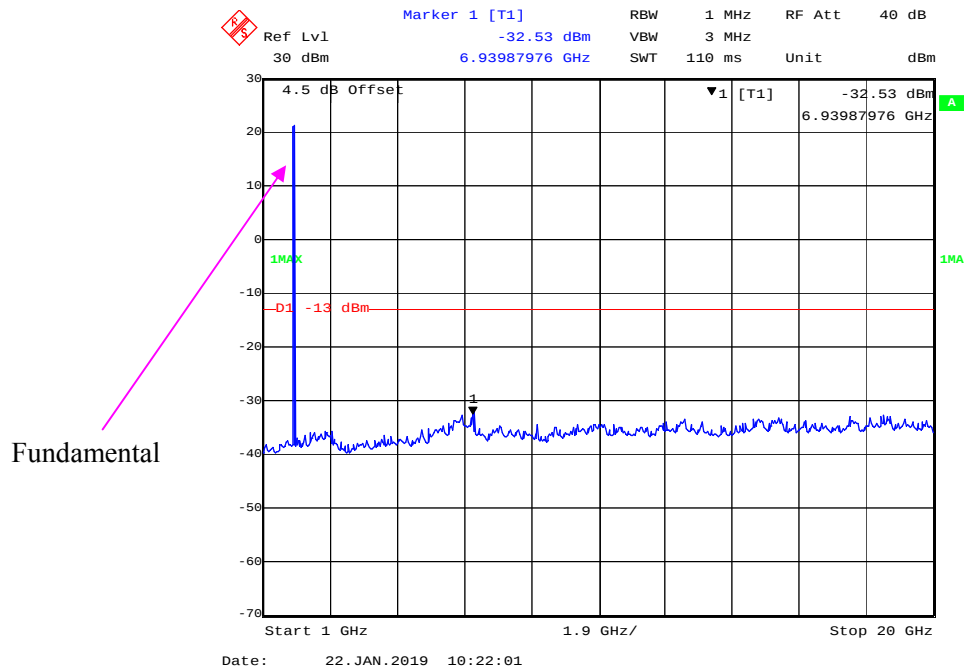
1 GHz – 20 GHz (5 MHz, QPSK, Middle Channel)



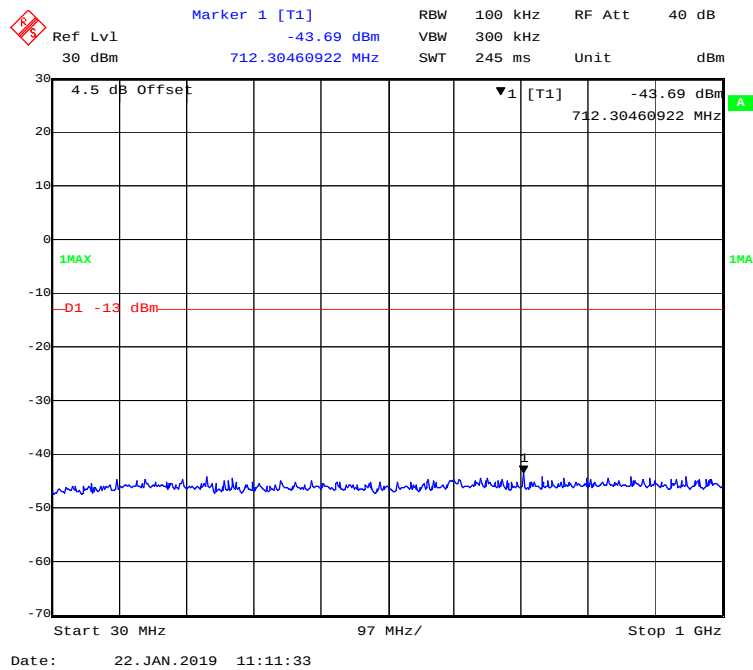
30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



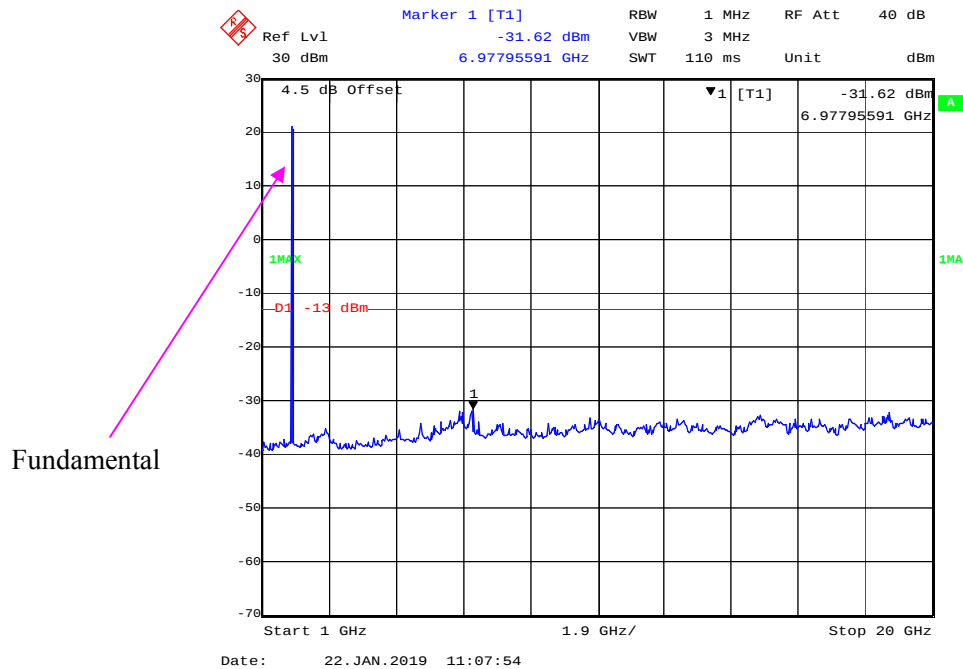
1 GHz – 20 GHz (5 MHz, 16-QAM, Middle Channel)



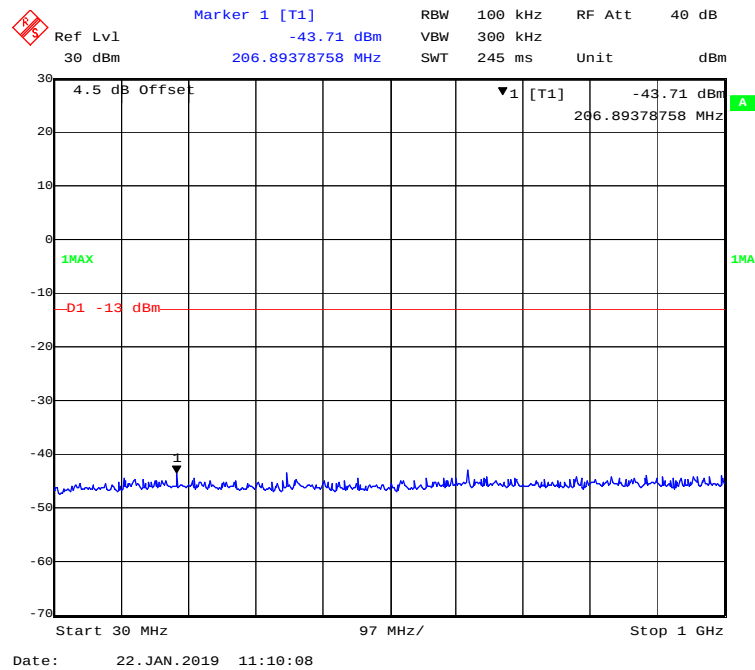
30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



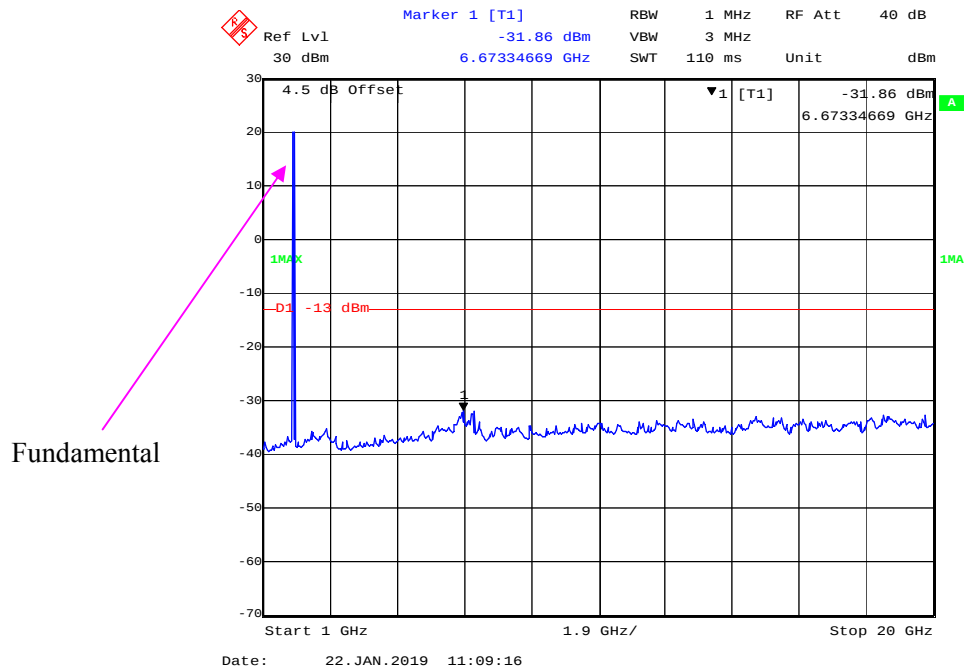
1 GHz – 20 GHz (10 MHz, QPSK, Middle Channel)



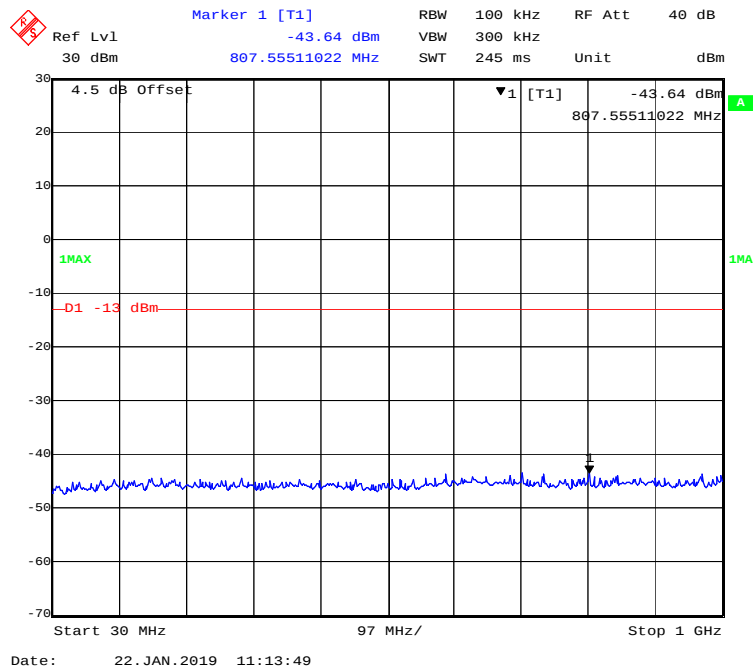
30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



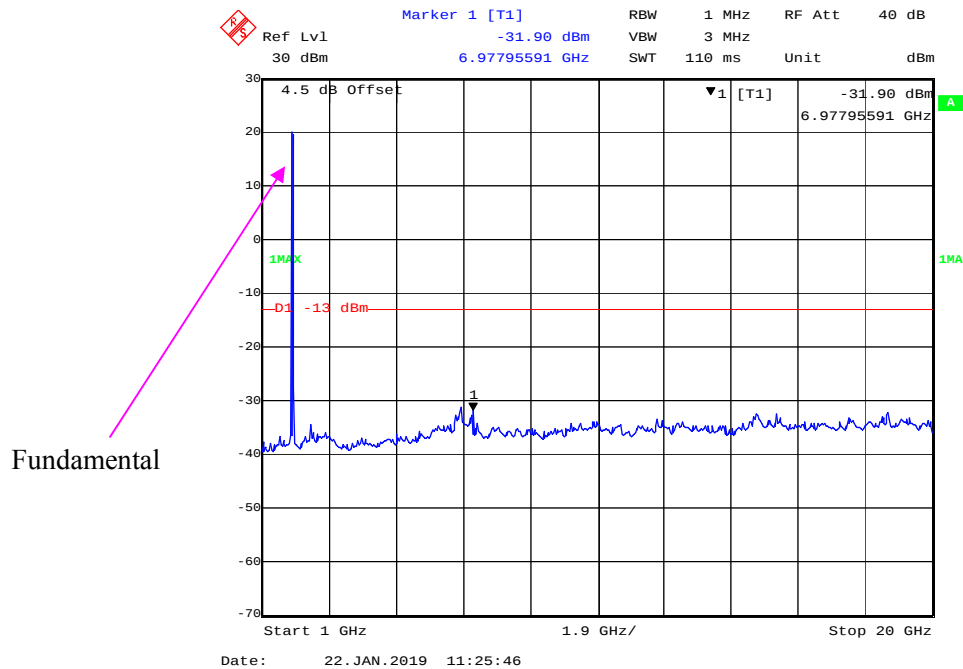
1 GHz – 20 GHz (10 MHz, 16-QAM, Middle Channel)



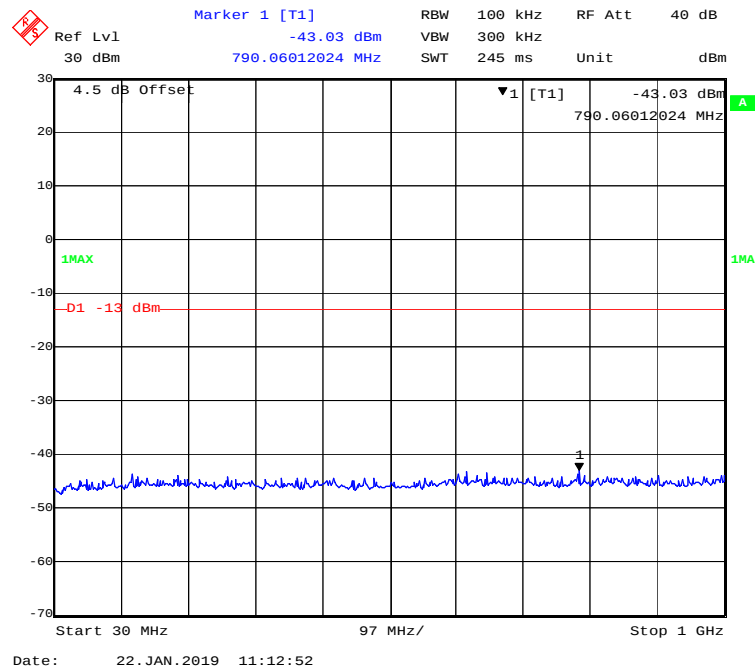
30 MHz - 1 GHz (15 MHz, QPSK, Middle Channel)



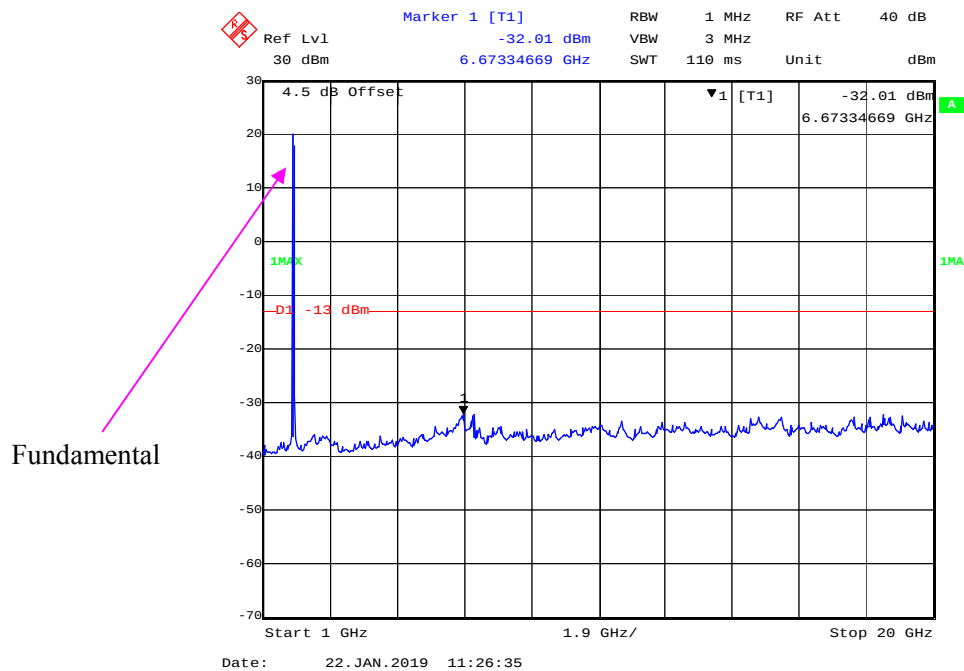
1 GHz – 20 GHz (15 MHz, QPSK, Middle Channel)



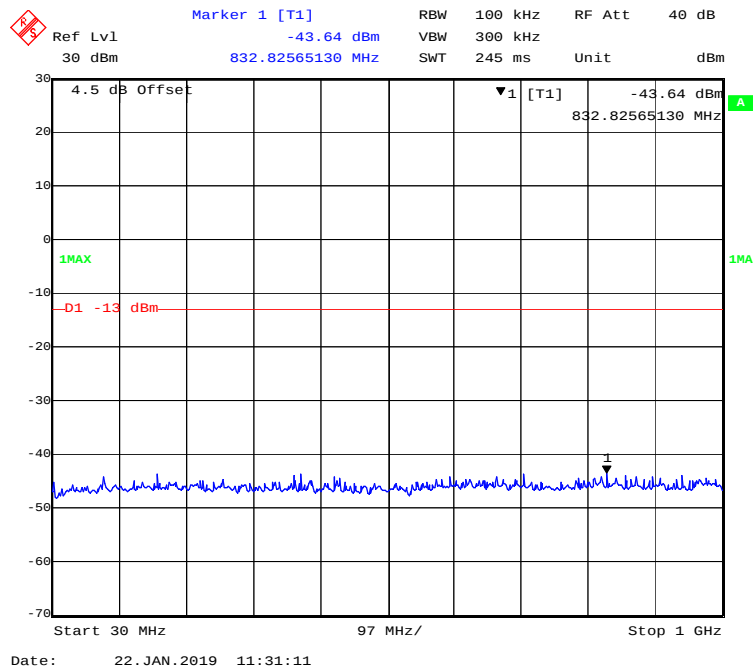
30 MHz - 1 GHz (15 MHz, 16-QAM, Middle Channel)



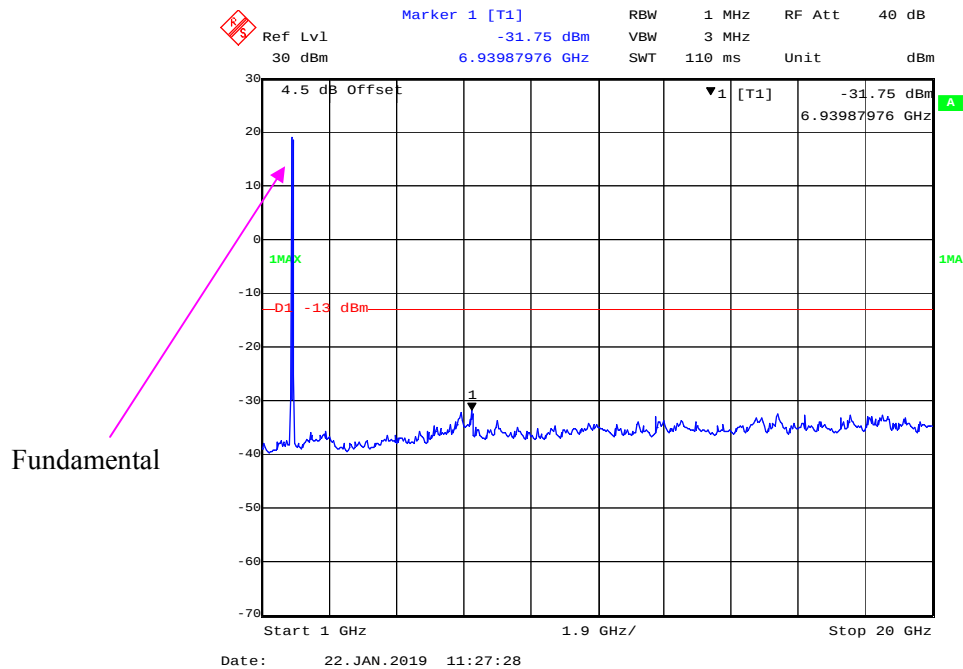
1 GHz – 20 GHz (15 MHz, 16-QAM, Middle Channel)



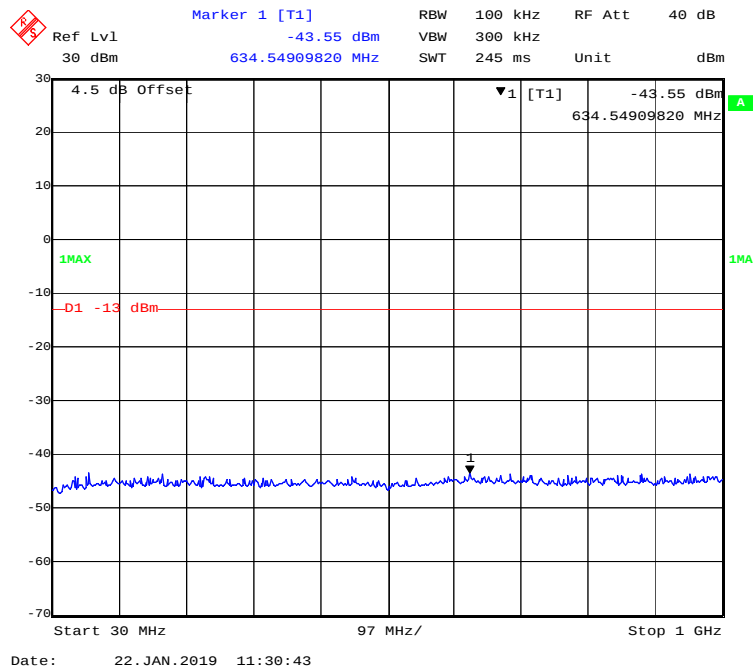
30 MHz - 1 GHz (20 MHz, QPSK, Middle Channel)



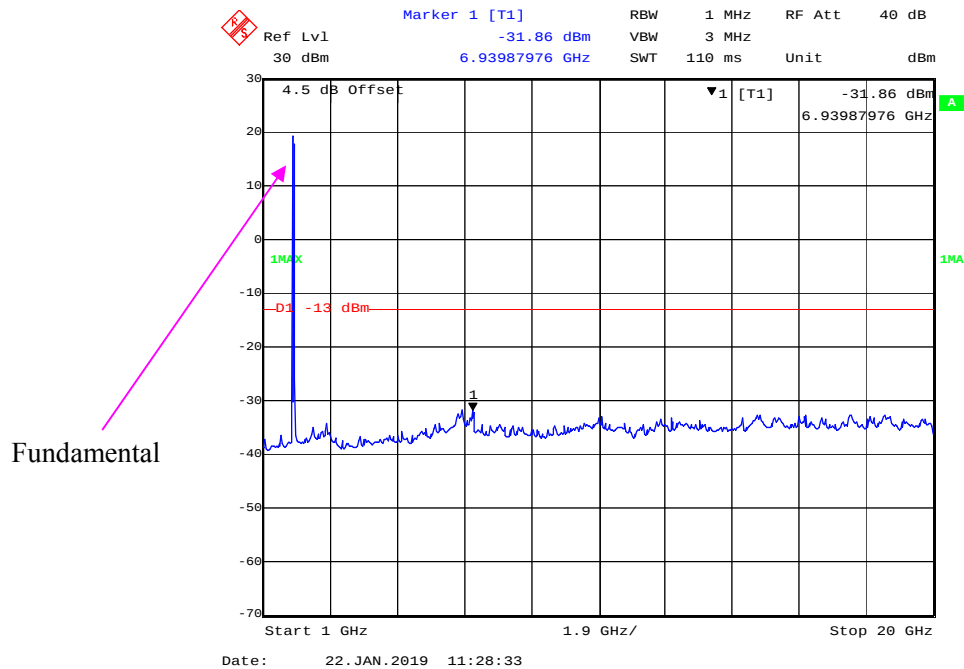
1 GHz – 20 GHz (20 MHz, QPSK, Middle Channel)



30 MHz - 1 GHz (20 MHz, 16-QAM, Middle Channel)

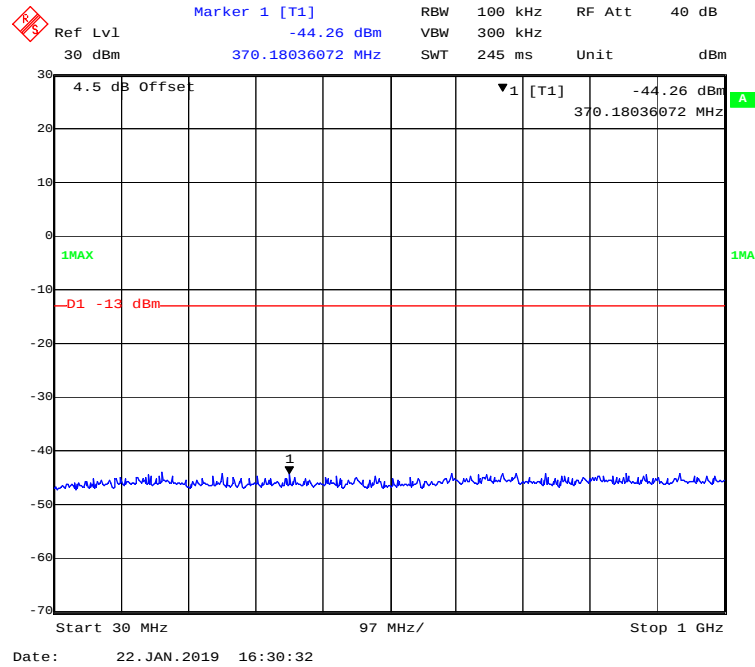


1 GHz – 20 GHz (20 MHz, 16-QAM, Middle Channel)

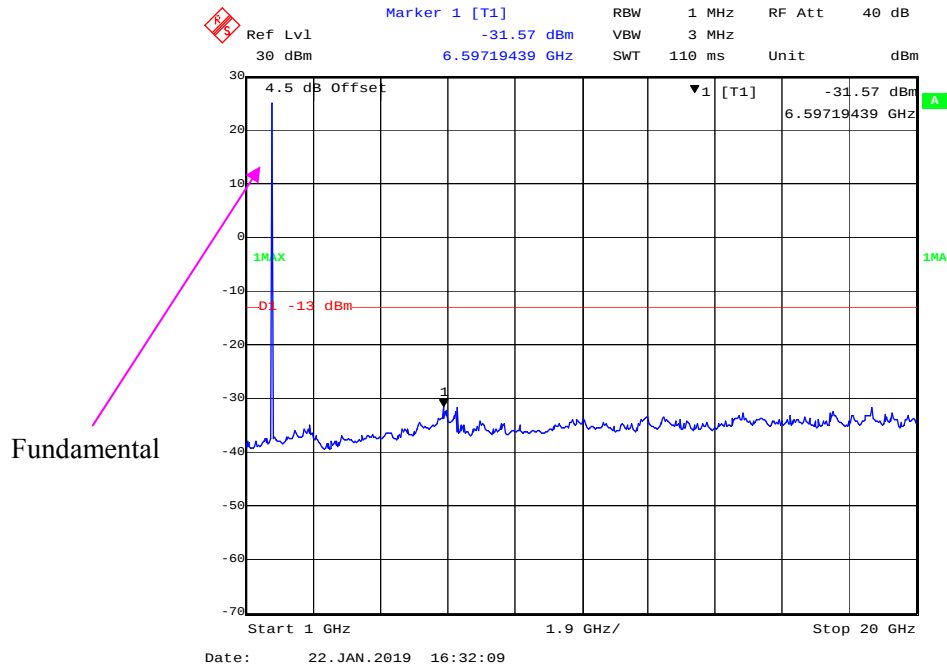


LTE Band 4:

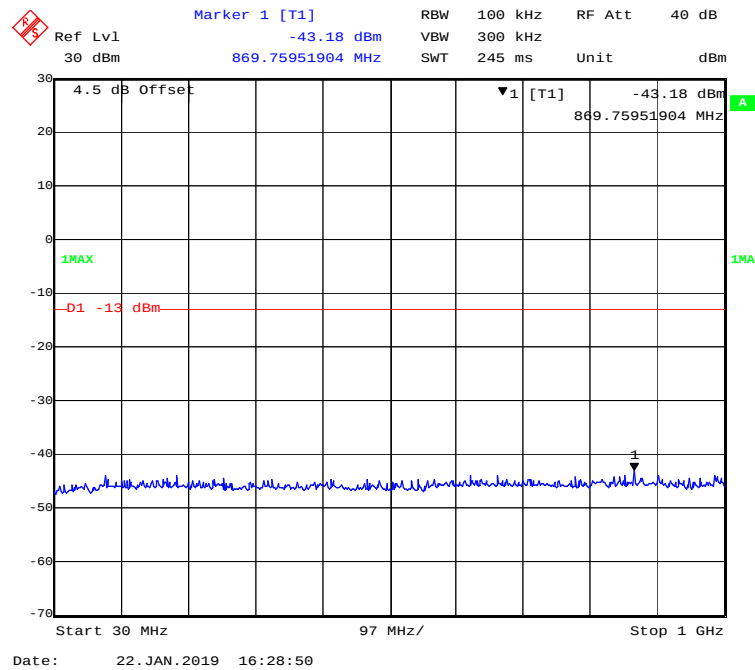
30 MHz - 1 GHz (1.4 MHz, QPSK, Middle Channel)



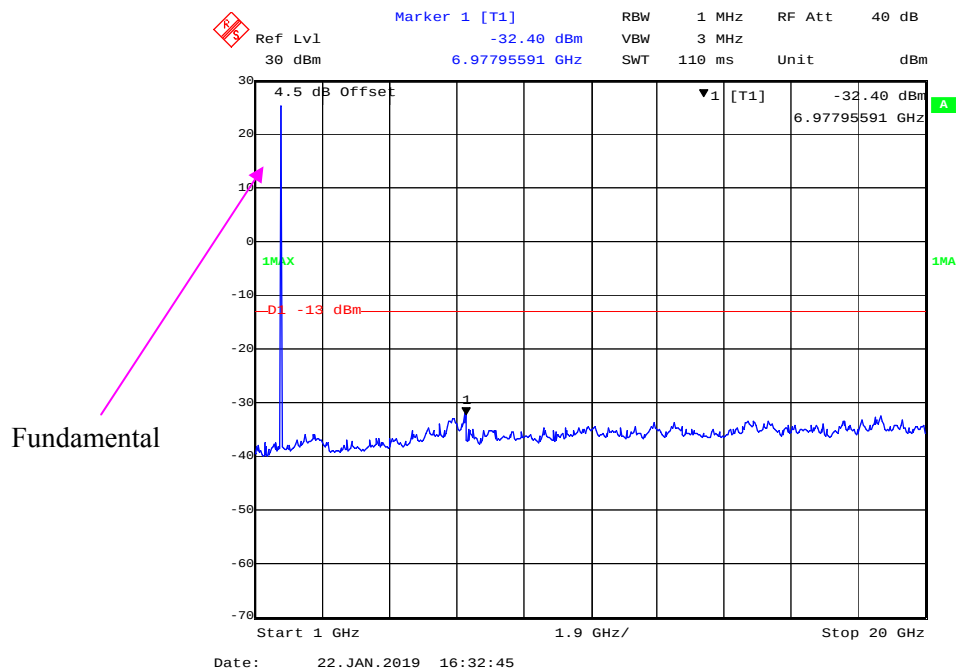
1 GHz – 20 GHz (1.4 MHz, QPSK, Middle Channel)



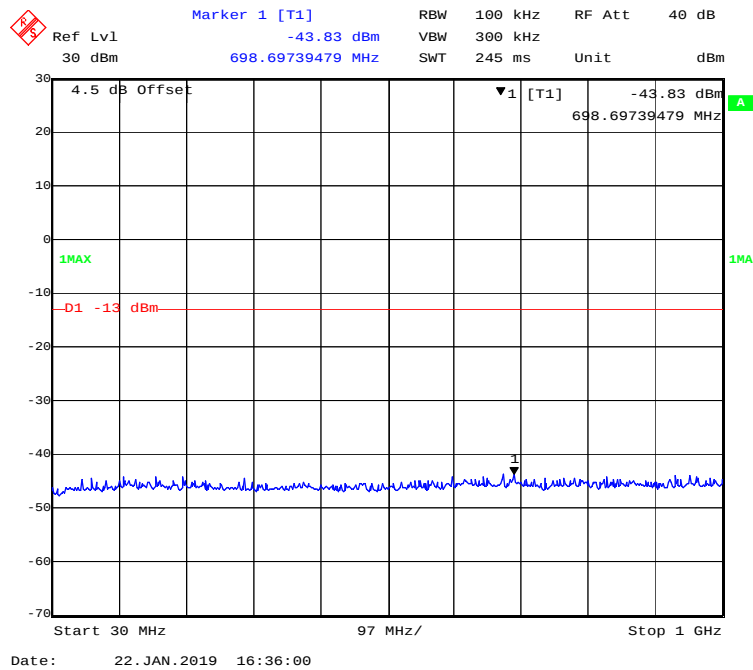
30 MHz - 1 GHz (1.4 MHz, 16-QAM, Middle Channel)



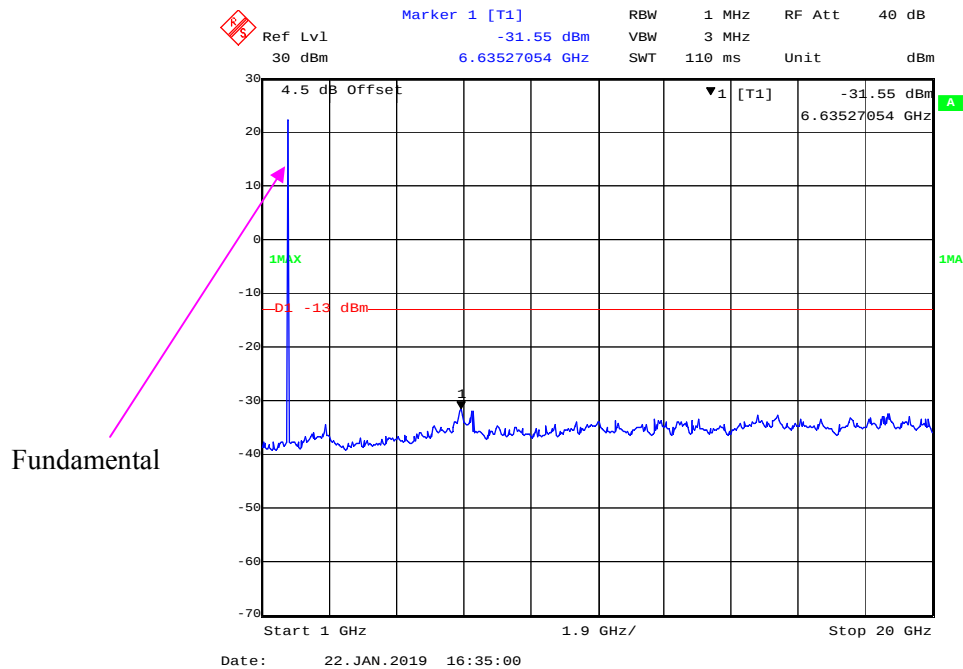
1 GHz – 20 GHz (1.4 MHz, 16-QAM, Middle Channel)



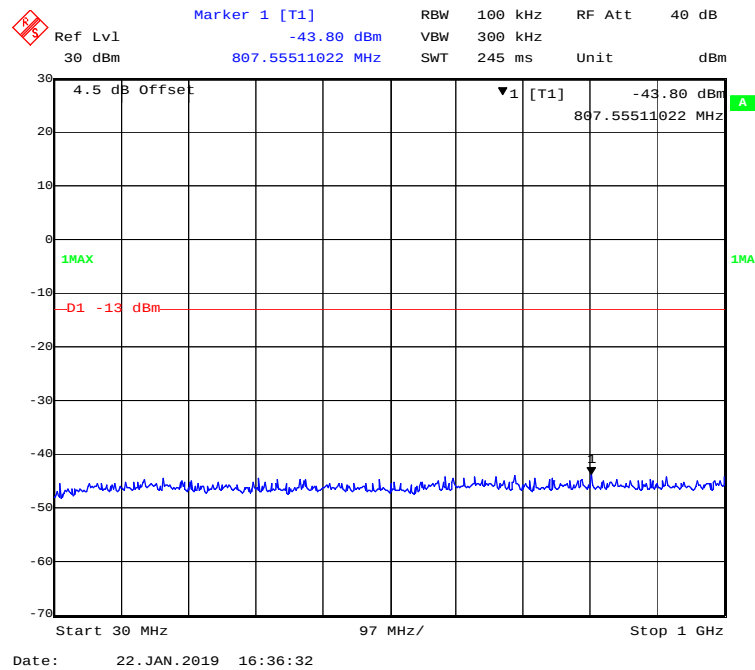
30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)



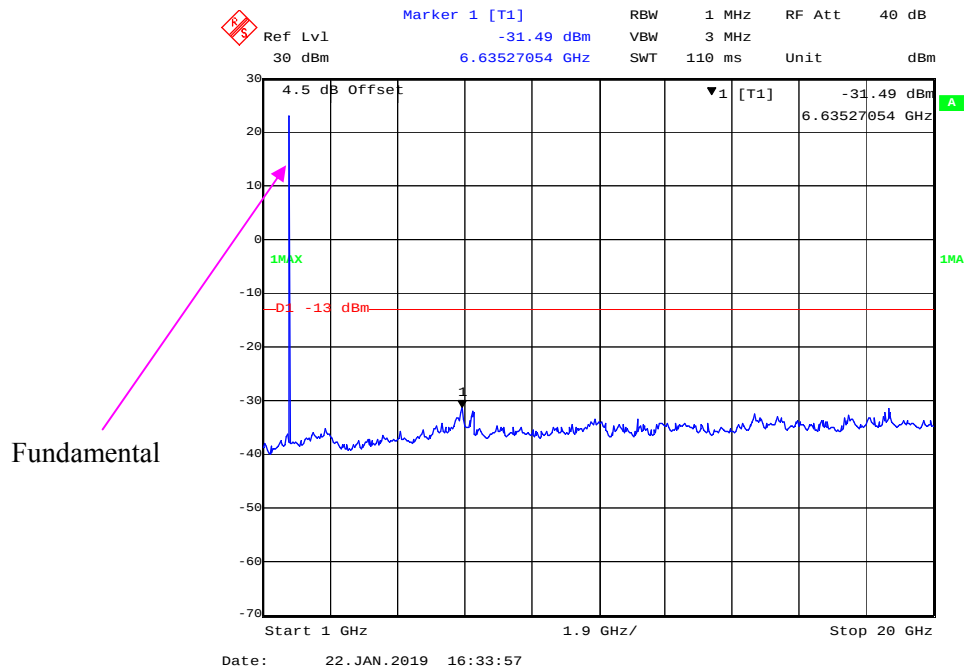
1 GHz – 20 GHz (3 MHz, QPSK, Middle Channel)



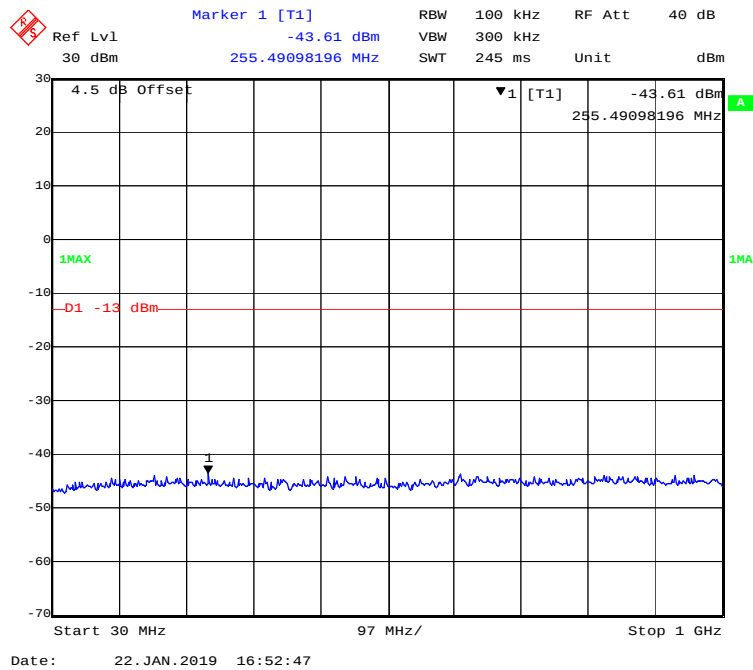
30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



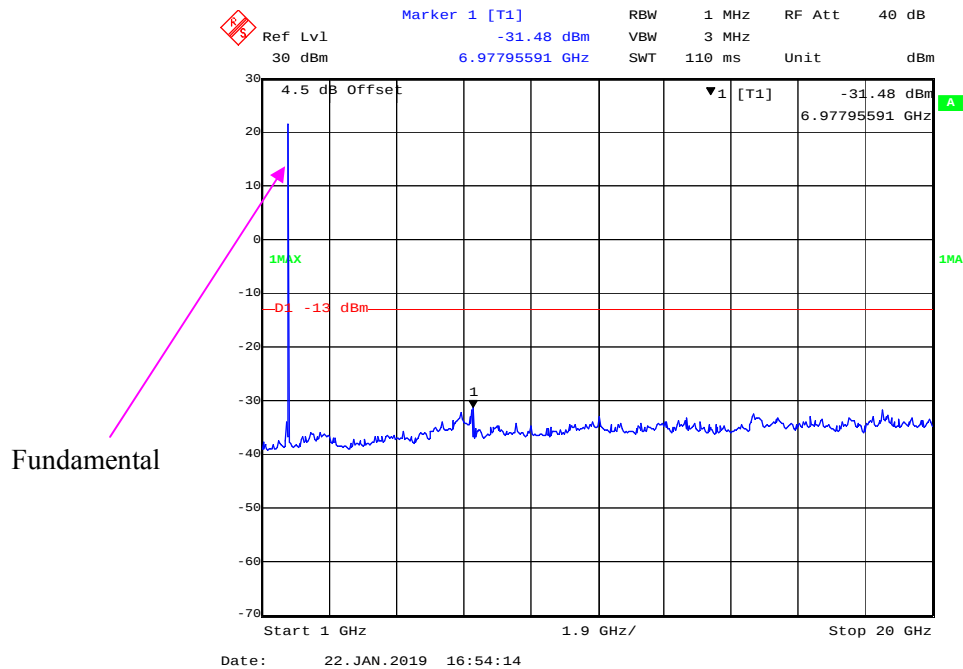
1 GHz – 20 GHz (3 MHz, 16-QAM, Middle Channel)



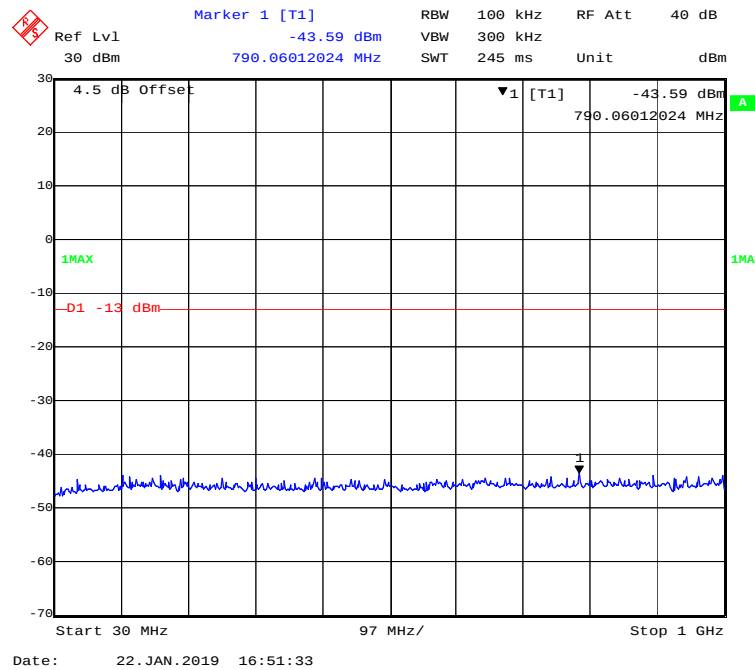
30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



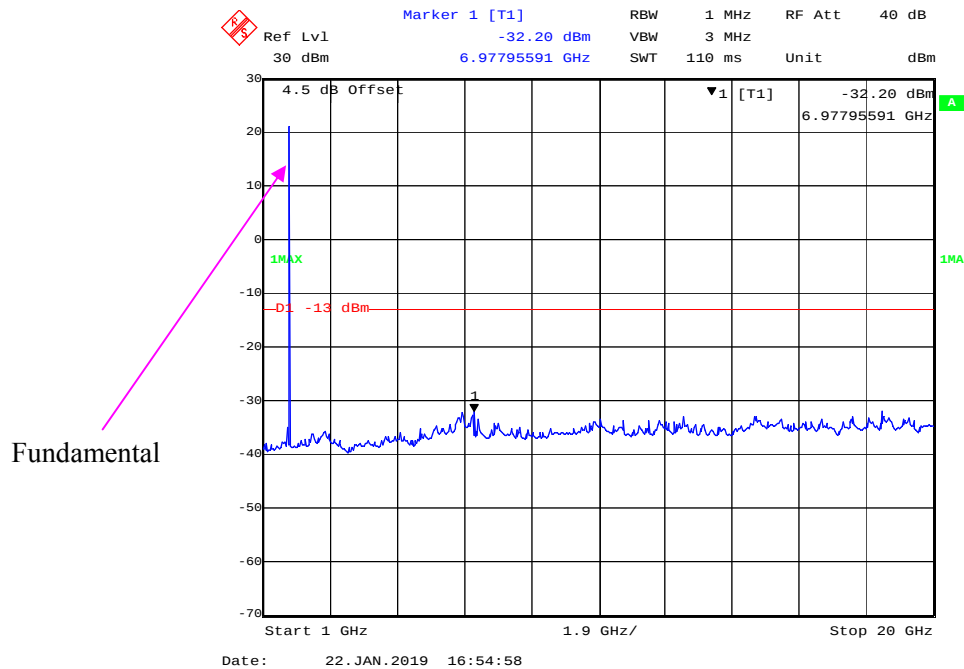
1 GHz – 20 GHz (5 MHz, QPSK, Middle Channel)



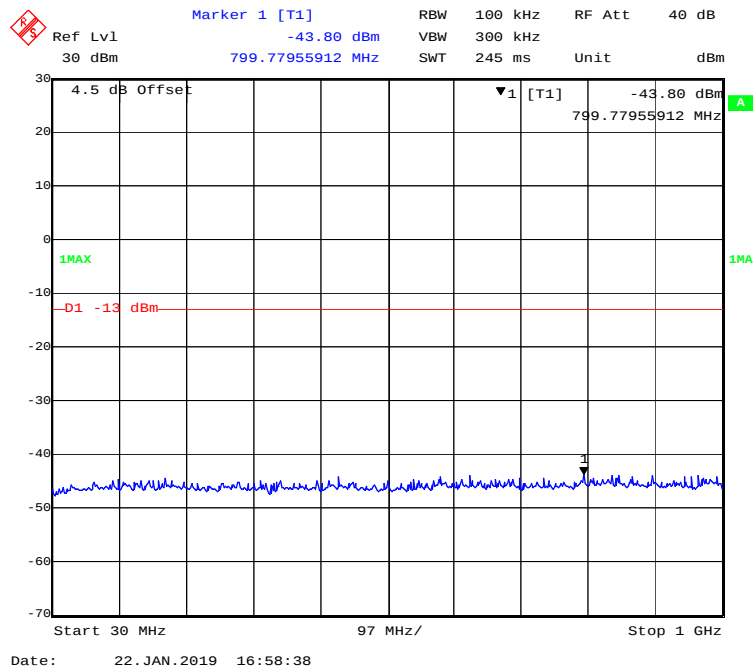
30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



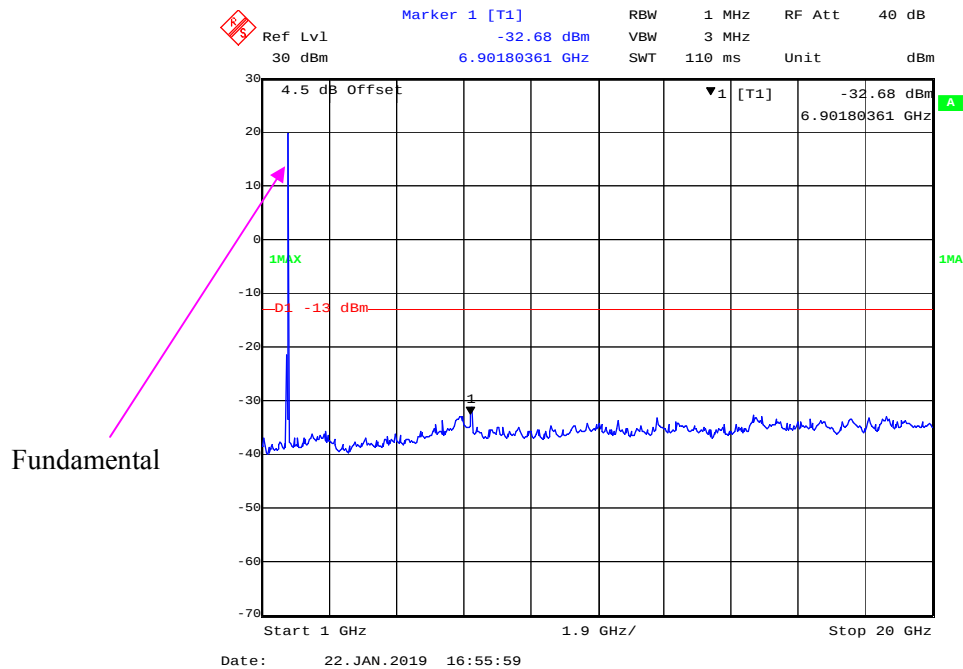
1 GHz – 20 GHz (5 MHz, 16-QAM, Middle Channel)



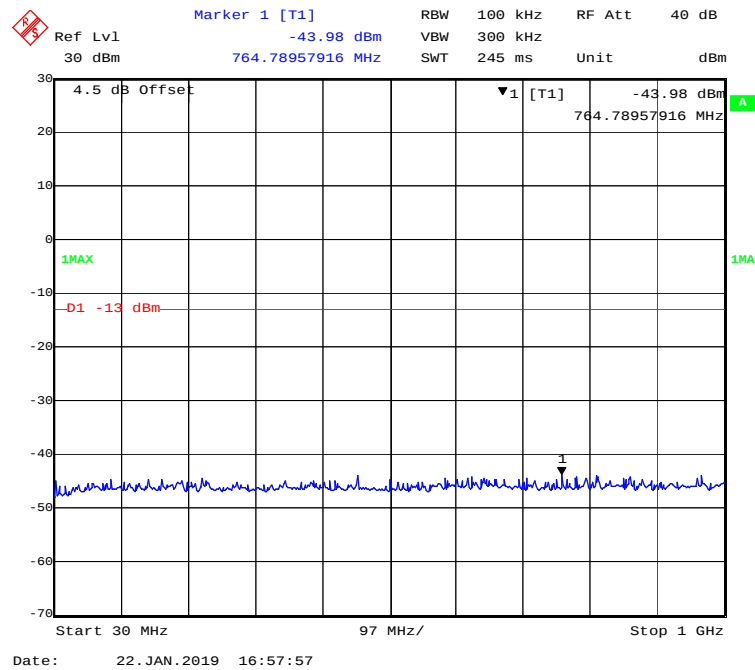
30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



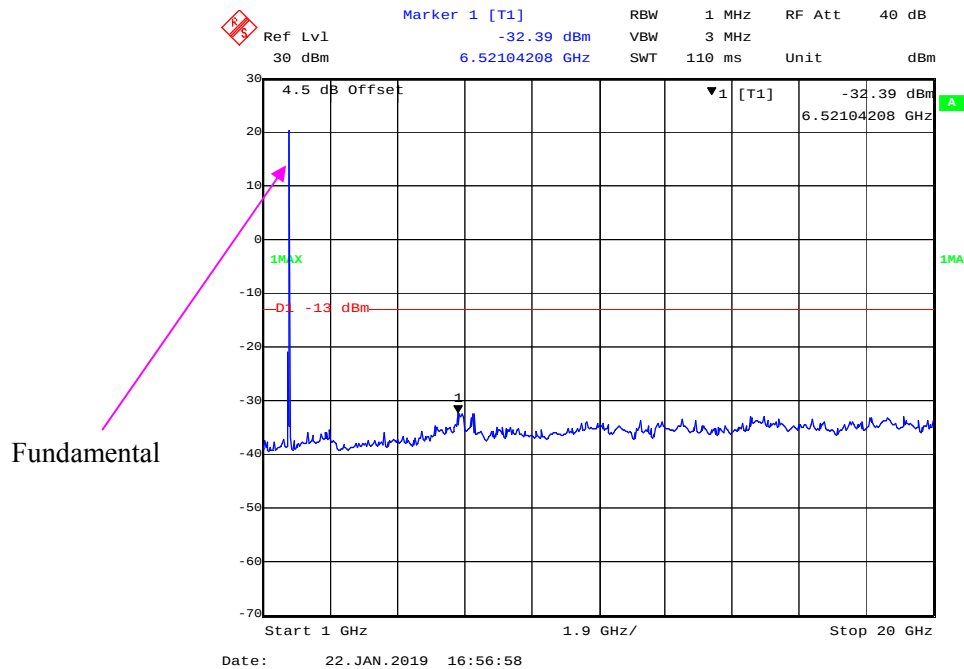
1 GHz – 20 GHz (10 MHz, QPSK, Middle Channel)



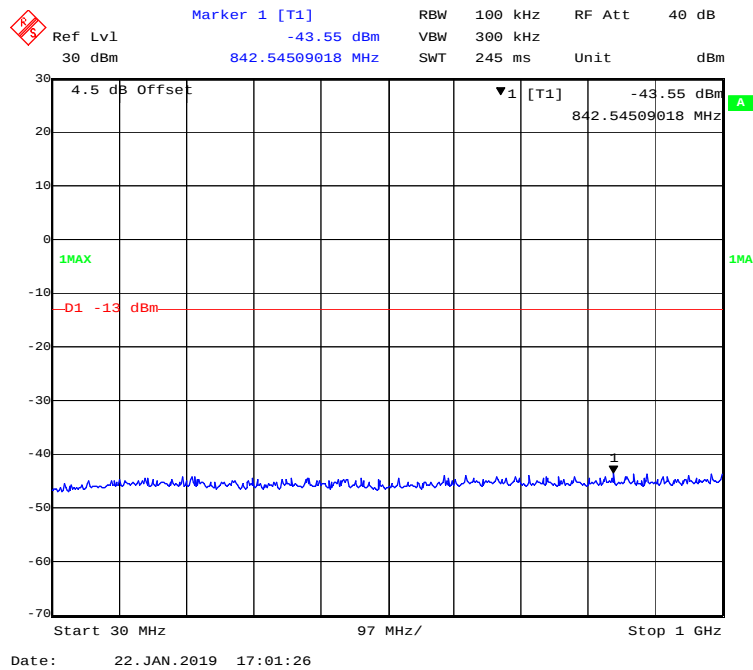
30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



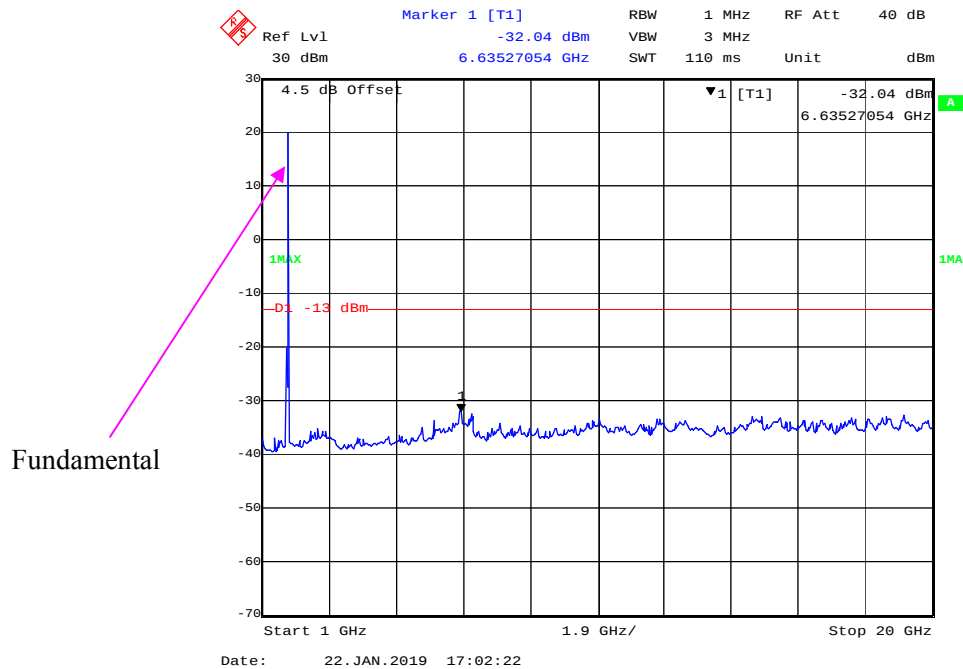
1 GHz – 20 GHz (10 MHz, 16-QAM, Middle Channel)



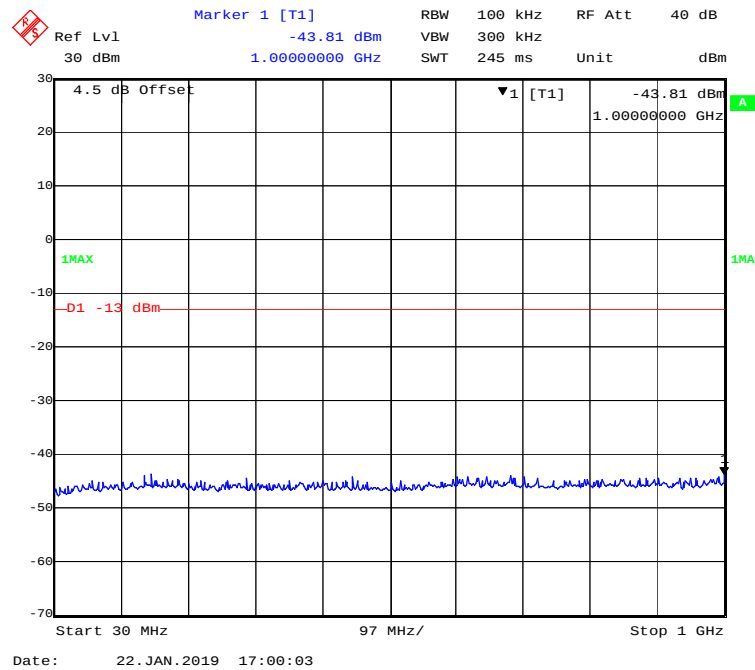
30 MHz - 1 GHz (15 MHz, QPSK, Middle Channel)



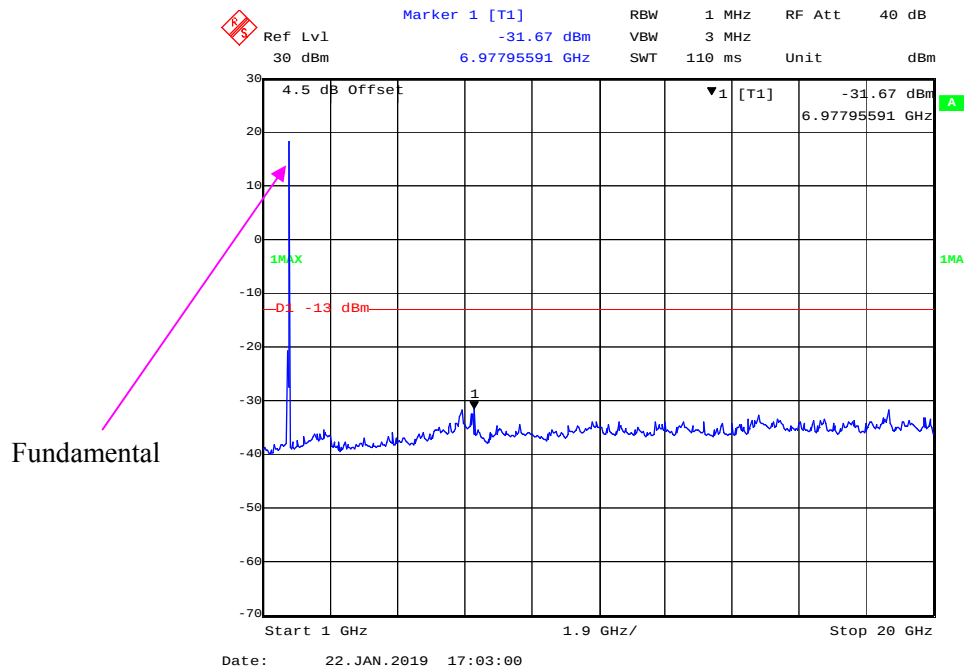
1 GHz – 20 GHz (15 MHz, QPSK, Middle Channel)



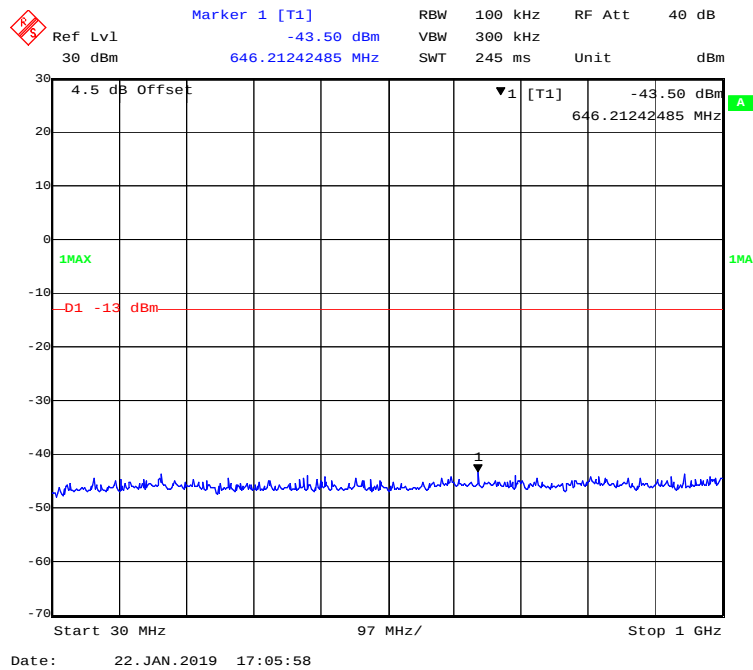
30 MHz - 1 GHz (15 MHz, 16-QAM, Middle Channel)



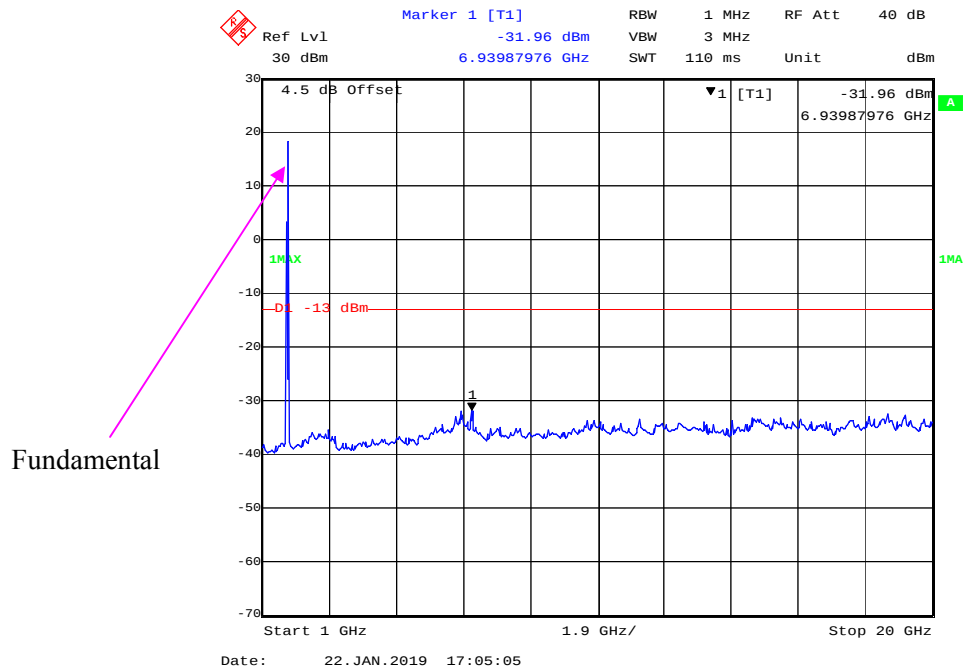
1 GHz – 20 GHz (15 MHz, 16-QAM, Middle Channel)



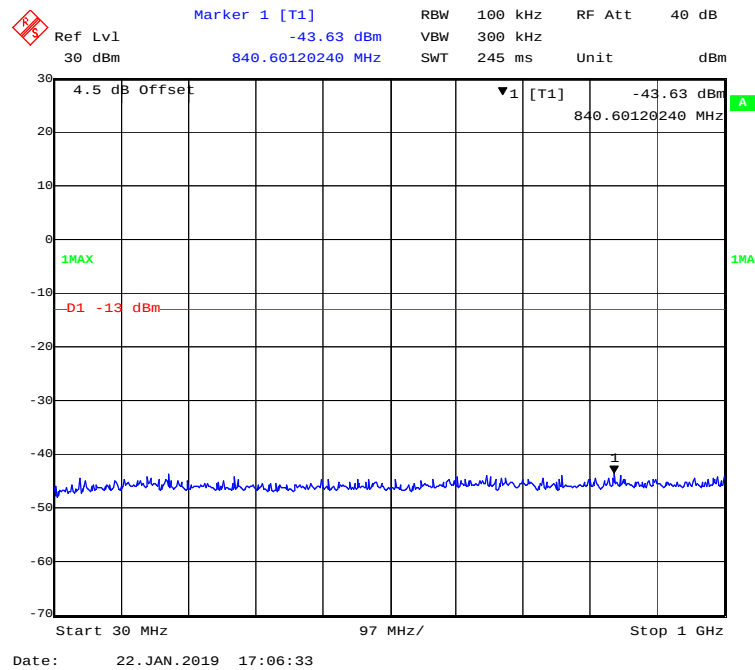
30 MHz - 1 GHz (20 MHz, QPSK, Middle Channel)



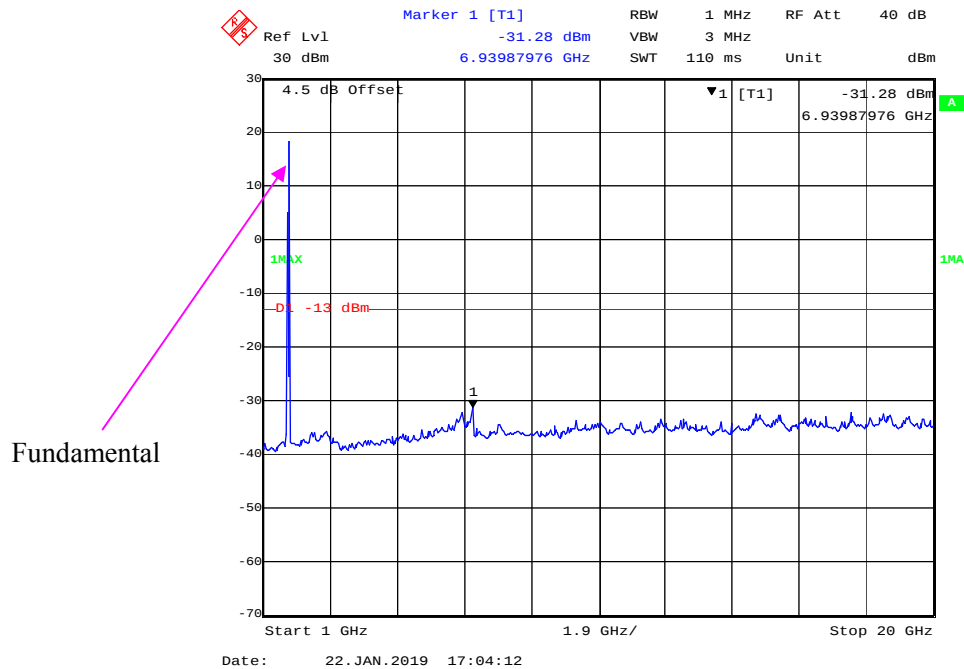
1 GHz – 20 GHz (20 MHz, QPSK, Middle Channel)



30 MHz - 1 GHz (20 MHz, 16-QAM, Middle Channel)

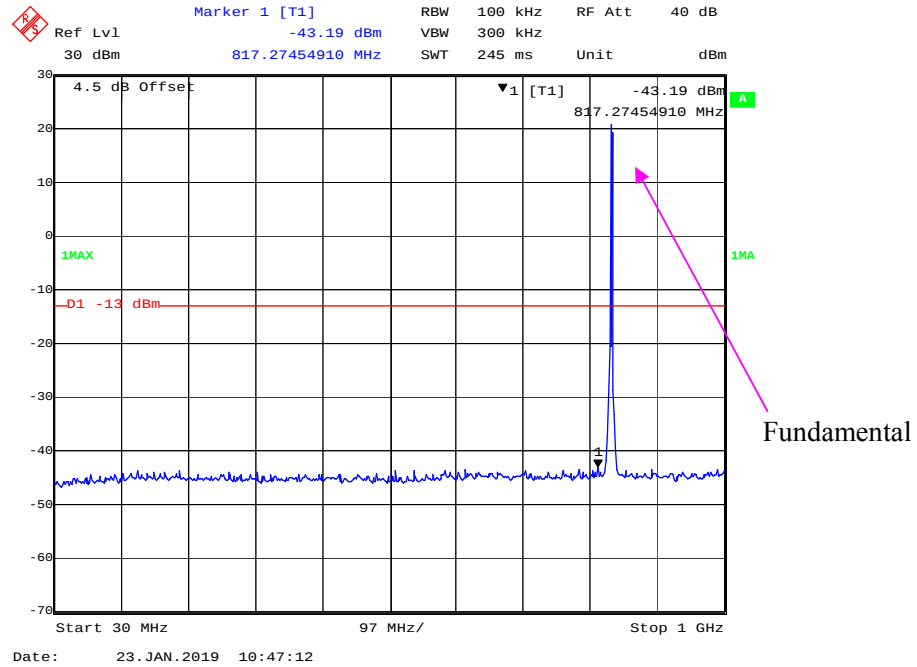


1 GHz – 20 GHz (20 MHz, 16-QAM, Middle Channel)

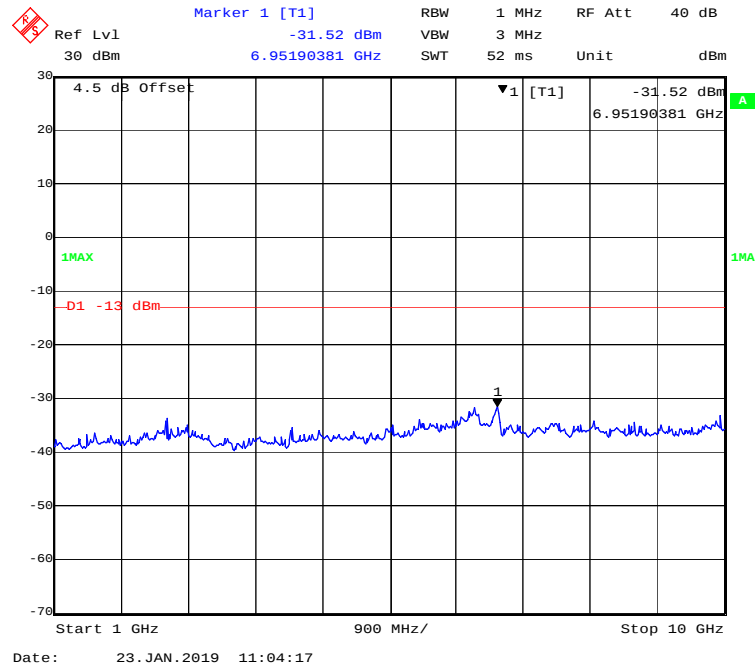


LTE Band 5:

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



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



Ref Lvl 30 dBm RBW 100 kHz VBW 300 kHz SWT 245 ms RF Att 40 dBm

Marker 1 [T1] -42.88 dBm 690.92184369 MHz

4.5 dB Offset

1MAX

D1 -13 dBm

▼1 [T1] -42.88 dBm 690.92184369 MHz

1

Fundamental

Start 30 MHz 97 MHz/ Stop 1 GHz

Date: 23. JAN. 2019 10:49:08

Ref Lvl 30 dBm

Marker 1 [T1] -31.80 dBm

RBW 1 MHz RF Att 40 dB

VBW 3 MHz Unit dBm

SWT 52 ms

Start 1 GHz 900 MHz/ Stop 10 GHz

4.5 dB Offset

1MAX

D1 -13 dBm

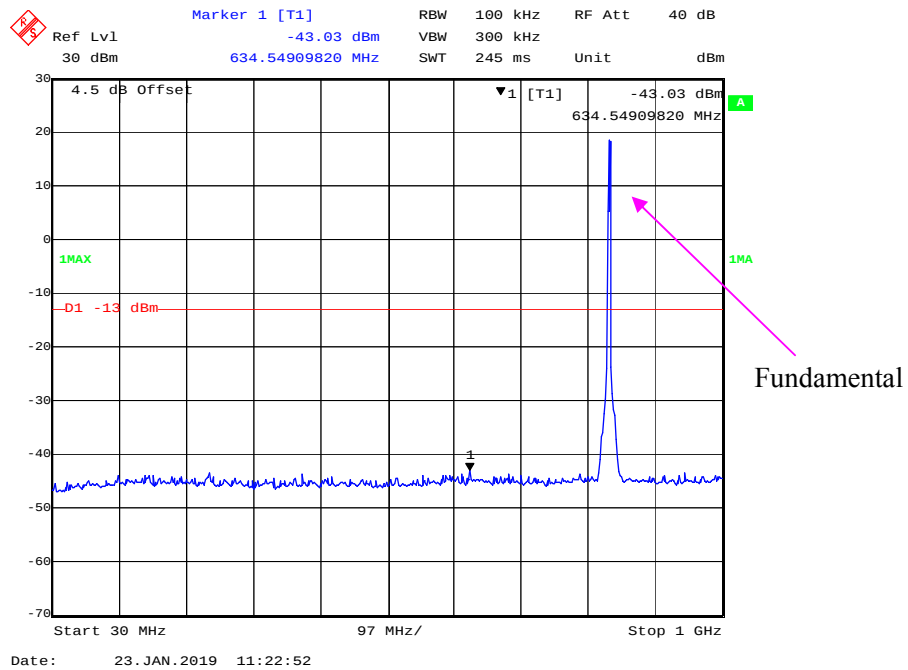
1

-31.80 dBm

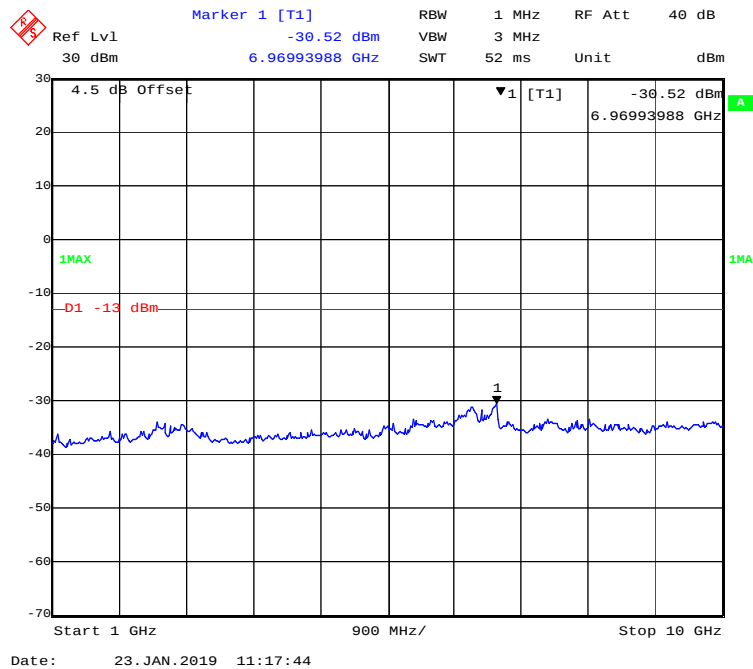
6.96993988 GHz

1MAX

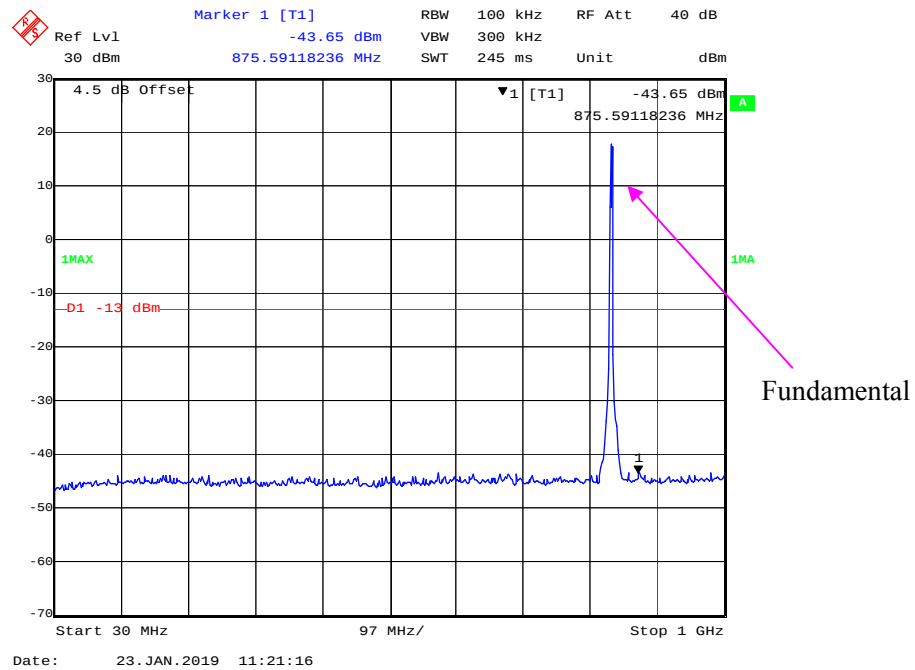
30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)



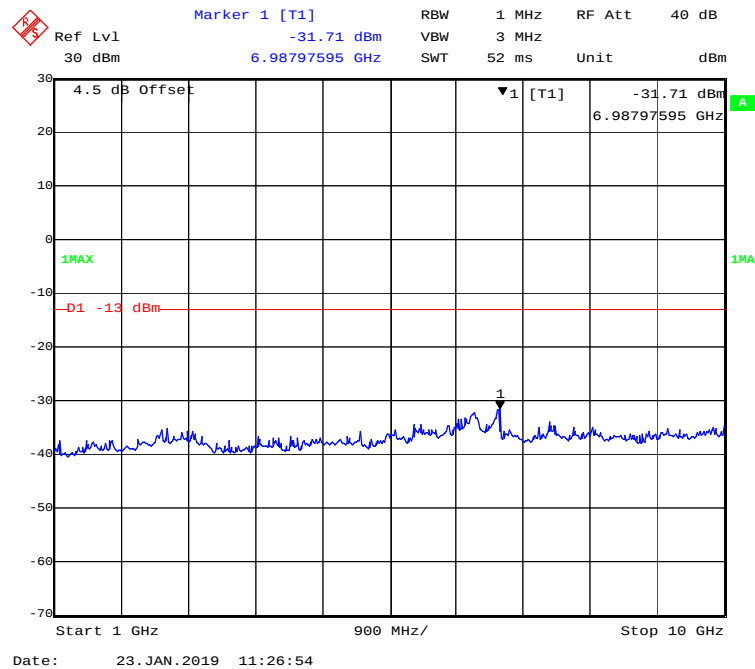
1 GHz – 10 GHz (3 MHz, QPSK, Middle Channel)



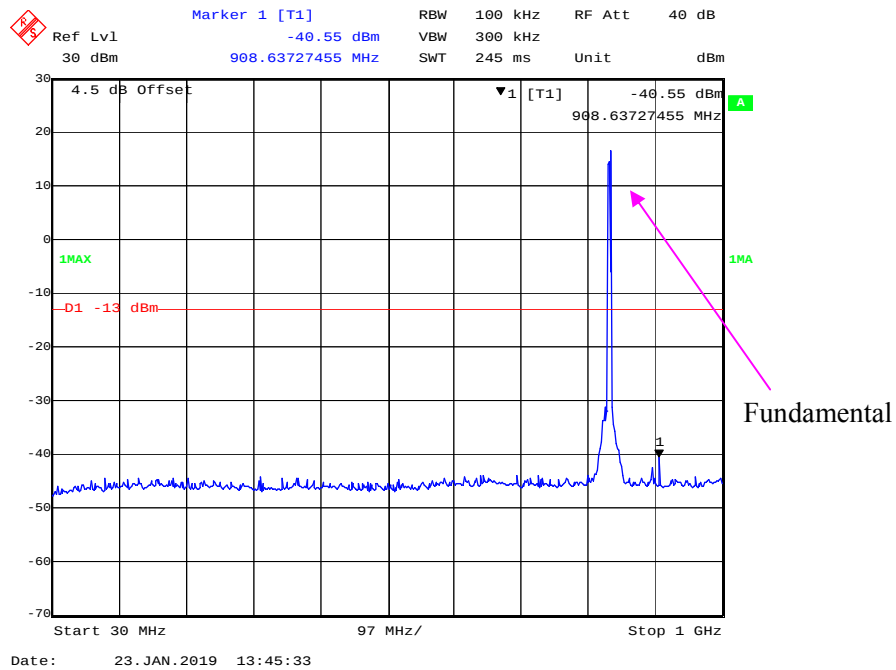
30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



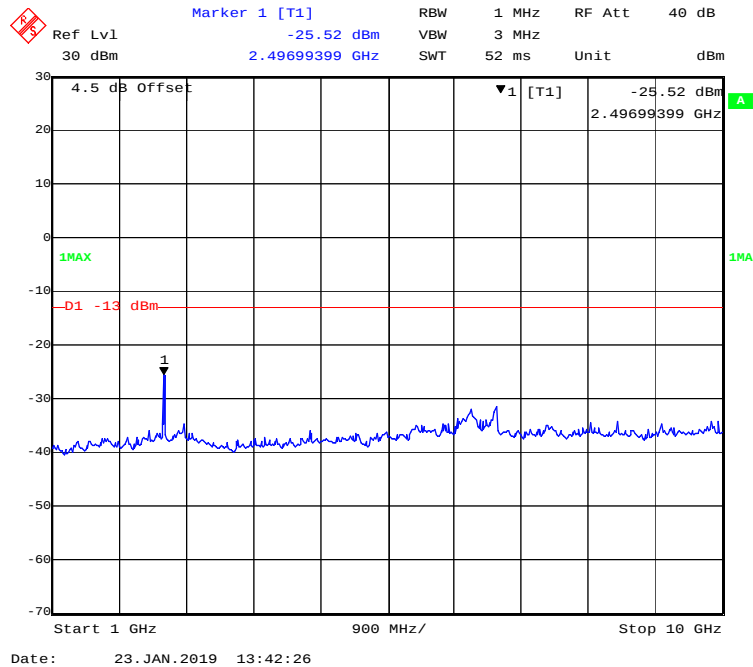
1 GHz – 10 GHz (3 MHz, 16-QAM, Middle Channel)



30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



Ref Lvl 30 dBm Offset 4.5 dB Marker 1 [T1] -43.40 dBm RBW 100 kHz VBW 300 kHz RF Att 40 dB
 30 dBm 739.51903808 MHz SWT 245 ms Unit dBm

Start 30 MHz 97 MHz/ Stop 1 GHz

Date: 23. JAN. 2019 13:44:34

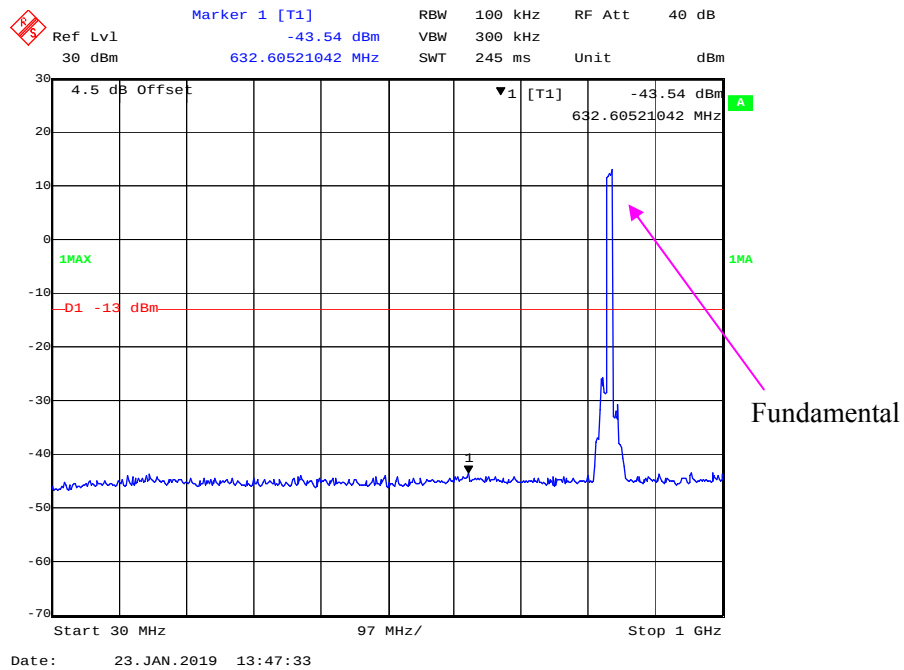
Ref Lvl 30 dBm
 Marker 1 [T1] -29.43 dBm
 2.49699399 GHz
 RBW 1 MHz
 VBW 3 MHz
 SWT 52 ms
 RF Att 40 dB
 Unit dBm

4.5 dB Offset
 1MAX
 -D1 -13 dBm
 1
 -29.43 dBm
 2.49699399 GHz

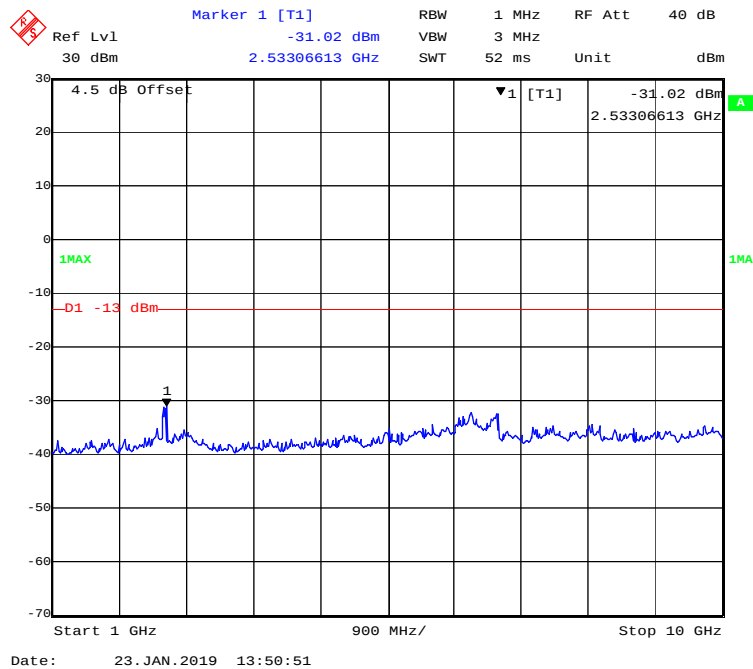
Start 1 GHz
 900 MHz/
 Stop 10 GHz

Date: 23. JAN. 2019 13:43:17

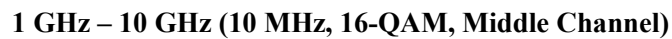
30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)

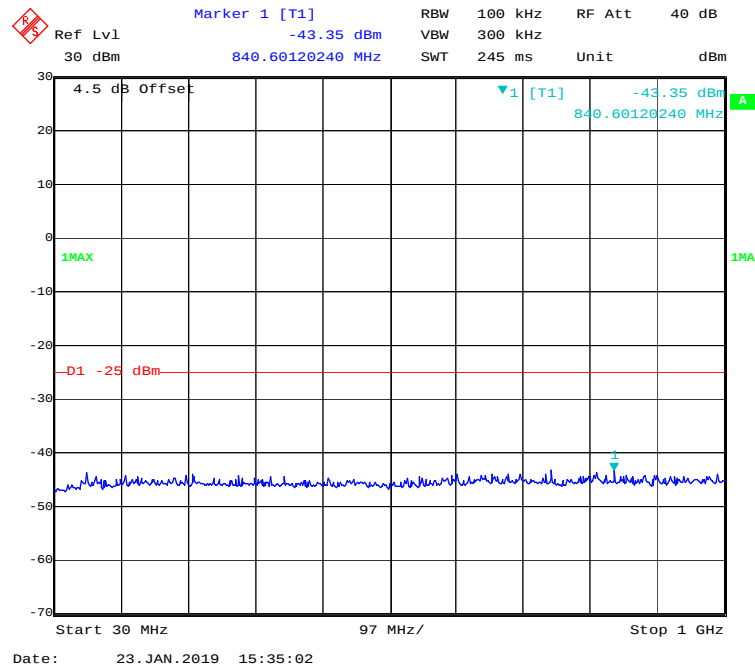
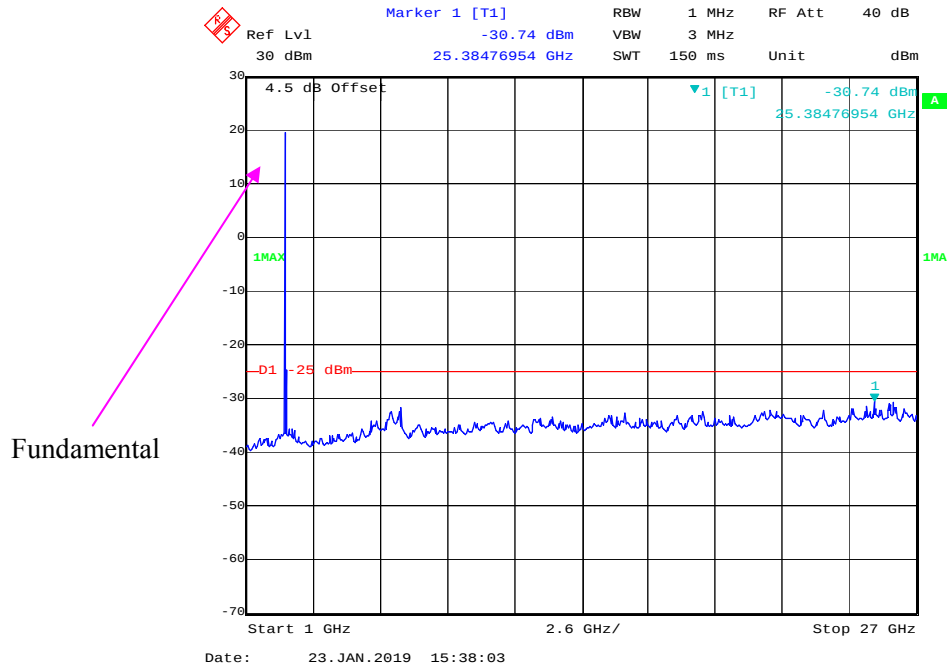


1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)

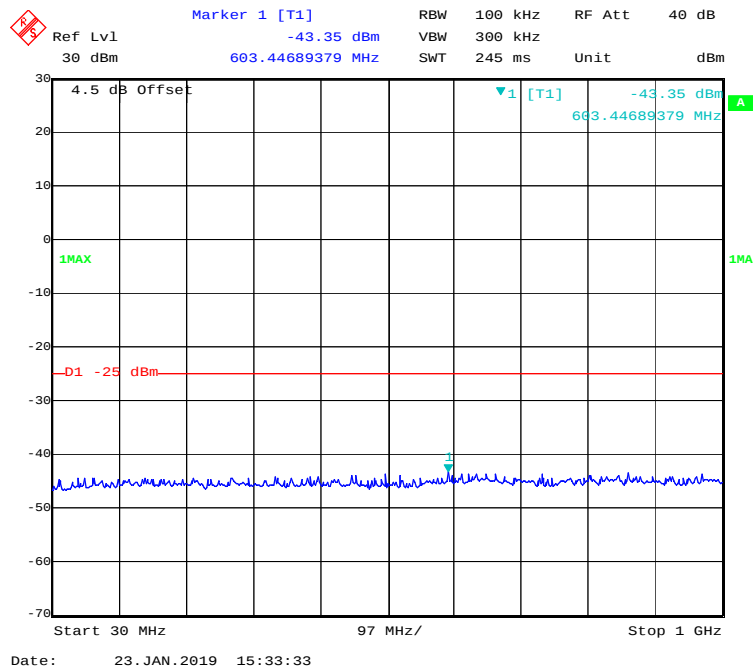


	Marker 1 [T1]		RBW	100 kHz	RF Att	40 dB
	Ref Lvl	-43.04 dBm	VBW	300 kHz		
	30 dBm	990.28056112 MHz	SWT	245 ms	Unit	dBm

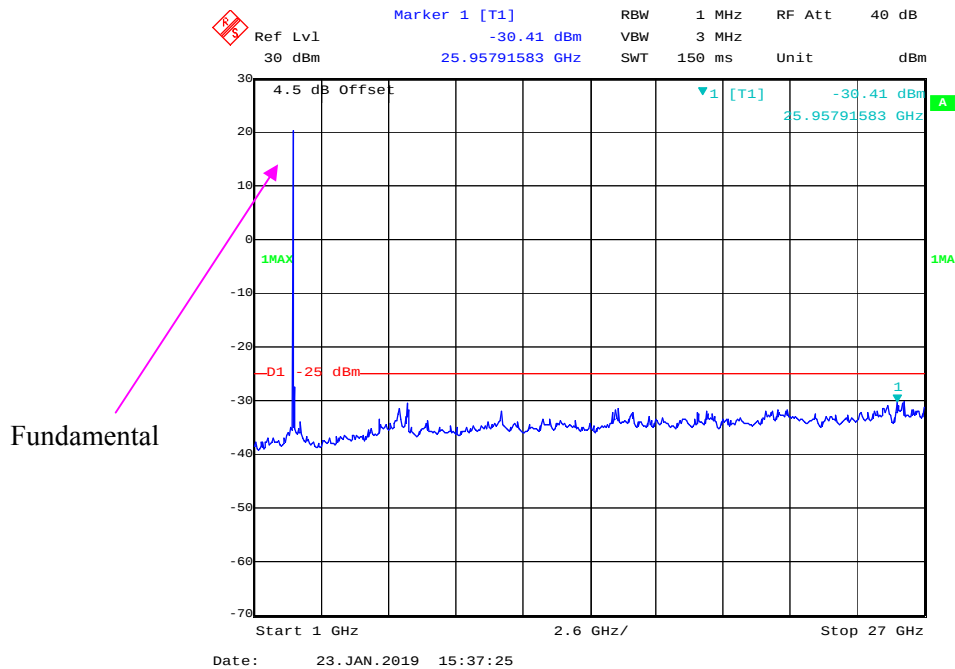


LTE Band 7:**30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)****1 GHz – 27 GHz (5 MHz, QPSK, Middle Channel)**

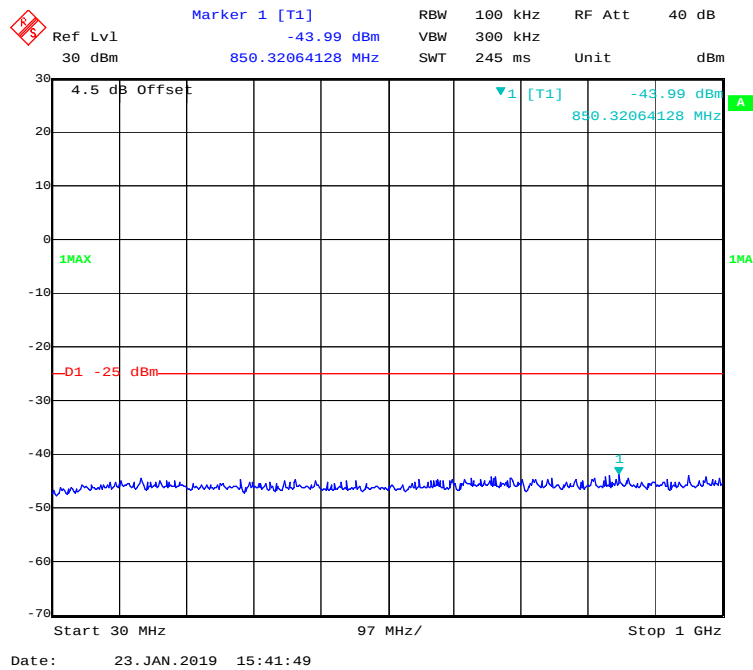
30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



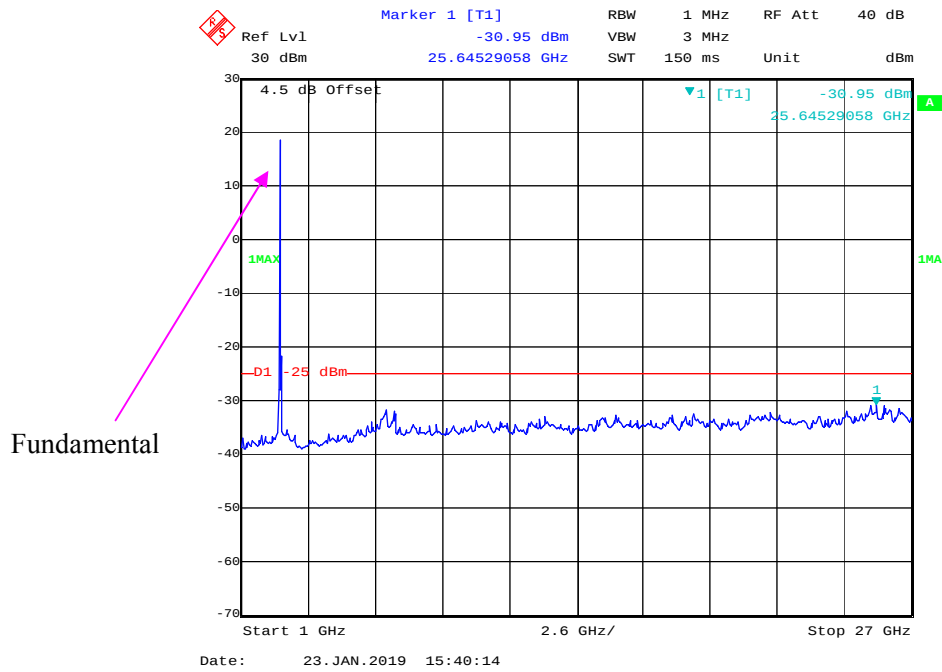
1 GHz – 27 GHz (5 MHz, 16-QAM, Middle Channel)



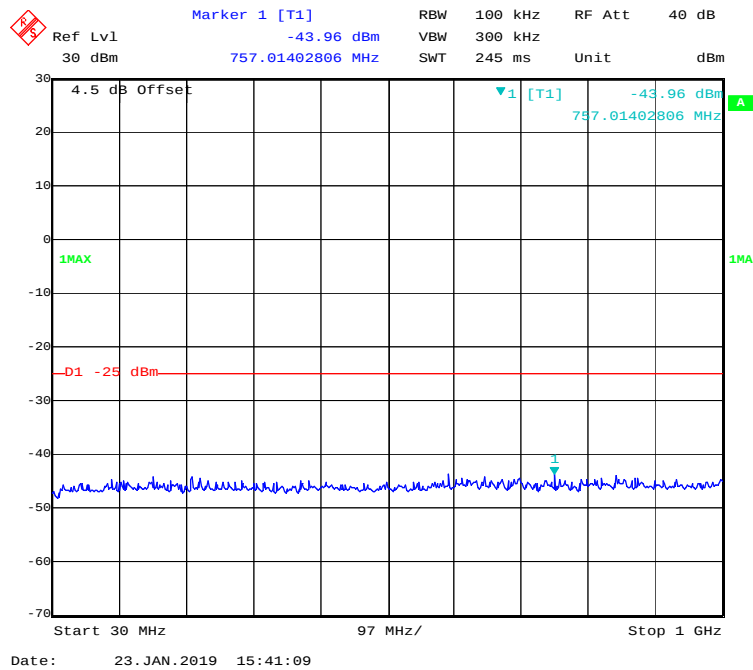
30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



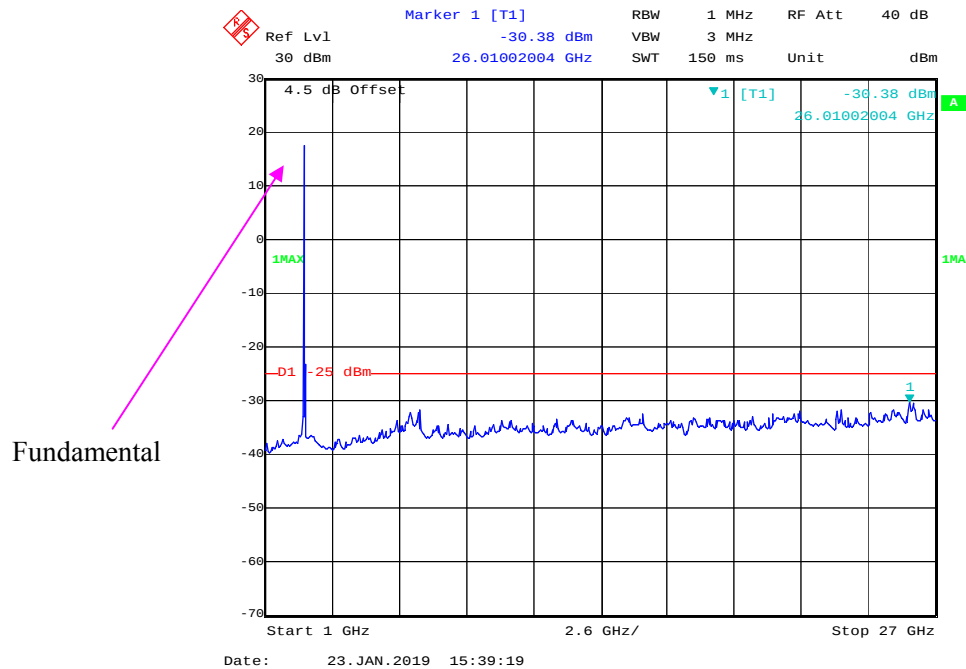
1 GHz – 27GHz (10MHz, QPSK, Middle Channel)



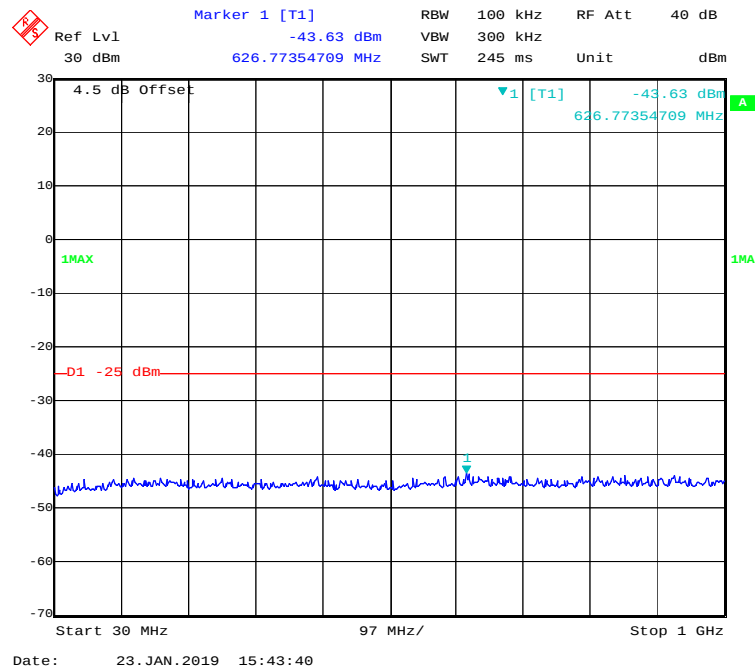
30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



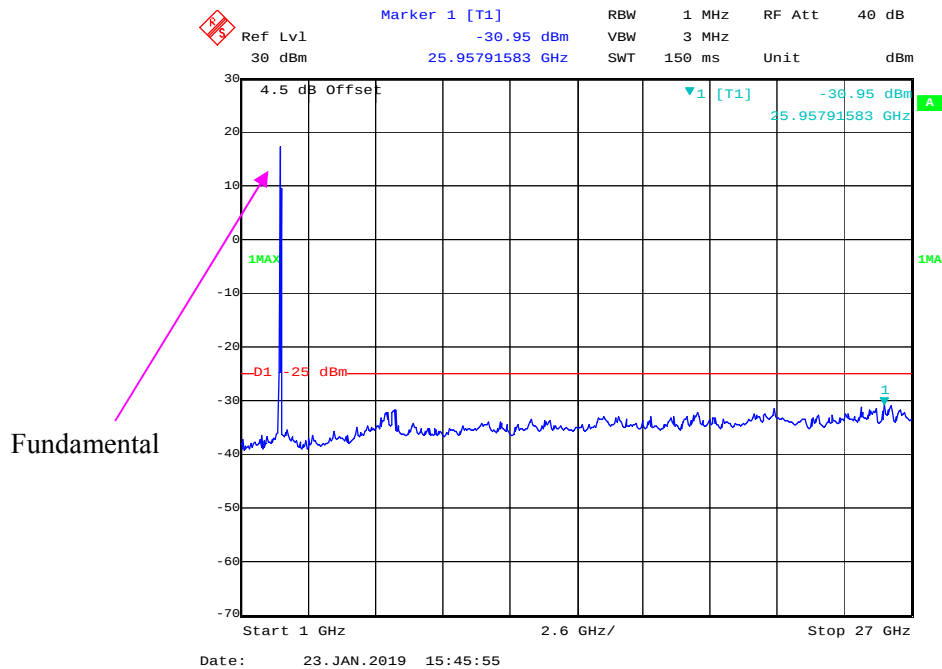
1 GHz – 27 GHz (10 MHz, 16-QAM, Middle Channel)



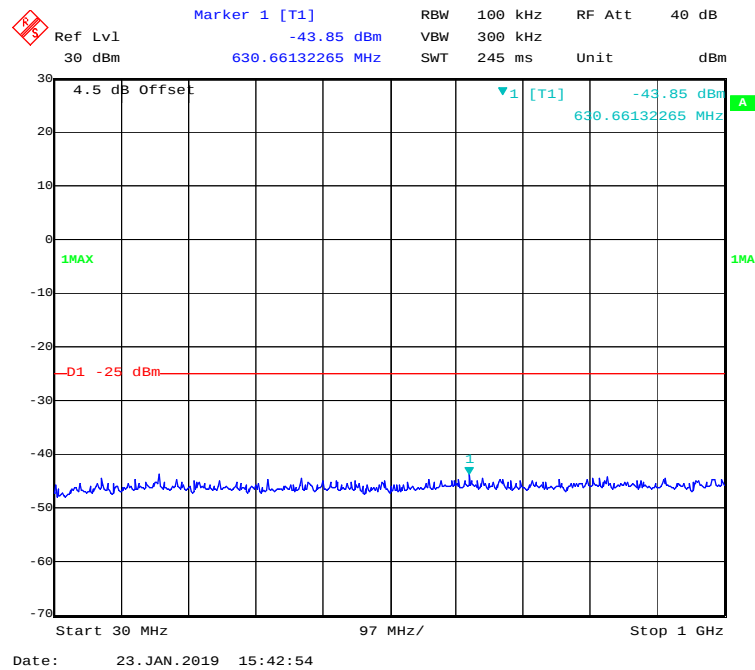
30 MHz - 1 GHz (15 MHz, QPSK, Middle Channel)



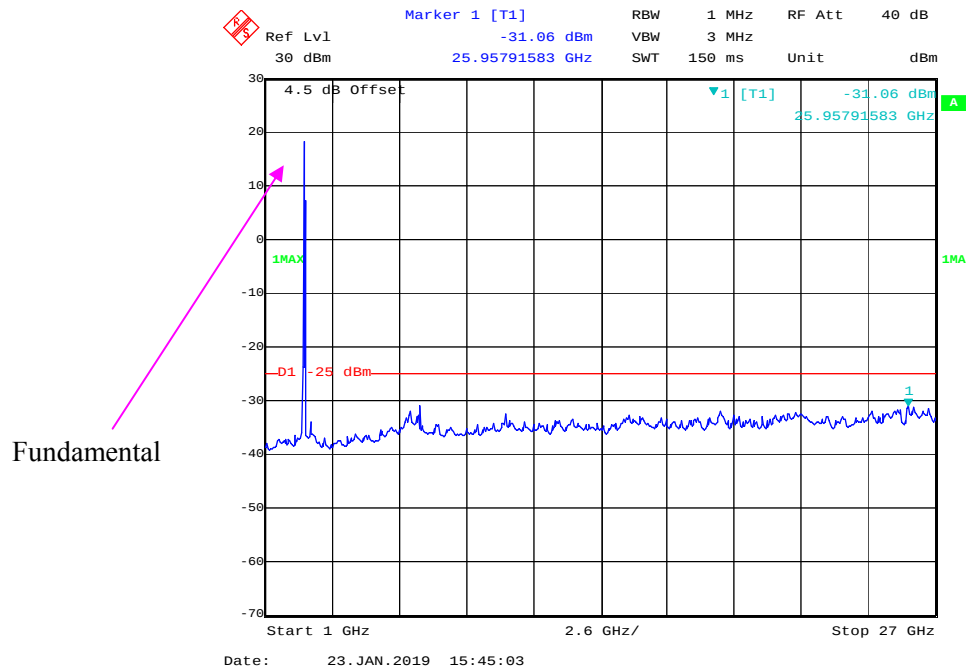
1 GHz – 27 GHz (15MHz, QPSK, Middle Channel)



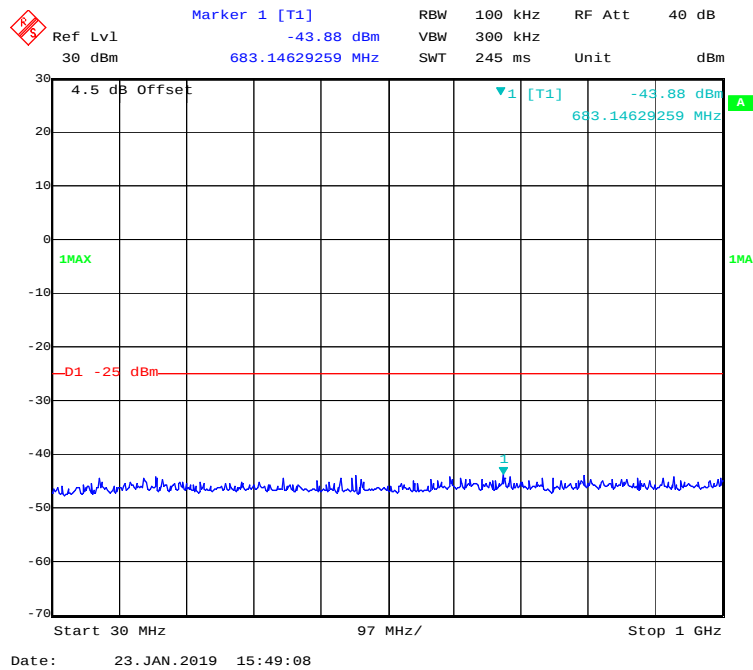
30 MHz - 1 GHz (15 MHz, 16-QAM, Middle Channel)



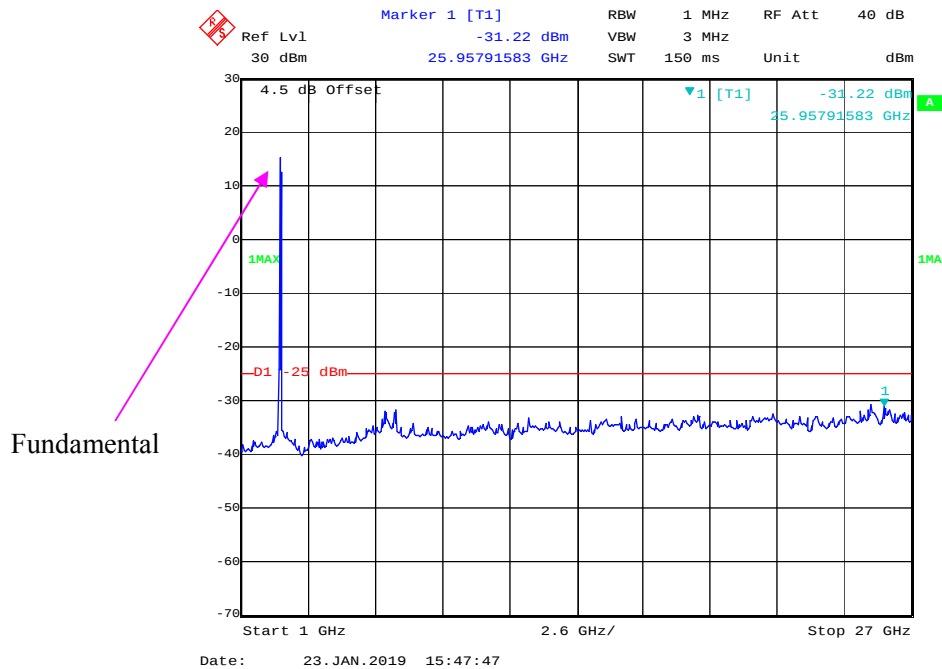
1 GHz – 27 GHz (15 MHz, 16-QAM, Middle Channel)



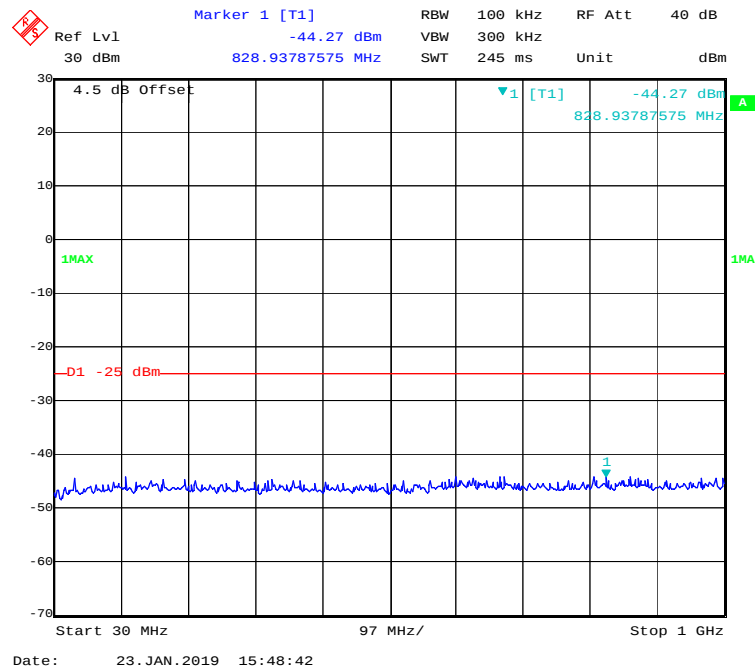
30 MHz - 1 GHz (20 MHz, QPSK, Middle Channel)



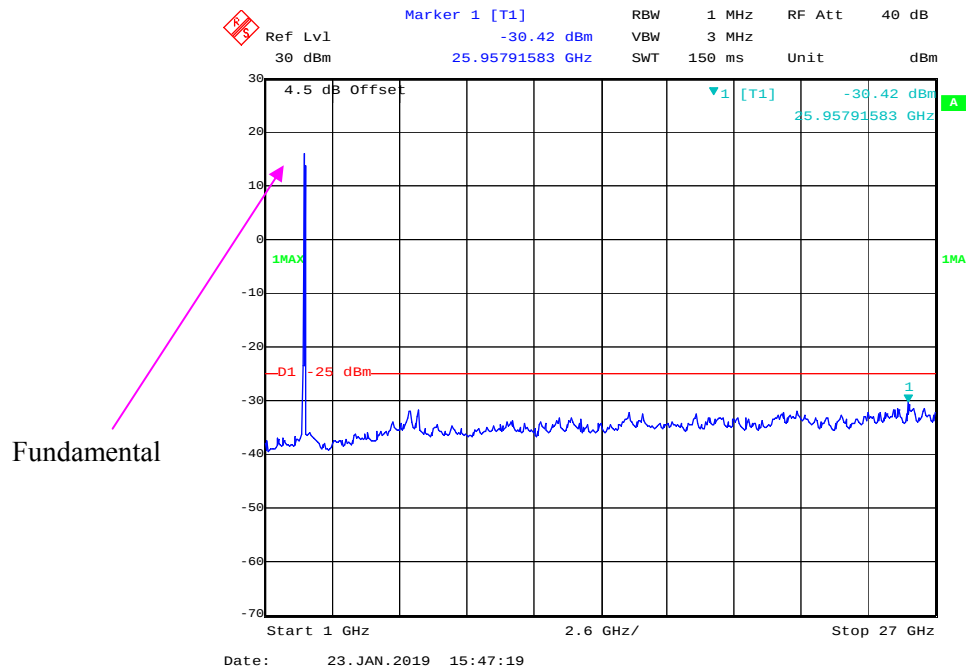
1 GHz – 27 GHz (20MHz, QPSK, Middle Channel)



30 MHz - 1 GHz (20 MHz, 16-QAM, Middle Channel)

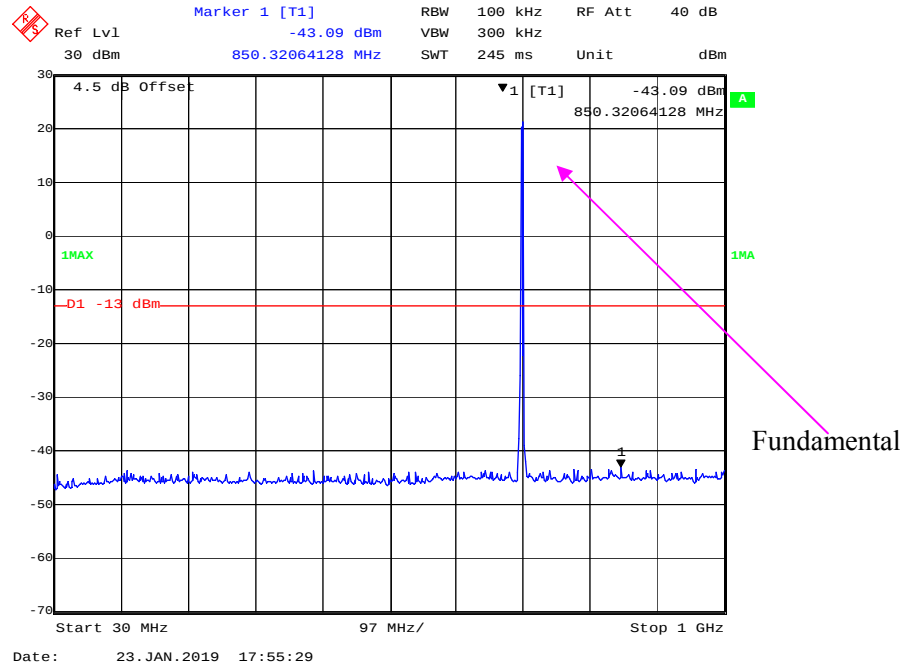


1 GHz – 27 GHz (20 MHz, 16-QAM, Middle Channel)

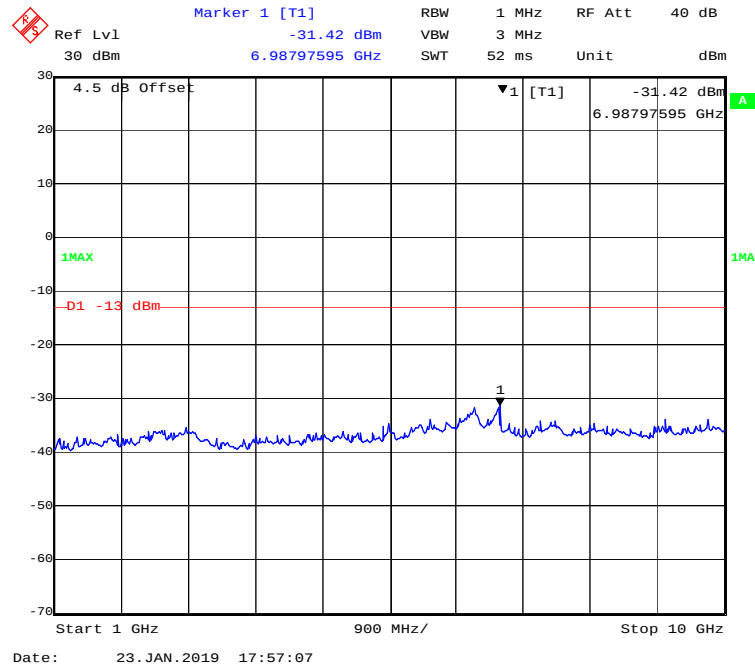


LTE Band 12:

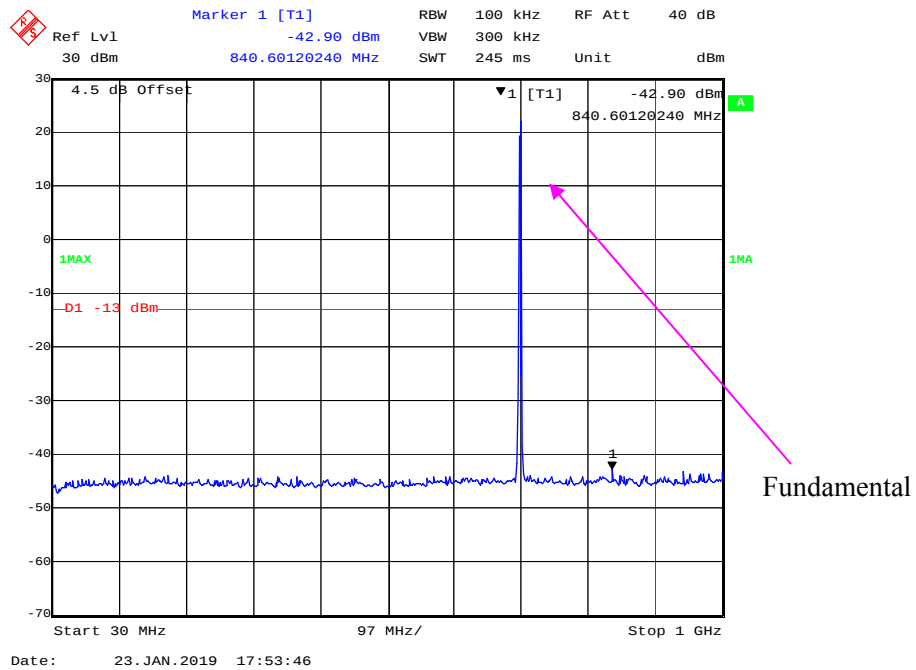
30 MHz - 1 GHz (1.4 MHz, QPSK, Middle Channel)



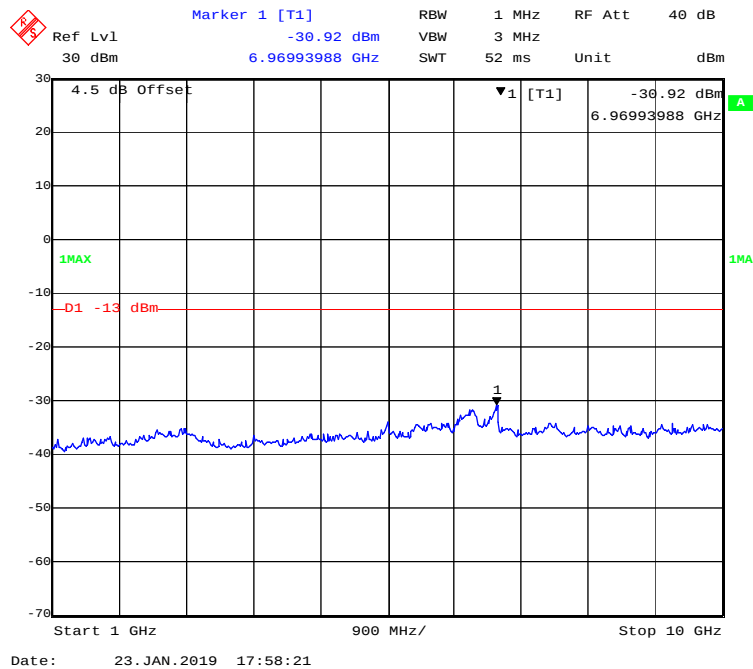
1 GHz – 10 GHz (1.4 MHz, QPSK, Middle Channel)



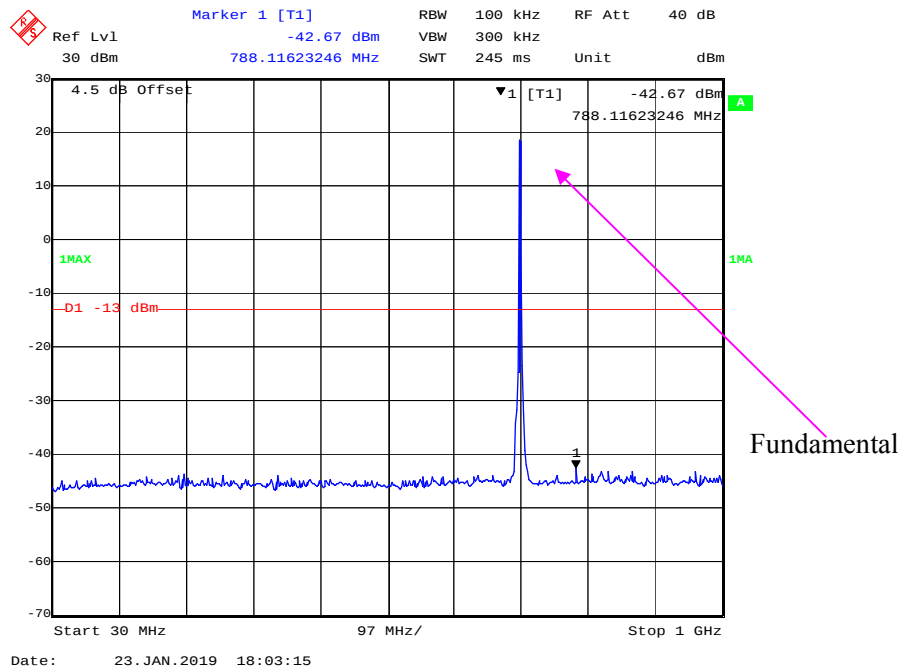
30 MHz - 1 GHz (1.4 MHz, 16-QAM, Middle Channel)



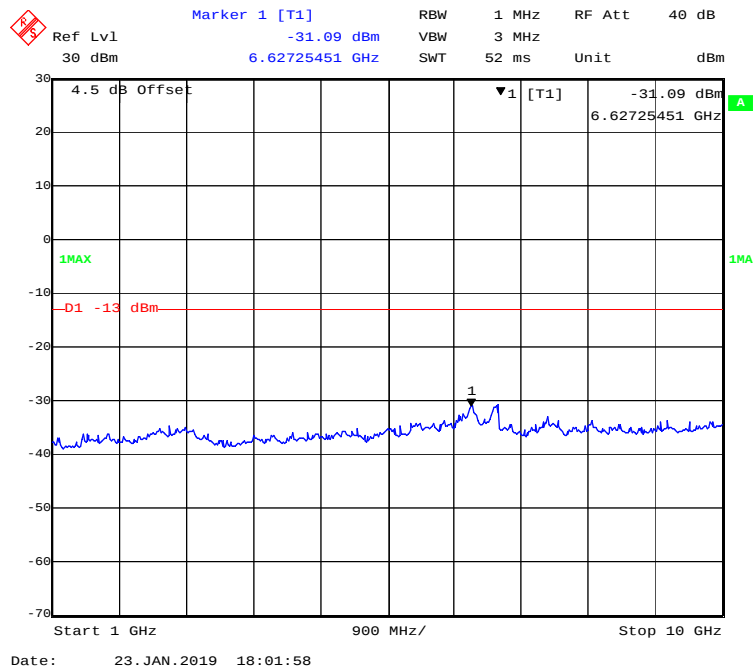
1 GHz – 10 GHz (1.4 MHz, 16-QAM, Middle Channel)

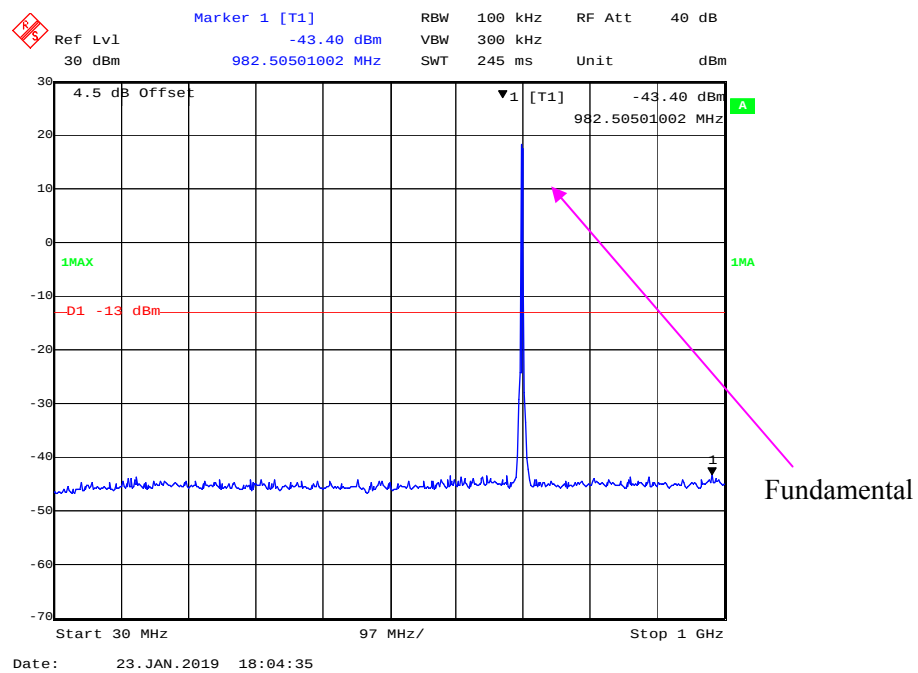
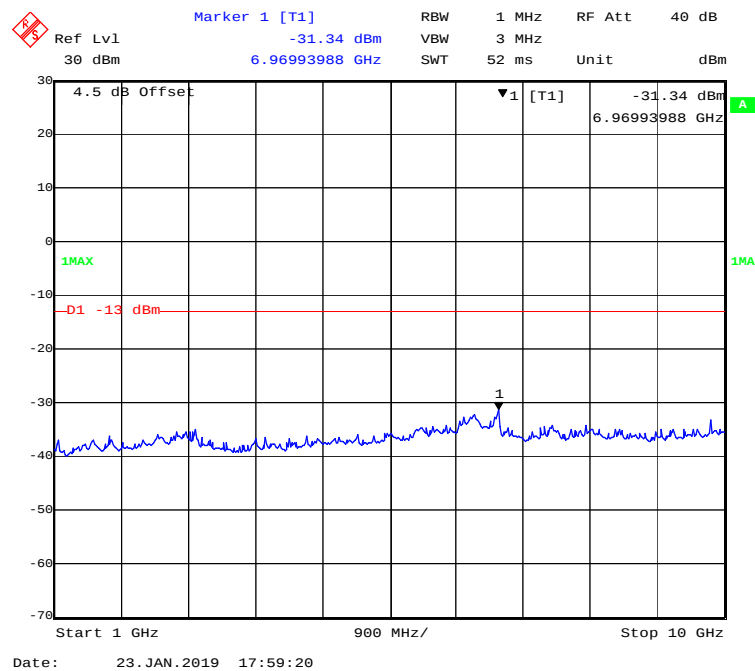


30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)

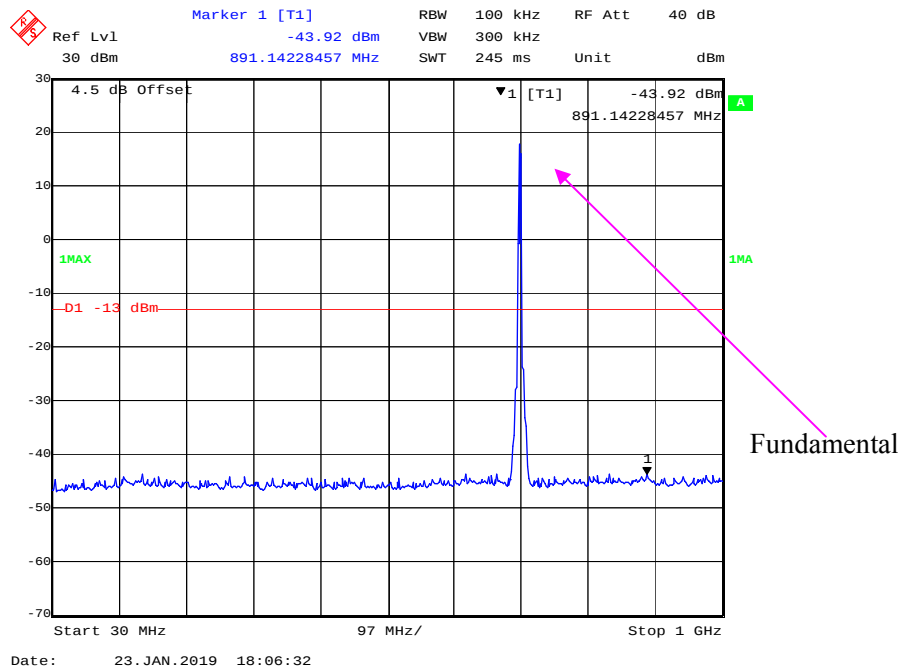


1 GHz – 10 GHz (3 MHz, QPSK, Middle Channel)

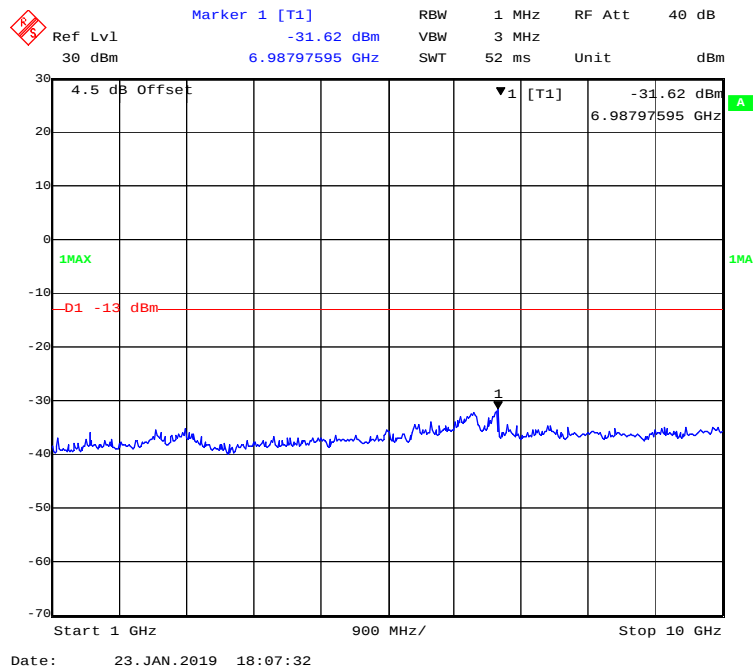


30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)**1 GHz – 10 GHz (3 MHz, 16-QAM, Middle Channel)**

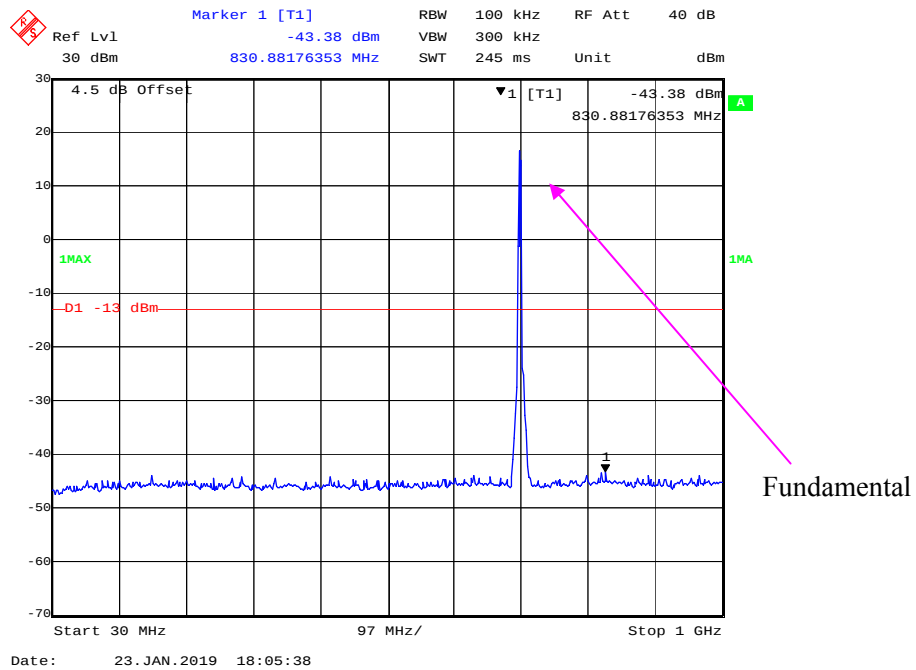
30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



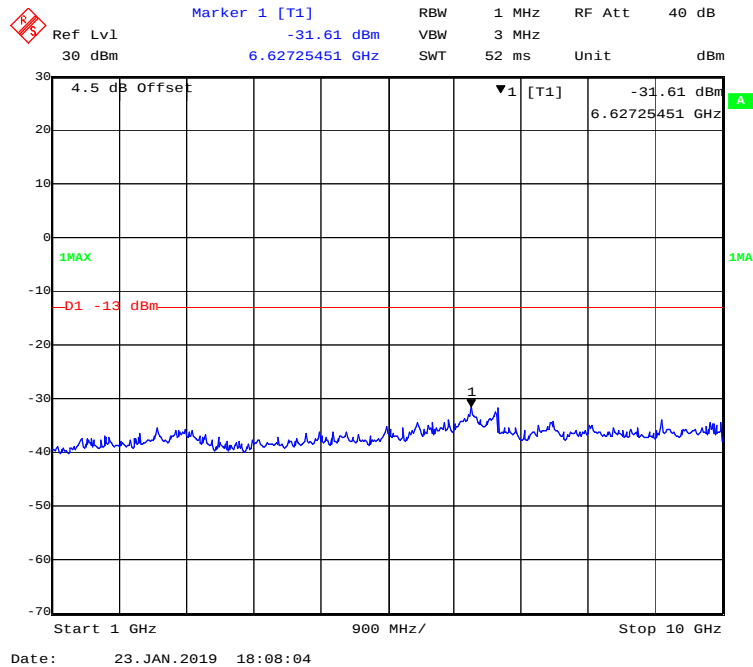
1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



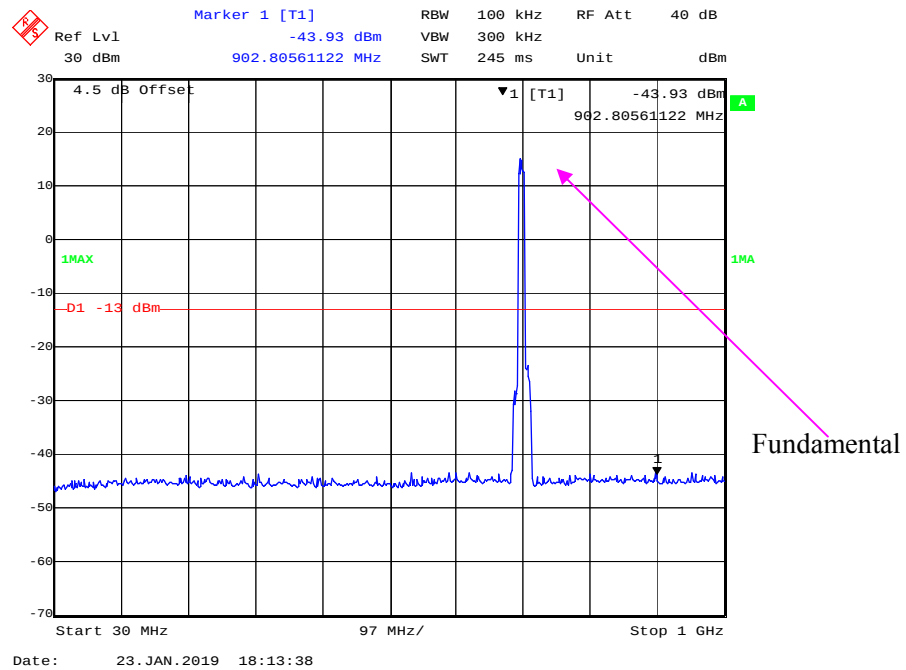
30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



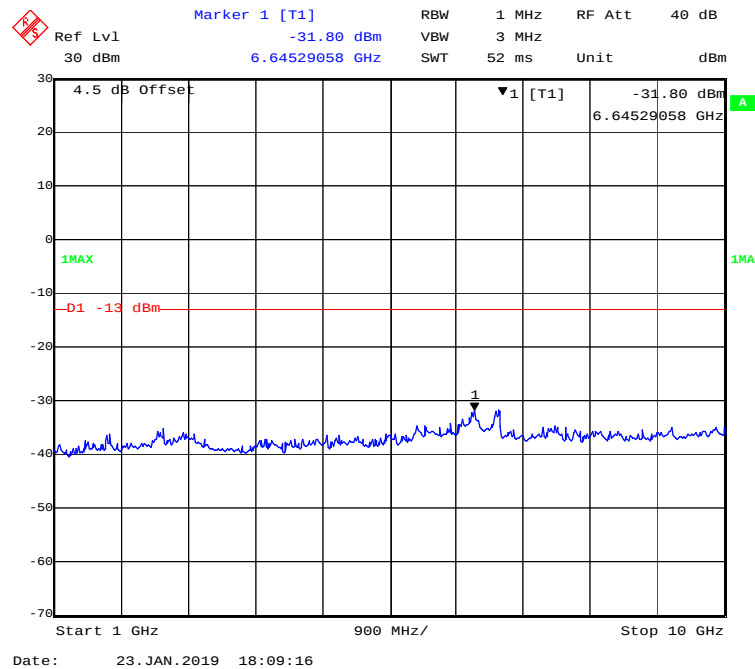
1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



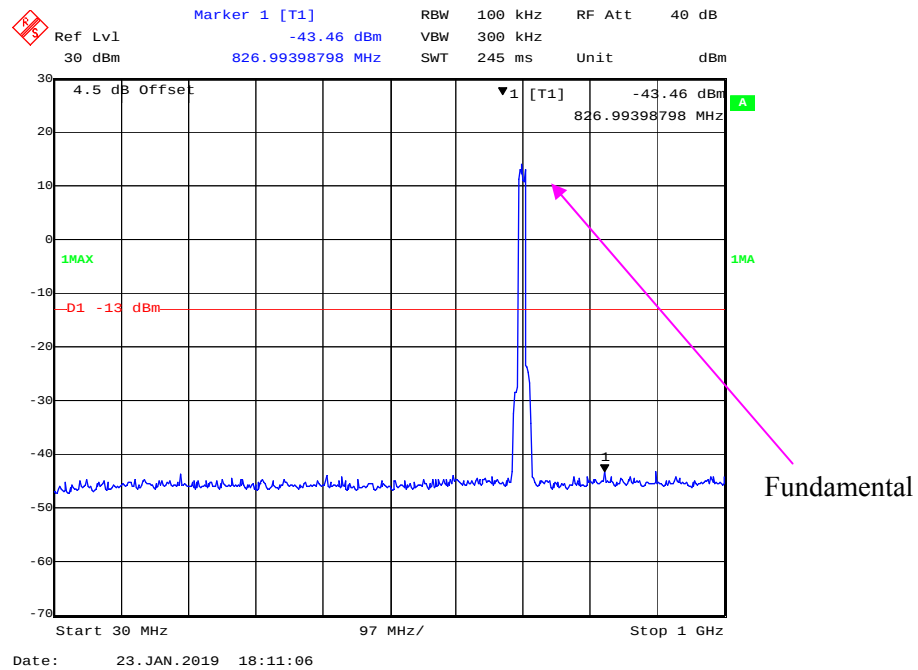
30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



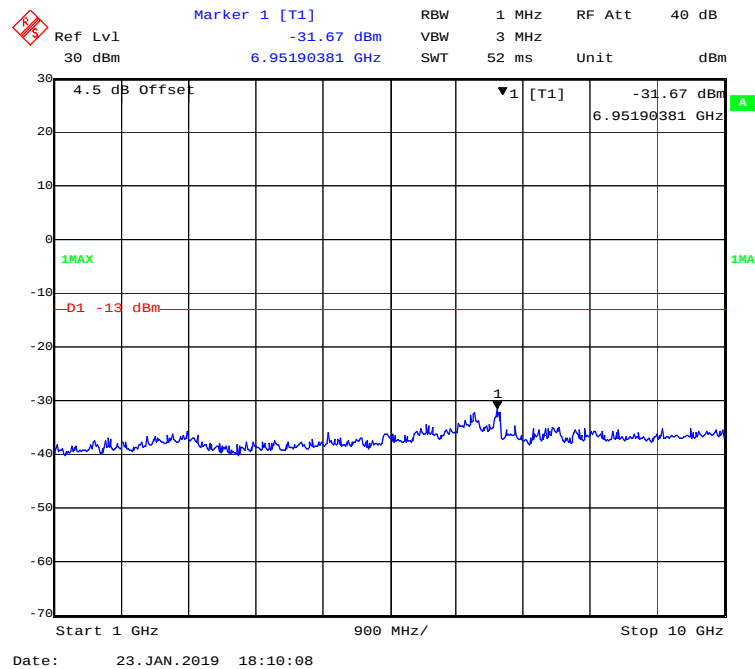
1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)



30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)

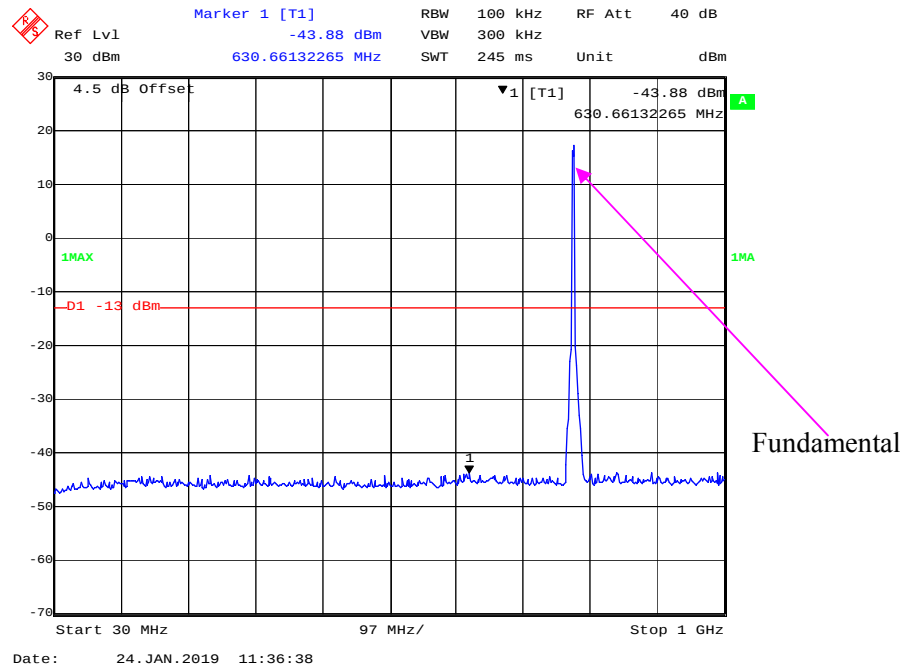


1 GHz – 10 GHz (10 MHz, 16-QAM, Middle Channel)

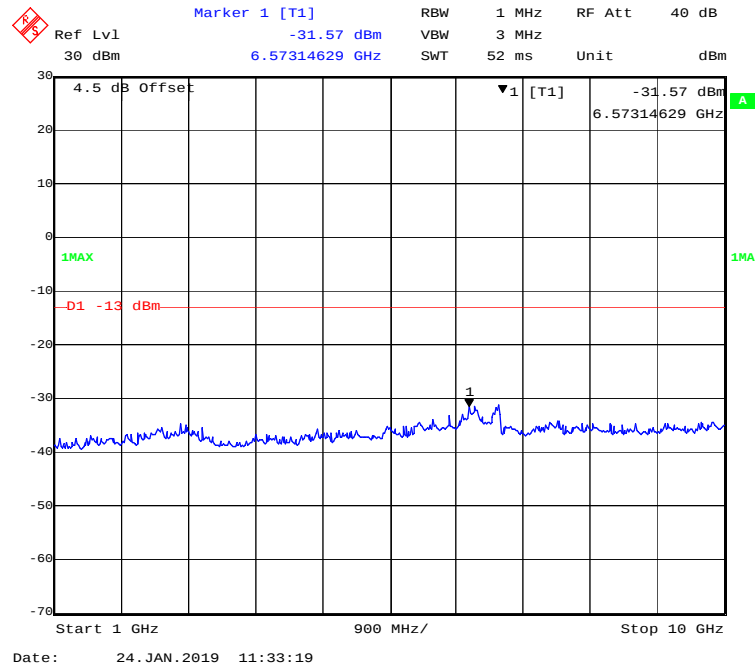


LTE Band 13:

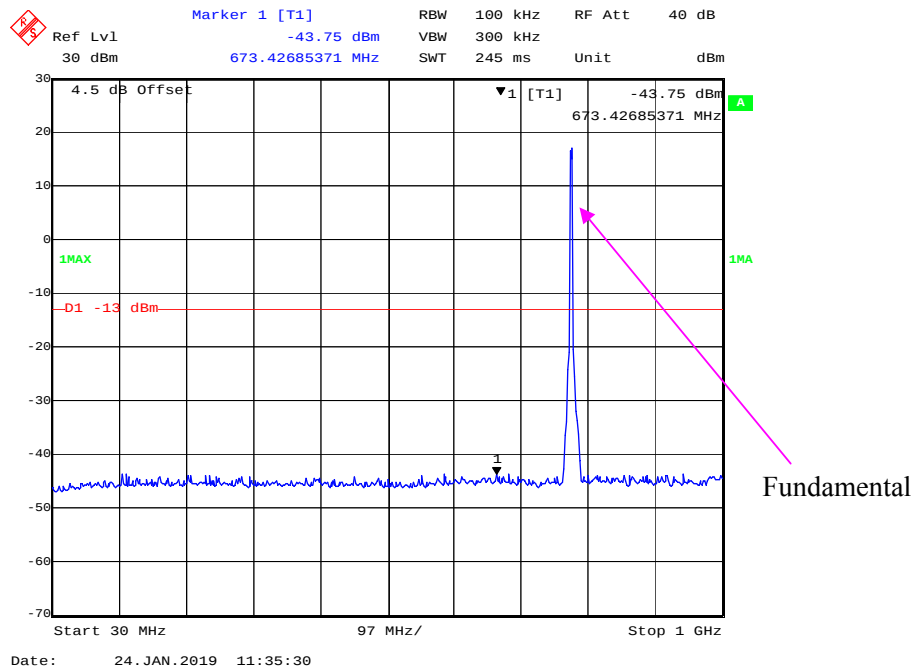
30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



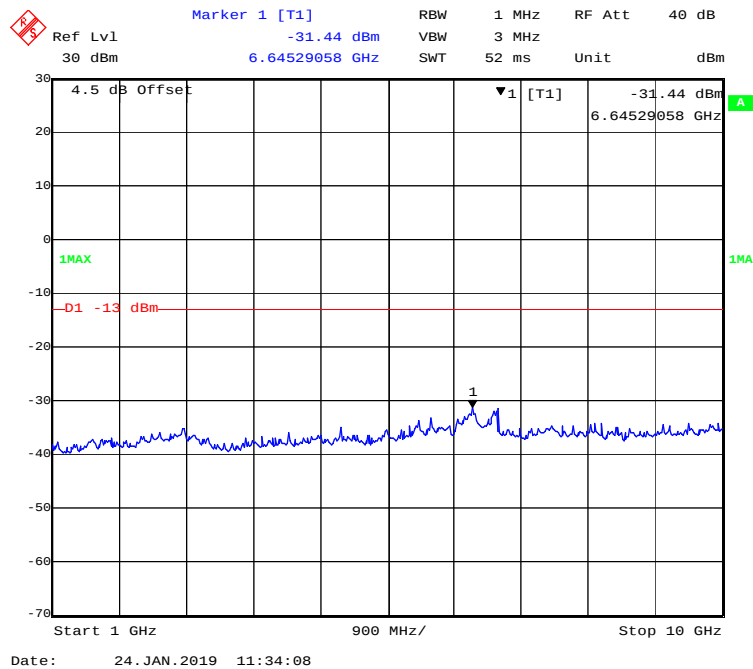
1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



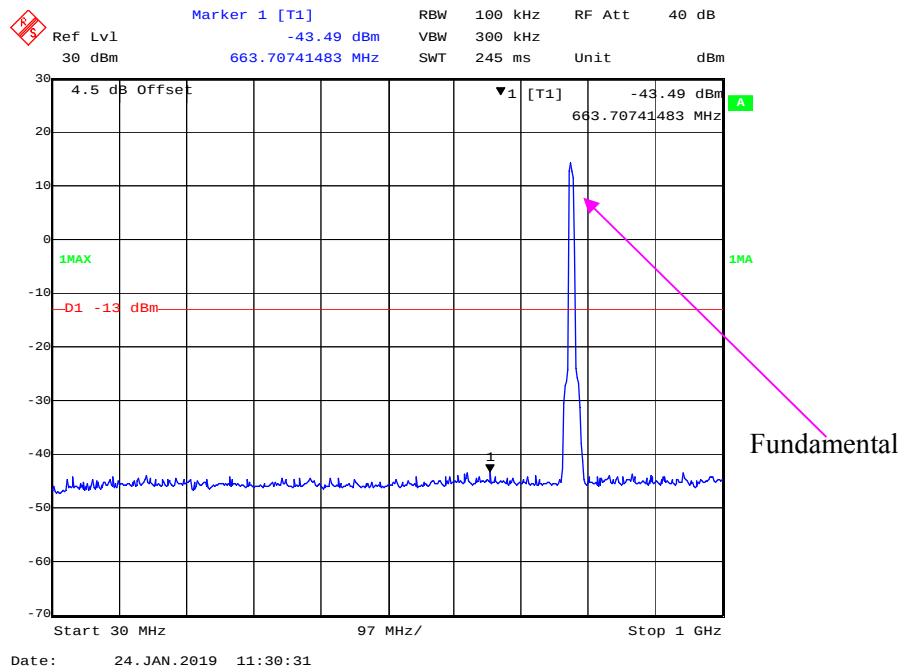
30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



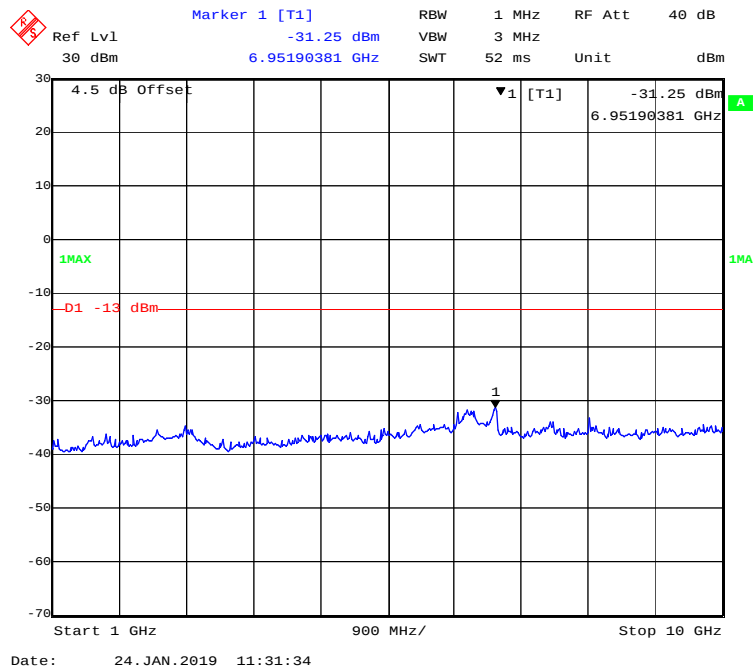
1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



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



Ref Lvl 30 dBm

Marker 1 [T1] -43.22 dBm

RBW 100 kHz

VBW 300 kHz

SWT 245 ms

RF Att 40 dB

Unit dBm

4.5 dB Offset

▼1 [T1] -43.22 dBm

677.31462926 MHz

1MAX

-D1 -13 dBm

1

Fundamental

Start 30 MHz

97 MHz/

Stop 1 GHz

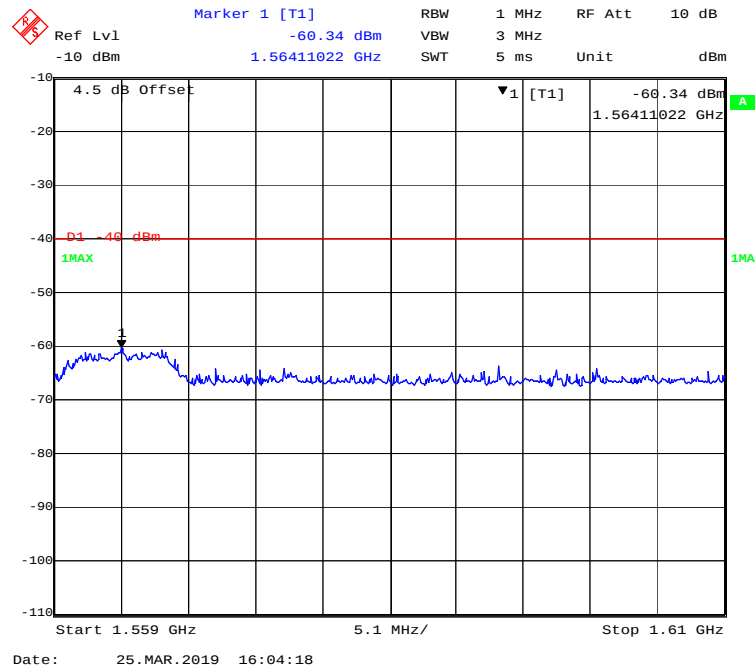
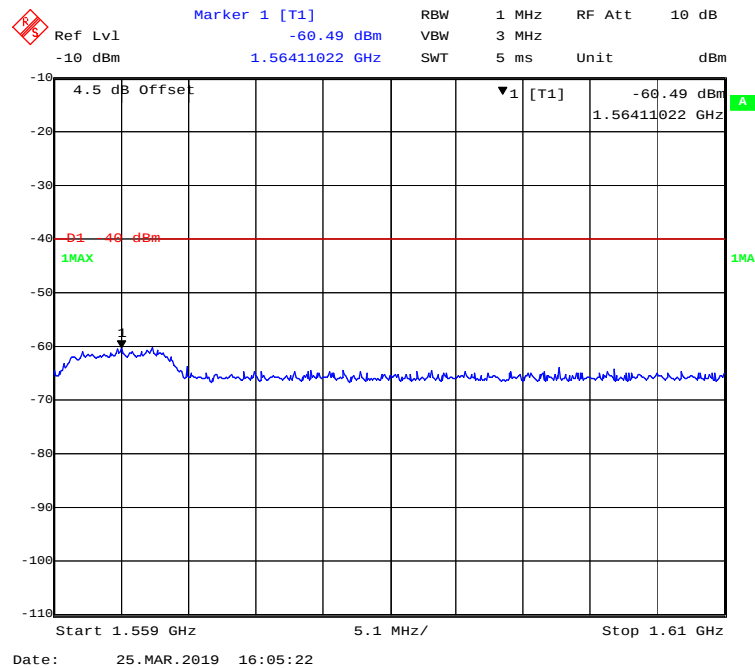
Date: 24. JAN. 2019 11:28:12

Ref Lvl 30 dBm
 Marker 1 [T1] -31.50 dBm
 RBW 1 MHz RF Att 40 dB
 VBW 3 MHz
 SWT 52 ms Unit dBm

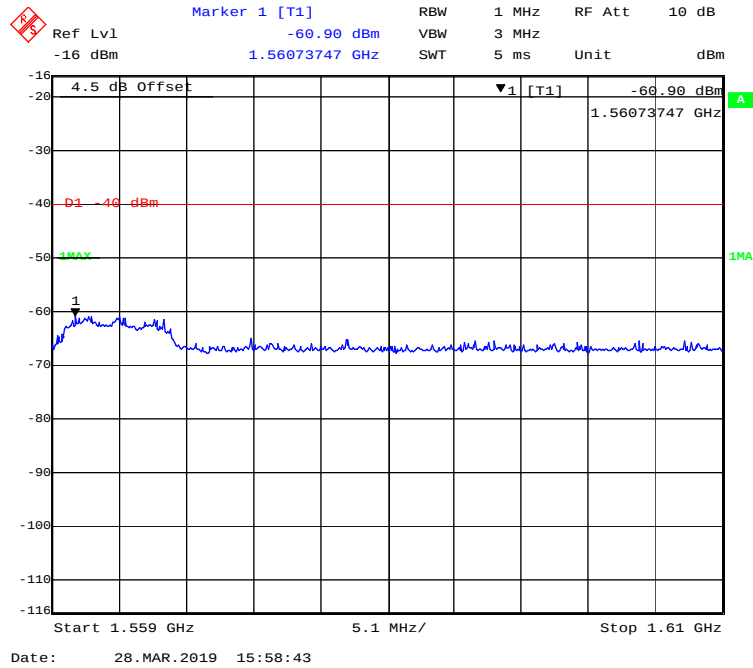
4.5 dB Offset
 1MAX
 D1 -13 dBm
 1
 -31.50 dBm
 6.96993988 GHz

Start 1 GHz 900 MHz/ Stop 10 GHz

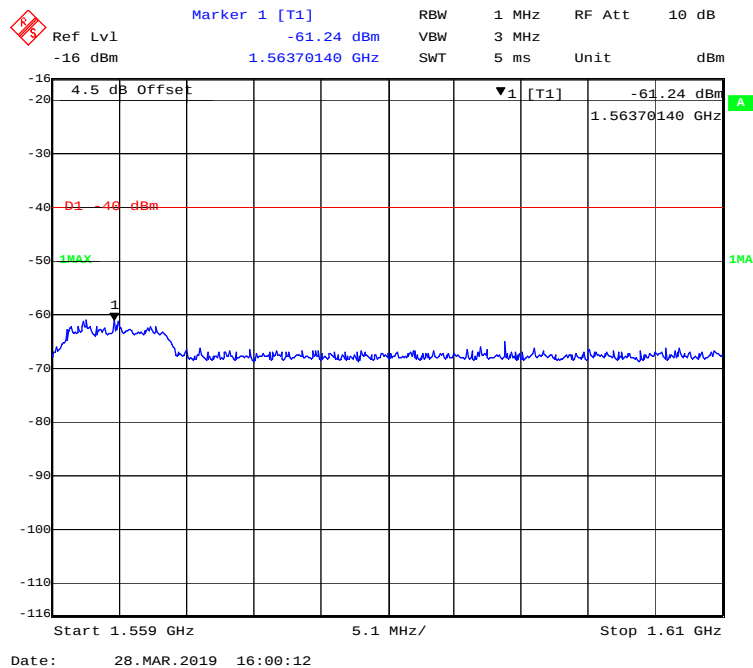
Date: 24. JAN. 2019 11:32:22

Additional Conducted Spurious Emissions Evaluations in accordance with FCC §27.53 (f)
1.559 GHz – 1.610 GHz (5 MHz, QPSK, Middle Channel)**1.559 GHz – 1.610 GHz (5 MHz, 16-QAM, Middle Channel)**

1.559 GHz – 1.610 GHz (10 MHz, QPSK, Middle Channel)



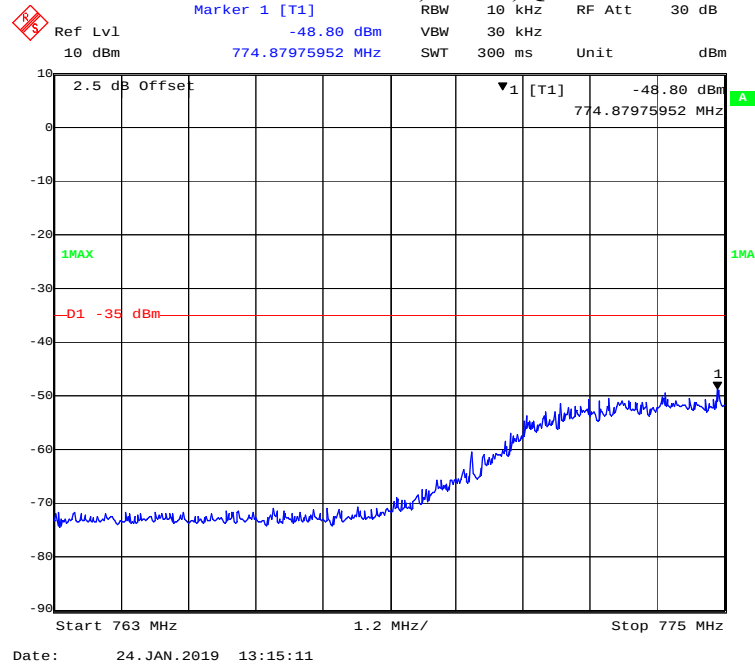
1.559 GHz – 1.610 GHz (10 MHz, 16-QAM, Middle Channel)



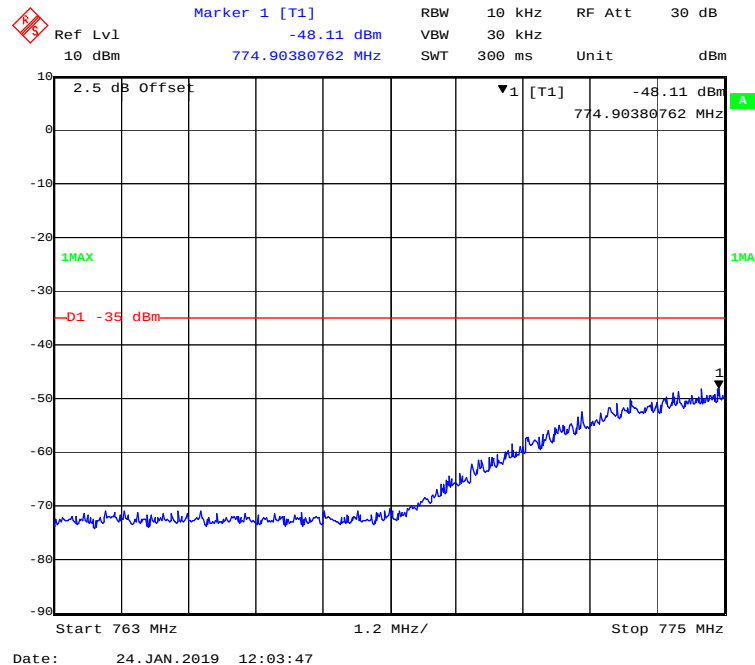
Additional Conducted Spurious Emissions Evaluations in accordance with FCC §27.53 (c)

Note: because of RBW 10kHz convert to 6.25kHz, $10\lg(10/6.25) = 2$, offset reduced with more 2dB.

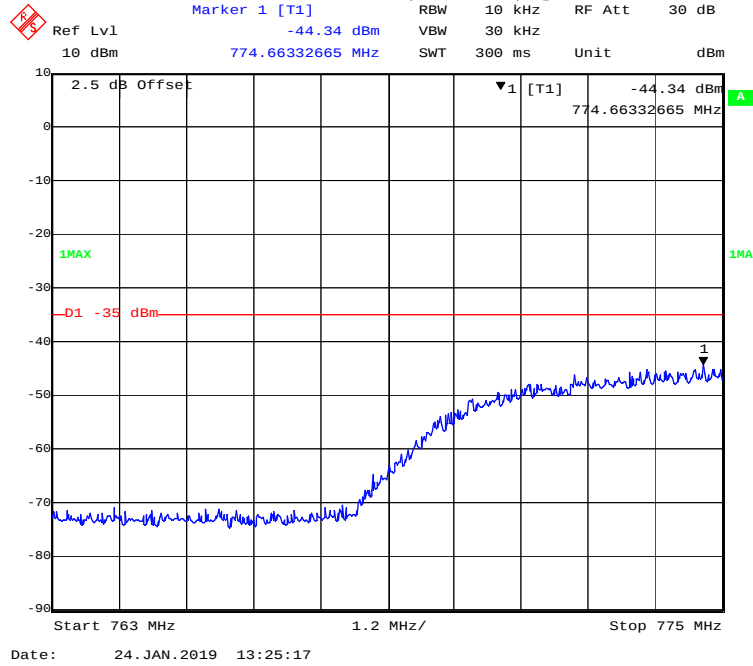
763 MHz – 775 MHz, 5 MHz, QPSK



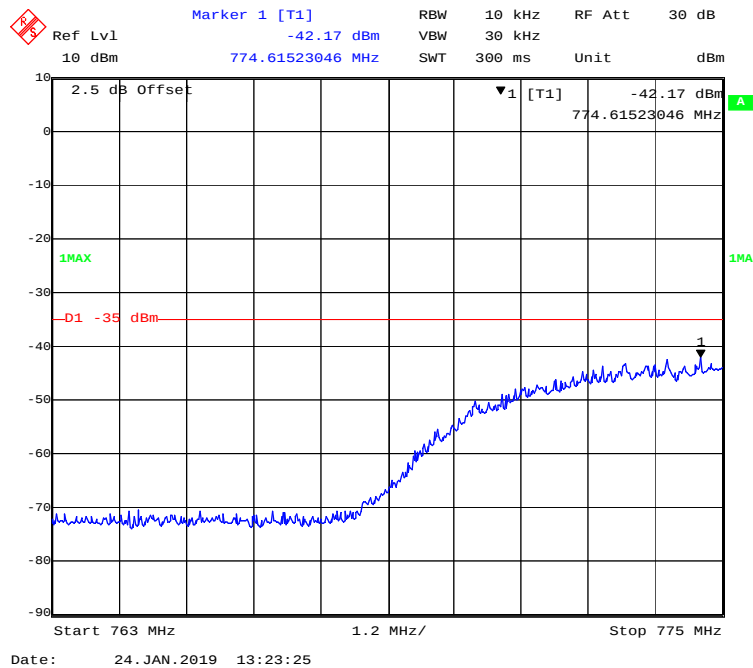
763 MHz – 775 MHz, 5 MHz, 16-QAM



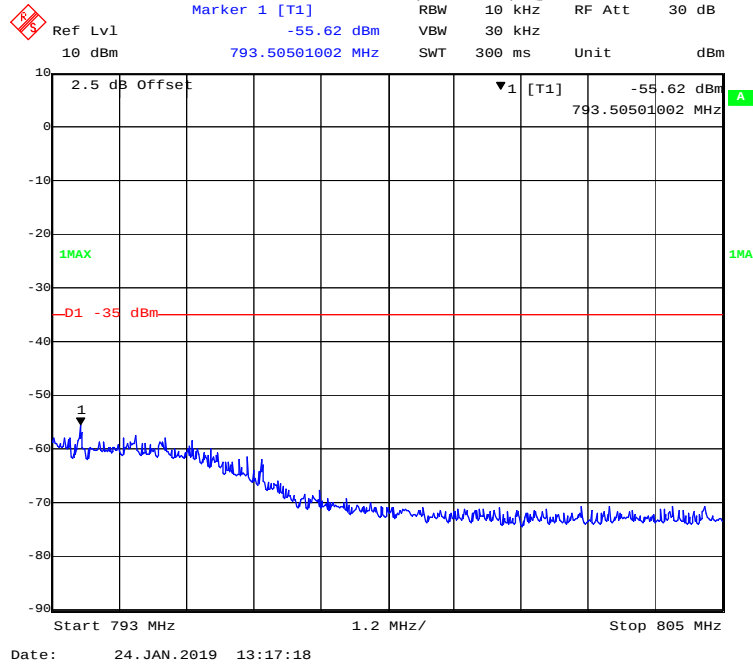
763 MHz – 775 MHz, 10 MHz, QPSK



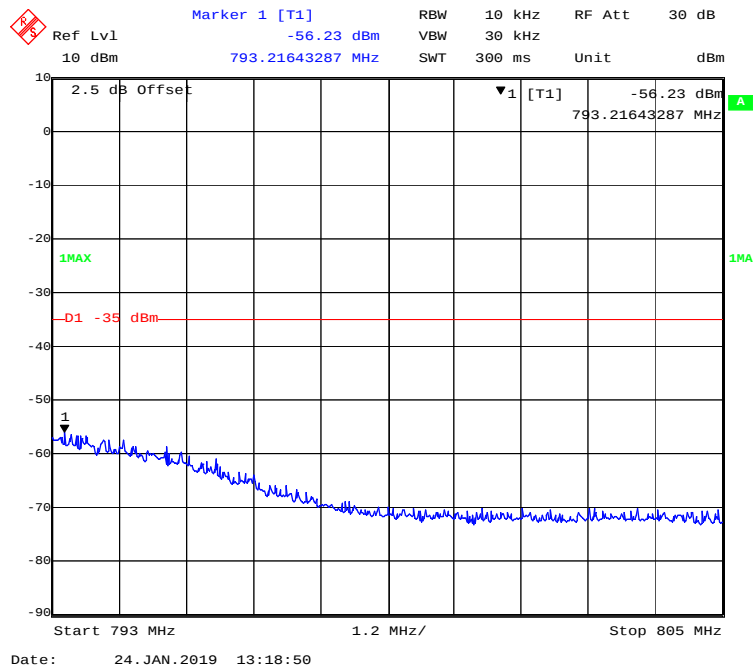
763 MHz – 775 MHz, 10 MHz, 16-QAM



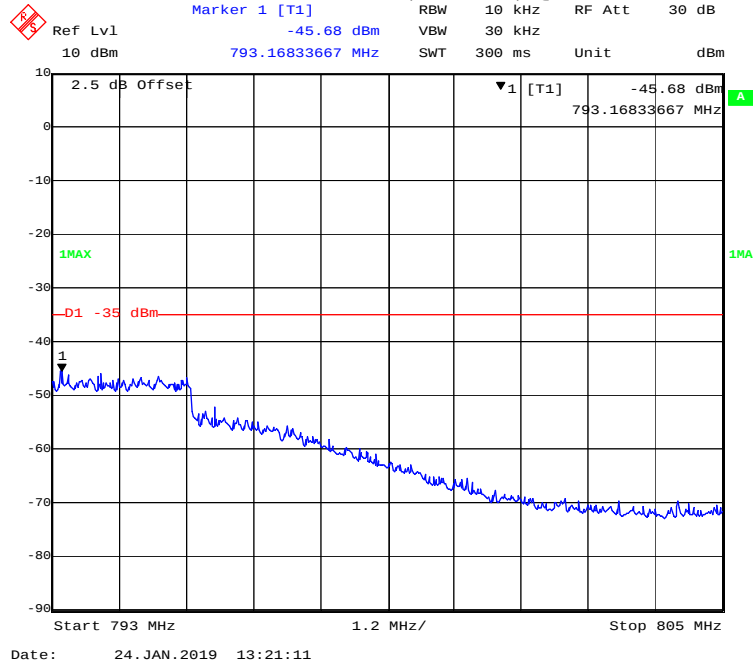
793 MHz – 805 MHz, 5 MHz, QPSK



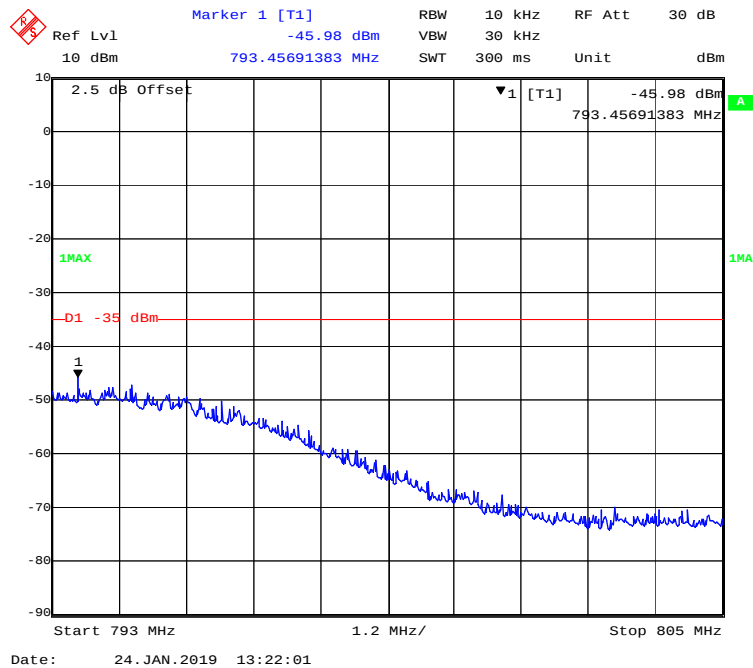
793 MHz – 805 MHz, 5 MHz, 16-QAM



793 MHz – 805 MHz, 10 MHz, QPSK

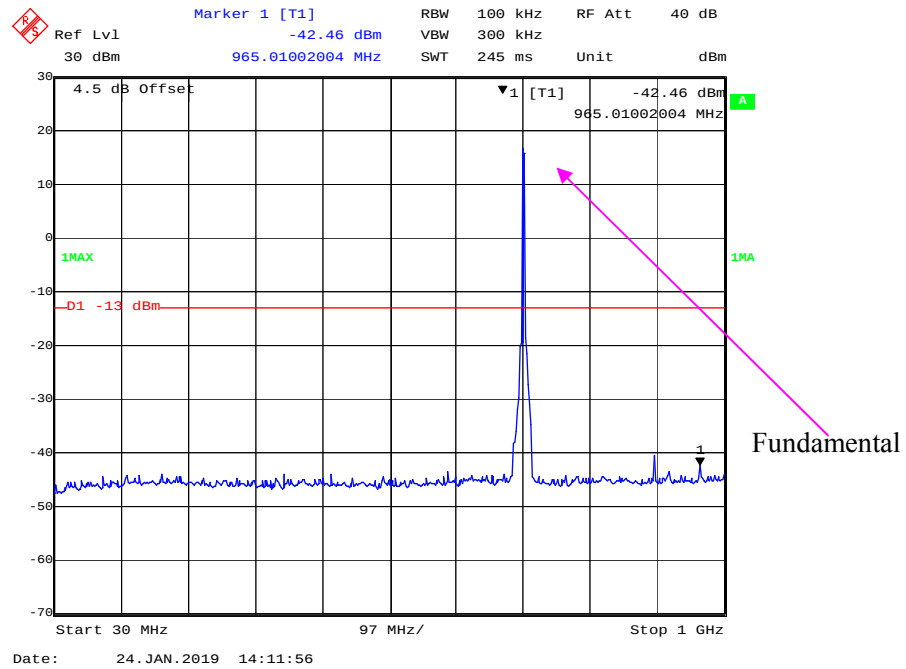


793 MHz – 805 MHz, 10 MHz, 16-QAM

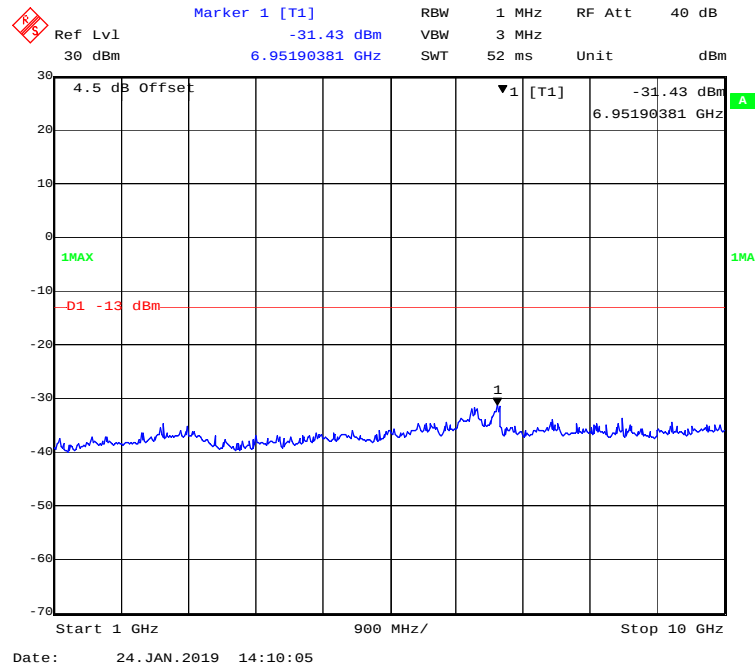


LTE Band 17:

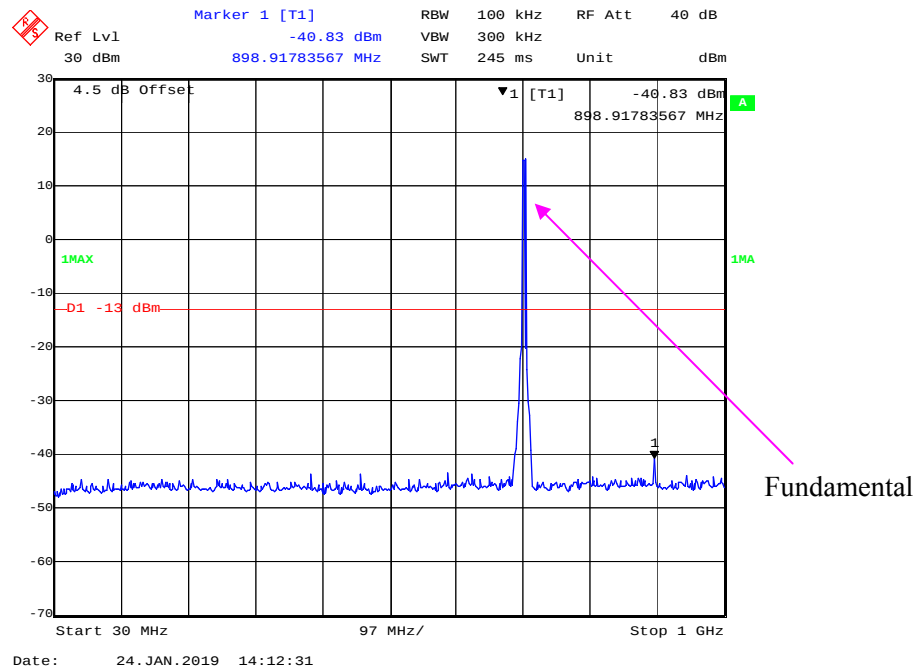
30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



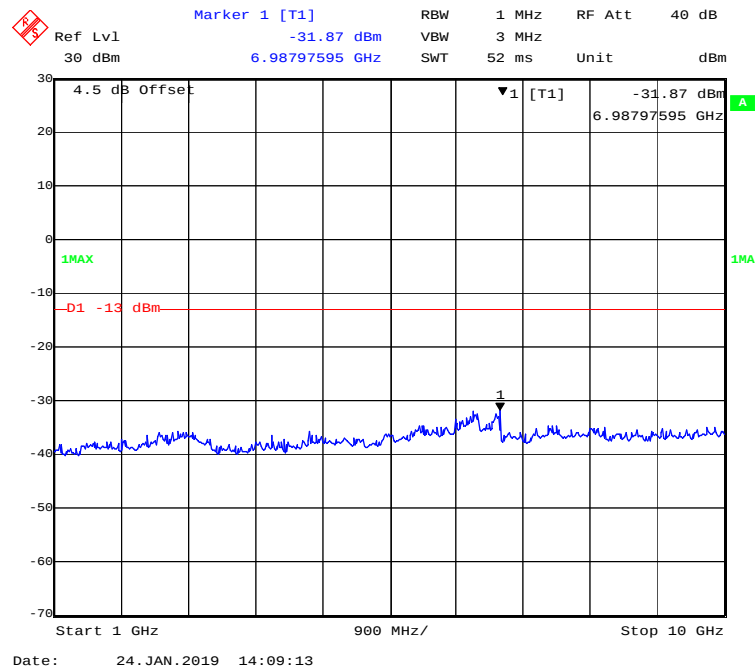
1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



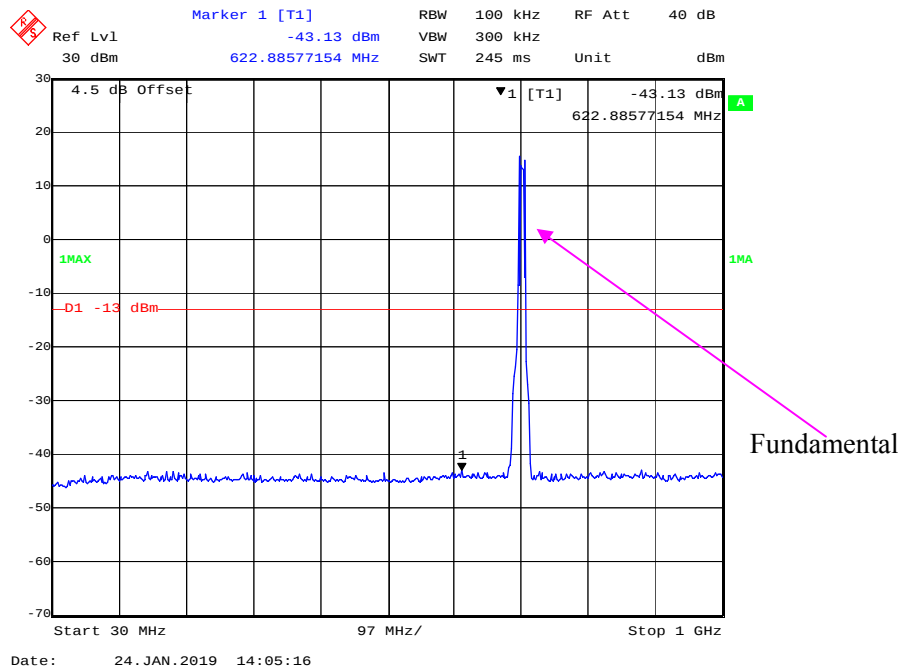
30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



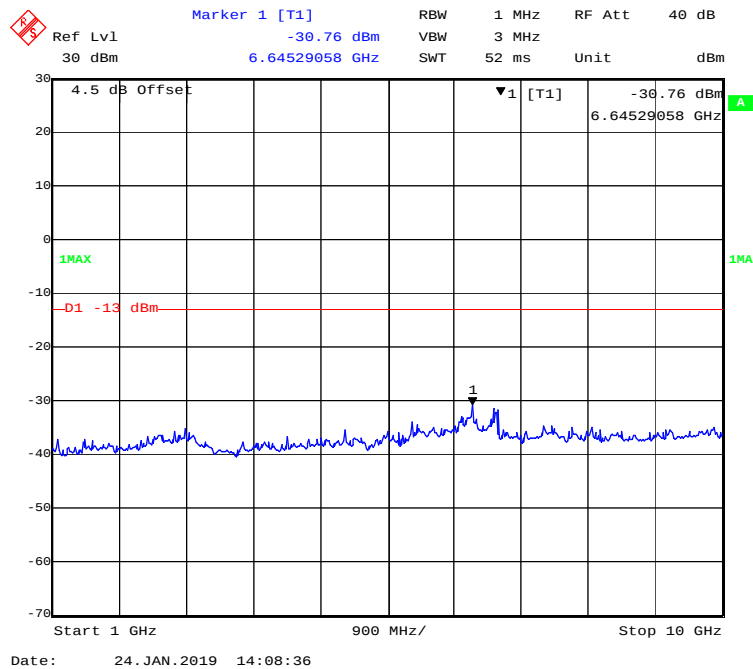
1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



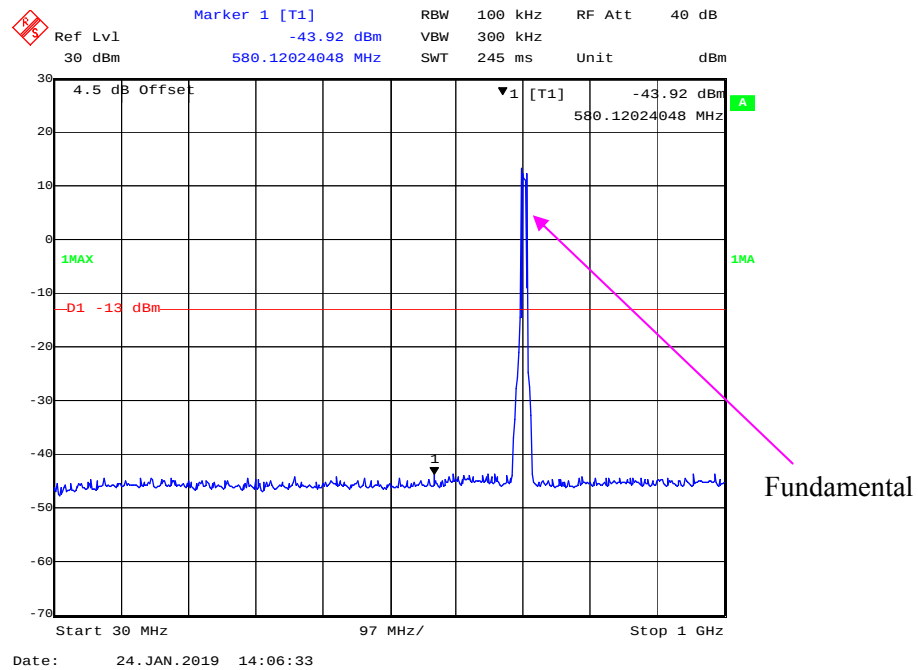
30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



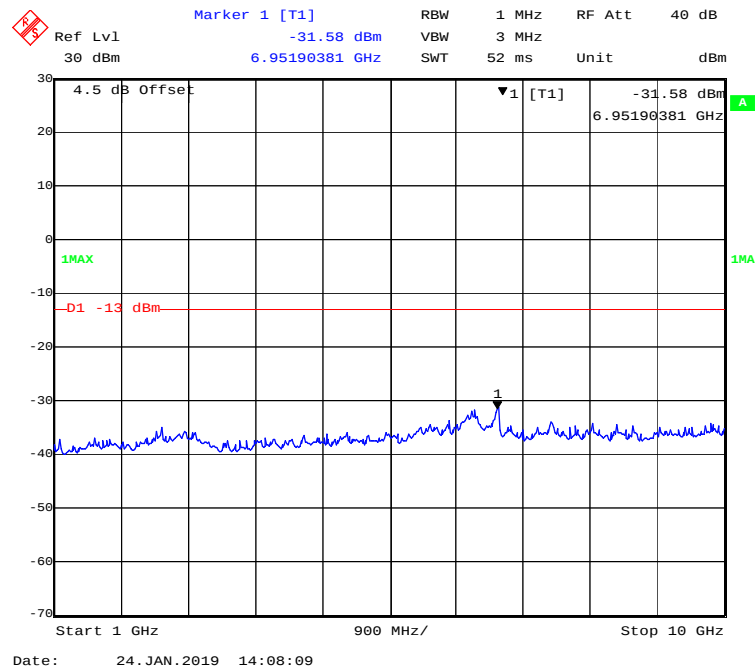
1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)



30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



1 GHz – 10 GHz (10 MHz, 16-QAM, Middle Channel)



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

Applicable Standards

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

22.917 (a) Out of band emissions. 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.

24.238 (a) Out of band emissions. 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.

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

Test Procedure

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

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

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

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

Spurious emissions in dB = $10 \lg (\text{TX pwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

Test Data**Environmental Conditions**

Temperature:	23.2℃
Relative Humidity:	51 %
ATM Pressure:	101.3kPa

The testing was performed by Hope Zhang on 2019-01-16.

Test mode: Transmitting (Pre-scan with low, middle and high channels, and the worse case data as below)

30 MHz ~ 10 GHz:

WCDMA Band V

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
147.42	51.39	275	210	H	-53.51	0.37	-6.14	-60.02	-13	47.02
147.42	47.70	94	130	V	-52.84	0.37	-6.14	-59.35	-13	46.35
1673.20	45.08	114	170	H	-58.31	0.84	8.48	-50.67	-13	37.67
1673.20	46.71	246	178	V	-57.18	0.84	8.48	-49.54	-13	36.54
2509.80	52.28	142	163	H	-48.66	0.89	10.09	-39.46	-13	26.46
2509.80	53.13	228	120	V	-47.82	0.89	10.09	-38.62	-13	25.62

30 MHz ~ 20 GHz:

WCDMA Band II

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
147.38	51.14	89	211	H	-53.76	0.37	-6.14	-60.27	-13	47.27
147.38	47.39	2	155	V	-53.15	0.37	-6.14	-59.66	-13	46.66
3760.00	37.41	221	141	H	-59.30	0.95	9.74	-50.51	-13	37.51
3760.00	38.79	169	132	V	-58.51	0.95	9.74	-49.72	-13	36.72
5640.00	36.23	209	123	H	-57.70	1.15	10.47	-48.38	-13	35.38
5640.00	37.15	166	141	V	-56.81	1.15	10.47	-47.49	-13	34.49

WCDMA Band IV

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
147.41	53.37	298	162	H	-51.53	0.37	-6.14	-58.04	-13	45.04
147.41	49.16	172	182	V	-51.38	0.37	-6.14	-57.89	-13	44.89
3465.20	35.72	56	153	H	-61.89	0.93	9.87	-52.95	-13	39.95
3465.20	38.05	193	123	V	-60.10	0.93	9.87	-51.16	-13	38.16
5197.80	42.90	298	145	H	-51.97	1.10	10.30	-42.77	-13	29.77
5197.80	44.65	93	187	V	-50.51	1.10	10.30	-41.31	-13	28.31

Note:

- 1) Absolute Level (dBm) = Submitted Level (dBm) - Cable loss (dB) + Antenna Gain (dBd/dBi)
- 2) Margin (dB) = Limit (dBm) - Absolute Level (dBm)

Test mode: Transmitting (Pre-scan with all the bandwidth, and worse case as below)

30 MHz ~ 20 GHz:

LTE Band 2:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4MHz Bandwidth Middle Channel										
147.58	52.15	309	163	H	-52.74	0.37	-6.15	-59.26	-13	46.26
147.58	48.20	189	211	V	-52.35	0.37	-6.15	-58.87	-13	45.87
3760.00	33.70	144	202	H	-63.01	0.95	9.74	-54.22	-13	41.22
3760.00	34.90	235	205	V	-62.40	0.95	9.74	-53.61	-13	40.61
5640.00	37.04	94	214	H	-56.89	1.15	10.47	-47.57	-13	34.57
5640.00	37.61	253	123	V	-56.35	1.15	10.47	-47.03	-13	34.03
16-QAM 1.4MHz Bandwidth Middle Channel										
147.63	52.11	246	212	H	-52.78	0.37	-6.15	-59.30	-13	46.30
147.63	48.22	49	223	V	-52.33	0.37	-6.15	-58.85	-13	45.85
3760.00	33.65	194	184	H	-63.06	0.95	9.74	-54.27	-13	41.27
3760.00	34.85	214	202	V	-62.45	0.95	9.74	-53.66	-13	40.66
5640.00	36.97	276	123	H	-56.96	1.15	10.47	-47.64	-13	34.64
5640.00	37.50	11	254	V	-56.46	1.15	10.47	-47.14	-13	34.14

30 MHz ~ 20 GHz:

LTE Band 4:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4MHz Bandwidth Middle Channel										
145.65	52.18	82	214	H	-52.82	0.37	-6.14	-59.33	-13	46.33
145.65	48.20	295	235	V	-52.26	0.37	-6.14	-58.77	-13	45.77
3465.00	35.61	173	214	H	-62.00	0.93	9.87	-53.06	-13	40.06
3465.00	36.62	108	221	V	-61.53	0.93	9.87	-52.59	-13	39.59
5197.50	37.03	17	232	H	-57.84	1.10	10.30	-48.64	-13	35.64
5197.50	37.58	124	184	V	-57.58	1.10	10.30	-48.38	-13	35.38
16-QAM 1.4MHz Bandwidth Middle Channel										
145.23	52.13	64	155	H	-52.89	0.37	-6.14	-59.40	-13	46.40
145.23	48.10	286	164	V	-52.34	0.37	-6.14	-58.85	-13	45.85
3465.00	35.65	183	174	H	-61.96	0.93	9.87	-53.02	-13	40.02
3465.00	36.60	209	153	V	-61.55	0.93	9.87	-52.61	-13	39.61
5197.50	37.12	23	174	H	-57.75	1.10	10.30	-48.55	-13	35.55
5197.50	37.62	215	135	V	-57.54	1.10	10.30	-48.34	-13	35.34

30 MHz ~ 10 GHz:**LTE Band 5:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4MHz Bandwidth Middle Channel										
152.36	50.79	309	152	H	-53.83	0.37	-6.15	-60.35	-13	47.35
152.36	47.45	326	174	V	-53.32	0.37	-6.15	-59.84	-13	46.84
1673.00	42.54	304	162	H	-60.85	0.84	8.48	-53.21	-13	40.21
1673.00	43.66	87	153	V	-60.23	0.84	8.48	-52.59	-13	39.59
2509.50	46.01	335	145	H	-54.93	0.89	10.09	-45.73	-13	32.73
2509.50	47.06	147	123	V	-53.89	0.89	10.09	-44.69	-13	31.69
16-QAM 1.4MHz Bandwidth Middle Channel										
152.17	51.22	302	174	H	-53.40	0.37	-6.15	-59.92	-13	46.92
152.17	47.54	312	123	V	-53.23	0.37	-6.15	-59.75	-13	46.75
1673.00	42.38	343	155	H	-61.01	0.84	8.48	-53.37	-13	40.37
1673.00	43.64	43	212	V	-60.25	0.84	8.48	-52.61	-13	39.61
2509.50	46.00	17	184	H	-54.94	0.89	10.09	-45.74	-13	32.74
2509.50	47.18	360	123	V	-53.77	0.89	10.09	-44.57	-13	31.57

30 MHz ~ 27 GHz:**LTE Band 7:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5MHz Bandwidth Middle Channel										
149.50	52.52	195	123	H	-52.26	0.37	-6.15	-58.78	-25	33.78
149.50	48.81	262	177	V	-51.83	0.37	-6.15	-58.35	-25	33.35
5070.00	33.81	141	123	H	-61.47	1.09	10.30	-52.26	-25	27.26
5070.00	34.85	146	174	V	-60.79	1.09	10.30	-51.58	-25	26.58
7605.00	36.10	187	211	H	-54.55	1.78	10.08	-46.25	-25	21.25
7605.00	36.75	159	192	V	-54.07	1.78	10.08	-45.77	-25	20.77
16-QAM 5MHz Bandwidth Middle Channel										
149.47	52.30	234	184	H	-52.48	0.37	-6.15	-59.00	-25	34.00
149.47	48.43	56	157	V	-52.21	0.37	-6.15	-58.73	-25	33.73
5070.00	33.83	306	177	H	-61.45	1.09	10.30	-52.24	-25	27.24
5070.00	34.84	145	153	V	-60.80	1.09	10.30	-51.59	-25	26.59
7605.00	35.98	9	148	H	-54.67	1.78	10.08	-46.37	-25	21.37
7605.00	36.68	112	135	V	-54.14	1.78	10.08	-45.84	-25	20.84

30 MHz ~ 10 GHz:
LTE Band 12:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4MHz Bandwidth Middle Channel										
152.30	54.89	31	155	H	-49.73	0.37	-6.15	-56.25	-13	43.25
152.30	51.56	229	177	V	-49.21	0.37	-6.15	-55.73	-13	42.73
1415.00	49.04	82	156	H	-55.71	0.82	7.96	-48.57	-13	35.57
1415.00	50.79	320	135	V	-54.36	0.82	7.96	-47.22	-13	34.22
2122.50	50.01	64	147	H	-51.25	0.86	9.27	-42.84	-13	29.84
2122.50	51.06	223	123	V	-50.48	0.86	9.27	-42.07	-13	29.07
16-QAM 1.4MHz Bandwidth Middle Channel										
152.28	54.97	118	125	H	-49.65	0.37	-6.15	-56.17	-13	43.17
152.28	51.83	43	144	V	-48.94	0.37	-6.15	-55.46	-13	42.46
1415.00	49.22	90	174	H	-55.53	0.82	7.96	-48.39	-13	35.39
1415.00	50.37	197	123	V	-54.78	0.82	7.96	-47.64	-13	34.64
2122.50	50.14	8	155	H	-51.12	0.86	9.27	-42.71	-13	29.71
2122.50	51.13	89	144	V	-50.41	0.86	9.27	-42.00	-13	29.00

30 MHz ~ 10 GHz:
LTE Band 13:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5MHz Bandwidth Middle Channel										
156.74	55.26	196	212	H	-49.11	0.38	-6.16	-55.65	-13	42.65
156.74	52.72	150	177	V	-48.25	0.38	-6.16	-54.79	-13	41.79
1564.00	48.14	194	153	H	-55.92	0.83	8.30	-48.45	-13	35.45
1564.00	49.47	224	154	V	-55.13	0.83	8.30	-47.66	-13	34.66
2346.00	49.85	78	213	H	-51.25	0.88	9.76	-42.37	-13	29.37
2346.00	50.46	203	203	V	-50.76	0.88	9.76	-41.88	-13	28.88
16-QAM 5MHz Bandwidth Middle Channel										
156.55	55.39	216	144	H	-48.98	0.38	-6.16	-55.52	-13	42.52
156.55	52.82	52	184	V	-48.15	0.38	-6.16	-54.69	-13	41.69
1564.00	48.12	210	152	H	-55.94	0.83	8.30	-48.47	-13	35.47
1564.00	49.37	35	174	V	-55.23	0.83	8.30	-47.76	-13	34.76
2346.00	49.81	20	155	H	-51.29	0.88	9.76	-42.41	-13	29.41
2346.00	50.47	161	163	V	-50.75	0.88	9.76	-41.87	-13	28.87

30 MHz ~ 10 GHz:**LTE Band 17:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5MHz Bandwidth Middle Channel										
156.50	54.06	345	174	H	-50.31	0.38	-6.16	-56.85	-13	43.85
156.50	51.27	206	162	V	-49.70	0.38	-6.16	-56.24	-13	43.24
1420.00	47.84	72	155	H	-56.89	0.82	7.98	-49.73	-13	36.73
1420.00	48.89	292	144	V	-56.25	0.82	7.98	-49.09	-13	36.09
2130.00	49.49	339	164	H	-51.76	0.86	9.29	-43.33	-13	30.33
2130.00	50.24	282	174	V	-51.29	0.86	9.29	-42.86	-13	29.86
16-QAM 5MHz Bandwidth Middle Channel										
156.46	54.14	120	173	H	-50.23	0.38	-6.16	-56.77	-13	43.77
156.46	51.36	147	151	V	-49.61	0.38	-6.16	-56.15	-13	43.15
1420.00	47.65	84	162	H	-57.08	0.83	8.30	-49.61	-13	36.61
1420.00	48.44	332	174	V	-56.70	0.83	8.30	-49.23	-13	36.23
2130.00	48.98	39	165	H	-52.27	0.88	9.76	-43.39	-13	30.39
2130.00	49.66	263	174	V	-51.87	0.88	9.76	-42.99	-13	29.99

Note:

1) Absolute Level (dBm) = Submitted Level (dBm) - Cable loss (dB) + Antenna Gain (dBd/dBi)

2) Margin (dB) = Limit (dBm) - Absolute Level (dBm)

FCC § 22.917 (a); § 24.238 (a); §27.53 (h) (m) - BAND EDGES**Applicable Standards**

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.

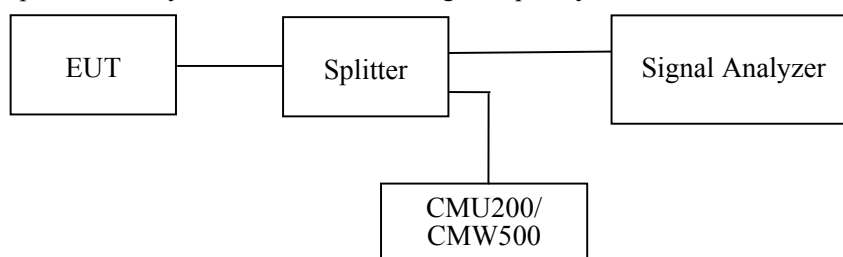
For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB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

FCC §2.1051. The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

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:	23.2°C-23.5°C
Relative Humidity:	51 %-53%
ATM Pressure:	101.1kPa-103.3kPa

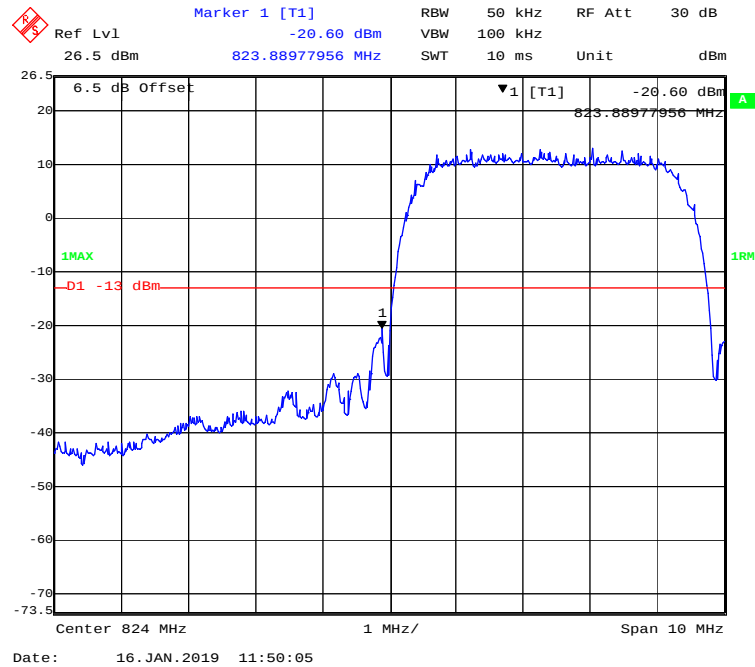
The testing was performed by Hope Zhang from 2019-01-16 to 2019-03-25.

EUT operation mode: Transmitting

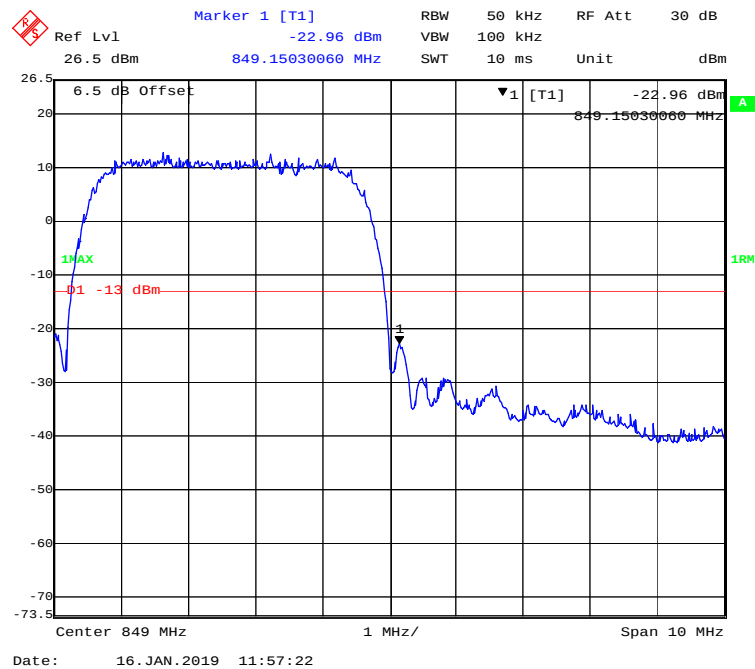
Test Result: Compliance.

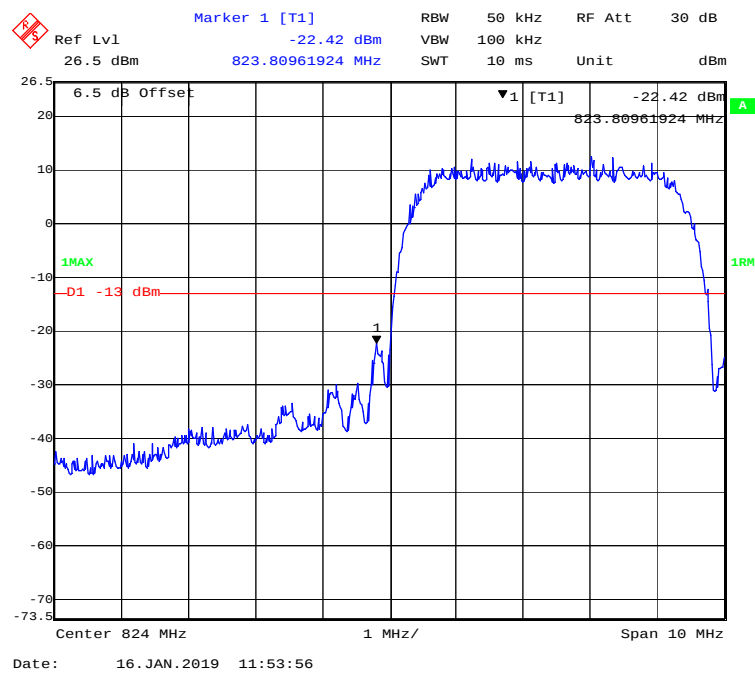
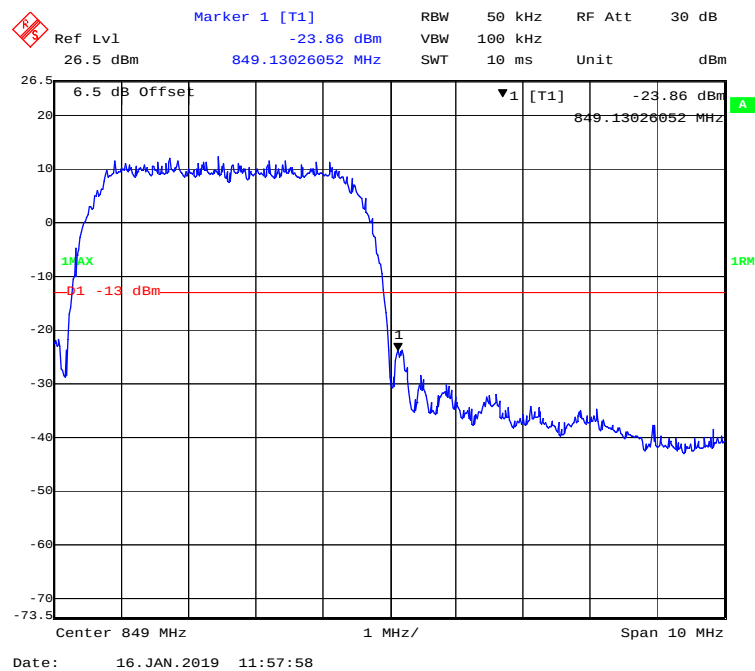
WCDMA Band V

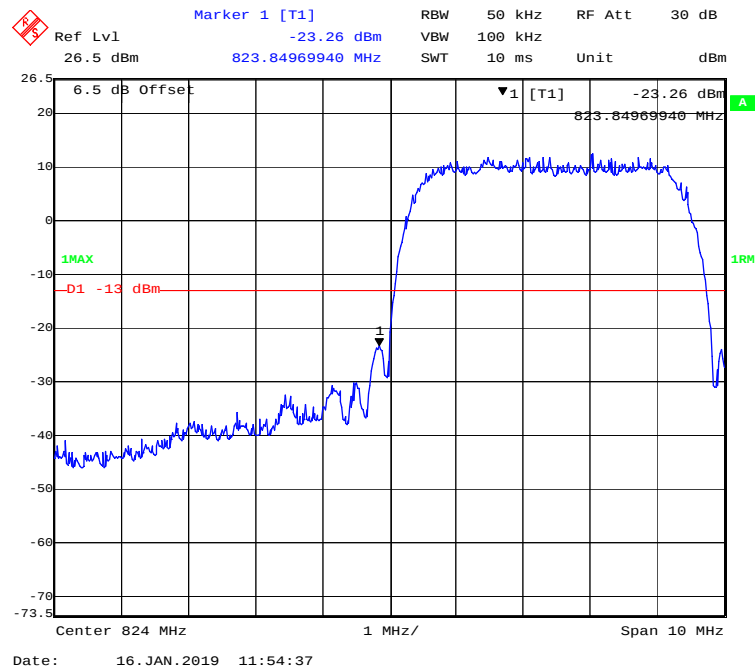
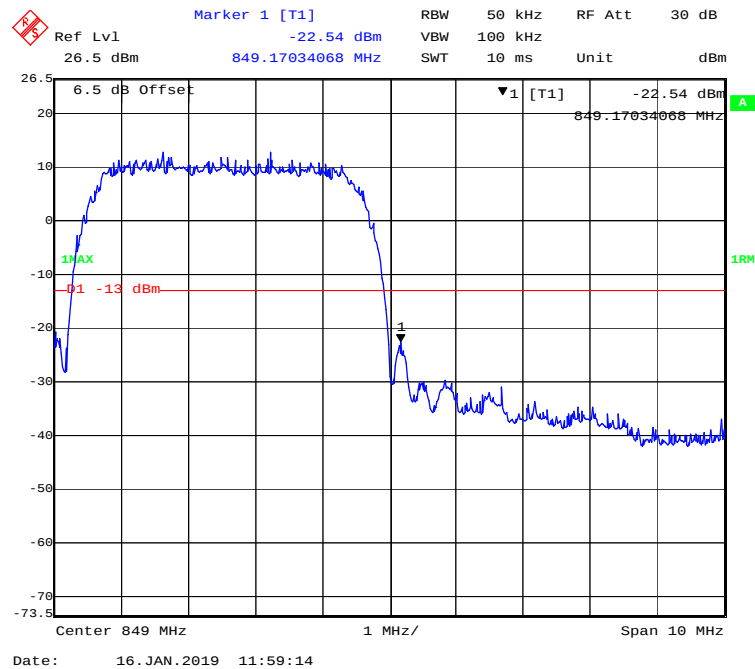
WCDMA (Rel 99) Mode, Left Band Edge

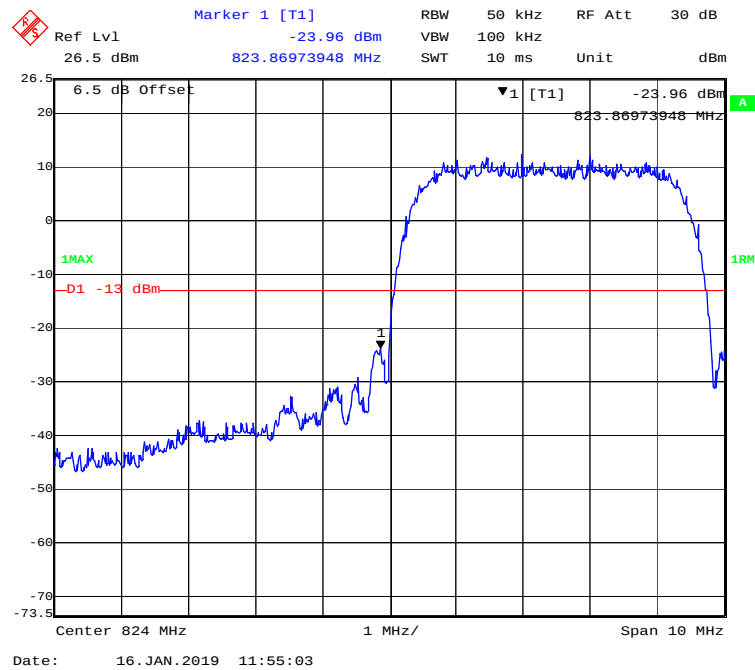
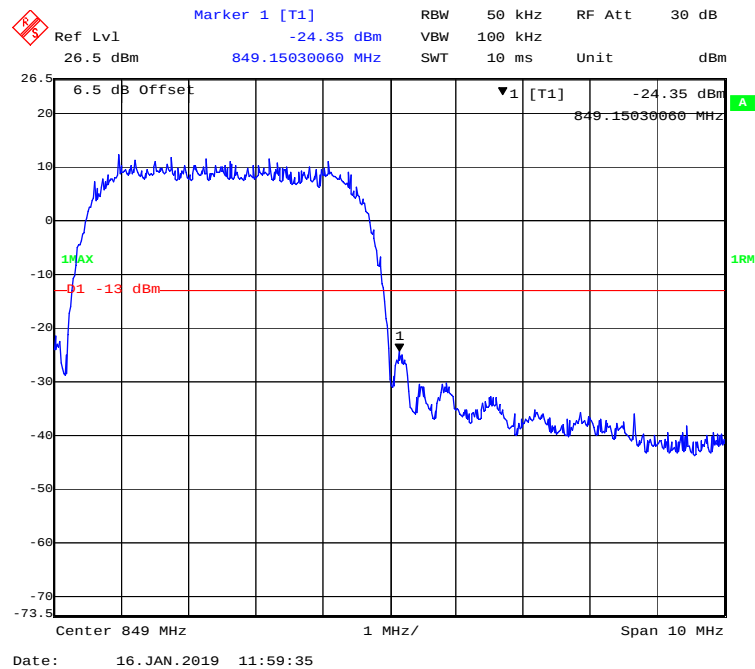


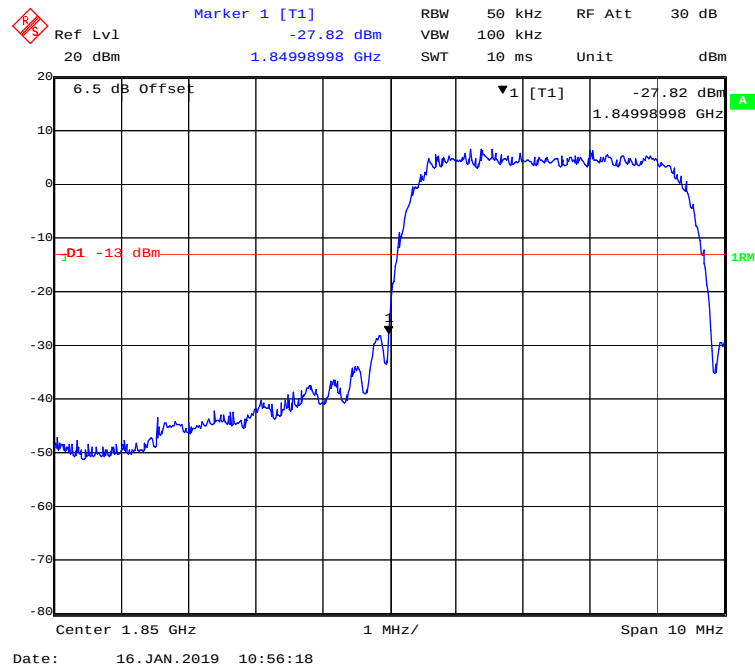
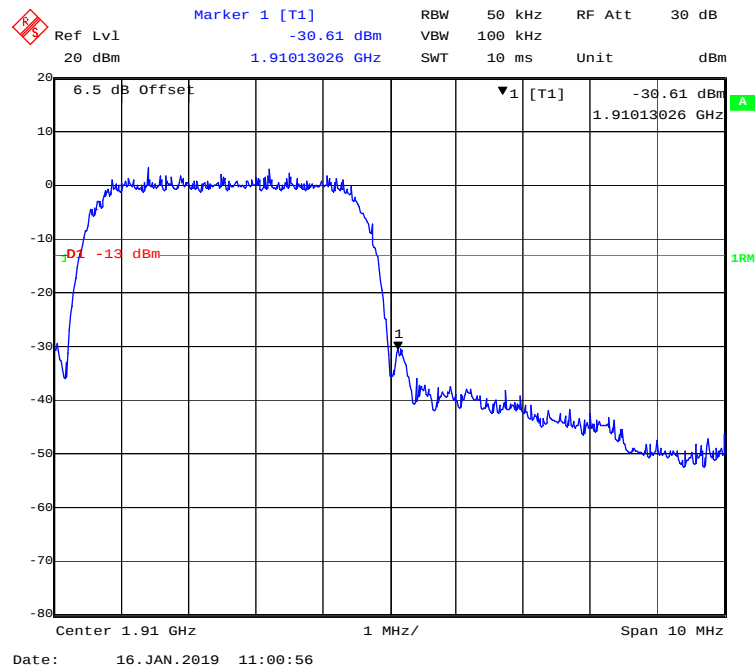
WCDMA (Rel 99) Mode, Right Band Edge



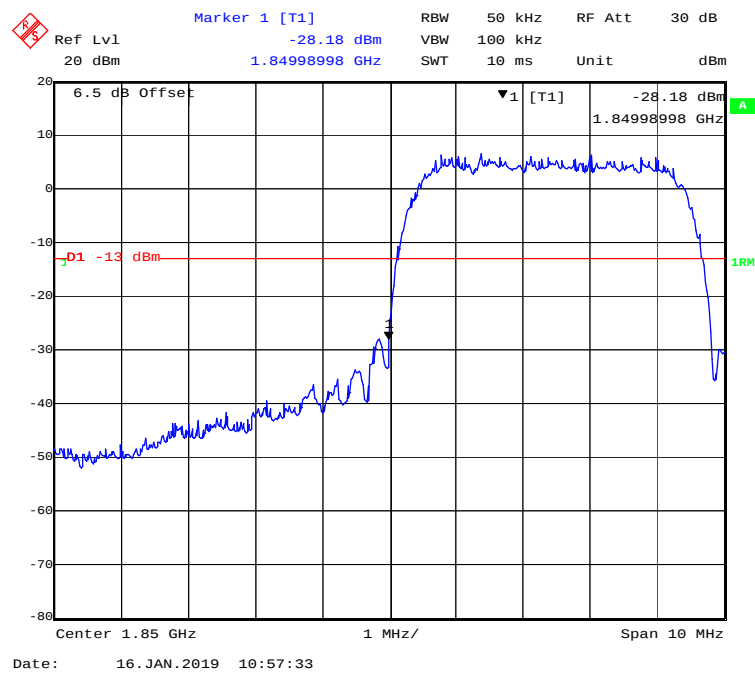
WCDMA (HSDPA) Mode, Left Band Edge**WCDMA (HSDPA) Mode, Right Band Edge**

WCDMA (HSUPA) Mode, Left Band Edge**WCDMA (HSUPA) Mode, Right Band Edge**

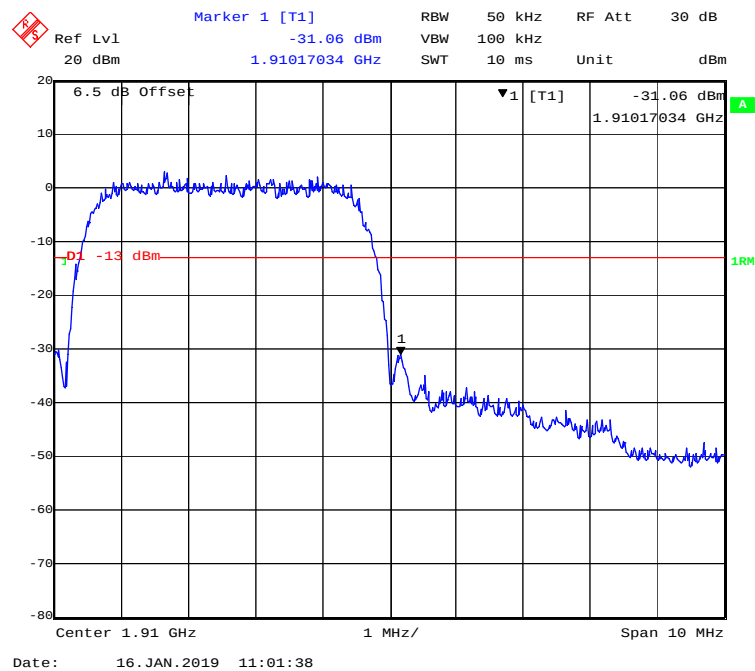
WCDMA (HSPA+) Mode, Left Band Edge**WCDMA (HSPA+) Mode, Right Band Edge**

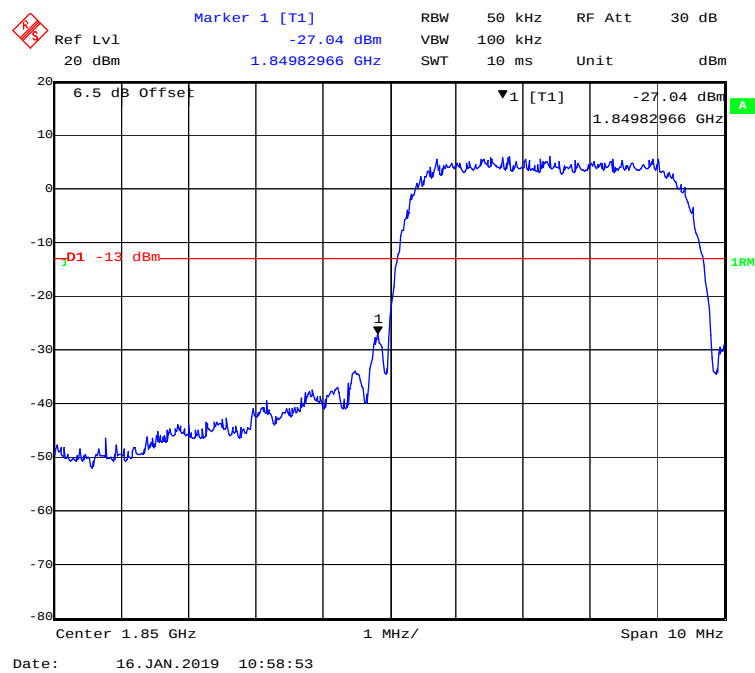
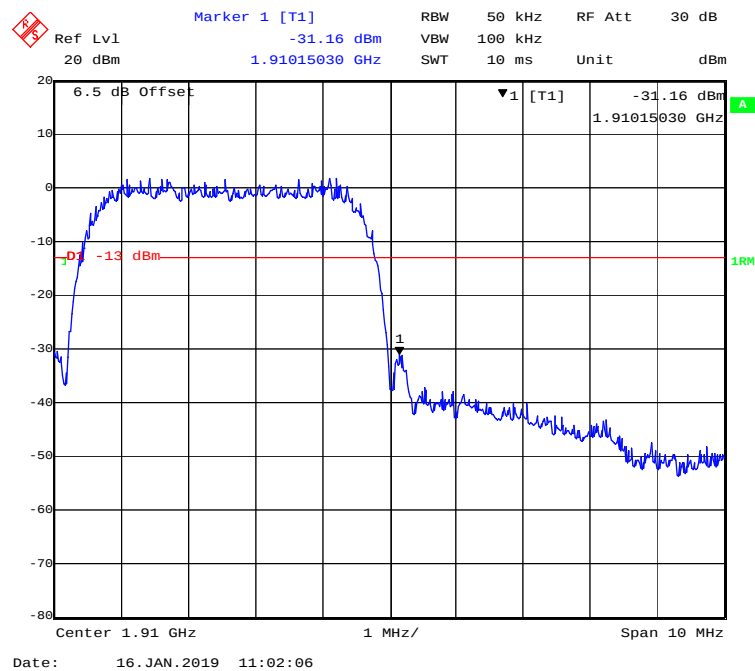
WCDMA Band II**WCDMA (Rel99) Mode, Left Band Edge****WCDMA (Rel99) Mode, Right Band Edge**

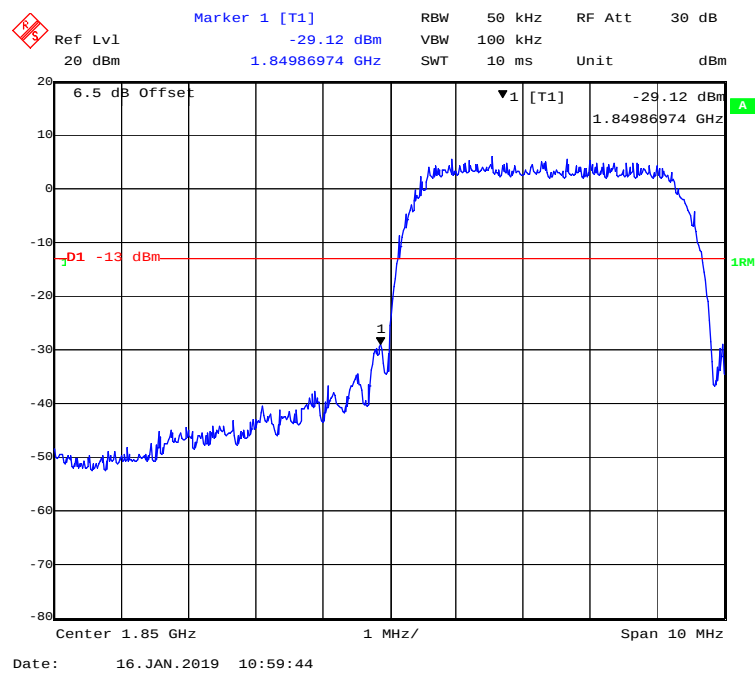
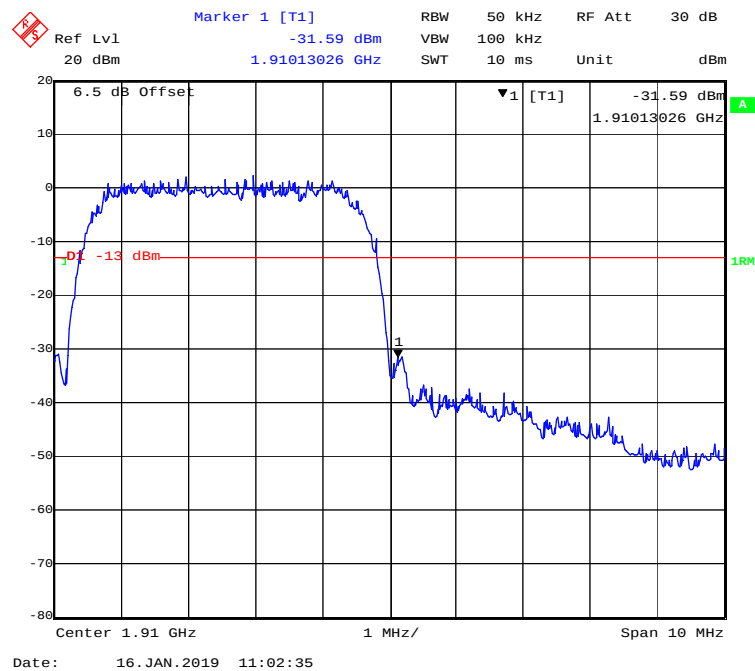
WCDMA (HSDPA) Mode, Left Band Edge

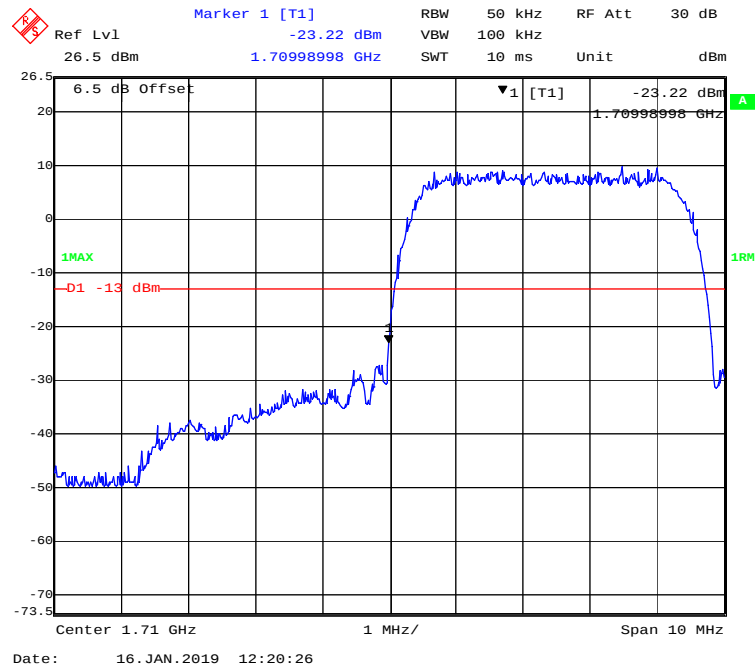
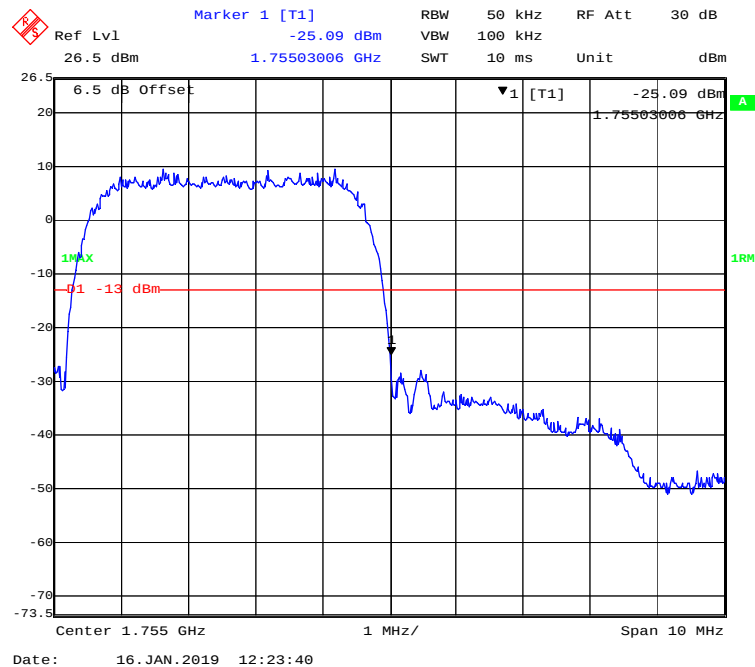


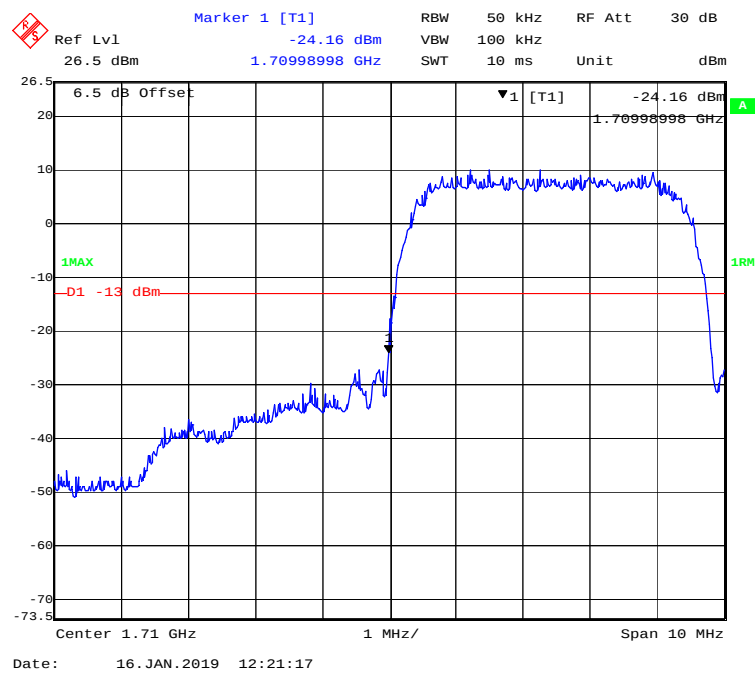
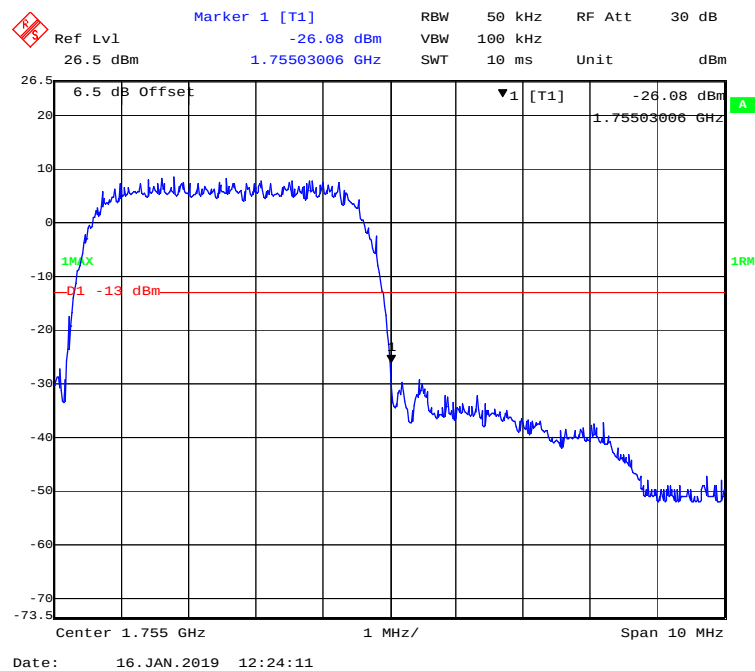
WCDMA (HSDPA) Mode, Right Band Edge

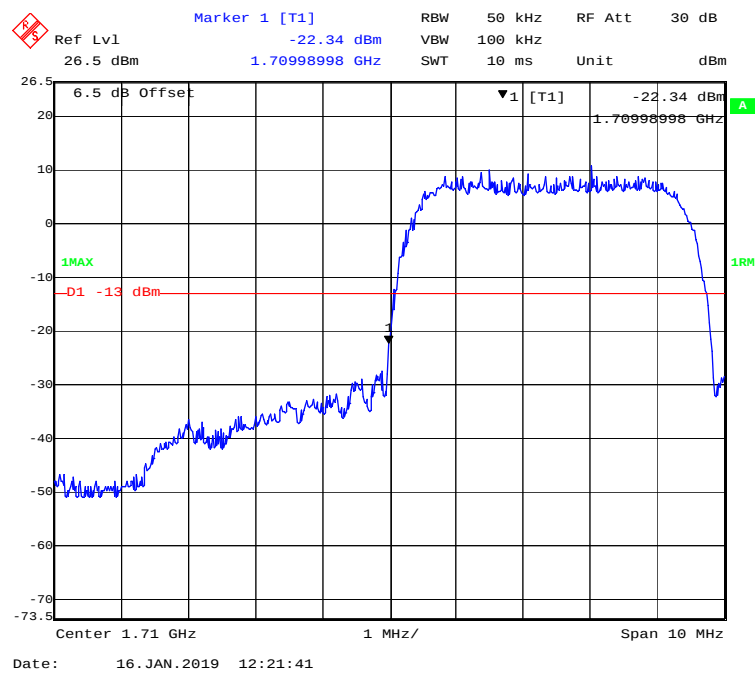
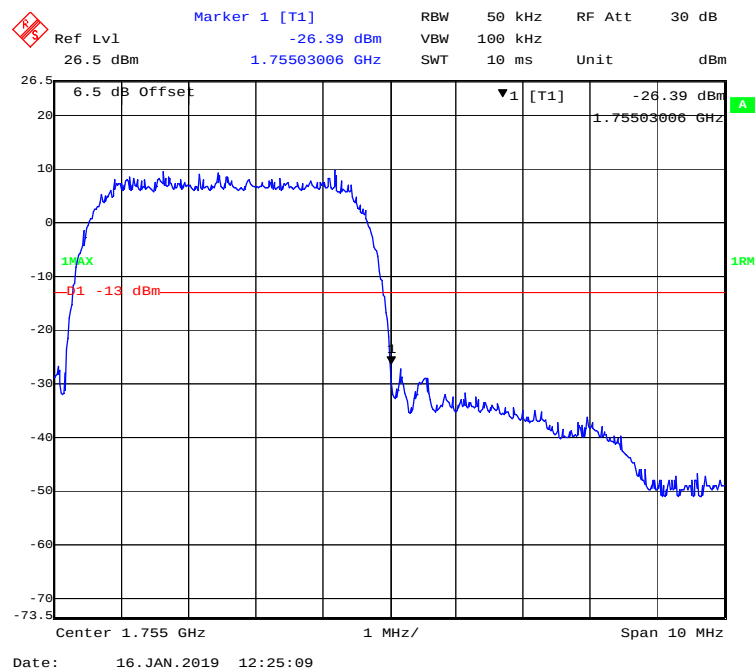


WCDMA (HSUPA) Mode, Left Band Edge**WCDMA (HSUPA) Mode, Right Band Edge**

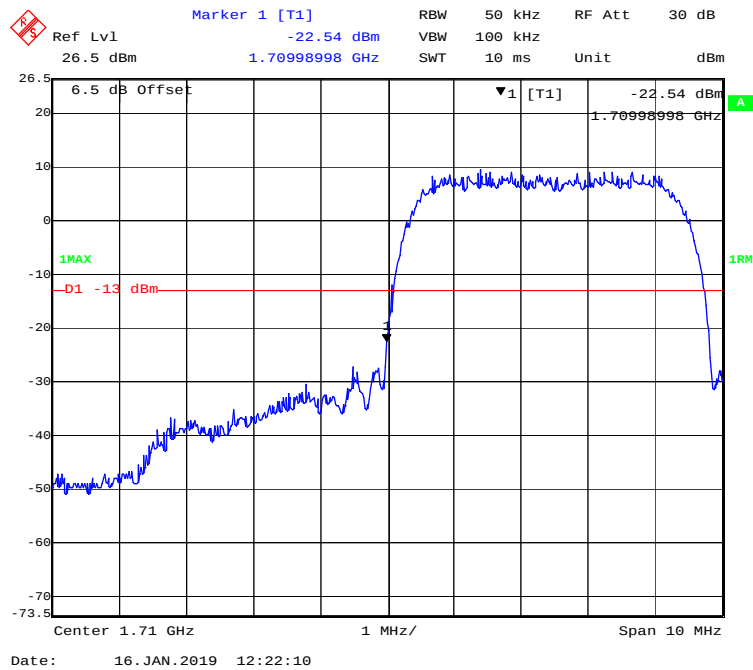
WCDMA (HSPA+) Mode, Left Band Edge**WCDMA (HSPA+) Mode, Right Band Edge**

WCDMA Band IV**WCDMA (Rel99) Mode, Left Band Edge****WCDMA (Rel99) Mode, Right Band Edge**

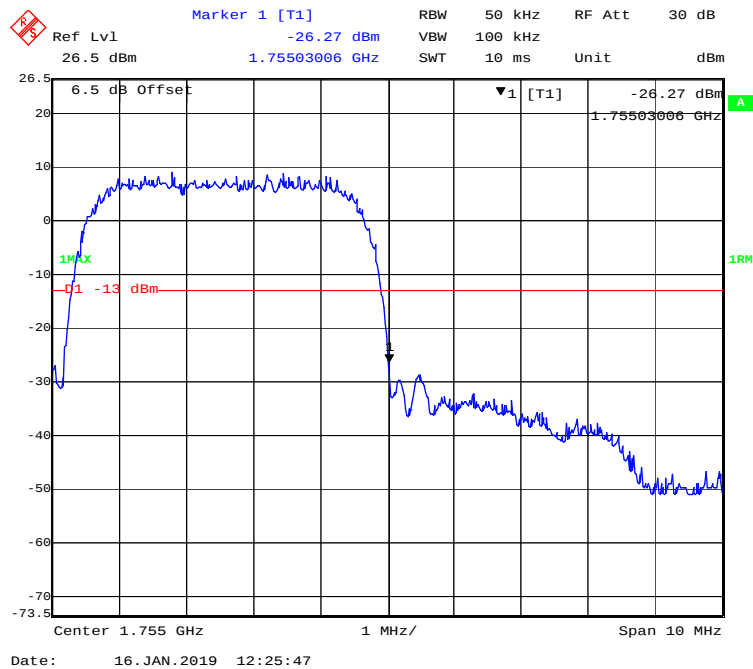
WCDMA (HSDPA) Mode, Left Band Edge**WCDMA (HSDPA) Mode, Right Band Edge**

WCDMA (HSUPA) Mode, Left Band Edge**WCDMA (HSUPA) Mode, Right Band Edge**

WCDMA (HSPA+) Mode, Left Band Edge

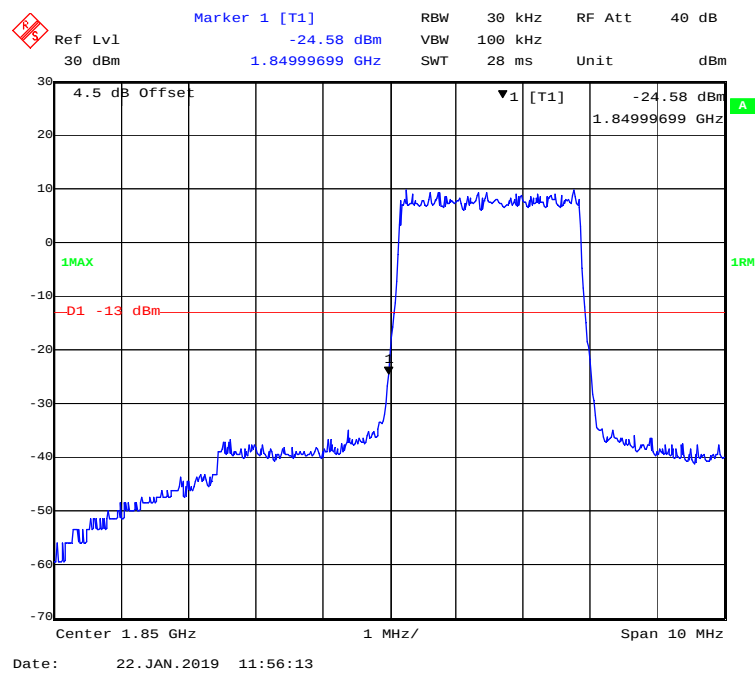
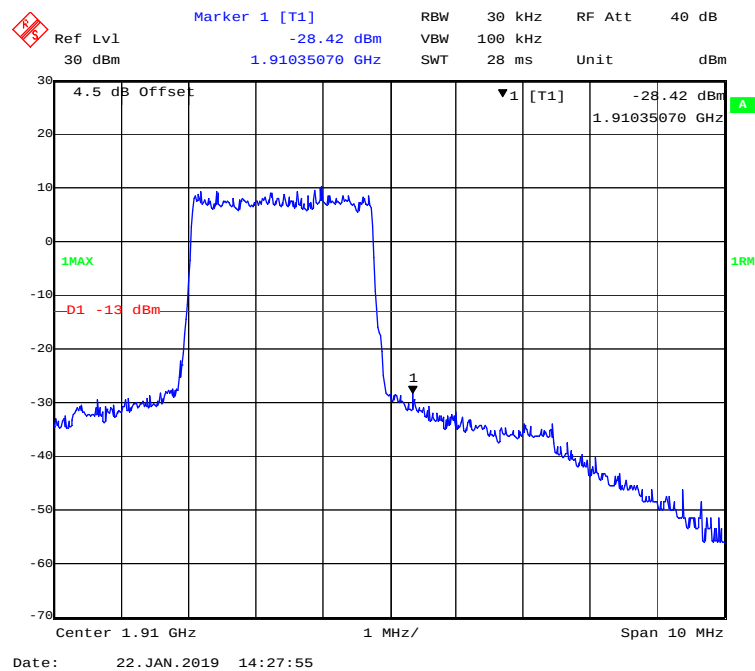


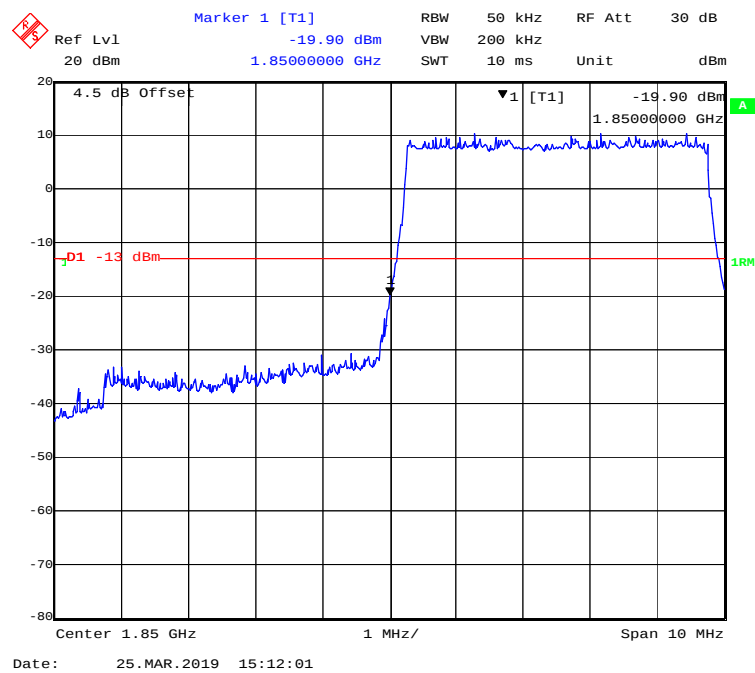
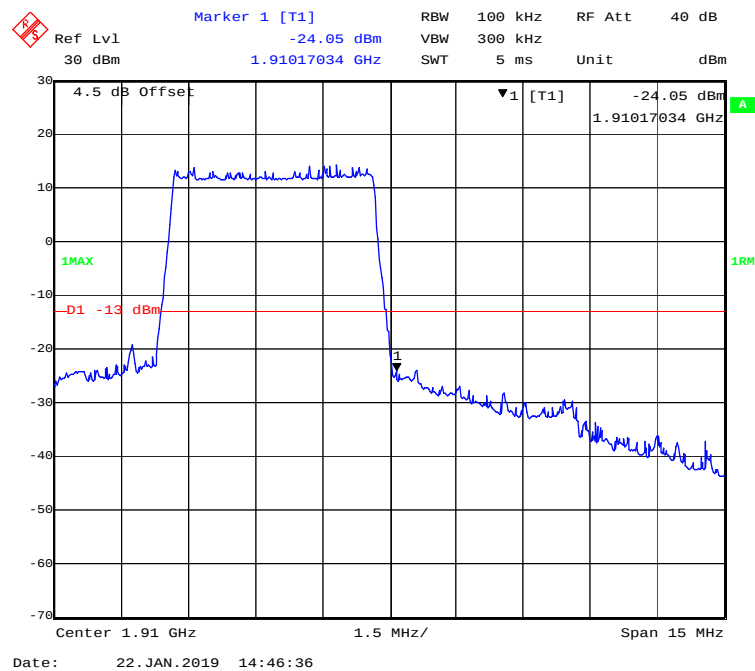
WCDMA (HSPA+) Mode, Right Band Edge



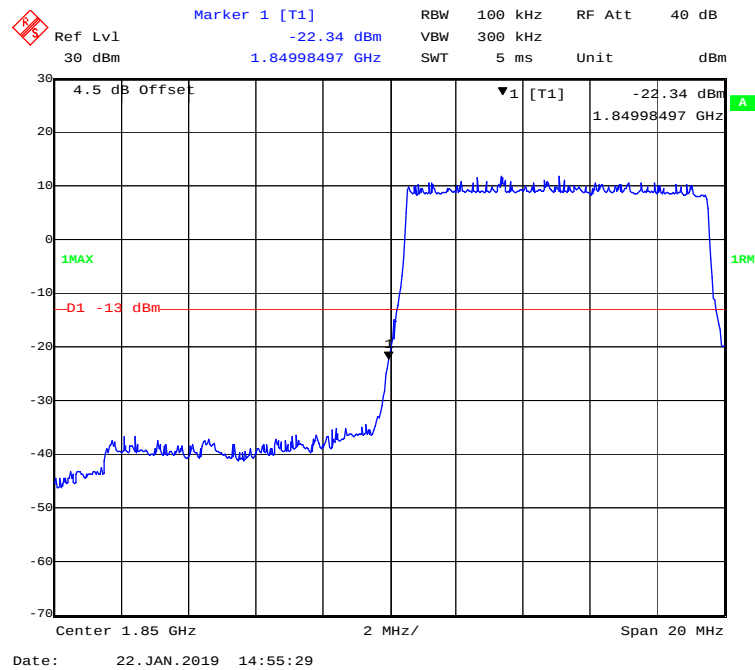
QPSK (1.4 MHz, FULL RB) - Left Band Edge



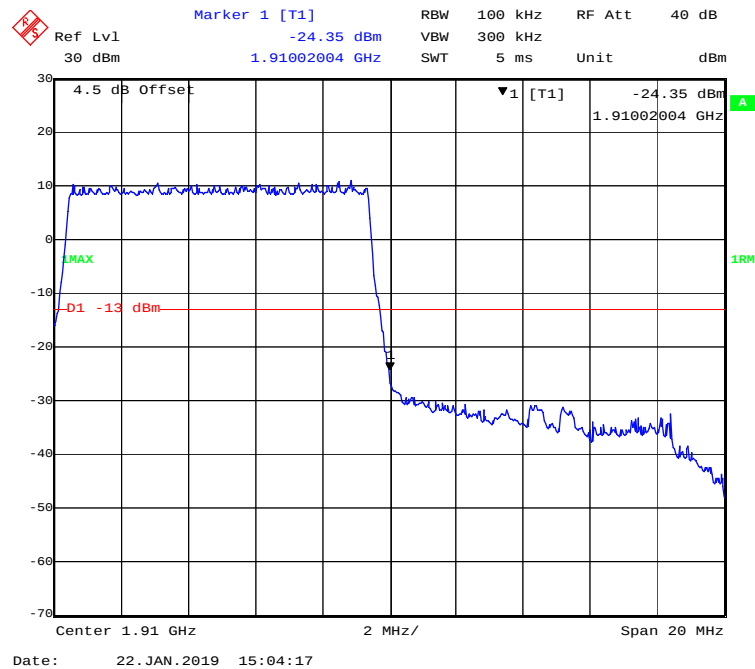
QPSK (3 MHz, FULL RB) - Left Band Edge**QPSK (3 MHz, FULL RB) - Right Band Edge**

QPSK (5 MHz, FULL RB) - Left Band Edge**QPSK (5 MHz, FULL RB) - Right Band Edge**

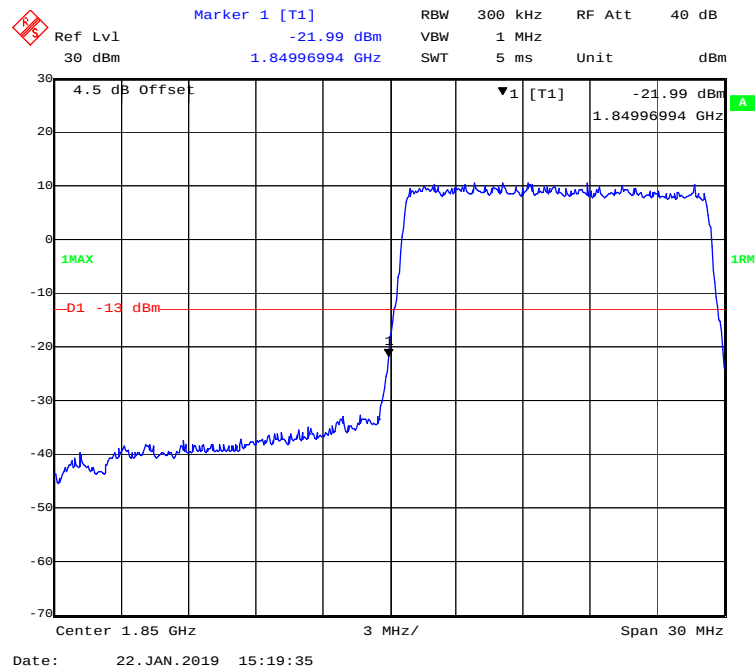
QPSK (10 MHz, FULL RB) - Left Band Edge



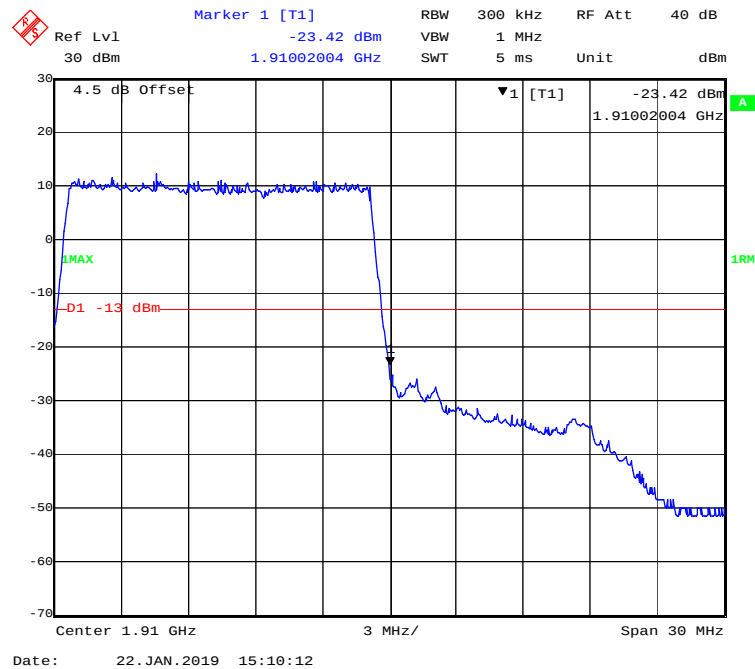
QPSK (10 MHz, FULL RB) - Right Band Edge



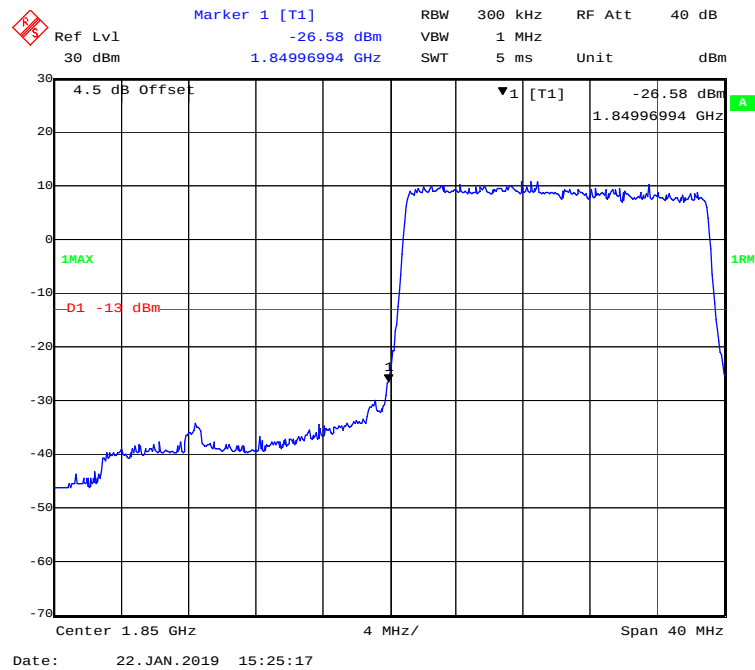
QPSK (15 MHz, FULL RB) - Left Band Edge



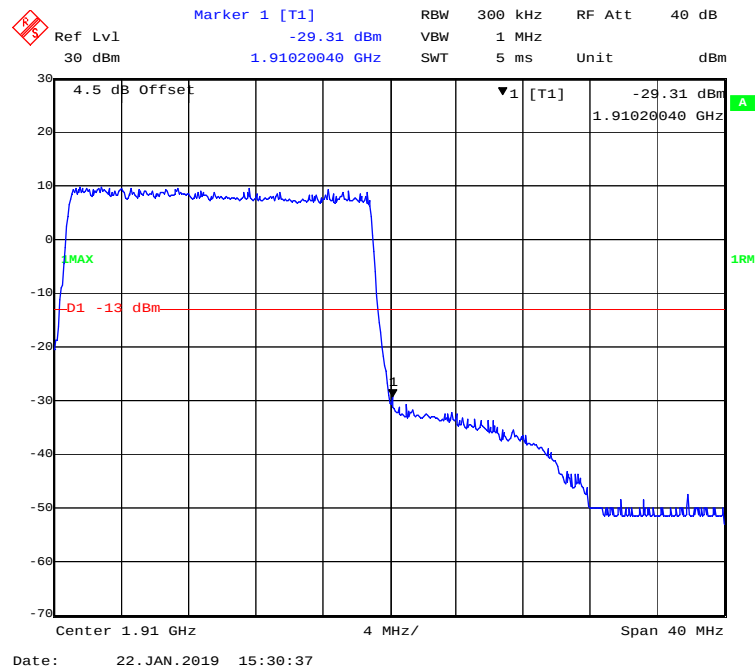
QPSK (15 MHz, FULL RB) - Right Band Edge



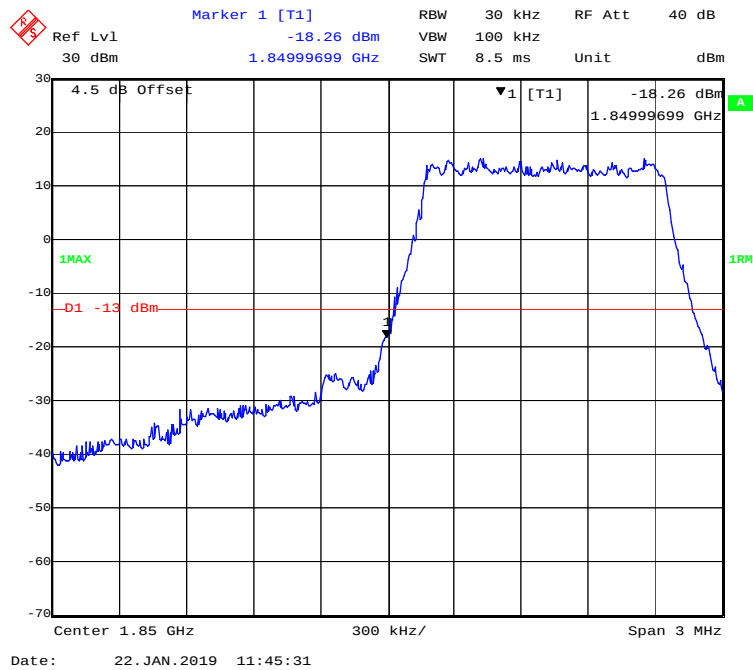
QPSK (20 MHz, FULL RB) - Left Band Edge



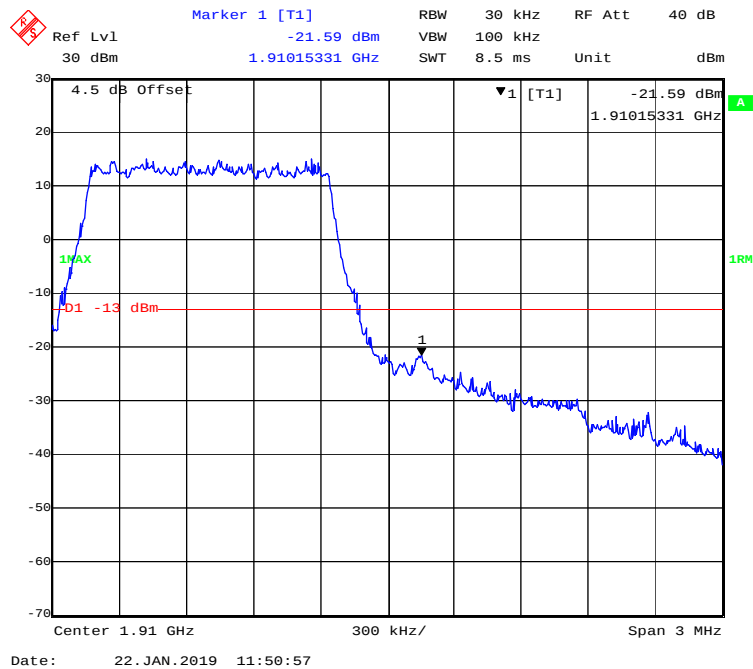
QPSK (20 MHz, FULL RB) - Right Band Edge



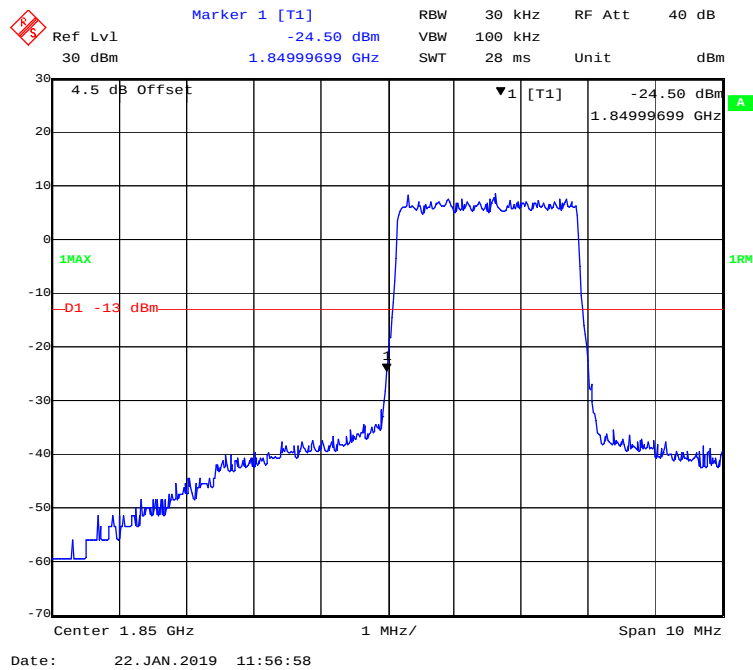
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



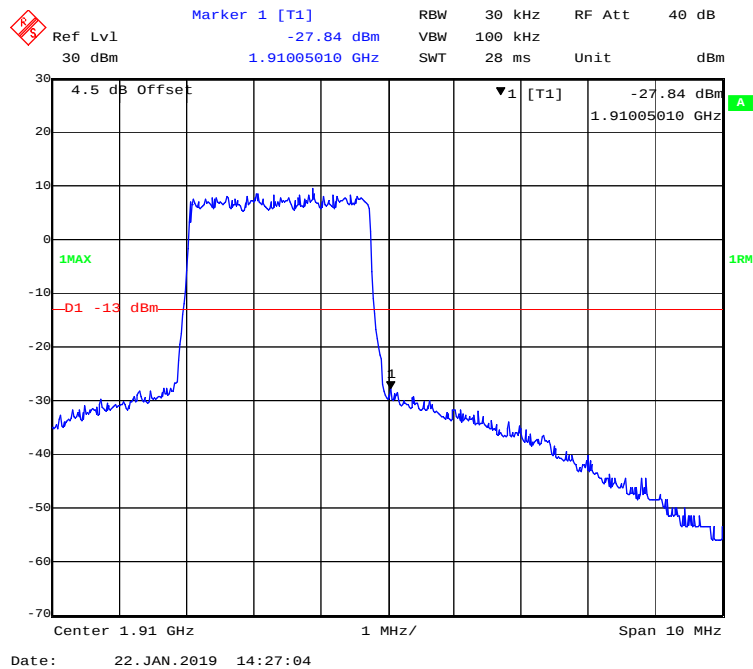
16-QAM (1.4 MHz, FULL RB) - Right Band Edge

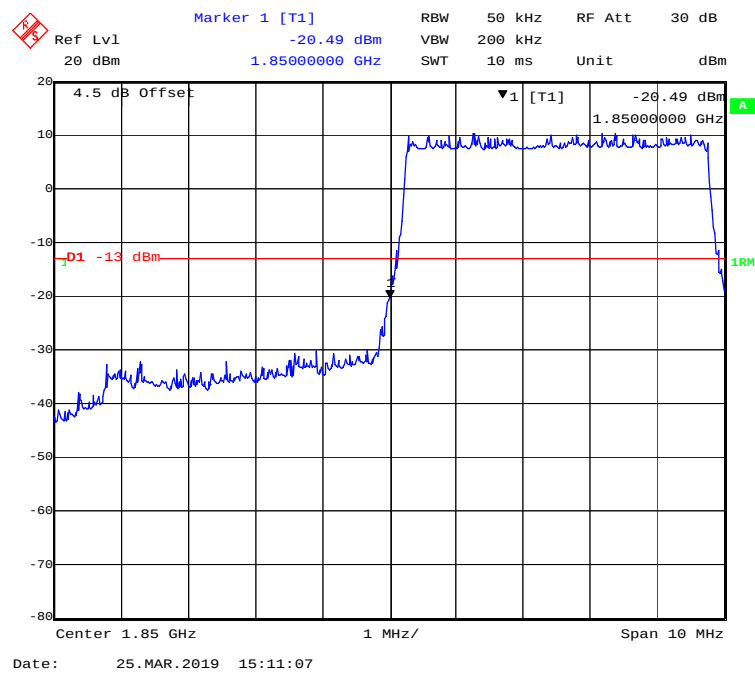
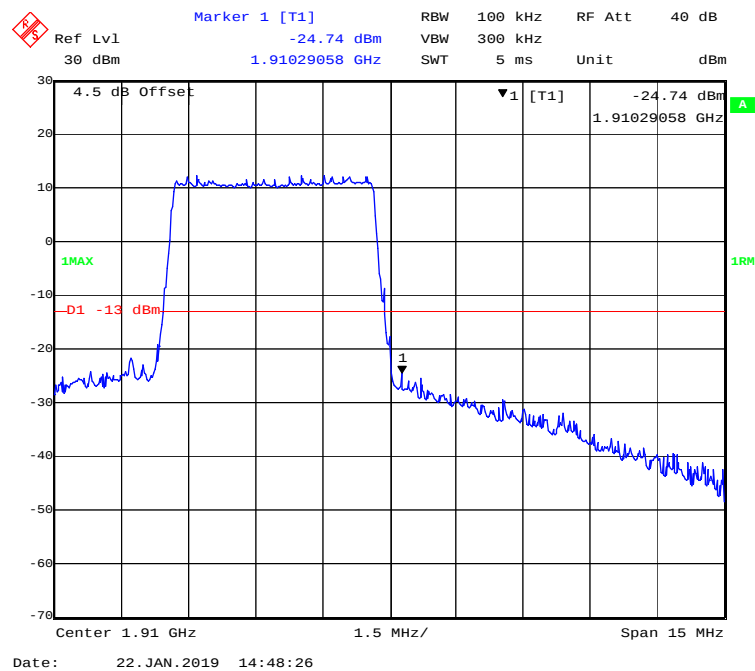


16-QAM (3 MHz, FULL RB) - Left Band Edge

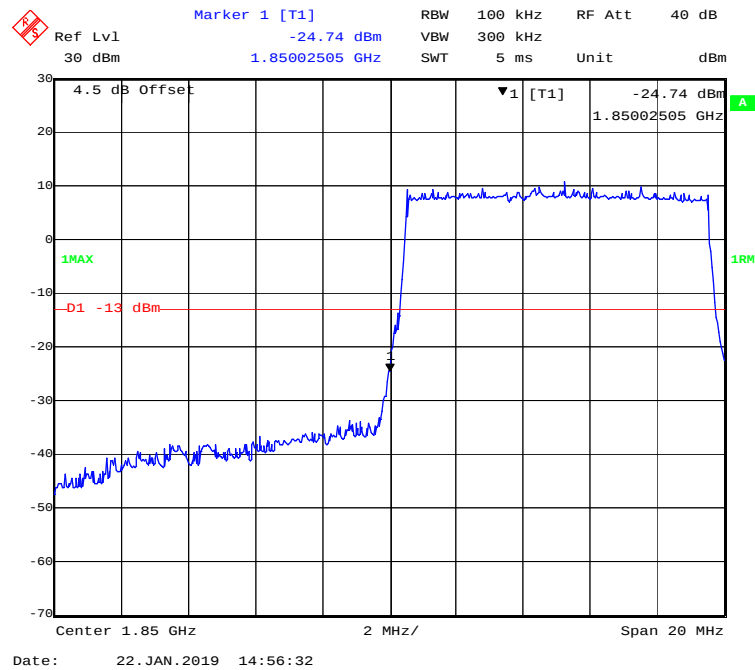


16-QAM (3 MHz, FULL RB) - Right Band Edge

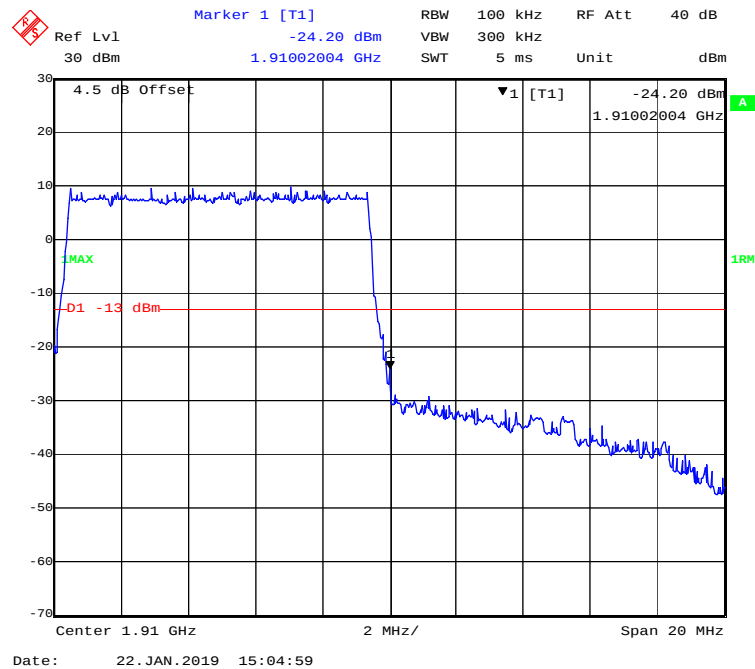


16-QAM (5 MHz, FULL RB) - Left Band Edge**16-QAM (5 MHz, FULL RB) - Right Band Edge**

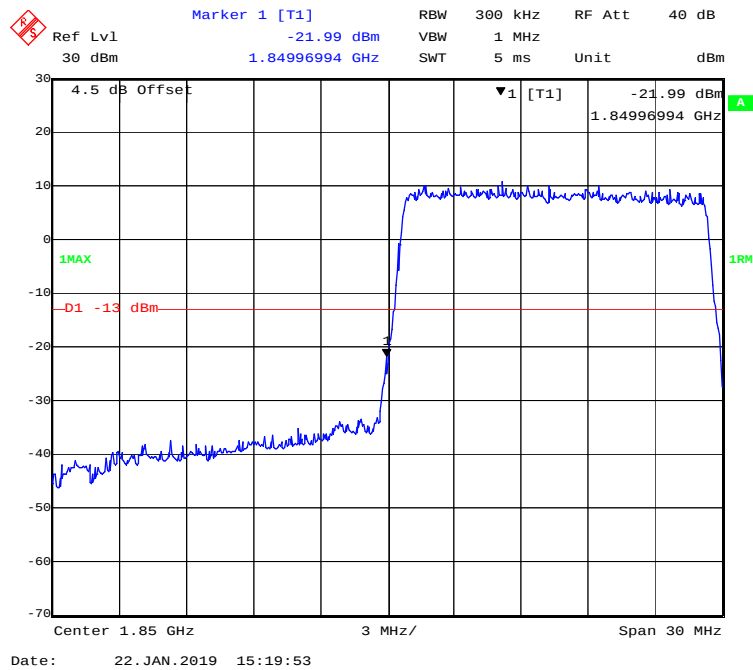
16-QAM (10 MHz, FULL RB) - Left Band Edge



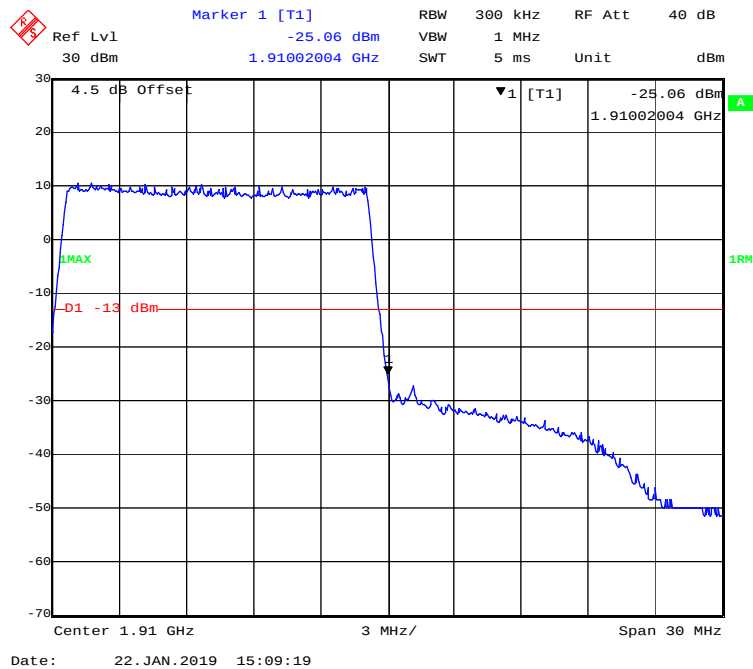
16-QAM (10 MHz, FULL RB) - Right Band Edge



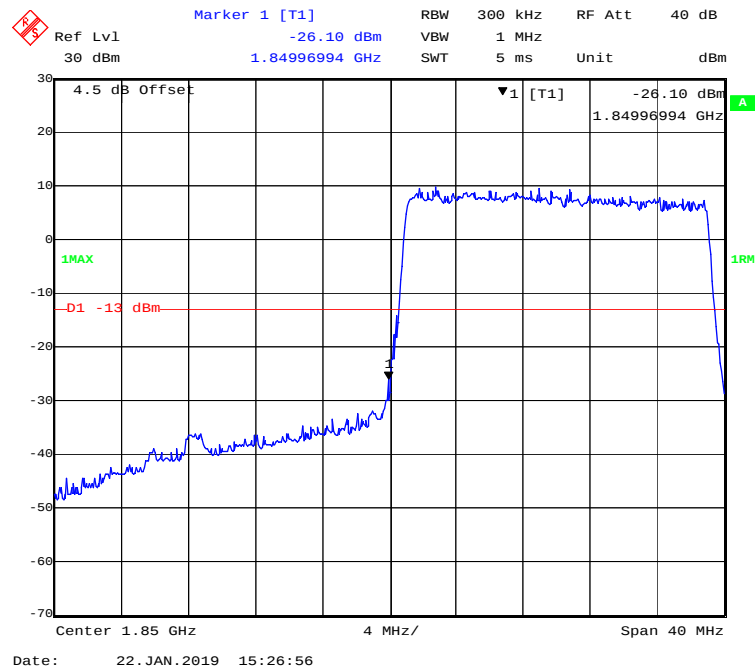
16-QAM (15 MHz, FULL RB) - Left Band Edge



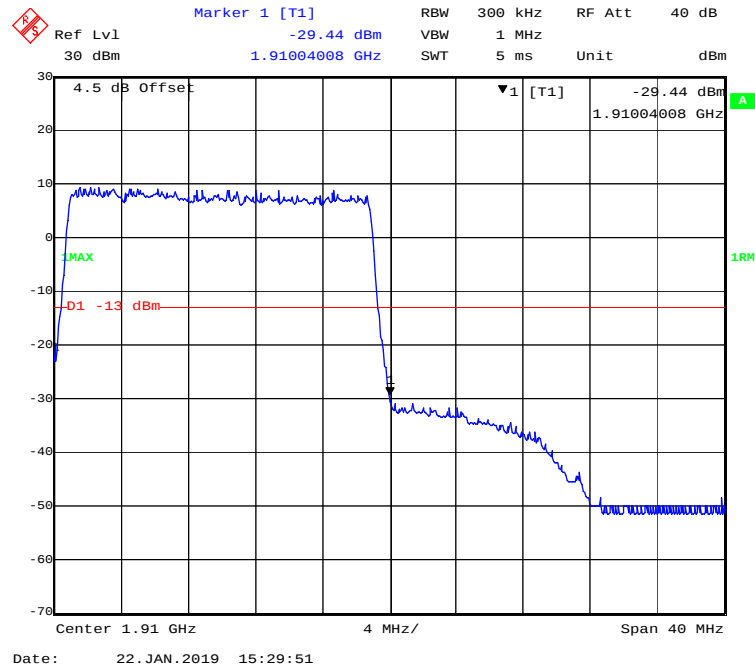
16-QAM (15 MHz, FULL RB) - Right Band Edge

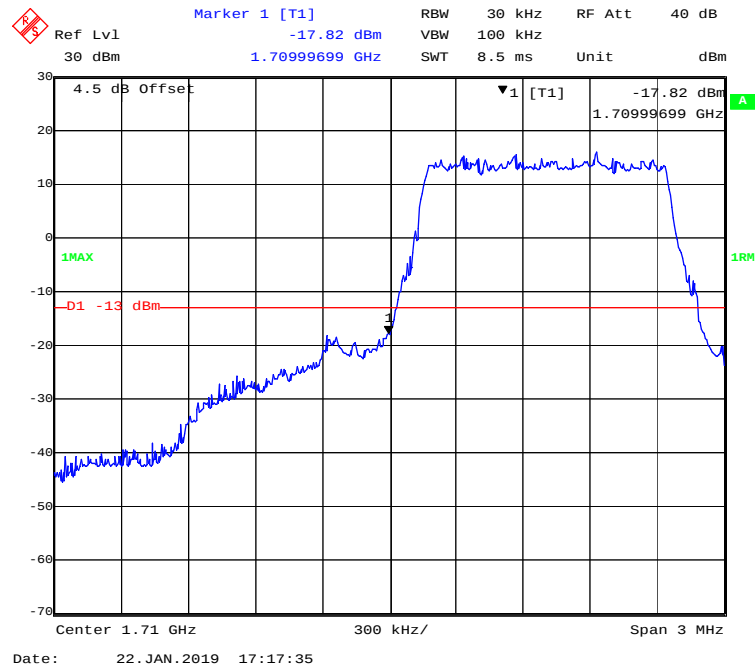
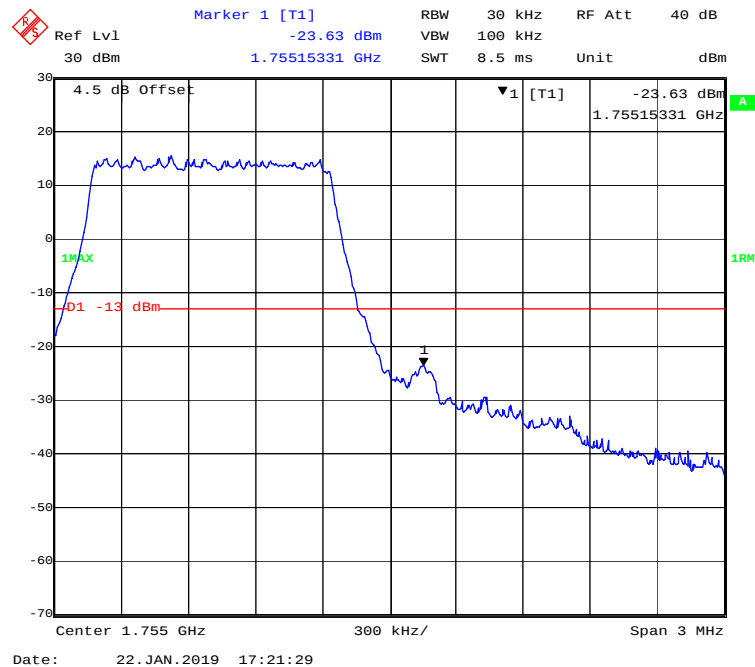


16-QAM (20 MHz, FULL RB) - Left Band Edge

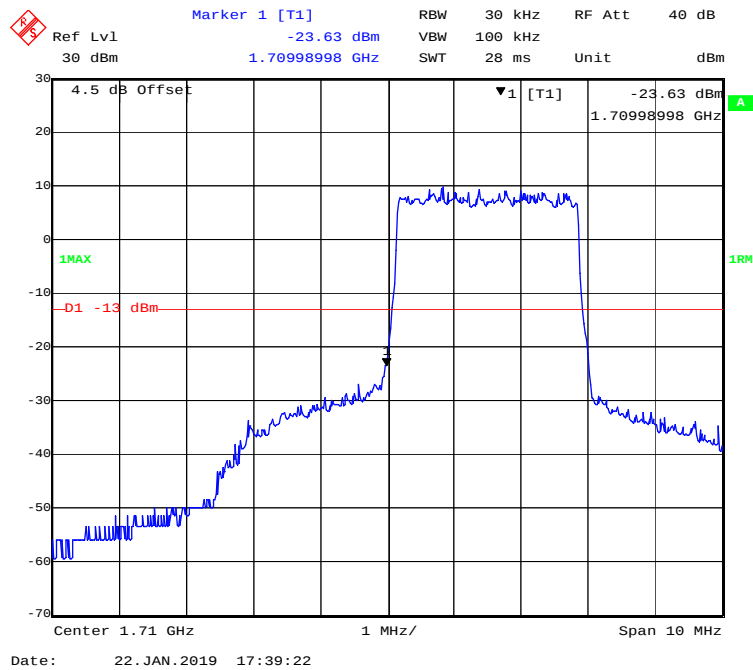


16-QAM (20 MHz, FULL RB) - Right Band Edge

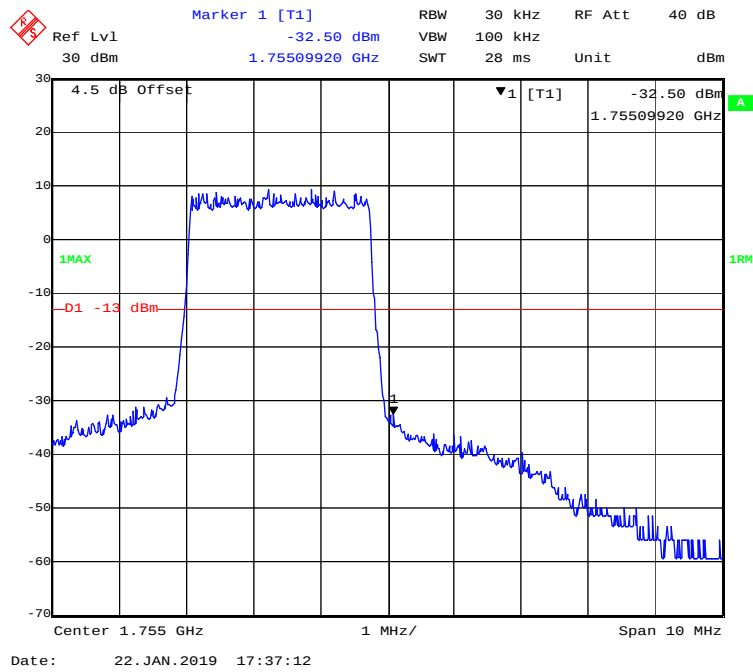


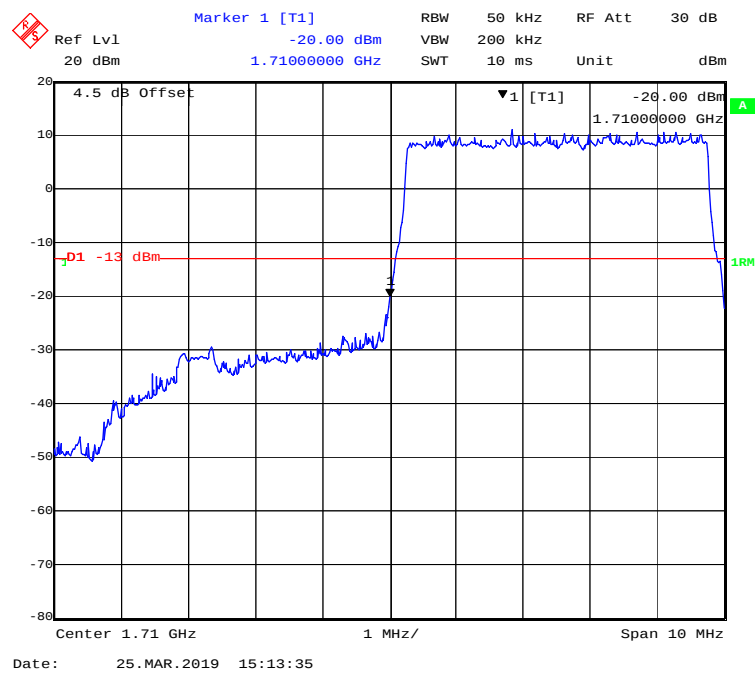
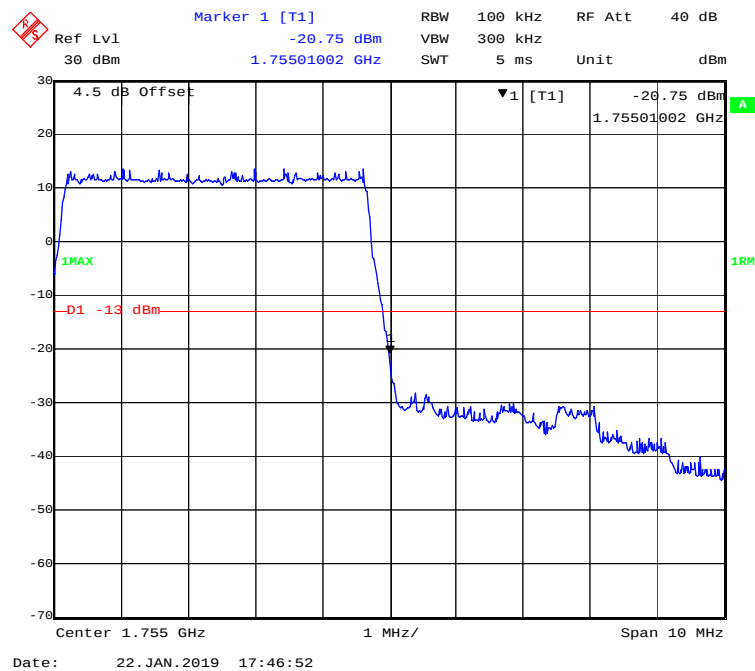
LTE Band 4:**QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

QPSK (3 MHz, FULL RB) - Left Band Edge

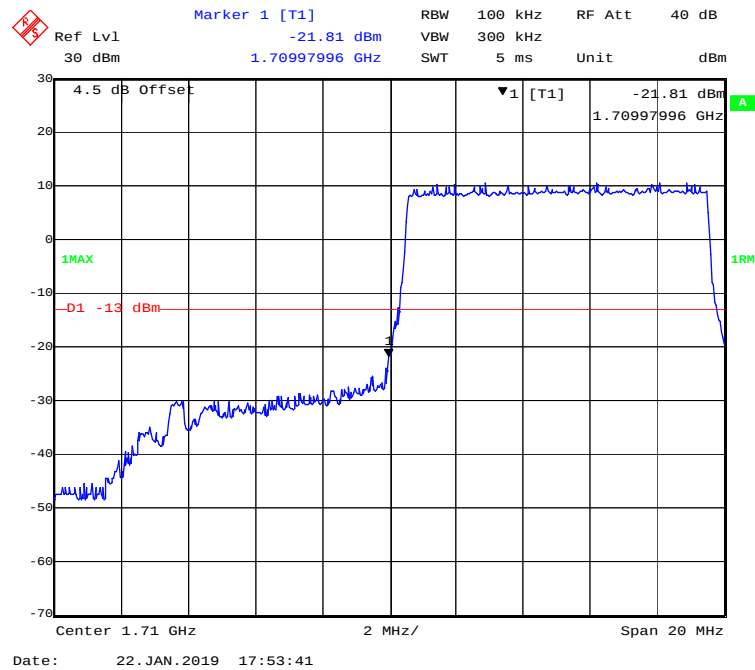


QPSK (3 MHz, FULL RB) - Right Band Edge

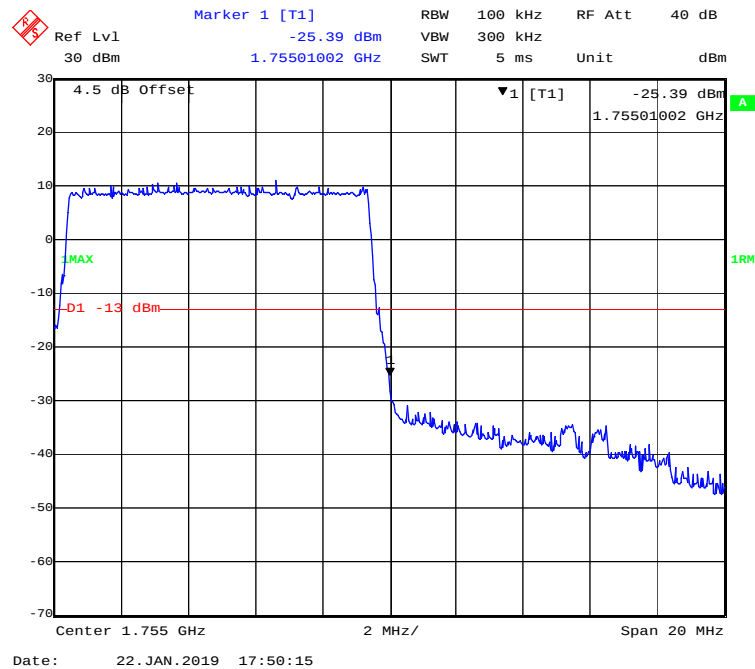


QPSK (5 MHz, FULL RB) - Left Band Edge**QPSK (5 MHz, FULL RB) - Right Band Edge**

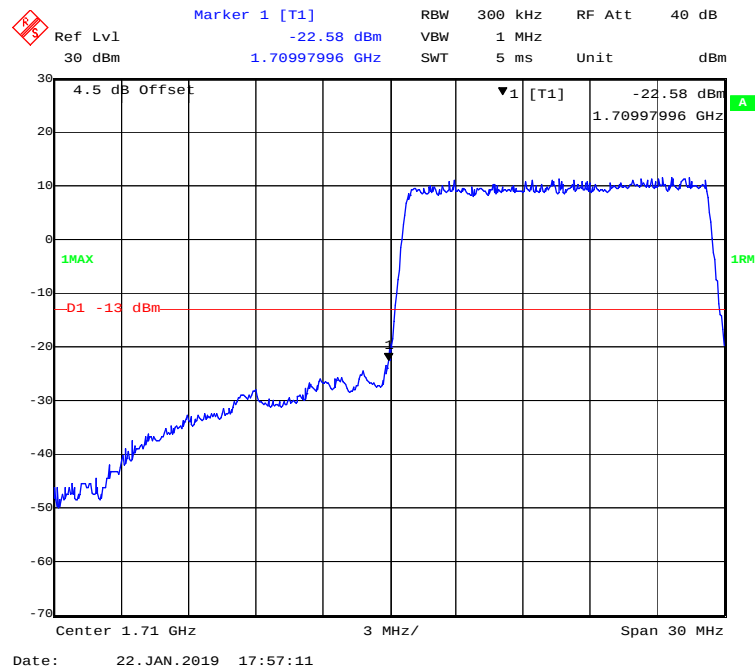
QPSK (10 MHz, FULL RB) - Left Band Edge



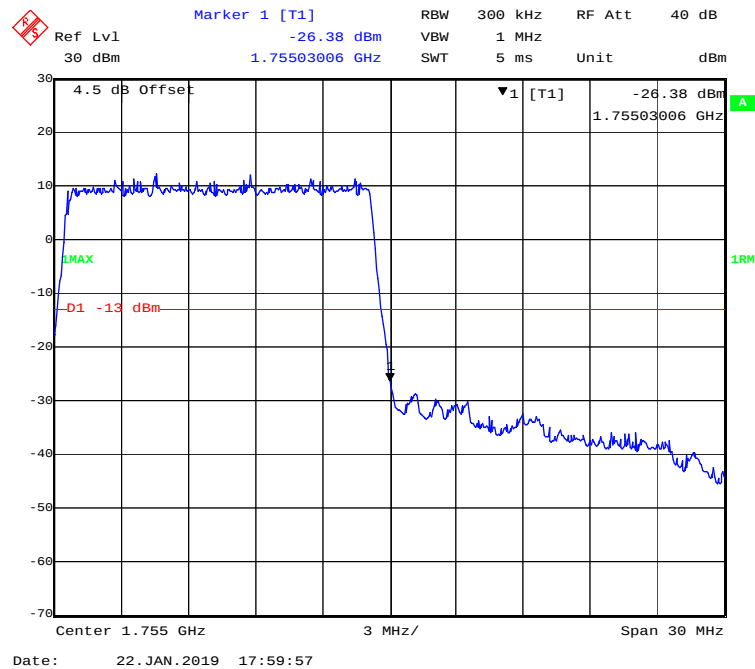
QPSK (10 MHz, FULL RB) - Right Band Edge



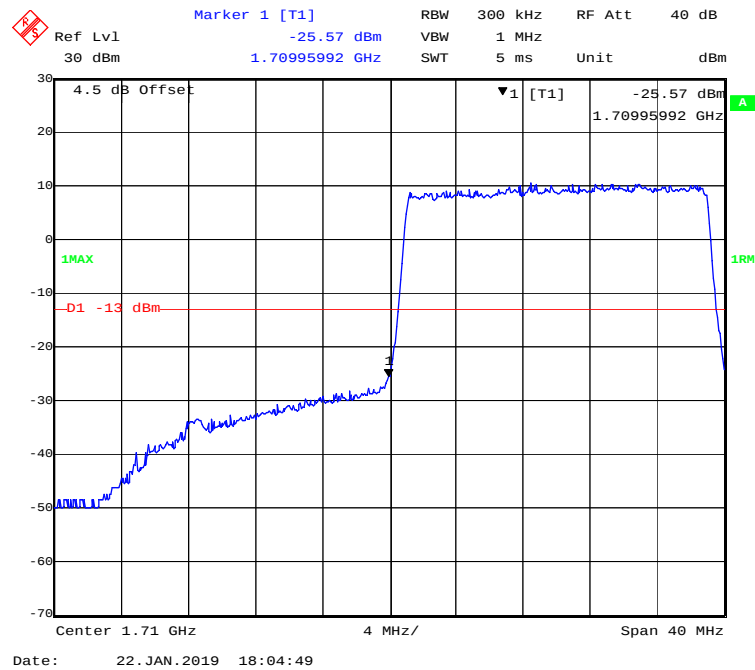
QPSK (15 MHz, FULL RB) - Left Band Edge



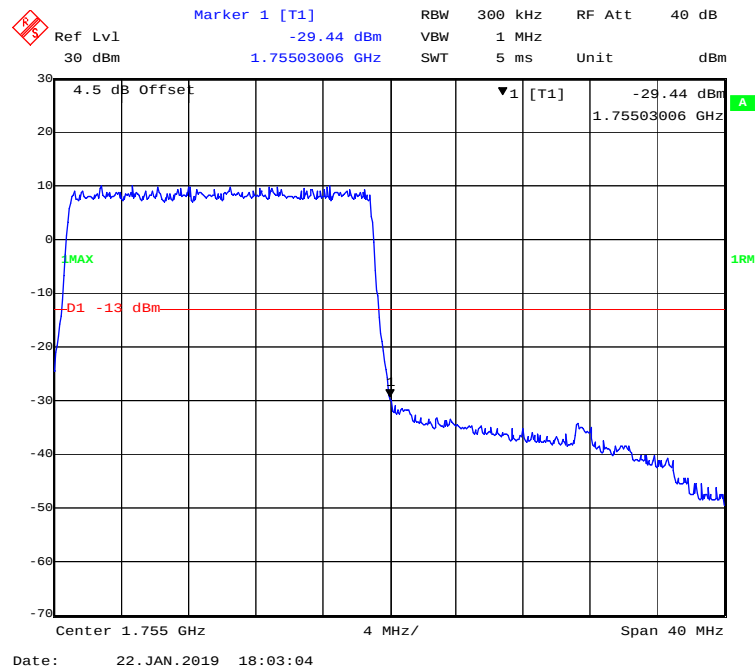
QPSK (15 MHz, FULL RB) - Right Band Edge

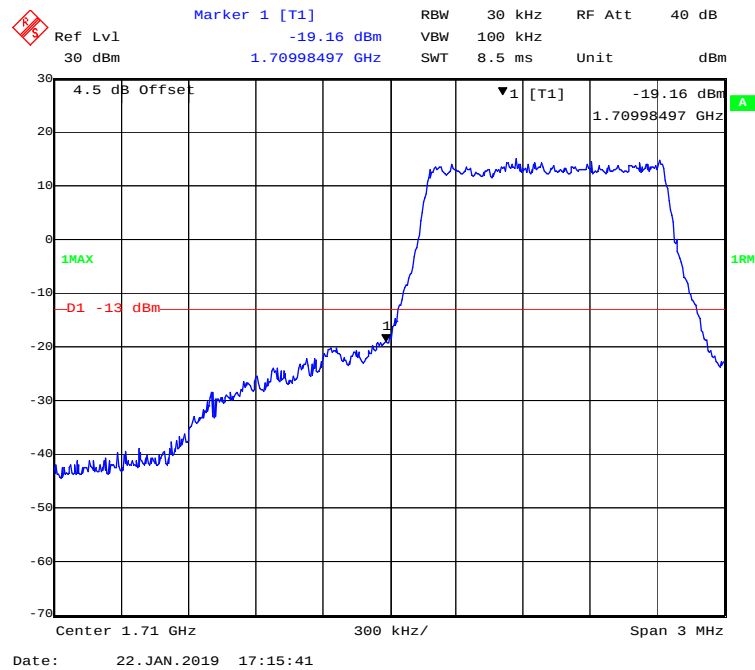
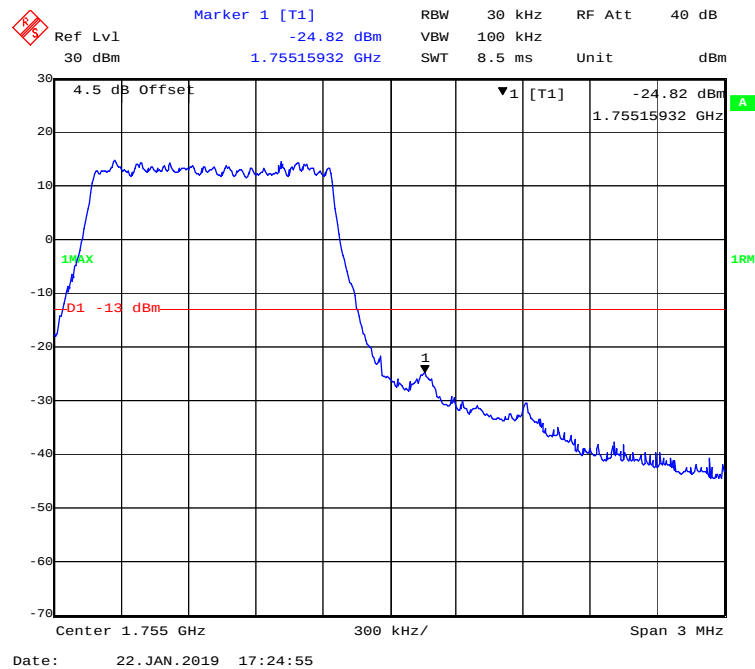


QPSK (20 MHz, FULL RB) - Left Band Edge

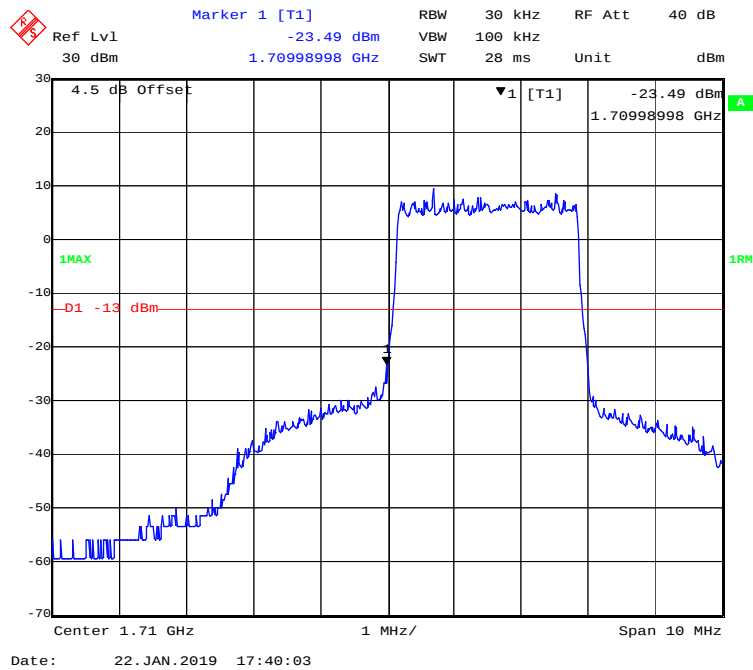


QPSK (20 MHz, FULL RB) - Right Band Edge

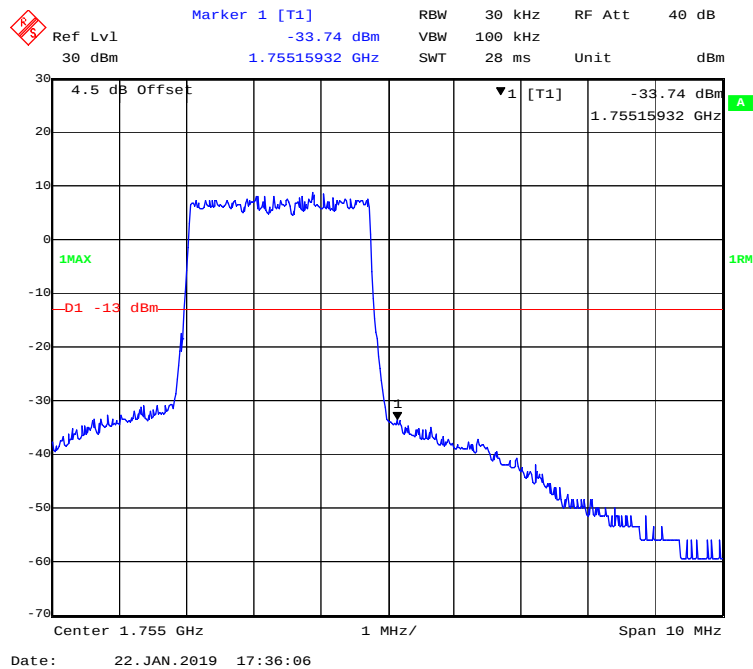


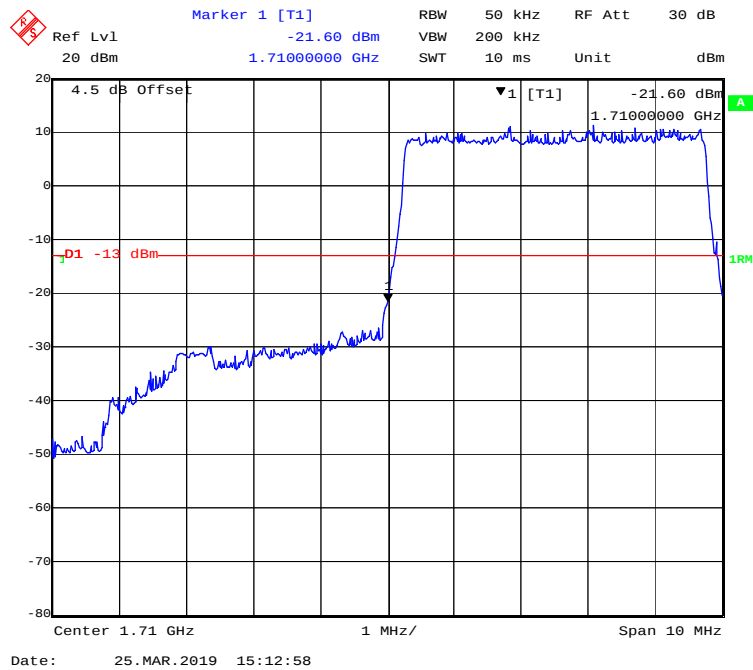
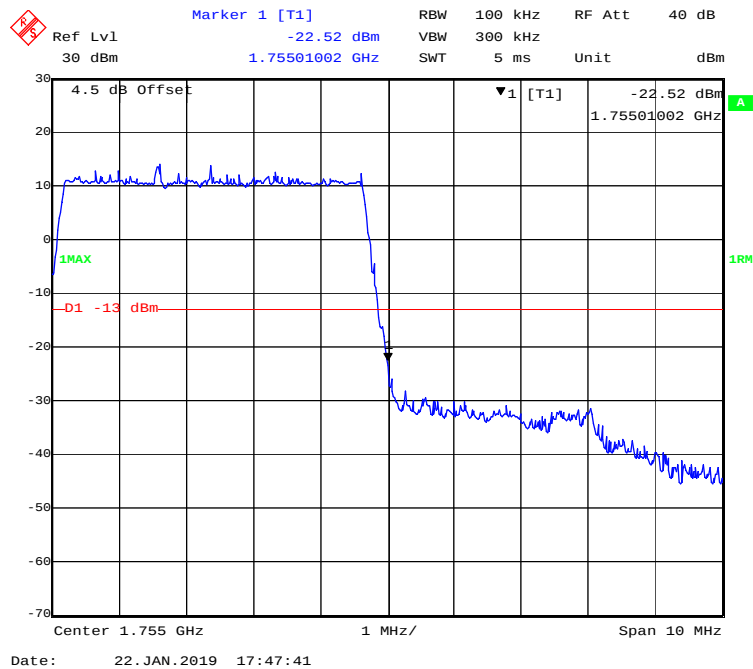
16-QAM (1.4 MHz, FULL RB) - Left Band Edge**16-QAM (1.4 MHz, FULL RB) - Right Band Edge**

16-QAM (3 MHz, FULL RB) - Left Band Edge

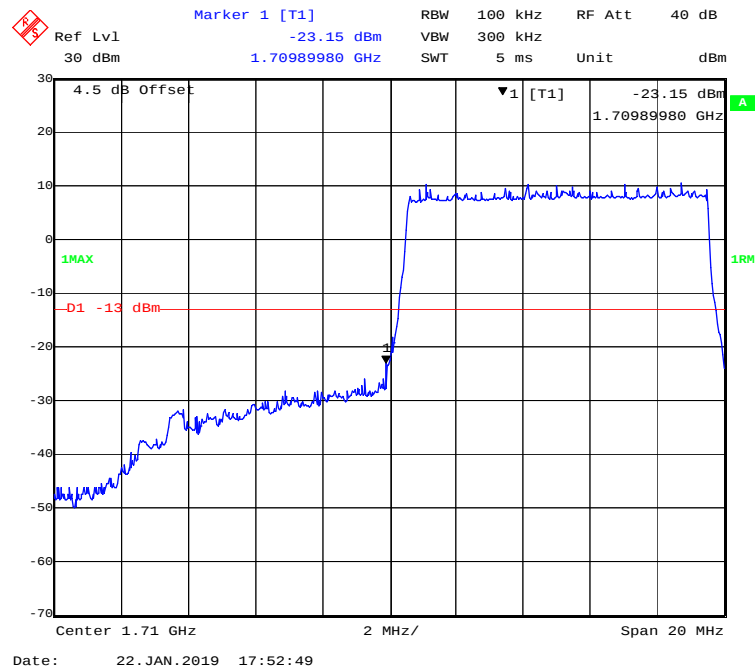


16-QAM (3 MHz, FULL RB) - Right Band Edge

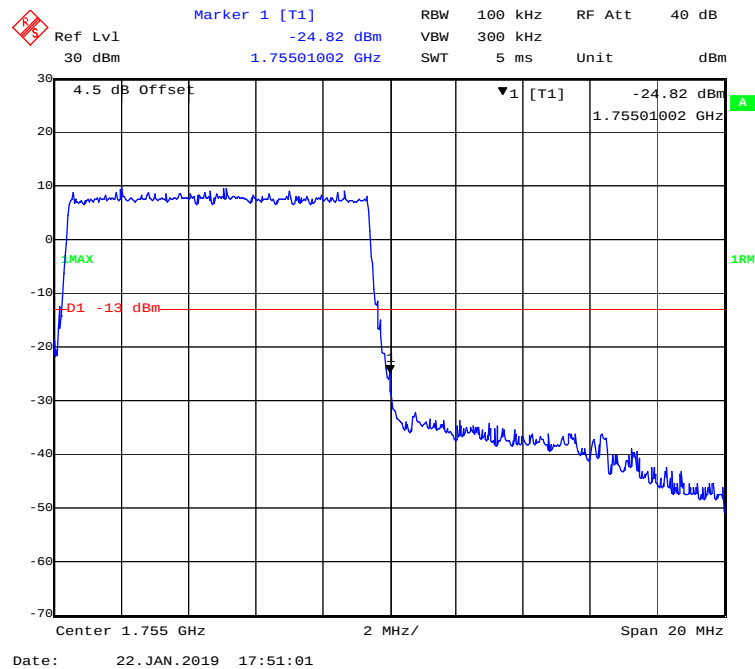


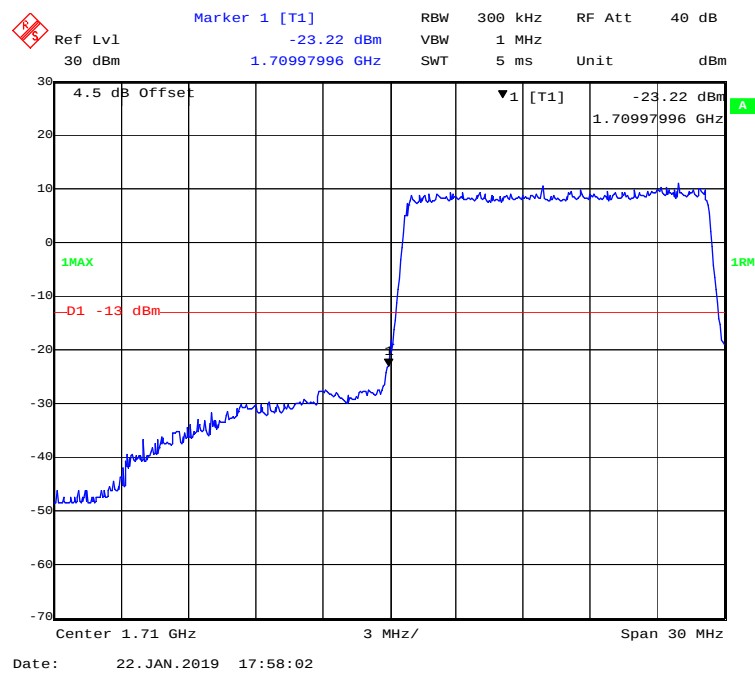
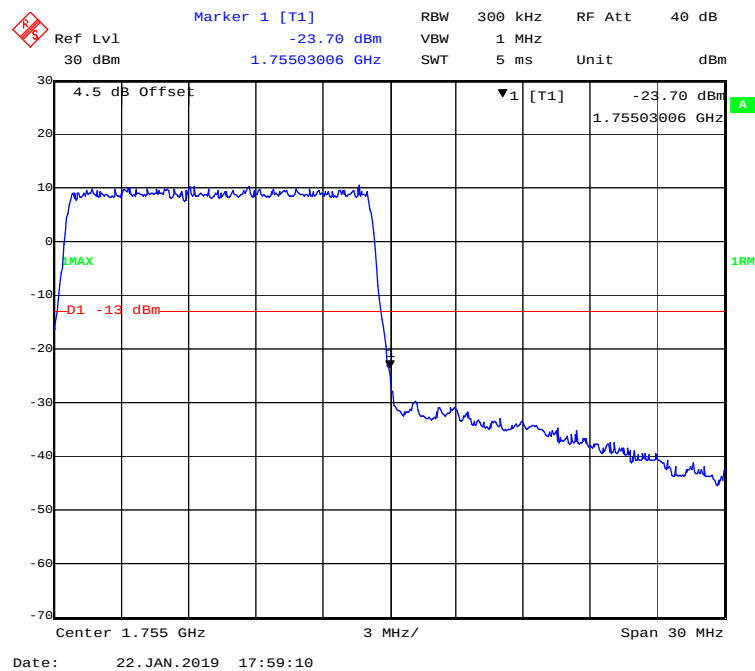
16-QAM (5 MHz, FULL RB) - Left Band Edge**16-QAM (5 MHz, FULL RB) - Right Band Edge**

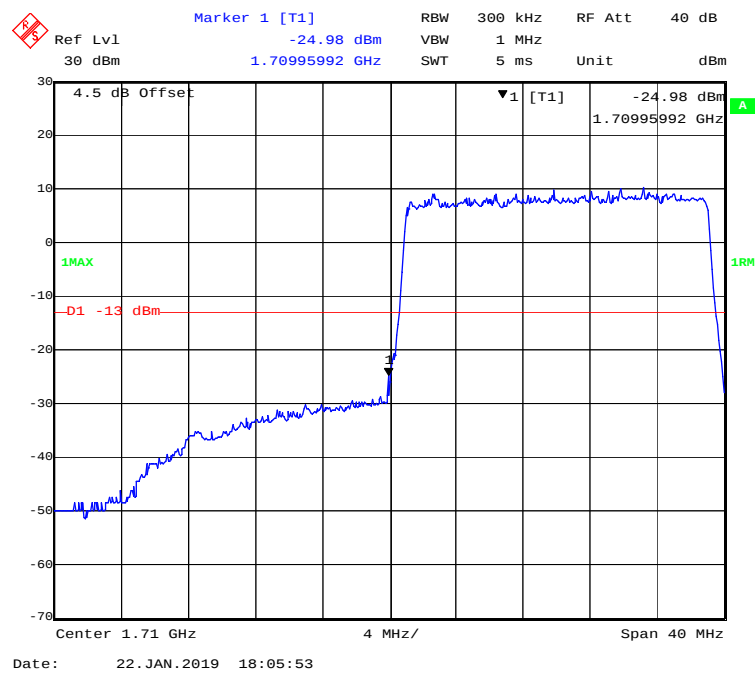
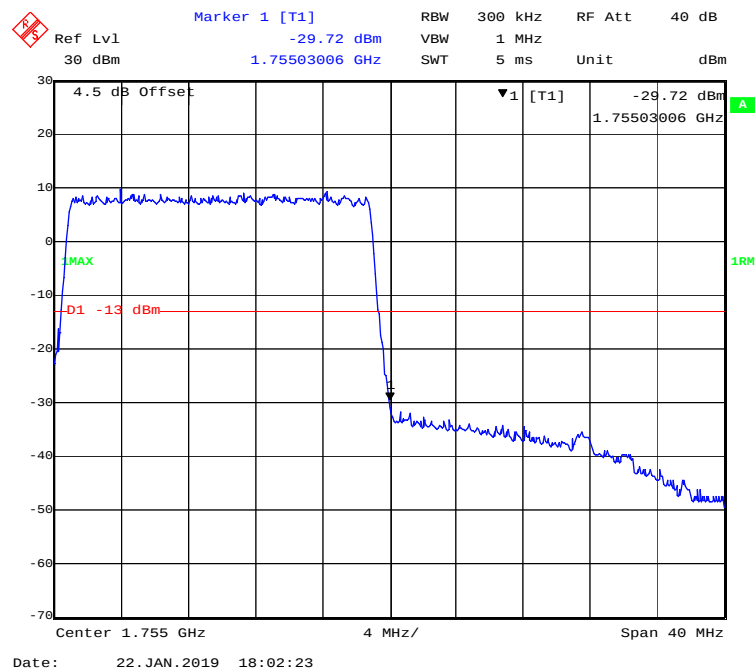
16-QAM (10 MHz, FULL RB) - Left Band Edge

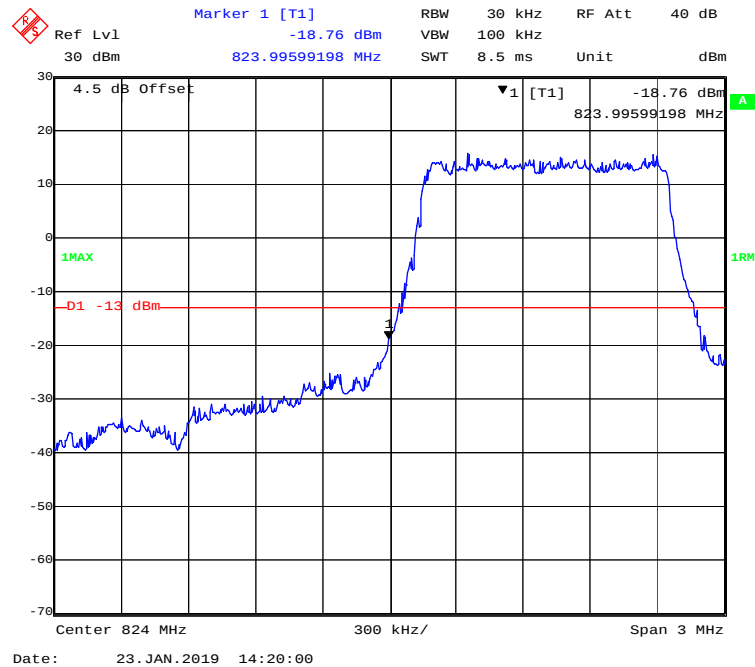
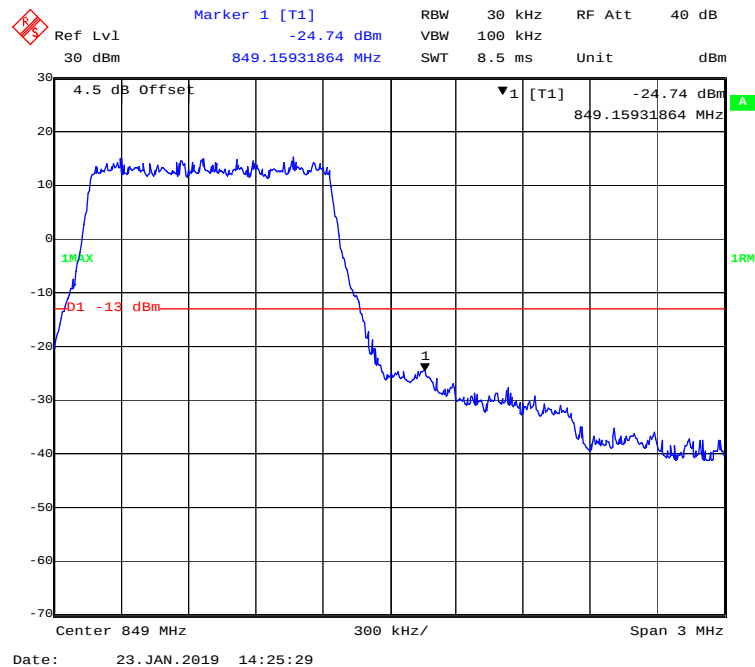


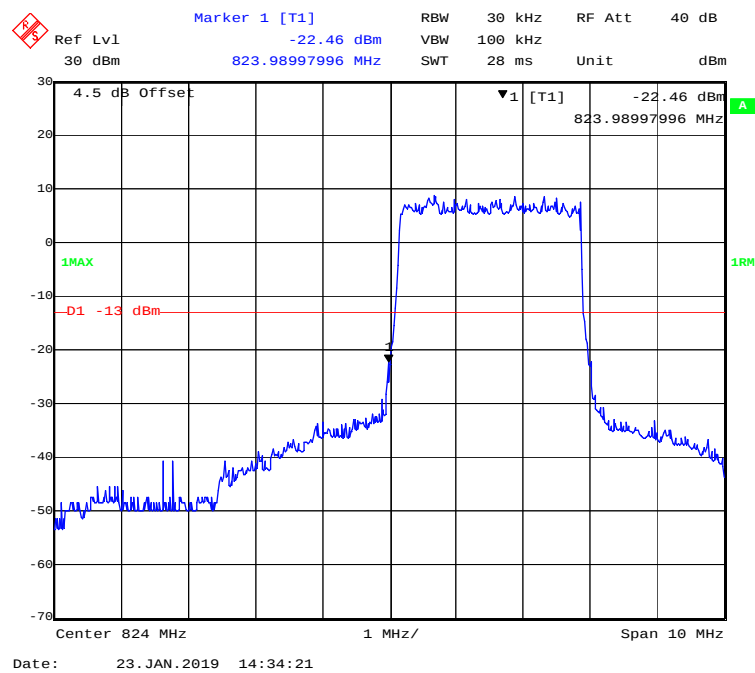
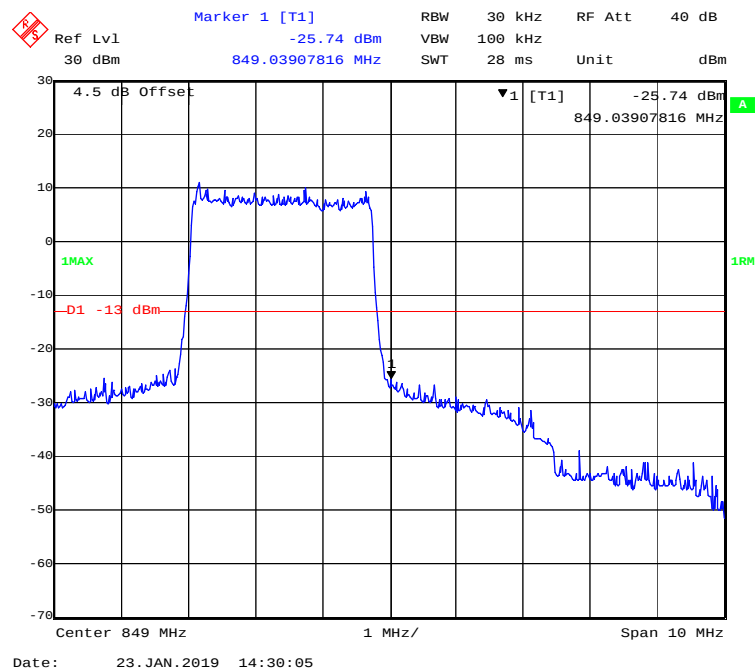
16-QAM (10 MHz, FULL RB) - Right Band Edge



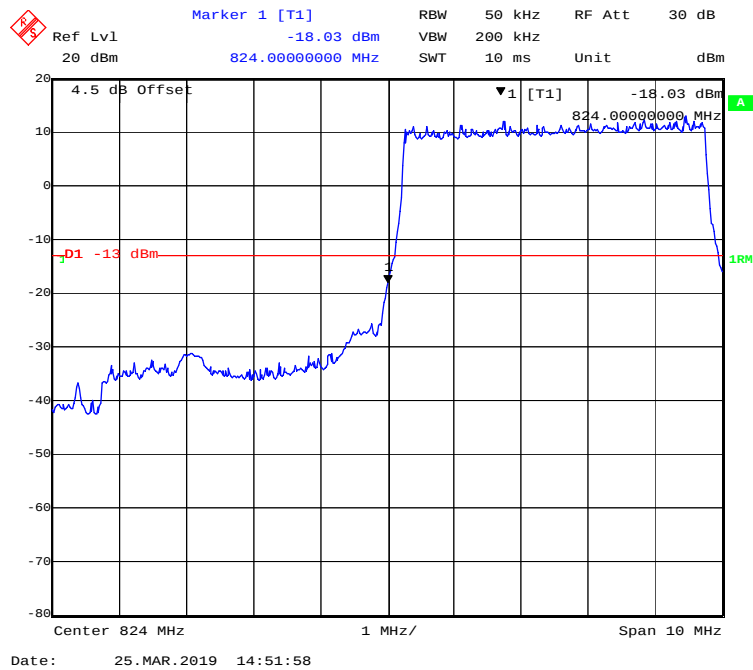
16-QAM (15 MHz, FULL RB) - Left Band Edge**16-QAM (15 MHz, FULL RB) - Right Band Edge**

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

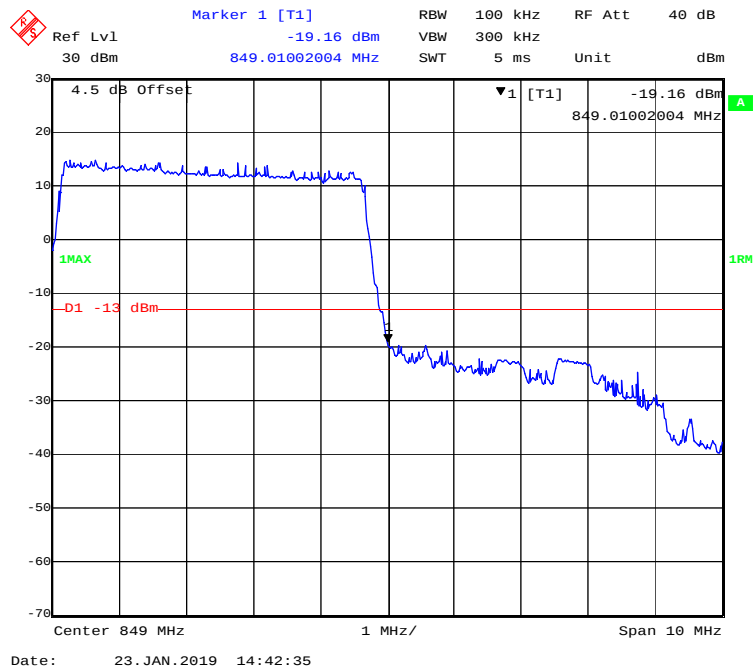
LTE Band 5:**QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

QPSK (3 MHz, FULL RB) - Left Band Edge**QPSK (3 MHz, FULL RB) - Right Band Edge**

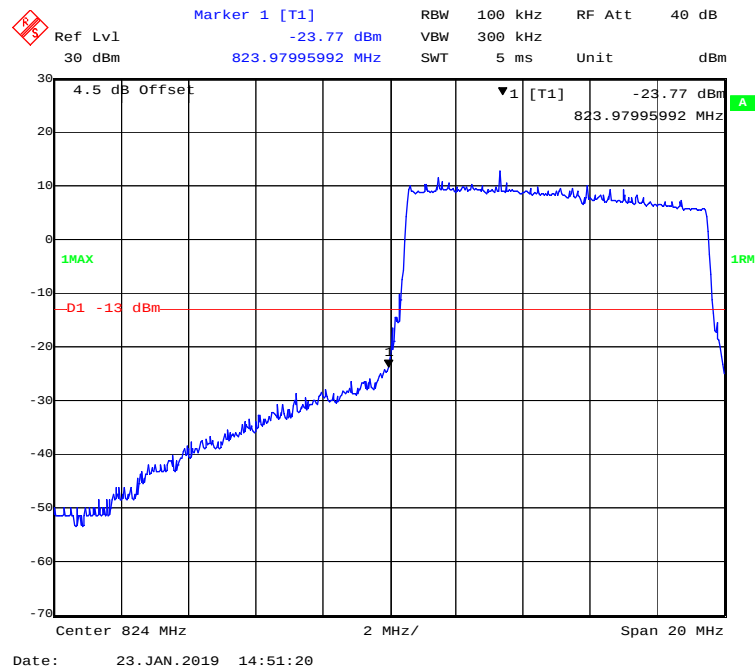
QPSK (5 MHz, FULL RB) - Left Band Edge



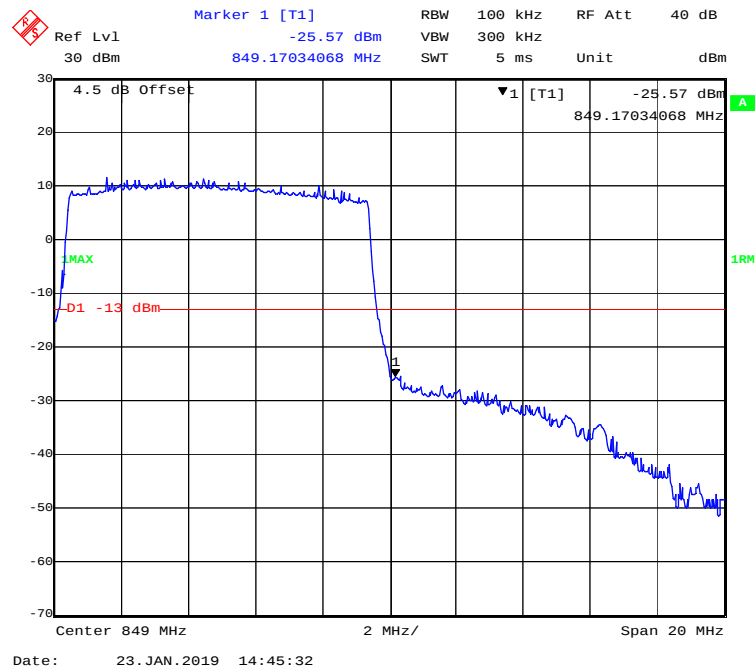
QPSK (5 MHz, FULL RB) - Right Band Edge



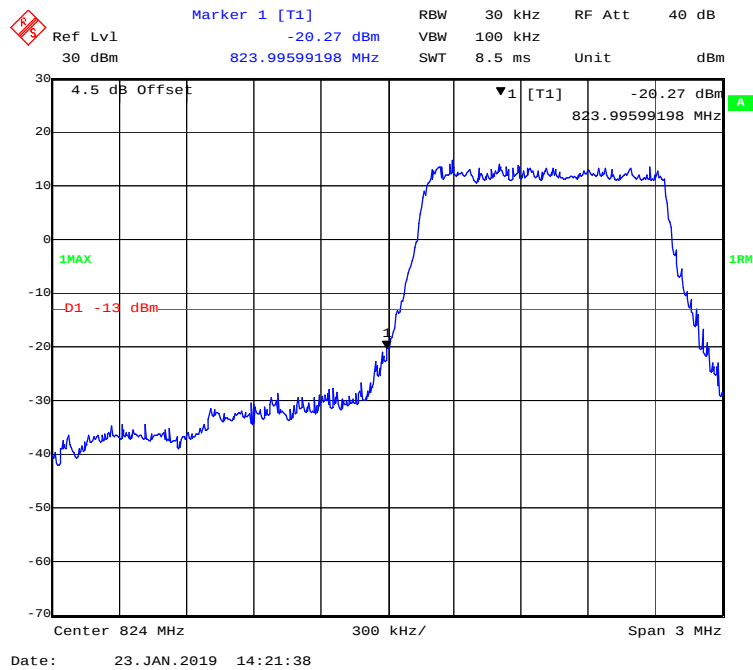
QPSK (10 MHz, FULL RB) - Left Band Edge



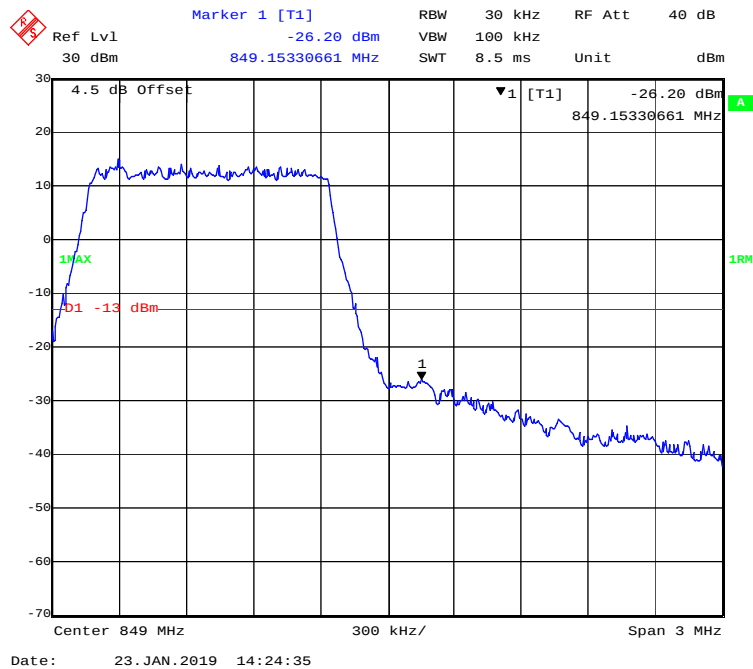
QPSK (10 MHz, FULL RB) - Right Band Edge



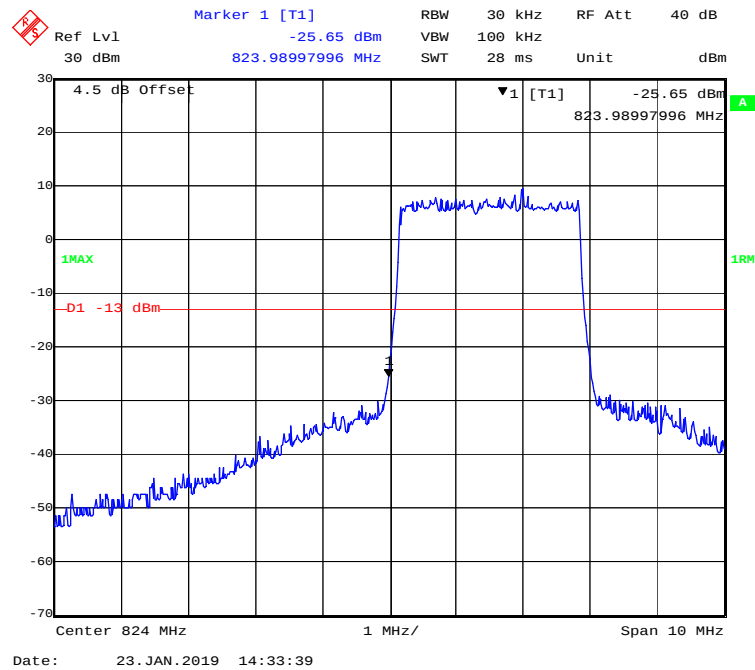
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



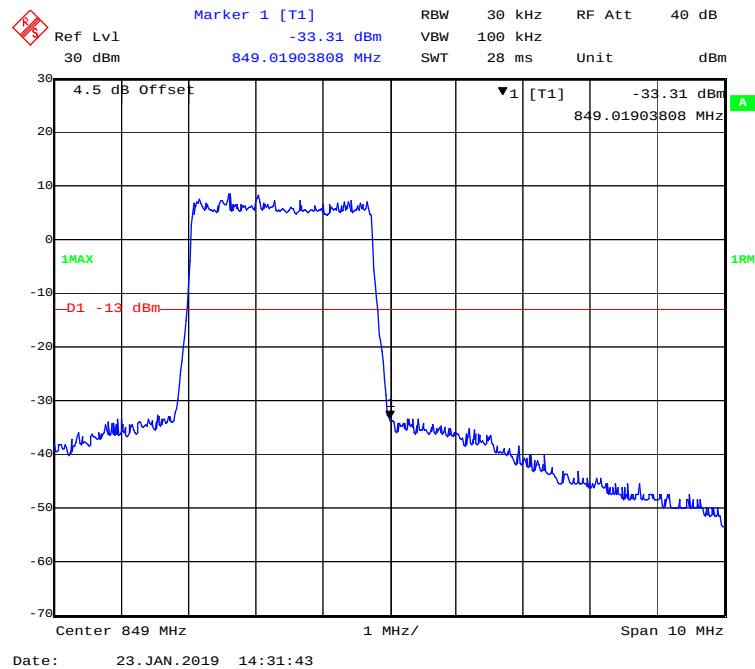
16-QAM (1.4 MHz, FULL RB) - Right Band Edge

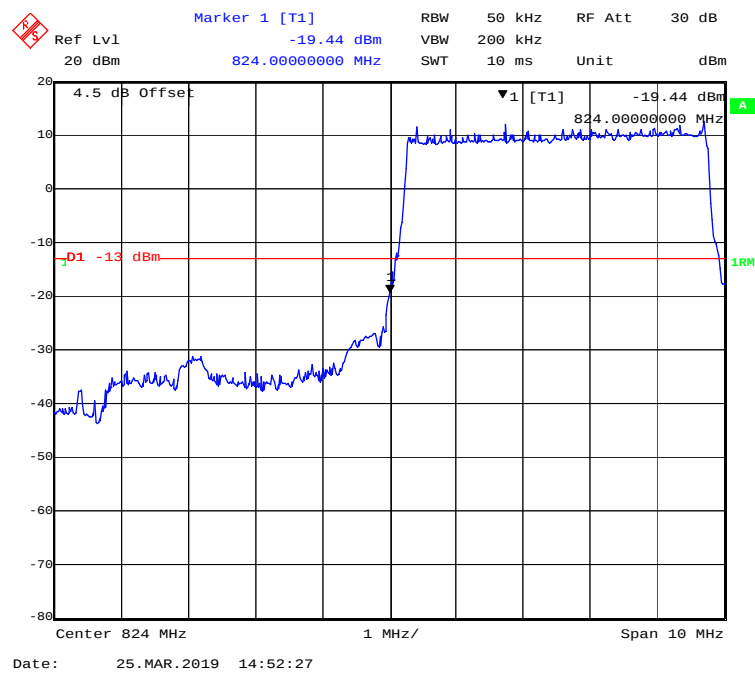
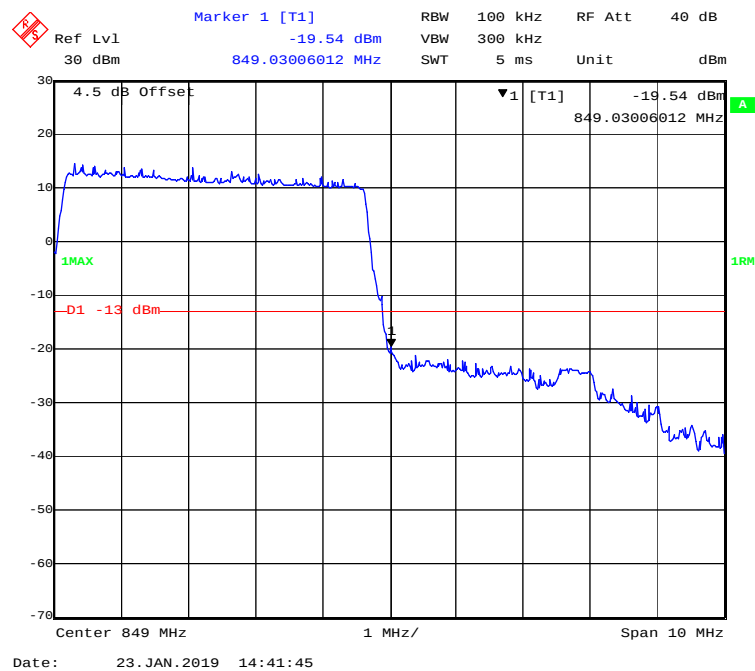


16-QAM (3 MHz, FULL RB) - Left Band Edge

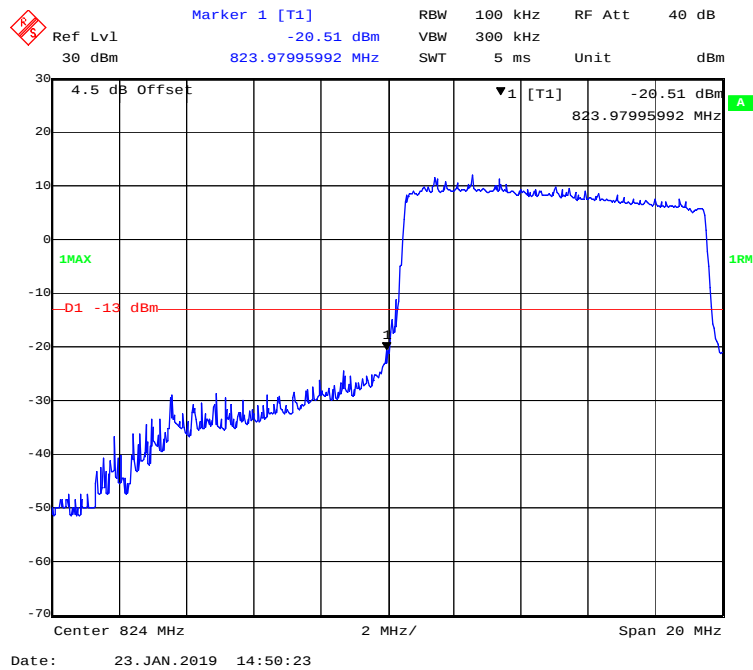


16-QAM (3 MHz, FULL RB) - Right Band Edge

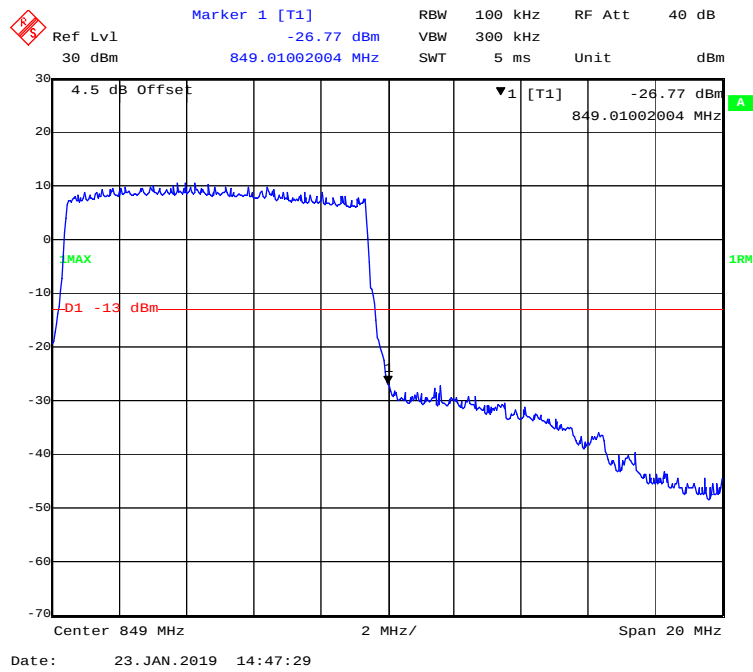


16-QAM (5 MHz, FULL RB) - Left Band Edge**16-QAM (5 MHz, FULL RB) - Right Band Edge**

16-QAM (10 MHz, FULL RB) - Left Band Edge

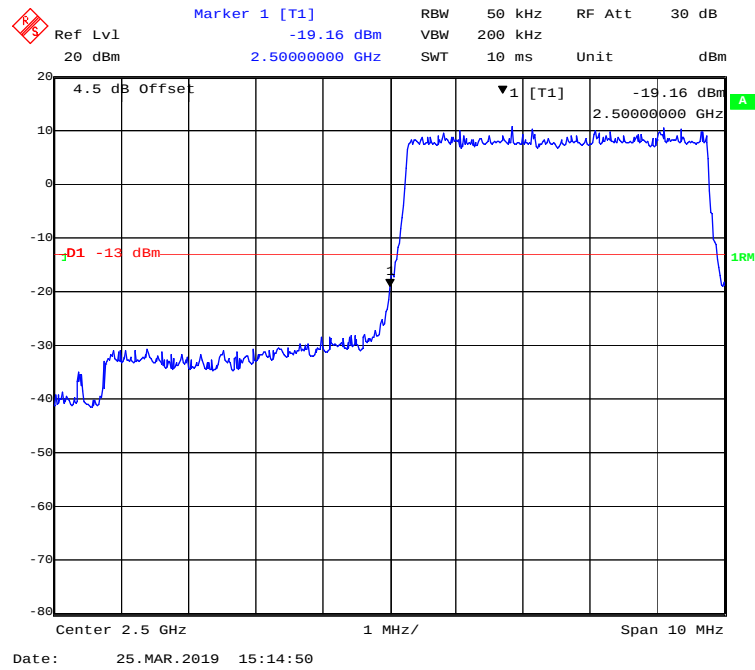


16-QAM (10 MHz, FULL RB) - Right Band Edge

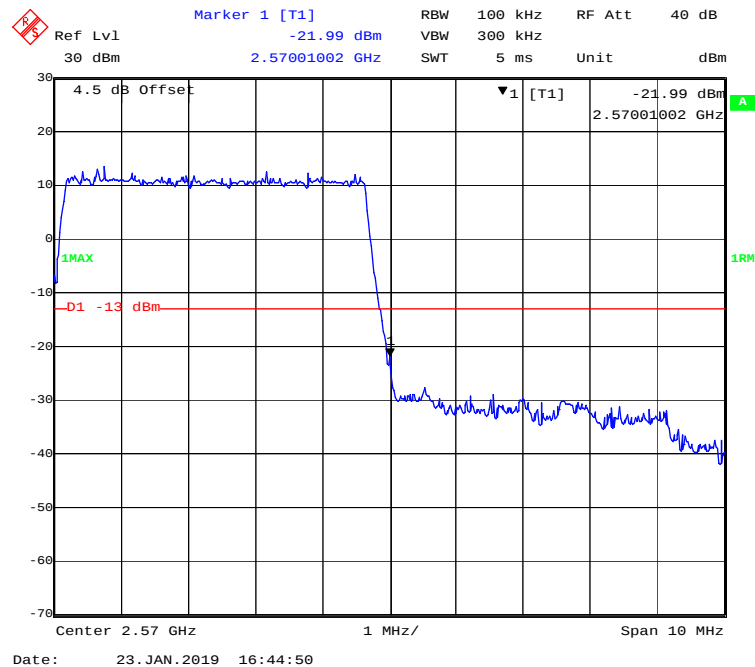


LTE Band 7:

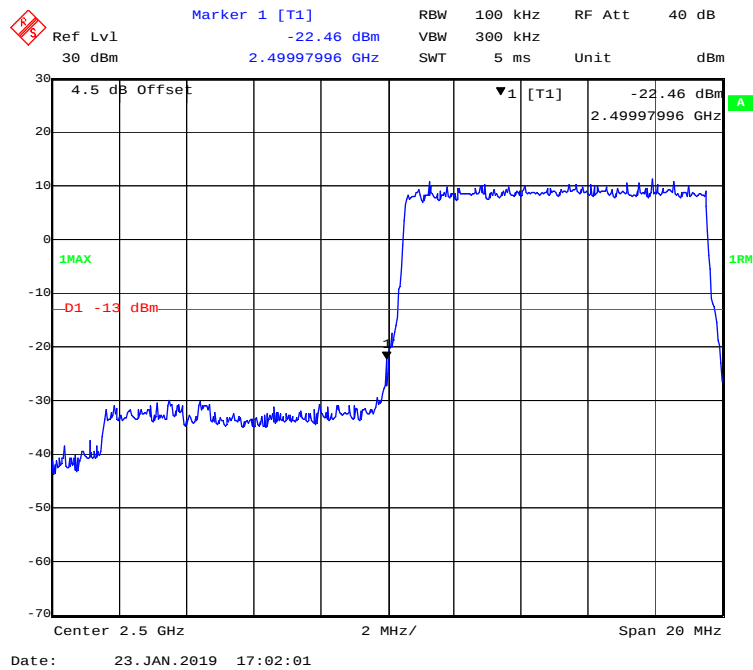
QPSK (5 MHz, FULL RB) - Left Band Edge



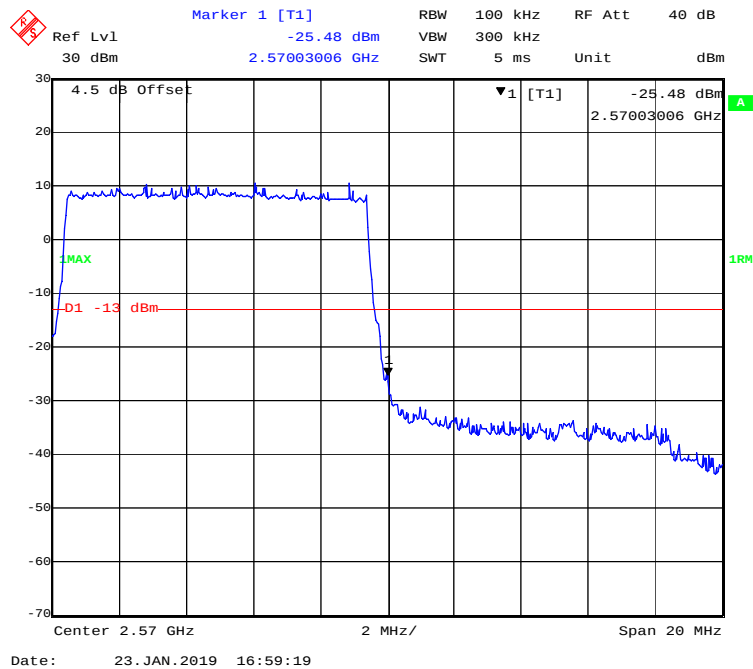
QPSK (5 MHz, FULL RB) - Right Band Edge



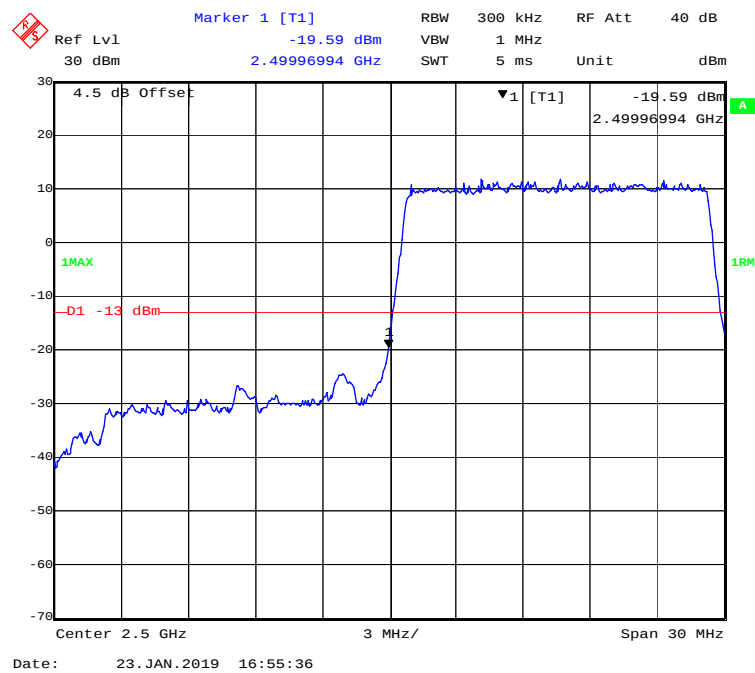
QPSK (10 MHz, FULL RB) - Left Band Edge



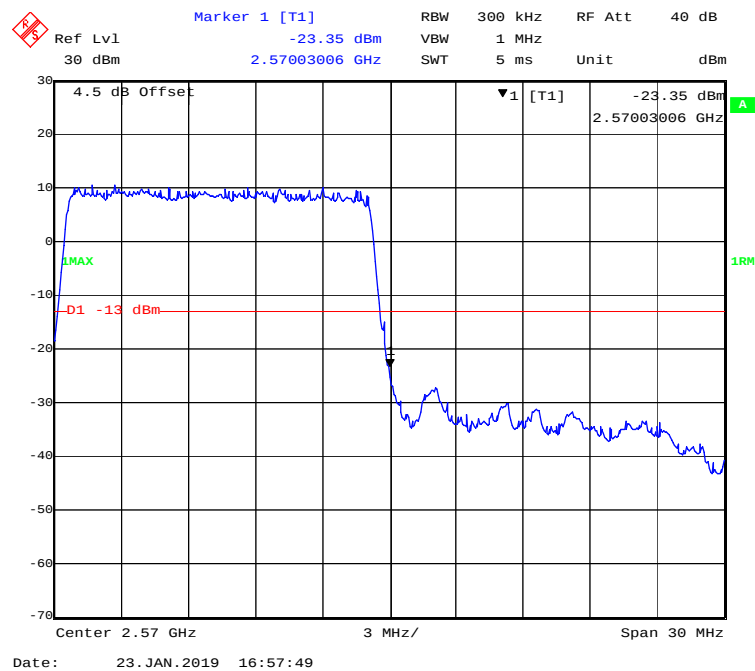
QPSK (10 MHz, FULL RB) - Right Band Edge



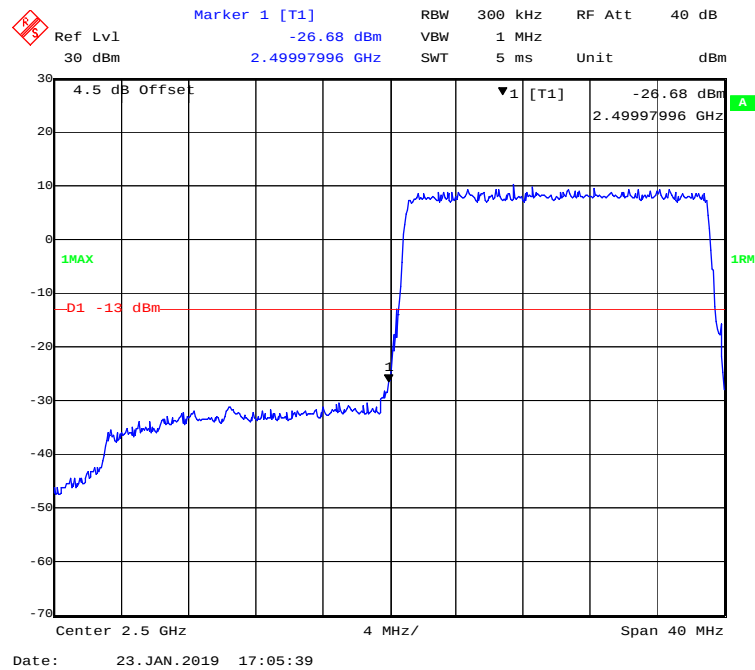
QPSK (15 MHz, FULL RB) - Left Band Edge



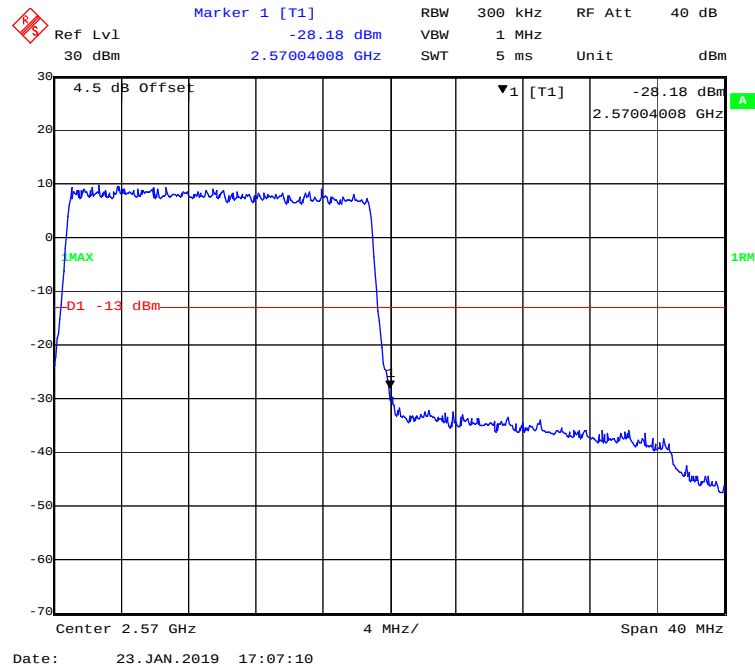
QPSK (15 MHz, FULL RB) - Right Band Edge



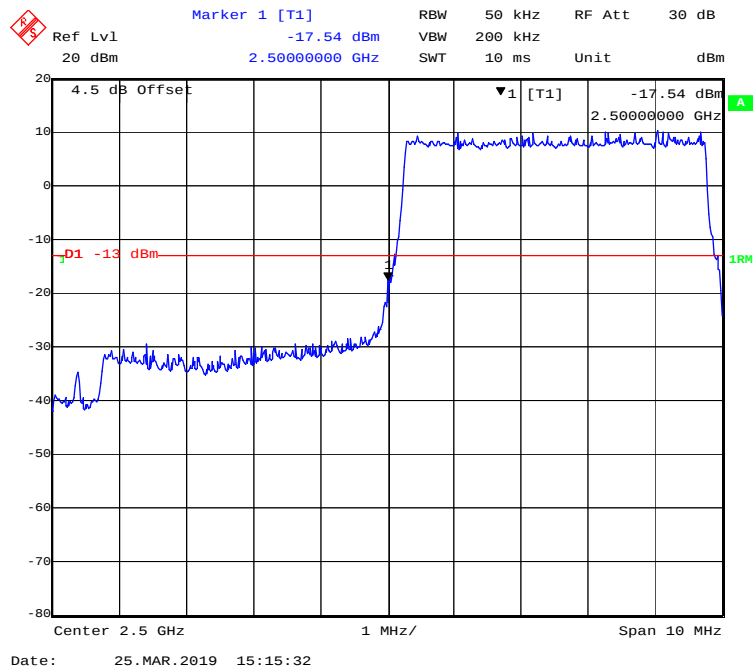
QPSK (20 MHz, FULL RB) - Left Band Edge



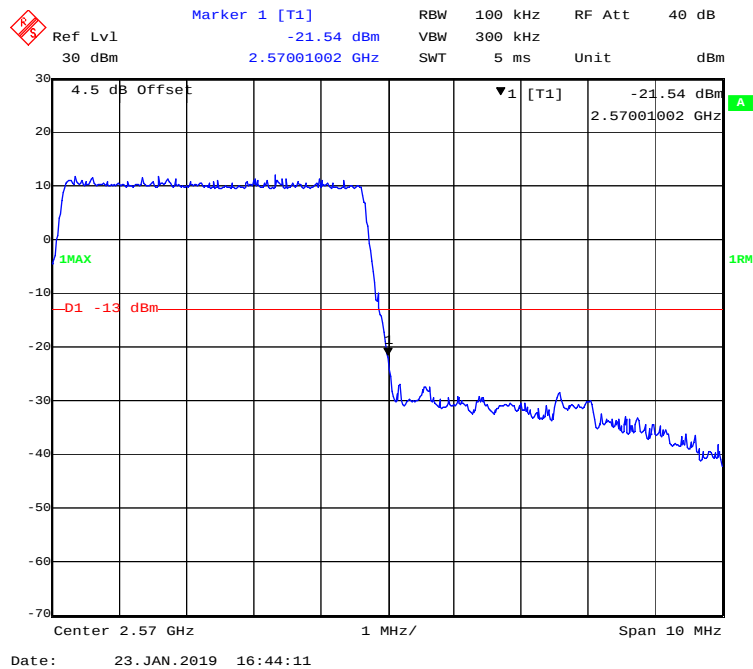
QPSK (20 MHz, FULL RB) - Right Band Edge



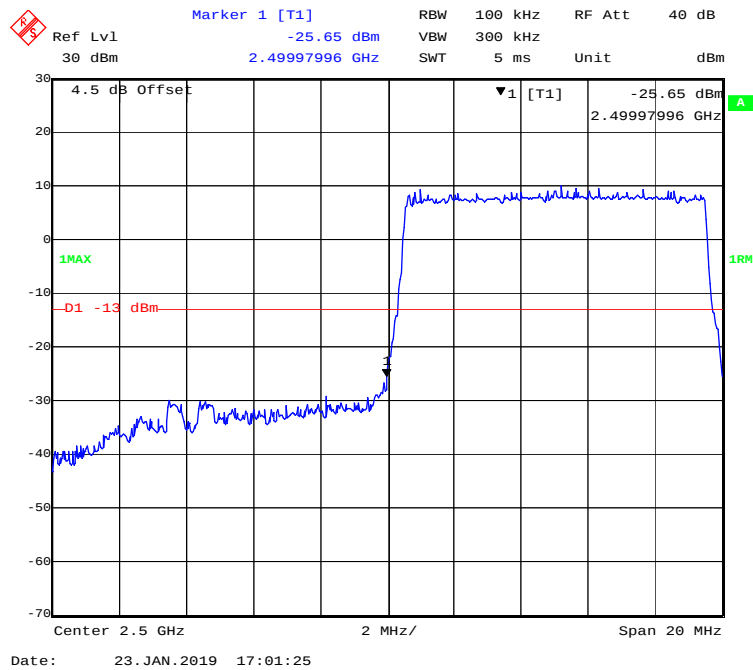
16-QAM (5 MHz, FULL RB) - Left Band Edge



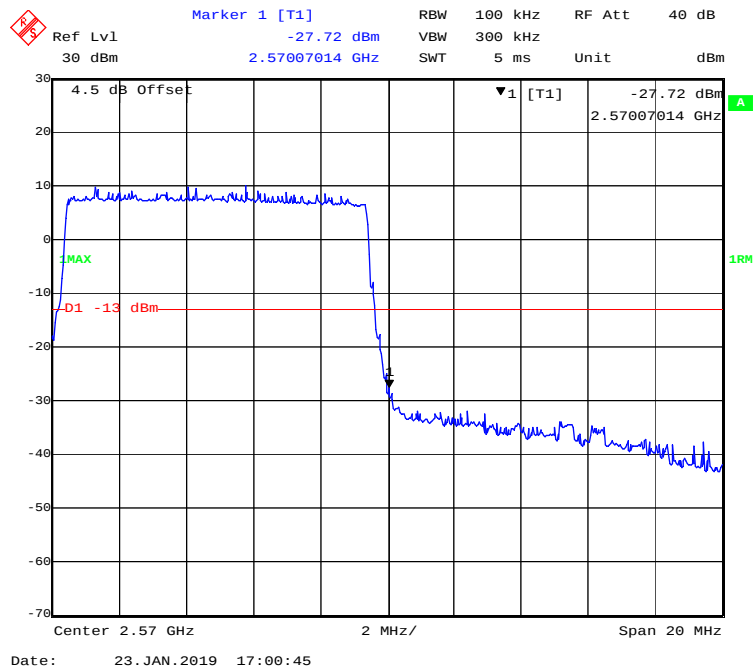
16-QAM (5 MHz, FULL RB) - Right Band Edge



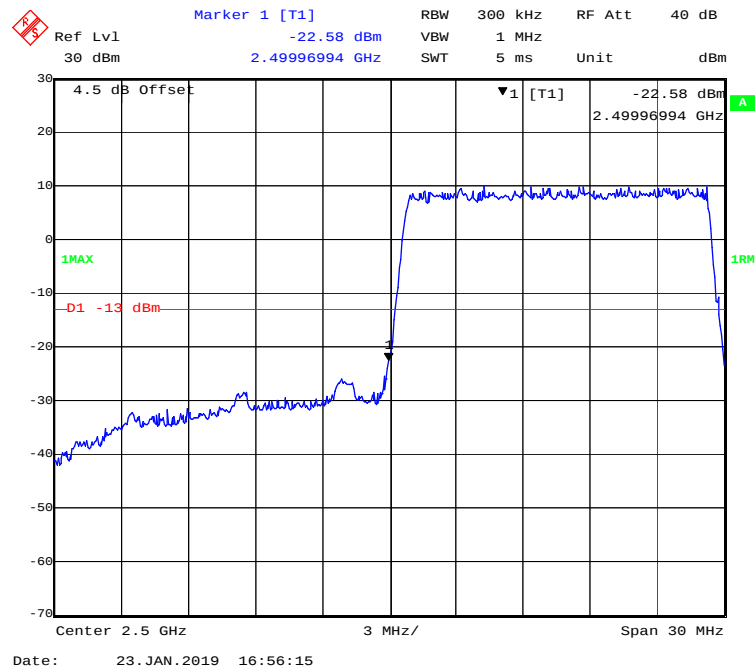
16-QAM (10 MHz, FULL RB) - Left Band Edge



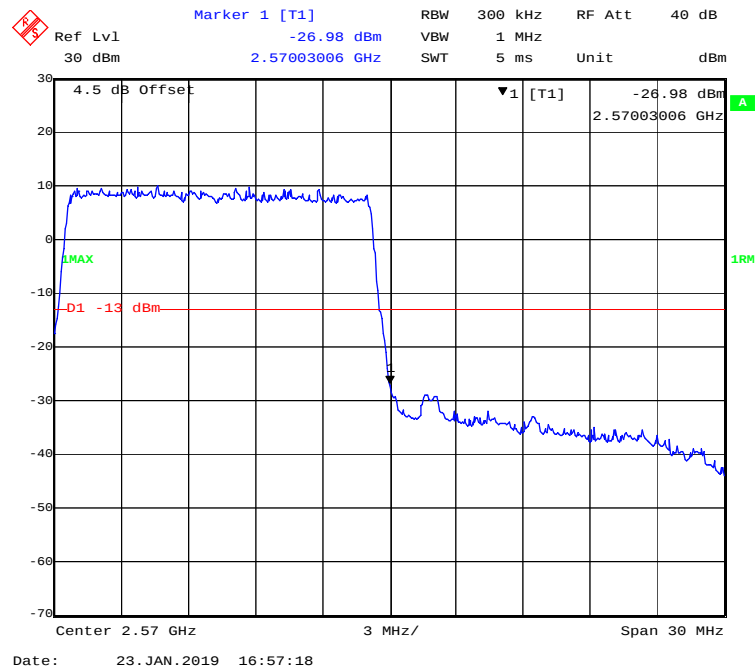
16-QAM (10 MHz, FULL RB) - Right Band Edge



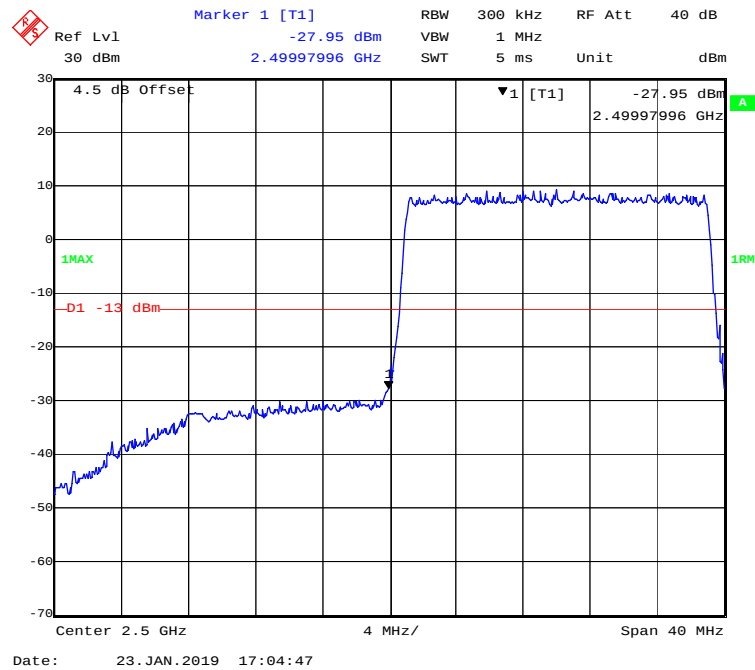
16-QAM (15 MHz, FULL RB) - Left Band Edge



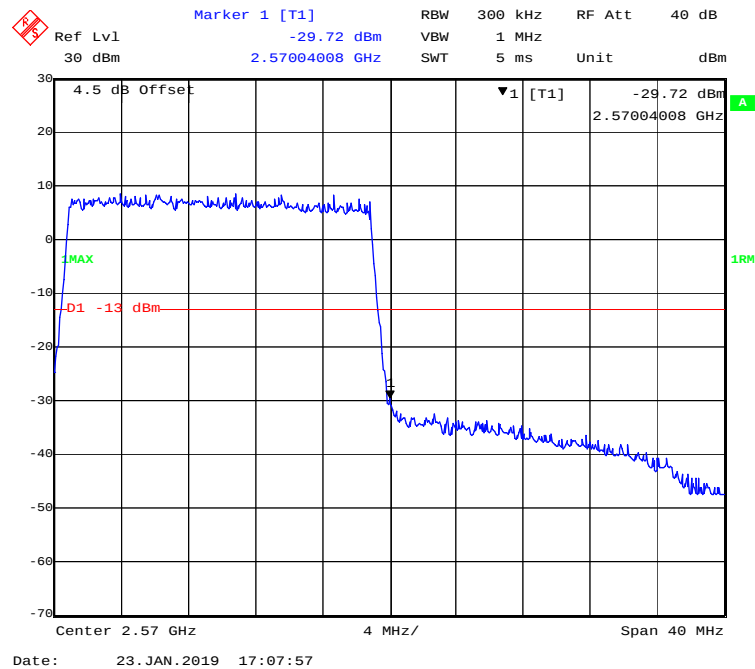
16-QAM (15 MHz, FULL RB) - Right Band Edge



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

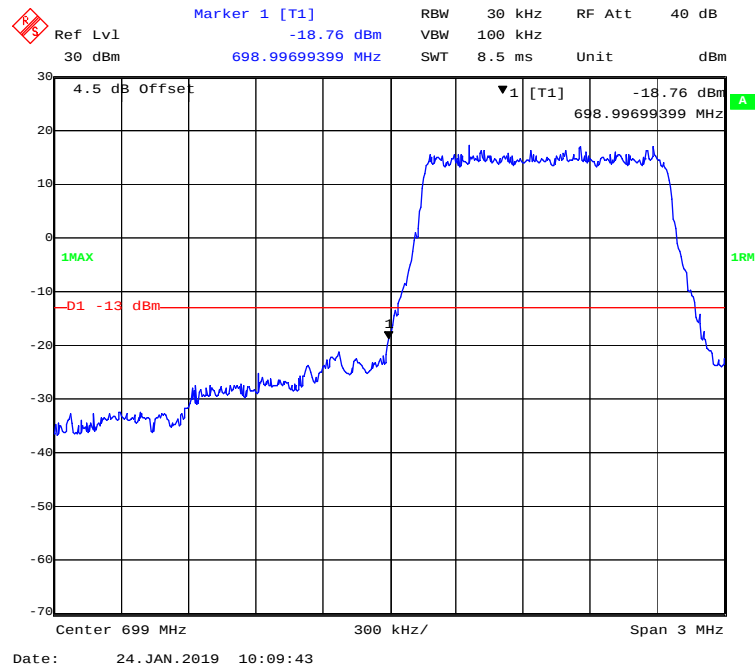


16-QAM (20 MHz, FULL RB) - Right Band Edge

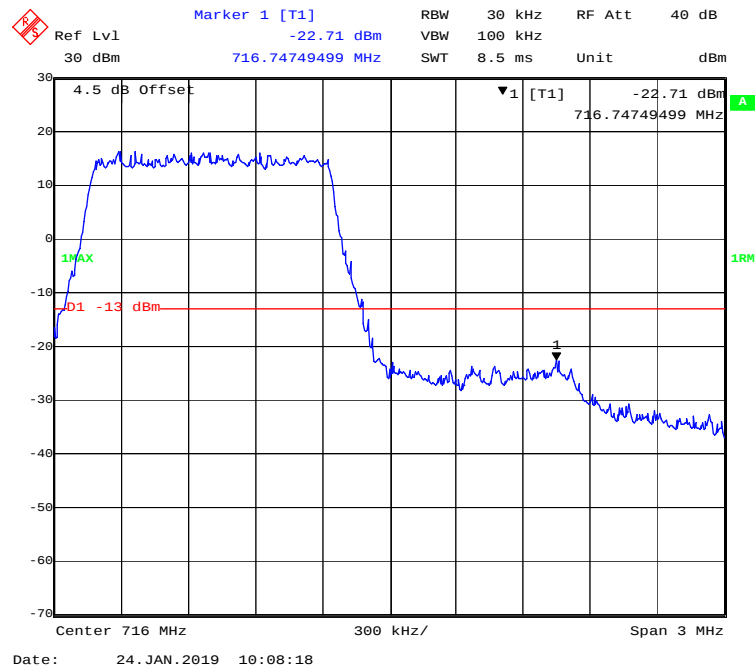


LTE Band 12:

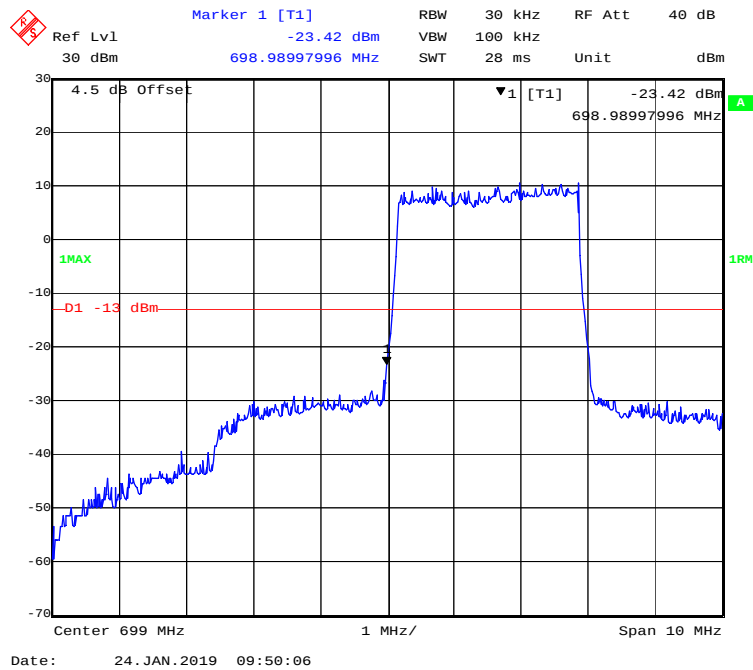
QPSK (1.4 MHz, FULL RB) - Left Band Edge



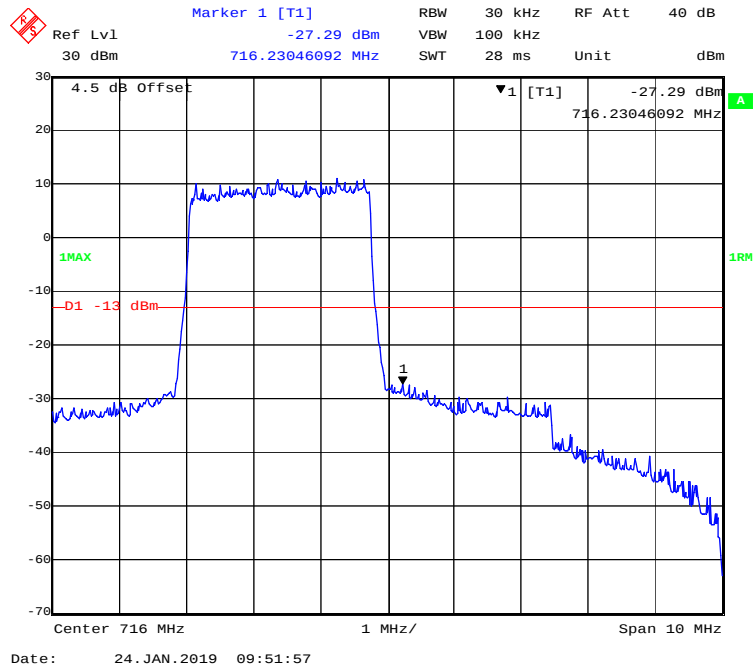
QPSK (1.4 MHz, FULL RB) - Right Band Edge



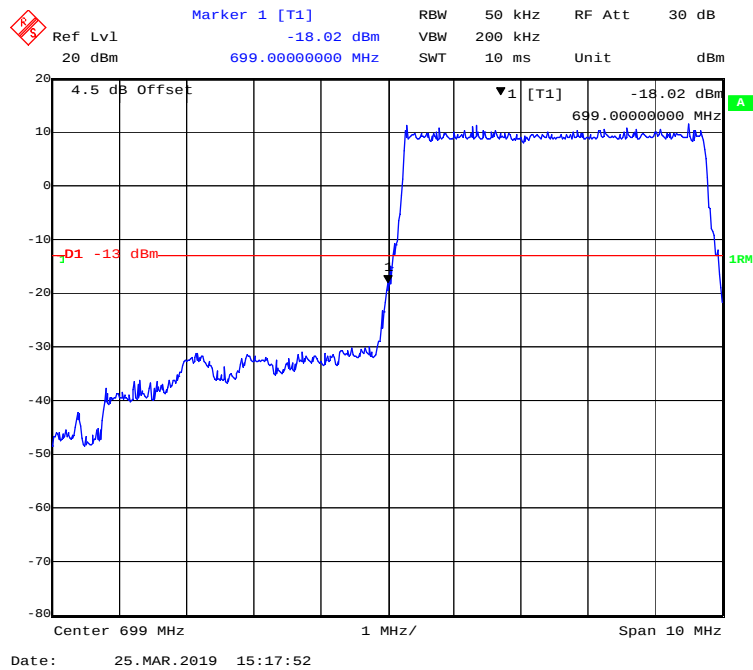
QPSK (3 MHz, FULL RB) - Left Band Edge



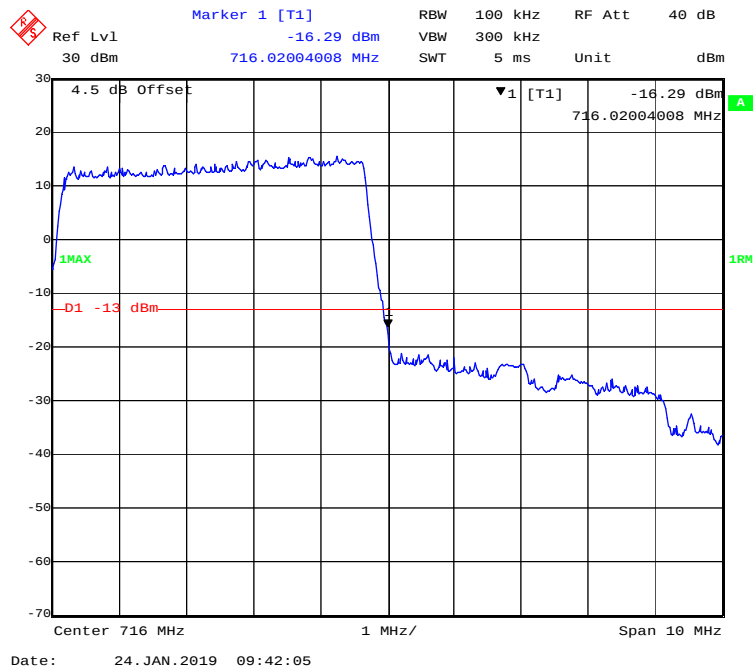
QPSK (3 MHz, FULL RB) - Right Band Edge



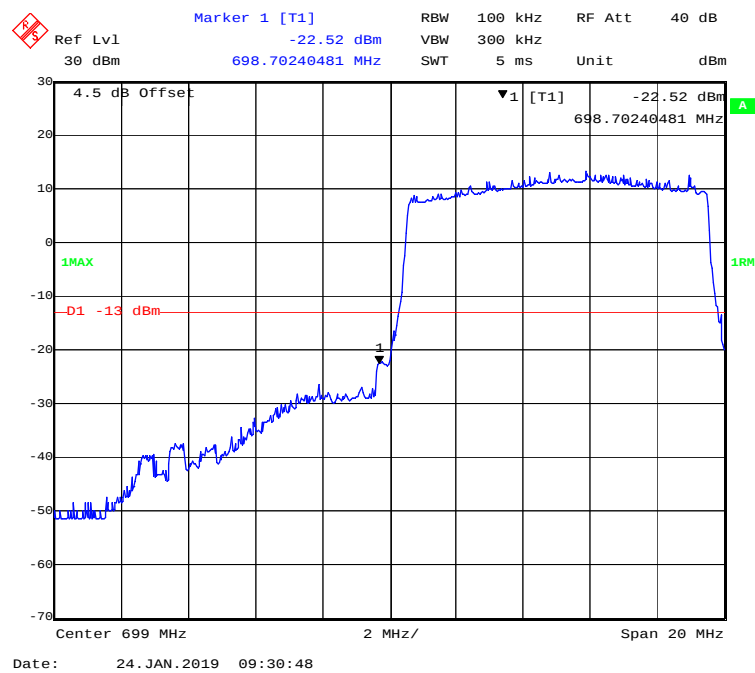
QPSK (5 MHz, FULL RB) - Left Band Edge



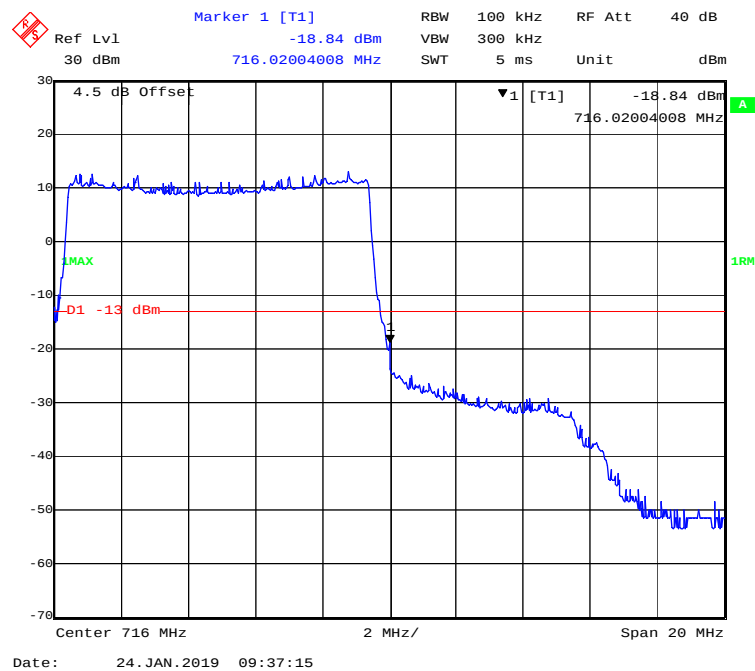
QPSK (5 MHz, FULL RB) - Right Band Edge



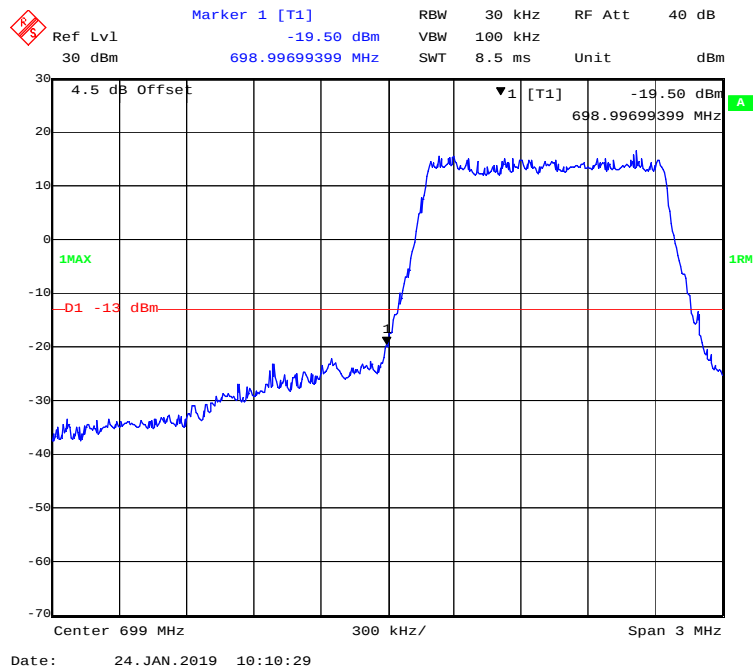
QPSK (10 MHz, FULL RB) - Left Band Edge



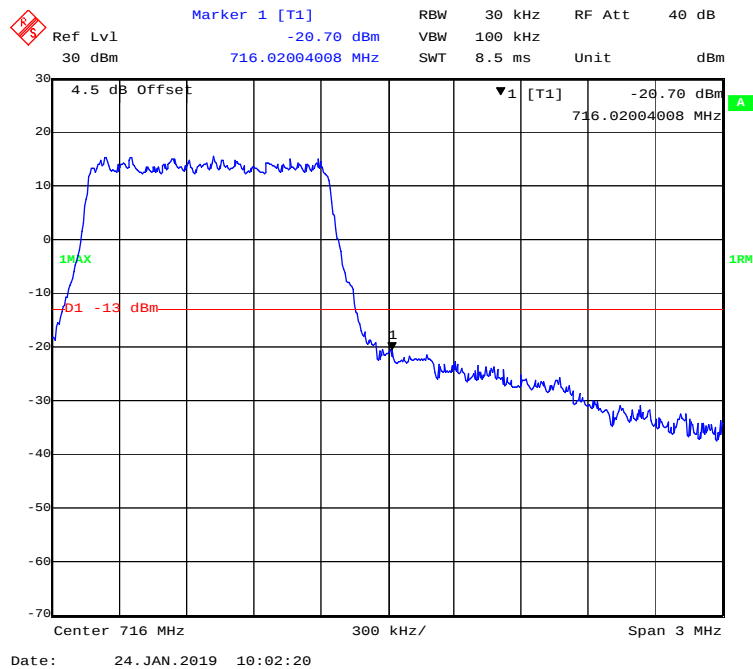
QPSK (10 MHz, FULL RB) - Right Band Edge



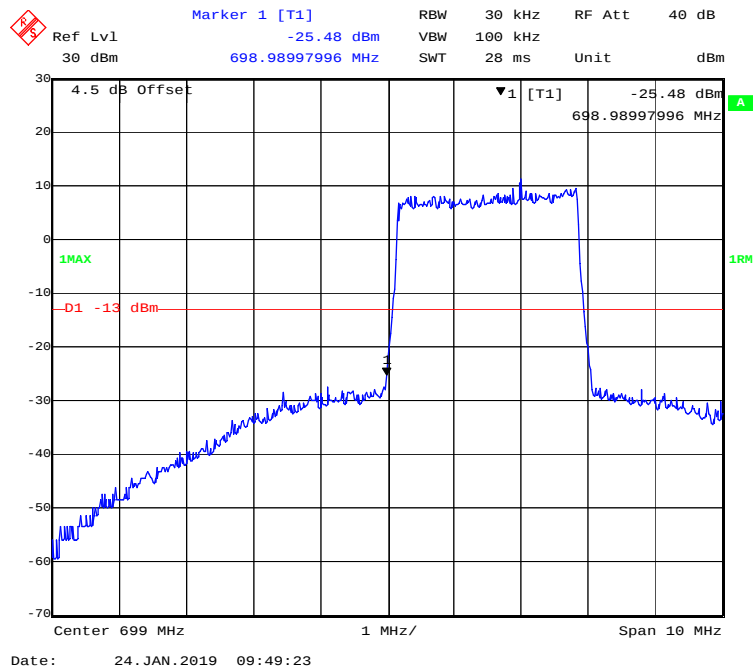
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



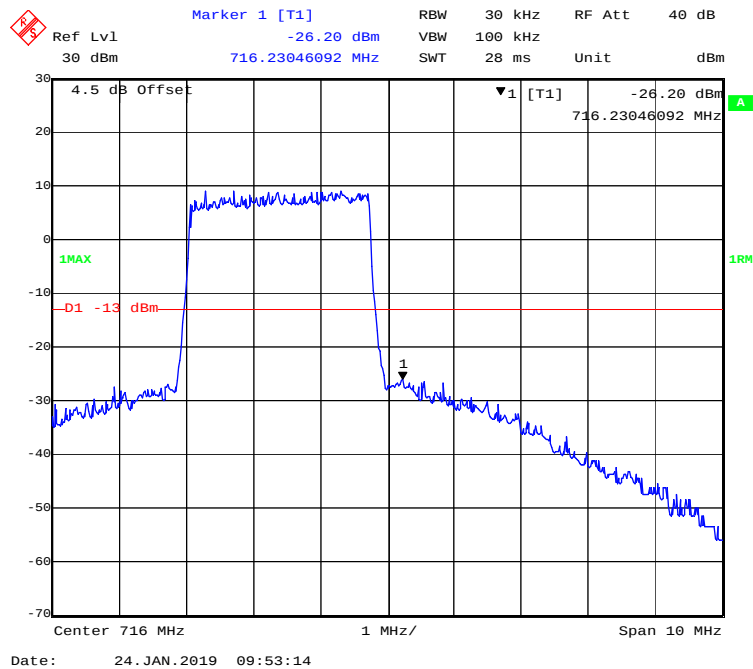
16-QAM (1.4 MHz, FULL RB) - Right Band Edge



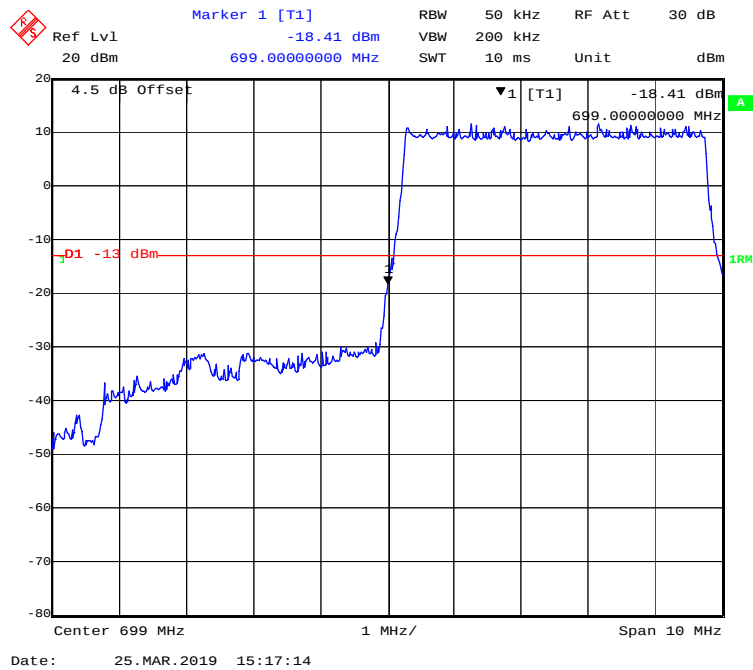
16-QAM (3 MHz, FULL RB) - Left Band Edge



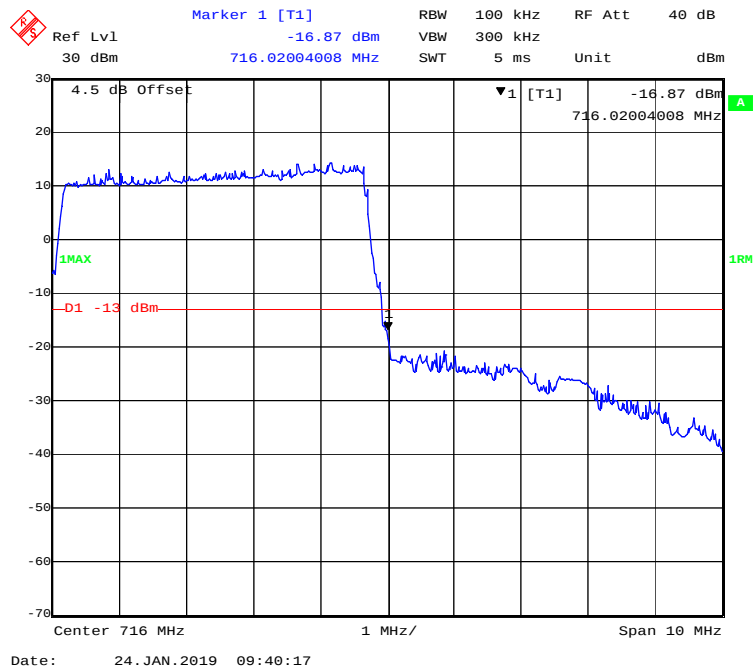
16-QAM (3 MHz, FULL RB) - Right Band Edge



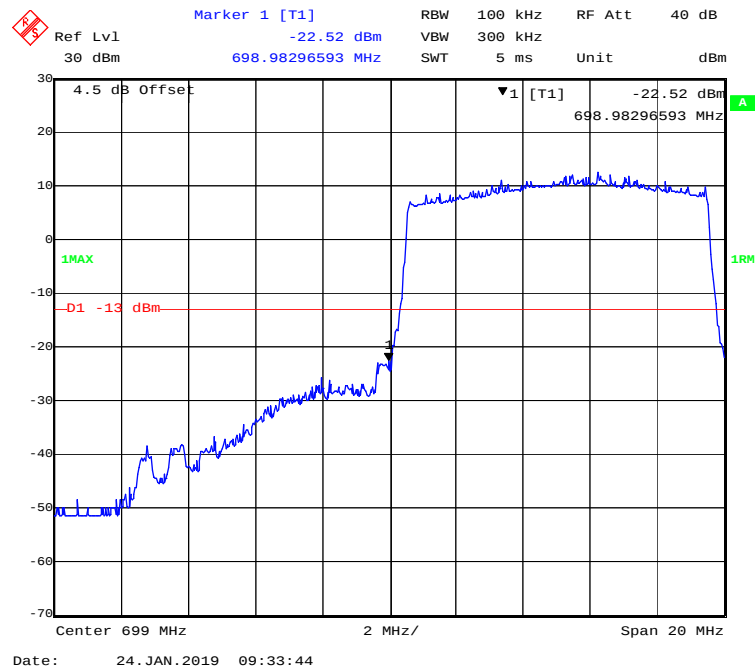
16-QAM (5 MHz, FULL RB) - Left Band Edge



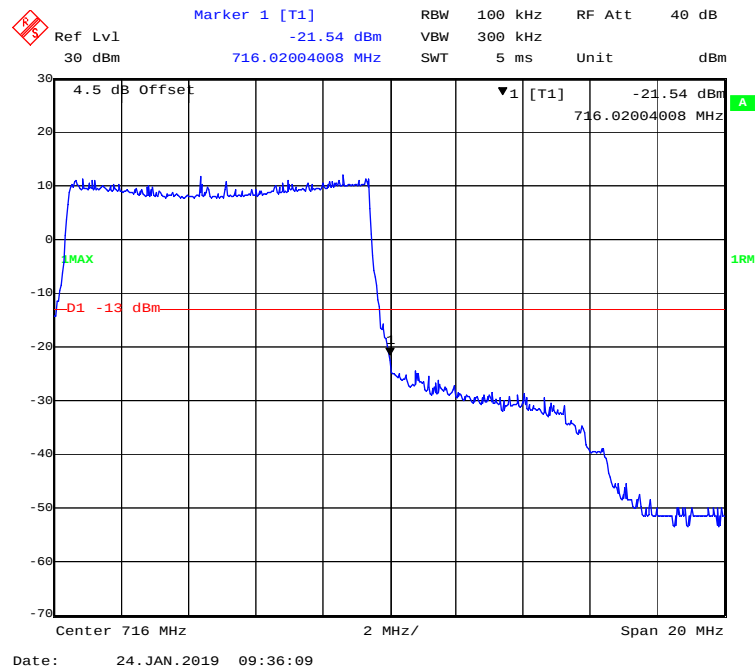
16-QAM (5 MHz, FULL RB) - Right Band Edge

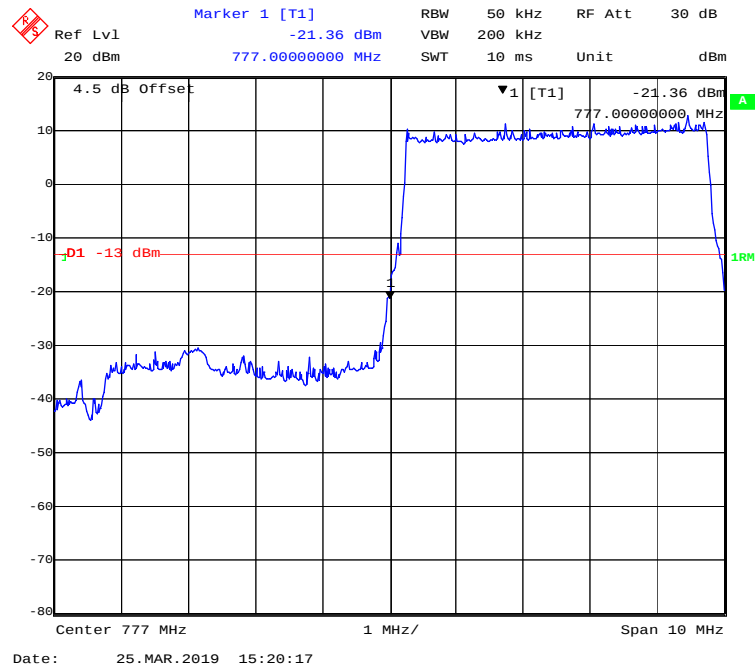
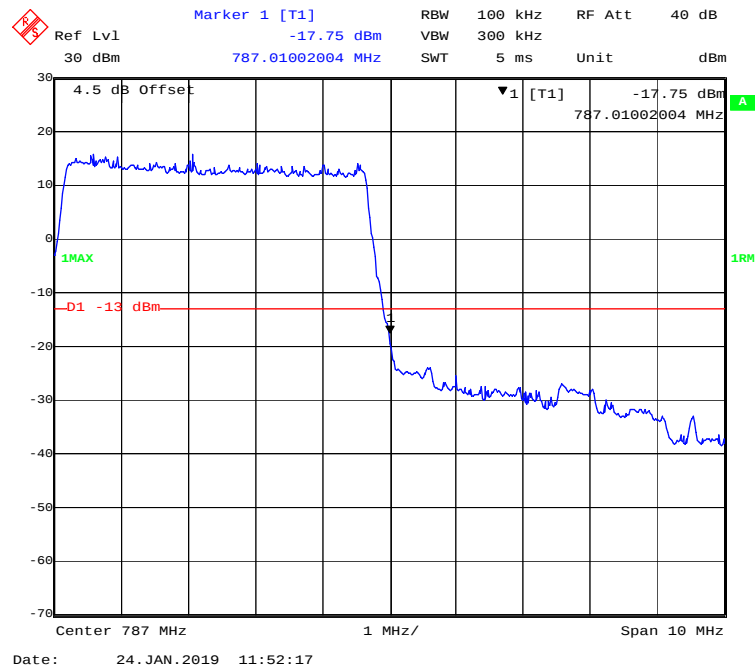


16-QAM (10 MHz, FULL RB) - Left Band Edge

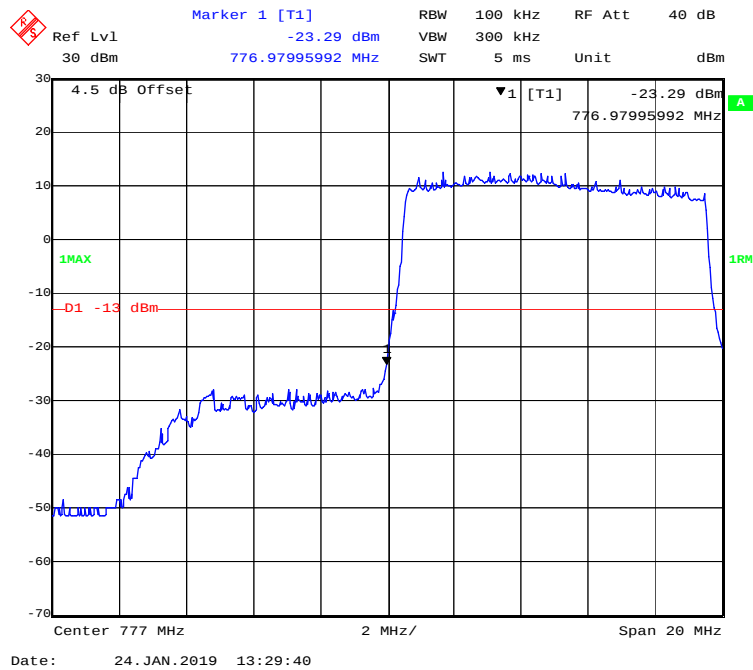


16-QAM (10 MHz, FULL RB) - Right Band Edge

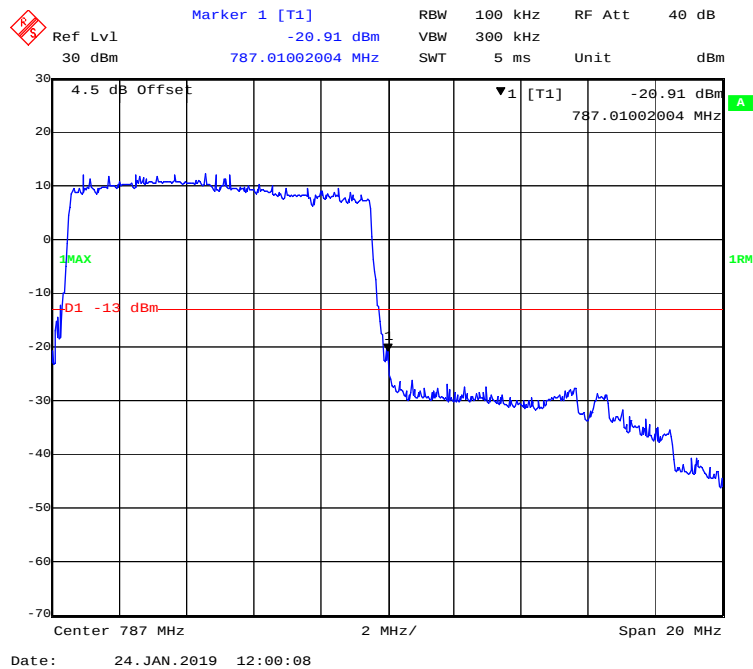


LTE Band 13:**QPSK (5 MHz, FULL RB) - Left Band Edge****QPSK (5 MHz, FULL RB) - Right Band Edge**

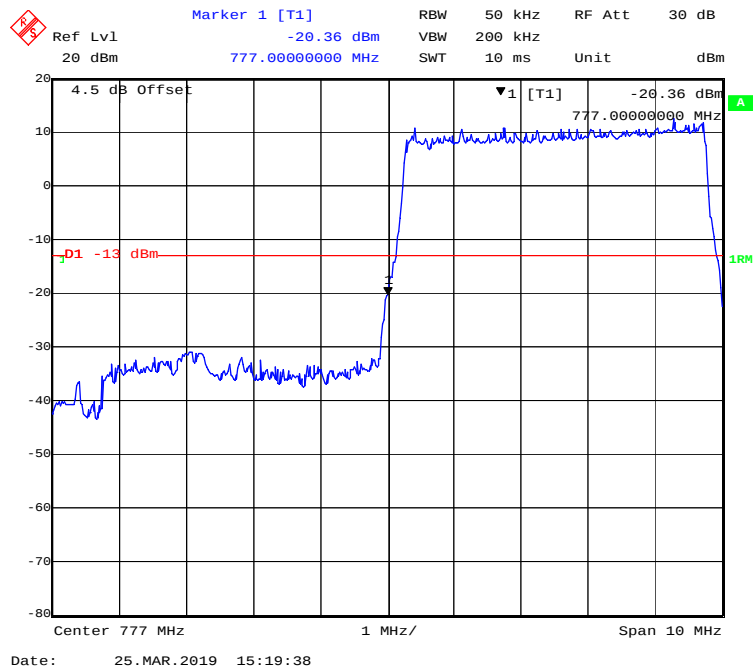
QPSK (10 MHz, FULL RB) - Left Band Edge



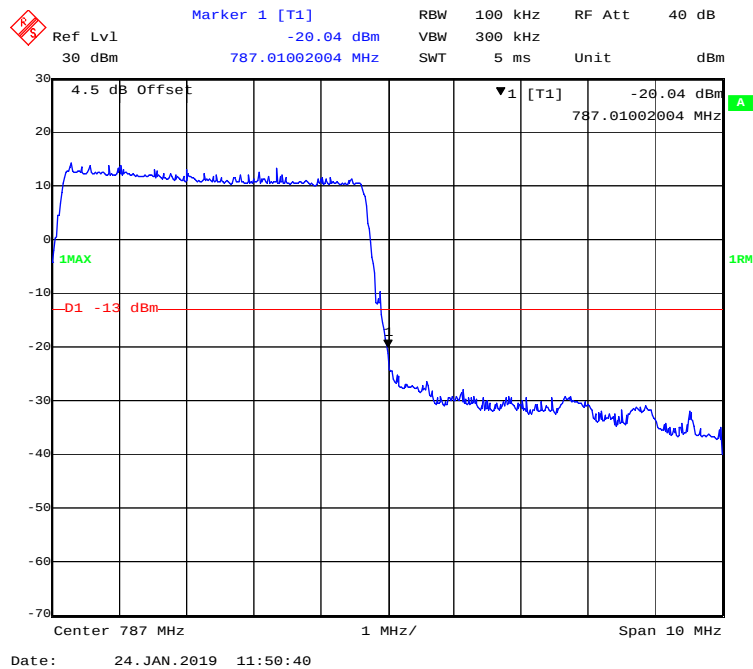
QPSK (10 MHz, FULL RB) - Right Band Edge



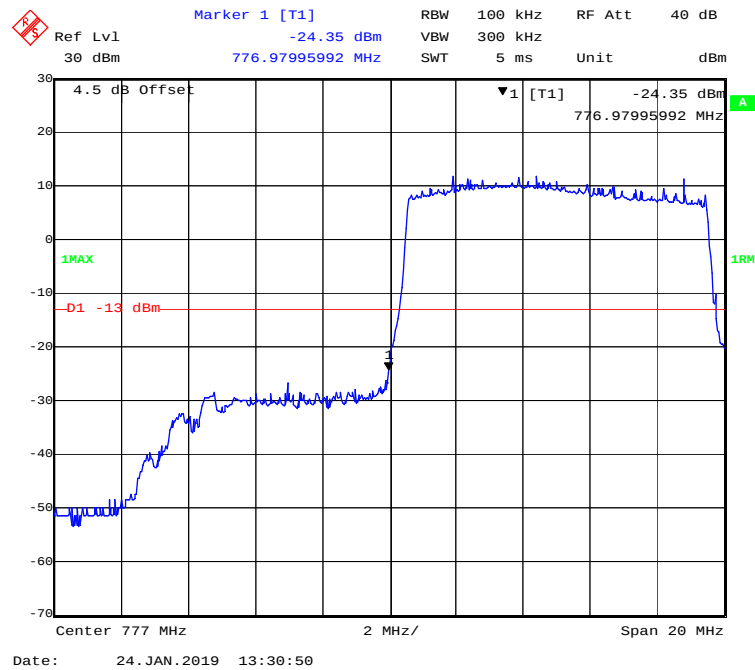
16-QAM (5 MHz, FULL RB) - Left Band Edge



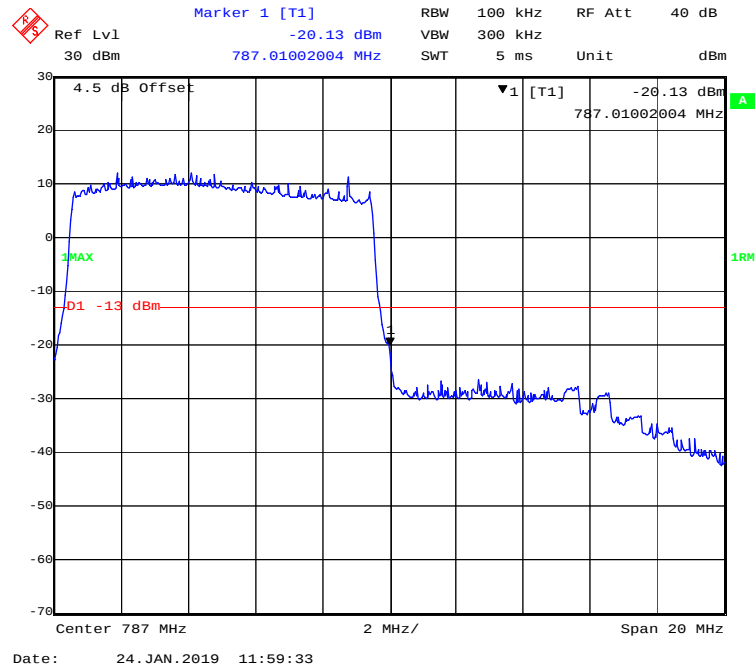
16-QAM (5 MHz, FULL RB) - Right Band Edge

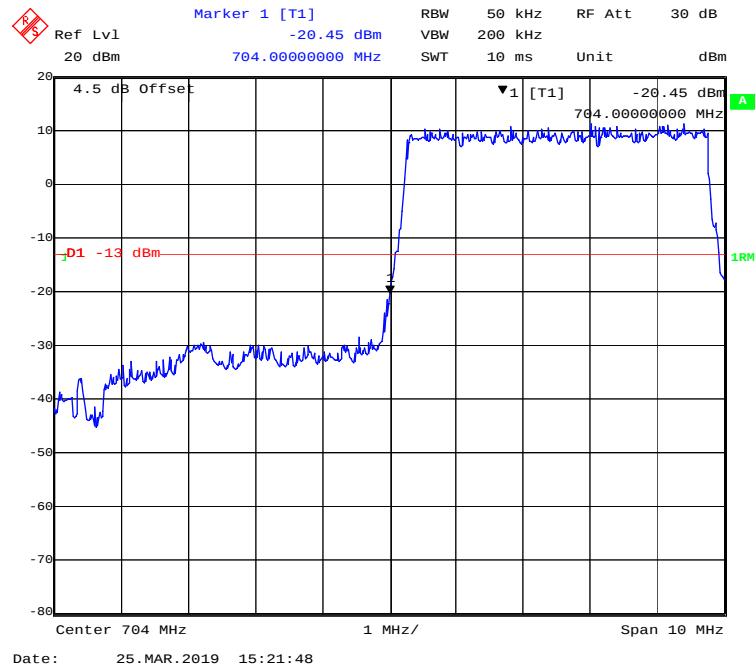
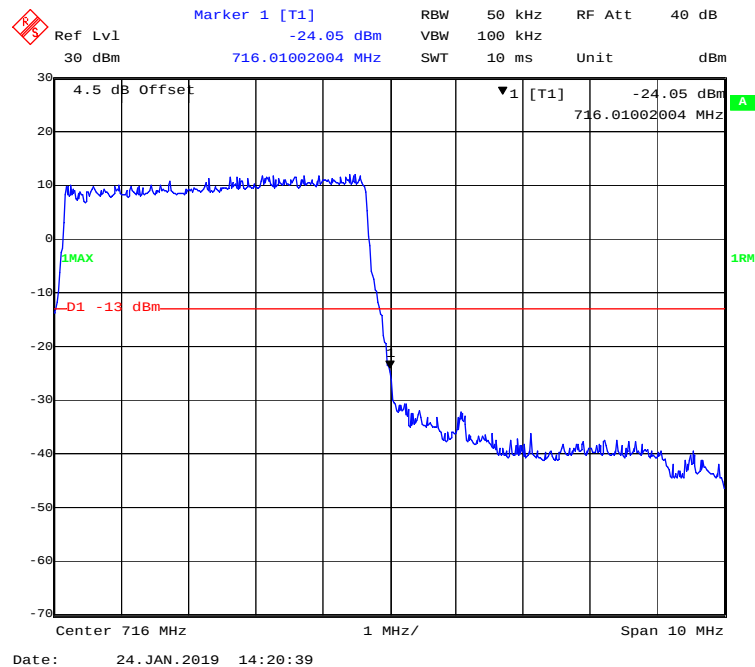


16-QAM (10 MHz, FULL RB) - Left Band Edge

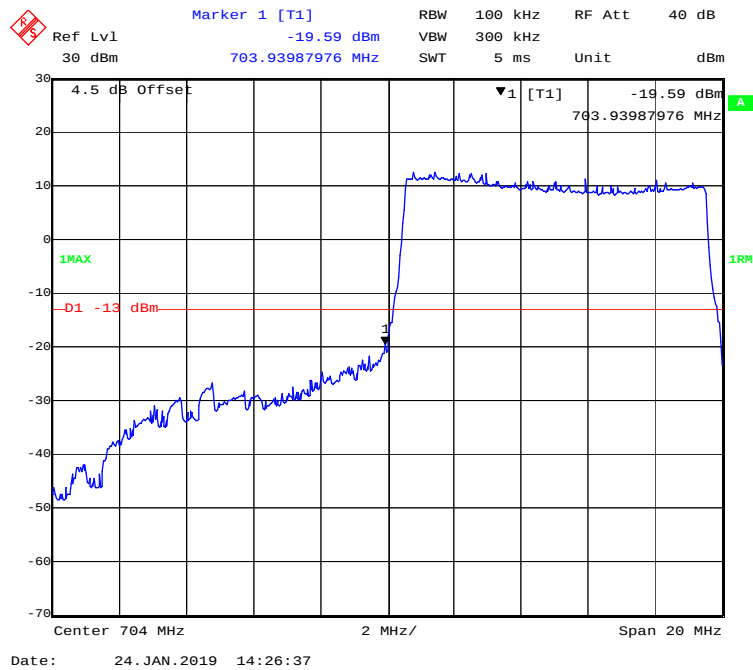


16-QAM (10 MHz, FULL RB) - Right Band Edge

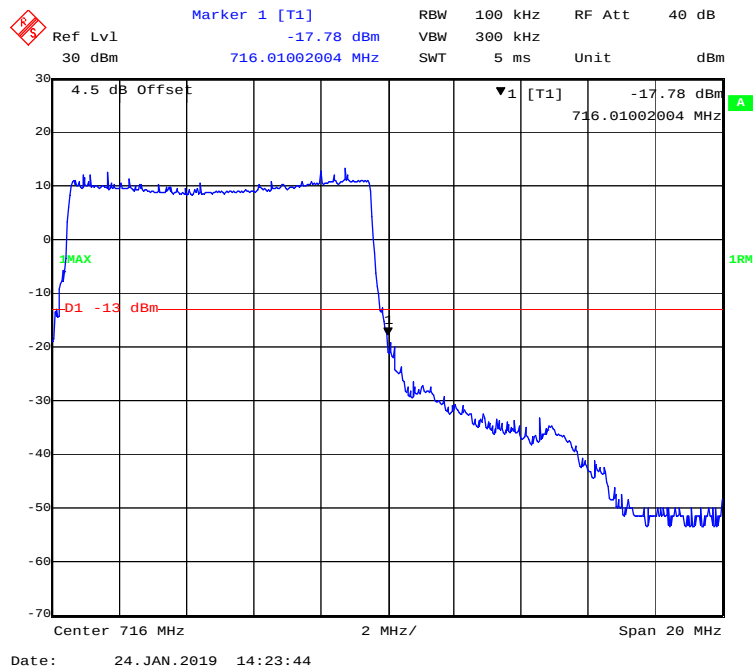


LTE Band 17:**QPSK (5 MHz, FULL RB) - Left Band Edge****QPSK (5 MHz, FULL RB) - Right Band Edge**

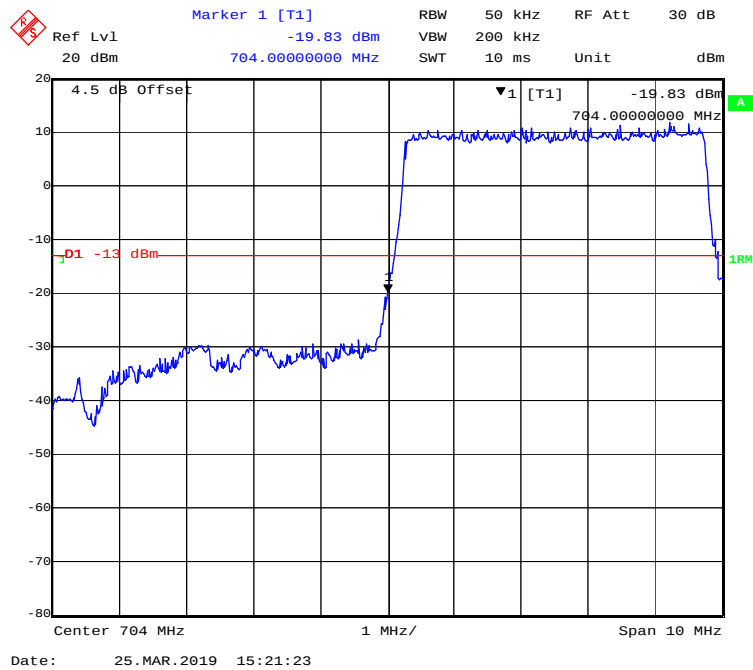
QPSK (10 MHz, FULL RB) - Left Band Edge



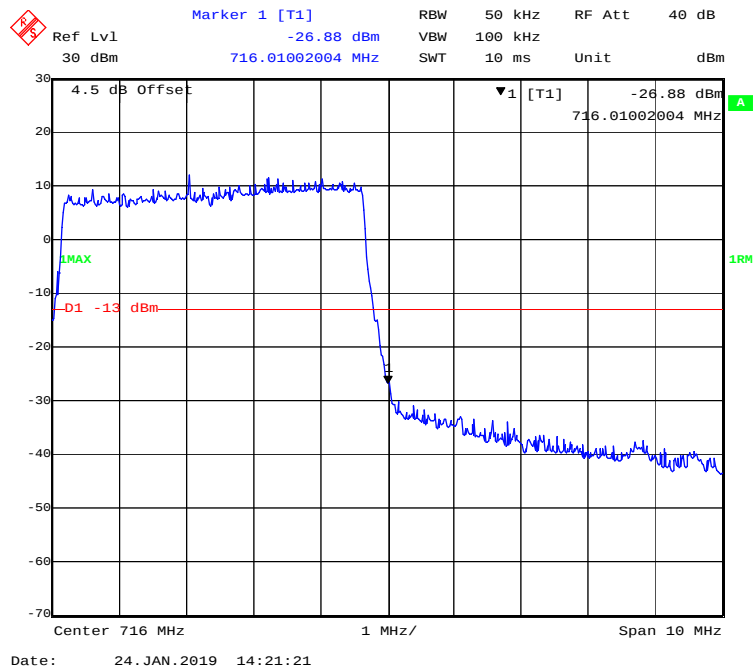
QPSK (10 MHz, FULL RB) - Right Band Edge



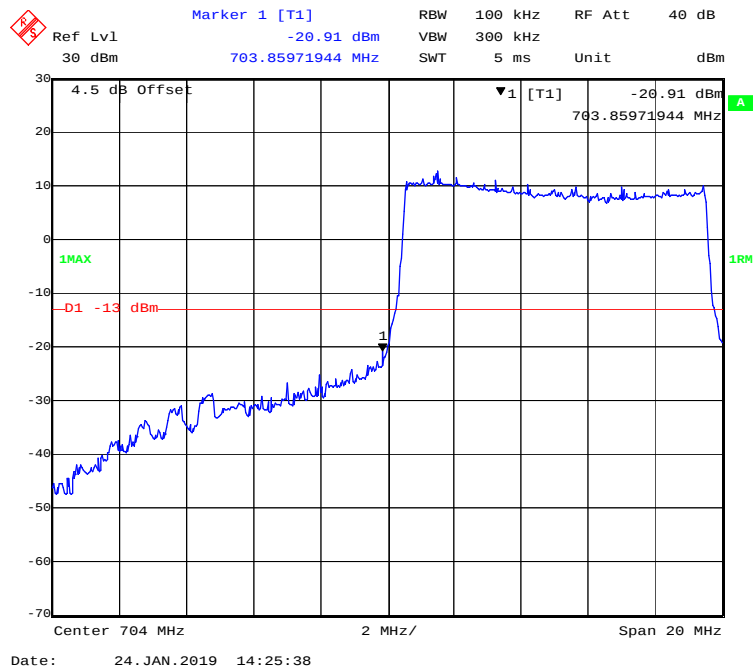
16-QAM (5 MHz, FULL RB) - Left Band Edge



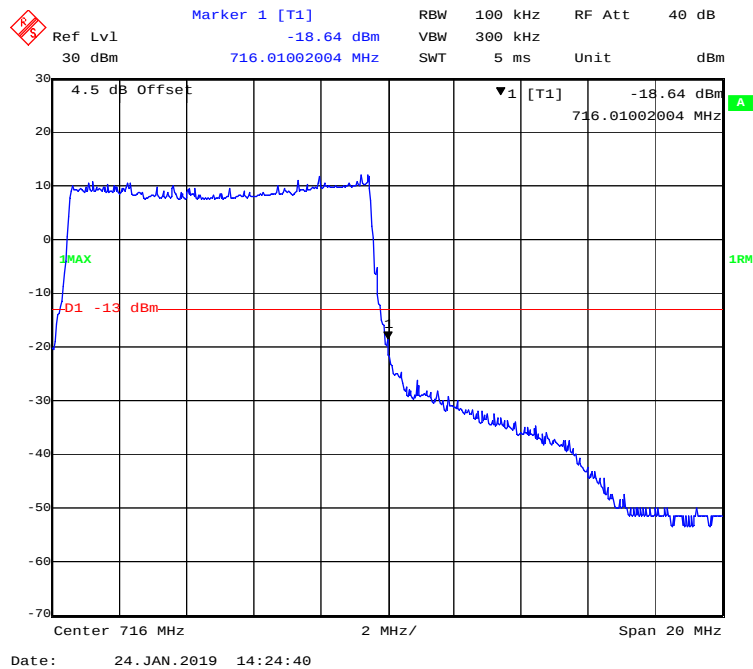
16-QAM (5 MHz, FULL RB) - Right Band Edge



16-QAM (10 MHz, FULL RB) - Left Band Edge



16-QAM (10 MHz, FULL RB) - Right Band Edge



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

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

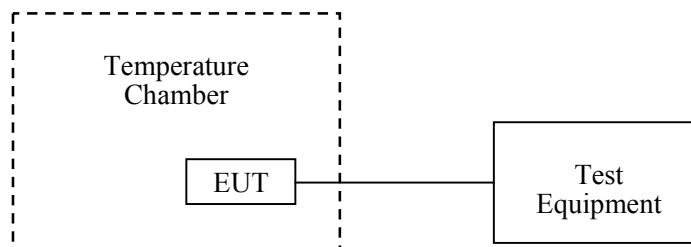
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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:	23.2℃
Relative Humidity:	51 %
ATM Pressure:	101.3kPa

The testing was performed by Hope Zhang on 2019-01-16.

EUT operation mode: Transmitting

Test Result: Compliance.

WCDMA Band V:

Middle Channel, $f_o = 836.6$ MHz				
Temperature (℃)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	10	0.0120	2.5
-20		9	0.0108	2.5
-10		10	0.0120	2.5
0		8	0.0096	2.5
10		7	0.0084	2.5
20		6	0.0072	2.5
30		3	0.0036	2.5
40		3	0.0036	2.5
50		5	0.0060	2.5
25	V min.= 3.5	8	0.0096	2.5
25	V max.= 4.2	9	0.0108	2.5

WCDMA Band II:

WCDMA Mode, Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	11	0.0585	Pass
-20		2	0.0106	Pass
-10		12	0.0638	Pass
0		7	0.0372	Pass
10		8	0.0426	Pass
20		7	0.0372	Pass
30		6	0.0319	Pass
40		5	0.0266	Pass
50		4	0.0213	Pass
25	V min.= 3.5	6	0.0319	Pass
25	V max.= 4.2	7	0.0372	Pass

WCDMA Band IV:

Temperature (°C)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	3.8	1710.3283	1754.6786	1710	1755
-20		1710.3259	1754.6739	1710	1755
-10		1710.3268	1754.6764	1710	1755
0		1710.3225	1754.6735	1710	1755
10		1710.3273	1754.6709	1710	1755
20		1710.3231	1754.6767	1710	1755
30		1710.3212	1754.6785	1710	1755
40		1710.3276	1754.6749	1710	1755
50		1710.3246	1754.6785	1710	1755
25	V min.= 3.5	1710.3279	1754.6734	1710	1755
25	V max.= 4.2	1710.3205	1754.6758	1710	1755

LTE Band 2:

Middle Channel, f_0 =1880.0 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	15	0.0798	Pass
-20		13	0.0691	Pass
-10		16	0.0851	Pass
0		12	0.0638	Pass
10		14	0.0745	Pass
20		3	0.0160	Pass
30		8	0.0426	Pass
40		15	0.0798	Pass
50		9	0.0479	Pass
25	V min.= 3.5	8	0.0426	Pass
25	V max.= 4.2	10	0.0532	Pass

Middle Channel, f_0 =1880.0 MHz (16-QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	8	0.0426	Pass
-20		11	0.0585	Pass
-10		10	0.0532	Pass
0		8	0.0426	Pass
10		9	0.0479	Pass
20		4	0.0213	Pass
30		2	0.0106	Pass
40		4	0.0213	Pass
50		5	0.0266	Pass
25	V min.= 3.5	6	0.0319	Pass
25	V max.= 4.2	8	0.0426	Pass

LTE Band 4:

Low Channel & High Channel (QPSK)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	1710.0496	1754.9497	1710	1755
-20		1710.0507	1754.9493	1710	1755
-10		1710.0502	1754.9502	1710	1755
0		1710.0496	1754.9487	1710	1755
10		1710.0509	1754.9486	1710	1755
20		1710.0489	1754.9499	1710	1755
30		1710.0495	1754.9497	1710	1755
40		1710.049	1754.9496	1710	1755
50		1710.0503	1754.9502	1710	1755
25	V min.= 3.5	1710.0496	1754.9499	1710	1755
25	V max.= 4.2	1710.0500	1754.9517	1710	1755

Low Channel & High Channel (16-QAM)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	1710.0500	1754.9496	1710	1755
-20		1710.0496	1754.9505	1710	1755
-10		1710.0500	1754.9497	1710	1755
0		1710.0503	1754.9496	1710	1755
10		1710.0501	1754.9495	1710	1755
20		1710.0510	1754.9497	1710	1755
30		1710.0501	1754.9496	1710	1755
40		1710.0495	1754.9489	1710	1755
50		1710.0509	1754.9511	1710	1755
25	V min.= 3.5	1710.0494	1754.9481	1710	1755
25	V max.= 4.2	1710.0492	1754.9485	1710	1755

LTE Band 5:

Middle Channel, f_0 =836.5 MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	11	0.0132	2.5
-20		12	0.0143	2.5
-10		13	0.0155	2.5
0		11	0.0132	2.5
10		14	0.0167	2.5
20		4	0.0048	2.5
30		4	0.0048	2.5
40		11	0.0132	2.5
50		7	0.0084	2.5
25	V min.= 3.5	5	0.0060	2.5
25	V max.= 4.2	9	0.0108	2.5

Middle Channel, f_0 =836.5 MHz(16-QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	6	0.0072	2.5
-20		10	0.0120	2.5
-10		9	0.0108	2.5
0		7	0.0084	2.5
10		6	0.0072	2.5
20		11	0.0132	2.5
30		9	0.0108	2.5
40		8	0.0096	2.5
50		4	0.0048	2.5
25	V min.= 3.5	8	0.0096	2.5
25	V max.= 4.2	9	0.0108	2.5

LTE Band 7:

Low Channel & High Channel (QPSK)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	2500.0497	2569.9496	2500	2570
-20		2500.0498	2569.9496	2500	2570
-10		2500.0489	2569.95	2500	2570
0		2500.048	2569.9501	2500	2570
10		2500.0506	2569.9492	2500	2570
20		2500.0514	2569.9518	2500	2570
30		2500.0506	2569.9505	2500	2570
40		2500.0493	2569.9516	2500	2570
50		2500.0508	2569.9505	2500	2570
25	V min.= 3.5	2500.0513	2569.9484	2500	2570
25	V max.= 4.2	2500.0508	2569.9505	2500	2570

Low Channel & High Channel (16-QAM)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	2500.0501	2569.949	2500	2570
-20		2500.0509	2569.9511	2500	2570
-10		2500.0506	2569.9495	2500	2570
0		2500.0499	2569.9499	2500	2570
10		2500.0512	2569.9487	2500	2570
20		2500.0503	2569.9498	2500	2570
30		2500.0485	2569.9497	2500	2570
40		2500.0516	2569.9486	2500	2570
50		2500.0506	2569.9492	2500	2570
25	V min.= 3.5	2500.049	2569.9506	2500	2570
25	V max.= 4.2	2500.0501	2569.9503	2500	2570

LTE Band 12:

Low Channel & High Channel (QPSK)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	699.0193	715.9795	699	716
-20		699.0198	715.9803	699	716
-10		699.0206	715.9792	699	716
0		699.0192	715.979	699	716
10		699.0208	715.9787	699	716
20		699.0206	715.9802	699	716
30		699.0197	715.9799	699	716
40		699.0213	715.9816	699	716
50		699.0204	715.9816	699	716
25	V min.= 3.5	699.0215	715.98	699	716
25	V max.= 4.2	699.0211	715.9804	699	716

Low Channel & High Channel (16-QAM)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	699.0199	715.9802	699	716
-20		699.02	715.9795	699	716
-10		699.0197	715.9789	699	716
0		699.019	715.9792	699	716
10		699.0212	715.9801	699	716
20		699.0196	715.9803	699	716
30		699.0209	715.9796	699	716
40		699.0216	715.9812	699	716
50		699.019	715.9796	699	716
25	V min.= 3.5	699.0193	715.9818	699	716
25	V max.= 4.2	699.0196	715.9804	699	716

LTE Band 13:

Low Channel & High Channel (QPSK)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	777.0215	786.9809	777	787
-20		777.0202	786.9798	777	787
-10		777.0206	786.9797	777	787
0		777.0194	786.9801	777	787
10		777.0206	786.9797	777	787
20		777.0212	786.9794	777	787
30		777.0207	786.9798	777	787
40		777.0211	786.9803	777	787
50		777.0198	786.9805	777	787
25	V min.= 3.5	777.0195	786.9796	777	787
25	V max.= 4.2	777.0198	786.9782	777	787

Low Channel & High Channel (16-QAM)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	777.0201	786.98	777	787
-20		777.0208	786.979	777	787
-10		777.0197	786.9799	777	787
0		777.0196	786.9787	777	787
10		777.0218	786.9801	777	787
20		777.0214	786.9786	777	787
30		777.0202	786.9807	777	787
40		777.0201	786.9792	777	787
50		777.0204	786.981	777	787
25	V min.= 3.5	777.021	786.9804	777	787
25	V max.= 4.2	777.0185	786.9802	777	787

LTE Band 17:

Low Channel & High Channel (QPSK)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	704.0251	715.9825	704	716
-20		704.0305	715.9756	704	716
-10		704.0623	715.9658	704	716
0		704.0684	715.9857	704	716
10		704.0917	715.9878	704	716
20		704.0325	715.9847	704	716
30		704.0514	715.9863	704	716
40		704.0592	715.9758	704	716
50		704.3525	715.9789	704	716
25	V min.= 3.5	704.0963	715.9814	704	716
25	V max.= 4.2	704.3636	715.9755	704	716

Low Channel & High Channel (16-QAM)					
Temperature	Power Supplied	F _L	F _H	F _L Limit	F _H Limit
(°C)	(V _{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	3.8	704.0635	715.9821	704	716
-20		704.0529	715.9739	704	716
-10		704.0214	715.9794	704	716
0		704.0319	715.9778	704	716
10		704.0433	715.9810	704	716
20		704.0987	715.9768	704	716
30		704.0519	715.9873	704	716
40		704.0358	715.9729	704	716
50		704.0293	715.9856	704	716
25	V min.= 3.5	704.0329	715.9841	704	716
25	V max.= 4.2	704.0128	715.9822	704	716

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