FCC PART 27

FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

Shanghai MobileTek Communication Ltd.

Free Trade Zone No. 33, No. 17 building 6H, Xiya Road, Shanghai, China

FCC ID: 2AK9DL506

Report Type:	**Product Type:**
Original Report	LTE Module

Test Engineer:	Chris Wang
Report Number:	RSHA170821002-00A
Report Date:	2017-09-19
Reviewed By:	Oscar Ye RF Leader
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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai MobileTek Communication Ltd.
Tested Model	L506
Product	LTE Module
Dimension	30.0 mm(L)×30.0 mm(W)×2.8mm(H)
Power Supply	DC 3.4V~4.2V

**All measurement and test data in this report was gathered from production sample serial number: 20170821002. (Assigned by BACL, Kunshan). The EUT was received on 2016-08-21.*

Objective

This type approval report is prepared on behalf of Shanghai MobileTek Communication 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)

N/A

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		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	4.88dB
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.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

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.

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

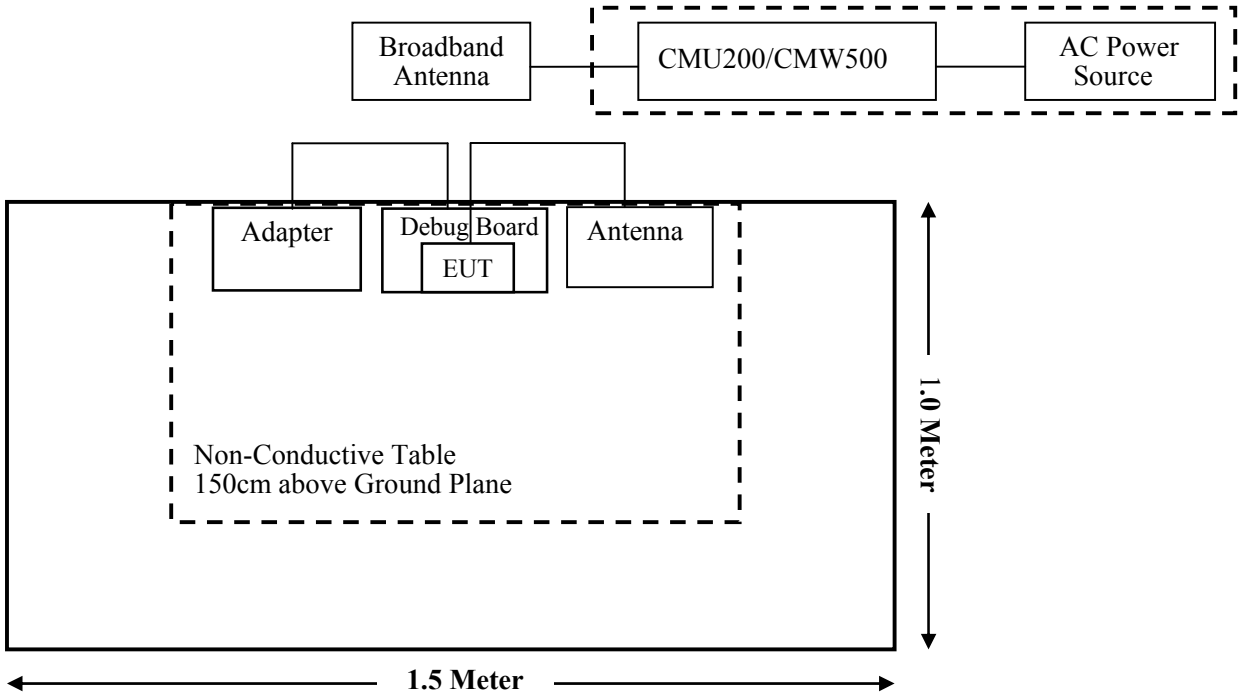
Manufacturer	Description	Model	Serial Number
Yuneng	Adapter	/	/
MobileTek	Antenna	/	/
MobileTek	Debug Board	/	/
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478

External Cable List and Details

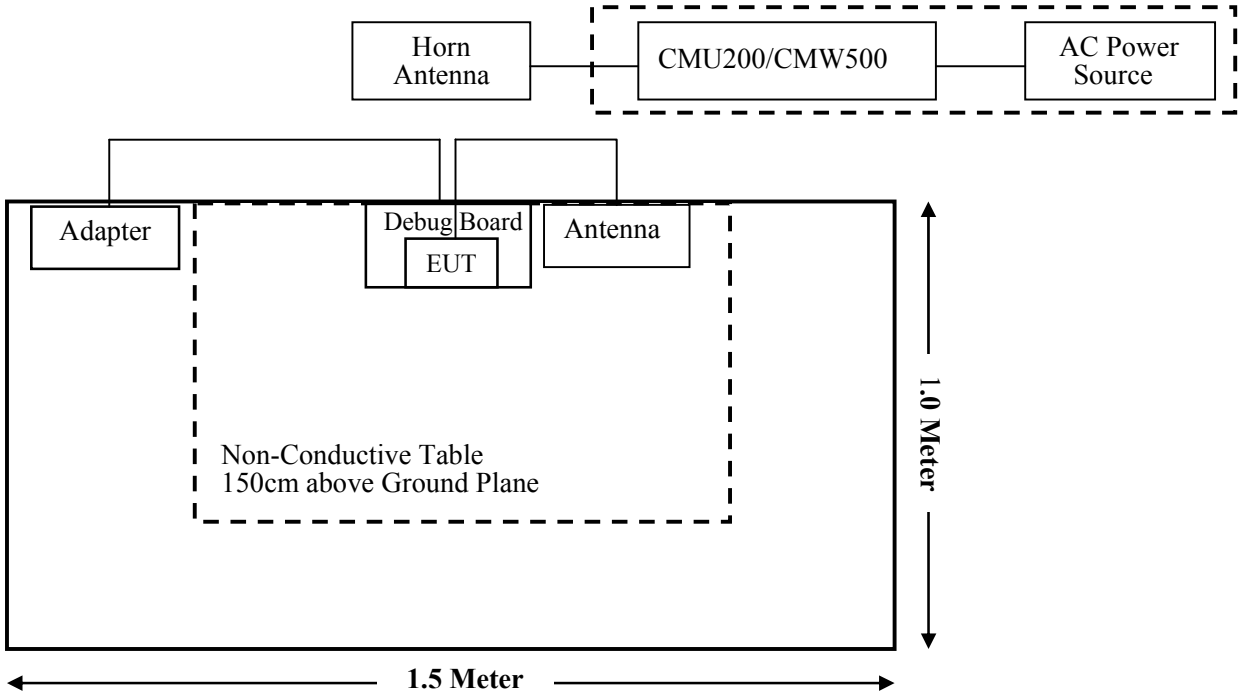
Cable Description	Length (m)	From Port	To
/	/	/	/

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)	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Spurious Radiated Emissions	Compliance
§ 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-12-12	2019-12-12
ETS-LINDGREN	Horn Antenna	3116	2516	2016-12-12	2019-12-12
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21
BACL	Temperature & Humidity Chamber	BTH-150	30023	2016-10-10	2017-10-09
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	/	/
Agilent	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
MobileTek	RF Cable	N/A	N/A	2017-09-01	2018-08-31

*** 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/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f^2)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

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

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/cm^2);
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);

Calculated Data:

Mode	Max Turn-up power (dBm)	ERP/EIRP Limit (dBm)	Max Antenna Gain (dBi)
WCDMA (Band V)	24.0	38.45	14.45
WCDMA (Band II)	23.5	33	9.5
FDD (Band 2)	23.0	33	10
FDD (Band 4)	23.0	30	7
FDD (Band 5)	23.0	38.45	15.45
FDD (Band 13)	22.0	34.77	12.77
FDD (Band 17)	22.0	34.77	12.77

Mode	Frequency	Antenna Gain		Target Output Power		Evaluation Distance	Power Density	MPE Limit
	(MHz)	(dBi)	(numeric)	(dBm)	(mW)	(cm)	(mW/cm^2)	(mW/cm^2)
WCDMA (Band V)	826.4	10.42	11.03	24.0	251.19	20	0.551	0.551
WCDMA (Band II)	1880.0	13.52	22.46	23.5	223.87	20	1.000	1.000
FDD (Band 2)	1880.0	14.01	25.19	23.0	199.53	20	1.000	1.000
FDD (Band 4)	1732.5	14.01	25.19	23.0	199.53	20	1.000	1.000
FDD (Band 5)	836.5	11.48	14.05	23.0	199.53	20	0.558	0.558
FDD (Band 13)	782.0	12.18	16.53	22.0	158.49	20	0.521	0.521
FDD (Band 17)	710.0	11.77	15.01	22.0	158.49	20	0.473	0.473

Mode	Max Allow Antenna Gain (dBi)
WCDMA (Band V) Uplink Frequency: 826.4 MHz~846.6 MHz	10.42
WCDMA (Band II) Uplink Frequency: 1852.4 MHz~1907.6 MHz	9.5
FDD (Band 2) Uplink Frequency: 1850 MHz~1910 MHz	10
FDD (Band 4) Uplink Frequency: 1710 MHz~1755 MHz	7
FDD (Band 5) Uplink Frequency: 824 MHz~849MHz	11.48
FDD (Band 13) Uplink Frequency: 777 MHz~787 MHz	12.18
FDD (Band 17) Uplink Frequency: 704 MHz~716 MHz	11.77

Note :

For the above target output power are all declared by the manufacturer.

To meet RF exposure & ERP/EIRP, the maximum net gain of antennas allowed are 10.42 dBi @ B5, 9.5 dBi @ B2, 7 dBi @ B4, 12.18 dBi @ B13, and 11.77 dBi @ B17.

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.

§2.1046; § 22.913 (a);§ 24.232 (c); §27.50 (d) - 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.

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

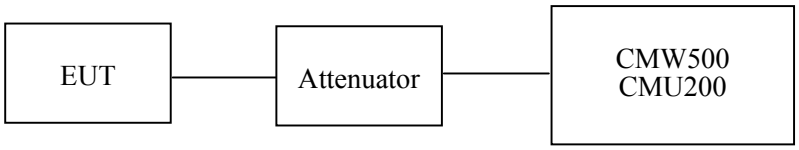
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.
The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

According to §27.50, the maximum EIRP must not exceed 3Watts (34.77dBm) for 699-716MHz.

Test Procedure

Conducted method:

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



Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Chris Wang on 2017-09-01 to 2017-09-05.

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	RMC12.2k		23.52	23.50	23.08
		Rel 6 HSDPA	1	23.54	23.49	23.07
			2	23.41	23.43	23.04
			3	23.21	23.18	22.83
			4	23.19	23.14	22.79
		Rel 6 HSUPA	1	23.45	23.42	23.00
			2	23.38	23.37	22.97
			3	23.39	23.37	22.95
			4	23.27	23.24	22.86
			5	23.34	23.31	22.85
		HSPA+	1	23.51	23.54	23.07

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	22.82	22.84	22.62
		Rel 6 HSDPA	1	23.01	23.04	22.86
			2	23.03	22.91	22.88
			3	22.68	22.72	22.84
			4	22.59	22.77	22.63
		Rel 6 HSUPA	1	22.77	22.92	22.87
			2	22.81	22.83	22.65
			3	22.73	22.53	22.76
			4	22.89	22.77	22.54
			5	22.81	22.75	22.57
		HSPA+	1	23.10	23.13	22.97

Maximum Output Power:

LTE Band 2

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
1.4M	QPSK	1#0	22.54	22.79	22.62	33
		1#3	22.48	22.76	22.56	
		1#5	22.59	22.78	22.69	
		3#0	22.33	22.43	22.37	
		3#1	22.27	22.49	22.31	
		3#3	22.21	22.43	22.26	
		6#0	21.73	21.75	21.58	
	16-QAM	1#0	22.01	22.26	22.11	
		1#3	21.93	22.22	21.98	
		1#5	21.97	22.23	22.06	
		3#0	21.57	21.81	21.73	
		3#1	21.63	21.82	21.71	
		3#3	21.61	21.80	21.74	
		6#0	21.58	21.78	21.63	
3M	QPSK	1#0	22.74	22.80	22.87	33
		1#7	22.79	22.69	22.82	
		1#14	22.75	22.66	22.84	
		8#0	22.39	22.33	22.40	
		8#4	22.44	22.37	22.34	
		8#7	22.38	22.40	22.38	
		15#0	21.80	21.67	21.79	
	16-QAM	1#0	21.98	21.78	21.90	
		1#7	21.92	21.61	21.85	
		1#14	21.94	21.68	21.99	
		8#0	21.63	21.65	21.44	
		8#4	21.62	21.59	21.51	
		8#7	21.55	21.62	21.48	
		15#0	21.03	21.56	21.93	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	22.75	22.81	22.67	33
		1#12	22.80	22.73	22.63	
		1#24	22.67	22.79	22.69	
		12#0	22.38	22.42	22.46	
		12#6	22.41	22.37	22.33	
		12#11	22.34	22.29	22.39	
		25#0	21.69	21.85	21.67	
	16-QAM	1#0	21.79	21.78	21.46	
		1#12	21.72	21.80	21.49	
		1#24	21.78	21.82	21.53	
		12#0	21.48	21.46	21.22	
		12#6	21.37	21.43	21.28	
		12#11	21.43	21.38	21.26	
		25#0	21.07	21.04	21.05	
10M	QPSK	1#0	22.72	22.88	22.72	33
		1#24	22.66	22.69	22.80	
		1#49	22.69	22.77	22.69	
		25#0	22.47	22.55	22.49	
		25#12	22.49	22.58	22.47	
		25#24	22.55	22.52	22.50	
		50#0	21.72	21.86	21.84	
	16-QAM	1#0	21.78	21.62	21.56	
		1#24	21.83	21.51	21.48	
		1#49	21.77	21.47	21.63	
		25#0	21.58	21.34	21.28	
		25#12	21.46	21.29	21.20	
		25#24	21.33	21.36	21.29	
		50#0	21.44	21.49	21.11	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
15M	QPSK	1#0	22.71	22.72	22.65	33
		1#37	22.60	22.69	22.62	
		1#74	22.66	22.64	22.69	
		36#0	22.40	22.31	22.26	
		36#17	22.31	22.36	22.20	
		36#35	22.38	22.32	22.27	
		75#0	21.78	21.92	22.81	
	16-QAM	1#0	21.60	21.73	21.58	
		1#37	21.65	21.77	21.51	
		1#74	21.71	21.79	21.57	
		36#0	21.26	21.45	21.29	
		36#17	21.19	21.49	21.21	
		36#35	21.13	21.43	21.18	
		75#0	21.42	21.60	21.56	
20M	QPSK	1#0	22.57	22.71	22.60	33
		1#49	22.62	22.59	22.55	
		1#99	22.64	22.68	22.69	
		50#0	22.39	22.38	22.48	
		50#24	22.28	22.33	22.40	
		50#49	22.32	22.39	22.41	
		100#0	21.91	21.97	21.60	
	16-QAM	1#0	21.69	21.33	21.85	
		1#49	21.64	21.31	21.81	
		1#99	21.62	21.33	21.78	
		50#0	21.27	21.03	21.46	
		50#24	21.30	20.98	21.42	
		50#49	21.34	21.35	21.39	
		100#0	21.37	21.22	21.33	

LTE Band 4

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
1.4M	QPSK	1#0	22.33	22.40	22.55	30
		1#3	22.15	22.45	22.46	
		1#5	22.26	22.57	22.43	
		3#0	22.29	22.32	22.10	
		3#1	22.10	22.31	22.25	
		3#3	22.03	22.19	21.89	
		6#0	21.49	21.72	21.55	
	16-QAM	1#0	21.97	22.25	21.77	
		1#3	21.57	21.99	21.71	
		1#5	21.63	22.13	21.99	
		3#0	21.27	21.81	21.61	
		3#1	21.38	21.63	21.55	
		3#3	21.45	21.70	21.49	
		6#0	21.36	21.62	21.38	
3M	QPSK	1#0	22.50	22.73	22.64	30
		1#7	22.48	22.53	22.67	
		1#14	22.72	22.81	22.48	
		8#0	22.29	22.06	22.34	
		8#4	22.24	22.05	22.18	
		8#7	22.31	22.35	22.11	
		15#0	21.80	21.60	21.55	
	16-QAM	1#0	21.88	21.69	21.50	
		1#7	21.53	21.32	21.61	
		1#14	21.81	21.32	21.61	
		8#0	21.31	21.58	21.31	
		8#4	21.54	21.38	21.43	
		8#7	21.23	21.61	21.47	
		15#0	21.00	21.33	21.58	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	22.56	22.50	22.40	30
		1#12	22.68	22.52	22.23	
		1#24	22.32	22.53	22.60	
		12#0	22.16	22.28	22.15	
		12#6	22.33	21.98	21.93	
		12#11	22.23	22.29	22.31	
		25#0	21.38	21.66	21.50	
	16-QAM	1#0	21.47	21.63	21.31	
		1#12	21.34	21.52	21.14	
		1#24	21.59	21.42	21.14	
		12#0	21.13	21.15	21.14	
		12#6	21.08	21.12	20.90	
		12#11	21.39	21.38	21.17	
		25#0	21.19	21.07	21.13	
10M	QPSK	1#0	22.66	22.73	22.66	30
		1#24	22.60	22.46	22.75	
		1#49	22.43	22.64	22.33	
		25#0	22.37	22.53	22.27	
		25#12	22.13	22.54	22.27	
		25#24	22.34	22.15	22.34	
		50#0	21.42	21.85	21.46	
	16-QAM	1#0	21.75	21.53	21.32	
		1#24	21.63	21.46	21.09	
		1#49	21.42	21.18	21.57	
		25#0	21.36	21.14	21.05	
		25#12	21.22	21.12	21.67	
		25#24	21.96	21.71	21.90	
		50#0	21.26	21.42	21.79	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
15M	QPSK	1#0	22.48	22.70	22.48	30
		1#37	22.55	22.42	22.46	
		1#74	22.32	22.38	22.54	
		36#0	22.25	22.09	22.15	
		36#17	22.10	22.14	22.10	
		36#35	22.02	22.32	22.12	
		75#0	21.67	21.79	22.71	
	16-QAM	1#0	21.39	21.37	21.29	
		1#37	21.31	21.43	21.51	
		1#74	21.58	21.69	21.51	
		36#0	21.15	21.44	20.96	
		36#17	21.93	21.33	21.03	
		36#35	21.84	21.04	21.88	
		75#0	21.38	21.33	21.41	
20M	QPSK	1#0	22.56	22.36	22.56	30
		1#49	22.54	22.26	22.50	
		1#99	22.51	22.54	22.45	
		50#0	22.09	22.29	22.13	
		50#24	21.89	22.10	22.04	
		50#49	21.94	22.04	22.09	
		100#0	21.78	21.67	21.23	
	16-QAM	1#0	21.36	21.14	21.51	
		1#49	21.33	21.99	21.60	
		1#99	21.41	21.07	21.77	
		50#0	21.06	21.89	21.07	
		50#24	21.98	21.63	21.04	
		50#49	21.04	21.95	21.21	
		100#0	21.25	21.32	21.49	

LTE Band 5

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
1.4M	QPSK	1#0	22.13	22.53	22.03	38.45
		1#3	21.95	22.52	22.14	
		1#5	22.22	22.18	22.34	
		3#0	21.84	21.83	21.85	
		3#1	21.86	21.94	21.88	
		3#3	21.95	21.83	21.93	
		6#0	21.35	21.19	21.33	
	16-QAM	1#0	21.66	21.89	21.84	
		1#3	21.62	21.90	21.42	
		1#5	21.77	21.86	21.66	
		3#0	21.18	21.46	21.28	
		3#1	21.43	21.29	21.19	
		3#3	21.14	21.43	21.42	
		6#0	21.13	21.34	21.08	
3M	QPSK	1#0	22.41	22.36	22.32	38.45
		1#7	22.52	22.59	22.46	
		1#14	22.47	22.23	22.43	
		8#0	22.16	21.95	22.07	
		8#4	22.00	21.95	21.88	
		8#7	22.07	21.93	22.02	
		15#0	21.57	21.46	21.55	
	16-QAM	1#0	21.54	21.45	21.32	
		1#7	21.61	21.24	21.40	
		1#14	21.46	21.46	21.72	
		8#0	21.14	21.31	21.88	
		8#4	21.37	21.28	21.98	
		8#7	21.98	21.33	21.90	
		15#0	21.70	21.16	21.39	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	22.38	22.53	22.10	38.45
		1#12	22.36	22.18	22.35	
		1#24	22.29	22.42	22.13	
		12#0	21.87	22.11	21.91	
		12#6	22.17	21.95	22.08	
		12#11	21.95	21.93	21.92	
		25#0	21.22	21.29	21.27	
	16-QAM	1#0	21.54	21.21	21.00	
		1#12	21.46	21.23	21.11	
		1#24	21.45	21.37	21.03	
		12#0	21.97	21.89	21.67	
		12#6	21.78	21.18	21.01	
		12#11	21.19	21.00	21.67	
		25#0	21.01	21.21	21.45	
10M	QPSK	1#0	22.45	22.53	22.46	38.45
		1#24	22.38	22.39	22.37	
		1#49	22.45	22.32	22.34	
		25#0	22.00	22.07	22.24	
		25#12	22.01	22.32	21.87	
		25#24	22.12	22.14	22.18	
		50#0	21.28	21.33	21.62	
	16-QAM	1#0	21.50	21.21	21.04	
		1#24	21.26	21.09	21.13	
		1#49	21.44	20.91	21.24	
		25#0	21.00	21.13	21.03	
		25#12	21.98	21.92	21.91	
		25#24	21.13	21.88	21.80	
		50#0	21.05	21.08	21.64	

LTE Band 13

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	21.49	21.56	21.64	34.77
		1#12	21.60	21.41	21.25	
		1#24	21.54	21.67	21.66	
		12#0	20.98	21.19	21.10	
		12#6	21.32	21.22	20.94	
		12#11	21.17	20.92	21.00	
		25#0	20.60	20.57	20.38	
	16-QAM	1#0	20.40	20.53	20.28	
		1#12	20.62	20.56	20.15	
		1#24	20.64	20.70	20.14	
		12#0	20.23	20.13	20.15	
		12#6	20.07	20.11	20.08	
		12#11	20.17	20.30	20.06	
		25#0	20.06	20.19	20.11	
10M	QPSK	1#0	21.49	21.60	21.35	34.77
		1#24	21.47	21.29	21.55	
		1#49	21.43	21.53	21.29	
		25#0	21.13	21.43	21.05	
		25#12	21.29	21.30	21.37	
		25#24	21.21	21.29	21.20	
		50#0	20.56	20.69	20.58	
	16-QAM	1#0	20.44	20.33	20.22	
		1#24	20.68	20.07	20.36	
		1#49	20.28	20.35	20.53	
		25#0	20.31	20.07	20.03	
		25#12	20.13	20.12	20.08	
		25#24	20.04	20.06	20.09	
		50#0	20.08	20.24	20.03	

LTE Band 17

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	21.84	21.80	21.75	34.77
		1#12	21.79	21.86	21.74	
		1#24	21.76	21.75	21.81	
		12#0	21.26	21.60	21.51	
		12#6	21.50	21.30	21.21	
		12#11	21.30	21.40	21.48	
		25#0	20.68	20.83	20.80	
	16-QAM	1#0	20.67	20.85	20.61	
		1#12	20.80	20.98	20.58	
		1#24	20.79	20.72	20.56	
		12#0	20.37	20.41	20.22	
		12#6	20.31	20.60	20.12	
		12#11	20.58	20.25	20.23	
		25#0	20.25	20.22	20.07	
10M	QPSK	1#0	21.82	21.65	21.53	34.77
		1#24	21.67	21.57	21.77	
		1#49	21.67	21.77	21.70	
		25#0	21.57	21.42	21.21	
		25#12	21.47	21.31	21.40	
		25#24	21.56	21.46	21.46	
		50#0	20.78	20.87	20.65	
	16-QAM	1#0	20.68	20.39	20.48	
		1#24	20.74	20.14	20.59	
		1#49	20.69	20.48	20.42	
		25#0	20.29	20.34	20.28	
		25#12	20.40	20.21	20.21	
		25#24	20.40	20.15	20.20	
		50#0	20.53	20.45	20.13	

Peak-to-average ratio (PAR):

WCDMA Band V

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	3.15	13
	Middle	3.13	13
	High	3.16	13
HSDPA (16QAM)	Low	2.80	13
	Middle	2.79	13
	High	2.73	13
HSUPA (BPSK)	Low	2.75	13
	Middle	2.72	13
	High	2.65	13
HSPA+ (16QAM)	Low	2.57	13
	Middle	2.48	13
	High	2.39	13

WCDMA Band II

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	2.72	13
	Middle	2.75	13
	High	2.74	13
HSDPA (16QAM)	Low	2.35	13
	Middle	2.37	13
	High	2.41	13
HSUPA (BPSK)	Low	2.47	13
	Middle	2.51	13
	High	2.55	13
HSPA+ (16QAM)	Low	2.26	13
	Middle	2.23	13
	High	2.25	13

LTE Band 2

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	3.81	3.80	3.84	13
	100 RB		6.01	5.99	6.04	13
16-QAM	1 RB	20M	4.46	4.49	4.52	13
	100 RB		6.42	6.45	6.47	13

LTE Band 4

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	4.19	4.20	4.18	13
	100 RB		6.42	6.43	6.42	13
16-QAM	1 RB	20M	5.12	5.12	5.09	13
	100 RB		7.08	7.08	7.05	13

LTE Band 5

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	5.13	5.11	5.17	13
	100 RB		7.30	7.28	7.34	13
16-QAM	1 RB	10M	6.04	6.02	6.05	13
	100 RB		7.96	7.93	7.97	13

LTE Band 13

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	5.04	5.01	5.02	13
	100 RB		7.24	7.20	7.22	13
16-QAM	1 RB	10M	6.04	6.05	6.04	13
	100 RB		7.98	7.95	7.96	13

LTE Band 17

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	5.31	5.30	5.32	13
	100 RB		7.54	7.55	7.56	13
16-QAM	1 RB	10M	6.22	6.21	6.24	13
	100 RB		8.12	8.13	8.15	13

Radiated Power:

WCDMA Mode

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 (dB)			
WCDMA Band V, Middle Channel										
836.6	76.04	196	153	H	20.59	0.63	-1.14	18.82	38.45	19.63
836.6	76.75	156	229	V	23.34	0.63	-1.14	21.57	38.45	16.88
WCDMA Band II, Middle Channel										
1880.0	90.42	55	225	H	11.11	0.85	8.81	19.07	33.00	13.93
1880.0	88.31	154	103	V	13.53	0.85	8.81	21.49	33.00	11.51

Note:
All above data were tested with no amplifier.
Absolute Level = Submitted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

EIRP:

LTE Band 2

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK, 1.4M BW, Middle Channel								
1880.0	H	87.11	14.42	0.85	8.81	22.38	33.00	10.62
1880.0	V	86.56	15.28	0.85	8.81	23.24	33.00	9.76
16-QAM, 1.4M BW, Middle Channel								
1880.0	H	87.97	13.56	0.85	8.81	21.52	33.00	11.48
1880.0	V	86.83	15.01	0.85	8.81	22.97	33.00	10.03
QPSK, 3M BW, Middle Channel								
1880.0	H	87.34	14.19	0.85	8.81	22.15	33.00	10.85
1880.0	V	86.54	15.30	0.85	8.81	23.26	33.00	9.74
16-QAM, 3M BW, Middle Channel								
1880.0	H	88.06	13.47	0.85	8.81	21.43	33.00	11.57
1880.0	V	86.98	14.86	0.85	8.81	22.82	33.00	10.18
QPSK, 5M BW, Middle Channel								
1880.0	H	88.78	12.75	0.85	8.81	20.71	33.00	12.29
1880.0	V	87.95	13.89	0.85	8.81	21.85	33.00	11.15
16-QAM, 5M BW, Middle Channel								
1880.0	H	89.20	12.33	0.85	8.81	20.29	33.00	12.71
1880.0	V	88.04	13.80	0.85	8.81	21.76	33.00	11.24
QPSK, 10M BW, Middle Channel								
1880.0	H	89.73	11.80	0.85	8.81	19.76	33.00	13.24
1880.0	V	88.93	12.91	0.85	8.81	20.87	33.00	12.13
16-QAM, 10M BW, Middle Channel								
1880.0	H	89.94	11.59	0.85	8.81	19.55	33.00	13.45
1880.0	V	89.27	12.57	0.85	8.81	20.53	33.00	12.47
QPSK, 15M BW, Middle Channel								
1880.0	H	89.96	11.57	0.85	8.81	19.53	33.00	13.47
1880.0	V	89.56	12.28	0.85	8.81	20.24	33.00	12.76
16-QAM, 15M BW, Middle Channel								
1880.0	H	90.01	11.52	0.85	8.81	19.48	33.00	13.52
1880.0	V	89.61	12.23	0.85	8.81	20.19	33.00	12.81
QPSK, 20M BW, Middle Channel								
1880.0	H	89.93	11.60	0.85	8.81	19.56	33.00	13.44
1880.0	V	89.75	12.09	0.85	8.81	20.05	33.00	12.95
16-QAM, 20M BW, Middle Channel								
1880.0	H	90.82	10.71	0.85	8.81	18.67	33.00	14.33
1880.0	V	89.95	11.89	0.85	8.81	19.85	33.00	13.15

LTE Band 4

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK, 1.4M BW, Middle Channel								
1732.5	H	88.08	14.72	0.84	8.57	22.45	30.00	7.55
1732.5	V	87.75	15.32	0.84	8.57	23.05	30.00	6.95
16-QAM, 1.4M BW, Middle Channel								
1732.5	H	88.89	13.91	0.84	8.57	21.64	30.00	8.36
1732.5	V	87.92	15.15	0.84	8.57	22.88	30.00	7.12
QPSK, 3M BW, Middle Channel								
1732.5	H	88.39	14.41	0.84	8.57	22.14	30.00	7.86
1732.5	V	87.61	15.46	0.84	8.57	23.19	30.00	6.81
16-QAM, 3M BW, Middle Channel								
1732.5	H	89.08	13.72	0.84	8.57	21.45	30.00	8.55
1732.5	V	87.91	15.16	0.84	8.57	22.89	30.00	7.11
QPSK, 5M BW, Middle Channel								
1732.5	H	89.75	13.05	0.84	8.57	20.78	30.00	9.22
1732.5	V	88.98	14.09	0.84	8.57	21.82	30.00	8.18
16-QAM, 5M BW, Middle Channel								
1732.5	H	90.22	12.58	0.84	8.57	20.31	30.00	9.69
1732.5	V	89.02	14.05	0.84	8.57	21.78	30.00	8.22
QPSK, 10M BW, Middle Channel								
1732.5	H	90.74	12.06	0.84	8.57	19.79	30.00	10.21
1732.5	V	90.02	13.05	0.84	8.57	20.78	30.00	9.22
16-QAM, 10M BW, Middle Channel								
1732.5	H	90.95	11.85	0.84	8.57	19.58	30.00	10.42
1732.5	V	90.24	12.83	0.84	8.57	20.56	30.00	9.44
QPSK, 15M BW, Middle Channel								
1732.5	H	90.97	11.83	0.84	8.57	19.56	30.00	10.44
1732.5	V	90.52	12.55	0.84	8.57	20.28	30.00	9.72
16-QAM, 15M BW, Middle Channel								
1732.5	H	91.09	11.71	0.84	8.57	19.44	30.00	10.56
1732.5	V	90.59	12.48	0.84	8.57	20.21	30.00	9.79
QPSK, 20M BW, Middle Channel								
1732.5	H	90.98	11.82	0.84	8.57	19.55	30.00	10.45
1732.5	V	90.71	12.36	0.84	8.57	20.09	30.00	9.91
16-QAM, 20M BW, Middle Channel								
1732.5	H	91.82	10.98	0.84	8.57	18.71	30.00	11.29
1732.5	V	91.42	11.65	0.84	8.57	19.38	30.00	10.62

LTE Band 5

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK, 1.4M BW, Middle Channel								
836.5	H	72.56	24.08	0.63	-1.14	22.31	38.45	16.14
836.5	V	75.07	25.03	0.63	-1.14	23.26	38.45	15.19
16-QAM, 1.4M BW, Middle Channel								
836.5	H	73.34	23.30	0.63	-1.14	21.53	38.45	16.92
836.5	V	75.41	24.69	0.63	-1.14	22.92	38.45	15.53
QPSK, 3M BW, Middle Channel								
836.5	H	72.70	23.94	0.63	-1.14	22.17	38.45	16.28
836.5	V	75.08	25.02	0.63	-1.14	23.25	38.45	15.20
16-QAM, 3M BW, Middle Channel								
836.5	H	73.40	23.24	0.63	-1.14	21.47	38.45	16.98
836.5	V	75.48	24.62	0.63	-1.14	22.85	38.45	15.60
QPSK, 5M BW, Middle Channel								
836.5	H	74.15	22.49	0.63	-1.14	20.72	38.45	17.73
836.5	V	76.48	23.62	0.63	-1.14	21.85	38.45	16.60
16-QAM, 5M BW, Middle Channel								
836.5	H	74.59	22.05	0.63	-1.14	20.28	38.45	18.17
836.5	V	76.59	23.51	0.63	-1.14	21.74	38.45	16.71
QPSK, 10M BW, Middle Channel								
836.5	H	75.10	21.54	0.63	-1.14	19.77	38.45	18.68
836.5	V	77.51	22.59	0.63	-1.14	20.82	38.45	17.63
16-QAM, 10M BW, Middle Channel								
836.5	H	75.33	21.31	0.63	-1.14	19.54	38.45	18.91
836.5	V	77.85	22.25	0.63	-1.14	20.48	38.45	17.97

LTE Band 13

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK, 5M BW, Middle Channel								
782.0	H	78.61	22.65	0.62	-1.34	20.69	34.77	14.08
782.0	V	76.36	23.52	0.62	-1.34	21.56	34.77	13.21
16-QAM, 5M BW, Middle Channel								
782.0	H	78.78	22.48	0.62	-1.34	20.52	34.77	14.25
782.0	V	76.56	23.32	0.62	-1.34	21.36	34.77	13.41
QPSK, 10M BW, Middle Channel								
782.0	H	79.51	21.75	0.62	-1.34	19.79	34.77	14.98
782.0	V	77.04	22.84	0.62	-1.34	20.88	34.77	13.89
16-QAM, 10M BW, Middle Channel								
782.0	H	79.69	21.57	0.62	-1.34	19.61	34.77	15.16
782.0	V	77.47	22.41	0.62	-1.34	20.45	34.77	14.32

LTE Band 17

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK, 5M BW, Middle Channel								
710.0	H	79.80	23.07	0.62	-1.70	20.75	34.77	14.02
710.0	V	77.41	23.90	0.62	-1.70	21.58	34.77	13.19
16-QAM, 5M BW, Middle Channel								
710.0	H	79.94	22.93	0.62	-1.70	20.61	34.77	14.16
710.0	V	77.62	23.69	0.62	-1.70	21.37	34.77	13.40
QPSK, 10M BW, Middle Channel								
710.0	H	80.57	22.30	0.62	-1.70	19.98	34.77	14.79
710.0	V	78.12	23.19	0.62	-1.70	20.87	34.77	13.90
16-QAM, 10M BW, Middle Channel								
710.0	H	80.90	21.97	0.62	-1.70	19.65	34.77	15.12
710.0	V	78.56	22.75	0.62	-1.70	20.43	34.77	14.34

Note:
All above data were tested with no amplifier
Absolute Level = Submitted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

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

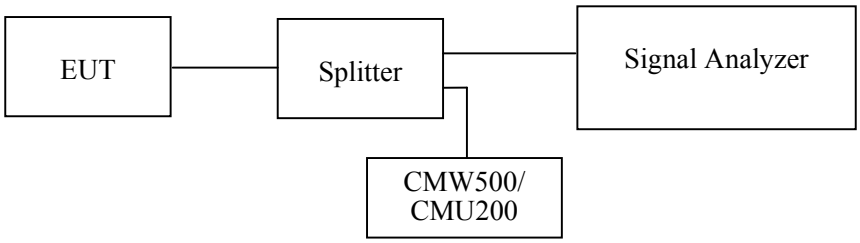
Applicable Standards

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 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Chris Wang on 2017-09-01 to 2017-09-10.

EUT operation mode: Transmitting

Test Result: Compliance.

WCDMA Band V

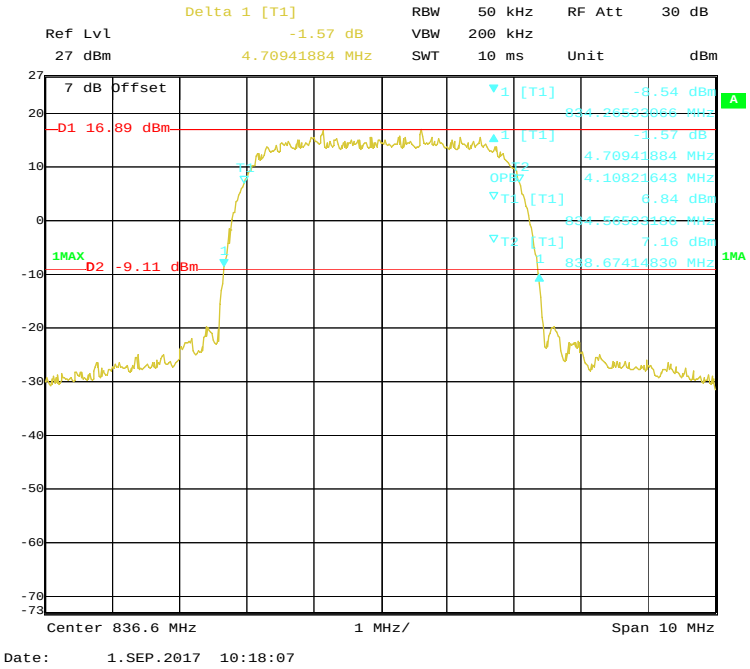
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA (BPSK)	836.6	4.108	4.709

WCDMA Band II

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA (BPSK)	1880.0	4.128	4.749

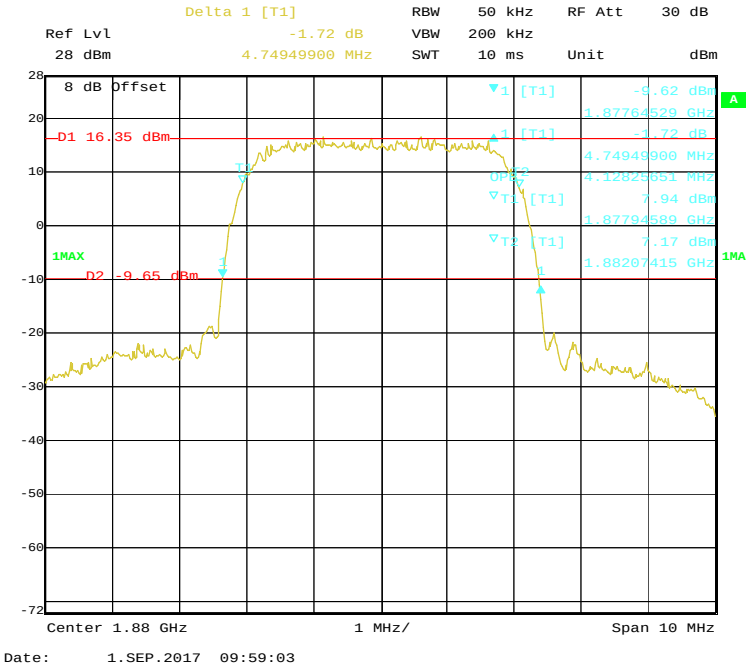
WCDMA Band V

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



WCDMA Band II

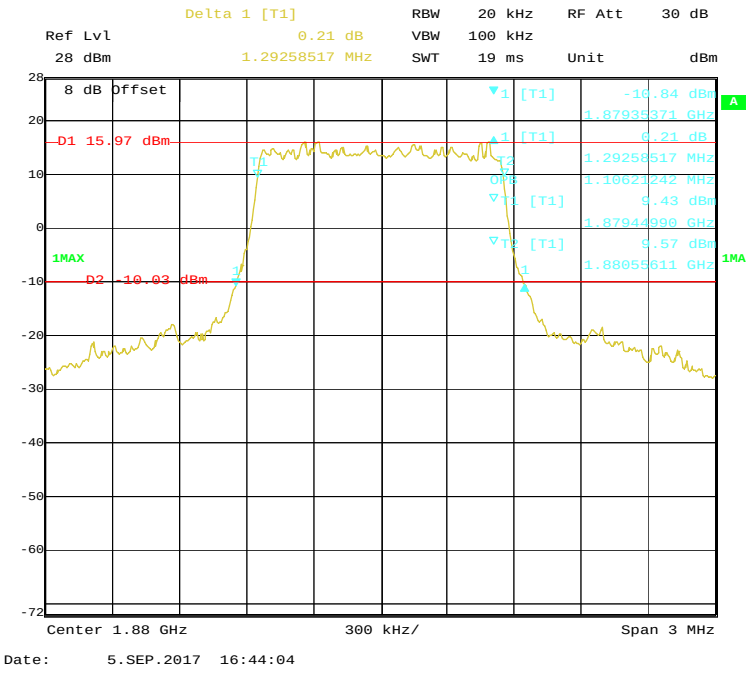
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode



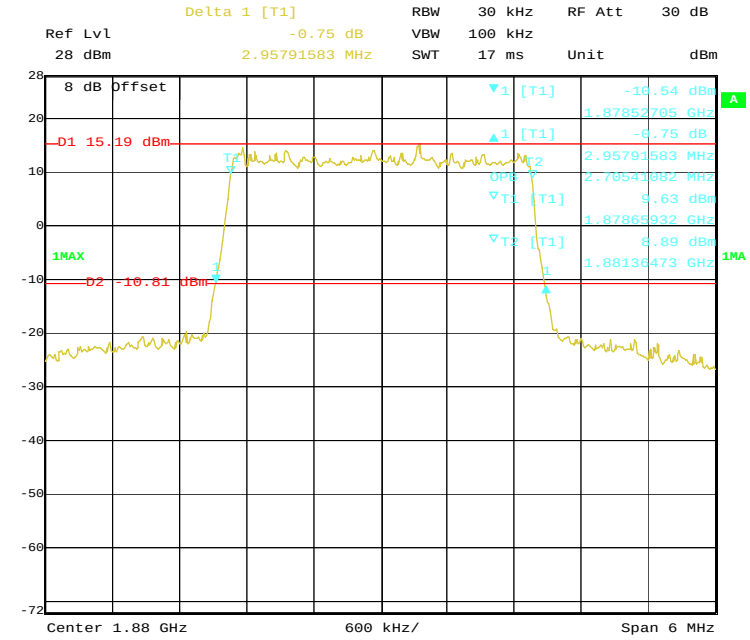
LTE Band 2:

Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth	26 dB Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.293	1.106
	3M		2.958	2.705
	5M		4.950	4.489
	10M		9.820	8.978
	15M		14.669	13.467
	20M		19.078	17.956
16-QAM	1.4M	Middle	1.311	1.100
	3M		2.946	2.693
	5M		5.010	4.509
	10M		9.860	8.978
	15M		14.729	13.467
	20M		19.158	17.876

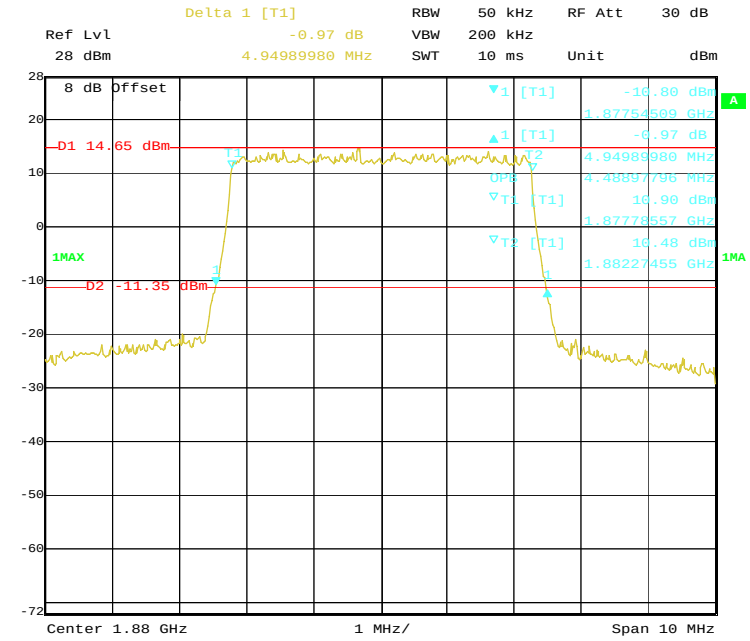
QPSK (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



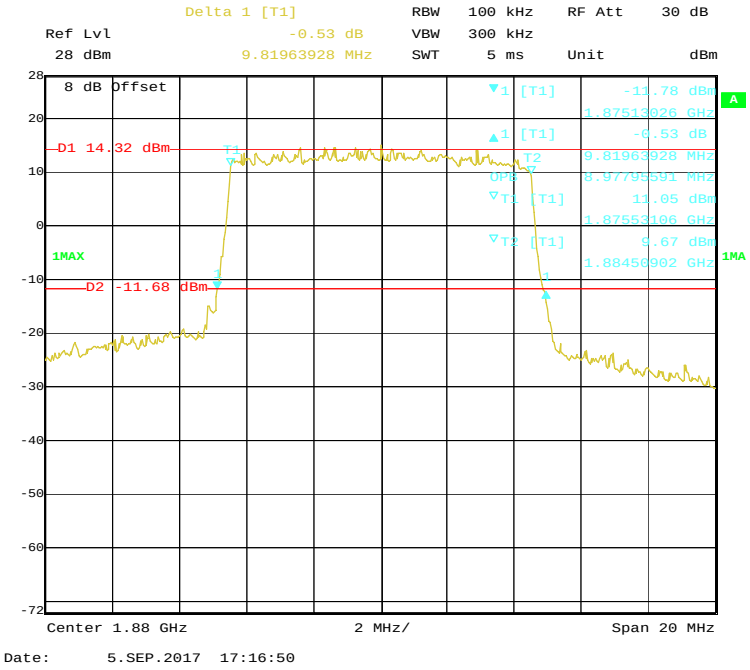
QPSK (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



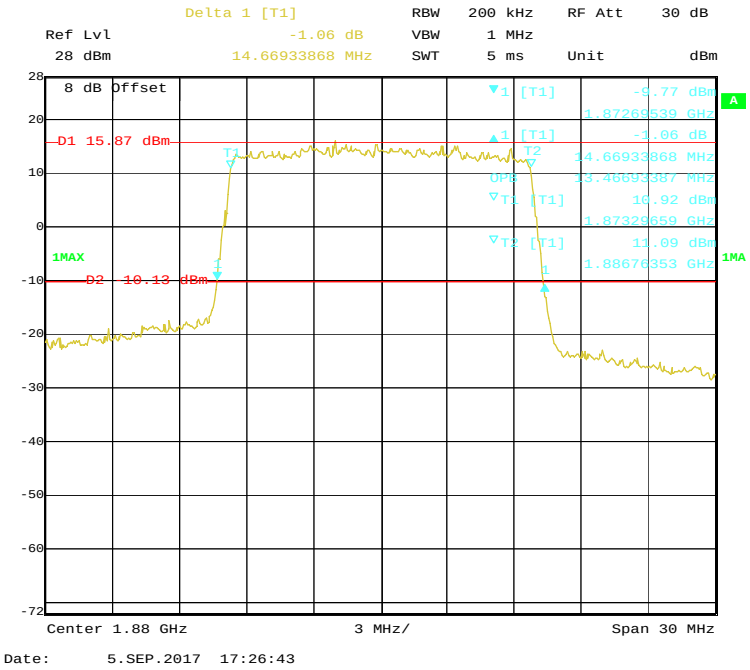
QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



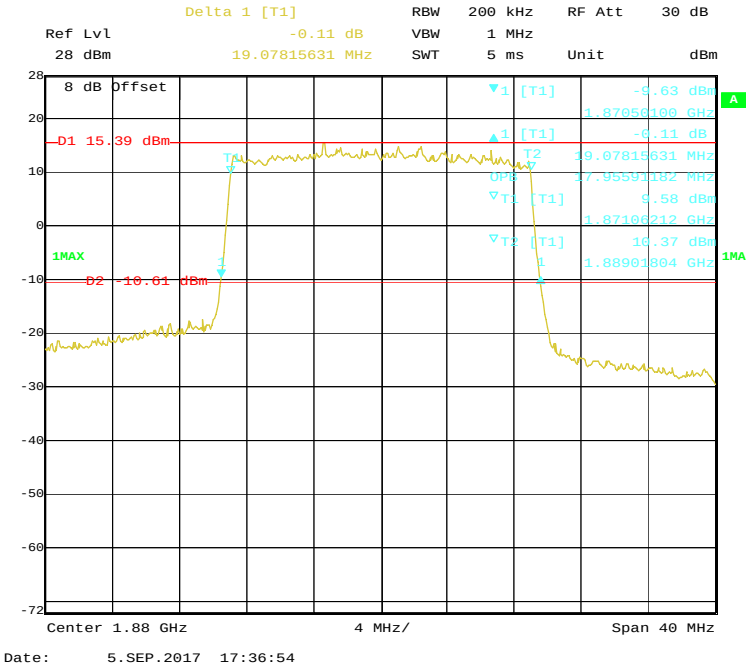
QPSK (10.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



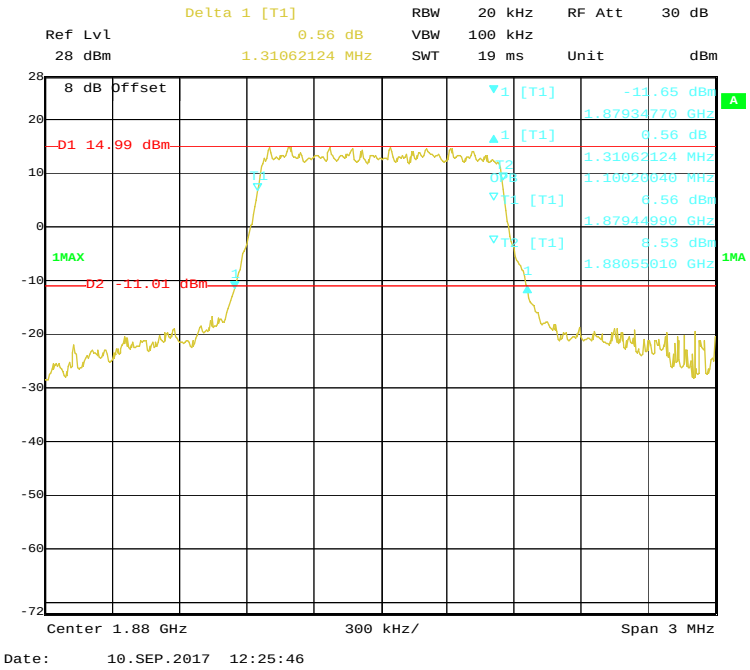
QPSK (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



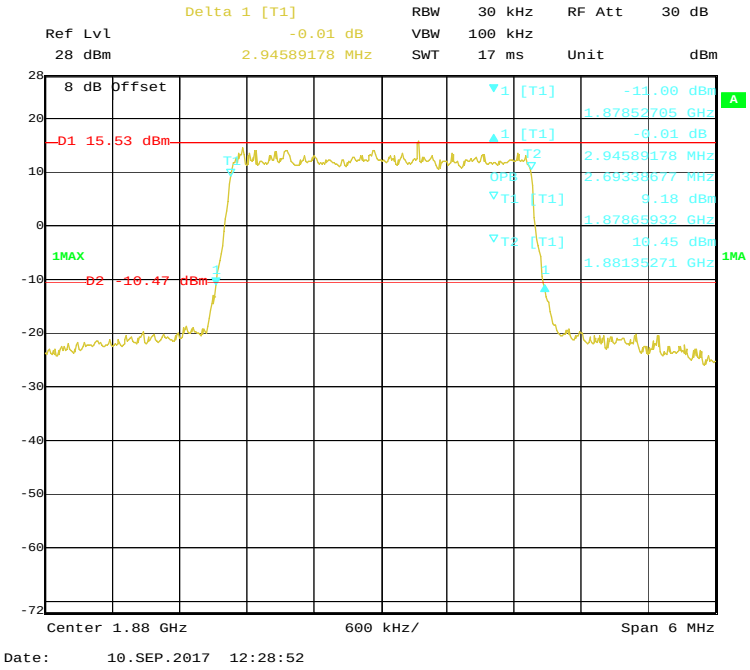
QPSK (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



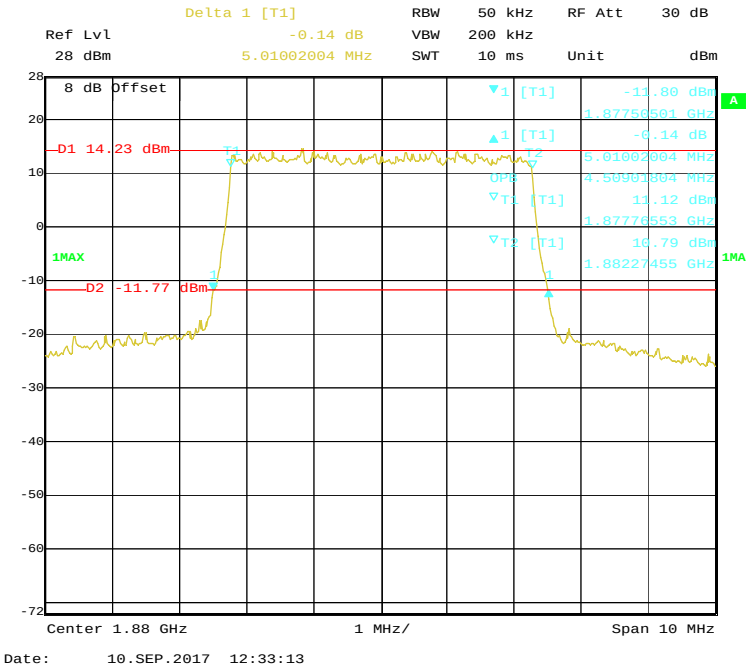
16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



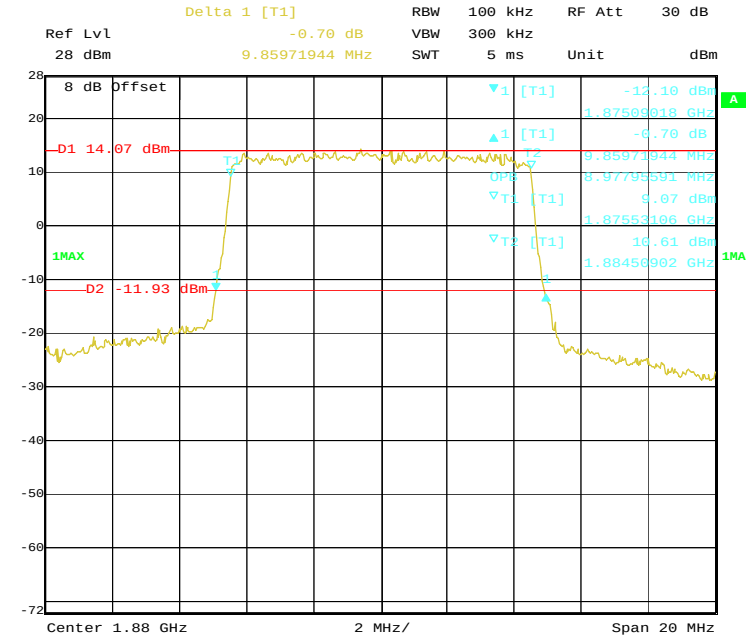
16-QAM (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



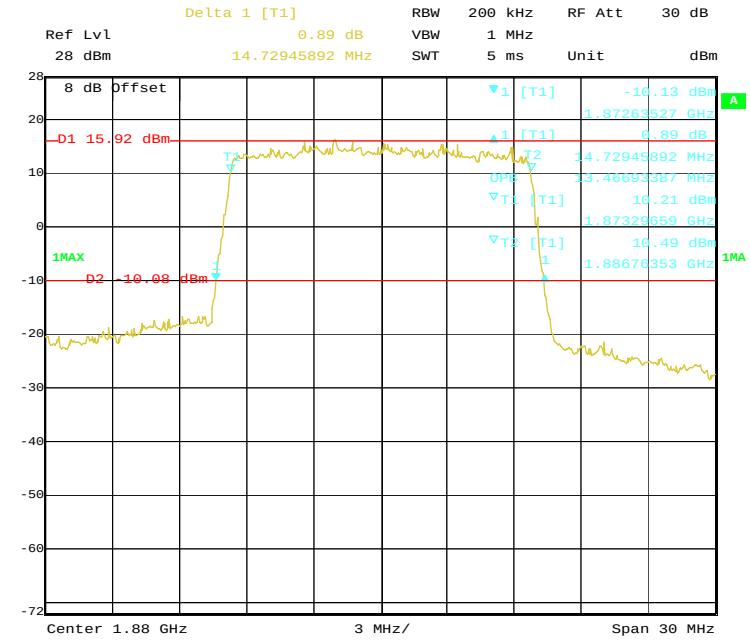
16-QAM (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



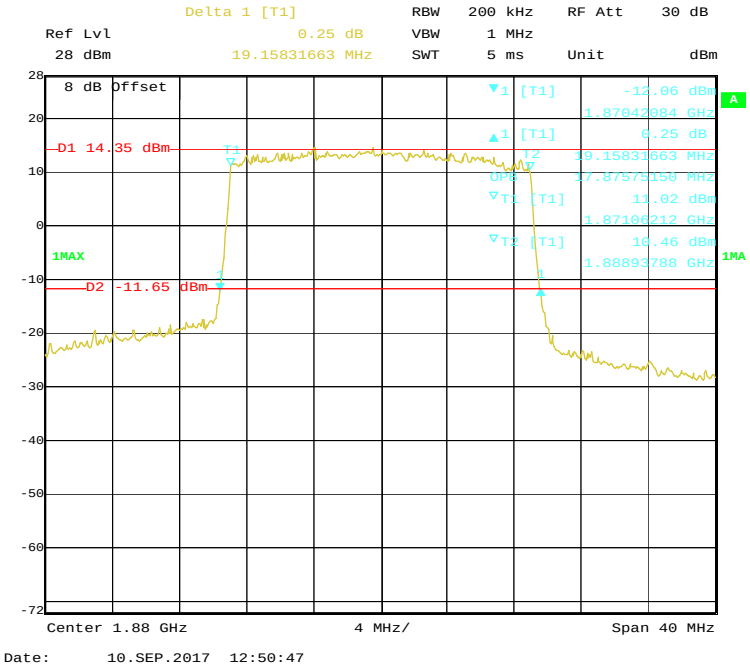
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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



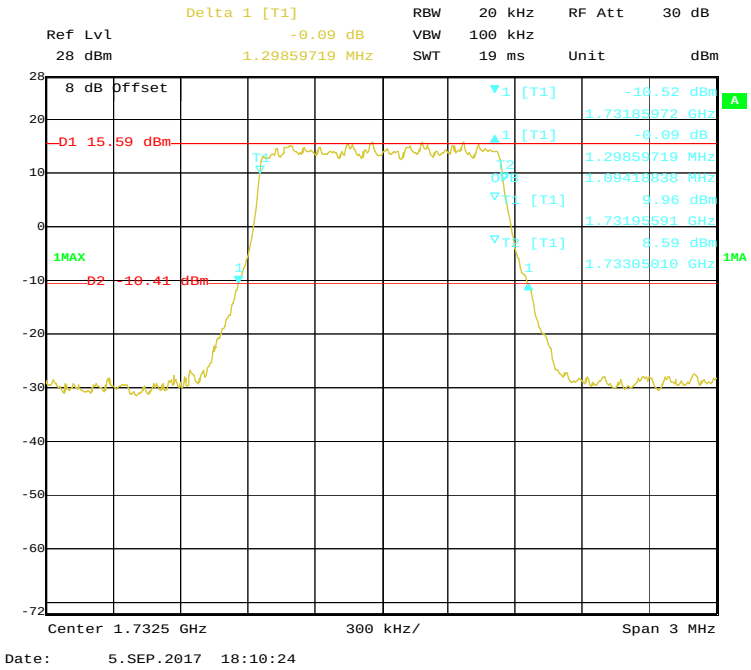
16-QAM (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



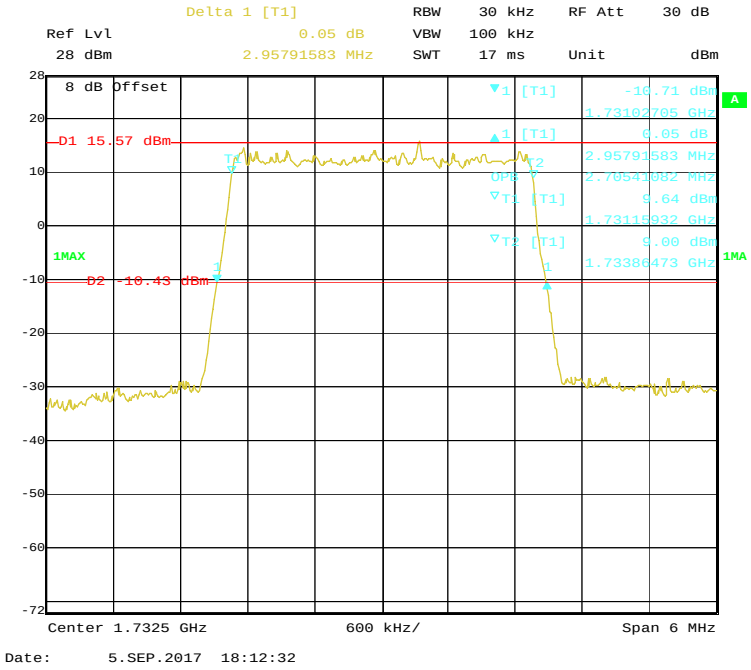
LTE Band 4:

Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth	26 dB Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.299	1.094
	3M		2.958	2.705
	5M		4.970	4.509
	10M		9.900	9.018
	15M		14.790	13.527
	20M		19.238	17.956
16-QAM	1.4M	Middle	1.317	1.094
	3M		2.958	2.705
	5M		5.010	4.509
	10M		9.860	8.978
	15M		14.790	13.467
	20M		19.479	17.956

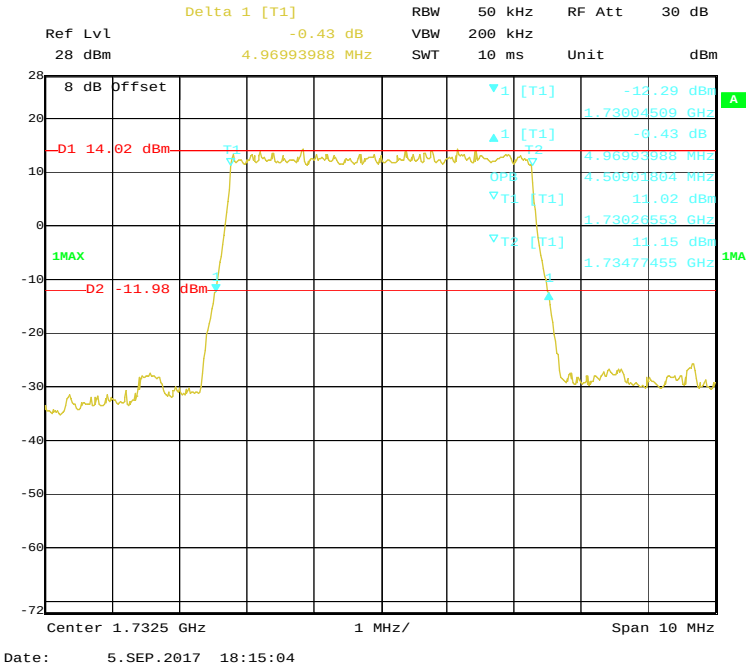
QPSK (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



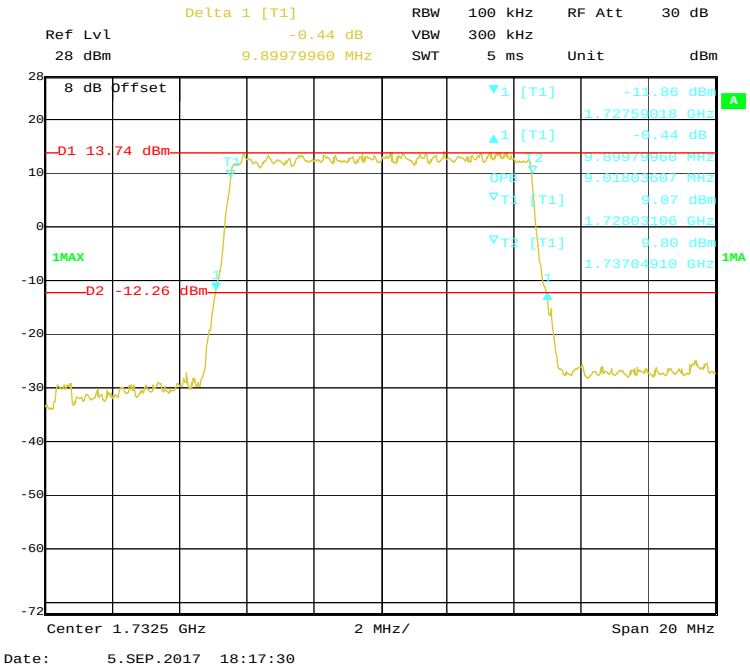
QPSK (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



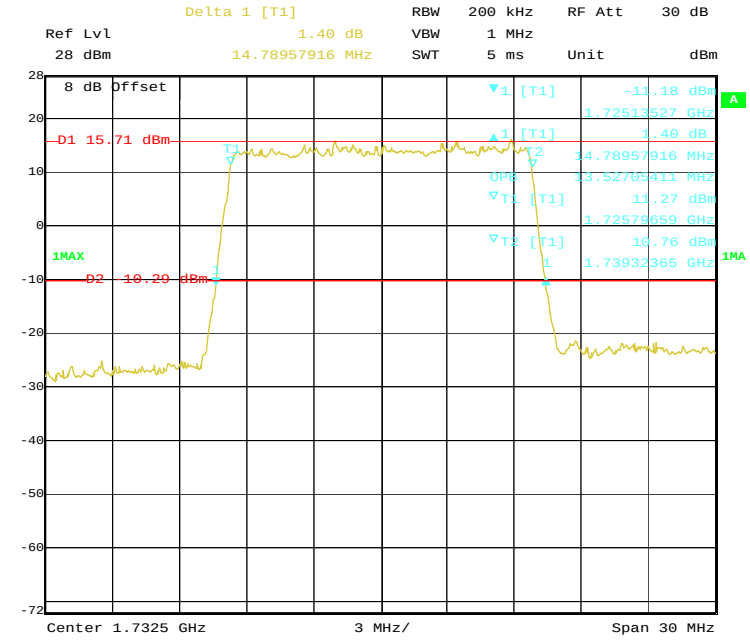
QPSK (5.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



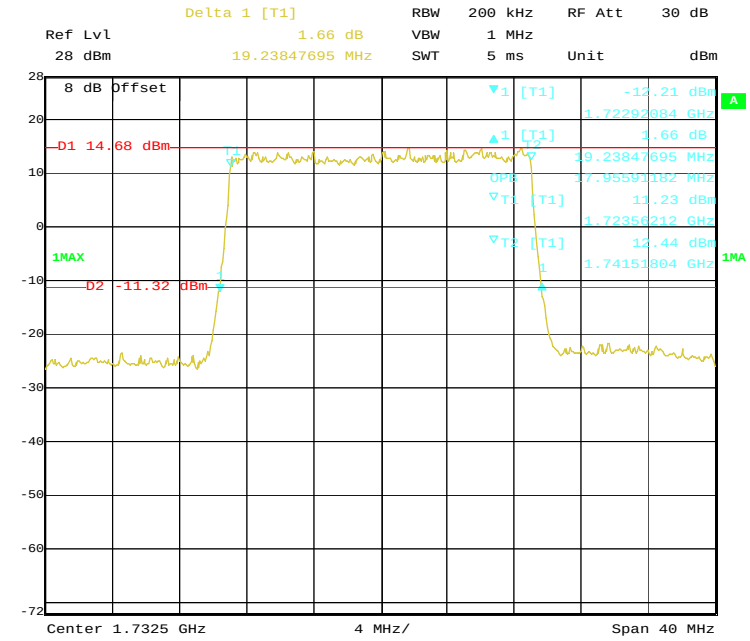
QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



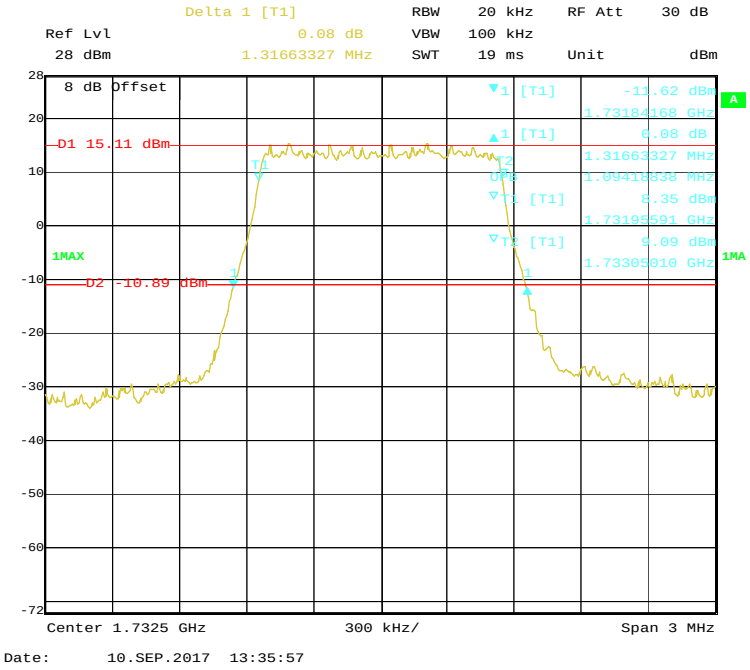
QPSK (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



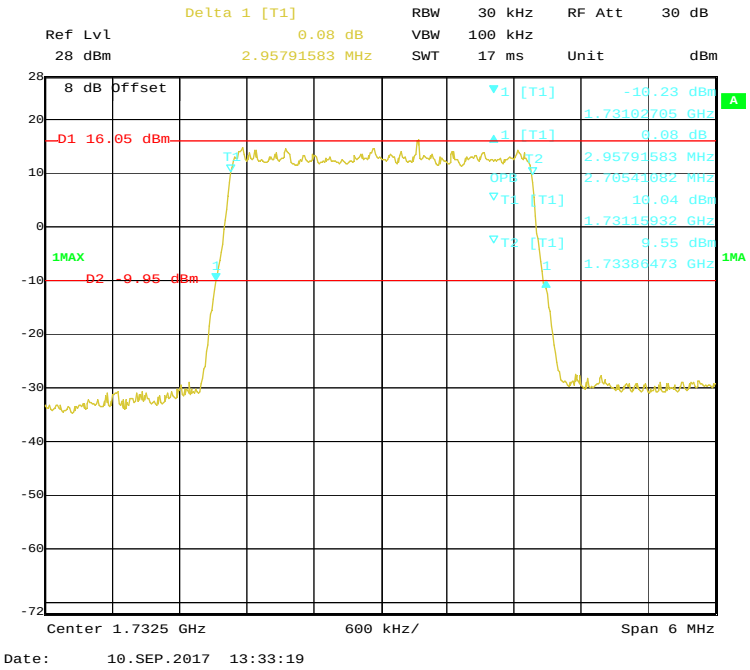
QPSK (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



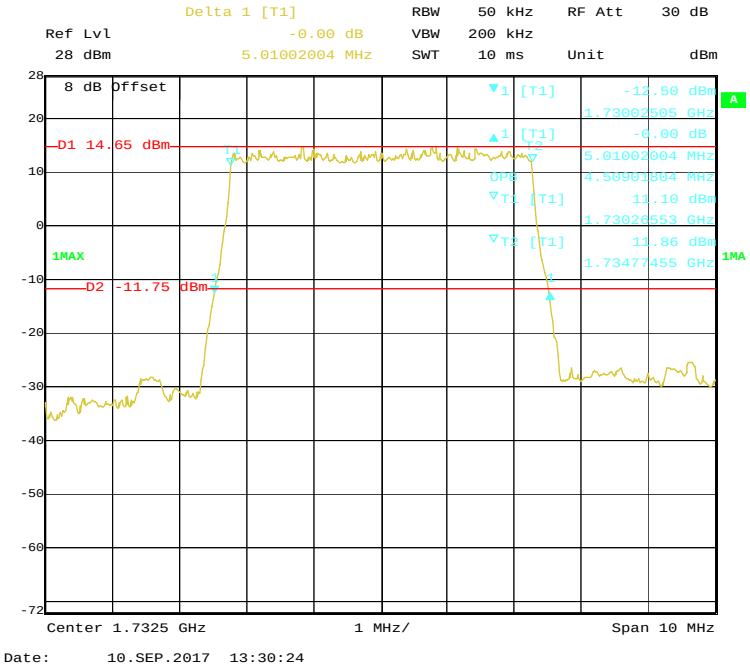
16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



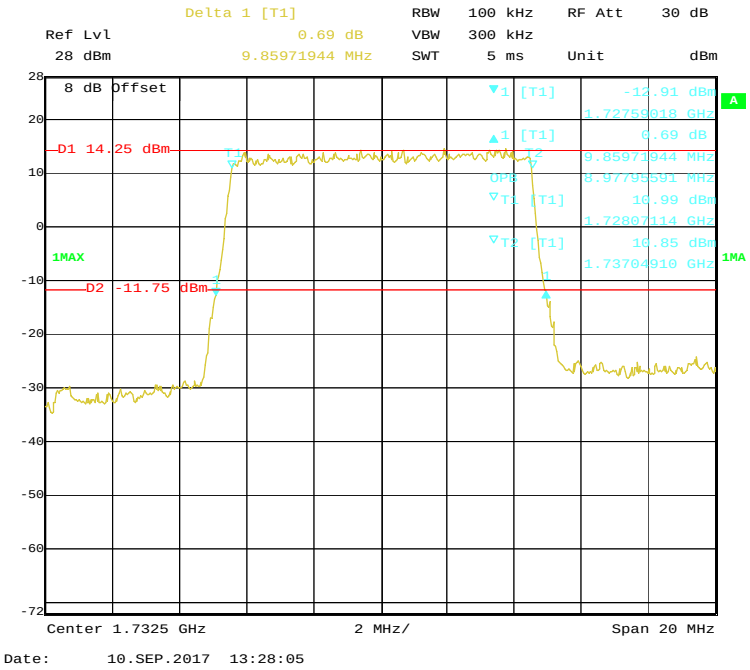
16-QAM (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



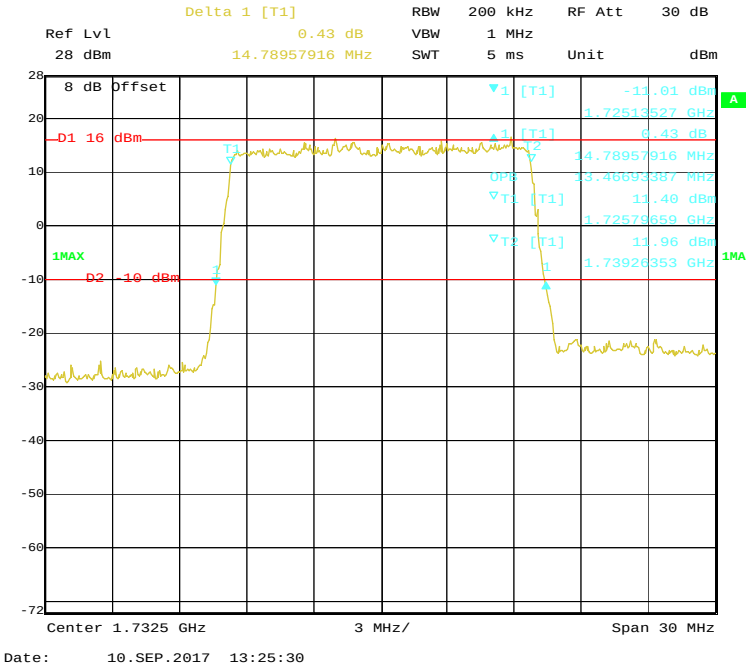
16-QAM (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



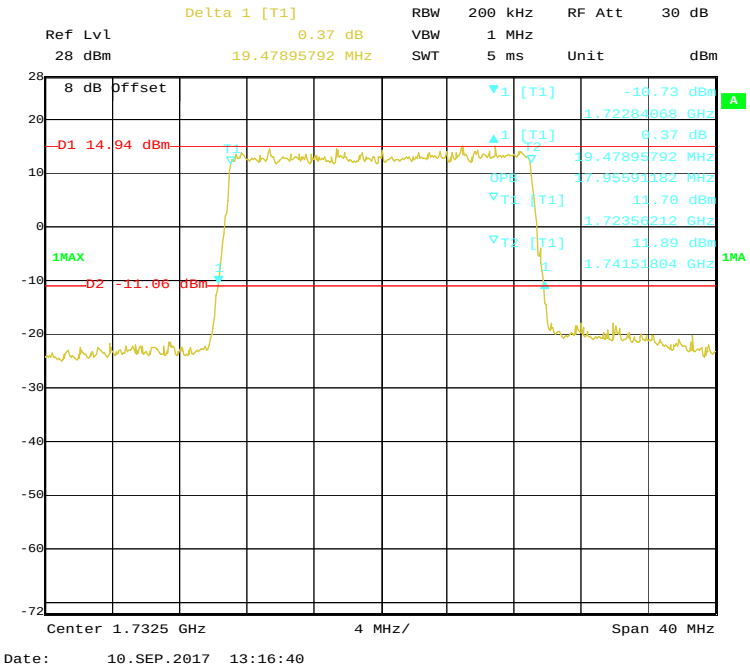
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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



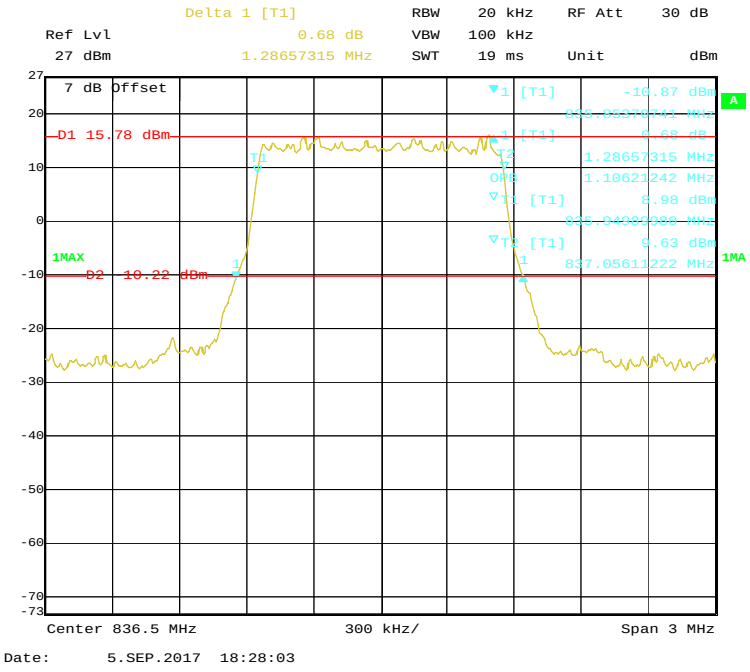
16-QAM (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



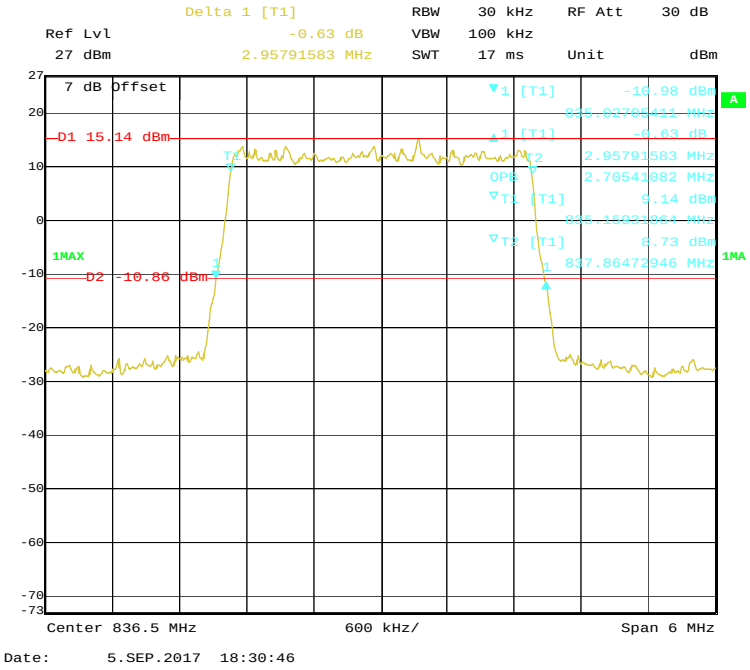
LTE Band 5:

Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth	26 dB Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.287	1.106
	3M		2.958	2.705
	5M		4.970	4.509
	10M		9.900	8.978
16-QAM	1.4M	Middle	1.293	1.094
	3M		2.958	2.705
	5M		4.970	4.509
	10M		9.860	8.978

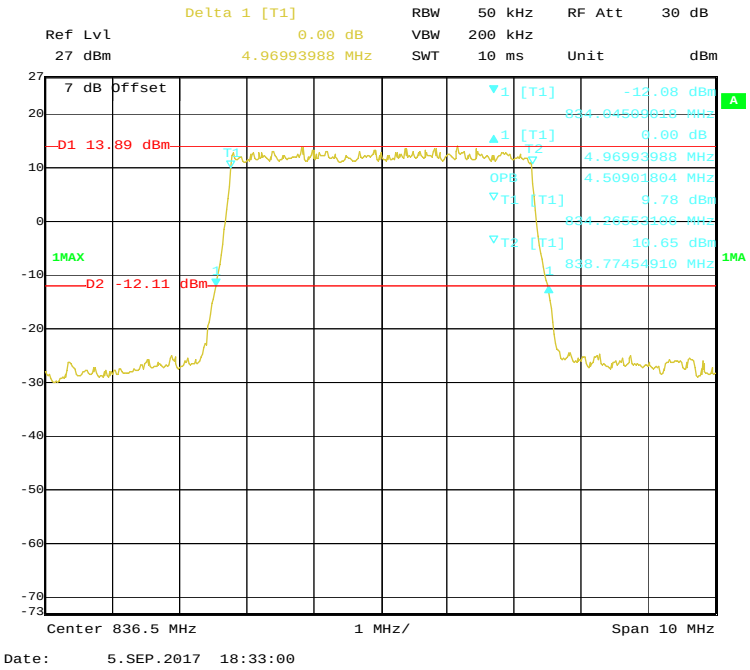
QPSK (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



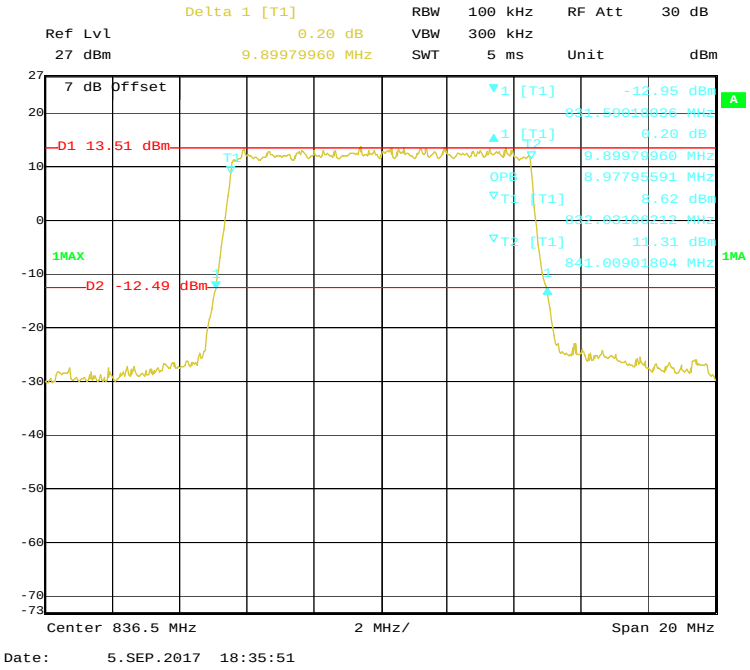
QPSK (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



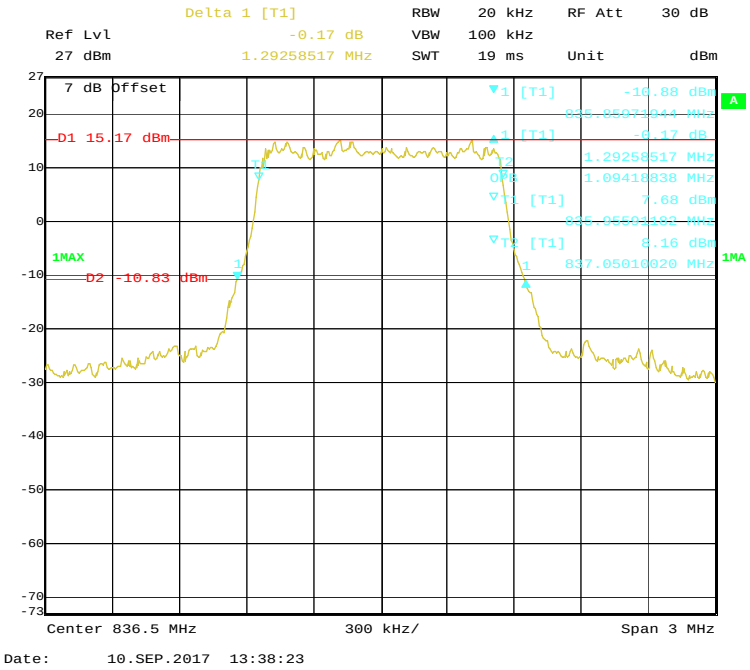
QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



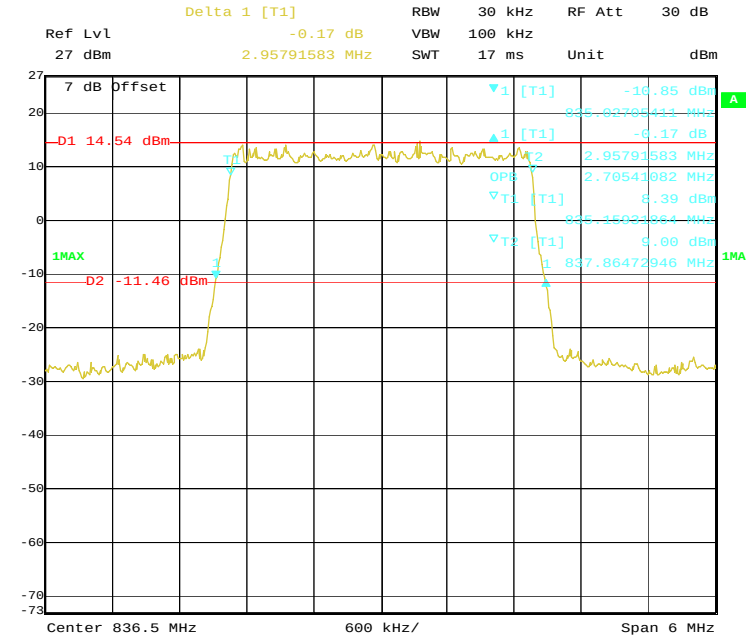
QPSK (10.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



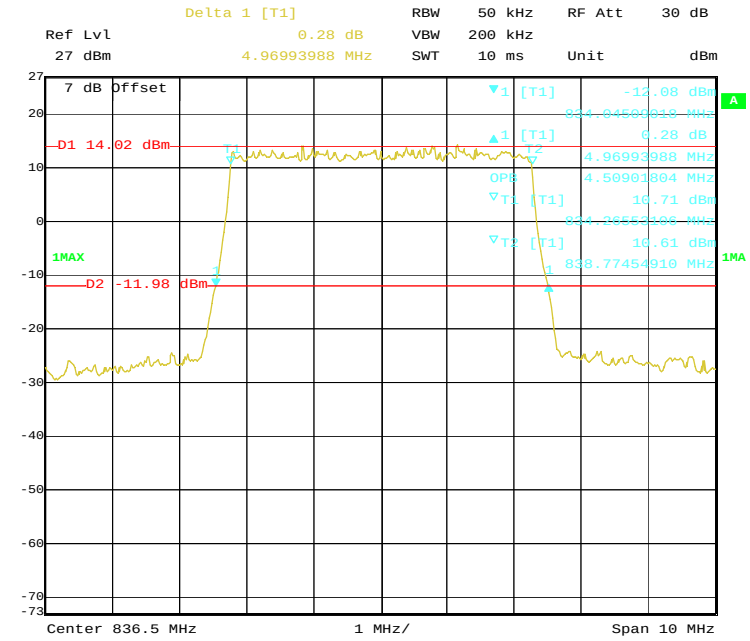
16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



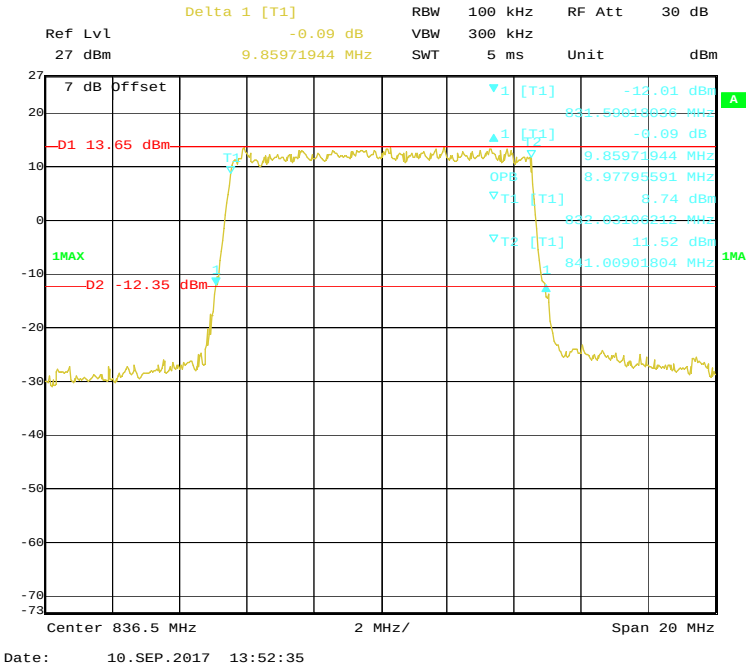
16-QAM (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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



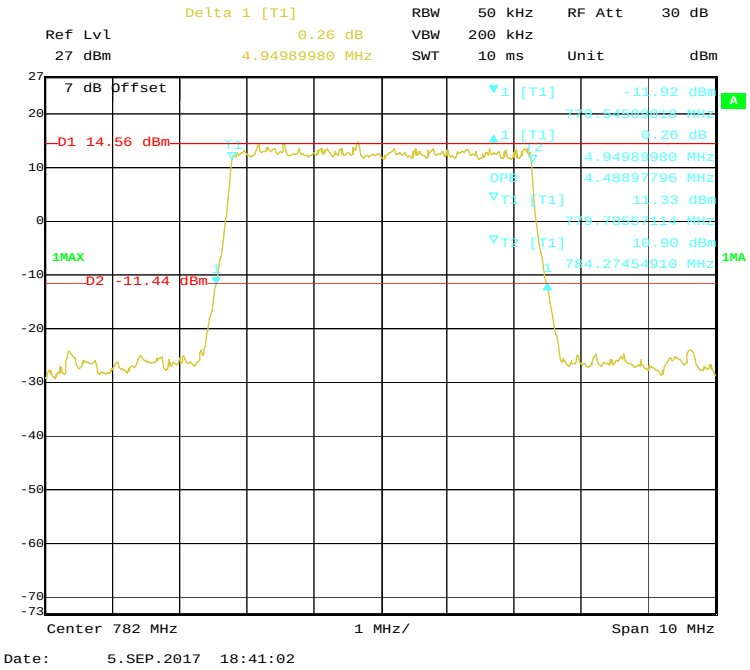
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



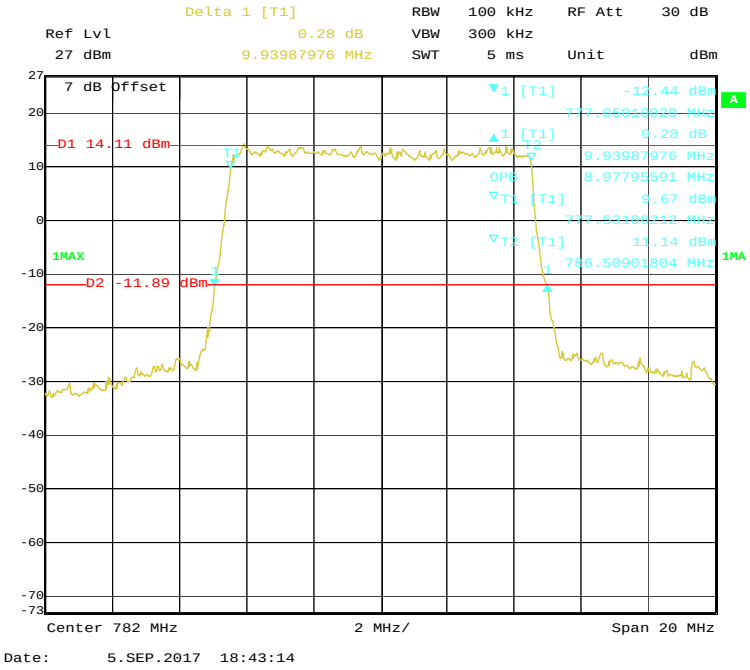
LTE Band 13:

Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth	26 dB Bandwidth
			MHz	MHz
QPSK	5M	Middle	4.950	4.489
	10M		9.940	8.978
16-QAM	5M	Middle	5.010	4.509
	10M		9.900	9.018

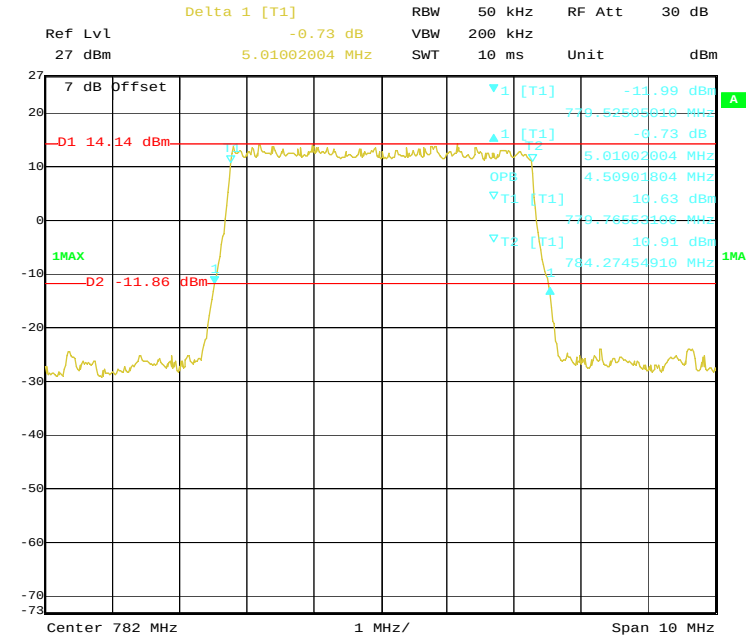
QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



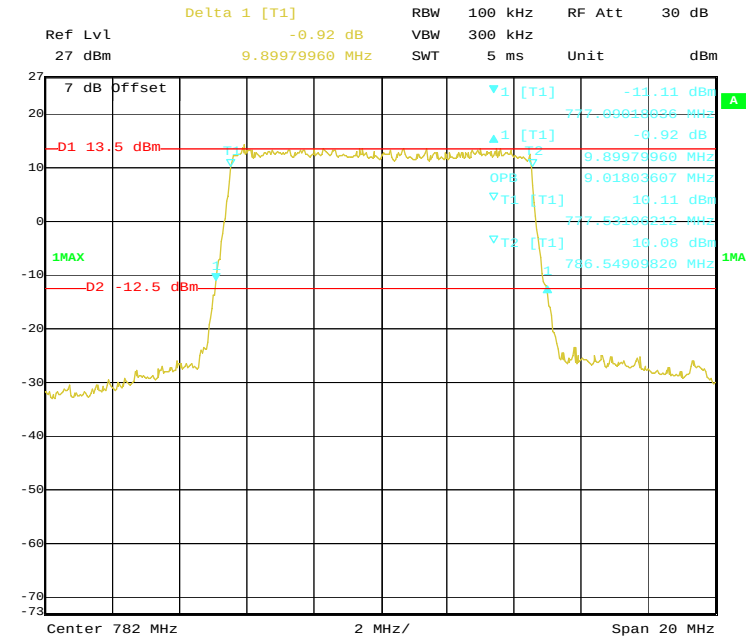
QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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



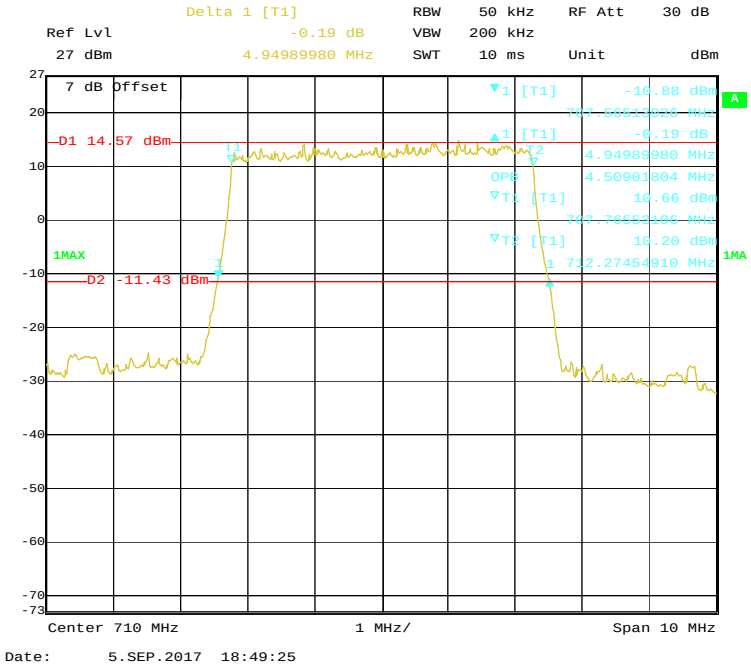
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



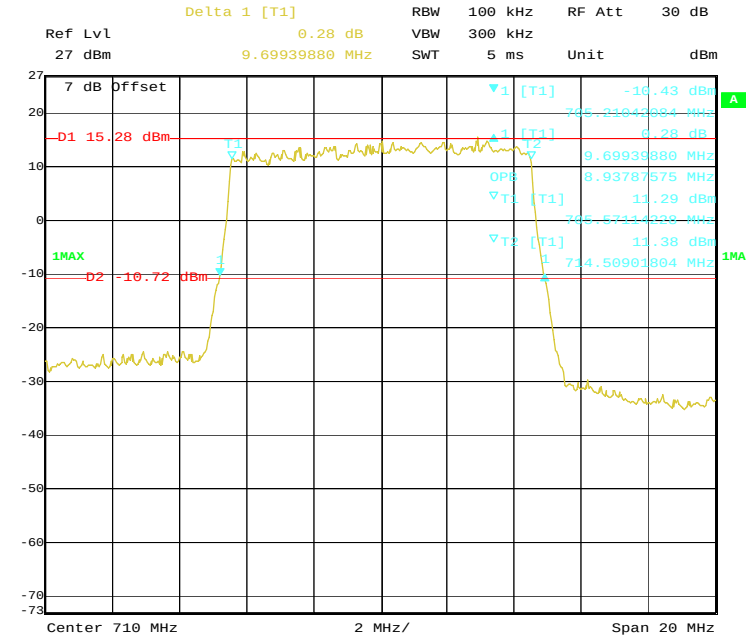
LTE Band 17:

Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth	26 dB Bandwidth
			MHz	MHz
QPSK	5M	Middle	4.950	4.509
	10M		9.699	8.938
16-QAM	5M	Middle	4.970	4.509
	10M		9.900	8.978

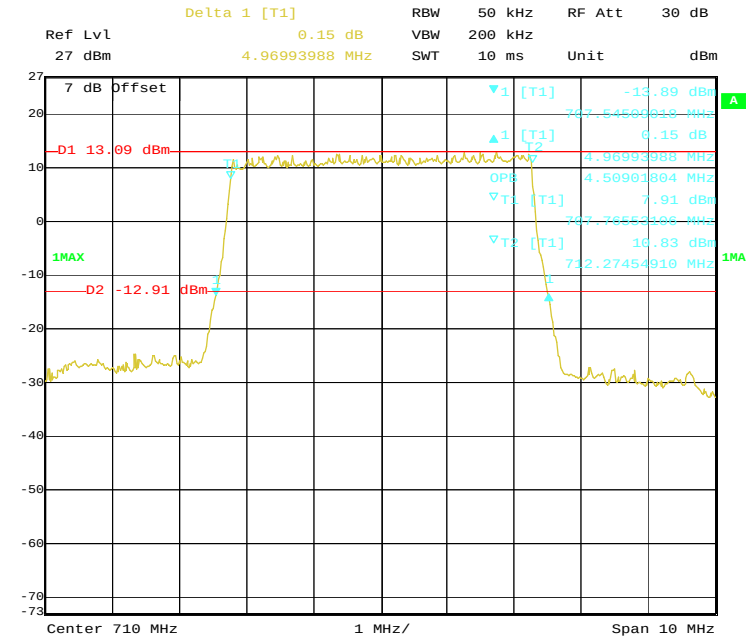
QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



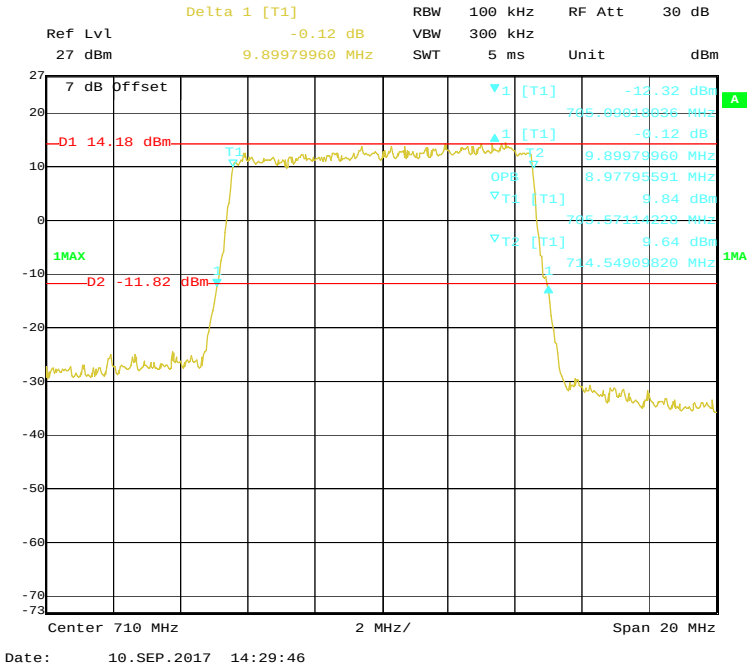
QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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



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



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

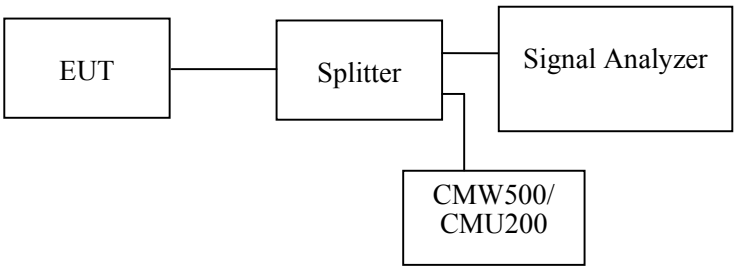
Applicable Standards

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

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz & 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

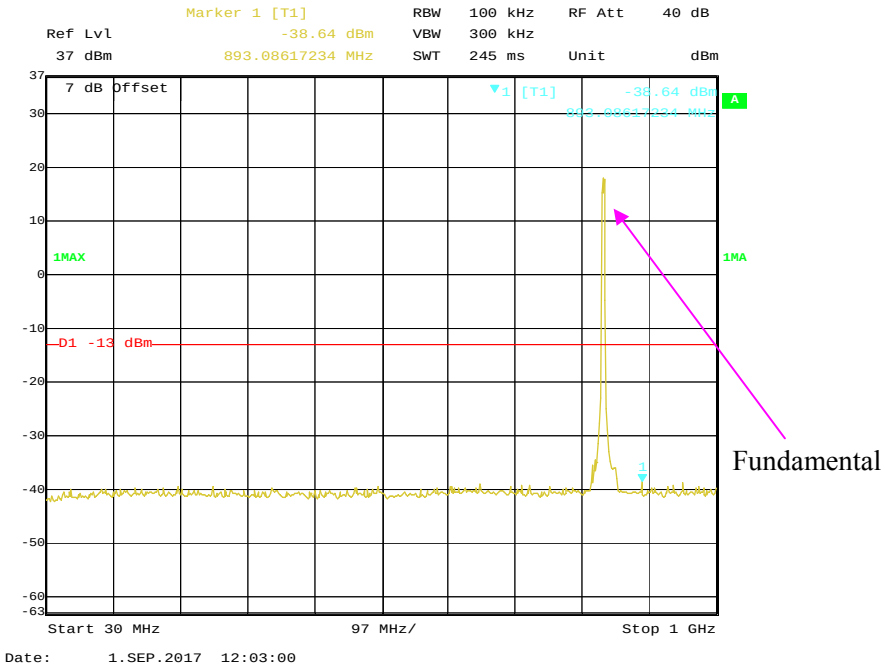
Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

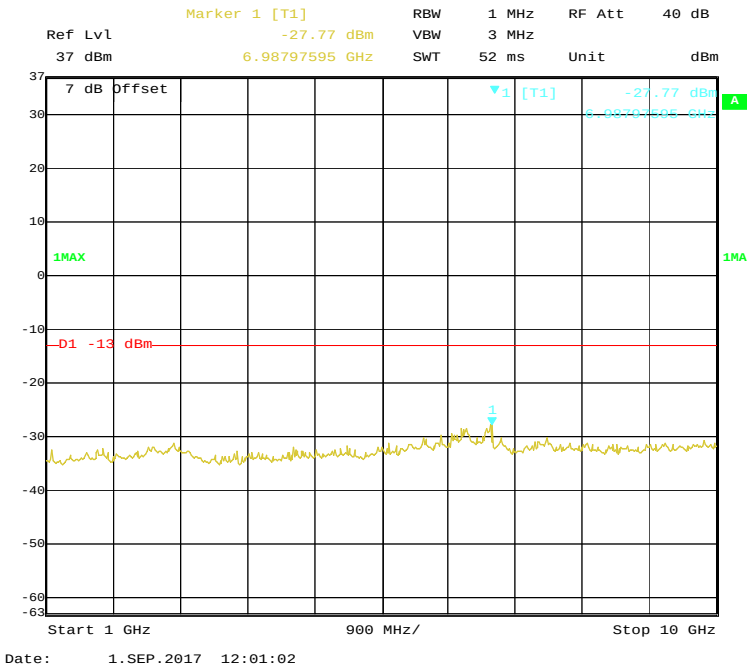
The testing was performed by Chris Wang on 2017-09-01 to 2017-09-30.

WCDMA Band V:

30 MHz – 1GHz(WCDMA Mode)

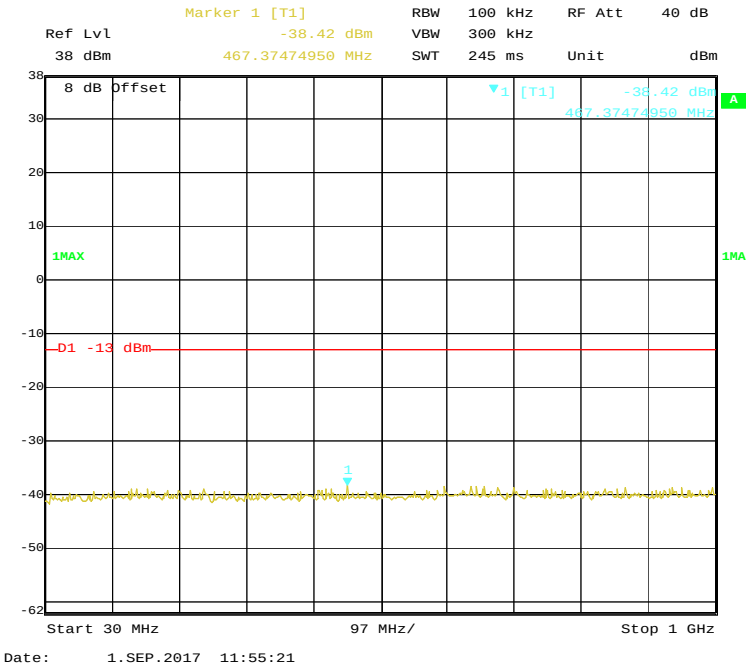


1 GHz – 10 GHz (WCDMA Mode)

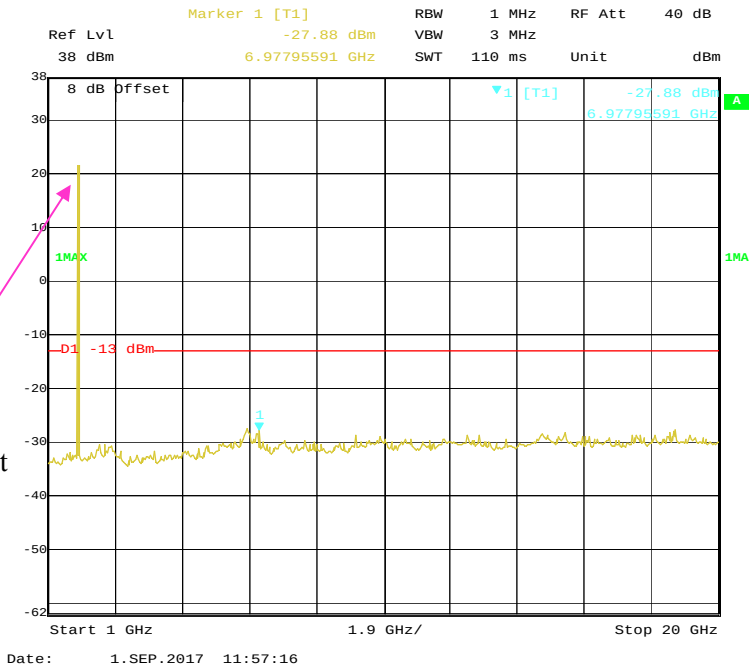


WCDMA Band II:

30 MHz – 1 GHz (WCDMA Mode)



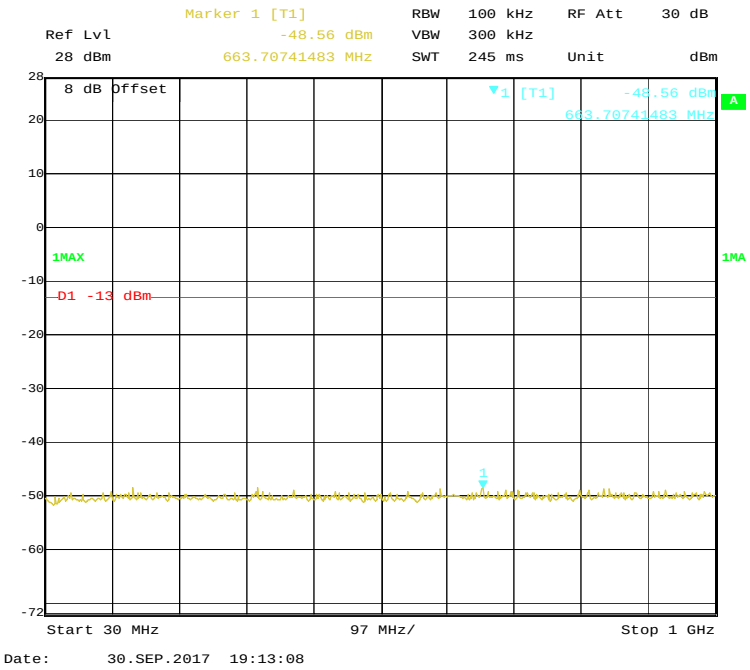
1 GHz – 20 GHz (WCDMA Mode)



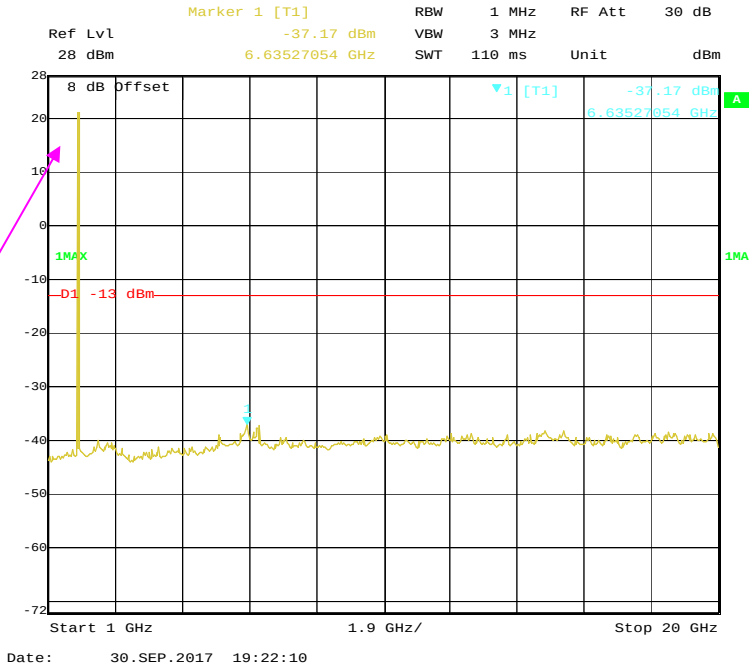
Fundamental test

LTE Band 2:

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

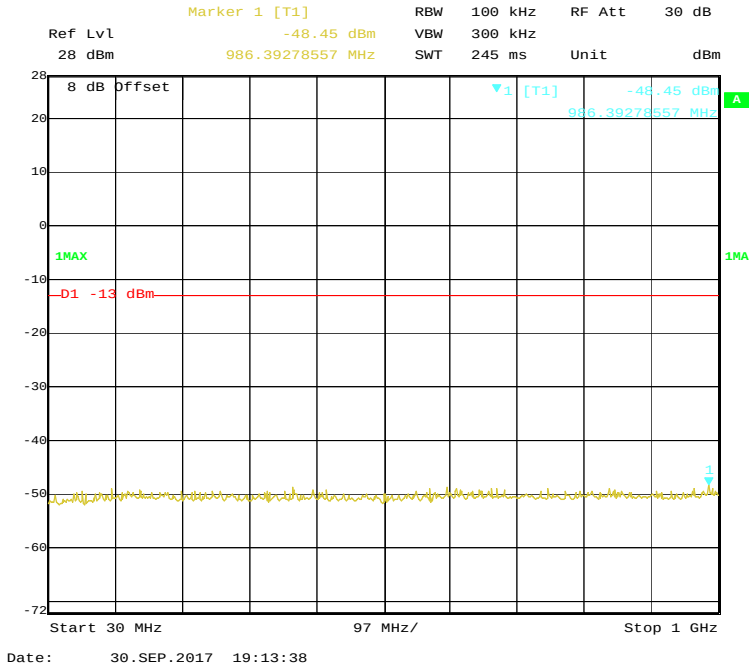


1 GHz – 20 GHz (1.4 MHz, Middle Channel)

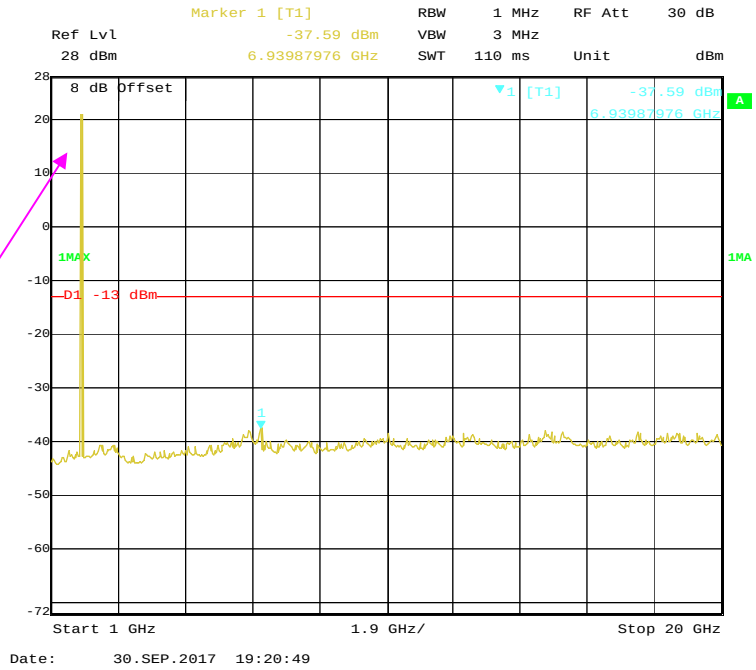


Fundamental test

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

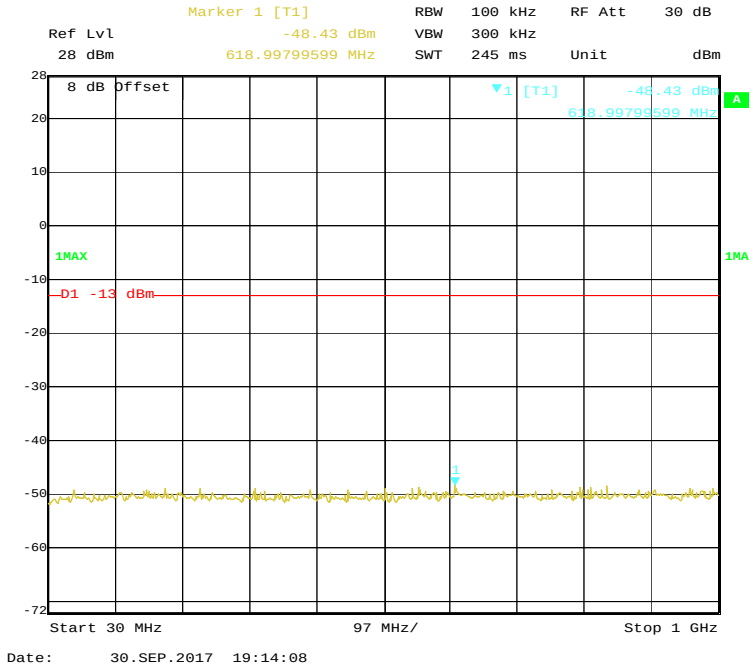


1 GHz – 20 GHz (3.0 MHz, Middle Channel)

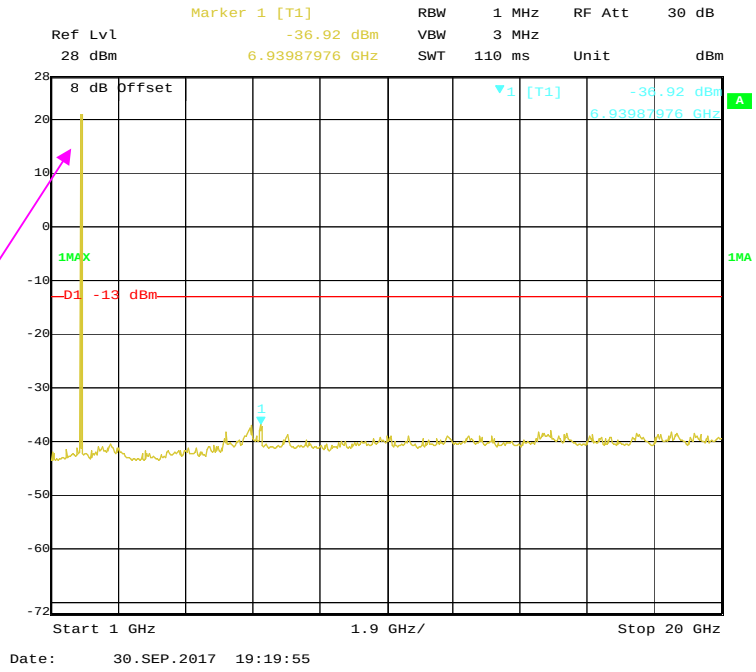


Fundamental test

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

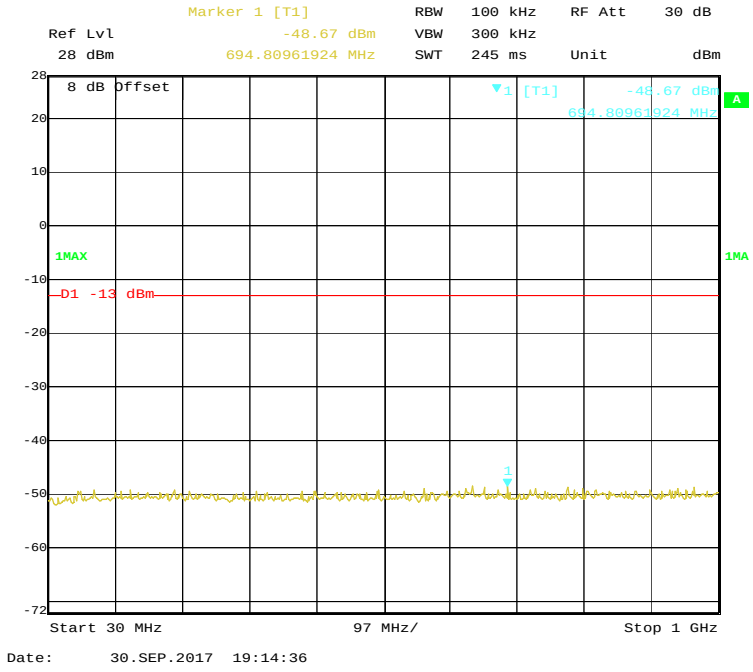


1 GHz – 20 GHz (5.0MHz, Middle Channel)

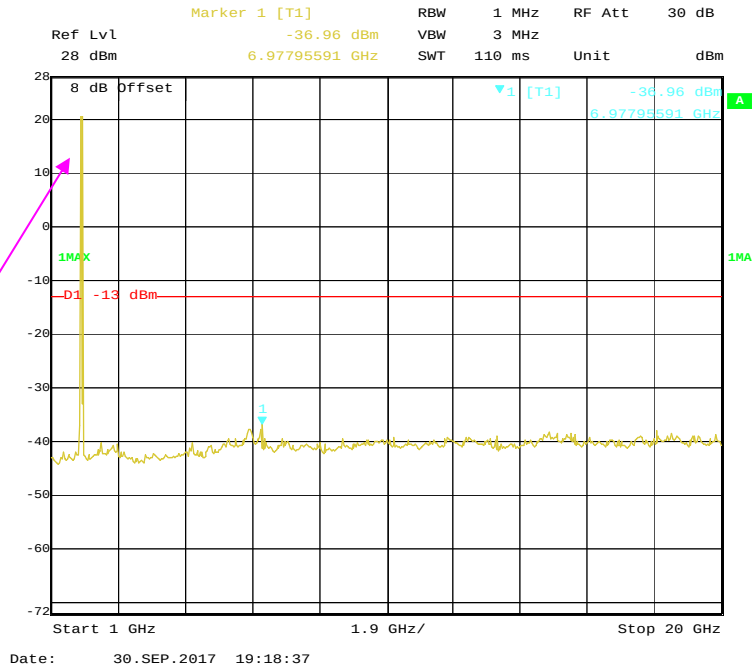


Fundamental test

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

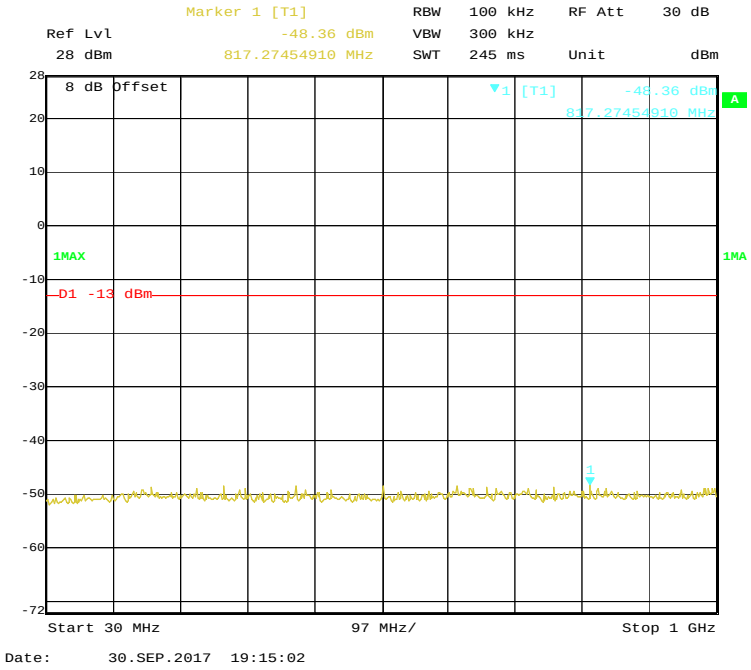


1 GHz – 20 GHz (10.0 MHz, Middle Channel)

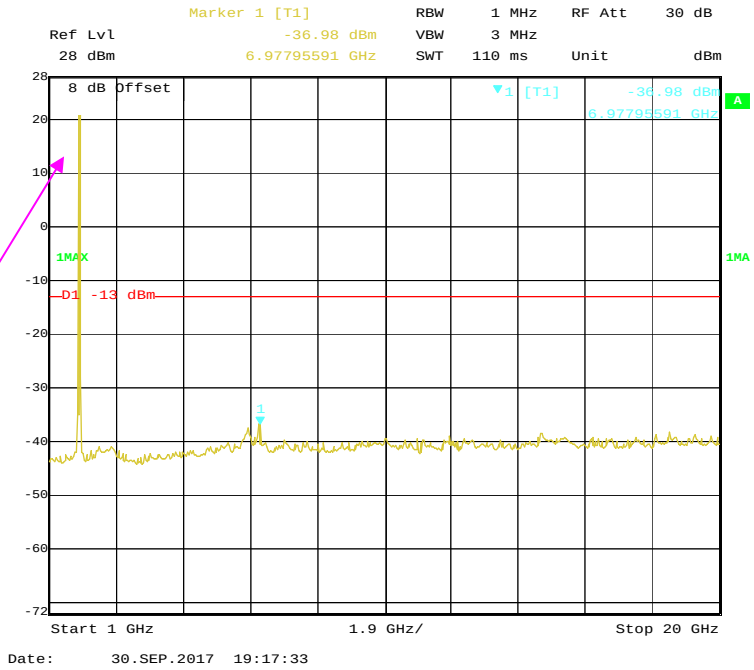


Fundamental test

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

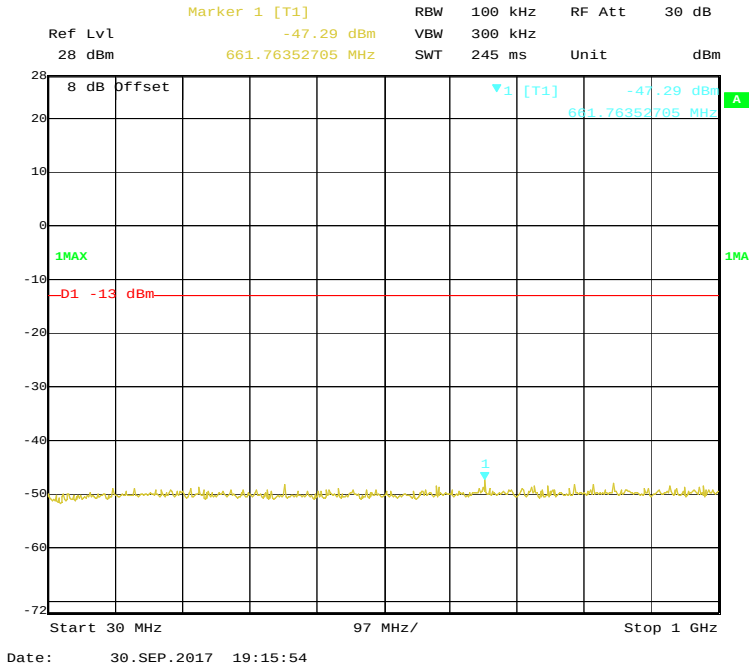


1 GHz – 20 GHz (15.0 MHz, Middle Channel)

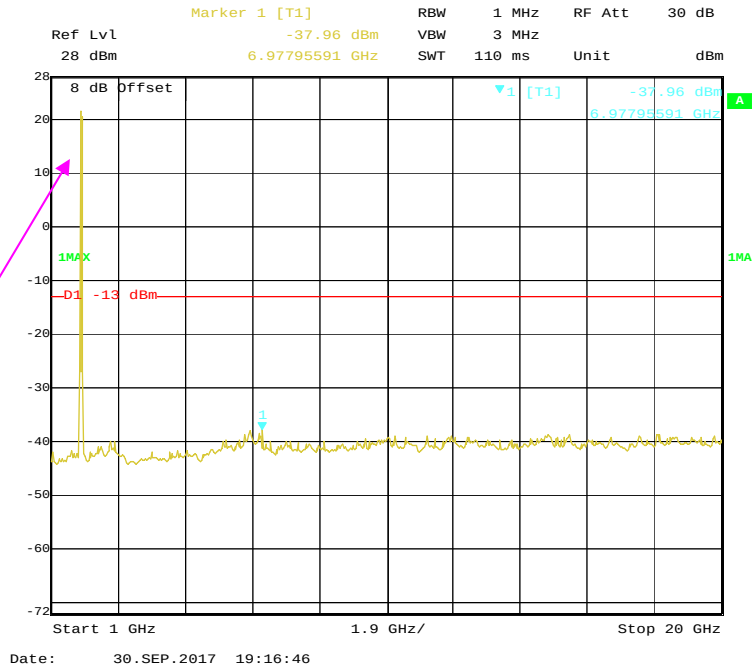


Fundamental test

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



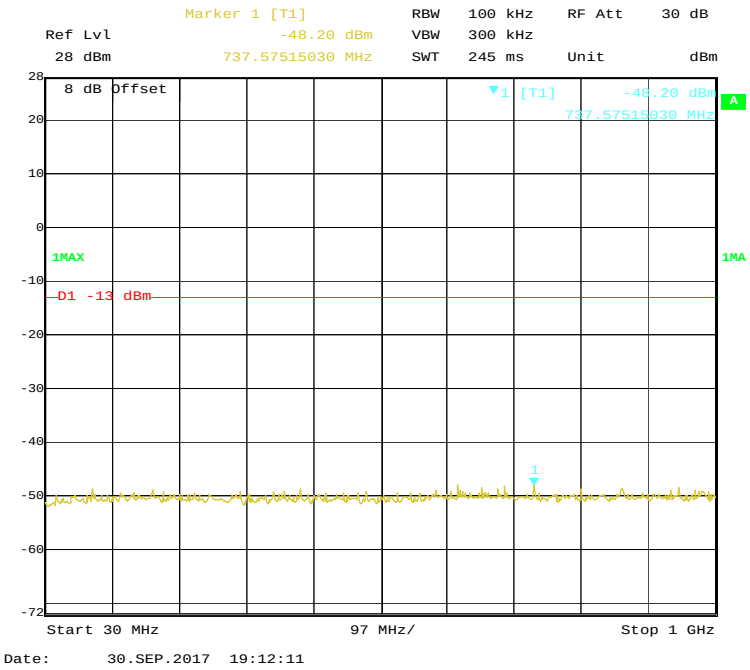
1 GHz – 20 GHz (20.0 MHz, Middle Channel)



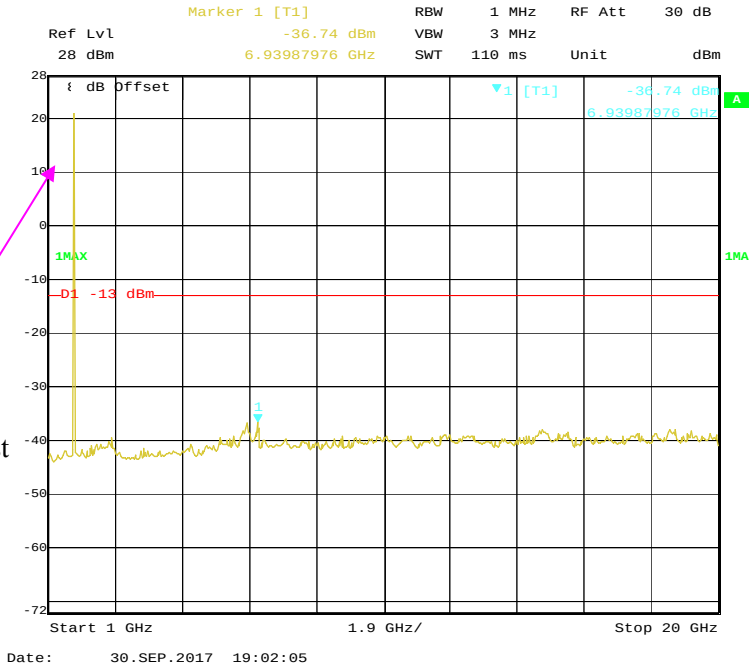
Fundamental test

LTE Band 4:

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

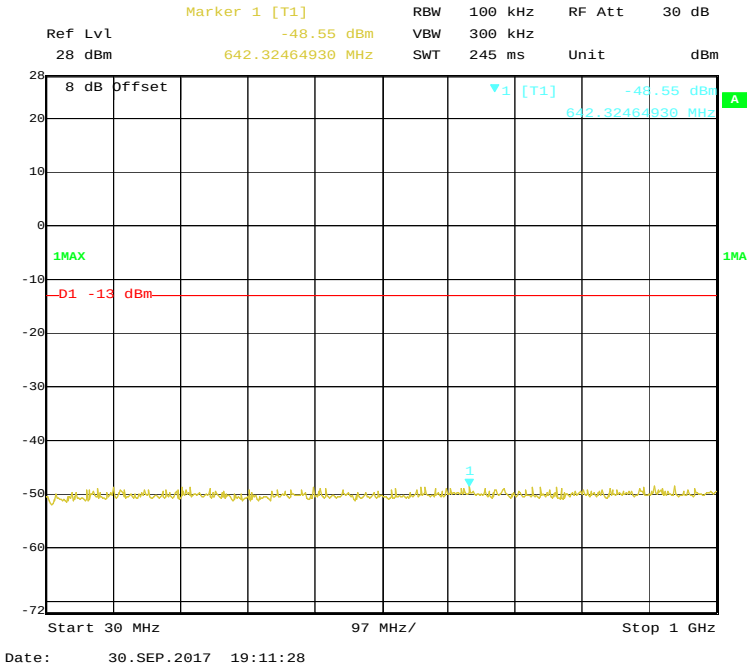


1 GHz – 20 GHz (1.4 MHz, Middle Channel)

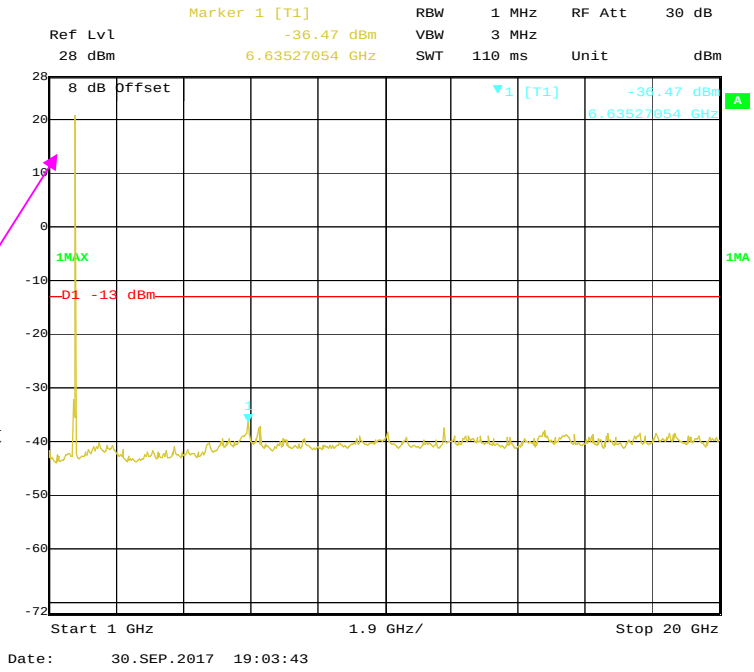


Fundamental test

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

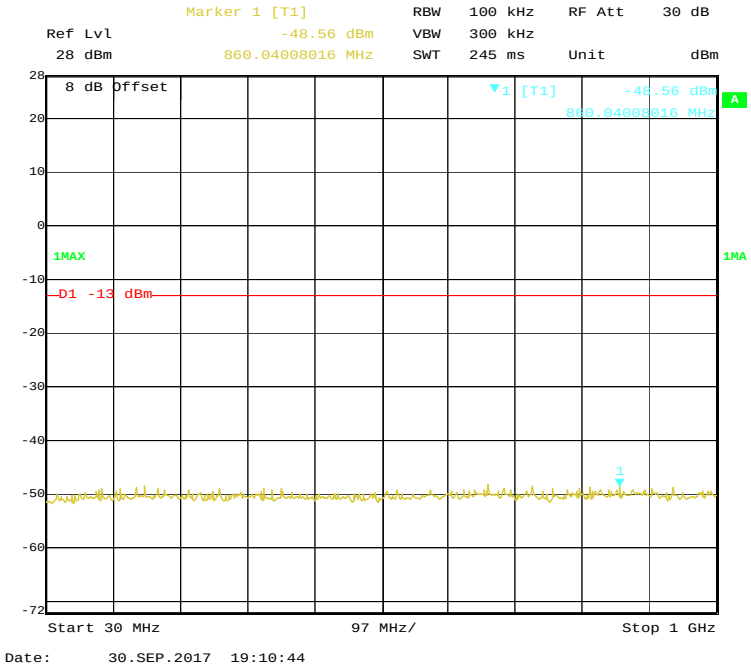


1 GHz – 20 GHz (3.0 MHz, Middle Channel)

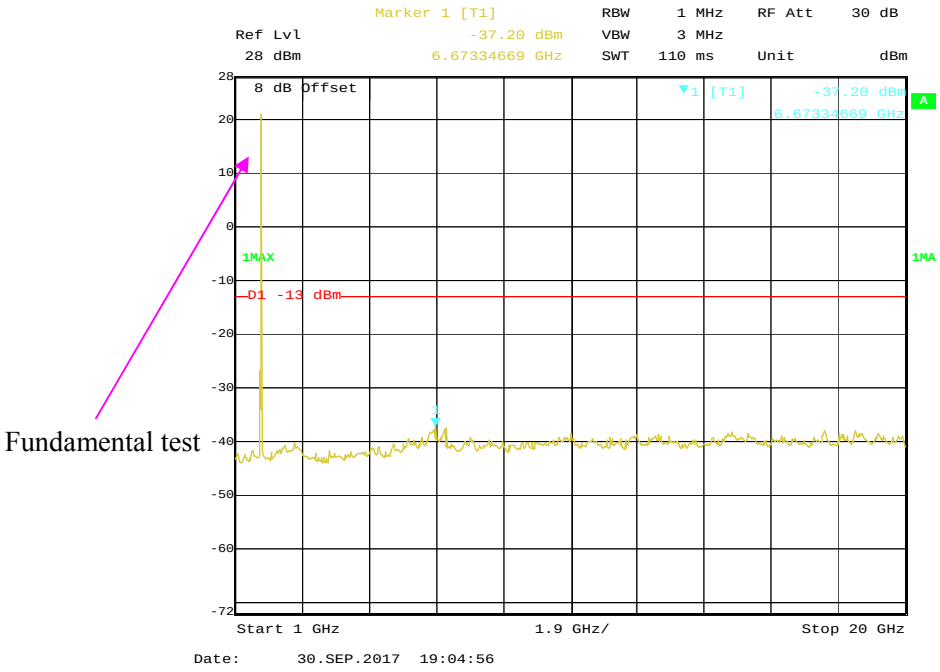


Fundamental test

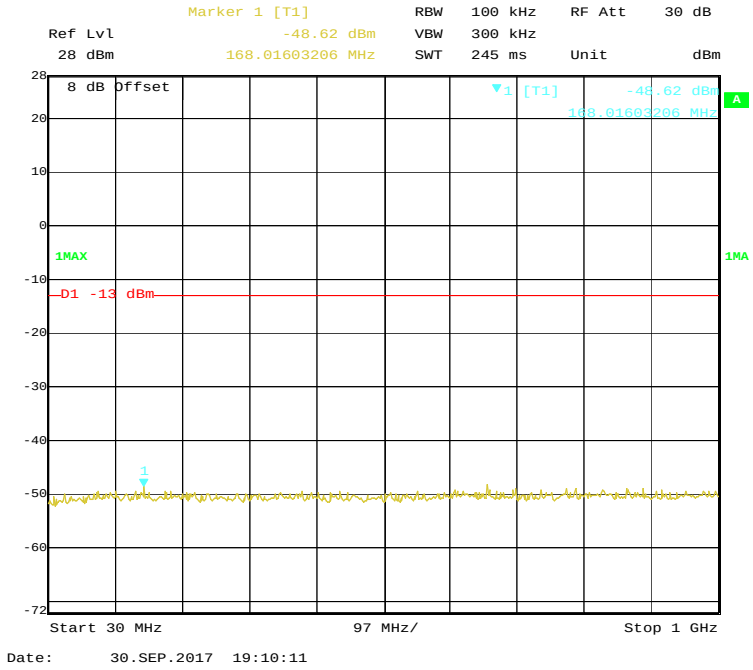
30 MHz - 1 GHz (5.0 MHz, Middle Channel)



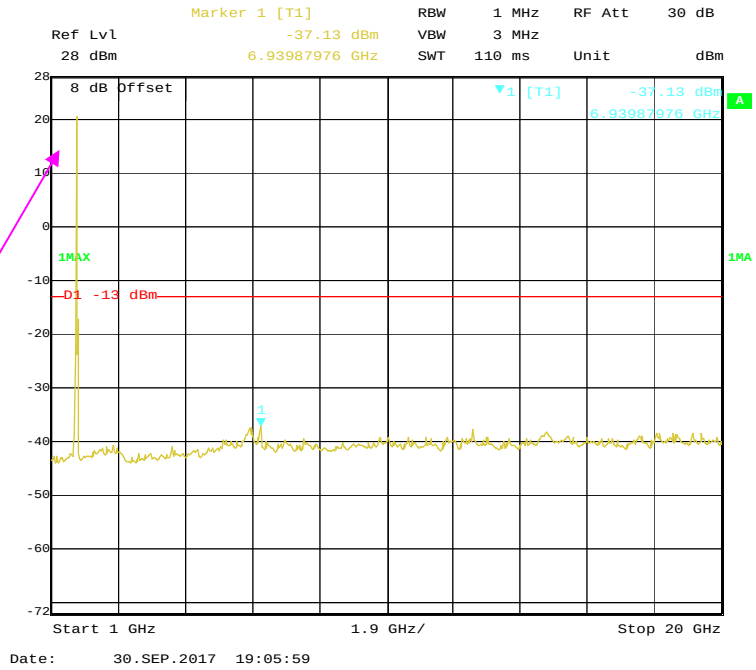
1 GHz – 20 GHz (5.0MHz, Middle Channel)



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

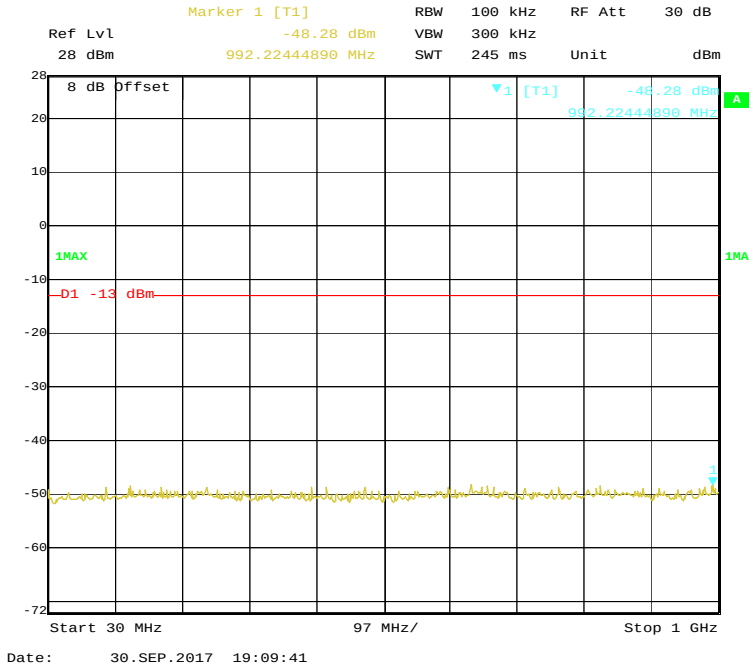


1 GHz – 20 GHz (10.0 MHz, Middle Channel)

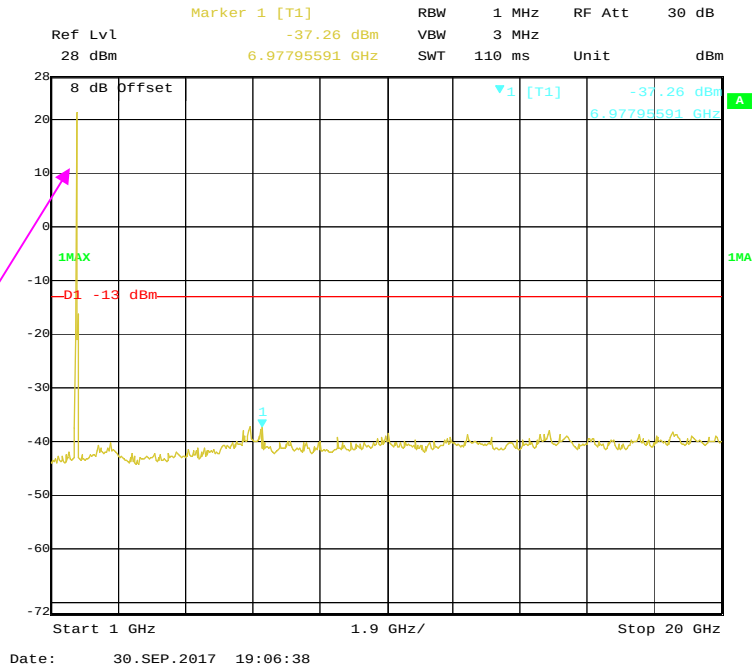


Fundamental test

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

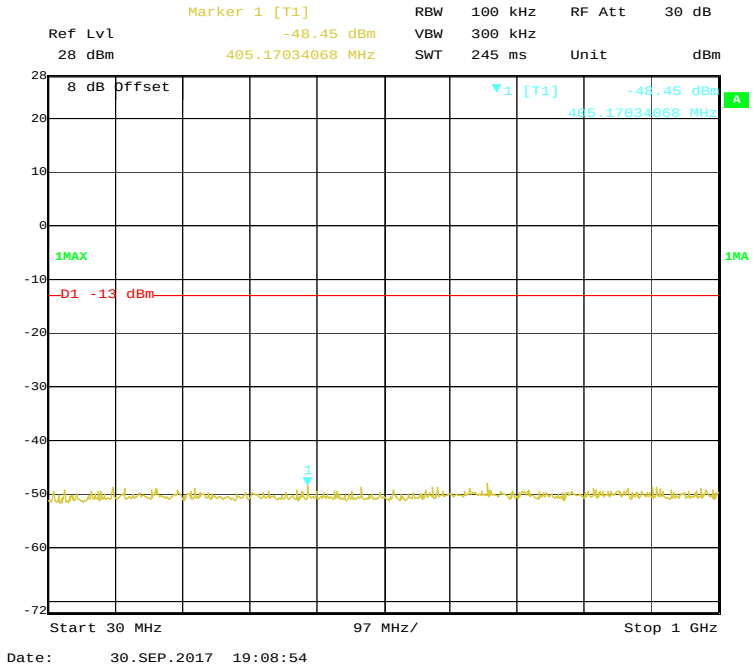


1 GHz – 20 GHz (15.0 MHz, Middle Channel)

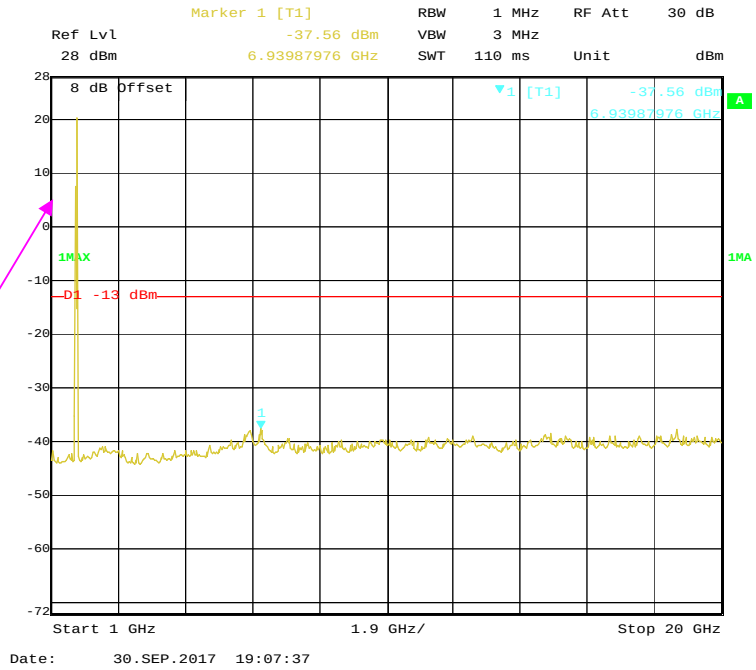


Fundamental test

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



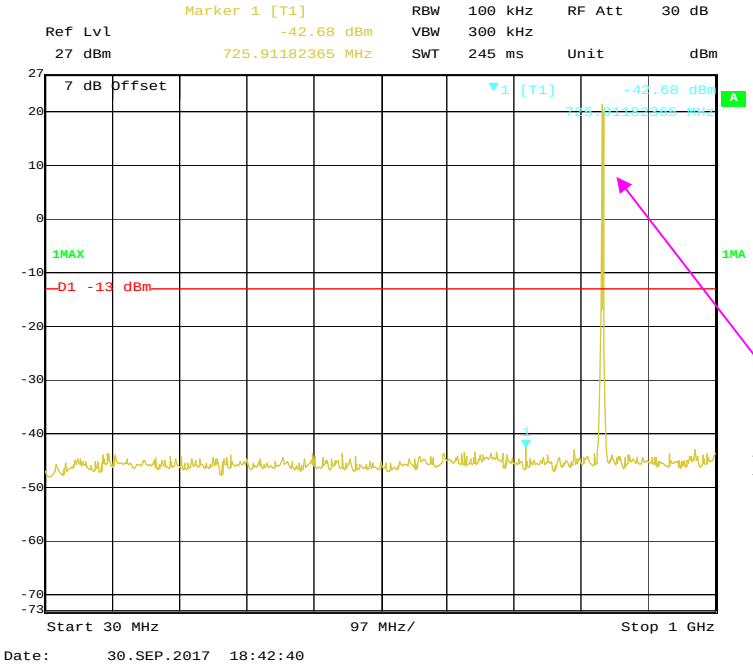
1 GHz – 20 GHz (20.0 MHz, Middle Channel)



Fundamental test

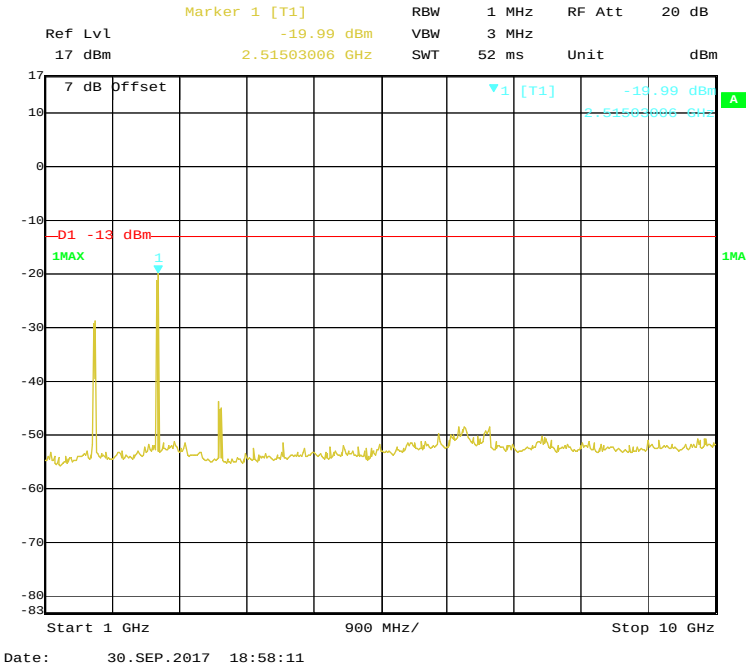
LTE Band 5:

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

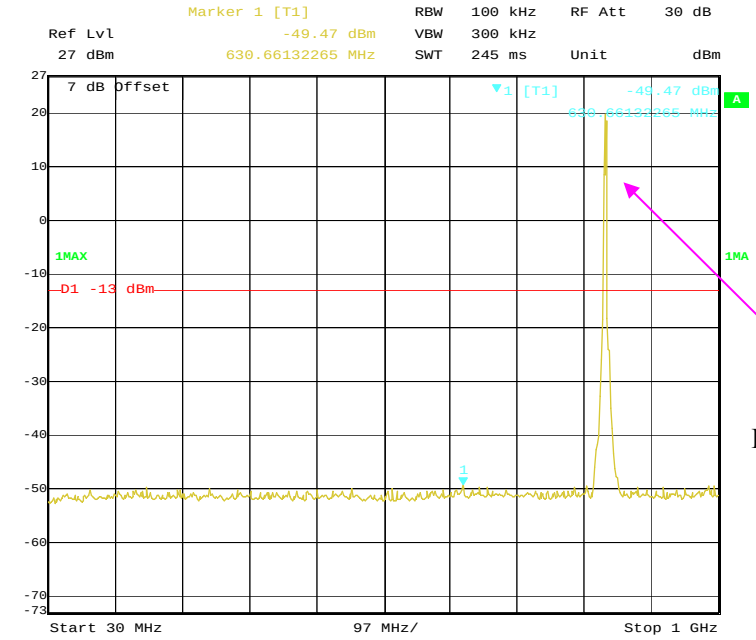


Fundamental test

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

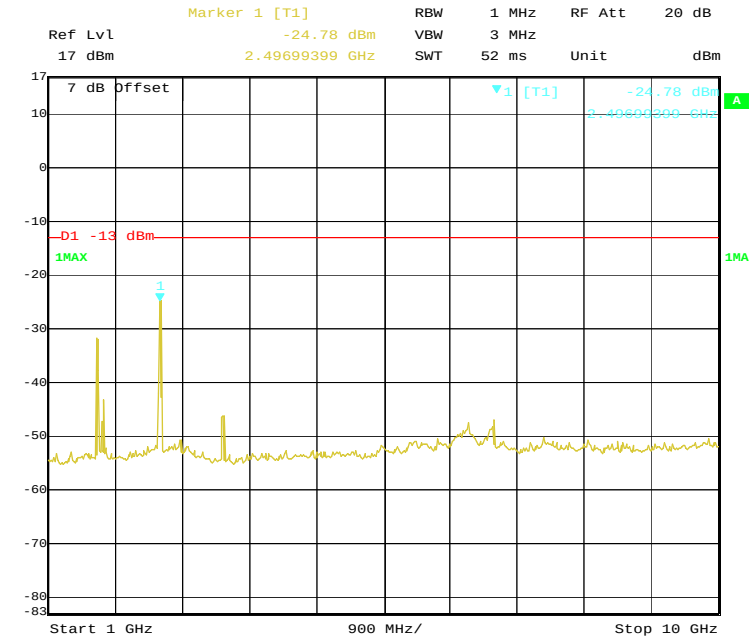


30 MHz - 1 GHz (3.0 MHz, Middle Channel)

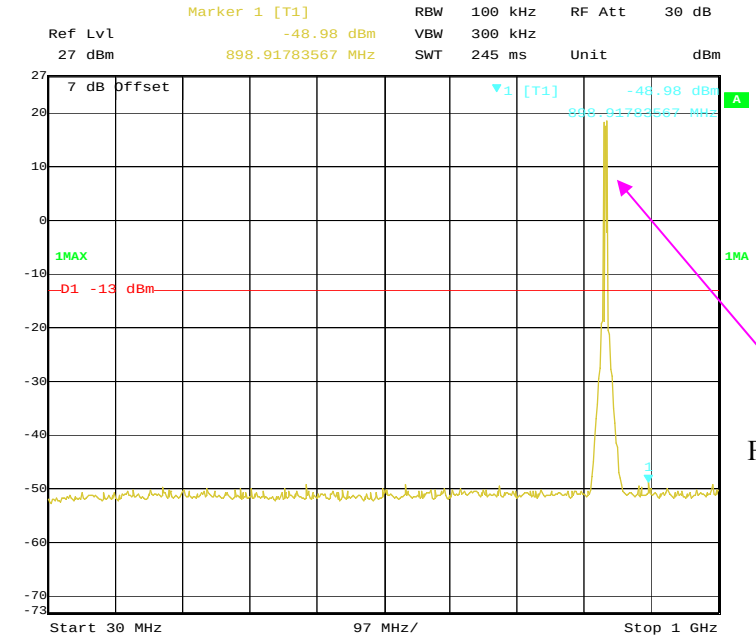


Fundamental test

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

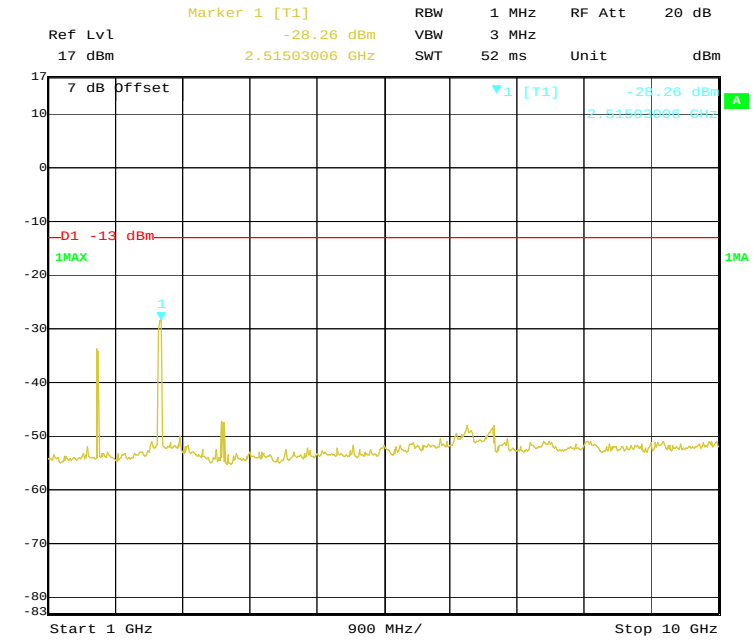


30 MHz - 1 GHz (5.0 MHz, Middle Channel)



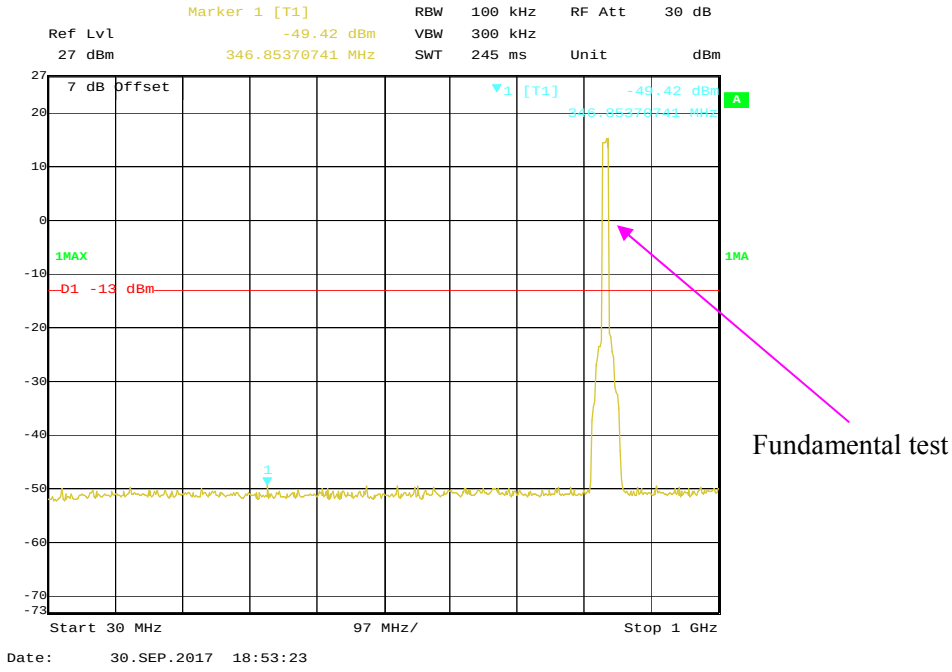
Date: 30.SEP.2017 18:52:19

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



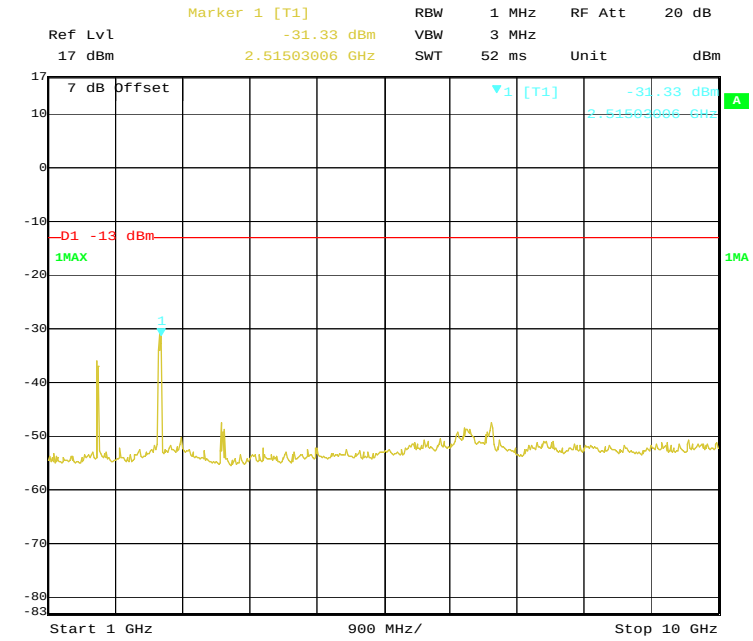
Date: 30.SEP.2017 18:55:31

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



Date: 30.SEP.2017 18:53:23

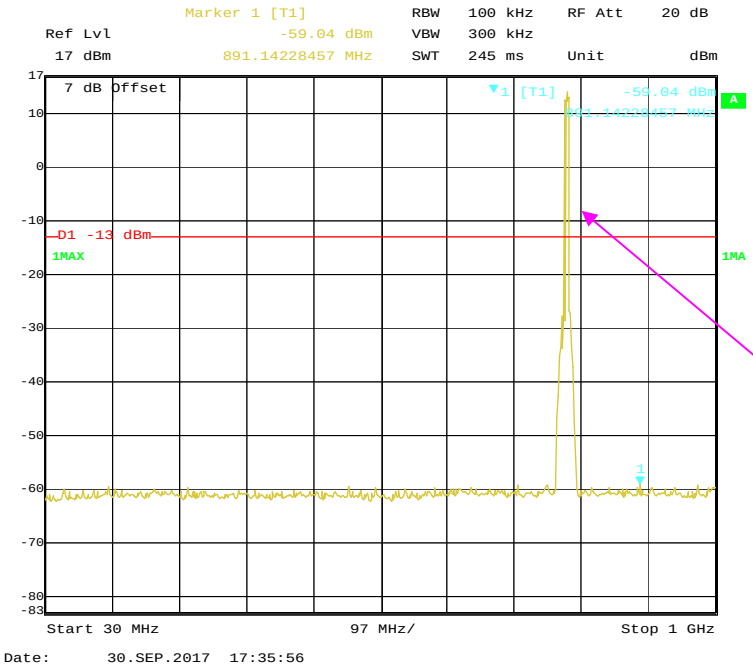
1 GHz – 10 GHz (10.0 MHz, Middle Channel)



Date: 30.SEP.2017 18:56:07

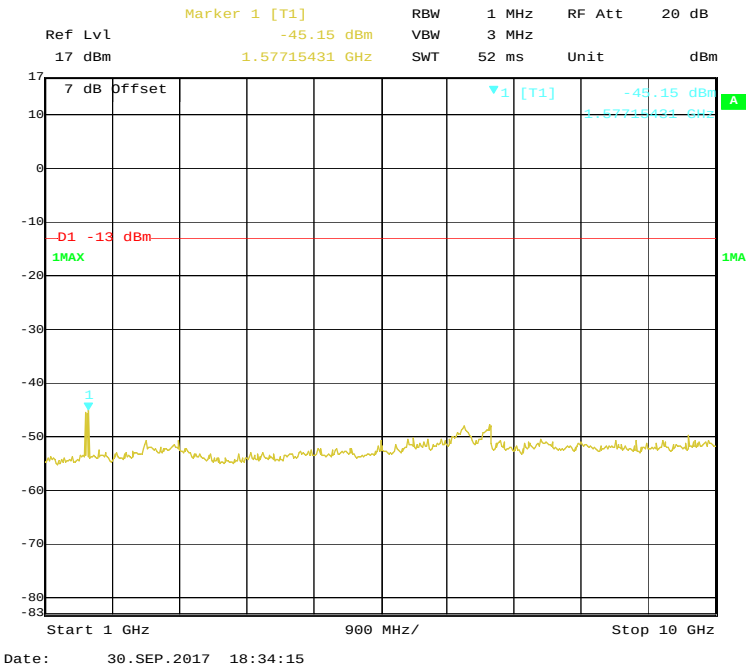
LTE Band 13:

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

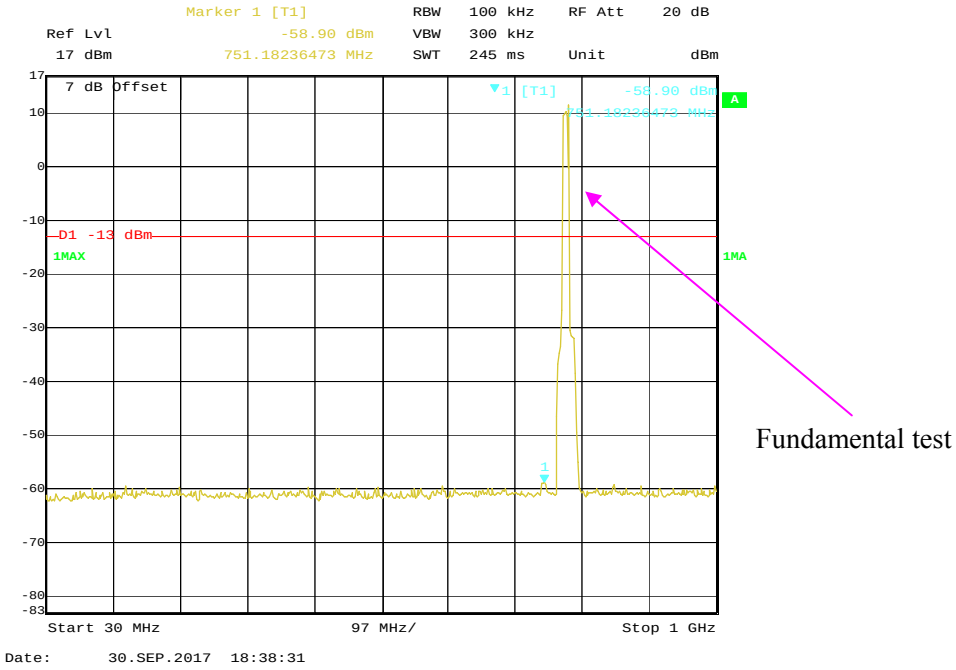


Fundamental test

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

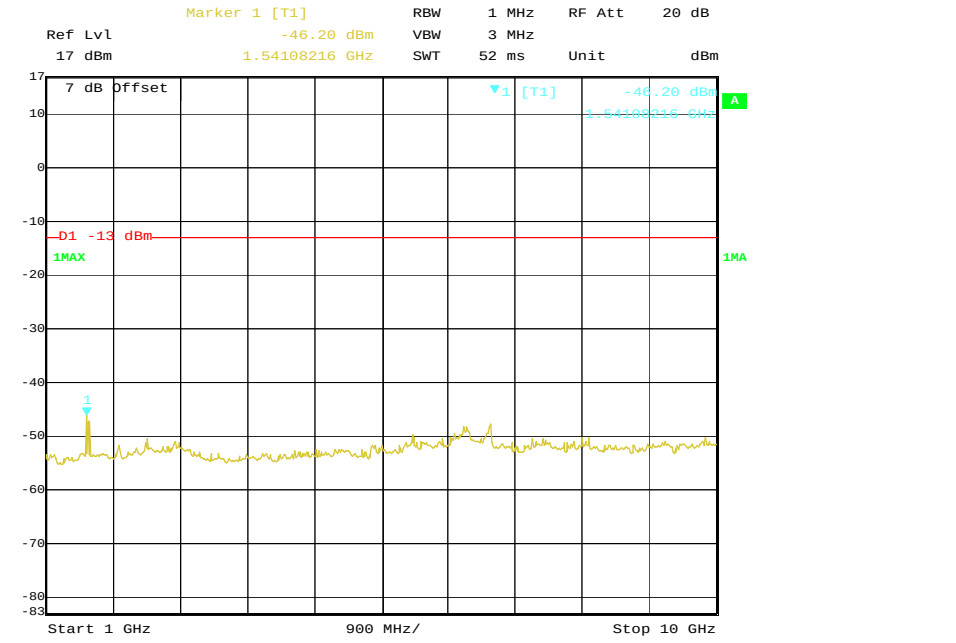


30 MHz - 1 GHz (10.0 MHz, Middle Channel)



Date: 30.SEP.2017 18:38:31

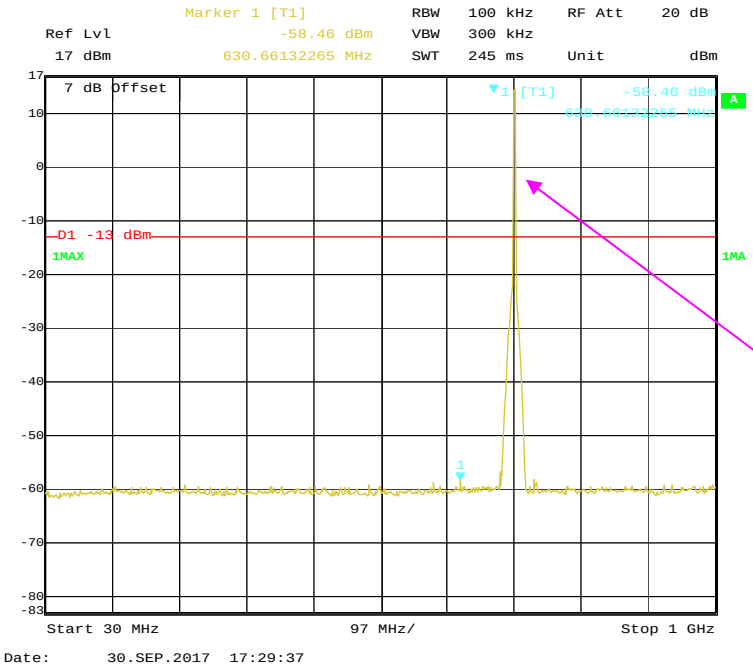
1 GHz – 10 GHz (10.0 MHz, Middle Channel)



Date: 30.SEP.2017 18:37:37

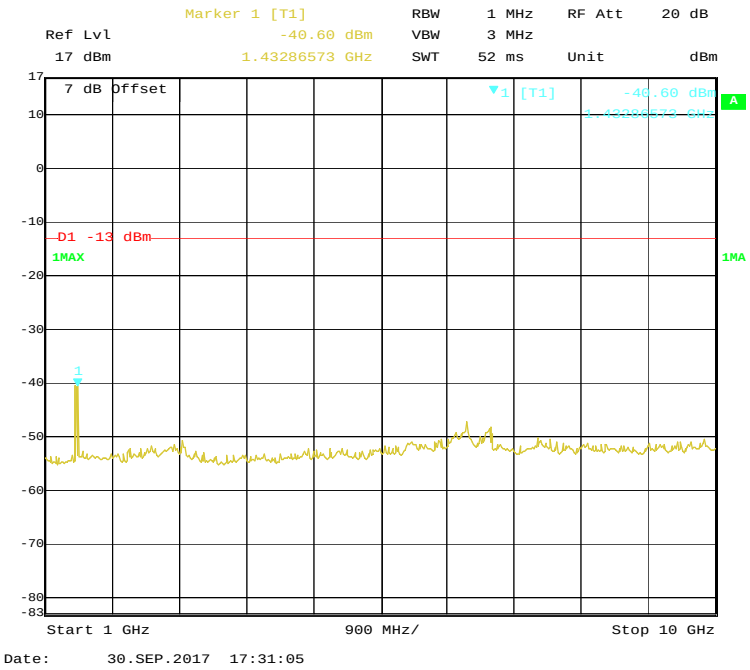
LTE Band 17:

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

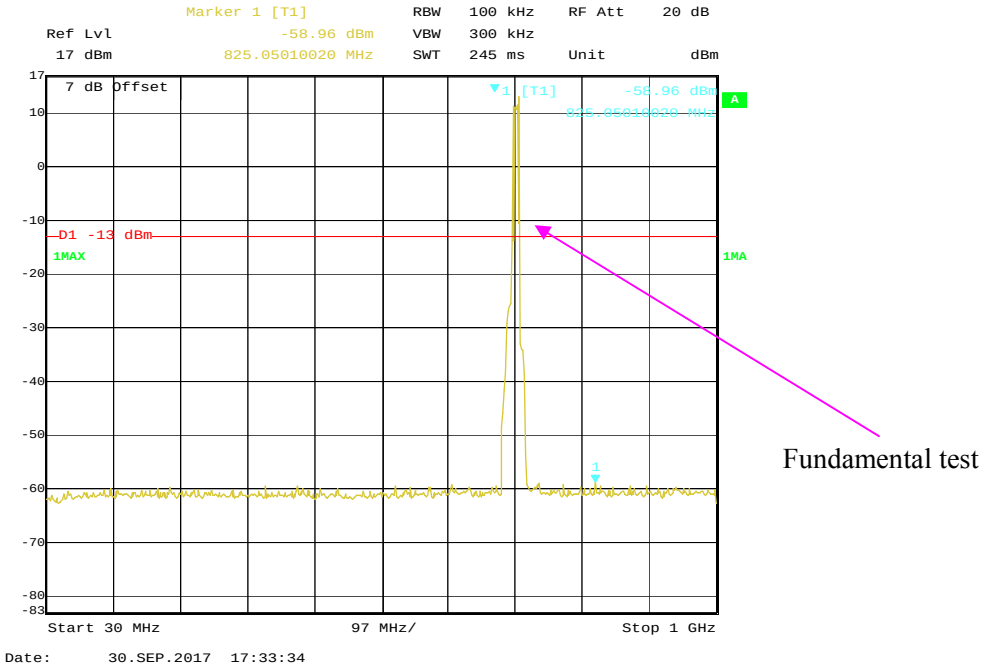


Fundamental test

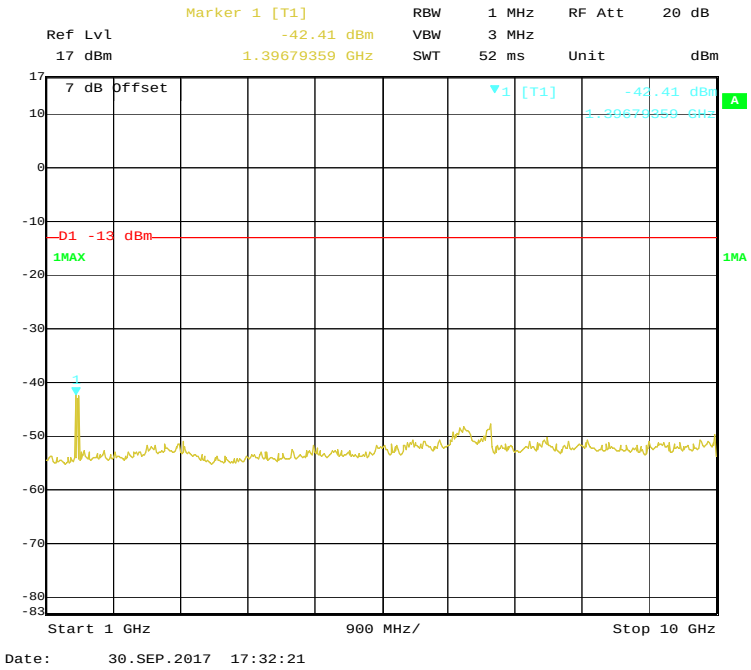
1 GHz – 10 GHz (5.0MHz, Middle Channel)



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



1 GHz – 10 GHz (10.0 MHz, 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 that 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 (TX pwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Chris Wang on 2017-09-10.

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, 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 (dB)			
WCDMA Mode, Middle channel										
256.61	42.06	298	153	H	-60.13	0.44	-2.24	-62.81	-13	49.81
256.61	51.11	22	163	V	-58.10	0.44	-2.24	-60.78	-13	47.78
1673.20	43.79	360	105	H	-67.16	0.84	8.48	-59.52	-13	46.52
1673.20	44.82	37	130	V	-66.38	0.84	8.48	-58.74	-13	45.74
2509.80	49.88	339	163	H	-58.74	0.89	10.09	-49.54	-13	36.54
2509.80	50.53	340	130	V	-58.16	0.89	10.09	-48.96	-13	35.96

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 (dB)			
WCDMA Mode, Middle channel										
256.61	42.33	1	211	H	-59.86	0.44	-2.24	-62.54	-13	49.54
256.61	50.86	109	118	V	-58.35	0.44	-2.24	-61.03	-13	48.03
3760.00	46.34	259	156	H	-57.35	0.95	9.74	-48.56	-13	35.56
3760.00	47.80	157	159	V	-56.21	0.95	9.74	-47.42	-13	34.42
5640.00	48.38	49	117	H	-52.13	1.15	10.74	-42.54	-13	29.54
5640.00	50.35	97	101	V	-50.46	1.15	10.74	-40.87	-13	27.87

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 (dB)			
QPSK 1.4MHz Bandwidth Middle Channel										
256.61	42.35	114	159	H	-59.84	0.44	-2.24	-62.52	-13	49.52
256.61	50.82	173	176	V	-58.39	0.44	-2.24	-61.07	-13	48.07
3760.00	46.52	168	172	H	-57.17	0.95	9.74	-48.38	-13	35.38
3760.00	47.57	327	218	V	-56.44	0.95	9.74	-47.65	-13	34.65
5640.00	48.26	50	215	H	-52.25	1.15	10.74	-42.66	-13	29.66
5640.00	50.54	259	195	V	-50.27	1.15	10.74	-40.68	-13	27.68
16-QAM 1.4MHz Bandwidth Middle Channel										
256.61	42.38	100	161	H	-59.81	0.44	-2.24	-62.49	-13	49.49
256.61	50.87	286	219	V	-58.34	0.44	-2.24	-61.02	-13	48.02
3760.00	46.47	349	159	H	-57.22	0.95	9.74	-48.43	-13	35.43
3760.00	47.60	240	109	V	-56.41	0.95	9.74	-47.62	-13	34.62
5640.00	48.20	274	160	H	-52.31	1.15	10.74	-42.72	-13	29.72
5640.00	50.53	297	214	V	-50.28	1.15	10.74	-40.69	-13	27.69

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 (dB)			
QPSK 1.4MHz Bandwidth Middle Channel										
256.61	42.41	345	162	H	-59.78	0.44	-2.24	-62.46	-13	49.46
256.61	50.92	96	150	V	-58.29	0.44	-2.24	-60.97	-13	47.97
3465.00	46.20	22	145	H	-58.59	0.93	9.87	-49.65	-13	36.65
3465.00	50.31	131	216	V	-54.91	0.93	9.87	-45.97	-13	32.97
5197.50	46.86	286	170	H	-55.22	1.10	10.30	-46.02	-13	33.02
5197.50	48.38	127	219	V	-53.91	1.10	10.30	-44.71	-13	31.71
16-QAM 1.4MHz Bandwidth Middle Channel										
256.61	42.35	303	169	H	-59.84	0.44	-2.24	-62.52	-13	49.52
256.61	50.84	244	215	V	-58.37	0.44	-2.24	-61.05	-13	48.05
3465.00	46.14	177	116	H	-58.65	0.93	9.87	-49.71	-13	36.71
3465.00	50.23	201	179	V	-54.99	0.93	9.87	-46.05	-13	33.05
5197.50	46.73	218	176	H	-55.35	1.10	10.30	-46.15	-13	33.15
5197.50	48.33	132	138	V	-53.96	1.10	10.30	-44.76	-13	31.76

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 (dB)			
QPSK 1.4MHz Bandwidth Middle Channel										
256.61	42.38	85	131	H	-59.81	0.44	-2.24	-62.49	-13	49.49
256.61	50.91	298	201	V	-58.30	0.44	-2.24	-60.98	-13	47.98
1673.00	49.17	42	146	H	-61.78	0.84	8.48	-54.14	-13	41.14
1673.00	51.28	338	120	V	-59.92	0.84	8.48	-52.28	-13	39.28
2509.50	49.55	304	206	H	-59.07	0.89	10.09	-49.87	-13	36.87
2509.50	50.57	32	174	V	-58.12	0.89	10.09	-48.92	-13	35.92
16-QAM 1.4MHz Bandwidth Middle Channel										
256.61	42.36	190	188	H	-59.83	0.44	-2.24	-62.51	-13	49.51
256.61	50.88	170	109	V	-58.33	0.44	-2.24	-61.01	-13	48.01
1673.00	49.14	212	218	H	-61.81	0.84	8.48	-54.17	-13	41.17
1673.00	51.25	29	217	V	-59.95	0.84	8.48	-52.31	-13	39.31
2509.50	49.47	173	208	H	-59.15	0.89	10.09	-49.95	-13	36.95
2509.50	50.47	99	177	V	-58.22	0.89	10.09	-49.02	-13	36.02

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 (dB)			
QPSK 5MHz Bandwidth Middle Channel										
256.61	42.37	61	139	H	-59.82	0.44	-2.24	-62.50	-13	49.50
256.61	50.84	3	145	V	-58.37	0.44	-2.24	-61.05	-13	48.05
1564.00	47.72	275	131	H	-64.00	0.83	8.30	-56.53	-13	43.53
1564.00	46.96	197	197	V	-64.98	0.83	8.30	-57.51	-13	44.51
2346.00	46.92	234	151	H	-61.73	0.88	9.76	-52.85	-13	39.85
2346.00	48.33	66	171	V	-60.47	0.88	9.76	-51.59	-13	38.59
16-QAM 5MHz Bandwidth Middle Channel										
256.61	42.40	49	117	H	-59.79	0.44	-2.24	-62.47	-13	49.47
256.61	50.86	163	157	V	-58.35	0.44	-2.24	-61.03	-13	48.03
1564.00	47.41	103	118	H	-64.31	0.83	8.30	-56.84	-13	43.84
1564.00	46.81	22	171	V	-65.13	0.83	8.30	-57.66	-13	44.66
2346.00	46.73	322	127	H	-61.92	0.88	9.76	-53.04	-13	40.04
2346.00	48.35	49	199	V	-60.45	0.88	9.76	-51.57	-13	38.57

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 (dB)			
QPSK 5MHz Bandwidth Middle Channel										
256.61	42.39	132	211	H	-59.80	0.44	-2.24	-62.48	-13	49.48
256.61	50.90	327	205	V	-58.31	0.44	-2.24	-60.99	-13	47.99
1420.00	47.75	358	220	H	-64.31	0.82	7.98	-57.15	-13	44.15
1420.00	47.35	9	145	V	-65.01	0.82	7.98	-57.85	-13	44.85
2130.00	46.14	203	115	H	-62.50	0.86	9.29	-54.07	-13	41.07
2130.00	47.60	274	122	V	-61.31	0.86	9.29	-52.88	-13	39.88
16-QAM 5MHz Bandwidth Middle Channel										
256.61	42.38	153	112	H	-59.81	0.44	-2.24	-62.49	-13	49.49
256.61	50.85	113	203	V	-58.36	0.44	-2.24	-61.04	-13	48.04
1420.00	47.34	71	178	H	-64.72	0.82	7.98	-57.56	-13	44.56
1420.00	47.09	262	136	V	-65.27	0.82	7.98	-58.11	-13	45.11
2130.00	45.97	151	120	H	-62.67	0.86	9.29	-54.24	-13	41.24
2130.00	47.52	128	198	V	-61.39	0.86	9.29	-52.96	-13	39.96

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.

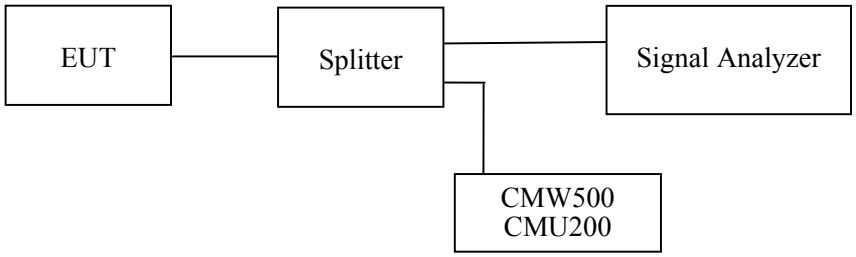
According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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 that 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 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

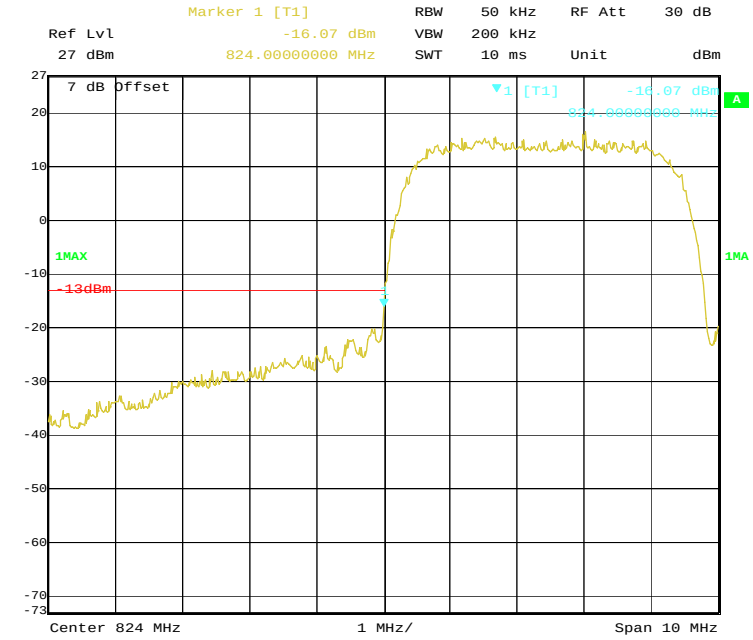
Temperature:	23.1 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Chris Wang on 2017-09-06 to 2017-09-30.

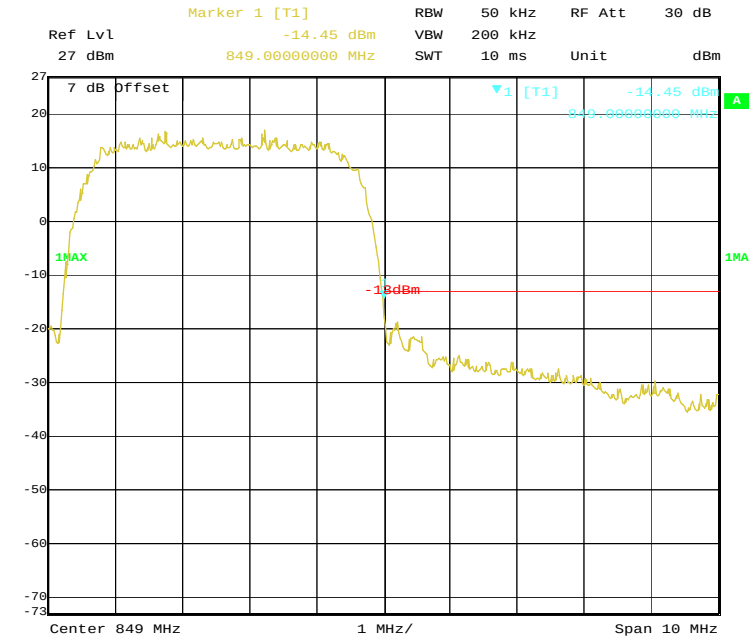
EUT operation mode: Transmitting

Test Result: Compliance.

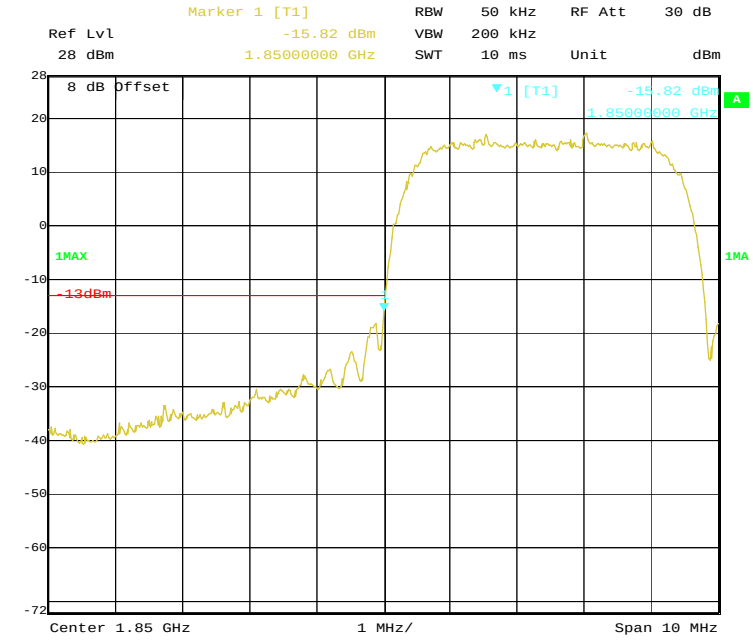
WCDMA Band V, Left Band Edge



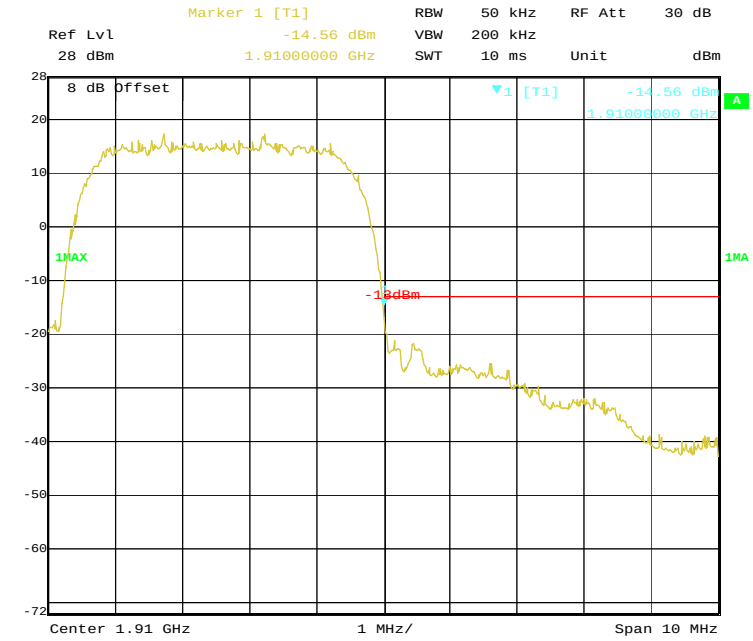
WCDMA Band V, Right Band Edge



WCDMA Band II, Left Band Edge

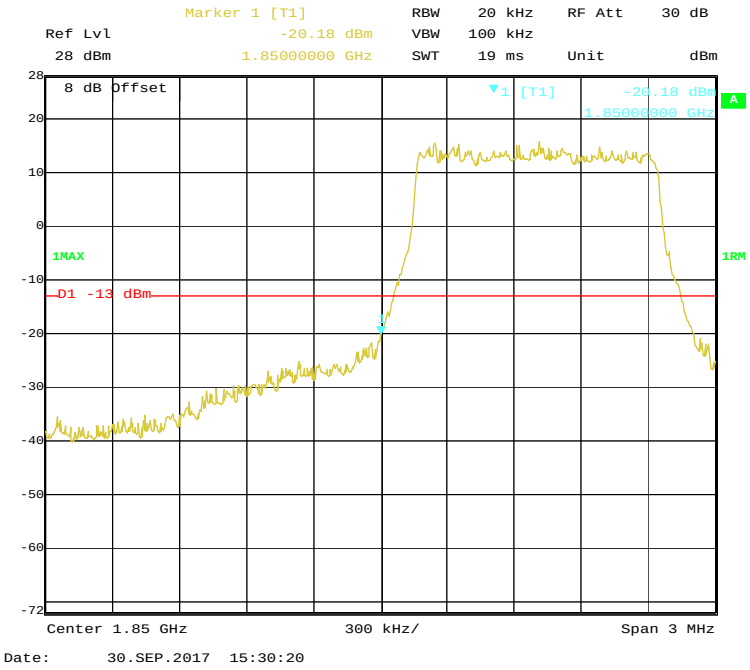


WCDMA Band II, Right Band Edge

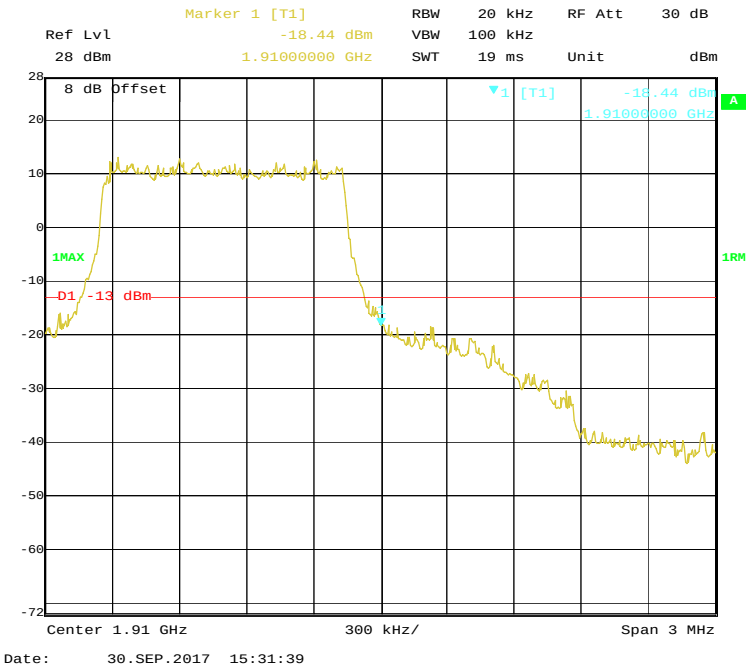


LTE Band 2:

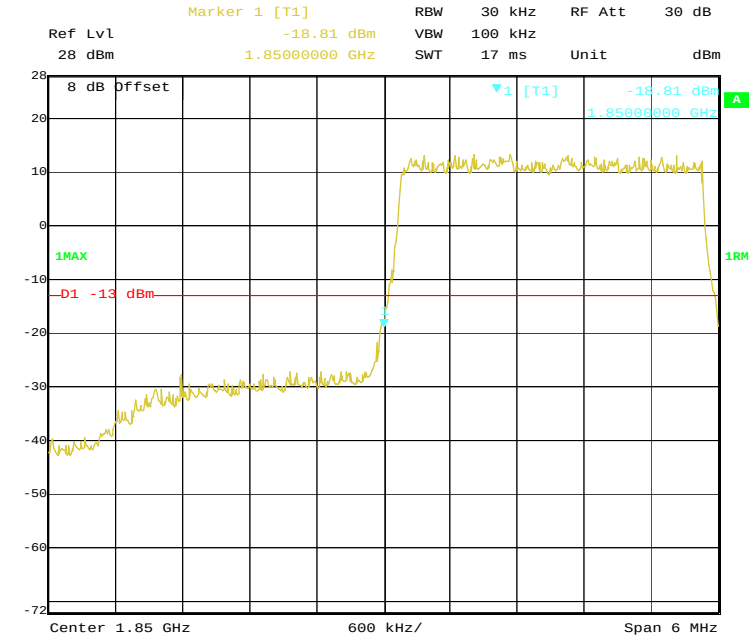
QPSK (1.4 MHz, FULL RB) - Left Band Edge



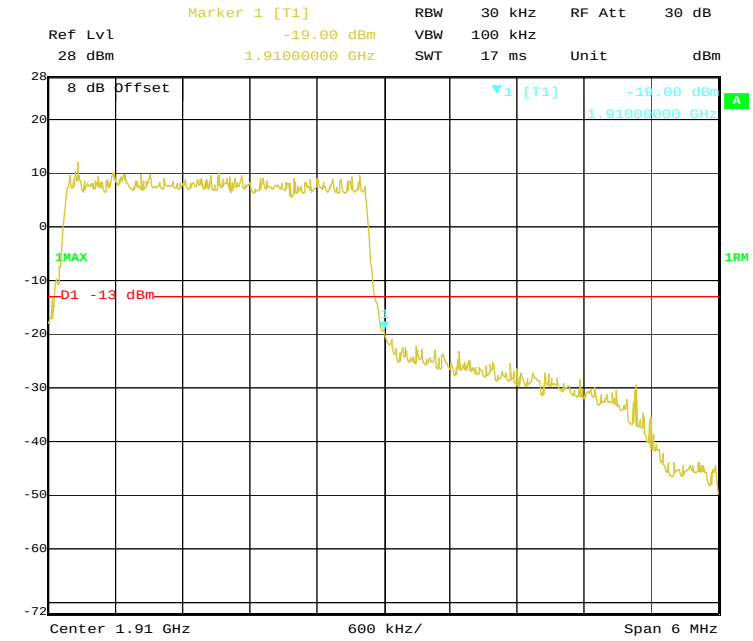
QPSK (1.4 MHz, FULL RB) - Right Band Edge



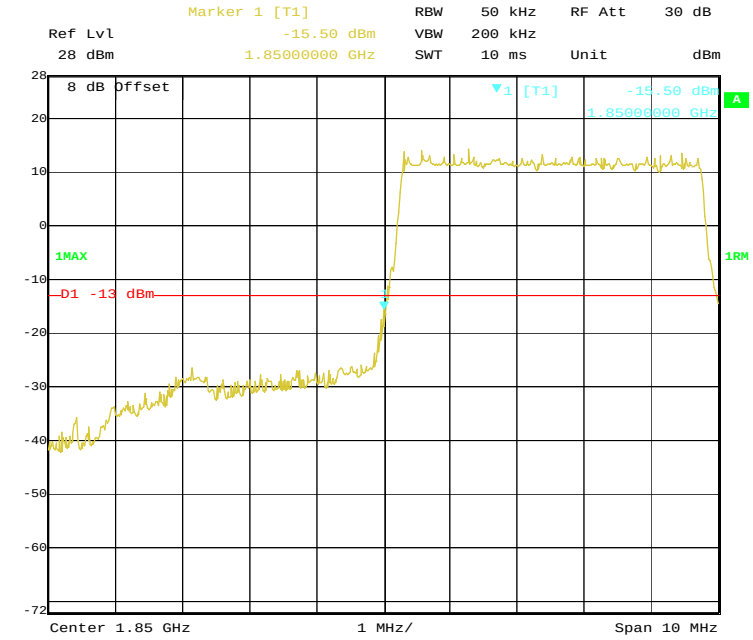
QPSK (3.0 MHz, FULL RB) - Left Band Edge



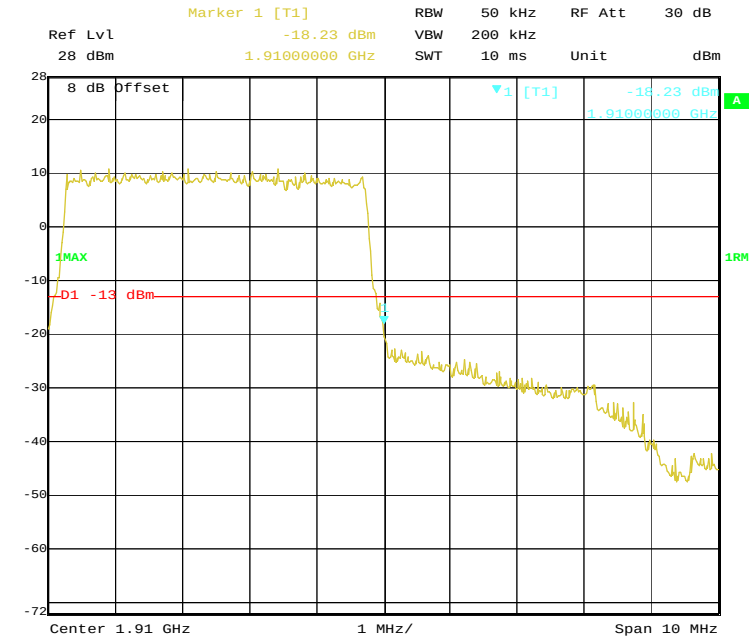
QPSK (3.0 MHz, FULL RB) - Right Band Edge



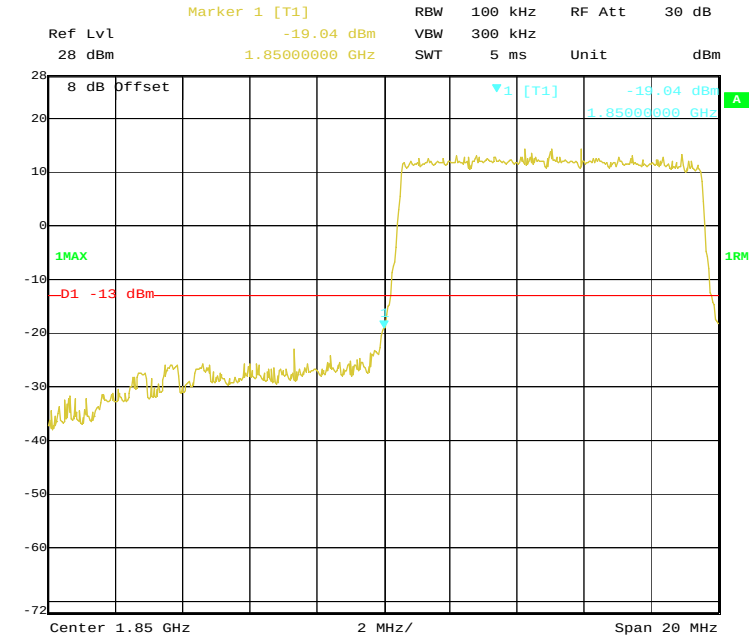
QPSK (5.0 MHz, FULL RB) - Left Band Edge



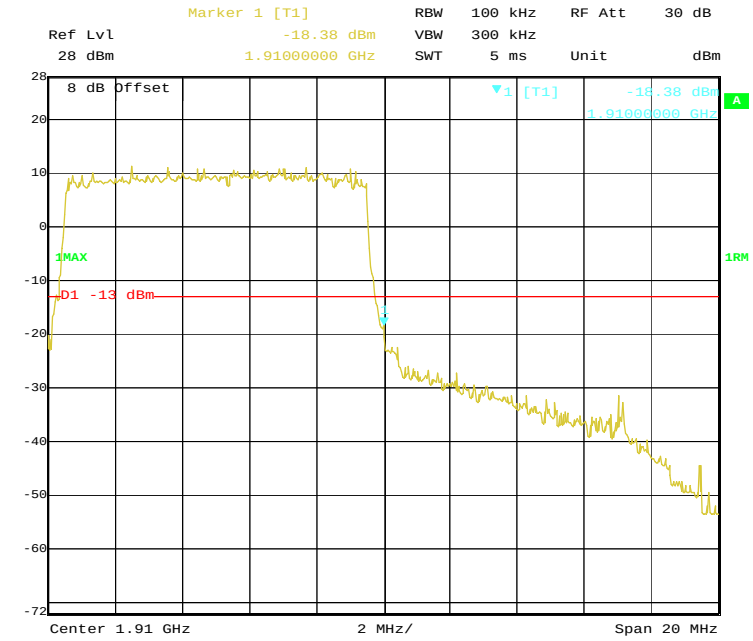
QPSK (5.0 MHz, FULL RB) - Right Band Edge



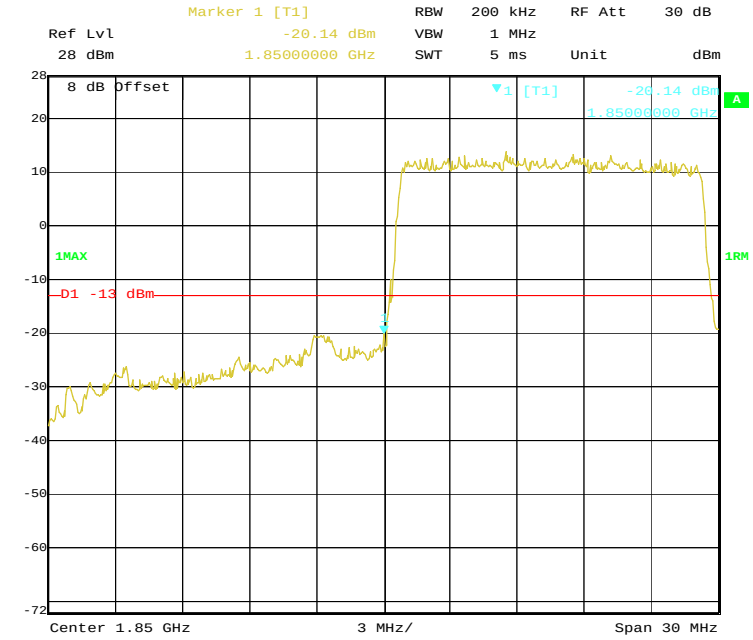
QPSK (10.0 MHz, FULL RB) - Left Band Edge



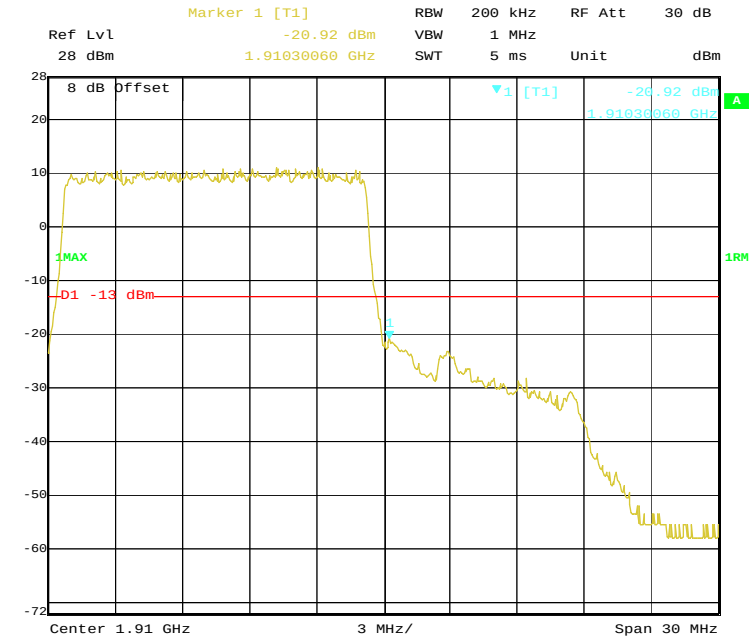
QPSK (10.0 MHz, FULL RB) - Right Band Edge



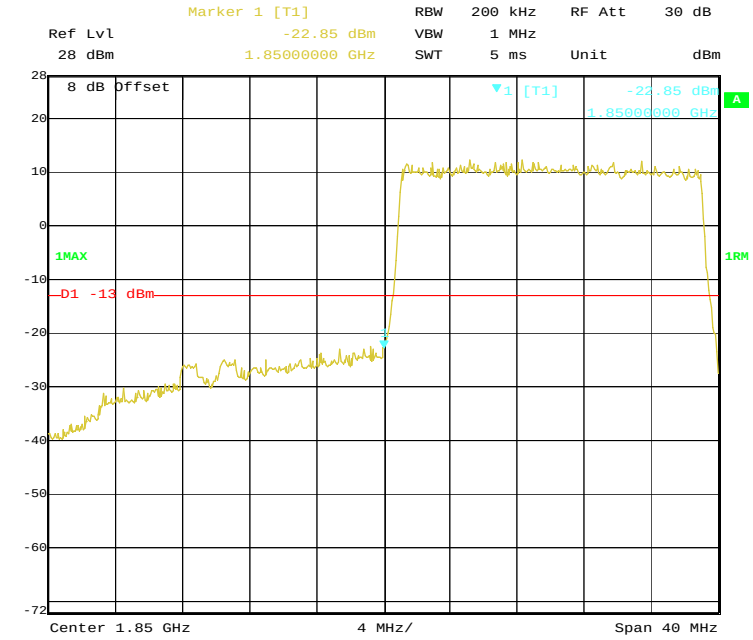
QPSK (15.0 MHz, FULL RB) - Left Band Edge



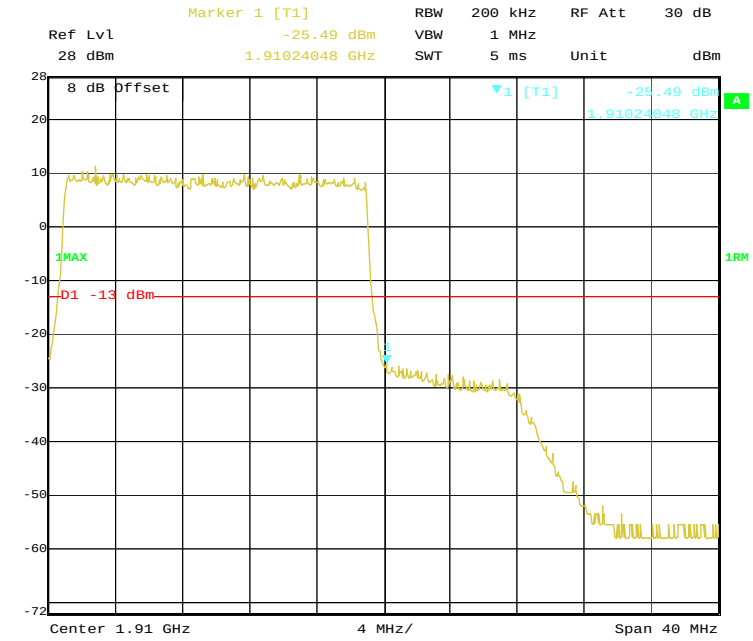
QPSK (15.0 MHz, FULL RB) - Right Band Edge



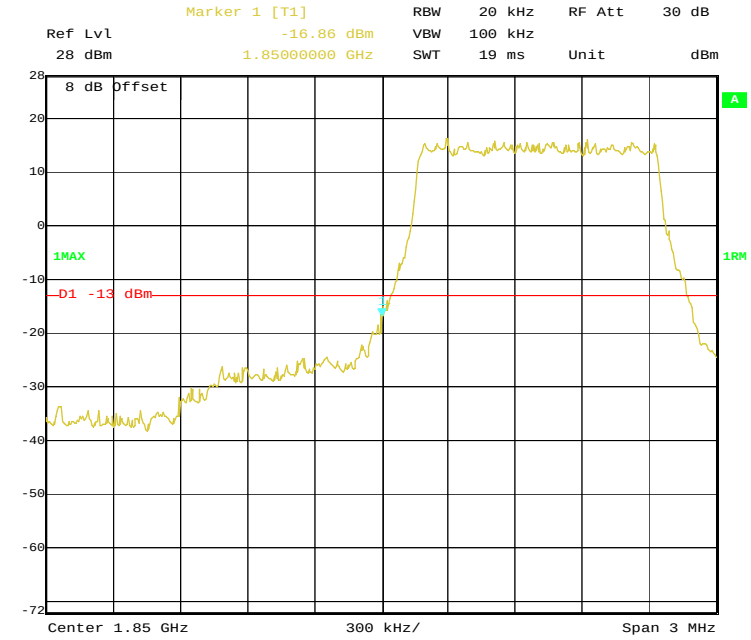
QPSK (20.0 MHz, FULL RB) - Left Band Edge



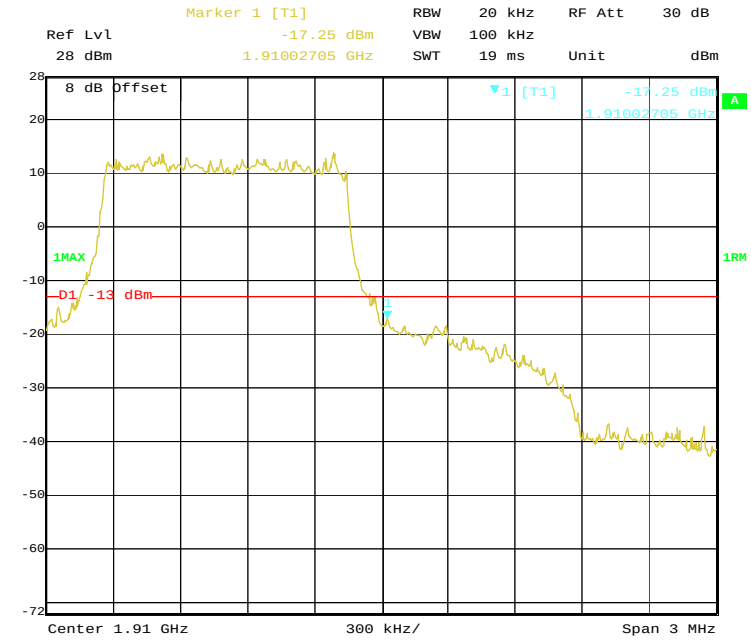
QPSK (20.0 MHz, FULL RB) - Right Band Edge



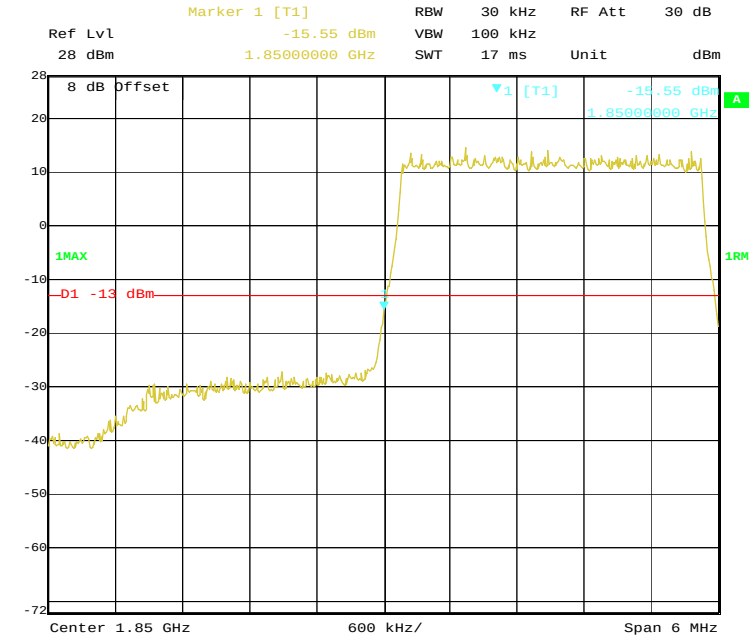
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



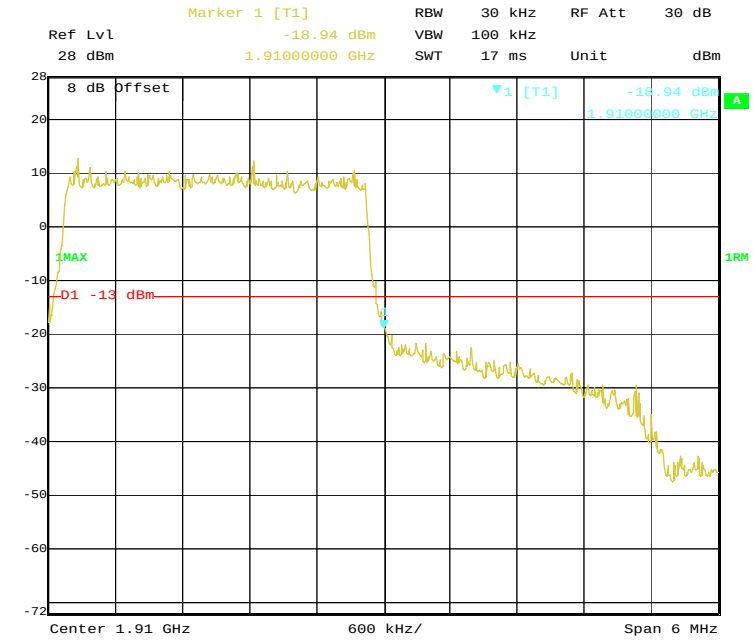
16-QAM (1.4 MHz, FULL RB) - Right Band Edge



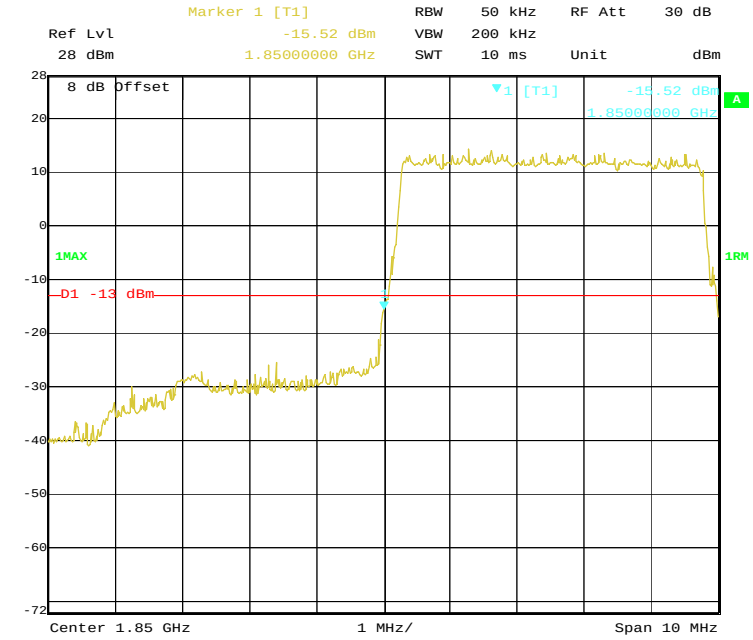
16-QAM (3.0 MHz, FULL RB) - Left Band Edge



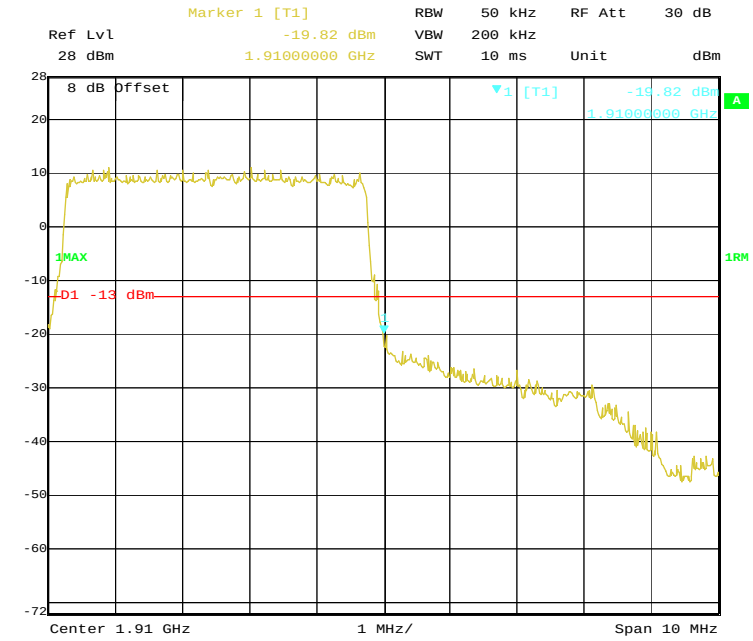
16-QAM (3.0 MHz, FULL RB) - Right Band Edge



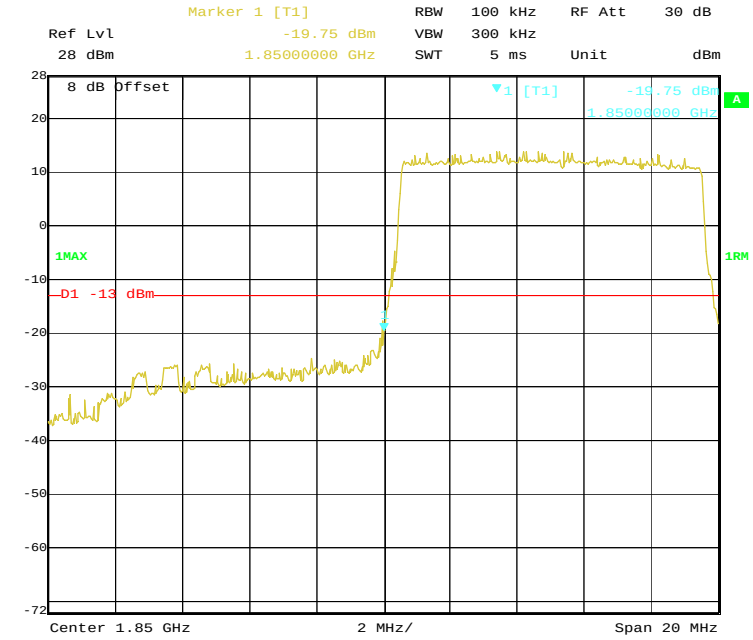
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



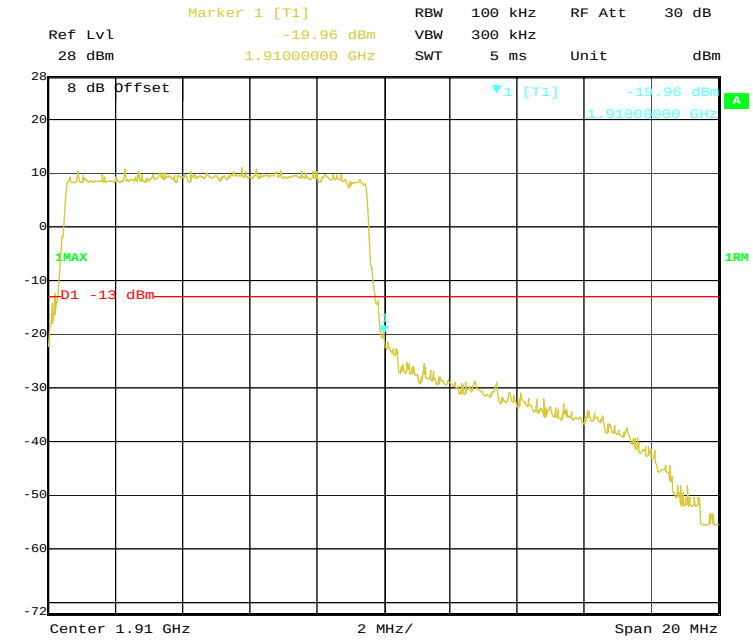
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



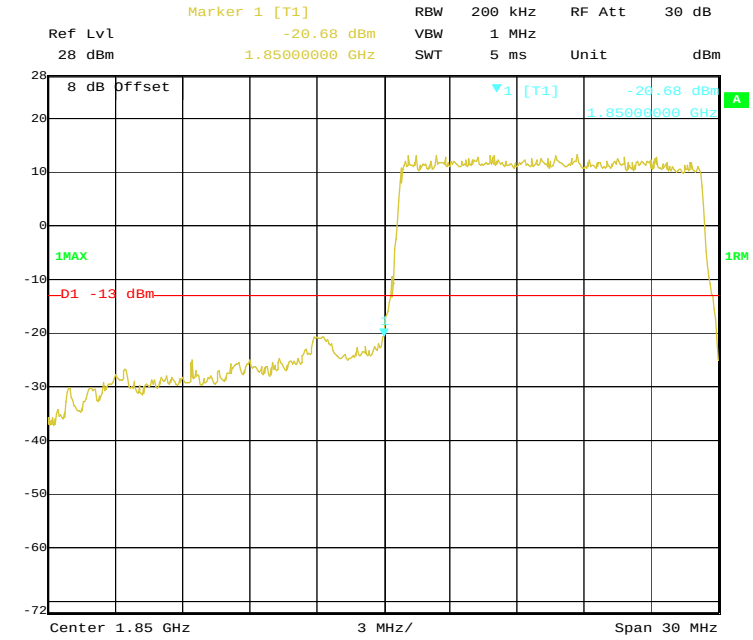
16-QAM (10.0 MHz, FULL RB) - Left Band Edge



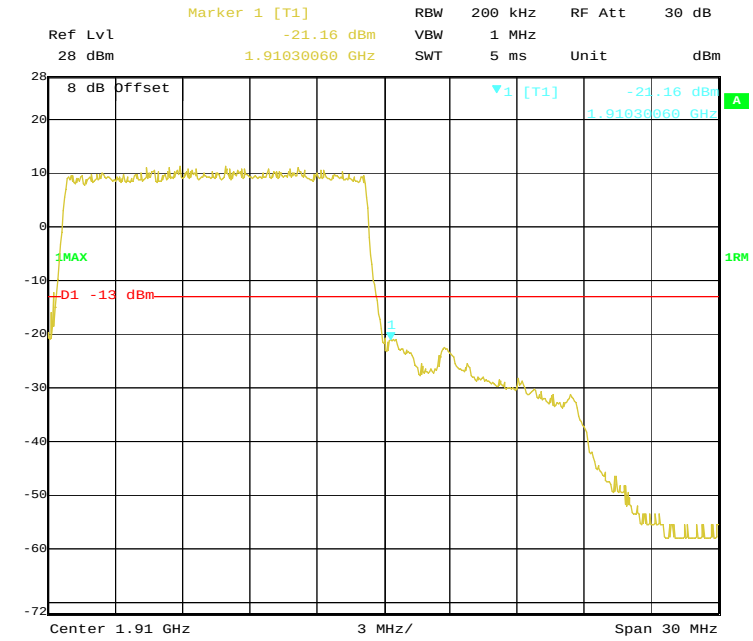
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



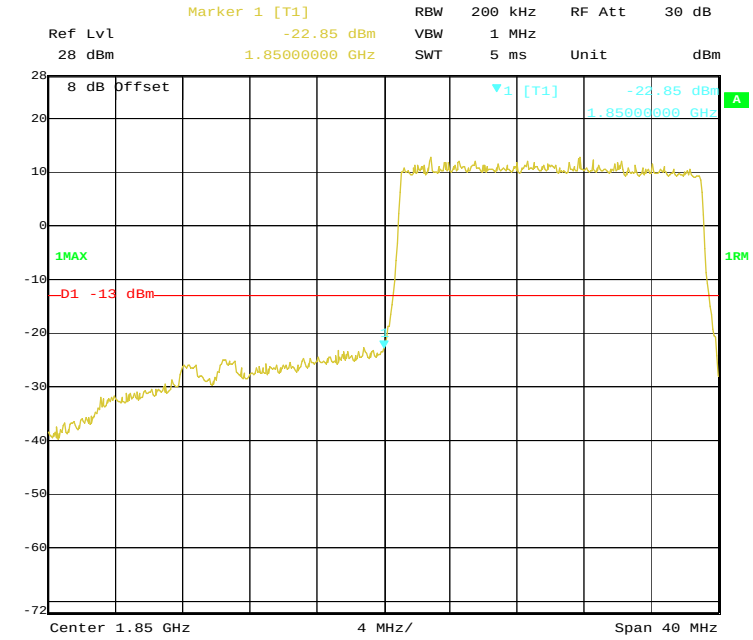
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



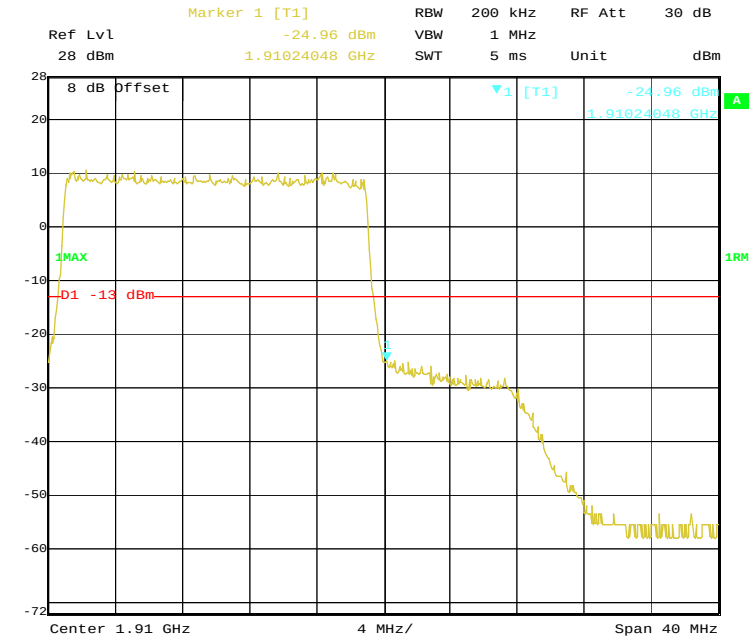
16-QAM (15.0 MHz, FULL RB) - Right Band Edge



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

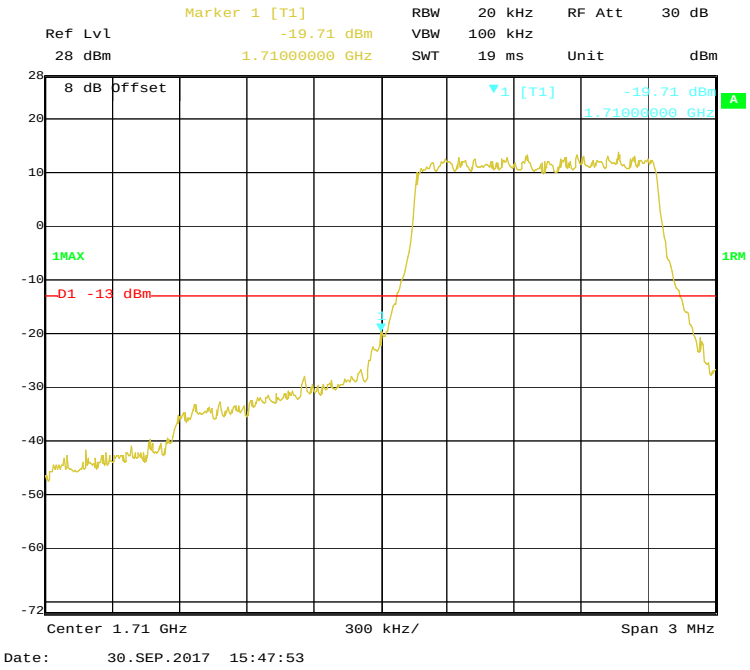


16-QAM (20.0 MHz, FULL RB) - Right Band Edge

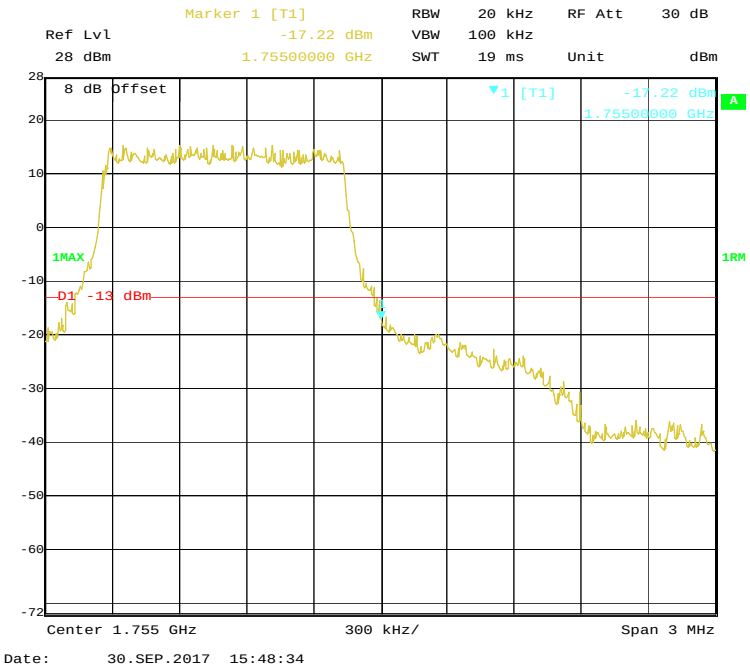


LTE Band 4:

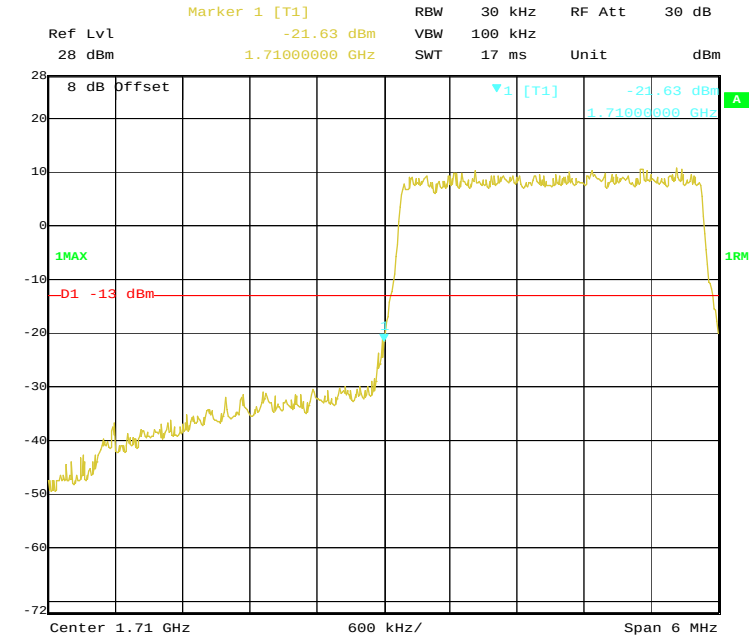
QPSK (1.4 MHz, FULL RB) - Left Band Edge



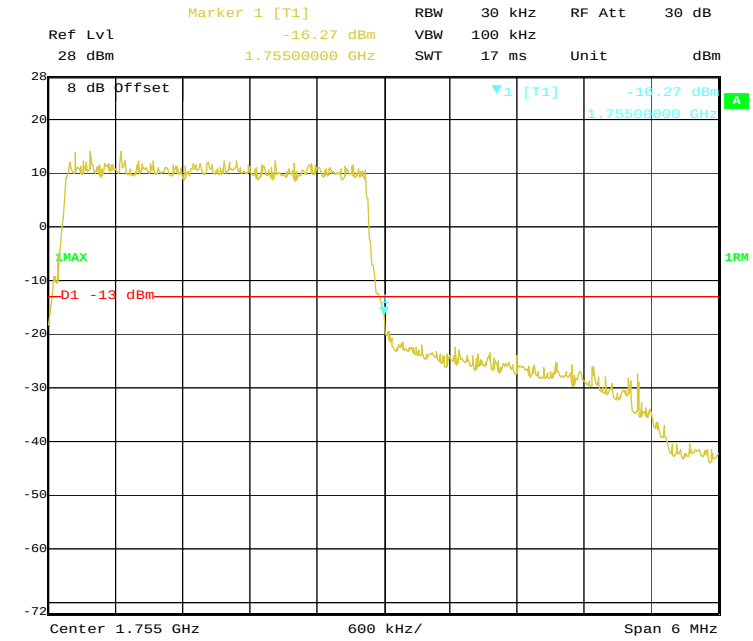
QPSK (1.4 MHz, FULL RB) - Right Band Edge



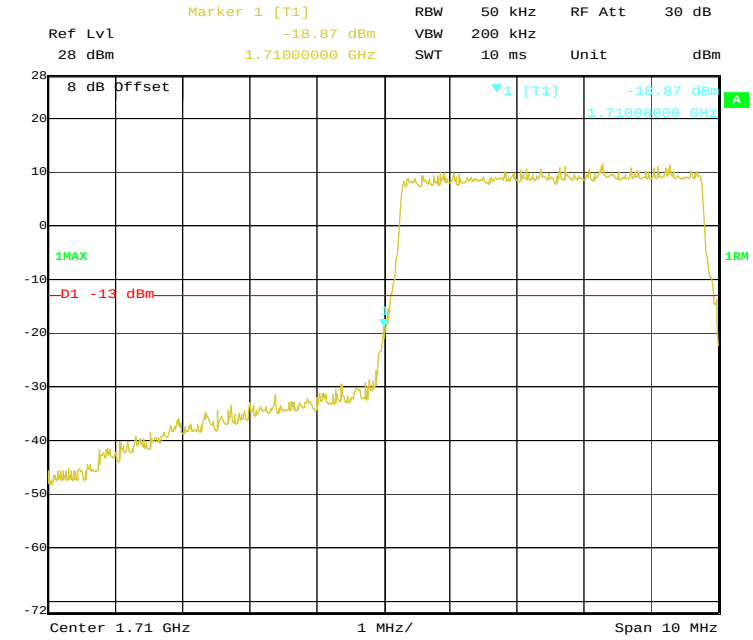
QPSK (3.0 MHz, FULL RB) - Left Band Edge



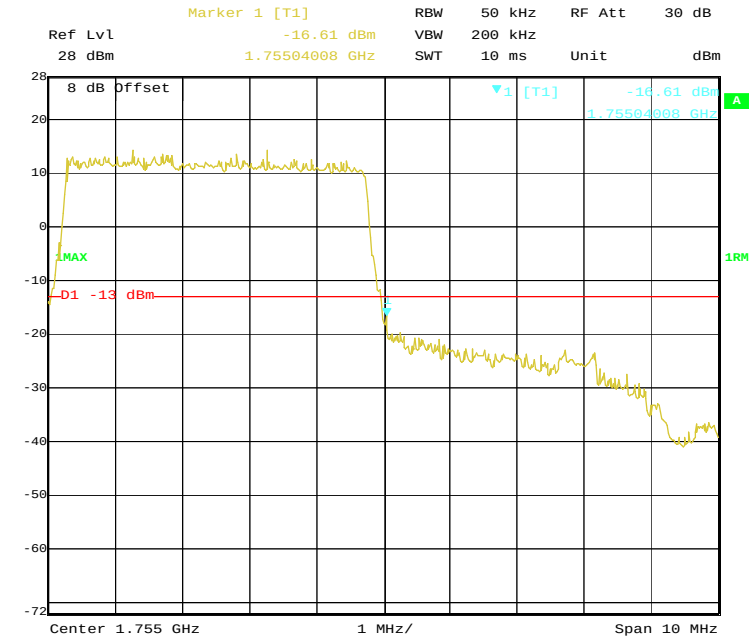
QPSK (3.0 MHz, FULL RB) - Right Band Edge



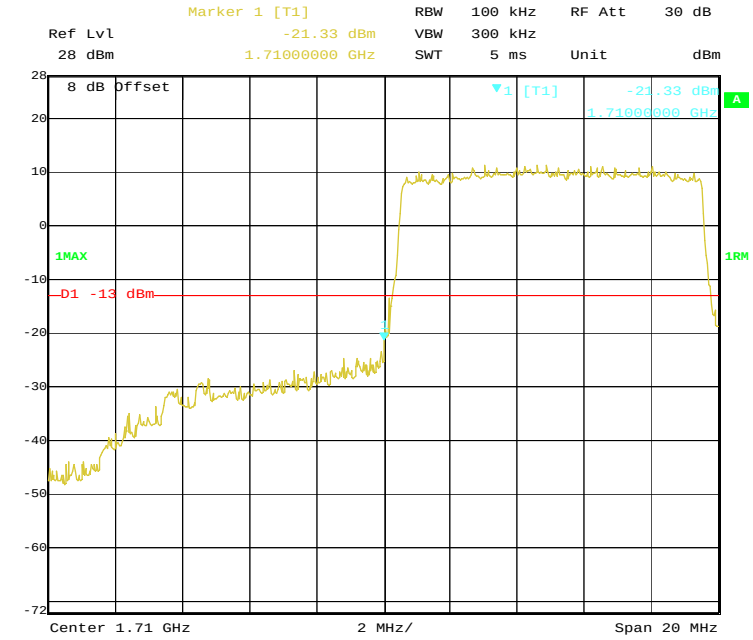
QPSK (5.0 MHz, FULL RB) - Left Band Edge



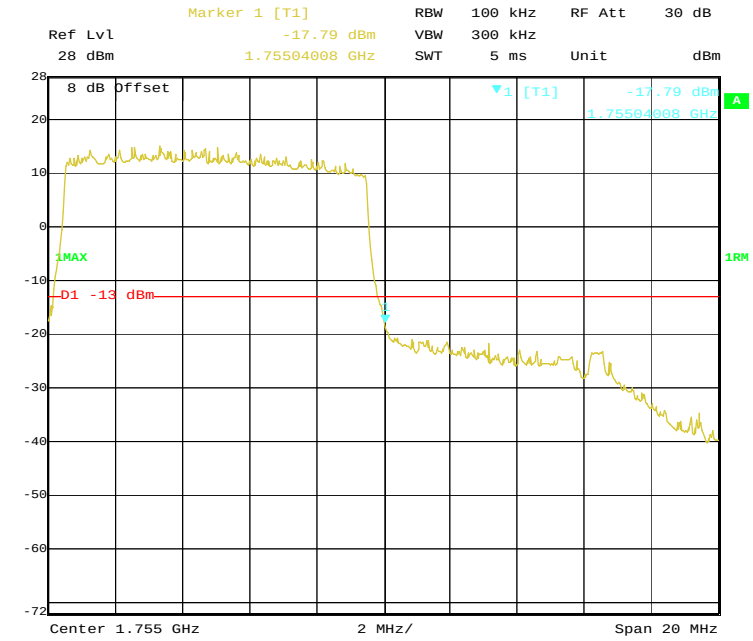
QPSK (5.0 MHz, FULL RB) - Right Band Edge



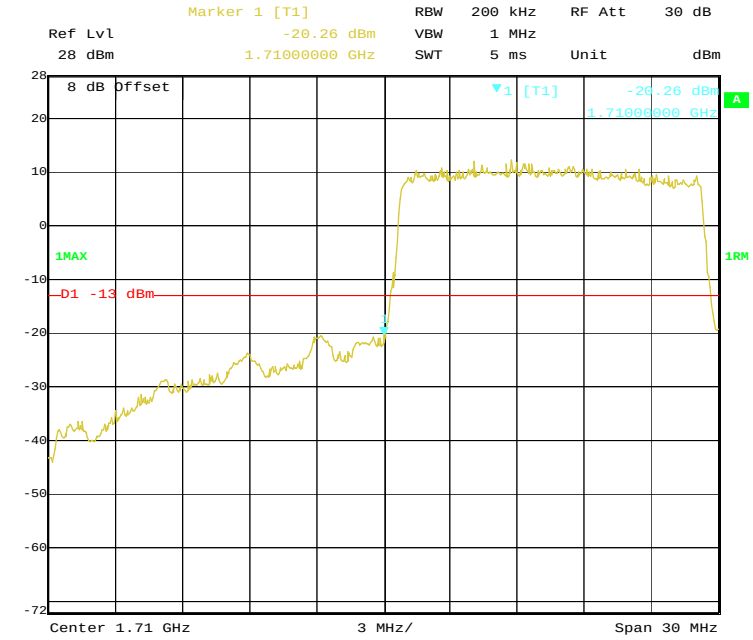
QPSK (10.0 MHz, FULL RB) - Left Band Edge



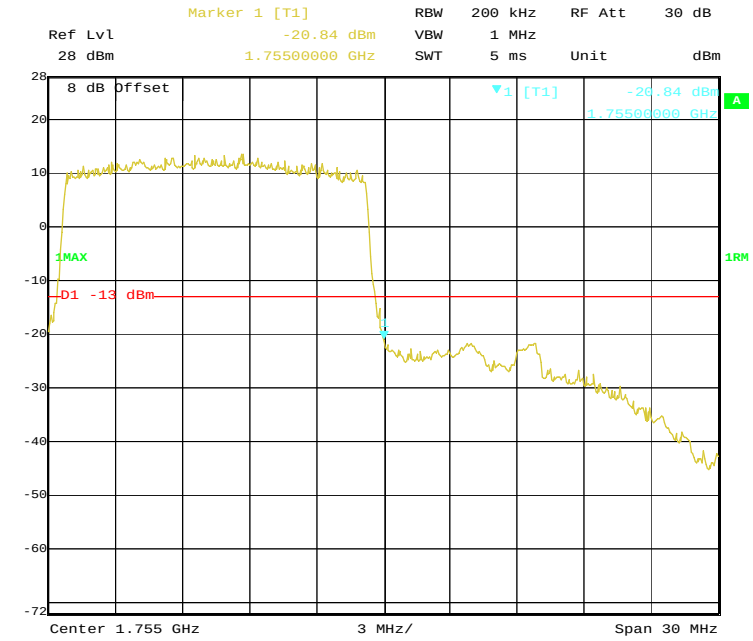
QPSK (10.0 MHz, FULL RB) - Right Band Edge



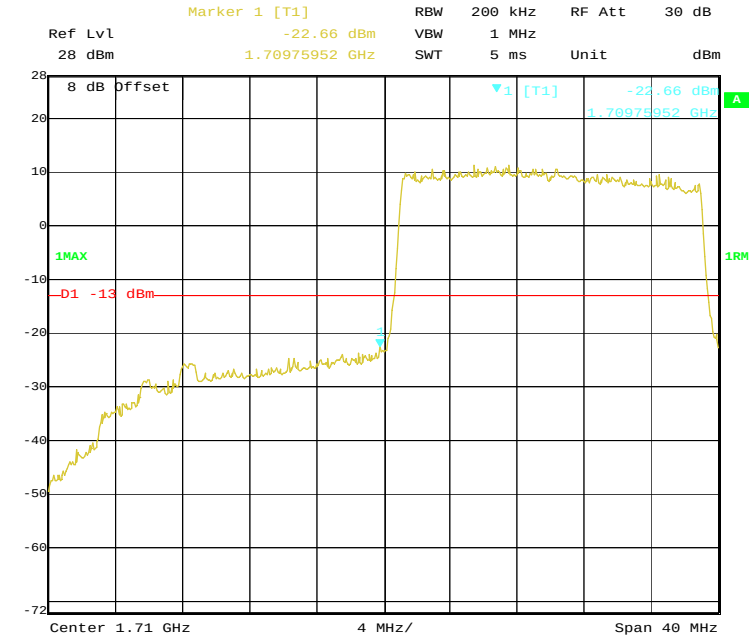
QPSK (15.0 MHz, FULL RB) - Left Band Edge



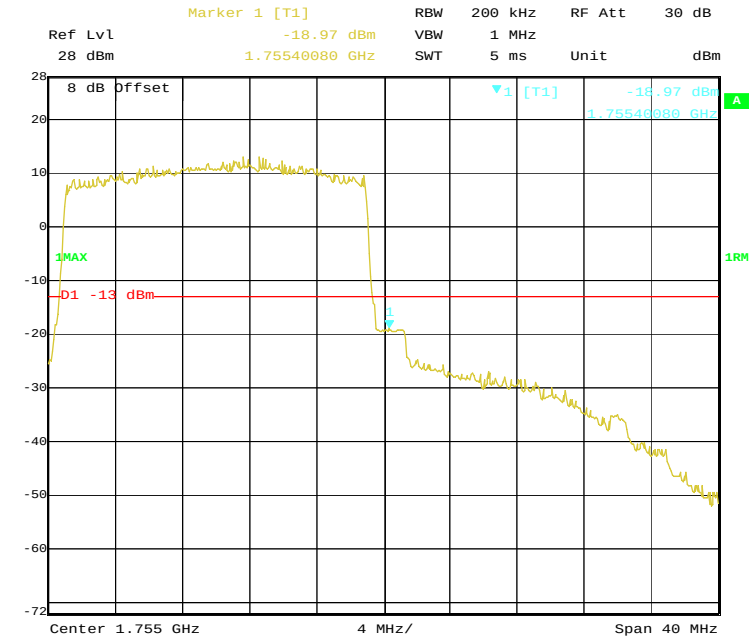
QPSK (15.0 MHz, FULL RB) - Right Band Edge



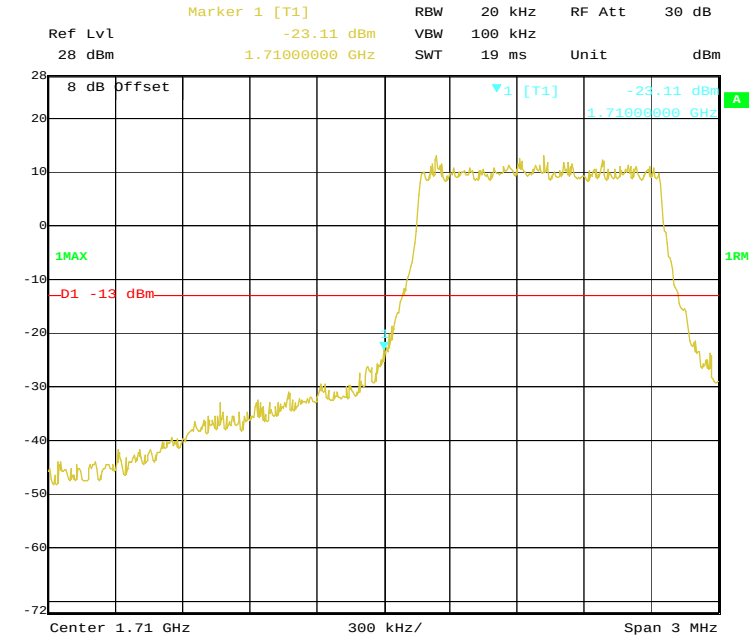
QPSK (20.0 MHz, FULL RB) - Left Band Edge



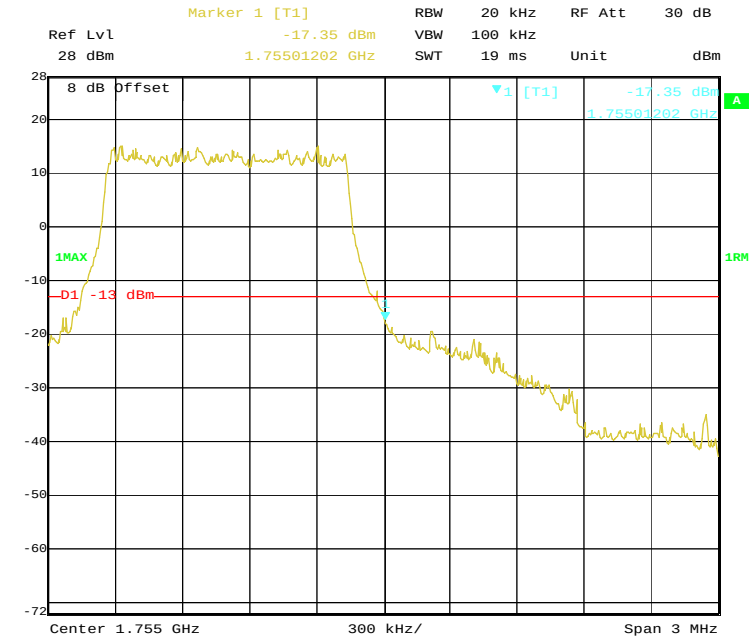
QPSK (20.0 MHz, FULL RB) - Right Band Edge



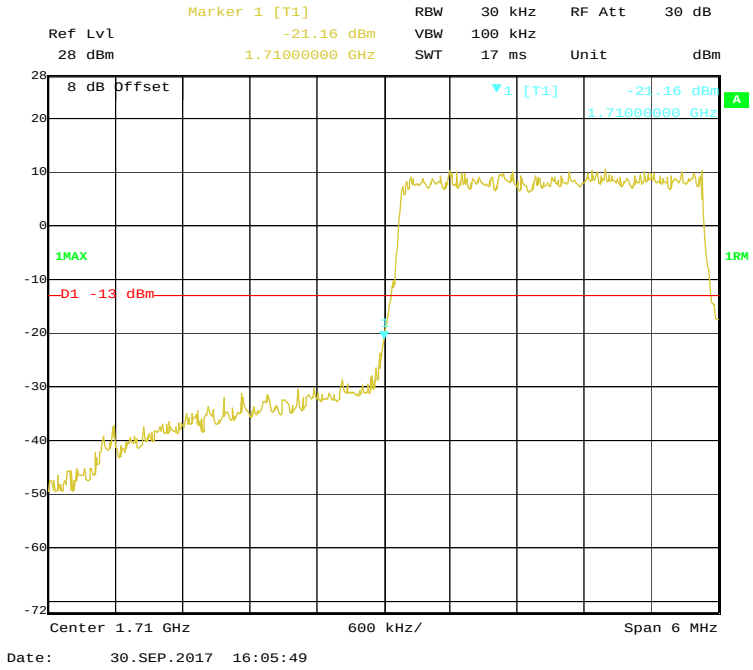
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



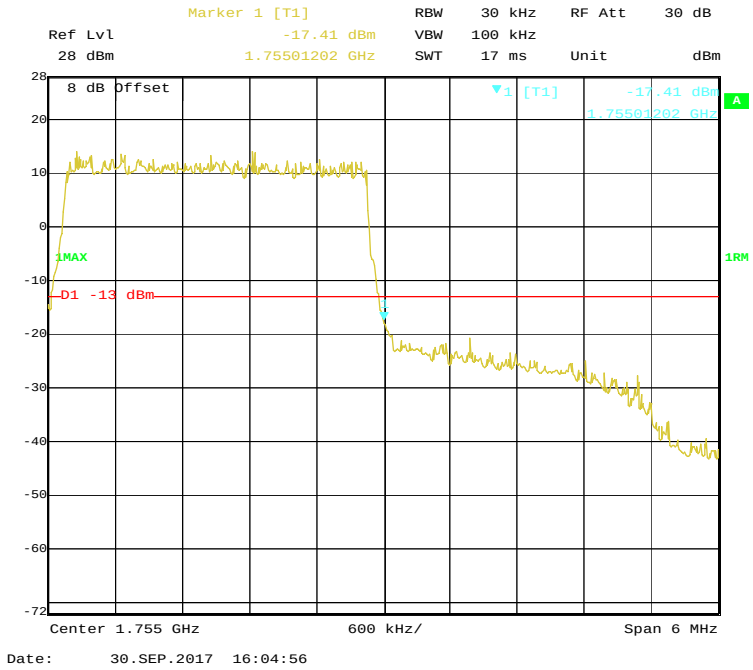
16-QAM (1.4 MHz, FULL RB) - Right Band Edge



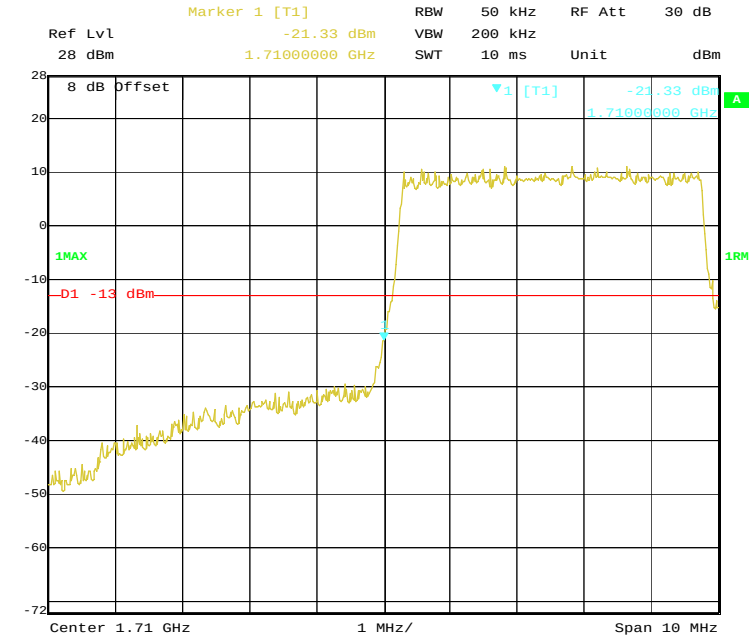
16-QAM (3.0 MHz, FULL RB) - Left Band Edge



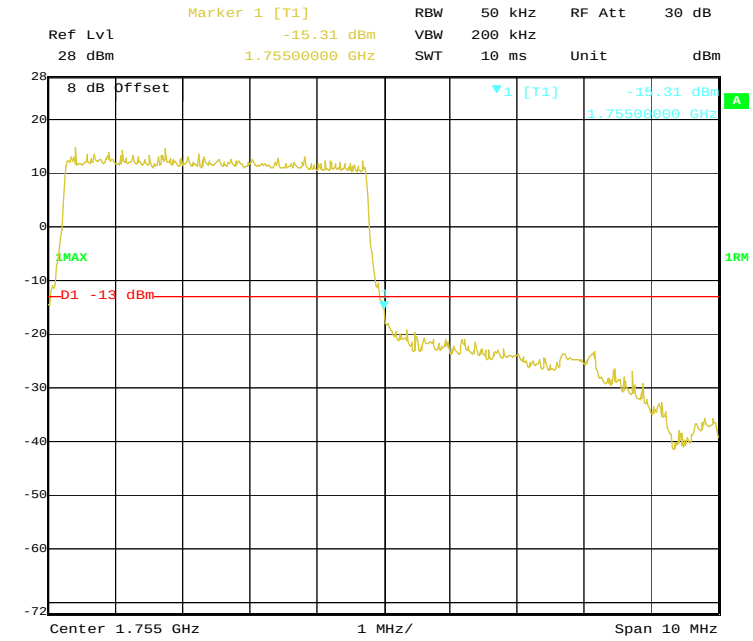
16-QAM (3.0 MHz, FULL RB) - Right Band Edge



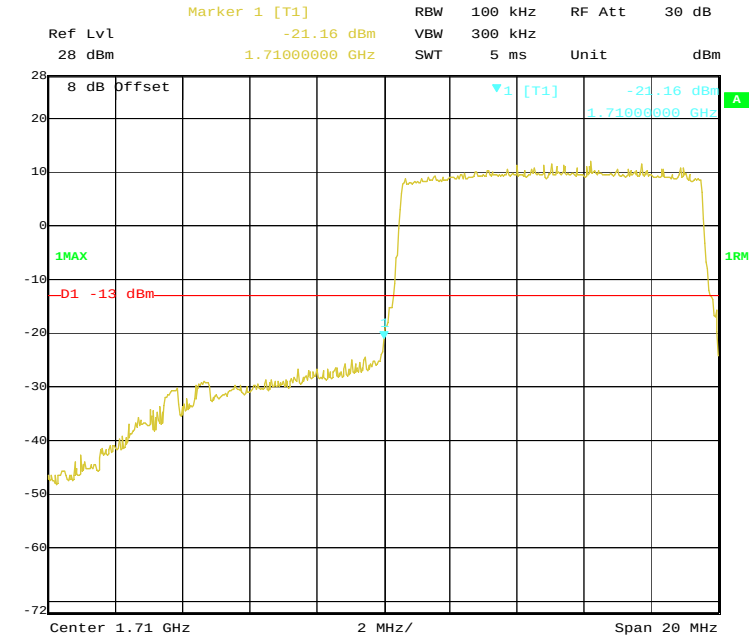
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



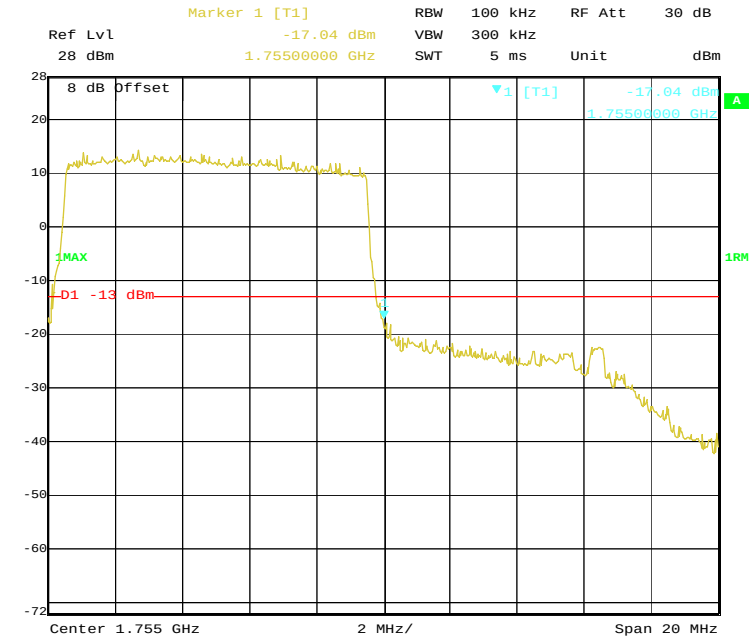
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



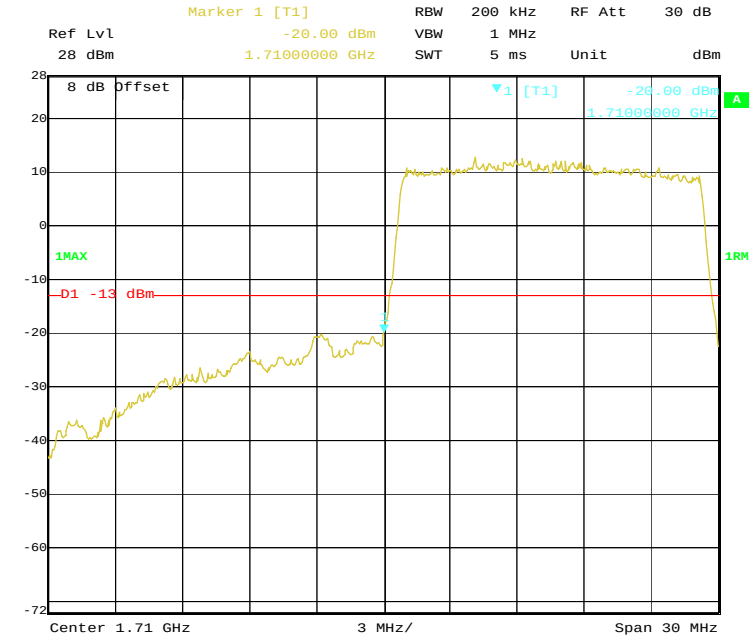
16-QAM (10.0 MHz, FULL RB) - Left Band Edge



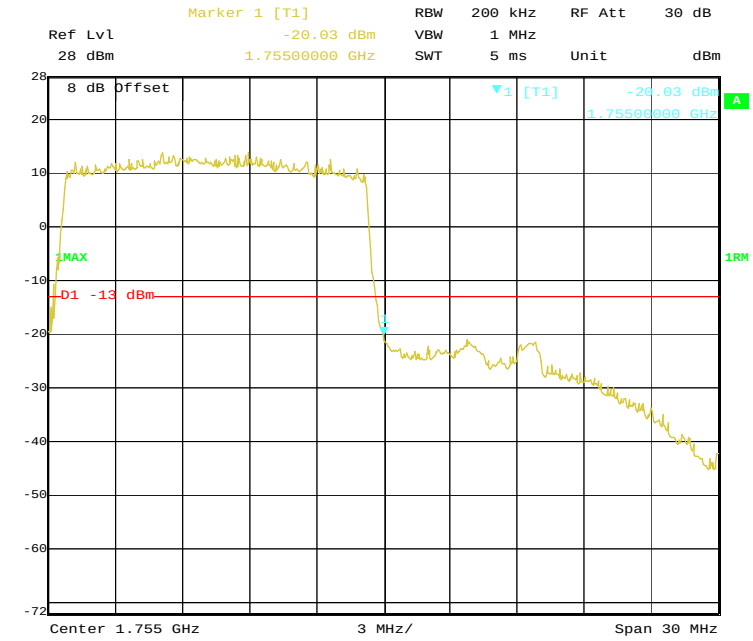
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



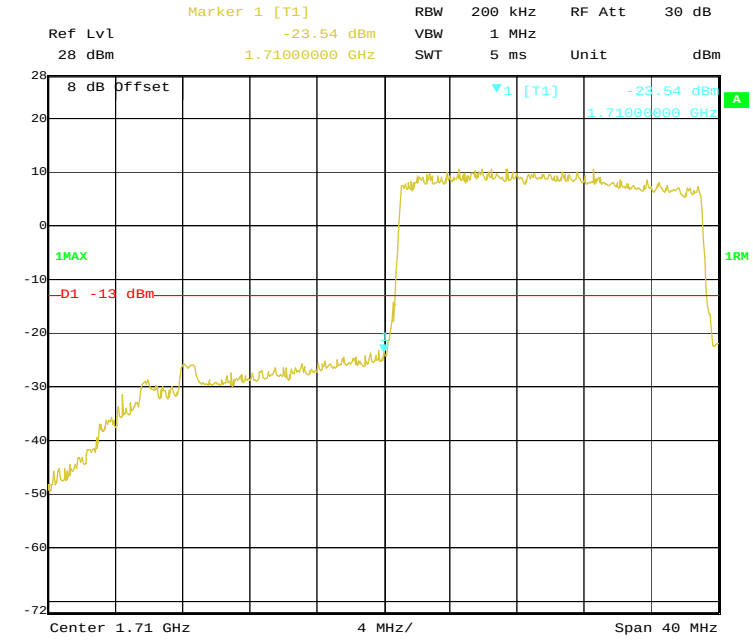
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



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



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



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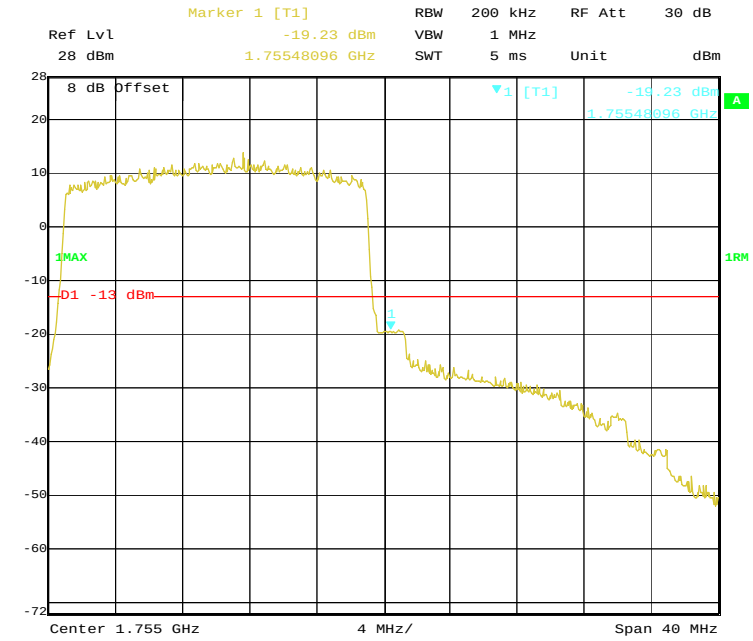
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



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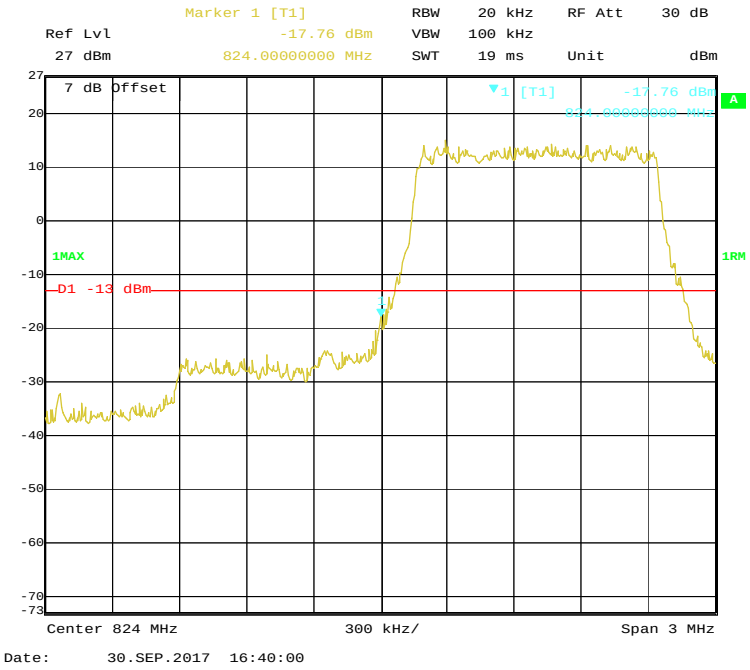
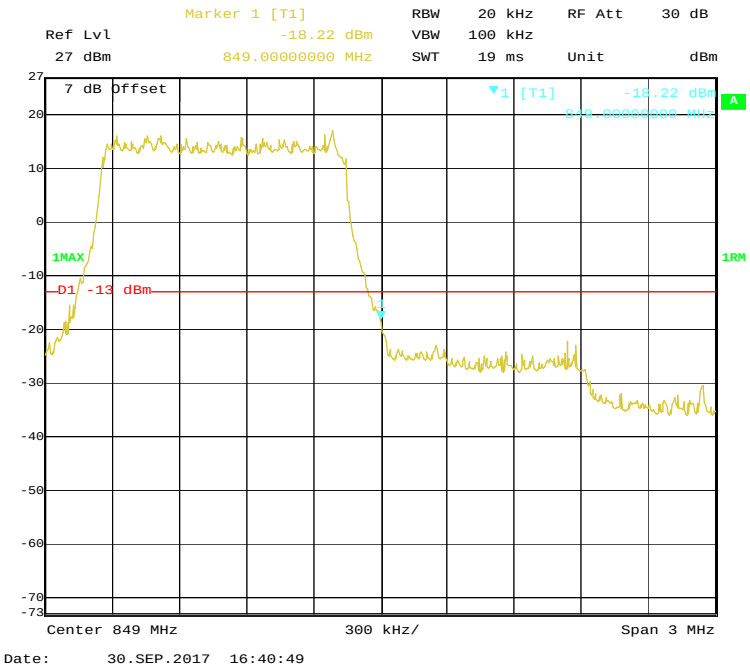
LTE Band 5:

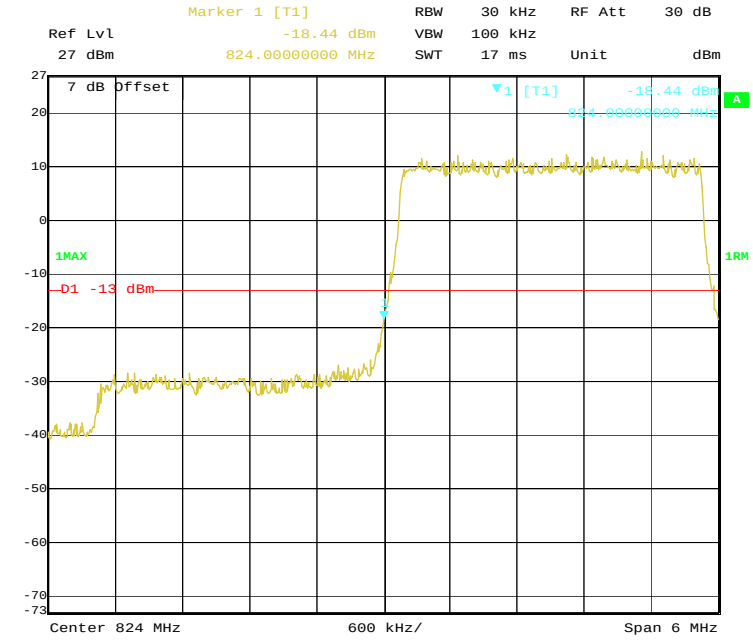
QPSK (1.4 MHz, FULL RB) - Left Band Edge



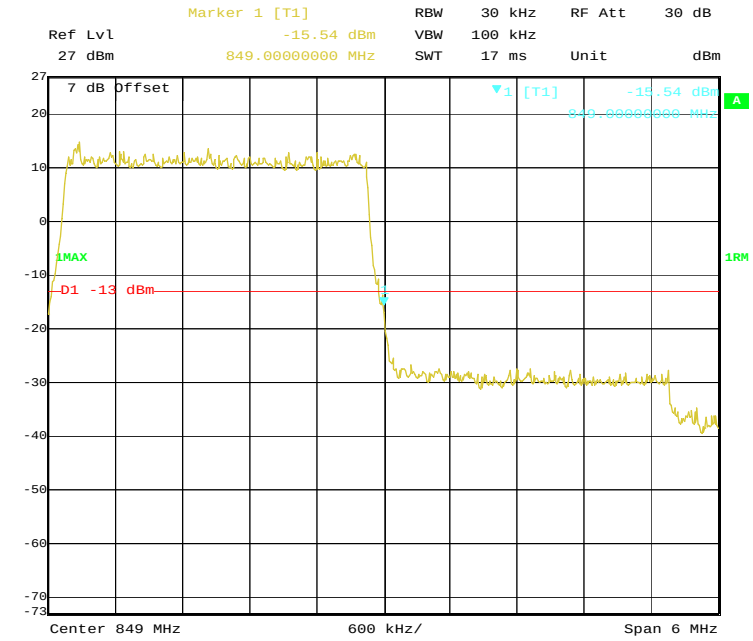
QPSK (1.4 MHz, FULL RB) - Right Band Edge



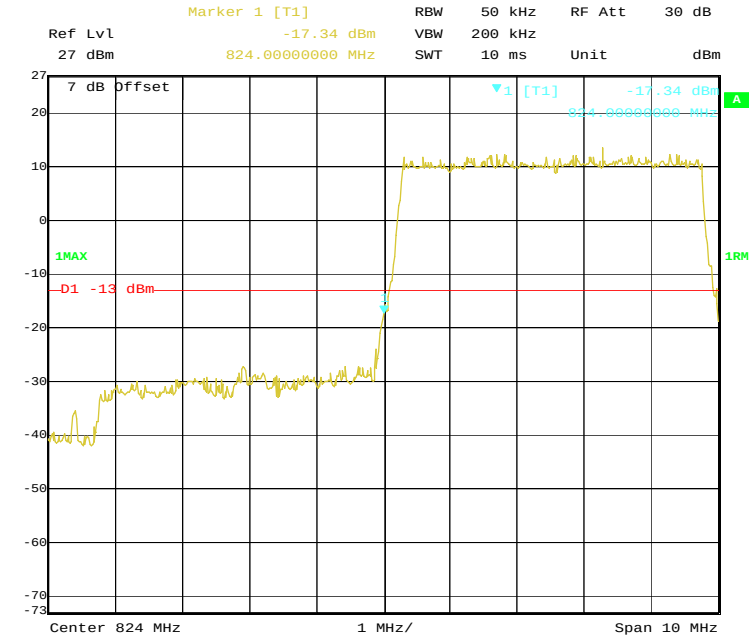
QPSK (3.0 MHz, FULL RB) - Left Band Edge



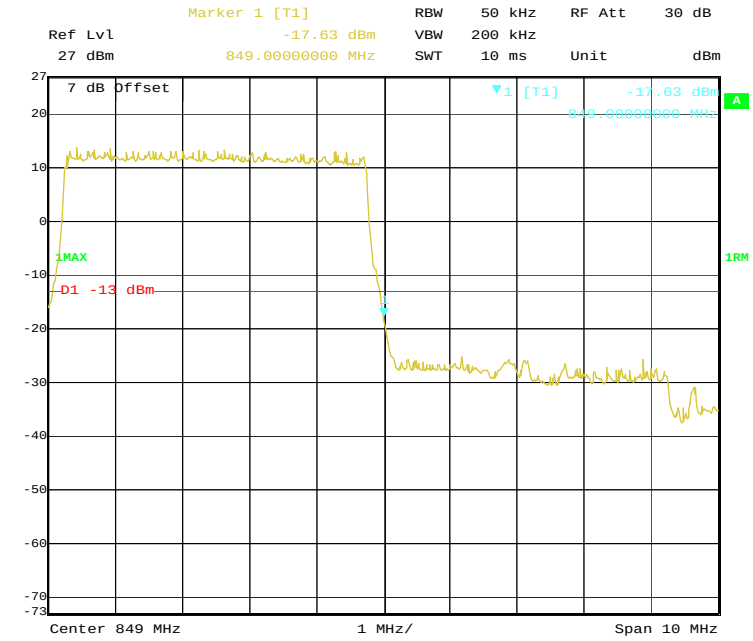
QPSK (3.0 MHz, FULL RB) - Right Band Edge



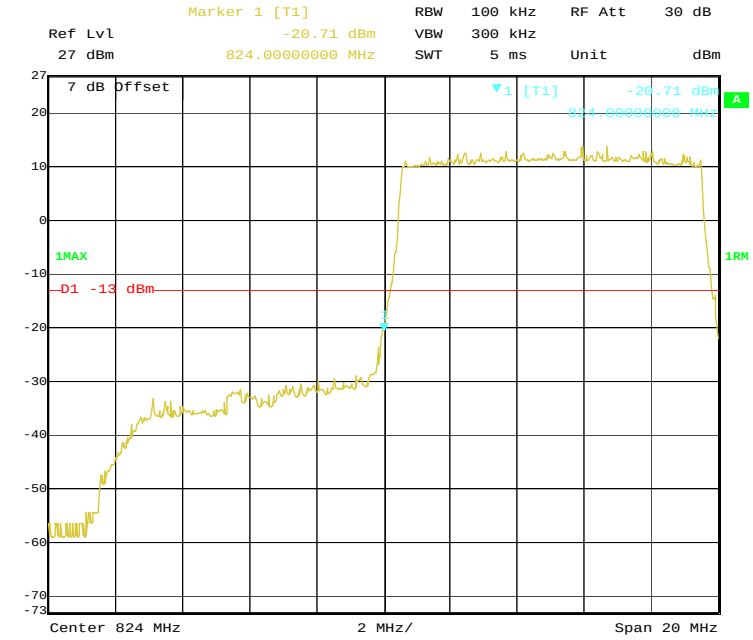
QPSK (5.0 MHz, FULL RB) - Left Band Edge



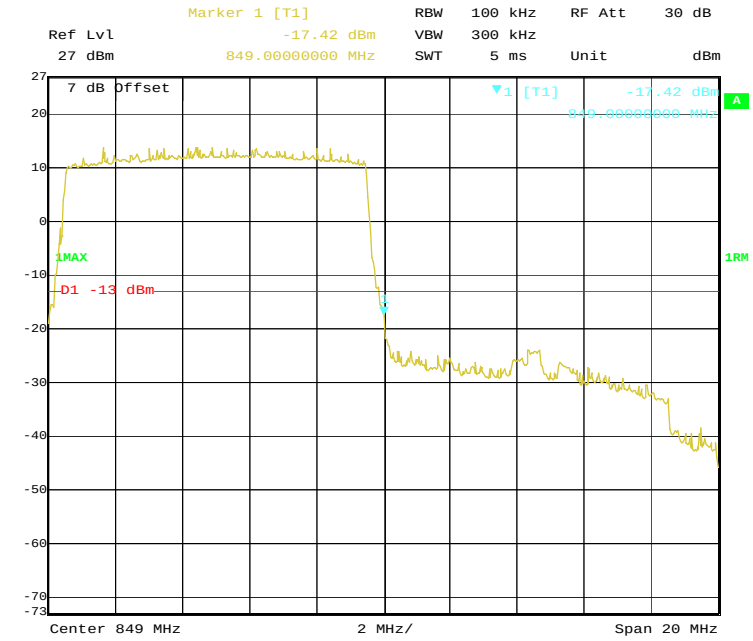
QPSK (5.0 MHz, FULL RB) - Right Band Edge



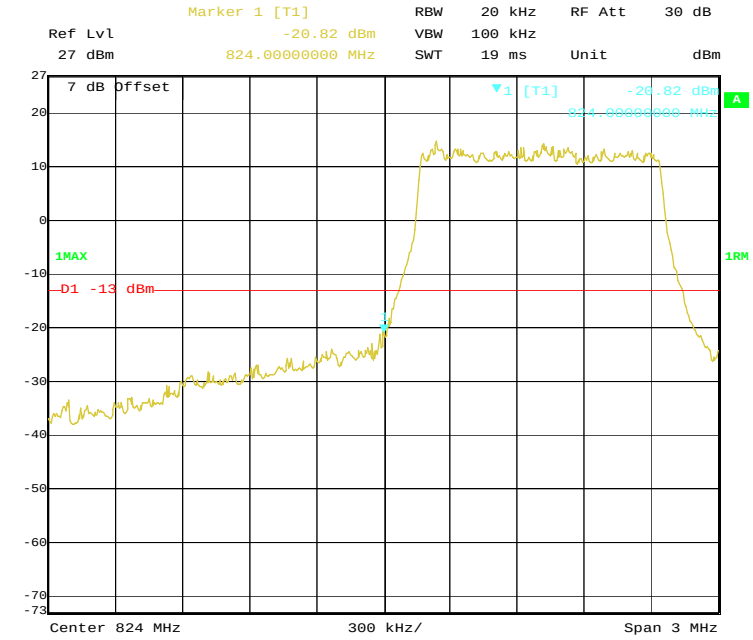
QPSK (10.0 MHz, FULL RB) - Left Band Edge



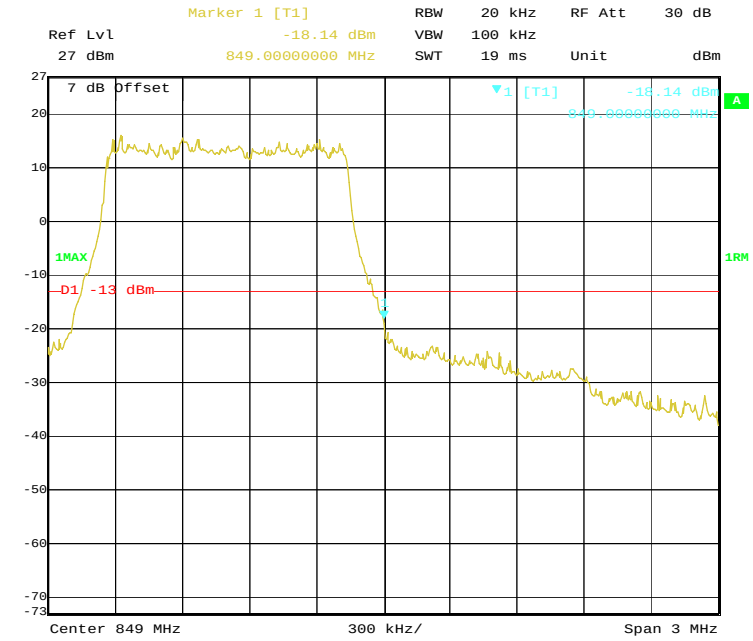
QPSK (10.0 MHz, FULL RB) - Right Band Edge



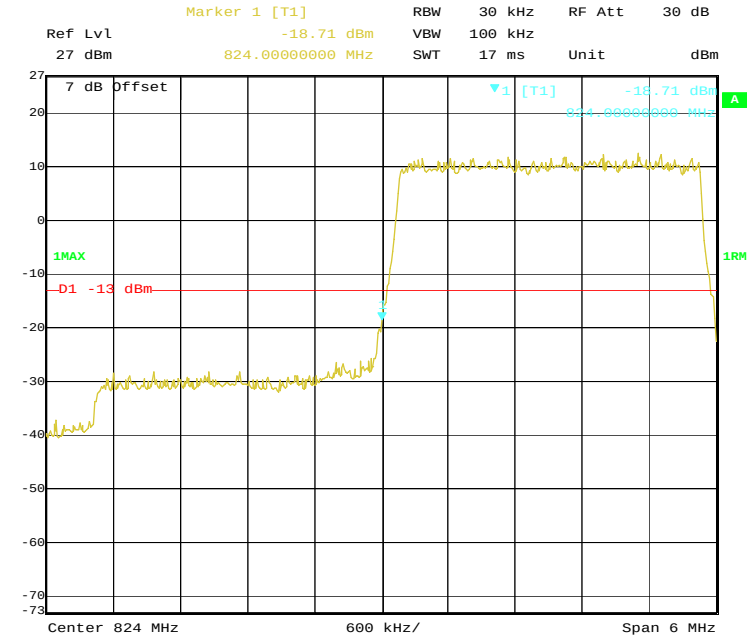
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



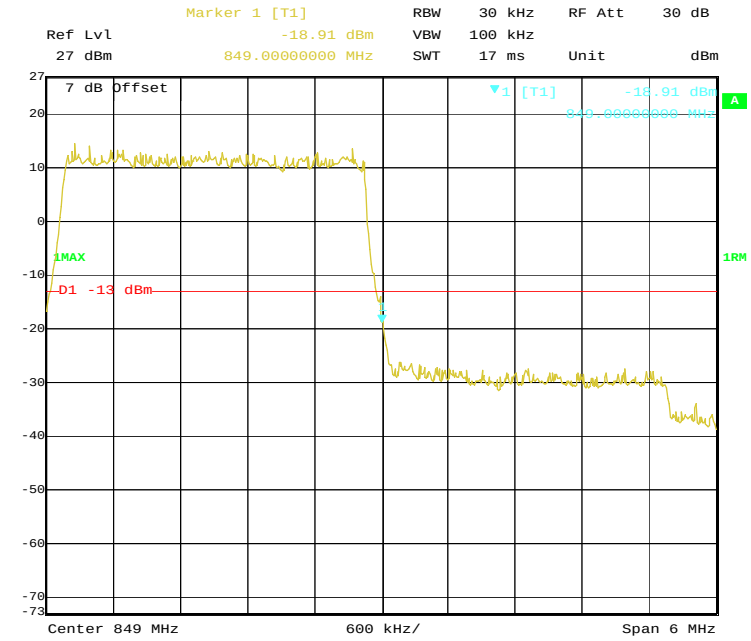
16-QAM (1.4 MHz, FULL RB) - Right Band Edge



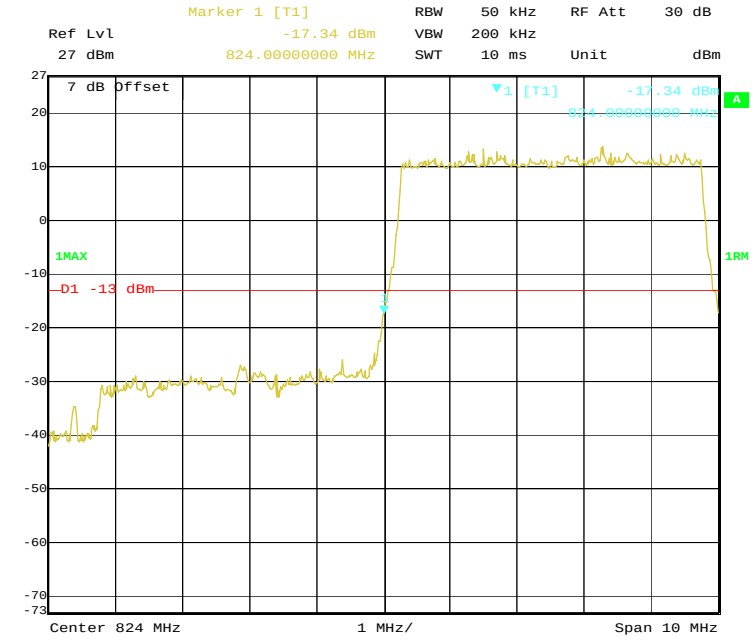
16-QAM (3.0 MHz, FULL RB) - Left Band Edge



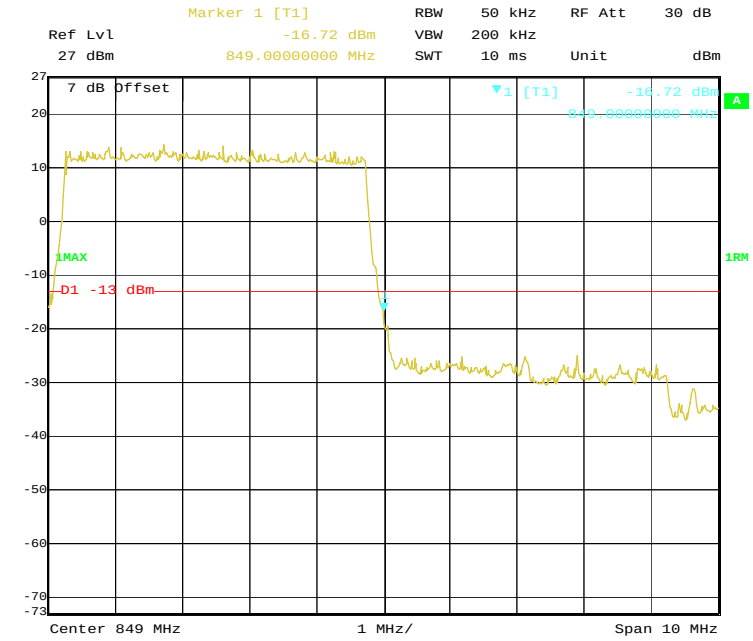
16-QAM (3.0 MHz, FULL RB) - Right Band Edge



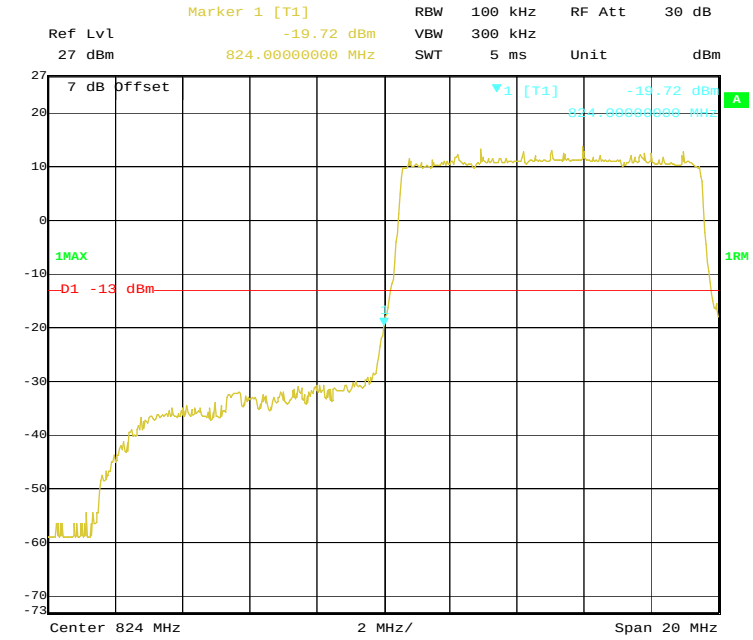
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



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



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



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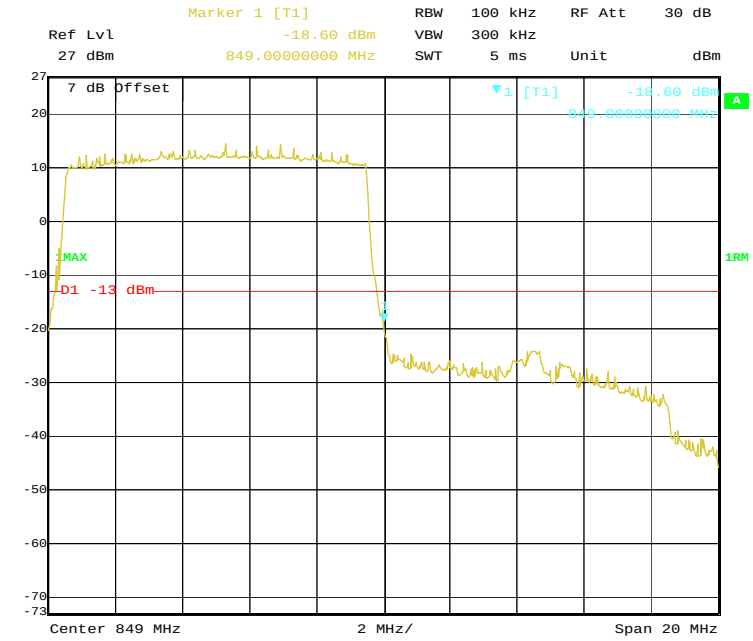
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



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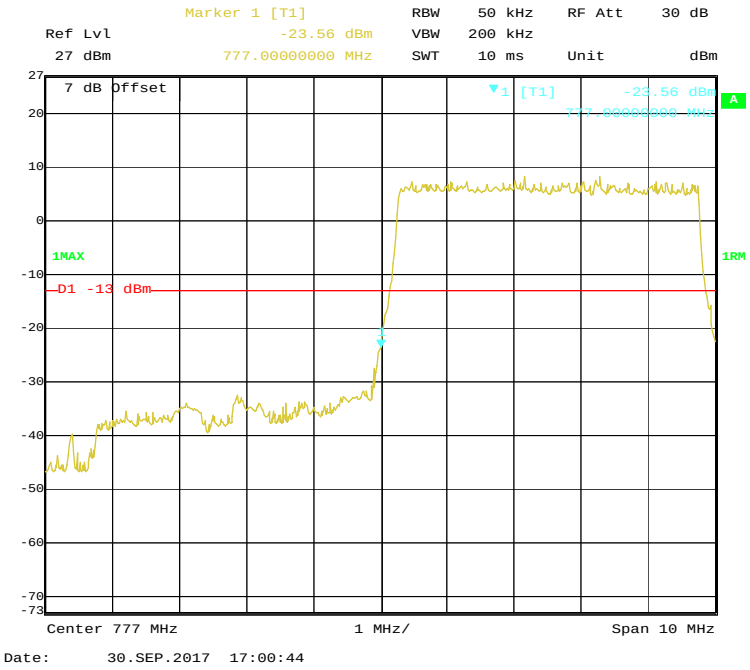
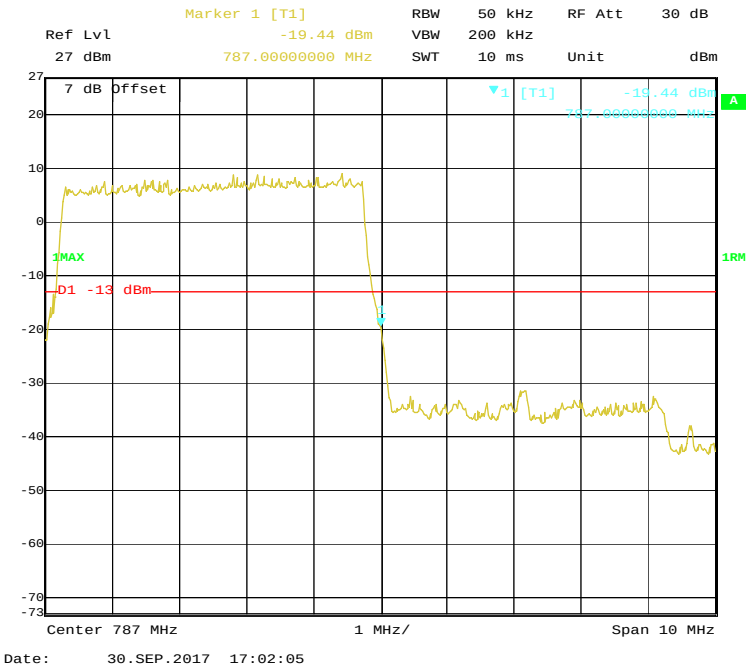
LTE Band 13:

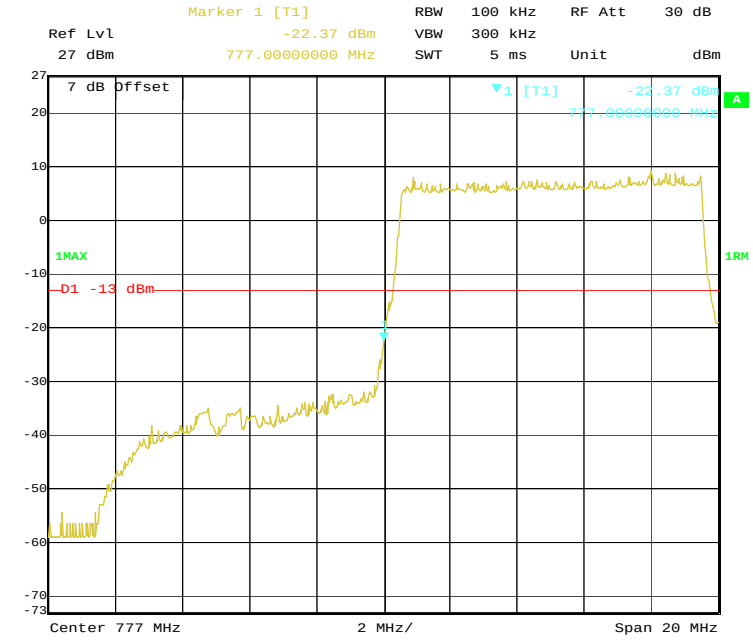
QPSK (5.0 MHz, FULL RB) - Left Band Edge



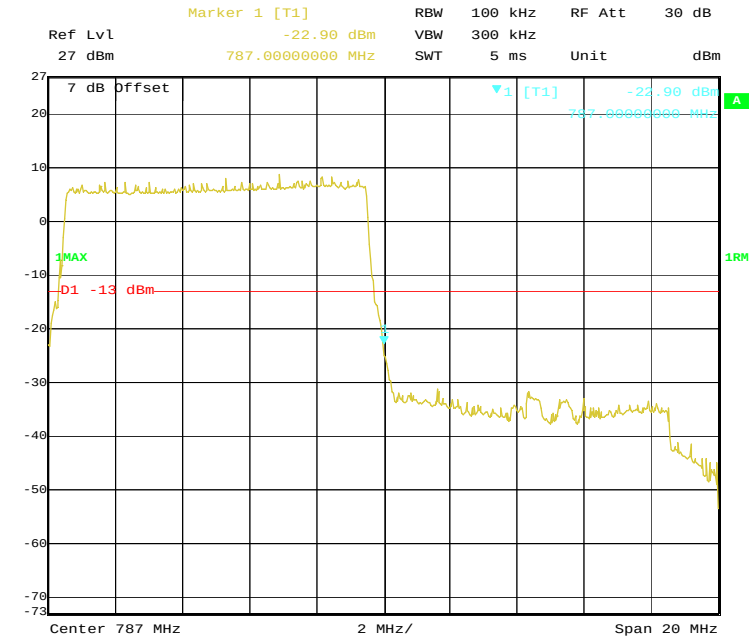
QPSK (5.0 MHz, FULL RB) - Right Band Edge



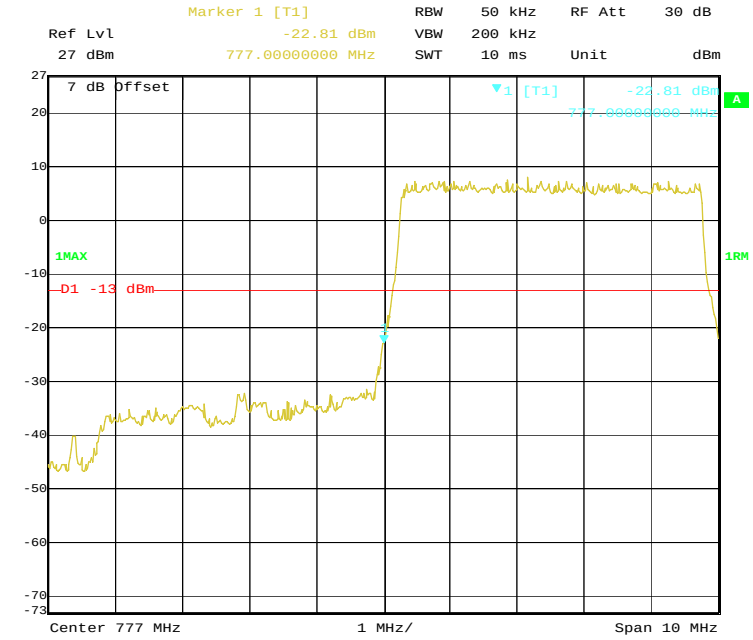
QPSK (10.0 MHz, FULL RB) - Left Band Edge



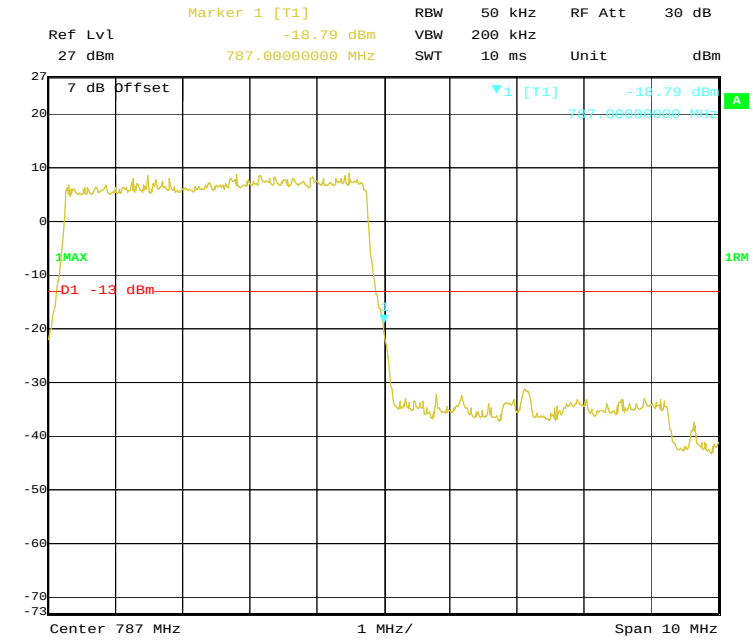
QPSK (10.0 MHz, FULL RB) - Right Band Edge



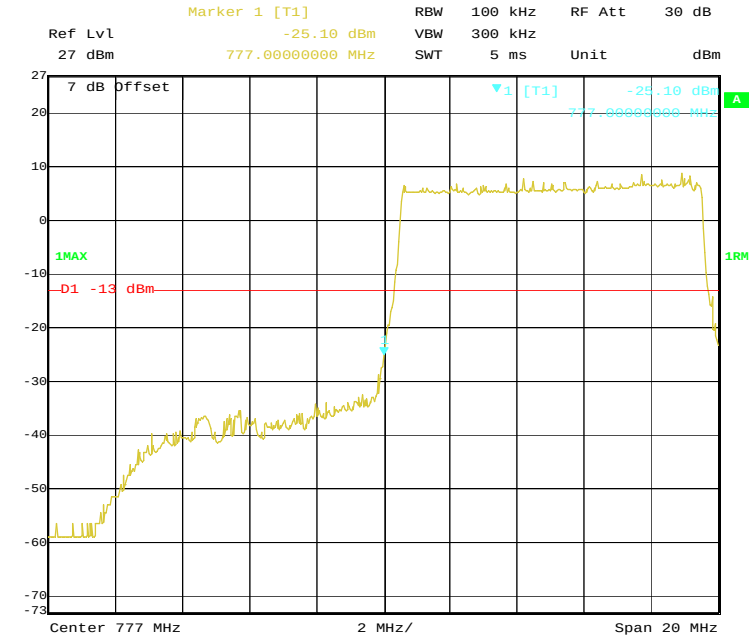
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



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



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



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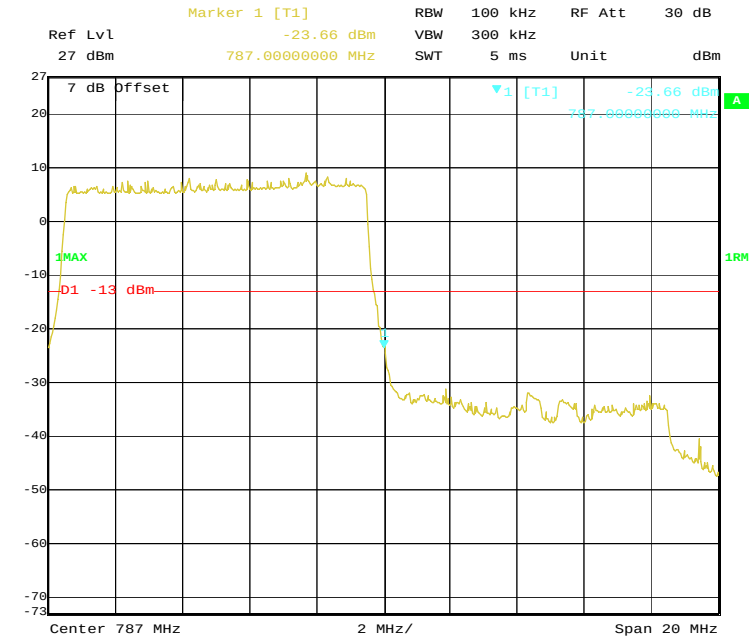
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



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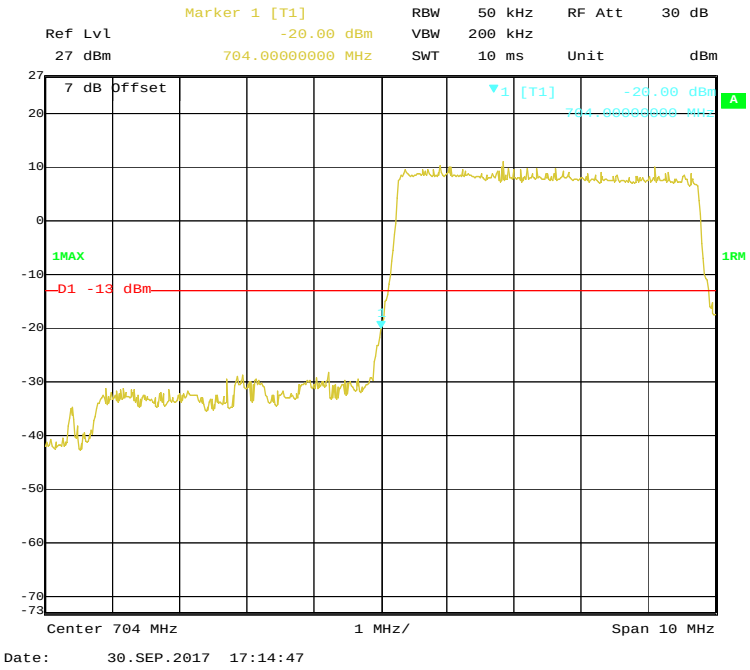
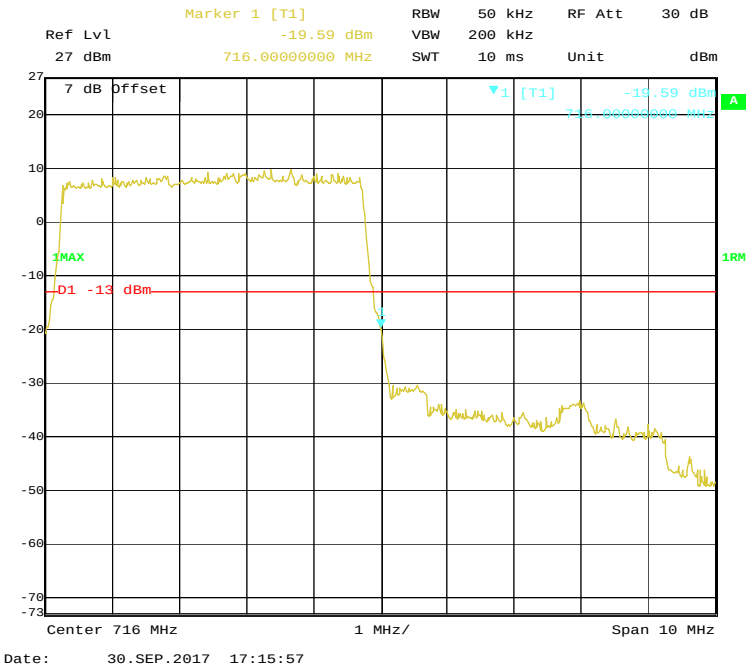
LTE Band 17:

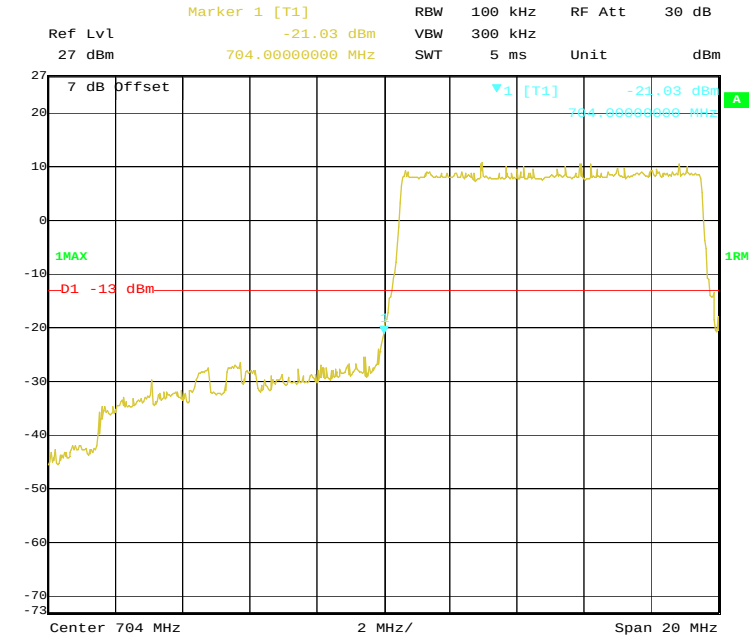
QPSK (5.0 MHz, FULL RB) - Left Band Edge



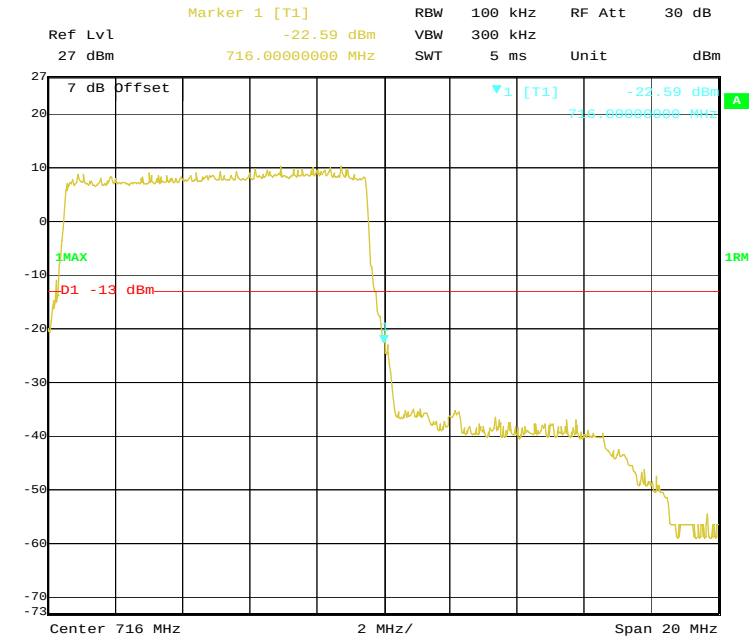
QPSK (5.0 MHz, FULL RB) - Right Band Edge



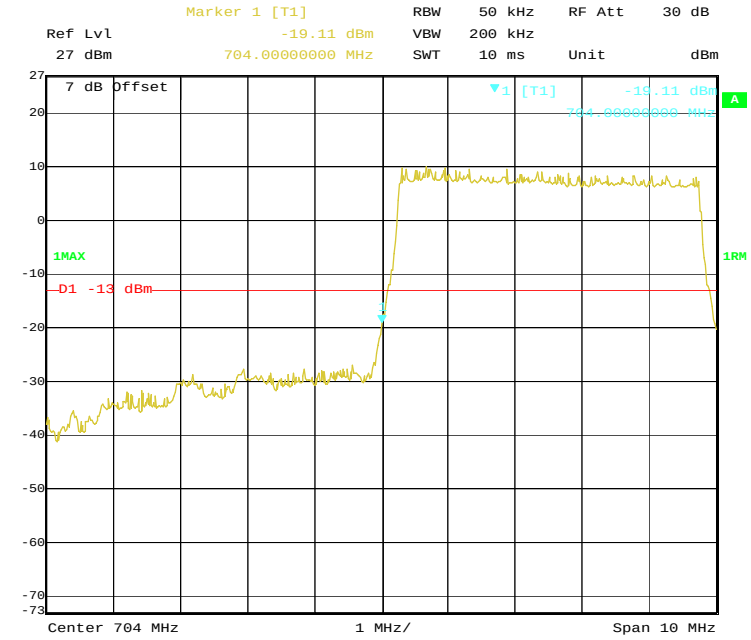
QPSK (10.0 MHz, FULL RB) - Left Band Edge



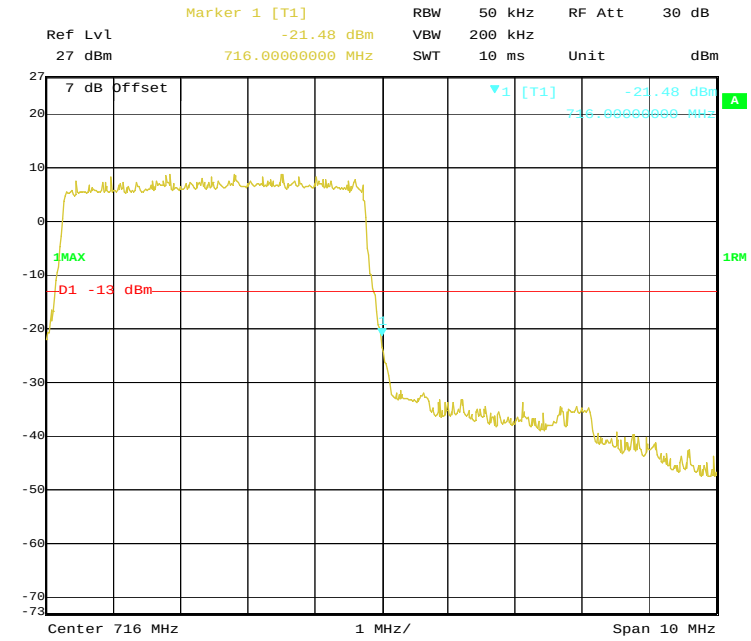
QPSK (10.0 MHz, FULL RB) - Right Band Edge



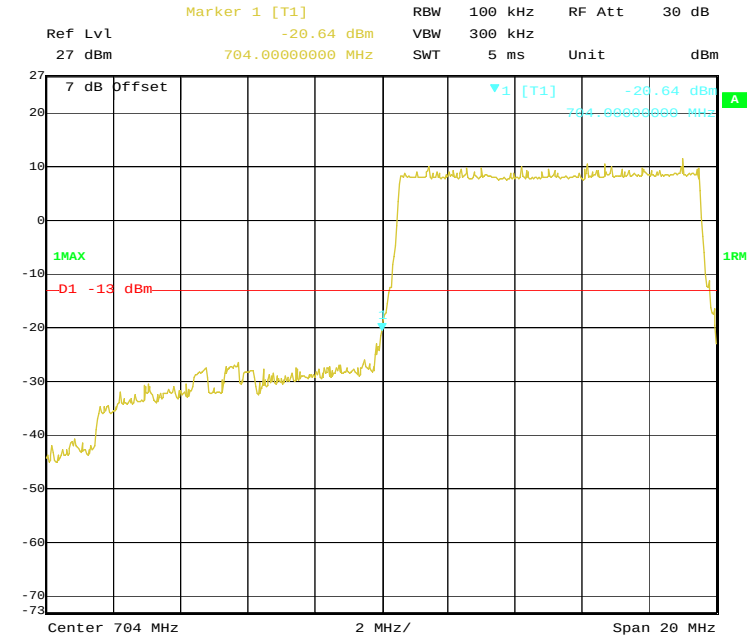
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



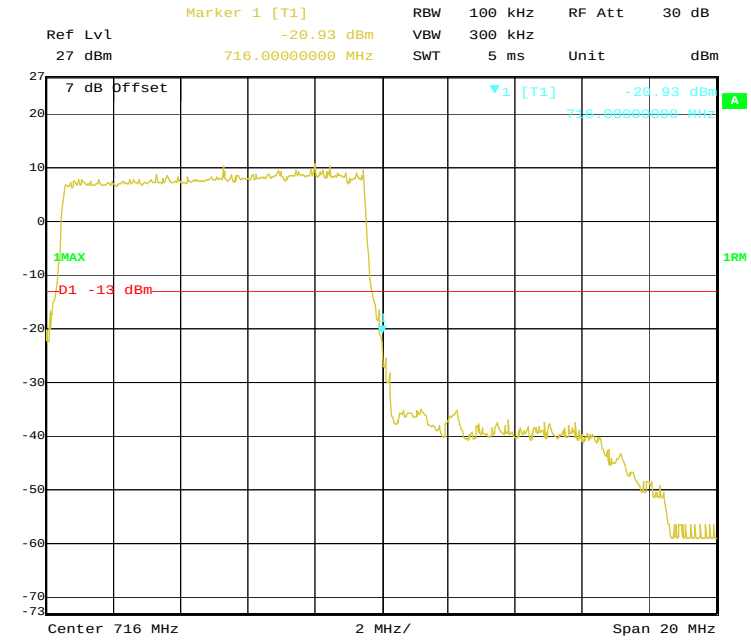
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



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



16-QAM (10.0 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

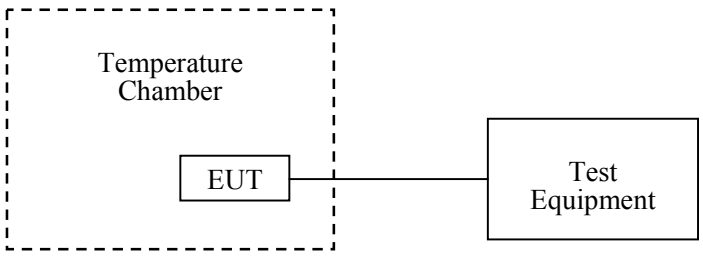
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Chris Wang on 2017-09-10.

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	4.52	0.0054	2.5
-20		3.51	0.0042	2.5
-10		3.26	0.0039	2.5
0		3.05	0.0036	2.5
10		2.32	0.0028	2.5
20		2.15	0.0026	2.5
30		2.61	0.0031	2.5
40		3.55	0.0042	2.5
50		2.42	0.0029	2.5
25	V min.= 3.4	5.14	0.0061	2.5
25	V max.= 4.2	6.25	0.0075	2.5

WCDMA Band II

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	5.06	0.0027	pass
-20		3.15	0.0017	pass
-10		3.11	0.0017	pass
0		2.38	0.0013	pass
10		4.28	0.0023	pass
20		6.21	0.0033	pass
30		4.21	0.0022	pass
40		2.17	0.0012	pass
50		5.28	0.0028	pass
25	V min.= 3.4	6.05	0.0032	pass
25	V max.= 4.2	7.12	0.0038	pass

LTE Band 2:

20.0 MHz Middle Channel, f_o =1880.0 MHz (QPSK)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	-2.46	-0.0013	pass
-20		-2.34	-0.0012	pass
-10		-2.28	-0.0012	pass
0		-2.19	-0.0012	pass
10		-2.25	-0.0012	pass
20		-2.22	-0.0012	pass
30		-2.32	-0.0012	pass
40		-2.21	-0.0012	pass
50		-2.30	-0.0012	pass
25	V min.= 3.4	-2.26	-0.0012	pass
25	V max.= 4.2	-2.42	-0.0013	pass

20.0 MHz Middle Channel, f_o =1880.0 MHz (16QAM)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	-3.12	-0.0017	pass
-20		-3.08	-0.0016	pass
-10		-3.11	-0.0017	pass
0		-3.10	-0.0016	pass
10		-3.16	-0.0017	pass
20		-3.14	-0.0017	pass
30		-3.15	-0.0017	pass
40		-3.18	-0.0017	pass
50		-3.21	-0.0017	pass
25	V min.= 3.4	-3.19	-0.0017	pass
25	V max.= 4.2	-3.24	-0.0017	pass

LTE Band 4:

20.0 MHz Middle Channel, f_o =1732.5MHz (QPSK)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	0.67	0.0004	pass
-20		0.54	0.0003	pass
-10		0.59	0.0003	pass
0		0.32	0.0002	pass
10		0.22	0.0001	pass
20		0.18	0.0001	pass
30		0.19	0.0001	pass
40		0.24	0.0001	pass
50		0.12	0.0001	pass
25	V min.= 3.4	0.63	0.0004	pass
25	V max.= 4.2	0.61	0.0004	pass

20.0 MHz Middle Channel, f_o =1732.5 MHz (16QAM)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	0.21	0.0001	pass
-20		0.24	0.0001	pass
-10		0.11	0.0001	pass
0		0.17	0.0001	pass
10		0.23	0.0001	pass
20		0.18	0.0001	pass
30		0.21	0.0001	pass
40		0.15	0.0001	pass
50		0.22	0.0001	pass
25	V min.= 3.4	0.25	0.0001	pass
25	V max.= 4.2	0.18	0.0001	pass

LTE Band 5:

10.0 MHz Middle Channel, f_o =836.5MHz (QPSK)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.8	2.15	0.0026	2.5
-20		2.11	0.0025	2.5
-10		2.10	0.0025	2.5
0		2.05	0.0025	2.5
10		2.14	0.0026	2.5
20		2.00	0.0024	2.5
30		2.17	0.0026	2.5
40		2.15	0.0026	2.5
50		2.12	0.0025	2.5
25	V min.= 3.4	2.11	0.0025	2.5
25	V max.= 4.2	2.24	0.0027	2.5

20.0 MHz Middle Channel, f_o =836.5 MHz (16QAM)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.8	1.64	0.0020	2.5
-20		1.63	0.0019	2.5
-10		1.58	0.0019	2.5
0		1.59	0.0019	2.5
10		1.57	0.0019	2.5
20		1.71	0.0020	2.5
30		1.70	0.0020	2.5
40		1.63	0.0019	2.5
50		1.59	0.0019	2.5
25	V min.= 3.4	1.59	0.0019	2.5
25	V max.= 4.2	1.71	0.0020	2.5

LTE Band 13:

10.0 MHz Middle Channel, f_o =782.0MHz (QPSK)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	3.79	0.0048	pass
-20		3.71	0.0047	pass
-10		3.70	0.0047	pass
0		3.68	0.0047	pass
10		3.80	0.0049	pass
20		3.61	0.0046	pass
30		3.77	0.0048	pass
40		3.81	0.0049	pass
50		3.72	0.0048	pass
25	V min.= 3.4	3.71	0.0047	pass
25	V max.= 4.2	3.84	0.0049	pass

20.0 MHz Middle Channel, f_o =782.0 MHz (16QAM)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	3.20	0.0041	pass
-20		3.18	0.0041	pass
-10		3.14	0.0040	pass
0		3.17	0.0041	pass
10		3.16	0.0040	pass
20		3.34	0.0043	pass
30		3.38	0.0043	pass
40		3.21	0.0041	pass
50		3.14	0.0040	pass
25	V min.= 3.4	3.21	0.0041	pass
25	V max.= 4.2	3.26	0.0042	pass

LTE Band 17:

10.0 MHz Middle Channel, f_o =710.0MHz (QPSK)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	5.76	0.0081	pass
-20		5.72	0.0081	pass
-10		5.78	0.0081	pass
0		5.82	0.0082	pass
10		5.80	0.0082	pass
20		5.79	0.0082	pass
30		5.98	0.0084	pass
40		5.91	0.0083	pass
50		5.77	0.0081	pass
25	V min.= 3.4	5.73	0.0081	pass
25	V max.= 4.2	5.91	0.0083	pass

10.0 MHz Middle Channel, f_o=710.0 MHz (16QAM)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.8	5.23	0.0063	pass
-20		5.20	0.0062	pass
-10		5.17	0.0062	pass
0		5.19	0.0062	pass
10		5.18	0.0062	pass
20		5.24	0.0063	pass
30		5.27	0.0063	pass
40		5.21	0.0062	pass
50		5.17	0.0062	pass
25	V min.= 3.4	5.21	0.0062	pass
25	V max.= 4.2	5.24	0.0063	pass

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