TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 27

MEASUREMENT AND TEST REPORT

For

Micron Electronics LLC.

1001 Yamato Road, Suite 400, Boca Raton, Florida, United States 33431

FCC ID: ZKQ-4G911

Report Type:	**Product Type:**
Original Report	Tracker

Test Engineer:	Alisa Gao
Report Number:	RSHA180408004-00B
Report Date:	2018-06-14
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	Micron Electronics LLC.
Tested Model	PA30
Product Type	Tracker
Dimension	66 mm (L)* 40 mm (W)*16.5 mm(H)
Power Supply	DC 3.7V from battery and DC 5.0V charging by adapter

Adapter Information:
Model: JT-H050100
Input: AC100-240 V 50/60Hz
Output:5.0V, 1A

**All measurement and test data in this report was gathered from production sample serial number: 20180408004. (Assigned by the BACL. The EUT supplied by the applicant was received on 2018-03-26)*

Objective

This type approval report is prepared on behalf of *Micron Electronics LLC.* in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: ZKQ-4G911.

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 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
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6GHz~18GHz	4.92dB
	18GHz~40GHz	5.21dB
Occupied Bandwidth		0.5kHz
Frequency Stability		1Hz
Temperature		1.0℃
Humidity		6%

Test Facility

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

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

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D.

The final qualification test was performed with the EUT operating at normal mode.

Channel List

Mode		Channel		Frequency
LTE Band 4	1.4M	Low	19957	1710.7
		Middle	20175	1732.5
		High	20393	1754.3
	3M	Low	19965	1711.5
		Middle	20175	1732.5
		High	20385	1753.5
	5M	Low	19975	1712.5
		Middle	20175	1732.5
		High	20375	1752.5
	10M	Low	20000	1715.0
		Middle	20175	1732.5
		High	20350	1750.0
	15M	Low	20025	1717.5
		Middle	20175	1732.5
		High	20325	1747.5
	20M	Low	20050	1720.0
		Middle	20175	1732.5
		High	20300	1745.0
LTE Band 13	5M	Low	23205	779.5
		Middle	23230	782.0
		High	23255	784.5
	10M	Low	/	/
		Middle	23230	782.0
		High	/	/

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

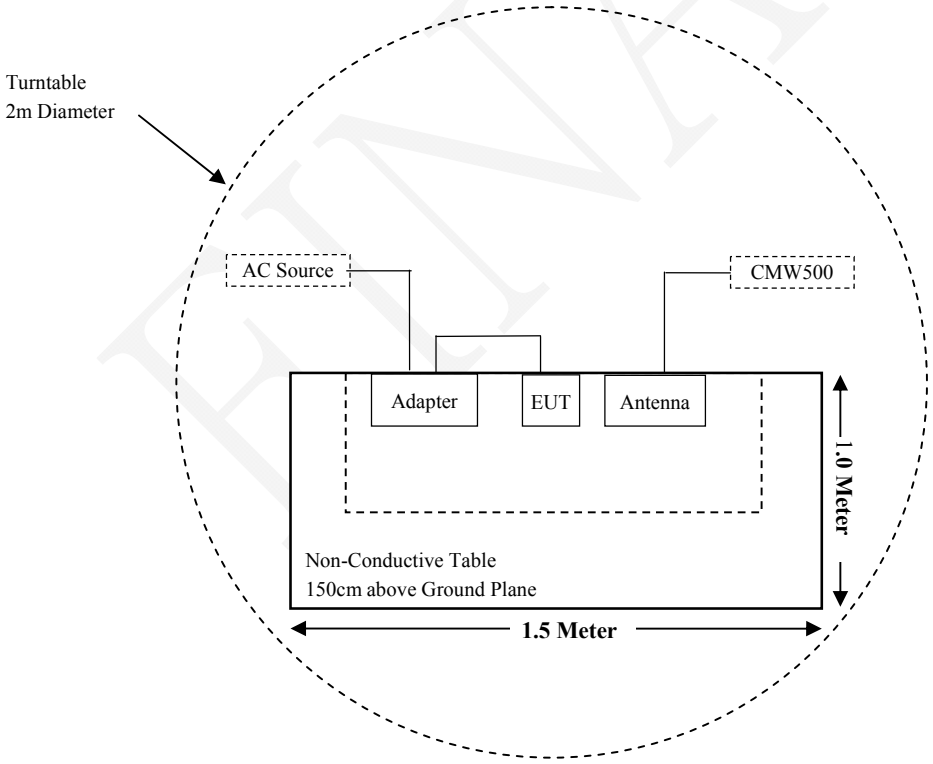
Manufacturer	Description	Model	Serial Number
Aihuaxin Technology	Antenna	/	/
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478

External Cable List and Details

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

Block Diagram of Test Setup

For Radiated Emissions(Below & Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310& §2.1093	RF Exposure Information	Compliant
§2.1046; §27.50 (d) (h)	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; §27.53	Occupied Bandwidth	Compliant
§ 2.1051; §27.53(c) (f) (h) (m)	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; §27.53 (h)(m)	Spurious Radiated Emissions	Compliant
§27.53 (h)(m)	Band Edge	Compliant
§ 2.1055; §27.54	Frequency stability	Compliant

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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	2017-11-12	2018-11-11
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
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
MICRO-COAX	Coaxial Cable	Cable-7	007	2017-08-15	2018-08-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
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	2016-10-18	2019-10-17
ETS-LINDGREN	Horn Antenna	3116	2516	2016-12-12	2019-12-12
Narda	Pre-amplifier	AFS42-00101800	2001270	2017-12-12	2018-12-11
EM Electronics Corporation	Amplifier	EM18G40G	060726	2018-03-22	2019-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	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	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	FSV40 Signal Analyzer	FSV40	101116	2017-07-22	2018-07-21
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21
BACL	Temperature & Humidity Chamber	BTH-150	30023	2017-10-10	2018-10-09
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	/	/
Micron Electronics	RF Cable	/	/	Each Time	/

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

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FCC §1.1310§2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1310, 2.1093.

Test Result

Compliance, please refer to the SAR report: RSH180521050-20A.

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FCC §2.1047 - MODULATION CHARACTERISTIC

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

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§2.1046; §27.50 (d) - RF OUTPUT POWER

Applicable Standards

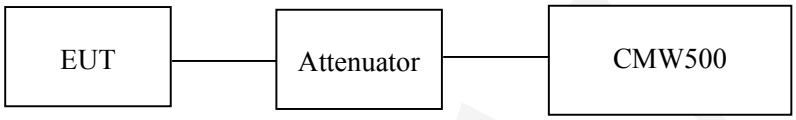
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.
The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

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 through sufficient attenuation.



Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Alisa Gao on 2018-04-16.

FINAL

Maximum Output Power:

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	22.59	22.52	22.48	30
		1#3	22.12	22.28	22.34	
		1#5	22.56	22.24	22.37	
		3#0	21.80	22.12	22.26	
		3#1	21.85	21.35	21.52	
		3#3	21.67	21.29	21.94	
		6#0	21.54	21.36	21.42	
	16-QAM	1#0	22.10	22.42	22.91	
		1#3	22.03	22.60	22.48	
		1#5	22.85	22.47	22.93	
		3#0	22.47	22.17	22.23	
		3#1	21.80	21.58	22.40	
		3#3	21.39	21.79	22.18	
		6#0	21.35	21.88	22.62	
3M	QPSK	1#0	22.69	22.15	22.58	30
		1#7	22.21	22.45	22.32	
		1#14	22.55	22.28	22.70	
		8#0	22.09	22.13	22.06	
		8#4	21.10	21.19	21.84	
		8#7	21.43	21.37	21.07	
		15#0	21.34	21.16	21.95	
	16-QAM	1#0	22.02	22.06	22.87	
		1#7	22.35	22.90	22.51	
		1#14	22.67	22.25	22.78	
		8#0	21.71	21.73	22.90	
		8#4	21.97	21.94	21.00	
		8#7	21.96	21.24	21.05	
		15#0	21.90	21.79	21.72	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	22.09	22.20	22.82	30
		1#12	22.64	22.54	22.20	
		1#24	22.78	22.40	22.63	
		12#0	21.41	21.97	22.74	
		12#6	21.14	21.90	21.64	
		12#11	21.70	21.78	21.89	
		25#0	21.21	21.85	21.47	
	16-QAM	1#0	22.31	22.53	22.79	
		1#12	22.87	22.25	22.56	
		1#24	22.17	23.00	22.95	
		12#0	21.22	21.77	22.08	
		12#6	21.22	21.70	21.43	
		12#11	21.09	21.35	21.51	
		25#0	21.47	21.94	21.07	
10M	QPSK	1#0	22.52	22.15	22.42	30
		1#24	22.93	22.87	22.85	
		1#49	22.66	22.53	22.36	
		25#0	22.57	22.77	22.33	
		25#12	22.00	21.80	21.08	
		25#24	21.02	21.86	21.78	
		50#0	21.98	21.47	21.89	
	16-QAM	1#0	22.43	22.99	22.56	
		1#24	22.46	22.77	22.57	
		1#49	22.98	22.05	22.80	
		25#0	22.12	22.81	22.06	
		25#12	21.81	21.26	21.66	
		25#24	21.01	21.03	21.79	
		50#0	21.14	21.79	21.68	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
15M	QPSK	1#0	21.42	21.20	21.22	30
		1#37	21.36	21.32	21.57	
		1#74	21.24	21.30	21.99	
		36#0	21.61	21.51	20.96	
		36#17	21.06	21.41	21.98	
		36#35	21.77	21.17	21.04	
		75#0	21.28	21.25	21.80	
	16-QAM	1#0	22.82	22.26	22.82	
		1#37	22.35	22.56	22.41	
		1#74	22.71	22.49	22.51	
		36#0	21.04	21.16	21.36	
		36#17	21.70	21.71	21.05	
		36#35	21.56	21.37	21.31	
		75#0	21.03	21.37	21.76	
20M	QPSK	1#0	22.83	22.19	22.96	30
		1#49	22.39	22.64	22.54	
		1#99	22.84	22.33	22.52	
		50#0	22.07	22.33	22.85	
		50#24	21.19	21.20	21.49	
		50#49	21.12	21.22	21.26	
		100#0	21.58	21.02	21.21	
	16-QAM	1#0	22.58	22.44	22.54	
		1#49	22.12	22.78	22.24	
		1#99	22.25	22.40	22.73	
		50#0	22.00	22.89	22.56	
		50#24	21.01	21.28	21.01	
		50#49	21.90	21.98	21.43	
		100#0	21.11	21.18	21.98	

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	22.58	22.44	22.54	33
		1#12	22.13	22.73	22.44	
		1#24	22.08	22.01	22.29	
		12#0	21.63	21.23	21.43	
		12#6	21.88	21.48	21.09	
		12#11	21.22	21.50	21.59	
		25#0	20.13	20.03	20.12	
	16-QAM	1#0	22.58	22.44	22.54	
		1#12	22.36	22.42	22.72	
		1#24	22.23	22.07	22.07	
		12#0	21.28	21.06	21.21	
		12#6	21.02	21.45	21.63	
		12#11	21.93	21.41	21.30	
		25#0	20.22	20.13	20.96	
10M	QPSK	1#0	/	22.44	/	33
		1#24	/	22.18	/	
		1#49	/	22.34	/	
		25#0	/	21.31	/	
		25#12	/	21.73	/	
		25#24	/	21.88	/	
		50#0	/	20.58	/	
	16-QAM	1#0	/	22.44	/	
		1#24	/	22.00	/	
		1#49	/	22.53	/	
		25#0	/	21.34	/	
		25#12	/	21.69	/	
		25#24	/	21.85	/	
		50#0	/	20.56	/	

Peak-to-average ratio (PAR):

LTE Band 4

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit (dB)
QPSK	1 RB	20M	2.87	2.78	2.81	13
	100 RB		8.12	7.96	8.03	13
16-QAM	1 RB	20M	2.75	2.72	2.88	13
	100 RB		7.97	7.86	7.95	13

LTE Band 13

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit (dB)
QPSK	1 RB	10M	/	4.93	/	13
	50 RB		/	7.33	/	13
16-QAM	1 RB	10M	/	7.68	/	13
	50 RB		/	7.68	/	13

Radiated Power:

EIRP:

LTE Band 4

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4M BW Middle Channel								
1732.5	H	85.29	13.25	0.84	8.57	20.98	30	9.02
1732.5	V	86.45	14.14	0.84	8.57	21.87	30	8.13
16-QAM 1.4M BW Middle Channel								
1732.5	H	84.54	12.50	0.84	8.57	20.23	30	9.77
1732.5	V	85.67	13.36	0.84	8.57	21.09	30	8.91
QPSK 3M BW Middle Channel								
1732.5	H	84.85	12.81	0.84	8.57	20.54	30	9.46
1732.5	V	85.28	12.97	0.84	8.57	20.70	30	9.30
16-QAM 3M BW Middle Channel								
1732.5	H	83.49	11.45	0.84	8.57	19.18	30	10.82
1732.5	V	84.06	11.75	0.84	8.57	19.48	30	10.52
QPSK 5M BW Middle Channel								
1732.5	H	83.77	11.73	0.84	8.57	19.46	30	10.54
1732.5	V	84.53	12.22	0.84	8.57	19.95	30	10.05
16-QAM 5M BW Middle Channel								
1732.5	H	83.25	11.21	0.84	8.57	18.94	30	11.06
1732.5	V	84.54	12.23	0.84	8.57	19.96	30	10.04
QPSK 10M BW Middle Channel								
1732.5	H	84.26	12.22	0.84	8.57	19.95	30	10.05
1732.5	V	84.58	12.27	0.84	8.57	20.00	30	10.00
16-QAM 10M BW Middle Channel								
1732.5	H	83.19	11.15	0.84	8.57	18.88	30	11.12
1732.5	V	84.52	12.21	0.84	8.57	19.94	30	10.06
QPSK 15M BW Middle Channel								
1732.5	H	83.28	11.24	0.84	8.57	18.97	30	11.03
1732.5	V	84.87	12.56	0.84	8.57	20.29	30	9.71
16-QAM 15M BW Middle Channel								
1732.5	H	83.21	11.17	0.84	8.57	18.90	30	11.10
1732.5	V	84.18	11.87	0.84	8.57	19.60	30	10.40
QPSK 20M BW Middle Channel								
1732.5	H	82.71	10.67	0.84	8.57	18.40	30	11.60
1732.5	V	83.14	10.83	0.84	8.57	18.56	30	11.44
16-QAM 20M BW Middle Channel								
1732.5	H	82.31	10.27	0.84	8.57	18.00	30	12.00
1732.5	V	83.12	10.81	0.84	8.57	18.54	30	11.46

LTE Band 13

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5M BW Middle Channel								
782	H	89.13	21.00	0.62	-1.34	19.04	33	13.96
782	V	90.25	23.50	0.62	-1.34	21.54	33	11.46
16-QAM 5M BW Middle Channel								
782	H	88.64	20.51	0.62	-1.34	18.55	33	14.45
782	V	90.58	23.83	0.62	-1.34	21.87	33	11.13
QPSK 10M BW Middle Channel								
782	H	88.61	20.48	0.62	-1.34	18.52	33	14.48
782	V	90.08	23.33	0.62	-1.34	21.37	33	11.63
16-QAM 10M BW Middle Channel								
782	H	88.24	20.11	0.62	-1.34	18.15	33	14.85
782	V	89.35	22.60	0.62	-1.34	20.64	33	12.36

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

FCC §2.1049 & §27.53 - OCCUPIED BANDWIDTH

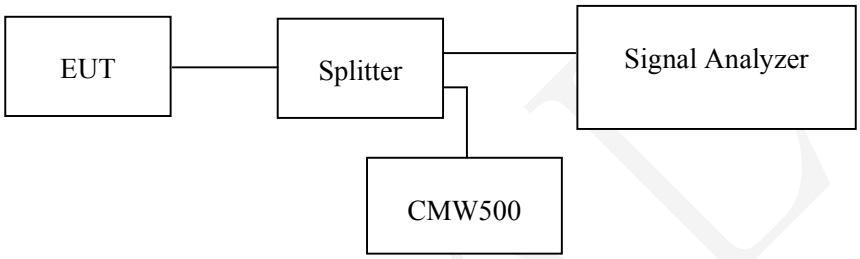
Applicable Standards

FCC 47 §2.1049, §27.53.

Test Procedure

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

The 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Alisa Gao on 2018-04-16.

EUT operation mode: Transmitting

Test Result: Compliance.

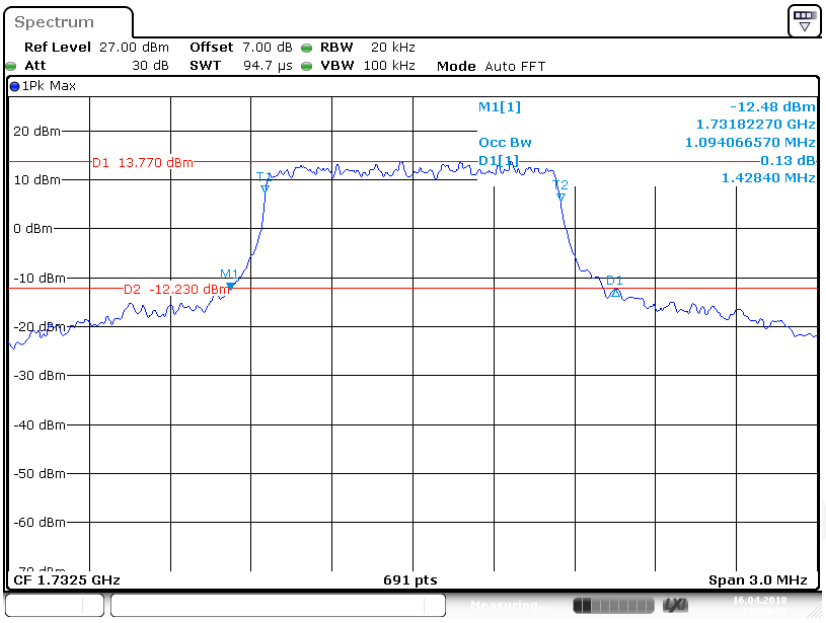
FINAL

LTE Band 4:

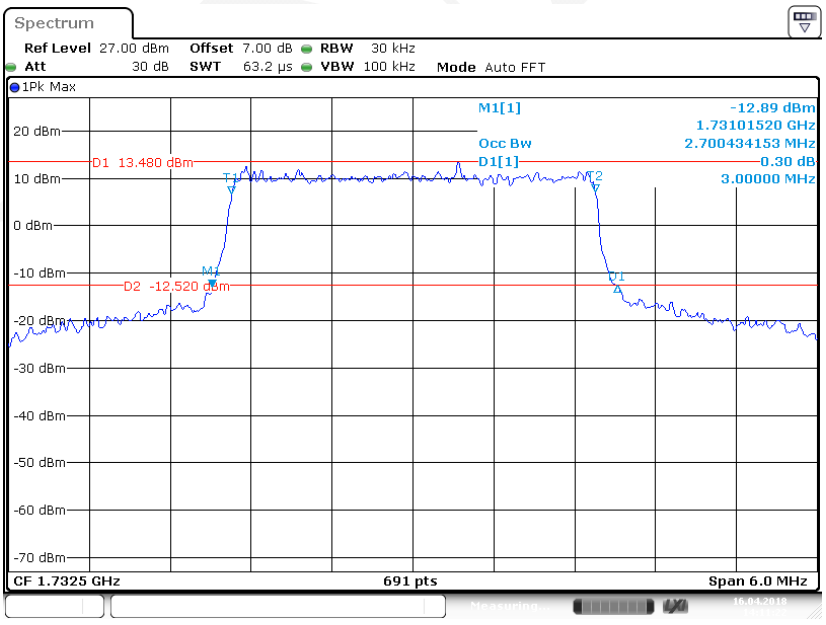
Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	1.4M	Middle	1.094	1.428
	3M		2.700	3.000
	5M		4.486	5.017
	10M		8.973	10.300
	15M		13.502	15.456
	20M		17.945	19.638
16-QAM	1.4M	Middle	1.103	1.042
	3M		2.692	2.983
	5M		4.486	4.873
	10M		8.973	9.865
	15M		13.459	14.935
	20M		17.887	19.986

FINAL

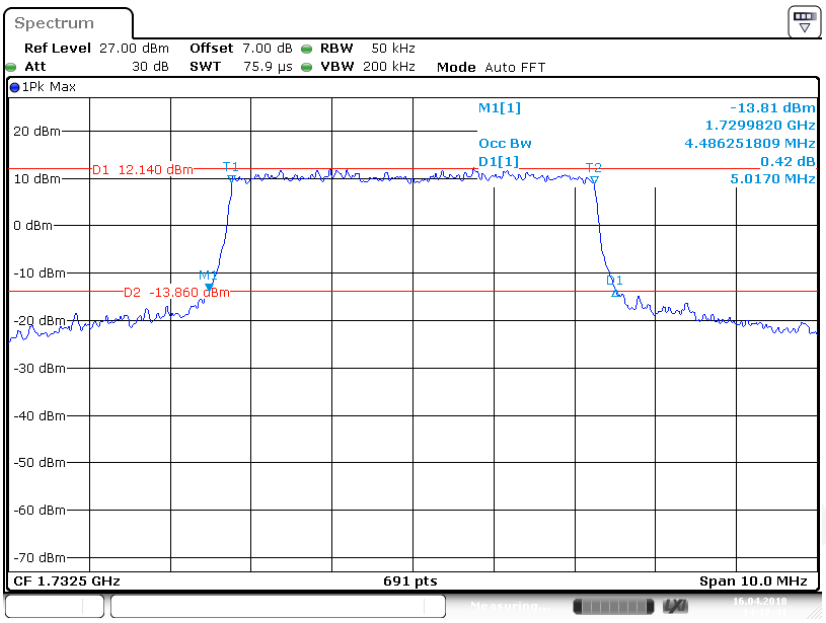
QPSK (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



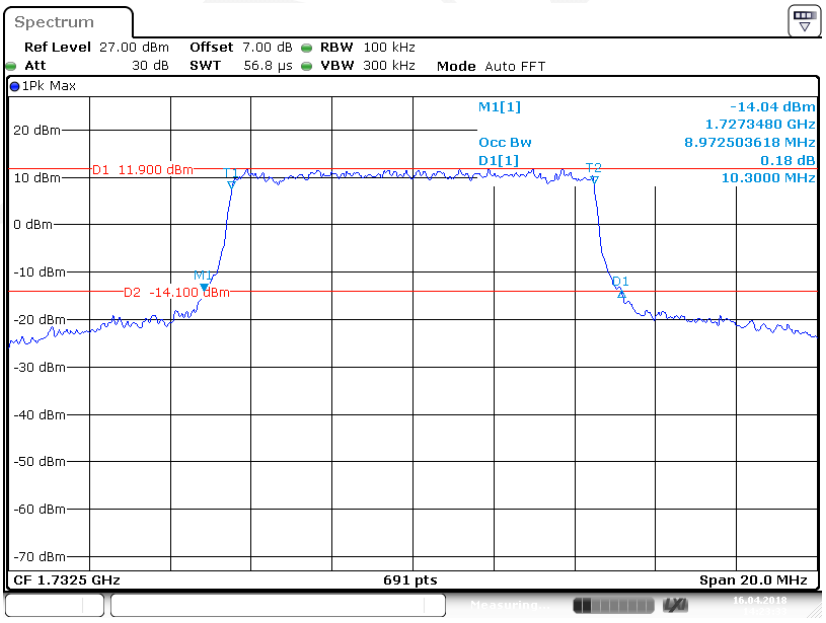
QPSK (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



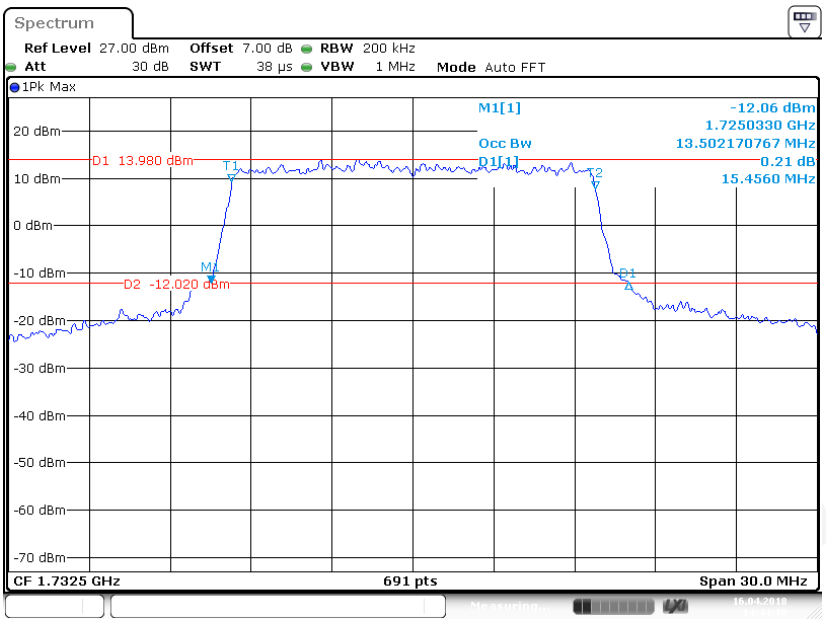
QPSK (5.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



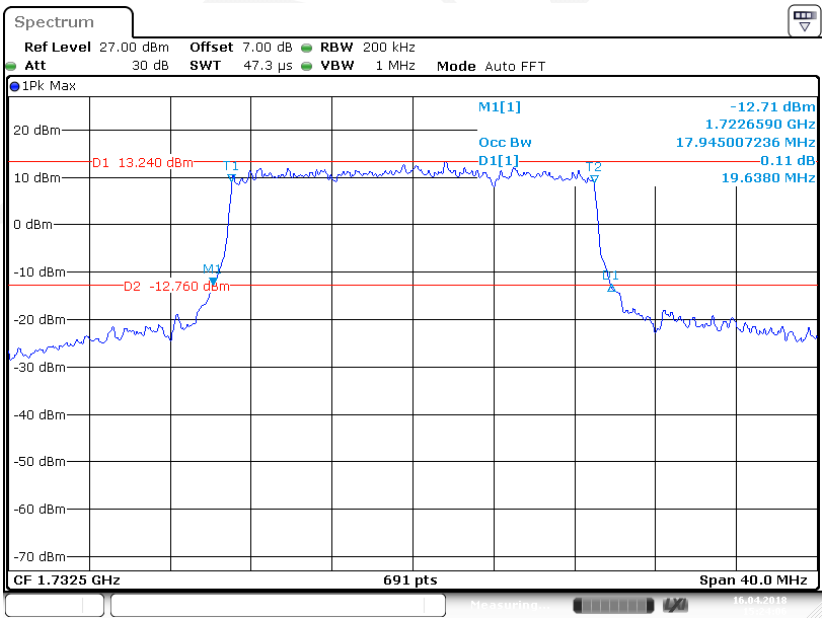
QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



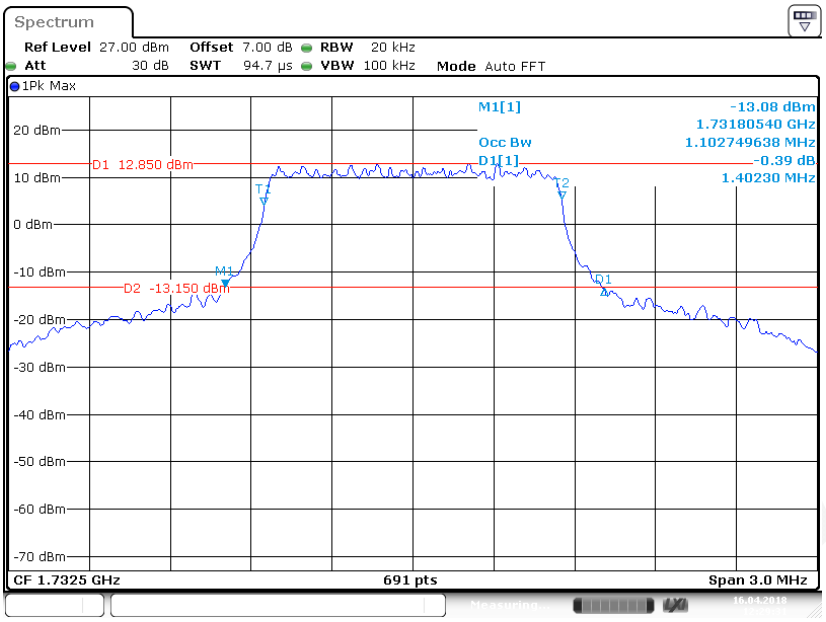
QPSK (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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

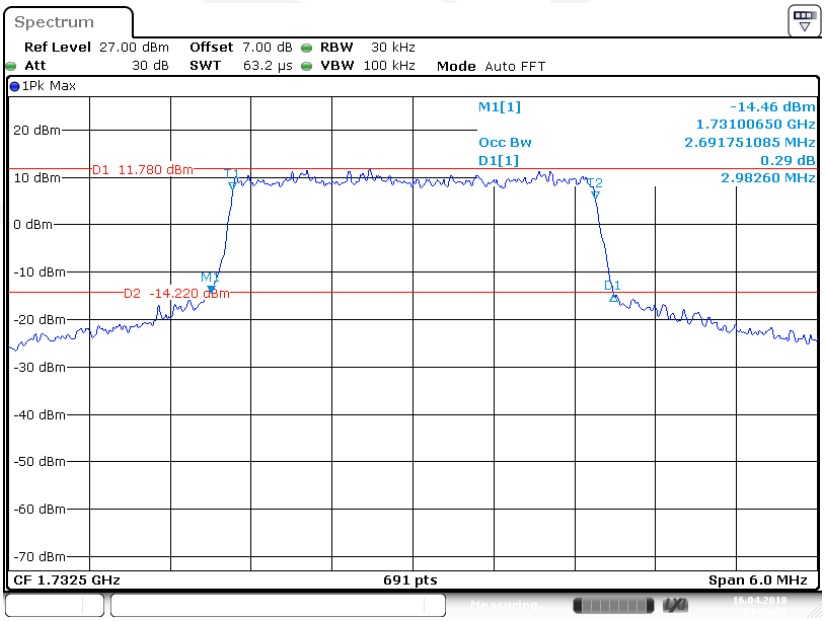


16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



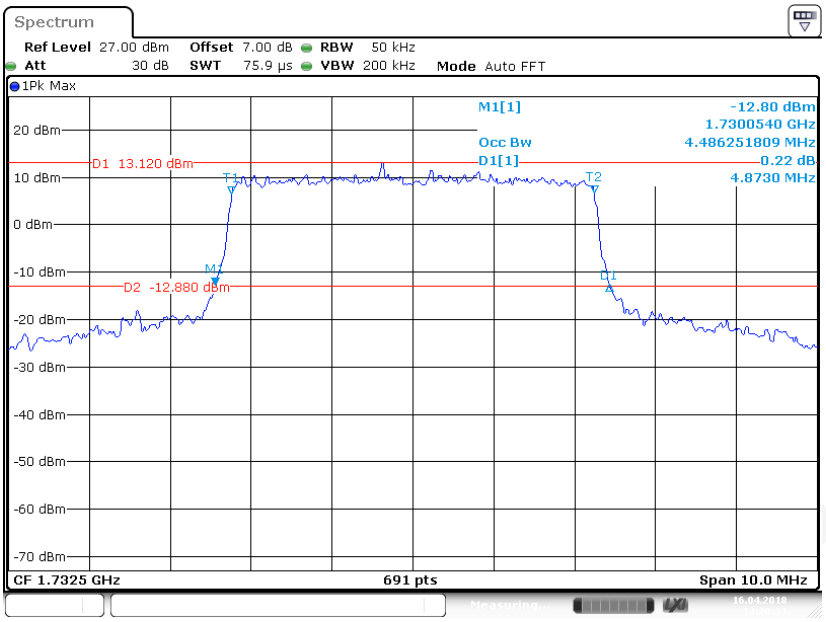
Date: 16.APR.2018 12:29:32

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



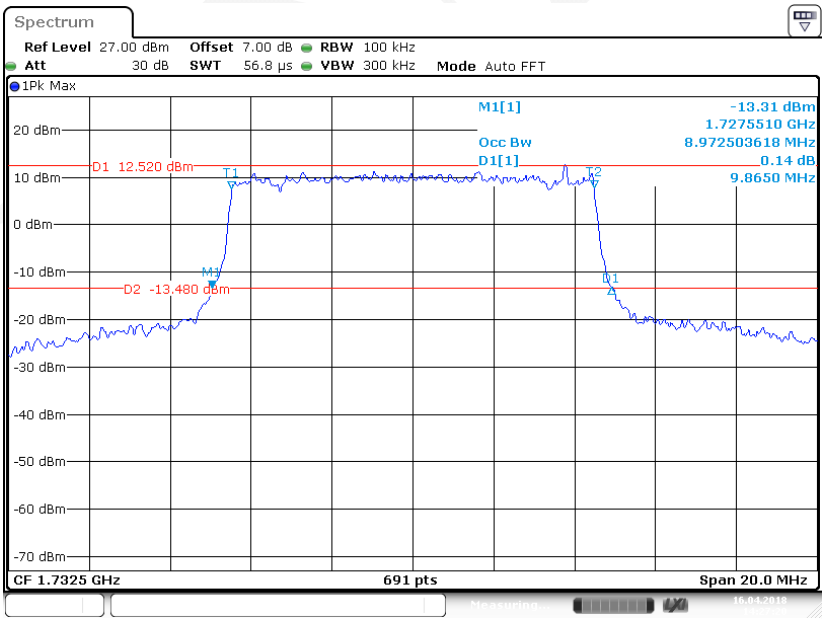
Date: 16.APR.2018 14:06:09

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



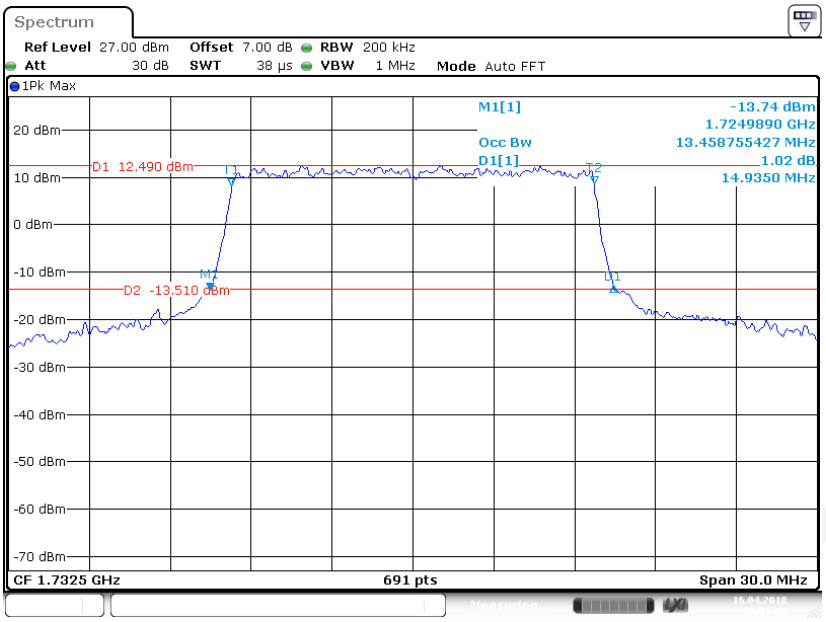
Date: 16.APR.2018 14:20:32

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



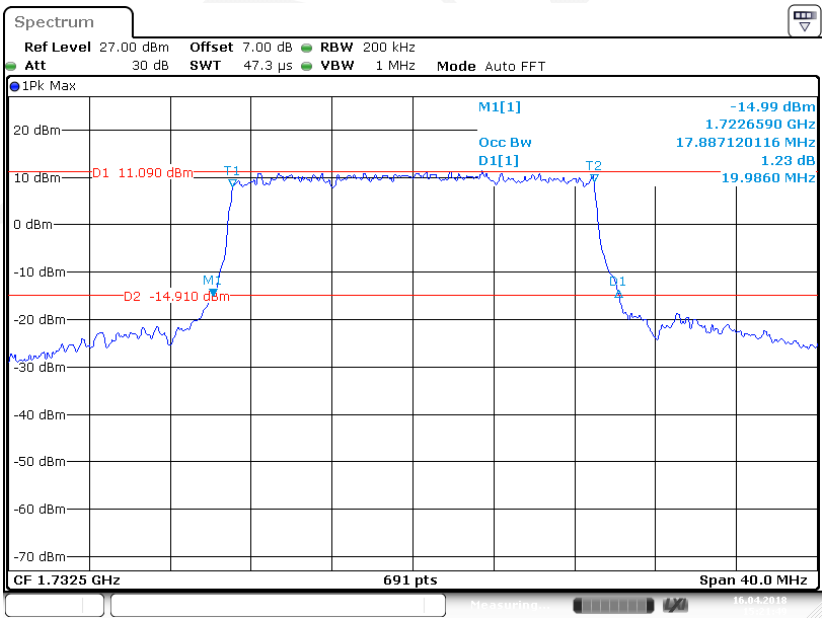
Date: 16.APR.2018 14:27:20

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



Date: 16.APR.2018 14:53:23

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



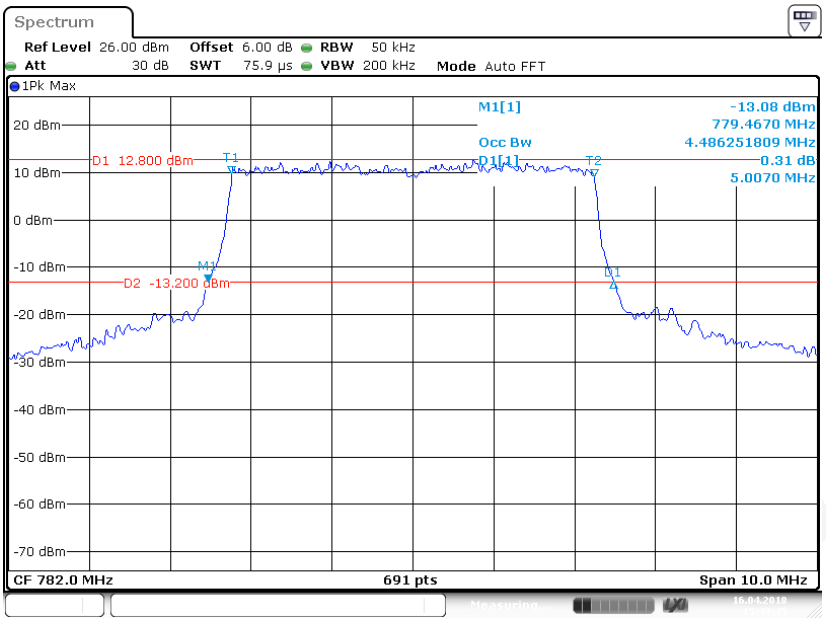
Date: 16.APR.2018 15:21:49

LTE Band 13:

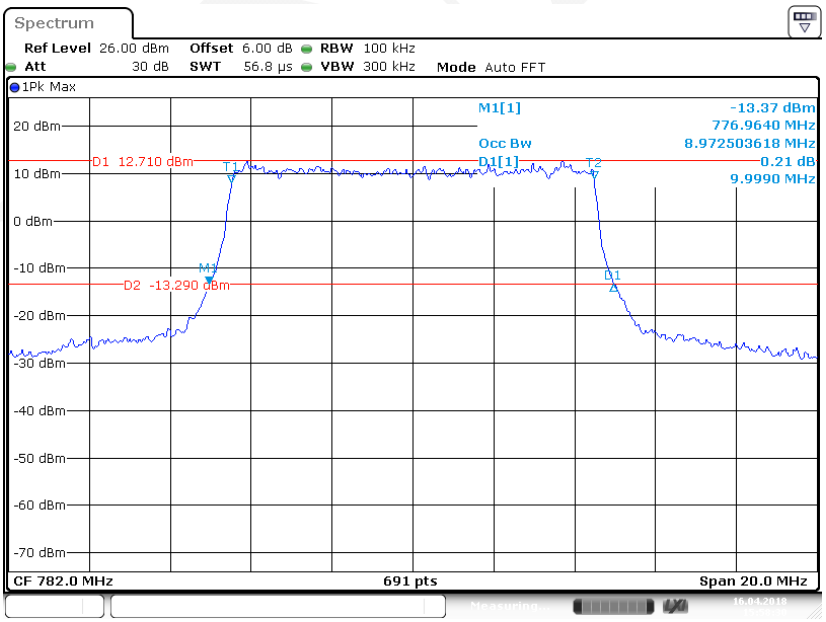
Test Modulation	Test Bandwidth	Test Channel	99% Occupied Bandwidth	26 dB Bandwidth
			MHz	MHz
QPSK	5M	Middle	4.486	5.007
	10M		8.973	9.999
16-QAM	5M	Middle	4.486	4.863
	10M		8.973	9.768

FINAL

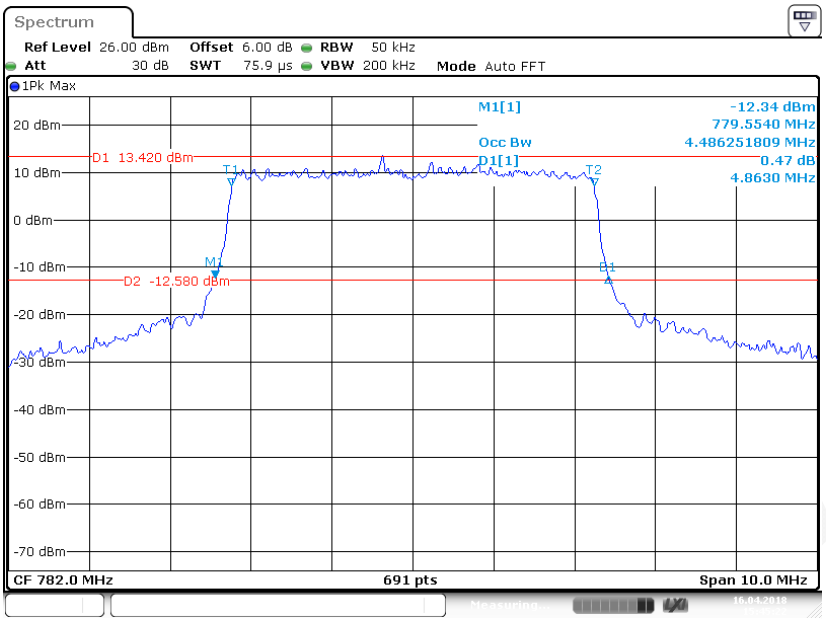
QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



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

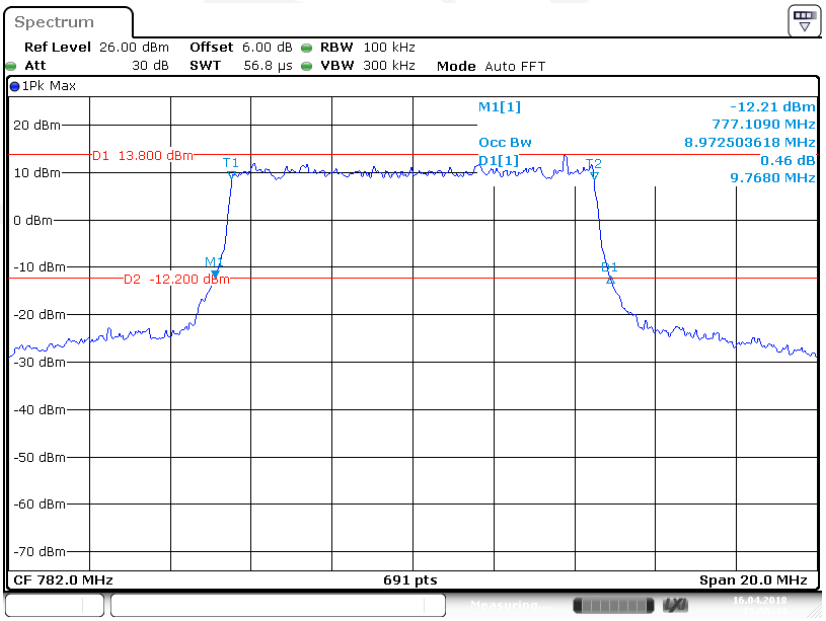


16-QAM (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



Date: 16.APR.2018 15:45:23

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



Date: 16.APR.2018 15:55:44

§ 2.1051 & §27.53(c) (f) (h) (m) SPURIOUS EMISSIONS AT ANTENNA TERMINALS

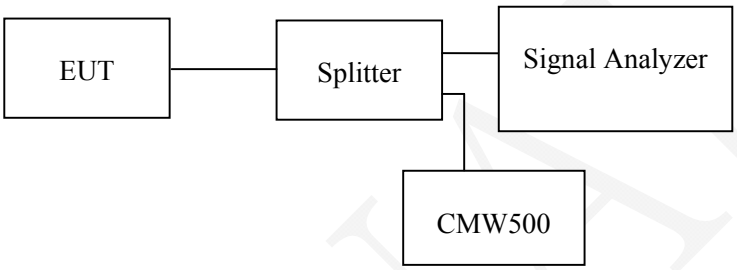
Applicable Standards

FCC §2.1051, §27.53(c) (f) (h) (m).

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

Test Procedure

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



Test Data

Environmental Conditions

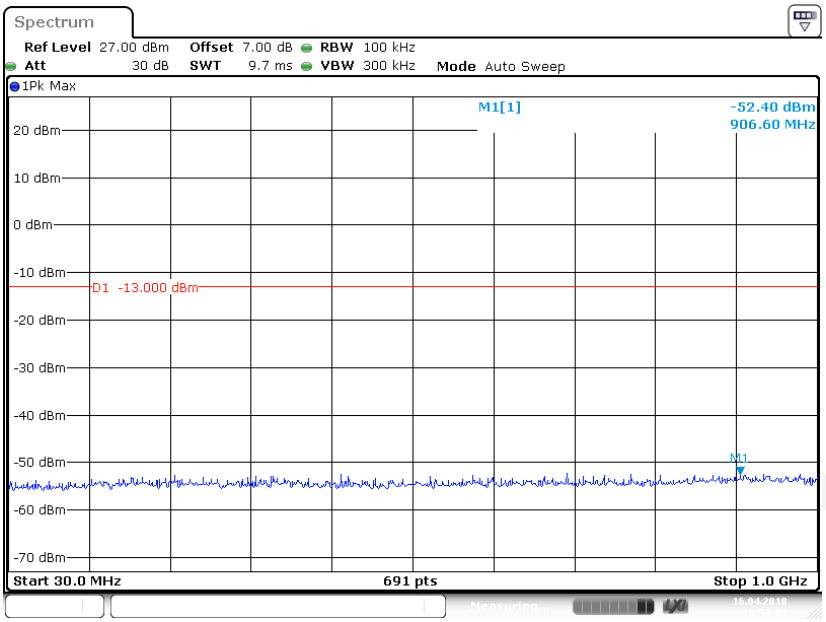
Temperature:	23.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Alisa Gao on 2018-04-16 to 2018-06-14.

FINAL

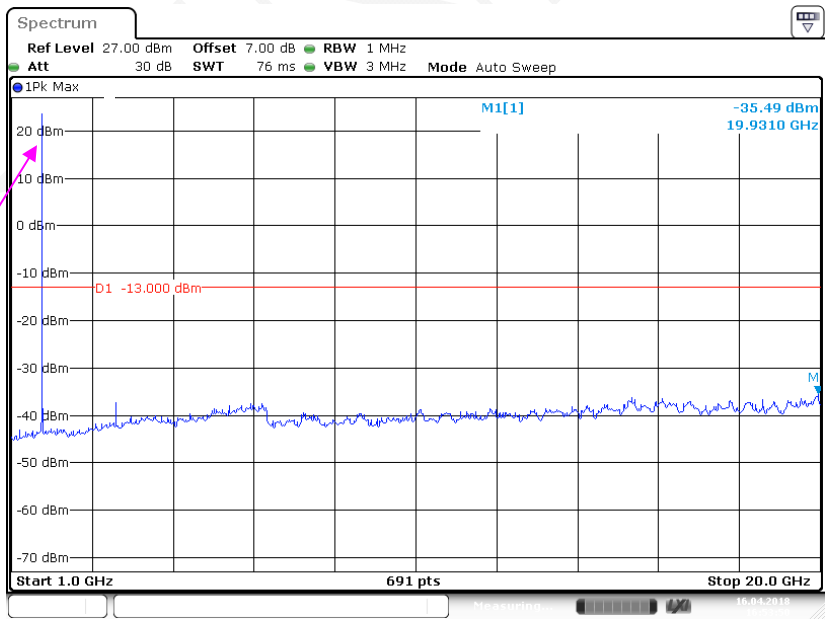
LTE Band 4:

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



Date: 16.APR.2018 16:51:05

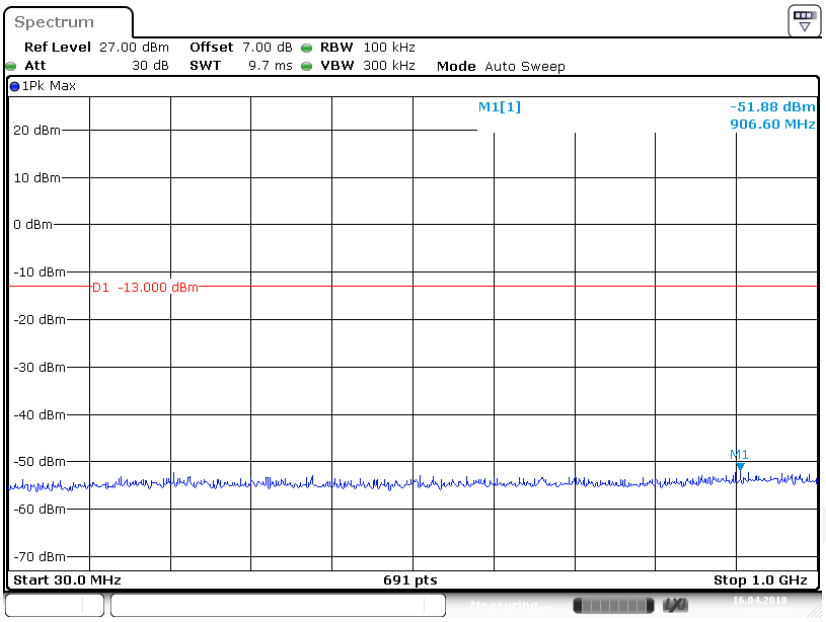
1 GHz – 20 GHz (1.4 MHz, Middle Channel)



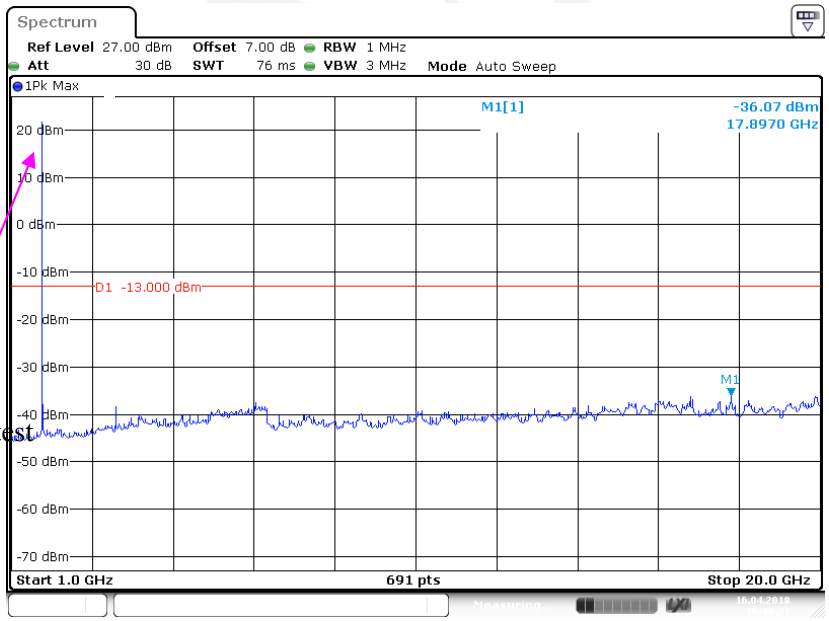
Fundamental test

Date: 16.APR.2018 16:53:50

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

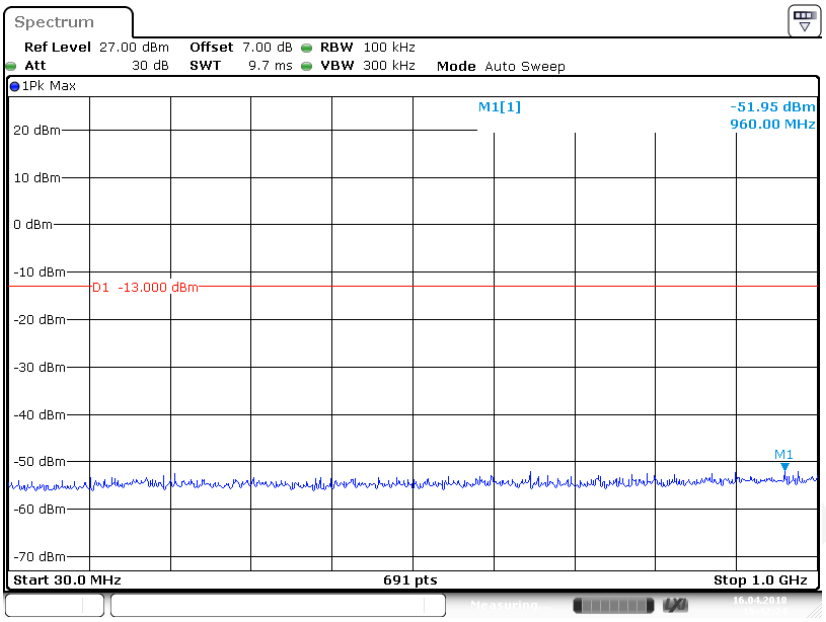


1 GHz – 20 GHz (3.0 MHz, Middle Channel)



Fundamental test

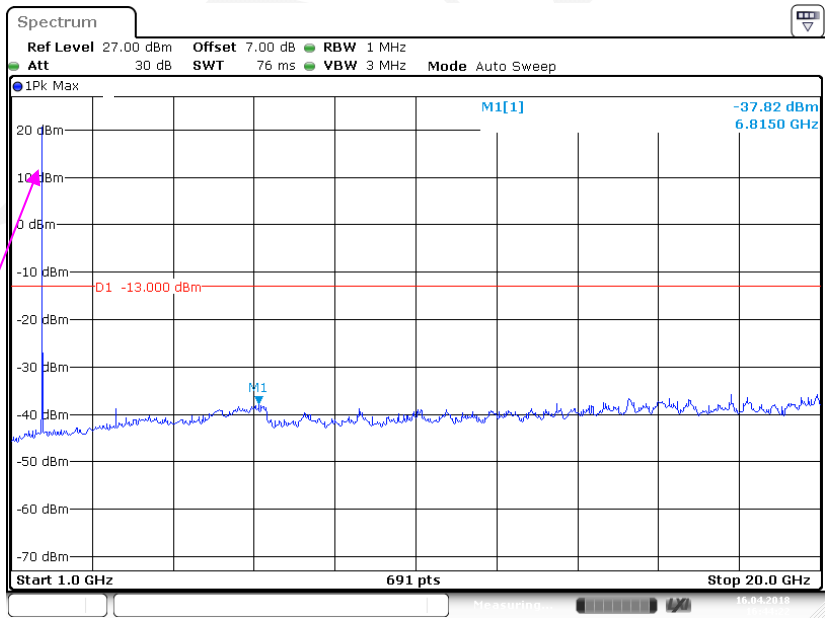
30 MHz - 1 GHz (5.0 MHz, Middle Channel)



Date: 16.APR.2018 16:42:24

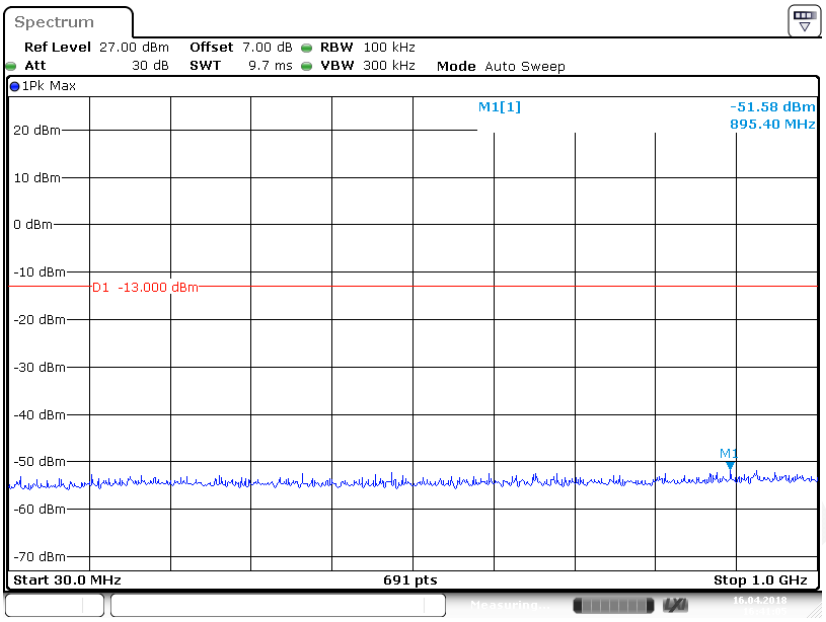
1 GHz – 20 GHz (5.0MHz, Middle Channel)

Fundamental test

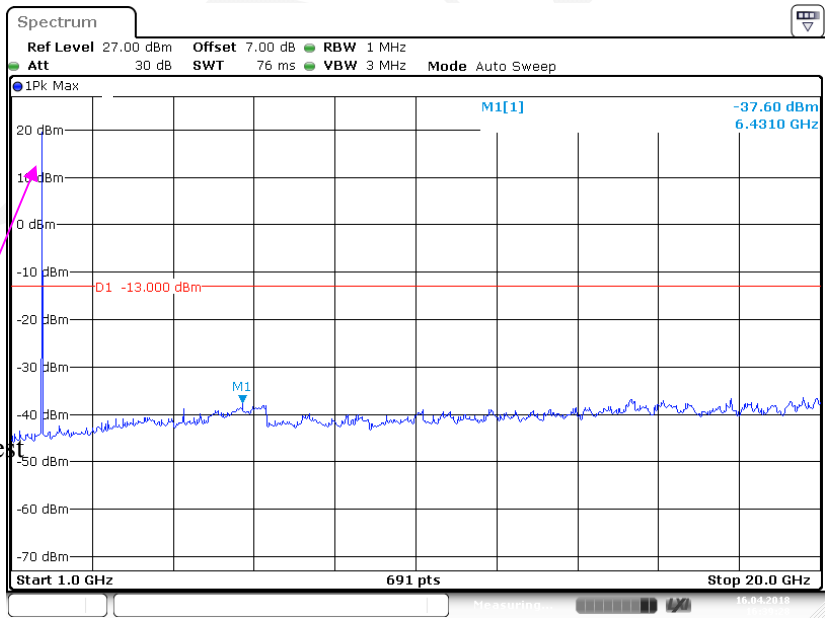


Date: 16.APR.2018 16:44:22

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

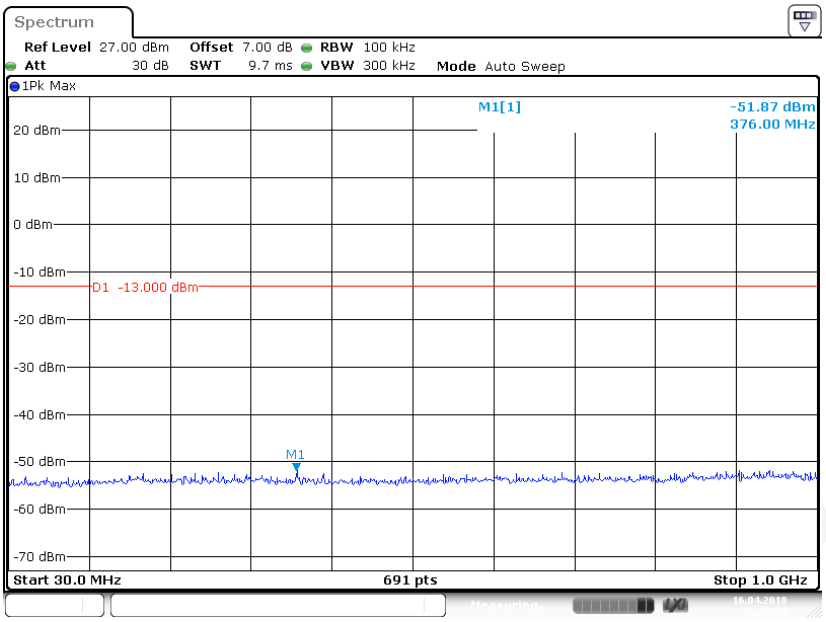


1 GHz – 20 GHz (10.0 MHz, Middle Channel)



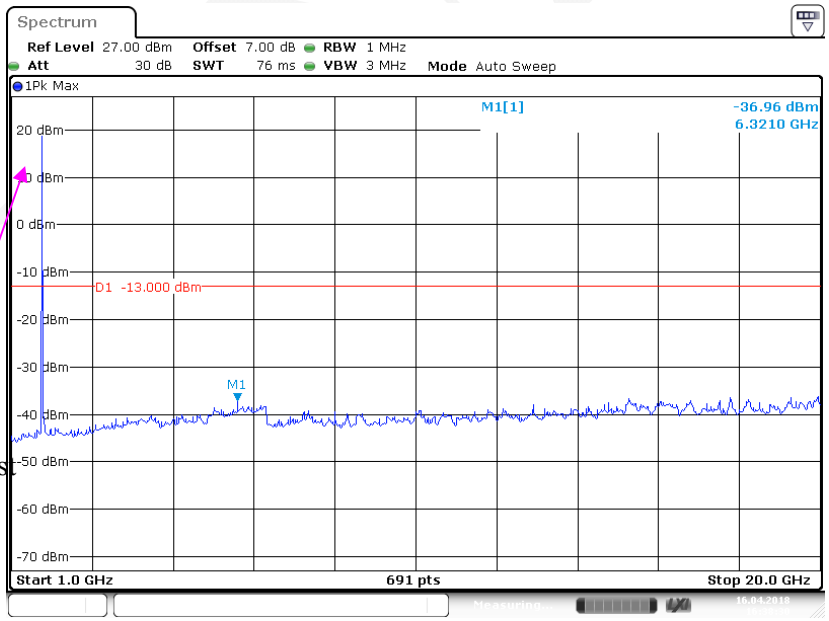
Fundamental test

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



Date: 16.APR.2018 16:36:57

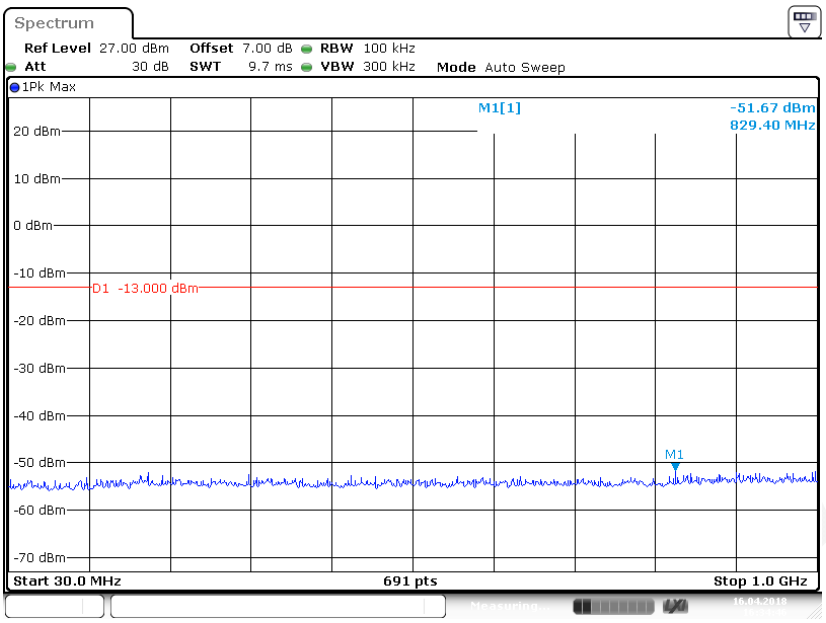
1 GHz – 20 GHz (15.0 MHz, Middle Channel)



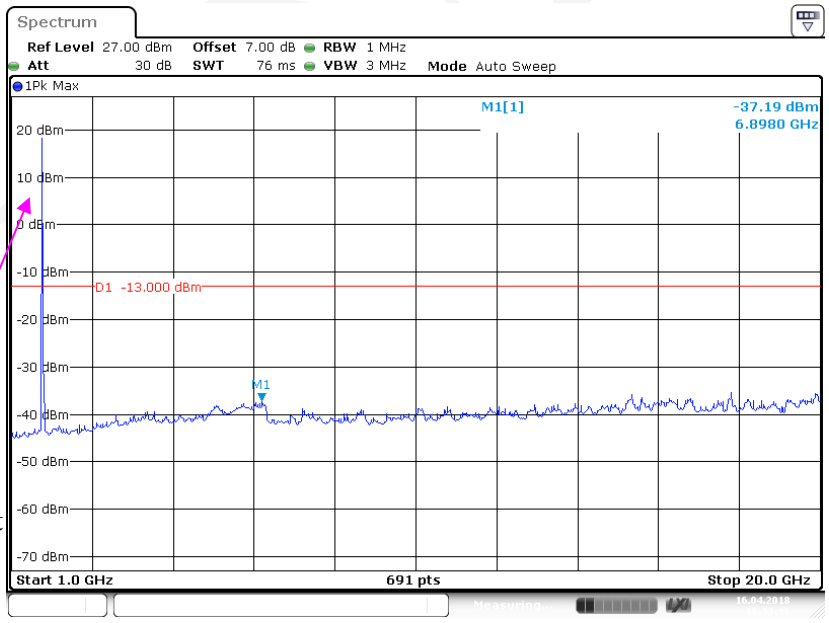
Fundamental test

Date: 16.APR.2018 16:38:30

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



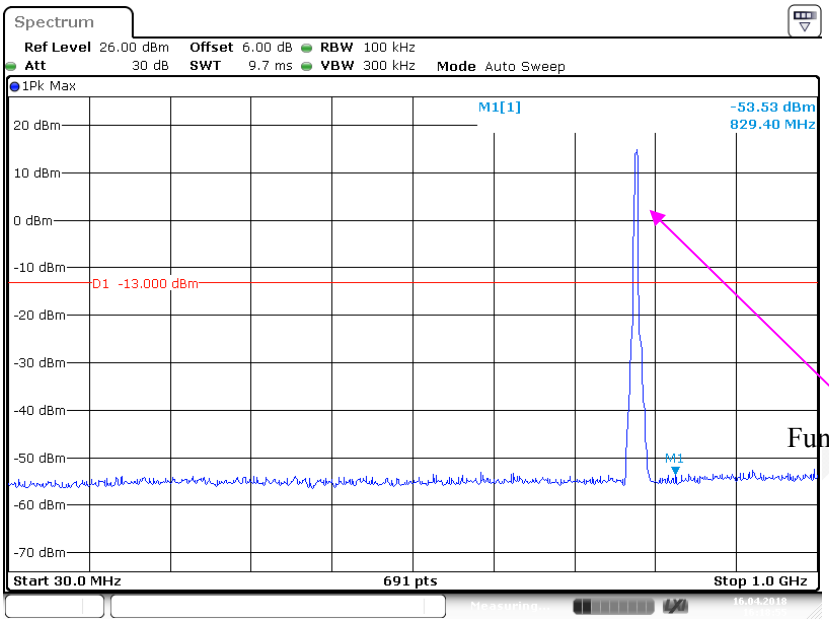
1 GHz – 20 GHz (20.0 MHz, Middle Channel)



Fundamental test

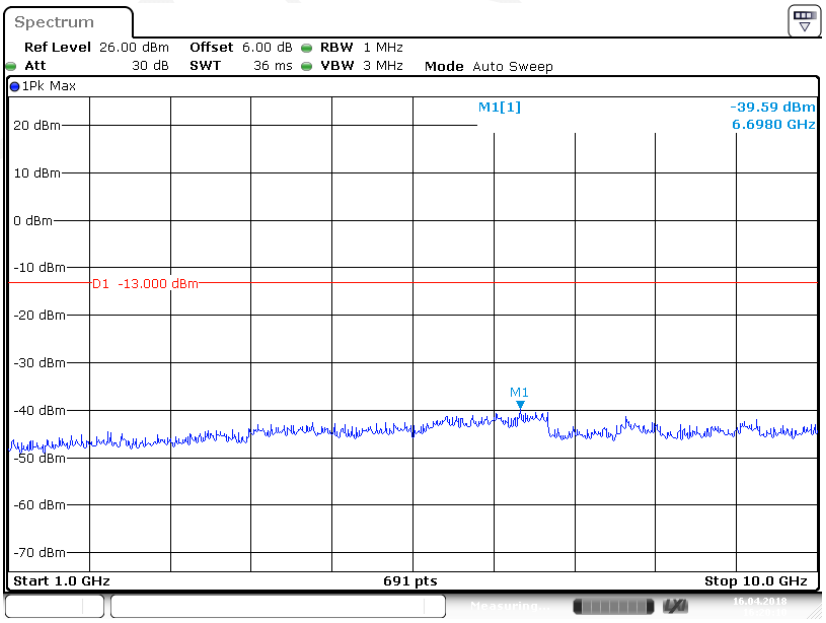
LTE Band 13:

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



Date:16.APR.2018 16:18:56

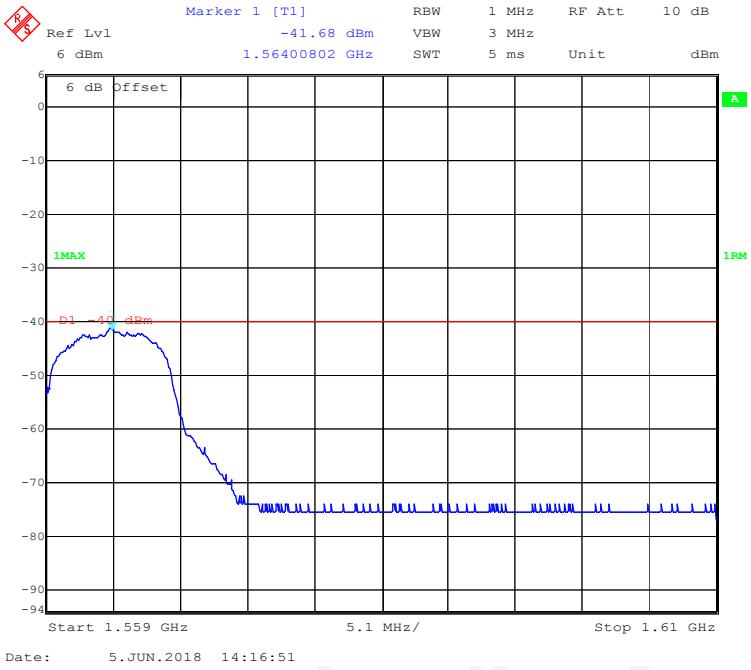
1 GHz – 10 GHz (5.0MHz, Middle Channel)



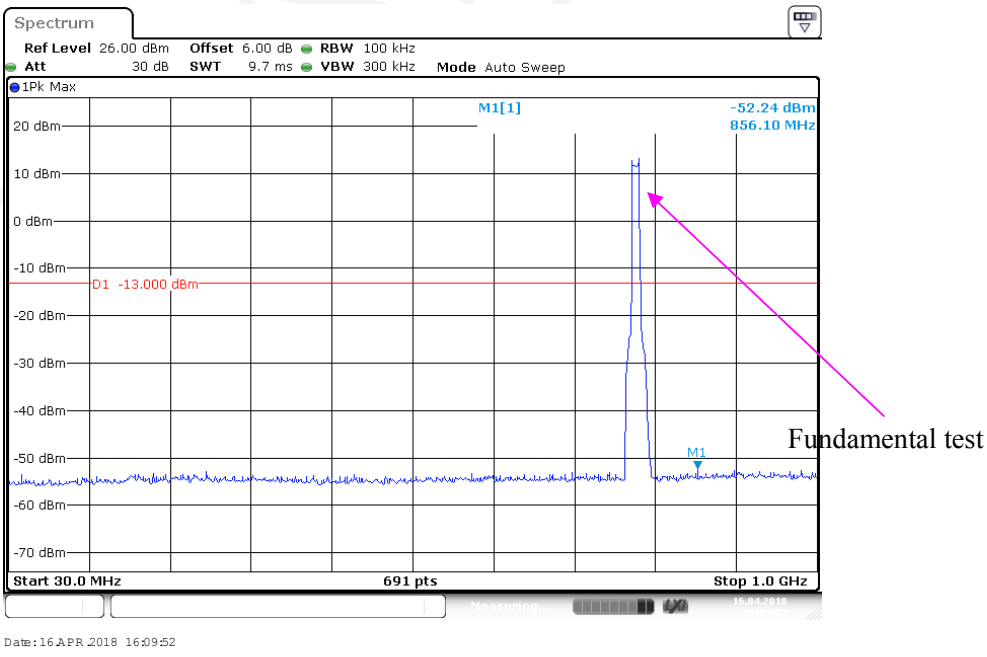
Date:16.APR.2018 16:20:10

1.559 GHz – 1.610 GHz (5.0 MHz, Middle Channel)

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

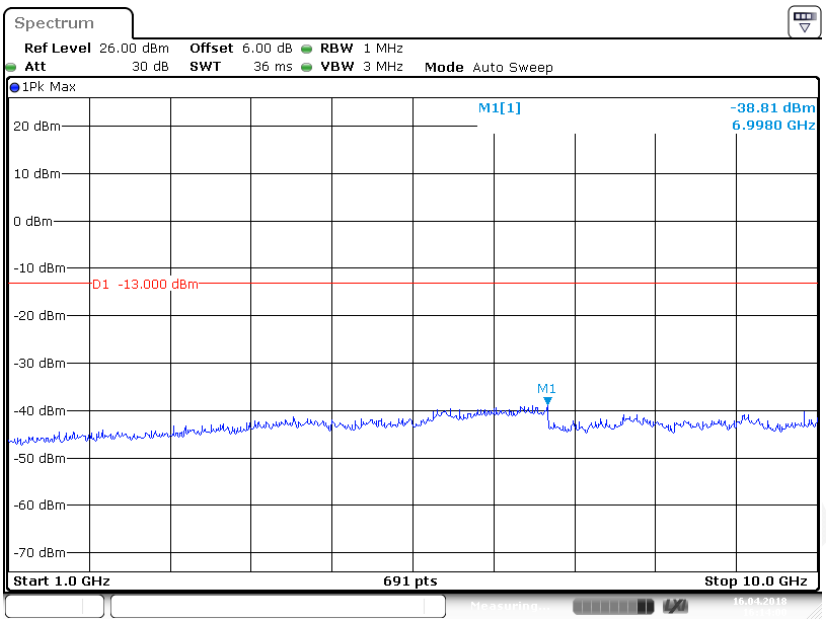


30 MHz - 1 GHz (10.0 MHz, Middle Channel)



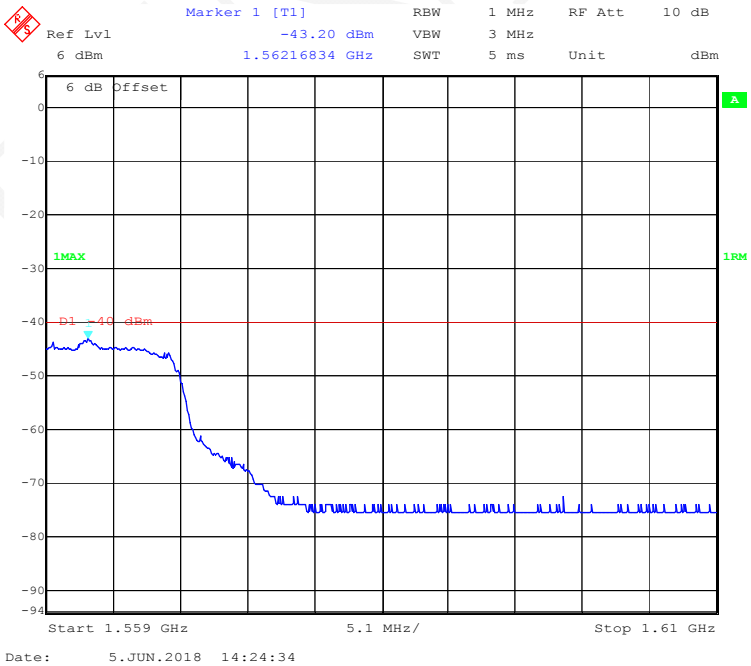
Fundamental test

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



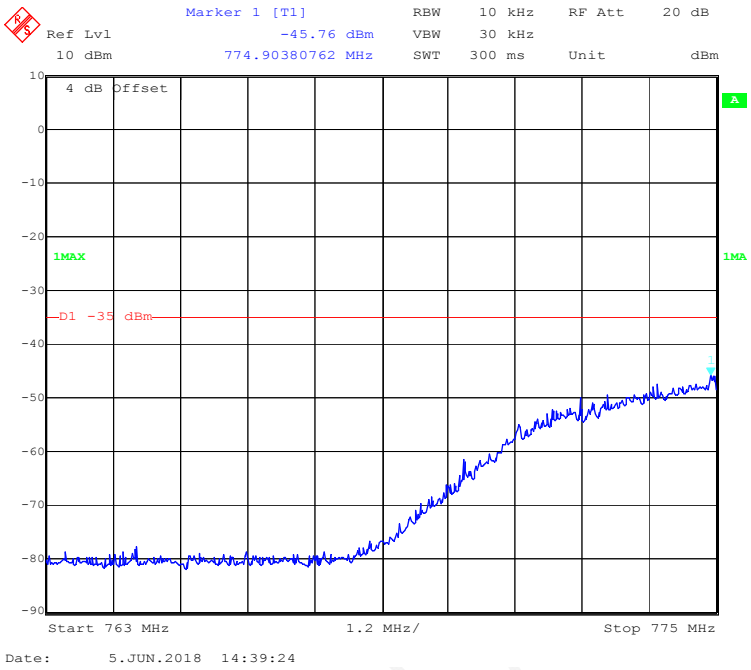
1.559 GHz – 1.610 GHz (10.0 MHz, Middle Channel)

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

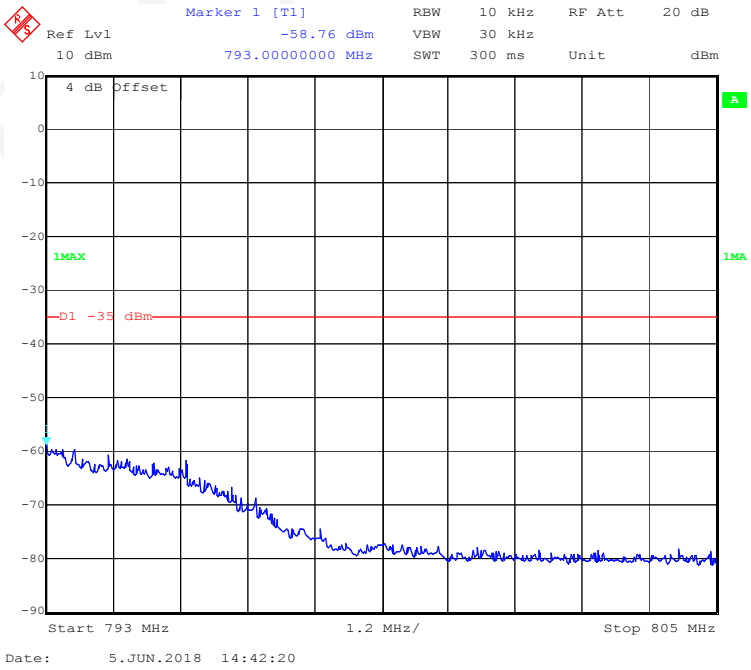


Additional Conducted Spurious Emissions Evaluations in accordance with FCC §27.53 (c)
Note: because of RBW 10kHz convert to 6.25kHz, 10lg (10/6.25) = 2, offset reduced with more 2dB.

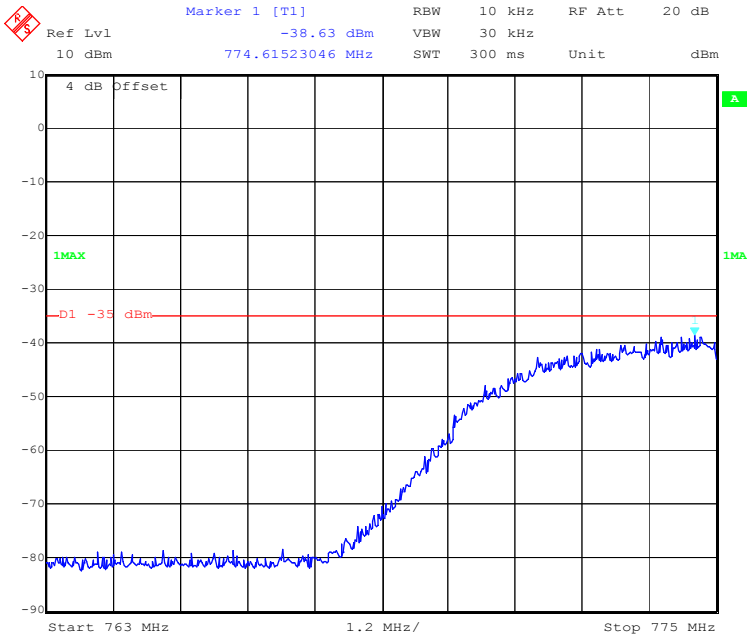
763 MHz – 775 MHz, 5MHz



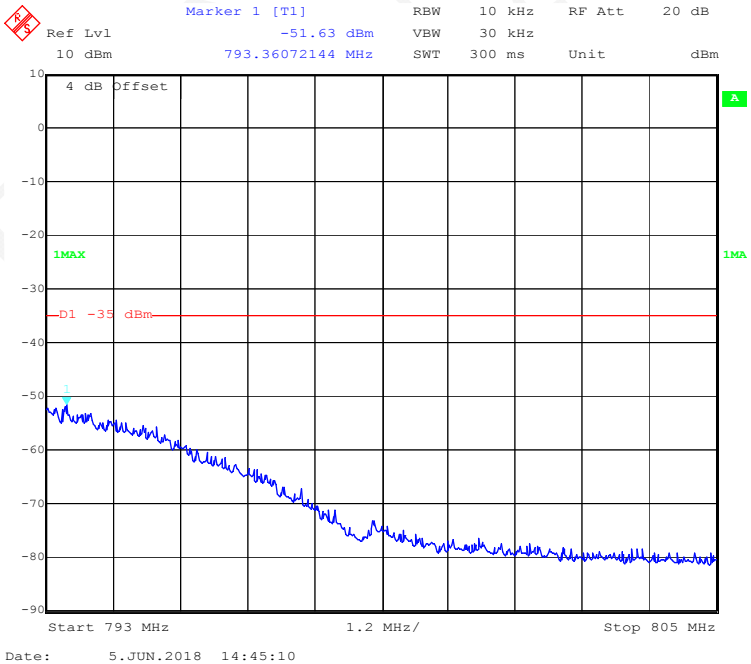
793 MHz – 805 MHz, 5MHz



763 MHz – 775 MHz, 10MHz



793 MHz – 805 MHz, 10MHz



FCC § 2.1053 & §27.53 (h)(m) - SPURIOUS RADIATED EMISSIONS

Applicable Standards

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

The testing was performed by Alisa Gao on 2018-04-13.

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

30 MHz ~ 20 GHz:

LTE Band 4:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
QPSK 1.4MHz Bandwidth Middle Channel										
41.70	56.36	69	242	H	-29.98	0.20	-19.13	-49.31	-13	36.31
41.70	59.19	98	123	V	-34.10	0.20	-19.13	-53.43	-13	40.43
3465.00	57.84	227	225	H	-49.91	0.93	9.87	-40.97	-13	27.97
3465.00	53.52	210	184	V	-54.66	0.93	9.87	-45.72	-13	32.72
5197.50	51.67	274	140	H	-53.25	1.10	10.30	-44.05	-13	31.05
5197.50	53.53	14	129	V	-51.60	1.10	10.30	-42.40	-13	29.40
16-QAM 1.4MHz Bandwidth Middle Channel										
41.70	55.49	190	182	H	-30.85	0.20	-19.13	-50.18	-13	37.18
41.70	58.73	62	182	V	-34.56	0.20	-19.13	-53.89	-13	40.89
3465.00	56.20	59	223	H	-51.55	0.93	9.87	-42.61	-13	29.61
3465.00	51.52	344	108	V	-56.66	0.93	9.87	-47.72	-13	34.72
5197.50	51.38	127	219	H	-53.54	1.10	10.30	-44.34	-13	31.34
5197.50	48.33	240	129	V	-56.80	1.10	10.30	-47.60	-13	34.60

30 MHz ~ 10 GHz:

LTE Band 13:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
QPSK 5MHz Bandwidth Middle Channel										
43.37	57.28	132	167	H	-31.67	0.21	-17.79	-49.67	-13	36.67
43.37	58.93	277	220	V	-36.54	0.21	-17.79	-54.54	-13	41.54
1564.00	51.73	74	113	H	-59.99	0.83	8.30	-52.52	-13	39.52
1564.00	48.44	294	146	V	-63.50	0.83	8.30	-56.03	-13	43.03
2346.00	49.96	314	203	H	-58.69	0.88	9.76	-49.81	-13	36.81
2346.00	46.70	76	102	V	-62.10	0.88	9.76	-53.22	-13	40.22
16-QAM 5MHz Bandwidth Middle Channel										
43.37	56.74	317	214	H	-32.21	0.21	-17.79	-50.21	-13	37.21
43.37	59.16	289	170	V	-36.31	0.21	-17.79	-54.31	-13	41.31
1564.00	54.22	137	169	H	-57.50	0.83	8.30	-50.03	-13	37.03
1564.00	50.16	293	231	V	-61.78	0.83	8.30	-54.31	-13	41.31
2346.00	51.05	310	114	H	-57.60	0.88	9.76	-48.72	-13	35.72
2346.00	47.93	308	223	V	-60.87	0.88	9.76	-51.99	-13	38.99

FINAL

FCC §27.53 (h) (m) - BAND EDGES

Applicable Standards

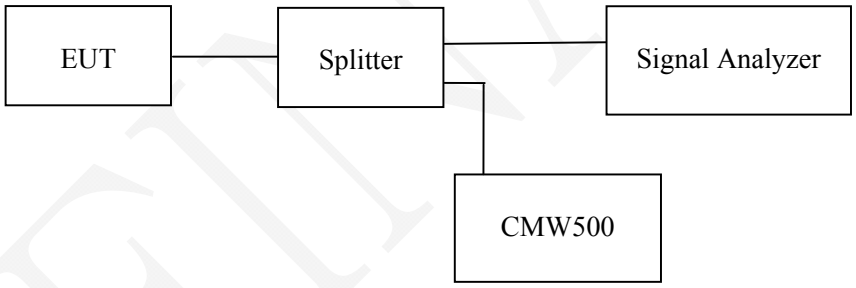
According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

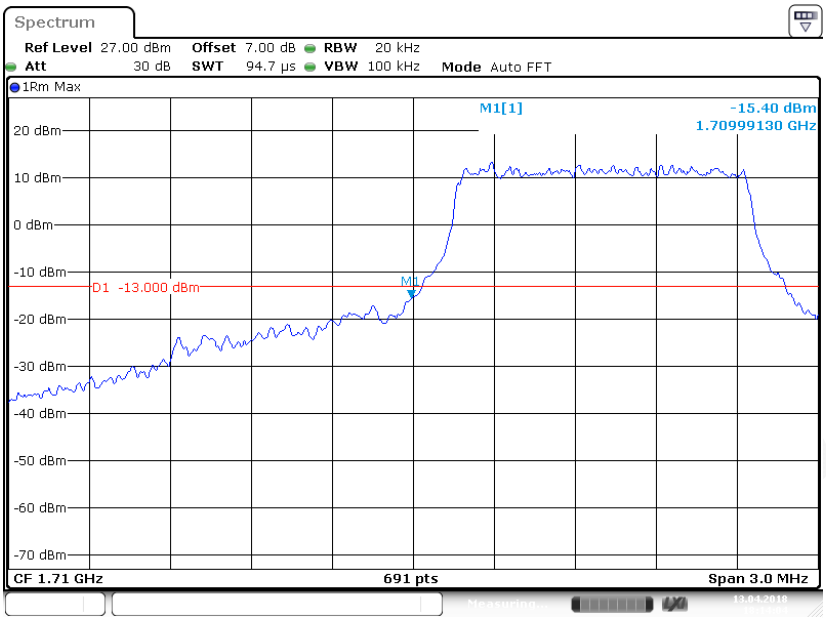
The testing was performed by Alisa Gao on 2018-04-13.

EUT operation mode: Transmitting

Test Result: Compliance.

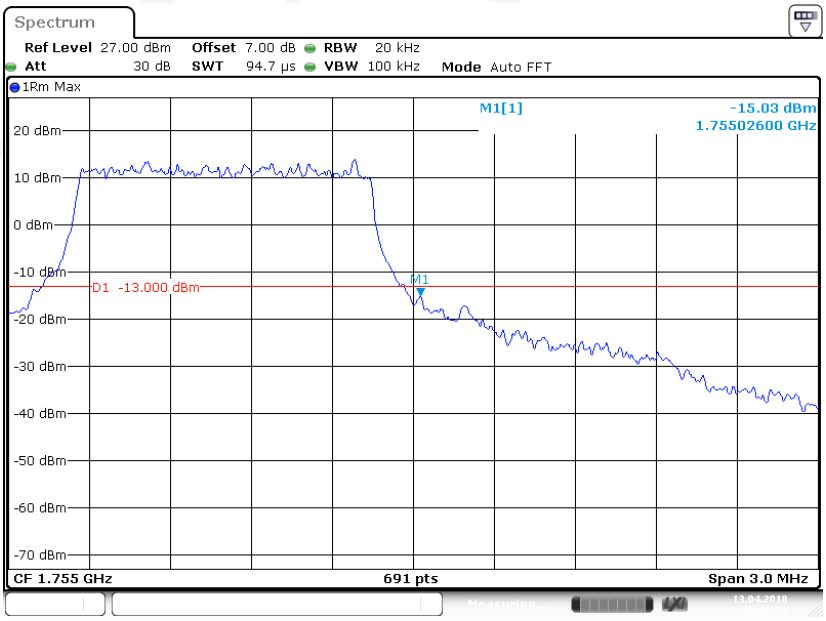
LTE Band 4:

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



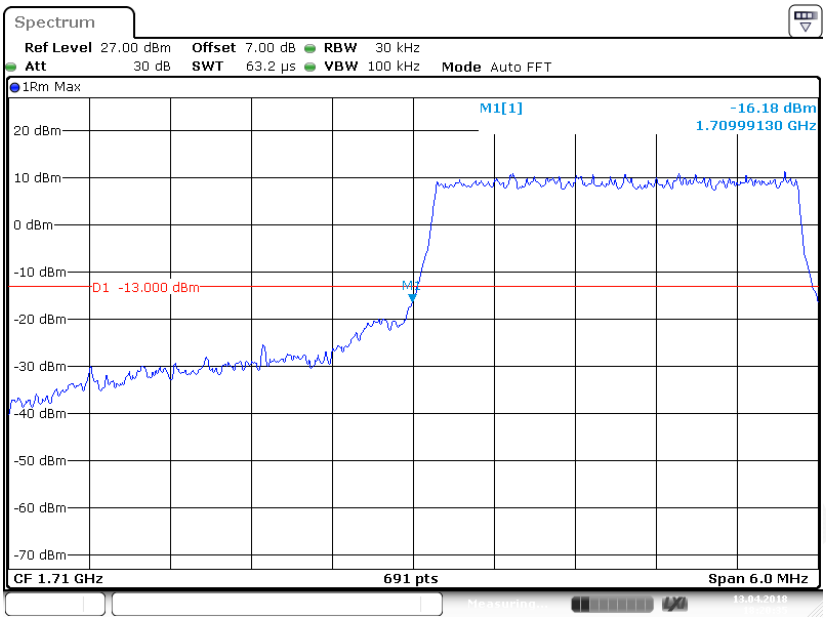
Date:13.APR.2018 18:14:04

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



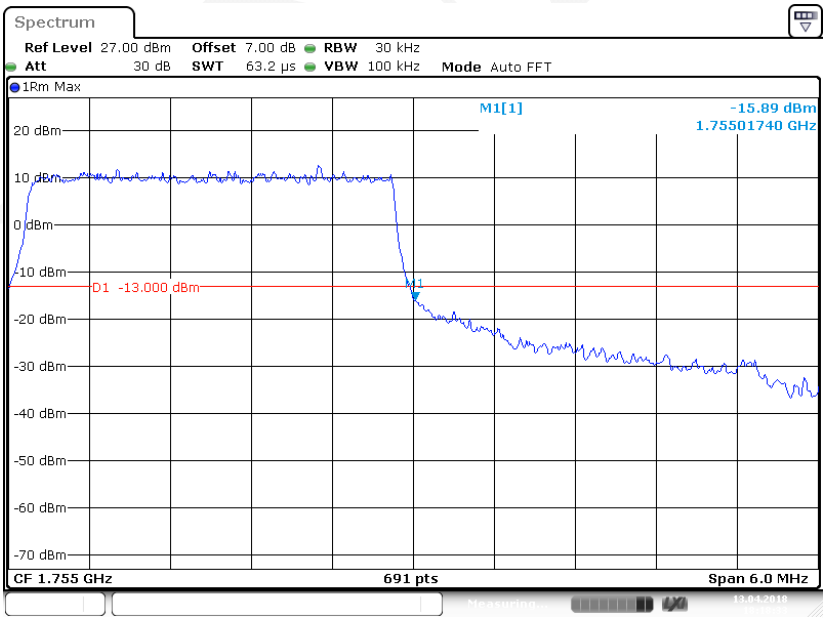
Date:13.APR.2018 18:16:21

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



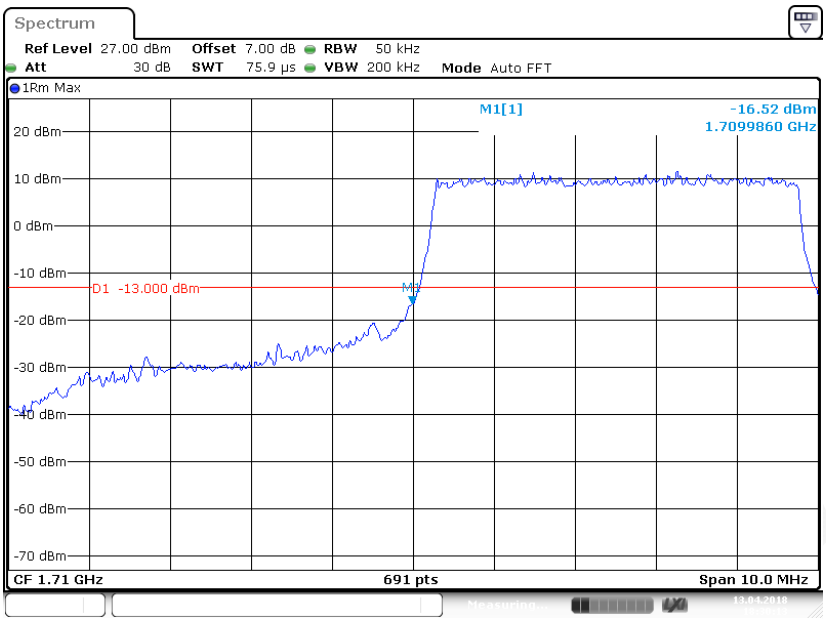
Date: 13.APR.2018 18:20:35

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



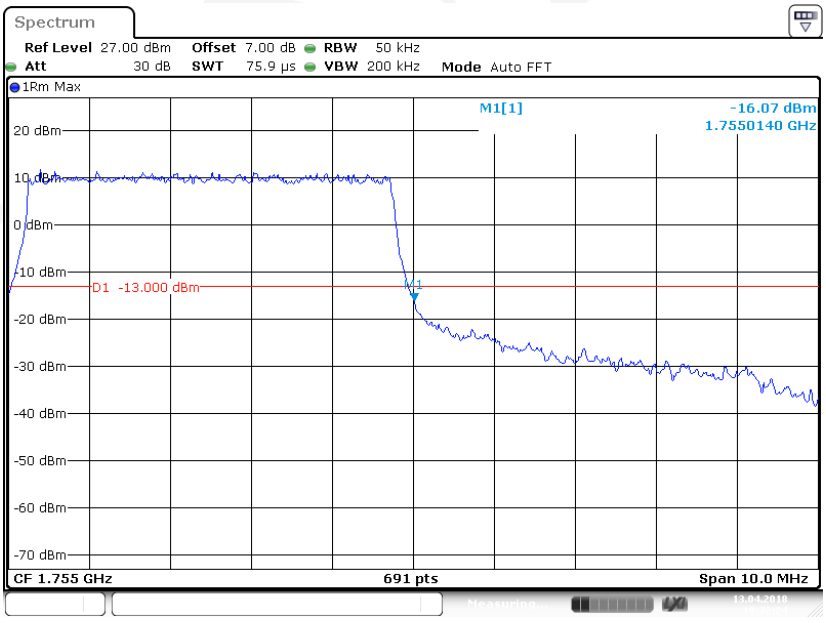
Date: 13.APR.2018 18:18:32

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



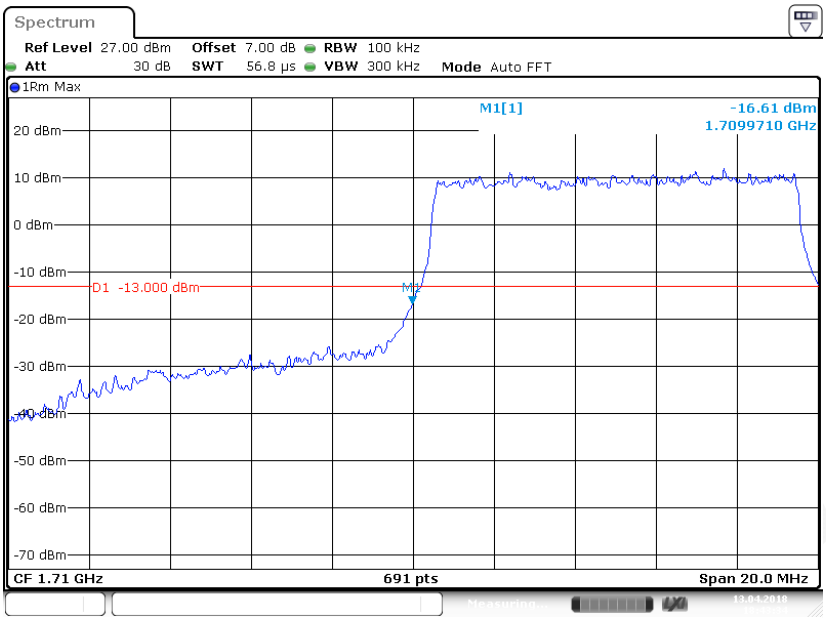
Date: 13.APR.2018 18:30:13

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



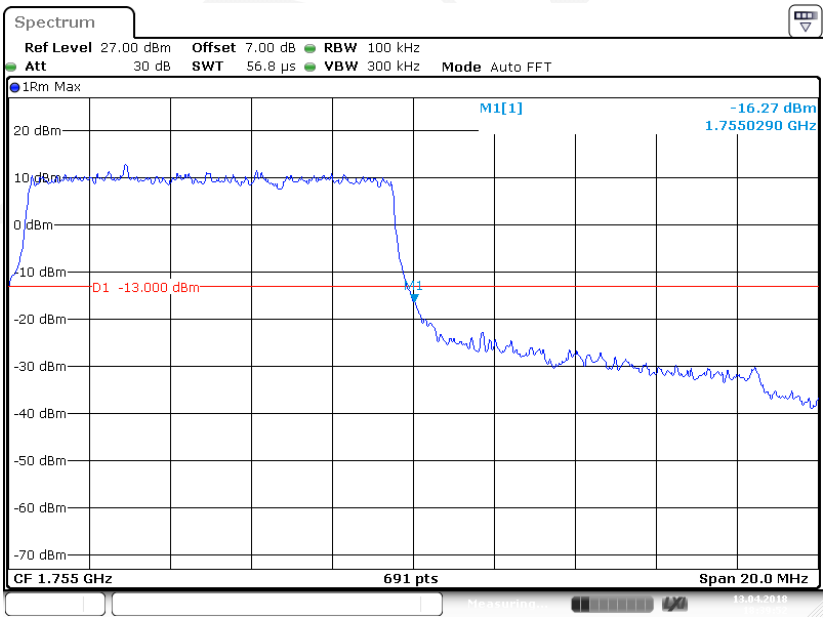
Date: 13.APR.2018 18:32:24

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



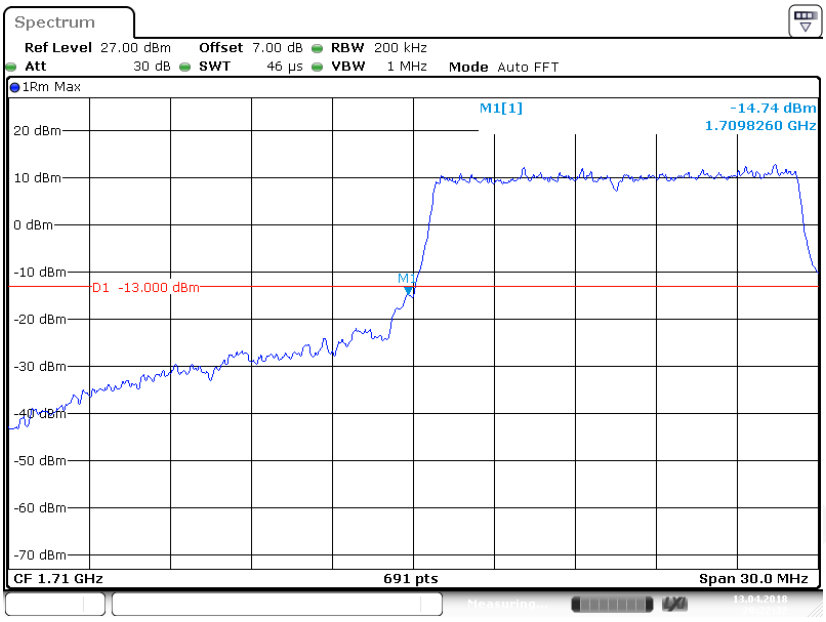
Date: 13.APR.2018 18:43:34

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



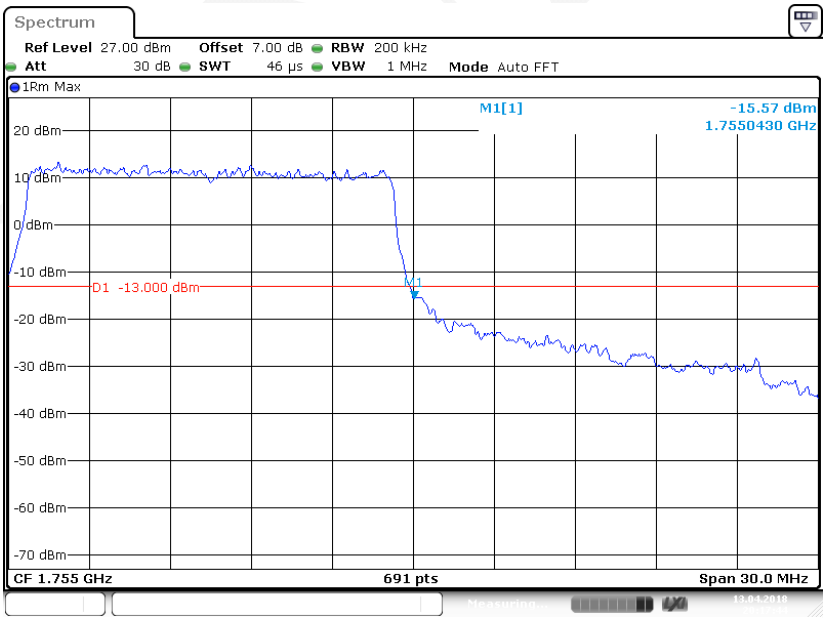
Date: 13.APR.2018 18:39:52

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



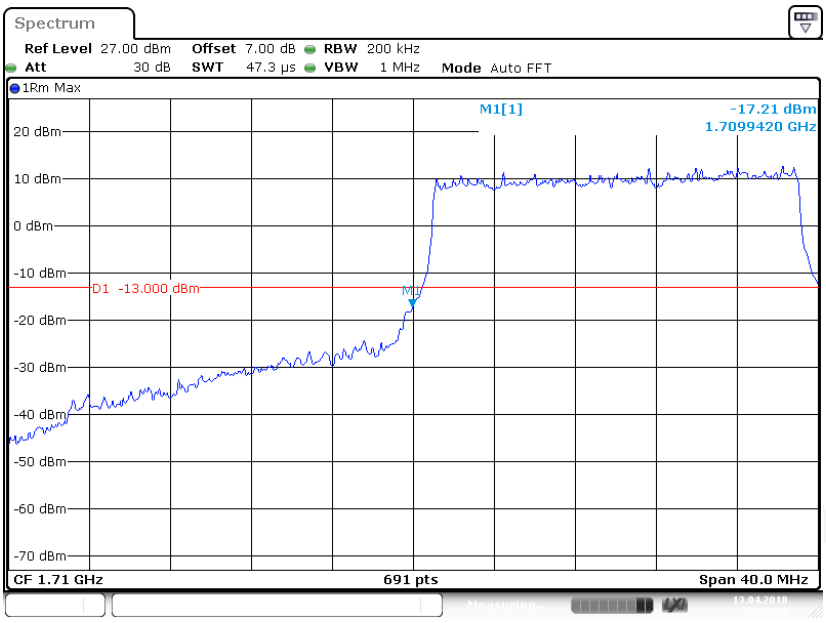
Date: 13.APR.2018 20:22:33

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



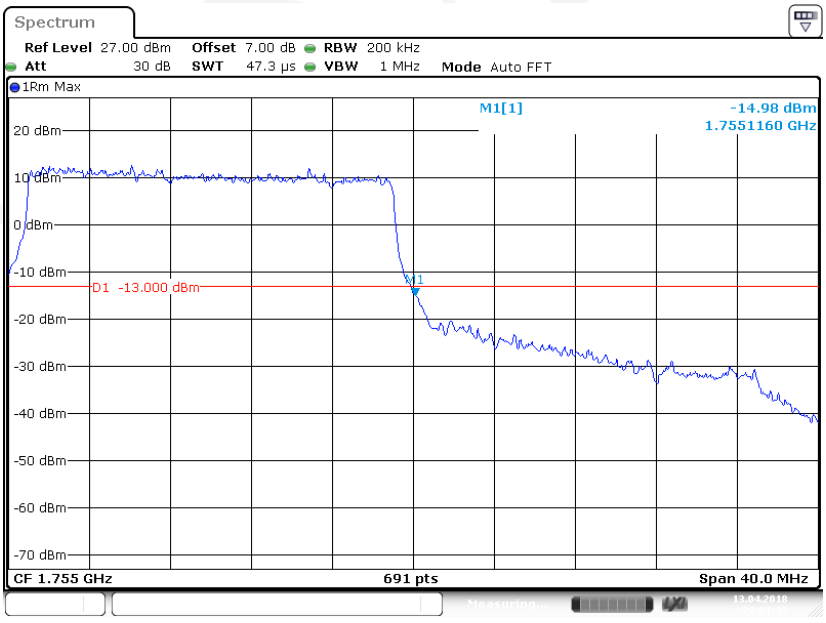
Date: 13.APR.2018 20:17:44

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



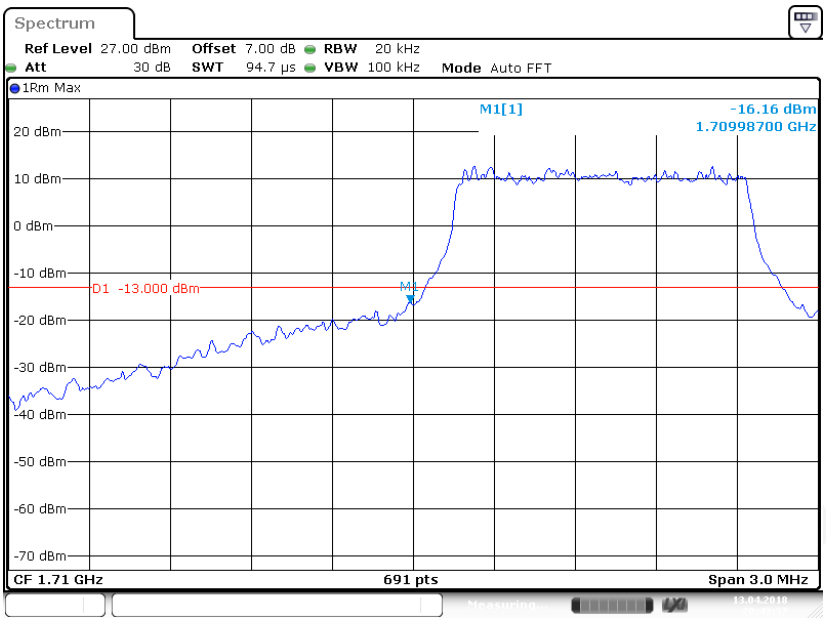
Date: 13.APR.2018 20:07:38

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



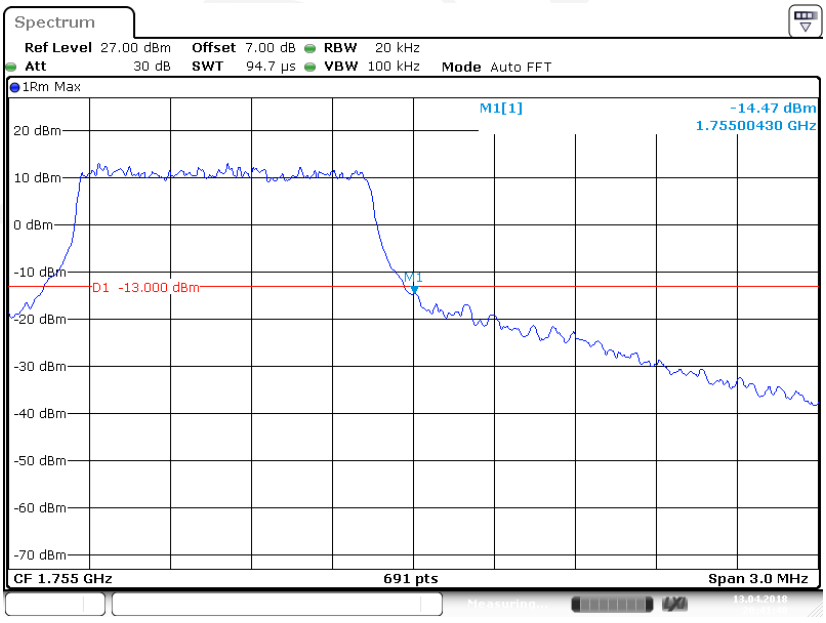
Date: 13.APR.2018 20:01:33

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



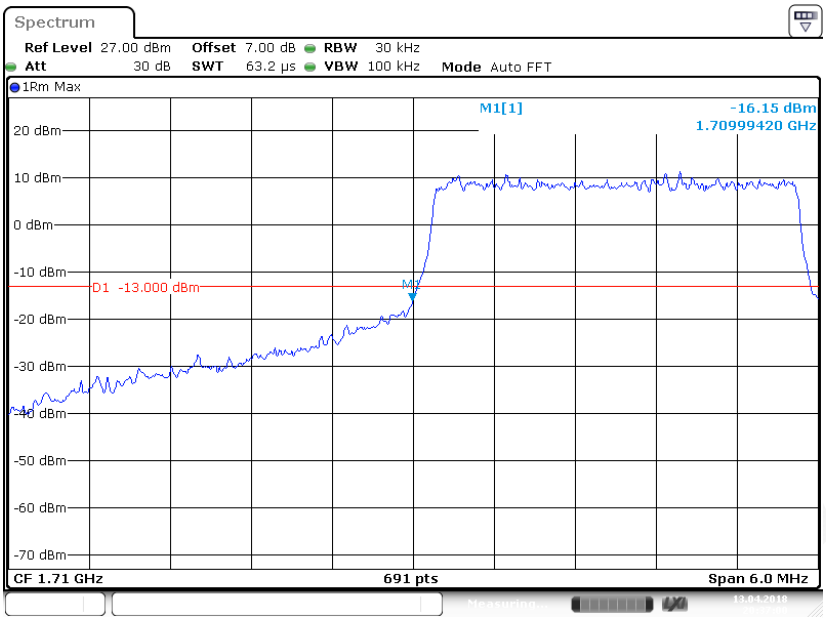
Date: 13.APR.2018 20:43:37

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



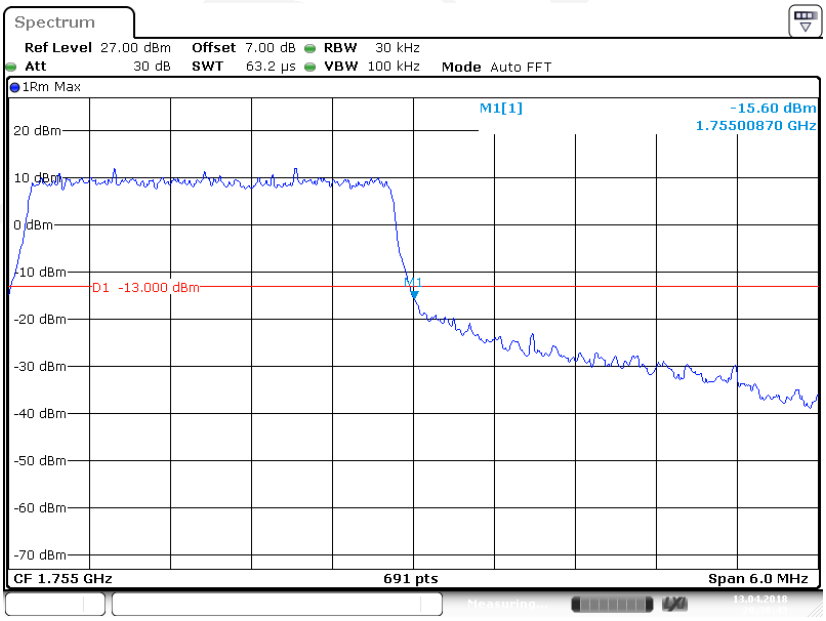
Date: 13.APR.2018 20:41:48

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



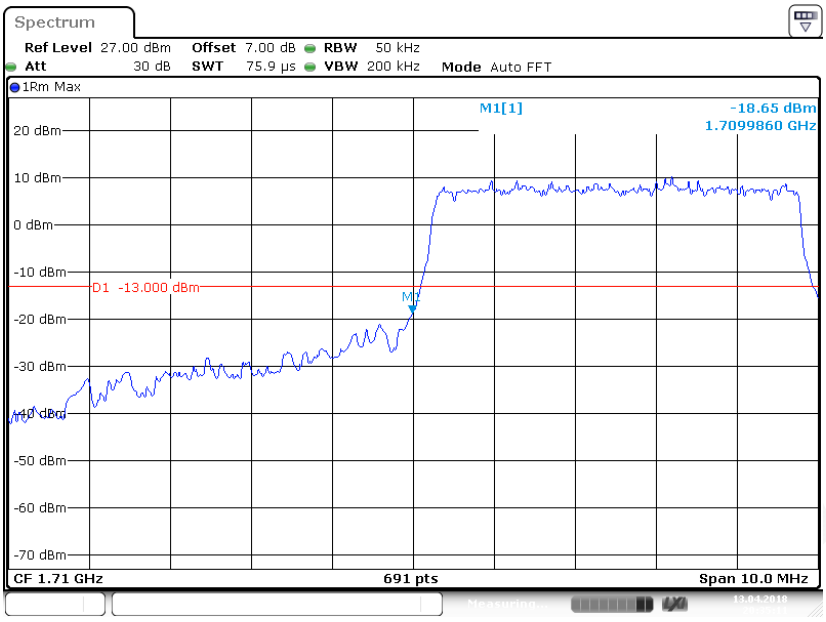
Date: 13.APR.2018 20:37:01

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



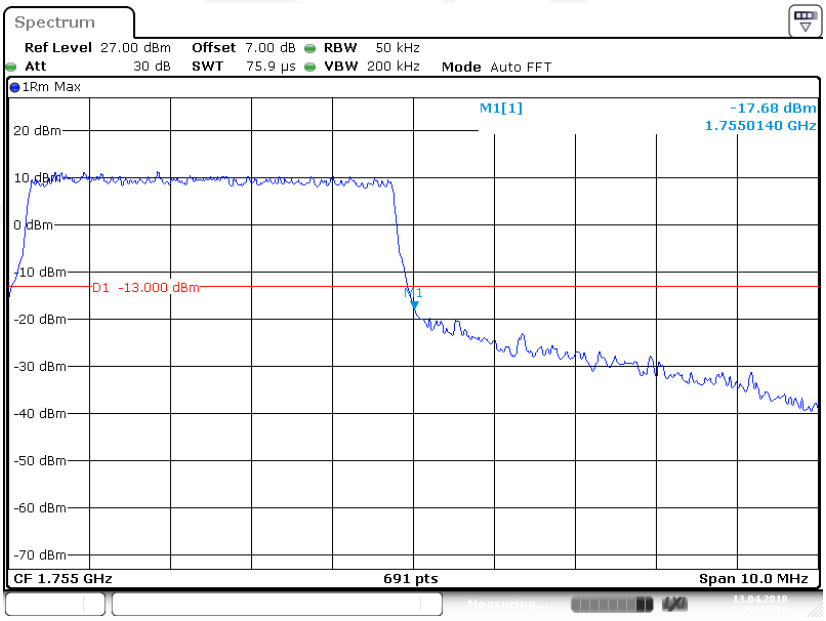
Date: 13.APR.2018 20:38:42

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



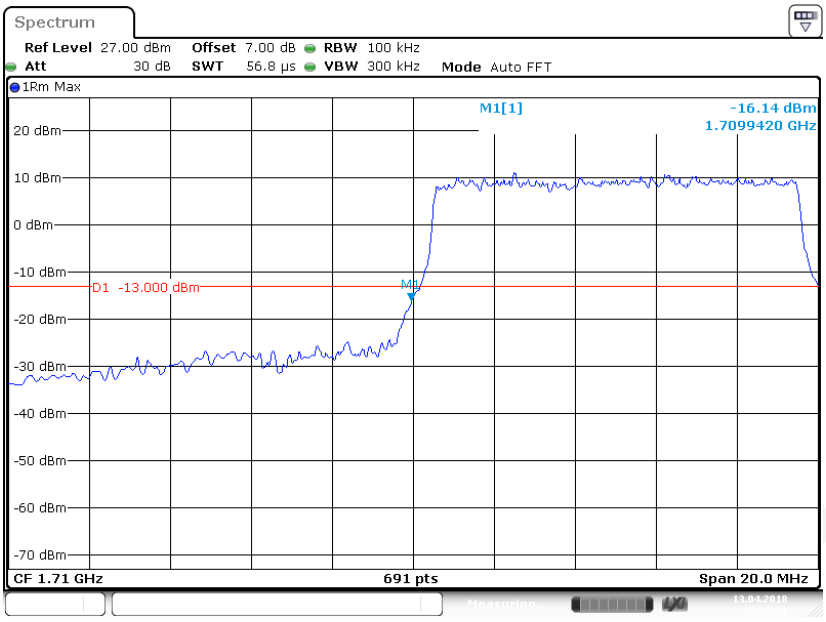
Date: 13.APR.2018 20:35:11

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



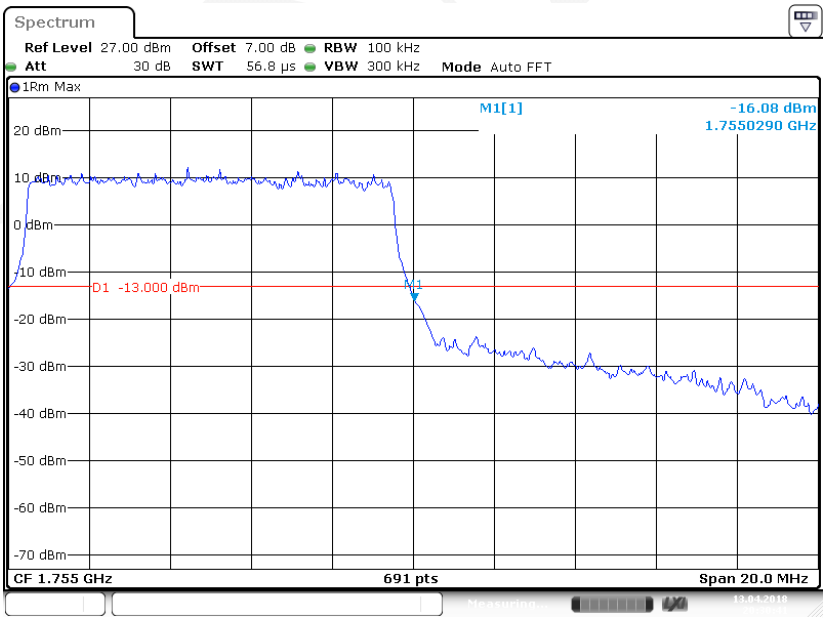
Date: 13.APR.2018 20:33:33

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



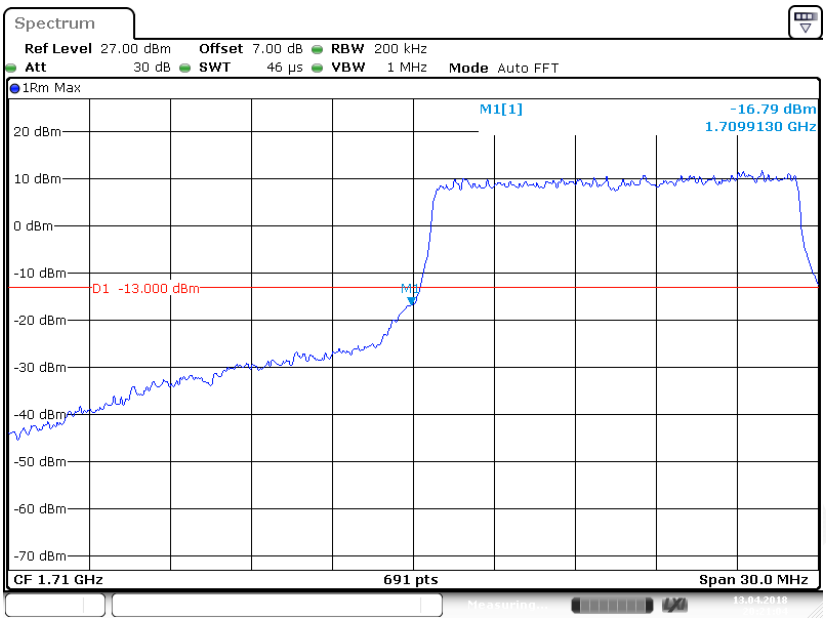
Date: 13.APR.2018 20:28:32

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



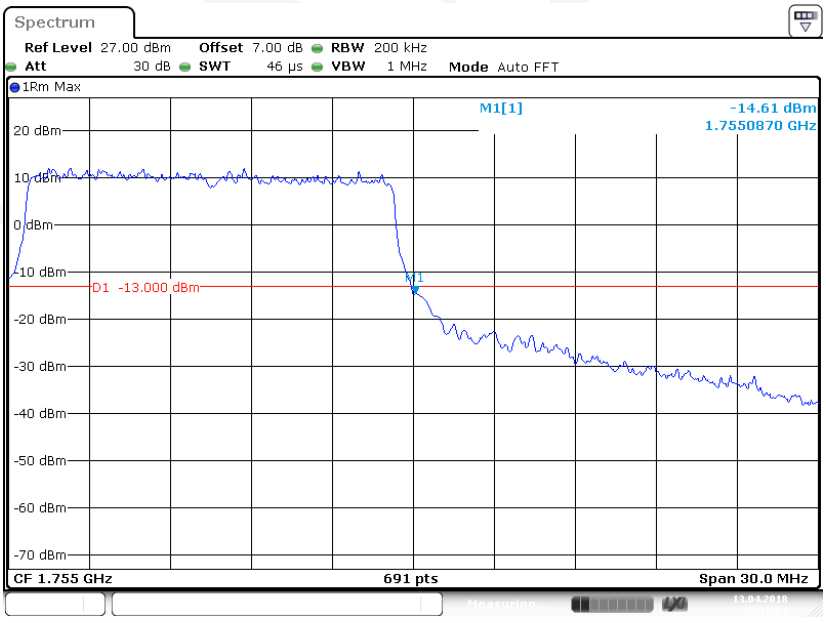
Date: 13.APR.2018 20:30:41

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



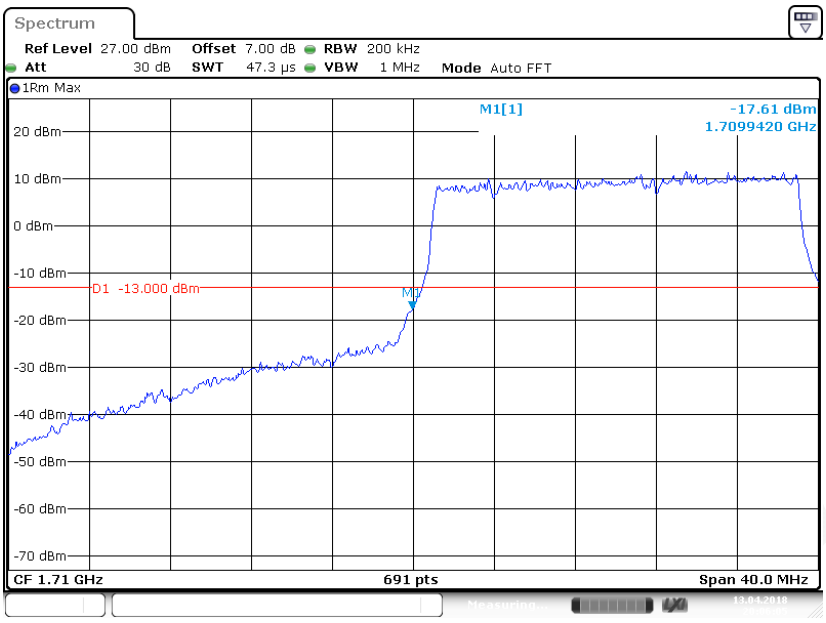
Date: 13.APR.2018 20:21:04

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



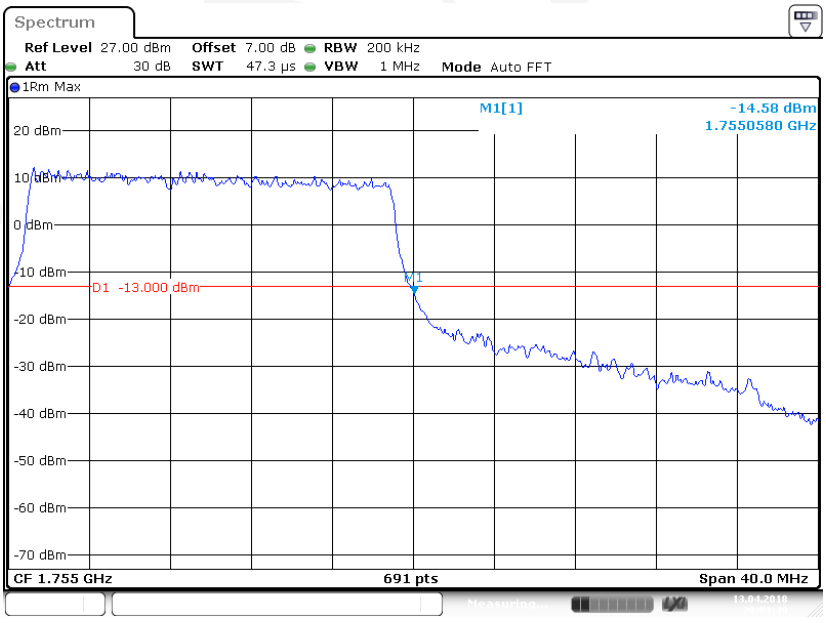
Date: 13.APR.2018 20:19:04

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



Date: 13.APR.2018 20:06:05

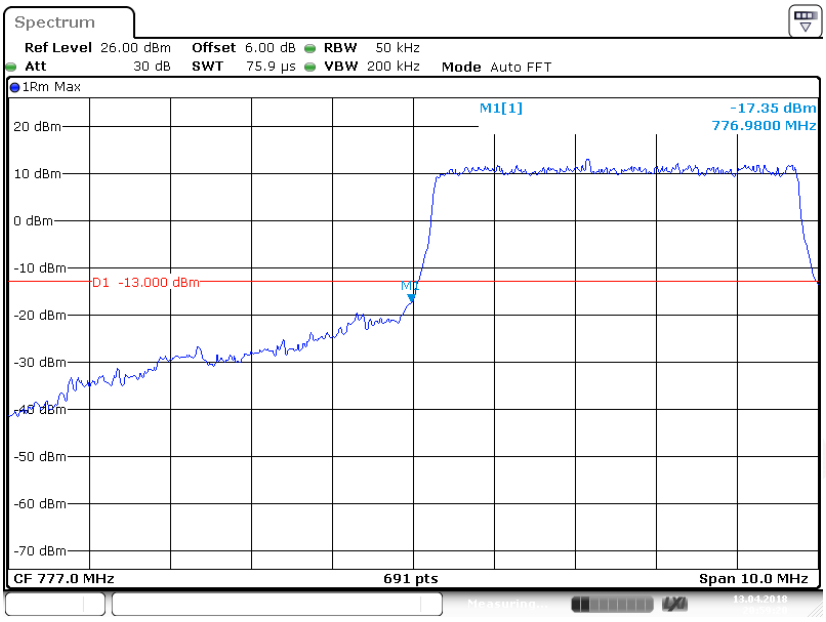
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 13.APR.2018 20:03:49

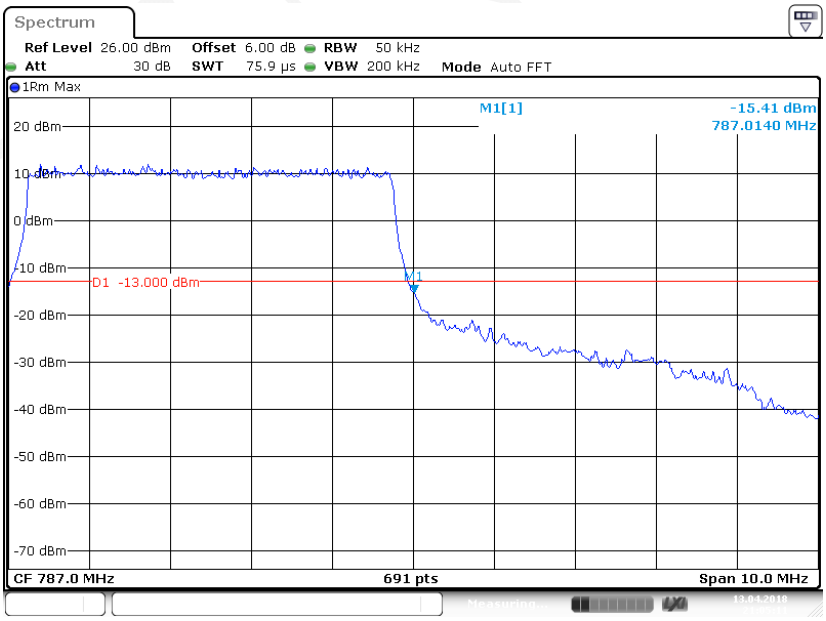
LTE Band 13:

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



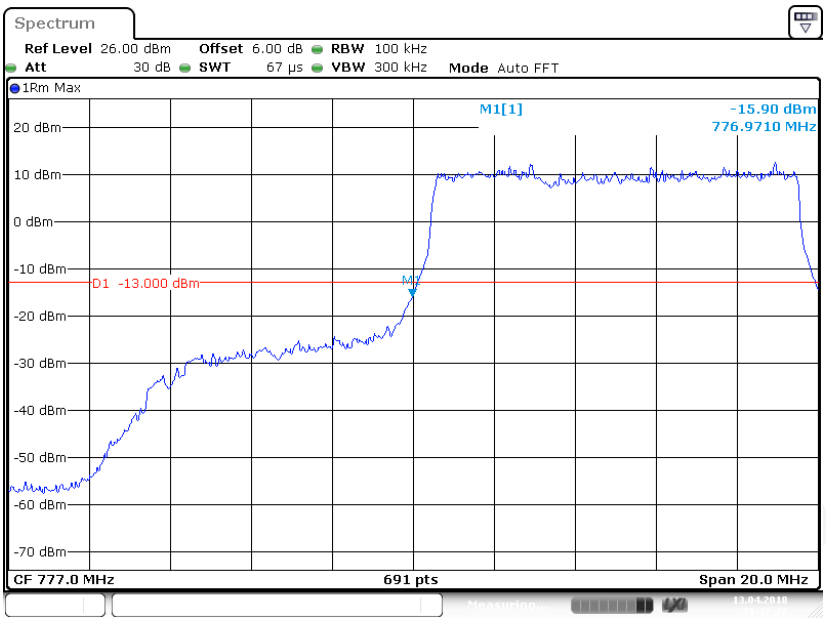
Date:13.APR.2018 20:59:20

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



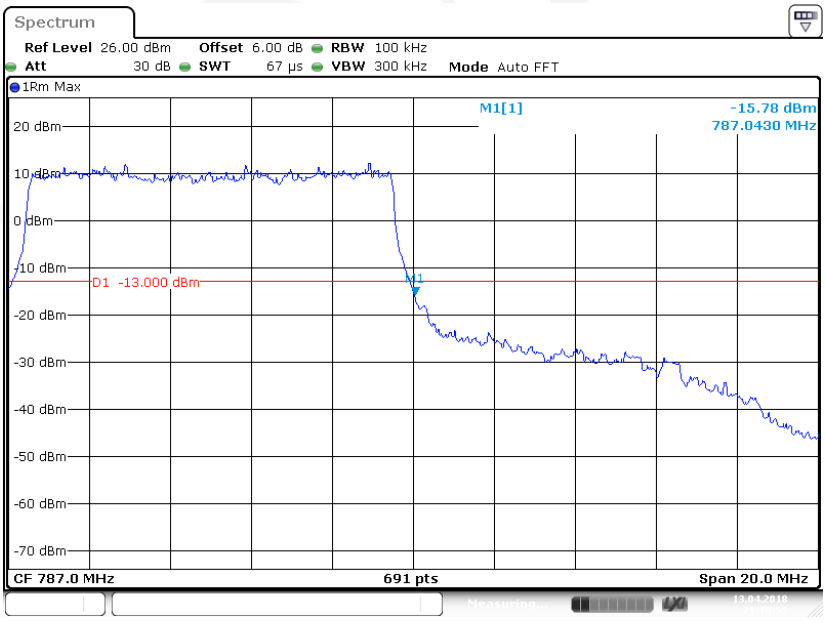
Date:13.APR.2018 21:05:11

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



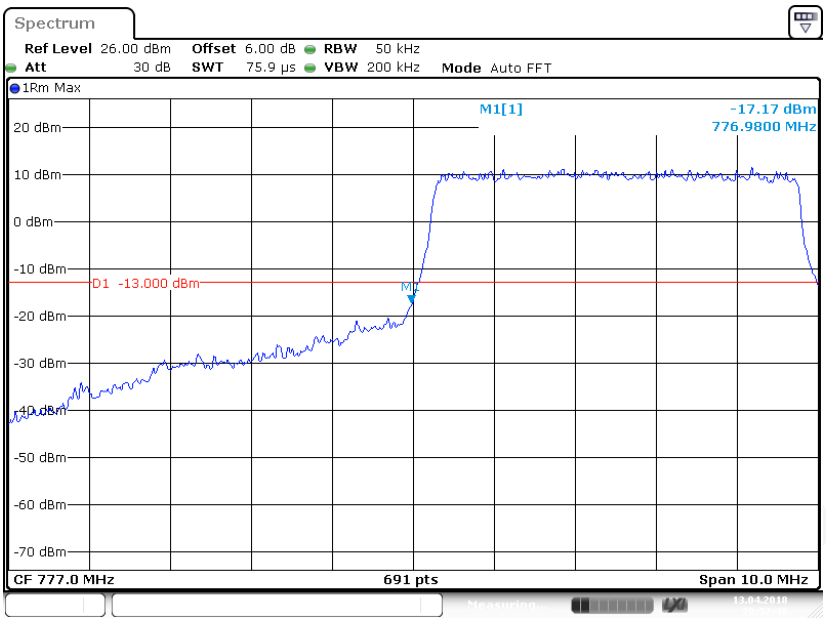
Date: 13.APR.2018 21:12:22

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



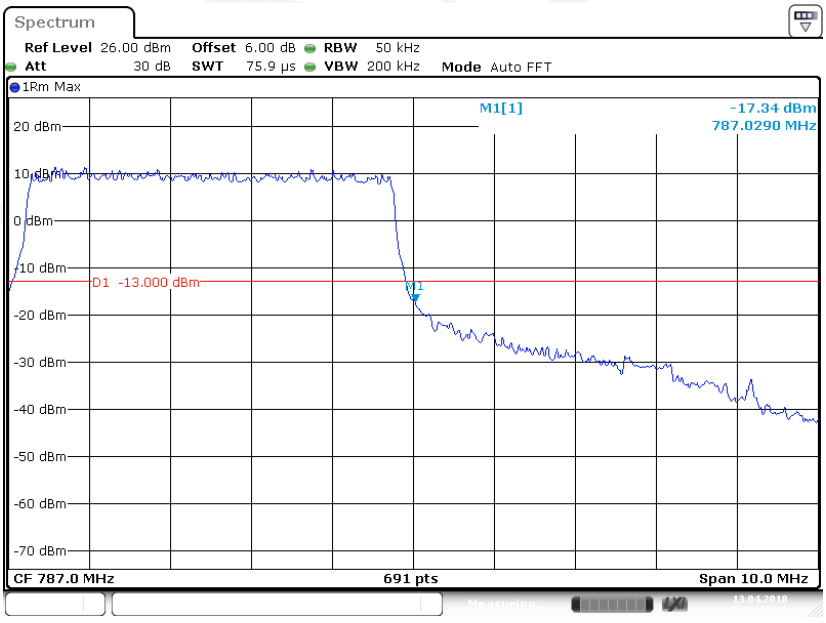
Date: 13.APR.2018 21:10:56

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



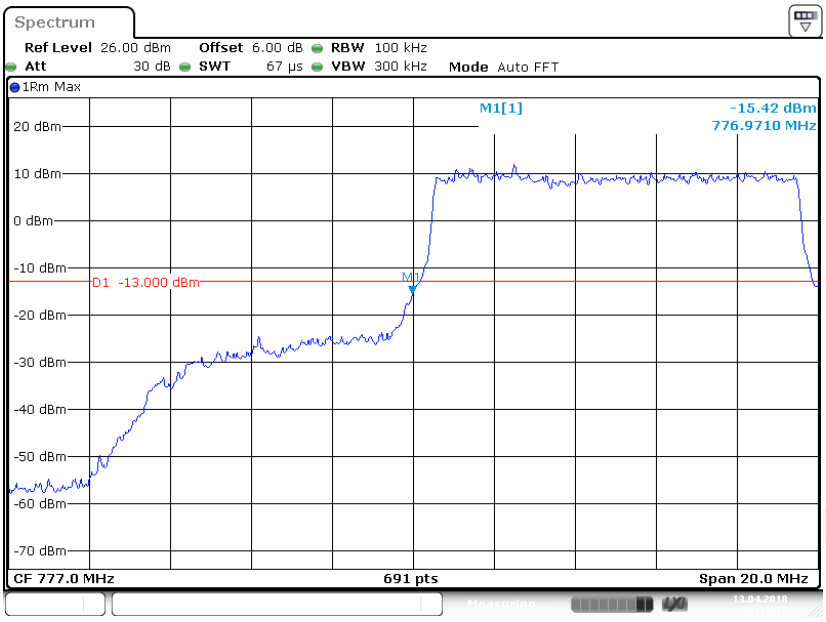
Date: 13.APR.2018 20:57:49

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



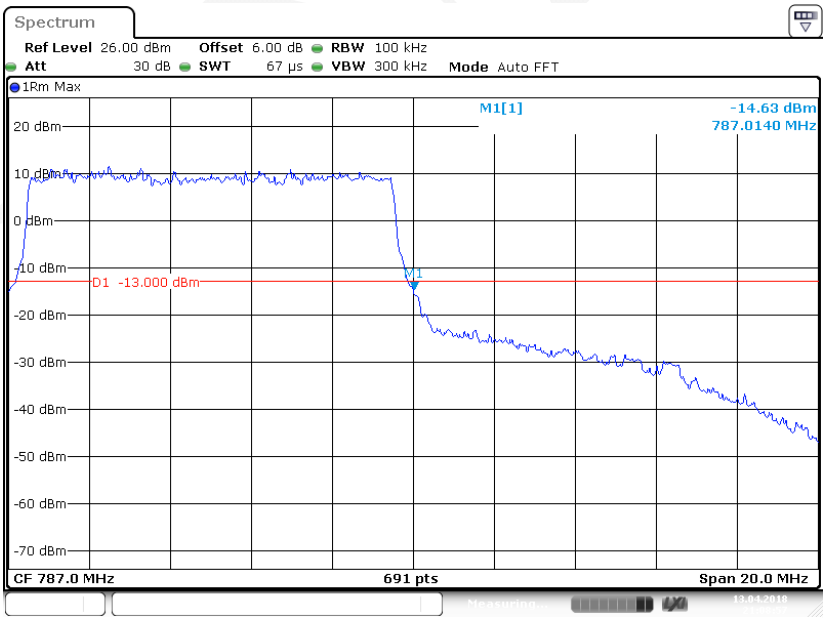
Date: 13.APR.2018 21:02:48

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



Date: 13.APR.2018 21:13:18

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



Date: 13.APR.2018 21:08:57

FCC § 2.1055; §27.54 - FREQUENCY STABILITY

Applicable Standards

FCC § 2.1055 & §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.

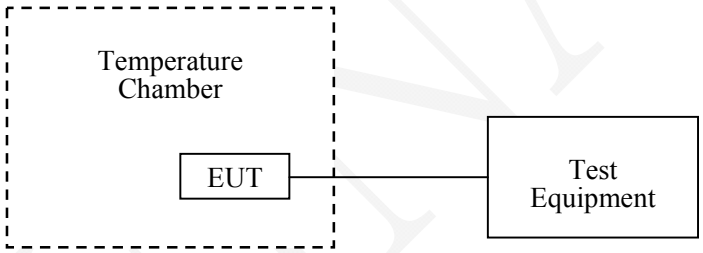
According to §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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.



FINAL

Test Data

Environmental Conditions

Temperature:	23.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Alisa Gao on 2018-04-15.

EUT operation mode: Transmitting

Test Result: Compliance.

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	3.7	-1	-0.0006	pass
-20		-3	-0.0017	pass
-10		-1	-0.0006	pass
0		0	0.0000	pass
10		-3	-0.0017	pass
20		-3	-0.0017	pass
30		-4	-0.0023	pass
40		-3	-0.0017	pass
50		-5	-0.0029	pass
25	V min.= 3.15	-2	-0.0012	pass
25	V max.= 4.23	-1	-0.0006	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	3.7	-3	-0.0017	pass
-20		-4	-0.0023	pass
-10		-2	-0.0012	pass
0		-1	-0.0006	pass
10		-2	-0.0012	pass
20		1	0.0006	pass
30		-5	-0.0029	pass
40		-4	-0.0023	pass
50		-6	-0.0035	pass
25	V min.= 3.15	-1	-0.0006	pass
25	V max.= 4.23	-1	-0.0006	pass

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	3.7	0	0.0000	pass
-20		2	0.0026	pass
-10		4	0.0047	pass
0		1	0.0013	pass
10		3	0.0038	pass
20		5	0.0064	pass
30		0	0.0000	pass
40		2	0.0026	pass
50		4	0.0048	pass
25	V min.= 3.15	3	0.0038	pass
25	V max.= 4.23	4	0.0049	pass

10.0 MHz Middle Channel, f_o =782.0 MHz (16QAM)				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	2	0.0026	pass
-20		1	0.0013	pass
-10		3	0.0040	pass
0		2	0.0026	pass
10		3	0.0040	pass
20		5	0.0064	pass
30		1	0.0013	pass
40		0	0.0000	pass
50		3	0.0038	pass
25	V min.= 3.15	3	0.0041	pass
25	V max.= 4.23	3	0.0042	pass

FINAL

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