BACL

Bay Area Compliance Labs Corp.

FCC PART 27

TEST REPORT

For

Pycom Ltd

High Point 9 Sydenham Road, Guildford Surrey GU1 3RX, Surrey, United Kingdom

FCC ID: 2AJMTGPY01R

Report Type:	Product Type:
Original Report	GPy

Report Number:	RSH180305055-00
Report Date:	2018-06-12
Reviewed By:	Rocky Kang *(signature: Rocky Kang)* RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Pycom Ltd's* product, model number: GPy 1.0 *(FCC ID: 2AJMTGPY01R)* or the "EUT" in this report was a *GPy*, which was measured approximately: 55 mm (L) × 20 mm (W) × 10 mm (H).

All measurement and test data in this report was gathered from production sample serial number: 180305055 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-03-05.

Objective

This test report is prepared on behalf of *Pycom Ltd* in accordance with Subpart 27 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS, Part 15.247 DTS submissions with FCC ID: 2AJMTGPY01R.

Test Methodology

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

Part 27 – Miscellaneous wireless communications services

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±1.5dB
Unwanted Emission, conducted		±1.5dB
Emissions, radiated	Below 1GHz	±4.70dB
	Above 1GHz	±4.80dB
Temperature		±1℃
Supply voltages		±0.4%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

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

eMTC Auto Mode: Narrowband and resource blocks per cell BW

Test Item	LTE Band	Bandwidth(MHz)				Modulation		RB setting		Test channel
		5	10	15	20	QPSK	16QAM	NB	TBS Idx	
RF Output Power**	4	√	√	√	√	√	√	0	10	L/M/H
	12	√	√	×	×	√	√	0	10	L/M/H
	13	√	√	×	×	√	√	0	10	L/M/H*
Peak-to-average ratio	4	√	√	√	√	√	√	0	10	M
	12	√	√	×	×	√	√	0	10	M
	13	√	√	×	×	√	√	0	10	M
Radiated power	4	√	√	√	√	√	√	0	10	M
	12	√	√	×	×	√	√	0	10	M
	13	√	√	×	×	√	√	0	10	M
Occupied Bandwidth	4	√	√	√	√	√	√	0	10	M
	12	√	√	×	×	√	√	0	10	M
	13	√	√	×	×	√	√	0	10	M
Spurious Emissions at Antenna Terminal	4	√	√	√	√	√	√	0	10	M
	12	√	√	×	×	√	√	0	10	M
	13	√	√	×	×	√	√	0	10	M
Field Strength of Spurious Radiation	4	√	√	√	√	√	√	0	10	M
	12	√	√	×	×	√	√	0	10	M
	13	√	√	×	×	√	√	0	10	M
Band Edge**	4	√	√	√	√	√	√	0/3@5MHz BW 0/7@10MHz BW 0/11@15MHz BW 0/15@20MHz BW	10	L/H
	12	√	√	×	×	√	√	0/3@5MHz BW 0/7@10MHz BW	10	L/H
	13	√	√	×	×	√	√	0/3@5MHz BW 0/7@10MHz BW	10	M*
Frequency stability	4	√	√	√	√	√	√	0	10	M
	12	√	√	×	×	√	√	0	10	M
	13	√	√	×	×	√	√	0	10	M

Note *: only middle channel with LTE band 13 @10MHz bandwidth.
Note**:Both RB 0 and RB 6 were test for QPSK, both RB 0 and RB 5 were test for 16QAM. other item only test RB 6 with QPSK and RB 5 with 16QAM.
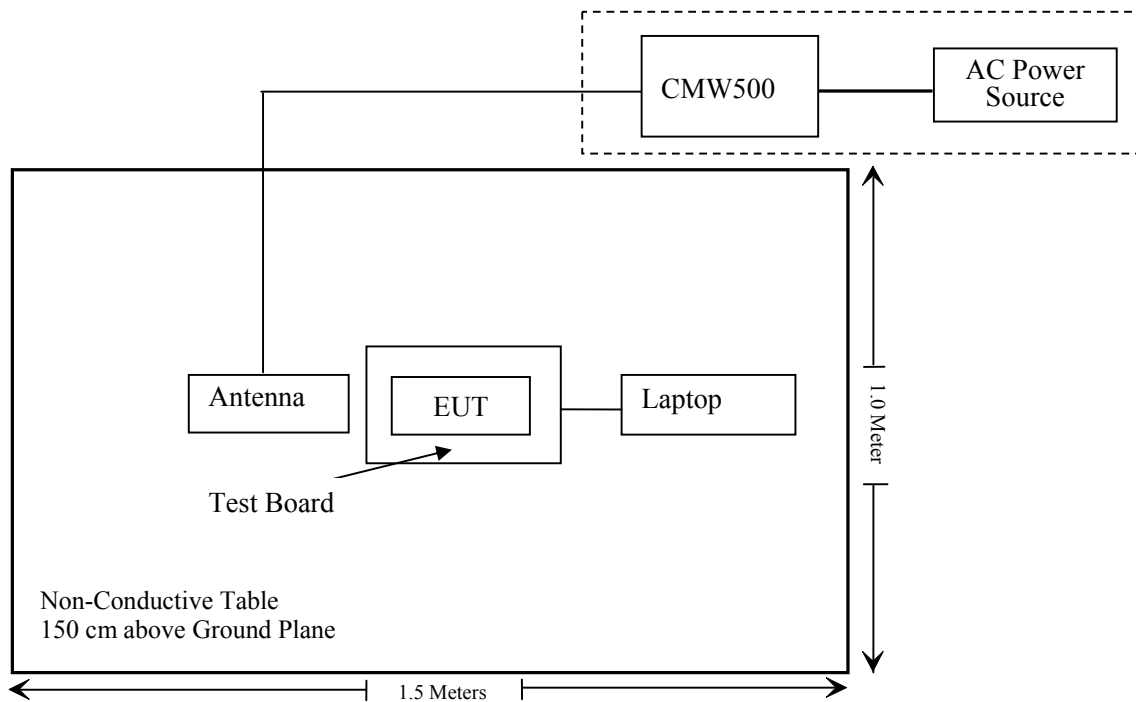
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-116218-UY
DELL	Laptop	E6410	GYXJ3A00 JSD2
Pycom Ltd	Expansion Board	/	1630001501

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§2.1046; §27.50 (b) (c) (d)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049;§27.53	Occupied Bandwidth	Compliance
§ 2.1051; §27.53 (c) (f) (g)(h)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; §27.53 (c) (g) (h)	Field Strength of Spurious Radiation	Compliance
§27.53 (c) (g) (h)	Band Edge	Compliance
§ 2.1055; §27.54;	Frequency stability	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-22	2020-12-21
Rohde & Schwarz	Signal ANALYZER	FSIQ26	8386001028	2018-04-24	2019-04-24
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-05-21	2018-05-21
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-21
Anritsu	Signal Generator	68369B	004114	2017-12-24	2018-12-24
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-19	2018-05-21
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2018-04-24	2019-04-24
Ducommun technologies	RF Cable	RG-214	1	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	2	2017-11-22	2018-05-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2017-12-29	2020-12-28
Ducommun technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2017-12-24	2018-12-24
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2017-12-21	2018-12-21
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Agilent	ESG Vector Signal Generator	E4438C	MY42080875	2018-05-09	2019-05-09
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2018-04-24	2019-04-24
Ducommun technologies	RF Cable	RG-214	3	Each Time	
WEINSCHEL	10dB Attenuator	5324	AU 3842	Each Time	
WEINSCHEL	3dB Attenuator	N/A	N/A	Each Time	
N/A	Power Splitter	N/A	N/A	2017-05-21	2018-05-21

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

FCC §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.

FCC § 2.1046, §27.50(b)(c)(d) - RF OUTPUT POWER

Applicable Standard

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

According to §27.50(c), Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
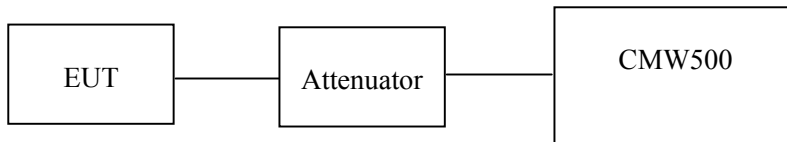
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedure

Conducted method:

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

Radiated method:

TIA 603-D section 2.2.17

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-11.

LTE Band 4:

Maximum Output Power

Bandwidth (MHz)	Modulation	RB size/ NB Index	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=0, Index=10	22.01	22.02	21.96
		RB Size=6, Index=10	22.12	22.16	22.02
	16QAM	RB Size=0, Index=10	22.17	22.03	21.89
		RB Size=5, Index=10	21.96	22.06	21.92
10.0	QPSK	RB Size=0, Index=10	21.86	21.79	21.74
		RB Size=6, Index=10	21.75	21.94	21.59
	16QAM	RB Size=0, Index=10	21.79	21.89	21.95
		RB Size=5, Index=10	21.84	21.86	21.76
15.0	QPSK	RB Size=0, Index=10	22.12	22.13	22.10
		RB Size=6, Index=10	22.06	22.22	22.06
	16QAM	RB Size=0, Index=10	22.18	22.31	22.19
		RB Size=5, Index=10	22.14	22.19	21.96
20.0	QPSK	RB Size=0, Index=10	22.21	22.15	22.29
		RB Size=6, Index=10	22.14	22.16	22.35
	16QAM	RB Size=0, Index=10	22.09	22.24	22.21
		RB Size=5, Index=10	22.36	22.18	22.24

Peak-to-average ratio (PAR)

Bandwidth	Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
5MHz	QPSK	5.16	13	Pass
	16QAM	5.25	13	Pass
10MHz	QPSK	5.19	13	Pass
	16QAM	5.32	13	Pass
15MHz	QPSK	5.29	13	Pass
	16QAM	5.46	13	Pass
20MHz	QPSK	5.28	13	Pass
	16QAM	5.51	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
1732.50	86.56	175	1.3	H	13.5	1.30	9.10	21.3	30
1732.50	84.56	132	1.5	V	12.0	1.30	9.10	19.8	30
10 MHz Bandwidth									
1732.50	85.76	15	1.5	H	12.7	1.30	9.10	20.5	30
1732.50	84.89	245	1.5	V	12.5	1.30	9.10	20.3	30
15 MHz Bandwidth									
1732.50	85.71	186	1.4	H	12.6	1.30	9.10	20.4	30
1732.50	83.25	12	1.3	V	10.8	1.30	9.10	18.6	30
20 MHz Bandwidth									
1732.50	85.96	186	1.5	H	12.6	1.30	9.10	20.4	30
1732.50	84.42	0	1.6	V	11.8	1.30	9.10	19.6	30

16QAM:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
1732.50	87.54	256	1.3	H	14.4	1.30	9.10	22.2	30
1732.50	86.25	312	1.2	V	13.6	1.30	9.10	21.4	30
10 MHz Bandwidth									
1732.50	86.35	245	1.3	H	13.3	1.30	9.10	21.1	30
1732.50	86.13	186	1.3	V	13.7	1.30	9.10	21.5	30
15 MHz Bandwidth									
1732.50	87.30	167	1.5	H	14.2	1.30	9.10	22	30
1732.50	85.53	142	1.4	V	12.8	1.30	9.10	20.6	30
20 MHz Bandwidth									
1732.50	85.50	169	1.5	H	12.1	1.30	9.10	19.9	30
1732.50	84.12	14	1.6	V	11.5	1.30	9.10	19.3	30

LTE Band 12:

Bandwidth (MHz)	Modulation	RB size/ NB Index	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5	QPSK	RB Size=1, Index=10	22.02	21.99	21.93
		RB Size=6, Index=10	22.18	21.86	21.91
	16QAM	RB Size=1, Index=10	22.11	21.79	21.78
		RB Size=5, Index=10	22.16	21.93	21.73
10	QPSK	RB Size=1, Index=10	21.76	22.06	22.15
		RB Size=6, Index=10	21.59	22.08	22.03
	16QAM	RB Size=1, Index=10	21.79	21.86	22.09
		RB Size=5, Index=10	21.86	21.90	21.93

Peak-to-average ratio (PAR)

Bandwidth	Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
5MHz	QPSK	5.69	13	Pass
	16QAM	5.18	13	Pass
10MHz	QPSK	4.95	13	Pass
	16QAM	4.89	13	Pass

ERP:

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
707.5	90.53	136	1.3	H	21.1	0.62	0	20.48	34.77
707.5	90.00	111	1.2	V	21.0	0.62	0	20.38	34.77
10 MHz Bandwidth									
707.5	90.85	120	1.4	H	21.1	0.62	0	20.48	34.77
707.5	90.13	136	1.4	V	20.6	0.62	0	19.98	34.77

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5MHz Bandwidth									
707.5	90.25	185	1.4	H	20.8	0.62	0	20.18	34.77
707.5	89.20	120	1.5	V	20.5	0.62	0	19.88	34.77
10 MHz Bandwidth									
707.5	90.53	145	1.3	H	20.8	0.62	0	20.18	34.77
707.5	89.32	122	1.4	V	19.8	0.62	0	19.18	34.77

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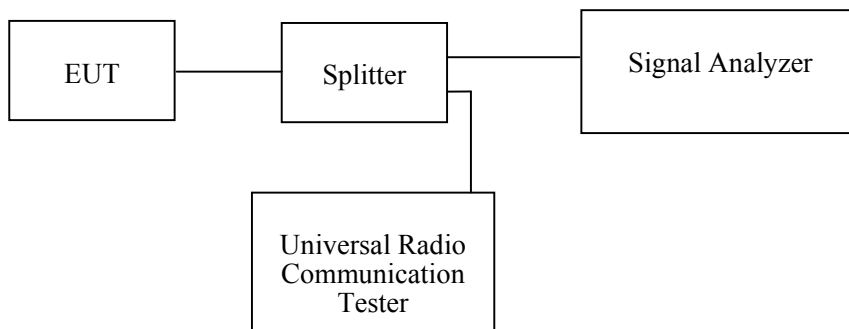Margin = Limit- Absolute Level

LTE Band 13:

Bandwidth (MHz)	Modulation	RB size/ NB Index	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5	QPSK	RB Size=1, Index=10	22.35	22.11	22.34
		RB Size=6, Index=10	22.10	22.07	22.26
	16QAM	RB Size=1, Index=10	22.15	22.16	22.18
		RB Size=5, Index=10	21.98	22.19	22.27
10	QPSK	RB Size=1, Index=10	/	22.19	/
		RB Size=6, Index=10	/	22.31	/
	16QAM	RB Size=1, Index=10	/	22.24	/
		RB Size=5, Index=10	/	22.12	/

Peak-to-average ratio (PAR)

Bandwidth	Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
5MHz	QPSK	5.35	13	Pass
	16QAM	5.16	13	Pass
10MHz	QPSK	5.49	13	Pass
	16QAM	5.80	13	Pass

ERP:

QPSK:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
782	90.03	153	1.6	H	20.5	0.65	0	19.85	34.77
782	90.04	189	1.4	V	20.5	0.65	0	19.85	34.77
10 MHz Bandwidth									
782	90.13	130	1.4	H	20.7	0.65	0	20.05	34.77
782	90.75	165	1.5	V	20.5	0.65	0	19.85	34.77

16QAM:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5MHz Bandwidth									
782	90.34	122	1.5	H	20.9	0.65	0	20.25	34.77
782	89.16	145	1.4	V	19.7	0.65	0	19.05	34.77
10 MHz Bandwidth									
782	90.55	136	1.3	H	21.1	0.65	0	20.45	34.77
782	90.23	146	1.6	V	20.0	0.65	0	19.35	34.77

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

FCC §2.1049 & §27.53 - OCCUPIED BANDWIDTH

Applicable Standard

FCC 47 §2.1049 and §27.53.

Test Procedure

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

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

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┌─────────┐      ┌──────────┐      ┌──────────────────┐
│   EUT   │──────│ Splitter │──────│ Signal Analyzer  │
└─────────┘      └──────────┘      └──────────────────┘
                      │
                 ┌──────────────┐
                 │  Universal   │
                 │    Radio     │
                 │Communication │
                 │    Tester    │
                 └──────────────┘
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Test Data

Environmental Conditions

Temperature:	24~25 ℃
Relative Humidity:	48~52 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Jacob Kong from 2018-05-11 to 2018-05-12.

EUT operation mode: Transmitting

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

LTE Band 4: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	1.128799	1.50650
	16QAM	0.981187	1.40230
10.0	QPSK	1.128799	1.47610
	16QAM	0.968162	1.42840
15.0	QPSK	1.120116	1.47180
	16QAM	0.989870	1.41970
20.0	QPSK	1.128797	1.48910
	16QAM	0.963821	1.42400

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
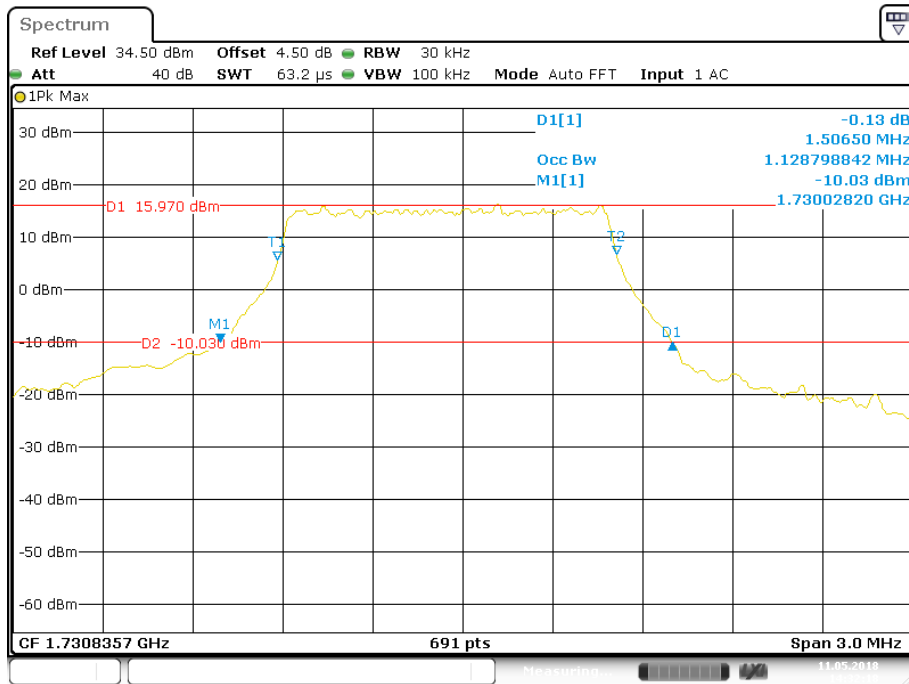
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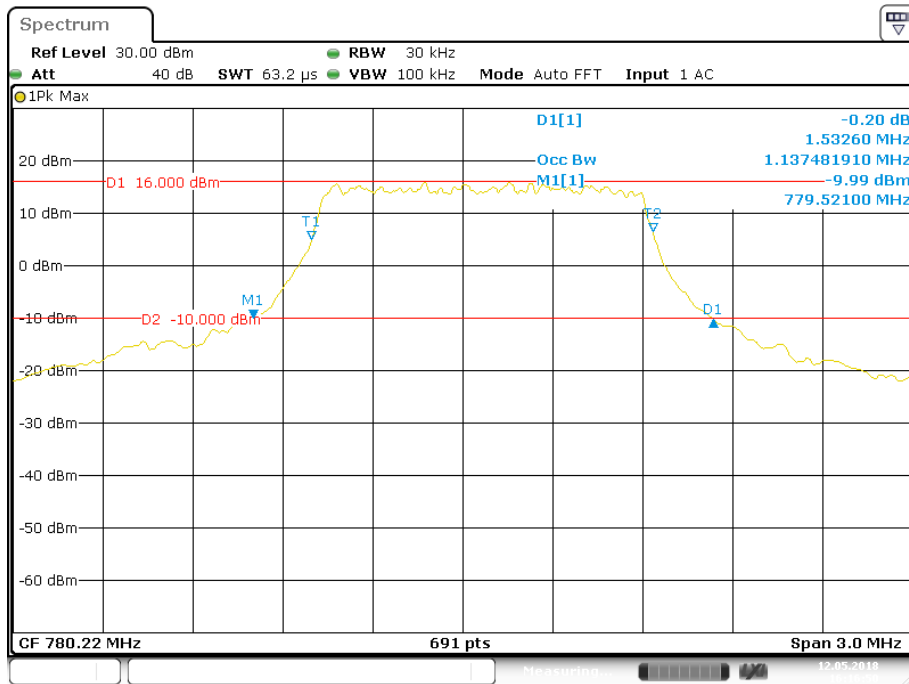## 16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
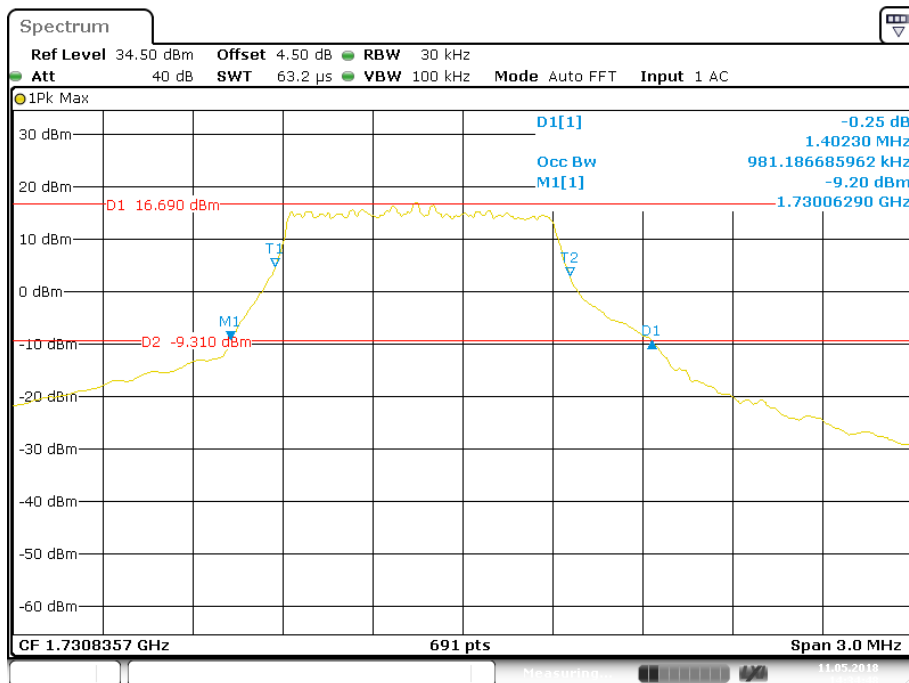
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QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
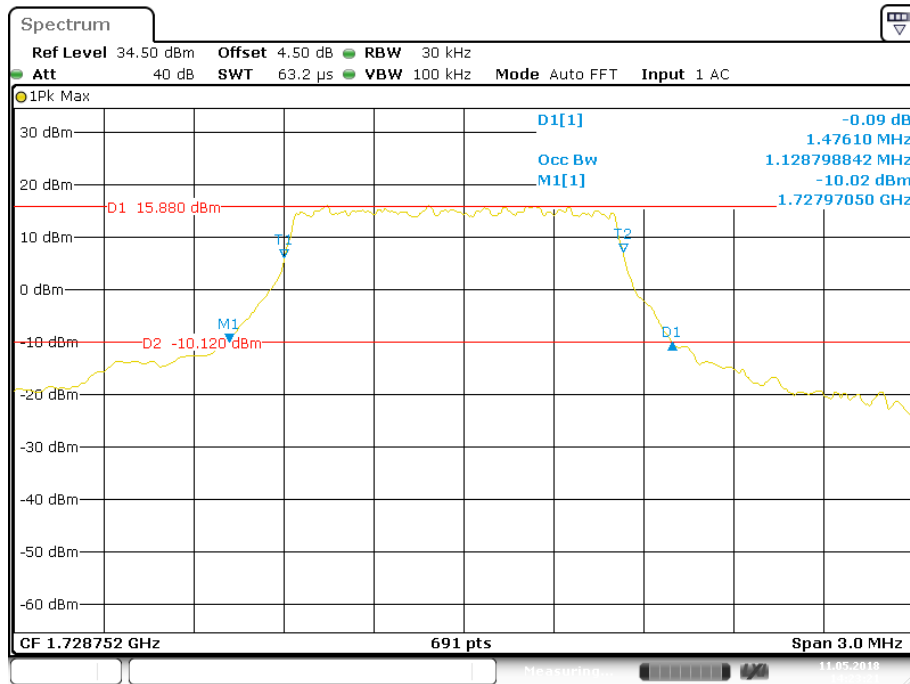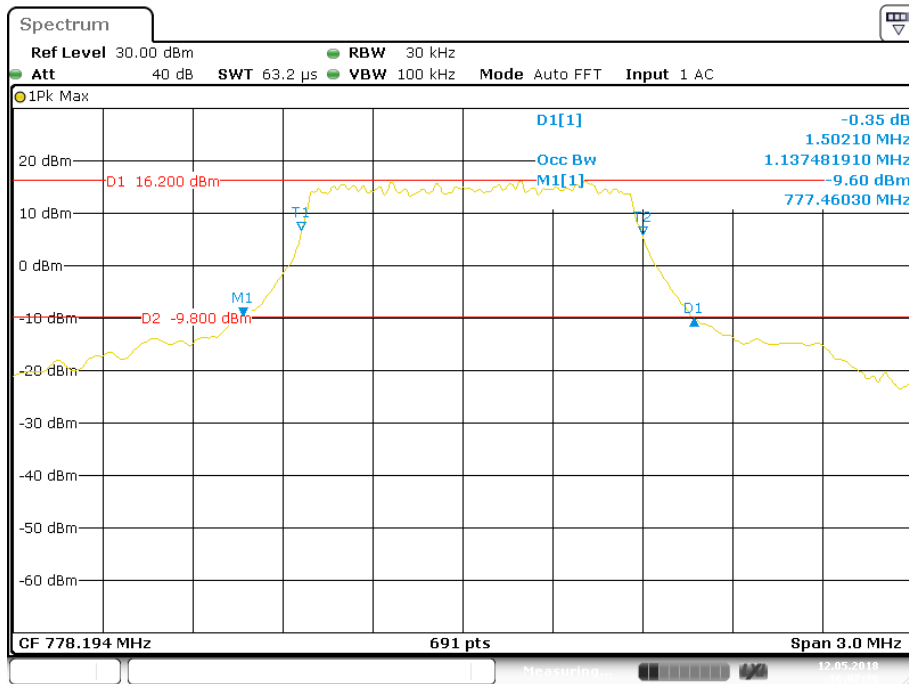

Date: 11.MAY.2018 14:23:22

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
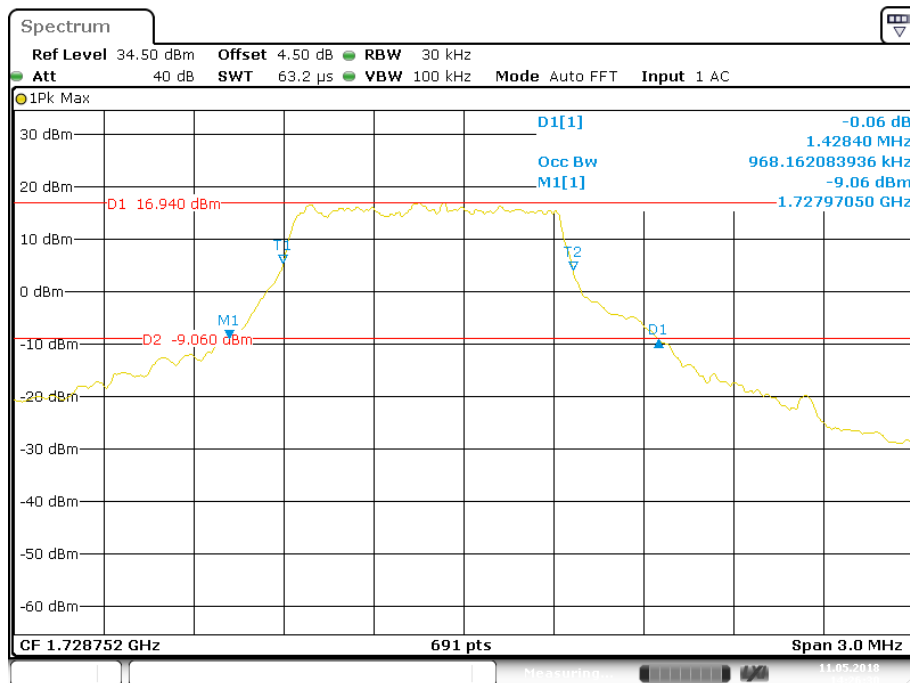
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QPSK (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
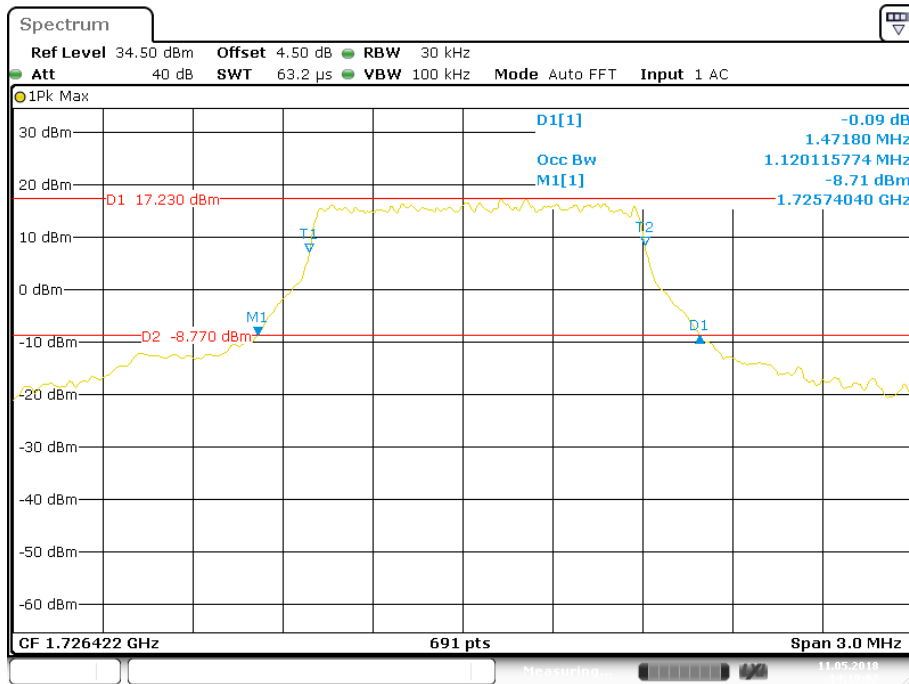
Date: 11.MAY.2018 14:19:08

**16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**
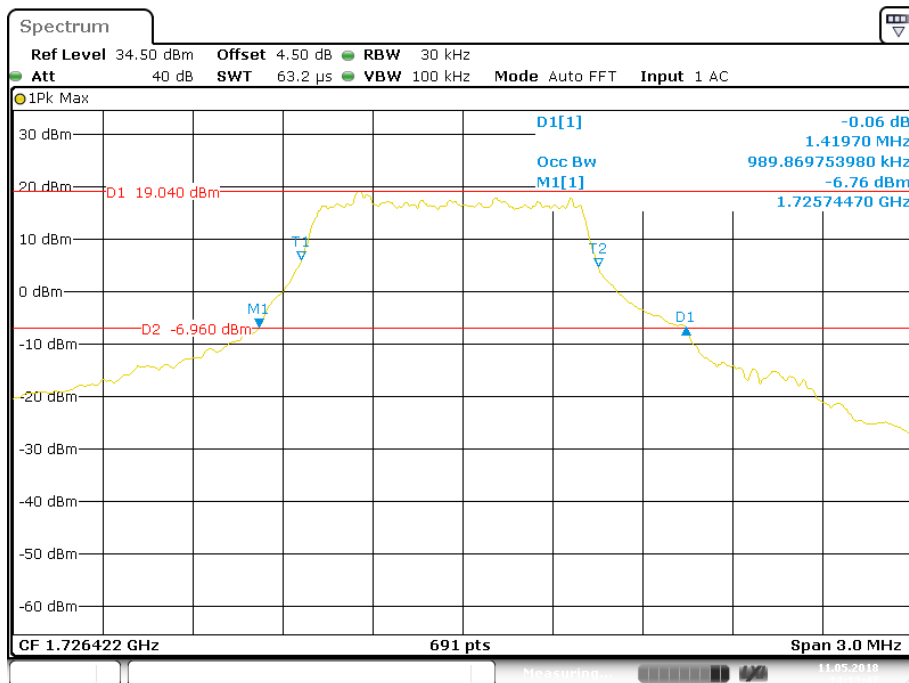
Date: 11.MAY.2018 14:13:47

QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
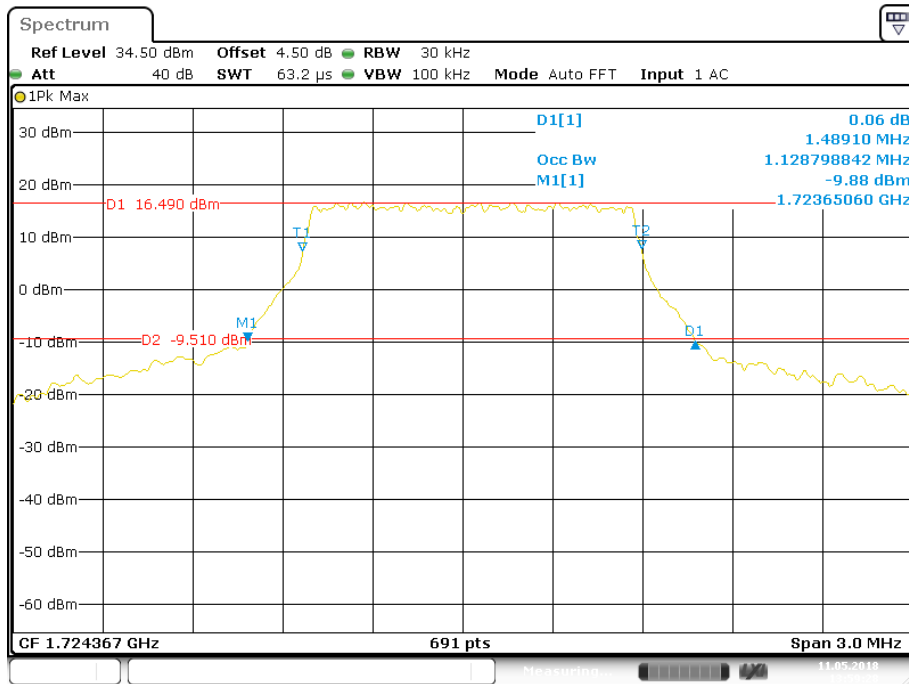
Date: 11.MAY.2018 13:59:29

16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
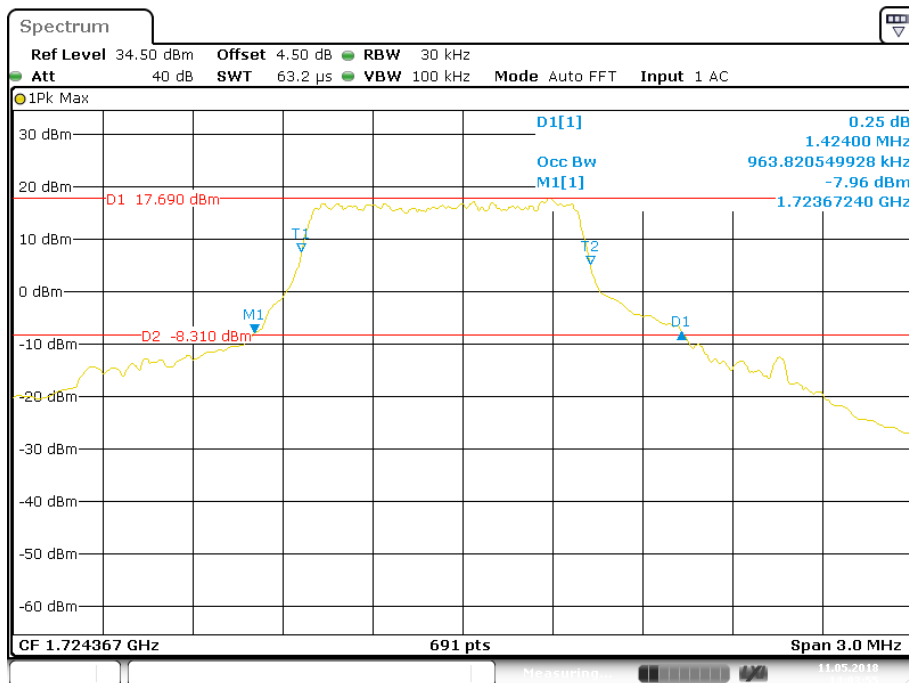
Date: 11.MAY.2018 14:03:55

LTE Band 12: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	1.124457	1.44980
	16QAM	0.972504	1.45880
10.0	QPSK	1.128799	1.47610
	16QAM	0.968162	1.43270

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
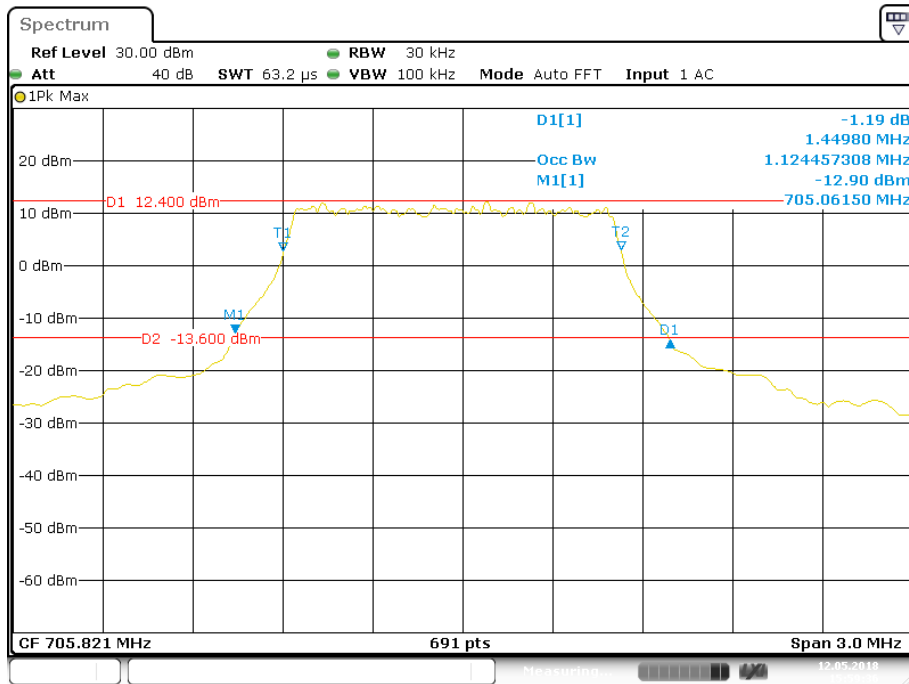
Date: 12.MAY.2018 15:59:36

16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
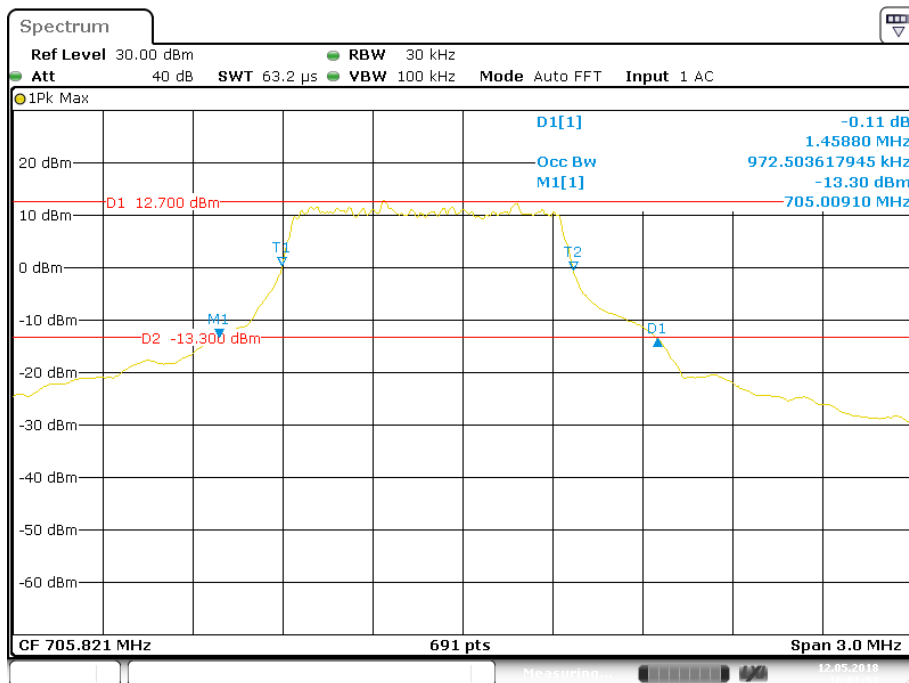
Date: 12.MAY.2018 16:01:54

QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
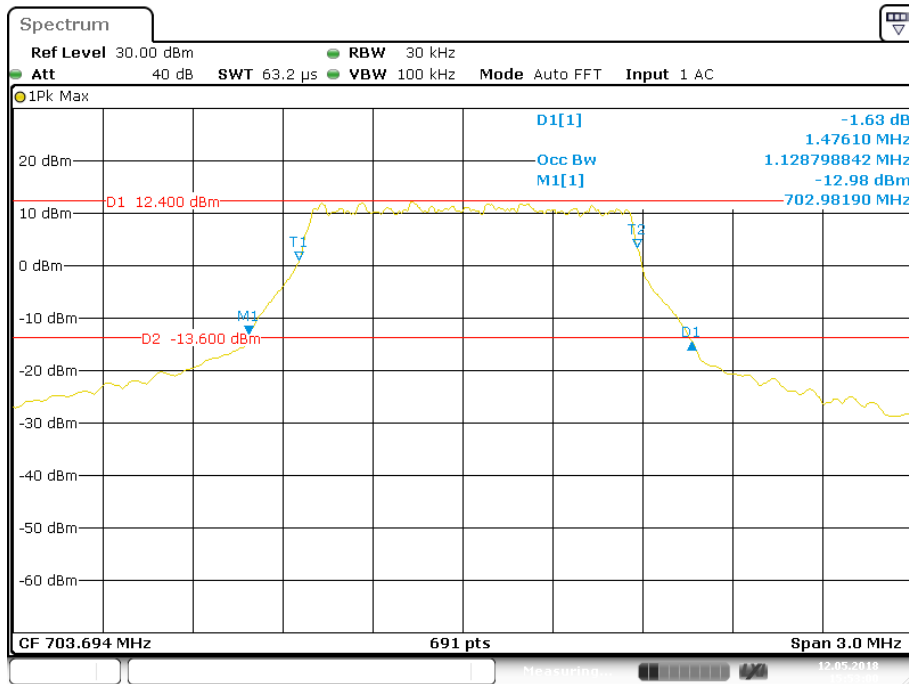
Date: 12.MAY.2018 15:53:00

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
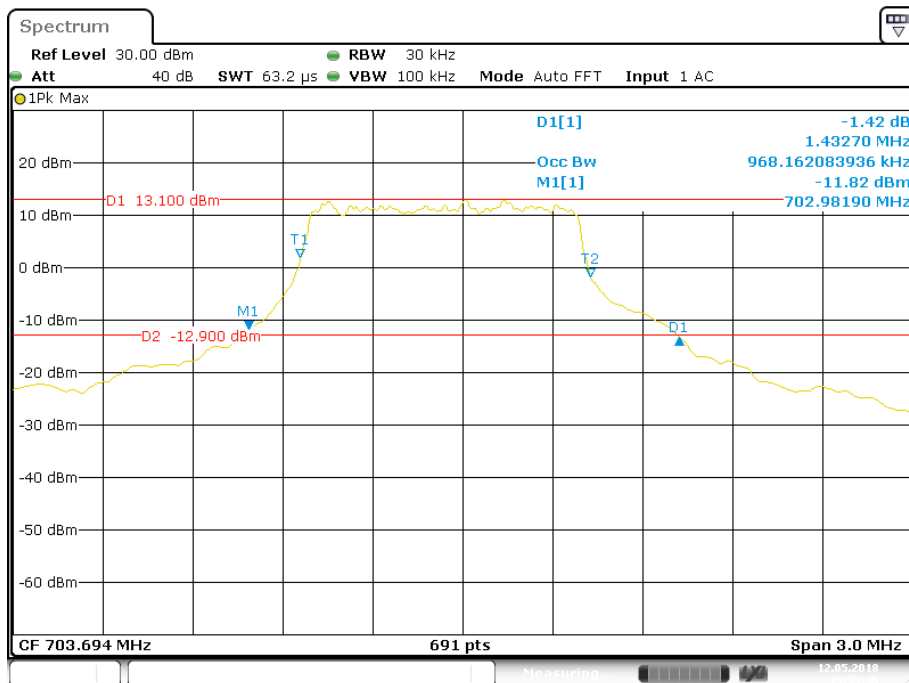
Date: 12.MAY.2018 15:55:47

LTE Band 13: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	1.137482	1.53260
	16QAM	0.963821	1.46740
10.0	QPSK	1.137482	1.50210
	16QAM	0.972504	1.48040

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

Date: 12.MAY.2018 16:16:51

16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
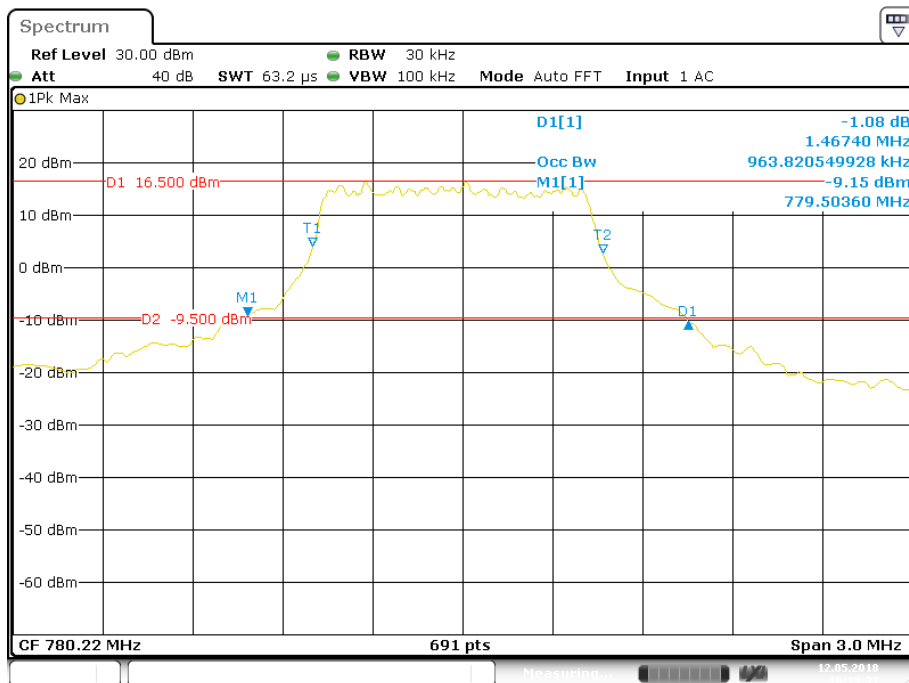
Date: 12.MAY.2018 16:19:32

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

Date: 12.MAY.2018 16:07:36

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
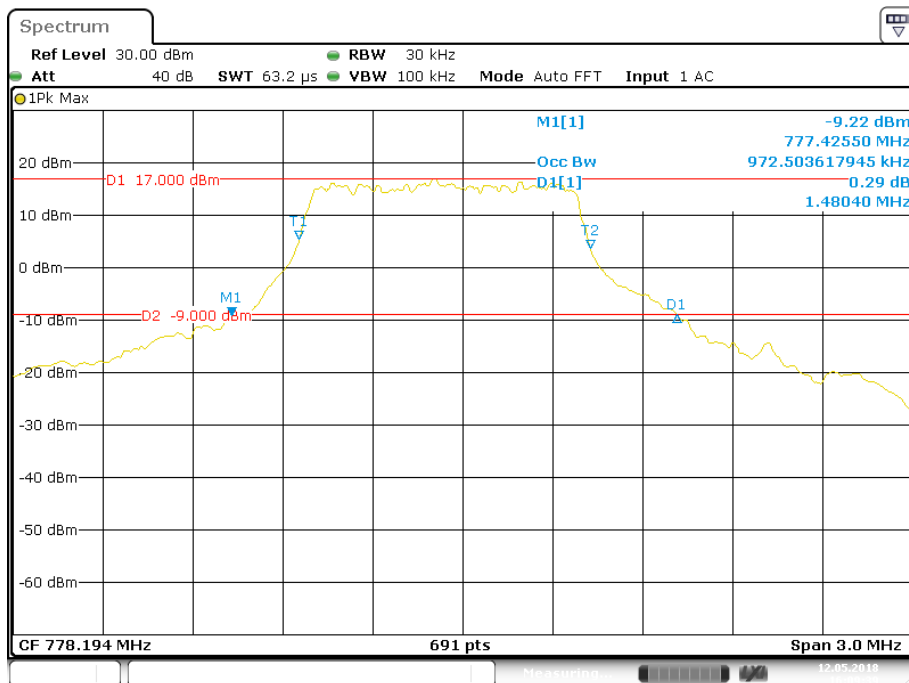
Date: 12.MAY.2018 16:09:40

FCC §2.1051 §27.53 (c) (f) (g) (h) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC §2.1051 and §27.53(c) (f) (g) (h).

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

Test Procedure

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

```
┌─────────┐        ┌─────────┐        ┌──────────────────┐
│   EUT   │────────│ Splitter│────────│  Signal Analyzer │
└─────────┘        └─────────┘        └──────────────────┘
                        │
                   ┌─────────┐
                   │ CMW500  │
                   └─────────┘
```
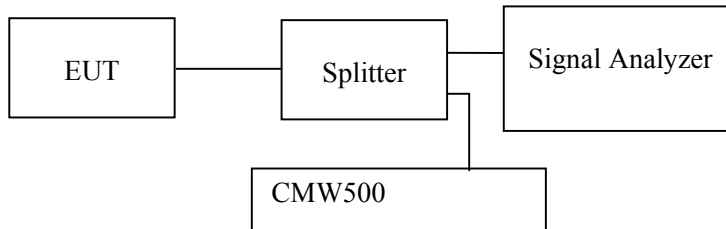
Test Data

Environmental Conditions

Temperature:	24~25 ℃
Relative Humidity:	59~52 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Jacob Kong from 2018-05-12 to 2018-05-13.

Test result: Compliance.

EUT operation mode: transmitting

Please refer to the following plots.

LTE Band 4:

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


```
                                        *RBW  100 kHz     Marker 1 [T1 ]
                                        *VBW  300 kHz              -56.80 dBm
        Ref   19.5 dBm        *Att  10 dB     SWT  100 ms     737.291666667 MHz
          Offset    4.5 dB
```
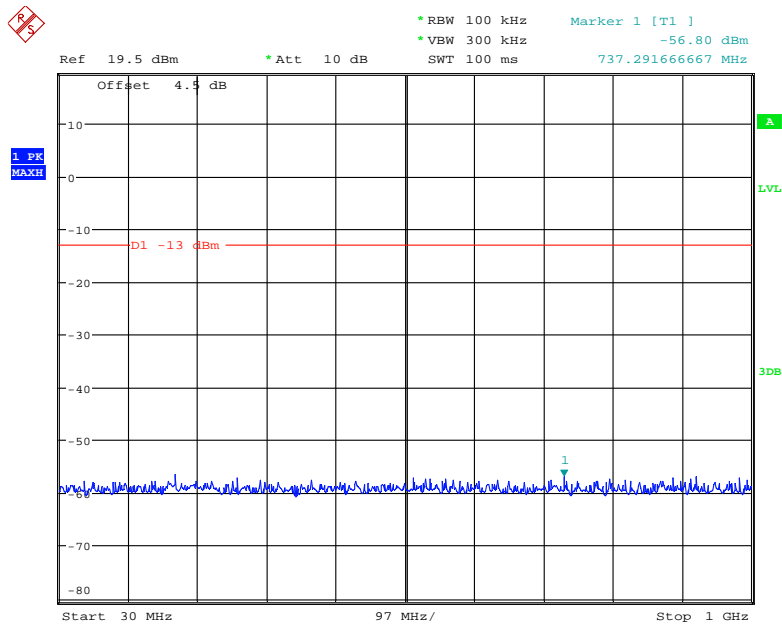
Date: 12.MAY.2018 21:51:32

1 GHz – 2 GHz (QPSK 5.0 MHz, Middle Channel)


```
                                        *RBW  1 MHz       Marker 1 [T1 ]
                                        *VBW  3 MHz               -37.24 dBm
        Ref   29.5 dBm        *Att  20 dB     SWT  2.5 ms    1.620192308 GHz
          Offset    4.5 dB
```

Fundamental test
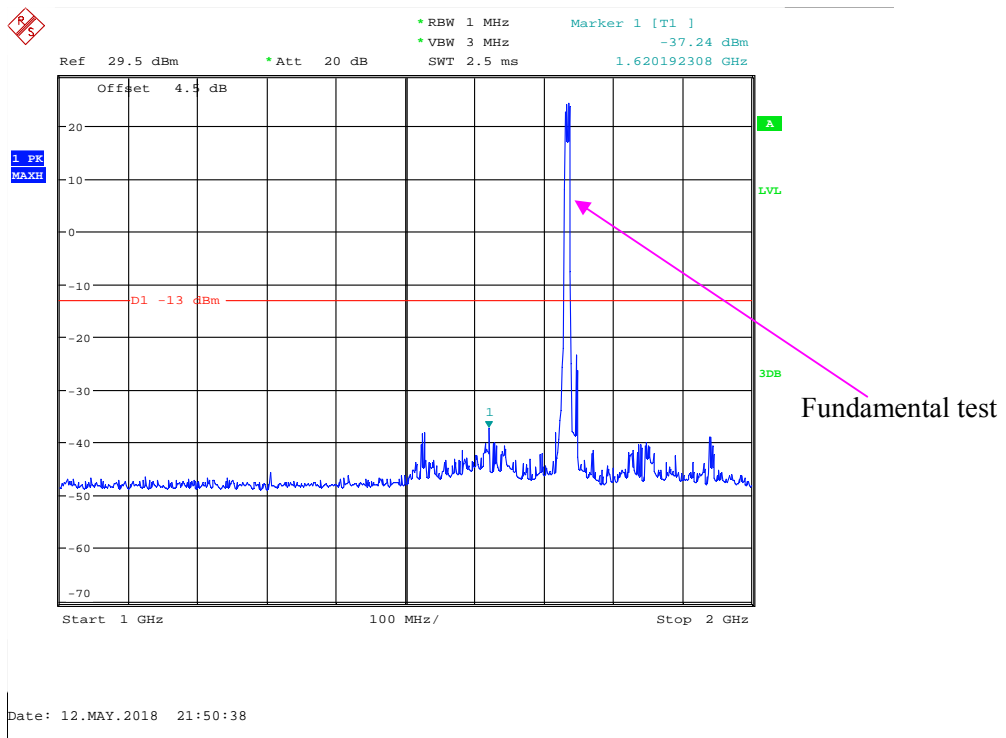
Date: 12.MAY.2018 21:50:38

2 GHz – 20 GHz (QPSK 5.0 MHz, Middle Channel)
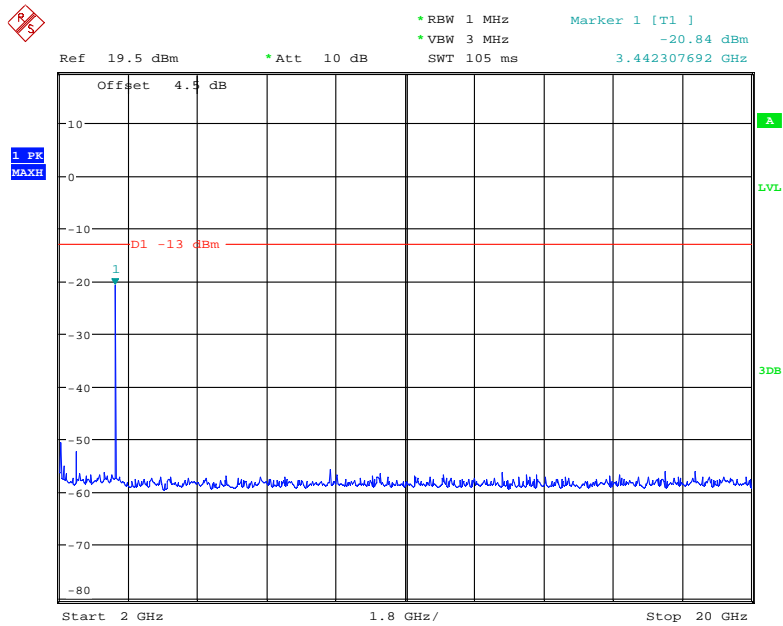
Date: 12.MAY.2018 21:48:17

30 MHz - 1 GHz (QPSK 10.0 MHz, Middle Channel)
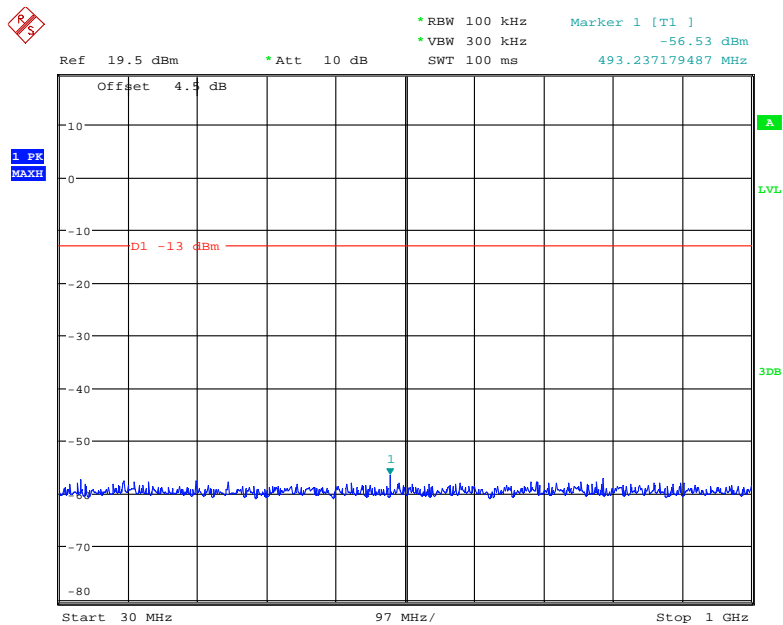
Date: 12.MAY.2018 21:44:26

1 GHz – 2 GHz (QPSK 10.0 MHz, Middle Channel)

Fundamental test
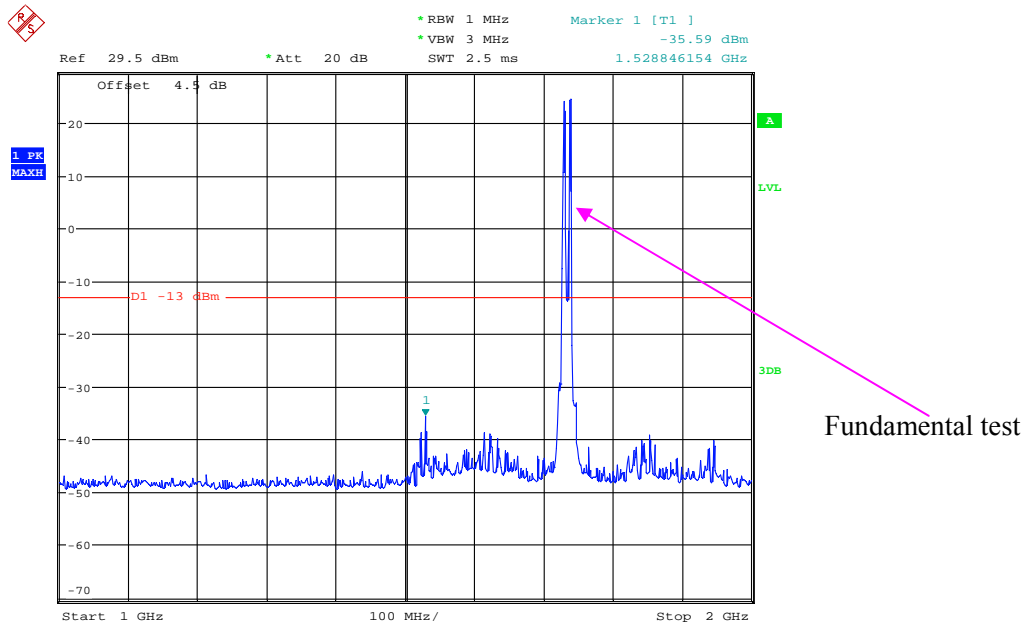
Date: 12.MAY.2018 21:46:07

2 GHz – 20 GHz (QPSK 10.0 MHz, Middle Channel)
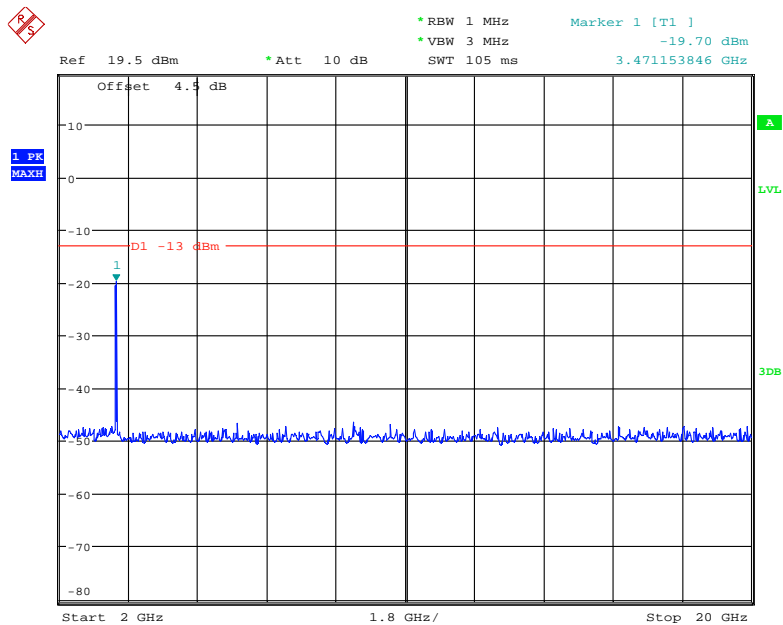
Date: 12.MAY.2018 21:46:35
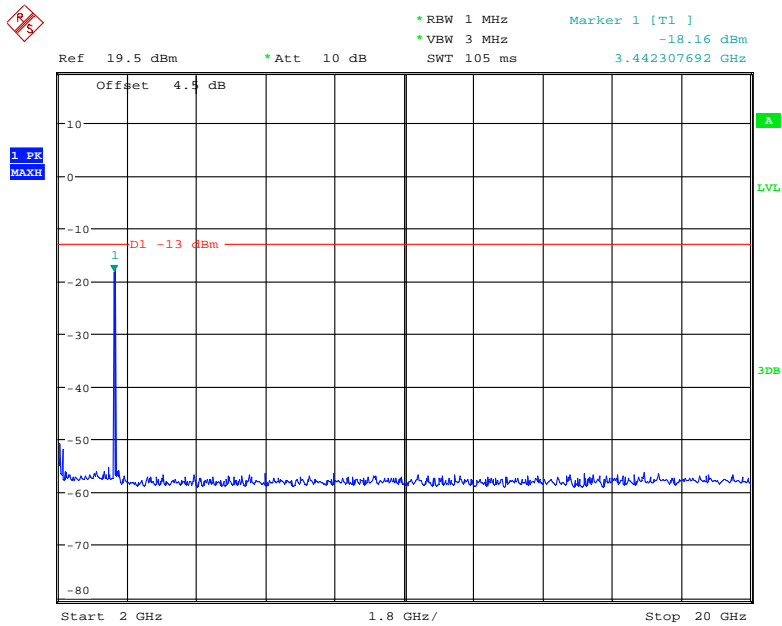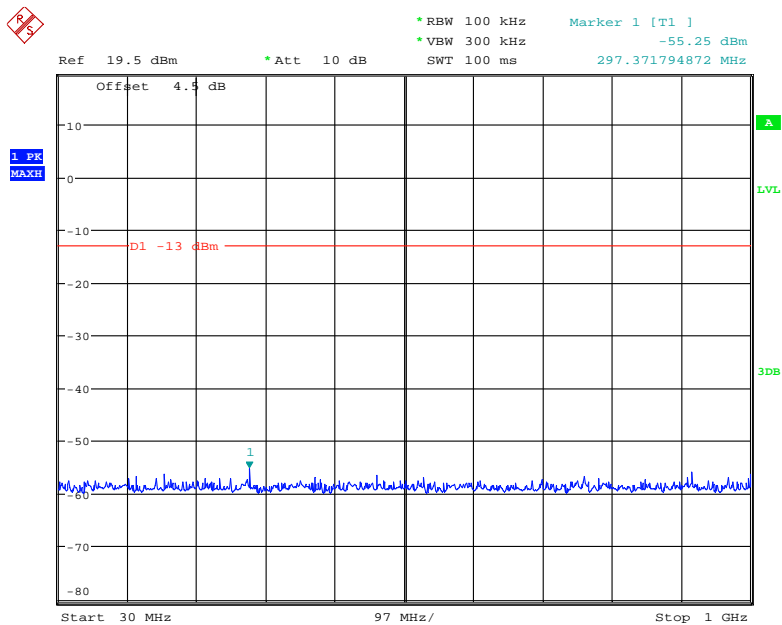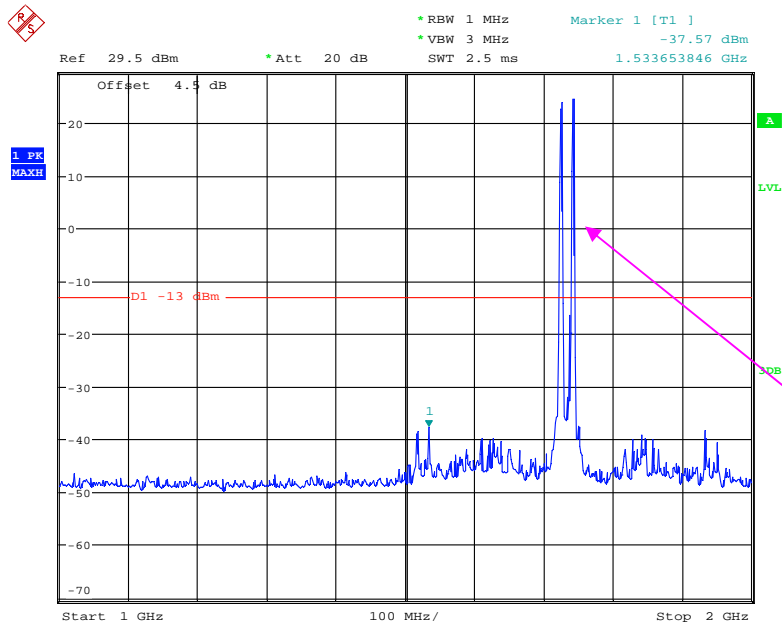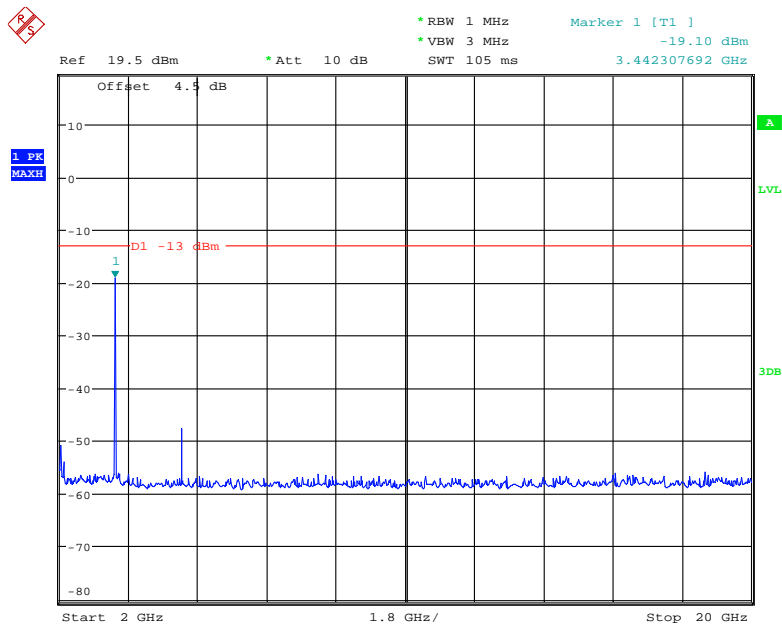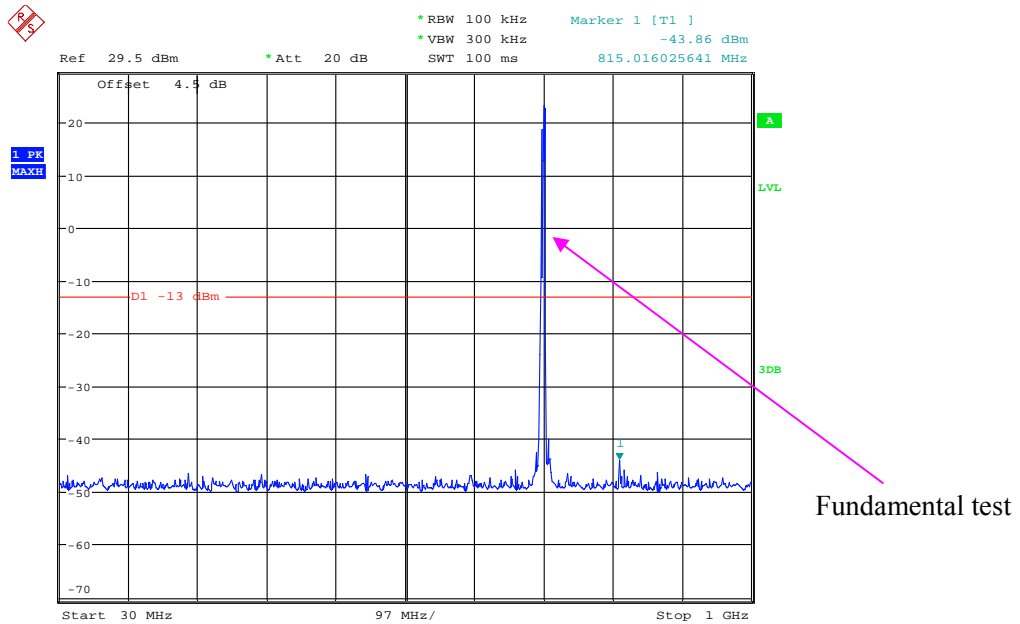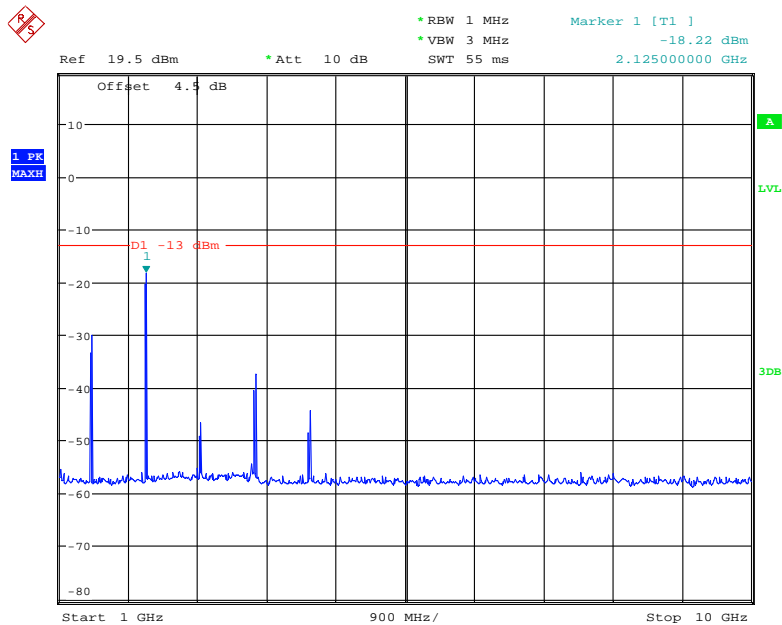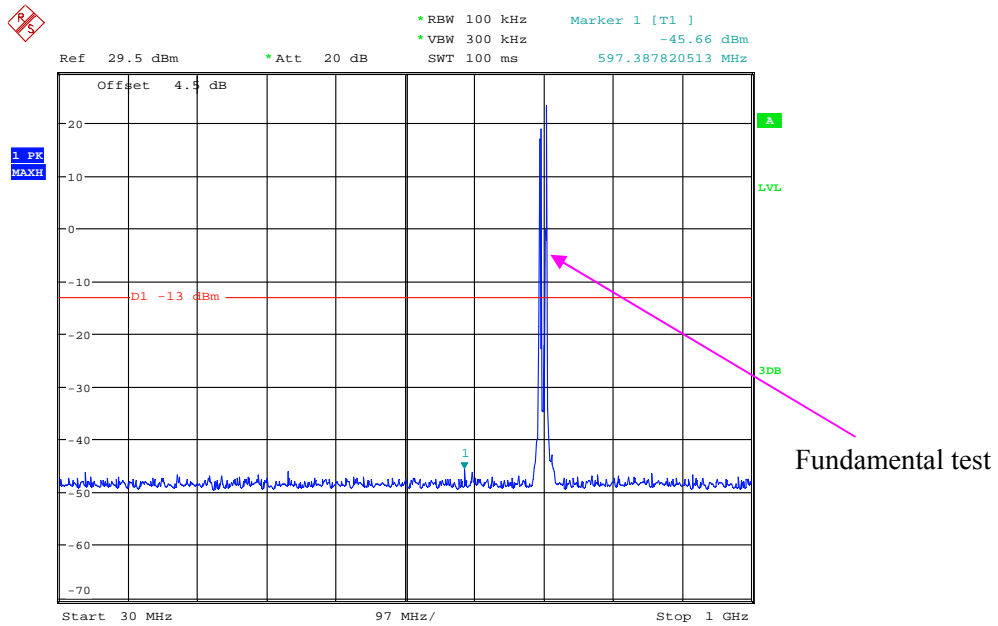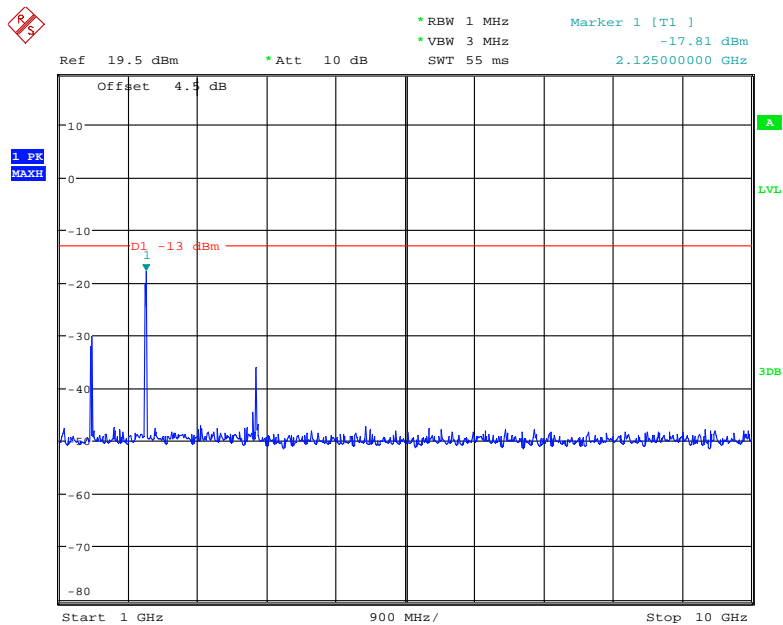
30 MHz - 1 GHz (QPSK 15.0 MHz, Middle Channel)

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz              -55.73 dBm
        Ref  19.5 dBm    *Att  10 dB    SWT 100 ms    289.599358974 MHz
           Offset  4.5 dB
```
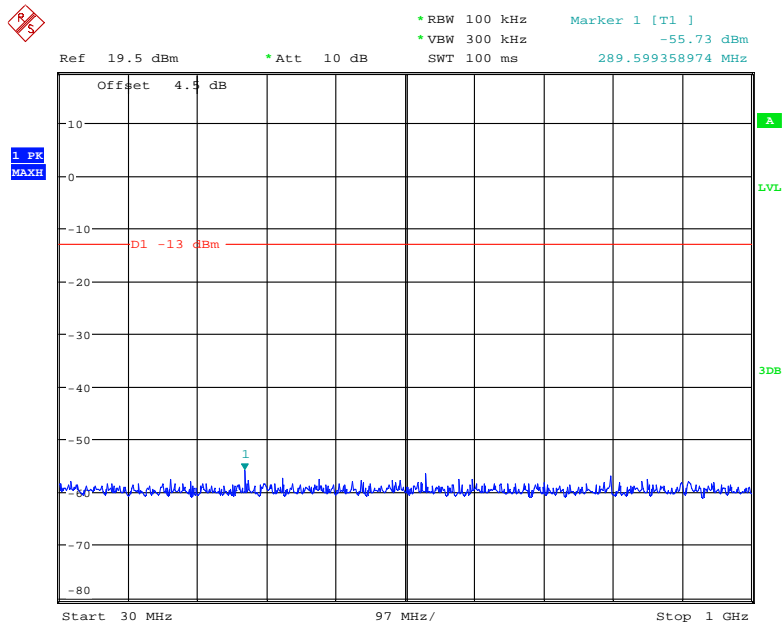
Date: 12.MAY.2018 21:42:37

1 GHz – 2 GHz (QPSK 15.0 MHz, Middle Channel)

```
                                    *RBW 1 MHz      Marker 1 [T1 ]
                                    *VBW 3 MHz               -36.92 dBm
        Ref  29.5 dBm    *Att  20 dB    SWT 2.5 ms    1.636217949 GHz
           Offset  4.5 dB
```
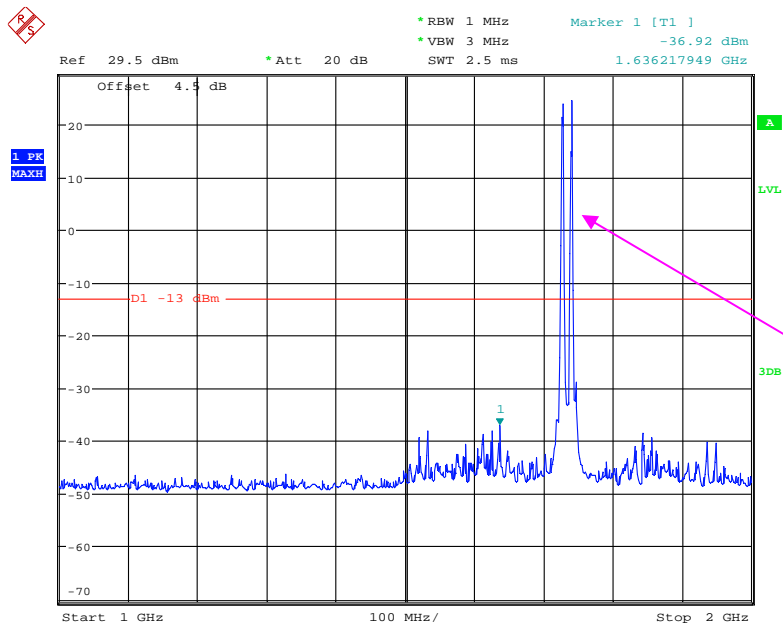
Fundamental test

Date: 12.MAY.2018 21:42:05

2 GHz – 20 GHz (QPSK 15.0 MHz, Middle Channel)

```
                                    *RBW 1 MHz        Marker 1 [T1 ]
                                    *VBW 3 MHz              -18.16 dBm
        Ref  19.5 dBm    *Att  10 dB   SWT 105 ms      3.442307692 GHz
           Offset  4.5 dB
```

Date: 12.MAY.2018 21:39:41

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

```
                                    *RBW 100 kHz      Marker 1 [T1 ]
                                    *VBW 300 kHz            -55.25 dBm
        Ref  19.5 dBm    *Att  10 dB   SWT 100 ms      297.371794872 MHz
           Offset  4.5 dB
```

Date: 12.MAY.2018 21:28:54

1 GHz – 2 GHz (QPSK 20.0 MHz, Middle Channel)
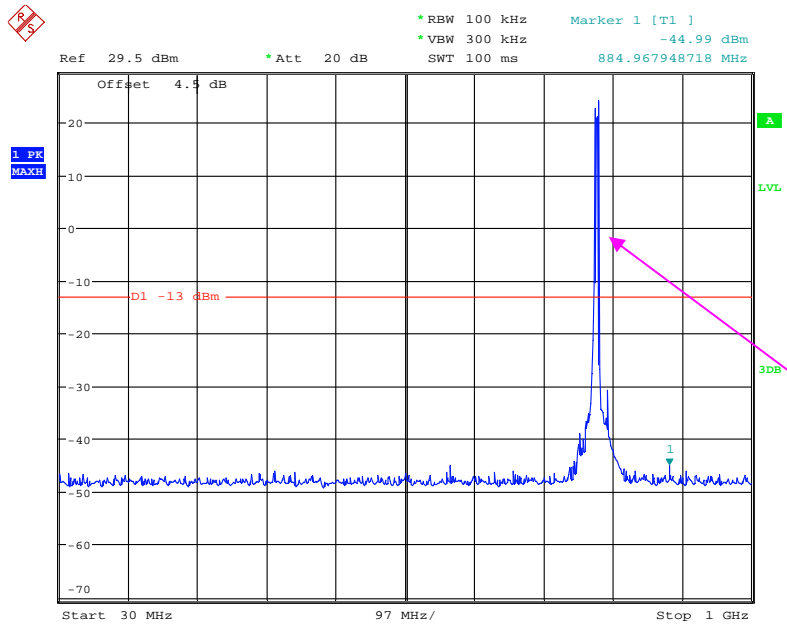

Fundamental test

Date: 12.MAY.2018 21:32:03

2 GHz – 20 GHz (QPSK 20.0 MHz, Middle Channel)
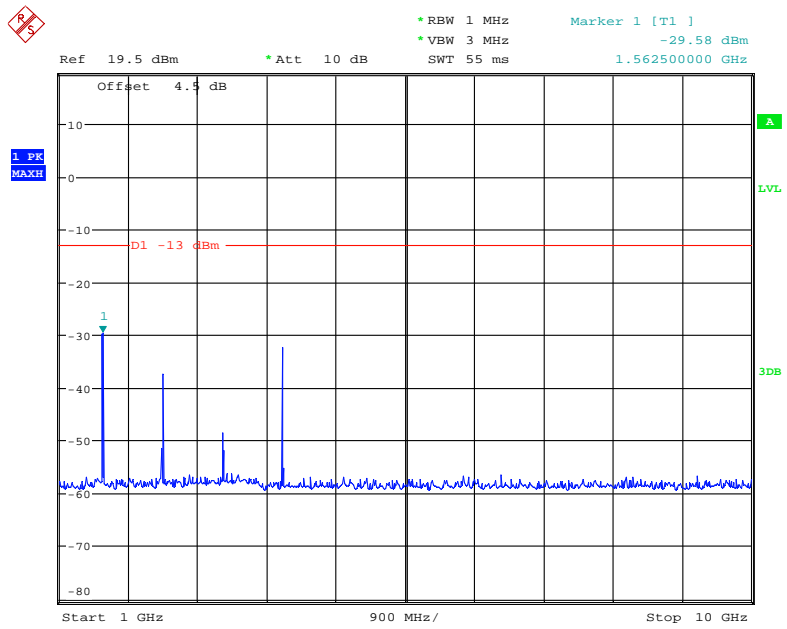

Date: 12.MAY.2018 21:33:08

LTE Band 12:

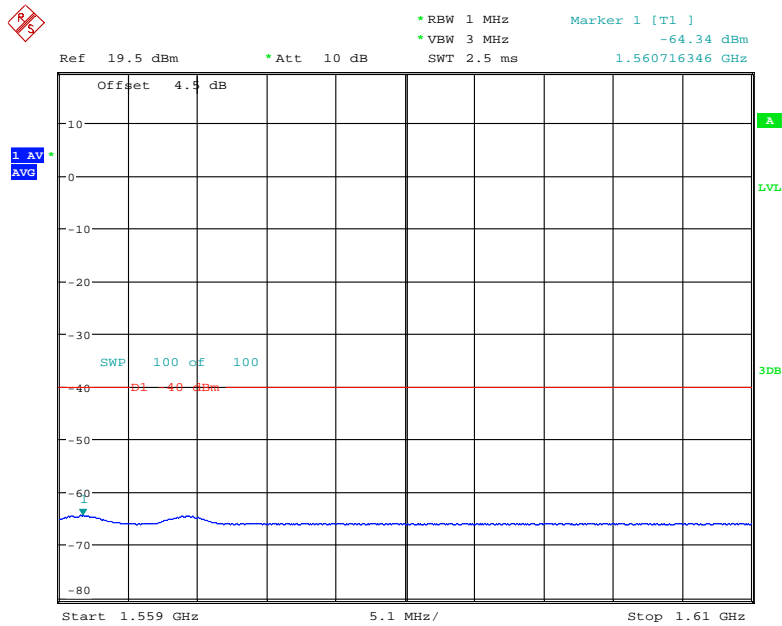### 30 MHz – 1 GHz (QPSK 5.0 MHz, Middle Channel)

Fundamental test

Date: 12.MAY.2018 20:20:22

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

Date: 12.MAY.2018 20:16:59

30 MHz – 1 GHz (QPSK 10.0 MHz, Middle Channel)

Fundamental test

Date: 12.MAY.2018 20:02:02

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

Date: 12.MAY.2018 20:23:12

LTE Band 13:

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

Fundamental test

Date: 12.MAY.2018 18:44:24
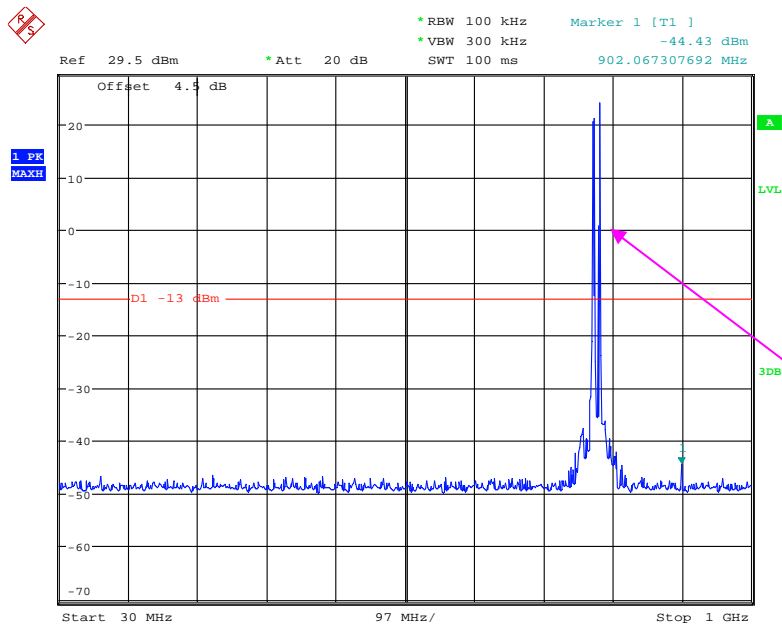
1 GHz – 10GHz (QPSK 5.0 MHz, Middle Channel)

Date: 12.MAY.2018 18:50:07

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

Date: 12.MAY.2018 18:51:58
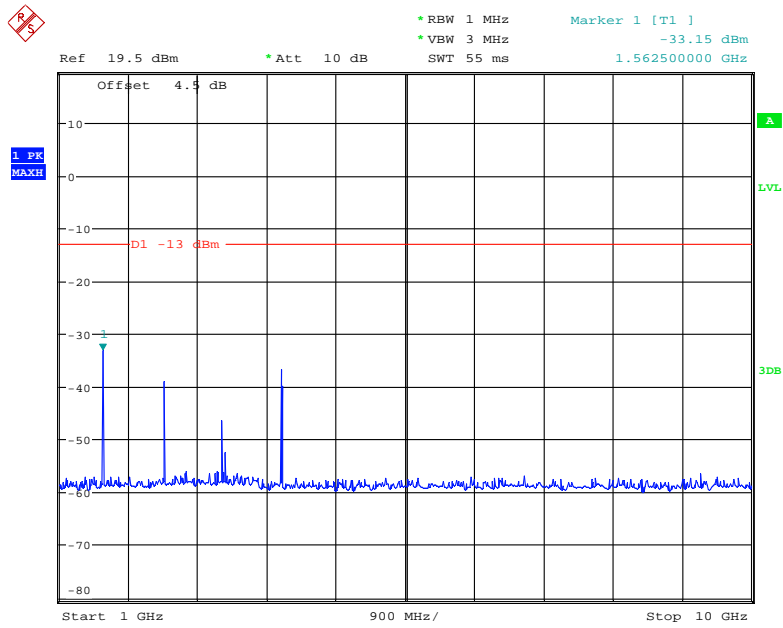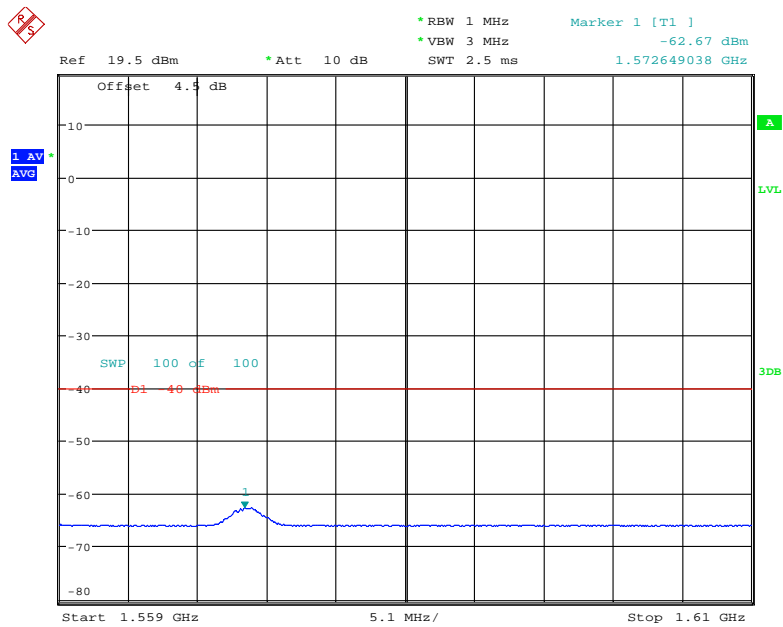
30 MHz – 1 GHz (QPSK 10.0 MHz, Middle Channel)

Date: 12.MAY.2018 19:02:13

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

```
                                    *RBW 1 MHz        Marker 1 [T1 ]
                                    *VBW 3 MHz              -33.15 dBm
        Ref  19.5 dBm      *Att  10 dB    SWT 55 ms      1.562500000 GHz
            Offset  4.5 dB                                              A
  1 PK    -10
  MAXH    -0                                                           LVL
            -10
        -D1 -13 dBm
            -20
            -30-1
            -40                                                        3DB
            -50
            -60
            -70
            -80
        Start  1 GHz              900 MHz/            Stop  10 GHz
```

Date: 12.MAY.2018 18:58:19

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

```
                                    *RBW 1 MHz        Marker 1 [T1 ]
                                    *VBW 3 MHz              -62.67 dBm
        Ref  19.5 dBm      *Att  10 dB    SWT 2.5 ms     1.572649038 GHz
            Offset  4.5 dB                                              A
  1 AV *  -10
  AVG     -0                                                           LVL
            -10
            -20
            -30
        SWP  100 of   100
            -40-D1 -40 dBm                                             3DB
            -50
            -60       1
            -70
            -80
        Start 1.559 GHz            5.1 MHz/            Stop 1.61 GHz
```
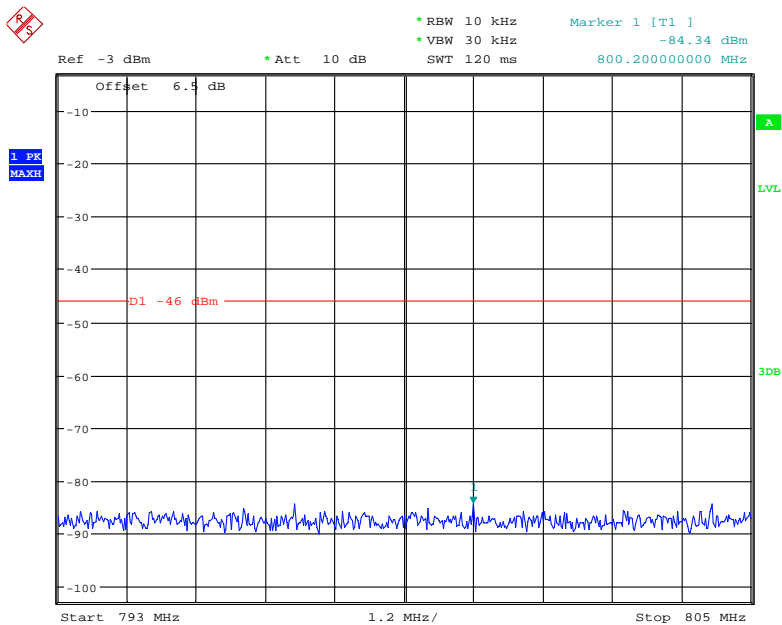
Date: 12.MAY.2018 18:56:23

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

Note: because of RBW 6.25kHz convert to 10kHz, 10lg(10/6.25)=2, offset added with more 2dB.
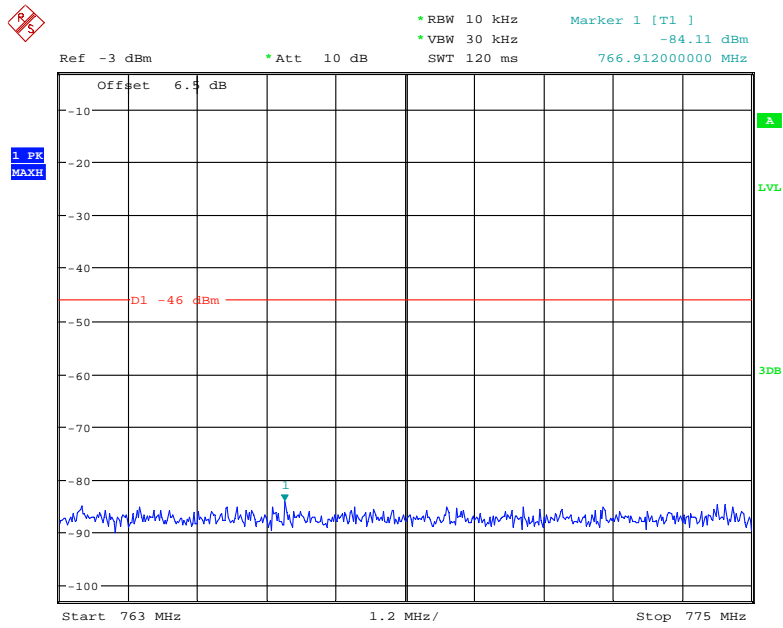
763 MHz – 775 MHz, QPSK 5MHz
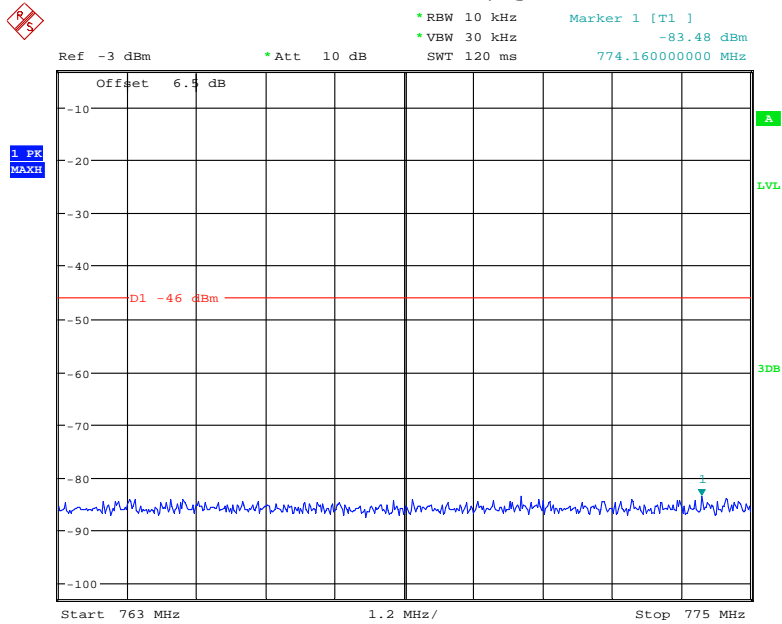
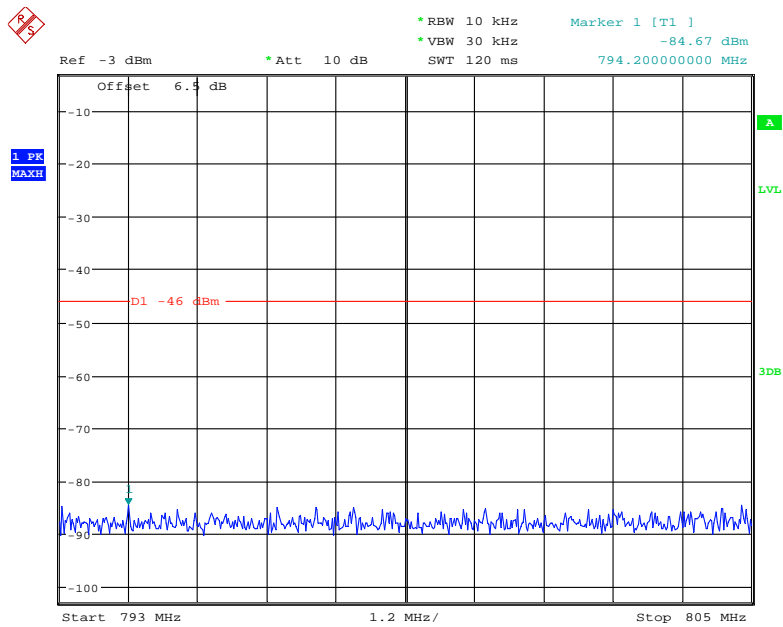Date: 13.MAY.2018 08:29:41

793 MHz – 805 MHz, QPSK 5MHz

Date: 13.MAY.2018 08:28:40

763 MHz – 775 MHz, QPSK 10MHz

```
                                          *RBW 10 kHz      Marker 1 [T1 ]
                                          *VBW 30 kHz              -84.11 dBm
        Ref -3 dBm          *Att 10 dB    SWT 120 ms      766.912000000 MHz
            Offset  6.5 dB
```


Date: 13.MAY.2018 08:24:24

793 MHz – 805 MHz, QPSK 10MHz

```
                                          *RBW 10 kHz      Marker 1 [T1 ]
                                          *VBW 30 kHz              -84.67 dBm
        Ref -3 dBm          *Att 10 dB    SWT 120 ms      794.200000000 MHz
            Offset  6.5 dB
```


Date: 13.MAY.2018 08:26:24

FCC § 2.1053; §27.53 (c)(g)(h) SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053 and § 27.53(c)(g)(h)

Test Procedure

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

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

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

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-15.

EUT operation mode: Transmitting

Pre-scan with Low, Middle and High channel, the worst case as below:

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

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)			
Band 4 QPSK										
Test frequency range:30 MHz ~ 18 GHz										
135.36	33.07	18	1.1	H	-63.9	0.26	0	-64.16	-13	51.16
135.36	33.57	304	1.7	V	-63.4	0.26	0	-63.66	-13	50.66
3465.00	65.71	185	1.8	H	-34.7	1.50	12.00	-24.20	-13	11.20
3465.00	65.15	284	2.0	V	-36.0	1.50	12.00	-25.50	-13	12.50
5197.50	44.06	115	1.8	H	-54.6	1.60	12.10	-44.10	-13	31.10
5197.50	46.72	197	1.2	V	-51.4	1.60	12.10	-40.90	-13	27.90
6930.00	49.22	180	1.7	H	-46.3	1.80	11.30	-36.80	-13	23.80
6930.00	48.51	292	2.3	V	-47.1	1.80	11.30	-37.60	-13	24.60
Band 12 QPSK										
Test frequency range: 30 MHz ~ 10GHz										
135.36	33.41	78	2.0	H	-63.6	0.26	0	-63.86	-13	50.86
135.36	33.10	314	1.0	V	-63.9	0.26	0	-64.16	-13	51.16
1415.00	52.85	24	2.3	H	-55.0	1.60	7.90	-48.70	-13	35.70
1415.00	50.35	171	1.8	V	-57.7	1.60	7.90	-51.40	-13	38.40
2122.50	72.53	233	2.3	H	-29.6	1.30	9.70	-21.20	-13	8.20
2122.50	74.93	50	2.1	V	-28.0	1.30	9.70	-19.60	-13	6.60
2830.00	47.93	107	1.8	H	-55.8	1.80	10.50	-47.10	-13	34.10
2830.00	48.95	323	2.4	V	-54.5	1.80	10.50	-45.80	-13	32.80
3537.50	44.76	108	1.6	H	-55.8	1.50	12.00	-45.30	-13	32.30
3537.50	46.14	112	1.9	V	-55.1	1.50	12.00	-44.60	-13	31.60
Band 13 QPSK										
Test frequency range: 30 MHz ~ 10GHz										
135.36	33.77	294	1.2	H	-63.2	0.26	0	-63.46	-13	50.46
135.36	33.18	23	1.5	V	-63.8	0.26	0	-64.06	-13	51.06
1564.00	78.2	246	1.5	H	-29.8	1.40	8.70	-22.50	-13	9.50
1564.00	78.67	183	2.0	V	-29.2	1.40	8.70	-21.90	-13	8.90
2346.00	62.32	101	1.9	H	-42.2	1.30	10.00	-33.50	-13	20.50
2346.00	60.31	55	1.3	V	-44.1	1.30	10.00	-35.40	-13	22.40
3128.00	44.82	37	1.3	H	-56.5	1.70	11.30	-46.90	-13	33.90
3128.00	44.56	170	1.9	V	-56.6	1.70	11.30	-47.00	-13	34.00

Note:
1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
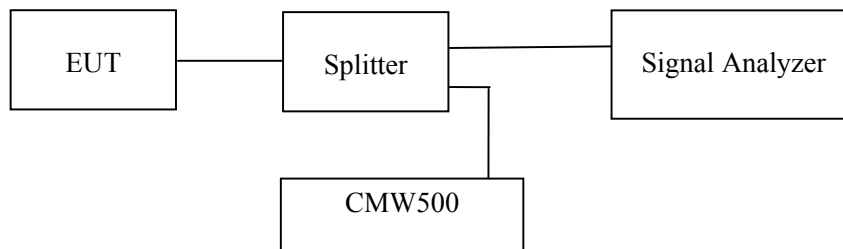2) Margin = Limit- Absolute Level

§27.53 (c) (g)(h) - BAND EDGES

Applicable Standard

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

Test Procedure

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

The center of the spectrum analyzer was set to block edge frequency

```
┌─────────┐      ┌─────────┐      ┌──────────────────┐
│   EUT   │──────│ Splitter │──────│  Signal Analyzer │
└─────────┘      └─────────┘      └──────────────────┘
                      │
                 ┌─────────┐
                 │ CMW500  │
                 └─────────┘
```

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-12.

EUT operation mode: Transmitting

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

Band 4:

QPSK (5.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 23:26:12

QPSK (5.0 MHz, RB0) - Right Band Edge
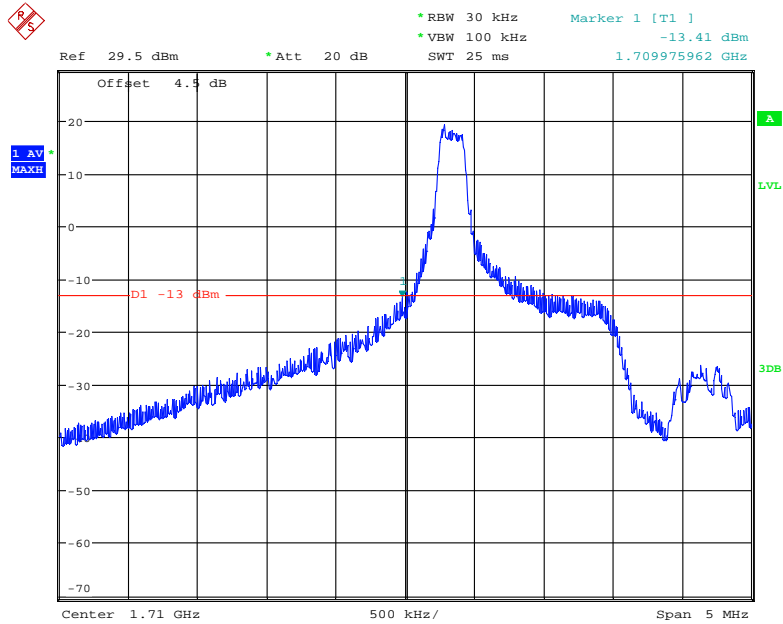
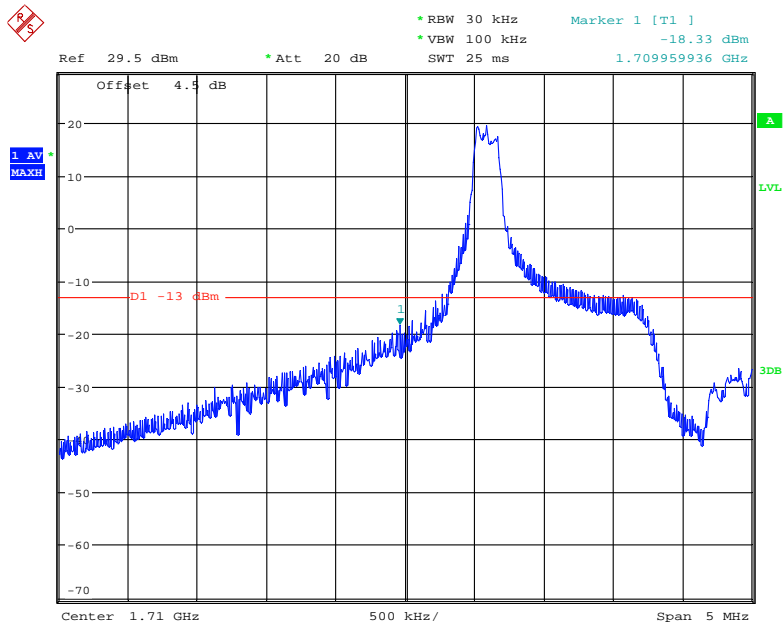Date: 12.MAY.2018 23:36:21
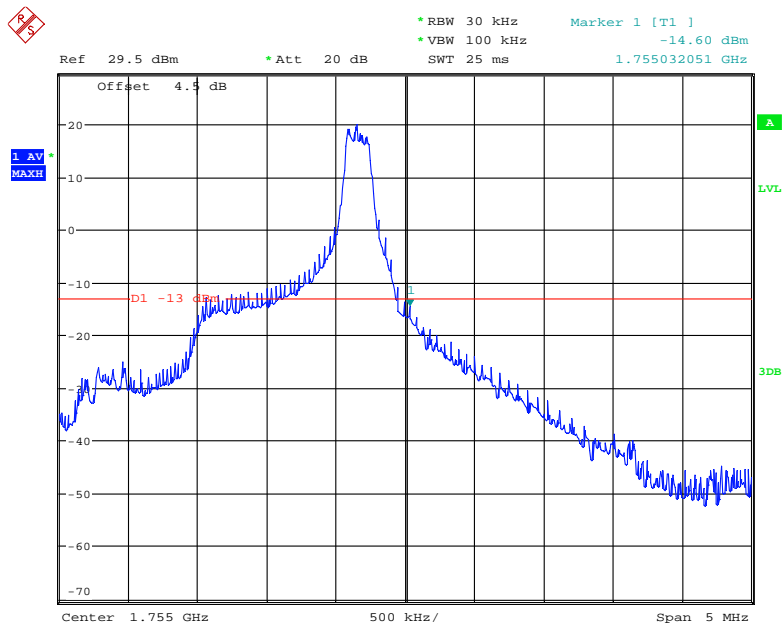
16-QAM (5.0 MHz, RB0) - Left Band Edge
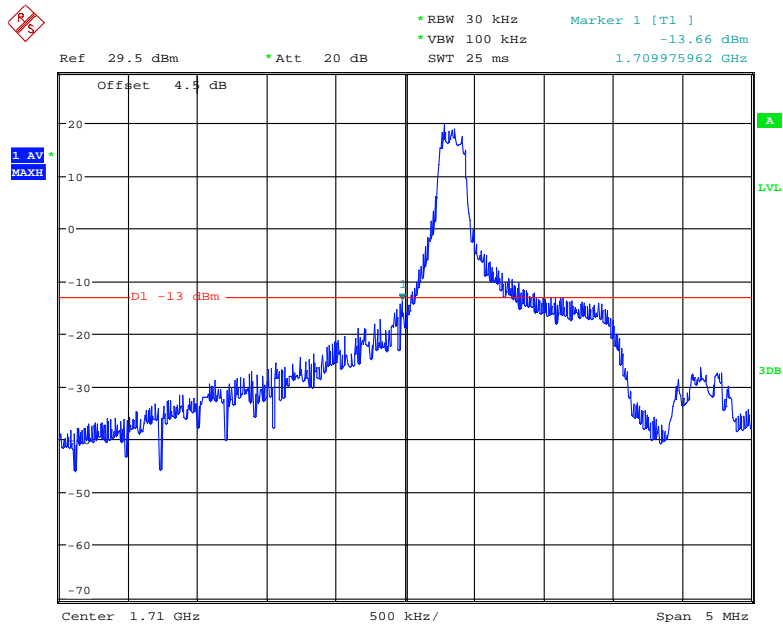
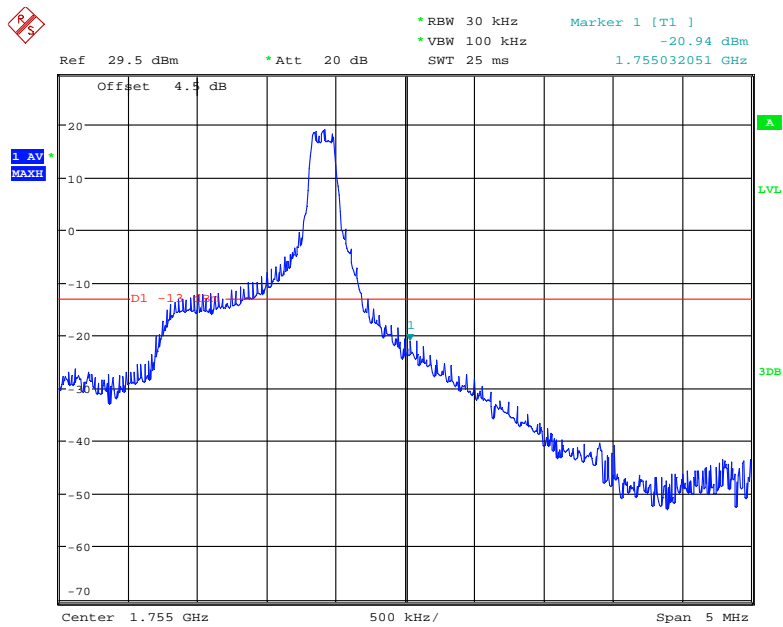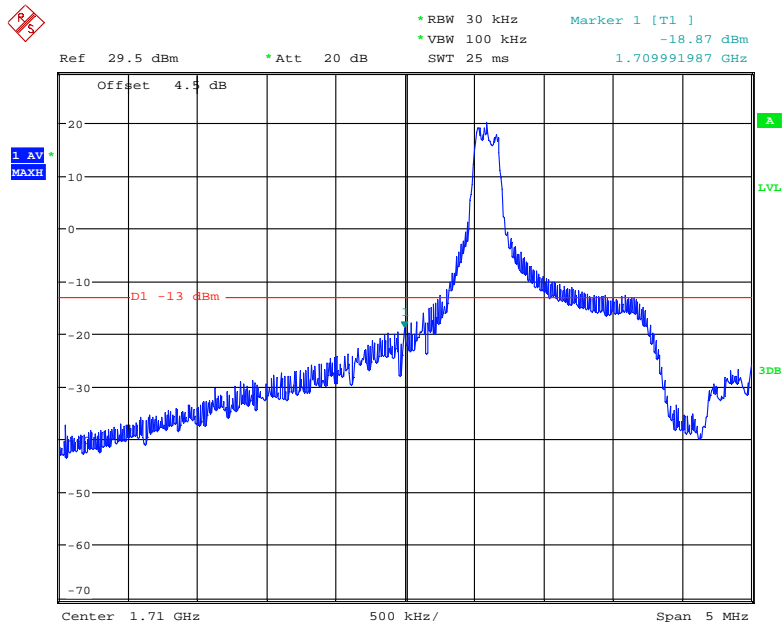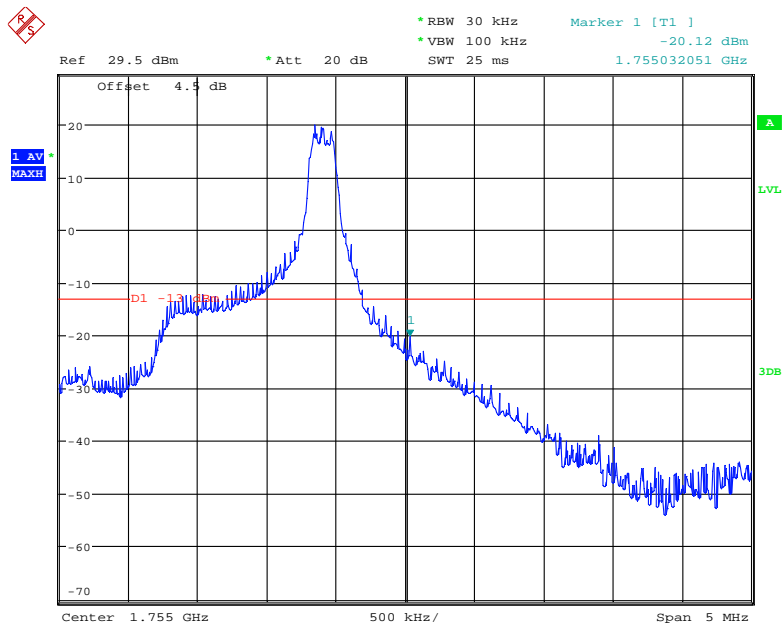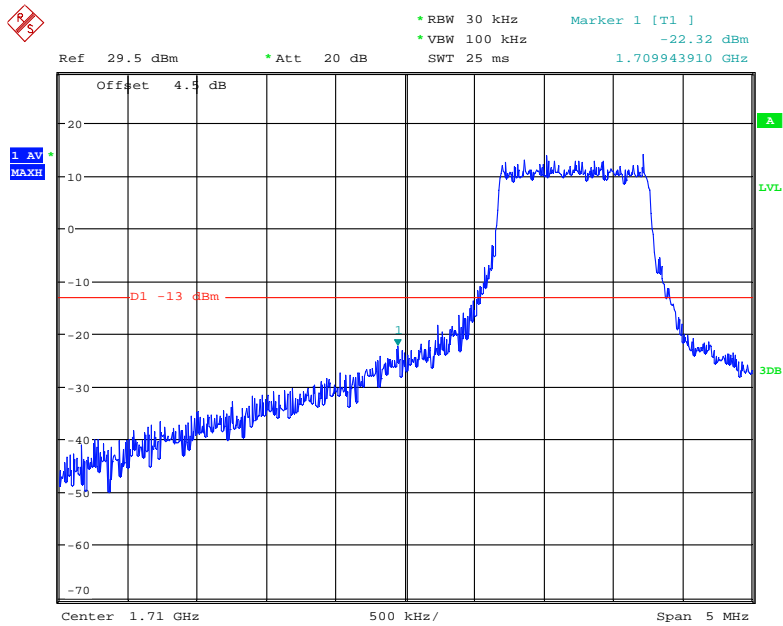Date: 12.MAY.2018 23:27:51
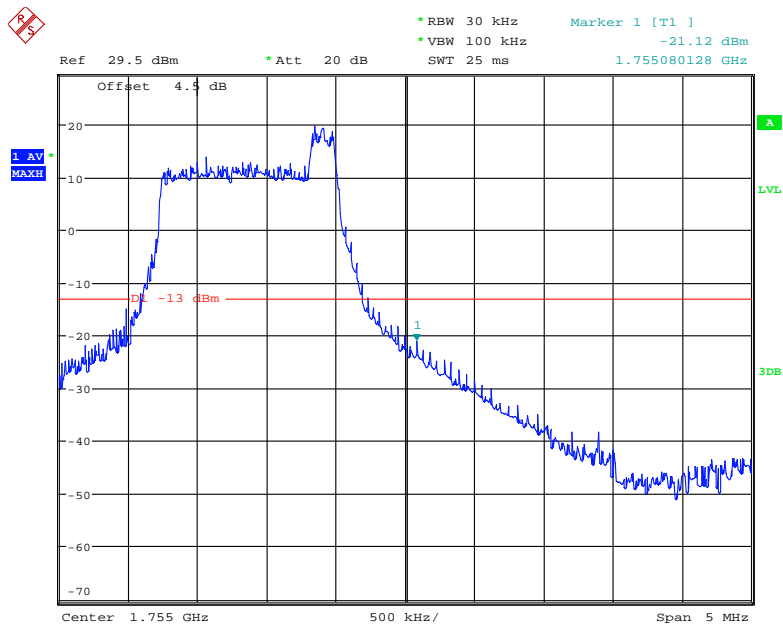
16-QAM (5.0 MHz, RB0) - Right Band Edge
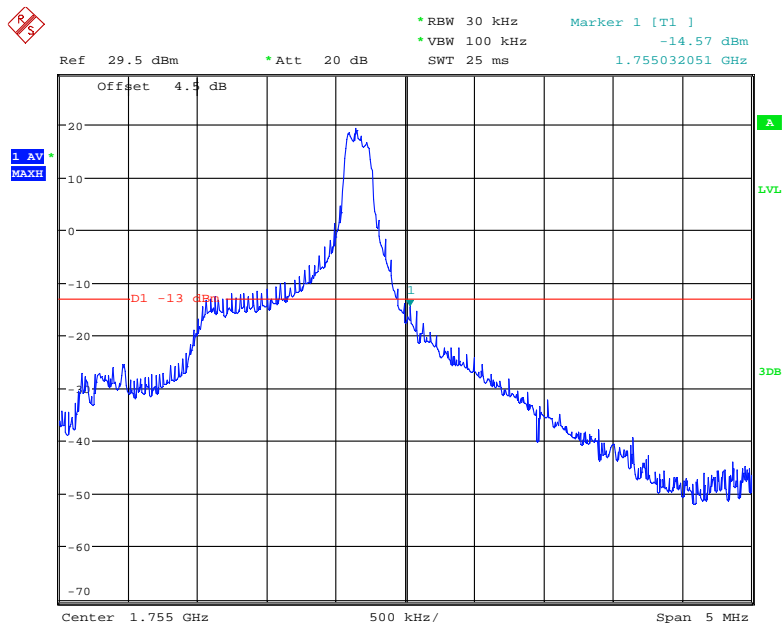
Date: 12.MAY.2018 23:38:01
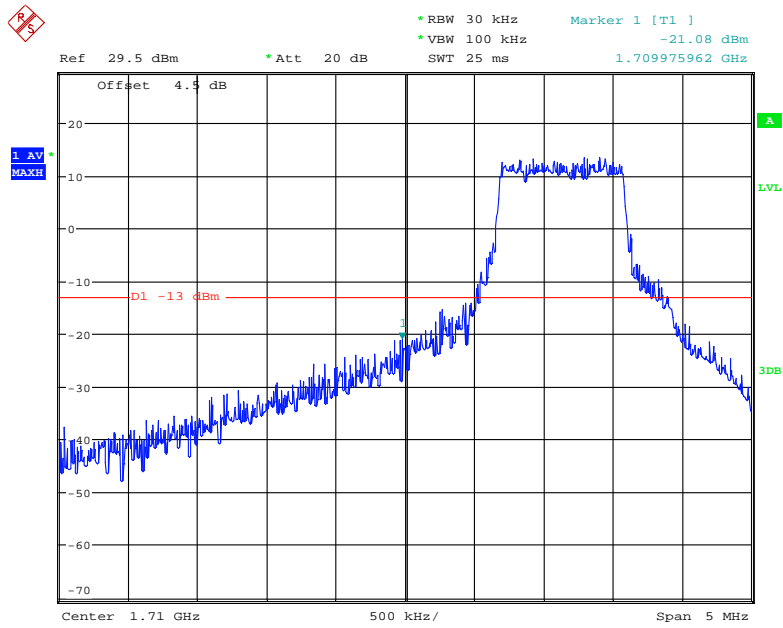
QPSK (5.0 MHz, RB6) - Left Band Edge
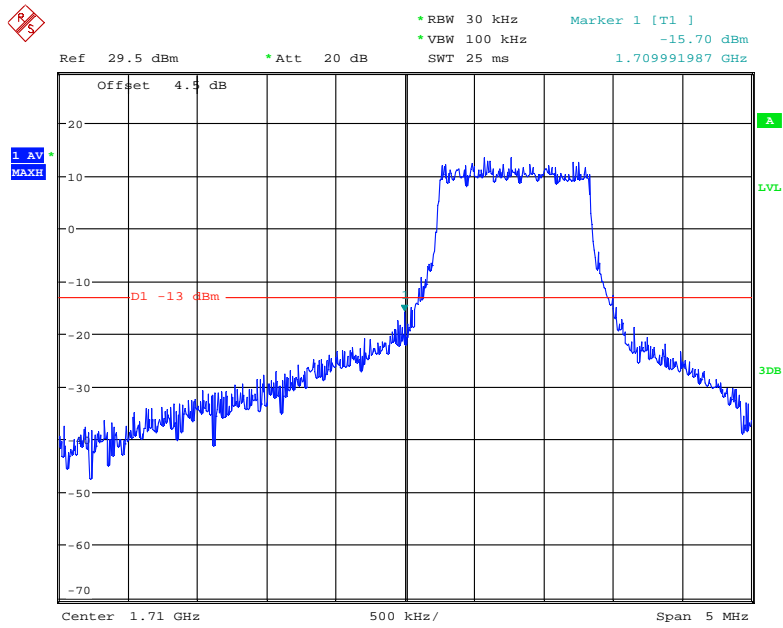
Date: 12.MAY.2018 23:22:42

QPSK (5.0 MHz, RB6) - Right Band Edge
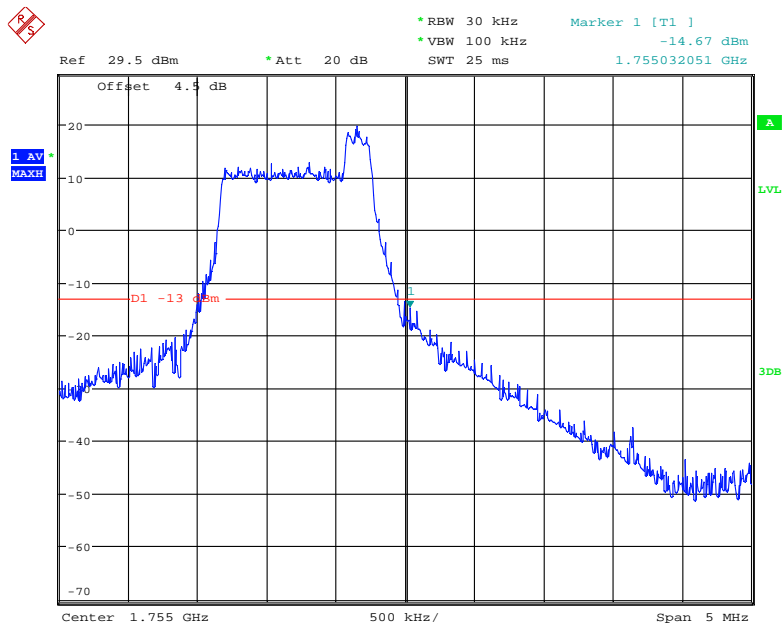
Date: 12.MAY.2018 23:34:31

16-QAM (5.0 MHz, RB5) - Left Band Edge
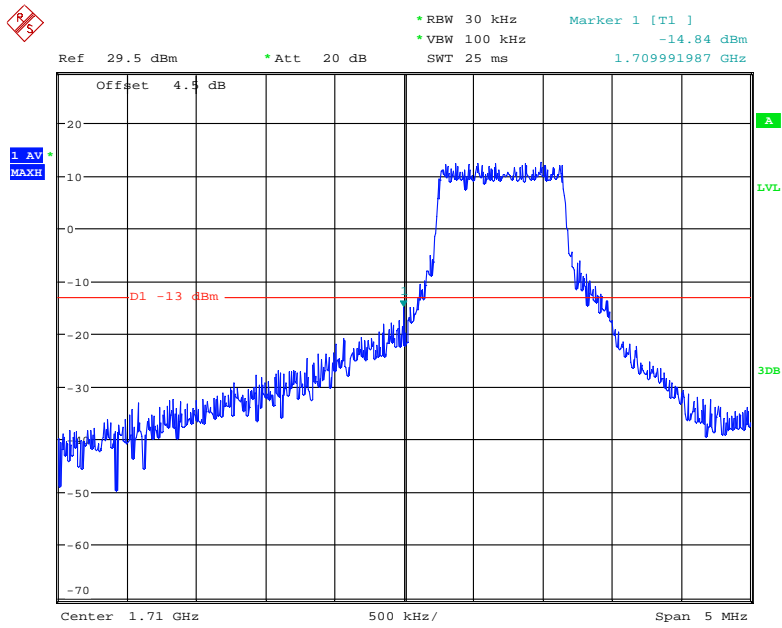
Date: 12.MAY.2018 23:29:37

16-QAM (5.0 MHz, RB5) - Right Band Edge
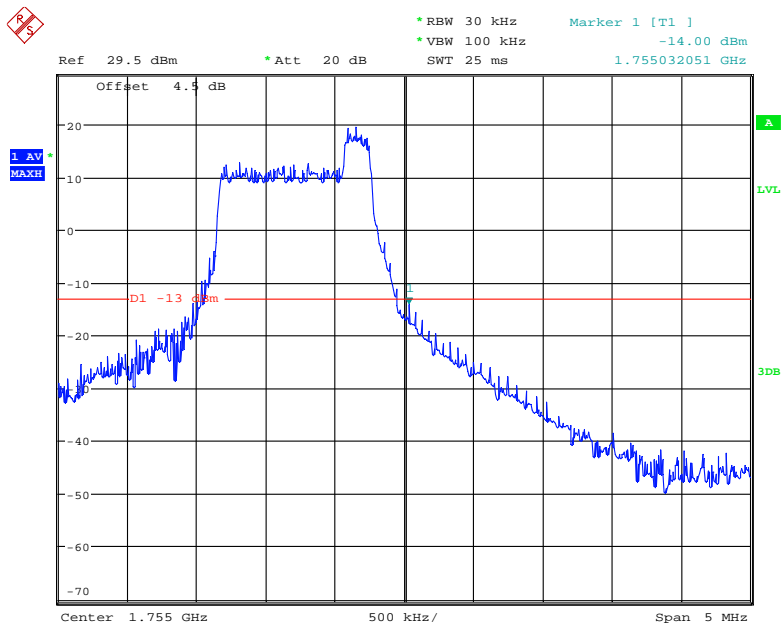
Date: 12.MAY.2018 23:39:44

QPSK (10.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 23:06:34

QPSK (10.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 23:16:30

16-QAM (10.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 23:09:00

16-QAM (10.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 23:17:59

QPSK (10.0 MHz, RB6) - Left Band Edge

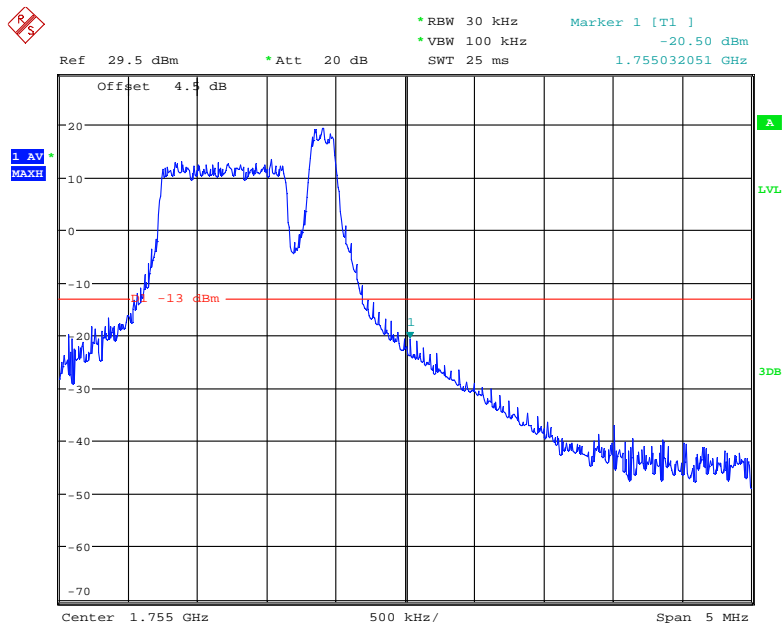Date: 12.MAY.2018   23:04:02

QPSK (10.0 MHz, RB6) - Right Band Edge

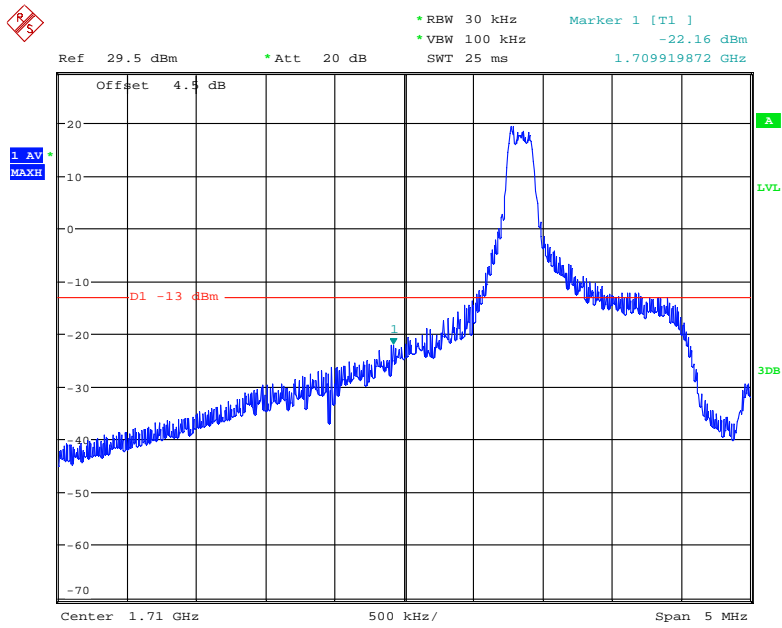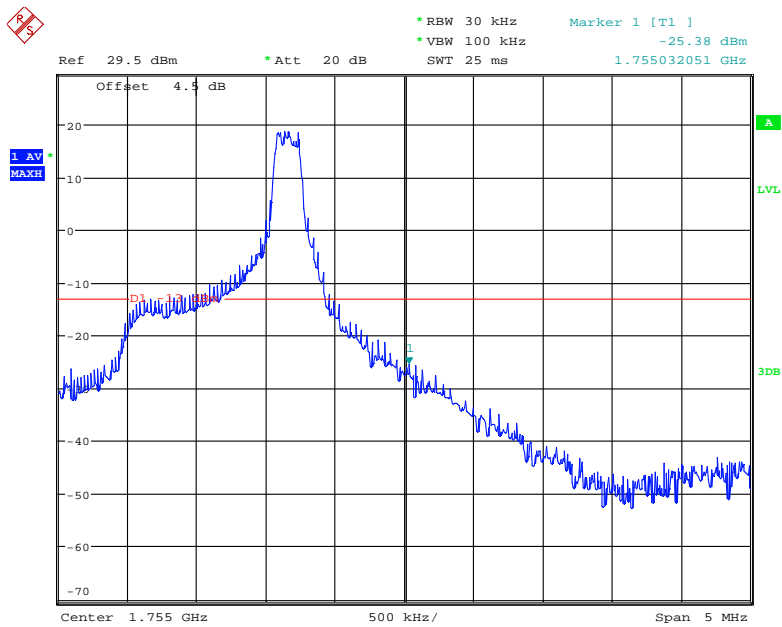Date: 12.MAY.2018   23:15:05

16-QAM (10.0 MHz, RB5) - Left Band Edge

```
                                          *RBW 30 kHz    Marker 1 [T1 ]
                                          *VBW 100 kHz         -21.08 dBm
       Ref  29.5 dBm        *Att  20 dB   SWT 25 ms      1.709975962 GHz
          Offset  4.5 dB
```

Date: 12.MAY.2018 23:11:12

16-QAM (10.0 MHz, RB5) - Right Band Edge

```
                                          *RBW 30 kHz    Marker 1 [T1 ]
                                          *VBW 100 kHz         -20.50 dBm
       Ref  29.5 dBm        *Att  20 dB   SWT 25 ms      1.755032051 GHz
          Offset  4.5 dB
```

Date: 12.MAY.2018 23:19:48
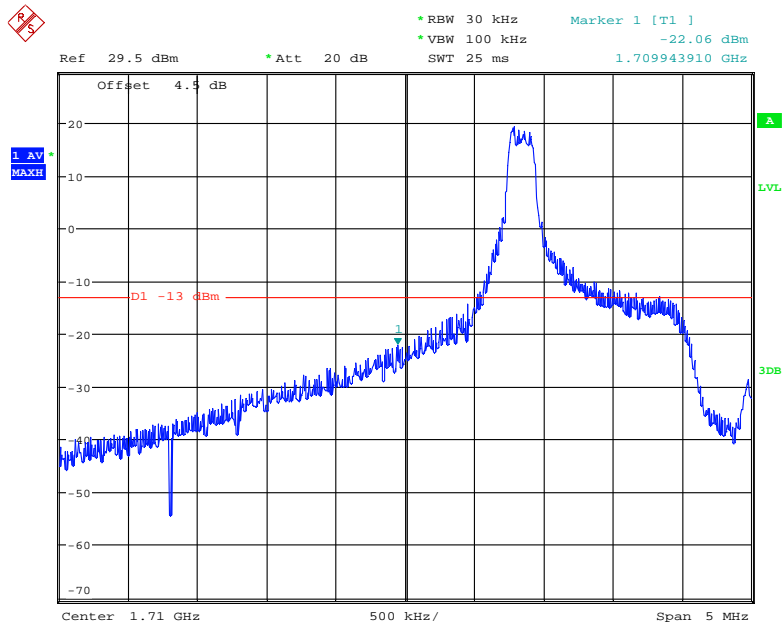
QPSK (15.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 22:48:39

QPSK (15.0 MHz, RB0) - Right Band Edge

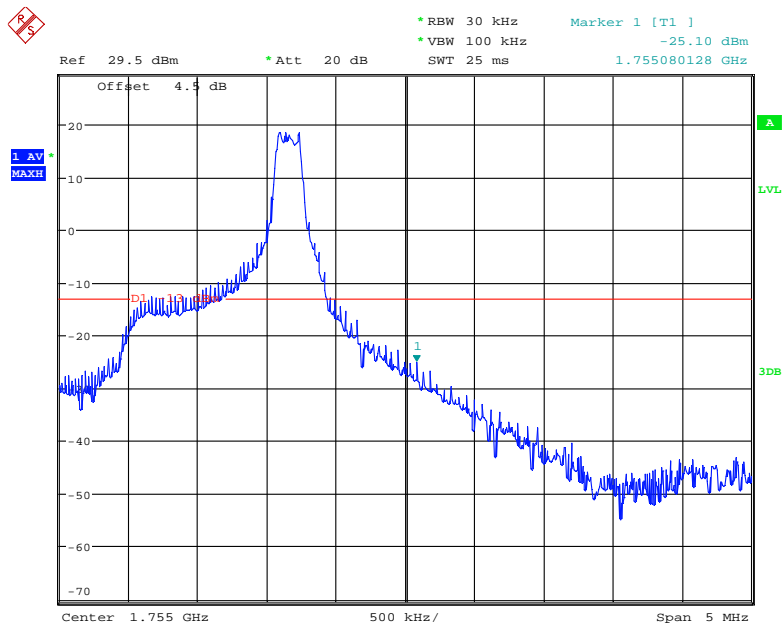Date: 12.MAY.2018 22:57:39

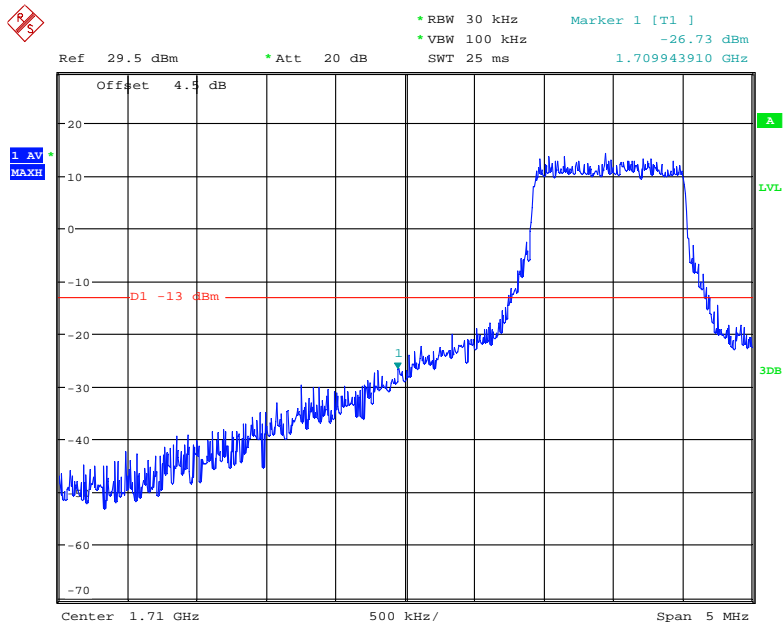## 16-QAM (15.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 22:50:54

16-QAM (15.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 22:59:19
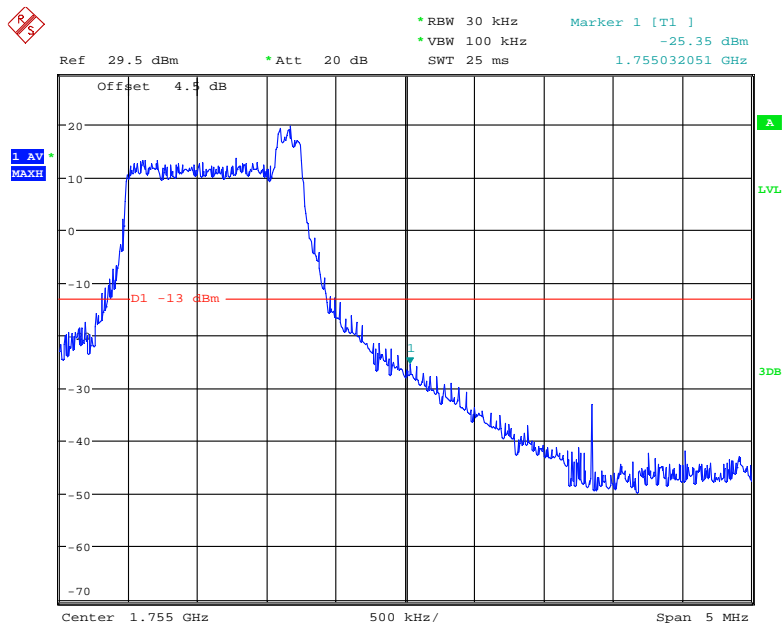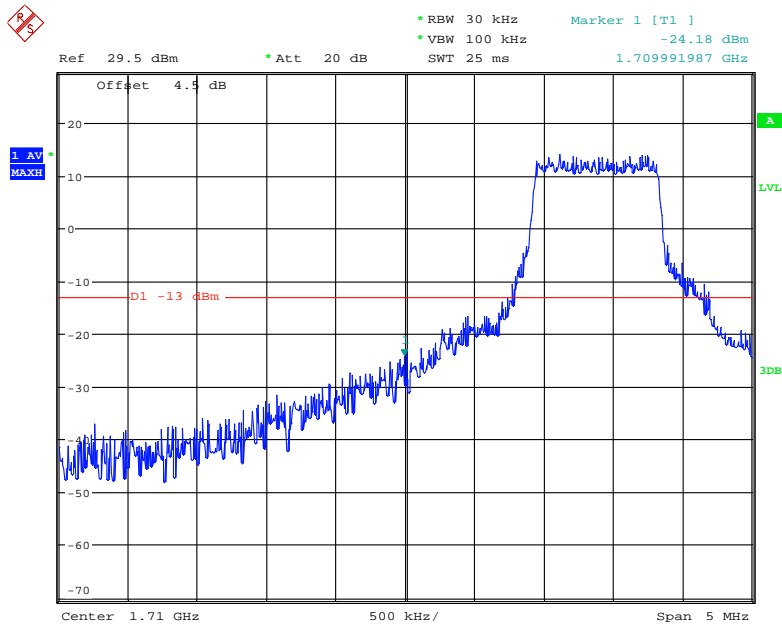
QPSK (15.0 MHz, RB6) - Left Band Edge

Date: 12.MAY.2018 22:45:43
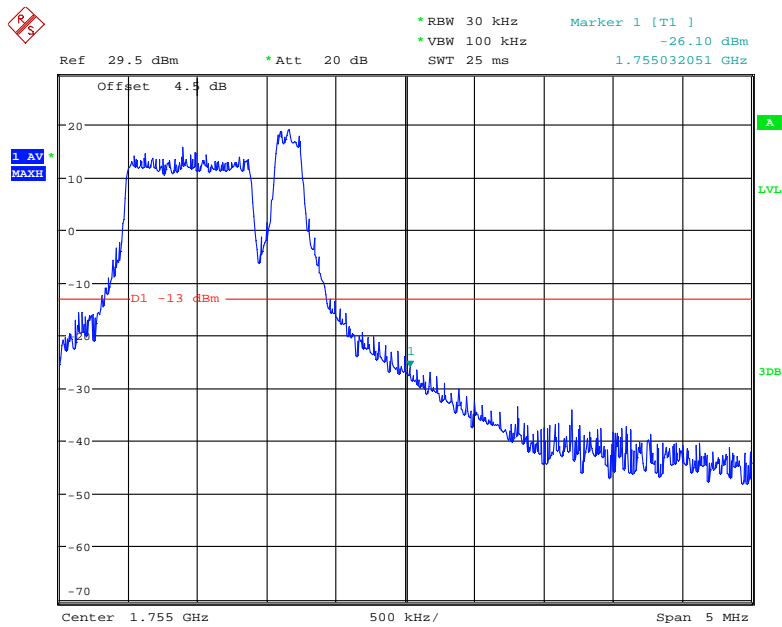
QPSK (15.0 MHz, RB6) - Right Band Edge

Date: 12.MAY.2018 22:55:53
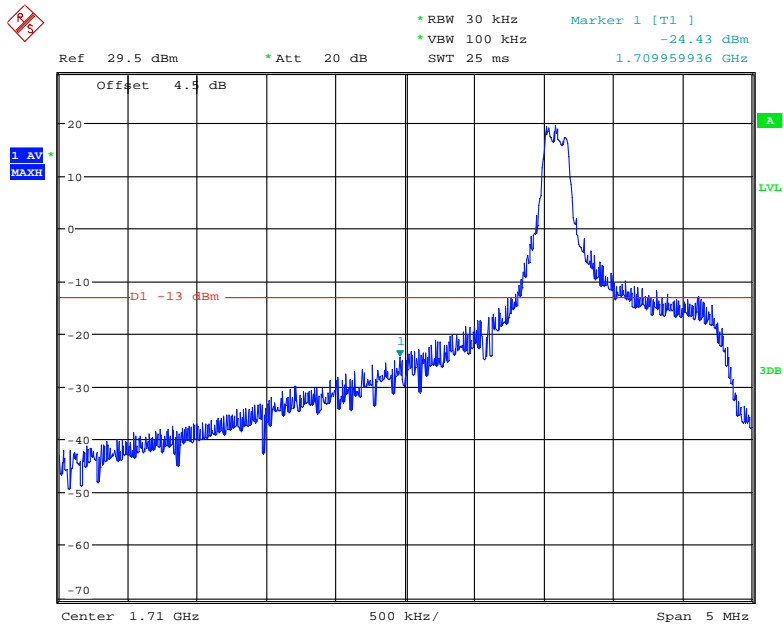
16-QAM (15.0 MHz, RB5) - Left Band Edge

Date: 12.MAY.2018 22:52:45

16-QAM (15.0 MHz, RB5) - Right Band Edge

Date: 12.MAY.2018 23:00:54

QPSK (20.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 22:16:11

QPSK (20.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 22:37:38

16-QAM (20.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 22:18:29
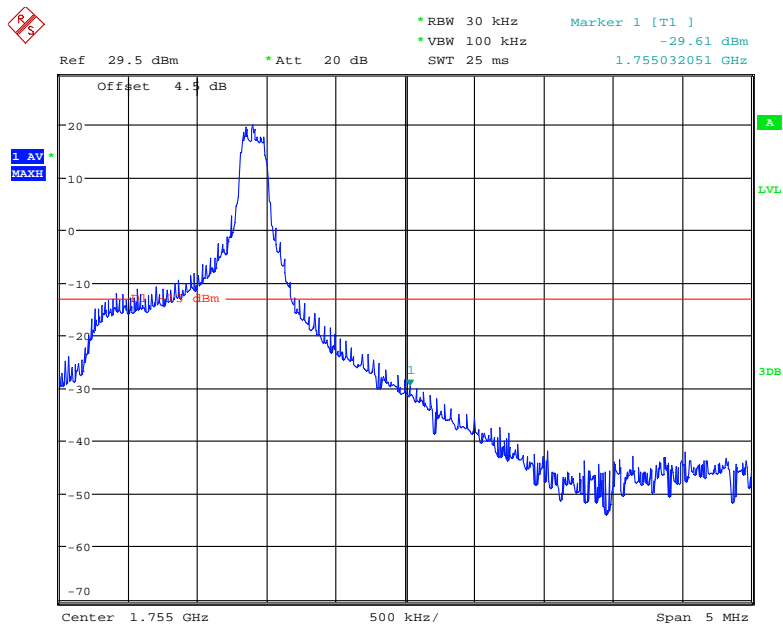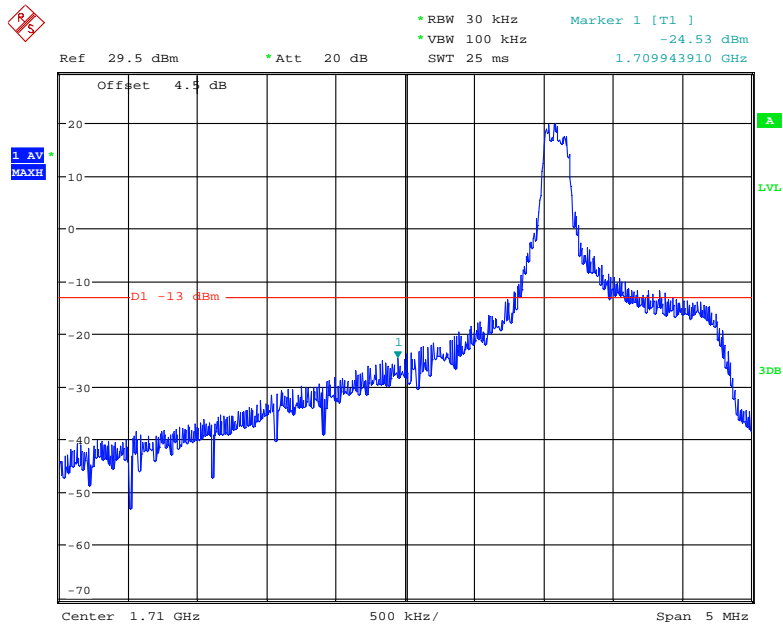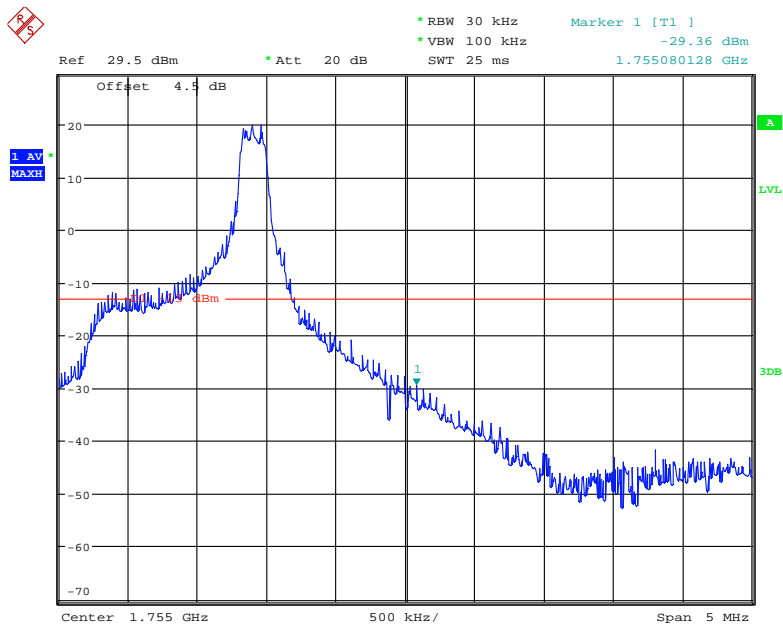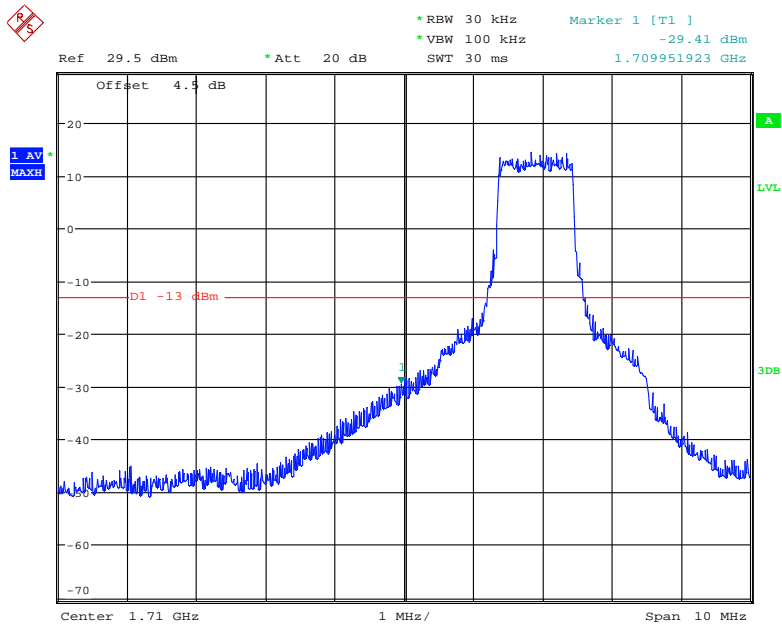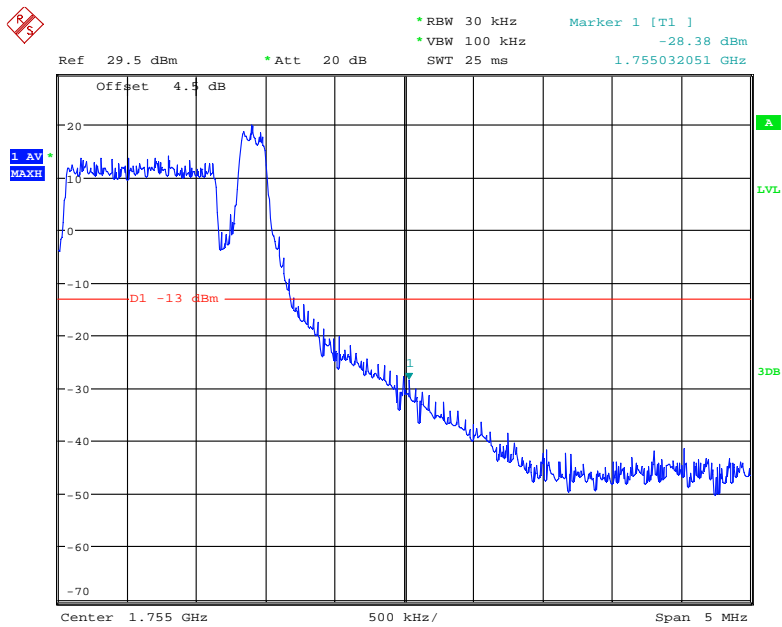
16-QAM (20.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 22:39:37
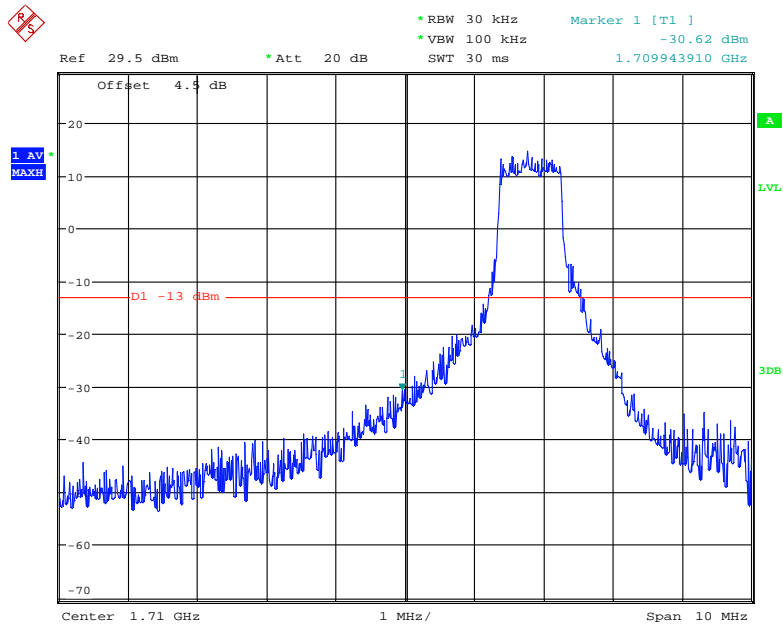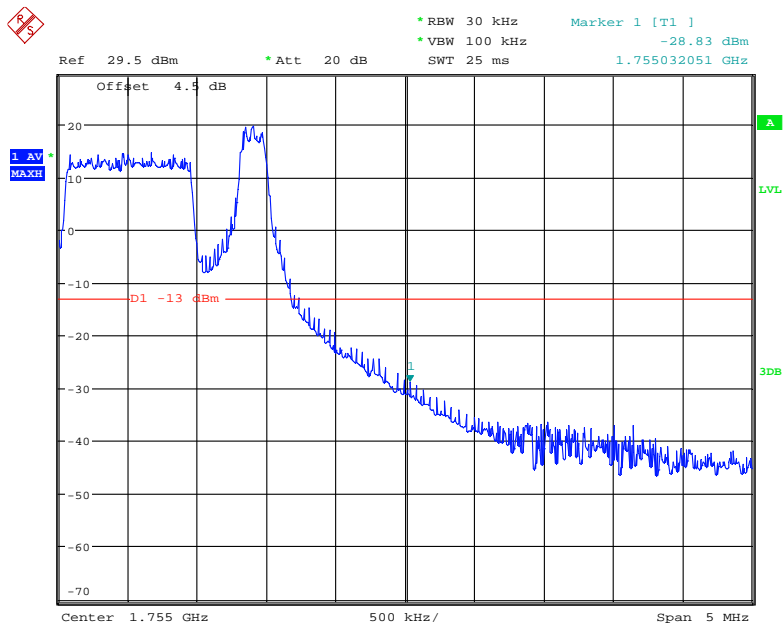
QPSK (20.0 MHz, RB6) - Left Band Edge

Date: 12.MAY.2018 22:13:29

QPSK (20.0 MHz, RB6) - Right Band Edge

Date: 12.MAY.2018 22:35:24

16-QAM (20.0 MHz, RB5) - Left Band Edge

```
                                        *RBW  30 kHz      Marker 1 [T1 ]
                                        *VBW 100 kHz              -30.62 dBm
         Ref   29.5 dBm      *Att  20 dB   SWT 30 ms        1.709943910 GHz
           Offset   4.5 dB                                              A

     20

  1 AV *
  MAXH  10                                                             LVL

      0

    -10
        D1 -13 dBm

    -20

    -30                                                               3DB

    -40

    -60

    -70
         Center  1.71 GHz        1 MHz/              Span  10 MHz
```

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

16-QAM (20.0 MHz, RB5) - Right Band Edge

```
                                        *RBW  30 kHz      Marker 1 [T1 ]
                                        *VBW 100 kHz              -28.83 dBm
         Ref   29.5 dBm      *Att  20 dB   SWT 25 ms        1.755032051 GHz
           Offset   4.5 dB                                              A

     20

  1 AV *
  MAXH 10                                                              LVL

      0

    -10
        D1 -13 dBm

    -20

    -30                                                               3DB

    -40

    -50

    -60

    -70
         Center  1.755 GHz       500 kHz/             Span  5 MHz
```

Date: 12.MAY.2018 22:42:17

Band 12:

QPSK (5.0 MHz, RB0) - Left Band Edge

```
                                    *RBW  30 kHz      Marker 1 [T1 ]
                                    *VBW 100 kHz              -14.27 dBm
         Ref   29.5 dBm    *Att  20 dB   SWT  25 ms    698.927884615 MHz
           Offset   4.5 dB
```



```
         Center  699 MHz          500 kHz/              Span  5 MHz
```

Date: 12.MAY.2018 21:07:04

QPSK (5.0 MHz, RB0) - Right Band Edge

```
                                    *RBW  30 kHz      Marker 1 [T1 ]
                                    *VBW 100 kHz              -14.51 dBm
         Ref   29.5 dBm    *Att  20 dB   SWT  25 ms    716.040064103 MHz
           Offset   4.5 dB
```



```
         Center  716 MHz          500 kHz/              Span  5 MHz
```

Date: 12.MAY.2018 21:17:34

16-QAM (5.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 21:09:12
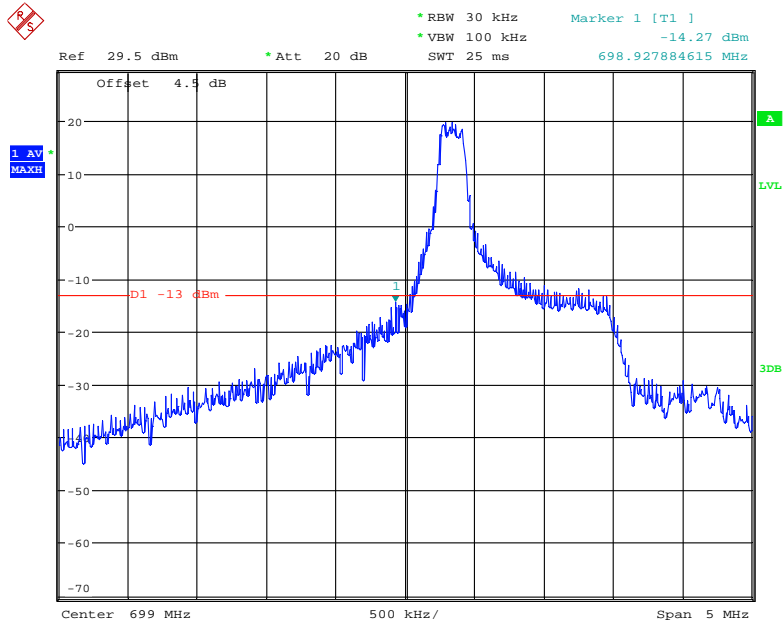
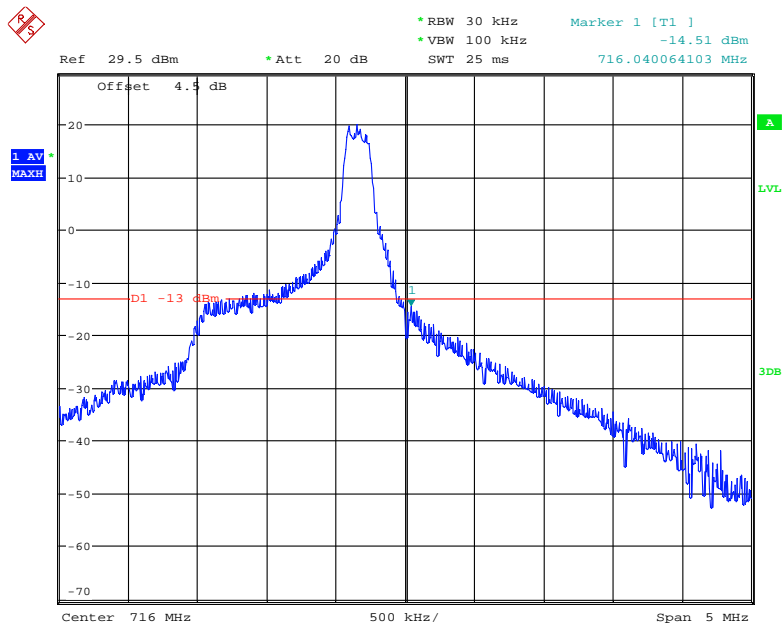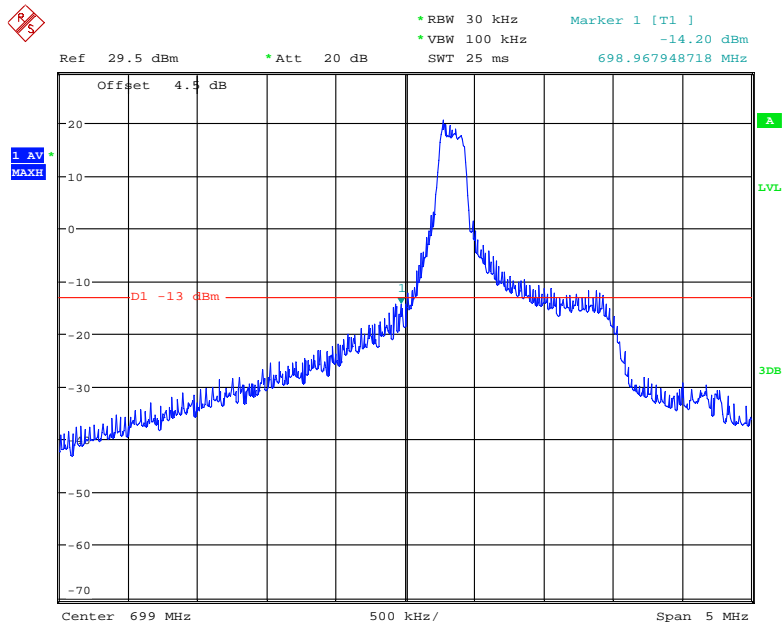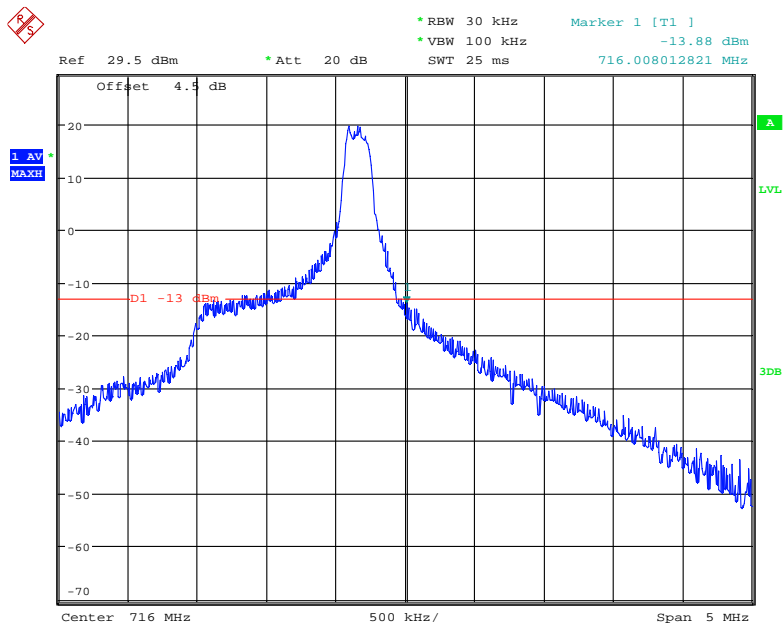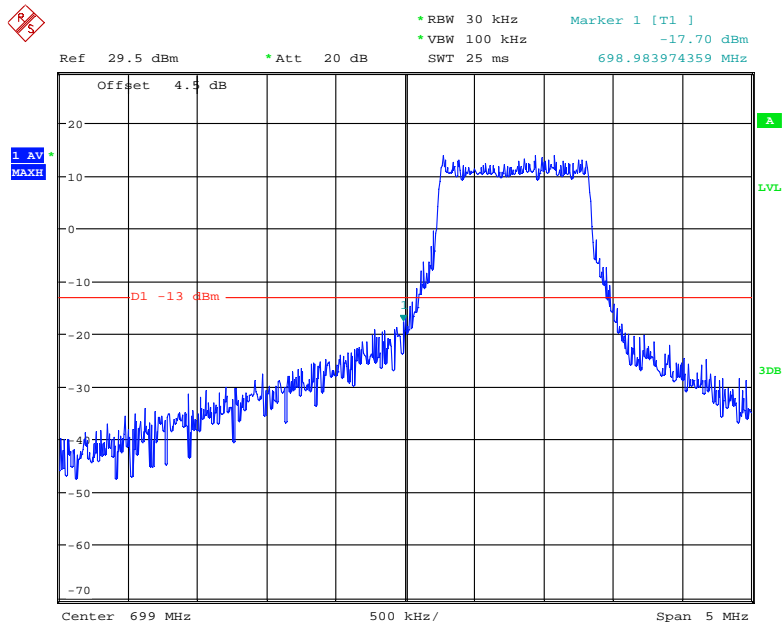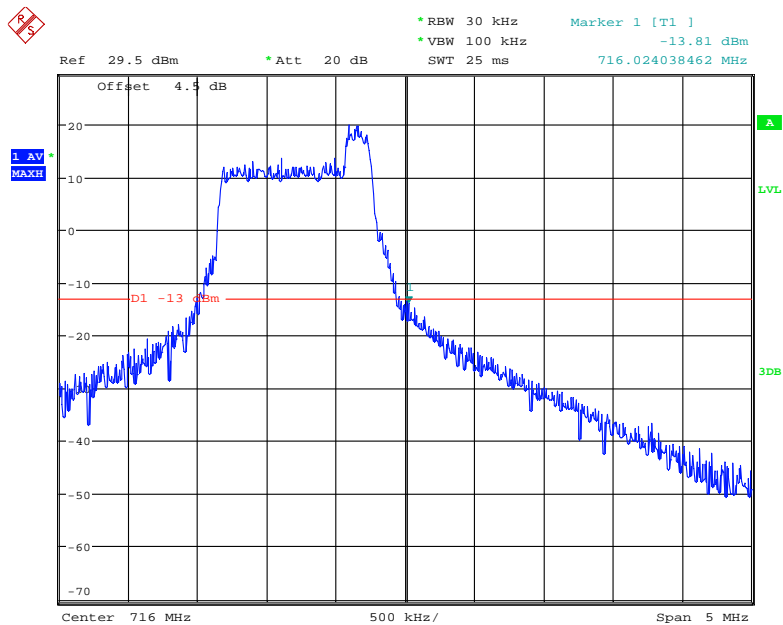## 16-QAM (5.0 MHz, RB0) - Right Band Edge

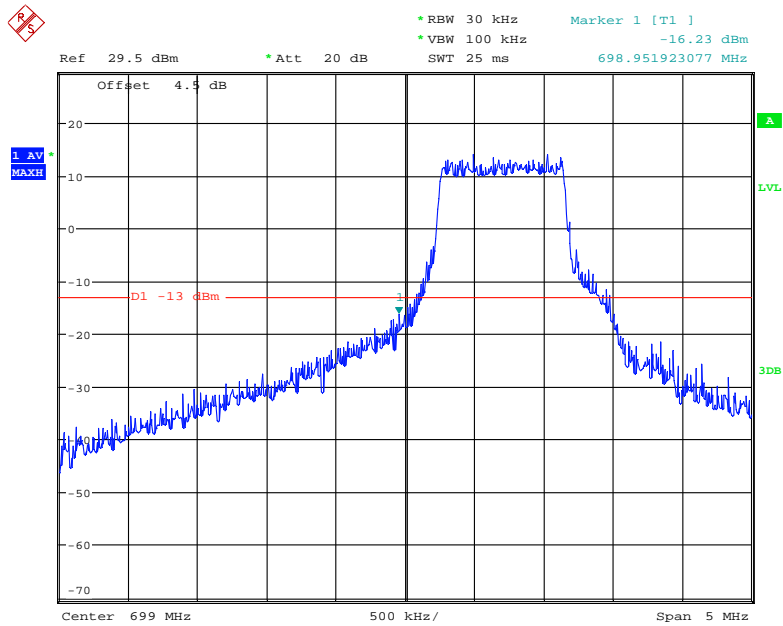Date: 12.MAY.2018 21:19:10

QPSK (5.0 MHz, RB6) - Left Band Edge

Date: 12.MAY.2018 21:05:19

QPSK (5.0 MHz, RB6) - Right Band Edge
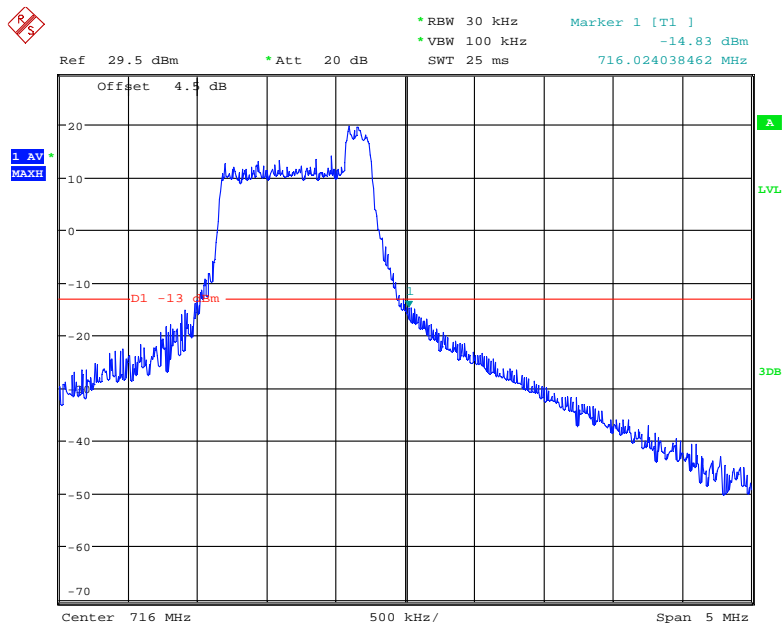

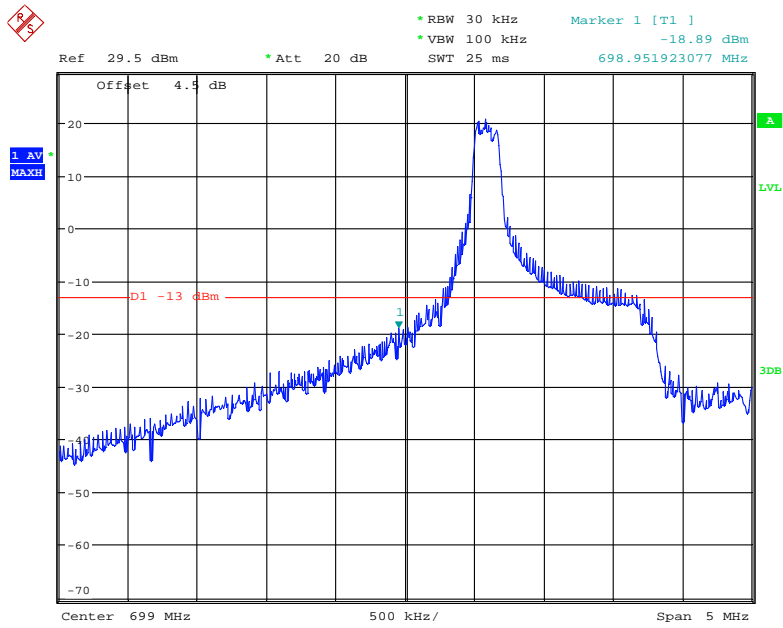Date: 12.MAY.2018 21:16:12

16-QAM (5.0 MHz, RB5) - Left Band Edge


```
                                          *RBW 30 kHz      Marker 1 [T1 ]
                                          *VBW 100 kHz              -16.23 dBm
        Ref  29.5 dBm       *Att  20 dB   SWT 25 ms       698.951923077 MHz
           Offset   4.5 dB
                                                                              A

  1 AV *
  MAXH                                                                        LVL


                                                                             3DB


   Center  699 MHz          500 kHz/                       Span  5 MHz
```

Date: 12.MAY.2018 21:12:05

16-QAM (5.0 MHz, RB5) - Right Band Edge


```
                                          *RBW 30 kHz      Marker 1 [T1 ]
                                          *VBW 100 kHz              -14.83 dBm
        Ref  29.5 dBm       *Att  20 dB   SWT 25 ms       716.024038462 MHz
           Offset   4.5 dB
                                                                              A

  1 AV *
  MAXH                                                                        LVL


                                                                             3DB


   Center  716 MHz          500 kHz/                       Span  5 MHz
```
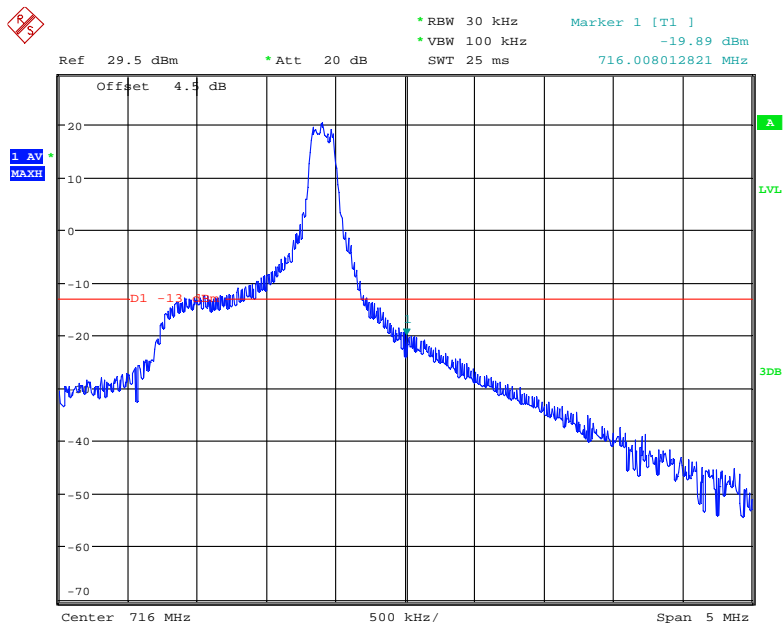
Date: 12.MAY.2018 21:20:33
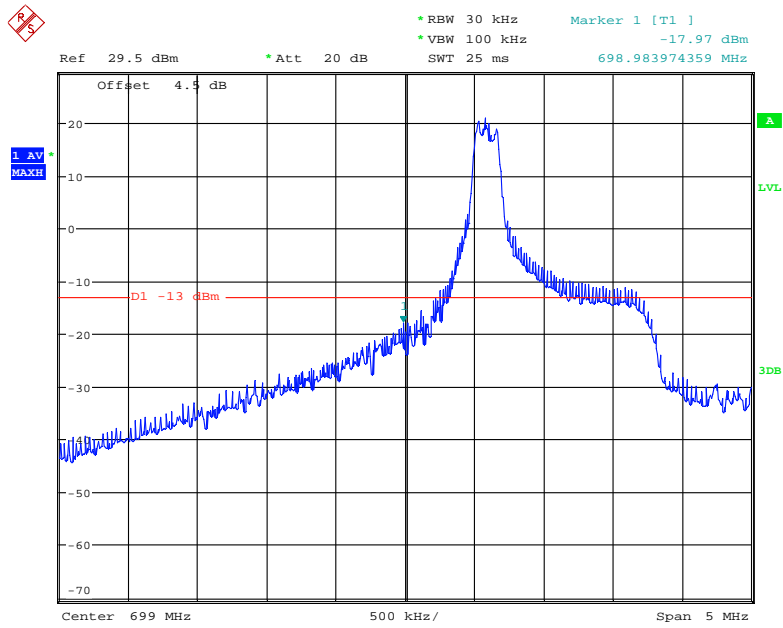
QPSK (10.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 20:46:50
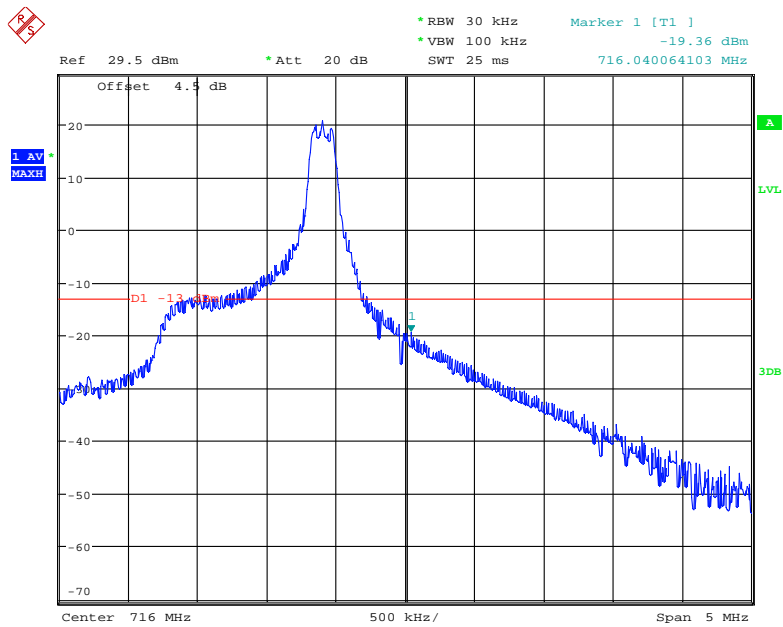
QPSK (10.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 20:57:50
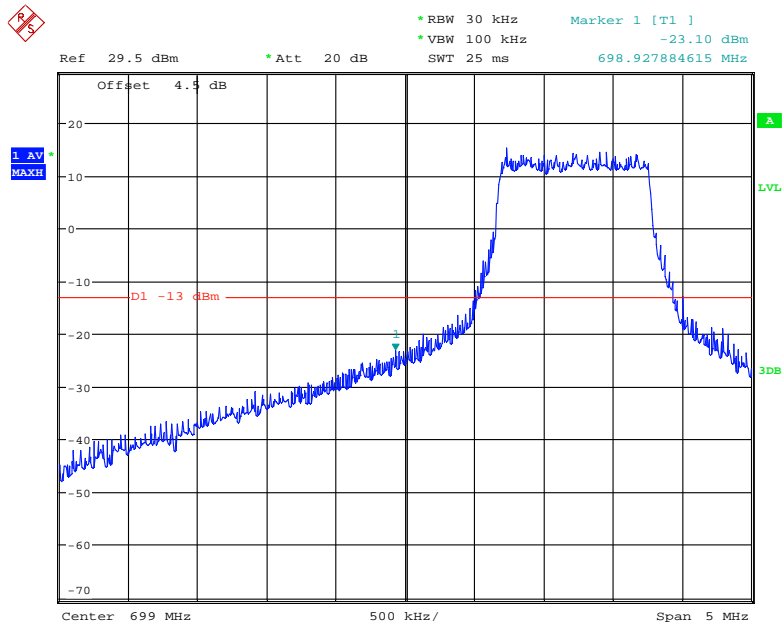
16-QAM (10.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 20:49:06
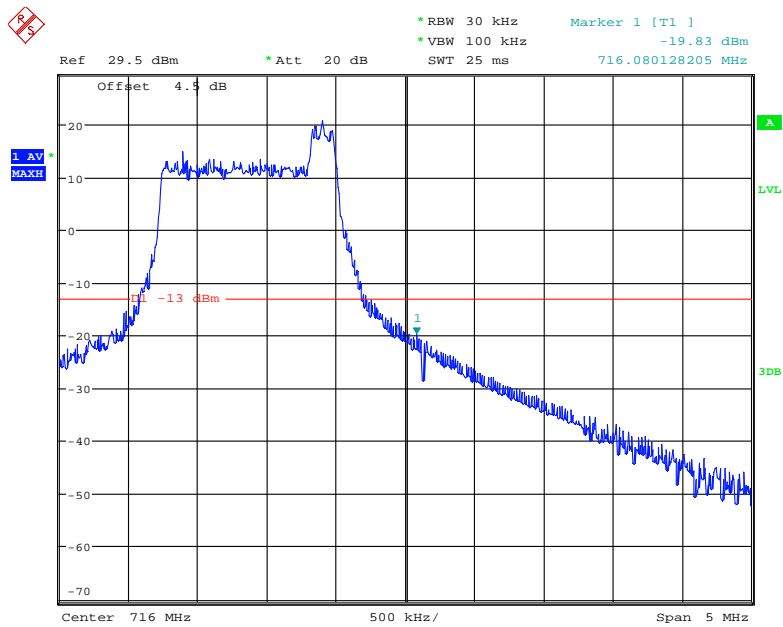
16-QAM (10.0 MHz, RB0) - Right Band Edge

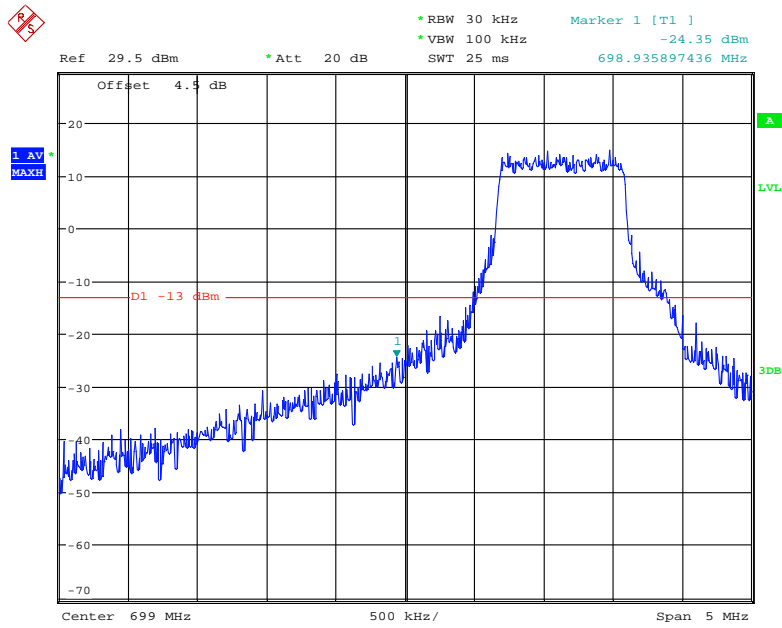Date: 12.MAY.2018 20:59:57

QPSK (10.0 MHz, RB6) - Left Band Edge

Date: 12.MAY.2018 20:43:46

QPSK (10.0 MHz, RB6) - Right Band Edge

Date: 12.MAY.2018 20:55:37

16-QAM (10.0 MHz, RB5) - Left Band Edge

```
                                    *RBW  30 kHz     Marker 1 [T1 ]
                                    *VBW 100 kHz              -24.35 dBm
    Ref   29.5 dBm      *Att  20 dB  SWT  25 ms      698.935897436 MHz
```

Date: 12.MAY.2018 20:51:15

16-QAM (10.0 MHz, RB5) - Right Band Edge

```
                                    *RBW  30 kHz     Marker 1 [T1 ]
                                    *VBW 100 kHz              -19.63 dBm
    Ref   29.5 dBm      *Att  20 dB  SWT  25 ms      716.040064103 MHz
```
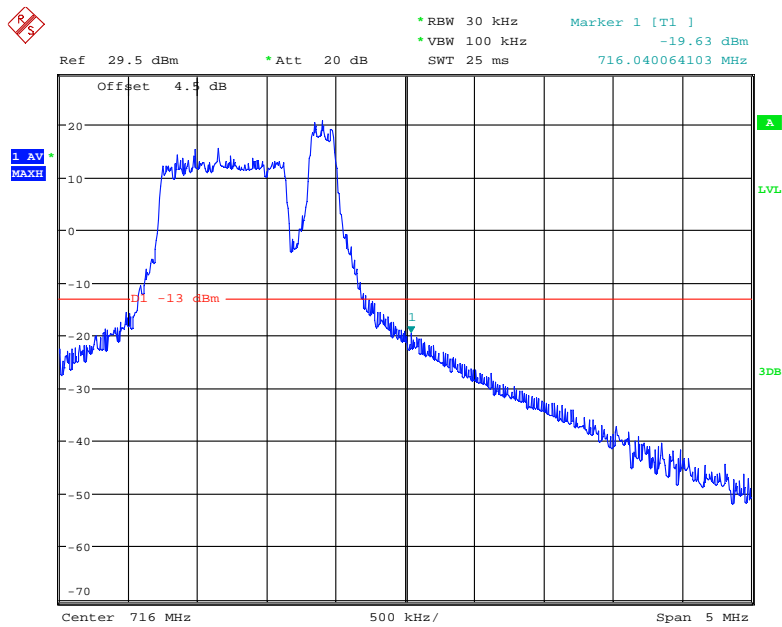
Date: 12.MAY.2018 21:01:45

Band 13:

QPSK (5.0 MHz, RB0) - Left Band Edge
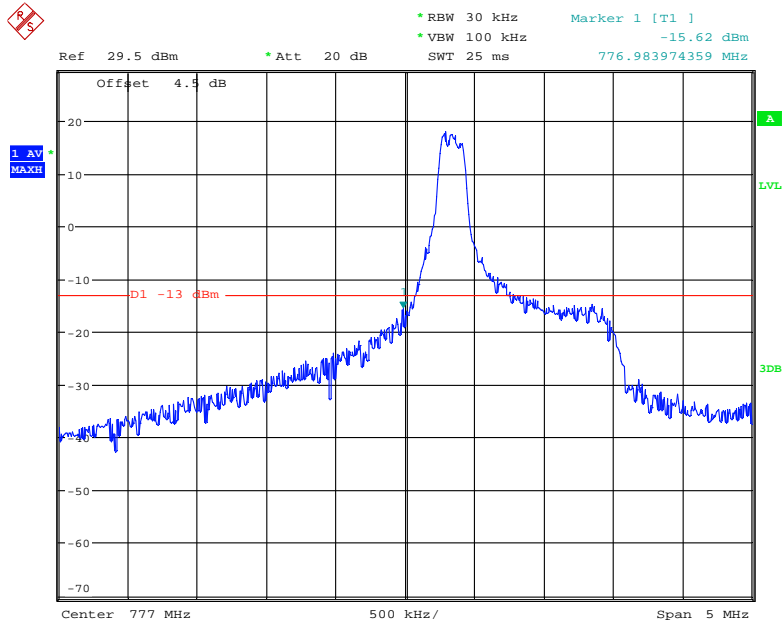
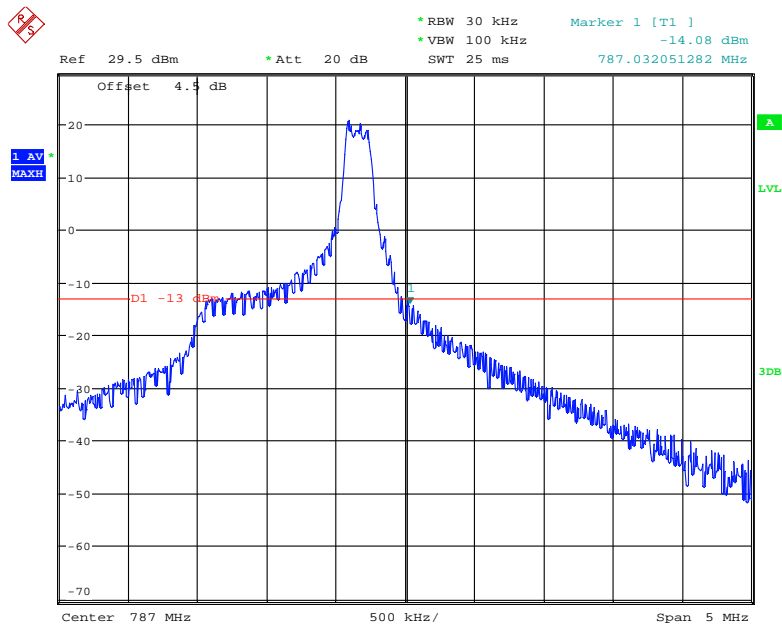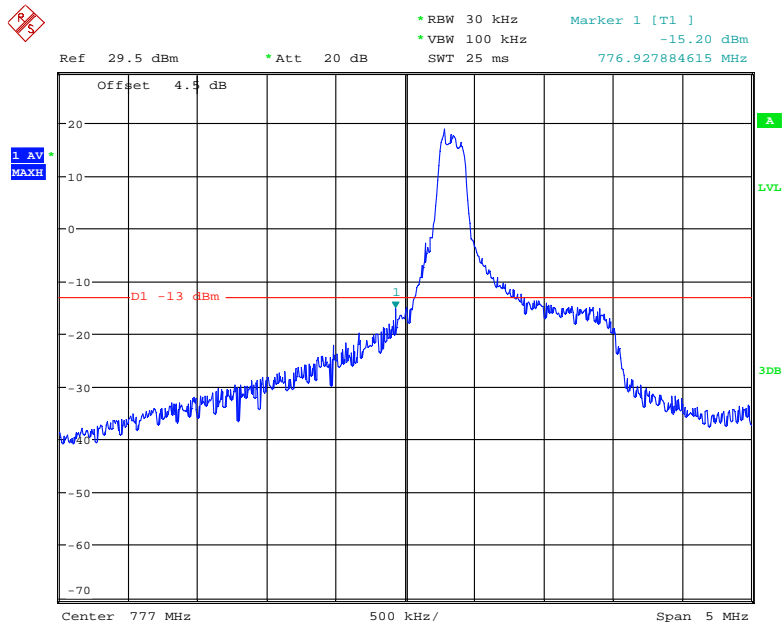Date: 12.MAY.2018 19:11:41

QPSK (5.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 19:24:02

16-QAM (5.0 MHz, RB0) - Left Band Edge

```
                                            * RBW  30 kHz      Marker 1 [T1 ]
                                            * VBW 100 kHz              -15.20 dBm
        Ref  29.5 dBm          * Att  20 dB   SWT 25 ms       776.927884615 MHz
           Offset   4.5 dB
```

Date: 12.MAY.2018 19:13:43

16-QAM (5.0 MHz, RB0) - Right Band Edge

```
                                            * RBW  30 kHz      Marker 1 [T1 ]
                                            * VBW 100 kHz              -13.46 dBm
        Ref  29.5 dBm          * Att  20 dB   SWT 25 ms       787.016025641 MHz
           Offset   4.5 dB
```
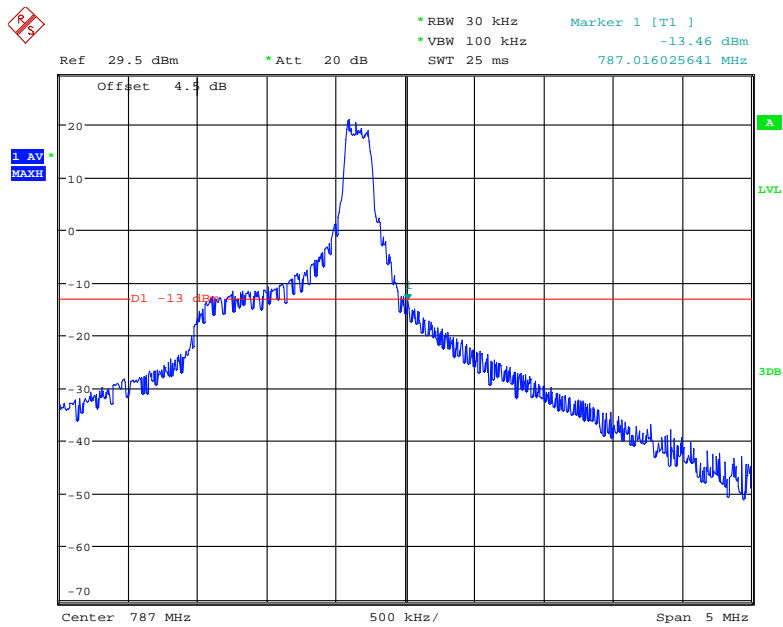
Date: 12.MAY.2018 19:26:01

QPSK (5.0 MHz, RB6) - Left Band Edge

```
                                        *RBW 30 kHz        Marker 1 [T1 ]
                                        *VBW 100 kHz              -19.56 dBm
        Ref   29.5 dBm      *Att  20 dB  SWT 25 ms        776.967948718 MHz
             Offset   4.5 dB
```
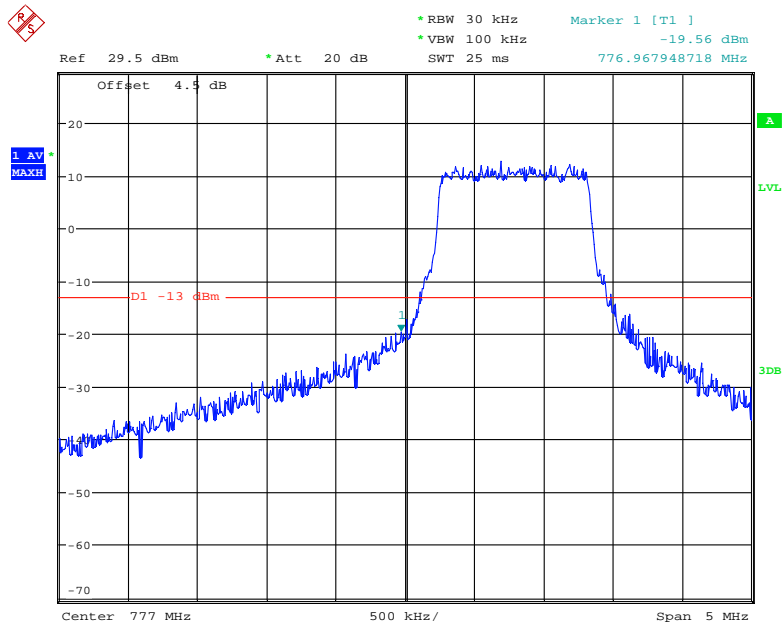
Date: 12.MAY.2018 19:07:38

QPSK (5.0 MHz, RB6) - Right Band Edge

```
                                        *RBW 30 kHz        Marker 1 [T1 ]
                                        *VBW 100 kHz              -13.88 dBm
        Ref   29.5 dBm      *Att  20 dB  SWT 25 ms        787.104166667 MHz
             Offset   4.5 dB
```
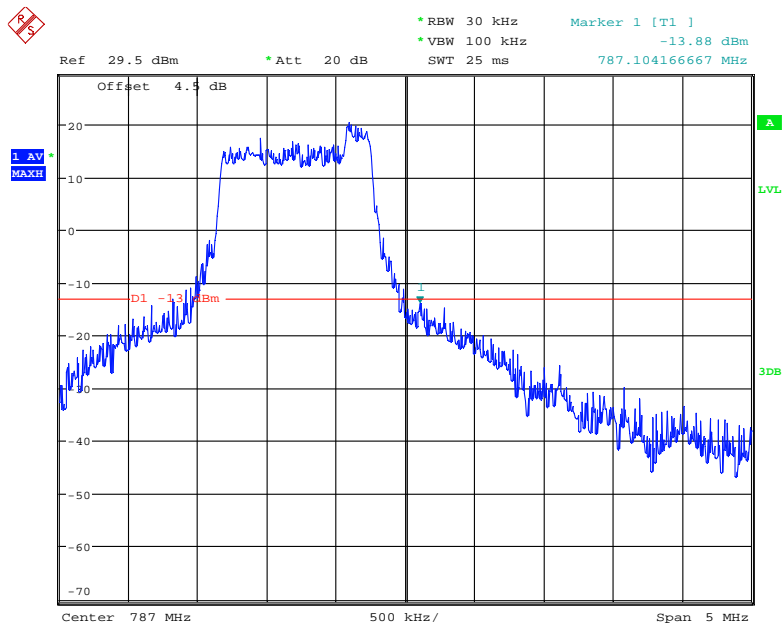
Date: 12.MAY.2018 19:21:35

16-QAM (5.0 MHz, RB5) - Left Band Edge

```
                                          *RBW  30 kHz      Marker 1 [T1 ]
                                          *VBW 100 kHz            -16.88 dBm
         Ref   29.5 dBm      *Att  20 dB   SWT  25 ms      776.959935897 MHz
            Offset   4.5 dB
```

Date: 12.MAY.2018 19:16:00

16-QAM (5.0 MHz, RB5) - Right Band Edge

```
                                          *RBW  30 kHz      Marker 1 [T1 ]
                                          *VBW 100 kHz            -15.10 dBm
         Ref   29.5 dBm      *Att  20 dB   SWT  25 ms      787.024038462 MHz
            Offset   4.5 dB
```

Date: 12.MAY.2018 19:27:50

QPSK (10.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 19:37:05

QPSK (10.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 19:49:40

16-QAM (10.0 MHz, RB0) - Left Band Edge

Date: 12.MAY.2018 19:40:41

16-QAM (10.0 MHz, RB0) - Right Band Edge

Date: 12.MAY.2018 19:51:54

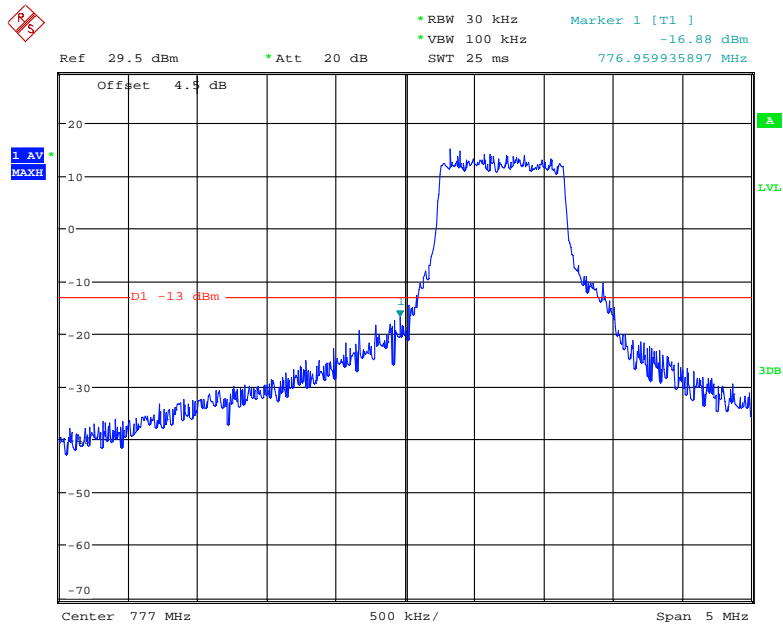## QPSK (10.0 MHz, RB6) - Left Band Edge

Date: 12.MAY.2018 19:34:21
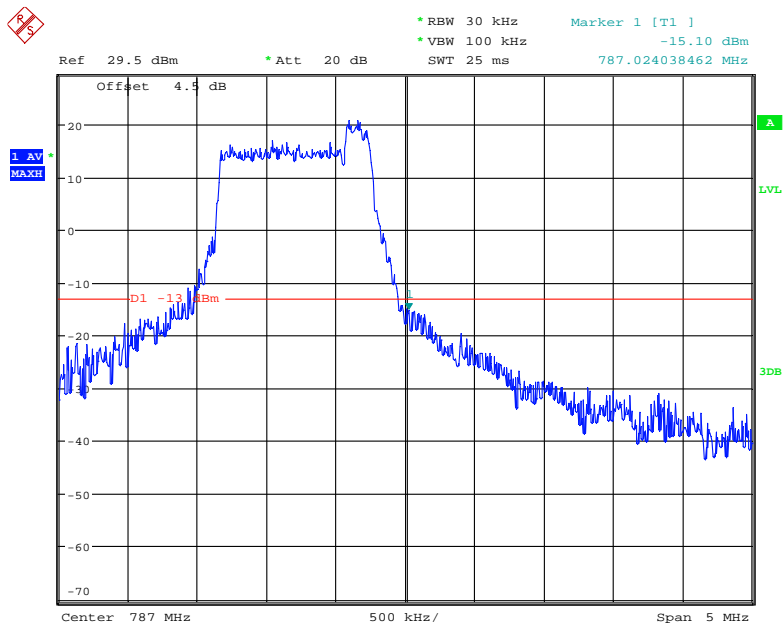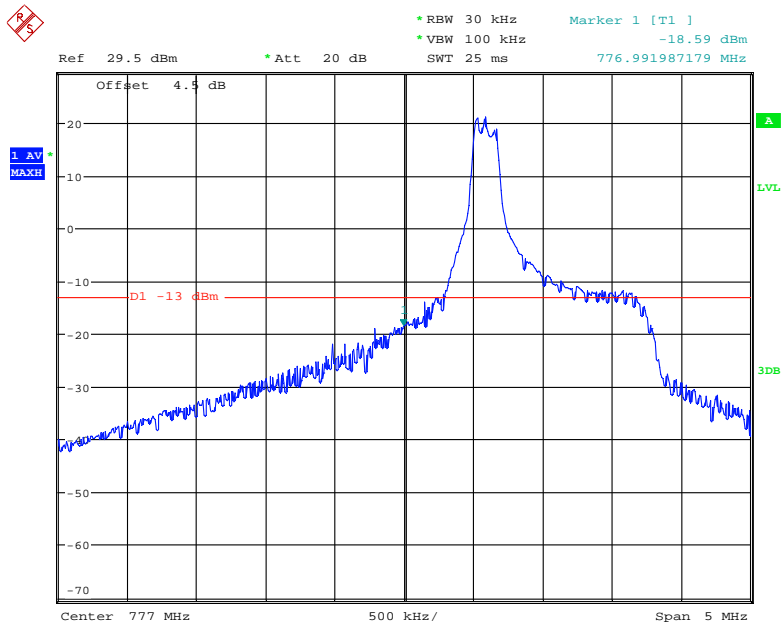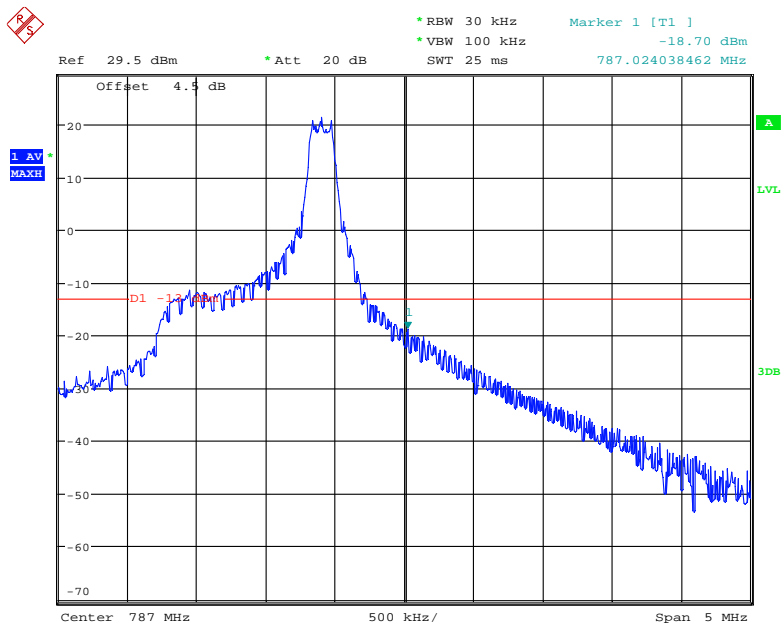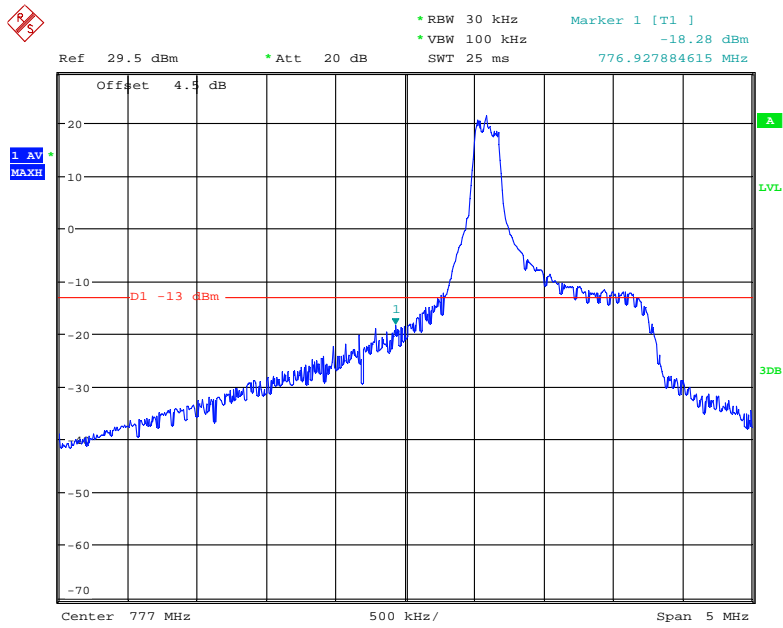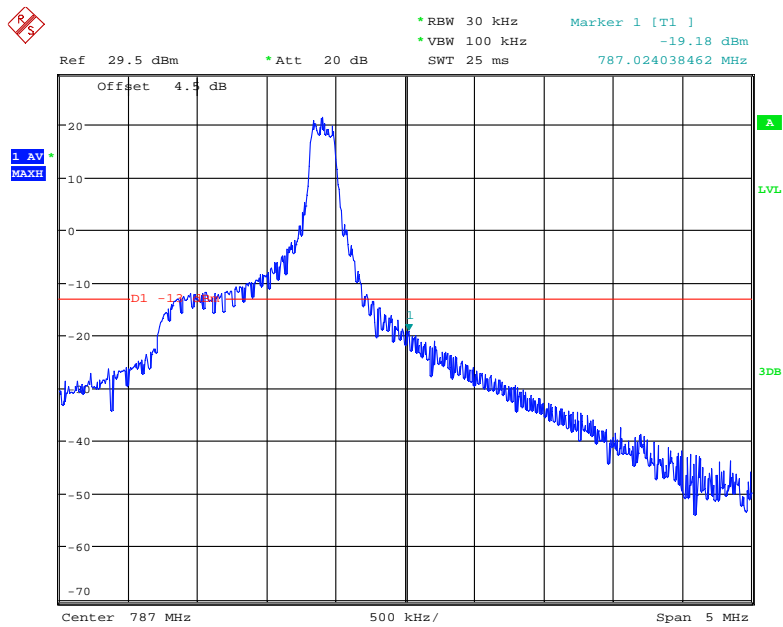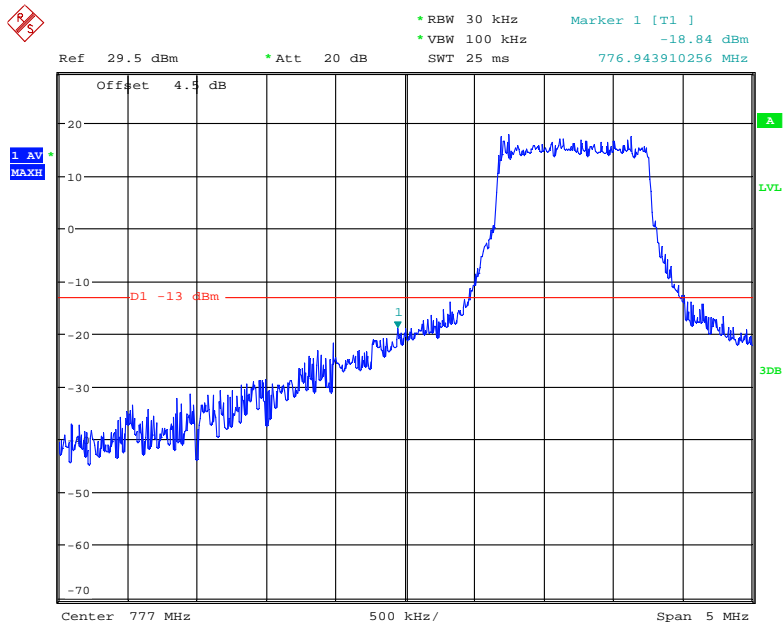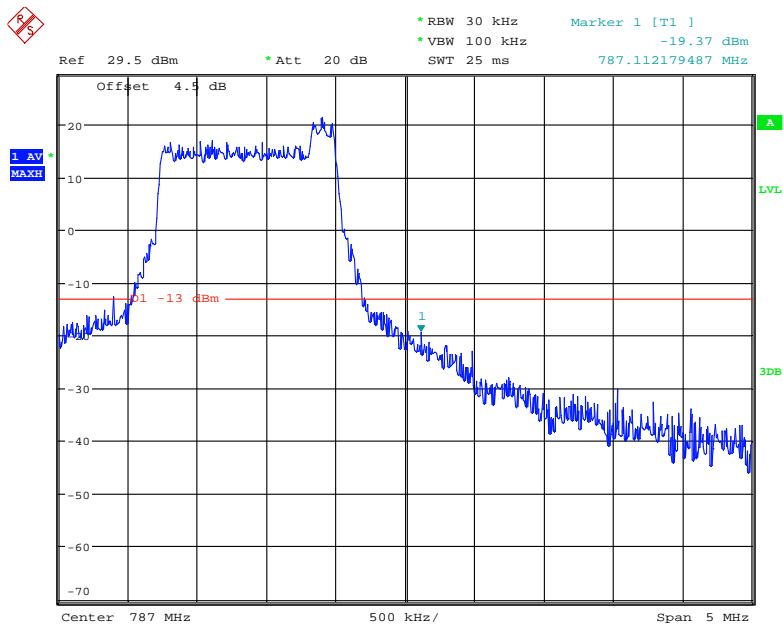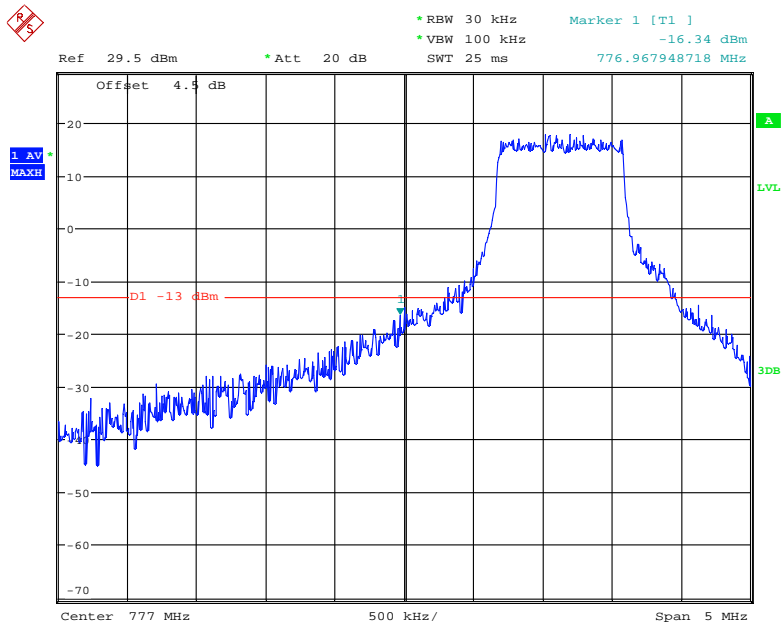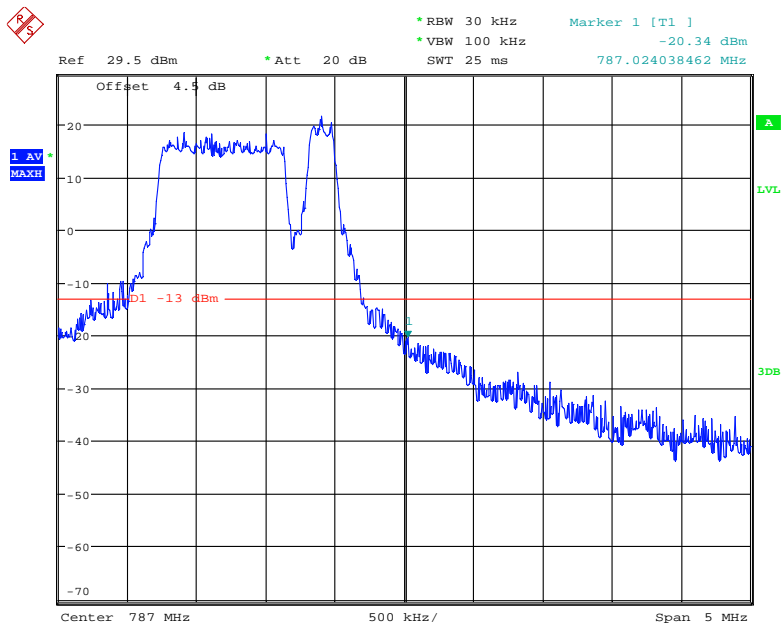
QPSK (10.0 MHz, RB6) - Right Band Edge

Date: 12.MAY.2018 19:46:31

16-QAM (10.0 MHz, RB5) - Left Band Edge

Date: 12.MAY.2018 19:42:55

16-QAM (10.0 MHz, RB5) - Right Band Edge

Date: 12.MAY.2018 19:54:25

FCC § 2.1055; §27.54 - FREQUENCY STABILITY

### Applicable Standard

FCC § 2.1055 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.

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.
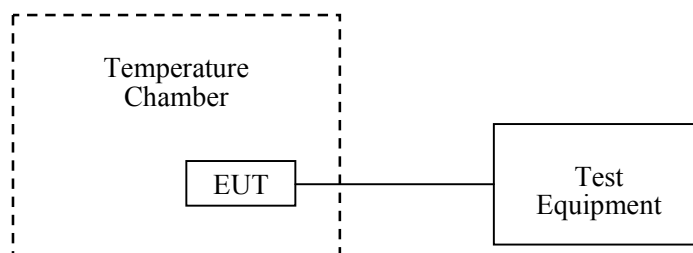
Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-15.

EUT operation mode: Transmitting

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

Note: EUT power by testing PCB board.

QPSK:

Band 4:

Temperature (℃)	Voltage Supplied (V$_{DC}$)	F$_L$ (MHz)	F$_H$ (MHz)	F$_L$ Limit (MHz)	F$_H$ Limit (MHz)
-30		1710.214752	1754.786521	1710	1755
-20		1710.214614	1754.786514	1710	1755
-10		1710.213241	1754.786215	1710	1755
0		1710.213658	1754.786254	1710	1755
10	5.0	1710.212546	1754.786241	1710	1755
20		1710.213256	1754.786102	1710	1755
30		1710.213982	1754.786321	1710	1755
40		1710.213254	1754.784210	1710	1755
50		1710.213952	1754.782412	1710	1755
20	3.5	1710.214751	1754.782403	1710	1755
20	5.5	1710.214746	1754.782356	1710	1755

Band 12:

Temperature (℃)	Voltage Supplied (V$_{DC}$)	F$_L$ (MHz)	F$_H$ (MHz)	F$_L$ Limit (MHz)	F$_H$ Limit (MHz)
-30		699.220120	715.782301	699	716
-20		699.221240	715.782124	699	716
-10		699.221020	715.782537	699	716
0		699.221284	715.782160	699	716
10	5.0	699.219652	715.782051	699	716
20		699.220235	715.781957	699	716
30		699.221247	715.782230	699	716
40		699.220310	715.781782	699	716
50		699.219985	715.782374	699	716
20	3.5	699.219983	715.782365	699	716
20	5.5	699.219979	715.782126	699	716

Band 13:

Temperature (℃)	Voltage Supplied (V$_{DC}$)	F$_L$ (MHz)	F$_H$ (MHz)	F$_L$ Limit (MHz)	F$_H$ Limit (MHz)
-30		777.219471	786.785412	777	787
-20		777.221240	786.785692	777	787
-10		777.219412	786.785742	777	787
0		777.218274	786.783571	777	787
10	5.0	777.218324	786.784125	777	787
20		777.221557	786.785241	777	787
30		777.219254	786.785324	777	787
40		777.219025	786.784257	777	787
50		777.219277	786.782359	777	787
20	3.5	777.219272	786.782352	777	787
20	5.5	777.219274	786.782355	777	787

16QAM:

Band 4:

Temperature (℃)	Voltage Supplied (V$_{DC}$)	F$_L$ (MHz)	F$_H$ (MHz)	F$_L$ Limit (MHz)	F$_H$ Limit (MHz)
-30		1710.213210	1754.785321	1710	1755
-20		1710.213652	1754.784562	1710	1755
-10		1710.214012	1754.784870	1710	1755
0		1710.214120	1754.784915	1710	1755
10	5.0	1710.214425	1754.785231	1710	1755
20		1710.214789	1754.785014	1710	1755
30		1710.214962	1754.785204	1710	1755
40		1710.213985	1754.784908	1710	1755
50		1710.214102	1754.784738	1710	1755
20	3.5	1710.214004	1754.784725	1710	1755
20	5.5	1710.214025	1754.784729	1710	1755

Band 12:

Temperature (℃)	Voltage Supplied (V$_{DC}$)	F$_L$ (MHz)	F$_H$ (MHz)	F$_L$ Limit (MHz)	F$_H$ Limit (MHz)
-30		699.222410	715.784240	699	716
-20		699.22241	715.784101	699	716
-10		699.221225	715.784761	699	716
0		699.222001	715.783542	699	716
10	5.0	699.221350	715.783908	699	716
20		699.221201	715.783127	699	716
30		699.221987	715.784010	699	716
40		699.220360	715.783514	699	716
50		699.220782	715.783419	699	716
20	3.5	699.220735	715.783415	699	716
20	5.5	699.220738	715.783408	699	716

Band 13:

Temperature (℃)	Voltage Supplied (V$_{DC}$)	F$_L$ (MHz)	F$_H$ (MHz)	F$_L$ Limit (MHz)	F$_H$ Limit (MHz)
-30		777.221012	786.784587	777	787
-20		777.221241	786.786424	777	787
-10		777.221012	786.784852	777	787
0		777.221012	786.785241	777	787
10	5.0	777.219352	786.785241	777	787
20		777.221024	786.785241	777	787
30		777.219521	786.784251	777	787
40		777.218759	786.784251	777	787
50		777.219524	786.785214	777	787
20	3.5	777.219511	786.785095	777	787
20	5.5	777.219503	786.785135	777	787

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