Test Report Serial Number:	**45461399 R1.1**
Test Report Date:	**18 September 2017**
Project Number:	**1379**

EMC Test Report - New Filing

Applicant:

4RF Limited
PO Box 13-506
Wellington, New Zealand 6440
New Zealand

FCC ID:	IC Registration Number
UIPXE757M170	**-**
Product Model Number / HVIN	Product Name / PMN
Aprisa XE	**Aprisa XE**

In Accordance With:

FCC 47 CFR Part 27 Subpart C, Part 15 Subpart B
Licensed Non-Broadcast Station Transmitter (TNB)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01 **IC Registration 3874A-1** **FCC Registration: 714830**

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1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:	Art Voss, P.Eng.	**Date(s) of Evaluation:**		10 Aug - 31 Aug, 2017
Report Prepared By:	Art Voss, P.Eng.	**Report Reviewed By:**		Ben Hewson
Report Revision	**Description of Revision**	**Revised Section**	**Revised By**	**Revision Date**
1.0	Initial Release	n/a	Art Voss	31August 2017
1.1	Added ANSI/TIA-603-E-2016 to References	3.0, 5.0	Art Voss	18 September 2017

2.0 CLIENT AND DUT INFORMATION

Client Information					
Applicant Name	**4RF Limited**				
Applicant Address	PO Box 13-506 Wellington, New Zealand, 6032 New Zealand				
DUT Information					
Device Identifier(s):	**FCC ID:**	**UIPXE757M170**			
	ISED ID:	**-**			
Equipment Class:	TNB - Licensed Non-Broadcast Station Transmitter				
Device Type:	Digital Radio				
Device Model(s) / HVIN:	XE 757-100-AC, XE 757-200-AC, XE 757-500-AC				
Device Marketing Name / PMN:	Aprisa XE				
Firmware Version ID Number / FVIN:	-				
Host Marketing Name / HMN:	-				
Test Sample Serial No.:	XE 757-200-AC S/N: 21822497				
Transmit Frequency Range:	757-758MHZ, 787-788MHz, Upper Block A				
Test Channels:	Programmable				
Manuf. Max. Rated Output Power:	QPSK: 31dBm				
	16 QAM: 31dBm				
	32 QAM: 30dBm				
	64 QAM: 29dBm				
Manuf. Max. Rated BW:	100kHz, 200kHz, 500kHz*				
Manuf. Max. Rated Data Rate (kbits/s):	**BW**	**QPSK**	**16 QAM**	**32 QAM**	**64 QAM**
	100kHz	168	344	432	520
	200KHz	336	680	840	1024
	500KHz	792	1592	1992	2392
Antenna Make and Model:	ZDA Communications US LLC.: ZDAFP750-10-60D				
Antenna Type and Gain:	Flat Panel, 10dBi Gain				
Modulation:	QPSK, 16 QAM, 32 QAM, 64 QAM				
Mode:	Duplex				
Emission Designator:	See Section 8.0				
DUT Power Source:	120VAC				
DUT Dimensions [HxWxD] (mm)	90 x 432 x 280				
Deviation(s) from standard/procedure:	None				
Modification of DUT:	None				

*The Aprisa XE employs one of two RF transceiver modules. They are identical in all aspects with the exception certain minor component changes. The 200kHz module performs both the 100Khz and 200kHz Bandwidth functions, the 500kHz module performs the 500kHz Bandwidth functions. Both modules were evaluated during the course of this investigation.

3.0 TEST SUMMARY

TEST SUMMARY					
Section	**Description of Test**	**Procedure Reference**	**Applicable Rule Part(s) FCC**	**Test Date**	**Result**
7.0	Conducted Power (Fundemental)	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§2.1046 §27.50(b)(1)	21 Aug 2017	Pass
8.0	Occupied Bandwidth	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§2.1049	21 Aug 2017	Pass
9.0	Band Edge	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§27.53(c)	29 Aug 2017	Pass
10.0	Emission Mask (Out of Band)	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§27.53(c)	24 Aug 2017	Pass
11.0	Conducted TX Spurious Emissions	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§2.1051 §27.53(c)	24 Aug 2017	Pass
12.0	Radiated TX Spurious Emissions	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§2.1053 §27.53(c)	28 Aug 2017	Pass
13.0	Emissions in 1550-1610 MHz Band	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§27.53(f)	28 Aug 2017	Pass
14.0	Frequency Stability	ANSI/TIA/EIA-603-E-2016 ANSI C63.4:2014	§2.1055 §27.54	5 Sep 2017	Pass

4.0 SCOPE

This Certification Report was prepared on behalf of:

4RF Limited

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

As per FCC CFR 47 Part §2.1091 and §2.1093, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in a separate exhibit from this report.

This *Equipment* is subject to FCC Declaration of Conformity (DoC). DoC evaluations were performed on this *Equipment* and the results of the DoC evaluation appear in a separate exhibit from this report.

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.	Art Voss, P.Eng. Technical Manager Celltech Labs Inc. 26 August 2017 Date	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA A. F. VOSS # 31327

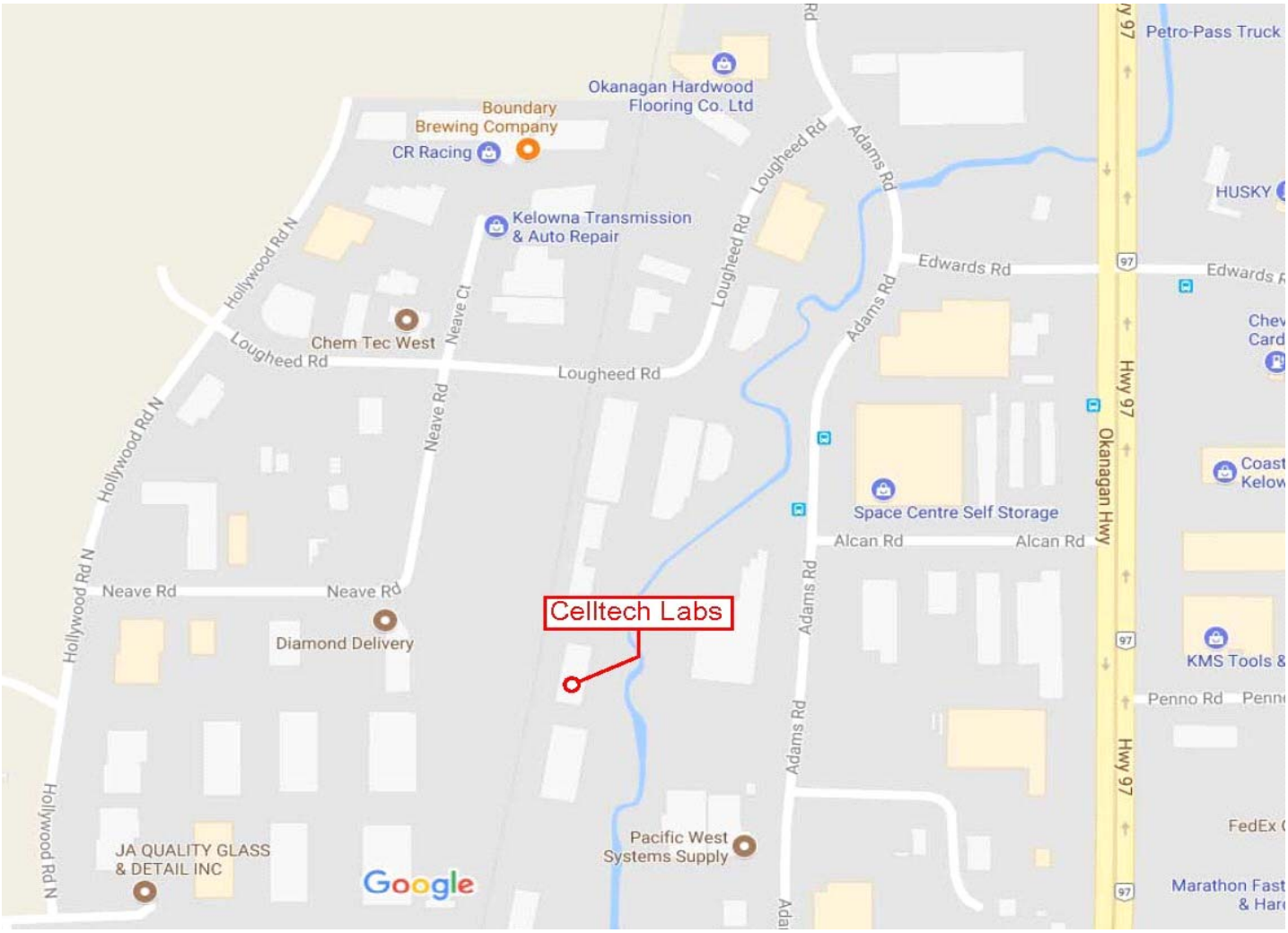
5.0 NORMATIVE REFERENCES

Normative References	
ANSI / ISO 17025:2005	General Requirements for competence of testing and calibration laboratories
IEEE/ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/TIA/EIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
CFR Title 47 Part 2	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47 Part 27C	Code of Federal Regulations Title 47: Telecommunication Part 27C: Miscellaneous Wireless Communications Services
CFR Title 47 Part 15	Code of Federal Regulations Title 47: Telecommunication Part 15: Radio Frequency Devices Subpart B: Unintensional Radiators

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number 714830 and Industry Canada under Test Site File Number IC 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 CONDUCTED POWER

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1046, §27.50(b)(9), KDB 971168 D01v02r02**

Limits	
47 CFR §27.50(b)(9)	**§ 27.50 Power limits and duty cycle.** (b) The following power and antenna height limits apply to transmitters operating in the 746–763 MHz, 775–793 MHz and 805–806 MHz bands: (9) Control stations and mobile stations transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands and fixed stations transmitting in the 787–788 MHz and 805–806 MHz bands are limited to 30 watts ERP.

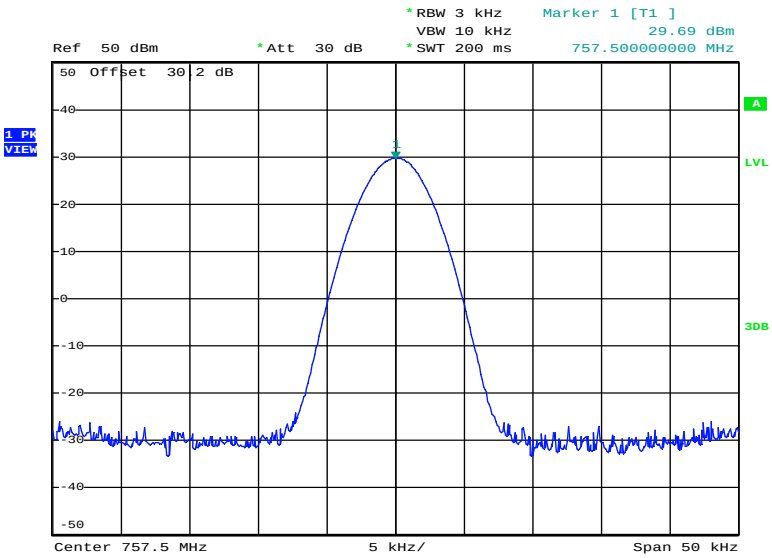
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak with the RBW set to ≥ the OBW of the DUT. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type and to the center frequency of each transmission band. All modulations (CW, QPSK, 16 QAM, 32 QAM and 64 QAM) and all bandwidths (100kHz, 200kHz and 500kHz) were investigated. The SA trace was set to Max Hold and Marker 1 set to Peak and the value recorded.

Plot 7.1 – Conducted Power 757.5MHz, 100kHz BW, CW

Conducted Power

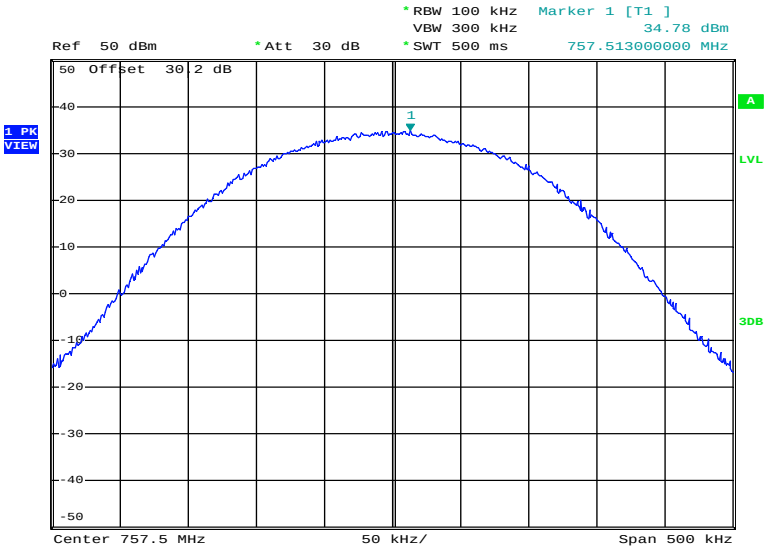


Date: 16.AUG.2017 09:27:34

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Measured Power (dBm):	29.69

Plot 7.2 – Conducted Power 757.5MHz, 100kHz BW, QPSK

Conducted Power

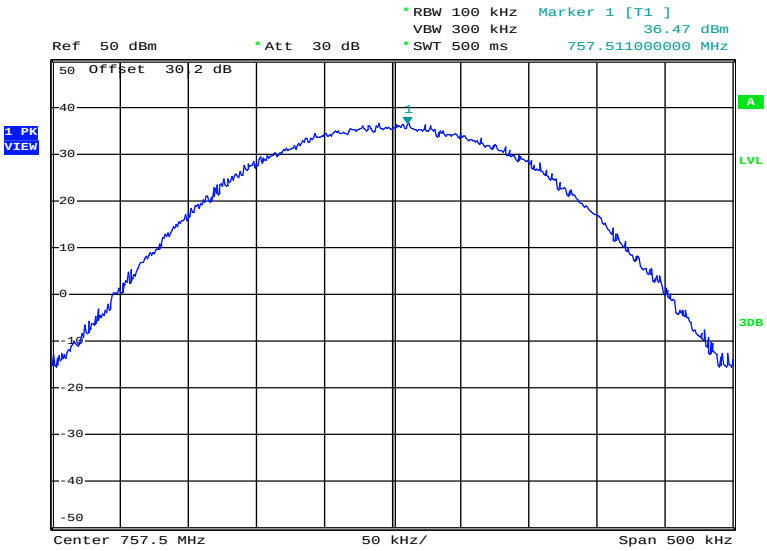


Date: 9.SEP.2017 11:59:13

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured Power (dBm):	34.78

Plot 7.3 – Conducted Power 757.5MHz, 100kHz BW, 16 QAM

Conducted Power

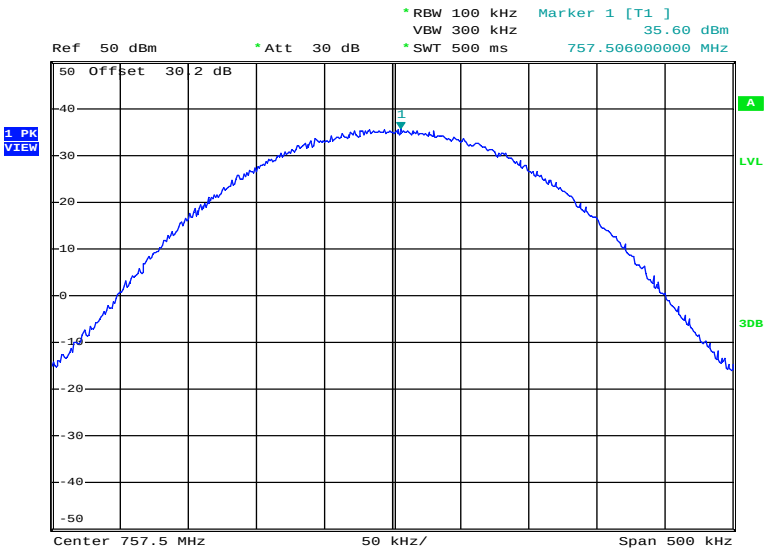


Date: 9.SEP.2017 12:00:23

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured Power (dBm):	36.47

Plot 7.4 – Conducted Power 757.5MHz, 100kHz BW, 32 QAM

Conducted Power

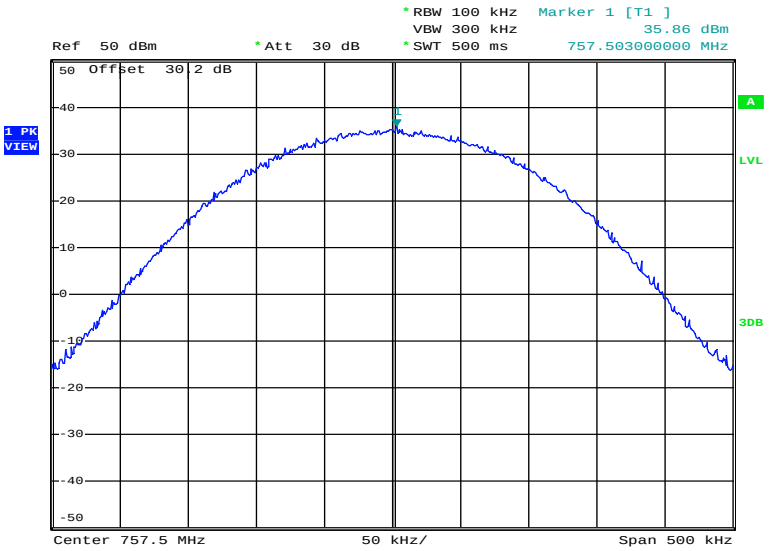


Date: 9.SEP.2017 12:01:19

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured Power (dBm):	35.60

Plot 7.5 – Conducted Power 757.5MHz, 100kHz BW, 64 QAM

Conducted Power

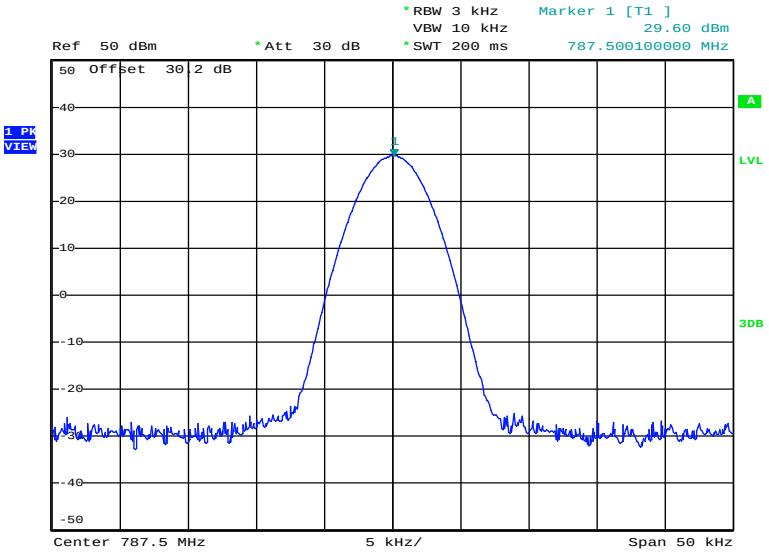


Date: 9.SEP.2017 12:02:22

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured Power (dBm):	35.86

Plot 7.6 – Conducted Power 787.5MHz, 100kHz BW, CW

Conducted Power

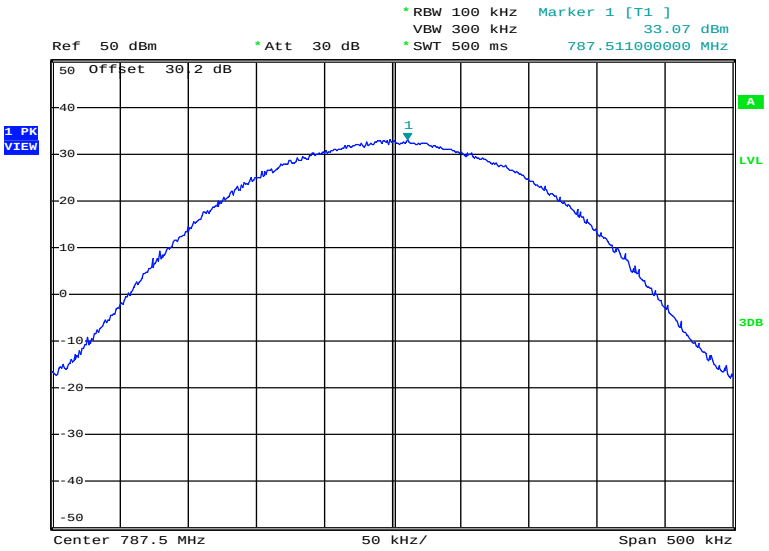


Date: 16.AUG.2017 09:52:42

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Measured Power (dBm):	29.60

Plot 7.7 – Conducted Power 787.5MHz, 100kHz BW, QPSK

Conducted Power

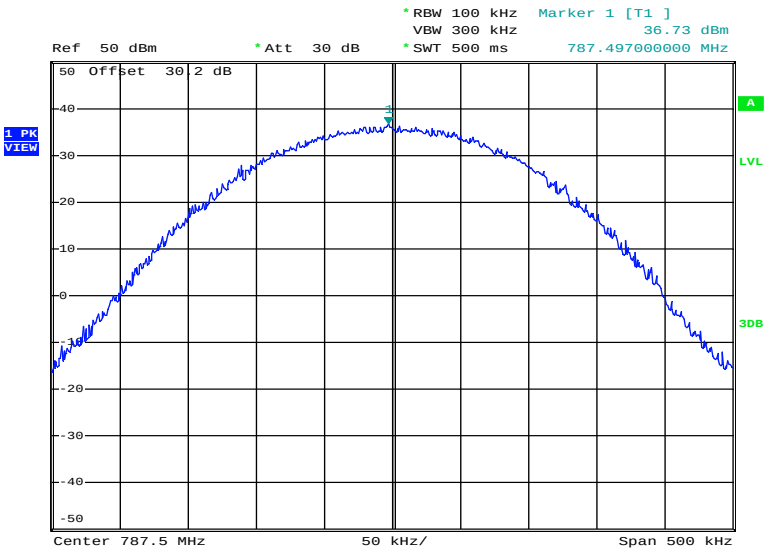


Date: 9.SEP.2017 12:17:00

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured Power (dBm):	33.07

Plot 7.8 – Conducted Power 787.5MHz, 100kHz BW, 16 QAM

Conducted Power

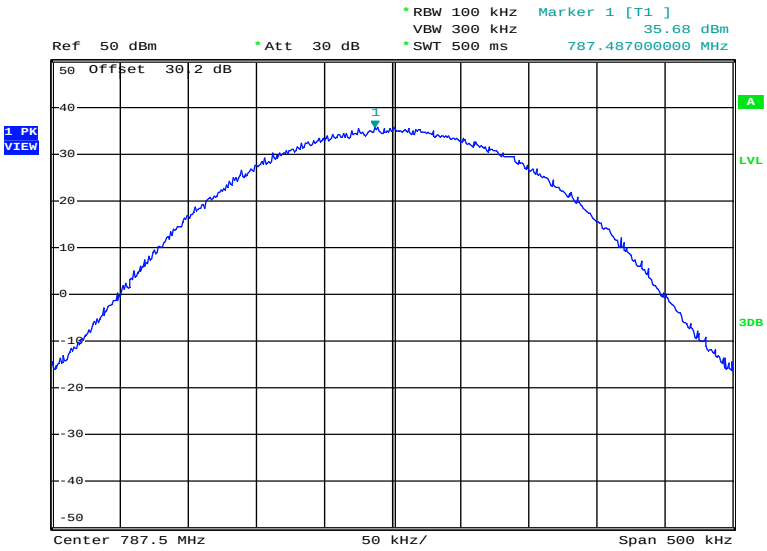


Date: 9.SEP.2017 12:17:54

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured Power (dBm):	36.73

Plot 7.9 – Conducted Power 787.5MHz, 100kHz BW, 32 QAM

Conducted Power

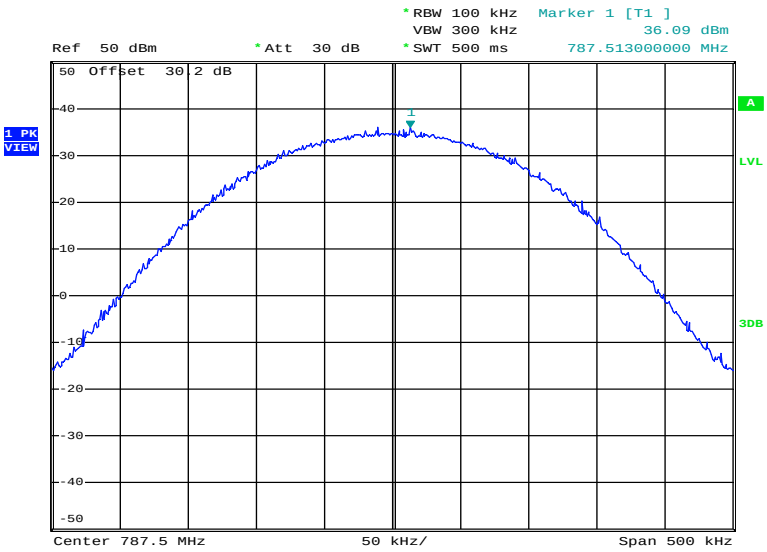


Date: 9.SEP.2017 12:18:50

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured Power (dBm):	35.68

Plot 7.10 – Conducted Power 787.5MHz, 100kHz BW, 64 QAM

Conducted Power

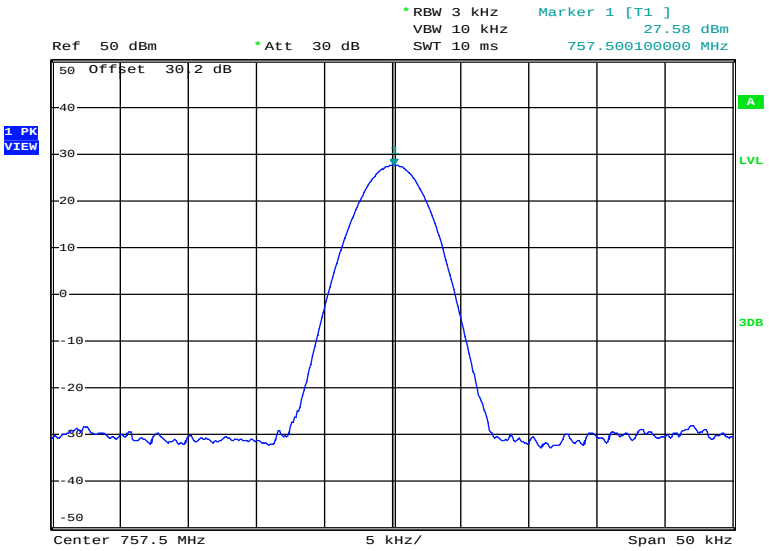


Date: 9.SEP.2017 12:20:02

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured Power (dBm):	36.09

Plot 7.11 – Conducted Power 757.5MHz, 200kHz BW, CW

Conducted Power

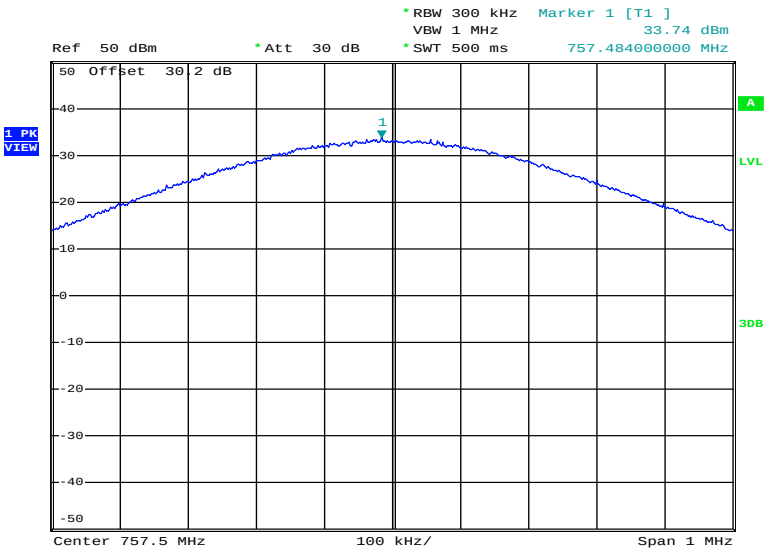


Date: 11.AUG.2017 10:20:04

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Measured Power (dBm):	27.58

Plot 7.12 – Conducted Power 757.5MHz, 200kHz BW, QPSK

Conducted Power

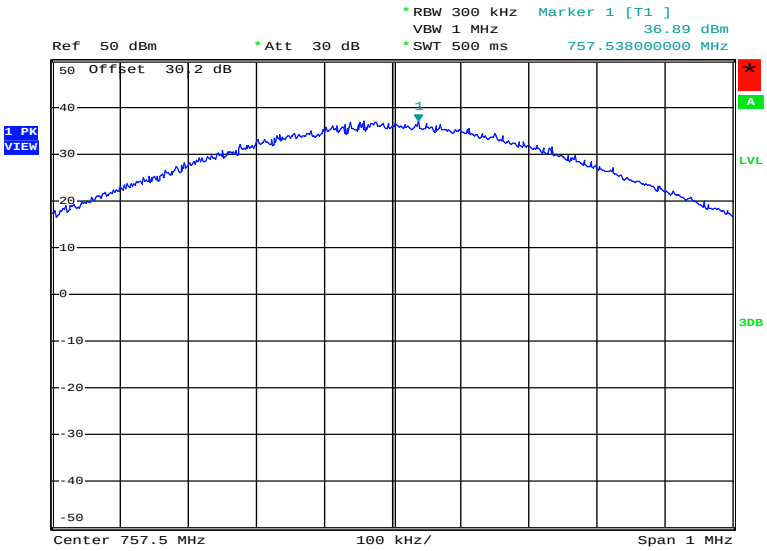


Date: 9.SEP.2017 12:04:46

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured Power (dBm):	33.74

Plot 7.13 – Conducted Power 757.5MHz, 200kHz BW, 16 QAM

Conducted Power

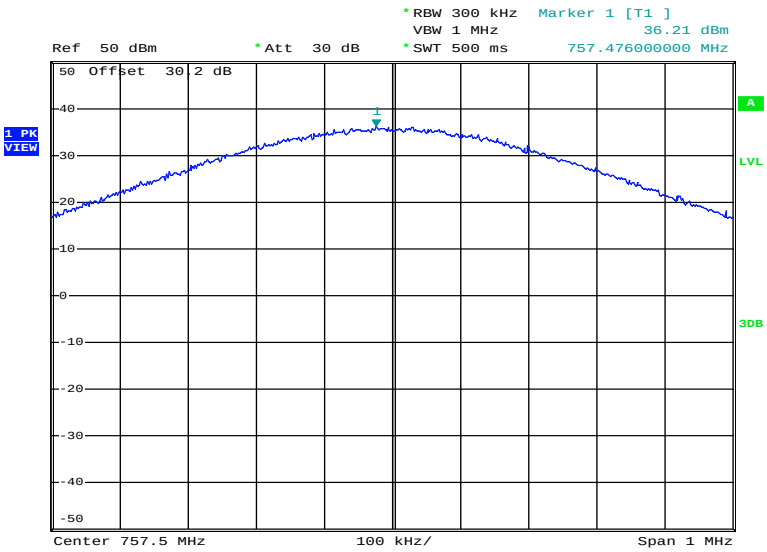


Date: 9.SEP.2017 12:06:26

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured Power (dBm):	36.89

Plot 7.14 – Conducted Power 757.5MHz, 200kHz BW, 32 QAM

Conducted Power

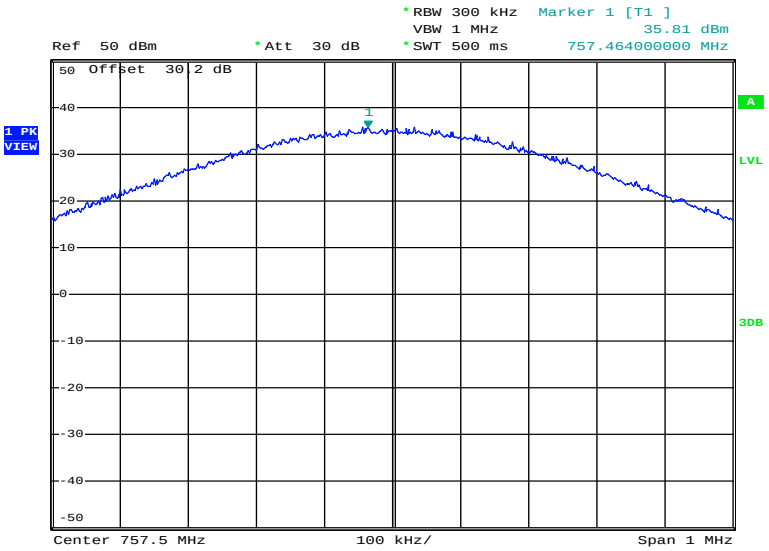


Date: 9.SEP.2017 12:07:17

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured Power (dBm):	36.21

Plot 7.15 – Conducted Power 757.5MHz, 200kHz BW, 64 QAM

Conducted Power

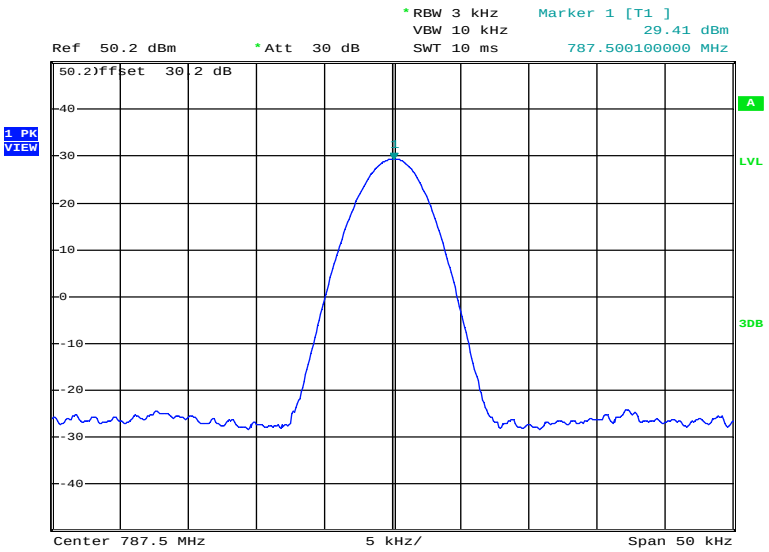


Date: 9.SEP.2017 12:08:16

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured Power (dBm):	35.81

Plot 7.16 – Conducted Power 787.5MHz, 200kHz BW, CW

Conducted Power

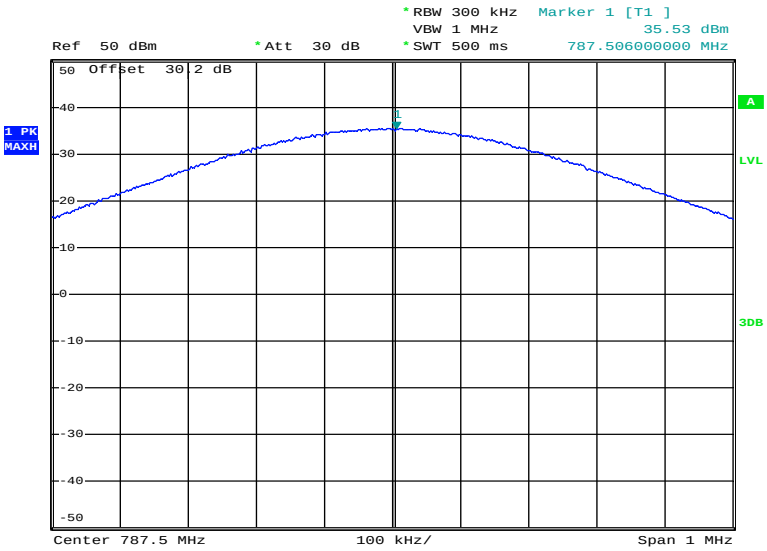


Date: 10.AUG.2017 16:17:01

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Measured Power (dBm):	29.41

Plot 7.17 – Conducted Power 787.5MHz, 200kHz BW, QPSK

Conducted Power

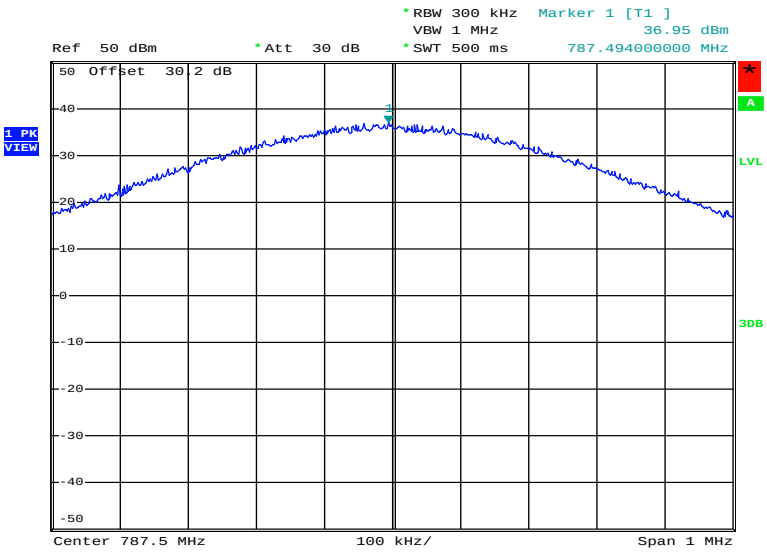


Date: 9.SEP.2017 12:12:00

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured Power (dBm):	35.53

Plot 7.18 – Conducted Power 787.5MHz, 200kHz BW, 16QAM

Conducted Power

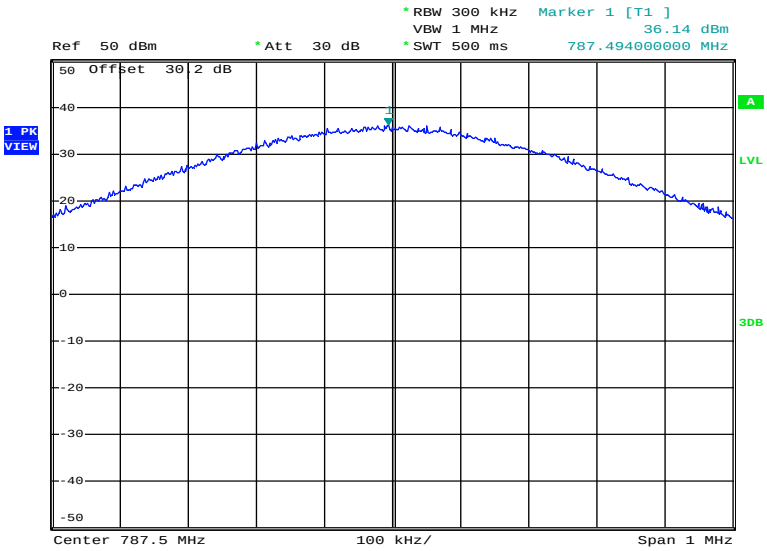


Date: 9.SEP.2017 12:13:01

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured Power (dBm):	36.95

Plot 7.19 – Conducted Power 787.5MHz, 200kHz BW, 32QAM

Conducted Power

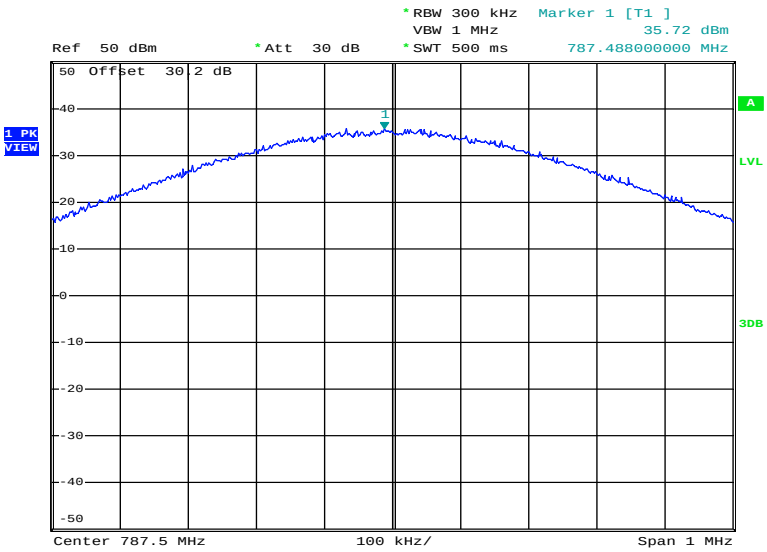


Date: 9.SEP.2017 12:13:52

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured Power (dBm):	36.14

Plot 7.20 – Conducted Power 787.5MHz, 200kHz BW, 64QAM

Conducted Power

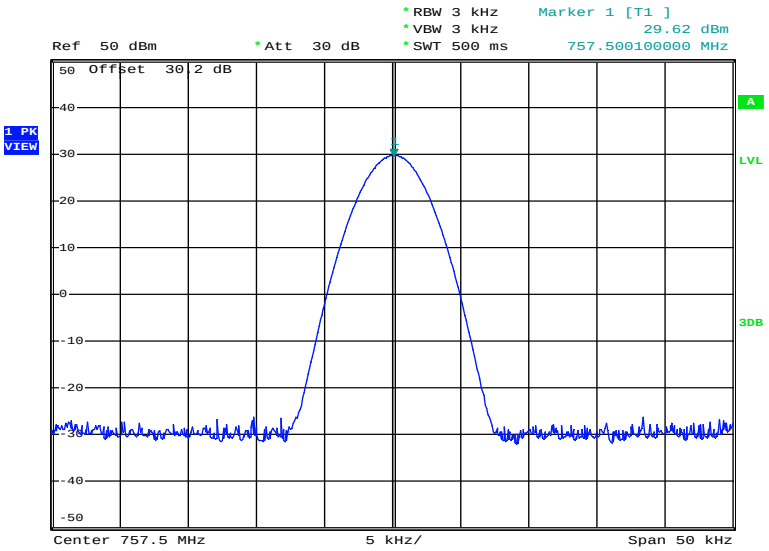


Date: 9.SEP.2017 12:14:47

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured Power (dBm):	35.72

Plot 7.21 – Conducted Power 757.5MHz, 500kHz BW, CW

Conducted Power

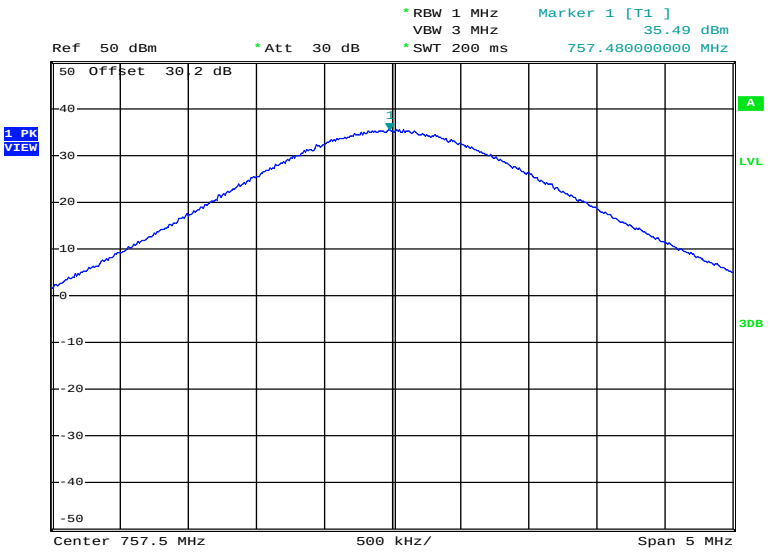


Date: 24.AUG.2017 14:08:06

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Measured Power (dBm):	29.62

Plot 7.22 – Conducted Power 757.5MHz, 500kHz BW, QPSK

Conducted Power

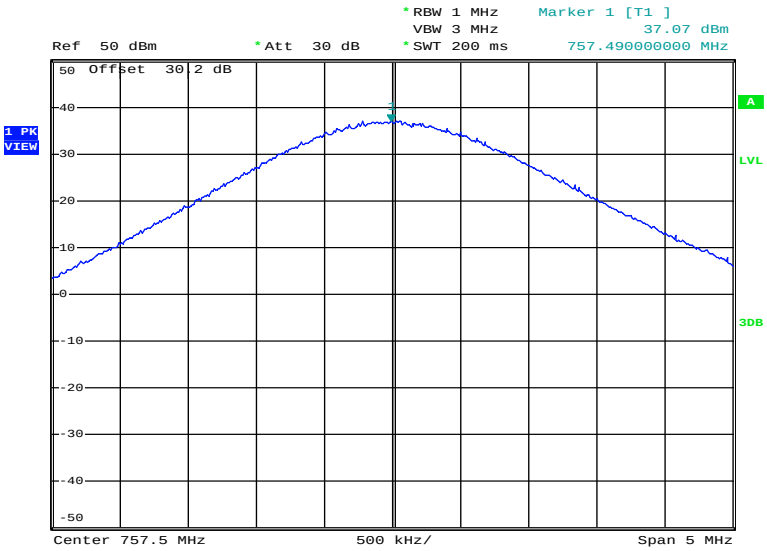


Date: 8.SEP.2017 12:59:31

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured Power (dBm):	35.49

Plot 7.23 – Conducted Power 757.5MHz, 500kHz BW, 16 QAM

Conducted Power

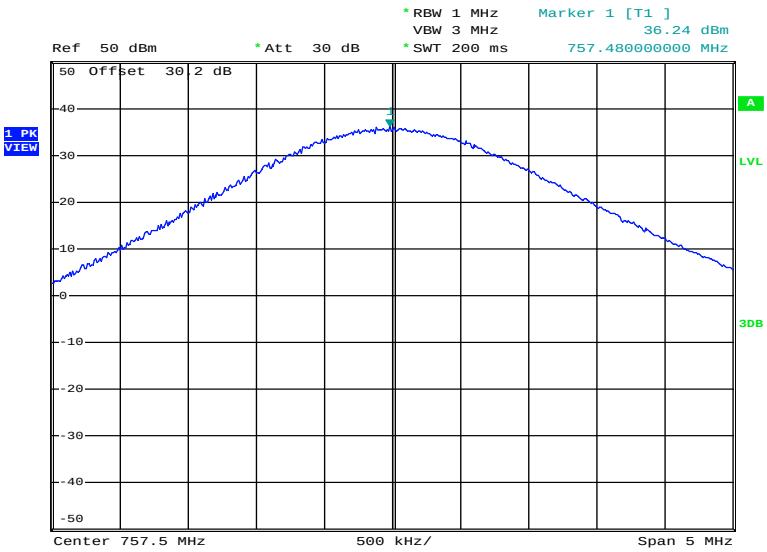


Date: 8.SEP.2017 13:01:10

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured Power (dBm):	37.07

Plot 7.24 – Conducted Power 757.5MHz, 500kHz BW, 32 QAM

Conducted Power

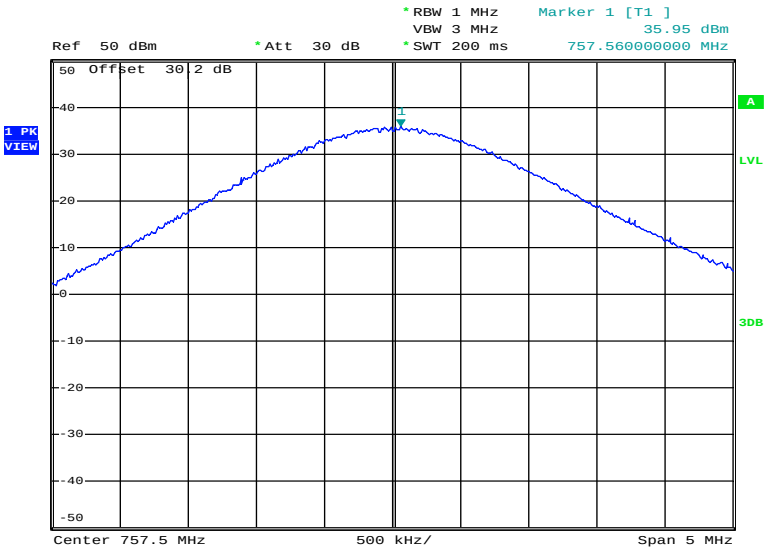


Date: 8.SEP.2017 13:01:55

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured Power (dBm):	36.24

Plot 7.25 – Conducted Power 757.5MHz, 500kHz BW, 64 QAM

Conducted Power

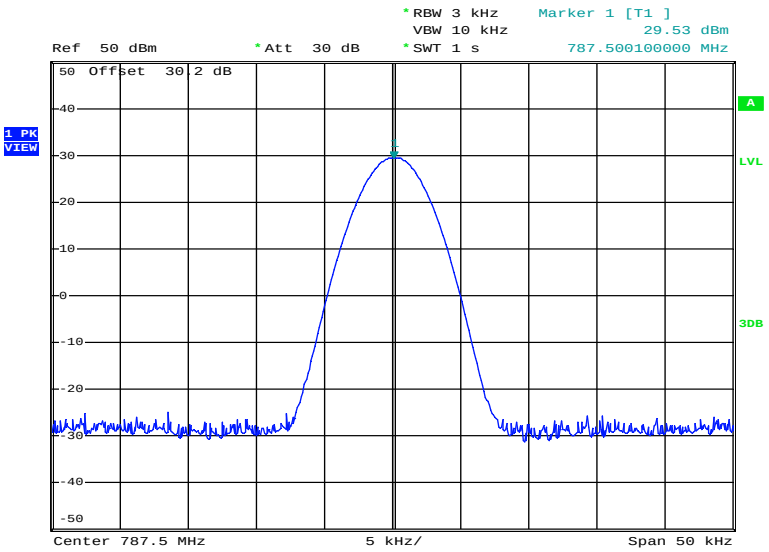


Date: 8.SEP.2017 13:05:34

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured Power (dBm):	35.95

Plot 7.26 – Conducted Power 787.5MHz, 500kHz BW, CW

Conducted Power

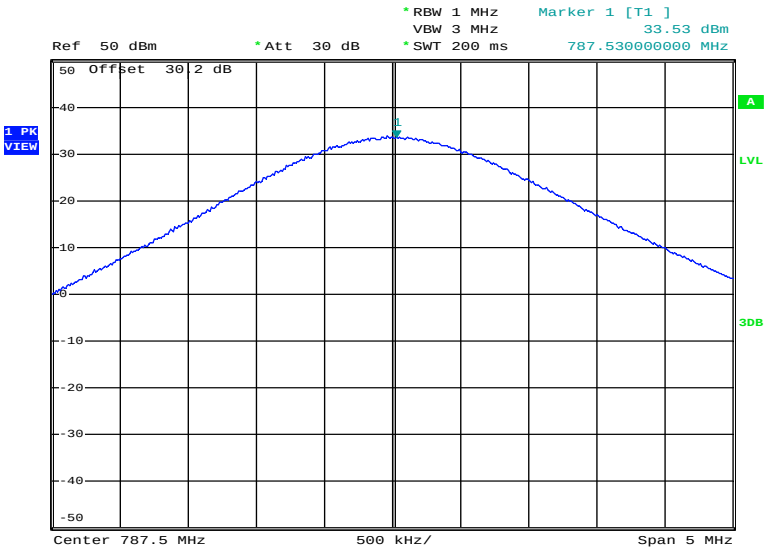


Date: 21.AUG.2017 10:21:35

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Measured Power (dBm):	29.53

Plot 7.27 – Conducted Power 787.5MHz, 500kHz BW, QPSK

Conducted Power

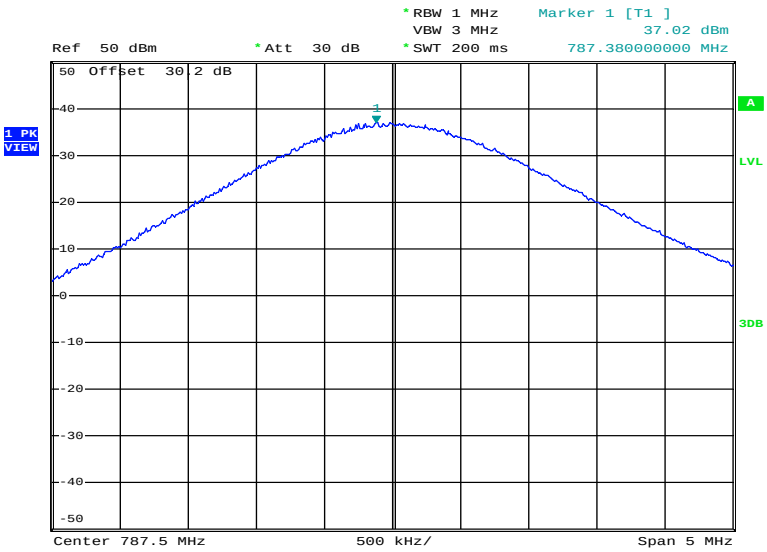


Date: 8.SEP.2017 13:12:33

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured Power (dBm):	33.53

Plot 7.28 – Conducted Power 787.5MHz, 500kHz BW, 16 QAM

Conducted Power

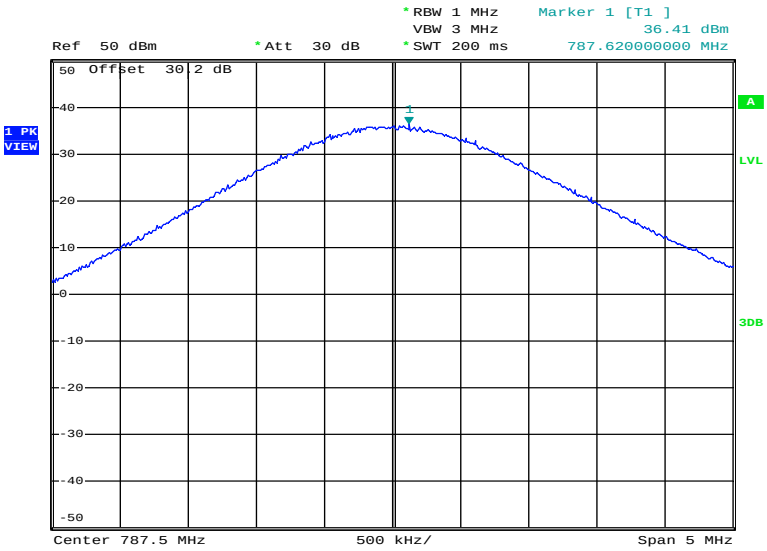


Date: 8.SEP.2017 13:13:22

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured Power (dBm):	37.02

Plot 7.29 – Conducted Power 787.5MHz, 500kHz BW, 32 QAM

Conducted Power

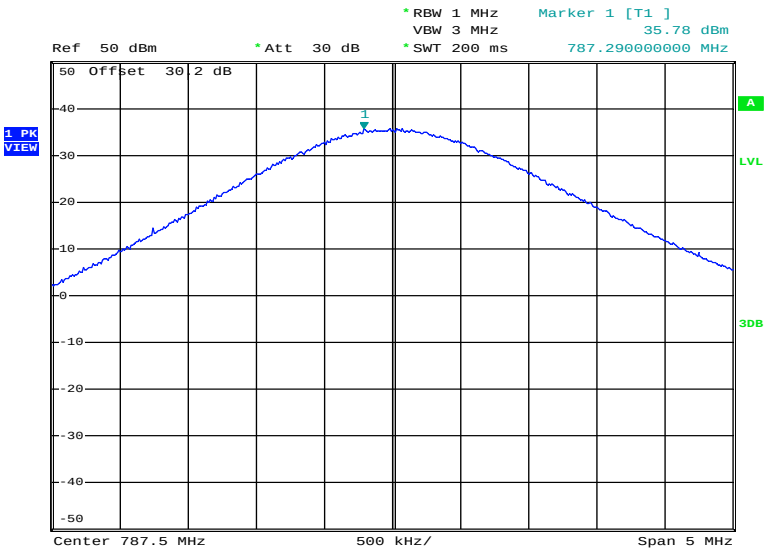


Date: 8.SEP.2017 13:14:10

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured Power (dBm):	36.41

Plot 7.30 – Conducted Power 787.5MHz, 500kHz BW, 64 QAM

Conducted Power



Date: 8.SEP.2017 13:15:04

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured Power (dBm):	35.78

Table 7.1 – Summary of Conducted Power Measurements (Peak)

§27.50(b)(9) Peak Output Power of Fundemental												
Freq (MHz)	BW (kHz)	Modulation	Measured Power PEAK [E_{Meas}] (dBm)	Antenna Gain[1] [G_T] (dBi)	Antenna Gain Correction[2] [G_C]	Cable Loss [L_C] (dB)	ERP (dBm)	ERP (W)	Limit (dBm)	Limit (W)	Margin (dB)	Margin (W)
757.5	100	CW[4]	29.96	10	-2.15	0.47	37.34	5.42	44.80	30.00	7.46	24.58
		QPSK	34.78	10	-2.15	0.47	42.16	16.44	44.80	30.00	2.64	13.56
		16 QAM	36.47	10	-2.15	0.47	43.85	24.27	44.80	30.00	0.95	5.73
		32 QAM[3]	35.60	10	-2.15	0.47	42.98	19.86	44.80	30.00	1.82	10.14
		64 QAM[3]	35.86	10	-2.15	0.47	43.24	21.09	44.80	30.00	1.56	8.91
787.5		CW[4]	29.60	10	-2.15	0.47	36.98	4.99	44.80	30.00	7.82	25.01
		QPSK	33.07	10	-2.15	0.47	40.45	11.09	44.80	30.00	4.35	18.91
		16 QAM	36.73	10	-2.15	0.47	44.11	25.76	44.80	30.00	0.69	4.24
		32 QAM[3]	35.68	10	-2.15	0.47	43.06	20.23	44.80	30.00	1.74	9.77
		64 QAM[3]	36.09	10	-2.15	0.47	43.47	22.23	44.80	30.00	1.33	7.77
757.5	200	CW[4]	27.59	10	-2.15	0.47	34.97	3.14	44.80	30.00	9.83	26.86
		QPSK	33.74	10	-2.15	0.47	41.12	12.94	44.80	30.00	3.68	17.06
		16 QAM	36.89	10	-2.15	0.47	44.27	26.73	44.80	30.00	0.53	3.27
		32 QAM[3]	36.21	10	-2.15	0.47	43.59	22.86	44.80	30.00	1.21	7.14
		64 QAM[3]	35.81	10	-2.15	0.47	43.19	20.84	44.80	30.00	1.61	9.16
787.5		CW[4]	29.41	10	-2.15	0.47	36.79	4.78	44.80	30.00	8.01	25.22
		QPSK	35.53	10	-2.15	0.47	42.91	19.54	44.80	30.00	1.89	10.46
		16 QAM	36.95	10	-2.15	0.47	44.33	27.10	44.80	30.00	0.47	2.90
		32 QAM[3]	36.14	10	-2.15	0.47	43.52	22.49	44.80	30.00	1.28	7.51
		64 QAM[3]	35.72	10	-2.15	0.47	43.10	20.42	44.80	30.00	1.70	9.58
757.5	500	CW[4]	29.62	10	-2.15	0.47	37.00	5.01	44.80	30.00	7.80	24.99
		QPSK	35.49	10	-2.15	0.47	42.87	19.36	44.80	30.00	1.93	10.64
		16 QAM	37.07	10	-2.15	0.47	44.45	27.86	44.80	30.00	0.35	2.14
		32 QAM[3]	36.24	10	-2.15	0.47	43.62	23.01	44.80	30.00	1.18	6.99
		64 QAM[3]	35.95	10	-2.15	0.47	43.33	21.53	44.80	30.00	1.47	8.47
787.5		CW[4]	29.53	10	-2.15	0.47	36.91	4.91	44.80	30.00	7.89	25.09
		QPSK	33.53	10	-2.15	0.47	40.91	12.33	44.80	30.00	3.89	17.67
		16 QAM	37.02	10	-2.15	0.47	44.40	27.54	44.80	30.00	0.40	2.46
		32 QAM[3]	36.41	10	-2.15	0.47	43.79	23.93	44.80	30.00	1.01	6.07
		64 QAM[3]	35.78	10	-2.15	0.47	43.16	20.70	44.80	30.00	1.64	9.30

Per FCC CFR 47 §2.1033(c)(8): Power to Transmitter:

Inputs to Transmitter Module : Voltage:12VDC, Current: 2.85A, P = V X I = 12 X 2.85 = **34.2W**

$ERP = P_{Meas} + G_T + G_C - L_C$

Margin = Limit - ERP

(1) The Gain of the ZDAFP750-10-60D used for compliance to §27.53(f) is assumed for this calculation

(2) Correction to dBd

(3) The output power setting is automatically reduced to: 32 QAM = 30dBm, 64QAM = 29dBm

(4) CW measurements for reference only

Result: Complies

Table 7.2 – Summary of Conducted Power Measurements (Average)

§27.50(b)(9) Average Output Power of Fundemental													
Freq (MHz)	BW (kHz)	Modulation	Measured Power [E_{Meas}] (dBm)	Freq (MHz)	BW (kHz)	Modulation	Measured Power [E_{Meas}] (dBm)	Freq (MHz)	BW (kHz)	Modulation	Measured Power [E_{Meas}] (dBm)	Rated Power (dBm)	Rated Power (W)
757.5	100	CW(4)	29.7	757.5	200	CW(4)	29.5	757.5	500	CW(4)	29.4	31	1.26
		QPSK	29.8			QPSK	30.0			QPSK	30.1	31	1.26
		16 QAM	30.5			16 QAM	30.7			16 QAM	30.7	31	1.26
		32 QAM(3)	29.5			32 QAM(3)	29.8			32 QAM(3)	29.8	30	1.00
		64 QAM(3)	28.6			64 QAM(3)	28.9			64 QAM(3)	28.8	29	0.80
787.5		CW(4)	29.6	787.5		CW(4)	29.4	787.5		CW(4)	29.3	31	1.26
		QPSK	29.7			QPSK	30.0			QPSK	30.1	31	1.26
		16 QAM	30.3			16 QAM	30.5			16 QAM	30.6	31	1.26
		32 QAM(3)	29.4			32 QAM(3)	29.7			32 QAM(3)	29.8	30	1.00
		64 QAM(3)	28.6			64 QAM(3)	28.8			64 QAM(3)	28.9	29	0.80

(3) The output power setting is automatically reduced to: 32 QAM = 30dBm, 64QAM = 29dBm
(4) CW measurements for reference only

8.0 OCCUPIED BANDWIDTH

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, KDB 971168 D01v02r02**

Limits	
47 CFR §2.1049	**§ 2.1049 Measurements required: Occupied Bandwidth.** The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured…

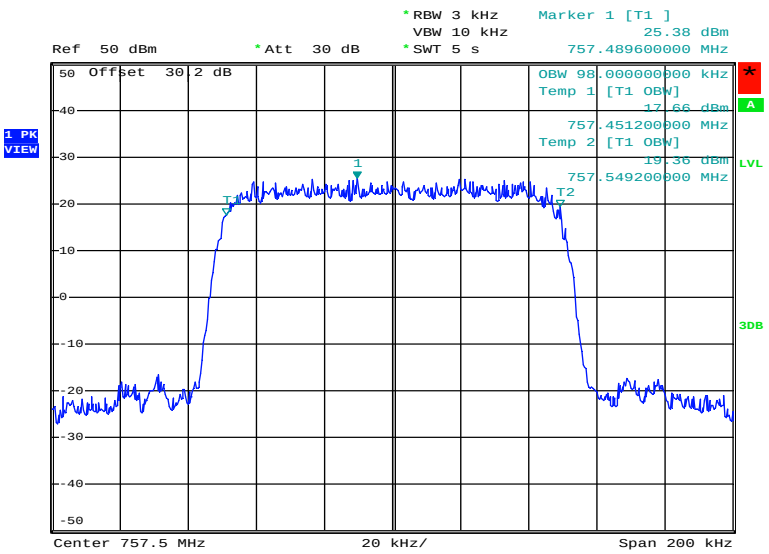
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak with the RBW set to << the OBW of the DUT. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type and set to the center frequency of each transmission band. All modulations (QPSK, 16 QAM, 32 QAM and 64 QAM) and all bandwidths (100kHz, 200kHz and 500kHz) were investigated. The SA trace was set to Max Hold and the SA set to measure the 99% Occupied Bandwidth.

Plot 8.1 – Occupied Bandwidth 757.5MHz, 100kHz BW, QPSK

Occupied Bandwidth

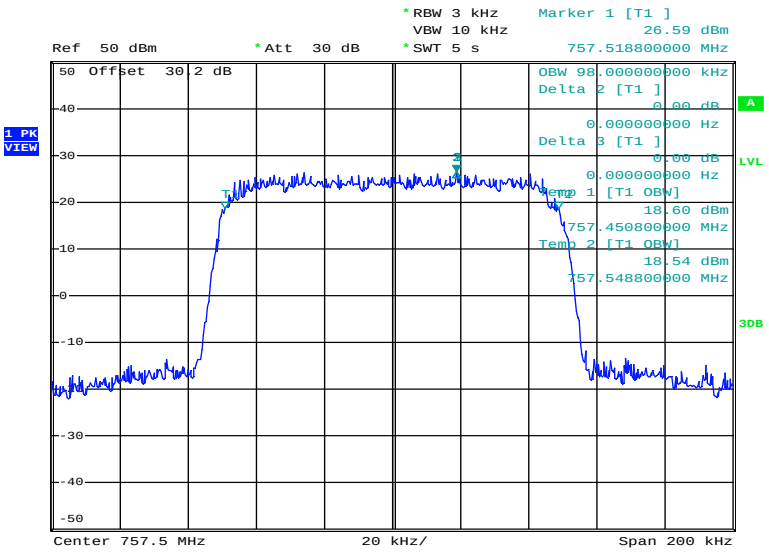


Date: 16.AUG.2017 15:22:59

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured OBW (kHz):	98.00
Emission Designator:	98K0G7W

Plot 8.2 – Occupied Bandwidth 757.5MHz, 100kHz BW, 16 QAM

Occupied Bandwidth

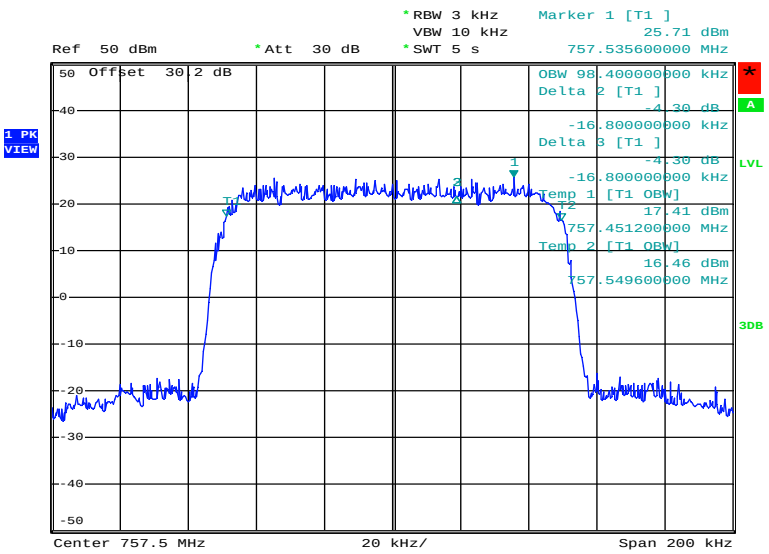


Date: 16.AUG.2017 15:27:18

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured OBW (kHz):	98.00
Emission Designator:	98K0D7W

Plot 8.3 – Occupied Bandwidth 757.5MHz, 100kHz BW, 32 QAM

Occupied Bandwidth

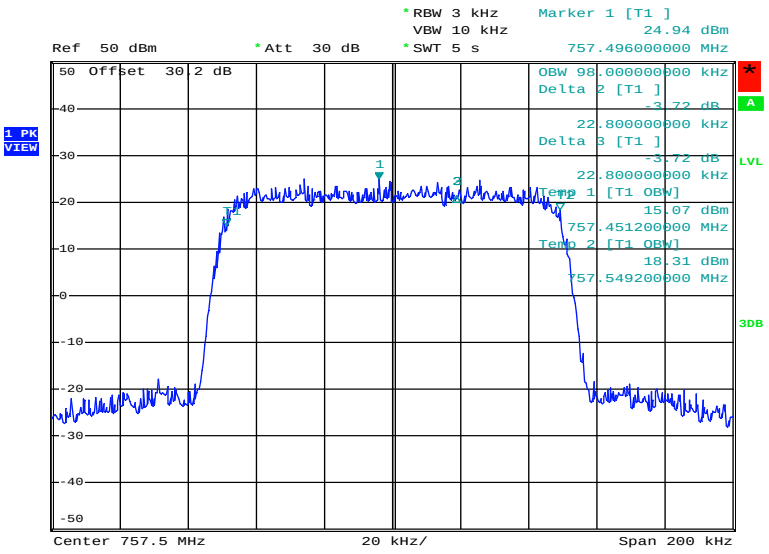


Date: 16.AUG.2017 15:30:07

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured OBW (kHz):	98.40
Emission Designator:	98K4D7W

Plot 8.4 – Occupied Bandwidth 757.5MHz, 100kHz BW, 64 QAM

Occupied Bandwidth

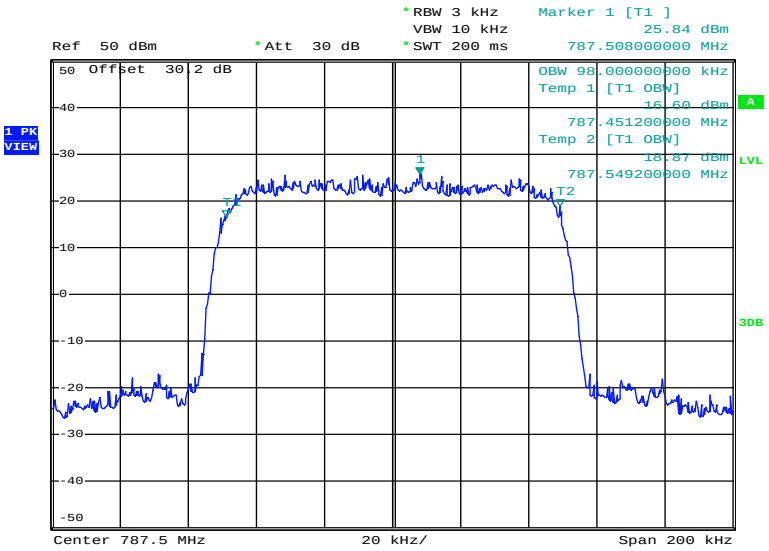


Date: 16.AUG.2017 15:32:20

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured OBW (kHz):	98.00
Emission Designator:	98K0D7W

Plot 8.5 – Occupied Bandwidth 787.5MHz, 100kHz BW, QPSK

Occupied Bandwidth

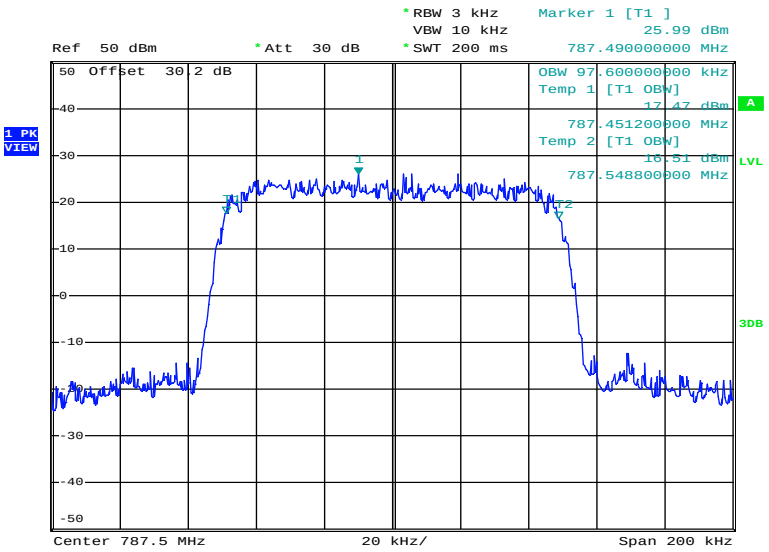


Date: 16.AUG.2017 10:20:08

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured OBW (kHz):	98.00
Emission Designator:	98K0G7W

Plot 8.6 – Occupied Bandwidth 787.5MHz, 100kHz BW, 16 QAM

Occupied Bandwidth

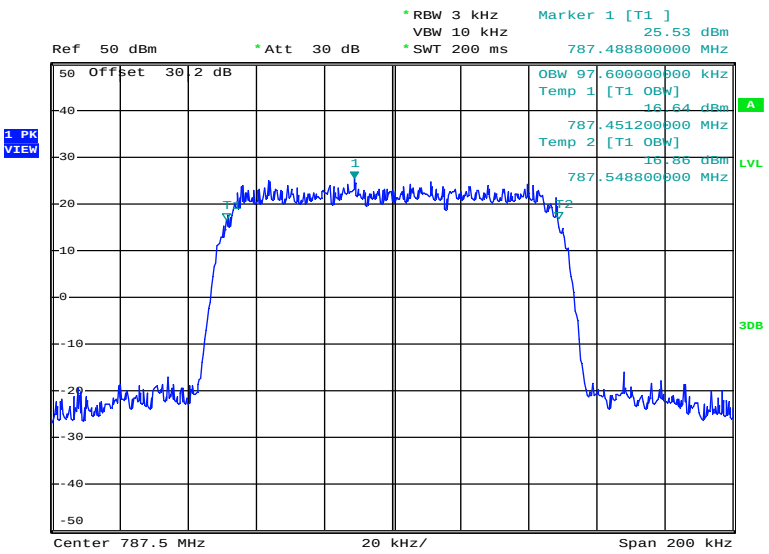


Date: 16.AUG.2017 10:24:07

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured OBW (kHz):	97.60
Emission Designator:	97K6D7W

Plot 8.7 – Occupied Bandwidth 787.5MHz, 100kHz BW, 32 QAM

Occupied Bandwidth

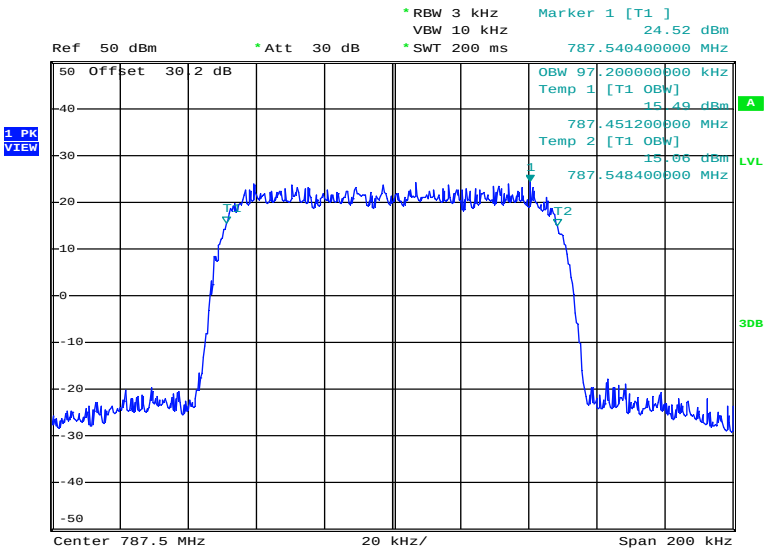


Date: 16.AUG.2017 10:26:31

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured OBW (kHz):	97.60
Emission Designator:	97K6D7W

Plot 8.8 – Occupied Bandwidth 787.5MHz, 100kHz BW, 64 QAM

Occupied Bandwidth

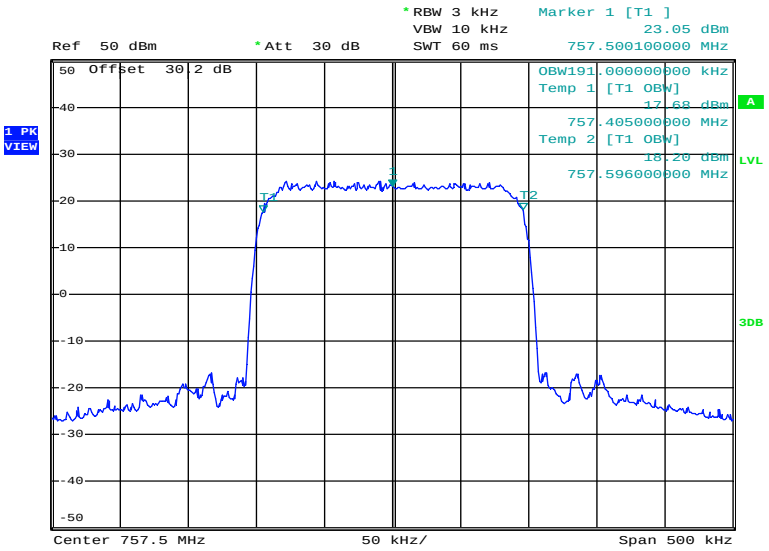


Date: 16.AUG.2017 10:28:43

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured OBW (kHz):	97.20
Emission Designator:	97K2D7W

Plot 8.9 – Occupied Bandwidth 757.5MHz, 200kHz BW, QPSK

Occupied Bandwidth

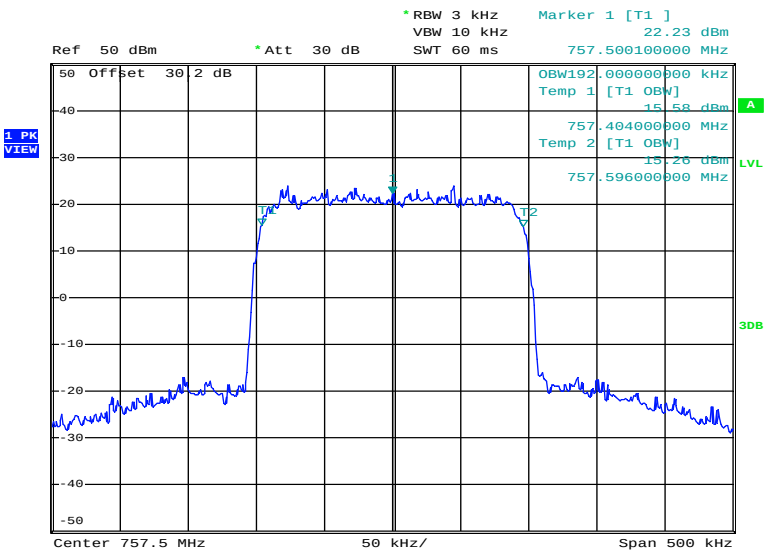


Date: 11.AUG.2017 10:59:03

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured OBW (kHz):	191.00
Emission Designator:	191KG7W

Plot 8.10 – Occupied Bandwidth 757.5MHz, 200kHz BW, 16 QAM

Occupied Bandwidth

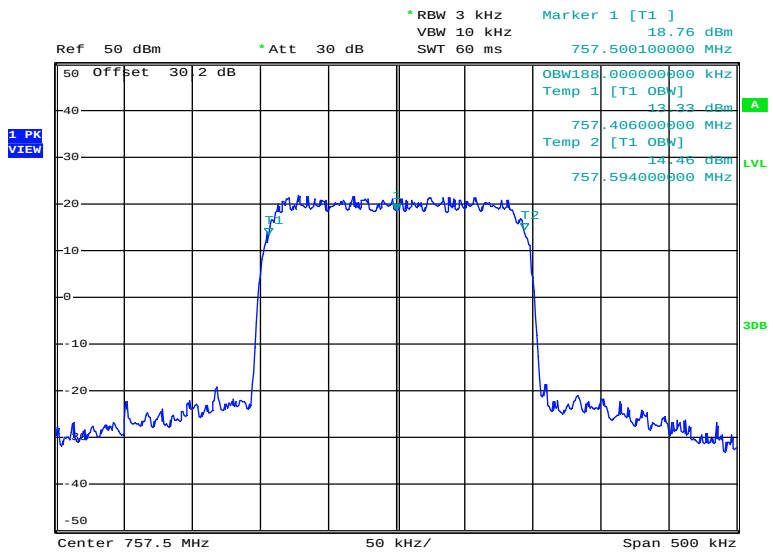


Date: 11.AUG.2017 11:01:56

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured OBW (kHz):	192.00
Emission Designator:	192KD7W

Plot 8.11 – Occupied Bandwidth 757.5MHz, 200kHz BW, 32 QAM

Occupied Bandwidth

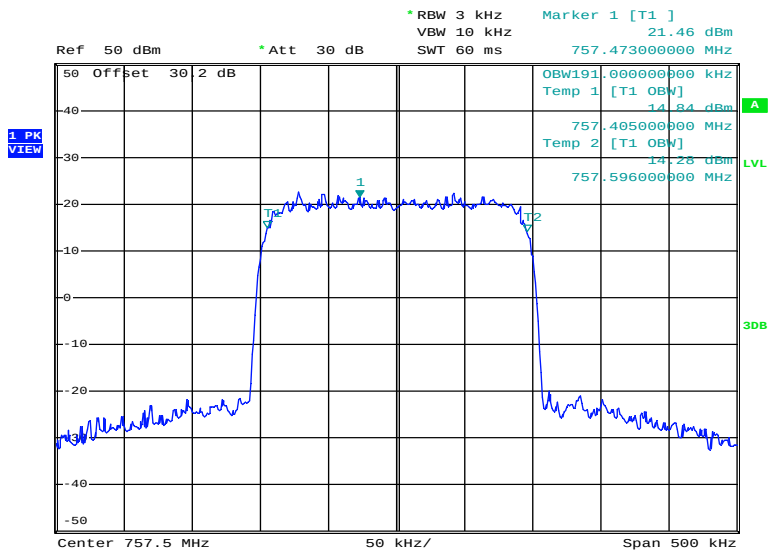


Date: 11.AUG.2017 11:04:52

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured OBW (kHz):	188.00
Emission Designator:	188KD7W

Plot 8.12 – Occupied Bandwidth 757.5MHz, 200kHz BW, 64 QAM

Occupied Bandwidth

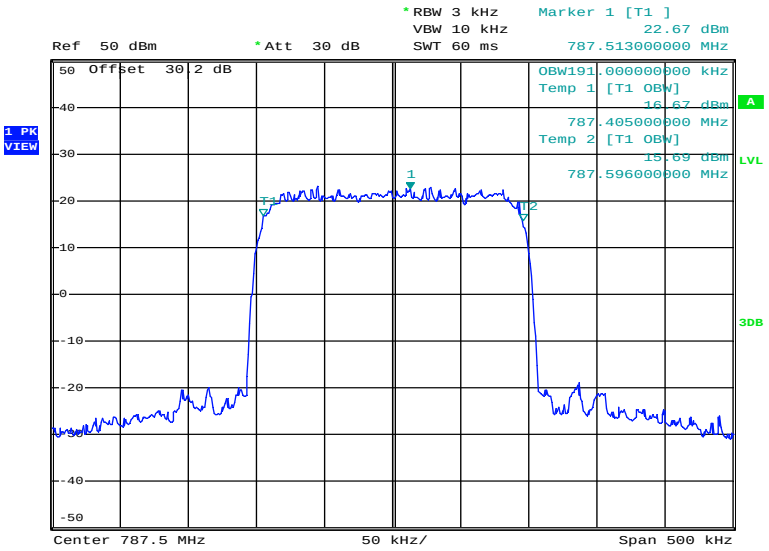


Date: 11.AUG.2017 11:07:22

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured OBW (kHz):	191.00
Emission Designator:	191KD7W

Plot 8.13 – Occupied Bandwidth 787.5MHz, 200kHz BW, QPSK

Occupied Bandwidth

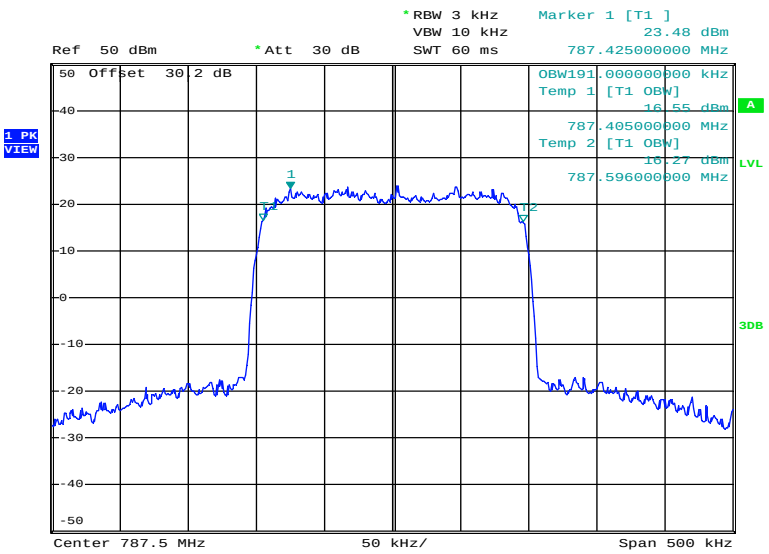


Date: 11.AUG.2017 11:17:36

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured OBW (kHz):	191.00
Emission Designator:	191KG7W

Plot 8.14 – Occupied Bandwidth 787.5MHz, 200kHz BW, 16 QAM

Occupied Bandwidth

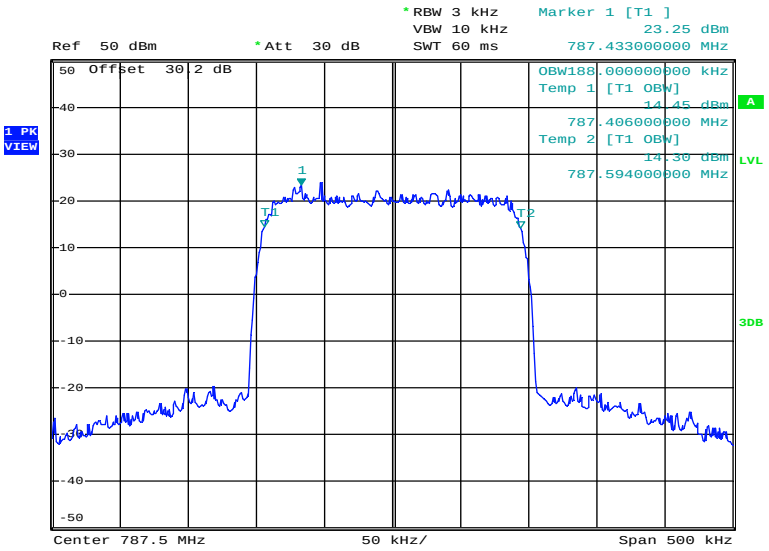


Date: 11.AUG.2017 11:24:36

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured OBW (kHz):	191.00
Emission Designator:	191KD7W

Plot 8.15 – Occupied Bandwidth 787.5MHz, 200kHz BW, 32 QAM

Occupied Bandwidth

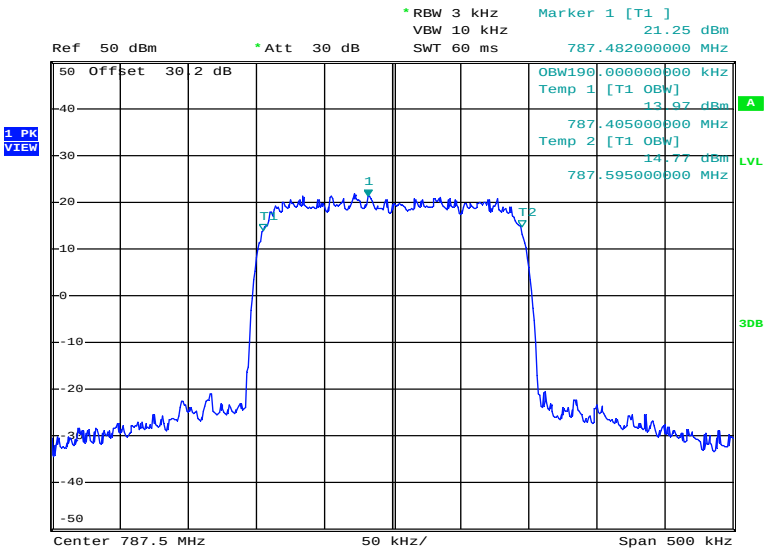


Date: 11.AUG.2017 11:26:19

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured OBW (kHz):	188.00
Emission Designator:	188KD7W

Plot 8.16 – Occupied Bandwidth 787.5MHz, 200kHz BW, 64 QAM

Occupied Bandwidth

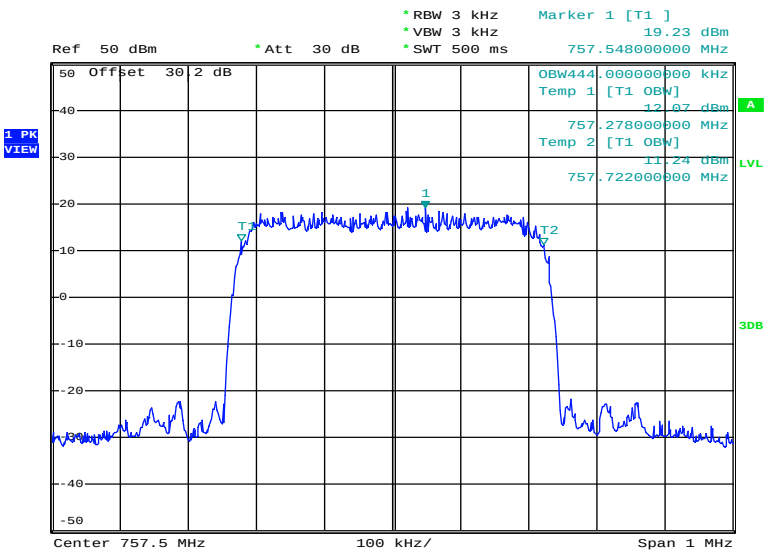


Date: 11.AUG.2017 11:27:39

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured OBW (kHz):	190.00
Emission Designator:	190KD7W

Plot 8.17 – Occupied Bandwidth 757.5MHz, 500kHz BW, QPSK

Occupied Bandwidth

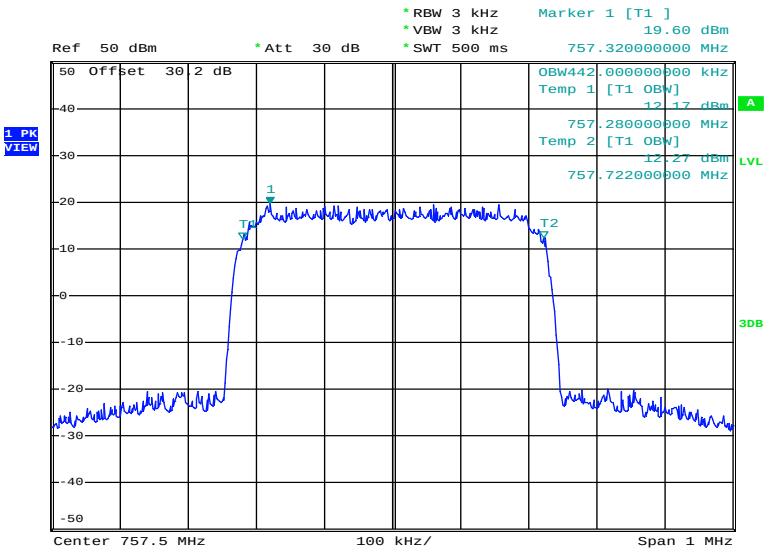


Date: 24.AUG.2017 14:20:34

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured OBW (kHz):	444.00
Emission Designator:	444KG7W

Plot 8.18 – Occupied Bandwidth 757.5MHz, 500kHz BW, 16 QAM

Occupied Bandwidth

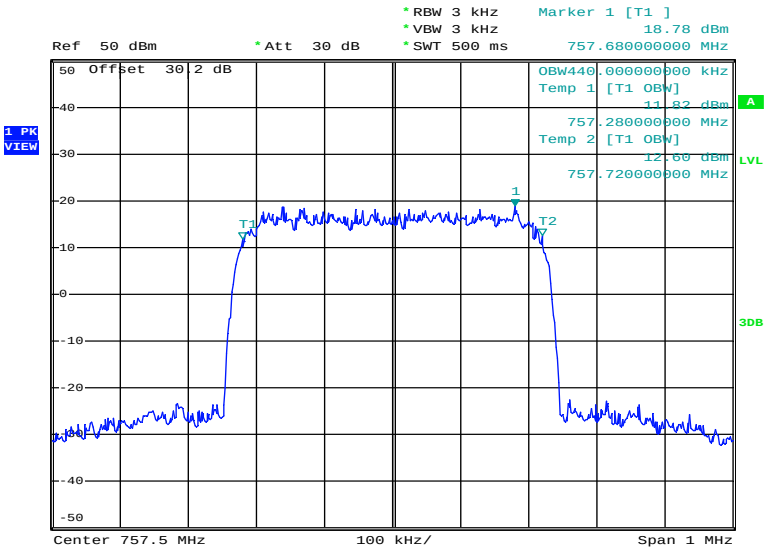


Date: 24.AUG.2017 14:19:27

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured OBW (kHz):	442.00
Emission Designator:	442KD7W

Plot 8.19 – Occupied Bandwidth 757.5MHz, 500kHz BW, 32 QAM

Occupied Bandwidth

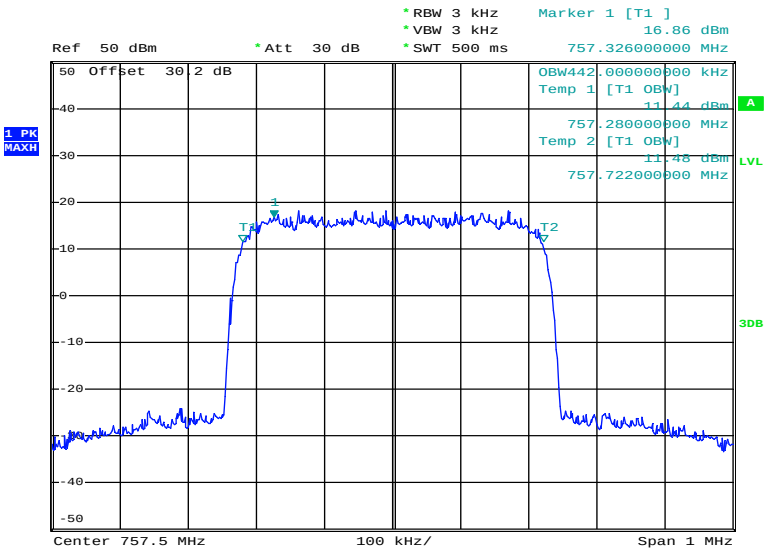


Date: 24.AUG.2017 14:18:15

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured OBW (kHz):	440.00
Emission Designator:	440KD7W

Plot 8.20 – Occupied Bandwidth 757.5MHz, 500kHz BW, 64 QAM

Occupied Bandwidth

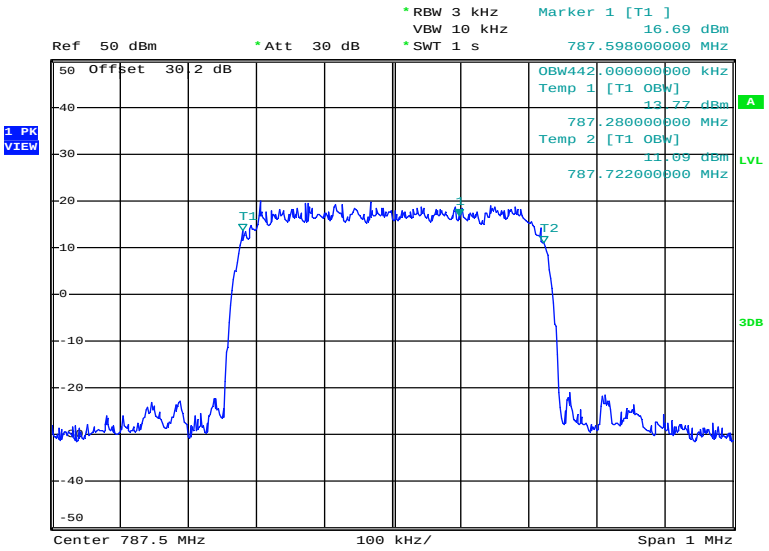


Date: 24.AUG.2017 14:17:02

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured OBW (kHz):	442.00
Emission Designator:	442KD7W

Plot 8.21 – Occupied Bandwidth 787.5MHz, 500kHz BW, QPSK

Occupied Bandwidth

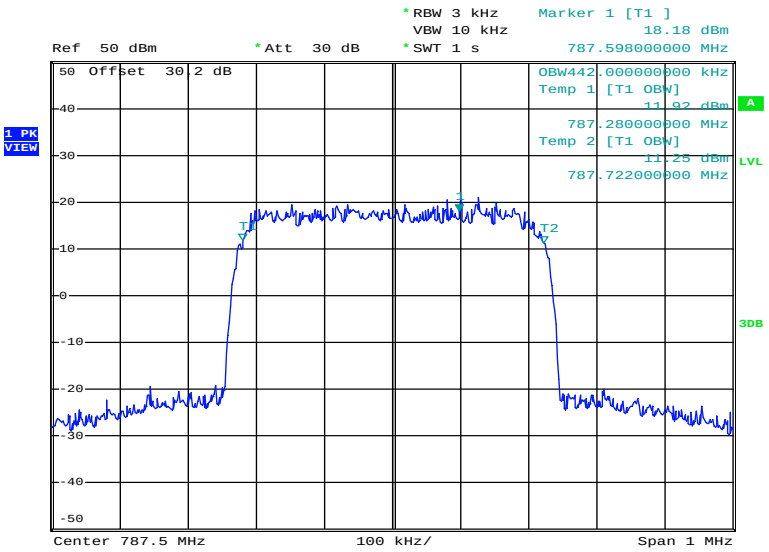


Date: 21.AUG.2017 10:58:26

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Measured OBW (kHz):	442.00
Emission Designator:	442KG7W

Plot 8.22 – Occupied Bandwidth 787.5MHz, 500kHz BW, 16 QAM

Occupied Bandwidth

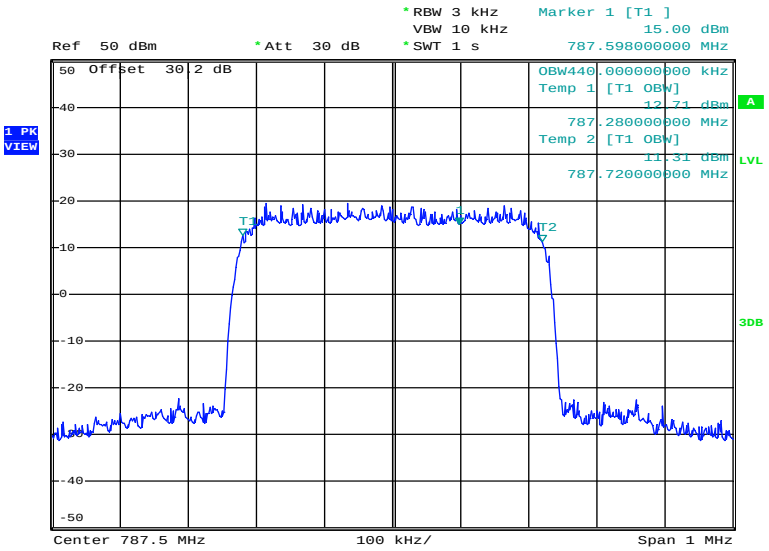


Date: 21.AUG.2017 10:59:50

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Measured OBW (kHz):	442.00
Emission Designator:	442KD7W

Plot 8.23 – Occupied Bandwidth 787.5MHz, 500kHz BW, 32 QAM

Occupied Bandwidth

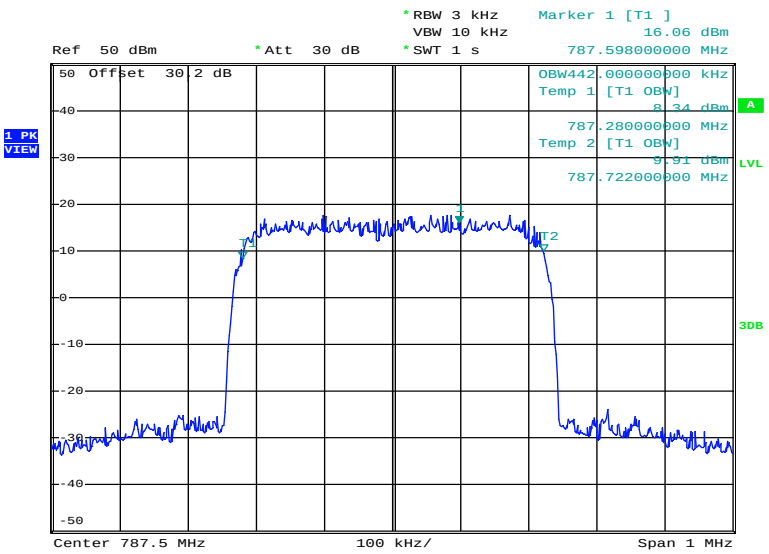


Date: 21.AUG.2017 11:01:08

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Measured OBW (kHz):	440.00
Emission Designator:	440KD7W

Plot 8.24 – Occupied Bandwidth 787.5MHz, 500kHz BW, 64 QAM

Occupied Bandwidth



Date: 21.AUG.2017 11:02:46

Channel Frequency (MHz):	787.50
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Measured OBW (kHz):	442.00
Emission Designator:	442KD7W

Table 8.1 – Summary of Occupied Bandwidth Measurements

§2.1049 Occupied Bandwidth						
Freqency (MHz)	Bandwidth Setting (kHz)	Modulation	Measured OBW [OBW] (kHz)	Authorized BW [ABW] (kHz)	Margin (kHz)	Emission Designator
757.5	100	QPSK	98.00	100	2.00	98K0G7W
		16 QAM	98.00		2.00	98K0D7W
		32 QAM	98.40		1.60	98K4D7W
		64 QAM	98.00		2.00	98K0D7W
787.5		QPSK	98.00		2.00	98K0G7W
		16 QAM	97.60		2.40	97K6D7W
		32 QAM	97.60		2.40	97K6D7W
		64 QAM	97.20		2.80	97K2D7W
757.5	200	QPSK	191.00	200	9.00	191KG7W
		16 QAM	192.00		8.00	192KD7W
		32 QAM	188.00		12.00	188KD7W
		64 QAM	191.00		9.00	191KD7W
787.5		QPSK	191.00		9.00	191KG7W
		16 QAM	191.00		9.00	192KD7W
		32 QAM	188.00		12.00	188KD7W
		64 QAM	190.00		10.00	190KD7W
757.5	500	QPSK	442.00	500	58.00	442KG7W
		16 QAM	442.00		58.00	442KD7W
		32 QAM	440.00		60.00	440KD7W
		64 QAM	442.00		58.00	442KD7W
787.5		QPSK	444.00		56.00	444KG7W
		16 QAM	442.00		58.00	442KD7W
		32 QAM	440.00		60.00	440KD7W
		64 QAM	444.00		56.00	444KD7W
Margin = ABW - OBW						
					Result:	**Complies**

9.0 CONDUCTED SPURIOUS EMISSIONS AT BAND-EDGE

Test Conditions	
Normative Reference	FCC 47 CFR §2.1046, §27.53(c), KDB 971168 D01v02r02

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee'sfrequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (2) On any frequency outside the 779-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Test Setup	Appendix A Figure A.1

Measurement Procedure

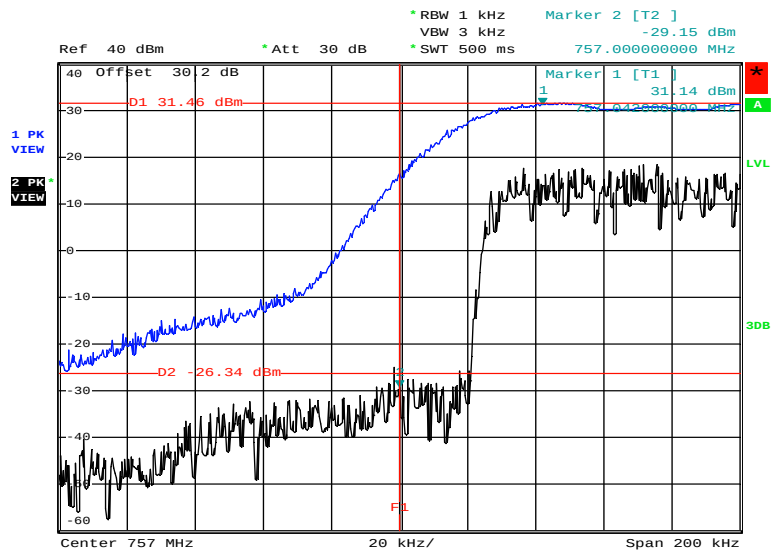
The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type. All modulations (QPSK, 16 QAM, 32 QAM and 64 QAM) and all bandwidths (100kHz, 200kHz and 500kHz) were investigated. To determine compliance at the band edges, the DUT frequency was set to the manufacturer's stated upper and lower frequencies within the band for each band and for each transmission bandwidth. The RBW of Trace 1 of the SA was set to 30kHz, set to Max Hold and the Marker 1 set to Peak. The RBW of Trace 2 was set to 1kHz and set to Max Hold. An Amplitude display line (D1) was set to the value of Marker 1 indicating the Peak Output Power at 30kHz RBW. RBW scaling was used for this evaluation. A second Amplitude line (D2) was set to the required limit plus the offset for RBW scaling or:

43 + 10Log(P) + 10Log([Required RBW] / [Measured RBW]) or 57.8 + 10Log(P).

P is the value of the Peak Power at 30kHz RBW or (D1). Marker 2 was set to the frequency of the upper or lower band edges. The *attenuation* referenced from the carrier, or dBc, was recorded.

Plot 9.1 – Lower Band Edge 757.075MHz, 100kHz BW, QPSK

Lower Band-Edge

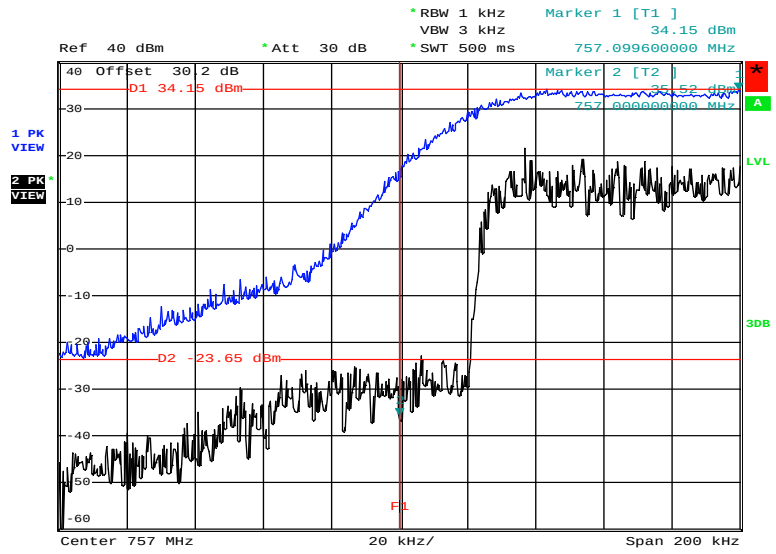


Date: 16.AUG.2017 16:51:24

Channel Frequency (MHz):	757.075
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.15

Plot 9.2 – Lower Band Edge 757.075MHz, 100kHz BW, 16 QAM

Lower Band-Edge

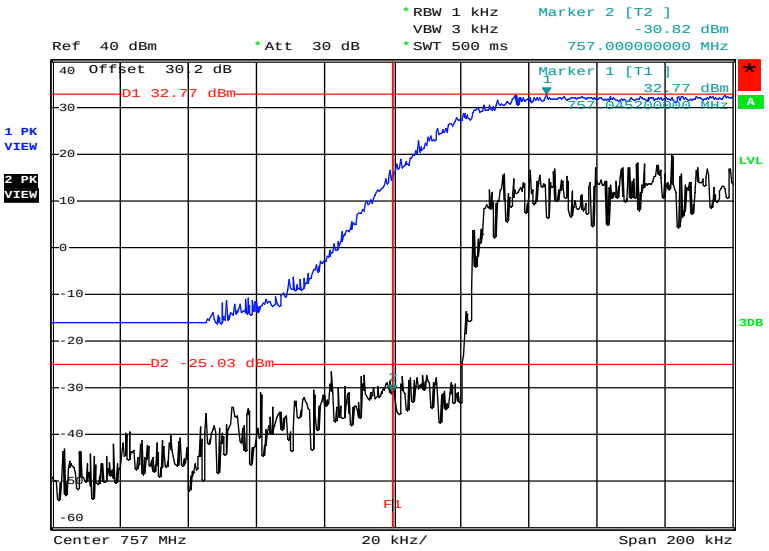


Date: 17.AUG.2017 08:56:44

Channel Frequency (MHz):	757.075
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-35.52

Plot 9.3 – Lower Band Edge 757.075MHz, 100kHz BW, 32 QAM

Lower Band-Edge

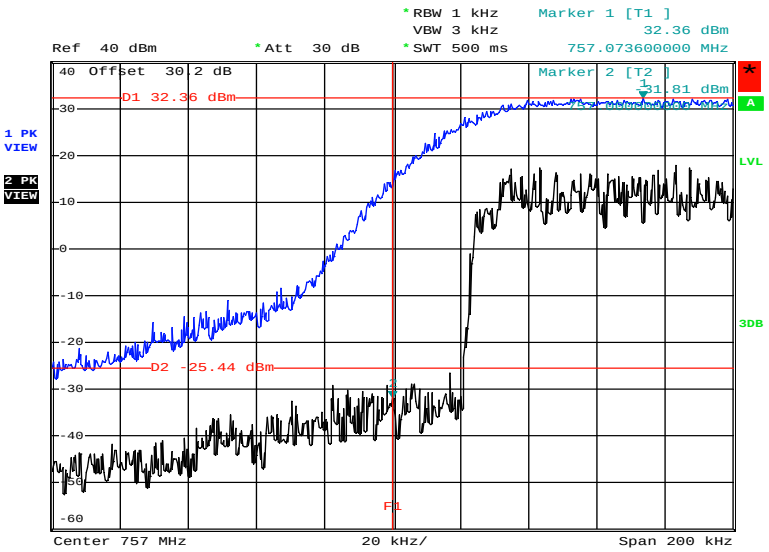


Date: 17.AUG.2017 11:47:18

Channel Frequency (MHz):	757.075
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-30.82

Plot 9.4 – Lower Band Edge 757.075MHz, 100kHz BW, 64 QAM

Lower Band-Edge

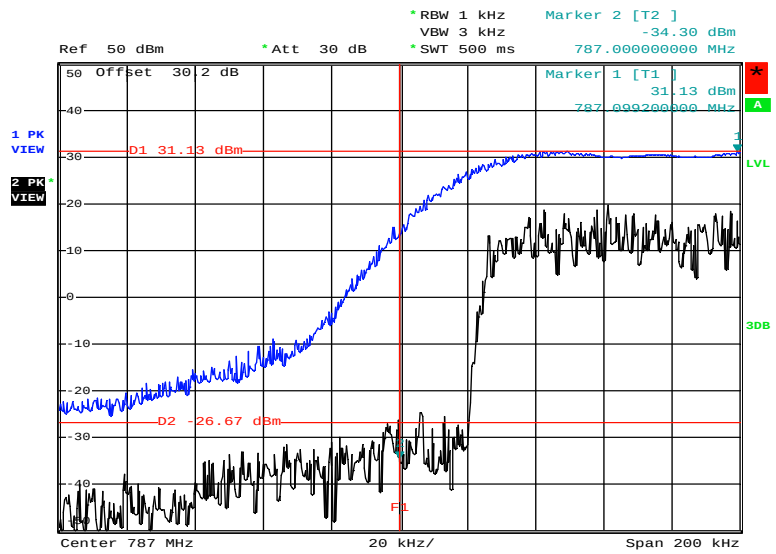


Date: 17.AUG.2017 09:08:58

Channel Frequency (MHz):	757.075
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-31.81

Plot 9.5 – Lower Band Edge 787.075MHz, 100kHz BW, QPSK

Lower Band-Edge

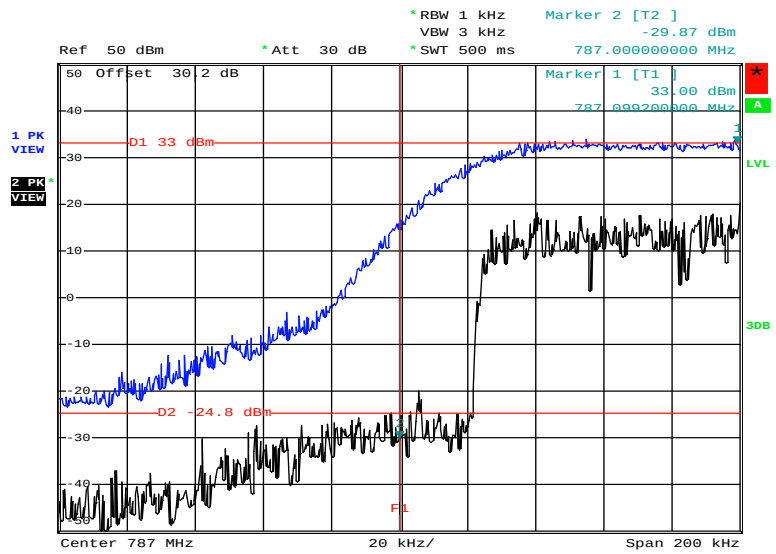


Date: 16.AUG.2017 11:27:17

Channel Frequency (MHz):	787.075
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-34.30

Plot 9.6 – Lower Band Edge 787.075MHz, 100kHz BW, 16 QAM

Lower Band-Edge

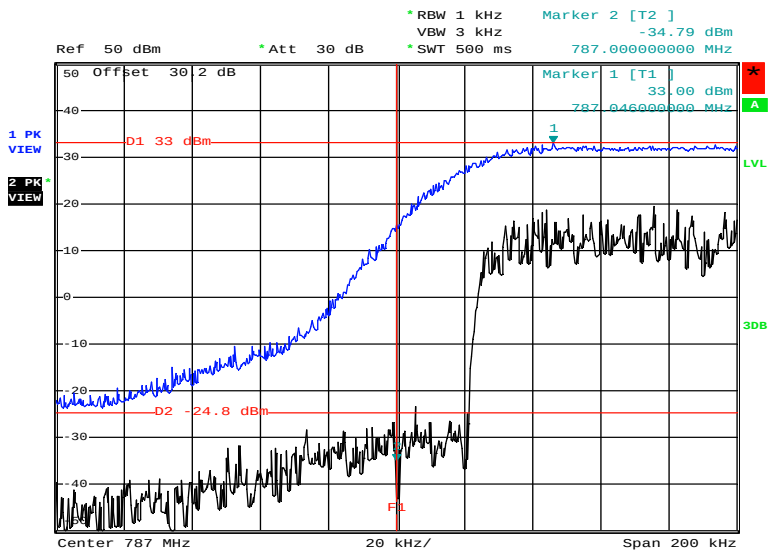


Date: 16.AUG.2017 11:34:43

Channel Frequency (MHz):	787.075
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.87

Plot 9.7 – Lower Band Edge 787.075MHz, 100kHz BW, 32 QAM

Lower Band-Edge

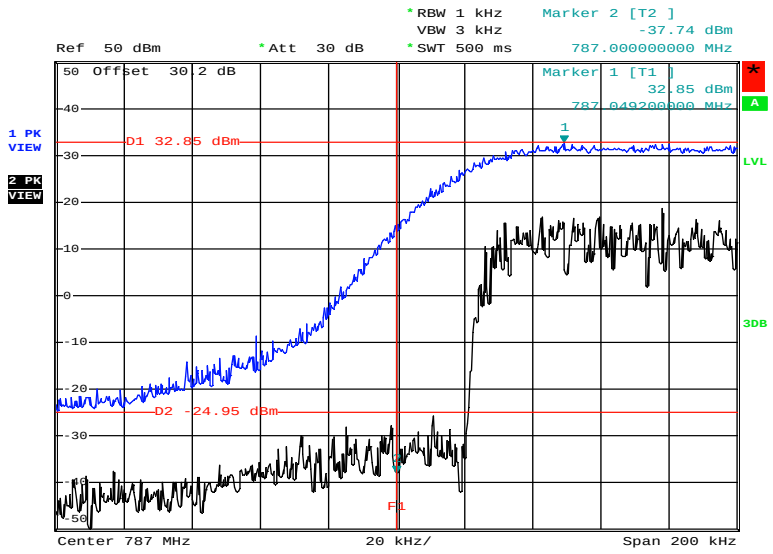


Date: 16.AUG.2017 12:03:41

Channel Frequency (MHz):	787.075
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-34.79

Plot 9.8 – Lower Band Edge 787.075MHz, 100kHz BW, 64 QAM

Lower Band-Edge

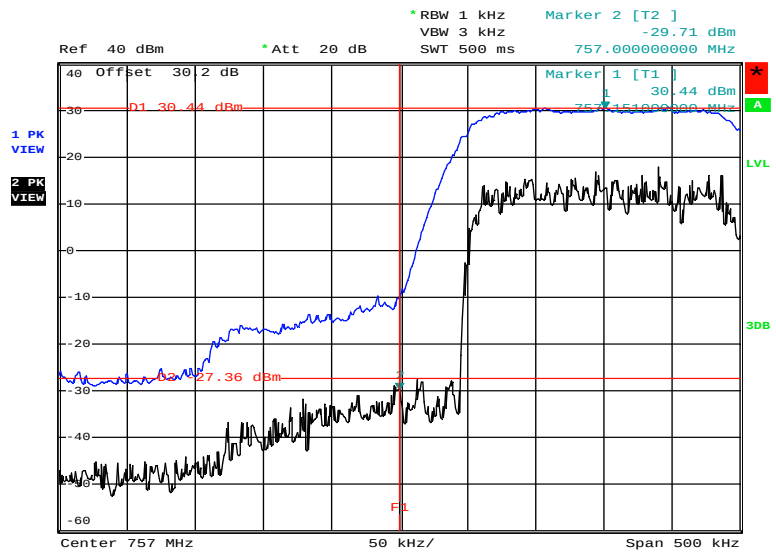


Date: 16.AUG.2017 12:08:07

Channel Frequency (MHz):	787.075
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-34.74

Plot 9.9 – Lower Band Edge 757.15MHz, 200kHz BW, QPSK

Lower Band-Edge

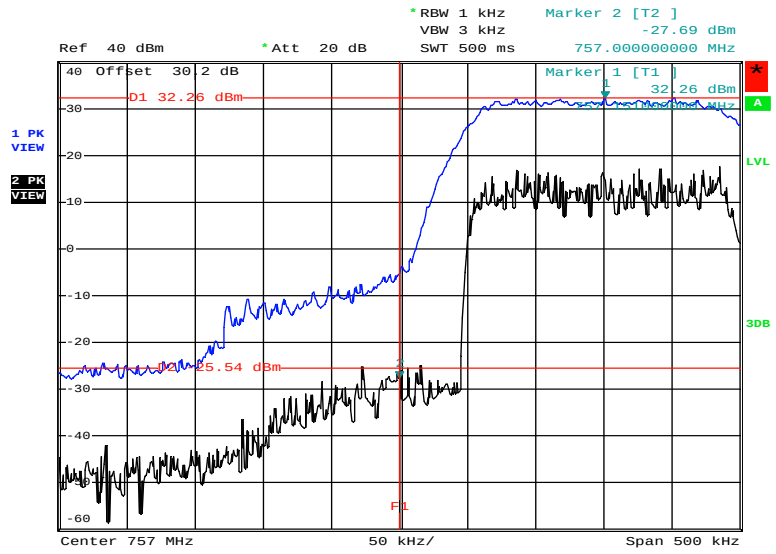


Date: 11.AUG.2017 14:54:40

Channel Frequency (MHz):	757.150
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.71

Plot 9.10 – Lower Band Edge 757.15MHz, 200kHz BW, 16 QAM

Lower Band-Edge

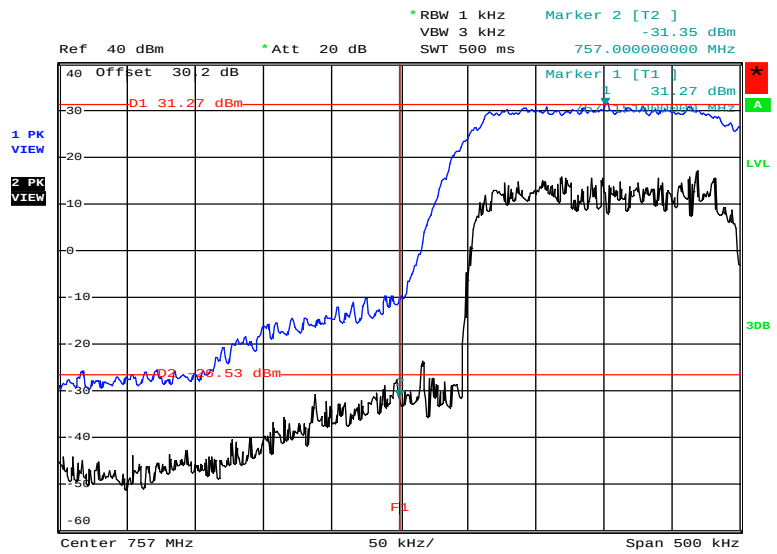


Date: 11.AUG.2017 15:00:55

Channel Frequency (MHz):	757.150
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-27.69

Plot 9.11 – Lower Band Edge 757.15MHz, 200kHz BW, 32 QAM

Lower Band-Edge

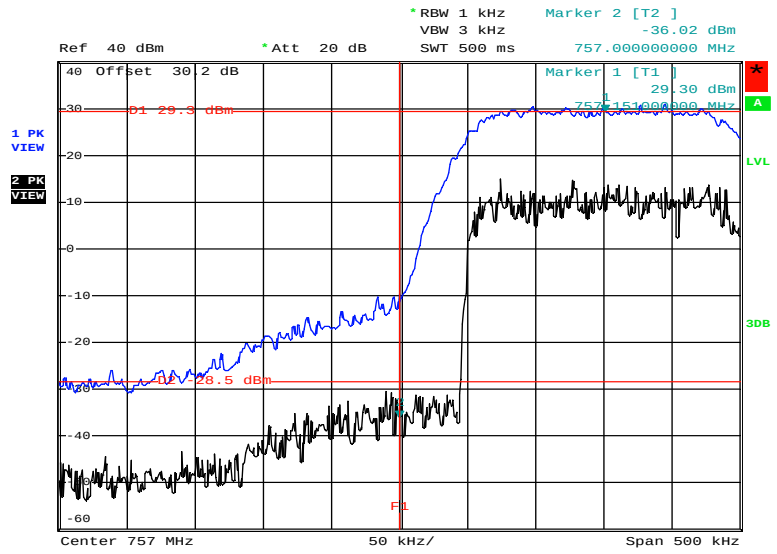


Date: 11.AUG.2017 15:05:27

Channel Frequency (MHz):	757.150
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-31.35

Plot 9.12 – Lower Band Edge 757.15MHz, 200kHz BW, 64 QAM

Lower Band-Edge

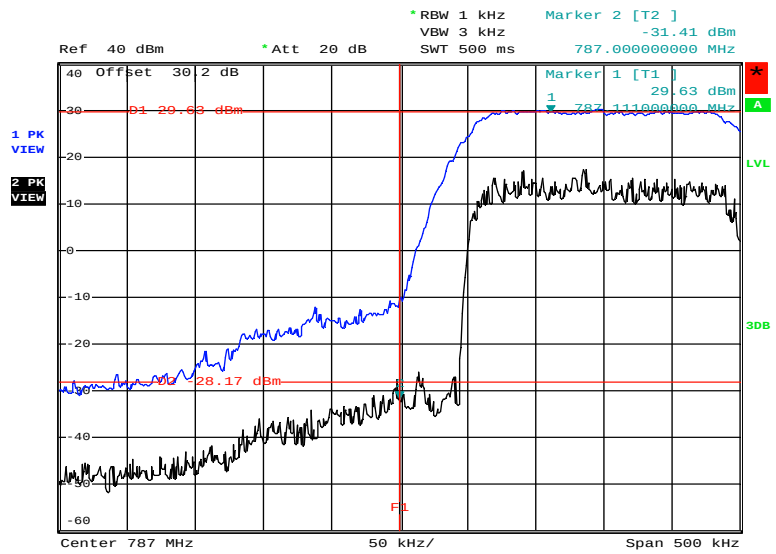


Date: 11.AUG.2017 15:10:48

Channel Frequency (MHz):	757.150
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-36.02

Plot 9.13 – Lower Band Edge 787.15MHz, 200kHz BW, QPSK

Lower Band-Edge

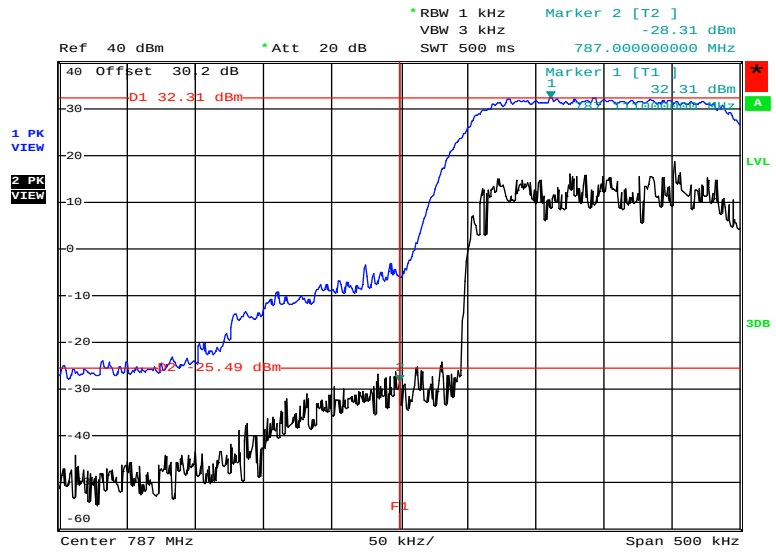


Date: 11.AUG.2017 13:33:58

Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-31.41

Plot 9.14 – Lower Band Edge 787.15MHz, 200kHz BW, 16 QAM

Lower Band-Edge

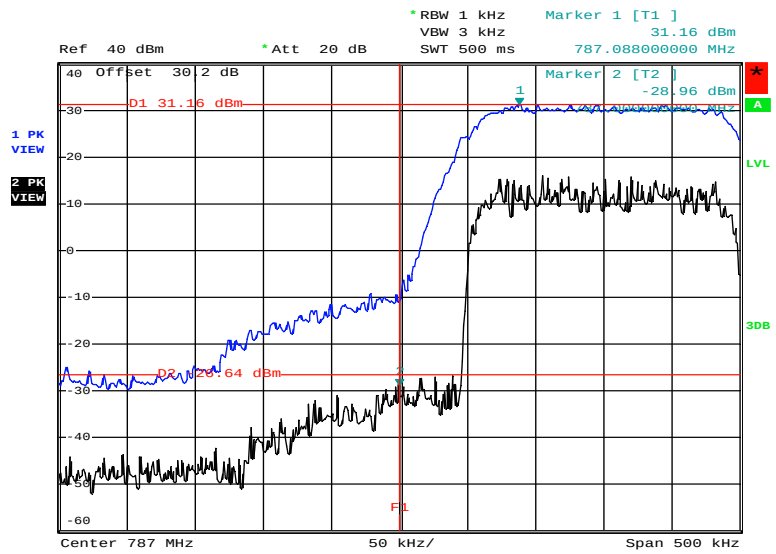


Date: 11.AUG.2017 13:26:34

Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-28.31

Plot 9.15 – Lower Band Edge 787.15MHz, 200kHz BW, 32 QAM

Lower Band-Edge

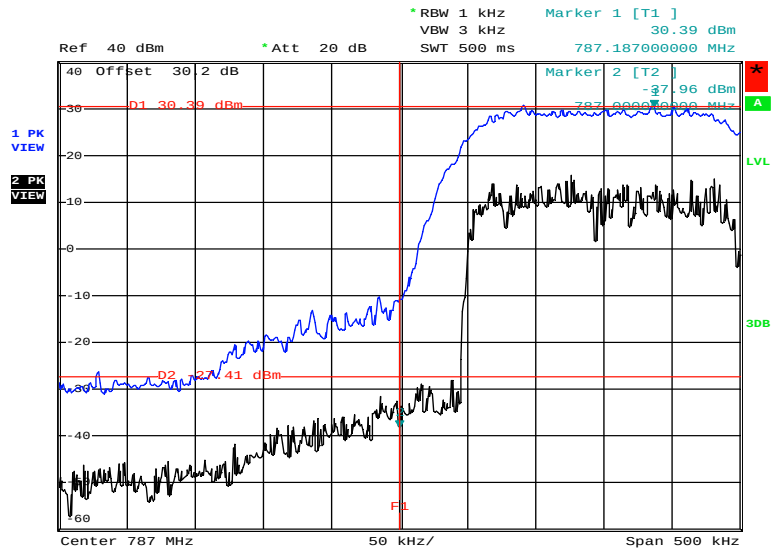


Date: 11.AUG.2017 13:40:52

Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-28.96

Plot 9.16 – Lower Band Edge 787.15MHz, 200kHz BW, 64 QAM

Lower Band-Edge

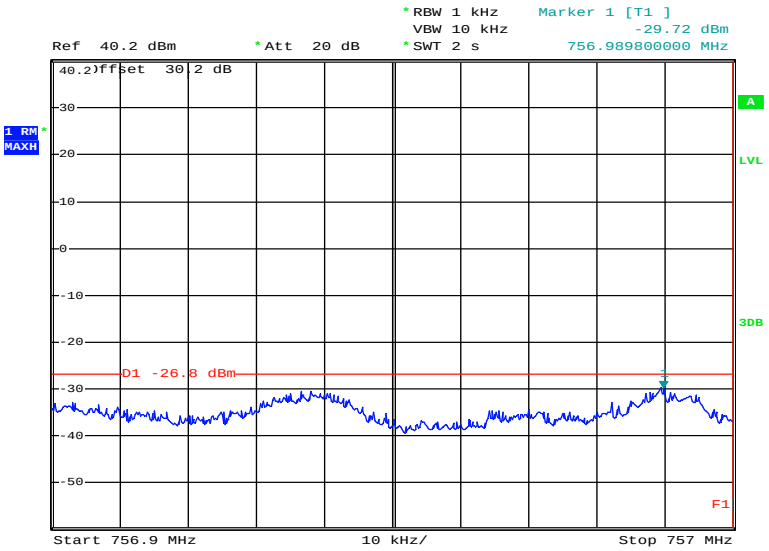


Date: 11.AUG.2017 13:46:13

Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-37.96

Plot 9.17 – Lower Band Edge 757.25MHz, 500kHz BW, QPSK

Lower Band-Edge

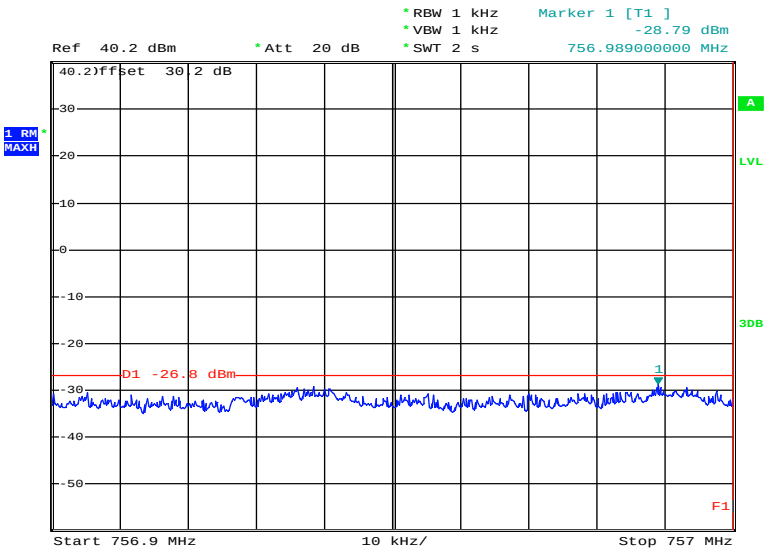


Date: 29.AUG.2017 10:49:24

Channel Frequency (MHz):	757.250
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
756.9MHz to Band-Edge(dBc):	-29.72

Plot 9.18 – Lower Band Edge 757.25MHz, 500kHz BW, 16 QAM

Lower Band-Edge

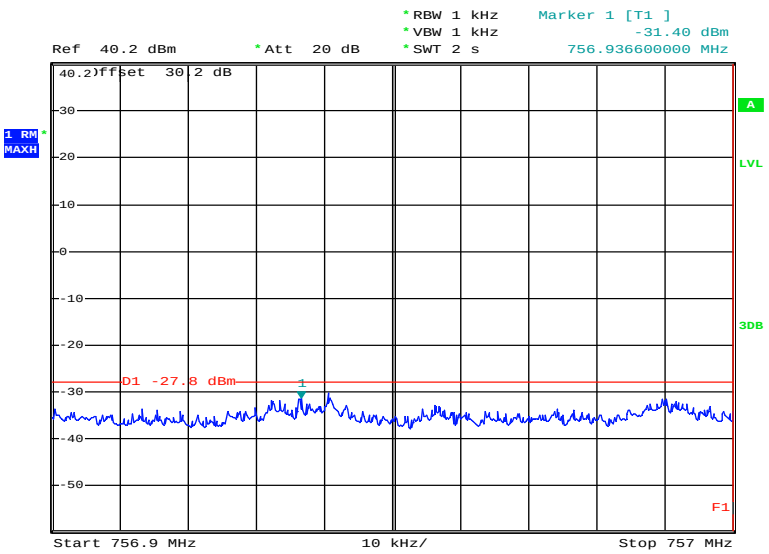


Date: 29.AUG.2017 10:51:37

Channel Frequency (MHz):	757.250
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
756.9MHz to Band-Edge(dBc):	-28.79

Plot 9.19 – Lower Band Edge 757.25MHz, 500kHz BW, 32 QAM

Lower Band-Edge

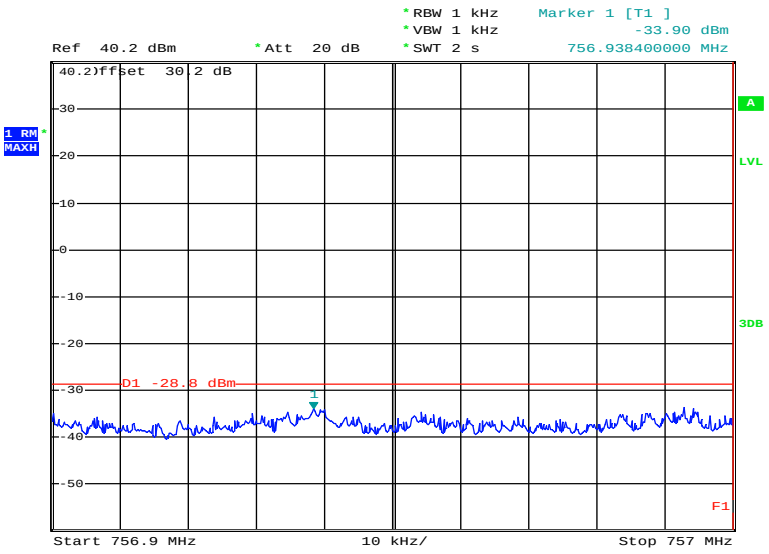


Date: 29.AUG.2017 10:53:17

Channel Frequency (MHz):	757.250
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
756.9MHz to Band-Edge(dBc):	-31.40

Plot 9.20 – Lower Band Edge 757.25MHz, 500kHz BW, 64 QAM

Lower Band-Edge

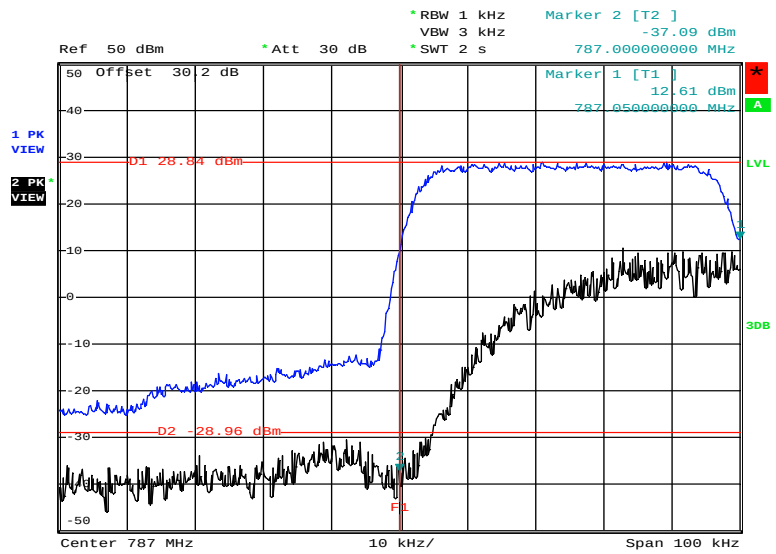


Date: 29.AUG.2017 10:54:43

Channel Frequency (MHz):	757.250
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
756.9MHz to Band-Edge(dBc):	-33.90

Plot 9.21 – Lower Band Edge 787.25MHz, 500kHz BW, QPSK

Lower Band-Edge

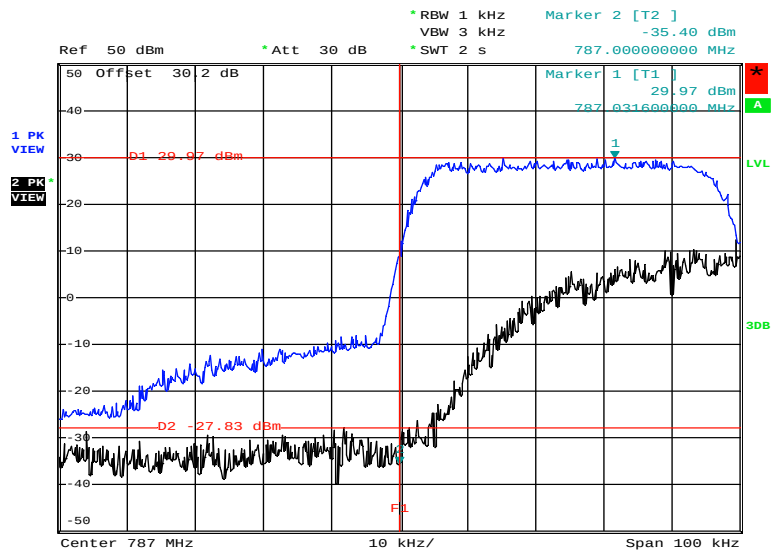


Date: 21.AUG.2017 13:21:59

Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-37.09

Plot 9.22 – Lower Band Edge 787.25MHz, 500kHz BW, 16 QAM

Lower Band-Edge

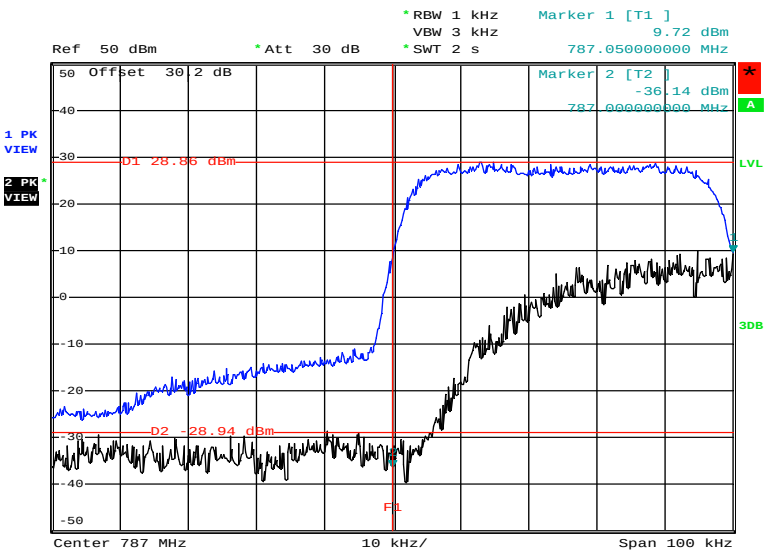


Date: 21.AUG.2017 13:25:35

Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
786.9MHz to Band-Edge(dBc):	-35.40

Plot 9.23 – Lower Band Edge 787.25MHz, 500kHz BW, 32 QAM

Lower Band-Edge

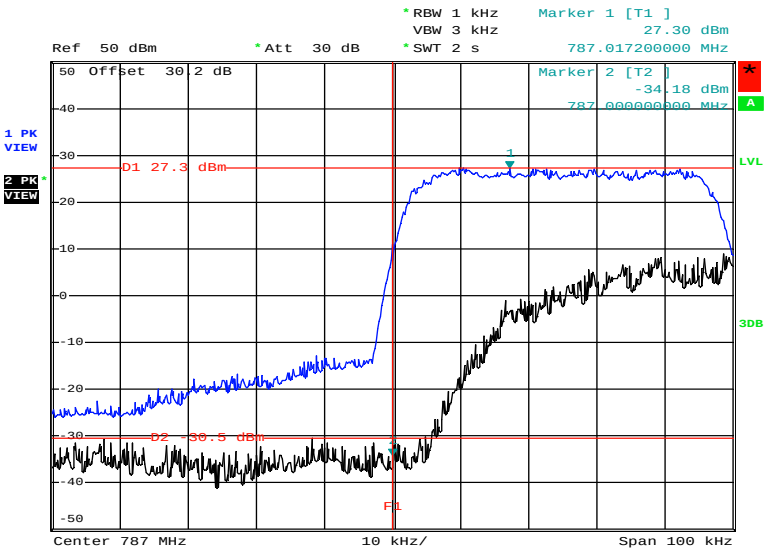


Date: 21.AUG.2017 13:28:09

Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
786.9MHz to Band-Edge(dBc):	-36.14

Plot 9.24 – Lower Band Edge 787.25MHz, 500kHz BW, 64 QAM

Lower Band-Edge

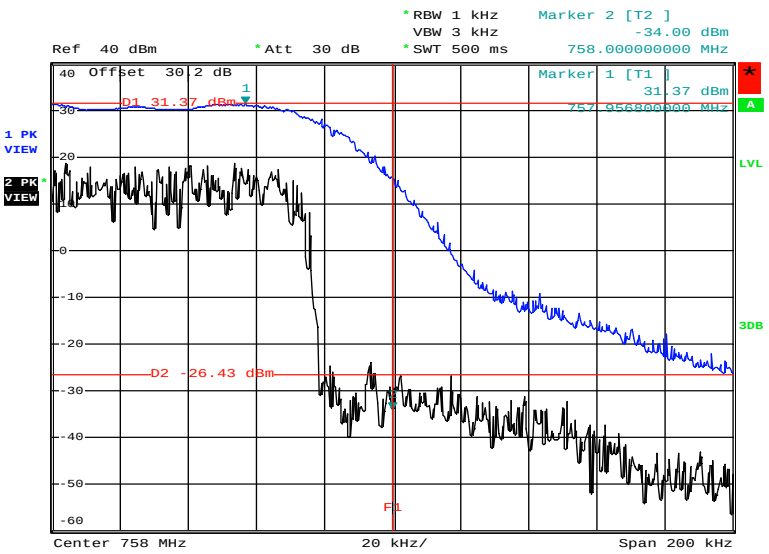


Date: 21.AUG.2017 13:33:45

Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
786.9MHz to Band-Edge(dBc):	-34.18

Plot 9.25 – Upper Band Edge 757.925MHz, 100kHz BW, QPSK

Upper Band-Edge

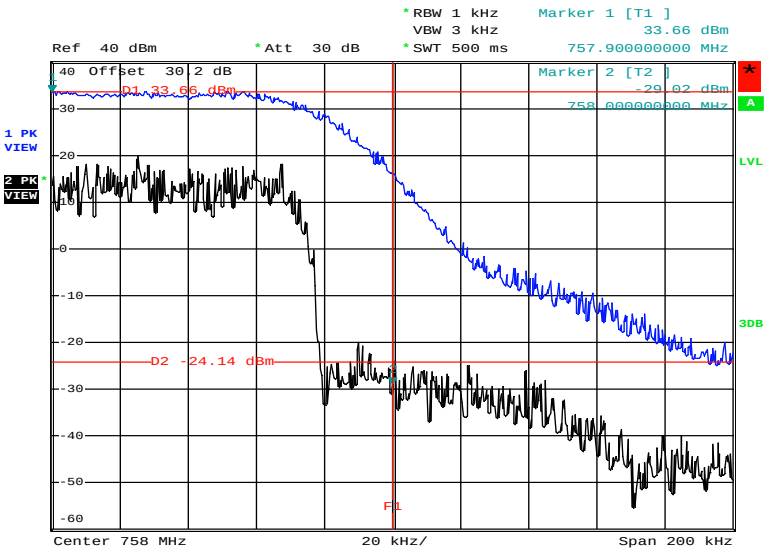


Date: 17.AUG.2017 09:26:38

Channel Frequency (MHz):	757.925
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-34.00

Plot 9.26 – Upper Band Edge 757.925MHz, 100kHz BW, 16 QAM

Upper Band-Edge

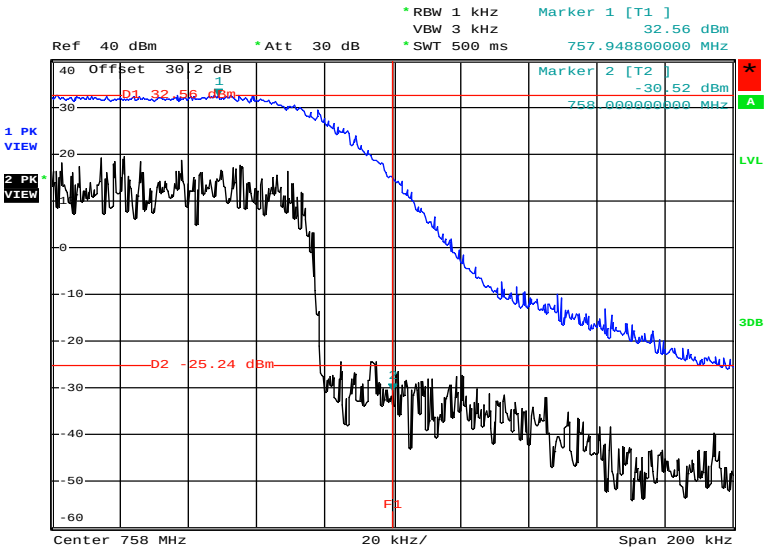


Date: 17.AUG.2017 09:31:10

Channel Frequency (MHz):	757.925
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.02

Plot 9.27 – Upper Band Edge 757.925MHz, 100kHz BW, 32 QAM

Upper Band-Edge

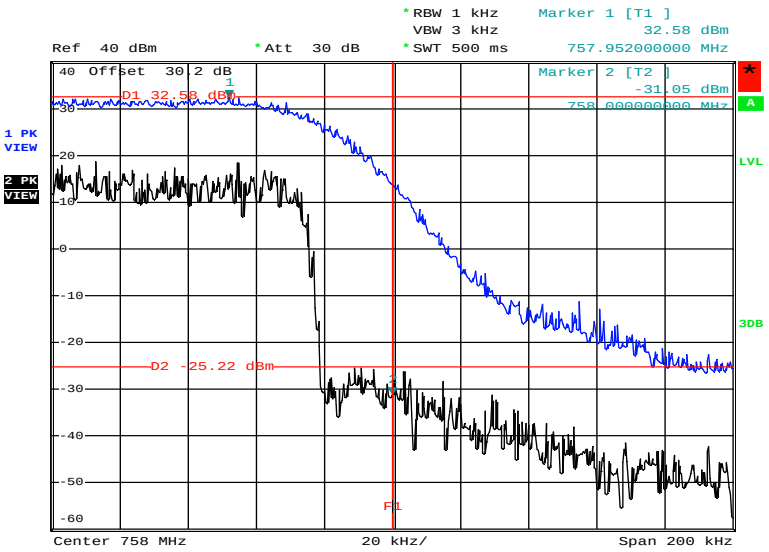


Date: 17.AUG.2017 09:35:09

Channel Frequency (MHz):	757.925
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-30.52

Plot 9.28 – Upper Band Edge 757.925MHz, 100kHz BW, 64 QAM

Upper Band-Edge

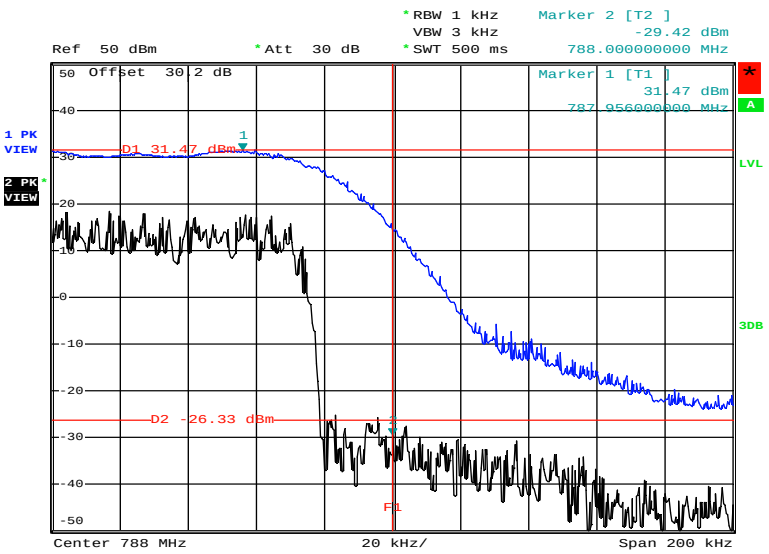


Date: 17.AUG.2017 09:38:37

Channel Frequency (MHz):	757.925
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-31.05

Plot 9.29 – Upper Band Edge 787.925MHz, 100kHz BW, QPSK

Upper Band-Edge

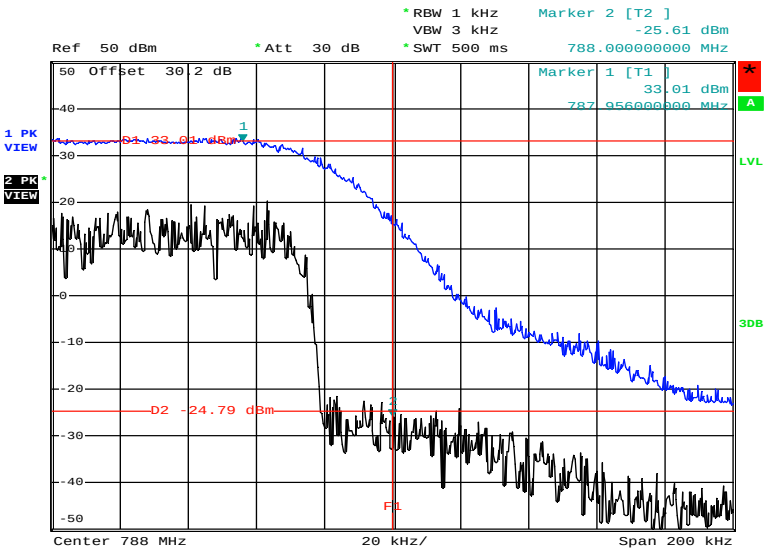


Date: 16.AUG.2017 12:21:22

Channel Frequency (MHz):	787.925
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.42

Plot 9.30 – Upper Band Edge 787.925MHz, 100kHz BW, 16 QAM

Upper Band-Edge

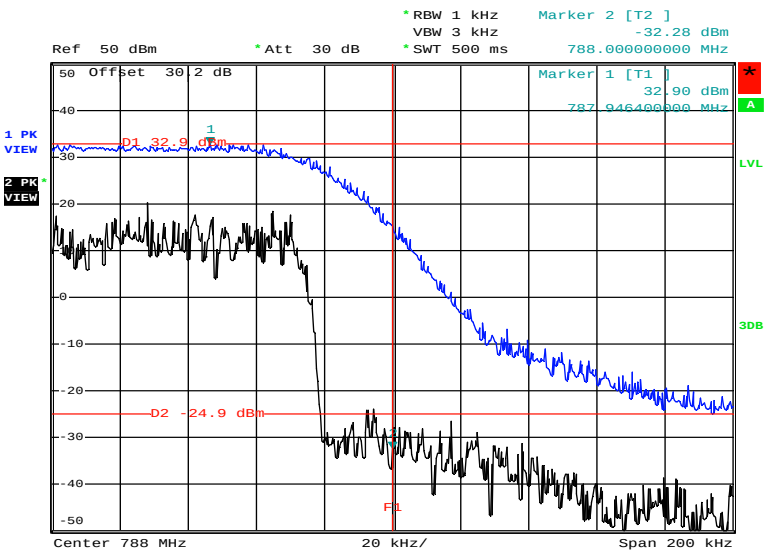


Date: 16.AUG.2017 12:33:48

Channel Frequency (MHz):	787.925
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-25.61

Plot 9.31 – Upper Band Edge 787.925MHz, 100kHz BW, 32 QAM

Upper Band-Edge

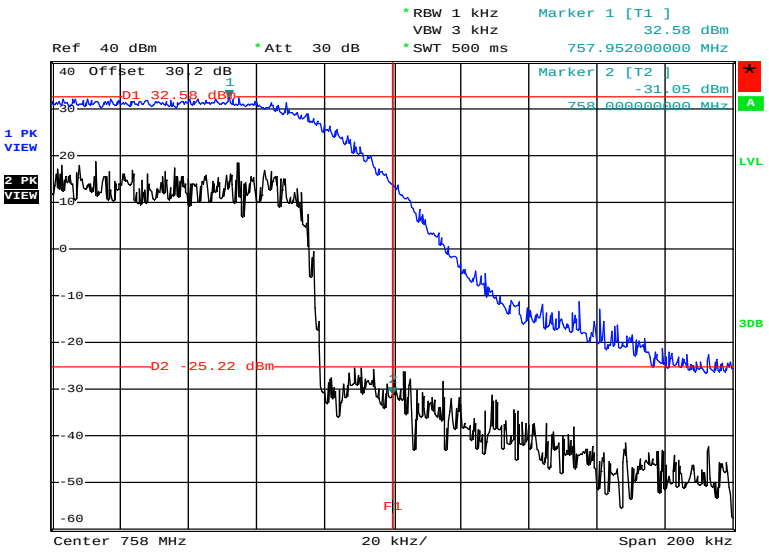


Date: 16.AUG.2017 12:39:13

Channel Frequency (MHz):	787.925
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-32.28

Plot 9.32 – Upper Band Edge 787.925MHz, 100kHz BW, 64 QAM

Upper Band-Edge

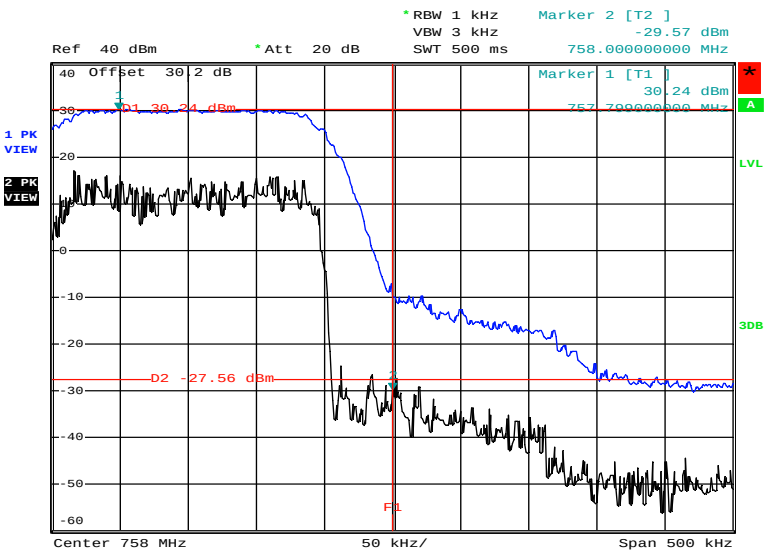


Date: 17.AUG.2017 09:38:37

Channel Frequency (MHz):	787.925
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-31.05

Plot 9.33 – Upper Band Edge 757.85MHz, 200kHz BW, QPSK

Upper Band-Edge

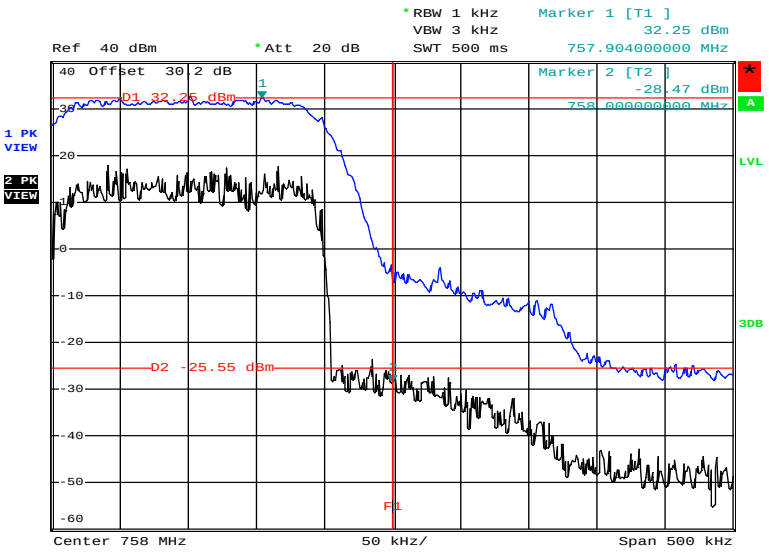


Date: 11.AUG.2017 15:21:11

Channel Frequency (MHz):	757.850
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.57

Plot 9.34 – Upper Band Edge 757.85MHz, 200kHz BW, 16 QAM

Upper Band-Edge

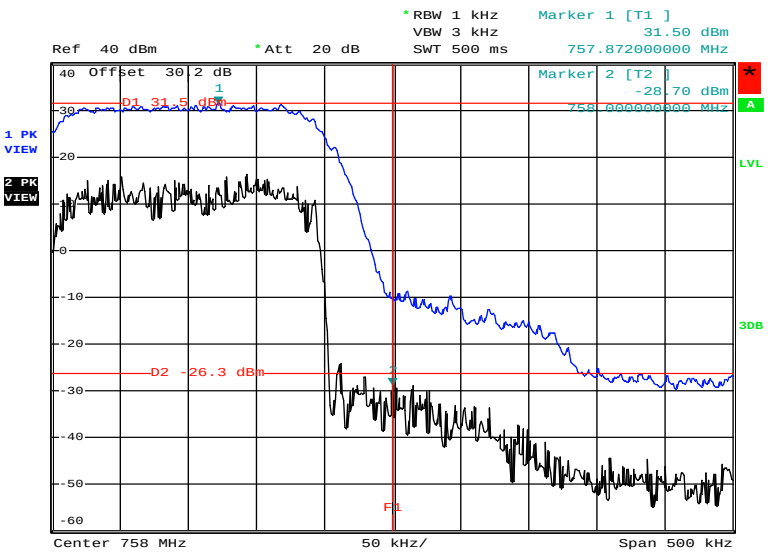


Date: 11.AUG.2017 15:24:52

Channel Frequency (MHz):	757.850
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-28.47

Plot 9.35 – Upper Band Edge 757.85MHz, 200kHz BW, 32 QAM

Upper Band-Edge

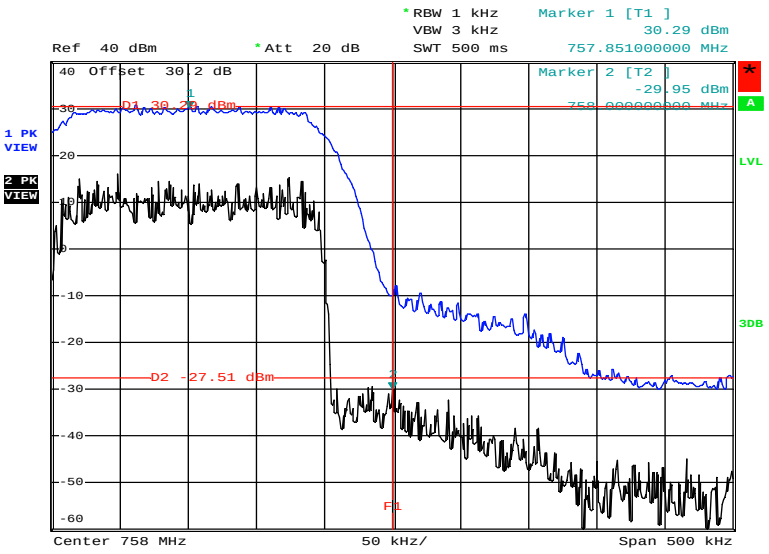


Date: 11.AUG.2017 15:29:55

Channel Frequency (MHz):	757.850
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-28.70

Plot 9.36 – Upper Band Edge 757.85MHz, 200kHz BW, 64 QAM

Upper Band-Edge

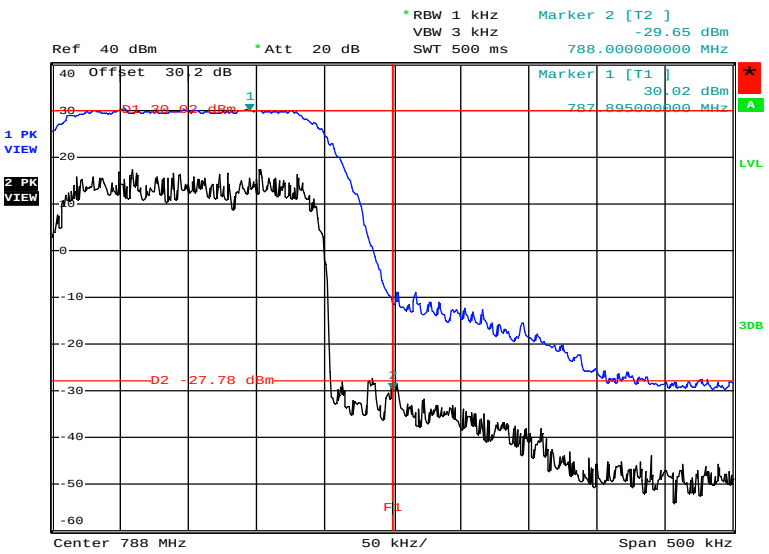


Date: 11.AUG.2017 15:33:10

Channel Frequency (MHz):	757.850
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-29.95

Plot 9.37 – Upper Band Edge 787.85MHz, 200kHz BW, QPSK

Upper Band-Edge

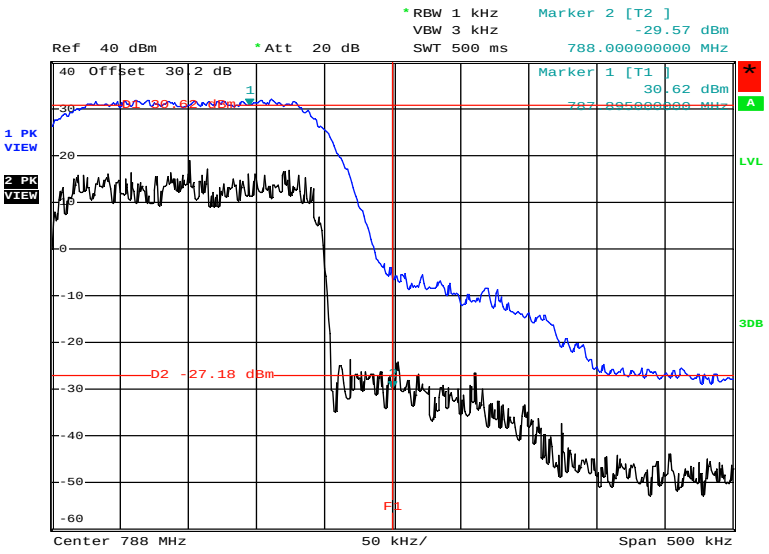


Date: 11.AUG.2017 13:52:58

Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.65

Plot 9.38 – Upper Band Edge 787.85MHz, 200kHz BW, 16 QAM

Upper Band-Edge

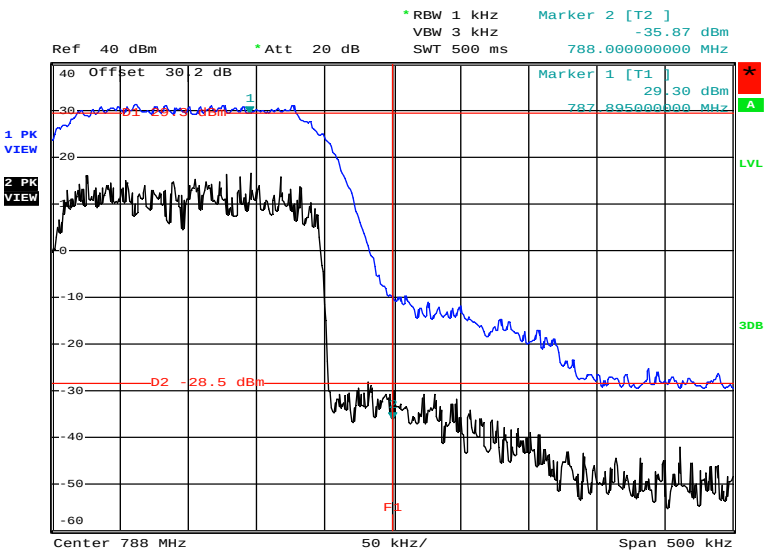


Date: 11.AUG.2017 13:59:45

Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-29.57

Plot 9.39 – Upper Band Edge 787.85MHz, 200kHz BW, 32 QAM

Upper Band-Edge

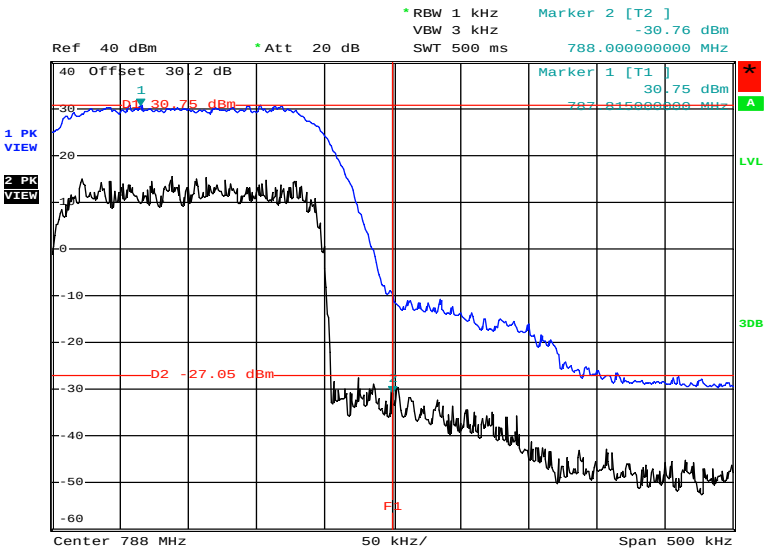


Date: 11.AUG.2017 14:04:15

Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-35.87

Plot 9.40 – Upper Band Edge 787.85MHz, 200kHz BW, 64 QAM

Upper Band-Edge

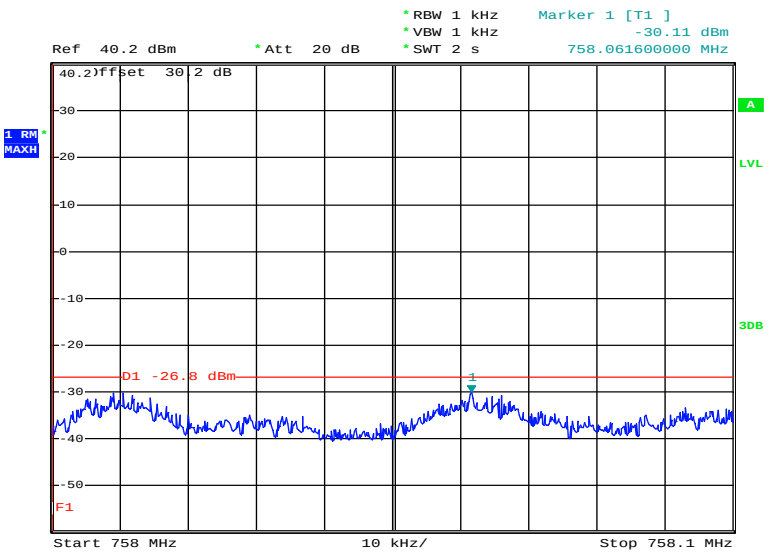


Date: 11.AUG.2017 14:12:20

Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-30.76

Plot 9.41 – Upper Band Edge 757.75MHz, 500kHz BW, QPSK

Upper Band-Edge

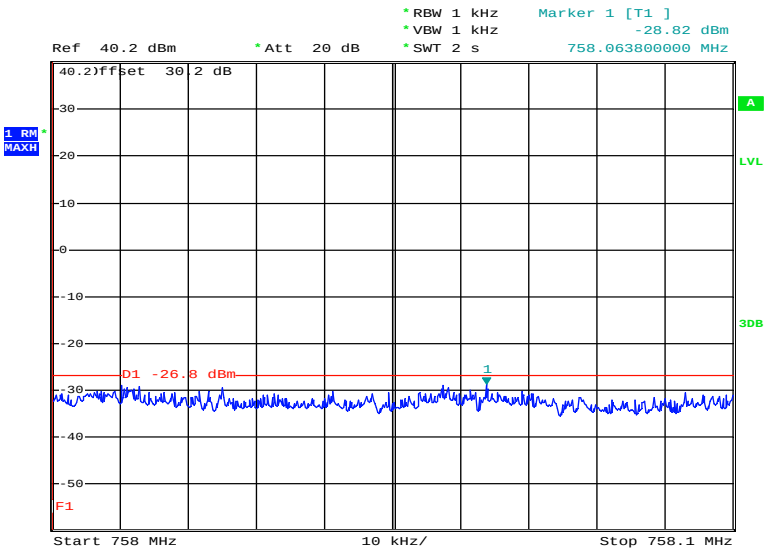


Date: 29.AUG.2017 11:05:28

Channel Frequency (MHz):	757.750
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Band-Edge to 758.1MHz(dBc):	-30.11

Plot 9.42 – Upper Band Edge 757.75MHz, 500kHz BW, 16 QAM

Upper Band-Edge

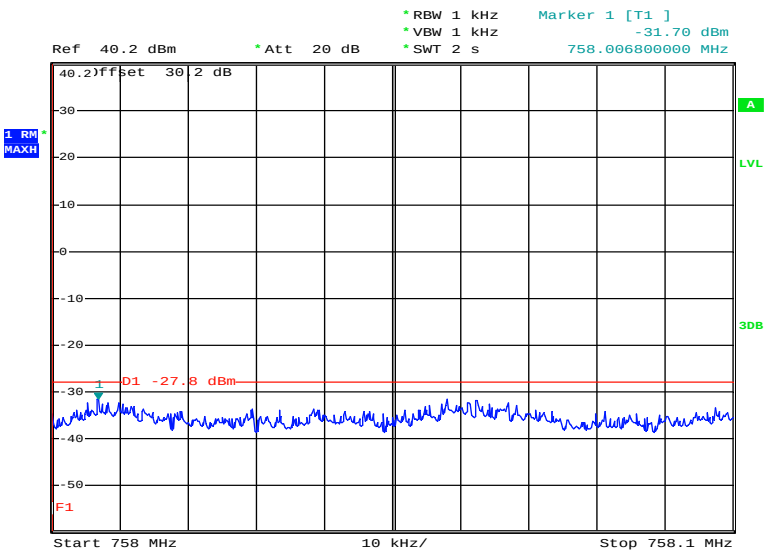


Date: 29.AUG.2017 11:07:06

Channel Frequency (MHz):	757.750
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Band-Edge to 758.1MHz(dBc):	-28.82

Plot 9.43 – Upper Band Edge 757.75MHz, 500kHz BW, 32 QAM

Upper Band-Edge

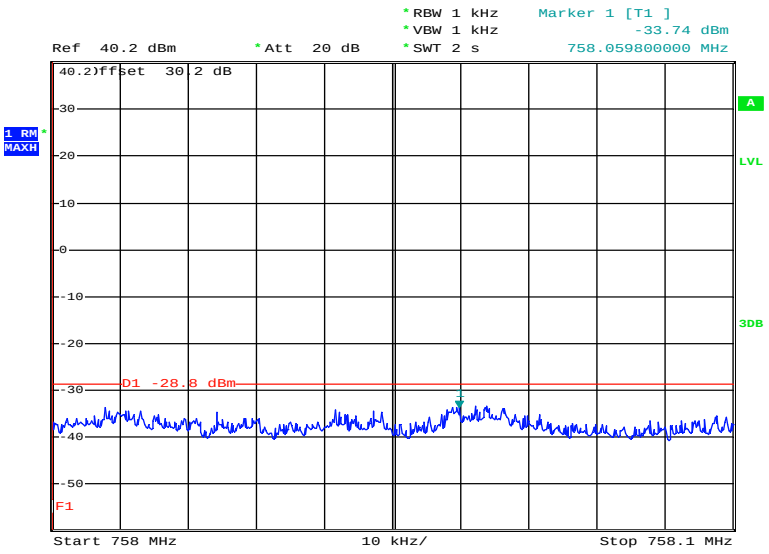


Date: 29.AUG.2017 11:08:47

Channel Frequency (MHz):	757.750
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Band-Edge to 758.1MHz(dBc):	-31.70

Plot 9.44 – Upper Band Edge 757.75MHz, 500kHz BW, 64 QAM

Upper Band-Edge

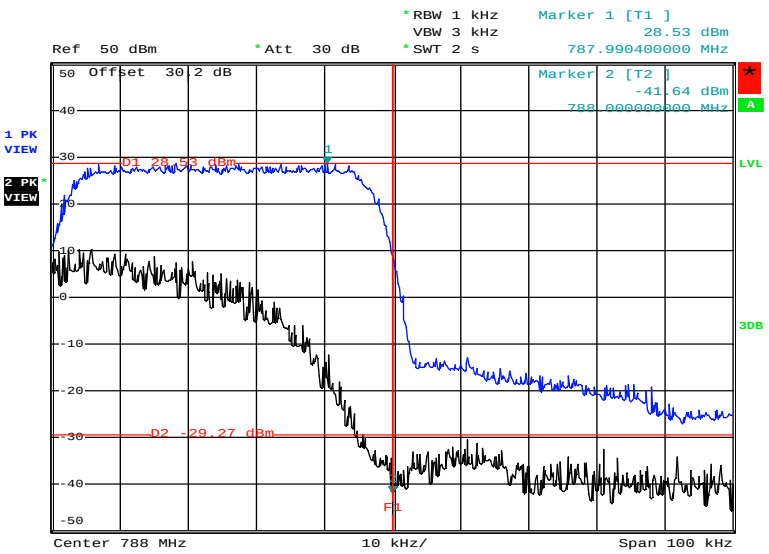


Date: 29.AUG.2017 11:10:09

Channel Frequency (MHz):	757.750
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Band-Edge to 758.1MHz(dBc):	-33.74

Plot 9.45 – Upper Band Edge 787.75MHz, 500kHz BW, QPSK

Upper Band-Edge

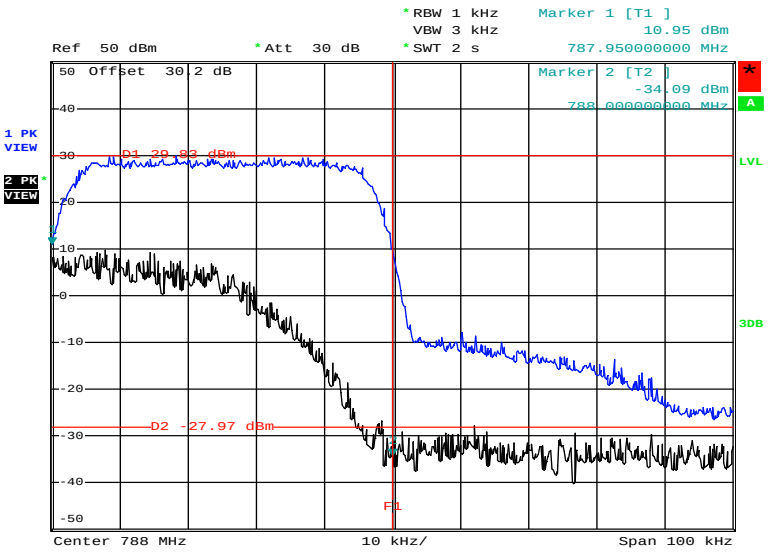


Date: 21.AUG.2017 13:07:21

Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-41.64

Plot 9.46 – Upper Band Edge 787.75MHz, 500kHz BW, 16 QAM

Upper Band-Edge

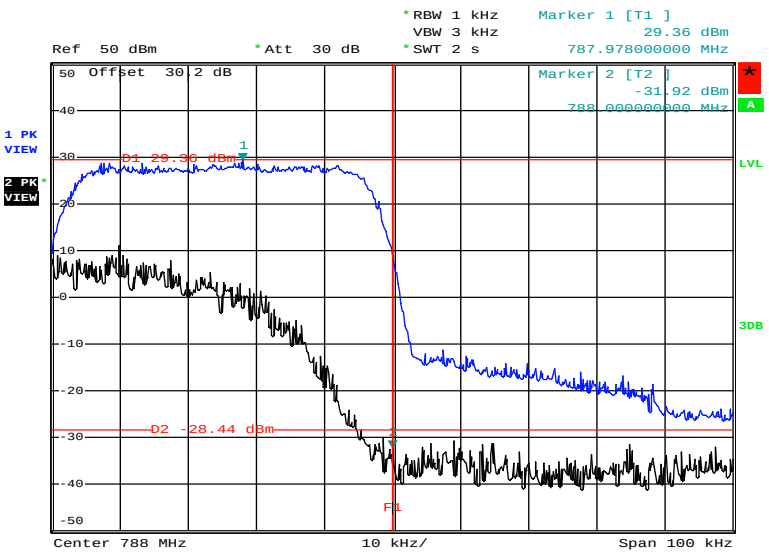


Date: 21.AUG.2017 13:10:06

Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
786.9MHz to Band-Edge(dBc):	-34.09

Plot 9.47 – Upper Band Edge 787.75MHz, 500kHz BW, 32 QAM

Upper Band-Edge

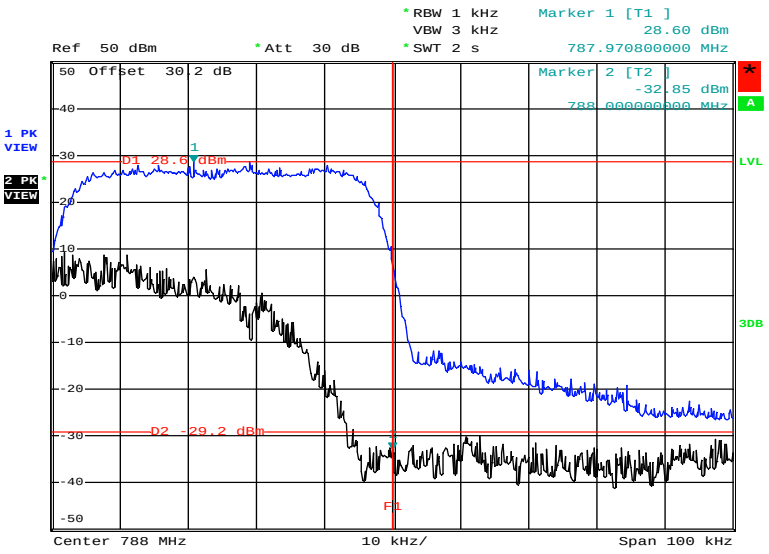


Date: 21.AUG.2017 13:13:38

Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
786.9MHz to Band-Edge(dBc):	-31.92

Plot 9.48 – Upper Band Edge 787.75MHz, 500kHz BW, 64 QAM

Upper Band-Edge



Date: 21.AUG.2017 13:16:25

Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
786.9MHz to Band-Edge(dBc):	-32.85

Table 9.1 - Summary of Lower Band-Edge Measurements

§27.53(c) Emission Limits - Lower Band Edge								
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting (dBm)	Channel Power @ 30kHz RBW [P_{chan}] (dBm)	Band-Edge Emission @ 1kHz RBW [P_{BE}] (dBc)	Attenuation [A] (dB)	Limit(1) (dBm)	Margin (dB)
757.075	100	QPSK	31	31.14	-29.15	60.29	57.80	2.49
		16QAM	31	34.15	-35.52	69.67		11.87
		32QAM	30	32.77	-30.82	63.59		5.79
		64QAM	29	32.36	-31.81	64.17		6.37
787.075		QPSK	31	31.13	-34.30	65.43		7.63
		16QAM	31	33.00	-29.87	62.87		5.07
		32QAM	30	33.00	-34.79	67.79		9.99
		64QAM	29	32.85	-37.74	70.59		12.79
757.15	200	QPSK	31	30.44	-29.71	60.15	57.80	2.35
		16QAM	31	32.26	-27.69	59.95		2.15
		32QAM	30	31.27	-31.35	62.62		4.82
		64QAM	29	29.30	-36.02	65.32		7.52
787.15		QPSK	31	29.63	-31.41	61.04		3.24
		16QAM	31	32.31	-28.31	60.62		2.82
		32QAM	30	31.16	-28.96	60.12		2.32
		64QAM	29	30.39	-37.96	68.35		10.55
757.25	500	QPSK	31	31.00	-29.72	60.72	57.80	2.92
		16QAM	31	31.00	-28.79	59.79		1.99
		32QAM	30	30.00	-31.40	61.40		3.60
		64QAM	29	29.00	-33.90	62.90		5.10
787.25		QPSK	31	28.84	-37.09	65.93		8.13
		16QAM	31	29.97	-35.40	65.37		7.57
		32QAM	30	28.86	-36.14	65.00		7.20
		64QAM	29	27.30	-34.18	61.48		3.68

(1) As per § 27.53 (c)(5): Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

A 1kHz RBW was employed for the measurement of emissions up to 100kHz of the bands immediately outside and adjacent to the block edge. As such, the limits were scaled using RBW scaling as follows:

As per § 27.53 (c)(1): the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

RBW Scaling = 10Log([Required RBW] / [Measured RBW])

RBW Scaling = 10Log([30kHz] / [1kHz]) = 15.8dB

Limit = 43 + 10Log(P) + 14.8dB = 57.8 +10Log(P)

Attenuation [A] = [P_{chan}] - [P_{BE}]

Margin = Attenuation [A] - Limit

Result: Complies

Table 9.2 - Summary of Upper Band-Edge Measurements

§27.53(c) Emission Limits - Upper Band Edge								
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting (dBm)	Channel Power @ 30kHz RBW [P_{chan}] (dBm)	Band-Edge Emission @ 1kHz RBW [P_{BE}] (dBc)	Attenuation [A] (dB)	Limit[(1)] (dBm)	Margin (dB)
757.925	100	QPSK	31	31.37	-34.00	65.37	57.80	7.57
		16QAM	31	33.66	-29.02	62.68		4.88
		32QAM	30	32.56	-30.52	63.08		5.28
		64QAM	29	32.58	-31.05	63.63		5.83
787.925		QPSK	31	31.47	-29.42	60.89		3.09
		16QAM	31	33.01	-25.61	58.62		0.82
		32QAM	30	32.90	-32.28	65.18		7.38
		64QAM	29	32.49	-30.14	62.63		4.83
757.85	200	QPSK	31	30.24	-29.57	59.81	57.80	2.01
		16QAM	31	32.25	-28.47	60.72		2.92
		32QAM	30	31.50	-28.70	60.20		2.40
		64QAM	29	30.29	-29.95	60.24		2.44
787.85		QPSK	31	30.02	-29.65	59.67		1.87
		16QAM	31	30.62	-29.57	60.19		2.39
		32QAM	30	29.30	-35.87	65.17		7.37
		64QAM	29	30.75	-30.76	61.51		3.71
757.75	500	QPSK	31	31.00	-31.11	62.11	57.80	4.31
		16QAM	31	31.00	-28.82	59.82		2.02
		32QAM	30	30.00	-31.70	61.70		3.90
		64QAM	29	29.00	-33.74	62.74		4.94
787.75		QPSK	31	28.53	-41.64	70.17		12.37
		16QAM	31	29.83	-34.09	63.92		6.12
		32QAM	30	29.36	-31.92	61.28		3.48
		64QAM	29	28.60	-32.85	61.45		3.65

(1) As per § 27.53 (c)(5): Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

A 1kHz RBW was employed for the measurement of emissions up to 100kHz of the bands immediately outside and adjacent to the block edge. As such, the limits were scaled using RBW scaling as follows:

As per § 27.53 (c)(1): the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

RBW Scaling = 10Log([Required RBW] / [Measured RBW])

RBW Scaling = 10Log([30kHz] / [1kHz]) = 15.8dB

Limit = 43 + 10Log(P) + 14.8dB = 57.8 +10Log(P)

Attenuation [A] = [P_{chan}] - [P_{BE}]

Margin = Attenuation [A] - Limit

Result: Complies

10.A CONDUCTED OUT OF BAND SPURIOUS EMISSIONS > 100KHZ OF BAND-EDGE

Test Conditions	
Normative Reference	FCC 47 CFR §2.1046, §27.53(c), KDB 971168 D01v02r02

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee'sfrequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (2) On any frequency outside the 779-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

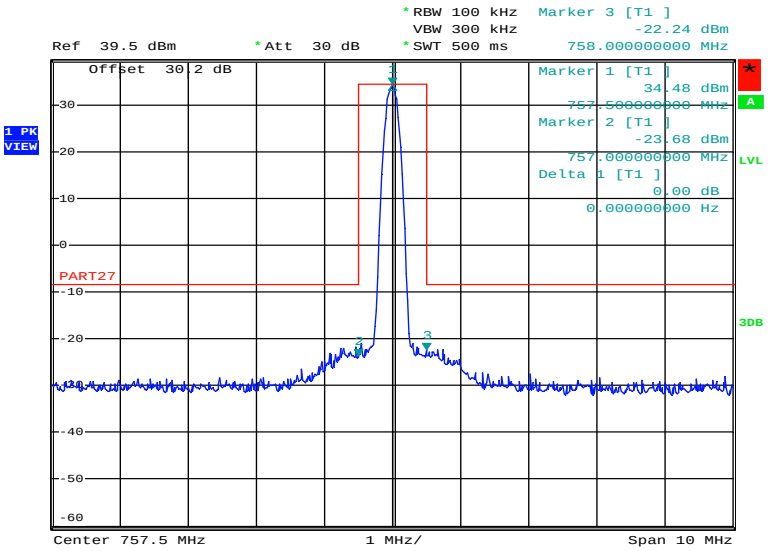
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type. All modulations (QPSK, 16 QAM, 32 QAM and 64 QAM) and all bandwidths (100kHz, 200kHz and 500kHz) were investigated. To determine compliance an emission mask was created to indicate the attenuation referenced to the carrier, or dBc. The DUT frequency was set to the center frequency of each band. The RBW of Trace 1 of the SA was set to 100kHz and set to Max Hold. Marker 1 was set to Peak and the emission mask and SA Reference Level set to Marker 1 Peak. Markers 2 and 3 were set to the upper and lower band edge frequencies and the minimum *attenuation* referenced to the carrier, dBc, was recorded.

Plot 10.A1 – Out of Band Emissions, 757.5MHz, 100kHz BW, QPSK

Out of Band

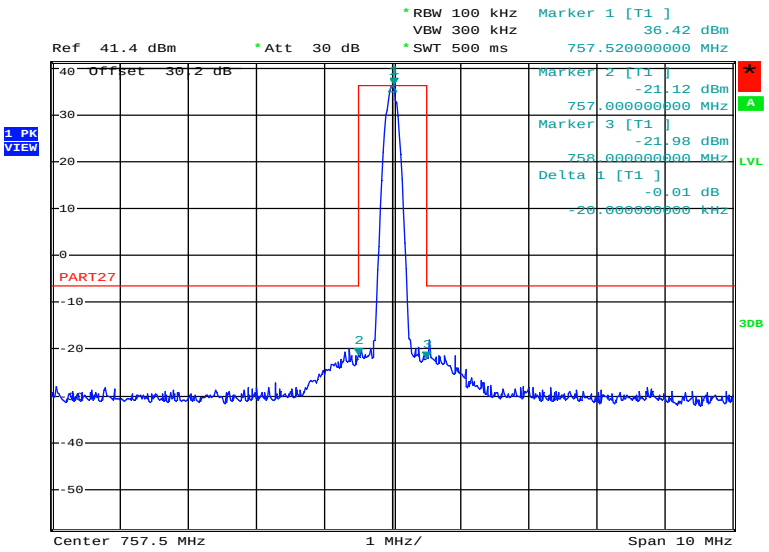


Date: 17.AUG.2017 09:51:29

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-22.24

Plot 10.A2 – Out of Band Emissions, 757.5MHz, 100kHz BW, 16 QAM

Out of Band

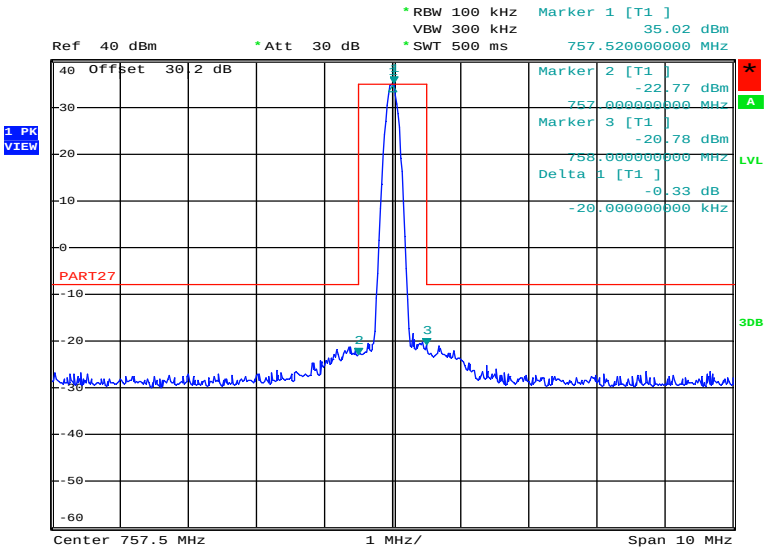


Date: 17.AUG.2017 09:56:15

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-21.12

Plot 10.A3 – Out of Band Emissions, 757.5MHz, 100kHz BW, 32 QAM

Out of Band

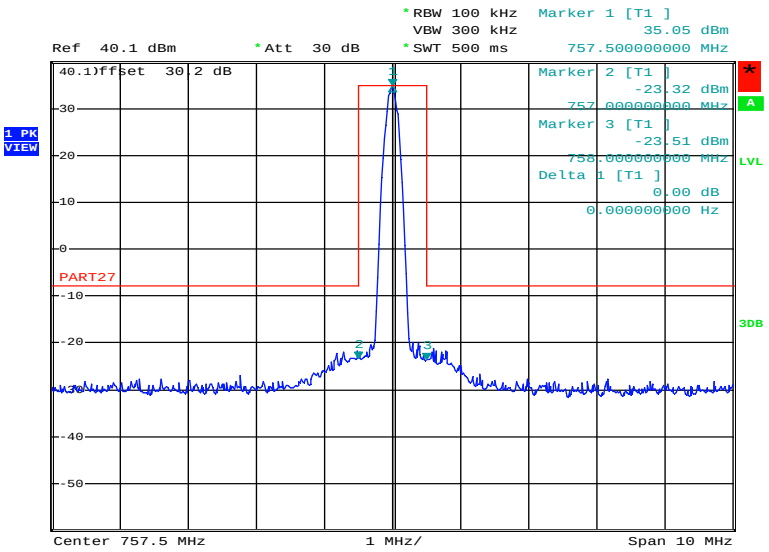


Date: 17.AUG.2017 10:01:05

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-20.78

Plot 10.A4 – Out of Band Emissions, 757.5MHz, 100kHz BW, 64 QAM

Out of Band

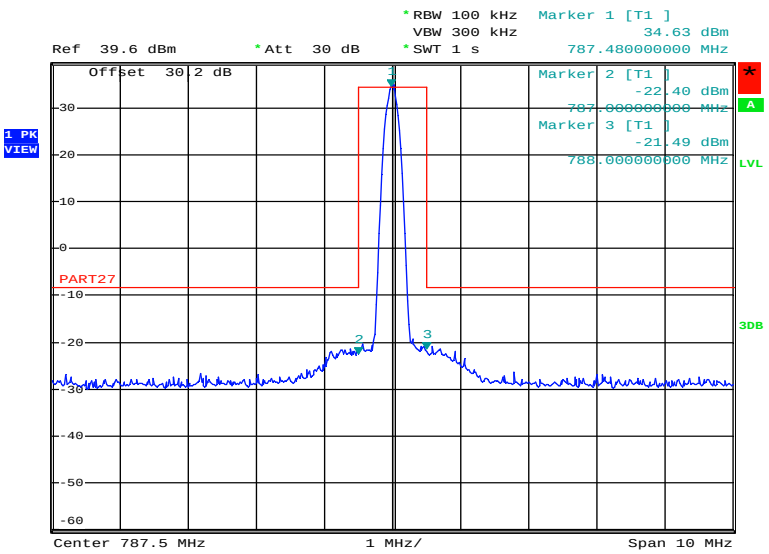


Date: 17.AUG.2017 10:03:30

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-23.32

Plot 10.A5 – Out of Band Emissions, 787.5MHz, 100kHz BW, QPSK

Out of Band

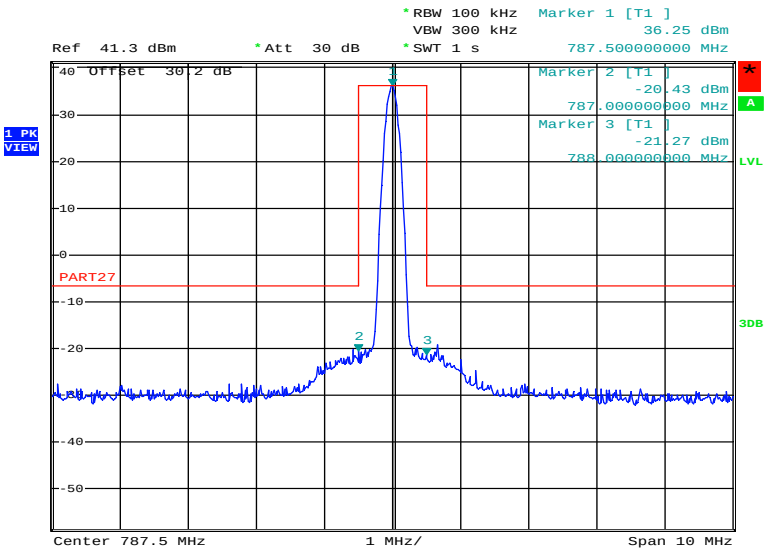


Date: 16.AUG.2017 13:38:15

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	100.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-21.49

Plot 10.A6 – Out of Band Emissions, 787.5MHz, 100kHz BW, 16 QAM

Out of Band

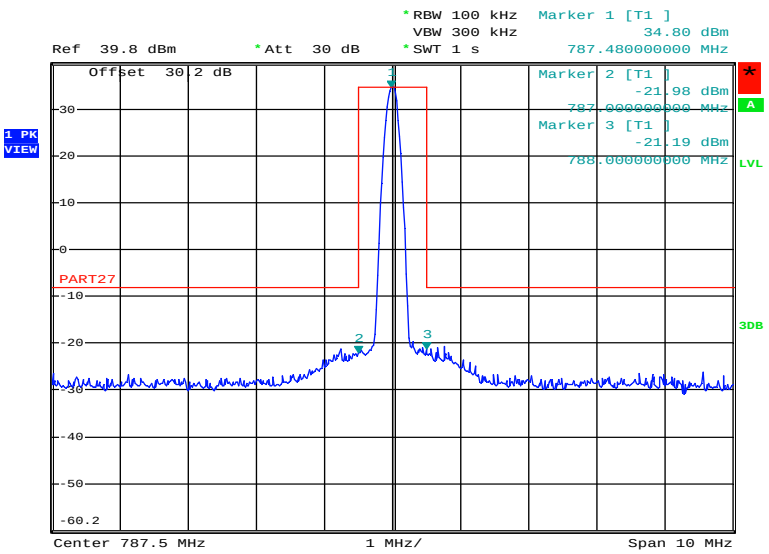


Date: 16.AUG.2017 13:44:04

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	100.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-20.43

Plot 10.A7 – Out of Band Emissions, 787.5MHz, 100kHz BW, 32 QAM

Out of Band

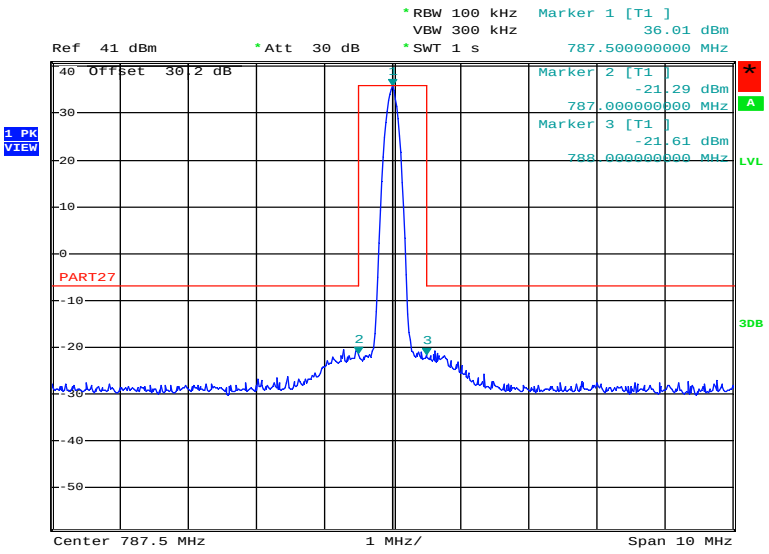


Date: 16.AUG.2017 13:51:16

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	100.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-21.19

Plot 10.A8 – Out of Band Emissions, 787.5MHz, 100kHz BW, 64 QAM

Out of Band

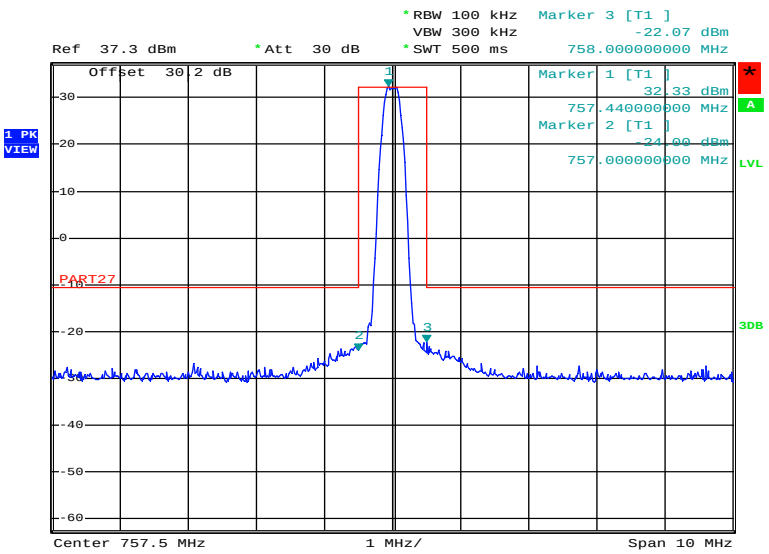


Date: 16.AUG.2017 13:54:31

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	100.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-21.29

Plot 10.A9 – Out of Band Emissions, 757.5MHz, 200kHz BW, QPSK

Out of Band

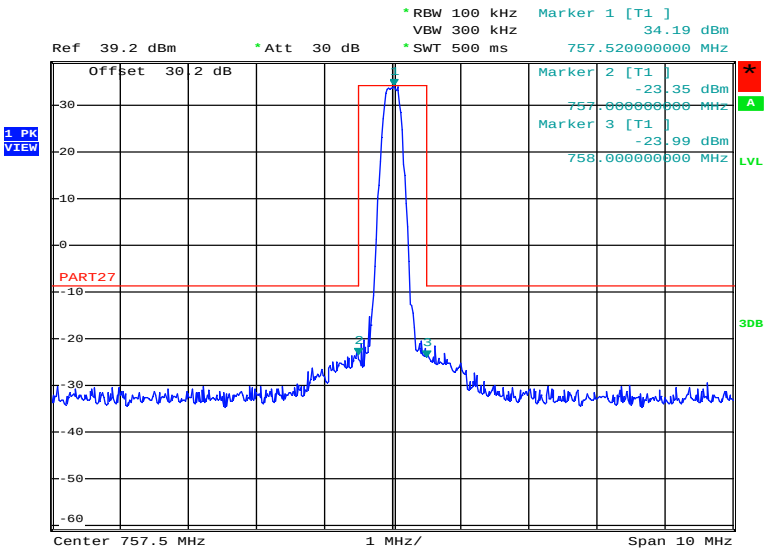


Date: 17.AUG.2017 11:59:42

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-22.07

Plot 10.A10 – Out of Band Emissions, 757.5MHz, 200kHz BW, 16 QAM

Out of Band

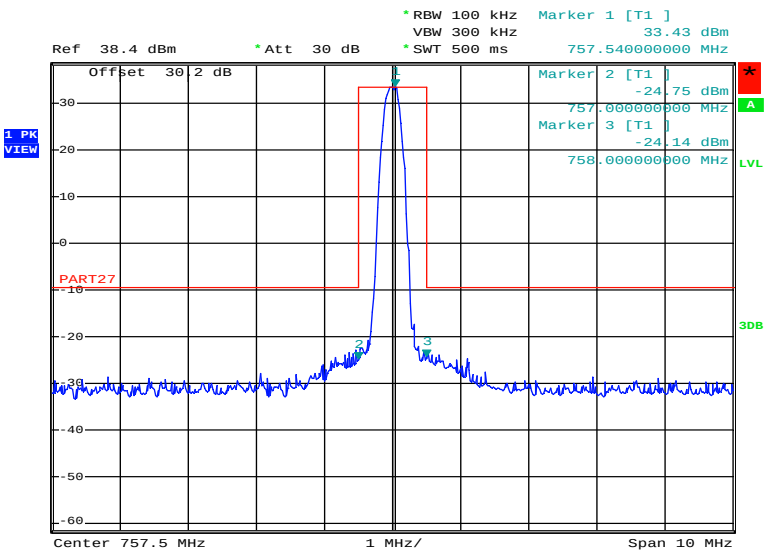


Date: 17.AUG.2017 12:04:15

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-23.35

Plot 10.A11 – Out of Band Emissions, 757.5MHz, 200kHz BW, 32 QAM

Out of Band

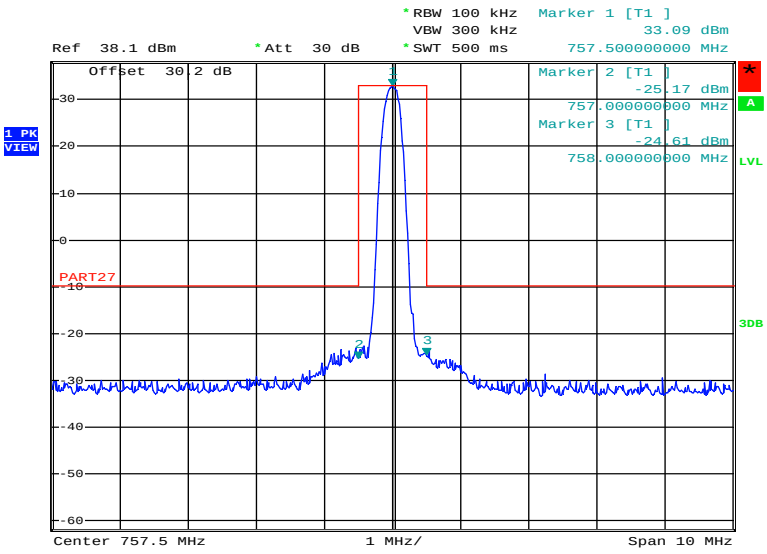


Date: 17.AUG.2017 12:06:22

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-24.14

Plot 10.A12 – Out of Band Emissions, 757.5MHz, 200kHz BW, 64 QAM

Out of Band

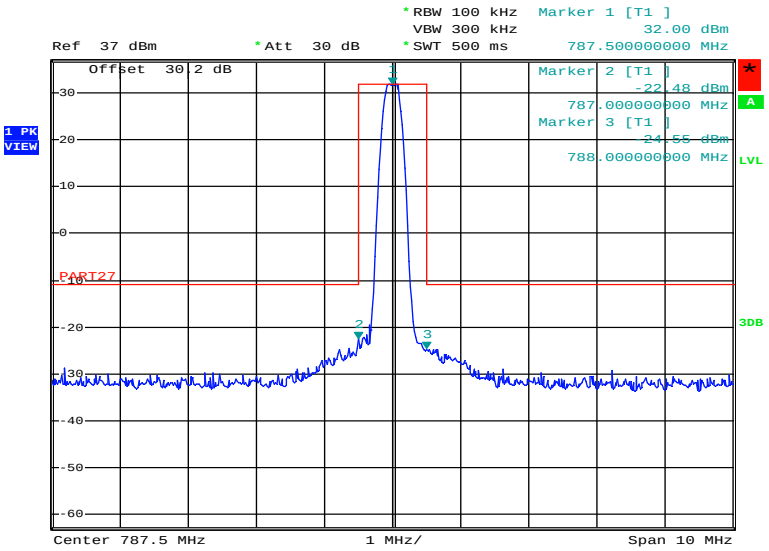


Date: 17.AUG.2017 12:09:30

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-24.61

Plot 10.A13 – Out of Band Emissions, 787.5MHz, 200kHz BW, QPSK

Out of Band

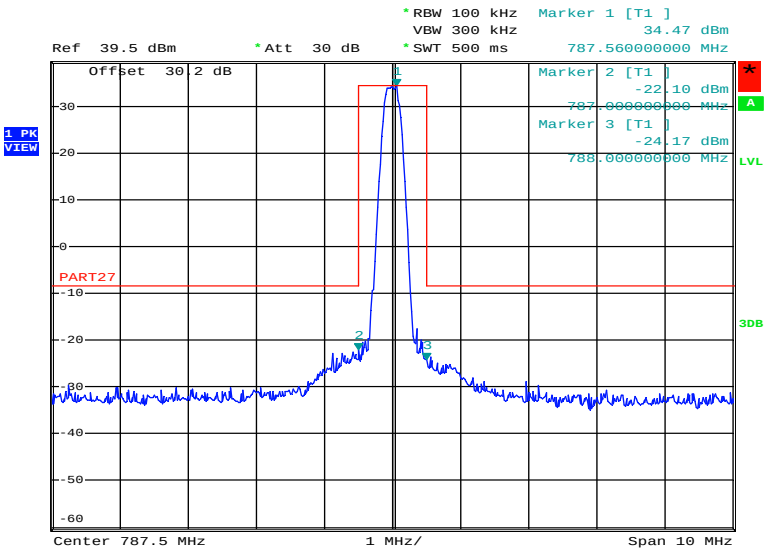


Date: 17.AUG.2017 13:42:08

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-22.48

Plot 10.A14 – Out of Band Emissions, 787.5MHz, 200kHz BW, 16 QAM

Out of Band

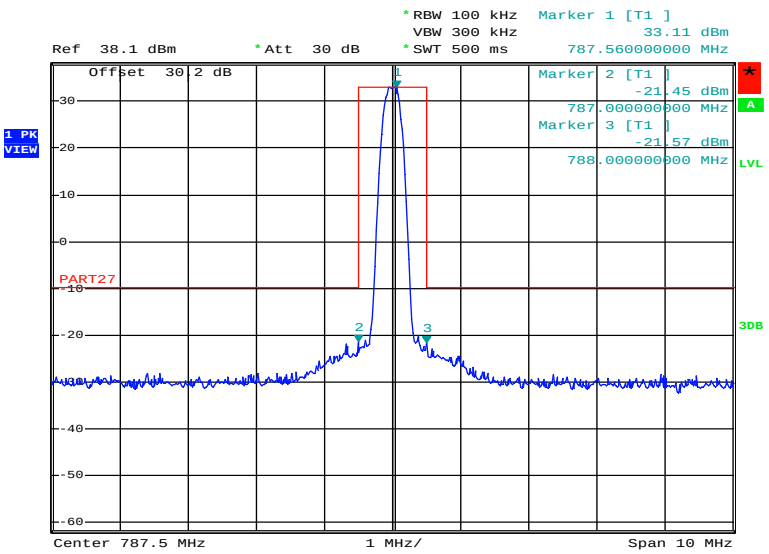


Date: 17.AUG.2017 13:45:37

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-22.10

Plot 10.A15 – Out of Band Emissions, 787.5MHz, 200kHz BW, 32 QAM

Out of Band

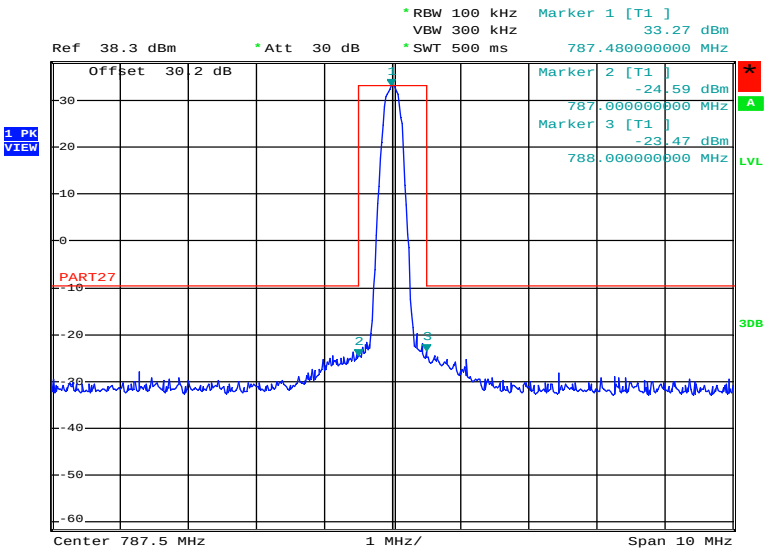


Date: 17.AUG.2017 13:47:40

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-21.45

Plot 10.A16 – Out of Band Emissions, 787.5MHz, 200kHz BW, 64 QAM

Out of Band

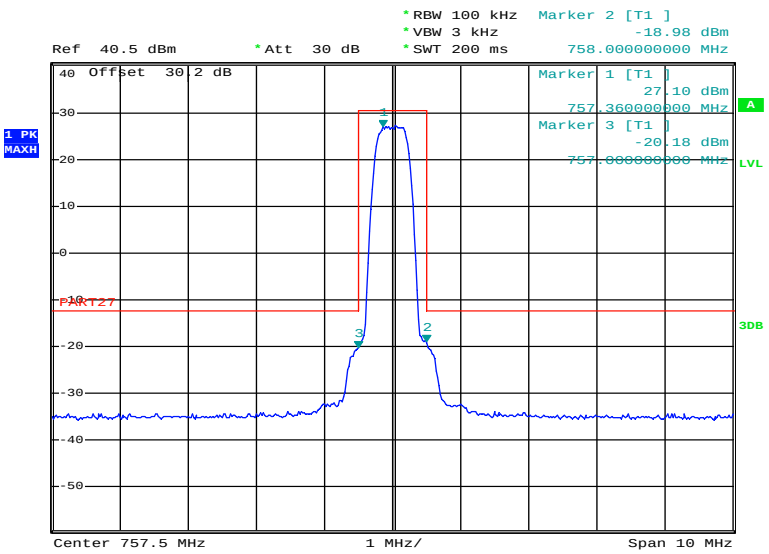


Date: 17.AUG.2017 13:49:37

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-23.47

Plot 10.A17 – Out of Band Emissions, 757.5MHz, 500kHz BW, QPSK

Out of Band

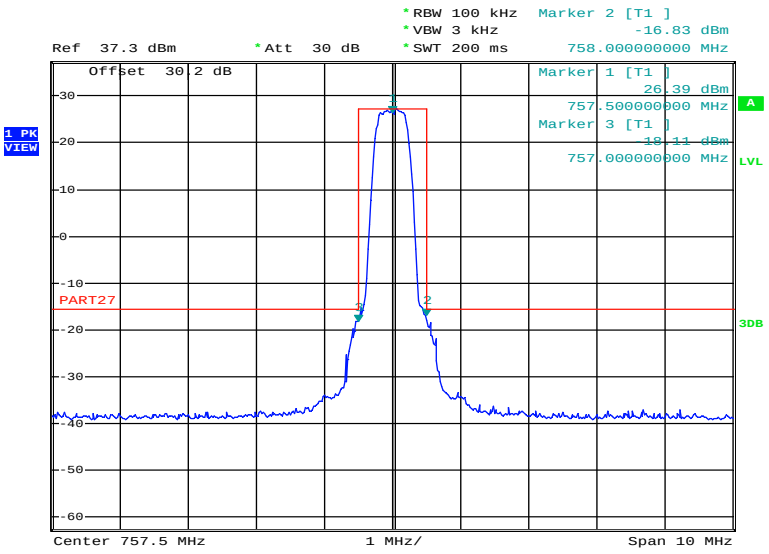


Date: 3.SEP.2017 13:58:44

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-18.98

Plot 10.A18 – Out of Band Emissions, 757.5MHz, 500kHz BW, 16 QAM

Out of Band

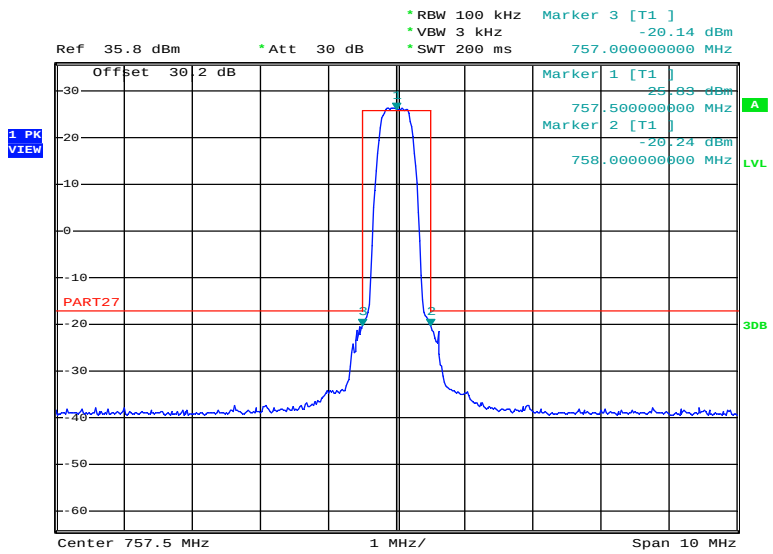


Date: 3.SEP.2017 14:01:27

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-16.83

Plot 10.A19 – Out of Band Emissions, 757.5MHz, 500kHz BW, 32 QAM

Out of Band

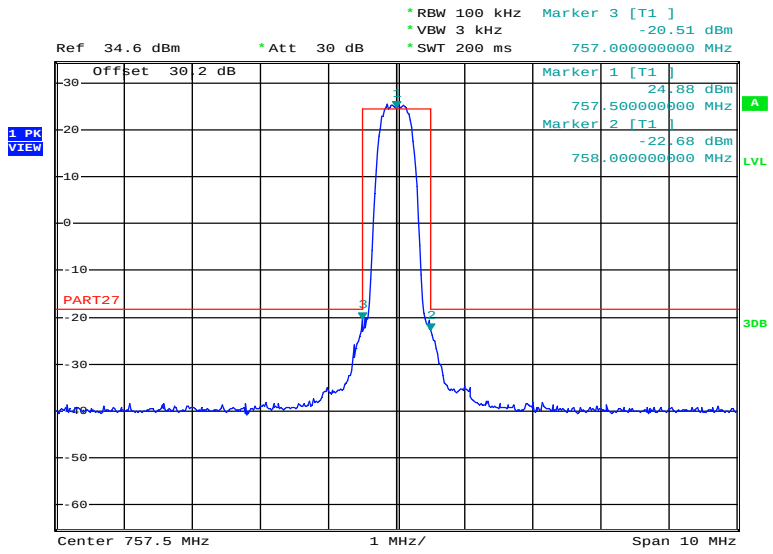


Date: 3.SEP.2017 14:03:48

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-20.14

Plot 10.A20 – Out of Band Emissions, 757.5MHz, 500kHz BW, 64 QAM

Out of Band

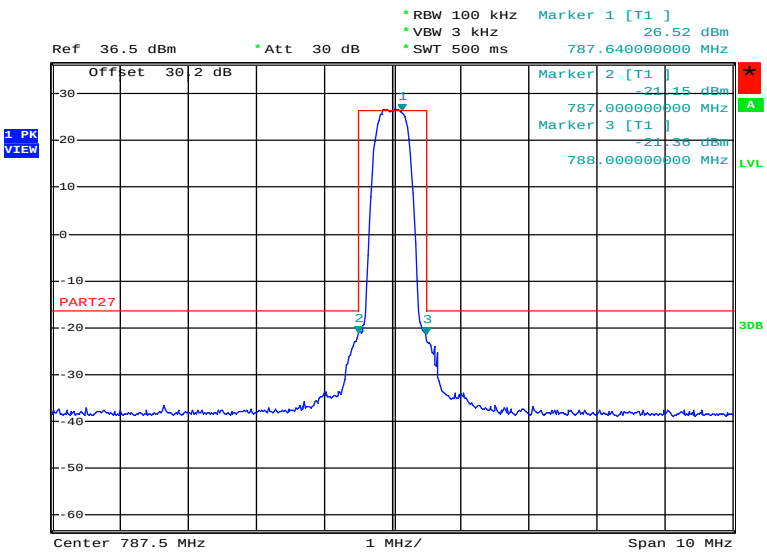


Date: 3.SEP.2017 14:05:11

Channel Frequency (MHz):	757.500
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-20.51

Plot 10.A21 – Out of Band Emissions, 787.5MHz, 500kHz BW, QPSK

Out of Band

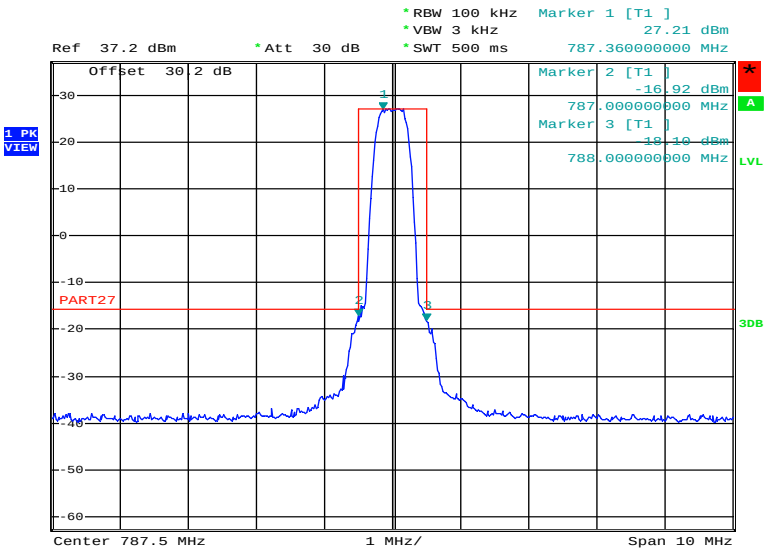


Date: 24.AUG.2017 13:35:33

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-21.15

Plot 10.A22 – Out of Band Emissions, 787.5MHz, 500kHz BW, 16 QAM

Out of Band

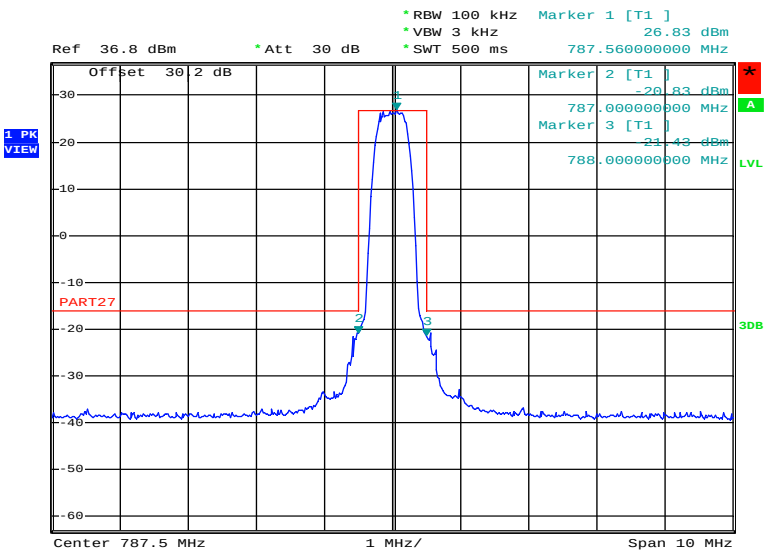


Date: 24.AUG.2017 13:36:57

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Emission at Band-Edge(dBc):	-16.92

Plot 10.A23 – Out of Band Emissions, 787.5MHz, 500kHz BW, 32 QAM

Out of Band

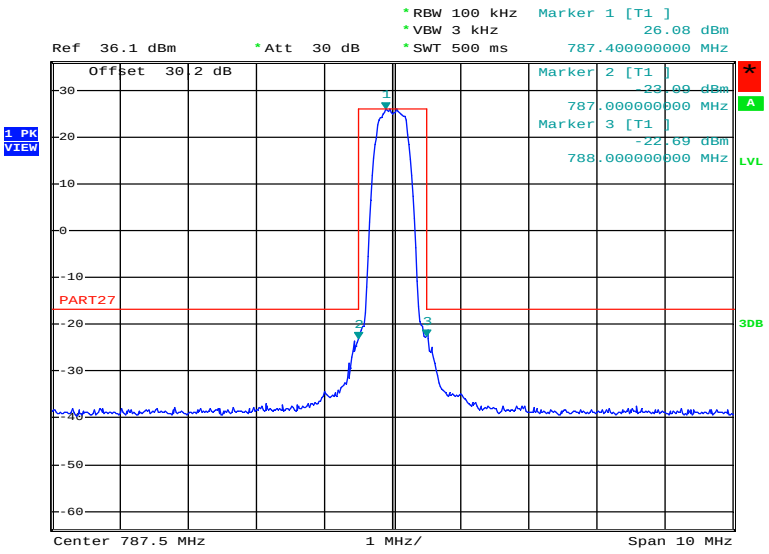


Date: 24.AUG.2017 13:38:23

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Emission at Band-Edge(dBc):	-20.83

Plot 10.A24 – Out of Band Emissions, 787.5MHz, 500kHz BW, 64 QAM

Out of Band



Date: 24.AUG.2017 13:39:42

Channel Frequency (MHz):	787.500
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Emission at Band-Edge(dBc):	-22.69

Table 10.A1 – Summary of Out of Band Emission Measurements

§27.53(c) Emission Limits - Out of Band								
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting (dBm)	Channel Power @ 100kHz RBW [P_{chan}] (dBm)	Band-Edge Emission @ 100kHz RBW [P_{BE}] (dBc)	Attenuation [A] (dB)	Limit (dBm)	Margin (dB)
757.925	100	QPSK	31	34.58	-22.24	56.82	43.00	13.82
		16QAM	31	36.42	-21.12	57.54		14.54
		32QAM	30	35.02	-20.78	55.80		12.80
		64QAM	29	35.05	-23.32	58.37		15.37
787.925		QPSK	31	34.63	-21.49	56.12		13.12
		16QAM	31	36.25	-20.43	56.68		13.68
		32QAM	30	34.80	-21.19	55.99		12.99
		64QAM	29	36.01	-21.29	57.30		14.30
757.85	200	QPSK	31	32.33	-22.07	54.40	43.00	11.40
		16QAM	31	34.19	-23.35	57.54		14.54
		32QAM	30	33.43	-24.14	57.57		14.57
		64QAM	29	33.09	-24.61	57.70		14.70
787.85		QPSK	31	32.00	-22.48	54.48		11.48
		16QAM	31	34.47	-22.10	56.57		13.57
		32QAM	30	33.11	-21.45	54.56		11.56
		64QAM	29	33.27	-23.47	56.74		13.74
757.75	500	QPSK	31	27.10	-18.98	46.08	43.00	3.08
		16QAM	31	26.39	-16.83	43.22		0.22
		32QAM	30	25.80	-20.14	45.94		2.94
		64QAM	29	24.88	-20.51	45.39		2.39
787.75		QPSK	31	26.52	-21.15	47.67		4.67
		16QAM	31	27.21	-16.92	44.13		1.13
		32QAM	30	26.83	-20.83	47.66		4.66
		64QAM	29	26.08	-22.69	48.77		5.77

Limit = 43 + 10Log(P)

Attenuation [A] = [P_{chan}] - [P_{BE}]

Margin = Attenuation [A] - Limit

Result: Complies

10.B COMPLIANCE TO §27.53(C)(3)

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1046, §27.53(c)(3), (6), KDB 971168 D01v02r02**

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee'sfrequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations; (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

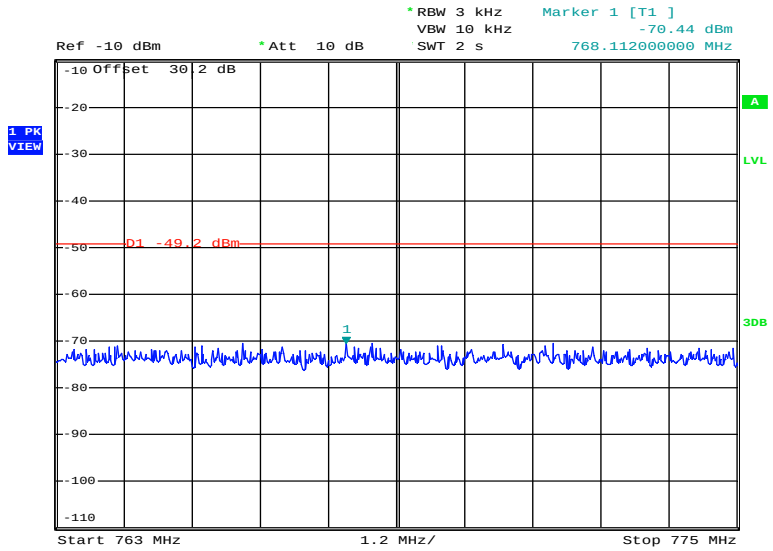
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type. All modulations (QPSK, 16 QAM, 32 QAM and 64 QAM) and all bandwidths (100kHz, 200kHz and 500kHz) were investigated. To determine compliance, the SA RBW was set to 3kHz and the limit line adjusted to the limit plus the offset for RBW scaling or:
76 + 10Log(P) + 10Log(6.25kHz/3kHz) or. 79.2 + 10Log(P) or an absolute limit line of -49.2dBm. Marker 1 was set to Peak and the *attenuation* recorded.

Plot 10.B1 – Spurious Emissions 763-775 MHz

Conducted Power

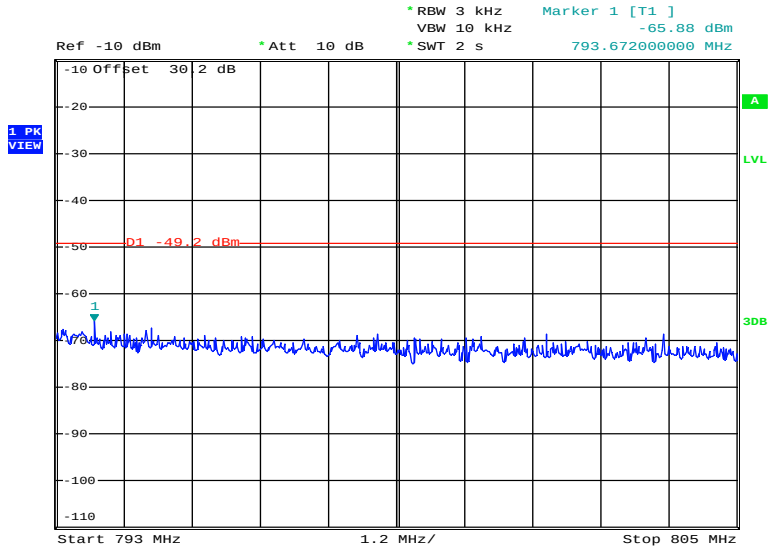


Date: 8.SEP.2017 17:02:31

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Frequency Range (MHz):	763-775
Emission Frequency (MHz):	768
Emission Level (dBm):	-70.44

Plot 10.B2 – Spurious Emissions 793-805 MHz

Conducted Power



Date: 9.SEP.2017 13:44:35

Channel Frequency (MHz):	757.50
Channel Bandwidth (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Frequency Range (MHz):	793-805
Emission Frequency (MHz):	794
Emission Level (dBm):	-65.88

Table 10.B1 – Summary of 27(c)(3) Spurious Emission Measurements

§27.53(c)(3) Emission Limits - Spurious Emissions									
Channel Frequency (MHz)	Frequency Range (MHz)	Frequency of Emission (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting [P_{chan}] (dBm)	Spurious Emission [P_{Spur}] (dBc)	Attenuation [A] (dB)	Limit (dBm)	Margin (dB)
757.5	763-775	768	100	CW	31	-70.44	101.40	79.20	22.20
	793-805	794				-65.88	96.88		17.68
Limit = 76 + 10Log(P)									
RBW Scaling = 10Log([Required RBW] / [Measured RBW])									
RBW Scaling = 10Log(6.25kHz / 3kHz) = 3.2dB									
Limit = 76 + 10Log(P) + 3.2dB = 79.2 + 10Log(P)									
Attenuation [A] = [P_{chan}] - [P_{Spur}]									
Margin = Attenuation [A] - Limit									
							Result:	Complies	

Shown are the worst case emissions. No other emissions within 20dB of the limit we observed.

11.0 CONDUCTED SPURIOUS EMISSIONS TO 10TH HARMONIC

Test Conditions	
Normative Reference	FCC 47 CFR §2.1046, §27.53(c), KDB 971168 D01v02r02

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee'sfrequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (2) On any frequency outside the 779-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

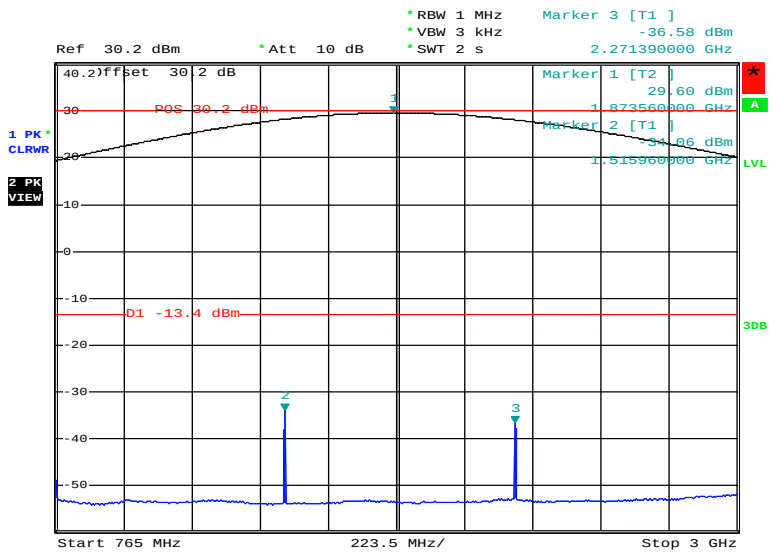
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak. The output power of the DUT was set to the manufacturer's highest rated output setting, CW mode and to the center frequency of each transmission band. All bandwidths (100kHz, 200kHz and 500kHz) were investigated. The SA was set to pre-scan two different regions, one scan to start just outside the band's edge of operation to 3GHz and the other from 3GHz to 8GHz. Any spurious emission observed approaching 20dB of the limit in the pre-scans were further investigated in a zoom scan. Trace 2 and Marker 1 indicate the Peak Power of the carrier using an RBW set to 100kHz. A Limit Line (D1) was set to 43 + 10Log(P) dBc where P is the Peak Carrier Power indicated by Marker 1. Trace 1 and Markers 2 and 3 indicate the spurious emissions. The Zoom scans indicate a narrower span of the emission with Markers 2 or 3 indicating the emission amplitude.

Plot 11.1 – Conducted Spurious Emission, 757.5MHz, 100kHz BW, CW, 765 to 3000MHz

Conducted Spurious Emissions

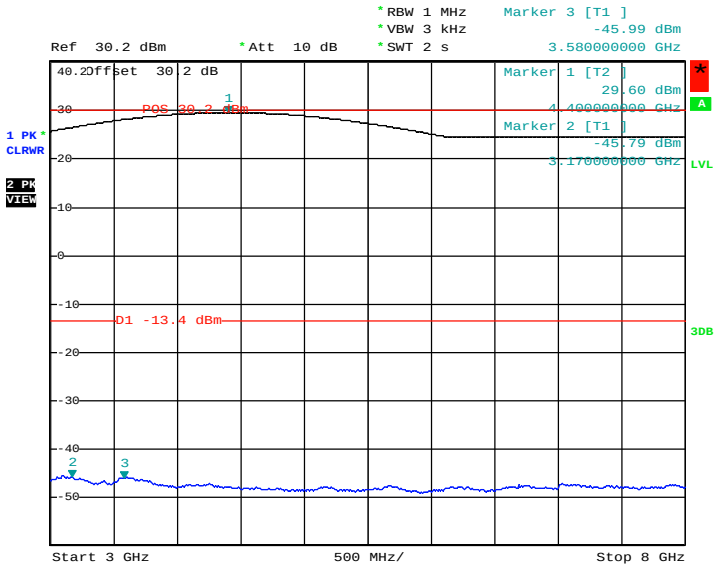


Date: 24.AUG.2017 12:28:02

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	765-3000

Plot 11.2 – Conducted Spurious Emission, 757.5MHz, 100kHz BW, CW, 3 to 8 GHz

Conducted Spurious Emissions

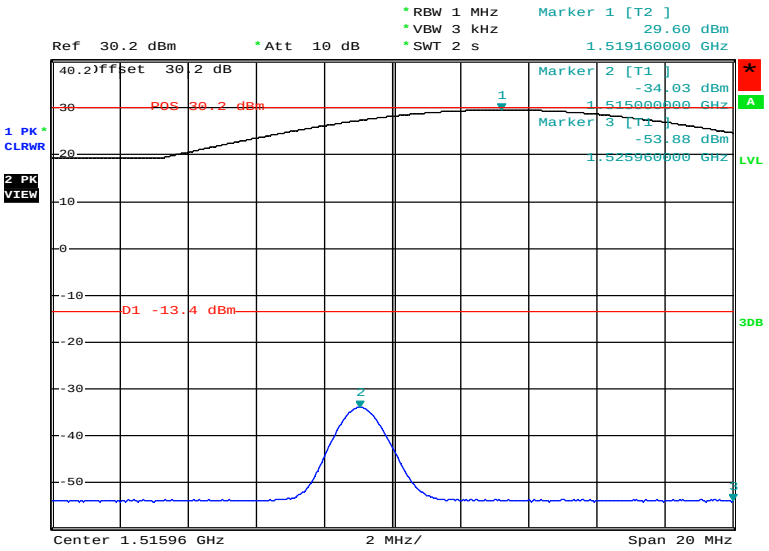


Date: 24.AUG.2017 12:30:54

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	3 - 8

Plot 11.3 – Conducted Spurious Emission, 757.5MHz, 100kHz BW, CW, 2nd Harmonic

Conducted Spurious Emissions

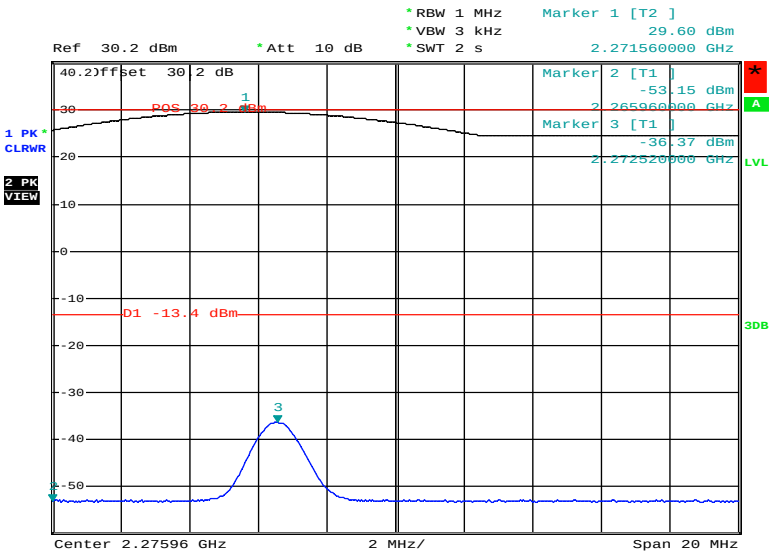


Date: 24.AUG.2017 12:28:53

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1519
Emission (dBm):	-34.03

Plot 11.4 – Conducted Spurious Emission, 757.5MHz, 100kHz BW, CW, 3rd Harmonic

Conducted Spurious Emissions

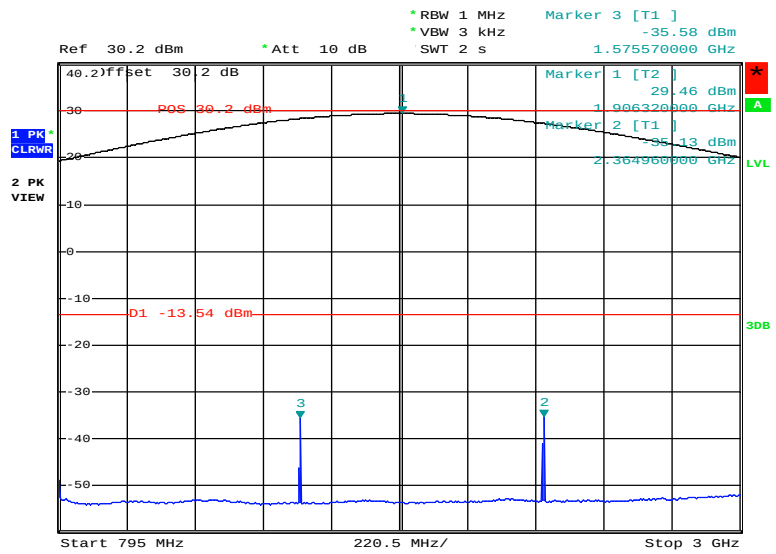


Date: 24.AUG.2017 12:30:00

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	2272
Emission (dBm):	-36.37

Plot 11.5 – Conducted Spurious Emission, 787.5MHz, 100kHz BW, CW, 795 to 3000MHz

Conducted Spurious Emissions

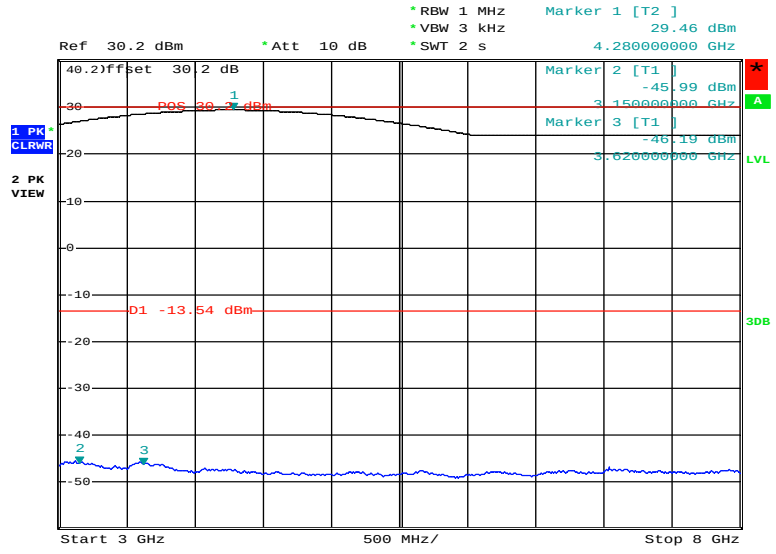


Date: 24.AUG.2017 11:42:06

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	795-3000

Plot 11.6 – Conducted Spurious Emission, 787.5MHz, 100kHz BW, CW, 3 to 8 GHz

Conducted Spurious Emissions

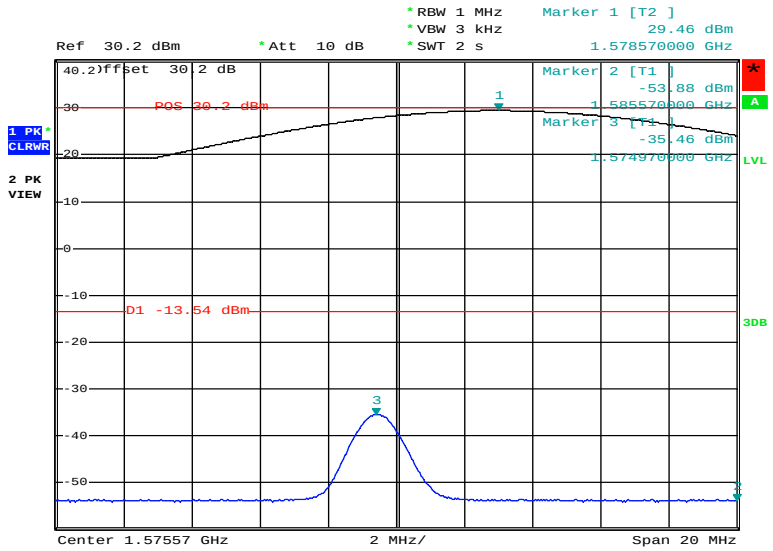


Date: 24.AUG.2017 12:05:41

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	3 - 8

Plot 11.7 – Conducted Spurious Emission, 787.5MHz, 100kHz BW, CW, 2nd Harmonic

Conducted Spurious Emissions

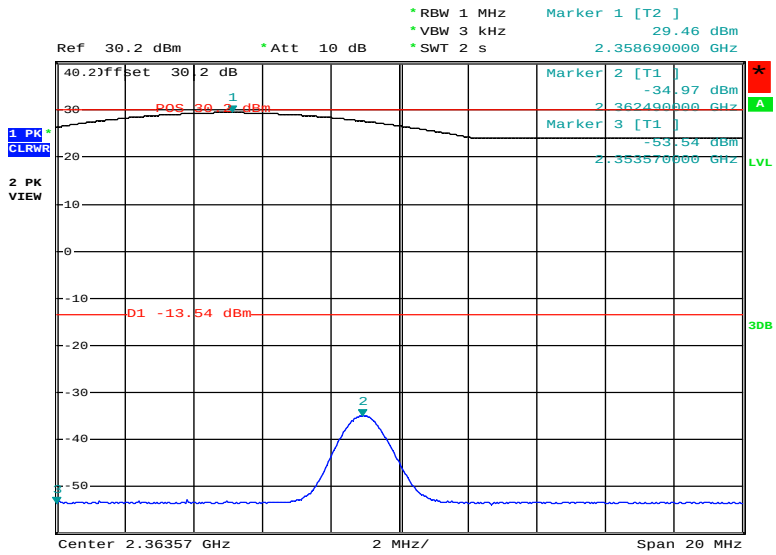


Date: 24.AUG.2017 11:43:17

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1579
Emission (dBm):	-35.46

Plot 11.8 – Conducted Spurious Emission, 787.5MHz, 100kHz BW, CW, 3rd Harmonic

Conducted Spurious Emissions

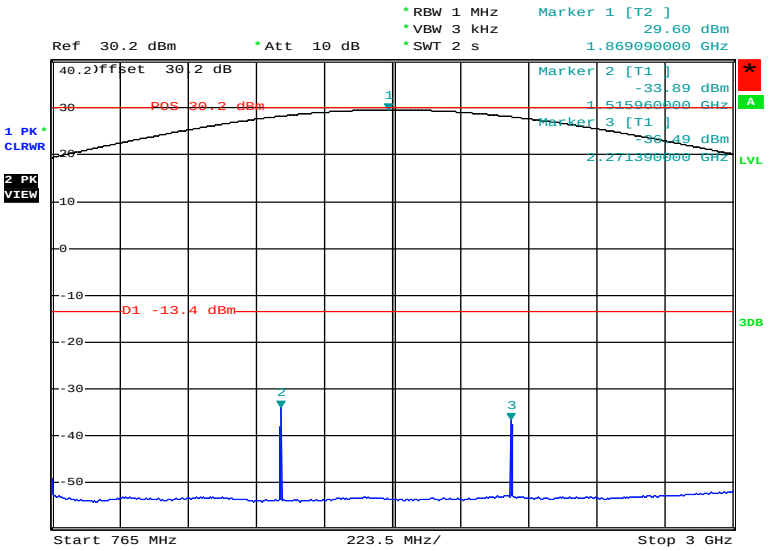


Date: 24.AUG.2017 11:44:32

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	2359
Emission (dBm):	-34.97

Plot 11.9 – Conducted Spurious Emission, 757.5MHz, 200kHz BW, CW, 765 to 3000MHz

Conducted Spurious Emissions

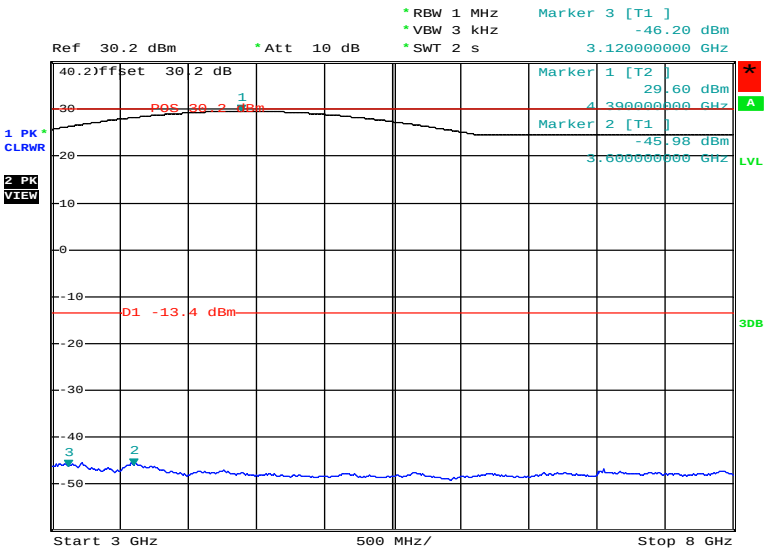


Date: 24.AUG.2017 12:21:09

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	765-3000

Plot 11.10 – Conducted Spurious Emission, 757.5MHz, 200kHz BW, CW, 3 to 8 GHz

Conducted Spurious Emissions

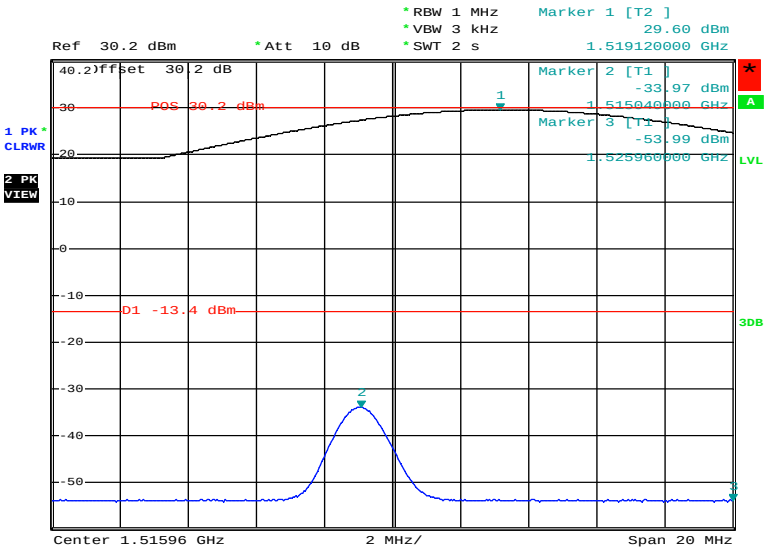


Date: 24.AUG.2017 12:24:51

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	3 - 8

Plot 11.11 – Conducted Spurious Emission, 757.5MHz, 200kHz BW, CW, 2nd Harmonic

Conducted Spurious Emissions

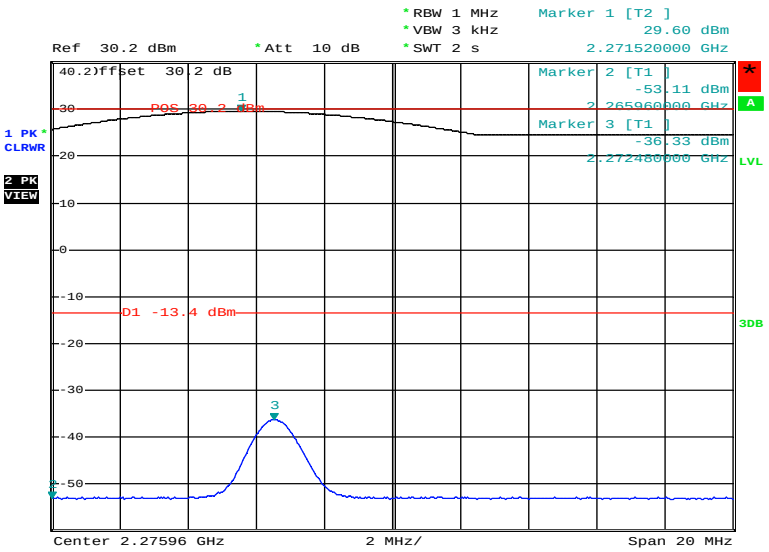


Date: 24.AUG.2017 12:22:06

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1519
Emission (dBm):	-33.97

Plot 11.12 – Conducted Spurious Emission, 757.5MHz, 200kHz BW, CW, 3rd Harmonic

Conducted Spurious Emissions

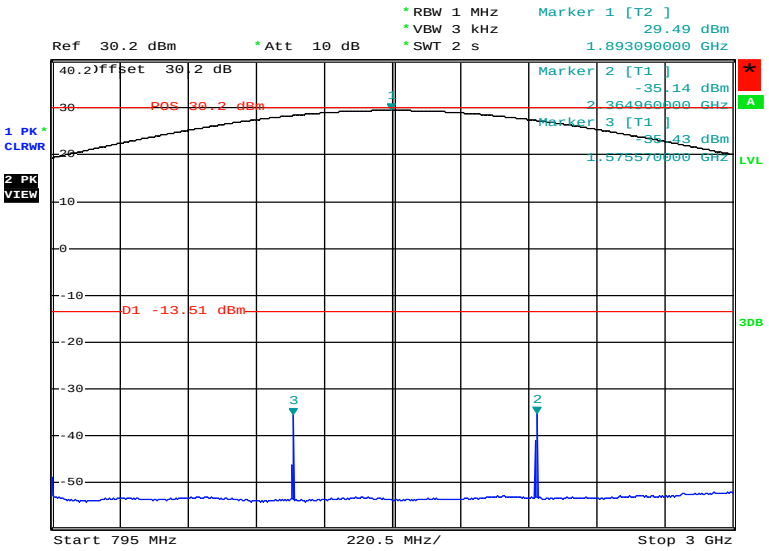


Date: 24.AUG.2017 12:23:36

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	2272
Emission (dBm):	-36.33

Plot 11.13 – Conducted Spurious Emission, 787.5MHz, 200kHz BW, CW, 795 to 3000MHz

Conducted Spurious Emissions

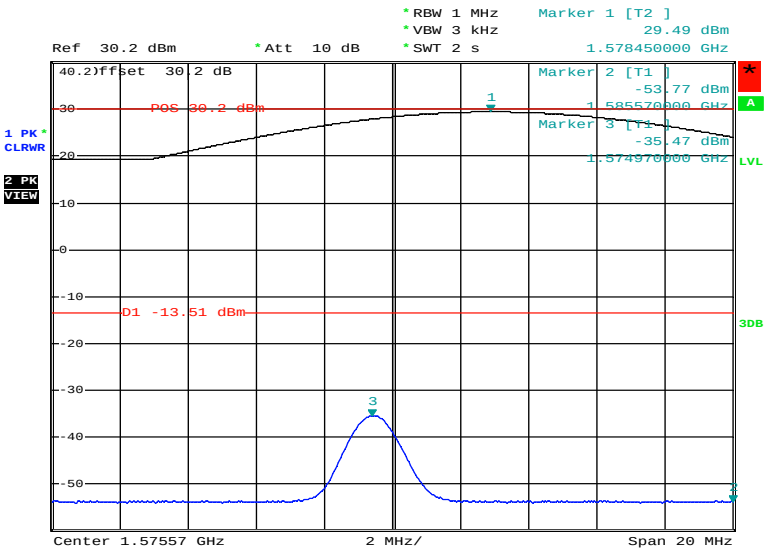


Date: 24.AUG.2017 12:12:20

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	795-3000

Plot 11.14 – Conducted Spurious Emission, 787.5MHz, 200kHz BW, CW, 3 to 8 GHz

Conducted Spurious Emissions

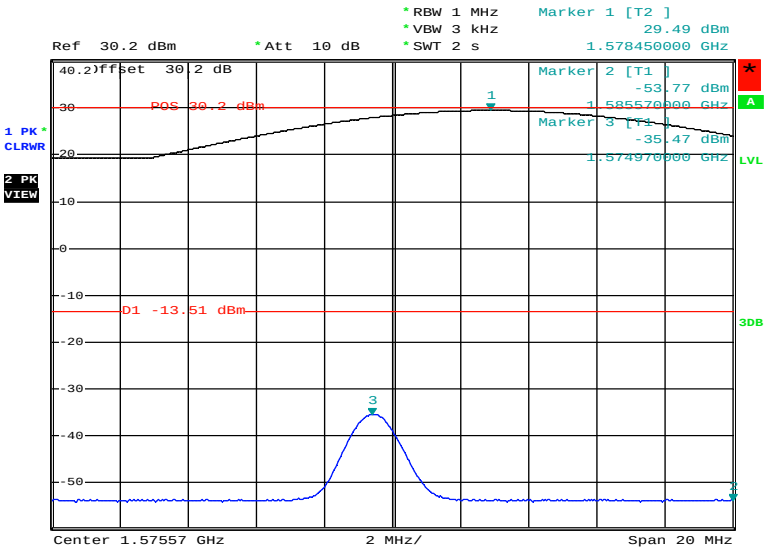


Date: 24.AUG.2017 12:13:09

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1579
Emission (dBm):	-35.47

Plot 11.15 – Conducted Spurious Emission, 787.5MHz, 200kHz BW, CW, 2nd Harmonic

Conducted Spurious Emissions

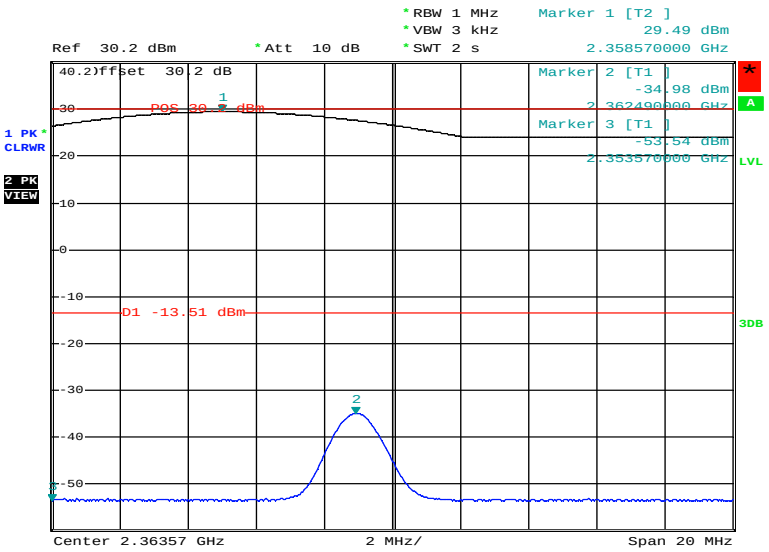


Date: 24.AUG.2017 12:13:09

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1579
Emission (dBm):	-35.47

Plot 11.16 – Conducted Spurious Emission, 787.5MHz, 200kHz BW, CW, 3rd Harmonic

Conducted Spurious Emissions

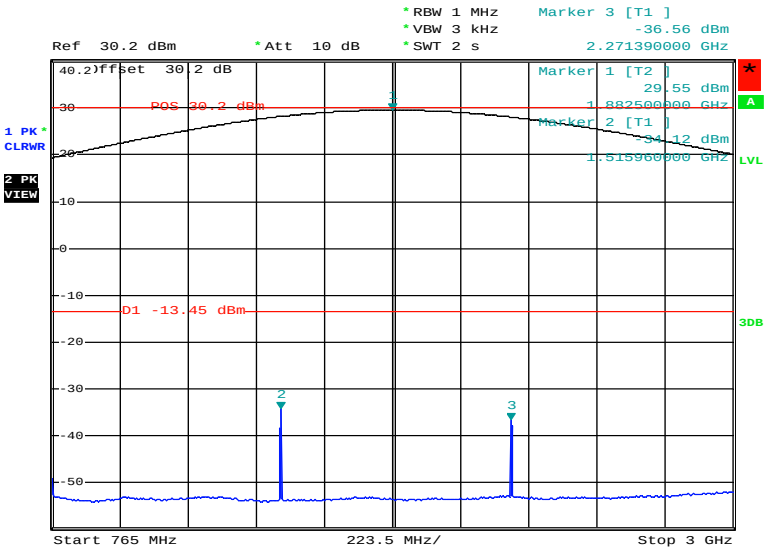


Date: 24.AUG.2017 12:14:18

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	200.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	2359
Emission (dBm):	-34.98

Plot 11.17 – Conducted Spurious Emission, 757.5MHz, 500kHz BW, CW, 765 to 3000MHz

Conducted Spurious Emissions

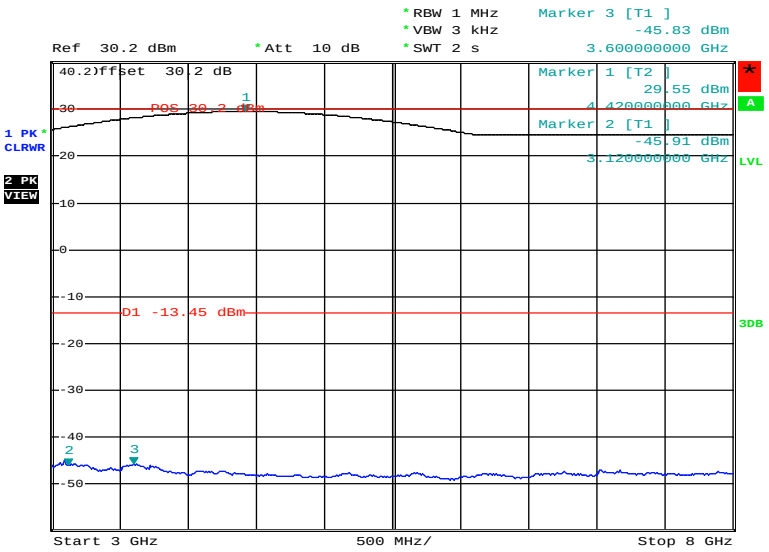


Date: 24.AUG.2017 12:47:29

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	765-3000

Plot 11.18 – Conducted Spurious Emission, 757.5MHz, 500kHz BW, CW, 3 to 8 GHz

Conducted Spurious Emissions

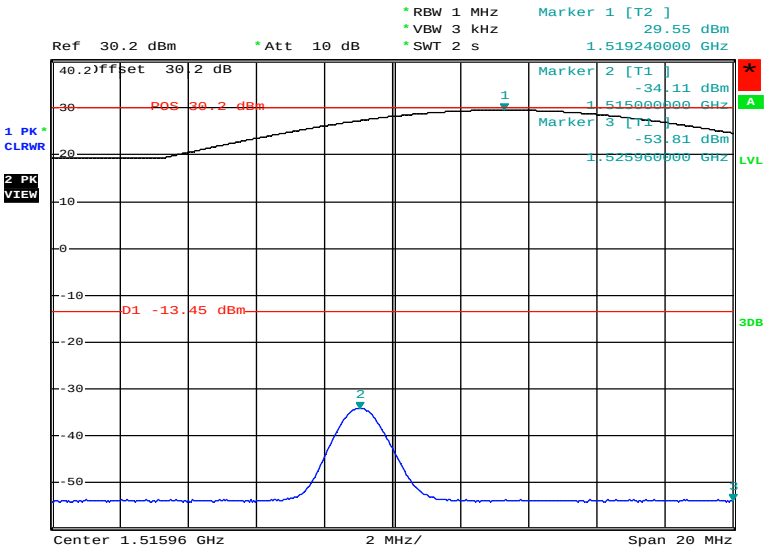


Date: 24.AUG.2017 12:50:08

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	3 - 8

Plot 11.19 – Conducted Spurious Emission, 757.5MHz, 500kHz BW, CW, 2nd Harmonic

Conducted Spurious Emissions

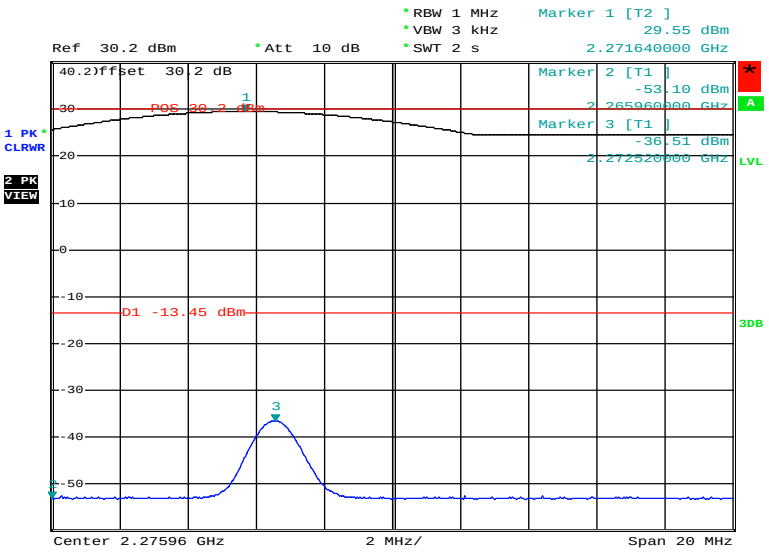


Date: 24.AUG.2017 12:48:11

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1519
Emission (dBm):	-34.11

Plot 11.20 – Conducted Spurious Emission, 757.5MHz, 500kHz BW, CW, 3rd Harmonic

Conducted Spurious Emissions

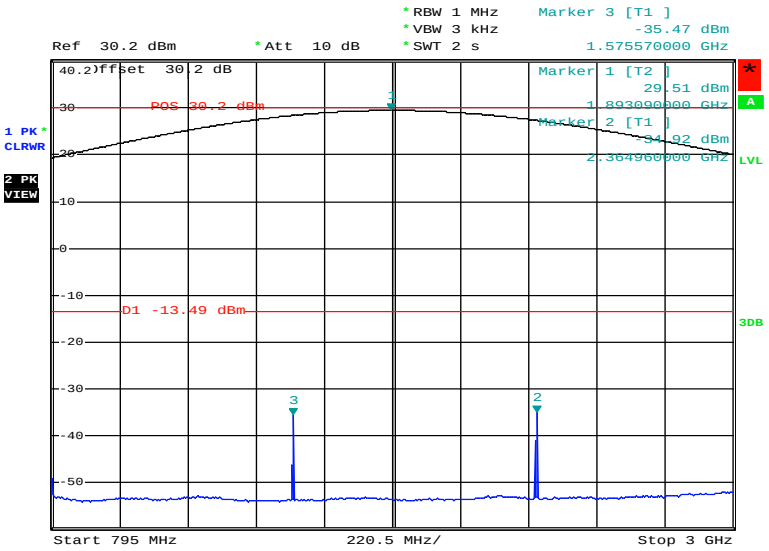


Date: 24.AUG.2017 12:49:12

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	2272
Emission (dBm):	-36.51

Plot 11.21 – Conducted Spurious Emission, 787.5MHz, 500kHz BW, CW, 795 to 3000MHz

Conducted Spurious Emissions

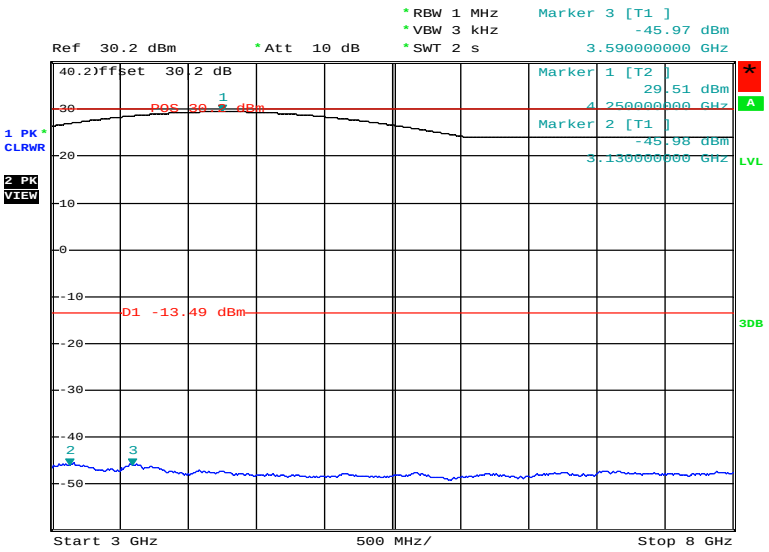


Date: 24.AUG.2017 12:55:25

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	795-3000

Plot 11.22 – Conducted Spurious Emission, 787.5MHz, 500kHz BW, CW, 3 to 8 GHz

Conducted Spurious Emissions

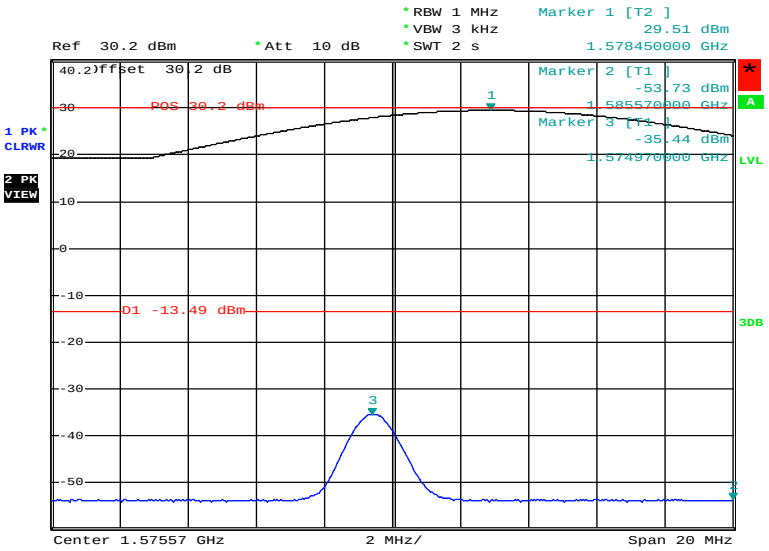


Date: 24.AUG.2017 12:57:46

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	3 - 8

Plot 11.23 – Conducted Spurious Emission, 787.5MHz, 500kHz BW, CW, 2nd Harmonic

Conducted Spurious Emissions

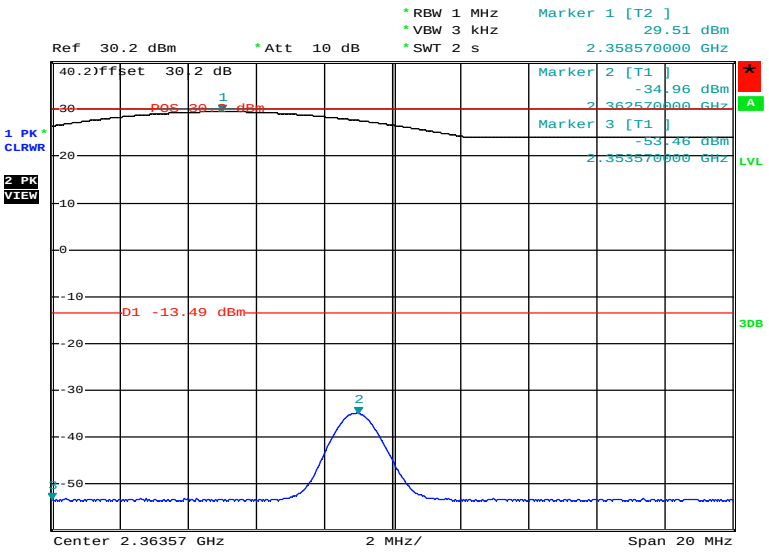


Date: 24.AUG.2017 12:56:08

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	1579
Emission (dBm):	-35.44

Plot 11.24 – Conducted Spurious Emission, 787.5MHz, 500kHz BW, CW, 3rd Harmonic

Conducted Spurious Emissions



Date: 24.AUG.2017 12:56:59

Channel Frequency (MHz):	787.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Frequency of Emission (MHz):	2359
Emission (dBm):	-34.96

Table 11.1 – Summary of Conducted Spurious Emission Measurements

§27.53(c) Emission Limits - Spurious Emissions to 10th Harmonic									
Channel Frequency (MHz)	Frequency of Emission (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting (dBm)	Channel Power @ 100kHz RBW [P_{chan}] (dBm)	Spurious Emission [P_{Spur}] (dBc)	Attenuation [A] (dB)	Limit (dBm)	Margin (dB)
757.5	1519	100	CW	31	29.60	-34.03	63.63	43.00	20.63
	2272				29.60	-36.37	65.97		22.97
787.5	1579				29.46	-35.46	64.92		21.92
	2359				29.46	-34.97	64.43		21.43
757.5	1519	200	CW	31	29.60	-33.97	63.57	43.00	20.57
	2272				29.60	-36.33	65.93		22.93
787.5	1579				29.49	-35.47	64.96		21.96
	2359				29.49	-34.98	64.47		21.47
757.5	1519	500	CW	31	29.55	-34.11	63.66	43.00	20.66
	2272				29.55	-36.51	66.06		23.06
787.5	1579				29.51	-35.44	64.95		21.95
	2359				29.51	-34.96	64.47		21.47

Limit = 43 + 10Log(P)

Attenuation [A] = [P_{chan}] - [P_{Spur}]

Margin = Attenuation [A] - Limit

Result: Complies

12.0 RADIATED SPURIOUS EMISSIONS

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1046, §27.53(c), KDB 971168 D01v02r02**

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee'sfrequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (2) On any frequency outside the 779-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

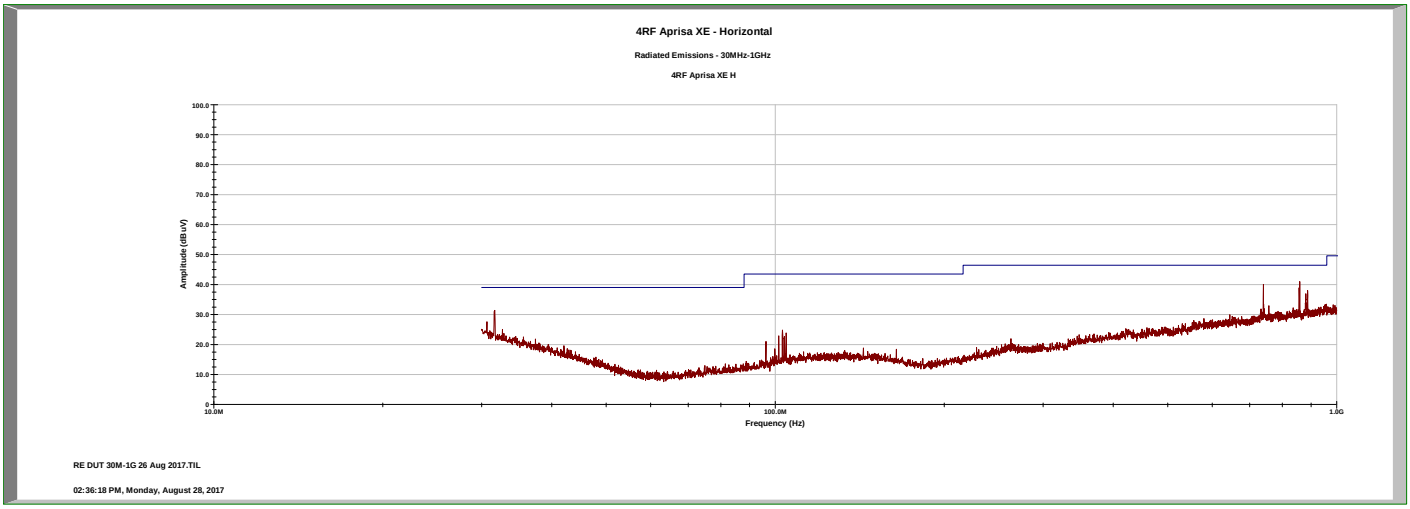
Test Setup	Appendix A Figure A.2

Measurement Procedure

The DUT and measurement equipment were setup in accordance with Figure A.2 in appendix A. Additionally "dummy" cabling was attached to the DUT. Two scan ranges were made, one from 30MHz to 1GHz and the other from 1GHz to 8GHz. The carrier emissions were suppressed from the 30MHz to 1GHz scans. The scans were made with the antennas in the horizontal and vertical polarizations and from 1 to 4m elevation. The DUT was rotated 360 degrees.

Plot 12.1 – Radiated Spurious Emissions, 30MHz to 1000MHz, Horizontal

Radiated Spurious Emissions

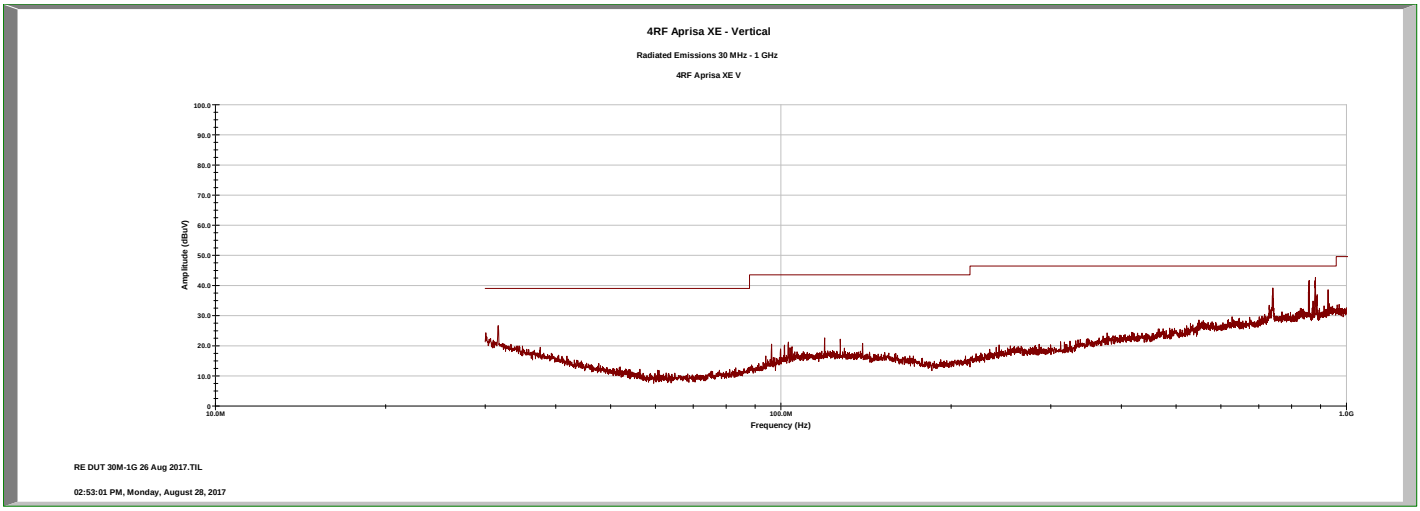


Antenna Polarization: Horizontal
Fundemental Emission Suppressed
Emissions Show are Ambient

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	30-1000

Plot 12.2 – Radiated Spurious Emissions, 30MHz to 1000MHz, Vertical

Radiated Spurious Emissions

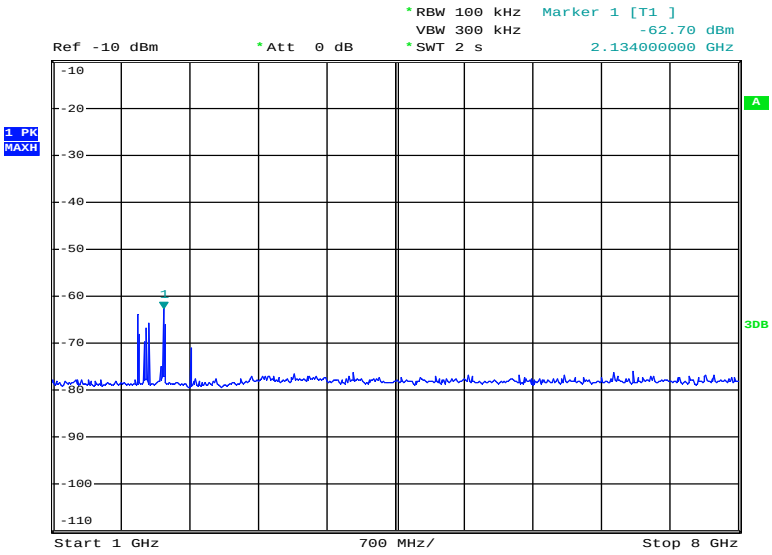


Antenna Polarization: Vertical
Fundemental Emission Suppressed
Emissions Show are Ambient

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	30-1000

Plot 12.3 – Radiated Spurious Emissions, 1 to 8 GHz, Horizontal

Radiated Spurious Emissions



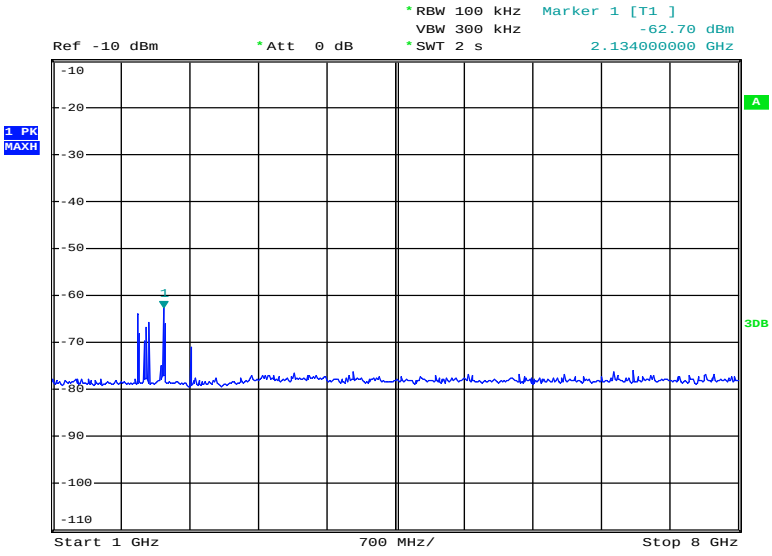
Date: 28.AUG.2017 16:10:19

Horizontal - Emissions Shown are Ambient

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	1 - 8

Plot 12.4 – Radiated Spurious Emissions, 1 to 8 GHz, Vertical

Radiated Spurious Emissions



Date: 28.AUG.2017 16:10:19

Vertical - Emissions Shown are Ambient

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	100.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (GHz):	1 - 8

Table 12.1 – Summary of Radiated Spurious Emission Measurements

Radiated Emissions

Freq (MHz)	DUT Freq (MHz)	DUT Modulation	Transmit* Antenna Polarization	Receive Antenna Polarization	Measured Emission** [E_{Meas}] (dBm)	Measured Distance [D] (m)	Receive Antenna Factor [AF] (dB)	Cable Loss [L_C] (dB)	Transmit Antenna Gain [G_T] (dBi)	EIRP (dBW/MHz)	Limit (dBW/MHz)	Margin (dB)
-	787.5	CW	Vertical	Vertical*	-	3.0	-	-	-	-	13.00	13.00
			Horizontal	Horizontal*	-	3.0	-	-	-	-	13.00	13.00

** Essentially no Emission Detected (Noise Floor)

$EIRP(dBM) = E_{Meas} + L_C + AF - G_T$

$EIRP(dBW) = EIRP(dBm) - 30$

Result: Complies

13.0 EMISSIONS IN THE 1559 – 1610 MHZ BAND

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1046, §27.53(f), KDB 971168 D01v02r02**

Limits	
47 CFR §27.53(f)	**§ 27.53 Emission limits** (f) For operations in the 746–763 MHz, 775–793 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

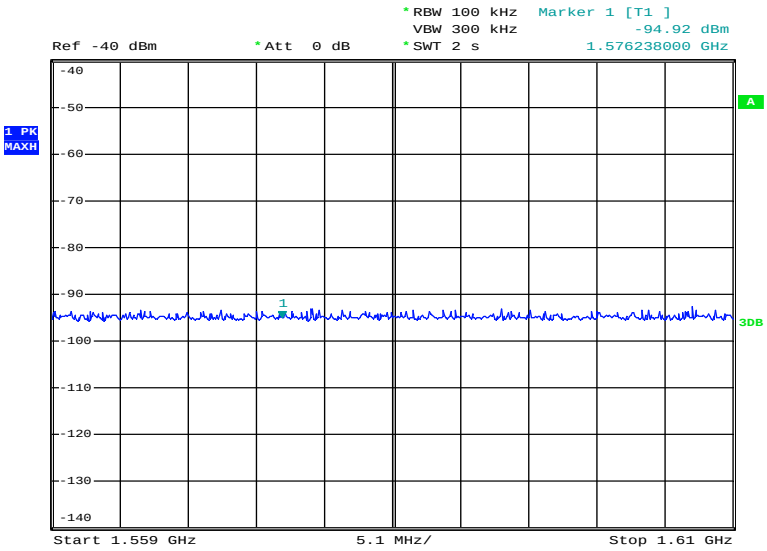
Test Setup	Appendix A Figure A.3

Measurement Procedure

The DUT and measurement equipment were setup in accordance with Figure A.3 in appendix A with the ZDAFP750 antenna. Additional "dummy" cabling was attached to the DUT. The scans were made with the antenna in the horizontal and vertical polarizations and from 1 to 4m elevation. The DUT was rotated 360 degrees.

Plot 13.1 – Emission in the 1559 – 1610 MHz Band - Vertical

Radiated Emissions

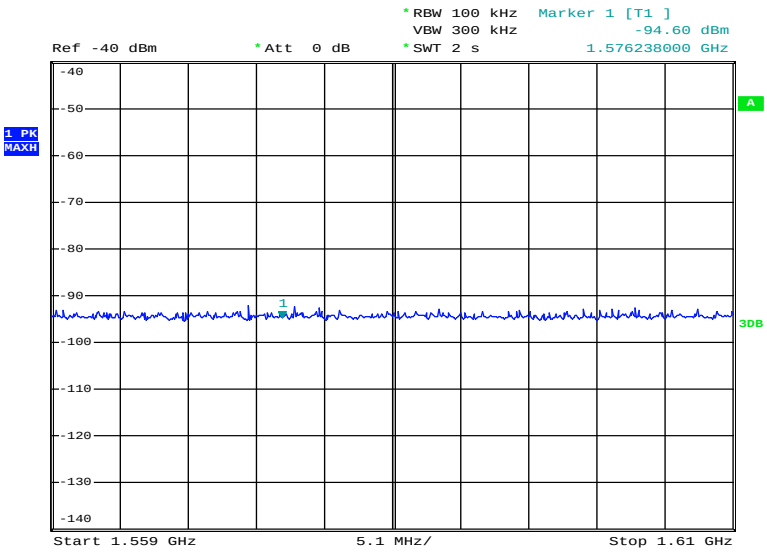


Date: 28.AUG.2017 16:29:50

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	1559-1610
Polarization:	Vertical
Emission (dBm):	-94.92

Plot 13.2 – Emission in the 1559 – 1610 MHz Band - Horizontal

Radiated Emissions



Date: 28.AUG.2017 16:25:13

Channel Frequency (MHz):	757.500
Channel Bandwidth Setting (kHz):	500.00
Modulation:	CW
Power Setting (dBm):	31
Scan Range (MHz):	1559-1610
Polarization:	Horizonatal
Emission (dBm):	-94.60

Table 13.1 – Summary of §27.53(f) Measurement

§27.53(f) Emissions within 1559 to 1610MHz Band												
Freq (MHz)	DUT Freq (MHz)	DUT Modulation	Transmit* Antenna Polarization	Receive Antenna Polarization	Measured Emission** [E_{Meas}] (dBm)	Measured Distance [D] (m)	Receive Antenna Factor [AF] (dB)	Cable Loss [L_C] (dB)	Transmit Antenna Gain [G_T] (dBi)	EIRP (dBW/MHz)	Limit (dBW/MHz)	Margin (dB)
1576	787.5	CW	Vertical	Vertical*	-94.9	3.0	25.5	4.1	10.0	-105.32	-70.00	35.32
			Horizontal	Horizontal*	-94.6	3.0	25.5	4.1	10.0	-105.00	-70.00	35.00

Transmit Antenna = ZDAFP750-10-60D

** Essentially no Emission Detected (Noise Floor)

$EIRP(dBM) = E_{Meas} + L_C + AF - G_T$

$EIRP(dBW) = EIRP(dBm) - 30$

Result: Complies

14.0 FREQUENCY STABILITY

********* NOTE ********

See Appendix D for Frequency Stability –vs- Temperature Plots

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1046, §27.54, §2.1055**

Limits	
47 CFR §27.54	**§ 27.54 Frequency stability** The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.
47 CFR §2.1055	**§ 2.1055 Measurements required: Frequency stability** (a) The frequency stability shall be measured with variation of ambient temperature as follows: (1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section. (d) The frequency stability shall be measured with variation of primary supply voltage as follows: (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

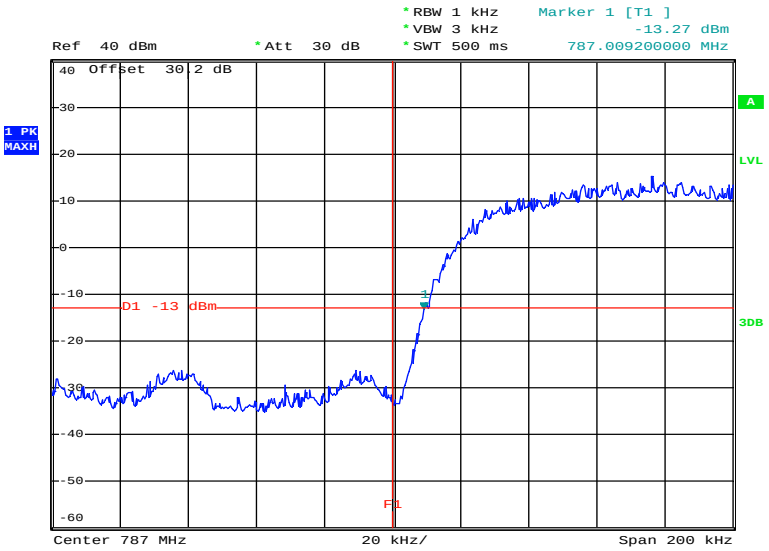
Test Setup	Appendix A Figure A.4

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type. All modulations (QPSK, 16 QAM, 32 QAM and 64 QAM) and one channel bandwidth from each transciever module. The DUT frequency was set to manufacturer's upper and lower band frequency settings. A limit line (D1) was set to -13dBm and two frequency lines (F1 and F2) were set to the upper and lower band edge frequencies. Marker 1 was set to the intersection of the emission and the D1 limit line and the frequency was recorded. This procedure was carried out throughout the entire temperature range.

Plot 14.1 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, QPSK, 115% Nominal Voltage

Frequency Stability vs Voltage

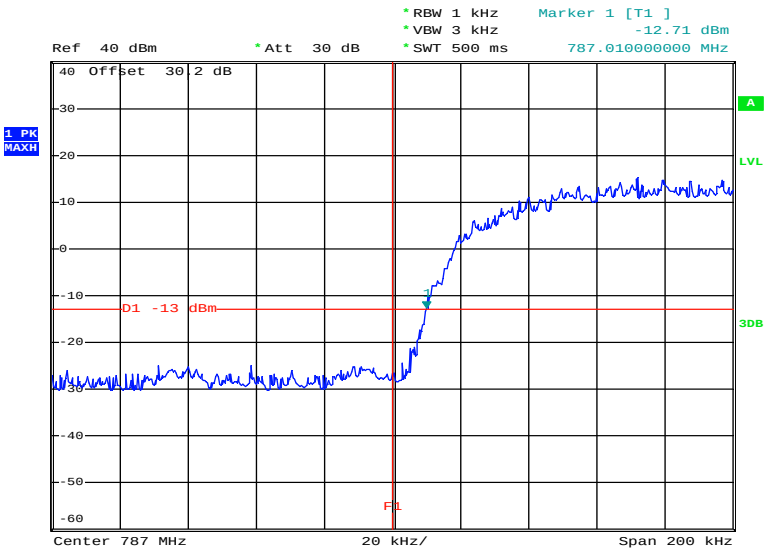


Date: 5.SEP.2017 15:32:25

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0092

Plot 14.2 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, 16 QAM, 115% Nominal Voltage

Frequency Stability

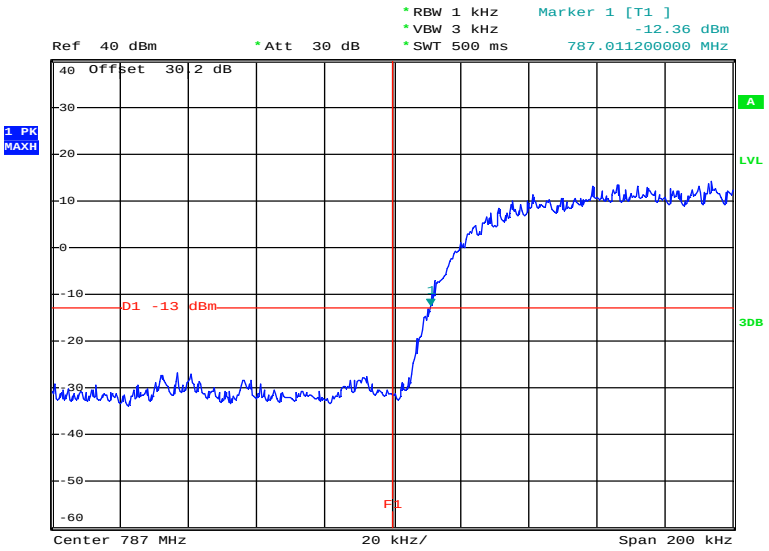


Date: 5.SEP.2017 15:33:43

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0100

Plot 14.3 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, 32 QAM, 115% Nominal Voltage

Frequency Stability

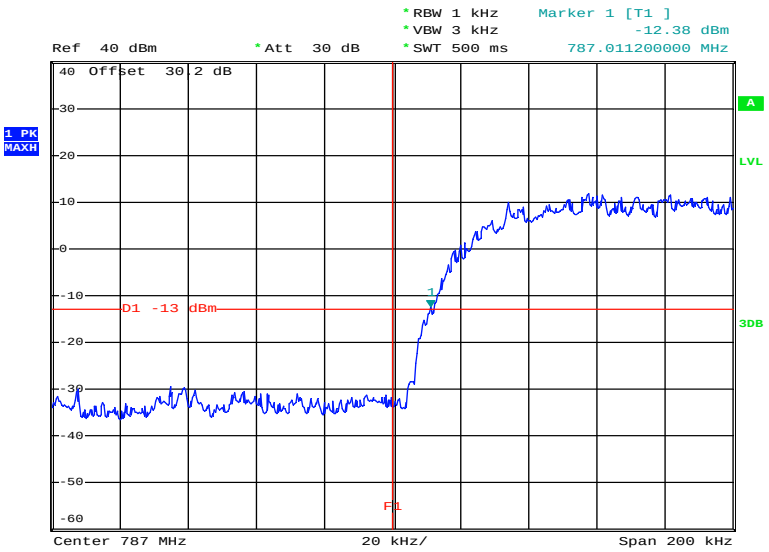


Date: 5.SEP.2017 15:34:45

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.0112

Plot 14.4 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, 64 QAM, 115% Nominal Voltage

Frequency Stability

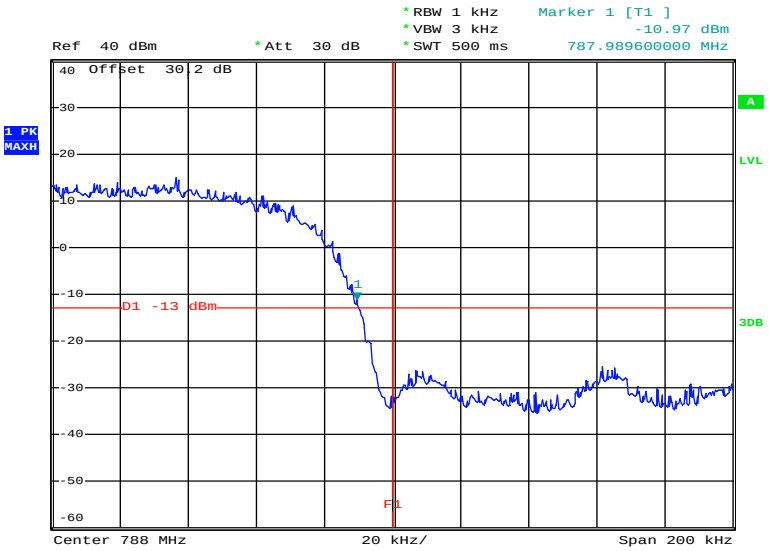


Date: 5.SEP.2017 15:35:43

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.0112

Plot 14.5 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, QPSK, 115% Nominal Voltage

Frequency Stability

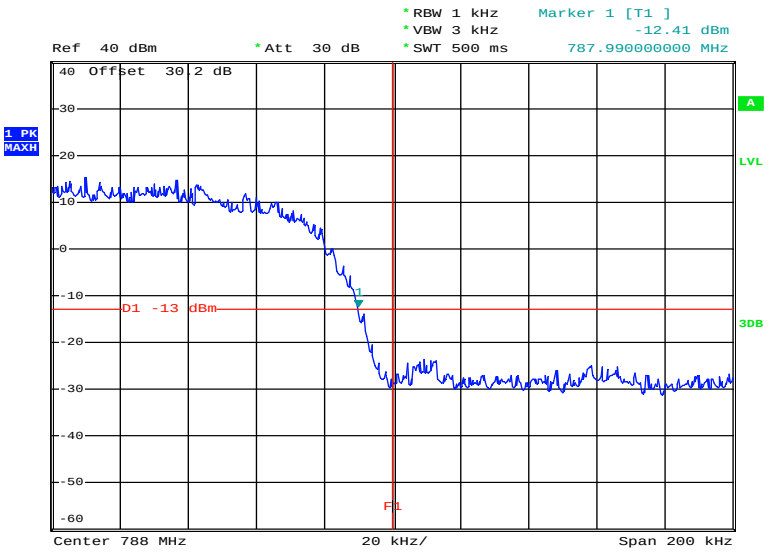


Date: 5.SEP.2017 15:37:40

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9896

Plot 14.6 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, 16 QAM, 115% Nominal Voltage

Frequency Stability

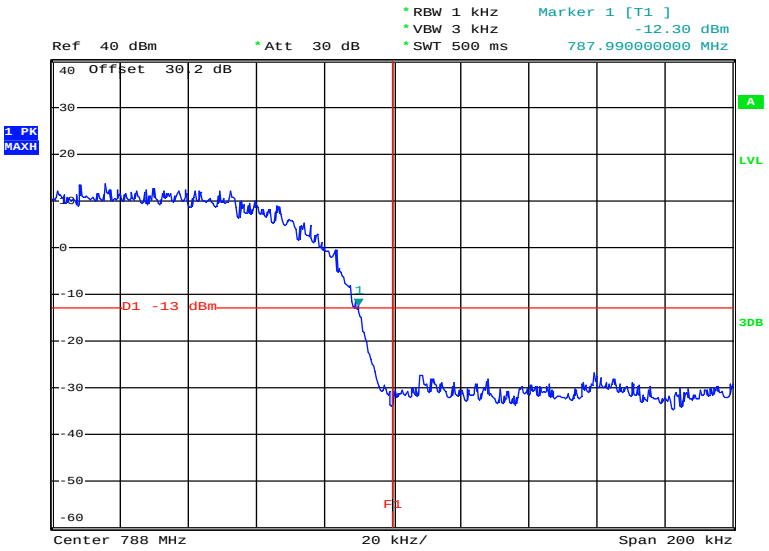


Date: 5.SEP.2017 15:38:37

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9900

Plot 14.7 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, 32 QAM, 115% Nominal Voltage

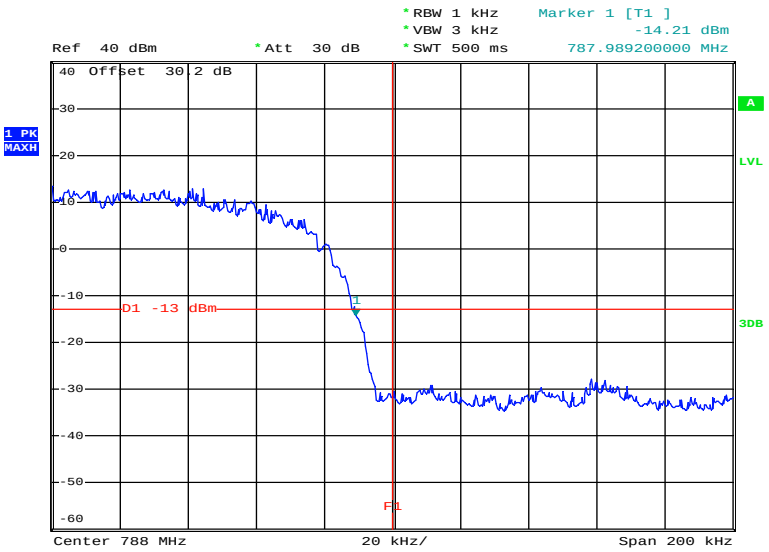
Frequency Stability



Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.9900

Plot 14.8 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, 64 QAM, 115% Nominal Voltage

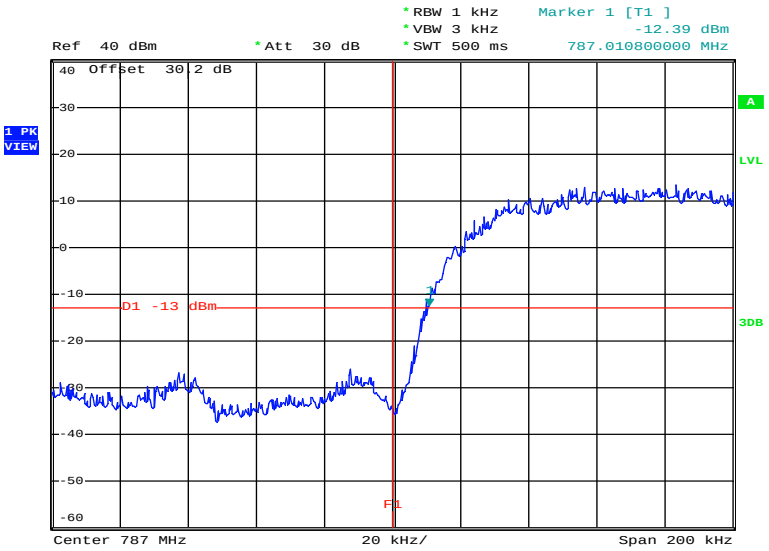
Frequency Stability



Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.9892

Plot 14.9 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, QPSK, 85% Nominal Voltage

Frequency Stability vs Voltage

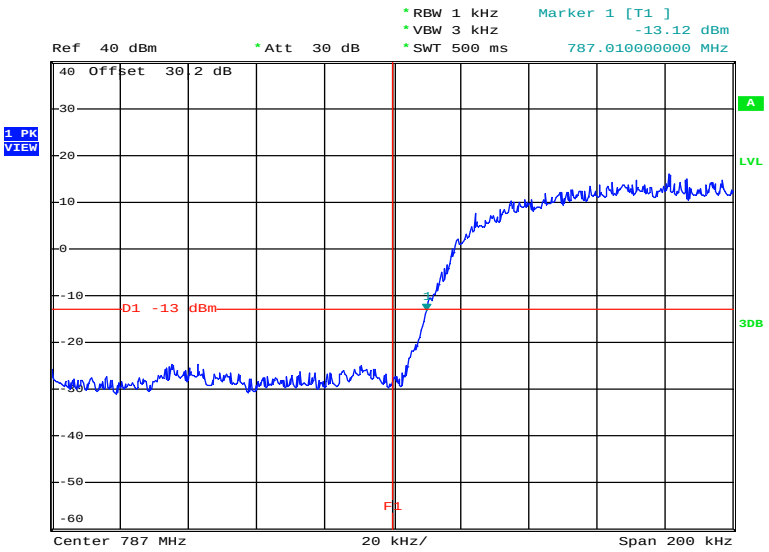


Date: 5.SEP.2017 15:48:27

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0108

Plot 14.10 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, 16 QAM, 85% Nominal Voltage

Frequency Stability

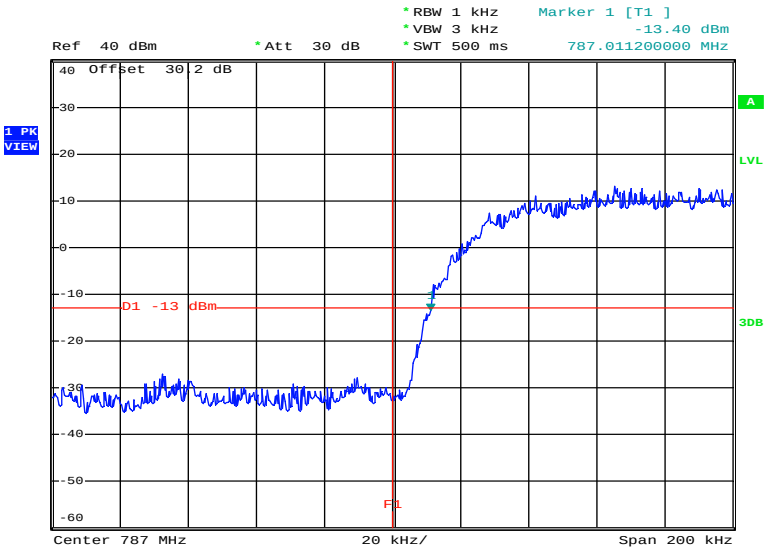


Date: 5.SEP.2017 15:49:49

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0100

Plot 14.11 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, 32 QAM, 85% Nominal Voltage

Frequency Stability

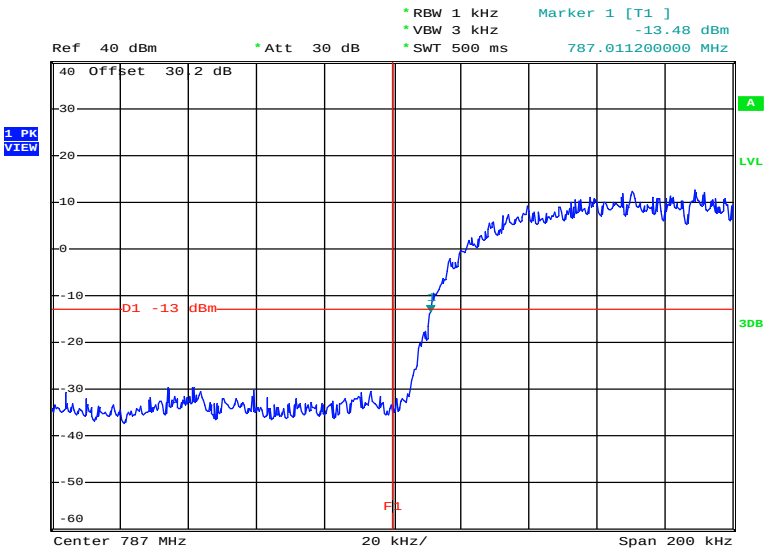


Date: 5.SEP.2017 15:50:55

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.0112

Plot 14.12 – Frequency Stability vs Voltage 787.25MHz, 500kHz BW, 64 QAM, 85% Nominal Voltage

Frequency Stability

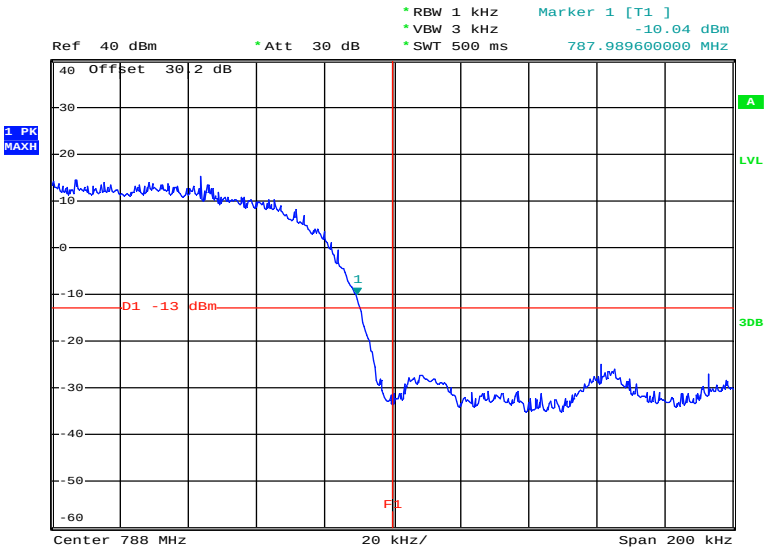


Date: 5.SEP.2017 15:51:53

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.250
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.0112

Plot 14.13 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, QPSK, 85% Nominal Voltage

Frequency Stability

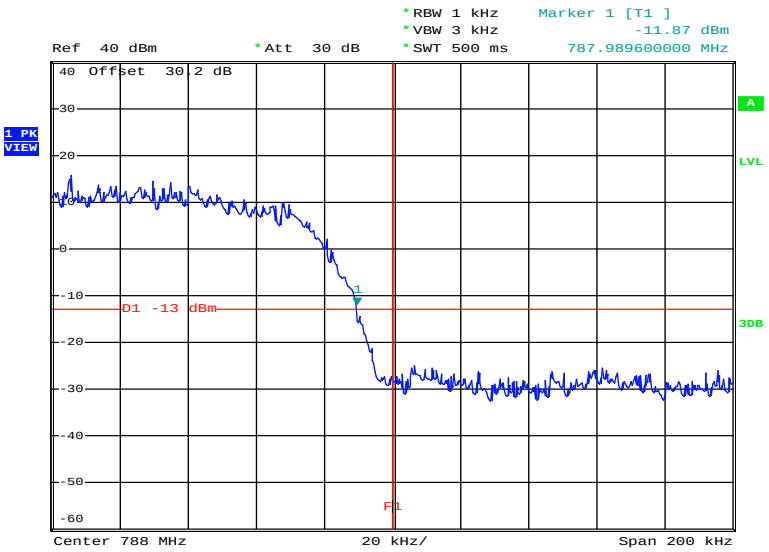


Date: 5.SEP.2017 15:54:20

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9896

Plot 14.14 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, 16 QAM, 85% Nominal Voltage

Frequency Stability

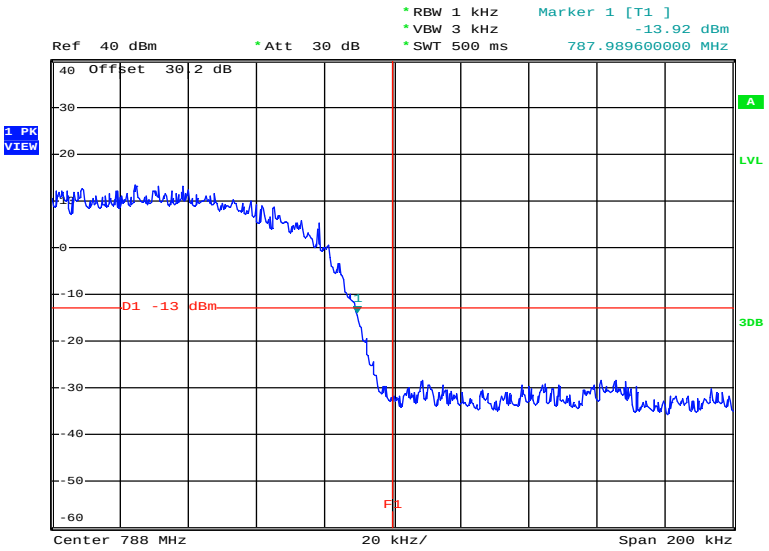


Date: 5.SEP.2017 15:55:21

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9896

Plot 14.15 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, 32 QAM, 85% Nominal Voltage

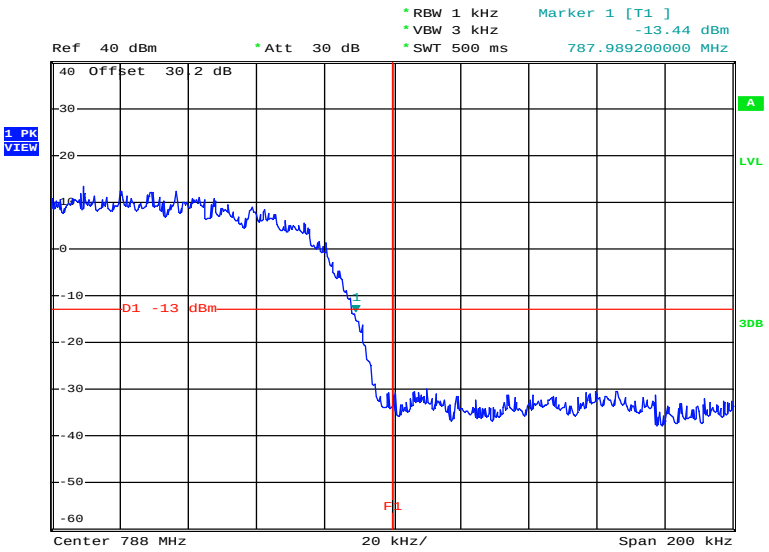
Frequency Stability



Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.9896

Plot 14.16 – Frequency Stability vs Voltage 787.75MHz, 500kHz BW, 64 QAM, 85% Nominal Voltage

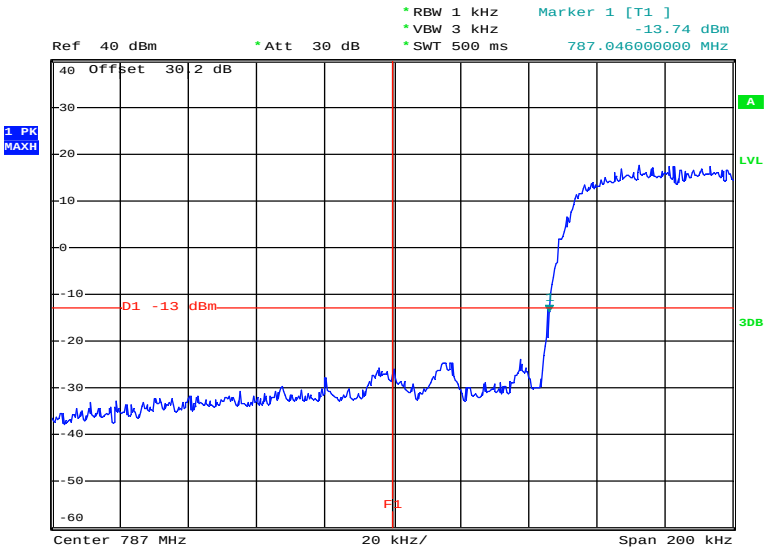
Frequency Stability



Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.750
Channel Bandwidth (kHz):	500.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.9892

Plot 14.17 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, QPSK, 115% Nominal Voltage

Frequency Stability vs Voltage

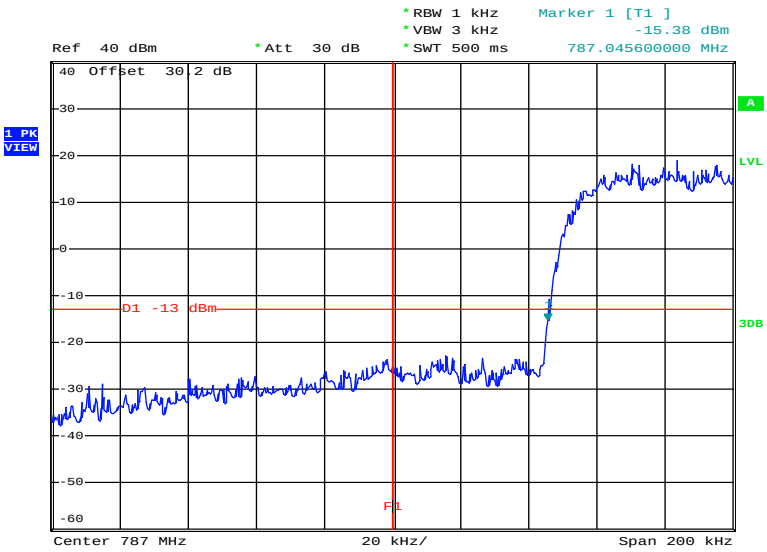


Date: 5.SEP.2017 16:16:23

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0460

Plot 14.18 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, 16 QAM, 115% Nominal Voltage

Frequency Stability

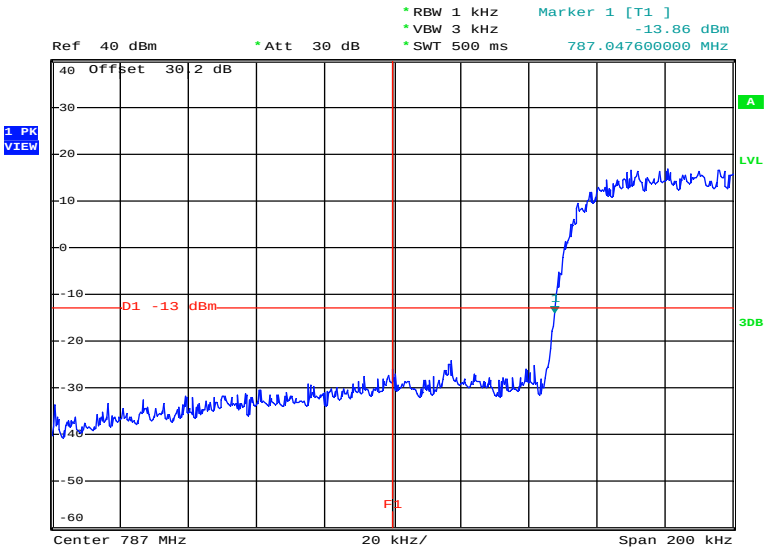


Date: 5.SEP.2017 16:17:18

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0456

Plot 14.19 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, 32 QAM, 115% Nominal Voltage

Frequency Stability

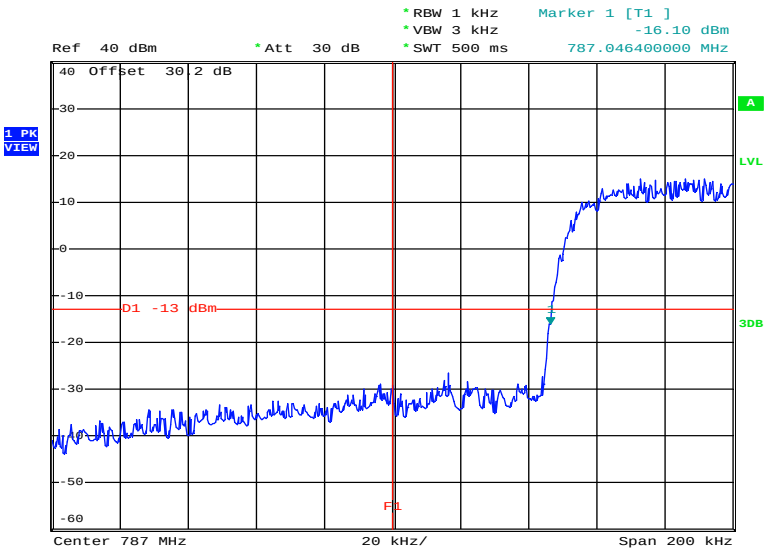


Date: 5.SEP.2017 16:18:18

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.0476

Plot 14.20 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, 64 QAM, 115% Nominal Voltage

Frequency Stability

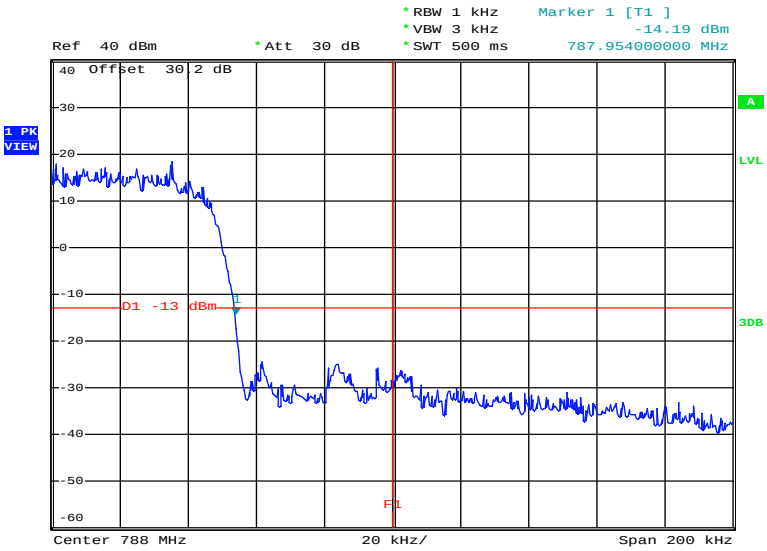


Date: 5.SEP.2017 16:19:17

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.0464

Plot 14.21 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, QPSK, 115% Nominal Voltage

Frequency Stability

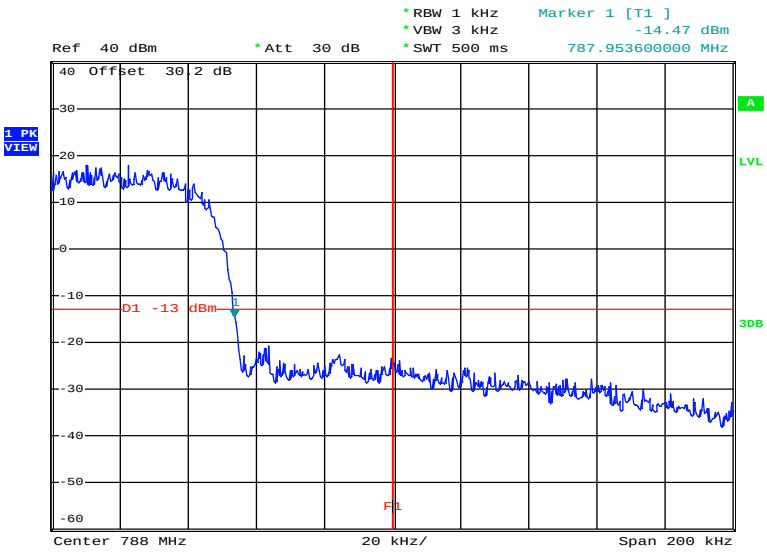


Date: 5.SEP.2017 16:20:45

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9540

Plot 14.22 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, 16 QAM, 115% Nominal Voltage

Frequency Stability

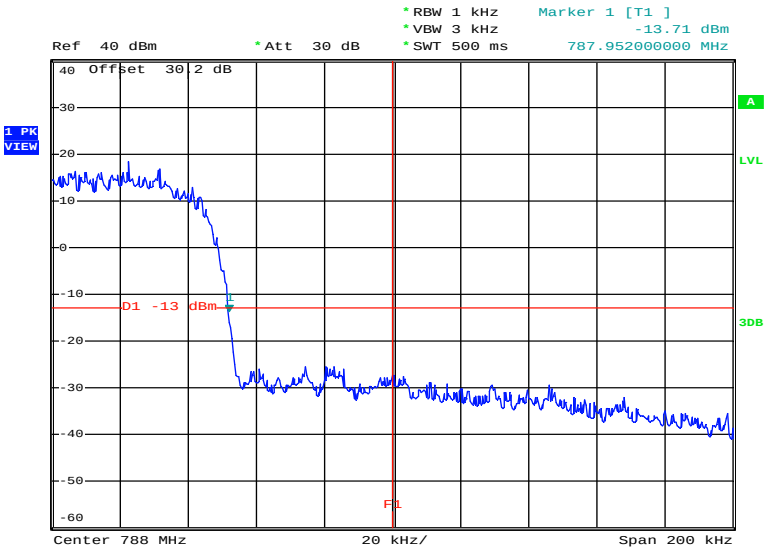


Date: 5.SEP.2017 16:21:43

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9536

Plot 14.23 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, 32 QAM, 115% Nominal Voltage

Frequency Stability

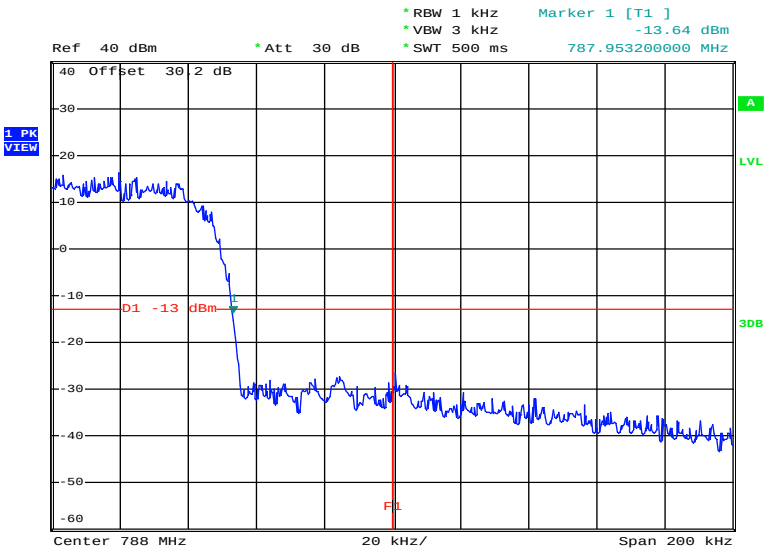


Date: 5.SEP.2017 16:22:36

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.9520

Plot 14.24 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, 64 QAM, 115% Nominal Voltage

Frequency Stability

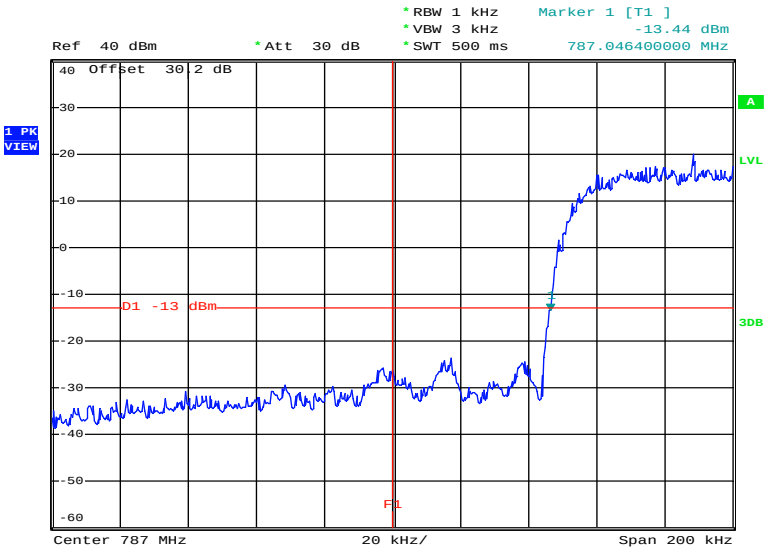


Date: 5.SEP.2017 16:23:34

Nominal Input Voltage (VAC):	115
115% Input Voltage (VAC):	132.3
Temperature (°C):	25.0
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.9532

Plot 14.25 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, QPSK, 85% Nominal Voltage

Frequency Stability vs Voltage

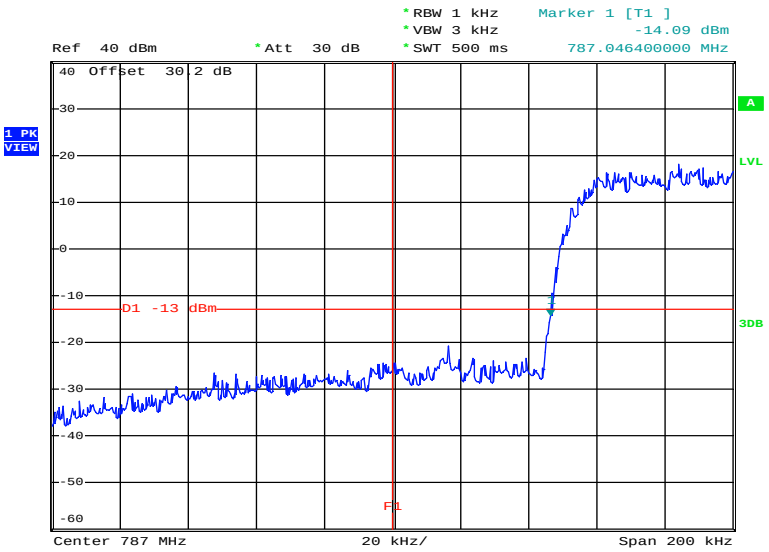


Date: 5.SEP.2017 16:05:58

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0464

Plot 14.26 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, 16 QAM, 85% Nominal Voltage

Frequency Stability

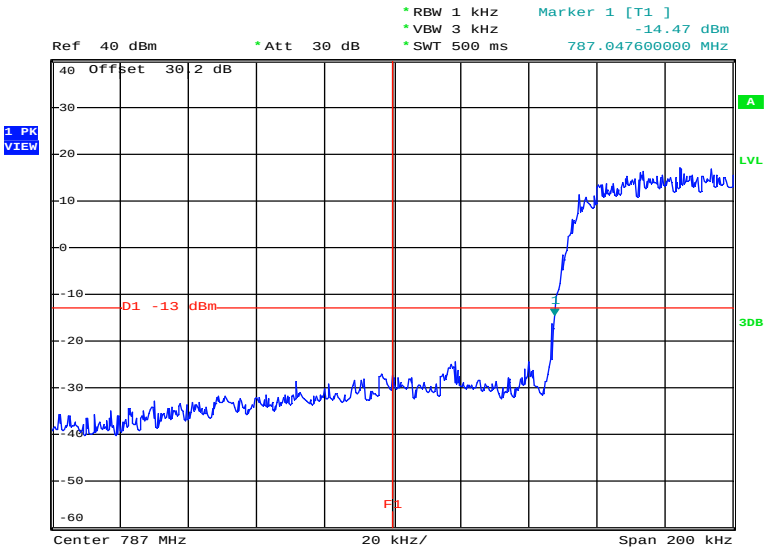


Date: 5.SEP.2017 16:06:59

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.0464

Plot 14.27 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, 32 QAM, 85% Nominal Voltage

Frequency Stability

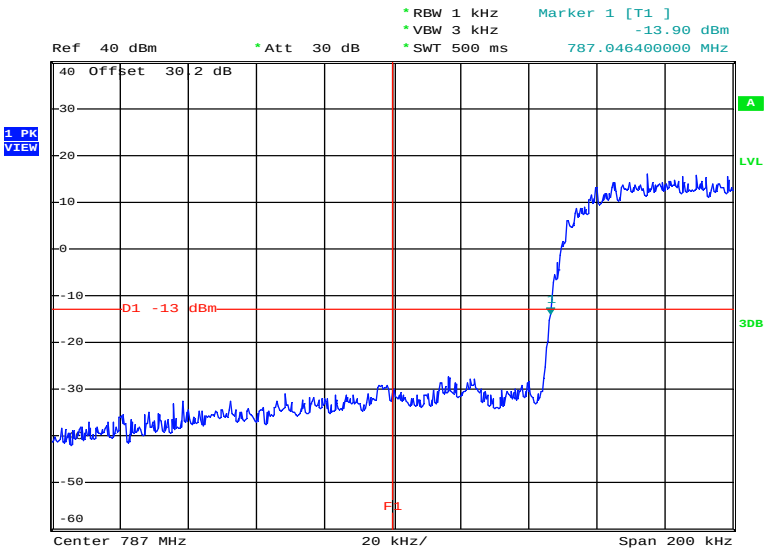


Date: 5.SEP.2017 16:07:58

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.0476

Plot 14.28 – Frequency Stability vs Voltage 787.15MHz, 200kHz BW, 64 QAM, 85% Nominal Voltage

Frequency Stability

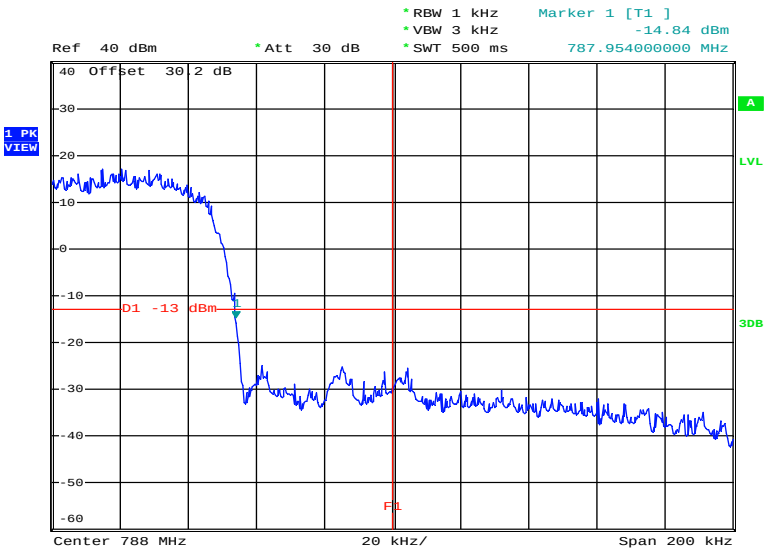


Date: 5.SEP.2017 16:09:03

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.150
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.0464

Plot 14.29 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, QPSK, 85% Nominal Voltage

Frequency Stability

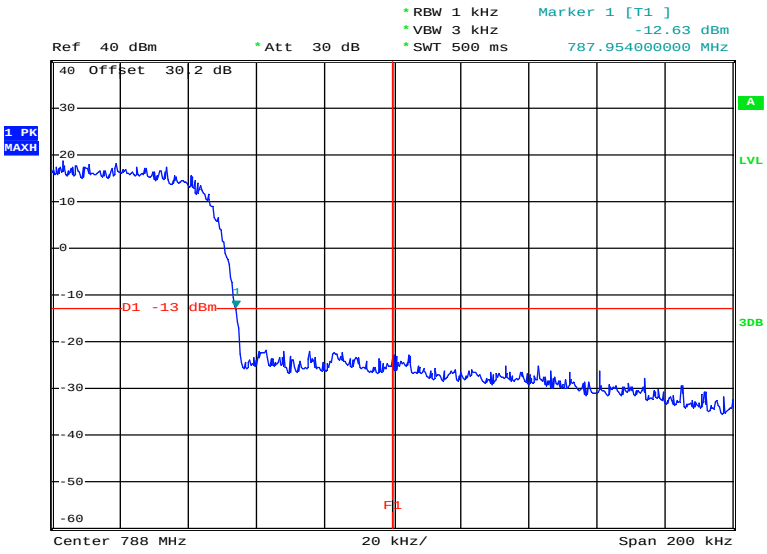


Date: 5.SEP.2017 16:11:02

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	QPSK
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9540

Plot 14.30 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, 16 QAM, 85% Nominal Voltage

Frequency Stability

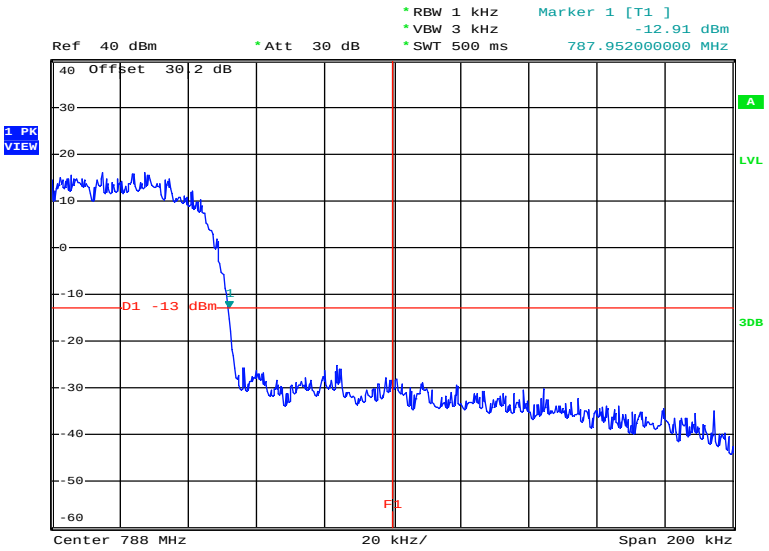


Date: 5.SEP.2017 16:12:17

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	16 QAM
Power Setting (dBm):	31
Freq @ -13dB Reference (MHz):	787.9540

Plot 14.31 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, 32 QAM, 85% Nominal Voltage

Frequency Stability

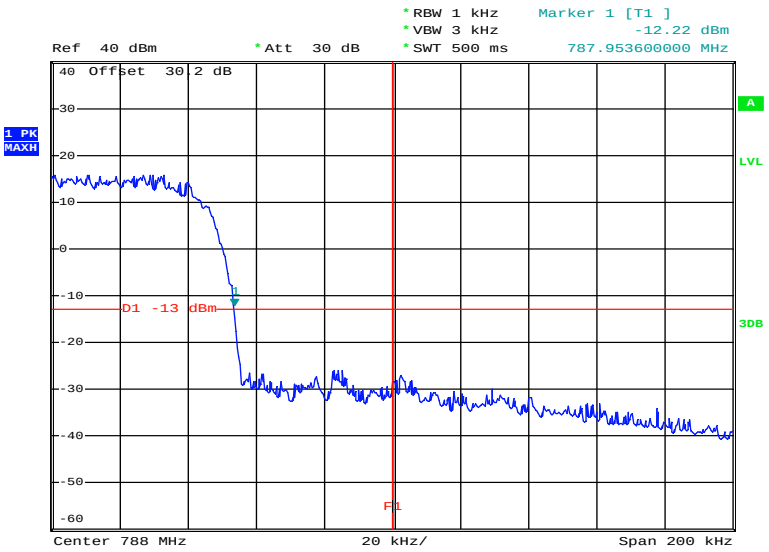


Date: 5.SEP.2017 16:13:17

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	25
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	32 QAM
Power Setting (dBm):	30
Freq @ -13dB Reference (MHz):	787.9520

Plot 14.32 – Frequency Stability vs Voltage 787.85MHz, 200kHz BW, 64 QAM, 85% Nominal Voltage

Frequency Stability



Date: 5.SEP.2017 16:14:29

Nominal Input Voltage (VAC):	115
85% Input Voltage (VAC):	97.8
Temperature (°C):	132.3
Channel Frequency (MHz):	787.850
Channel Bandwidth (kHz):	200.00
Modulation:	64 QAM
Power Setting (dBm):	29
Freq @ -13dB Reference (MHz):	787.9536

Table 14.1 – Frequency Stability –vs- Temperature, 500kHz BW

§27.54 Frequency Stability vs Temperature								
Temperature	500kHz Channel Bandwidth							
	Measured Frequency @ -13dBm Reference (MHz)							
	Lower Band Edge				Upper Band Edge			
(°C)	Assigned Frequency (MHz):			787.250	Assigned Frequency (MHz):			787.750
Modulation >>	QPSK	16 QAM	32 QAM	64 QAM	QPSK	16 QAM	32 QAM	64 QAM
-30	787.0100	787.0092	787.0104	787.0104	787.9884	787.9896	787.9892	787.9888
-20	787.0100	787.0104	787.0116	787.0116	787.9892	787.9900	787.9888	787.9880
-10	787.0104	787.0100	787.0112	787.0112	787.9900	787.9900	787.9892	787.9888
0	787.0100	787.0100	787.0108	787.0116	787.9888	787.9896	787.9884	787.9884
10	787.0100	787.0104	787.0104	787.0112	787.9892	787.9896	787.9896	787.9884
20	787.0108	787.0104	787.0116	787.0116	787.9888	787.9896	787.9888	787.9884
30	787.0108	787.0100	787.0120	787.0112	787.9896	787.9896	787.9896	787.9880
40	787.0100	787.0104	787.0108	787.0116	787.9900	787.9900	787.9888	787.9872
30	787.0108	787.0108	787.0108	787.0120	787.9896	787.9888	787.9892	787.9880
f_{max}	787.0108	787.0108	787.0120	787.0120	787.9900	787.9900	787.9896	787.9888
f_{min}	787.0100	787.0092	787.0104	787.0104	787.9884	787.9888	787.9884	787.9872
f_{avg}	787.01031	787.01018	787.01107	787.01138	787.98929	787.98964	787.98907	787.98822
f_{maxdev} (MHz)	489	978	933	978	889	844	667	1022
f_{Limit} (MHz)	10311	10178	11067	11378	10711	10356	10933	11778
Margin (MHz)	9822	9200	10133	10400	9822	9511	10267	10756

Reference = 43 + 10Log(P) = -13dBm

f_{max} = Maximum Measured Frequency in the Modulation Group.

f_{min} = Minimum Measured Frequency in the Modulation Group.

f_{avg} = Average of the Measured Frequency in each Modulation Group

f_{maxdev} = Absolute Value of Maximum Frequency Deviation from Average (Tolerance)

$f_{maxdev} = f_{max} - f_{avg}$ or $f_{avg} - f_{min}$

f_{Limit} = Maximum Displacement of the Average Frequency to the Band Edge

$f_{Limit} = f_{avg}$ - 787.0MHz or 788.0MHz - f_{avg}

Margin = $f_{Limit} - f_{maxdev}$

Result: Complies

Table 14.2 – Frequency Stability –vs- Temperature, 200kHz BW

§27.54 Frequency Stability vs Temperature								
Temperature	200kHz Channel Bandwidth							
	Measured Frequency @ -13dBm Reference (MHz)							
	Lower Band Edge				Upper Band Edge			
(^{O}C)	Assigned Frequency (MHz):			787.150	Assigned Frequency (MHz):			787.850
Modulation >>	QPSK	16 QAM	32 QAM	64 QAM	QPSK	16 QAM	32 QAM	64 QAM
-30	787.0460	787.0460	787.0476	787.0460	787.9536	787.9536	787.9520	787.9528
-20	787.0460	787.0464	787.0476	787.0464	787.9540	787.9540	787.9524	787.9536
-10	787.0460	787.0460	787.0484	787.0460	787.9540	787.9540	787.9520	787.9528
0	787.0460	787.0464	787.0476	787.0472	787.9540	787.9540	787.9524	787.9536
10	787.0464	787.0468	787.0484	787.0472	787.9536	787.9544	787.9520	787.9532
20	787.0464	787.0464	787.0484	787.0464	787.9540	787.9536	787.9524	787.9532
30	787.0464	787.0464	787.0484	787.0468	787.9536	787.9536	787.9520	787.9532
40	787.0456	787.0464	787.0480	787.0468	787.9532	787.9532	787.9516	787.9528
30	787.0464	787.0456	787.0476	787.0464	787.9532	787.9536	787.9516	787.9532
f_{max}	787.0464	787.0468	787.0484	787.0472	787.9540	787.9544	787.9524	787.9536
f_{min}	787.0456	787.0456	787.0476	787.0460	787.9532	787.9532	787.9516	787.9528
f_{avg}	787.04613	787.04627	787.04800	787.04658	787.95369	787.95378	787.95204	787.95316
f_{maxdev} (Hz)	533	667	400	622	489	622	444	444
f_{Limit} (Hz)	46133	46267	48000	46578	46311	46222	47956	46844
Margin (Hz)	45600	45600	47600	45956	45822	45600	47511	46400

Reference = 43 + 10Log(P) = -13dBm

f_{max} = Maximum Measured Frequency in the Modulation Group.

f_{min} = Minimum Measured Frequency in the Modulation Group.

f_{avg} = Average of the Measured Frequency in each Modulation Group

f_{maxdev} = Absolute Value of Maximum Frequency Deviation from Average (Tolerance)

$f_{maxdev} = f_{max} - f_{avg}$ or $f_{avg} - f_{min}$

f_{Limit} = Maximum Displacement of the Average Frequency to the Band Edge

$f_{Limit} = f_{avg}$ - 787.0MHz or 788.0MHz - f_{avg}

Margin = $f_{Limit} - f_{maxdev}$

Result: Complies

Table 14.3 – Frequency Stability –vs- Voltage, 500kHz BW

§27.54 Frequency Stability vs Voltage								
Input Voltage	500kHz Channel Bandwidth							
	Measured Frequency @ -13dBm Reference (MHz)							
	Nominal Operating Voltage (VAC):			115	Nominal Temperature (°C):			25
	Lower Band Edge				Upper Band Edge			
(VAC)	Assigned Frequency (MHz):			787.250	Assigned Frequency (MHz):			787.750
Modulation >>	QPSK	16 QAM	32 QAM	64 QAM	QPSK	16 QAM	32 QAM	64 QAM
132.3	787.0092	787.0100	787.0112	787.0112	787.9896	787.9900	787.9900	787.9892
97.8	787.0108	787.0100	787.0112	787.0112	787.9896	787.9896	787.9896	787.9892
f_{max}	787.0108	787.0100	787.0112	787.0112	787.9896	787.9900	787.9900	787.9892
f_{min}	787.0092	787.0100	787.0112	787.0112	787.9896	787.9896	787.9896	787.9892
f_{avg*}	787.01031	787.01018	787.01107	787.01138	787.98929	787.98964	787.98907	787.98822
f_{maxdev} (Hz)	1111	178	133	178	311	356	933	978
f_{Limit} (Hz)	10311	10178	11067	11378	10711	10356	10933	11778
Margin (Hz)	9200	10000	10933	11200	10400	10000	10000	10800

Reference = 43 + 10Log(P) = -13dBm

f_{max} = Maximum Measured Frequency in the Modulation Group.
f_{min} = Minimum Measured Frequency in the Modulation Group.
f_{avg*} = Average of the Measured Frequency in each Modulation Group (From Temperature Measurement)
f_{maxdev} = Absolute Value of Maximum Frequency Deviation from Average (Tolerance)
$f_{maxdev} = f_{max} - f_{avg}$ or $f_{avg} - f_{min}$
f_{Limit} = Maximum Displacement of the Average Frequency to the Band Edge
$f_{Limit} = f_{avg} - 787.0MHz$ or $788.0MHz - f_{avg}$
Margin = $f_{Limit} - f_{maxdev}$

Result: Complies

Table 14.4 – Frequency Stability –vs- Voltage, 200kHz BW

§27.54 Frequency Stability vs Voltage								
Input Voltage	200kHz Channel Bandwidth							
	Measured Frequency @ -13dBm Reference (MHz)							
	Nominal Operating Voltage (VAC):			115	Nominal Temperature (°C):			25
	Lower Band Edge				Upper Band Edge			
(VAC)	Assigned Frequency (MHz):			787.150	Assigned Frequency (MHz):			787.850
Modulation >>	QPSK	16 QAM	32 QAM	64 QAM	QPSK	16 QAM	32 QAM	64 QAM
132.3	787.0460	787.0456	787.0476	787.0464	787.9540	787.9536	787.9520	787.9532
97.8	787.0464	787.0464	787.0476	787.0464	787.9540	787.9540	787.9520	787.9536
f_{max}	787.0464	787.0464	787.0476	787.0464	787.9540	787.9540	787.9520	787.9536
f_{min}	787.0460	787.0456	787.0476	787.0464	787.9540	787.9536	787.9520	787.9532
f_{avg*}	787.04613	787.04627	787.04800	787.04658	787.95369	787.95378	787.95204	787.95316
f_{maxdev} (Hz)	267	667	400	178	311	222	44	444
f_{Limit} (Hz)	46133	46267	48000	46578	46311	46222	47956	46844
Margin (Hz)	45867	45600	47600	46400	46000	46000	47911	46400

Reference = 43 + 10Log(P) = -13dBm

f_{max} = Maximum Measured Frequency in the Modulation Group.
f_{min} = Minimum Measured Frequency in the Modulation Group.
f_{avg*} = Average of the Measured Frequency in each Modulation Group (From Temperature Measurement)
f_{maxdev} = Absolute Value of Maximum Frequency Deviation from Average (Tolerance)
$f_{maxdev} = f_{max} - f_{avg}$ or $f_{avg} - f_{min}$
f_{Limit} = Maximum Displacement of the Average Frequency to the Band Edge
$f_{Limit} = f_{avg} - 787.0MHz$ or $788.0MHz - f_{avg}$
Margin = $f_{Limit} - f_{maxdev}$

Result: Complies

APPENDIX A – TEST SETUP DRAWINGS AND CONDITIONS

Figure A.1 – Test Setup Conducted Measurements

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00241	R&S	FSU40	Spectrum Analyzer

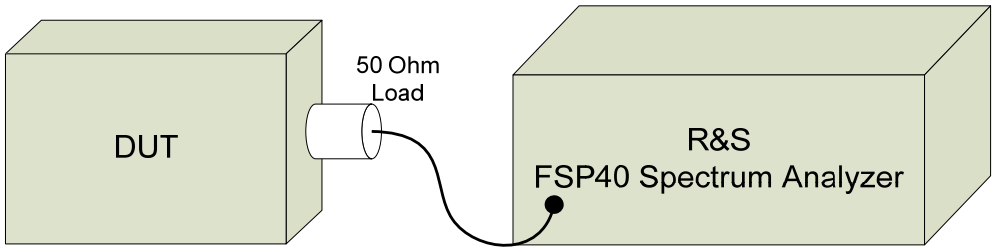


Figure A.2 – Test Setup Radiated Measurements

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List

Asset Number	Manufacturer	Model Number	Description
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn

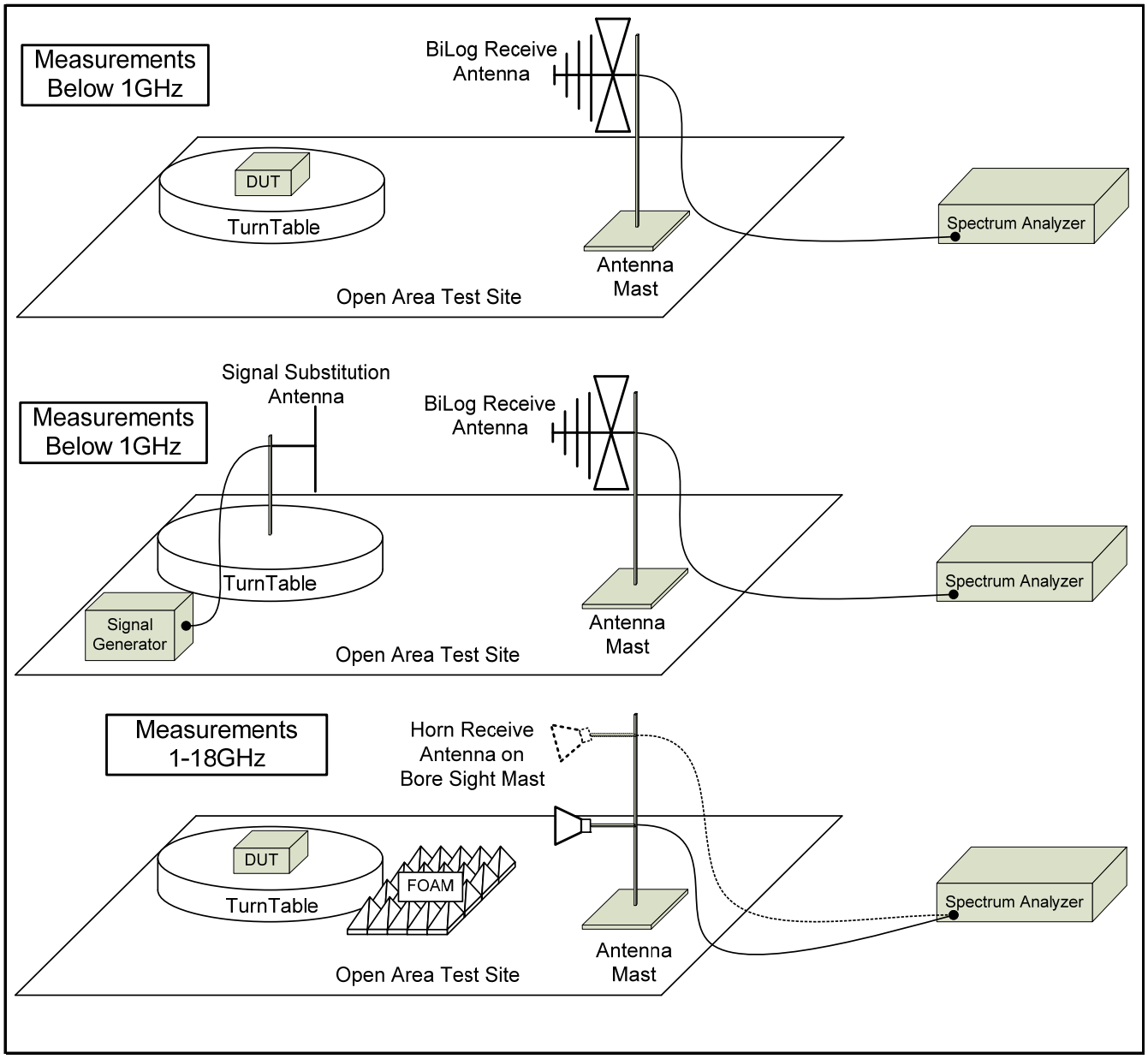


Figure A.3 – Test Setup Radiated Measurements 27.53(f)

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List

Asset Number	Manufacturer	Model Number	Description
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn

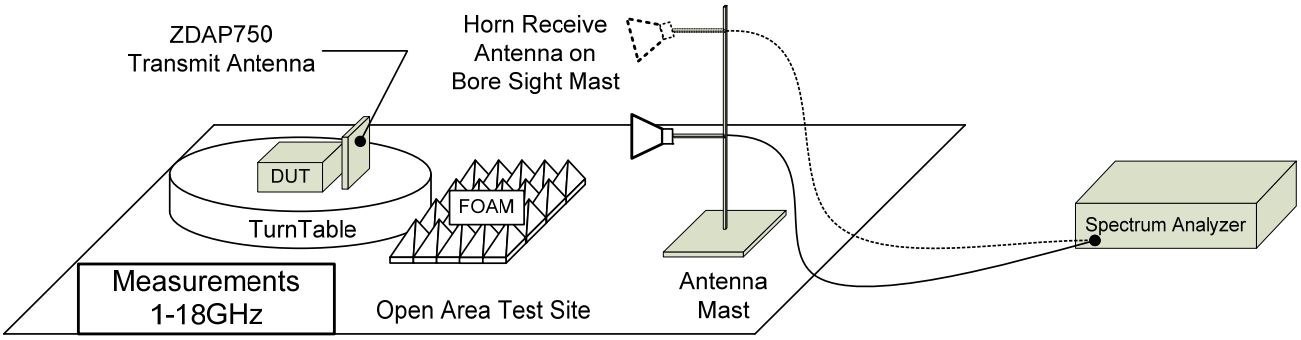
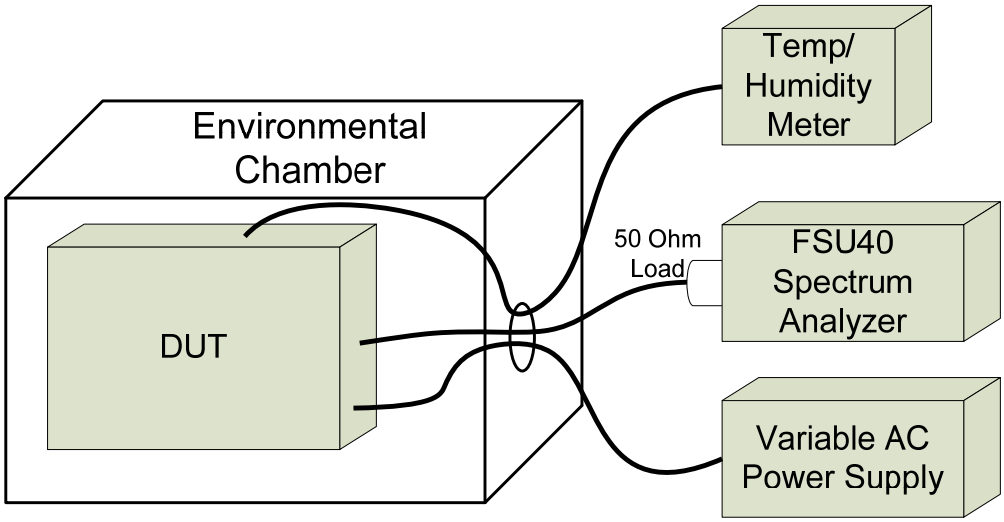


Figure A.4 – Test Setup Frequency Stability

Environmental Conditions (Typical)	
Temperature	-30°C to +50°C at 10°C Increments
Humidity	<100% Non Condensating
Voltage (VAC)	97.8VAC(85%) - 115VAC(100%) - 132.3VAC(115%)

Equipment List

Asset Number	Manufacturer	Model Number	Description
00241	R&S	FSU40	Spectrum Analyzer
Rental	CSZ	2S-8-1-1-H/AC	Environmental Chamber
00281	Interior Elect	SC-3m	Variac
00291	Traceable	61161-247	Digital Thermometer



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List

Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval
00003	HP	53181A	3736A05175	Frequency Counter	21 Jun 2017	Biennial
00034	ETS	3115	6267	Double Ridged Guide Horn	02 Dec 2015	Triennial
00047	HP	85685A	2837A00826	RF Preselector	23 Jun 2017	Triennial
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2017	Triennial
00050	Chase	CBL-6111A	1607	Bilog Antenna	23 Jun 2017	Triennial
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2017	Triennial
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a
00121	HP	E3611A	KR83015294	Power Supply	COU	n/a
00129	ESPEC	ECT-2	0510154-B	Environmental Chamber	CNR	n/a
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial
00241	R&S	FSU40	100500	Spectrum Analyzer	23 Apr 2015	Triennial
00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier	COU	n/a
00275	Coaxis	LMR400	n/a	25m Cable	COU	n/a
00276	Coaxis	LMR400	n/a	4m Cable	COU	n/a
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a

CNR: Calibration Not Required
COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})	
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2	
30MHz - 200MHz	
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB	
200MHz - 1000MHz	
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB	
1GHz - 6GHz	
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB	
6GHz - 18GHz	
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB	
If the calculated uncertainty **U_{lab}** is **less** than **U_{CISPR}** then:	
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
If the calculated uncertainty **U_{lab}** is **greater** than **U_{CISPR}** then:	
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), **EXCEEDS** the disturbance limit

