



Test Report Serial Number:

45461350R1.4

Test Report Date:

19 August 2016

Project Number:

1350

EMC Test Report - New Filing

Applicant:



4RF Limited
PO Box 13-506
Wellington, New Zealand 6032
New Zealand

FCC ID:

UIPSQ757M160

Product Model Number / HVIN

SQ757M160

IC Registration Number

-

Product Name / PMN

Aprisa SR & Aprisa SR+

In Accordance With:

FCC 47 CFR §2.1093

Radiofrequency Radiation Exposure Evaluation: Portable Devices

Health Canada Safety Code 6

Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range
from 3kHz to 300GHz

Approved By:

Ben Hewson, President

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



Test Lab Certificate: 2470.01



**Industry
Canada**

IC Registration 3874A-1



FCC Registration: 714830

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1.0 REVISION LOG

Tested By:	Art Voss		
Prepared By:	Art Voss		
Reviewed By:	Ben Hewson		
Issue Number	Description	By	Issue Date
1.0	Initial Release	Art Voss	22 July 2016
1.1	Corrections per TCB	Art Voss	3 August 2016
1.2	Corrections per TCB	Art Voss	5 August 2016
1.3	Corrections per TCB	Art Voss	9 August 2016
1.4	Corrections per Client	Art Voss	19 August 2016

2.0 TEST RESULT SUMMARY

TEST SUMMARY					
Referenced Standard(s):		FCC CFR Title 47 Parts 2, 27, 15B			
Appendix	Description of Test	Procedure Reference	Limit Reference	Test Date	Result
A	Conducted Power (Fundamental)	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$27.50(b)(1) \$2.1046	30 June 2016	Pass
B	Occupied Bandwidth	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$2.1049	30 June 2016	Pass
C	Band Edge	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$27.53(c)	5 July 2016	Pass
D	Emissions in 1550-1610MHz Band	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$27.53(f)	14 July 2016	Pass
E	Conducted TX Spurious Emissions	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$27.53(c) \$2.1051	15 July 2016	Pass
F	Radiated TX Spurious Emissions	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$27.53(c) \$2.1053	14 July 2016	Pass
G	Radiated Receiver Emissions	ANSI C63.4:2014	\$15 Subpart B	14 July 2016	Pass
H	Frequency Stability	ANSI/TIA/EIA-603-D ANSI C63.4:2014	\$27.54 \$2.1055	22 July 2016	Pass

3.0 PASS/FAIL CRITERIA

Unless otherwise noted in the Appendices, the pass/fail criteria are the limits set forth in the reference standards. The DUT is considered to have passed the requirements if the data collected during the described measurement procedure is no greater than the specified limits as defined. The pass/fail statements made in this report only apply to the unit(s) tested.

I attest to the accuracy of the data reported herein 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 and were not modified in any manner by Celltech Labs Inc. This test report has been completed in accordance with ISO/IEC 17025.


Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.
19 August 2016
Date



4.0 SCOPE

This report outlines the measurements made and results collected during electromagnetic emissions testing of the:

4RF Aprisa Model SQ757M160 transceiver FCC ID: UIPSQ757M160, SR and SR+ Variants

The measurement results were applied against the applicable EMC requirements and limits outlined in the technical rules and regulations set forth in the Federal Communication's Commission Code of Federal Regulations Title 47 Part 2, Part 15 Subpart B and Part 27.

Note: The SR is identical to the SR+ with the exception that it has one less interface port and has a different marketing name. The RF Section, Control, Processing and Power Supply circuitry are the same.

5.0 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-D	Land Mobile FM or PM Communication 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 27	Code of Federal Regulations Title 47: Telecommunication Part 27: Miscellaneous Wireless Communications Services
CFR Title 47 Part 15	Code of Federal Regulations Title 47: Telecommunication Part 15: Radio Frequency Devices Subpart B: Unintentional Radiators

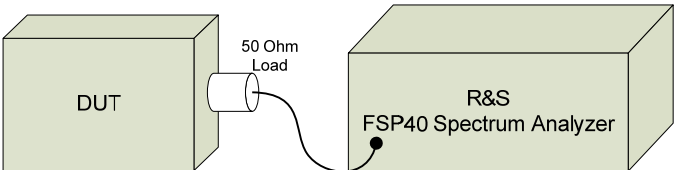
6.0 FACILITIES AND ACCREDITATIONS

The facilities used in collecting the test results outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site conforms to the requirements set forth in ANSI C63.4 and is filed and listed with Industry Canada under File Number IC 3874A-1. Celltech test site is listed with the FCC as an accredited test facility. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.

7.0 GENERAL INFORMATION

Client Information		
Applicant Name	4RF Limited	
Applicant Address	26 Glover St.	
	Welling, New Zealand, 6032	
	New Zealand	
DUT Information		
Device Identifier(s):	FCC ID:	UIPSQ757M160
Device Type:	Licensed Non-Broadcast Station Transmitter (TNB)	
Type of Equipment:	Digital Transceiver	
Device Model(s) / HVIN:	SQ757M160	
Device Marketing Name / PMN:	Aprisa SR and Aprisa SR+	
Firmware Version ID Number / FVIN:	n/a	
Host Marketing Name / HMN:	n/a	
Test Sample Serial No.:	T/A Sample - Identical Prototype	
Transmit Frequency Range:	757-758MHz, 787-788MHz	
Number of Channels:	n/a	
Manuf. Max. Rated Output Power:	QPSK: 37dBm, 16QAM: 35dBm, 64QAM: 34dBm	
Manuf. Max. Rated BW/Data Rate:	350kHz, 250kbps	
Antenna Make and Model:	ZDA Communications US LLC M/N ZDAFP750-10-60D	
Antenna Type and Gain:	Dual Polarization Flat Panel 10dBi	
Maximum Antenna Gain:	18dBi	
Modulation:	QPKS, 16QAM, 64QAM	
Mode:	Periodic Burst	
Emission Designator:	12K5G1D, 25K0G1D, 50K0G1D 12K5D1D, 25K0D1D, 50K0D1D	
DUT Power Source:	10-30VDC External	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

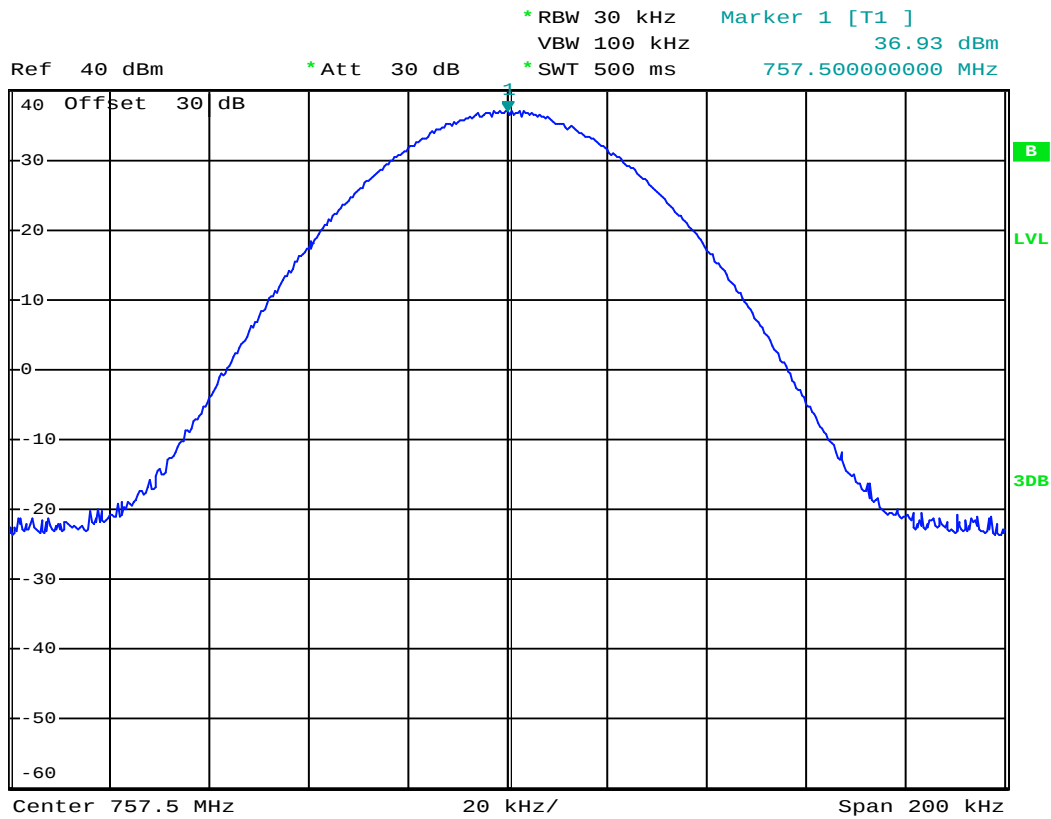
APPENDIX A - RF Conducted Output Power

Test Conditions			
Normative Reference		FCC 47 CFR §2.1046, §27.50(b)(9), KDB 971168 D01v02r01	
Limits			
47 CFR §27.50(b)(9)		30Watts ERP	
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
Set-Up Drawing			
			

Peak Power (QPKS)



1 PK
VIEW



Date: 4.AUG.2016 11:48:06

Reference Only

Frequency:	757.5MHz
Bandwidth:	12.5kHz
Modulation:	QPSK

Peak Power (QPSK)

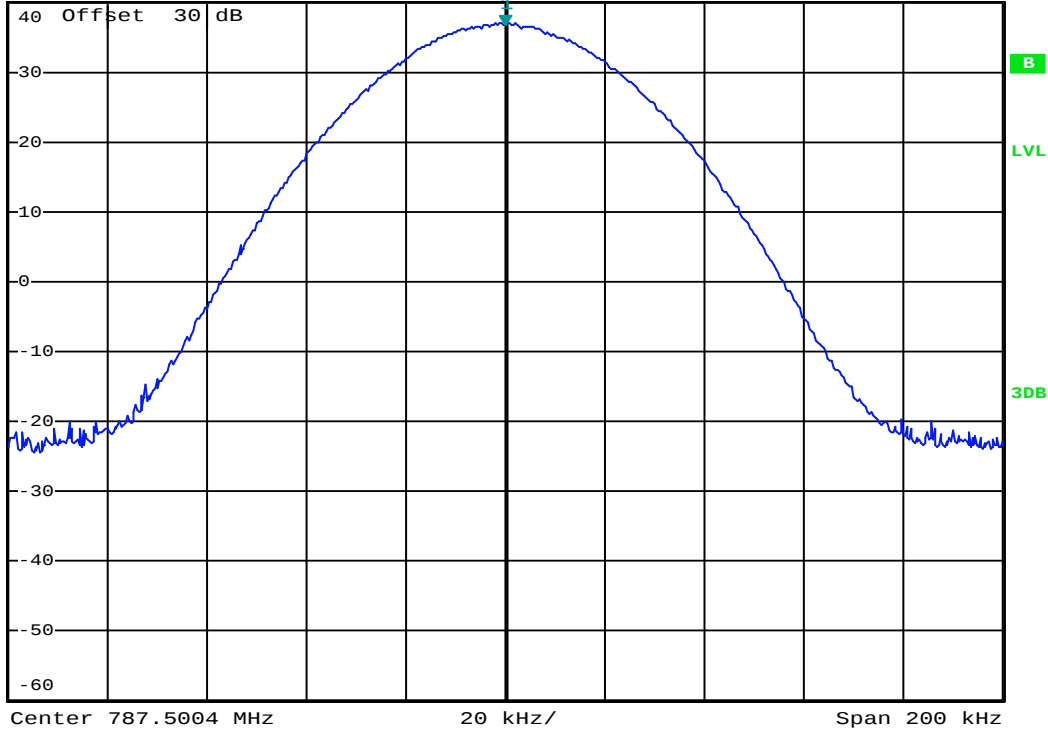


* RBW 30 kHz
* Att 30 dB
* SWT 500 ms
Marker 1 [T1]
36.71 dBm
787.500400000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Date: 4.AUG.2016 12:07:42

Reference Only

Frequency:	787.5MHz
Bandwidth:	12.5kHz
Modulation:	QPSK

Peak Power (QPKS)

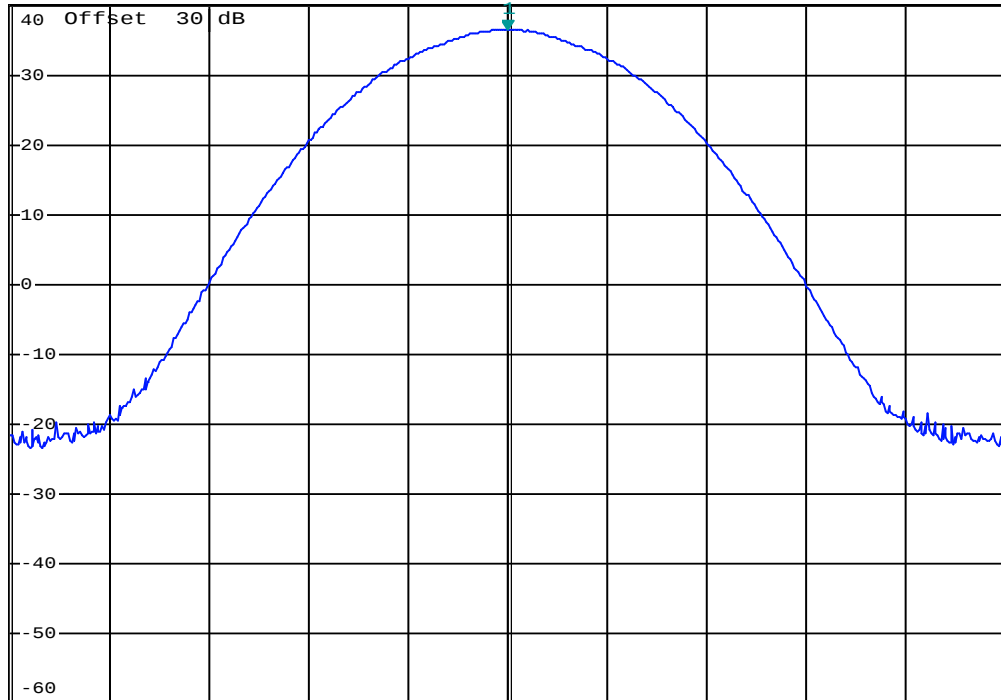


* RBW 30 kHz Marker 1 [T1]
VBW 100 kHz 36.52 dBm
* SWT 500 ms 757.500000000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Center 757.5 MHz

20 kHz/

Span 200 kHz

B

LVL

3DB

Date: 4.AUG.2016 11:46:08

Reference Only

Frequency:	757.5MHz
Bandwidth:	25kHz
Modulation:	QPSK

Peak Power (QPSK)

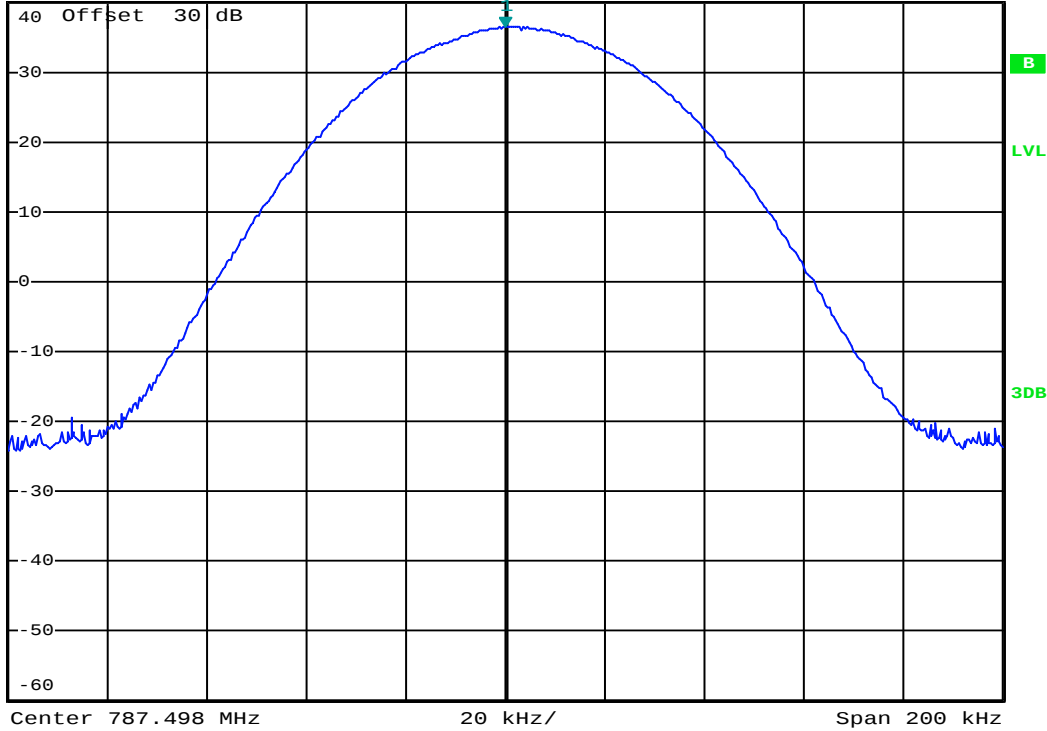


* RBW 30 kHz
* Att 30 dB
* SWT 500 ms
Marker 1 [T1]
36.39 dBm
787.498000000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Date: 4.AUG.2016 11:44:58

Reference Only

Frequency:	787.5MHz
Bandwidth:	25kHz
Modulation:	QPSK

Peak Power (QPKS)

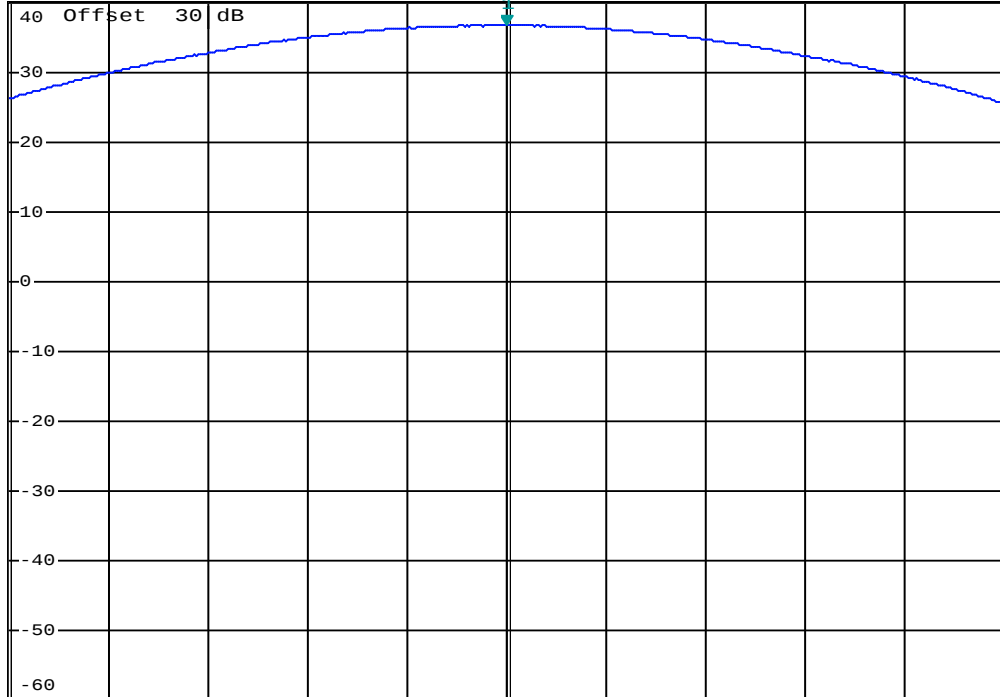


* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 36.69 dBm
* SWT 500 ms 757.500800000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



B

LVL

3DB

Center 757.5008 MHz

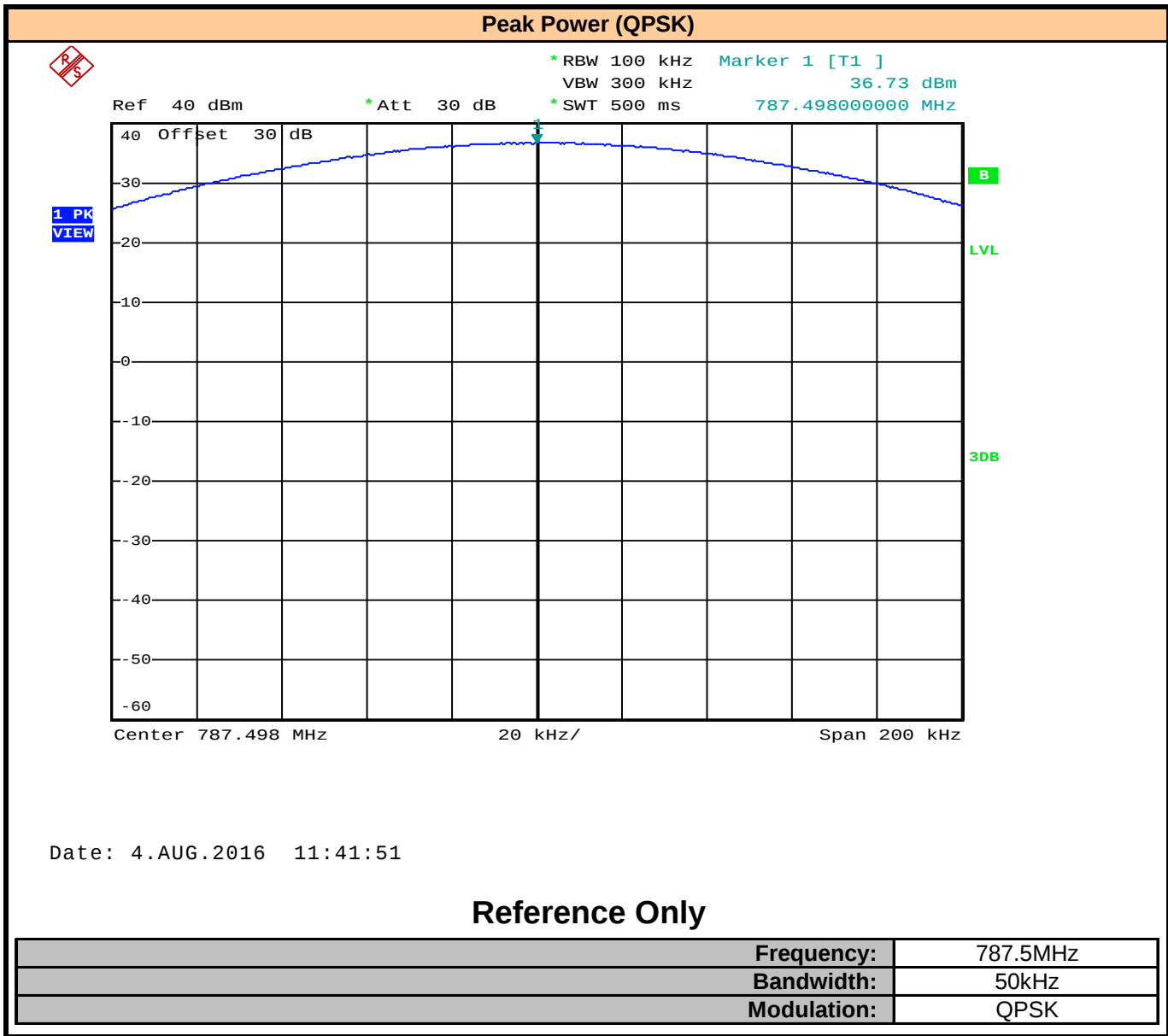
20 kHz/

Span 200 kHz

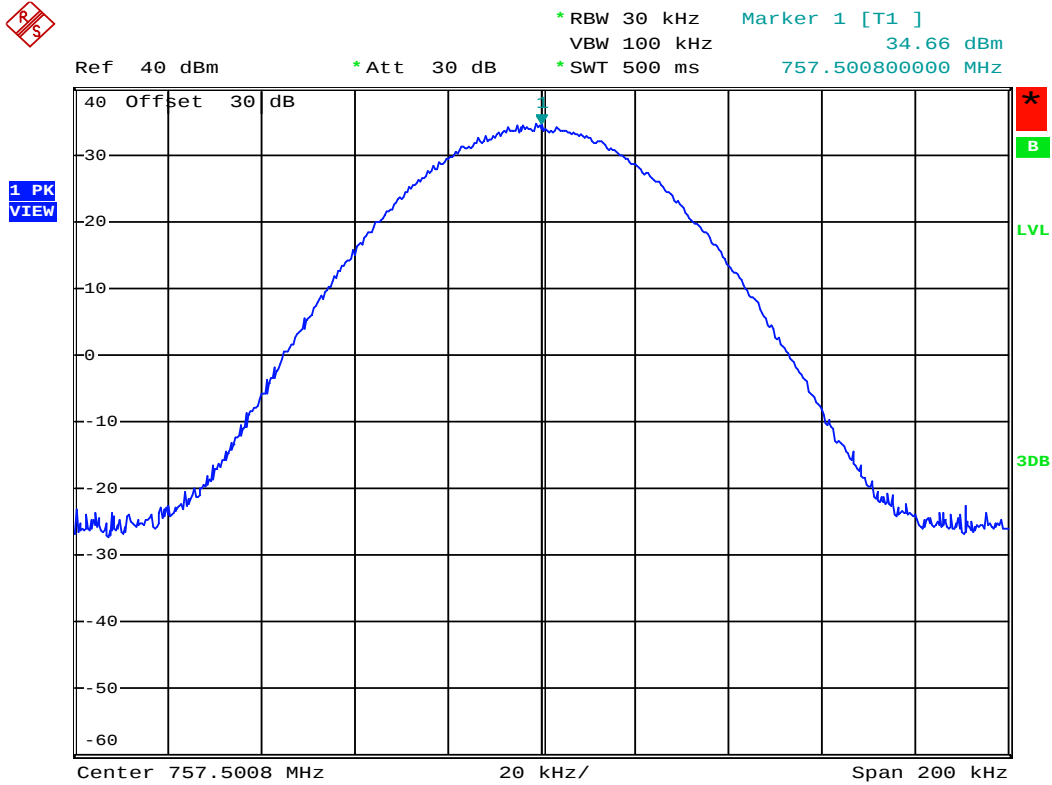
Date: 4.AUG.2016 11:37:42

Reference Only

Frequency:	757.5MHz
Bandwidth:	50kHz
Modulation:	QPSK



Peak Power (16QAM)



Date: 9.AUG.2016 15:04:30

Reference Only

Frequency:	757.5MHz
Bandwidth:	12.5kHz
Modulation:	16QAM

Peak Power (16QAM)

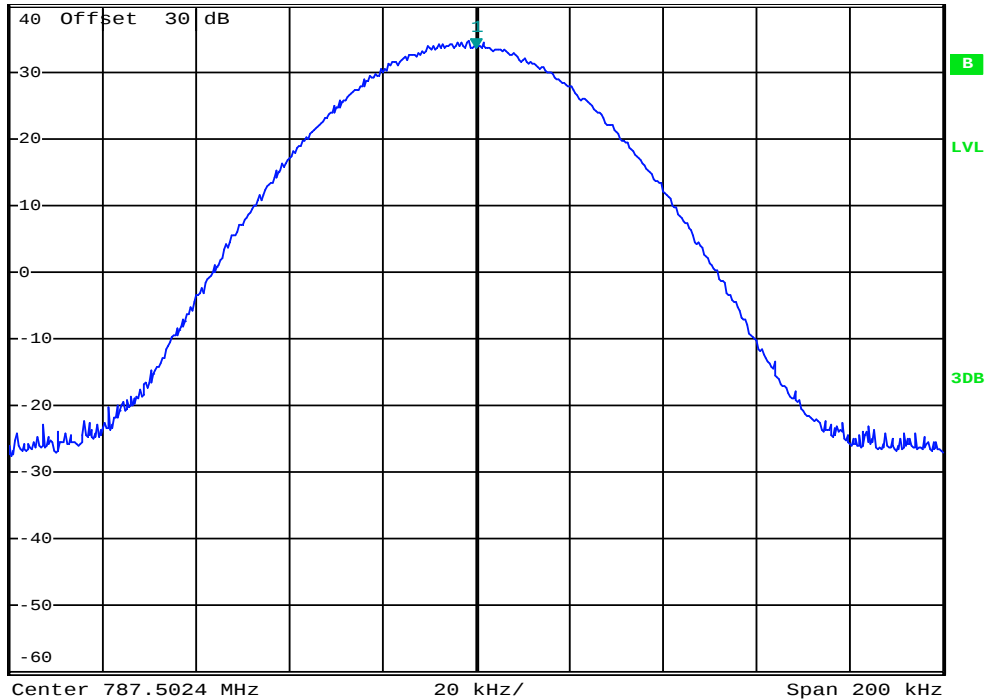


* RBW 30 kHz Marker 1 [T1]
VBW 100 kHz 33.62 dBm
* SWT 500 ms 787.502400000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Date: 9.AUG.2016 15:05:43

Reference Only

Frequency:	787.5MHz
Bandwidth:	12.5kHz
Modulation:	16QAM

Peak Power (16QAM)

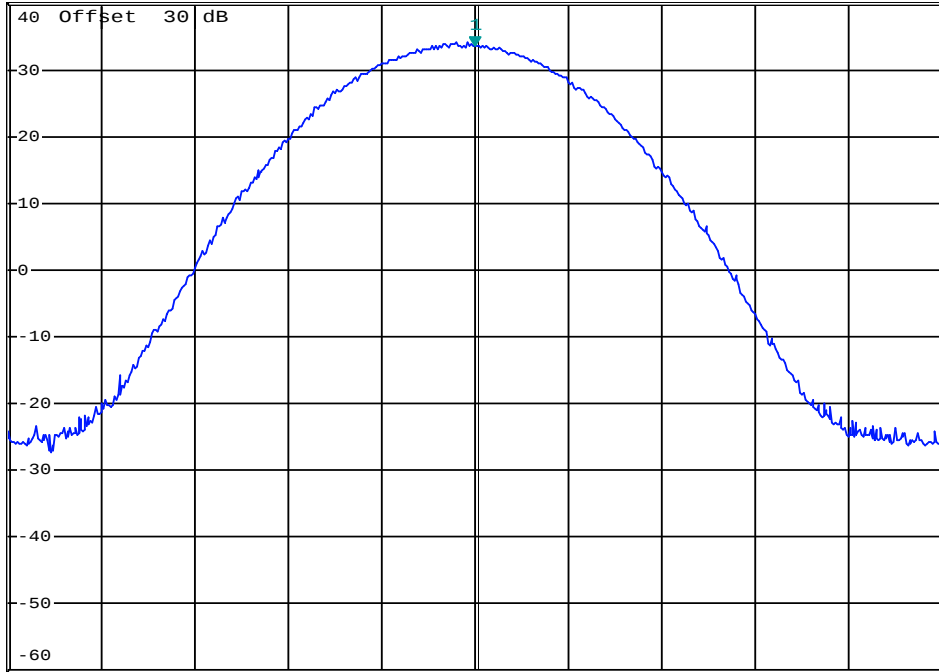


*RBW 30 kHz Marker 1 [T1]
VBW 100 kHz 33.48 dBm
*SWT 500 ms 757.502800000 MHz

Ref 40 dBm

*Att 30 dB

1 PK
VIEW



Center 757.5028 MHz 20 kHz/ Span 200 kHz

Date: 9.AUG.2016 15:08:48

Reference Only

Frequency:	757.5MHz
Bandwidth:	25kHz
Modulation:	16QAM

Peak Power (16QAM)

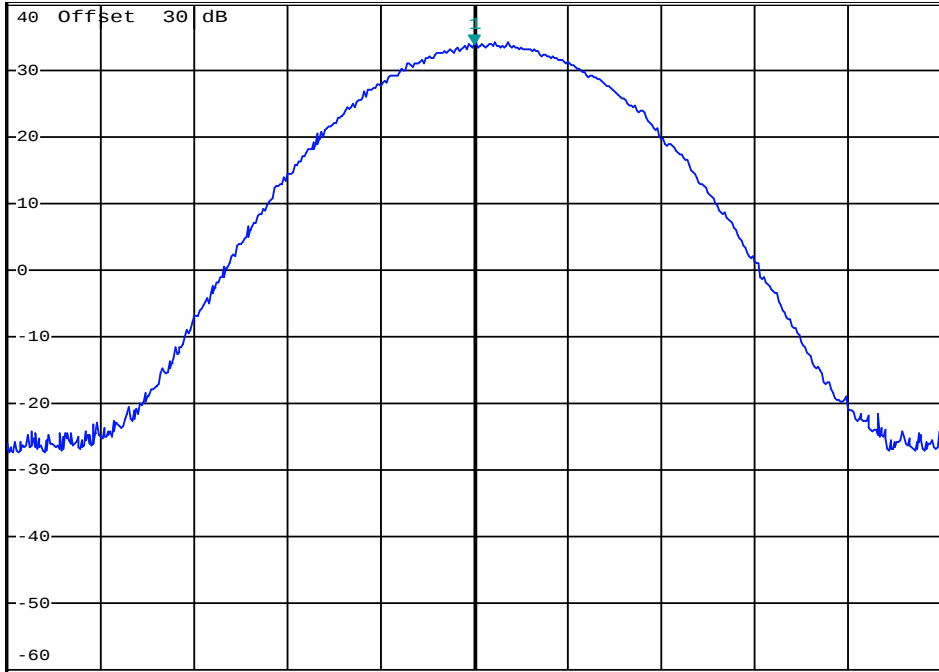


* RBW 30 kHz Marker 1 [T1]
VBW 100 kHz 33.80 dBm
* SWT 500 ms 787.496000000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Center 787.496 MHz

20 kHz/

Span 200 kHz

Date: 9.AUG.2016 15:07:41

Reference Only

Frequency:	787.5MHz
Bandwidth:	25kHz
Modulation:	16QAM

Peak Power (16QAM)

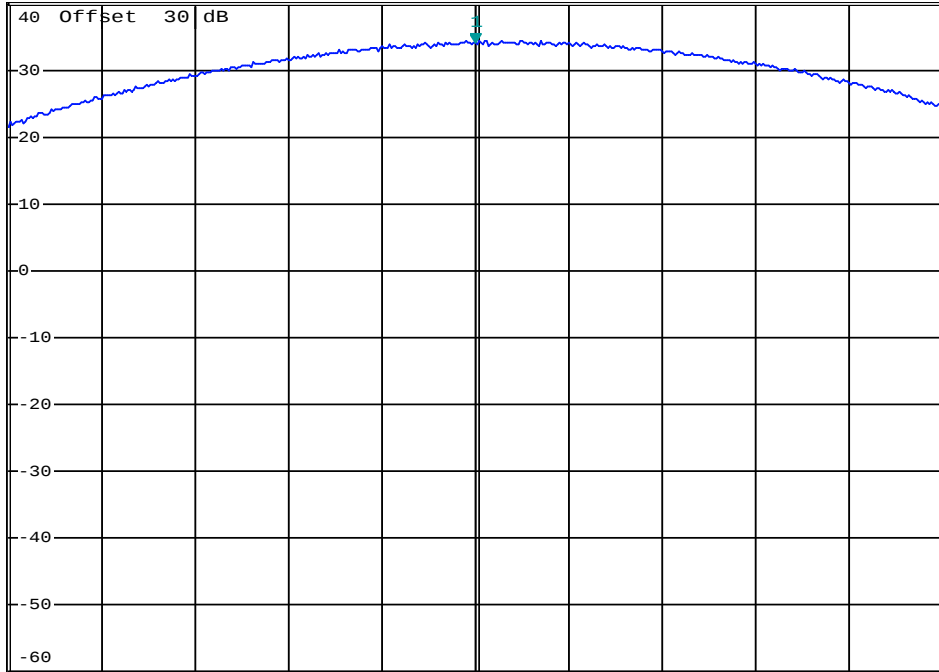


* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 34.14 dBm
* Att 30 dB * SWT 500 ms 757.492800000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Center 757.4928 MHz 20 kHz/ Span 200 kHz

Date: 9.AUG.2016 15:10:50

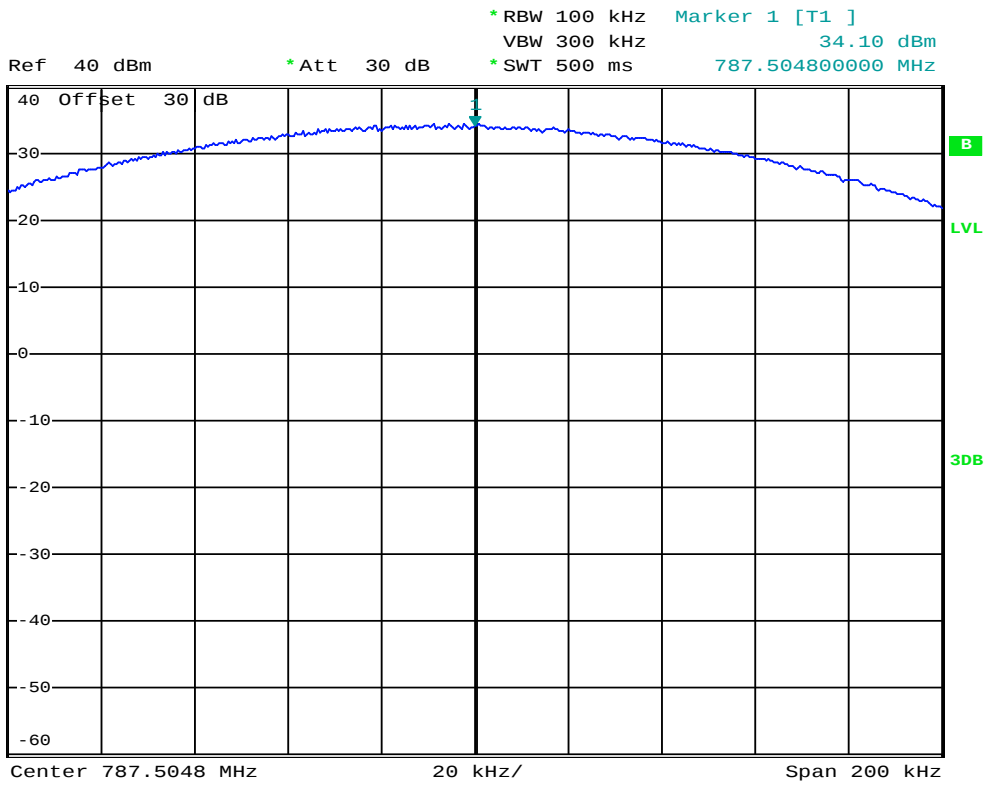
Reference Only

Frequency:	757.5MHz
Bandwidth:	50kHz
Modulation:	16QAM

Peak Power (16QAM)



1 PK
VIEW

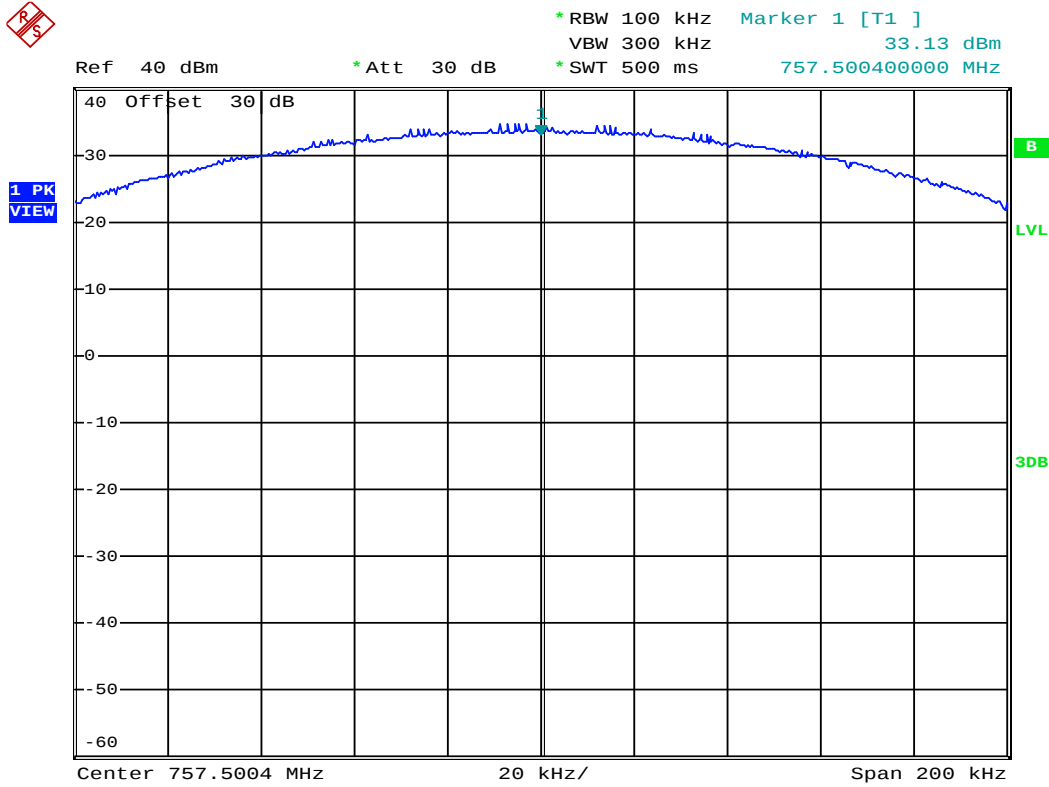


Date: 9.AUG.2016 15:12:09

Reference Only

Frequency:	787.5MHz
Bandwidth:	50kHz
Modulation:	16QAM

Peak Power (64QAM)



Date: 9.AUG.2016 15:42:45

Reference Only

Frequency:	757.5MHz
Bandwidth:	50kHz
Modulation:	64QAM

§27.50(b)(9) Peak Output Power of Fundamental

Freq (MHz)	Bandwidth (kHz)	Modulation	[E _{Meas}] (dBm)	Antenna Gain* [G _T] (dBi)	Antenna Gain Correction* [G _C]	Cable Loss [L _C] (dB)	ERP (dBm)	ERP (W)	Limit (dBm)	Limit (W)	Margin (dB)	Margin (W)
757.5	12.5	QPSK	36.93	10	-2.15	0.47	44.31	26.98	44.80	30.00	0.49	3.02
787.5	12.5	QPSK	36.71	10	-2.15	0.47	44.09	25.64	44.80	30.00	0.71	4.36
757.5	25	QPSK	36.52	10	-2.15	0.47	43.90	24.55	44.80	30.00	0.90	5.45
787.5	25	QPSK	36.39	10	-2.15	0.47	43.77	23.82	44.80	30.00	1.03	6.18
757.5	50	QPSK	36.69	10	-2.15	0.47	44.07	25.53	44.80	30.00	0.73	4.47
787.5	50	QPSK	36.73	10	-2.15	0.47	44.11	25.76	44.80	30.00	0.69	4.24
757.5	12.5	16QAM***	34.66	10	-2.15	0.47	42.04	16.00	44.80	30.00	2.76	14.00
787.5	12.5	16QAM***	33.62	10	-2.15	0.47	41.00	12.59	44.80	30.00	3.80	17.41
757.5	25	16QAM***	33.48	10	-2.15	0.47	40.86	12.19	44.80	30.00	3.94	17.81
787.5	25	16QAM***	33.80	10	-2.15	0.47	41.18	13.12	44.80	30.00	3.62	16.88
757.5	50	16QAM***	34.11	10	-2.15	0.47	41.49	14.09	44.80	30.00	3.31	15.91
787.5	50	16QAM***	34.10	10	-2.15	0.47	41.48	14.06	44.80	30.00	3.32	15.94
787.5	50	64QAM***	33.13	10	-2.15	0.47	40.51	11.25	44.80	30.00	4.29	18.75

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

$$Margin = Limit - ERP$$

* The Gain of the ZDAP750-10-60D used for compliance to §27.53(f) is assumed for this calculation

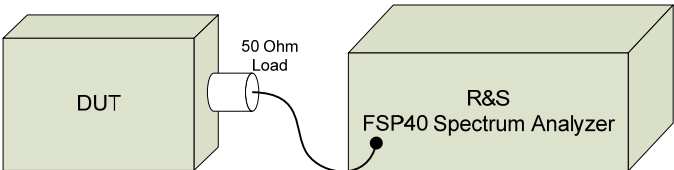
** Correction to dBd

*** The output power setting is automatically reduced to: 16QAM = 35dBm, 64QAM = 34dBm

Result:

Complies

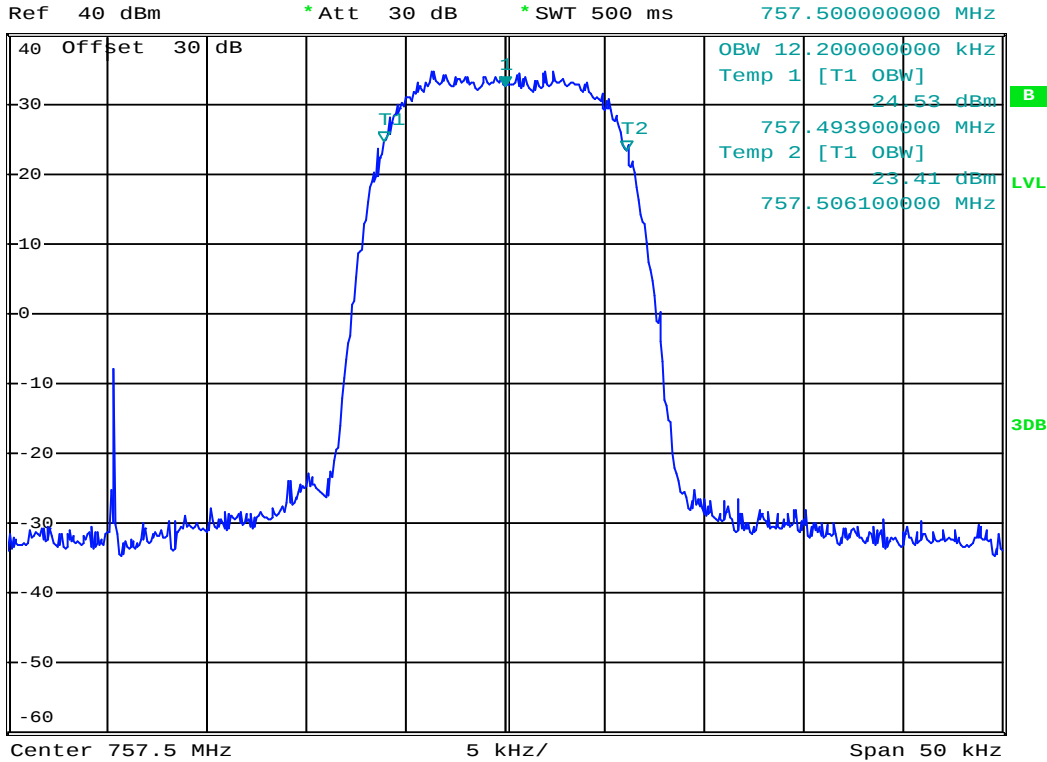
APPENDIX B - Occupied Bandwidth

Test Conditions			
Normative Reference		FCC 47 CFR §2.1049, KDB 971168 D01v02r01	
Limits			
47 CFR §2.1049		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...	
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
Set-Up Drawing			
			

Occupied Bandwidth



* RBW 1 kHz Marker 1 [T1] 32.44 dBm
VBW 3 kHz
* Att 30 dB * SWT 500 ms 757.500000000 MHz



Date: 30.JUN.2016 11:32:52

Channel Frequency:	757.500
Rated Bandwidth:	12.5kHz
Modulation:	QPSK
Measured Occupied Bandwidth:	12.2kHz
Authorized Bandwidth:	12.5kHz
Result:	Complies

Occupied Bandwidth

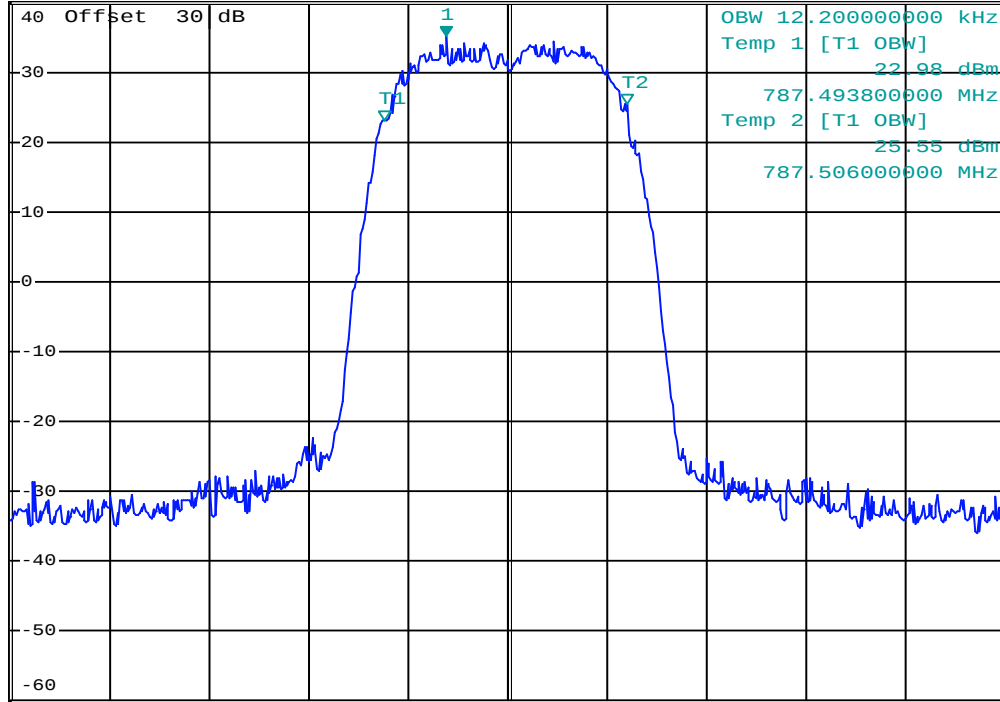


*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 35.05 dBm
*SWT 500 ms 787.496900000 MHz

Ref 40 dBm

*Att 30 dB

1 PK
VIEW



Center 787.5 MHz

5 kHz/

Span 50 kHz

Date: 4.JUL.2016 12:13:54

Channel Frequency:	787.500
Rated Bandwidth:	12.5kHz
Modulation:	QPSK
Measured Occupied Bandwidth:	12.2kHz
Authorized Bandwidth:	12.5kHz
Result:	Complies

Occupied Bandwidth



*RBW 1 kHz
VBW 3 kHz
*SWT 500 ms

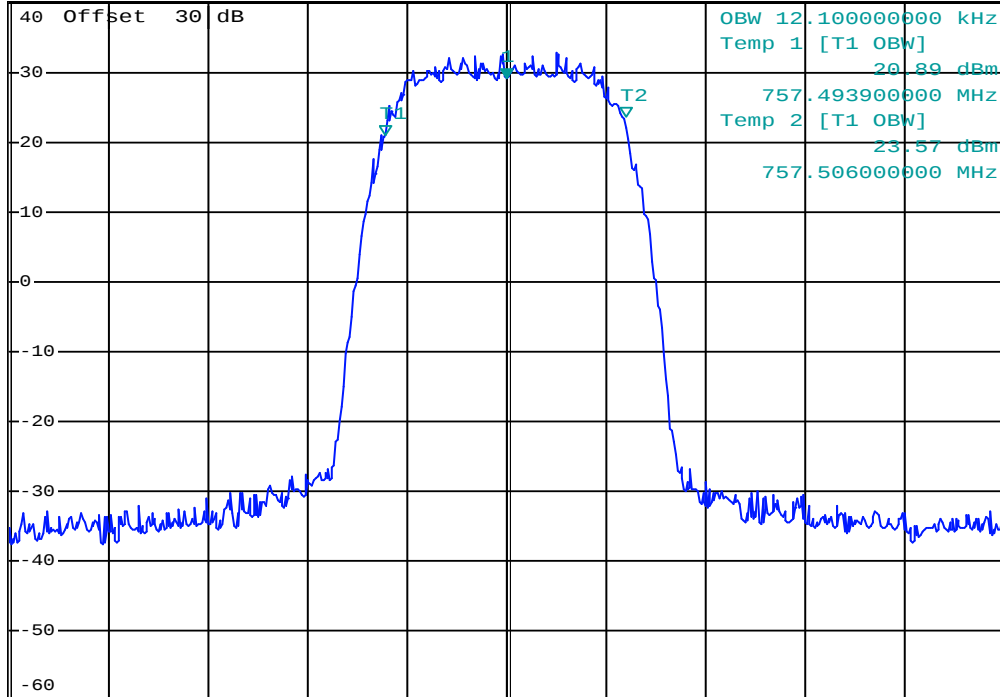
Marker 1 [T1]
29.22 dBm
757.500000000 MHz

Ref 40 dBm

*Att 30 dB

757.500000000 MHz

1 PK
VIEW



Center 757.5 MHz

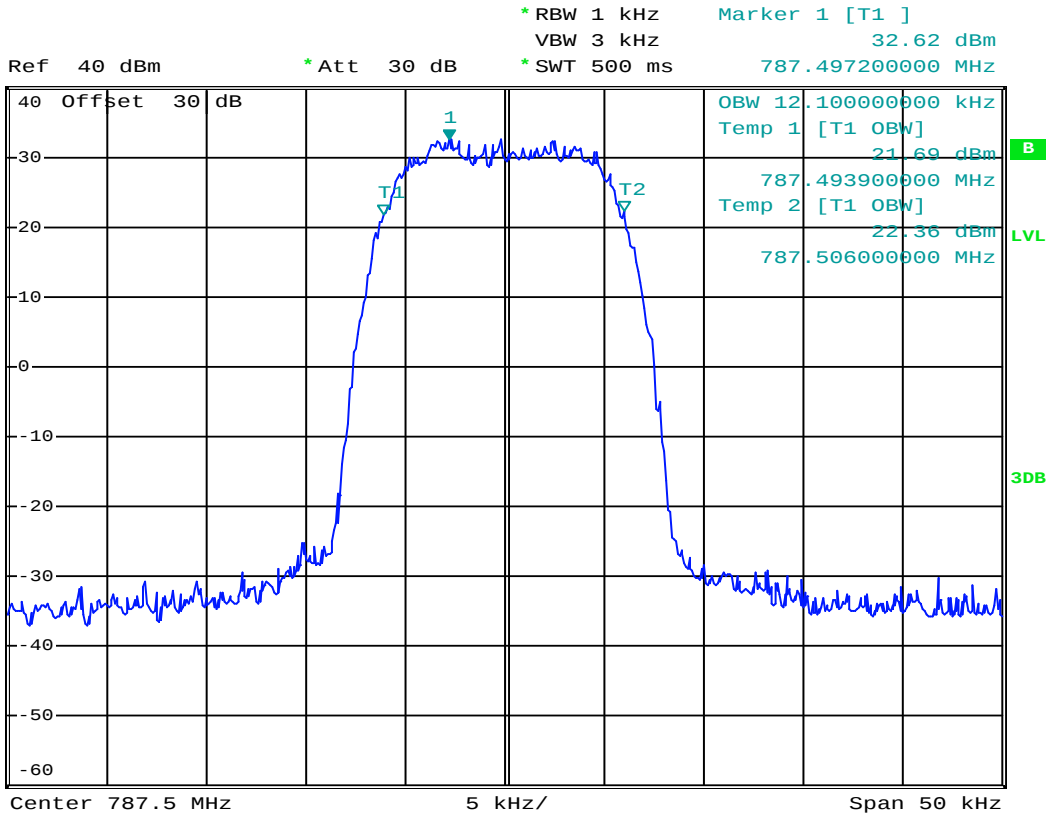
5 kHz/

Span 50 kHz

Date: 30.JUN.2016 11:34:25

Channel Frequency:	757.500
Rated Bandwidth:	12.5kHz
Modulation:	16QAM
Measured Occupied Bandwidth:	12.1kHz
Authorized Bandwidth:	12.5kHz
Result:	Complies

Occupied Bandwidth



Date: 4.JUL.2016 12:15:52

Channel Frequency:	787.500
Rated Bandwidth:	12.5kHz
Modulation:	16QAM
Measured Occupied Bandwidth:	12.1kHz
Authorized Bandwidth:	12.5kHz
Result:	Complies

Occupied Bandwidth

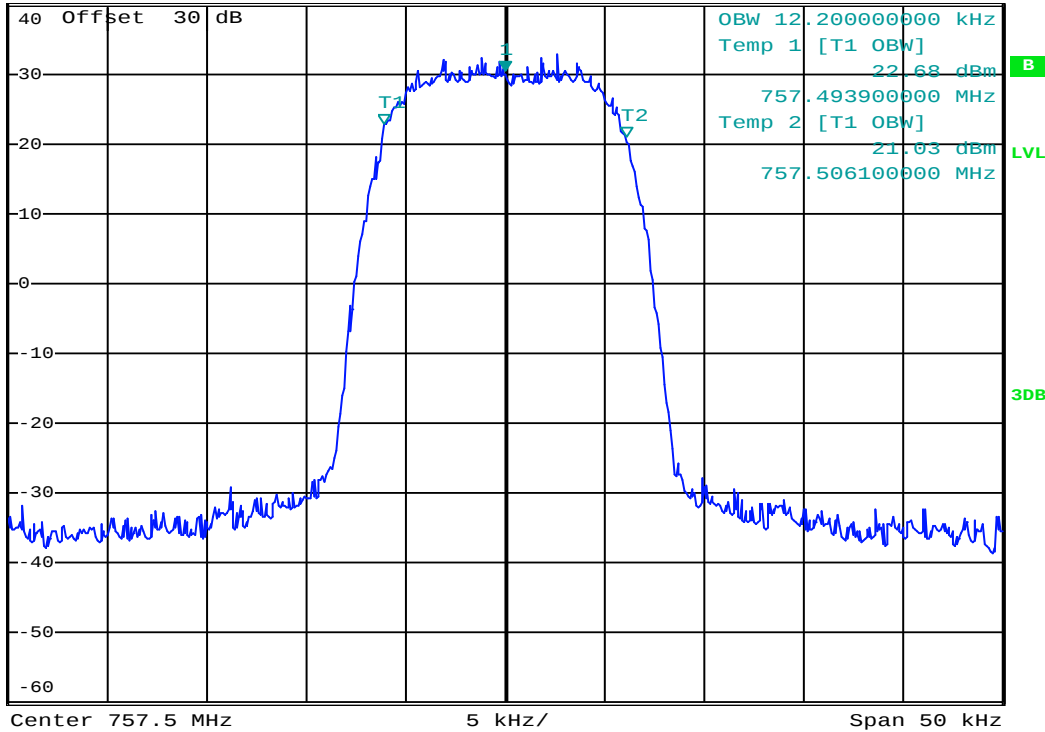


* RBW 1 kHz Marker 1 [T1]
* VBW 3 kHz 30.33 dBm
* SWT 500 ms 757.500000000 MHz

Ref 40 dBm

* Att 30 dB

1 PK
VIEW



Date: 30.JUN.2016 11:40:21

Channel Frequency:	757.500
Rated Bandwidth:	12.5kHz
Modulation:	64QAM
Measured Occupied Bandwidth:	12.2kHz
Authorized Bandwidth:	12.5kHz
Result:	Complies

Occupied Bandwidth

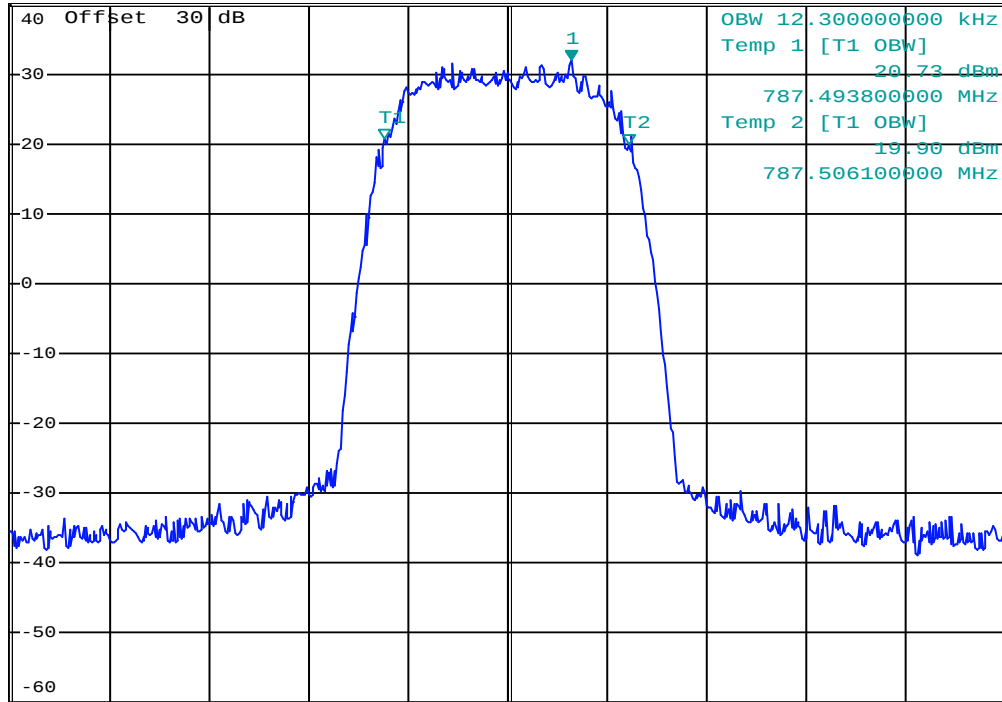


*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 31.93 dBm
*SWT 500 ms 787.503200000 MHz

Ref 40 dBm

*Att 30 dB

1 PK
VIEW



Center 787.5 MHz

5 kHz/

Span 50 kHz

Date: 4.JUL.2016 12:17:14

Channel Frequency:	787.500
Rated Bandwidth:	12.5kHz
Modulation:	64QAM
Measured Occupied Bandwidth:	12.3kHz
Authorized Bandwidth:	12.5kHz
Result:	Complies

Occupied Bandwidth



*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 30.21 dBm
*Att 30 dB 757.495300000 MHz
*SWT 500 ms

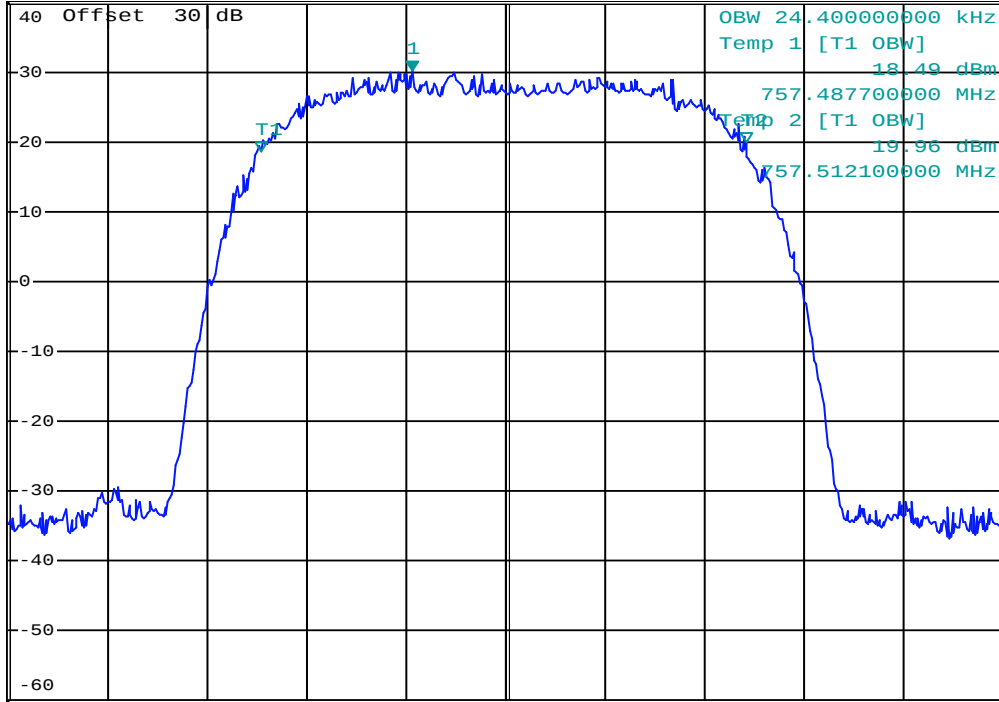
Ref 40 dBm

*Att 30 dB

*SWT 500 ms

757.495300000 MHz

1 PK
VIEW



Center 757.5 MHz

5 kHz/

Span 50 kHz

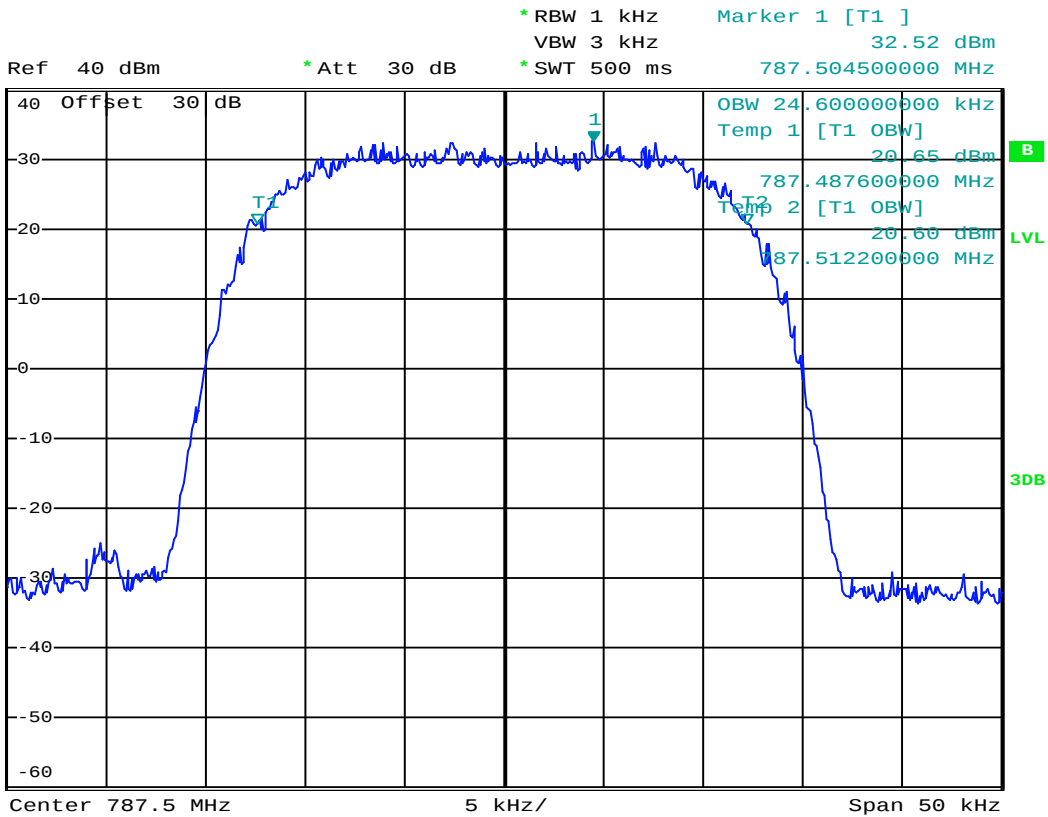
Date: 4.JUL.2016 15:29:26

Channel Frequency:	757.500
Rated Bandwidth:	25kHz
Modulation:	QPSK
Measured Occupied Bandwidth:	24.4kHz
Authorized Bandwidth:	25kHz
Result:	Complies

Occupied Bandwidth



1 PK
VIEW



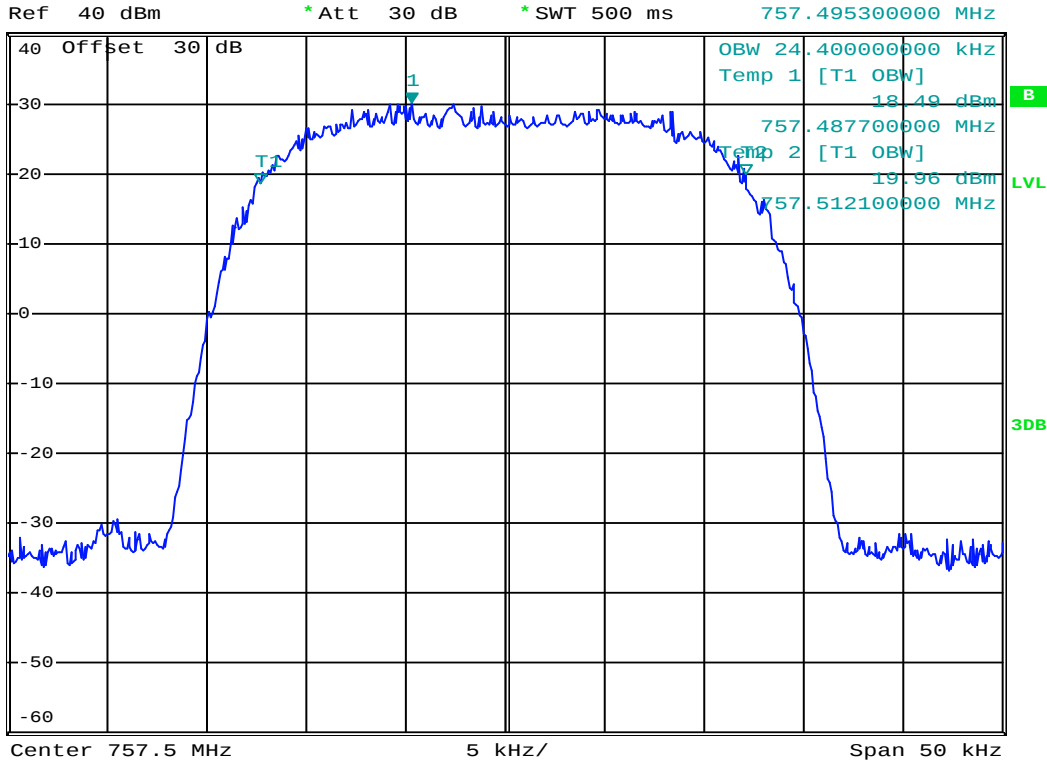
Date: 4.JUL.2016 15:31:30

Channel Frequency:	787.500
Rated Bandwidth:	25kHz
Modulation:	QPSK
Measured Occupied Bandwidth:	24.6kHz
Authorized Bandwidth:	25kHz
Result:	Complies

Occupied Bandwidth



* RBW 1 kHz Marker 1 [T1] 30.21 dBm
VBW 3 kHz
* Att 30 dB * SWT 500 ms 757.495300000 MHz



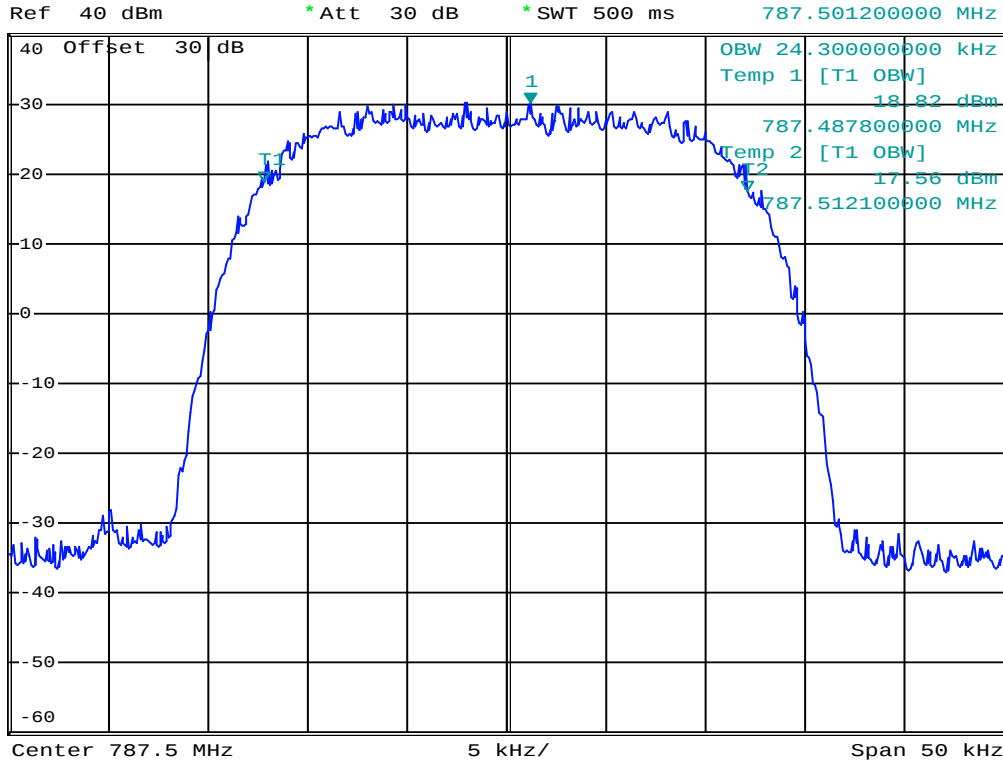
Date: 4.JUL.2016 15:29:26

Channel Frequency:	757.500
Rated Bandwidth:	25kHz
Modulation:	16QAM
Measured Occupied Bandwidth:	24.4kHz
Authorized Bandwidth:	25kHz
Result:	Complies

Occupied Bandwidth



* RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 30.17 dBm
* SWT 500 ms 787.501200000 MHz



Date: 4.JUL.2016 15:33:54

Channel Frequency:	787.500
Rated Bandwidth:	25kHz
Modulation:	16QAM
Measured Occupied Bandwidth:	24.3kHz
Authorized Bandwidth:	25kHz
Result:	Complies

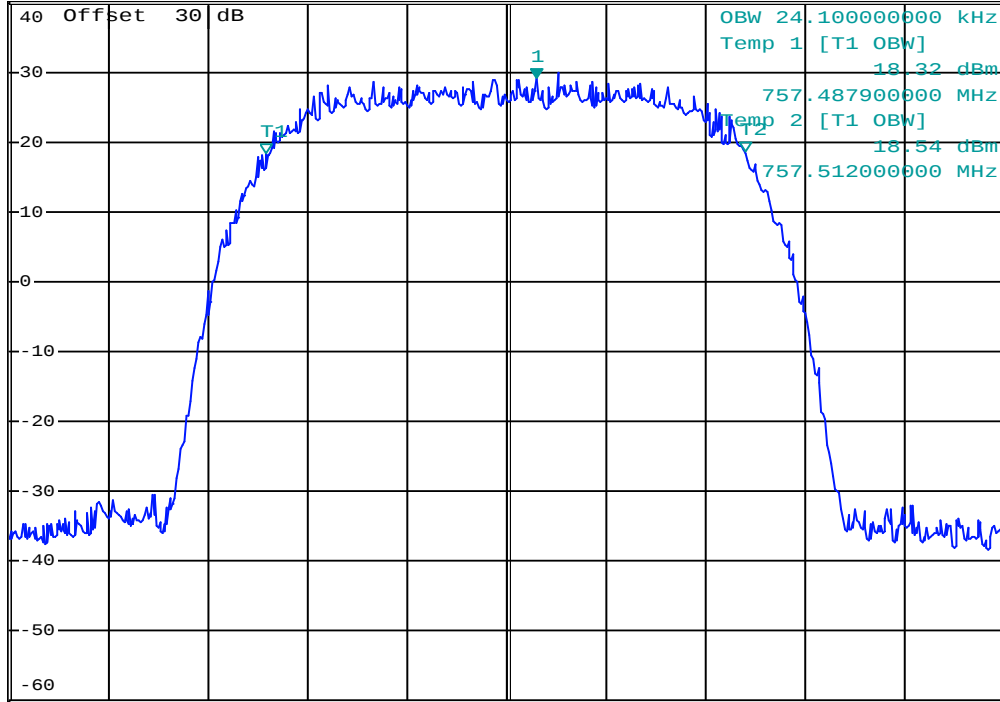
Occupied Bandwidth



* RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 29.02 dBm
* Att 30 dB 757.501500000 MHz
* SWT 500 ms

Ref 40 dBm

1 PK
VIEW



Center 757.5 MHz

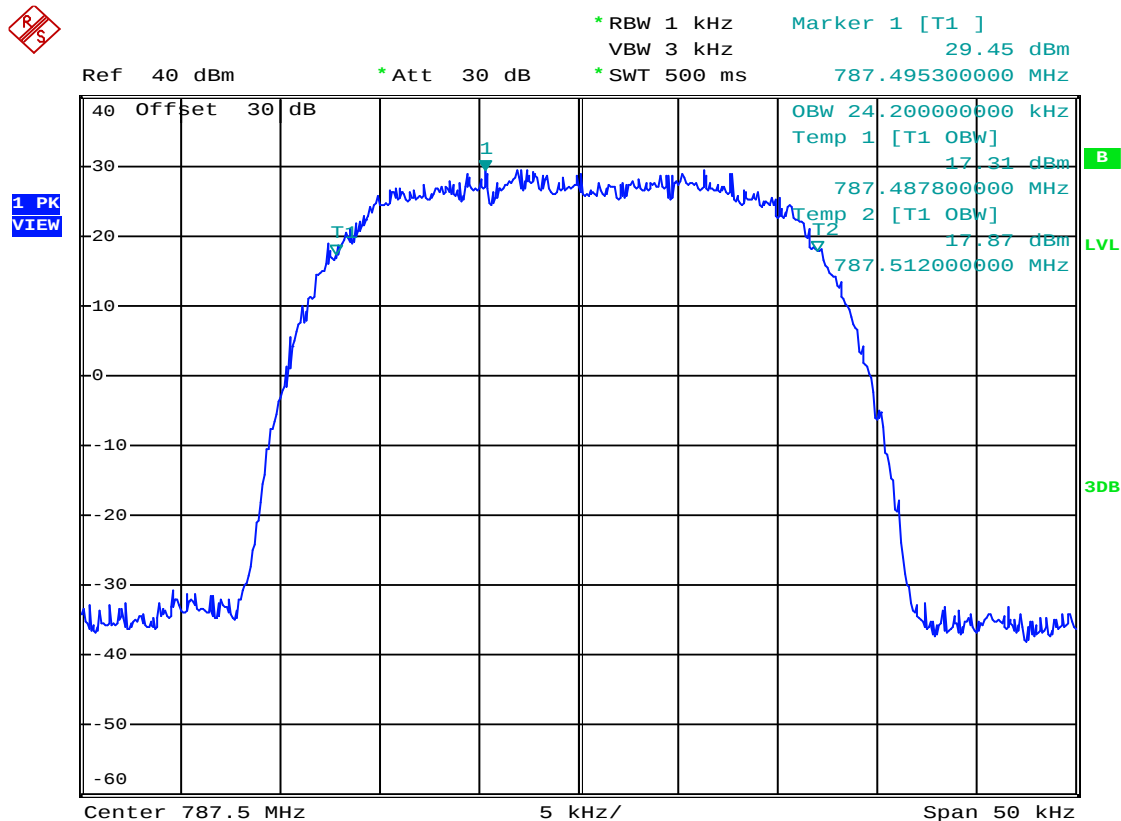
5 kHz/

Span 50 kHz

Date: 4.JUL.2016 15:26:30

Channel Frequency:	757.500
Rated Bandwidth:	25kHz
Modulation:	64QAM
Measured Occupied Bandwidth:	24.1kHz
Authorized Bandwidth:	25kHz
Result:	Complies

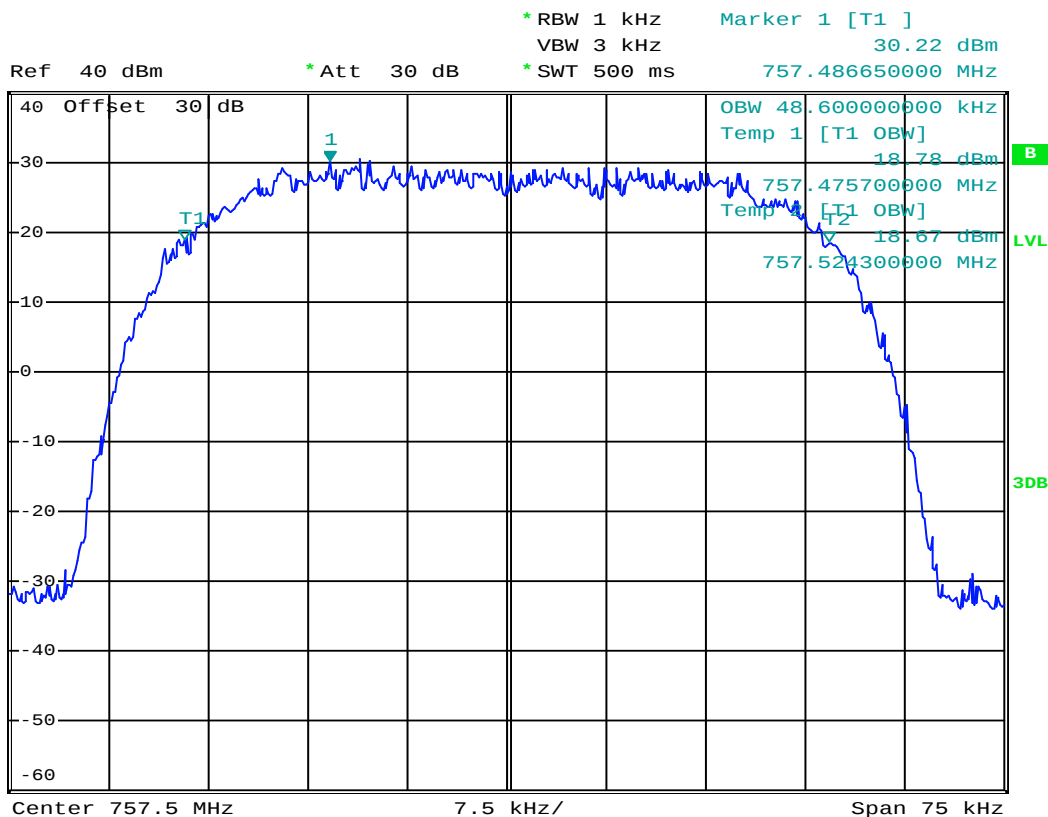
Occupied Bandwidth



Date: 4.JUL.2016 15:36:01

Channel Frequency:	787.500
Rated Bandwidth:	25kHz
Modulation:	64QAM
Measured Occupied Bandwidth:	24.2kHz
Authorized Bandwidth:	25kHz
Result:	Complies

Occupied Bandwidth



Date: 4.JUL.2016 15:47:41

Channel Frequency:	757.500
Rated Bandwidth:	50kHz
Modulation:	QPSK
Measured Occupied Bandwidth:	48.6kHz
Authorized Bandwidth:	50kHz
Result:	Complies

Occupied Bandwidth

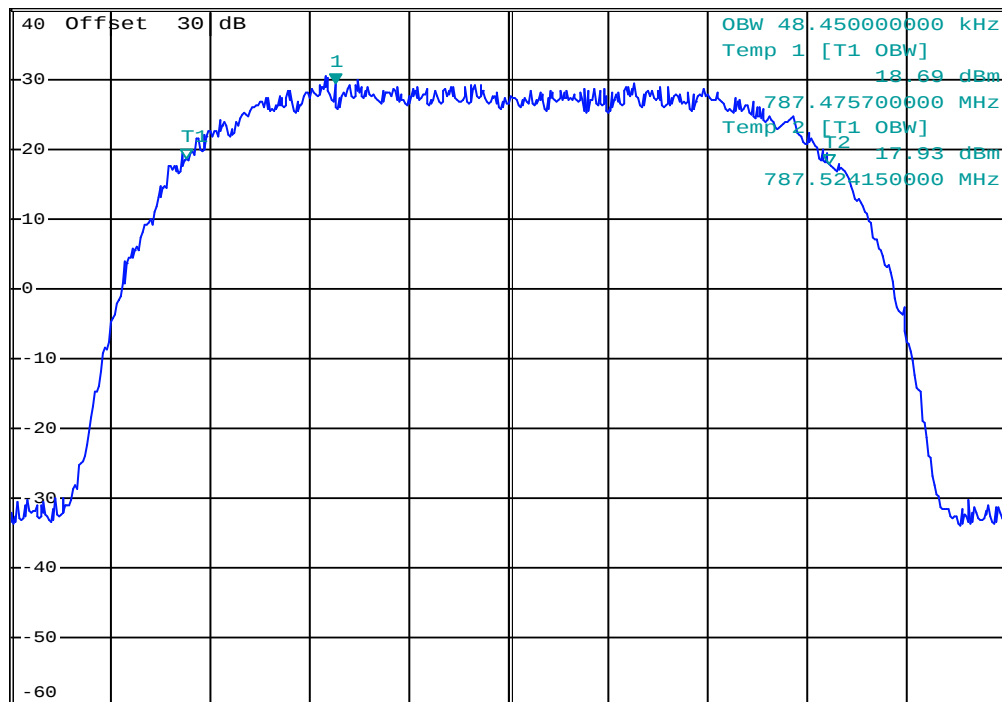


*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 29.43 dBm
*SWT 500 ms 787.486950000 MHz

Ref 40 dBm

*Att 30 dB

1 PK
VIEW



Center 787.5 MHz

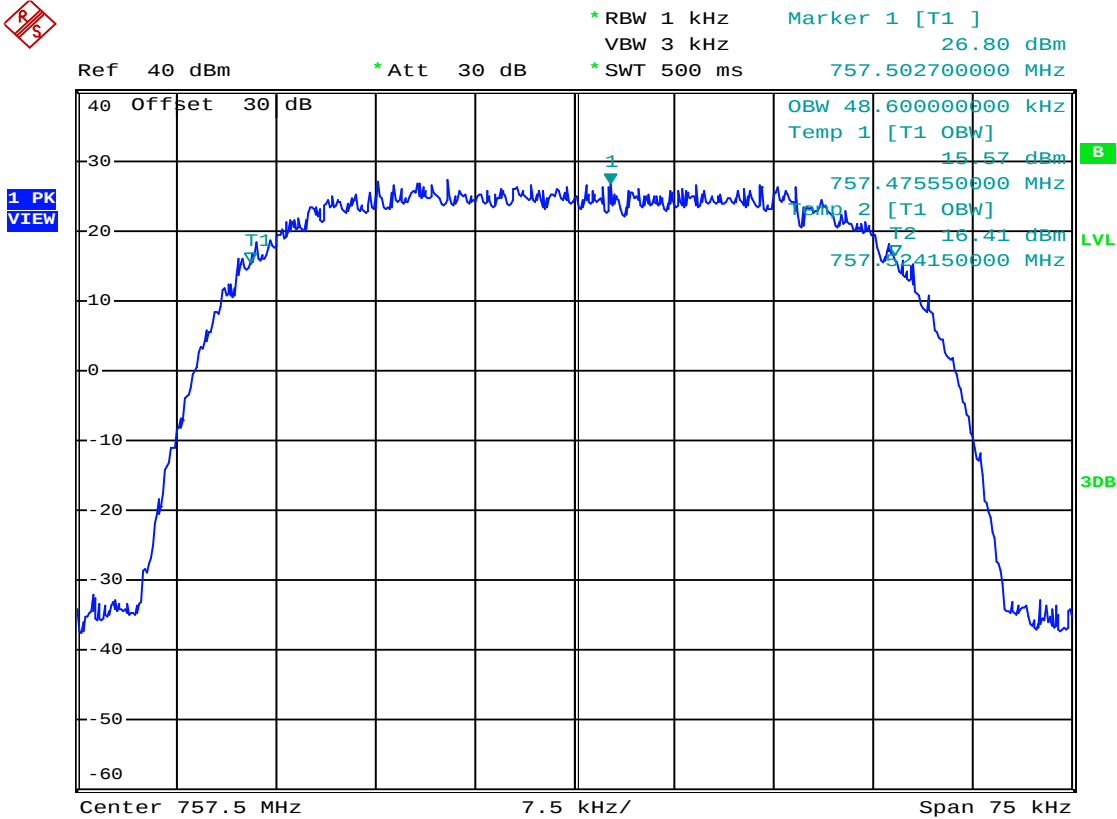
7.5 kHz/

Span 75 kHz

Date: 4.JUL.2016 15:52:03

Channel Frequency:	787.500
Rated Bandwidth:	50kHz
Modulation:	QPSK
Measured Occupied Bandwidth:	48.5kHz
Authorized Bandwidth:	50kHz
Result:	Complies

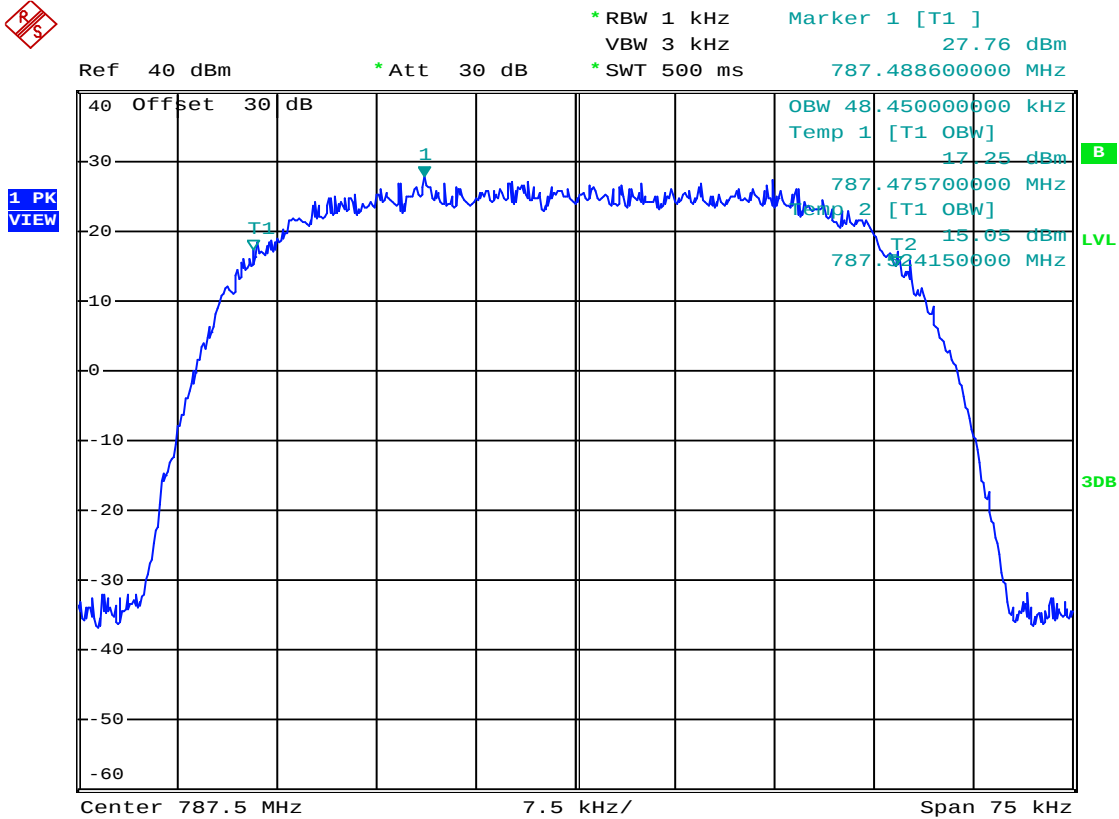
Occupied Bandwidth



Date: 4.JUL.2016 15:48:56

Channel Frequency:	757.500
Rated Bandwidth:	50kHz
Modulation:	16QAM
Measured Occupied Bandwidth:	48.6kHz
Authorized Bandwidth:	50kHz
Result:	Complies

Occupied Bandwidth



Date: 4.JUL.2016 15:53:24

Channel Frequency:	787.500
Rated Bandwidth:	50kHz
Modulation:	16QAM
Measured Occupied Bandwidth:	48.5kHz
Authorized Bandwidth:	50kHz
Result:	Complies

Occupied Bandwidth

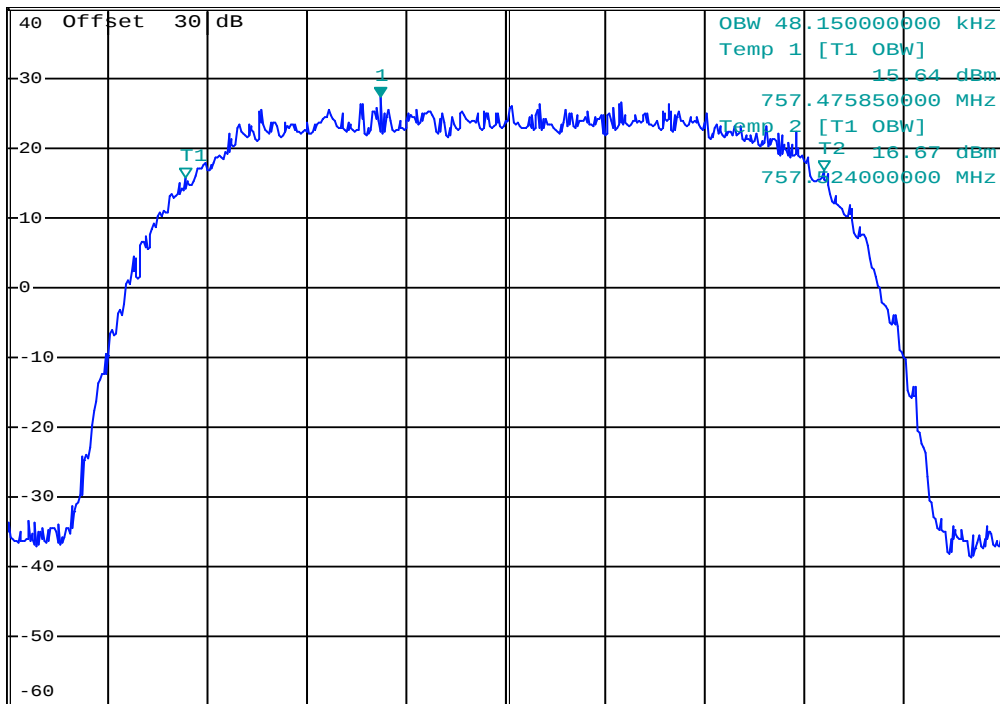


*RBW 1 kHz Marker 1 [T1]
VBW 3 kHz 27.39 dBm
*SWT 500 ms 757.490550000 MHz

Ref 40 dBm

*Att 30 dB

1 PK
VIEW



Center 757.5 MHz

7.5 kHz/

Span 75 kHz

Date: 4.JUL.2016 15:50:11

Channel Frequency:	757.500
Rated Bandwidth:	50kHz
Modulation:	64QAM
Measured Occupied Bandwidth:	48.2kHz
Authorized Bandwidth:	50kHz
Result:	Complies

Occupied Bandwidth



* RBW 1 kHz
* Att 30 dB
* VBW 3 kHz
* SWT 500 ms
Marker 1 [T1]
26.63 dBm
787.490100000 MHz

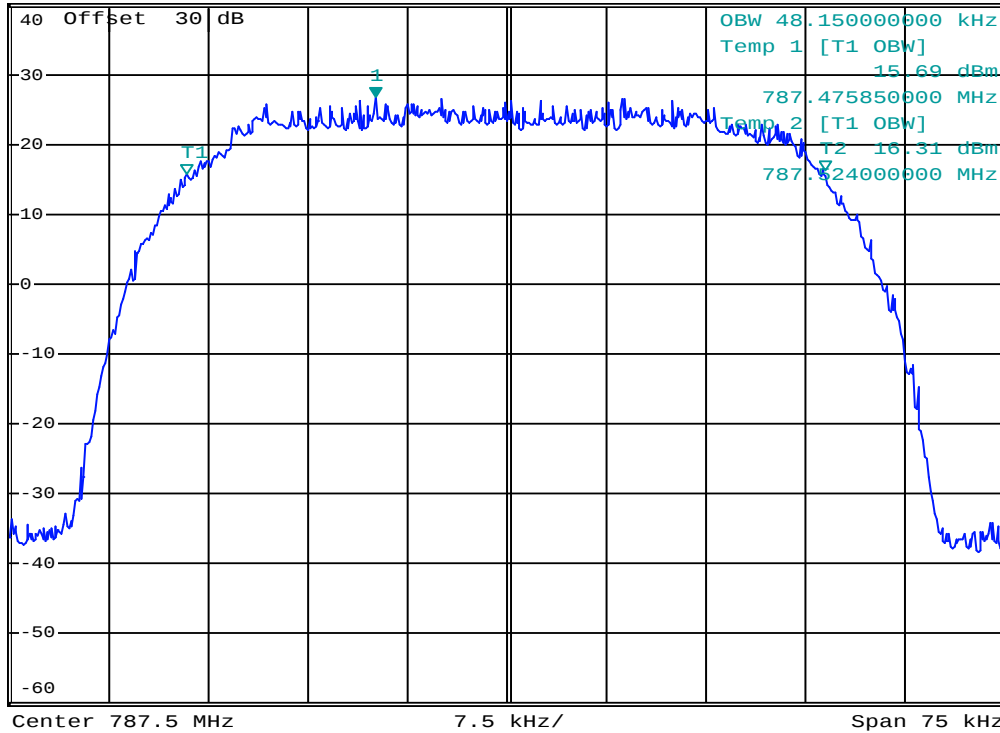
Ref 40 dBm

* Att 30 dB

* RBW 1 kHz

Marker 1 [T1]
26.63 dBm
787.490100000 MHz

1 PK
VIEW



Date: 4.JUL.2016 15:55:00

Channel Frequency: 787.500

Rated Bandwidth: 50kHz

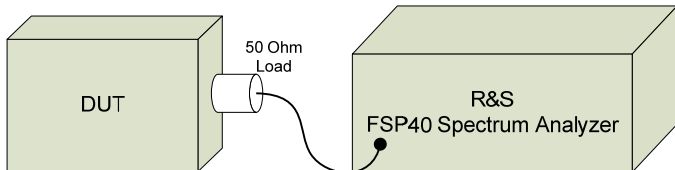
Modulation: 64QAM

Measured Occupied Bandwidth: 48.2kHz

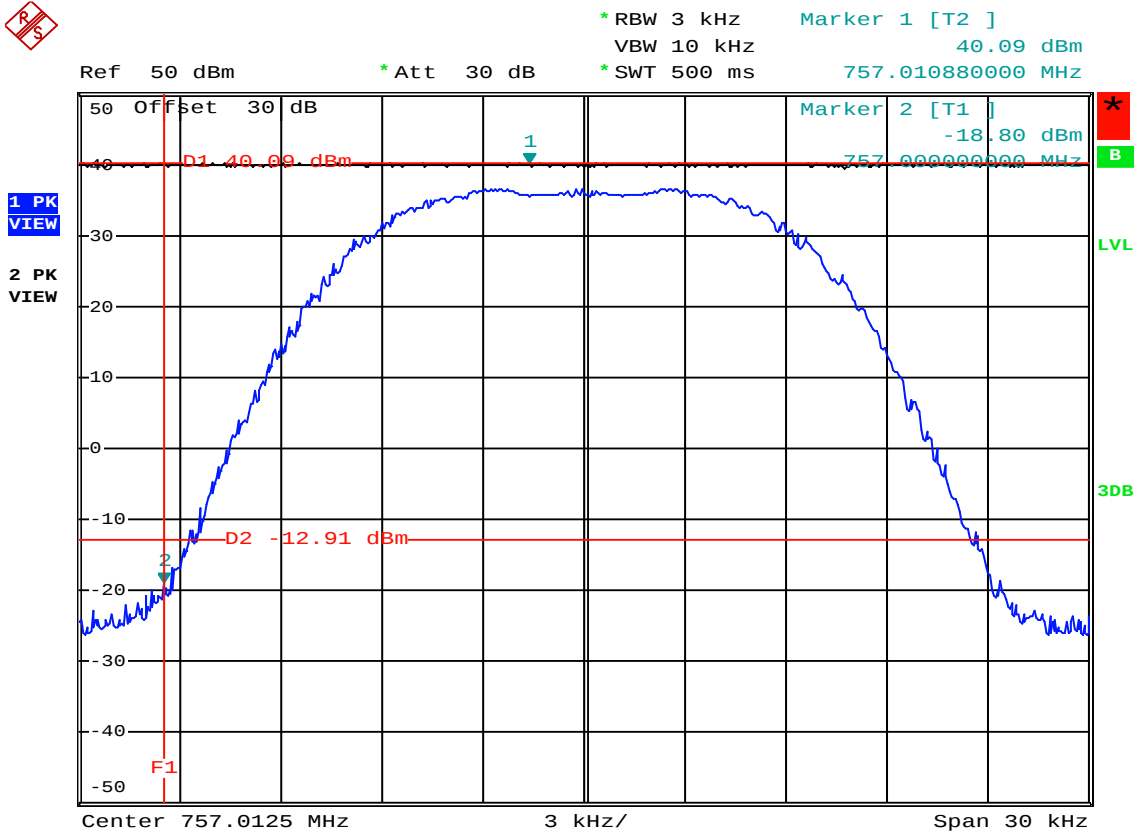
Authorized Bandwidth: 50kHz

Result: **Complies**

APPENDIX C - Band Edge

Test Conditions			
Normative Reference	FCC 47 CFR §27.53(c), KDB 971168 D01v02r01		
Limits			
47 CFR §27.53(c)	c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, 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 776– 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;		
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
Set-Up Drawing			
			

Lower Band Edge Emissions



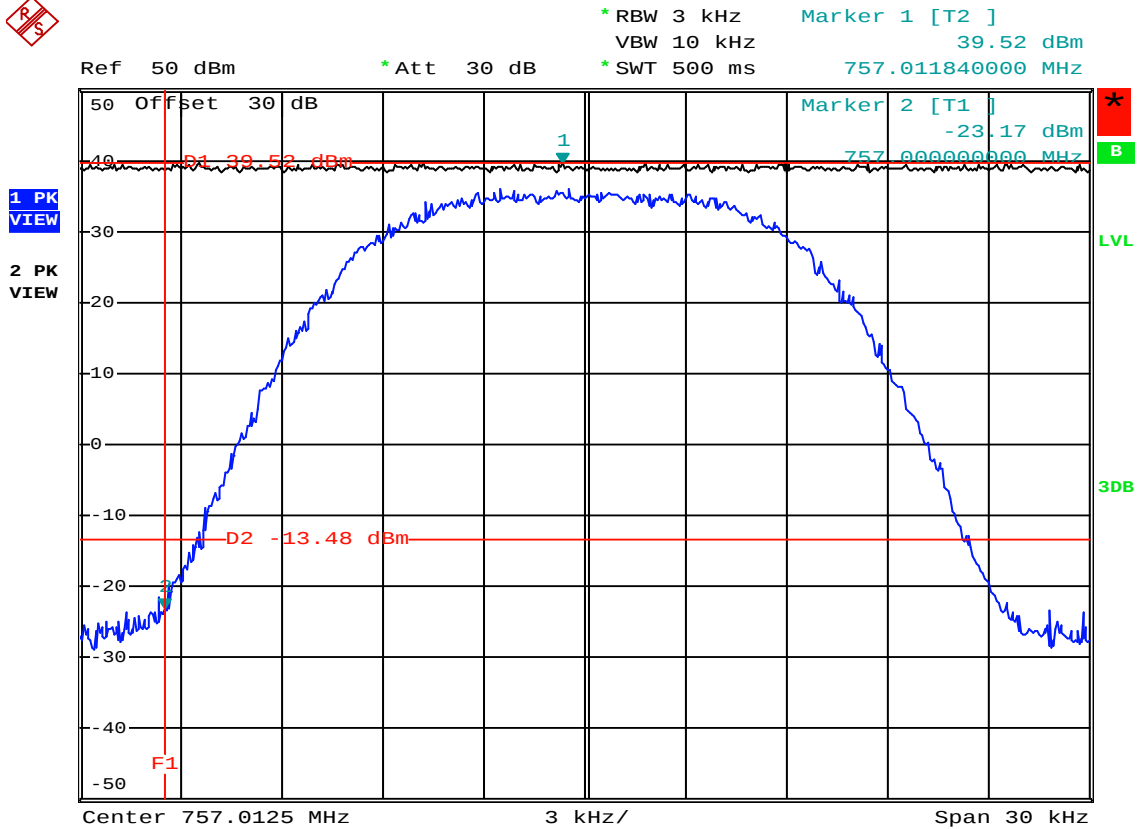
Date: 5.JUL.2016 15:04:22

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Modulation:	QPSK
Bandwidth:	12.5kHz

Lower Band Edge Emissions



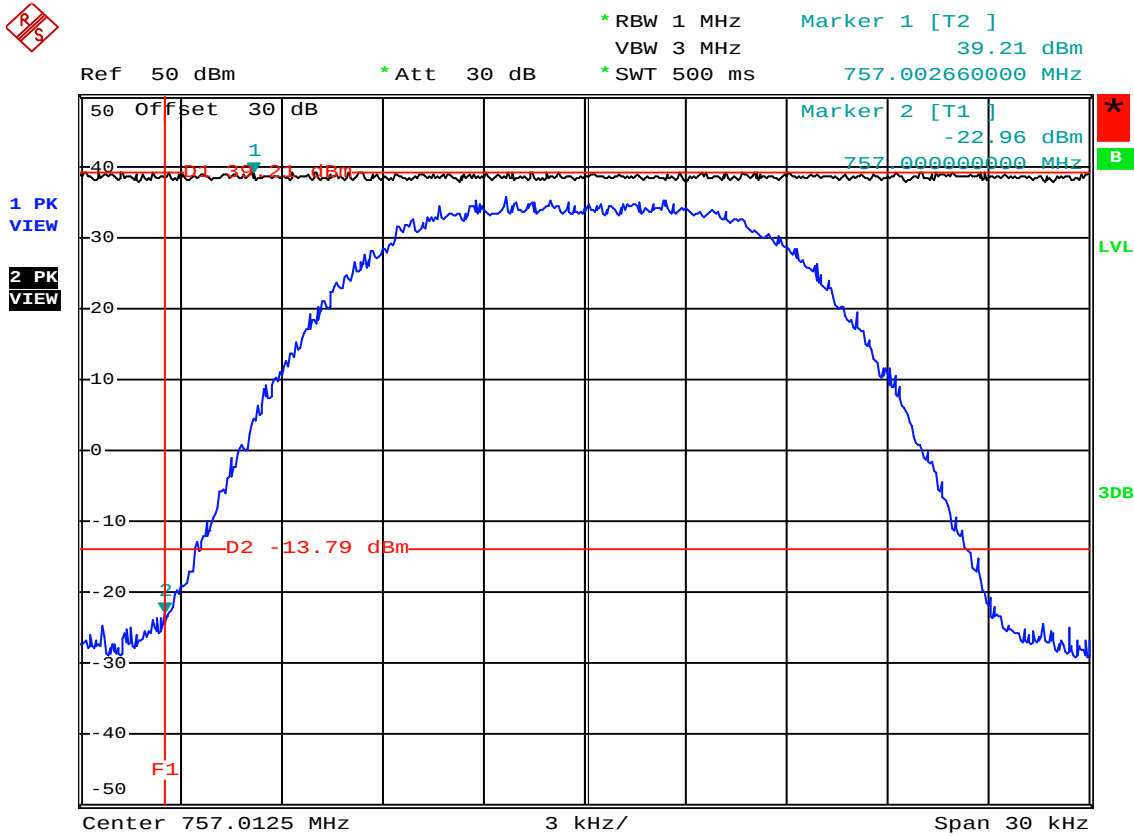
Date: 5. JUL.2016 14:56:23

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Modulation:	16QAM
Bandwidth:	12.5kHz

Lower Band Edge Emissions



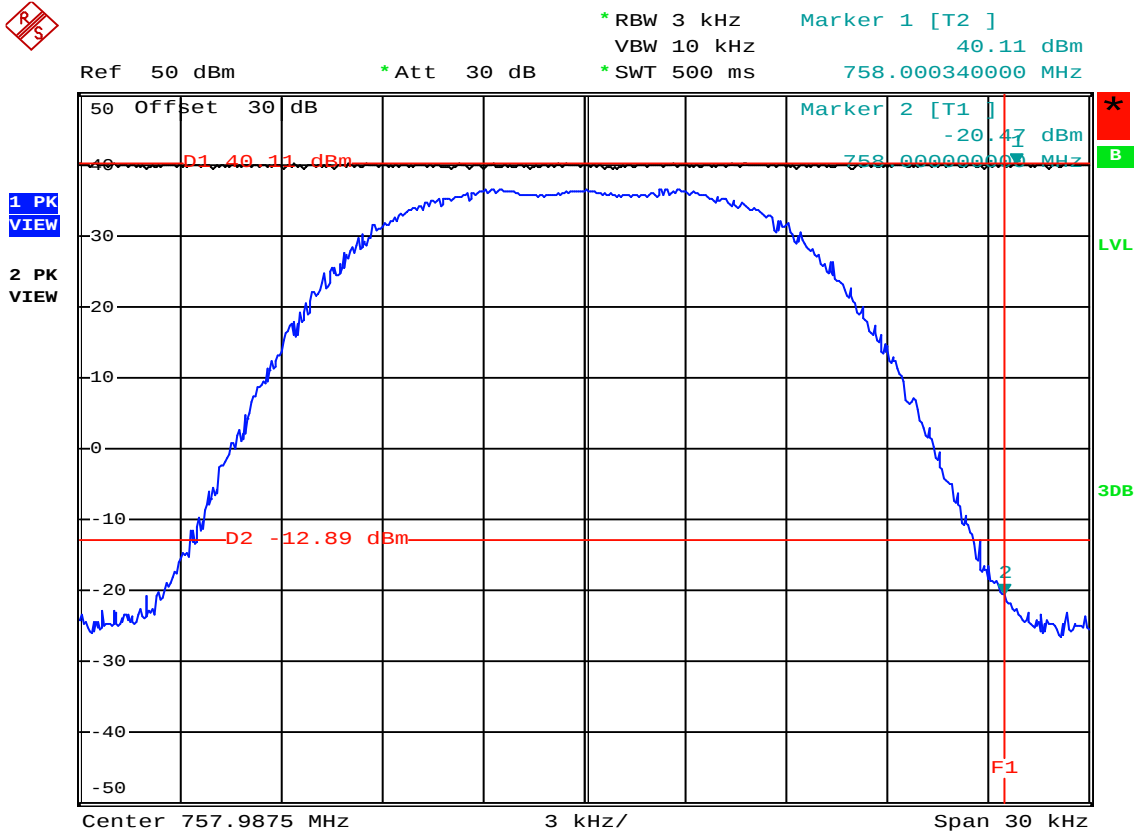
Date: 5.JUL.2016 15:02:10

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Modulation:	64QAM
Bandwidth:	12.5kHz

Upper Band Edge Emissions



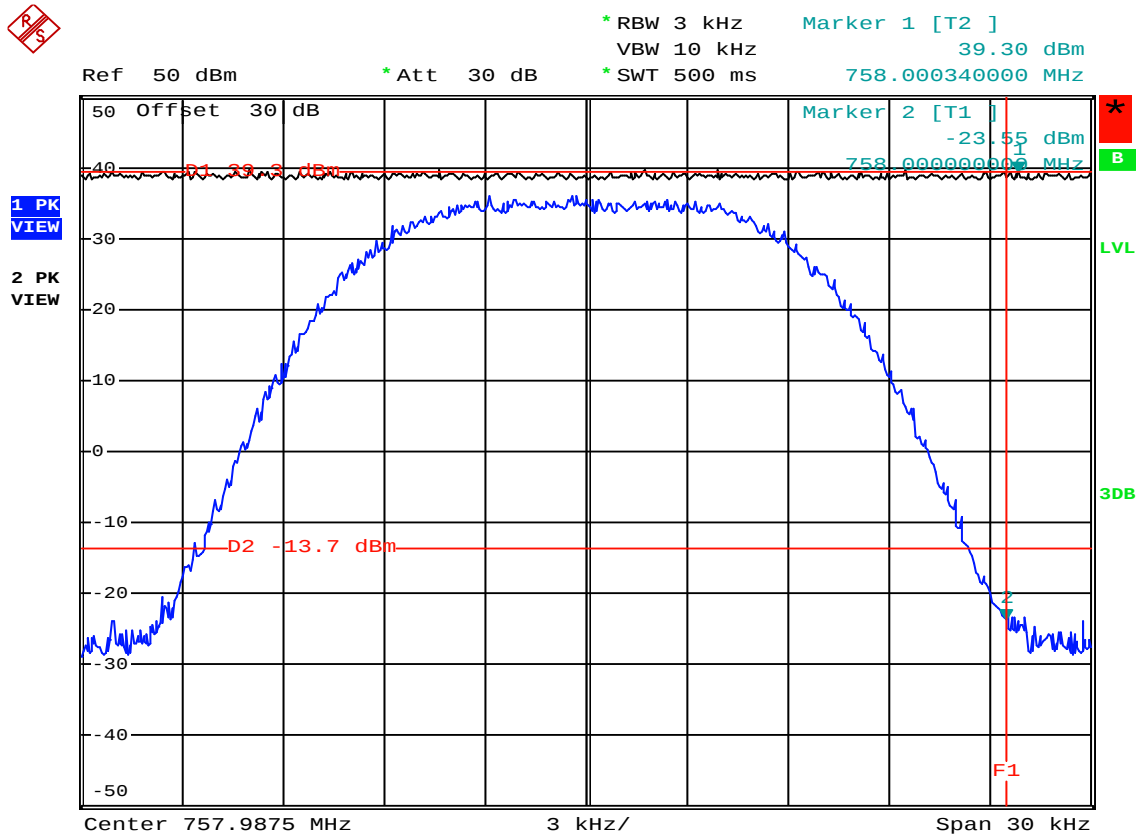
Date: 5.JUL.2016 15:11:34

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Modulation:	QPSK
Bandwidth:	12.5kHz

Upper Band Edge Emissions



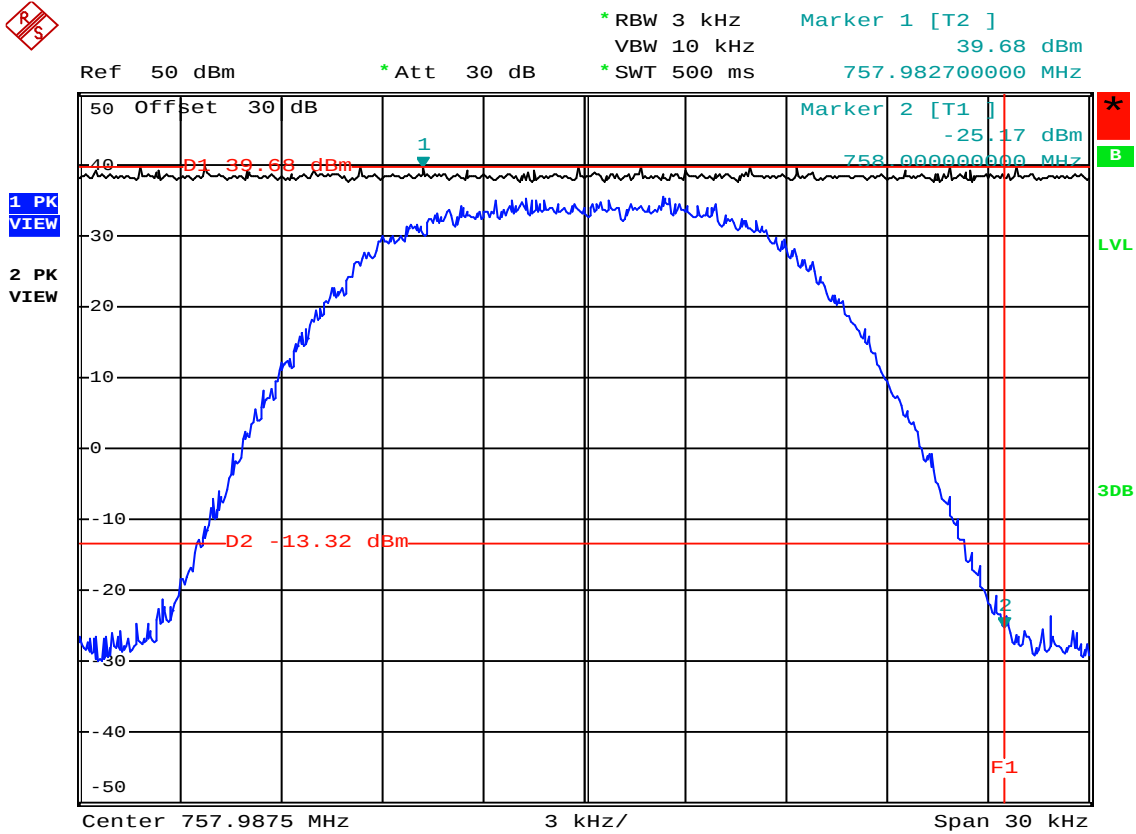
Date: 5.JUL.2016 15:13:44

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Modulation:	16QAM
Bandwidth:	12.5kHz

Upper Band Edge Emissions



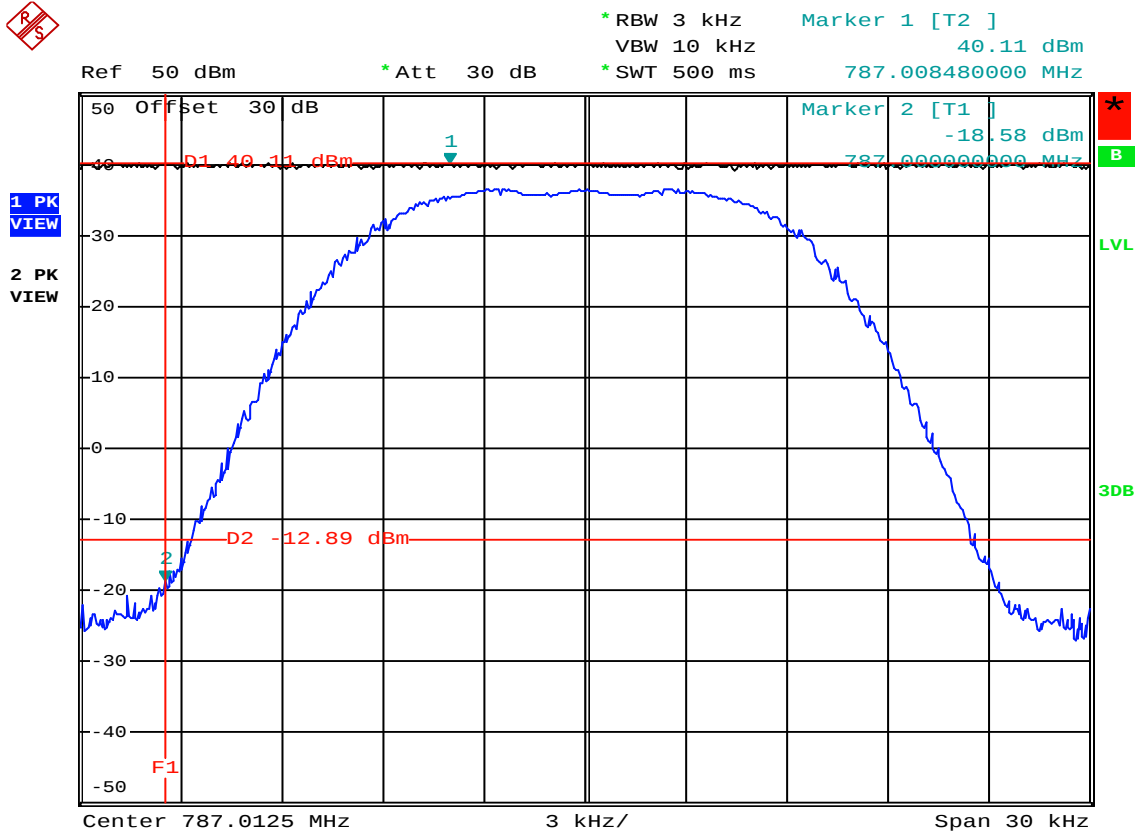
Date: 5. JUL. 2016 15:16:33

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Modulation:	64QAM
Bandwidth:	12.5kHz

Lower Band Edge Emissions

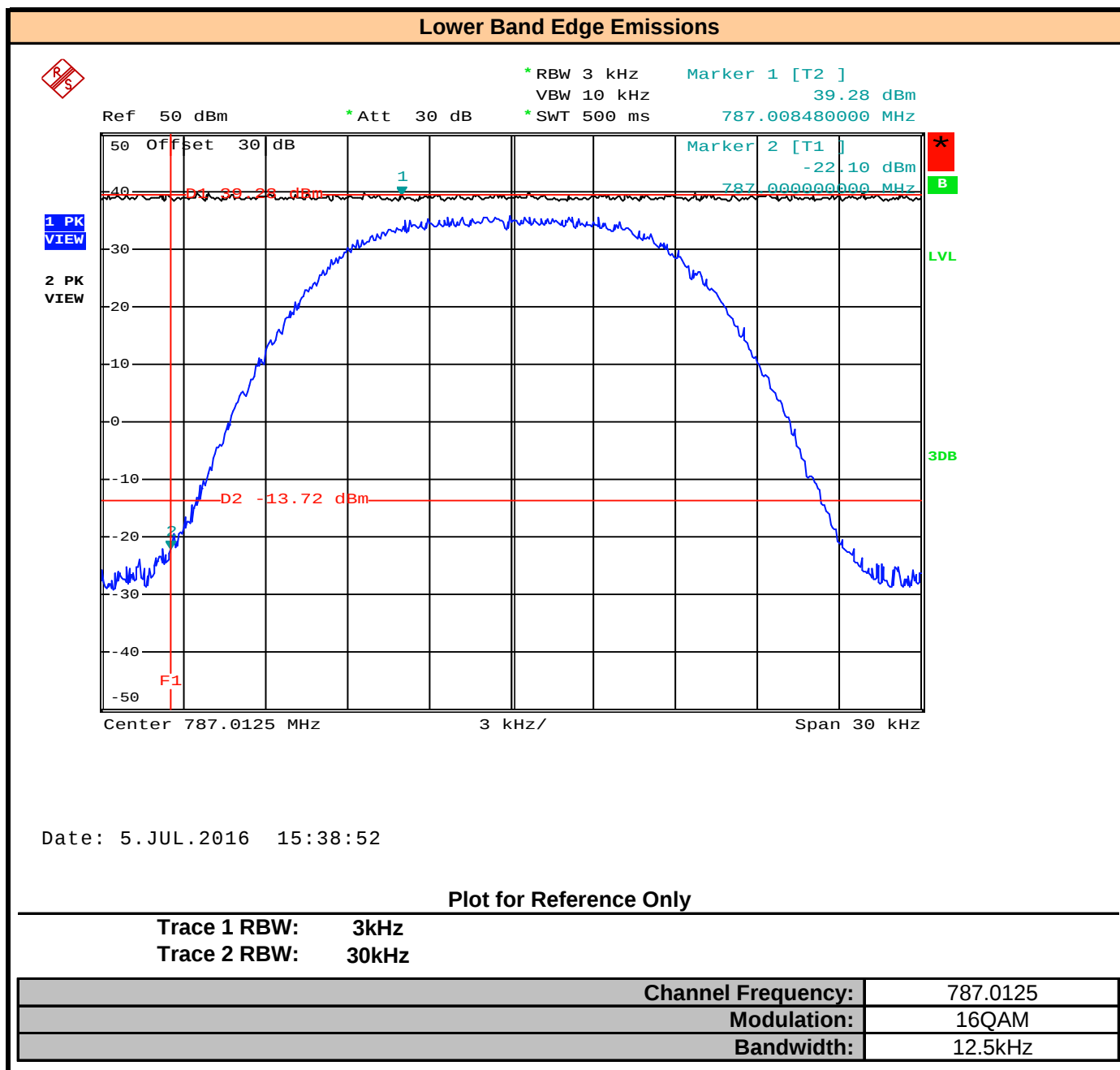


Date: 5.JUL.2016 15:36:21

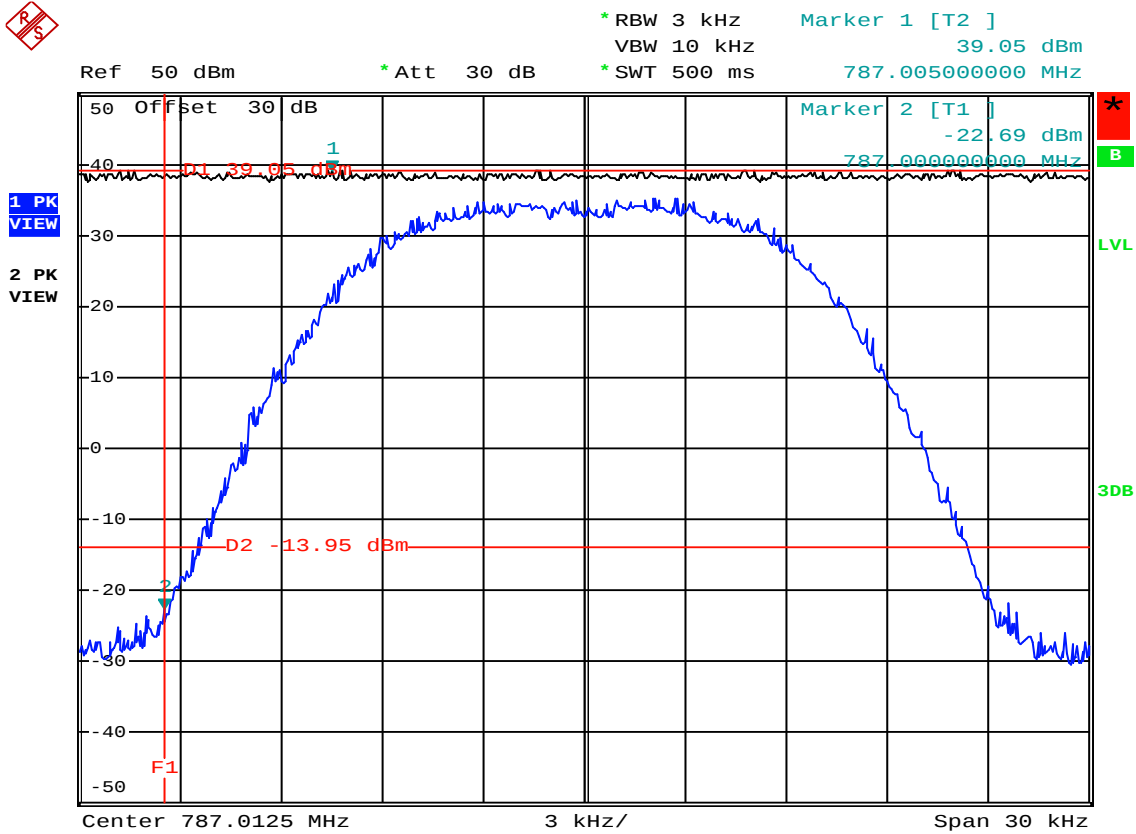
Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.0125
Modulation:	QPSK
Bandwidth:	12.5kHz



Lower Band Edge Emissions



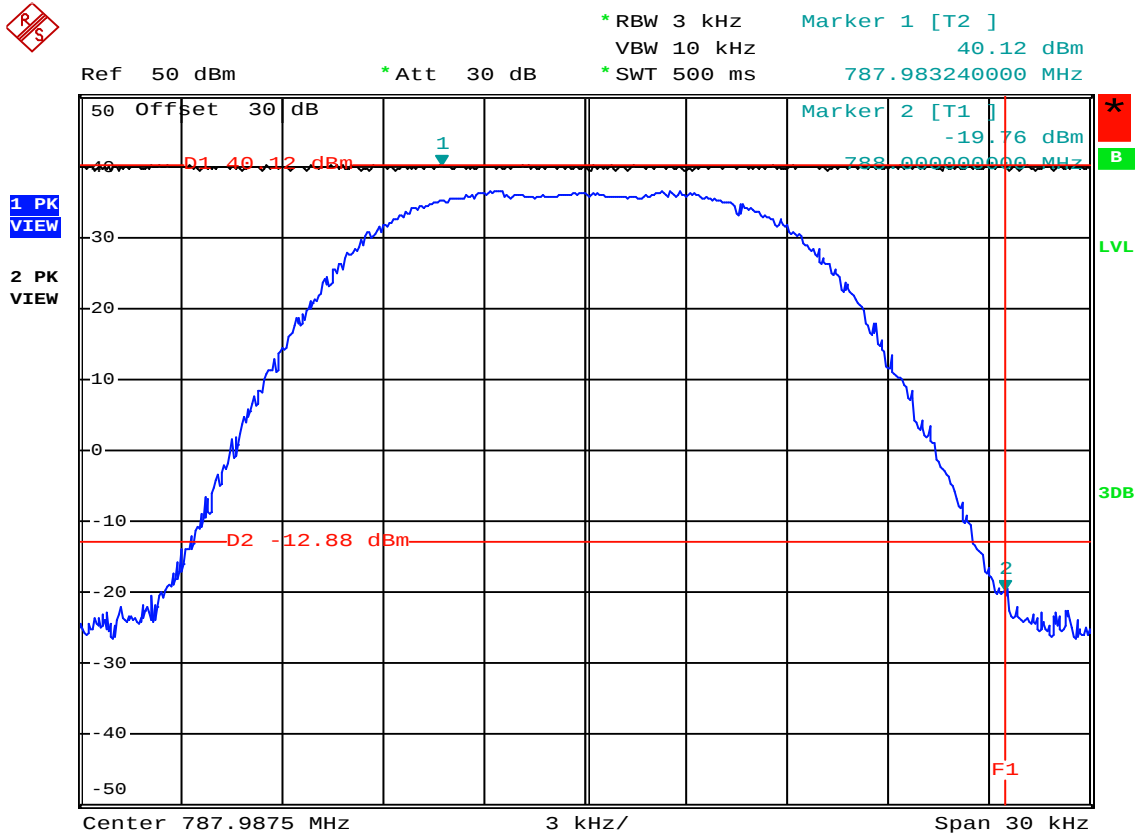
Date: 5. JUL. 2016 15:41:16

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.0125
Modulation:	64QAM
Bandwidth:	12.5kHz

Upper Band Edge Emissions



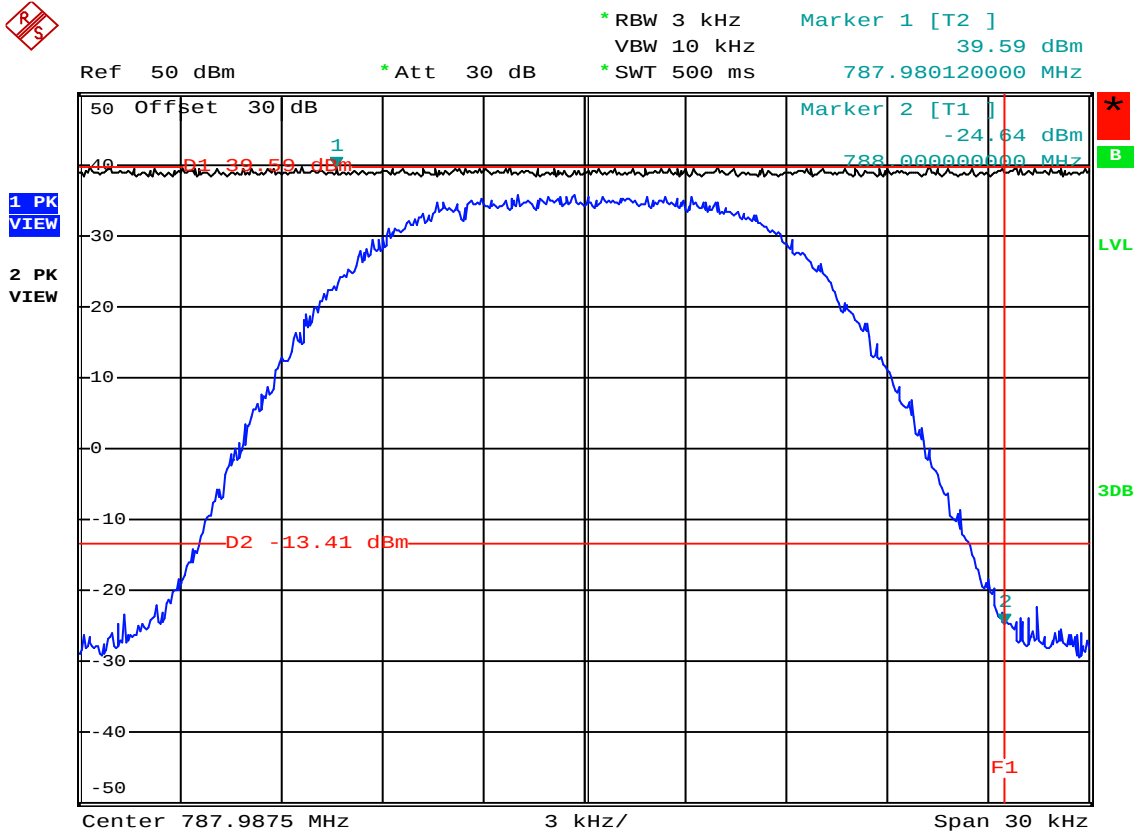
Date: 5.JUL.2016 15:21:13

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.9875
Modulation:	QPSK
Bandwidth:	12.5kHz

Upper Band Edge Emissions



Date: 5.JUL.2016 15:23:44

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.9875
Modulation:	16QAM
Bandwidth:	12.5kHz

Upper Band Edge Emissions

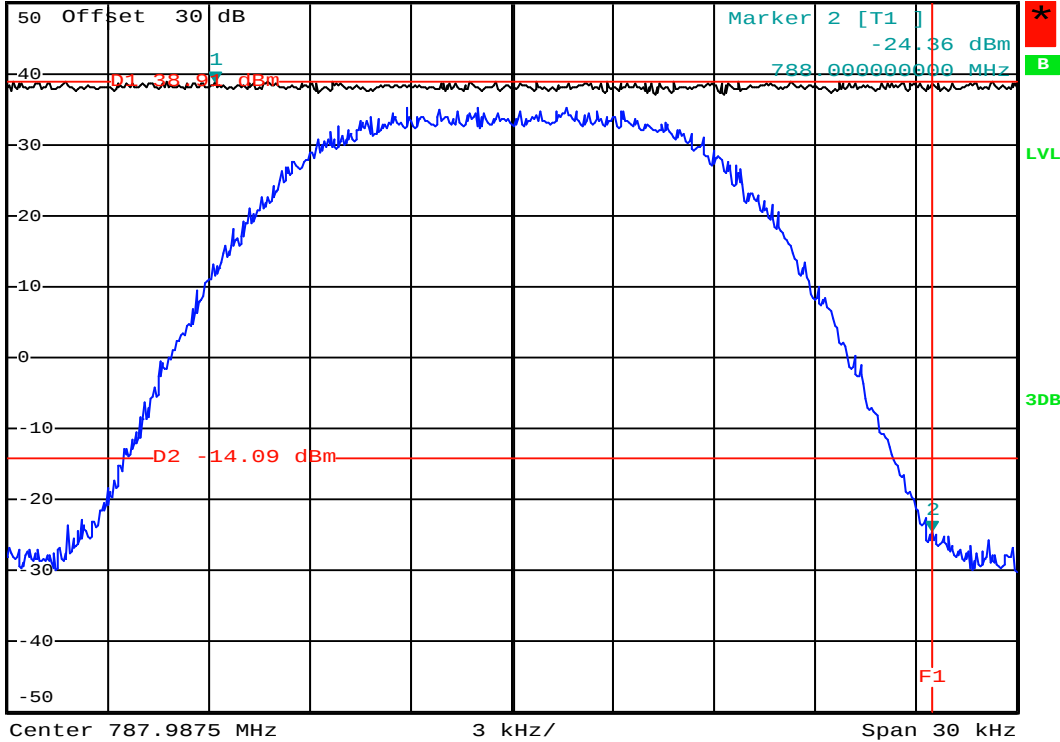


* RBW 3 kHz Marker 1 [T2] 38.91 dBm
VBW 10 kHz
* Att 30 dB 787.978680000 MHz
* SWT 500 ms

Ref 50 dBm

1 PK
VIEW

2 PK
VIEW



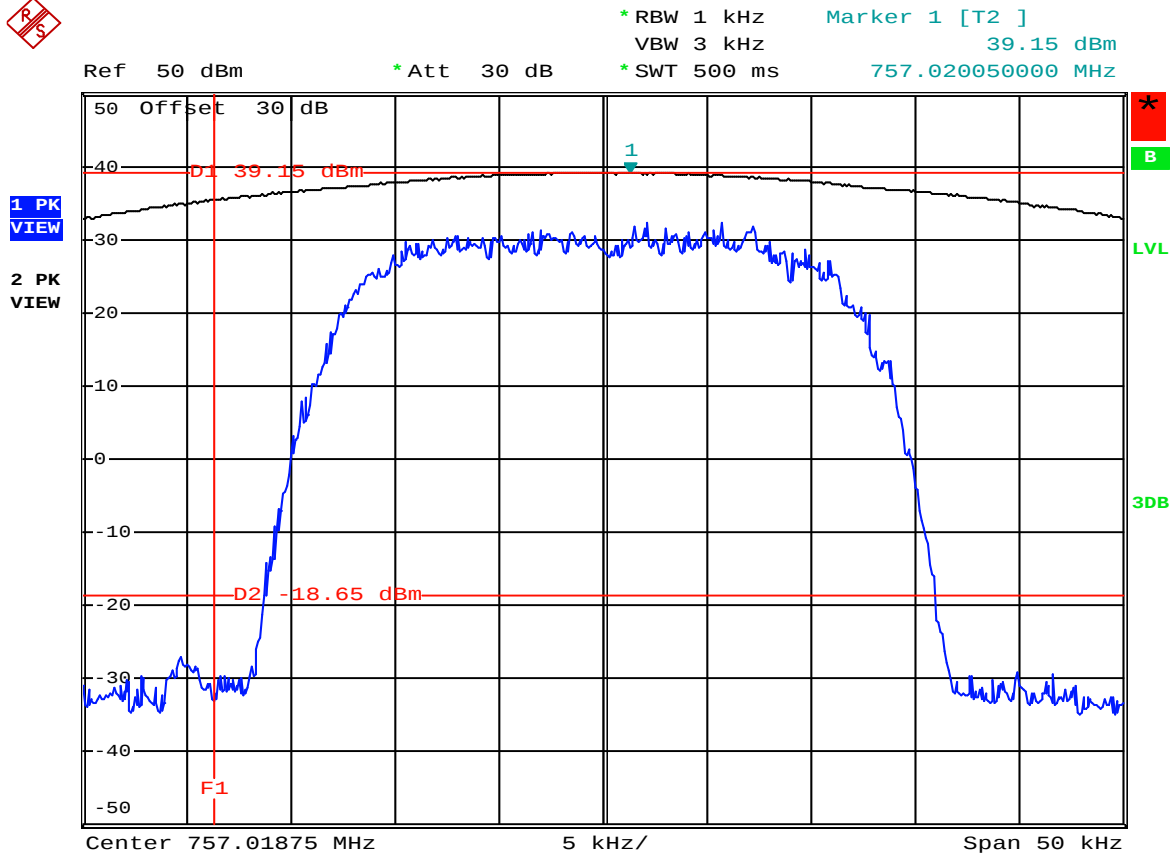
Date: 5.JUL.2016 15:26:16

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.9875
Modulation:	64QAM
Bandwidth:	12.5kHz

Lower Band Edge Emissions



Date: 15.JUL.2016 12:00:36

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Modulation:	QPSK
Bandwidth:	25kHz

Lower Band Edge Emissions

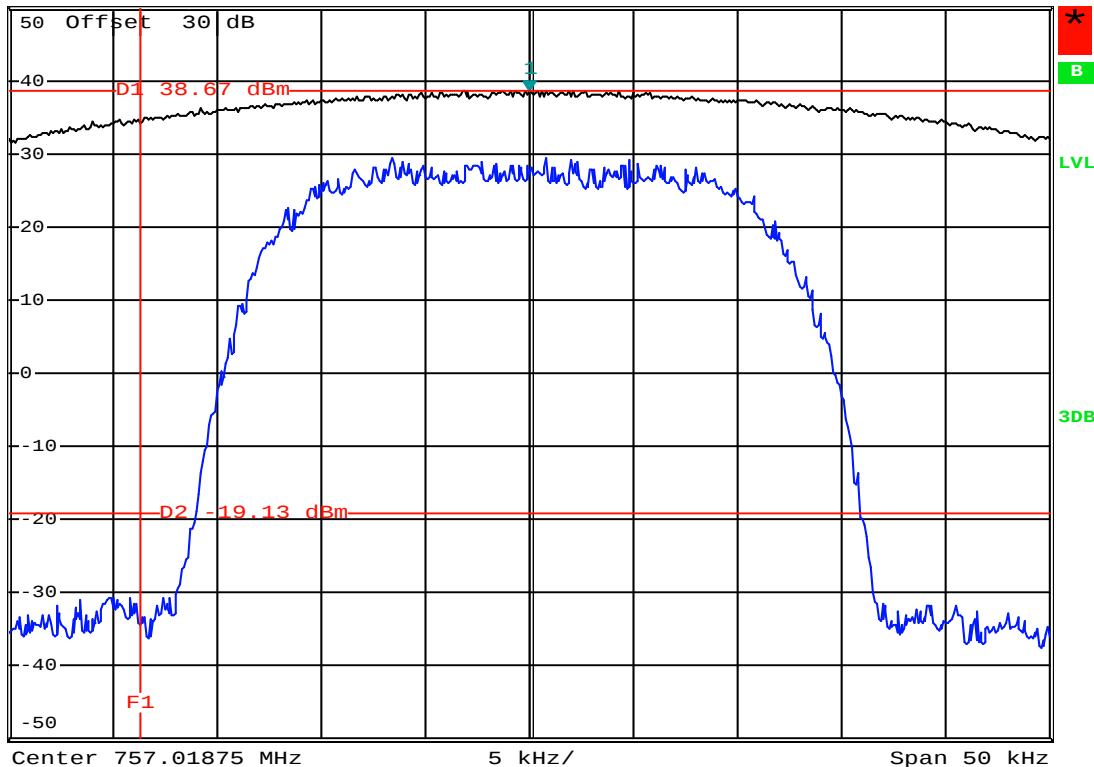


* RBW 1 kHz Marker 1 [T2] 38.67 dBm
VBW 3 kHz
* Att 30 dB * SWT 500 ms 757.018750000 MHz

Ref 50 dBm

1 PK
VIEW

2 PK
VIEW

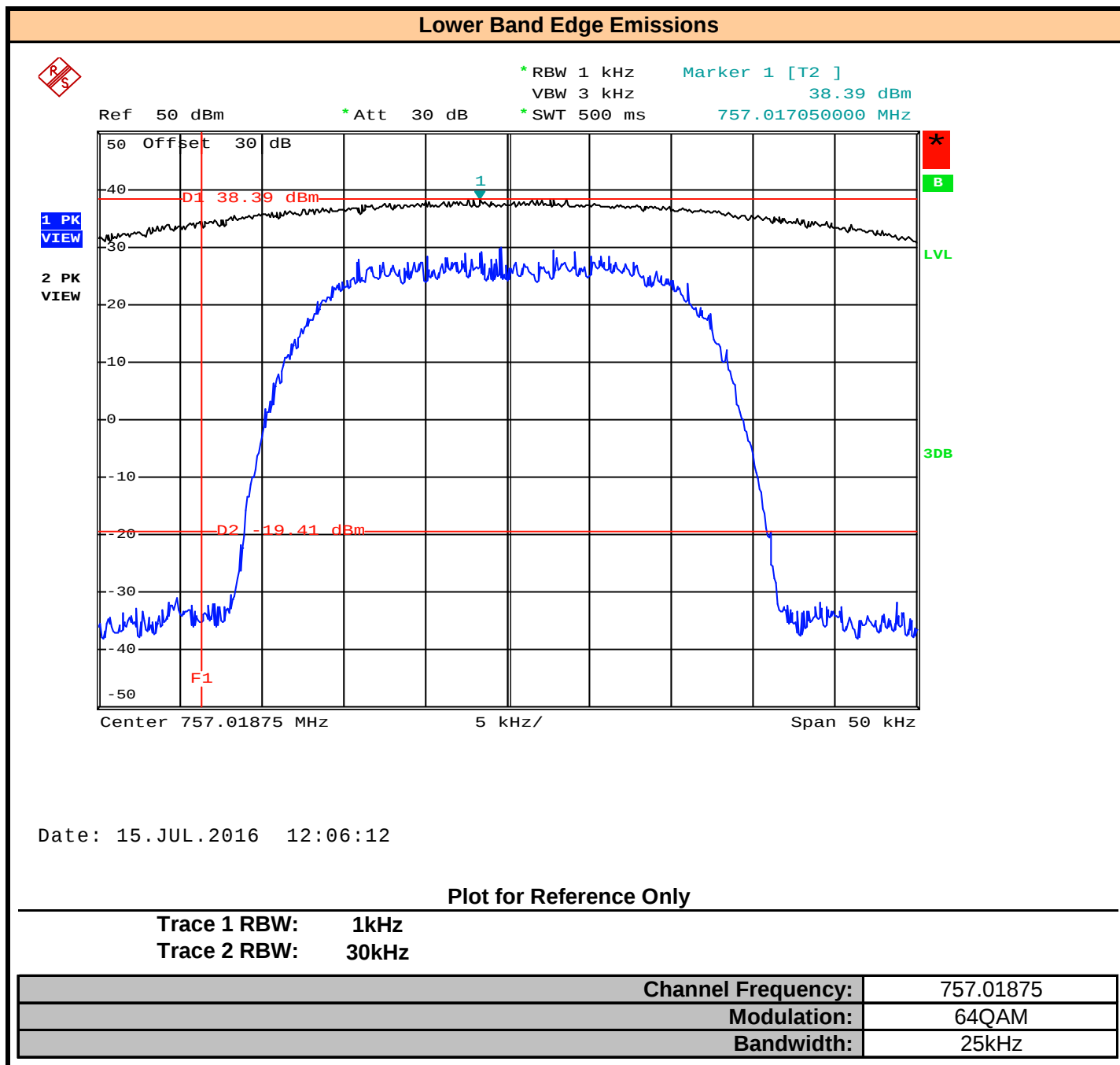


Date: 15.JUL.2016 12:03:52

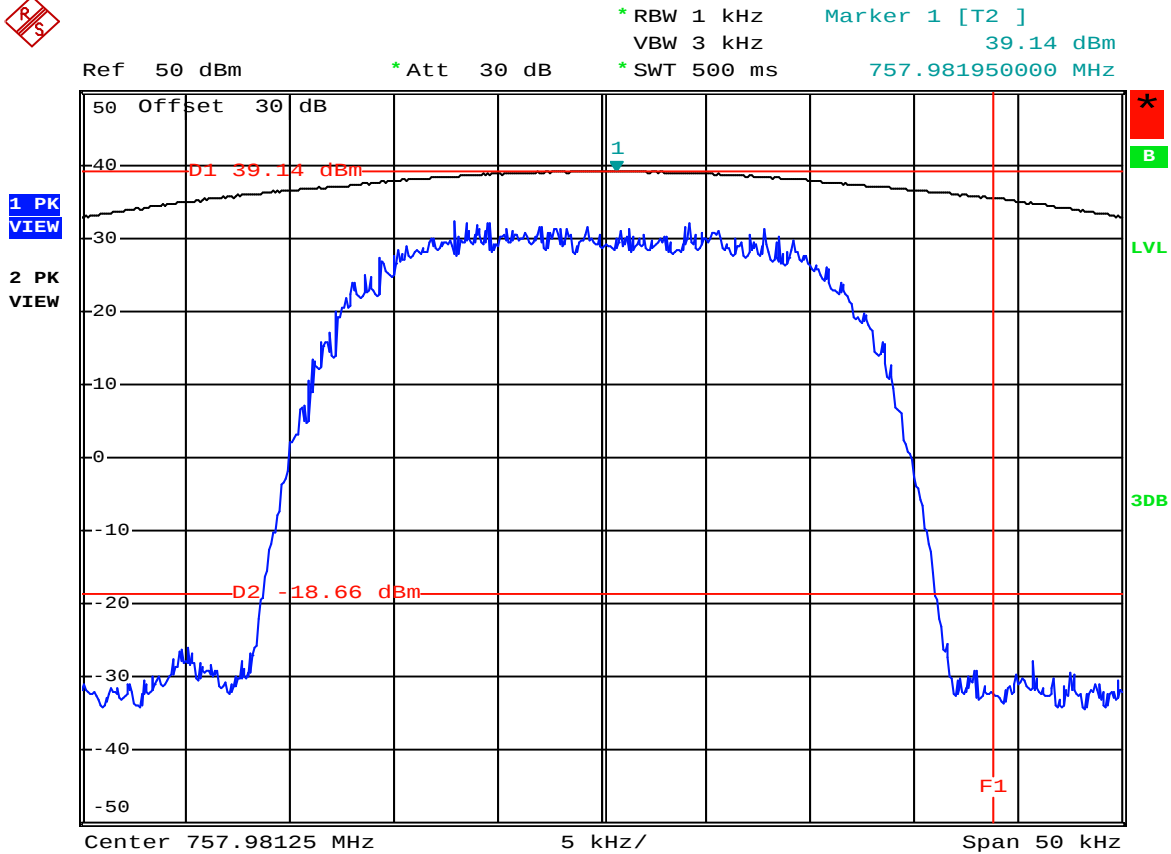
Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Modulation:	16QAM
Bandwidth:	25kHz



Upper Band Edge Emissions



Date: 15.JUL.2016 12:18:58

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Modulation:	QPSK
Bandwidth:	25kHz

Upper Band Edge Emissions



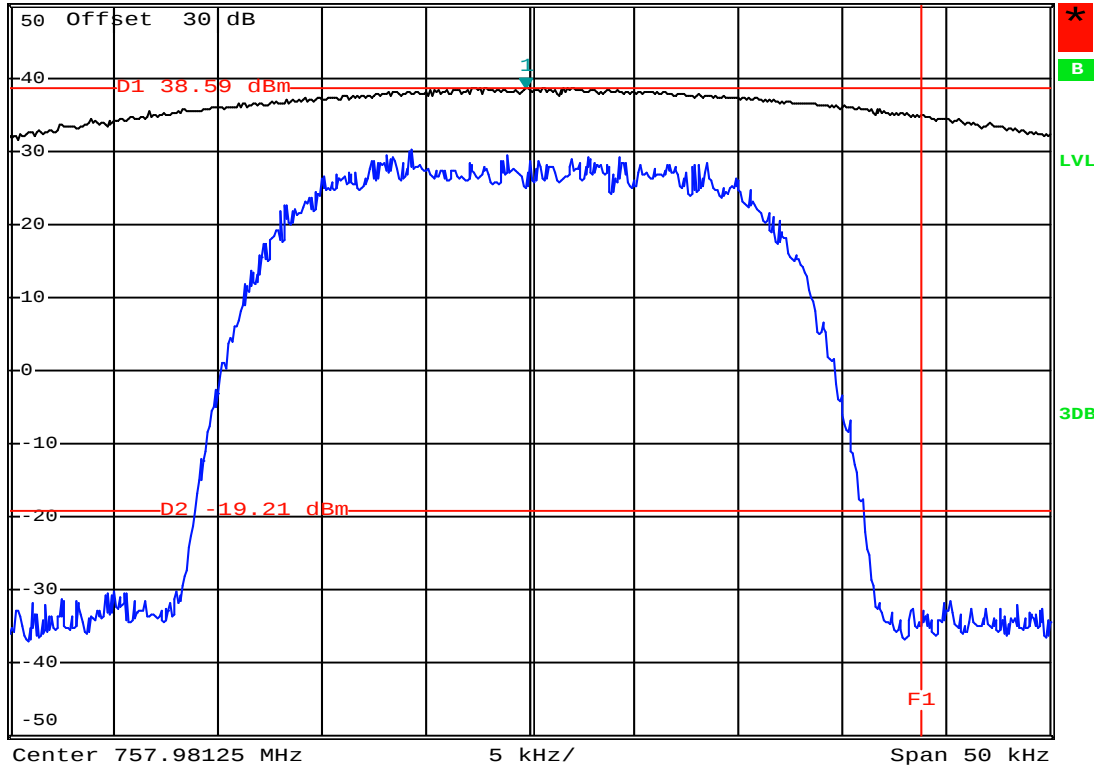
* RBW 1 kHz Marker 1 [T2]
VBW 3 kHz 38.59 dBm
* SWT 500 ms 757.981050000 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 15.JUL.2016 12:21:21

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Modulation:	16QAM
Bandwidth:	25kHz

Upper Band Edge Emissions

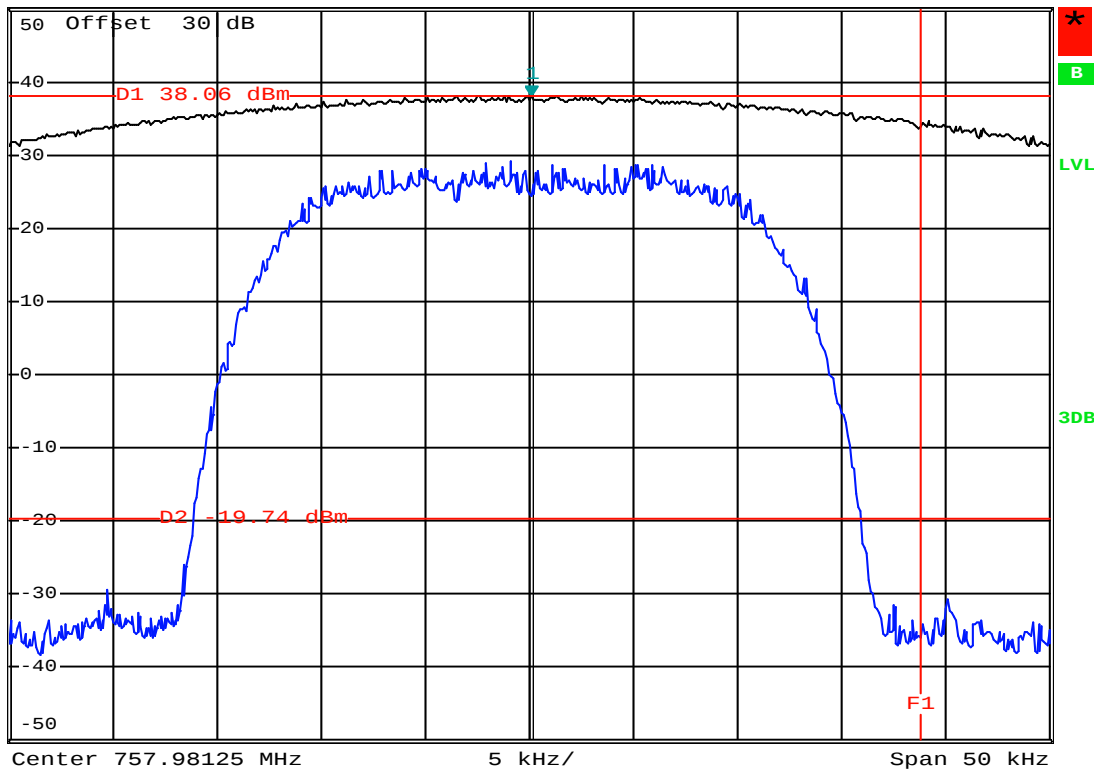


* RBW 1 kHz Marker 1 [T2] 38.06 dBm
VBW 3 kHz
* Att 30 dB * SWT 500 ms 757.981350000 MHz

Ref 50 dBm

1 PK
VIEW

2 PK
VIEW



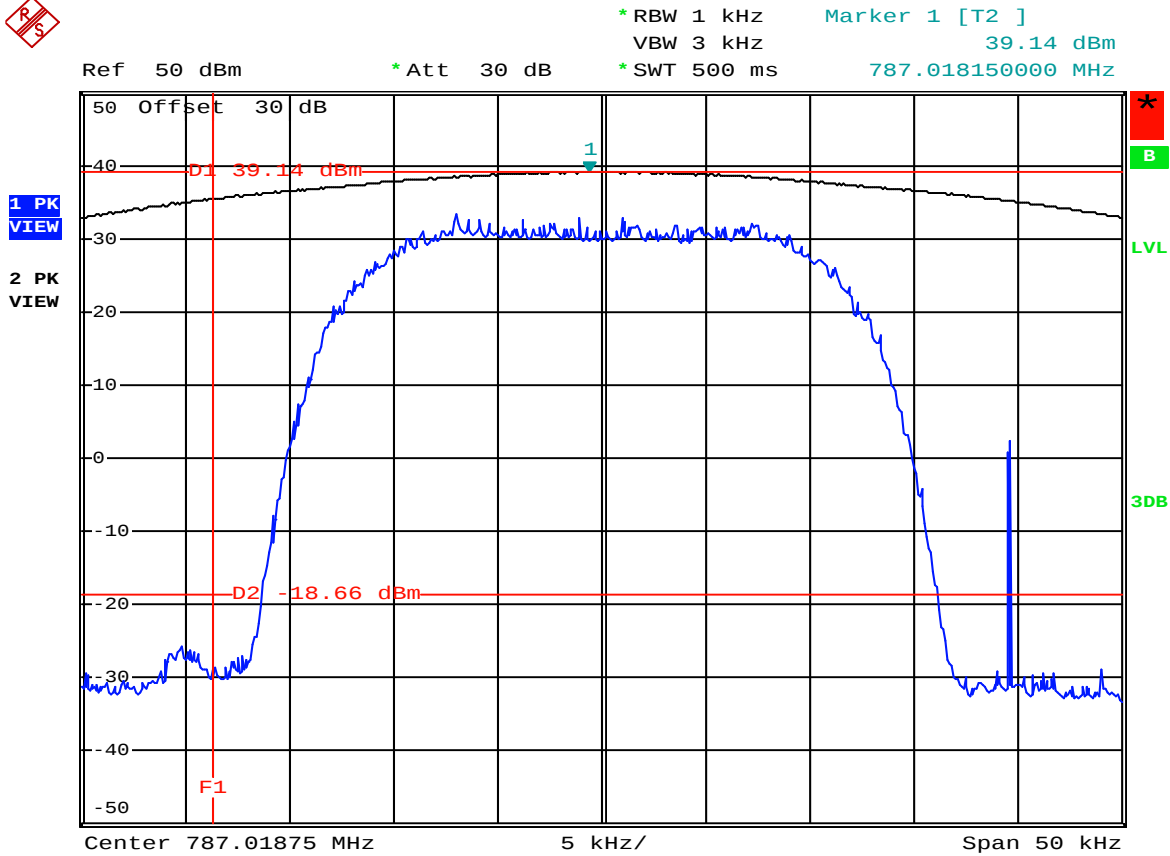
Date: 15.JUL.2016 12:23:33

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Modulation:	64QAM
Bandwidth:	25kHz

Lower Band Edge Emissions



Date: 15.JUL.2016 12:28:02

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.01875
Modulation:	QPSK
Bandwidth:	25kHz

Lower Band Edge Emissions



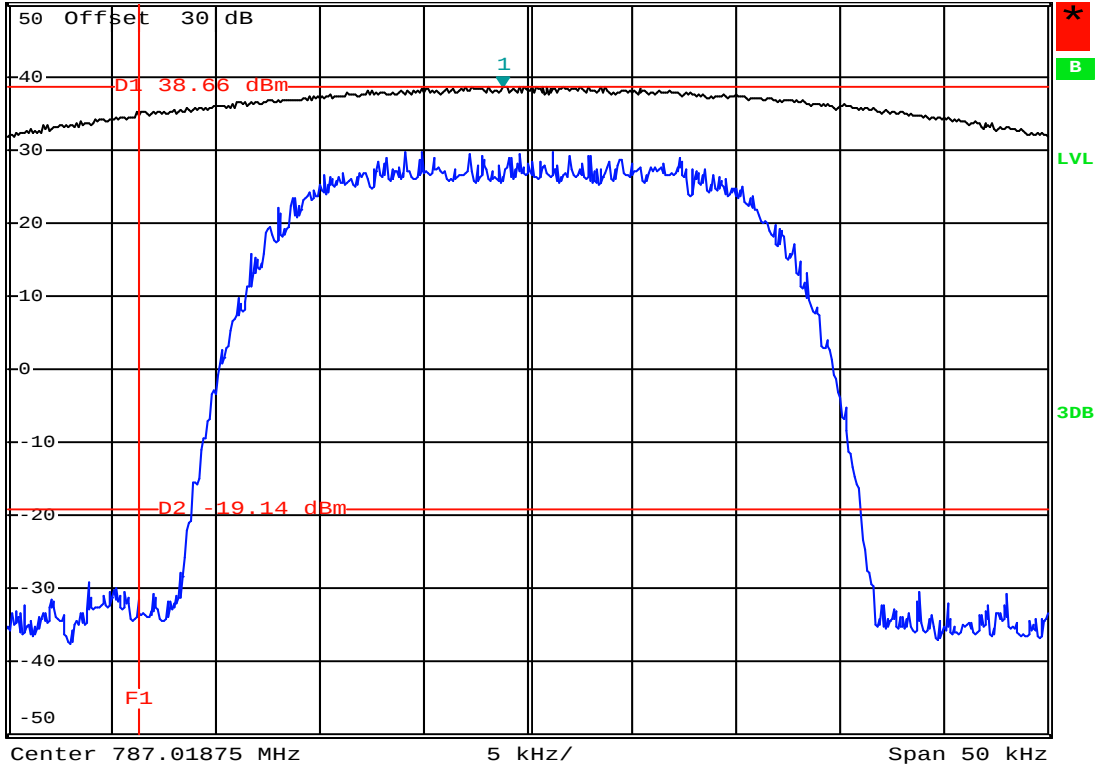
*RBW 1 kHz Marker 1 [T2]
VBW 3 kHz 38.66 dBm
*SWT 500 ms 787.017550000 MHz

Ref 50 dBm

*Att 30 dB

1 PK
VIEW

2 PK
VIEW

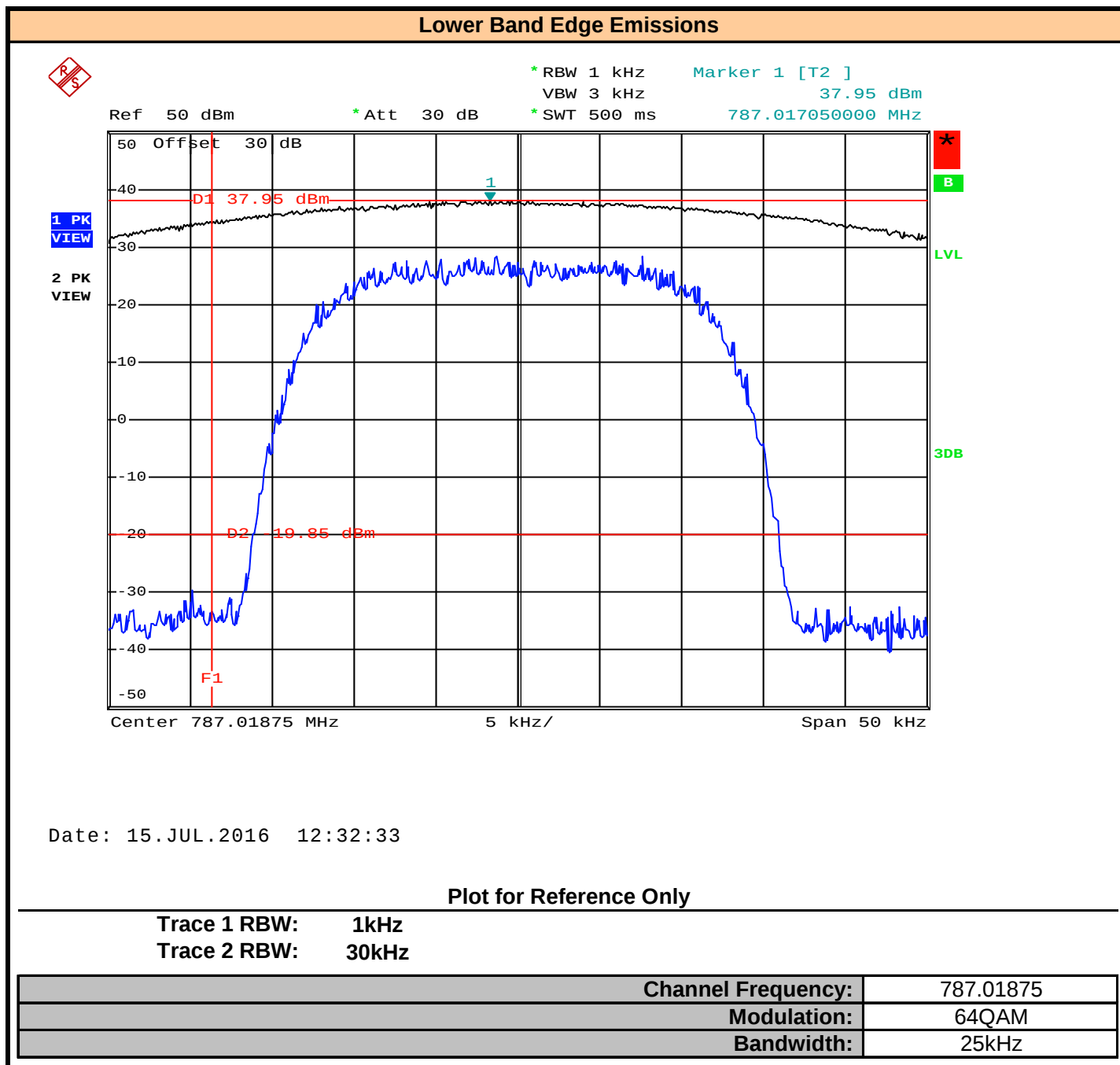


Date: 15.JUL.2016 12:30:31

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.01875
Modulation:	16QAM
Bandwidth:	25kHz



Upper Band Edge Emissions



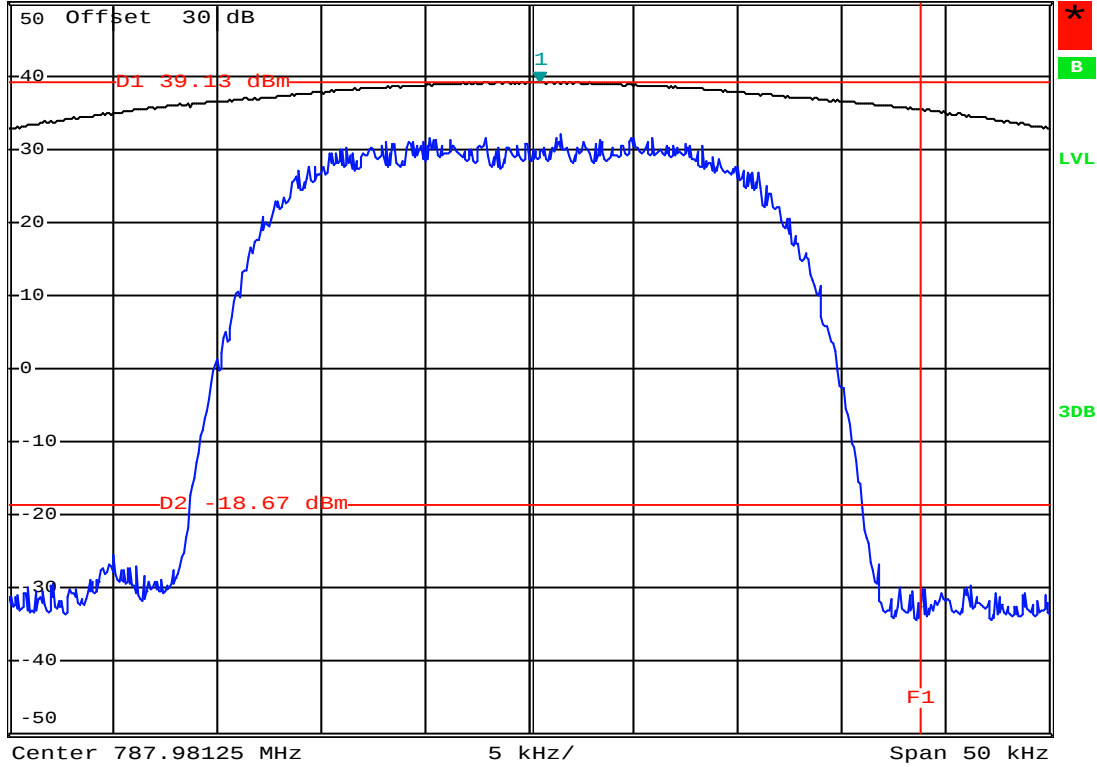
* RBW 1 kHz Marker 1 [T2]
VBW 3 kHz 39.13 dBm
* SWT 500 ms 787.981750000 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



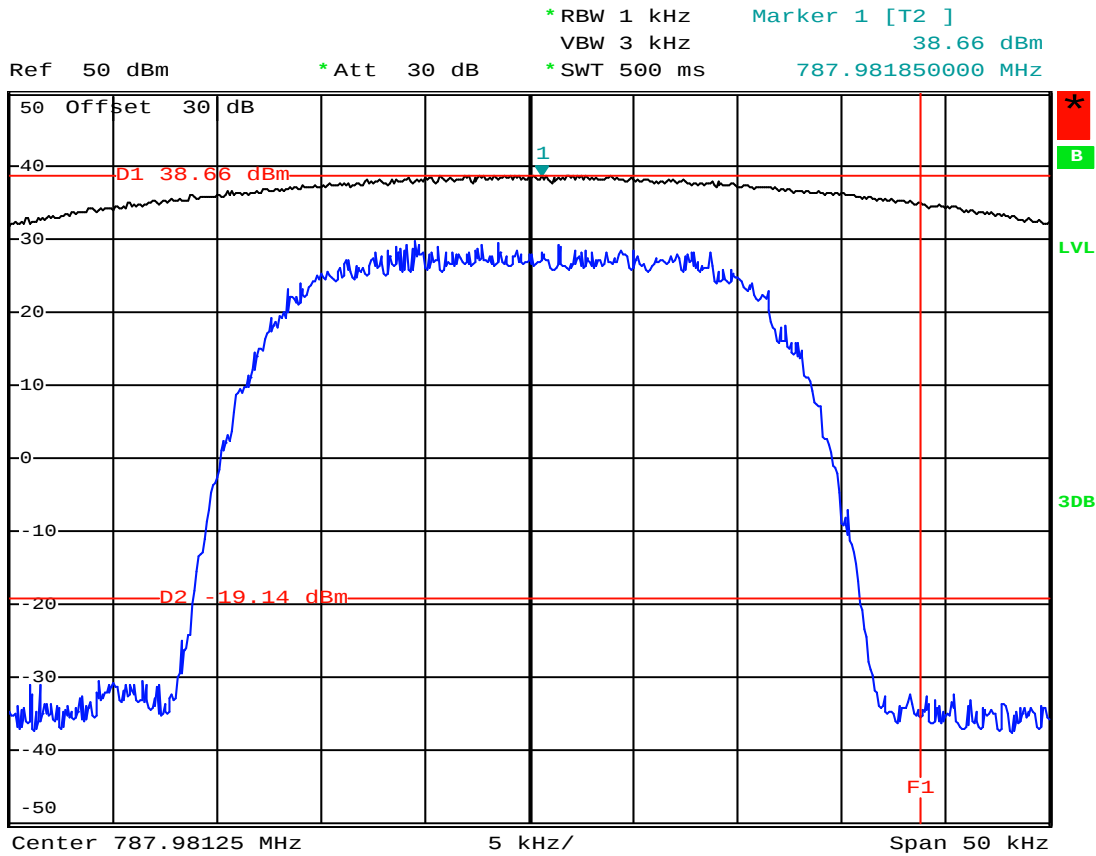
Date: 15.JUL.2016 12:35:51

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.98125
Modulation:	QPSK
Bandwidth:	25kHz

Upper Band Edge Emissions



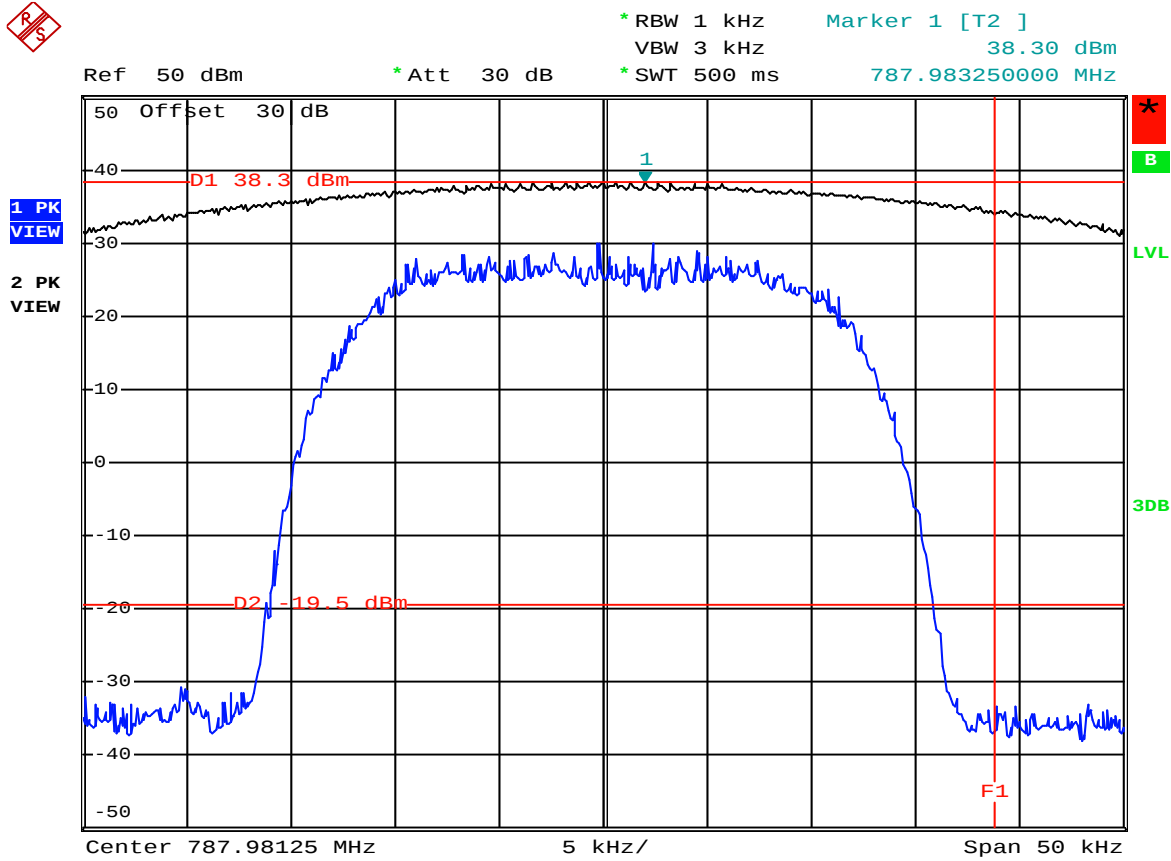
Date: 15.JUL.2016 12:38:12

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.98125
Modulation:	16QAM
Bandwidth:	25kHz

Upper Band Edge Emissions



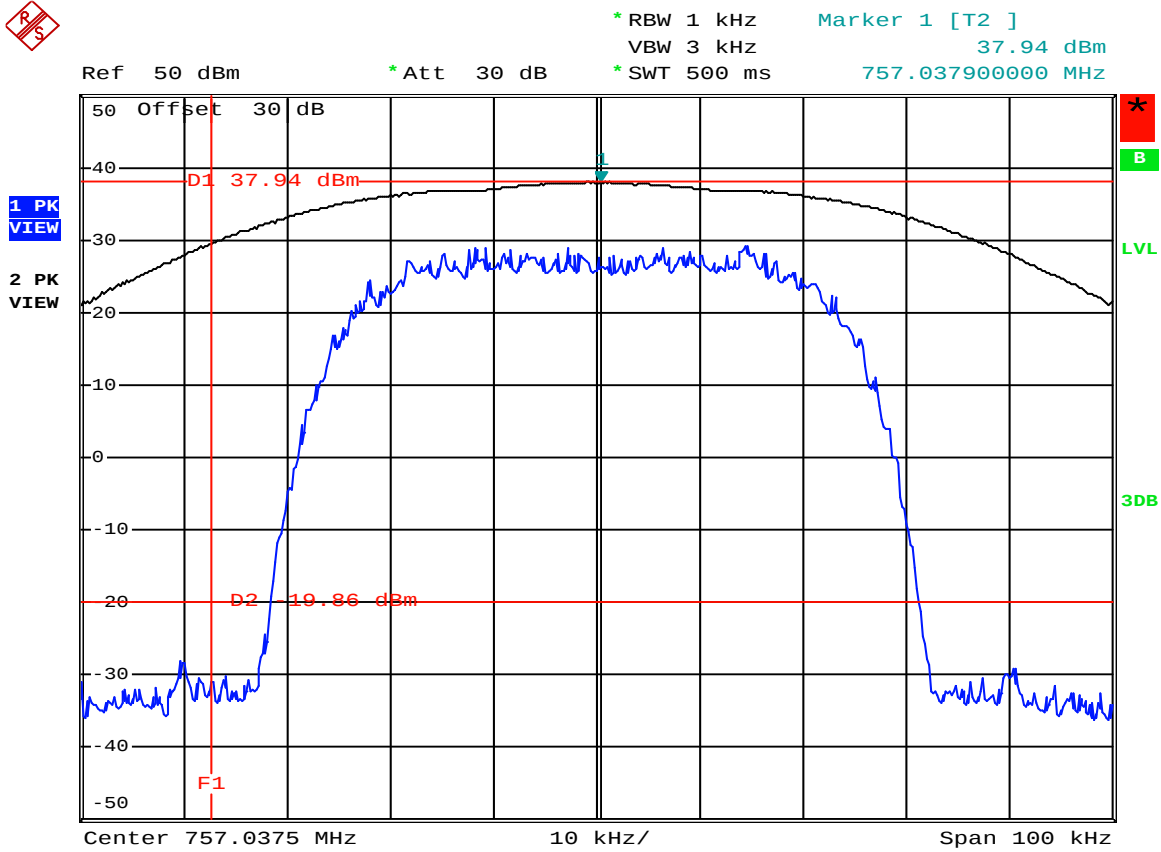
Date: 15.JUL.2016 12:40:20

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.98125
Modulation:	64QAM
Bandwidth:	25kHz

Lower Band Edge Emissions



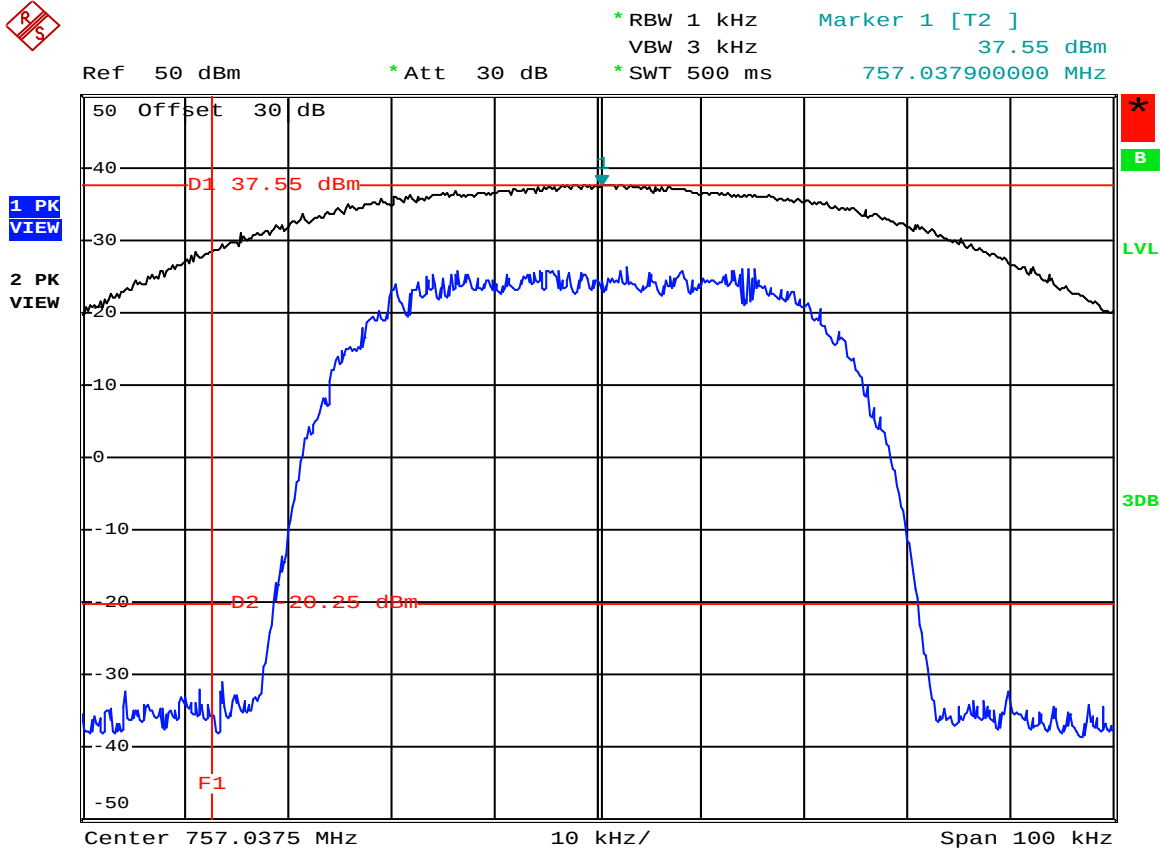
Date: 15.JUL.2016 12:56:35

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Modulation:	QPSK
Bandwidth:	50kHz

Lower Band Edge Emissions



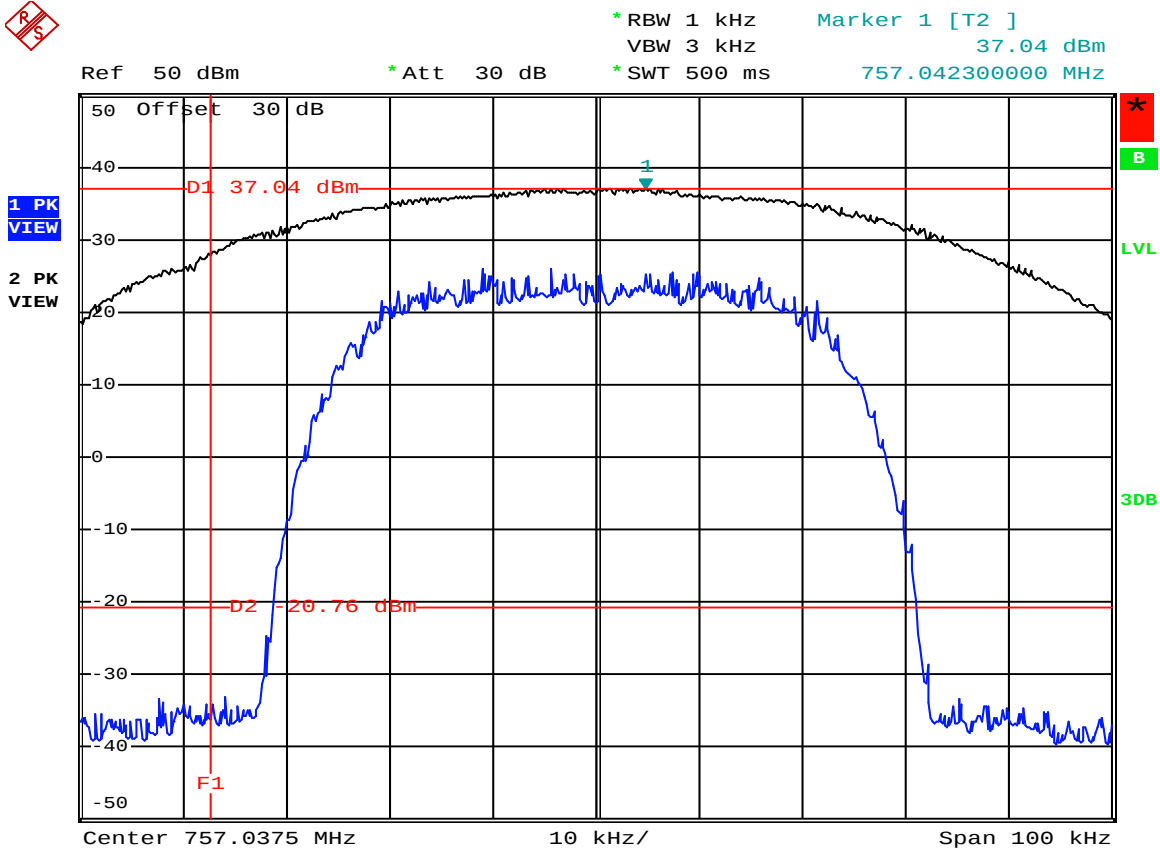
Date: 15.JUL.2016 12:58:34

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Modulation:	16QAM
Bandwidth:	50kHz

Lower Band Edge Emissions



Date: 15.JUL.2016 13:00:28

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Modulation:	64QAM
Bandwidth:	50kHz

Upper Band Edge Emissions



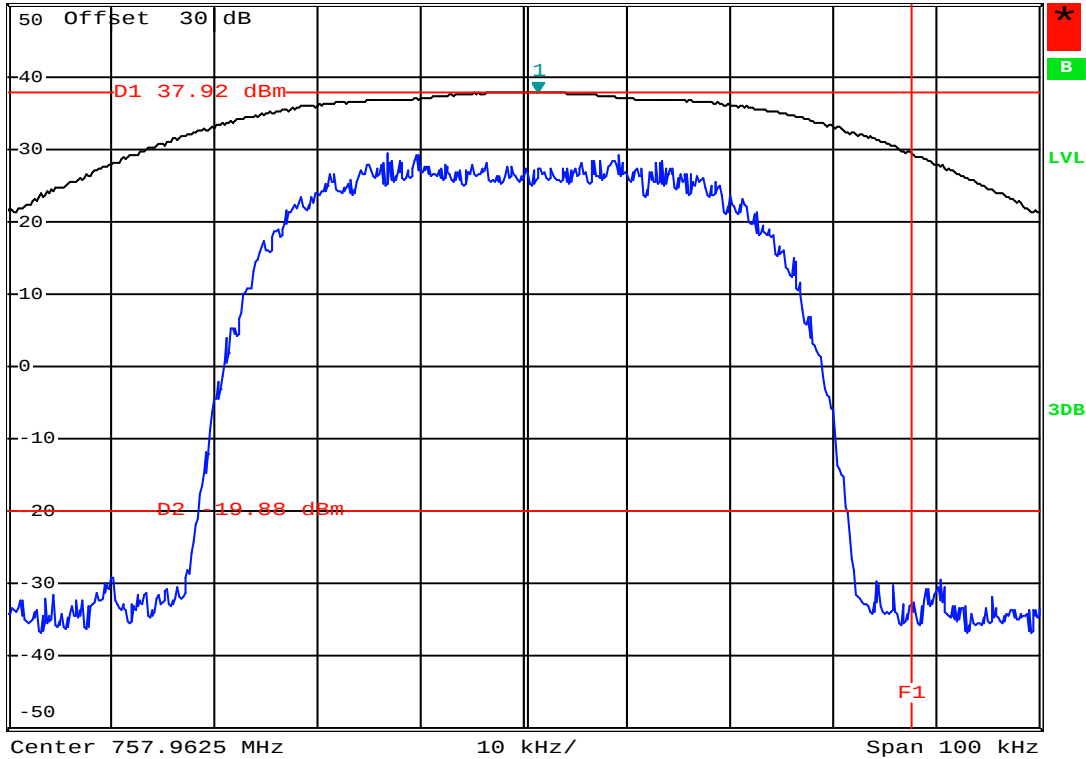
*RBW 1 kHz Marker 1 [T2]
VBW 3 kHz 37.92 dBm
*SWT 500 ms 757.963900000 MHz

Ref 50 dBm

*Att 30 dB

1 PK
VIEW

2 PK
VIEW



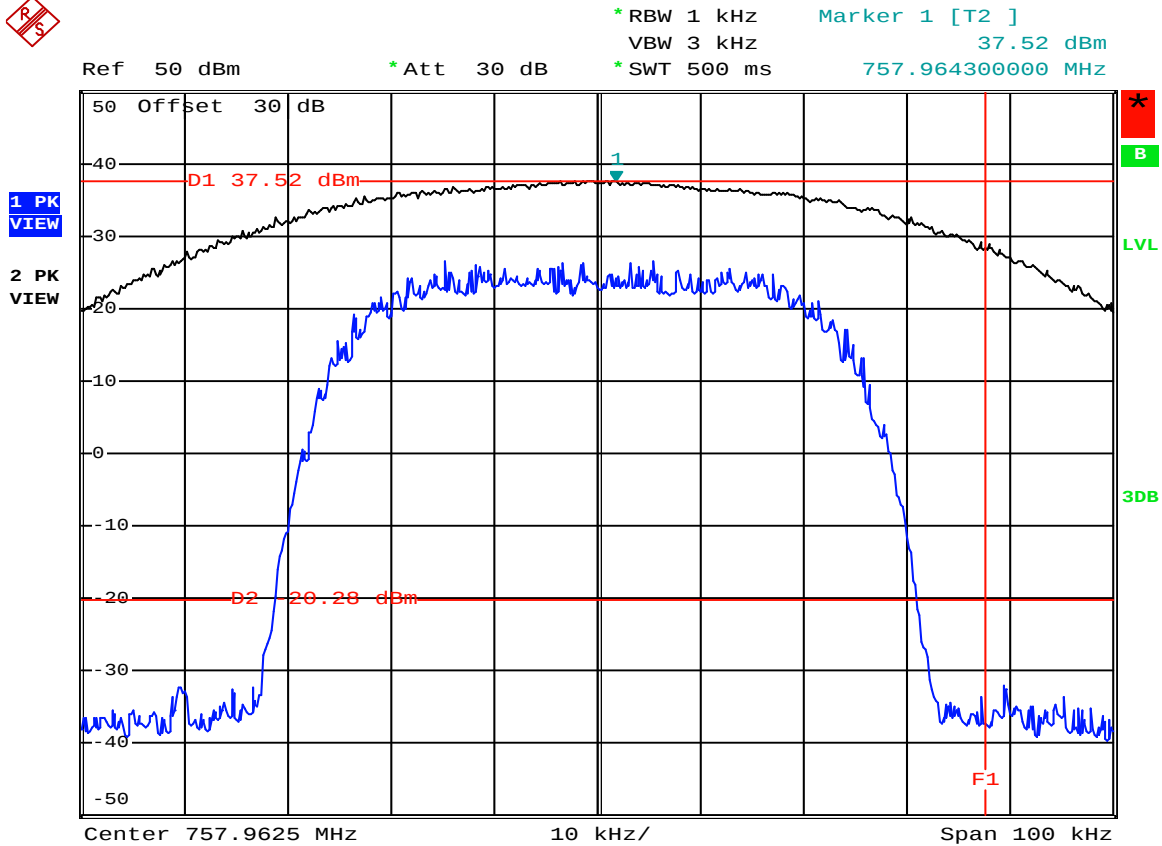
Date: 15.JUL.2016 13:03:54

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Modulation:	QPSK
Bandwidth:	50kHz

Upper Band Edge Emissions



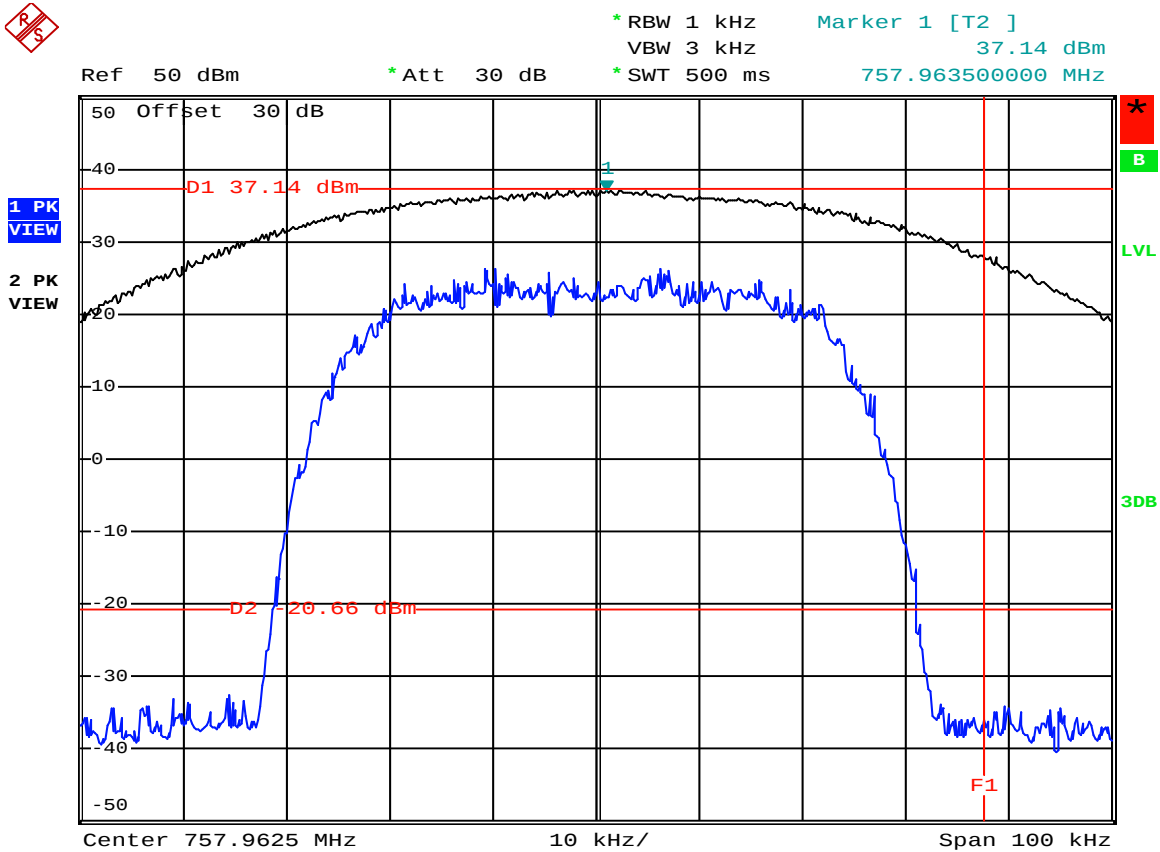
Date: 15.JUL.2016 13:05:54

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Modulation:	16QAM
Bandwidth:	50kHz

Upper Band Edge Emissions



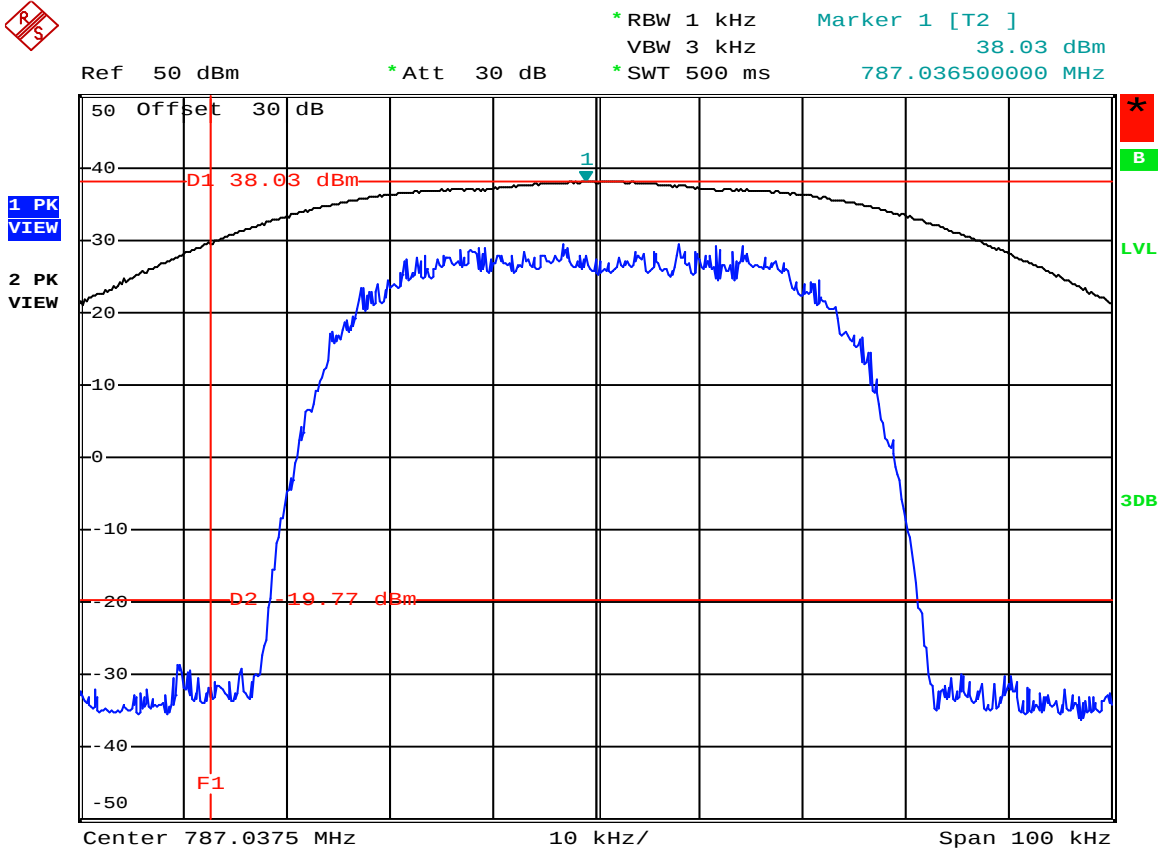
Date: 15.JUL.2016 13:07:49

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Modulation:	64QAM
Bandwidth:	50kHz

Lower Band Edge Emissions



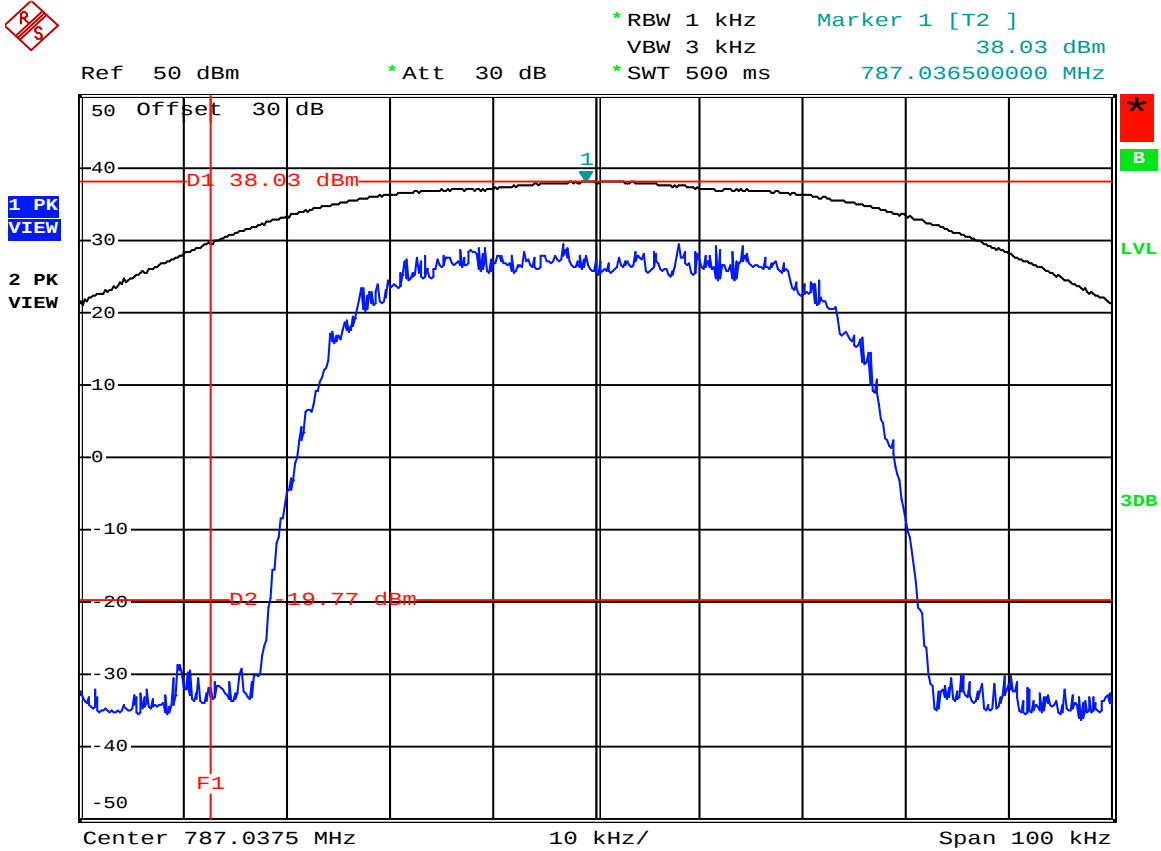
Date: 15.JUL.2016 13:11:09

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.03750
Modulation:	QPSK
Bandwidth:	50kHz

Lower Band Edge Emissions



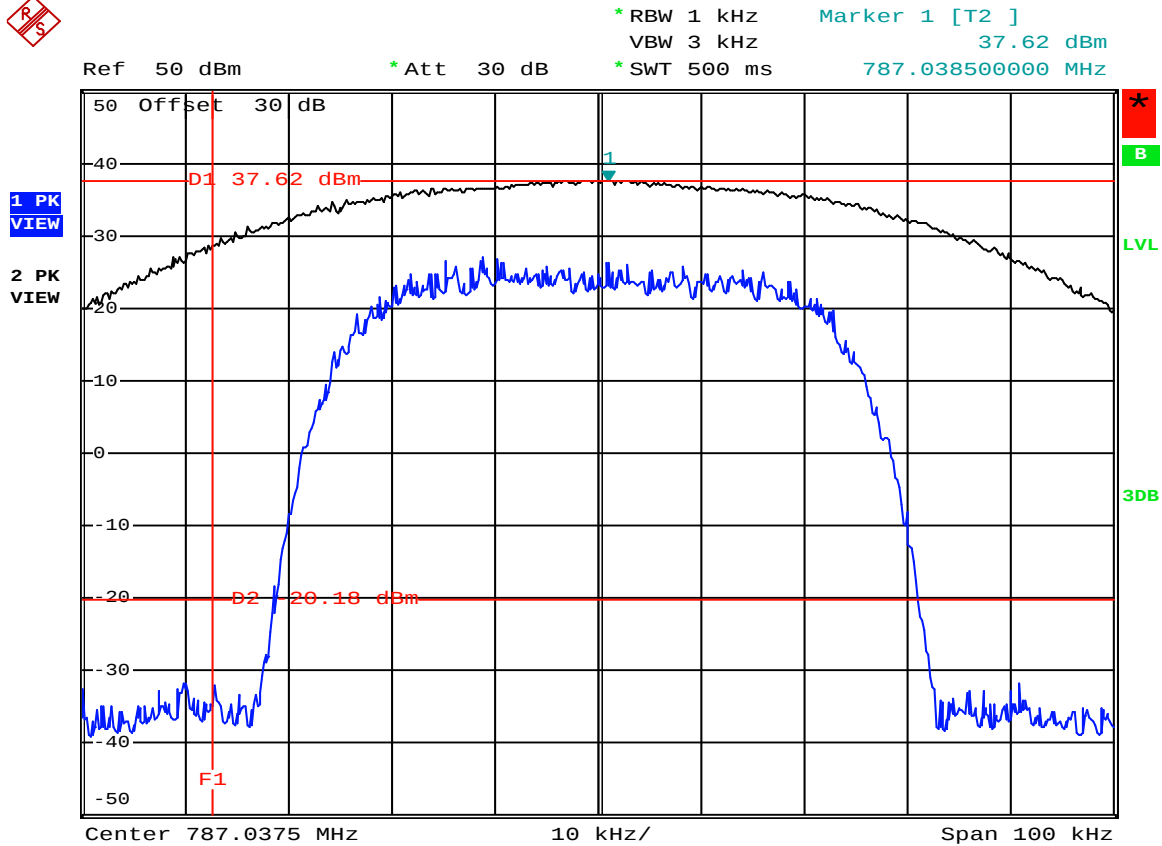
Date: 15.JUL.2016 13:11:09

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.03750
Modulation:	QPSK
Bandwidth:	50kHz

Lower Band Edge Emissions



Date: 15.JUL.2016 13:13:10

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.03750
Modulation:	16QAM
Bandwidth:	50kHz

Lower Band Edge Emissions

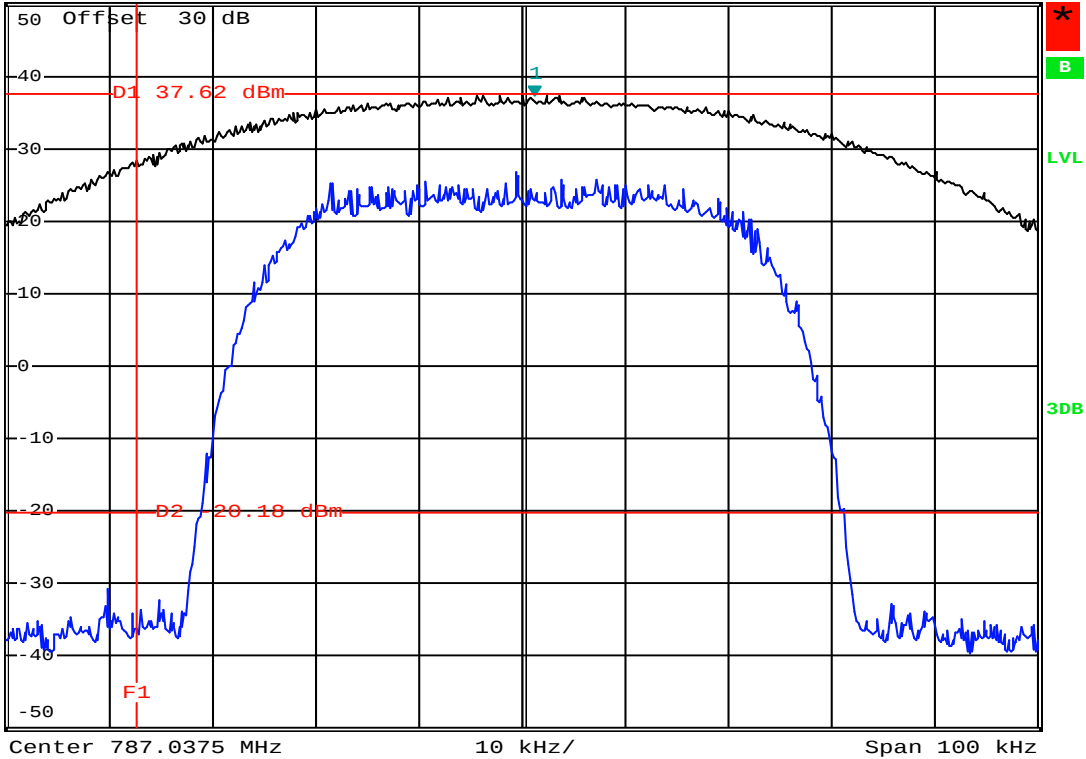


* RBW 1 kHz Marker 1 [T2] 37.36 dBm
VBW 3 kHz
* Att 30 dB * SWT 500 ms 787.038700000 MHz

Ref 50 dBm

1 PK
VIEW

2 PK
VIEW



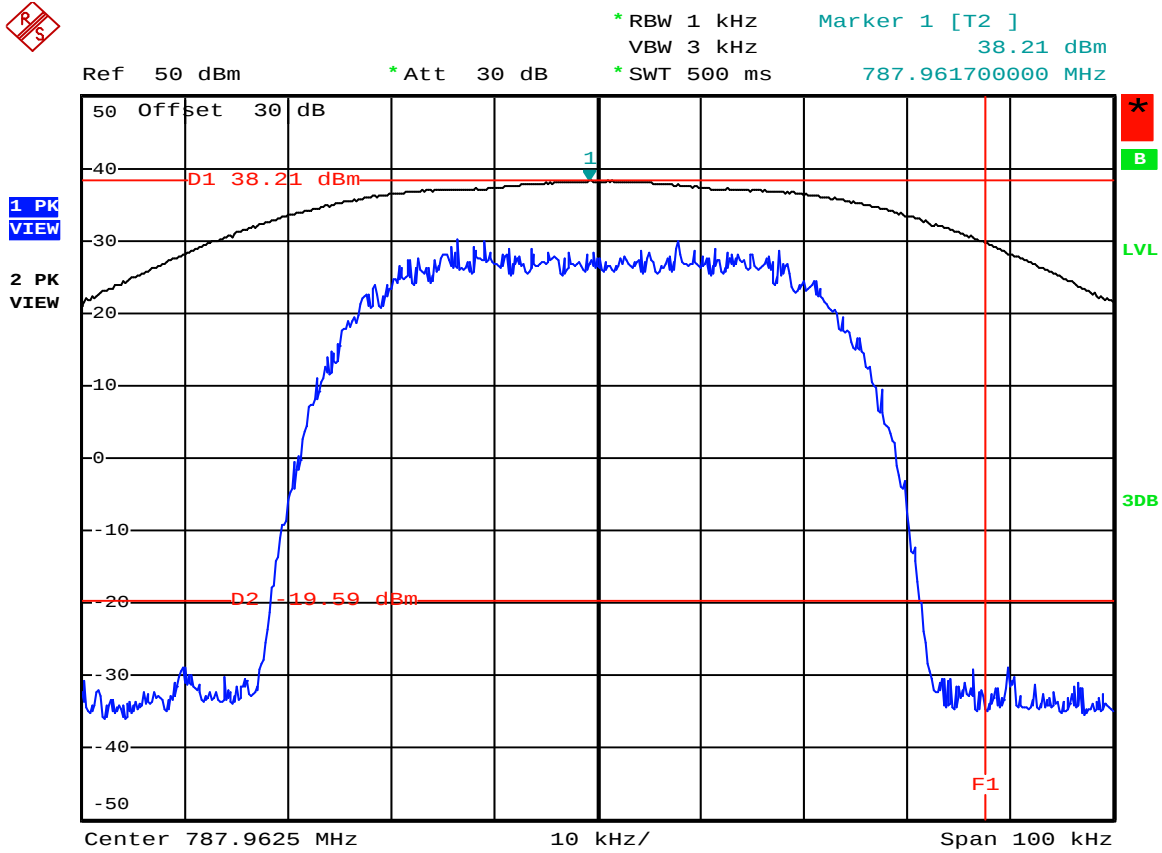
Date: 15.JUL.2016 13:15:17

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.03750
Modulation:	64QAM
Bandwidth:	50kHz

Upper Band Edge Emissions



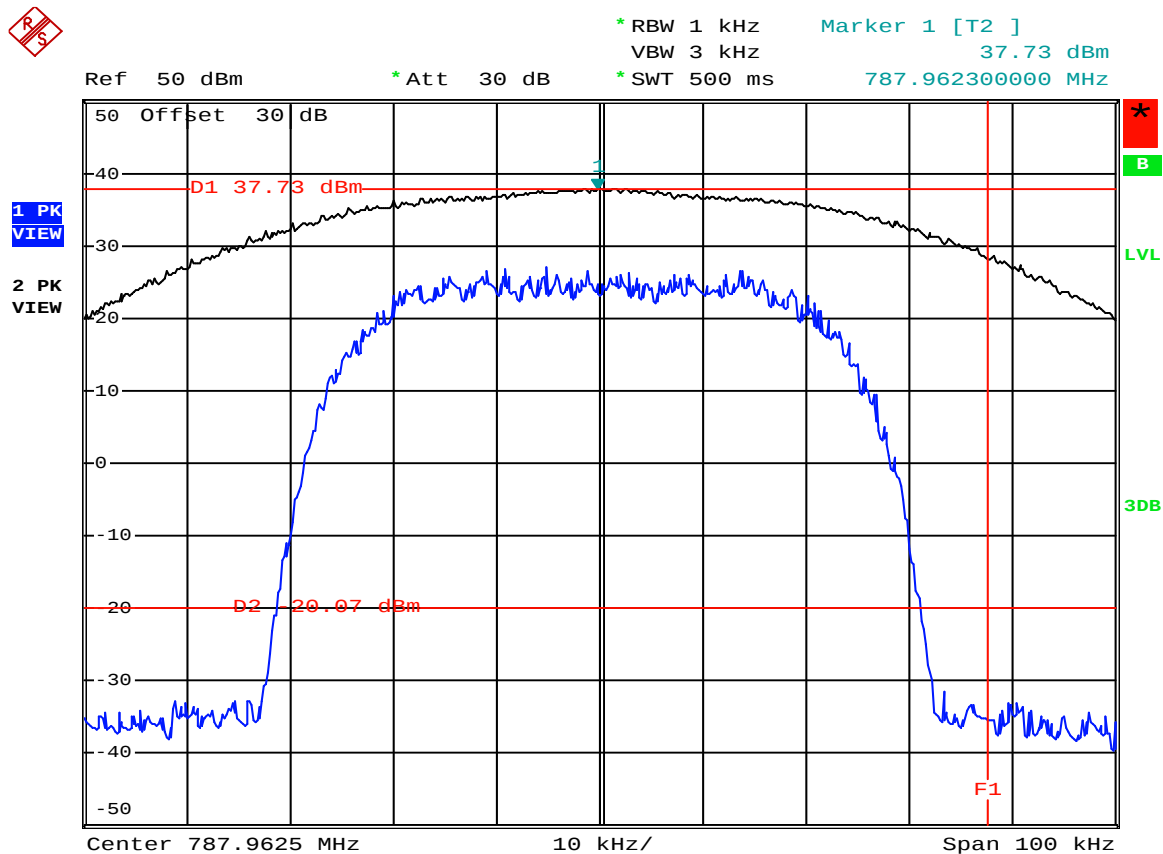
Date: 15.JUL.2016 13:18:51

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.96250
Modulation:	QPSK
Bandwidth:	50kHz

Upper Band Edge Emissions



Date: 15.JUL.2016 13:21:05

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.96250
Modulation:	16QAM
Bandwidth:	50kHz

Upper Band Edge Emissions



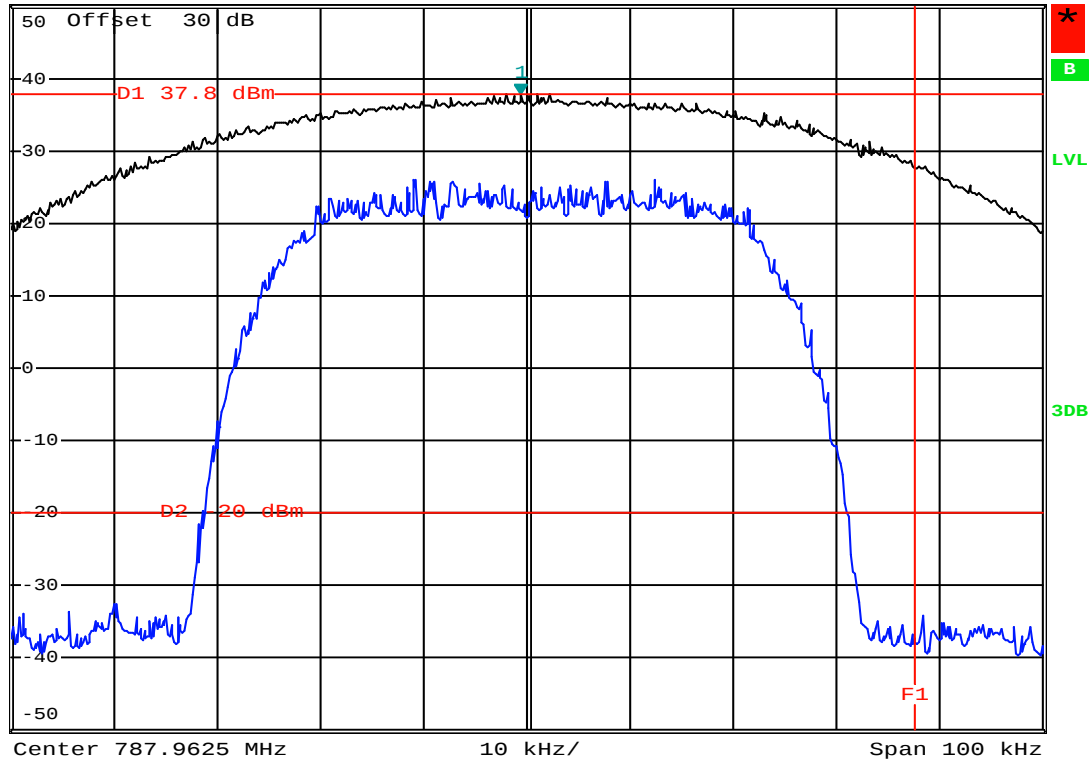
* RBW 1 kHz Marker 1 [T2]
VBW 3 kHz 37.80 dBm
* SWT 500 ms 787.961900000 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 15.JUL.2016 13:23:01

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.96250
Modulation:	64QAM
Bandwidth:	50kHz

§27.53(c) Band Edge Emissions

47 CFR §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;
KDB 971168 D02	In general, scaling of RBW is appropriate only when the signal is noise-like and is relatively flat across the spectrum under measurement.

Scaling of RBW

For 3kHz Instrument RBW, Limit = $43 + 10\log(P) + 10\log(30\text{kHz}/3\text{kHz}) = 53 + 10\log(P)$

For 1kHz Instrument RBW, Limit = $43 + 10\log(P) + 10\log(30\text{kHz}/1\text{kHz}) = 57.8 + 10\log(P)$

Measurement Results

Freq (MHz)	DUT BW (kHz)	DUT Modulation	Instrument RBW (kHz)	In Band (dBm)	Band Edge (dBm)	Attenuation [dB]	Limit (W)	Margin (dB)
757.0125	12.5	QPSK	3.0	40.1	-18.8	58.9	53.0	5.89
757.0125	12.5	16QAM	3.0	39.5	-23.2	62.7	53.0	9.72
757.0125	12.5	64QAM	3.0	39.2	-23.0	62.2	53.0	9.17
757.9875	12.5	QPSK	3.0	40.1	-20.5	60.6	53.0	7.61
757.9875	12.5	16QAM	3.0	39.3	-23.6	62.9	53.0	9.90
757.9875	12.5	64QAM	3.0	39.7	-23.2	62.9	53.0	9.90
787.0125	12.5	QPSK	3.0	40.1	-18.6	58.7	53.0	5.71
787.0125	12.5	16QAM	3.0	39.3	-22.1	61.4	53.0	8.40
787.0125	12.5	64QAM	3.0	39.0	-22.7	61.7	53.0	8.70
787.9875	12.5	QPSK	3.0	40.1	-19.8	59.9	53.0	6.92
787.9875	12.5	16QAM	3.0	39.6	-24.6	64.2	53.0	11.20
787.9875	12.5	64QAM	3.0	38.9	-24.4	63.3	53.0	10.30

§27.53(c) Band Edge Emissions Cont.

Freq (MHz)	DUT BW (kHz)	DUT Modulation	Instrument RBW (kHz)	In Band [P _{Meas}] (dBm)	Band Edge [P _{BE}] (dBm)	Attenuation [dB]	Limit (W)	Margin (dB)
757.01875	25	QPSK	1.0	39.2	-28.0	67.2	57.8	9.35
757.01875	25	16QAM	1.0	38.7	-31.1	69.8	57.8	12.00
757.01875	25	64QAM	1.0	38.4	-30.9	69.3	57.8	11.50
757.98125	25	QPSK	1.0	39.1	-28.5	67.6	57.8	9.80
757.98125	25	16QAM	1.0	38.6	-30.5	69.1	57.8	11.30
757.98125	25	64QAM	1.0	38.1	-30.9	69.0	57.8	11.20
787.01875	25	QPSK	1.0	39.1	-29.9	69.0	57.8	11.24
787.01875	25	16QAM	1.0	38.7	-30.5	69.2	57.8	11.40
787.01875	25	64QAM	1.0	38.0	-33.5	71.5	57.8	13.70
787.98125	25	QPSK	1.0	39.1	-29.8	68.9	57.8	11.10
787.98125	25	16QAM	1.0	38.7	-33.5	72.2	57.8	14.40
787.98125	25	64QAM	1.0	38.3	-34.1	72.4	57.8	14.60
757.0375	50	QPSK	1.0	37.9	-28.6	66.5	57.8	8.70
757.0375	50	16QAM	1.0	37.6	-31.5	69.1	57.8	11.30
757.0375	50	64QAM	1.0	37.0	-35.1	72.1	57.8	14.30
757.9625	50	QPSK	1.0	37.9	-29.8	67.7	57.8	9.90
757.9625	50	16QAM	1.0	37.5	-32.1	69.6	57.8	11.80
757.9625	50	64QAM	1.0	37.1	-36.1	73.2	57.8	15.40
787.0375	50	QPSK	1.0	38.0	-28.5	66.5	57.8	8.70
787.0375	50	16QAM	1.0	37.6	-32.0	69.6	57.8	11.80
787.0375	50	64QAM	1.0	37.4	-30.5	67.9	57.8	10.10
787.9625	50	QPSK	1.0	38.2	-29.7	67.9	57.8	10.10
787.9625	50	16QAM	1.0	37.7	-35.1	72.8	57.8	15.00
787.9625	50	64QAM	1.0	37.8	-34.5	72.3	57.8	14.50

Margin = Limit - Attenuation

Result:	Complies
----------------	-----------------

APPENDIX D - Emissions in 1559 – 1610MHz Band

Test Conditions	
Normative Reference	FCC 47 CFR §27.53(c)
Procedure Reference	ANSI/TIA/EIA-603-D, ANSI C63.4

Limits	
FCC §27.53(c)	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...

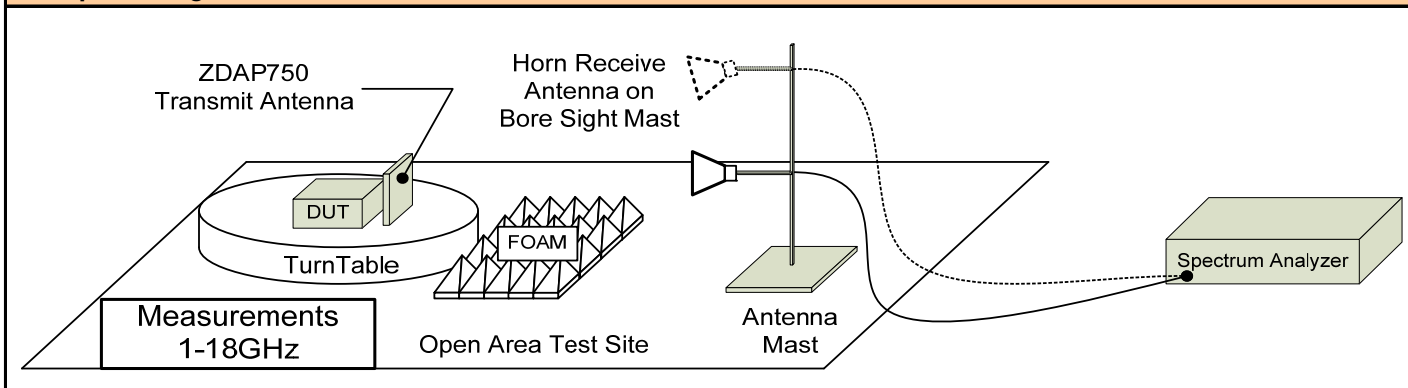
Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

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

CNR: Calibration Not Required

COU: Calibrate On Use

Set-Up Drawing - DUT Measurement



Compliance to 27.53(f)

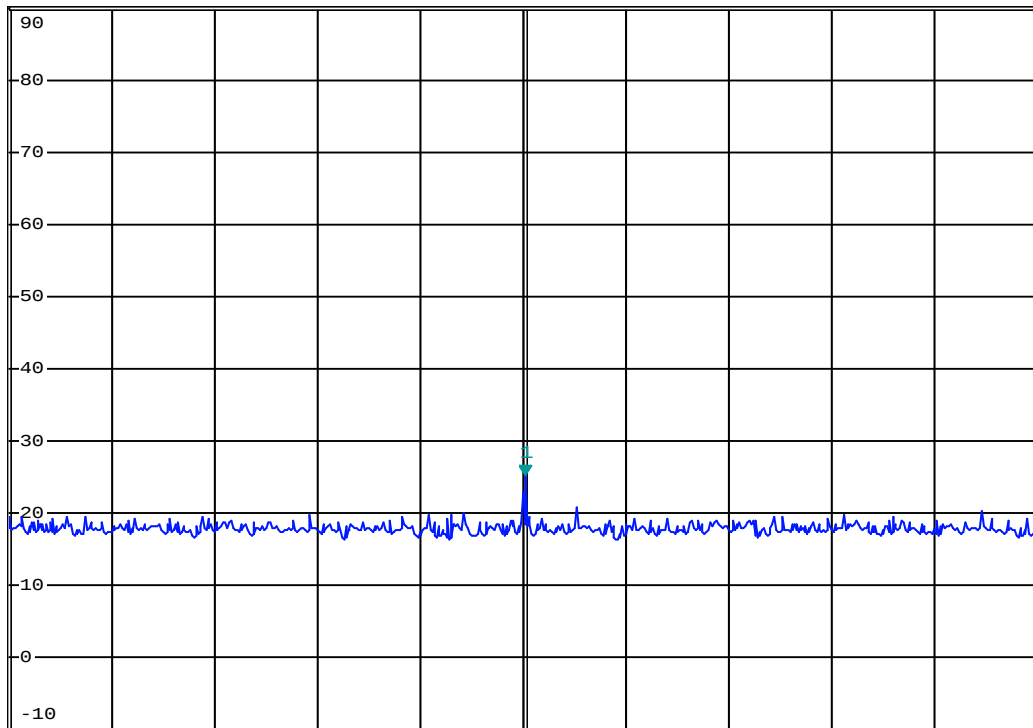


* RBW 30 kHz Marker 1 [T1]
VBW 100 kHz 25.32 dBμV
* SWT 500 ms 1.575060000 GHz

Ref 90 dBμV

* Att 10 dB

1 PK
VIEW



Center 1.57492 GHz

7 MHz/

Span 70 MHz

3DB

Date: 14.JUL.2016 14:44:14

Plot for Reference Only

Transmit Frequency:	787.5MHz
Modulation:	CW
Transmit Antenna:	ZDAFP750-10-60D
Transmit Antenna Polarization:	Vertical
Receive Antenna Polarization:	Vertical

Compliance to 27.53(f)



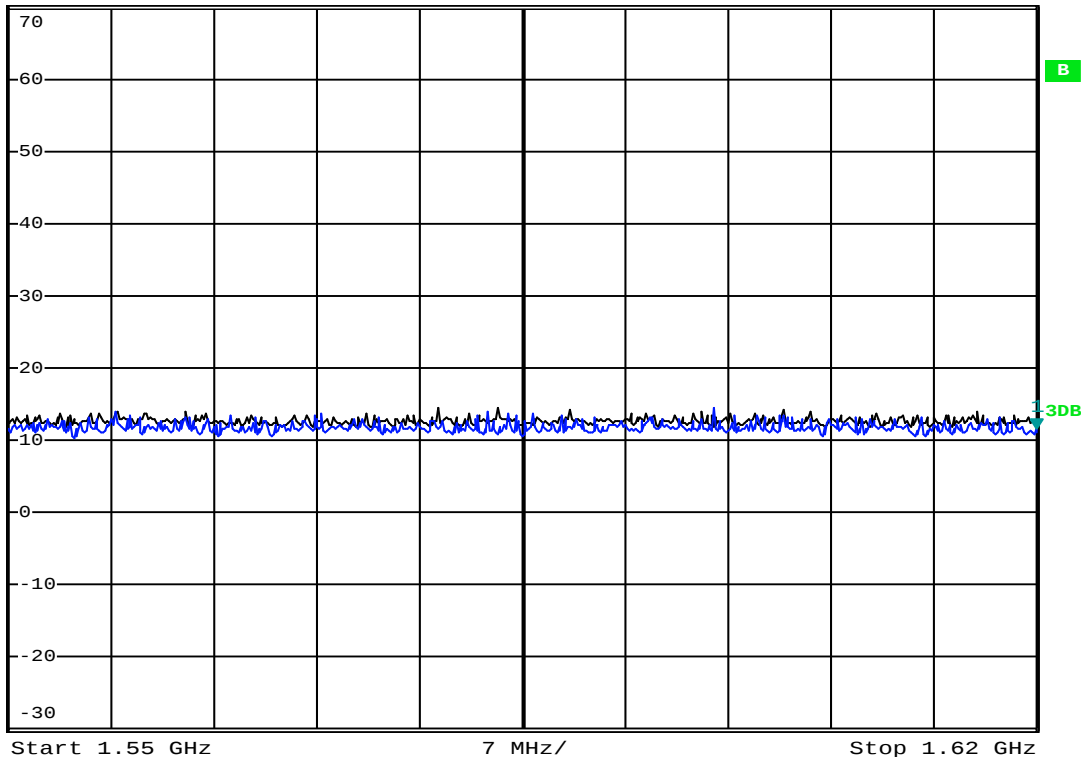
* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 11.71 dBμV
* SWT 500 ms 1.620000000 GHz

Ref 70 dBμV

* Att 0 dB

1 PK
VIEW

2 PK
VIEW



Date: 14.JUL.2016 14:19:07

Plot for Reference Only

Transmit Frequency:	787.5MHz
Modulation:	CW
Transmit Antenna:	ZDAFP750-10-60D
Transmit Antenna Polarization:	Vertical
Receive Antenna Polarization:	Horizontal

§27.53(f) Emissions within 1559 to 1610MHz Band

Freq (MHz)	DUT Freq (MHz)	DUT Modulation	Transmit Antenna	Transmit Antenna Polarization	Receive Antenna Polarization	Measured Emission [E _{Meas}] (dBuV)	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)
1575	787.5	CW	ZDAFP750-10-60D	Vertical	Vertical	25.3	3.0	25.5	4.1	10.0	-89.88	-75.00	14.88
		CW			Horizontal*	11.7	3.0	25.5	4.1	10.0	-103.49	-75.00	28.49

* Essentially no Emission Detected

** Calibrated at 3m

$$E(\text{dBuV/m}) = E_{\text{Meas}} + L_c + AF - G_T$$

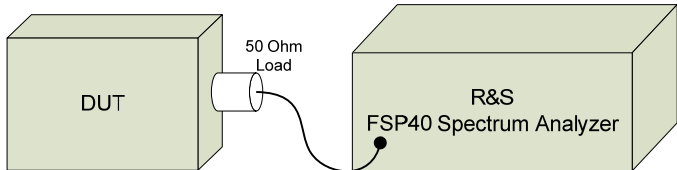
$$\text{EIRP}(\text{dBm}) = E(\text{dBuV/m}) + 20\text{Log}(D)^{***} - 104.8$$

$$\text{EIRP}(\text{dBW}) = \text{EIRP}(\text{dBm}) - 30$$

*** This term = 0, receive antenna calibrated at 3m

Result:	Complies
----------------	-----------------

APPENDIX E - Conducted Spurious Emissions at the Antenna Terminal

Test Conditions			
Normative Reference	FCC 47 CFR §27.53(c) , KDB 971168 D01v02r01		
Limits			
47 CFR §27.53(c)	c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, 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 776– 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;		
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
Set-Up Drawing			
			

Conducted Spurious Emissions

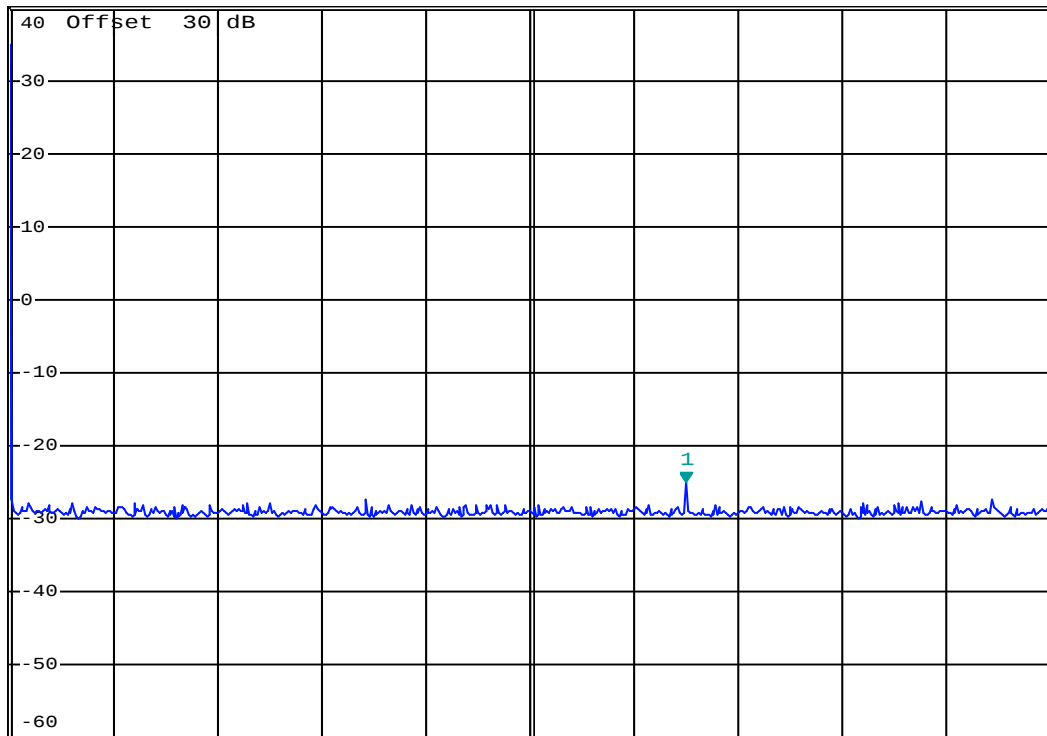


* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -24.95 dBm
* SWT 1 s 1.575800000 GHz

Ref 40 dBm

* Att 20 dB

1 PK
VIEW



Start 788 MHz

121.2 MHz/

Stop 2 GHz

B

LVL

3DB

Date: 15.JUL.2016 14:44:58

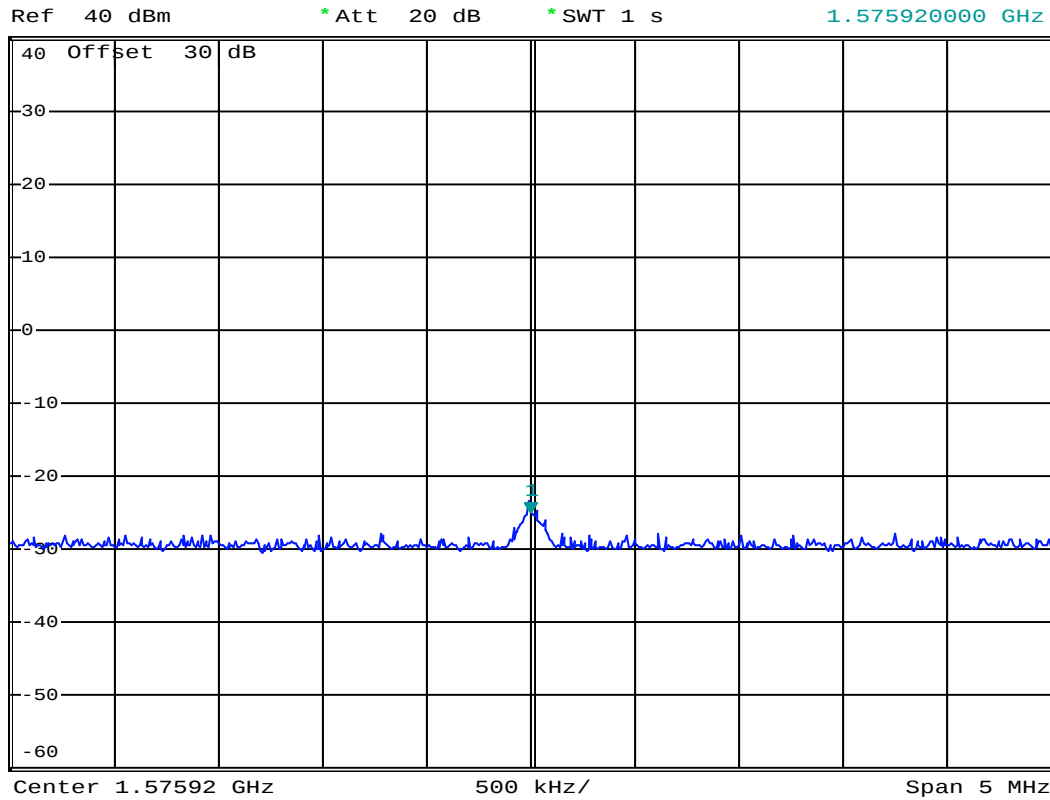
Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	788MHz - 2GHz

Conducted Spurious Emissions



* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -24.84 dBm
* SWT 1 s 1.575920000 GHz



Date: 15.JUL.2016 14:46:28

Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	2nd Harmonic

Conducted Spurious Emissions

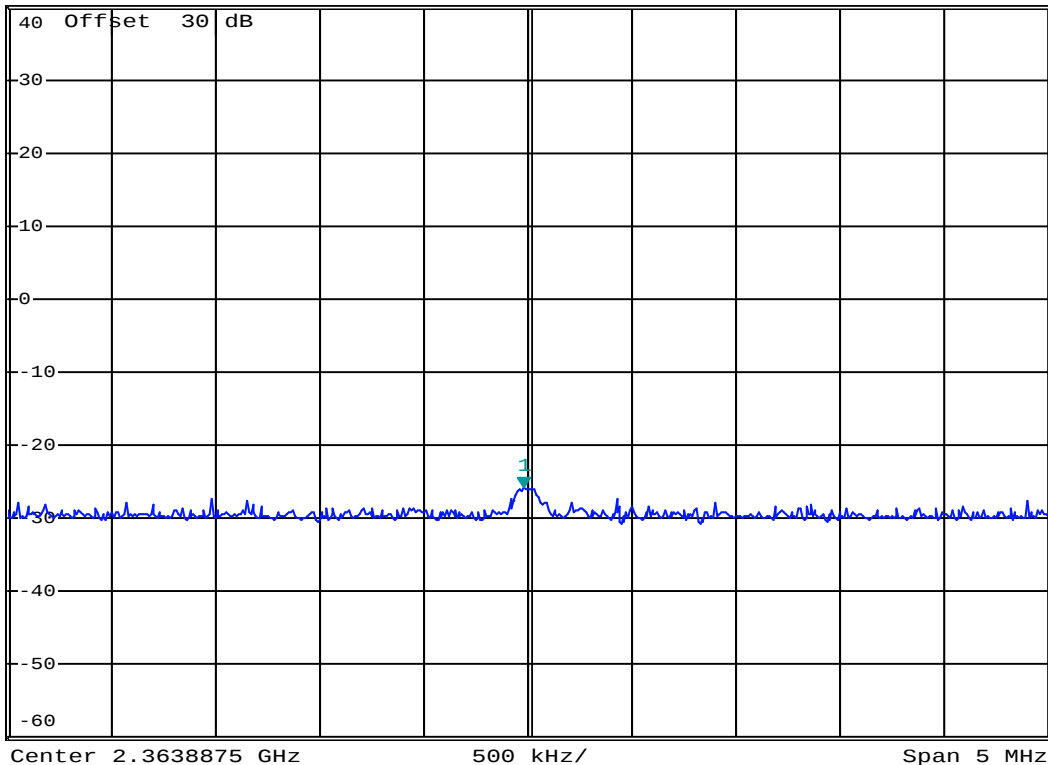


* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -25.68 dBm
* SWT 1 s 2.363867500 GHz

Ref 40 dBm

* Att 20 dB

1 PK
MAXH



Date: 15.JUL.2016 14:48:14

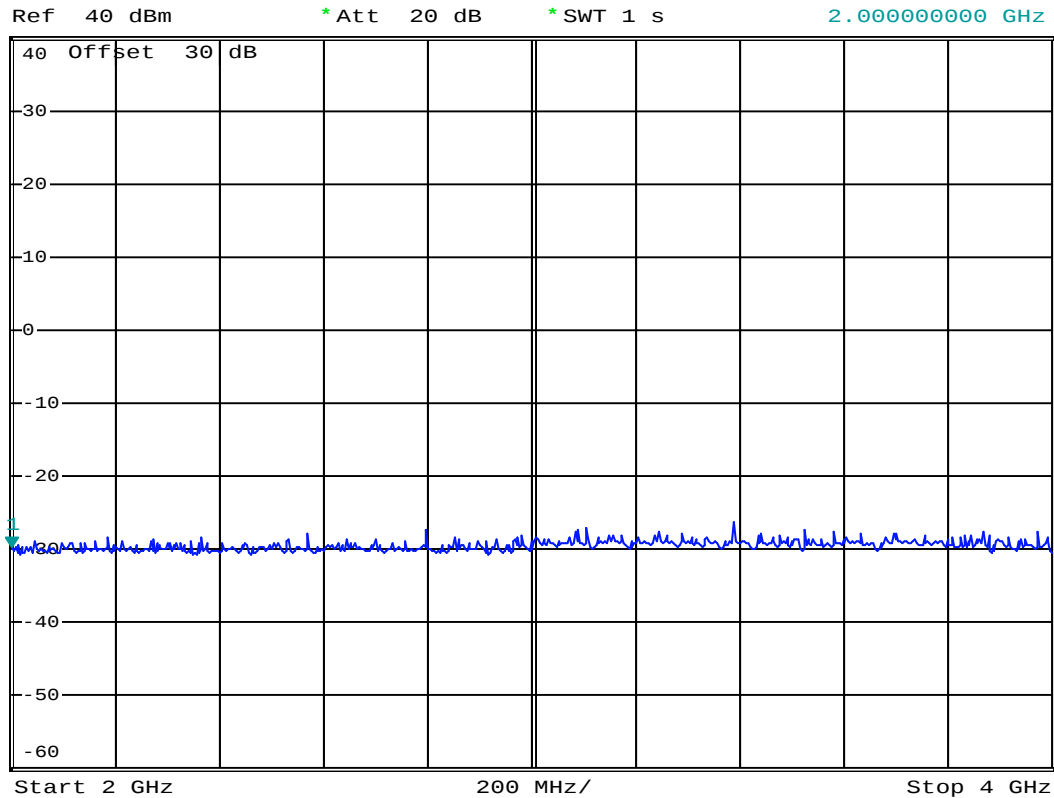
Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	3rd Harmonic

Conducted Spurious Emissions



* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -29.67 dBm
* SWT 1 s 2.000000000 GHz



Date: 15.JUL.2016 14:50:40

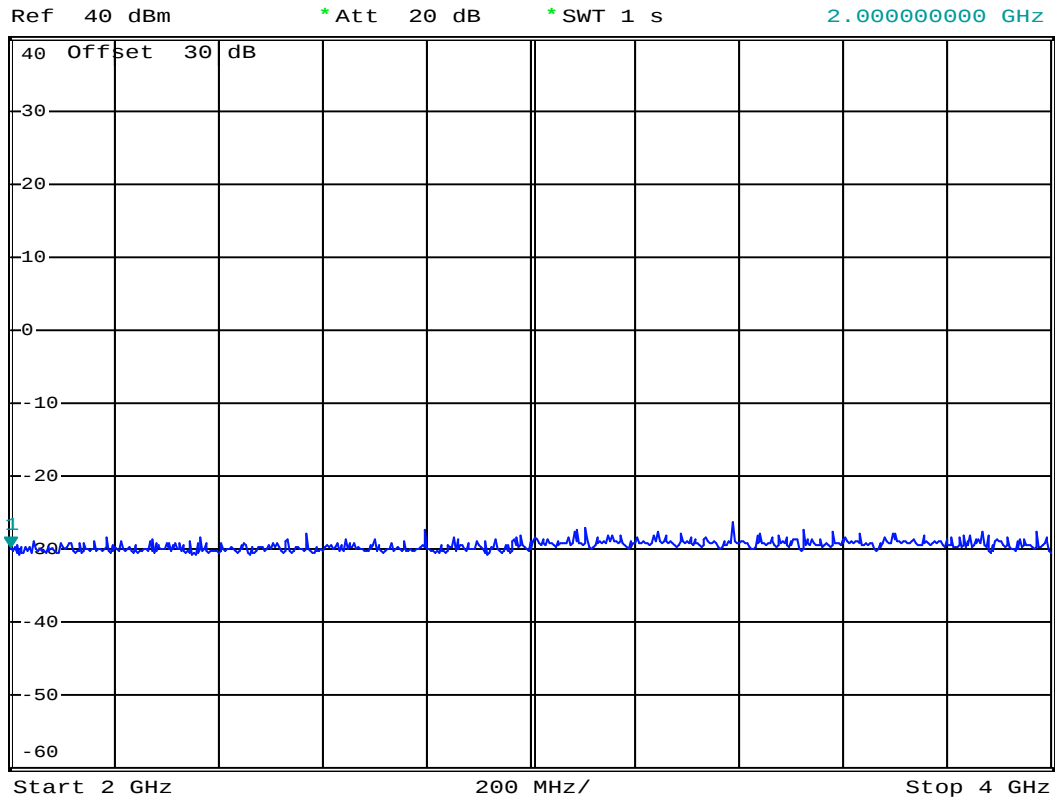
Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	2-4GHz

Conducted Spurious Emissions



* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -29.67 dBm
* SWT 1 s 2.000000000 GHz



Date: 15.JUL.2016 14:50:40

Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	2-4GHz

Conducted Spurious Emissions

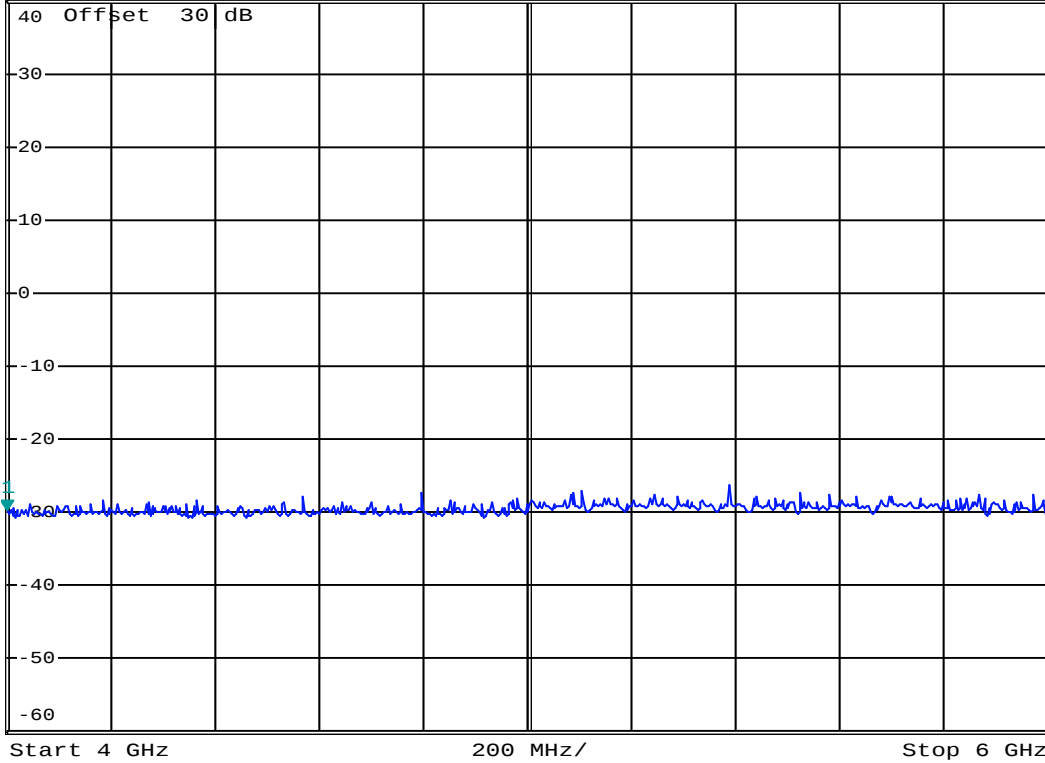


* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -29.67 dBm
* SWT 1 s 4.000000000 GHz

Ref 40 dBm

* Att 20 dB

1 PK
VIEW



Date: 15.JUL.2016 14:51:18

Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	4-6GHz

Conducted Spurious Emissions

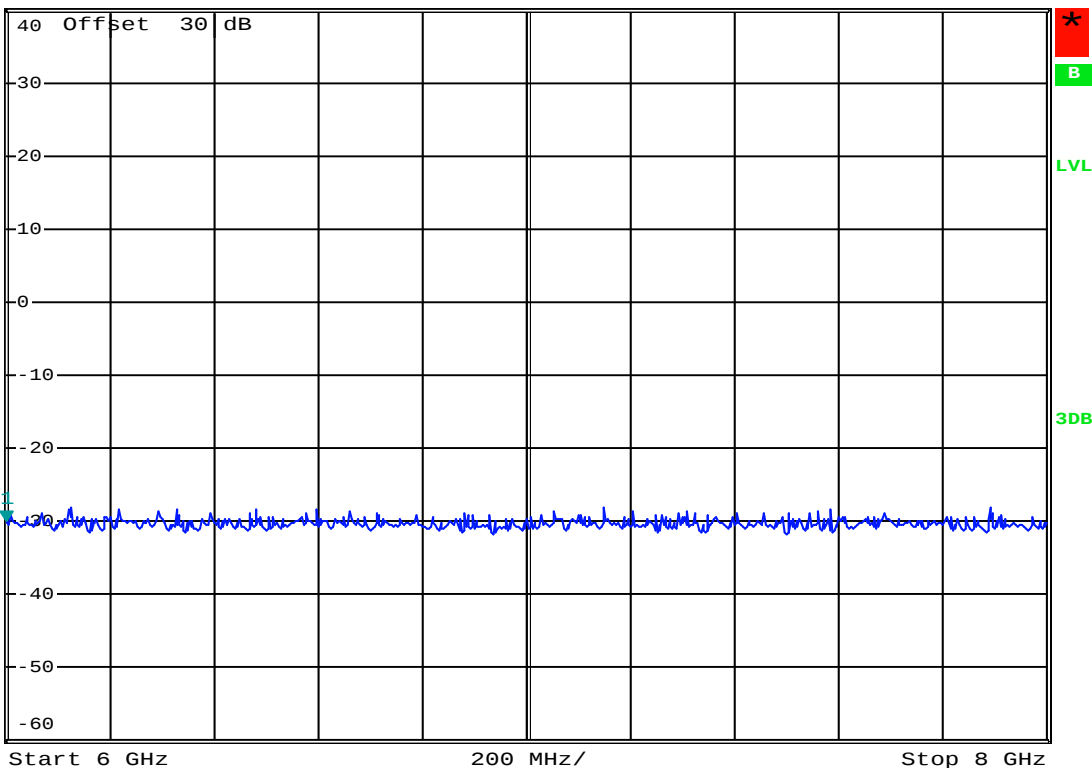


* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -30.01 dBm
* SWT 1 s 6.000000000 GHz

Ref 40 dBm

* Att 20 dB

1 PK
VIEW



Date: 15.JUL.2016 14:51:51

Plot for Reference Only

Channel Frequency:	787.5000
Modulation:	CW
Frequency Range:	4-6GHz

§27.53(c) Conducted Spurious Emissions

Freq (MHz)	DUT Modulation	Fundamental Power [P] (dBm)	Out of Band Emission [P _E] (dBm)	Attenuation [dB]	Limit (W)	Margin (dB)
1576	CW	36.7	-24.8	61.5	43.0	18.52
2364	CW	36.7	-25.7	62.4	43.0	19.36

Margin = Limit - Attenuation

All Spurious Emissions were evaluated to the 10th harmonic (7.88GHz). No other emissions were observed.

Result:	Complies
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APPENDIX F - Radiated Tx Spurious Emissions

Test Conditions	
Normative Reference	FCC 47 CFR §27.53(c)
Procedure Reference	ANSI/TIA/EIA-603-D, ANSI C63.4

Limits	
FCC §27.53(c)	On all emission outside the block: 43 + 10Log(P)

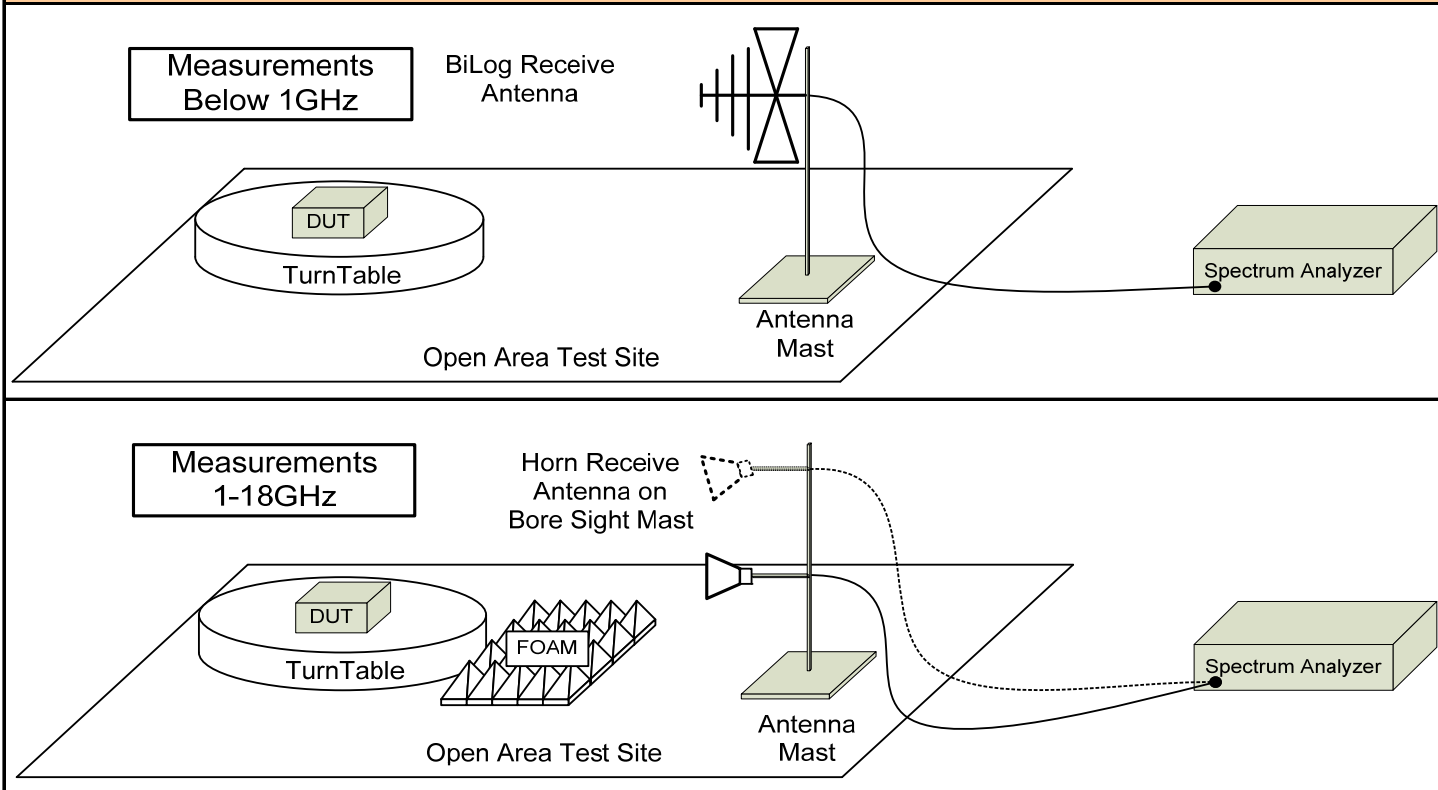
Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

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

CNR: Calibration Not Required

COU: Calibrate On Use

Set-Up Drawing - DUT Measurement



Notes:

The spectrum was searched from the lowest frequency generated in the device to the 10th harmonic of the fundamental.
 All detected emissions have been reported.
 The DUT was searched on all axis for worst case performance.
 Worst case emissions are reported.

Transmitter Radiated Spurious Emissions (Tx)



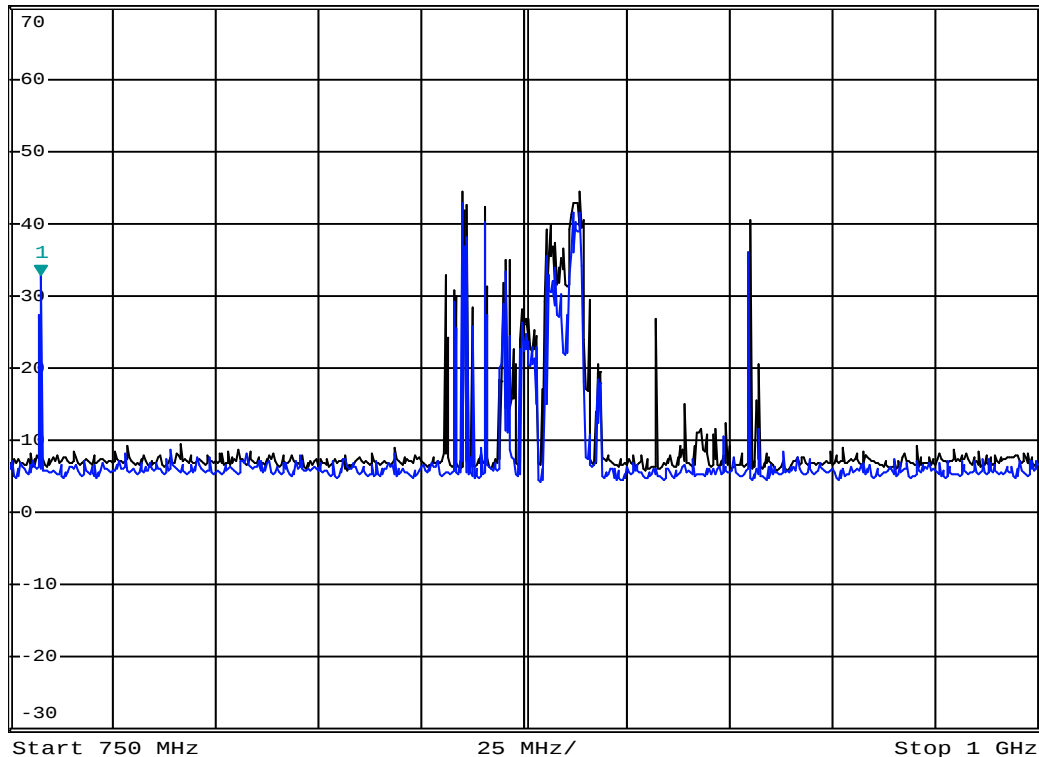
* RBW 30 kHz Marker 1 [T1]
VBW 100 kHz 32.91 dBμV
* SWT 1 s 757.500000000 MHz

Ref 70 dBμV

* Att 0 dB

1 PK
VIEW

2 PK
VIEW



Date: 14.JUL.2016 13:44:31

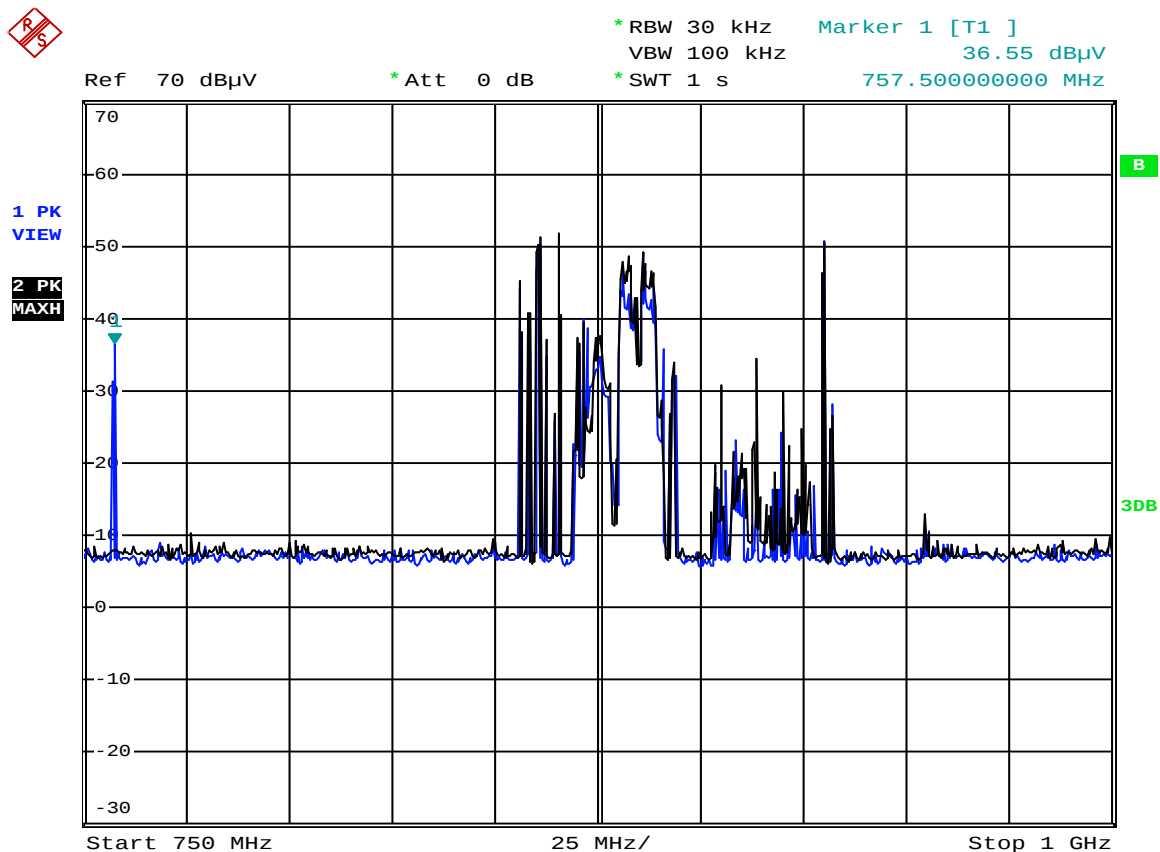
Plot for Reference Only

Trace 1: DUT

Trace 2: Abmient

Transmit Frequency:	757.5MHz
Modulation:	CW
Frequency Span:	750-1000MHz
Polarization:	Horizontal

Transmitter Radiated Spurious Emissions (Tx)



Date: 14.JUL.2016 13:41:50

Plot for Reference Only

Trace 1: DUT

Trace 2: Abmient

Transmit Frequency:	757.5MHz
Modulation:	CW
Frequency Span:	750-1000MHz
Polarization:	Vertical

Transmitter Radiated Spurious Emissions (Tx)



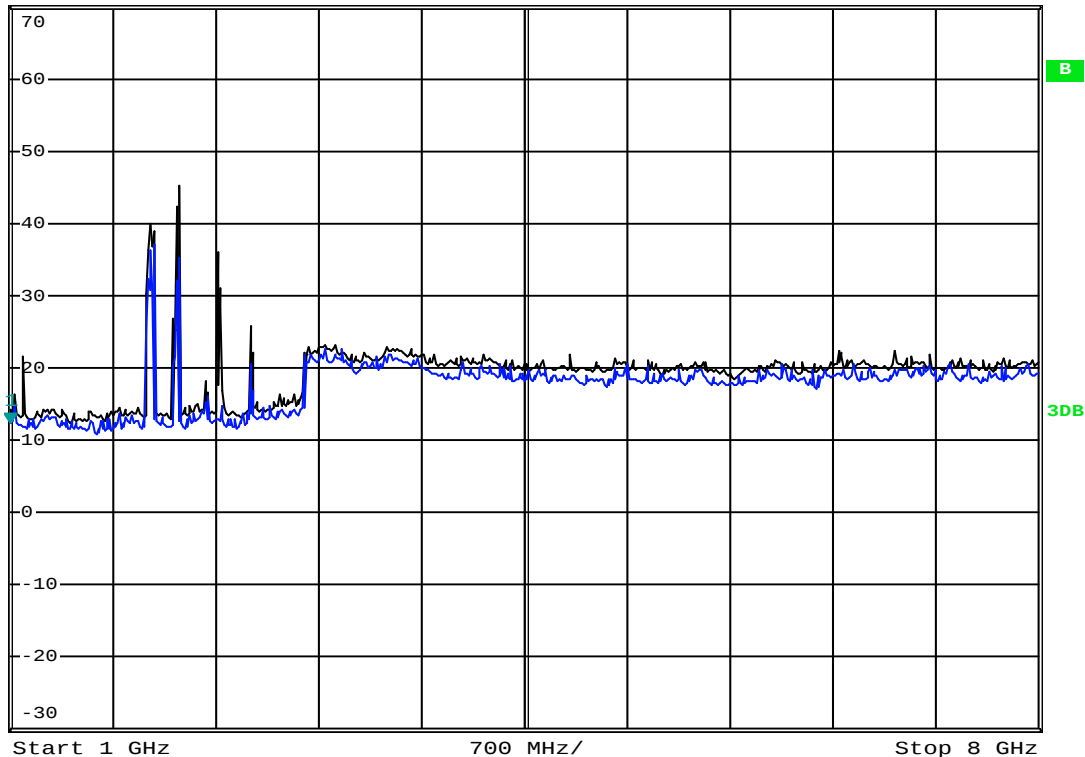
* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 12.41 dBμV
* SWT 5 s 1.000000000 GHz

Ref 70 dBμV

* Att 0 dB

1 PK
VIEW

2 PK
VIEW



Date: 14.JUL.2016 14:03:06

Plot for Reference Only

Trace 1: DUT

Trace 2: Ambient

Transmit Frequency:	757.5MHz
Modulation:	CW
Frequency Span:	1-8GHz
Polarization:	Horizontal

Transmitter Radiated Spurious Emissions (Tx)



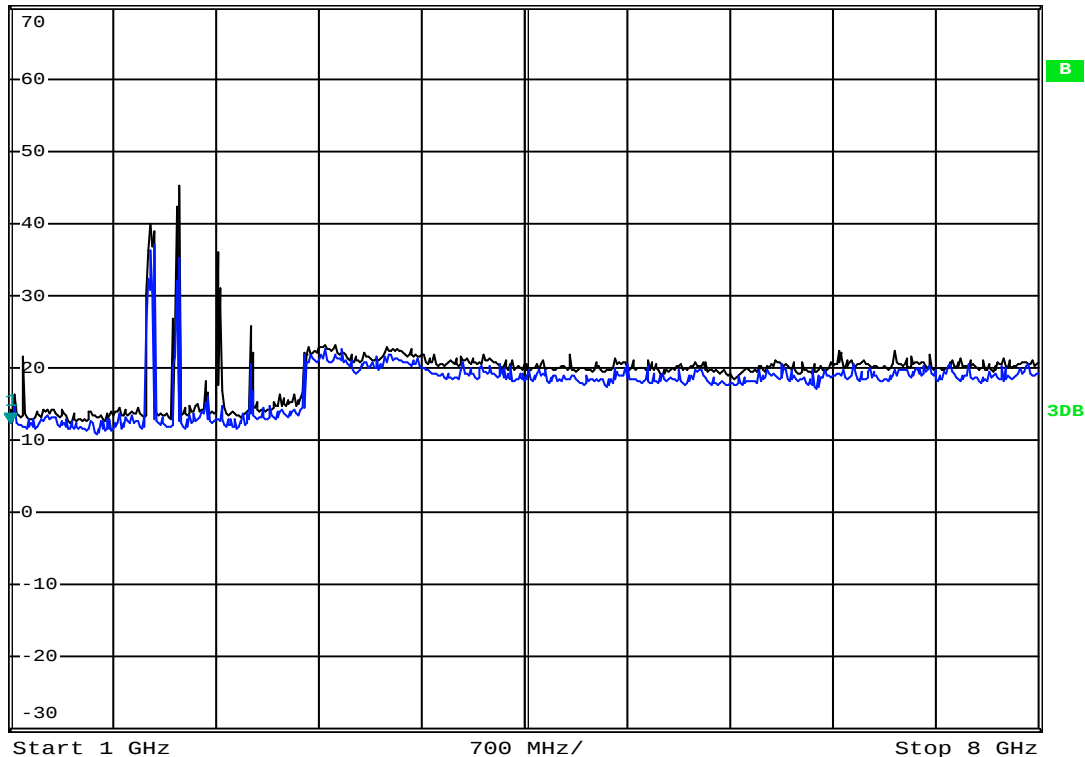
* RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 12.41 dBμV
* SWT 5 s 1.000000000 GHz

Ref 70 dBμV

* Att 0 dB

1 PK
VIEW

2 PK
VIEW



Date: 14.JUL.2016 14:03:06

Plot for Reference Only

Trace 1: DUT

Trace 2: Ambient

Transmit Frequency:	757.5MHz
Modulation:	CW
Frequency Span:	1-8GHz
Polarization:	Vertical

Result:	Complies
*No emissions were detected. Ambient noise emissions shown.	
Notes	
Data presented may use a peak detector and compared to quasi-peak limit	
All detected emissions have been reported	

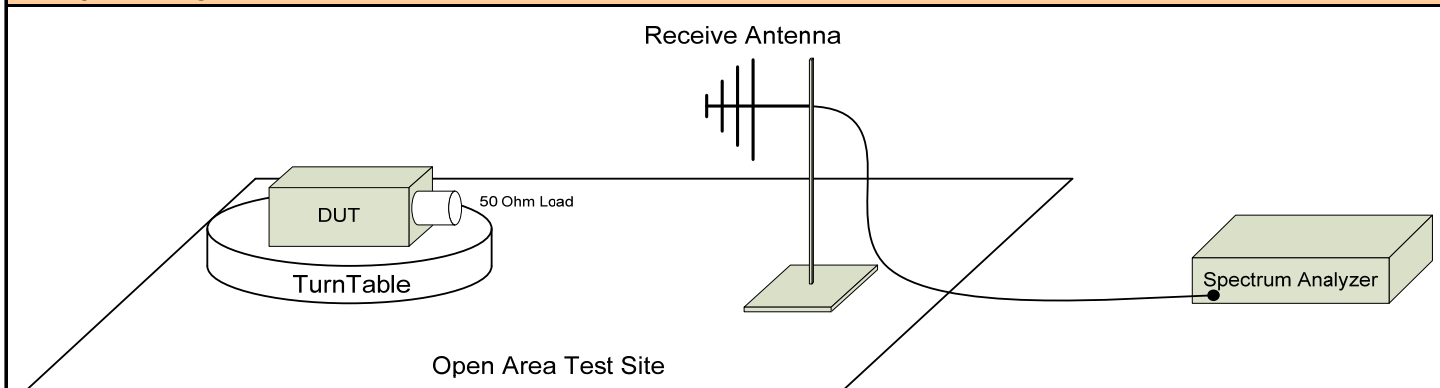
APPENDIX G - Receiver Radiated Emissions

Test Conditions			
Normative Reference		FCC 47 CFR §2.1053, §15.109	
Procedure Reference		ANSI/TIA/EIA-603-D, ANSI C63.4	
Limits			
FCC §15.109		30-88MHz: 90uV/m 88-216MHz: 150uV/m 216-960MHz: 210uV/m >960MHz: 300uV/m Measurement Distance = 10m	
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

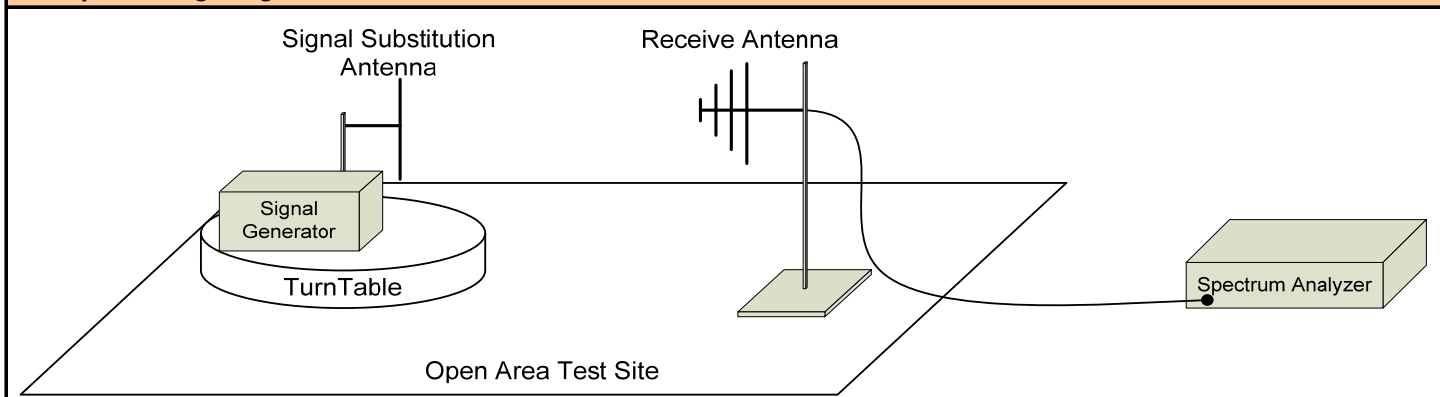
CNR: Calibration Not Required

COU: Calibrate On Use

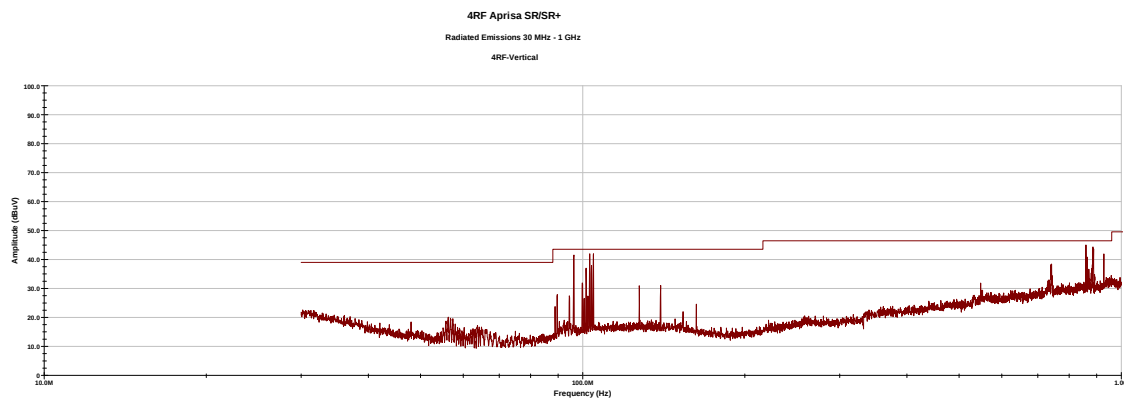
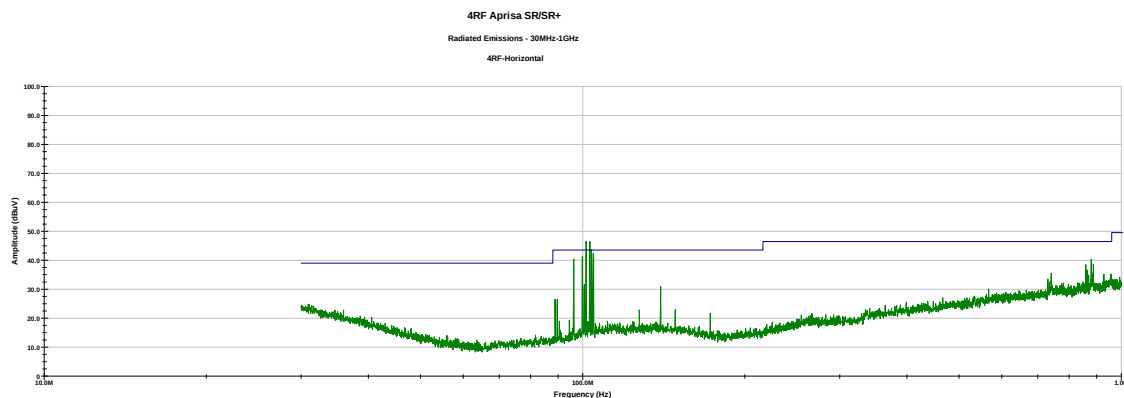
Set-Up Drawing - DUT Measurement



Set-Up Drawing - Signal Substitution Measurement



Receiver Radiated Spurious Emissions (Rx)



Plot for Reference Only

Result: **Complies**

*No emissions were detected. Ambient noise emissions shown.

Notes

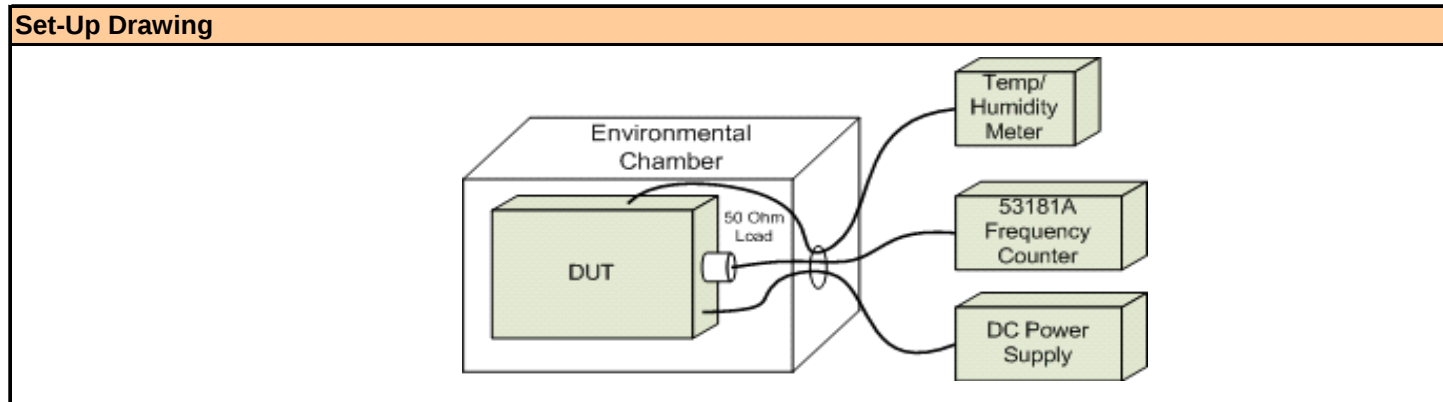
Data presented may use a peak detector and compared to quasi-peak limit
All detected emissions have been reported

APPENDIX H - Frequency Stability

Test Conditions	
Normative Reference	FCC 47 CFR §2.1055, §27.54
Limits	
FCC §27.54	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Conditions	
Temperature	-30°C to +50°C at 10°C Increments
Humidity	<100% Non Condensating
Voltage (VDC)	9.8VDC(*) - 20VDC - 34.5VDC(115%)

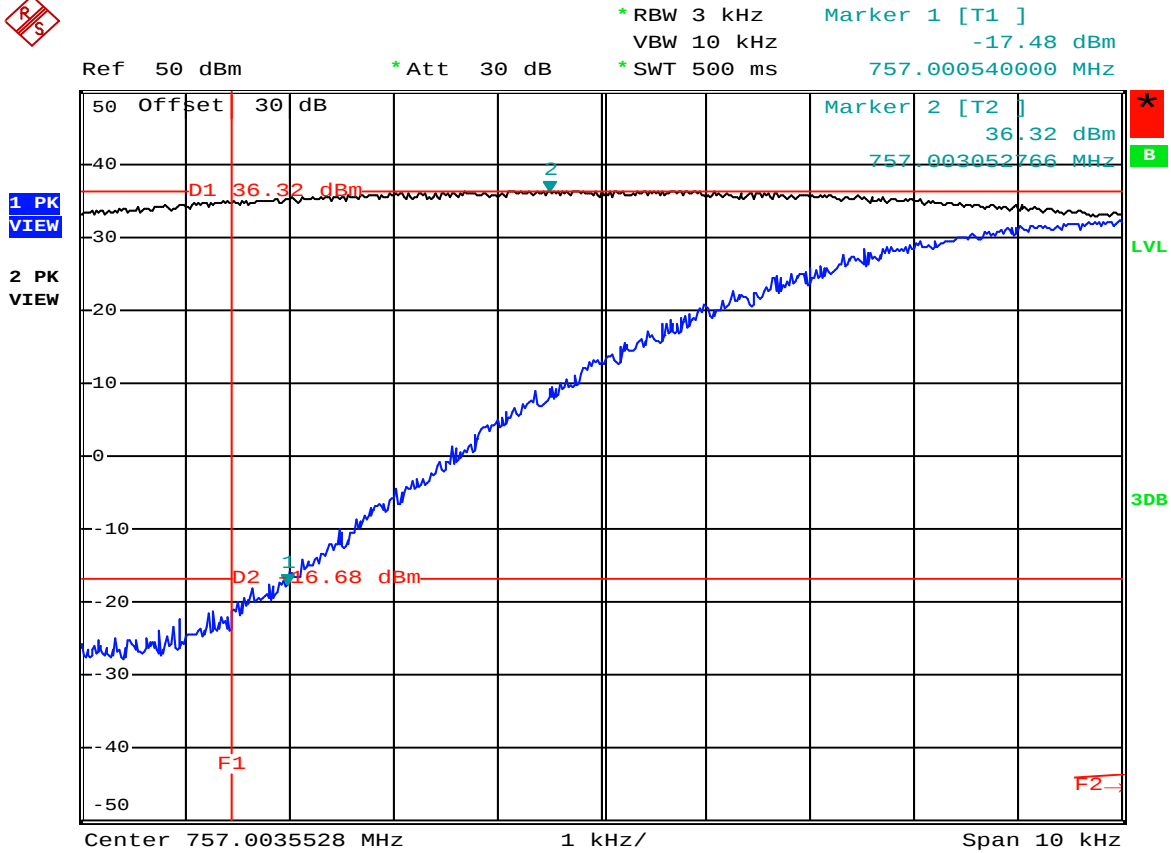
Equipment List			
Asset Number	Manufacturer	Model Number	Description
n/a	ESPEC	ECT-2	Environmental Chamber
00003	HP	53181A	Frequency Counter
n/a	HP	E3611A	Power Supply
00234	VWR	61161-378	Temp/Humidity Meter



* The Aprisa SR, SR+ does not operate below 9.8VDC.

Note: The instrument setup was similar to that used for the Band Edge measurements, using 1kHz and 3kHz RBW, and applying RBW scaling (see Appendix C). The DUT was set to QPSK Modulation and the 757-758MHz frequency band as this produced the worst case configuration. The 787-788MHz band as well as the 16QAM and 64QAM modulation configurations were verified at select temperatures. The term “Deviation” and “Delta F” in the following evaluation is the difference between the measured $53 + 10\log(P)$ or $57.8 + 10\log(P)$ values and the band’s edge. The 12.5kHz Band Width configuration produced emissions closest to the band’s edge and this bandwidth was used for the Voltage, 16QAM and 64QAM frequency stability measurements.

Lower Band Edge Emissions



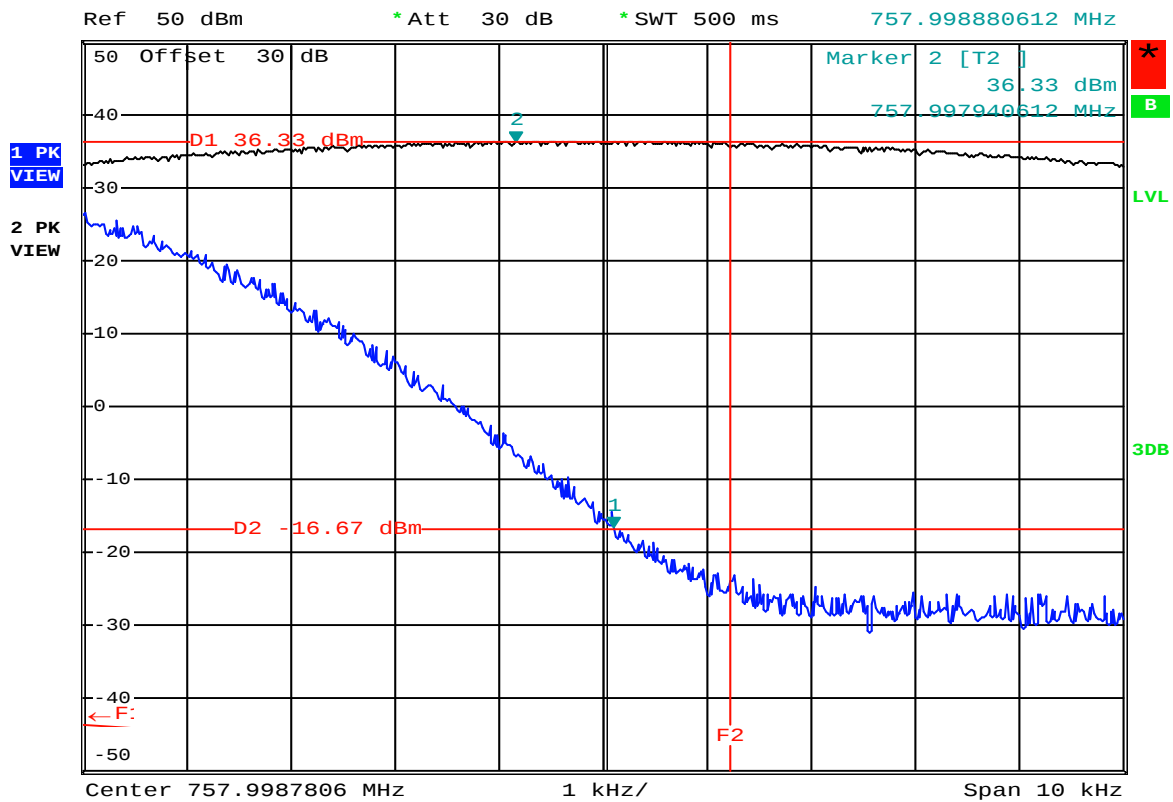
Date: 5.AUG.2016 12:02:22

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	540
Temp (°C):	-40

Upper Band Edge Emissions



Date: 5.AUG.2016 11:58:56

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	1119
Temp (°C):	-40

Lower Band Edge Emissions



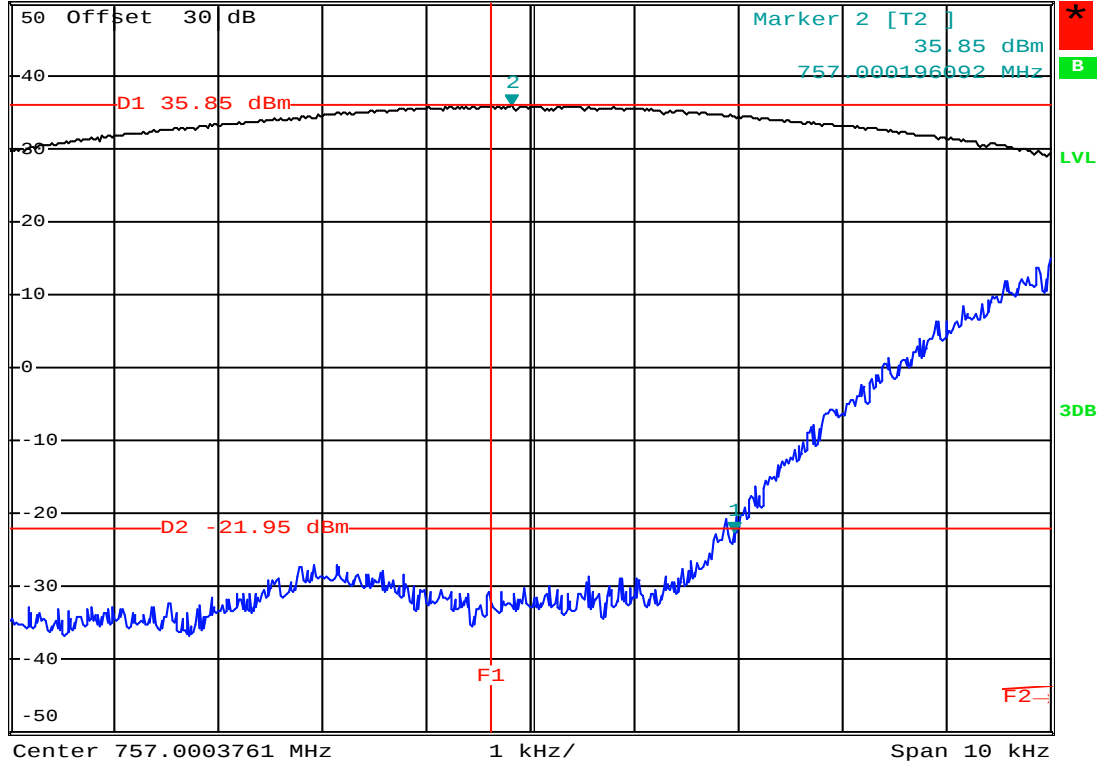
* RBW 1 kHz Marker 1 [T1]
VBW 3 kHz -22.59 dBm
* SWT 500 ms 757.002336092 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



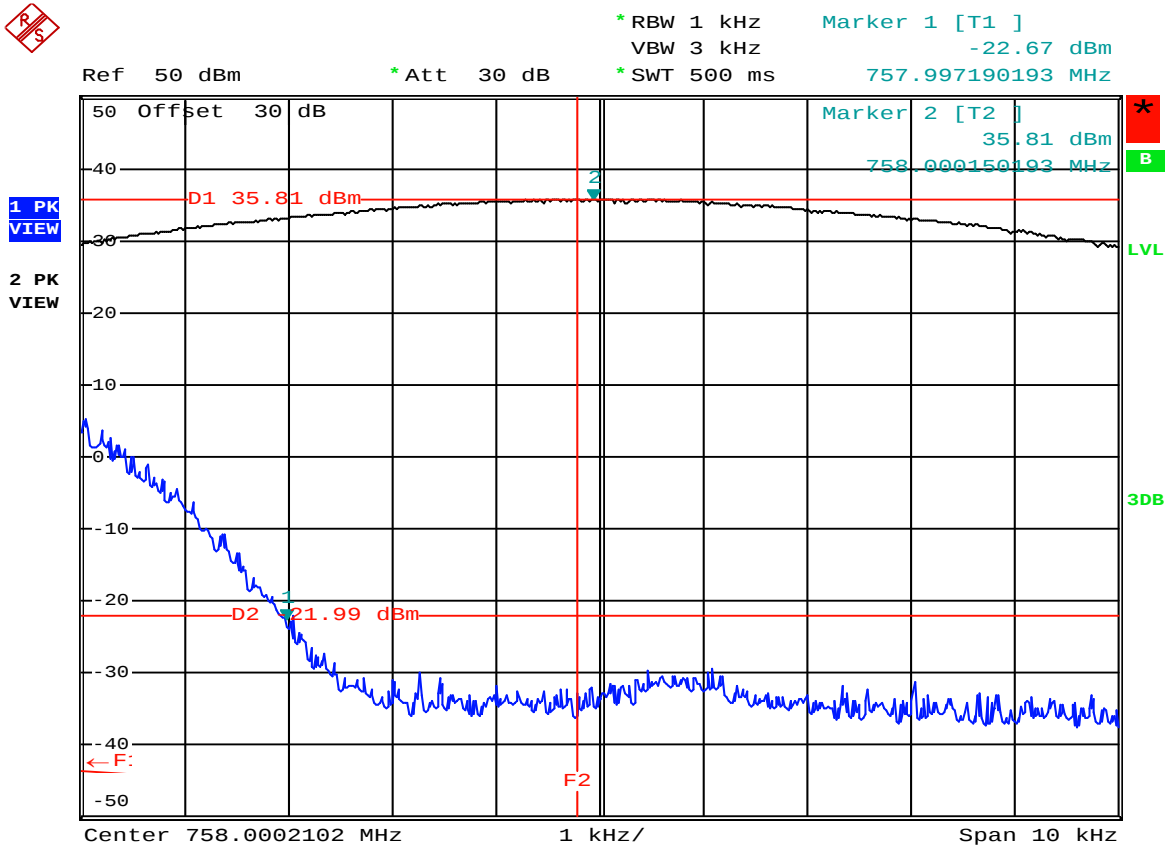
Date: 5.AUG.2016 12:09:04

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2336
Temp (°C):	-40

Upper Band Edge Emissions



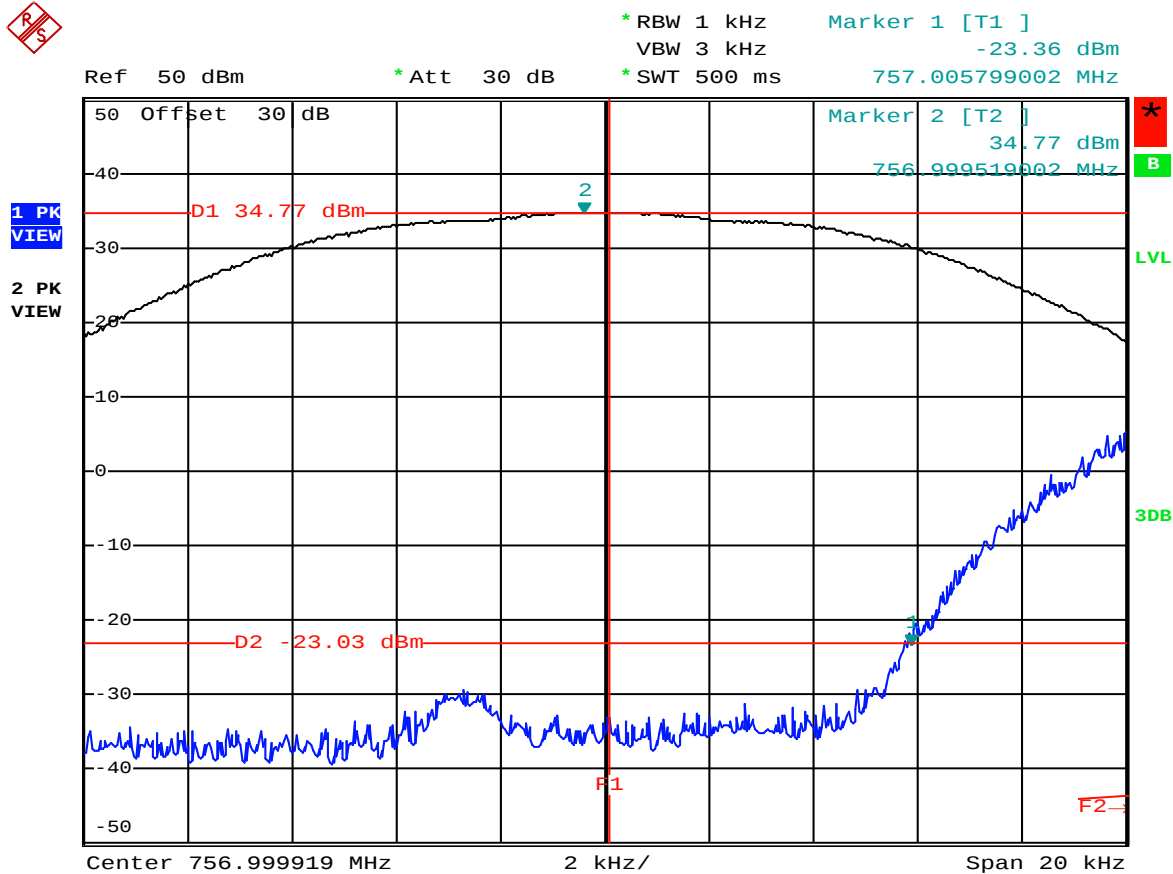
Date: 5.AUG.2016 12:12:17

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2810
Temp (°C):	-40

Lower Band Edge Emissions

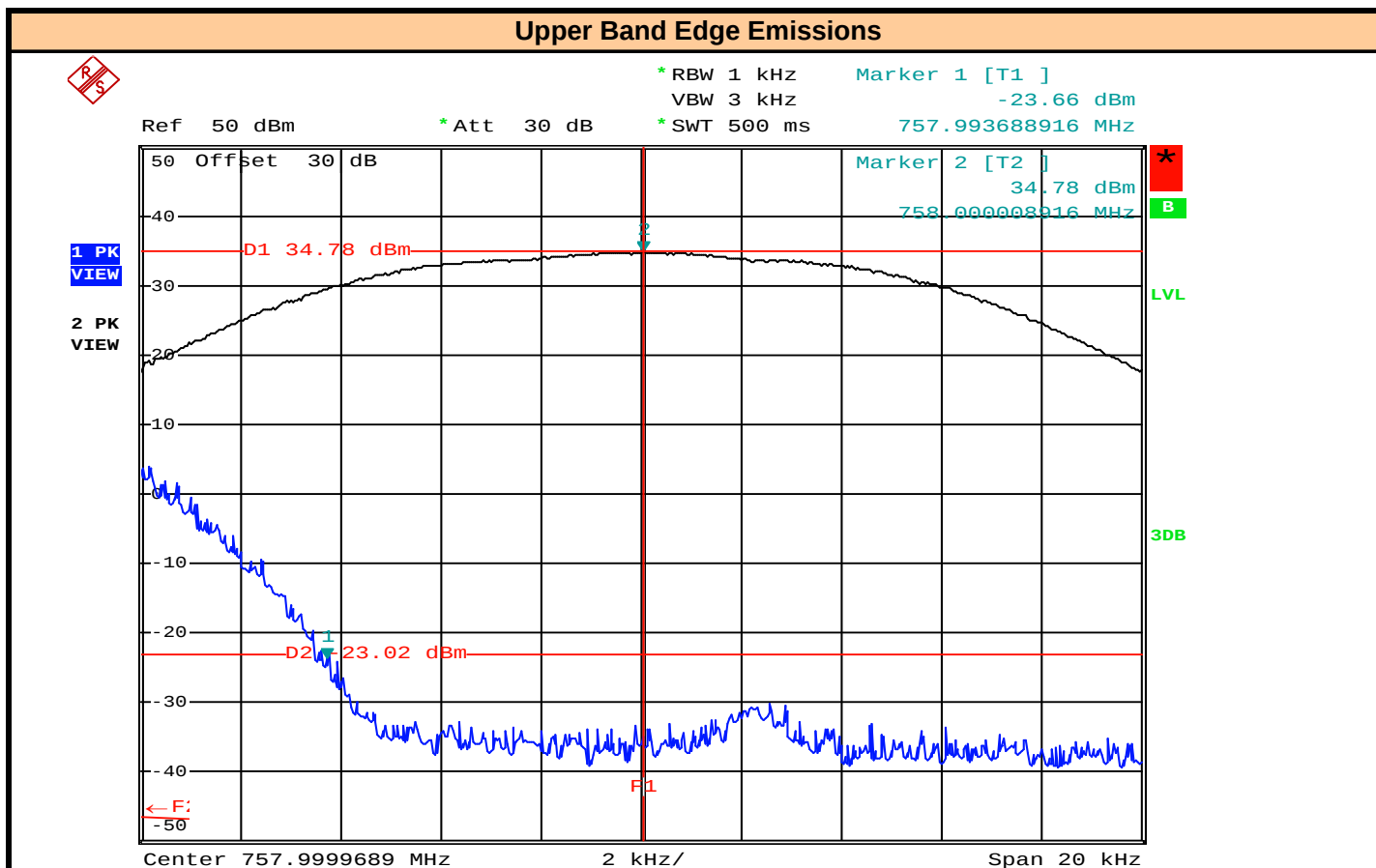


Date: 5.AUG.2016 12:37:27

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	5790
Temp (°C):	-40



Date: 5.AUG.2016 12:34:08

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6311
Temp (°C):	-40

Lower Band Edge Emissions



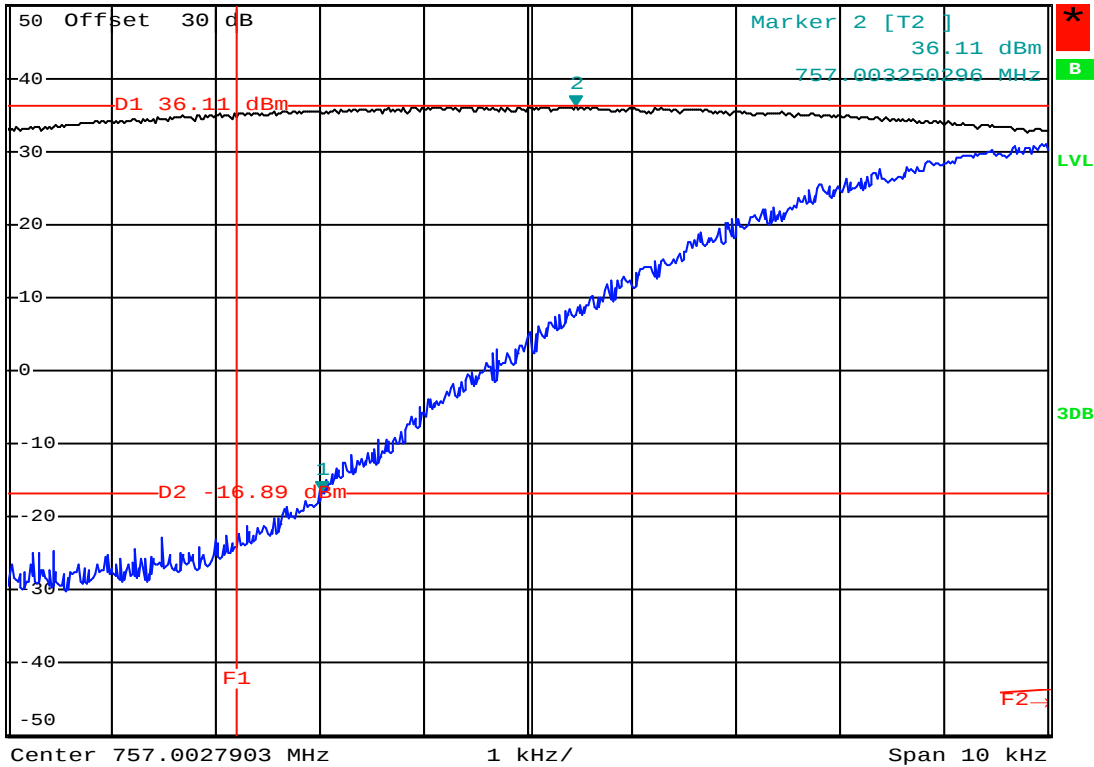
* RBW 3 kHz Marker 1 [T1] -16.53 dBm
VBW 10 kHz
* SWT 500 ms 757.000810296 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



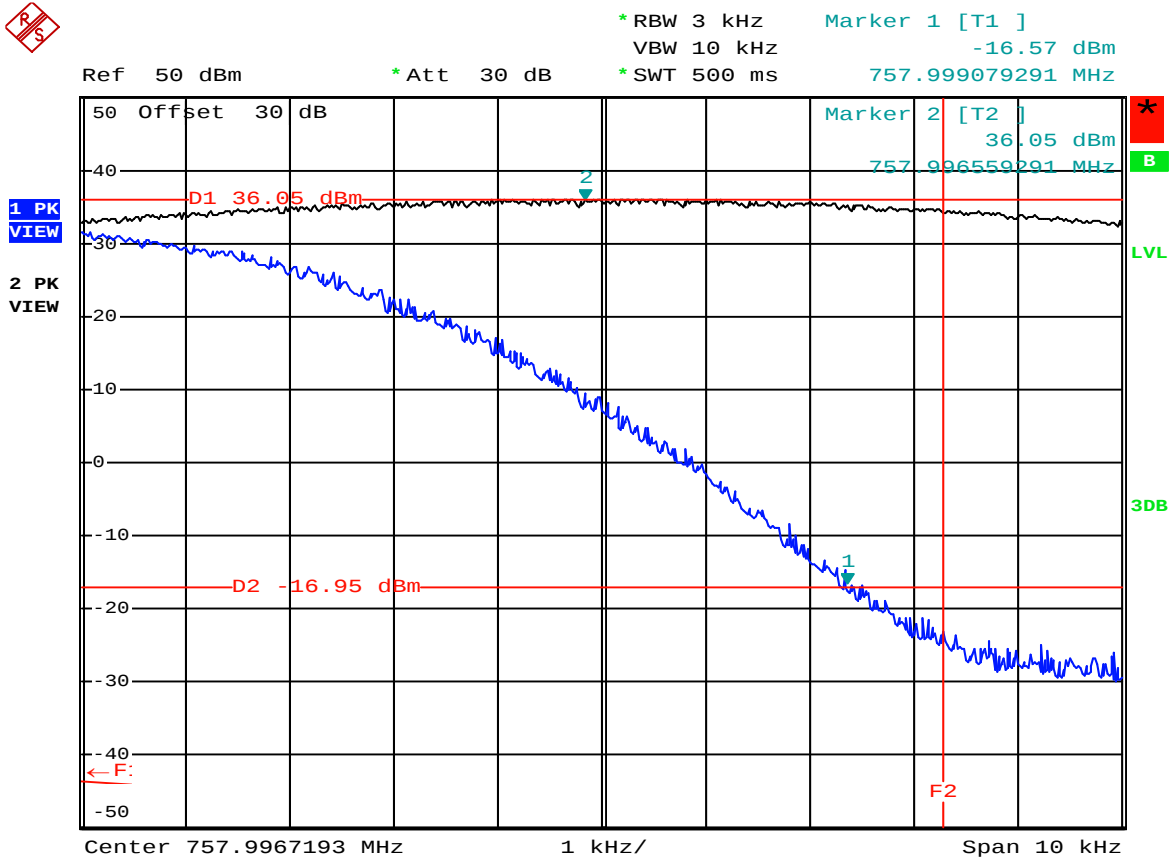
Date: 5.AUG.2016 13:33:27

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	810
Temp (°C):	-30

Upper Band Edge Emissions



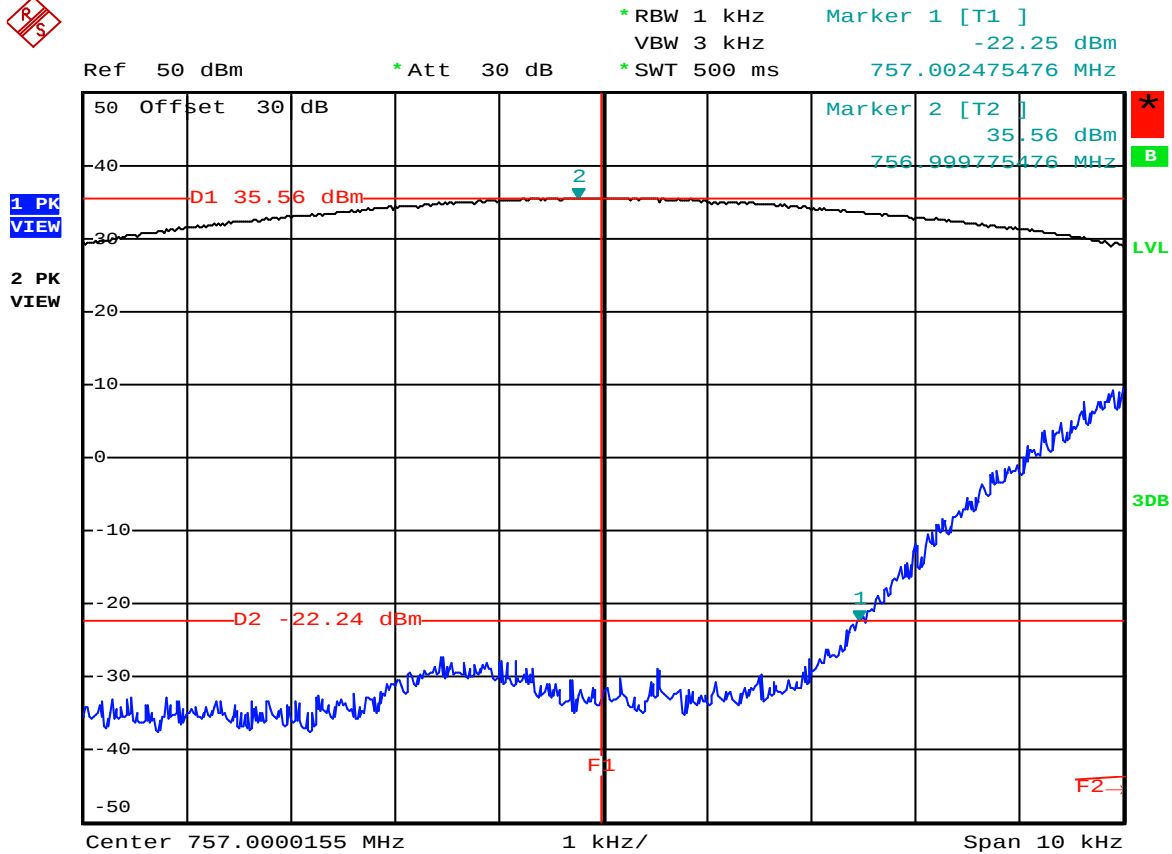
Date: 5.AUG.2016 13:36:04

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	921
Temp (°C):	-30

Lower Band Edge Emissions



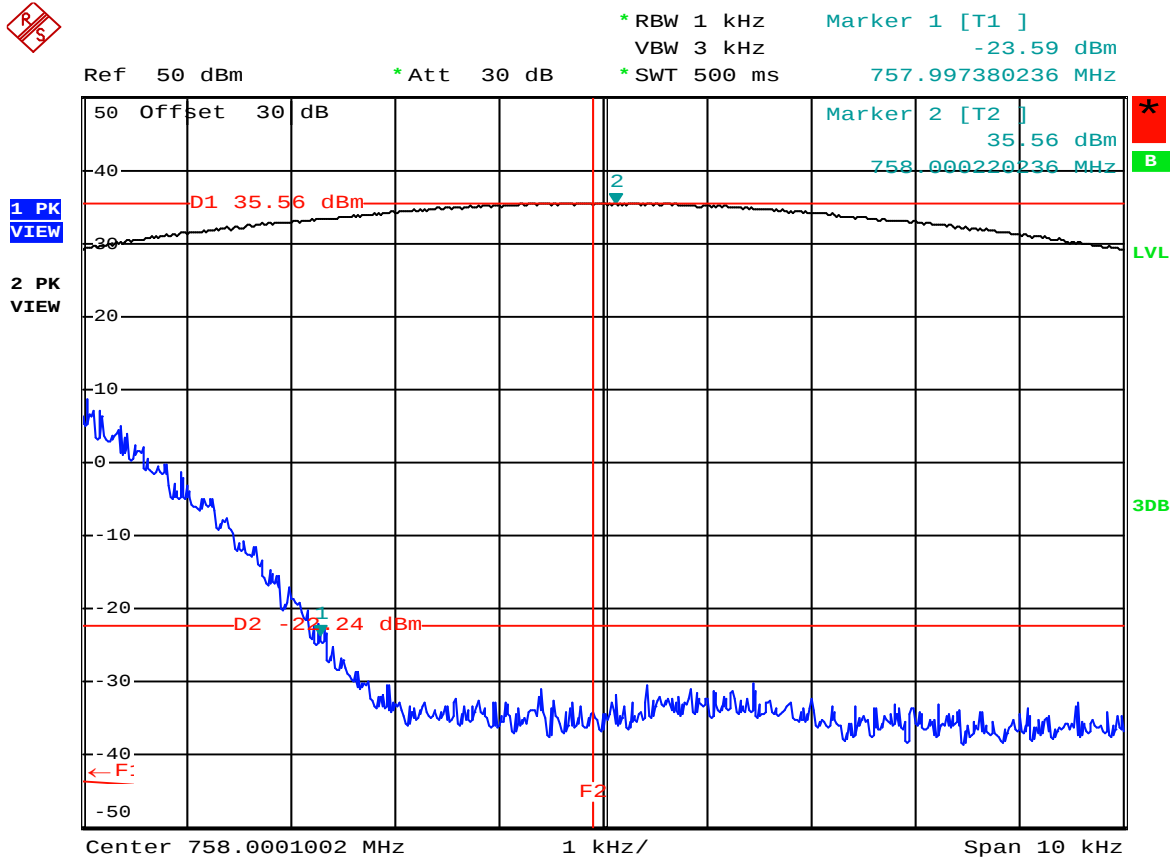
Date: 5.AUG.2016 13:29:00

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2475
Temp (°C):	-30

Upper Band Edge Emissions



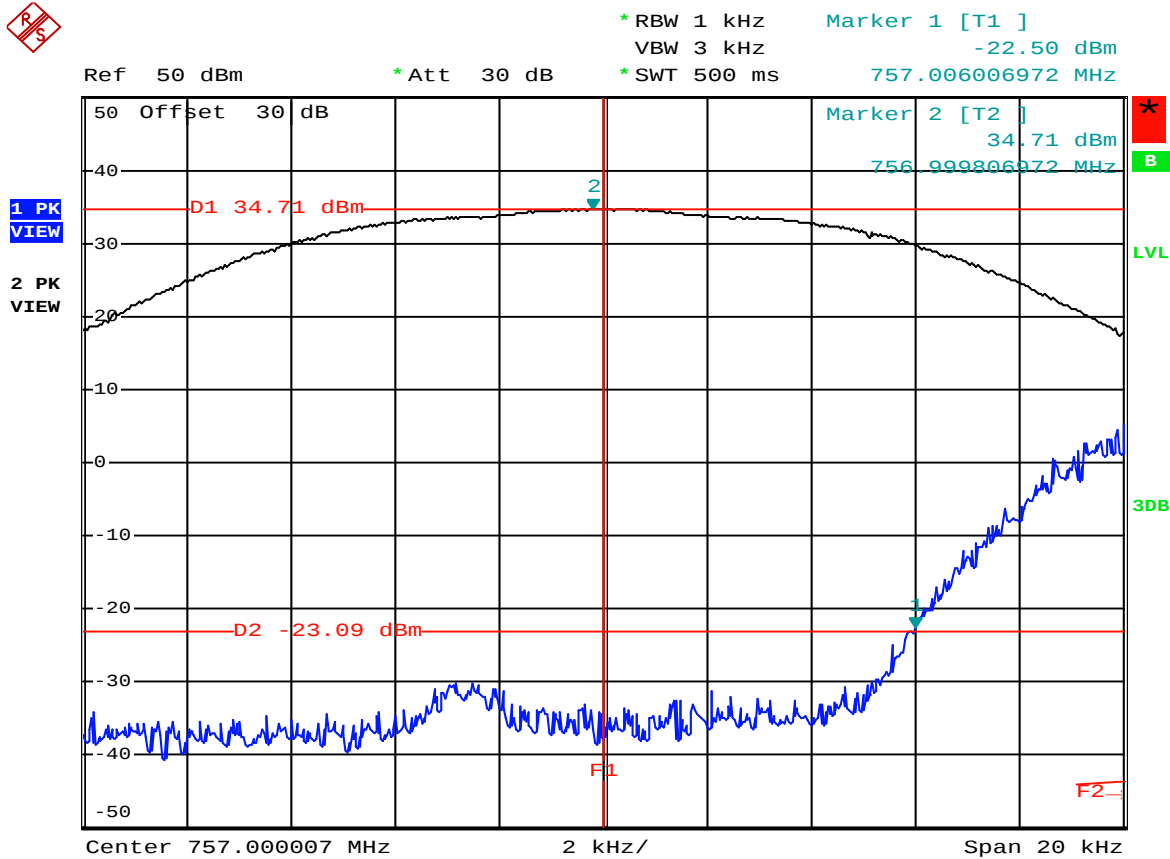
Date: 5.AUG.2016 13:25:28

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2620
Temp (°C):	-30

Lower Band Edge Emissions



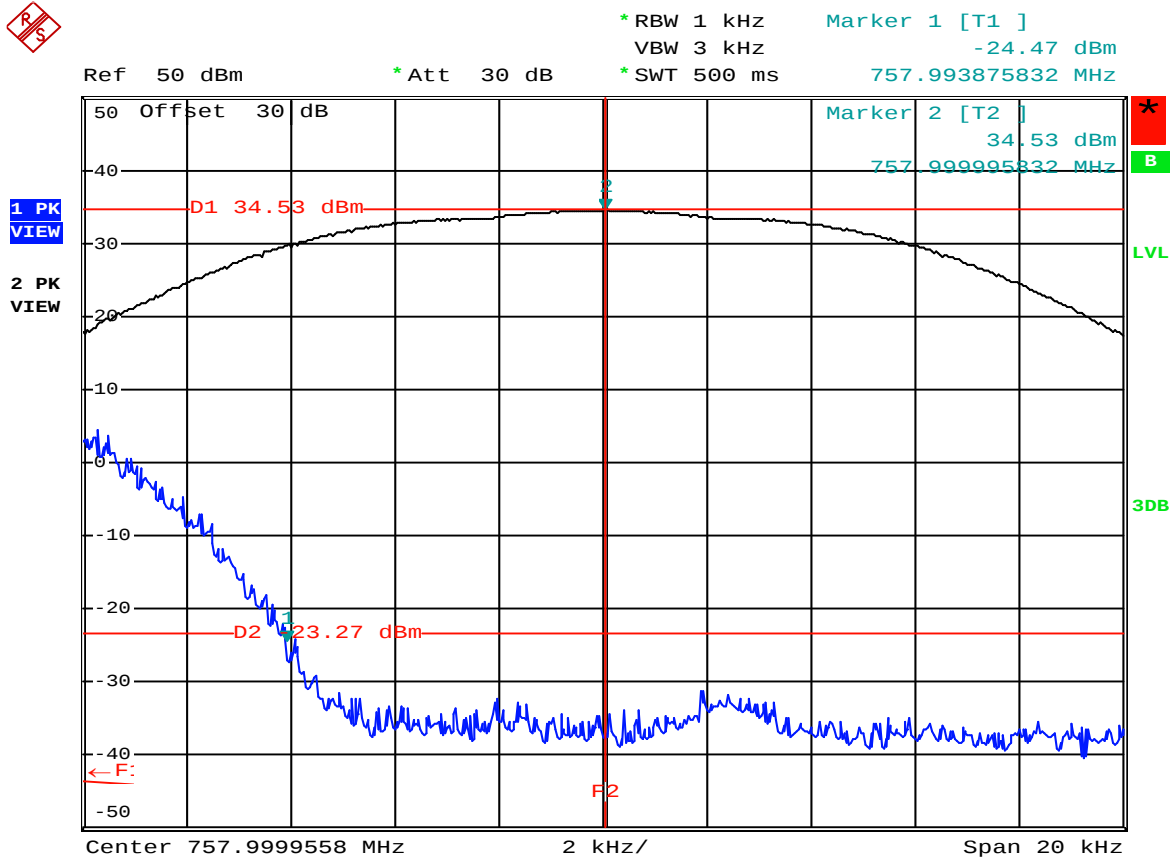
Date: 5.AUG.2016 13:17:20

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6007
Temp (°C):	-30

Upper Band Edge Emissions



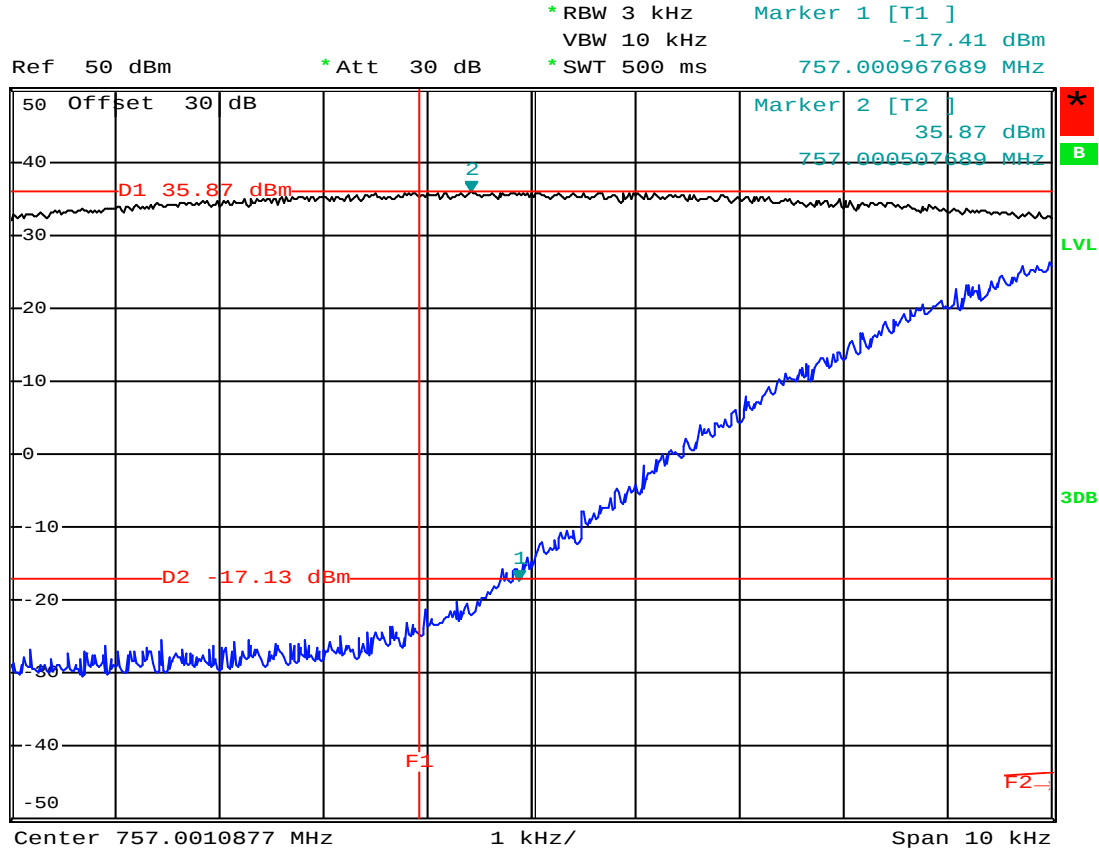
Date: 5.AUG.2016 13:20:43

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6125
Temp (°C):	-30

Lower Band Edge Emissions



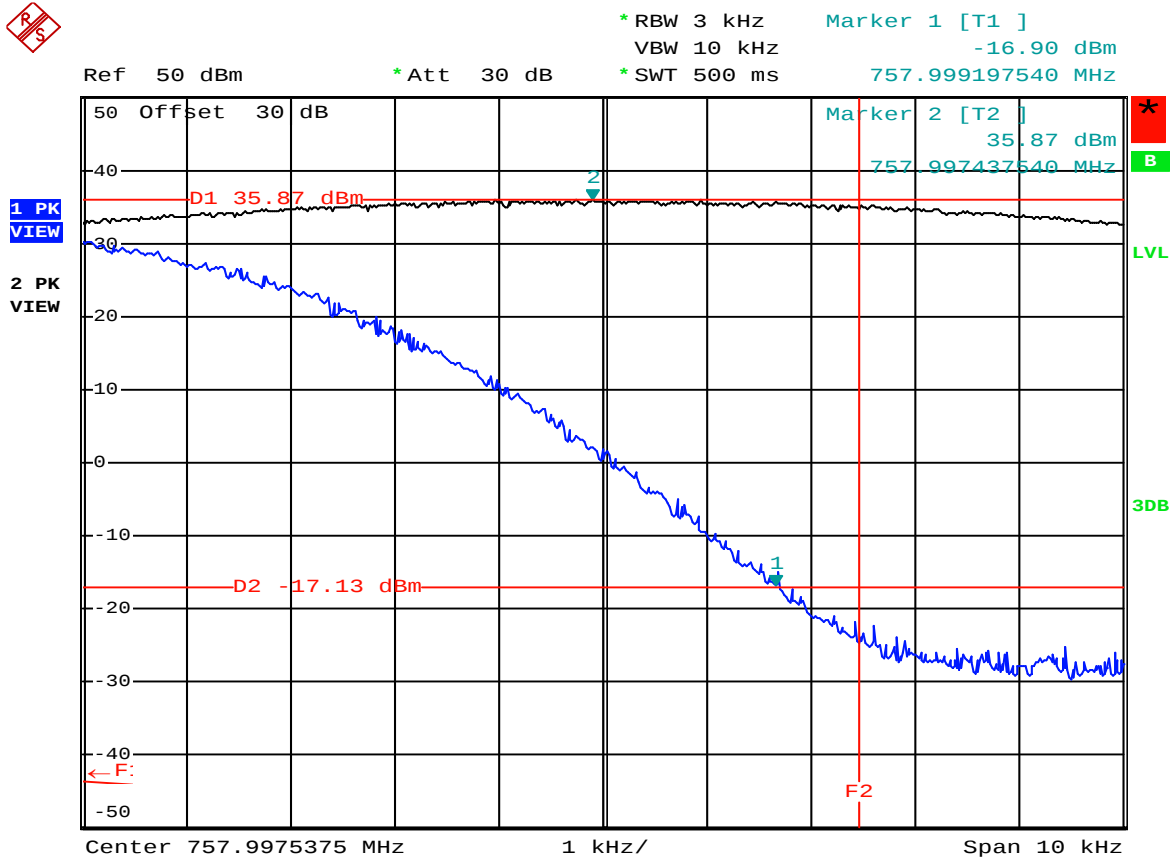
Date: 5.AUG.2016 14:11:56

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	967
Temp (°C):	-20

Upper Band Edge Emissions



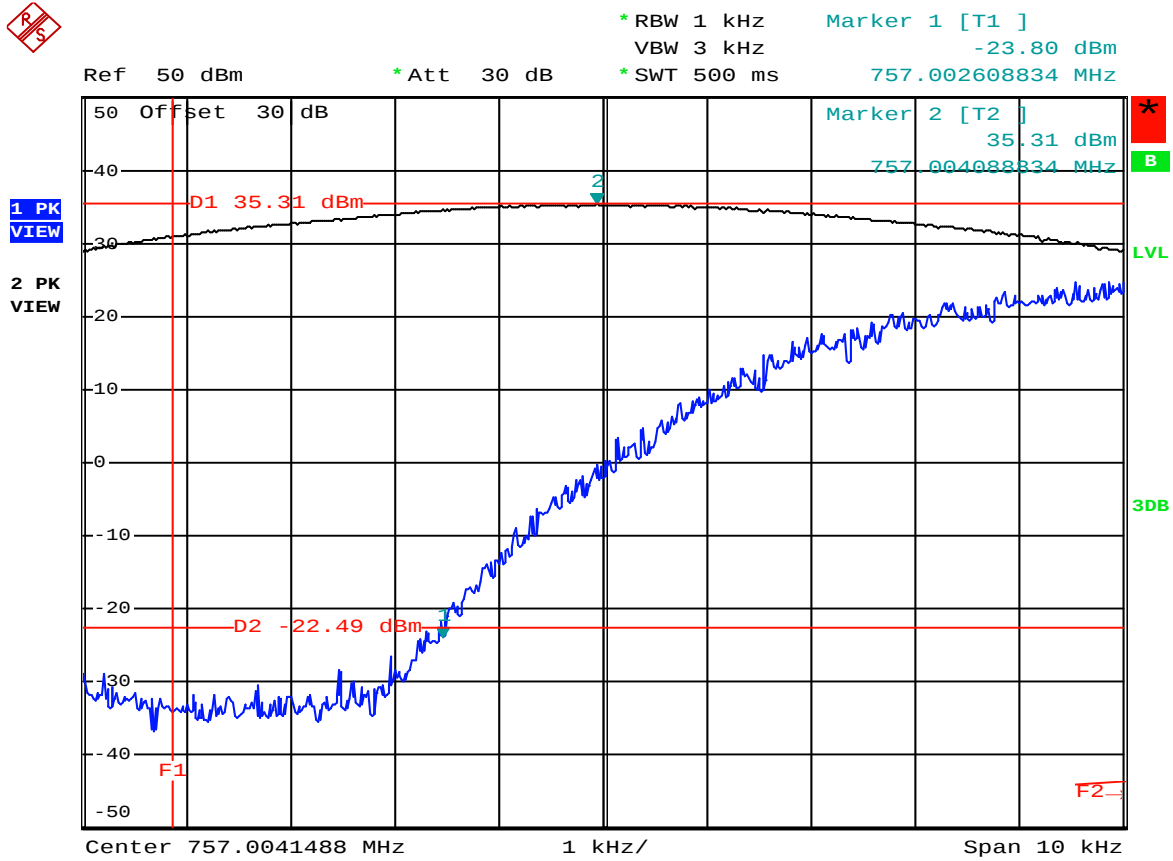
Date: 5.AUG.2016 14:09:06

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	803
Temp (°C):	-20

Lower Band Edge Emissions



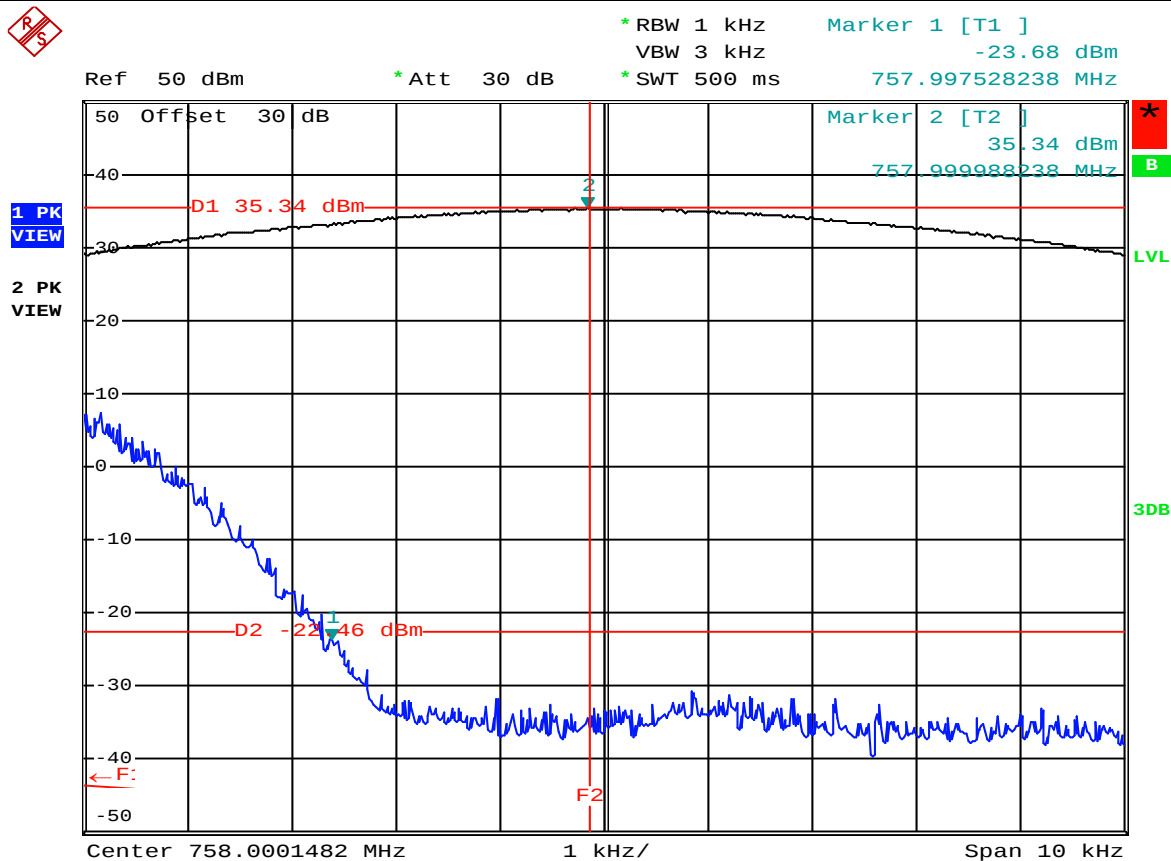
Date: 5.AUG.2016 14:19:54

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2609
Temp (°C):	-20

Upper Band Edge Emissions



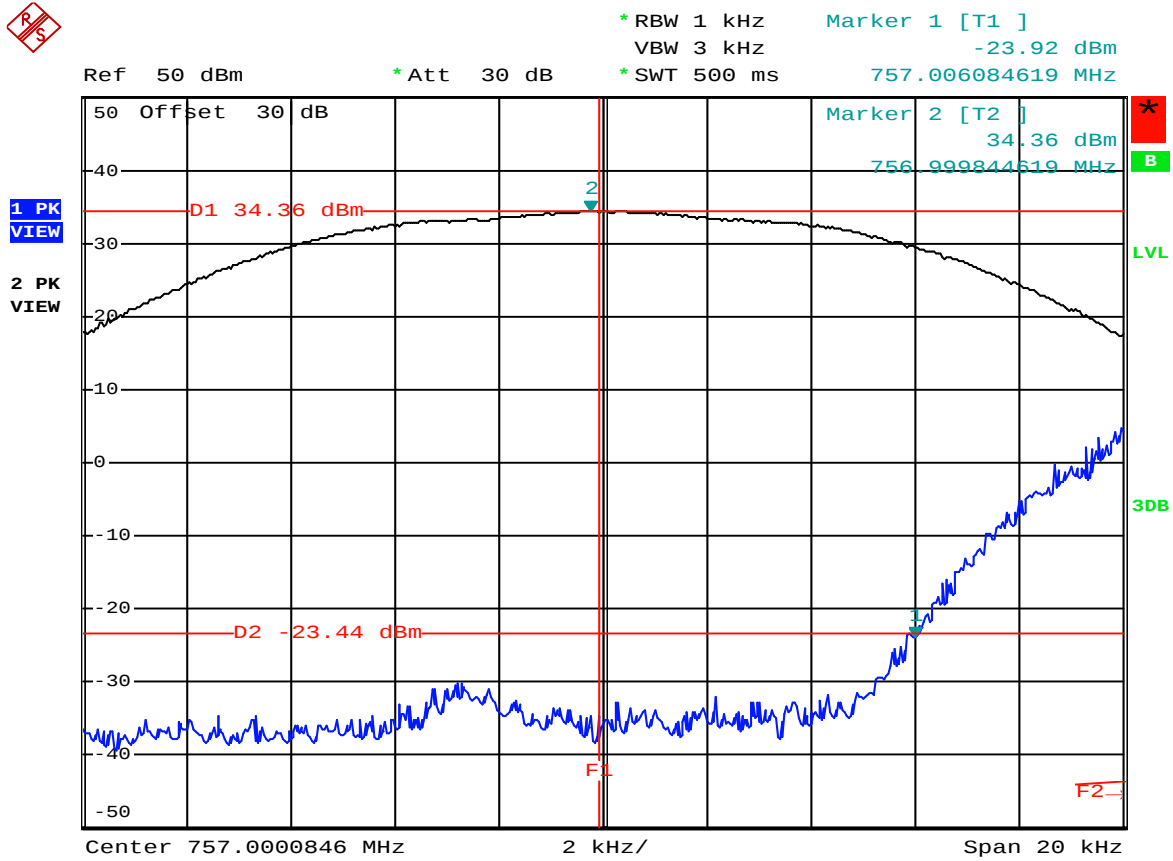
Date: 5.AUG.2016 14:25:02

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2472
Temp (°C):	-20

Lower Band Edge Emissions



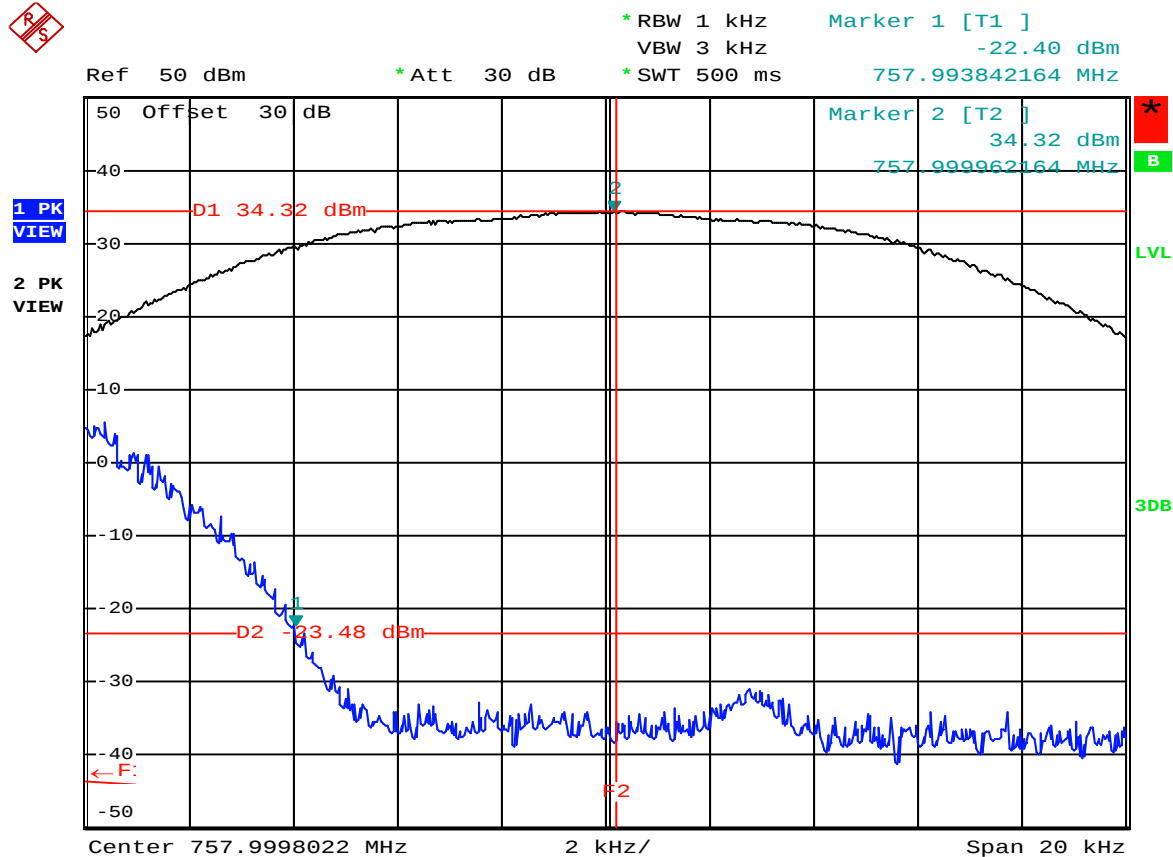
Date: 5.AUG.2016 14:32:49

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6085
Temp (°C):	-20

Upper Band Edge Emissions



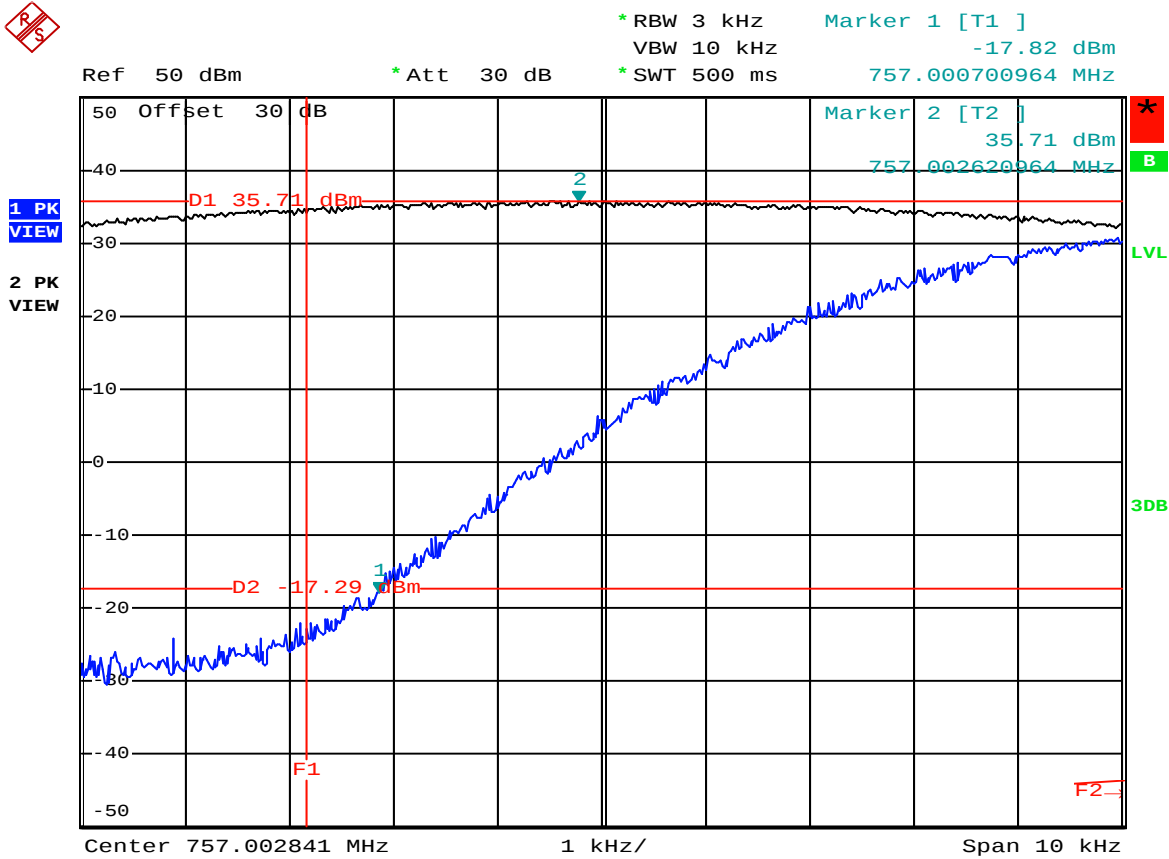
Date: 5.AUG.2016 14:29:28

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6579
Temp (°C):	-20

Lower Band Edge Emissions



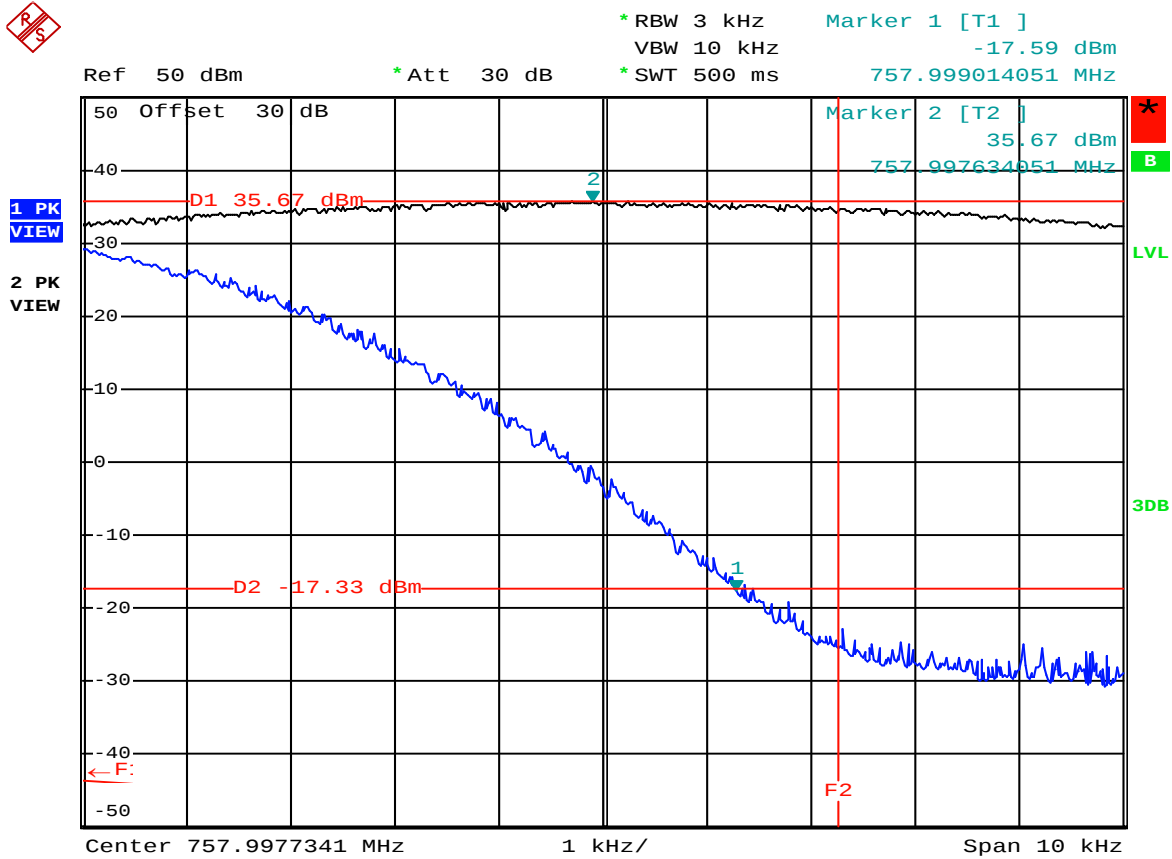
Date: 5.AUG.2016 15:17:28

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	701
Temp (°C):	-10

Upper Band Edge Emissions



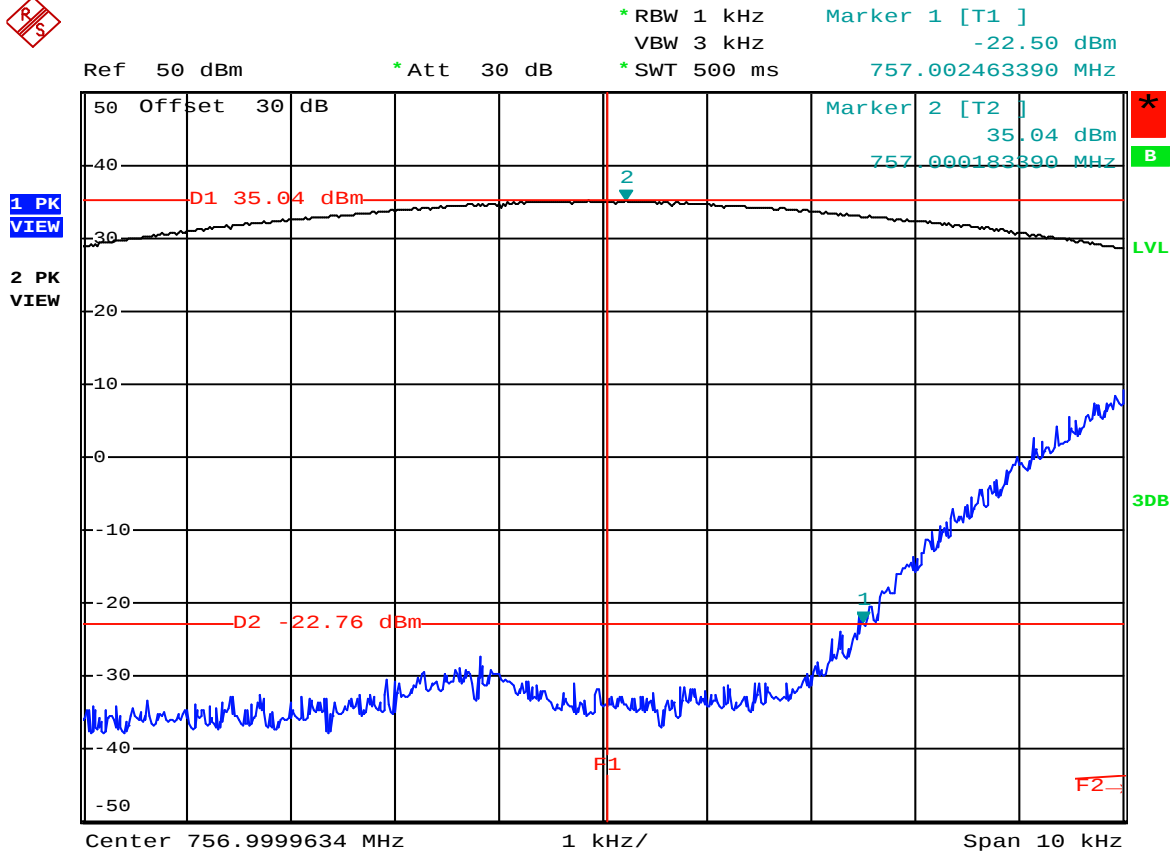
Date: 5.AUG.2016 15:20:04

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	986
Temp (°C):	-10

Lower Band Edge Emissions



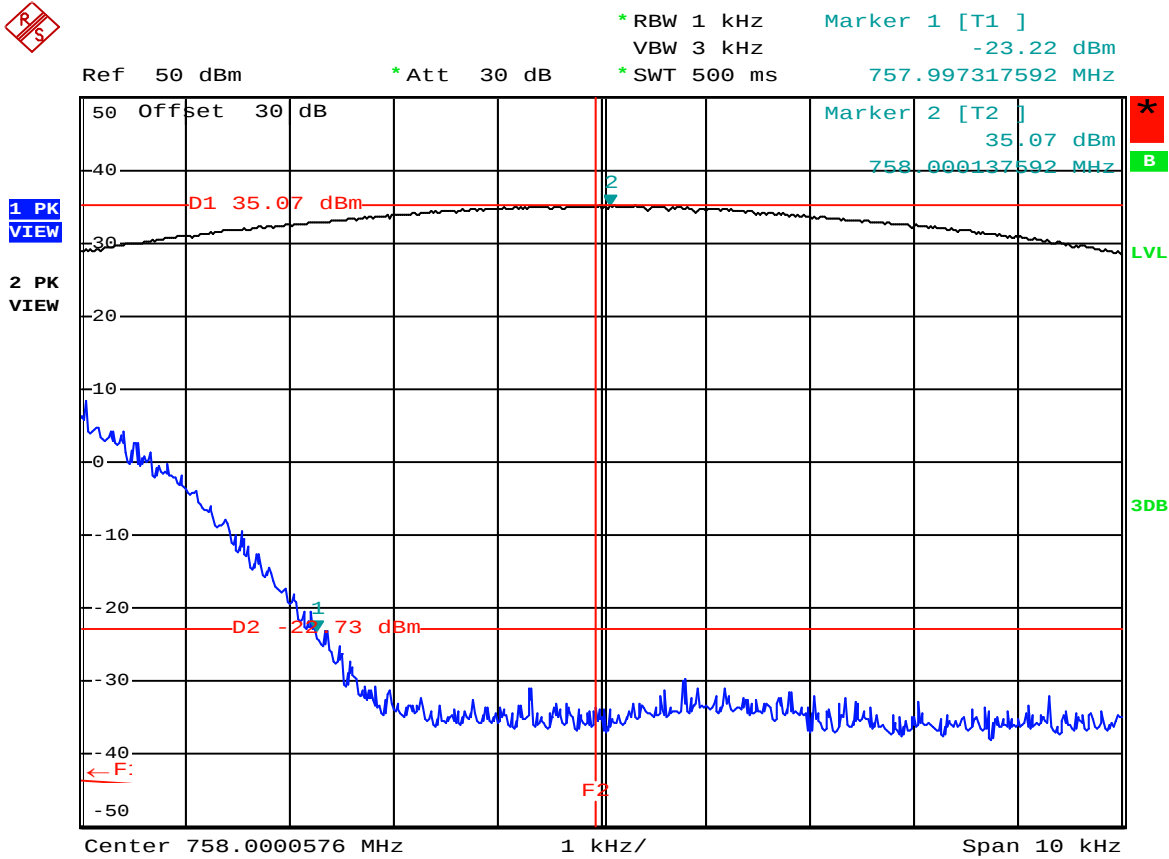
Date: 5.AUG.2016 15:13:08

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2463
Temp (°C):	-10

Upper Band Edge Emissions



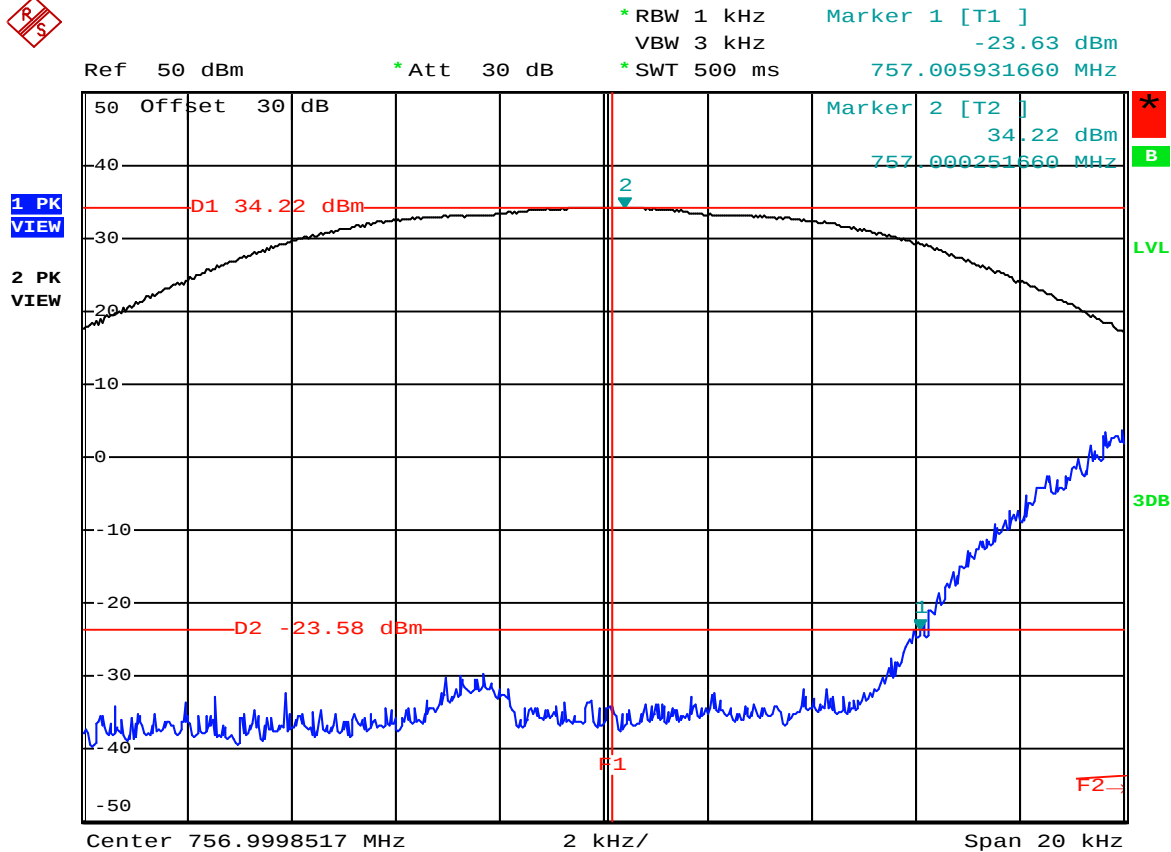
Date: 5.AUG.2016 15:10:21

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2683
Temp (°C):	-10

Lower Band Edge Emissions



Date: 5.AUG.2016 15:03:32

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	5932
Temp (°C):	-10

Upper Band Edge Emissions



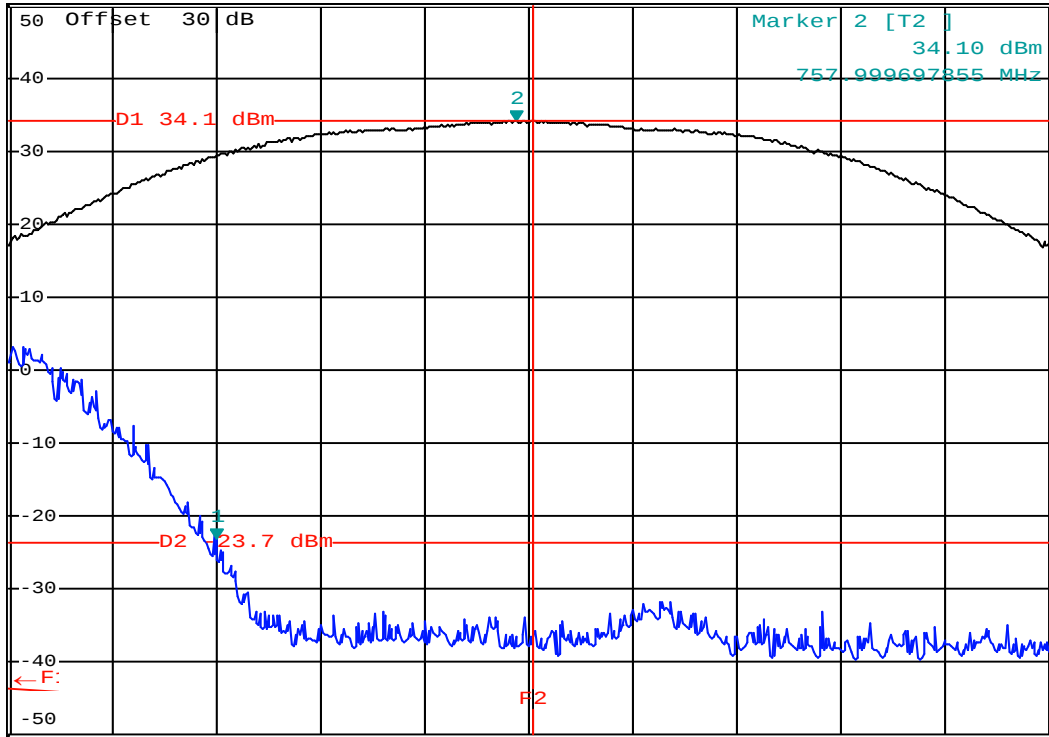
Ref 50 dBm * Att 30 dB * RBW 1 kHz * VBW 3 kHz * SWT 500 ms

Marker 1 [T1]
-23.22 dBm

757.9993937855 MHz

1 PK
VIEW

2 PK
VIEW



Center 757.9999379 MHz 2 kHz/ Span 20 kHz

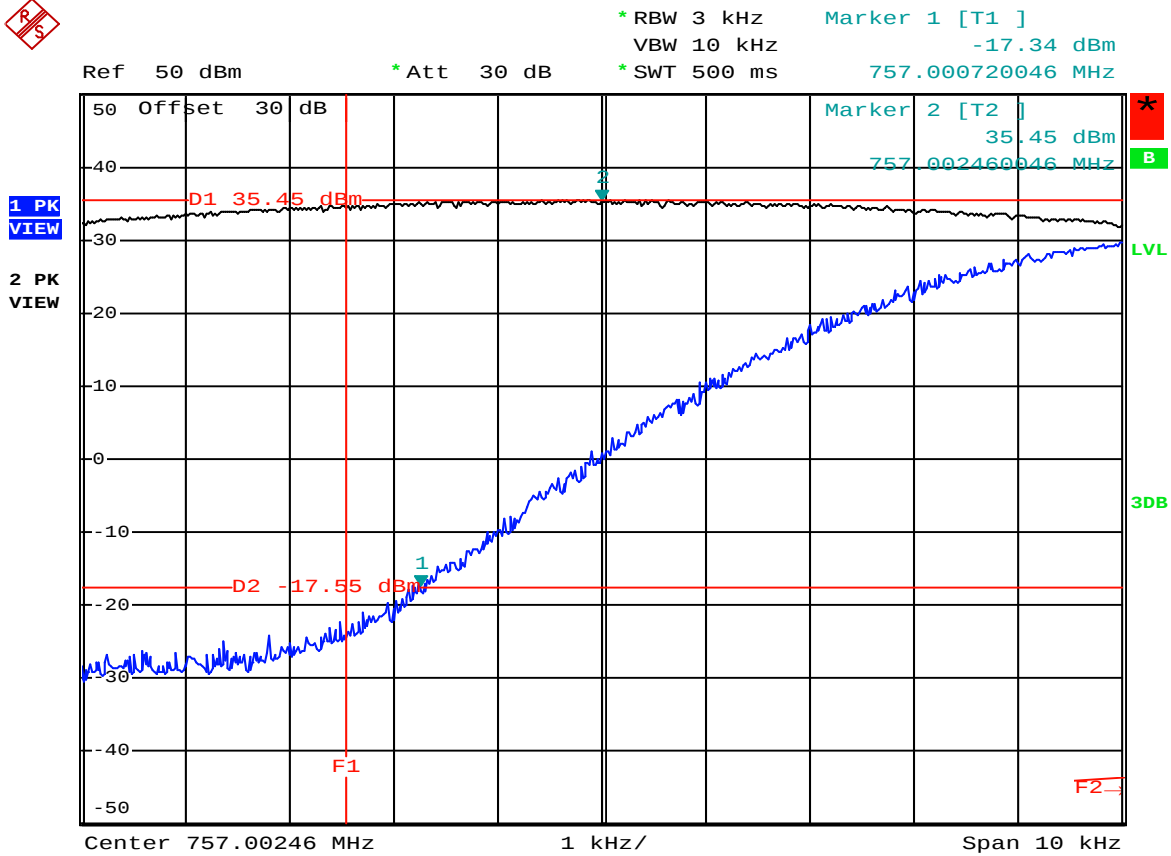
Date: 5.AUG.2016 15:06:25

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6063
Temp (°C):	-10

Lower Band Edge Emissions



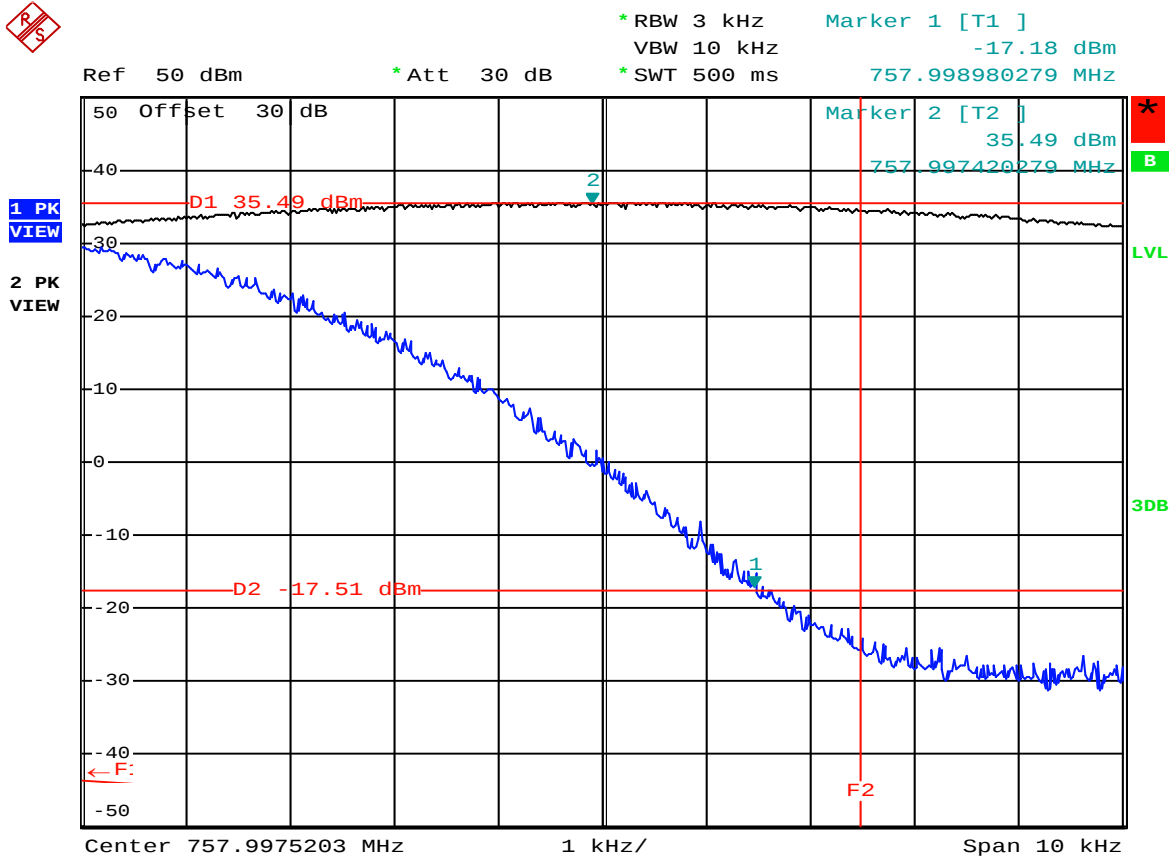
Date: 5.AUG.2016 15:44:42

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	720
Temp (°C):	0

Upper Band Edge Emissions



Date: 5.AUG.2016 15:42:16

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	1018
Temp (°C):	0

Lower Band Edge Emissions



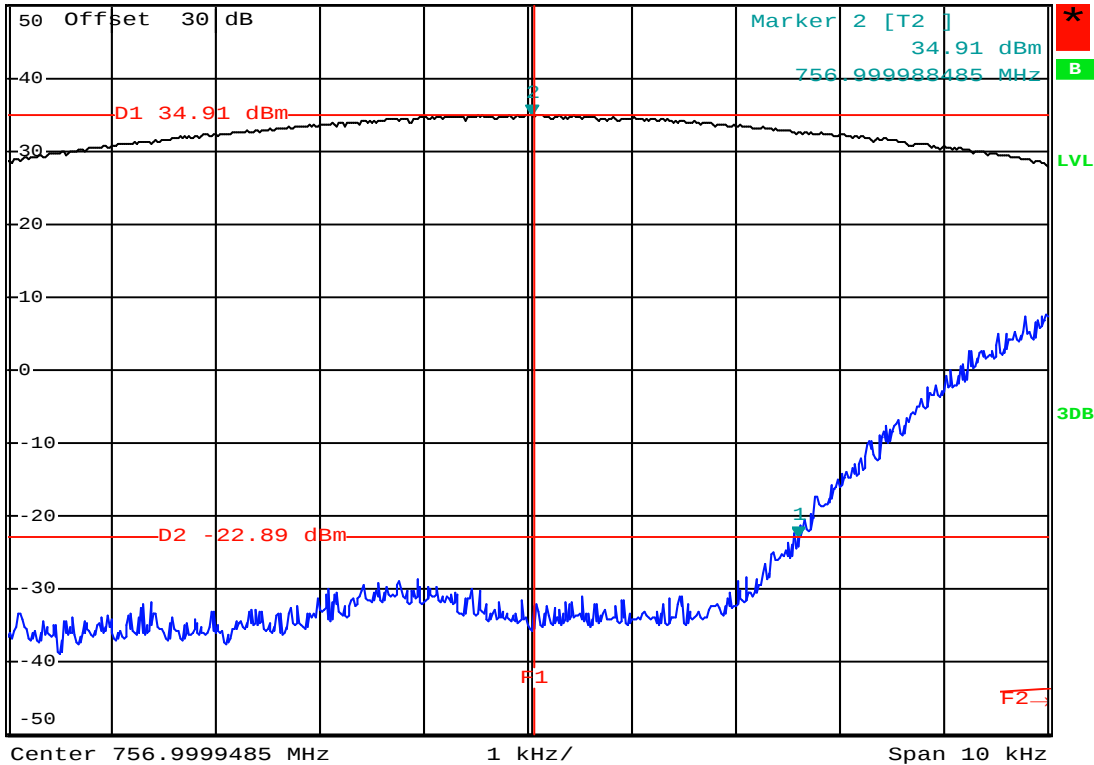
* RBW 1 kHz Marker 1 [T1]
VBW 3 kHz -22.78 dBm
* SWT 500 ms 757.002548485 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 5.AUG.2016 15:48:40

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2548
Temp (°C):	0

Upper Band Edge Emissions



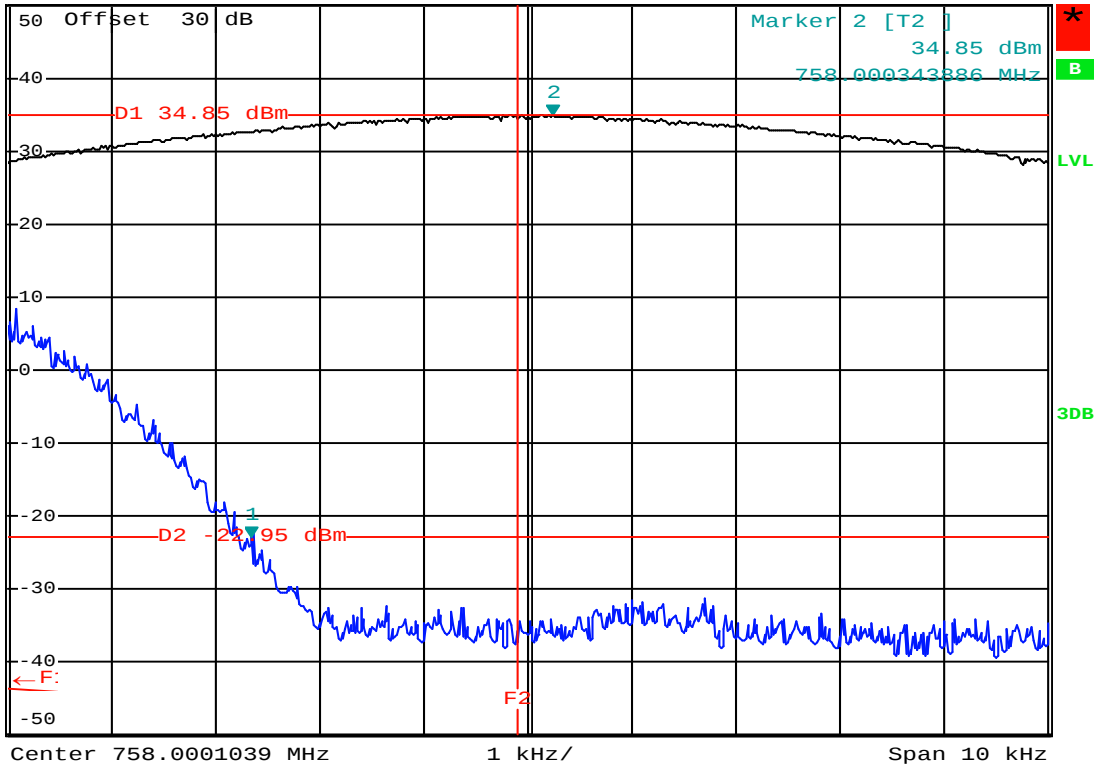
* RBW 1 kHz Marker 1 [T1]
VBW 3 kHz -22.79 dBm
* SWT 500 ms 757.997443886 MHz

Ref 50 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



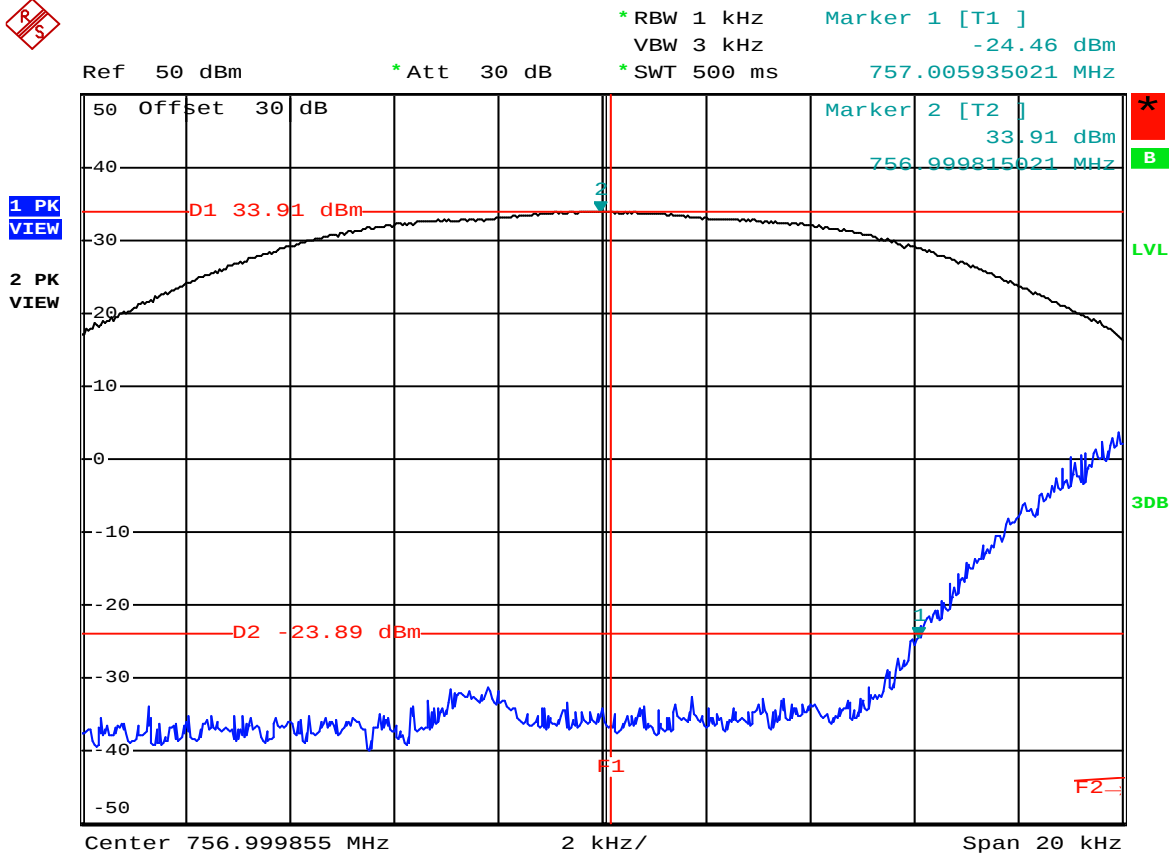
Date: 5.AUG.2016 15:51:16

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2557
Temp (°C):	0

Lower Band Edge Emissions



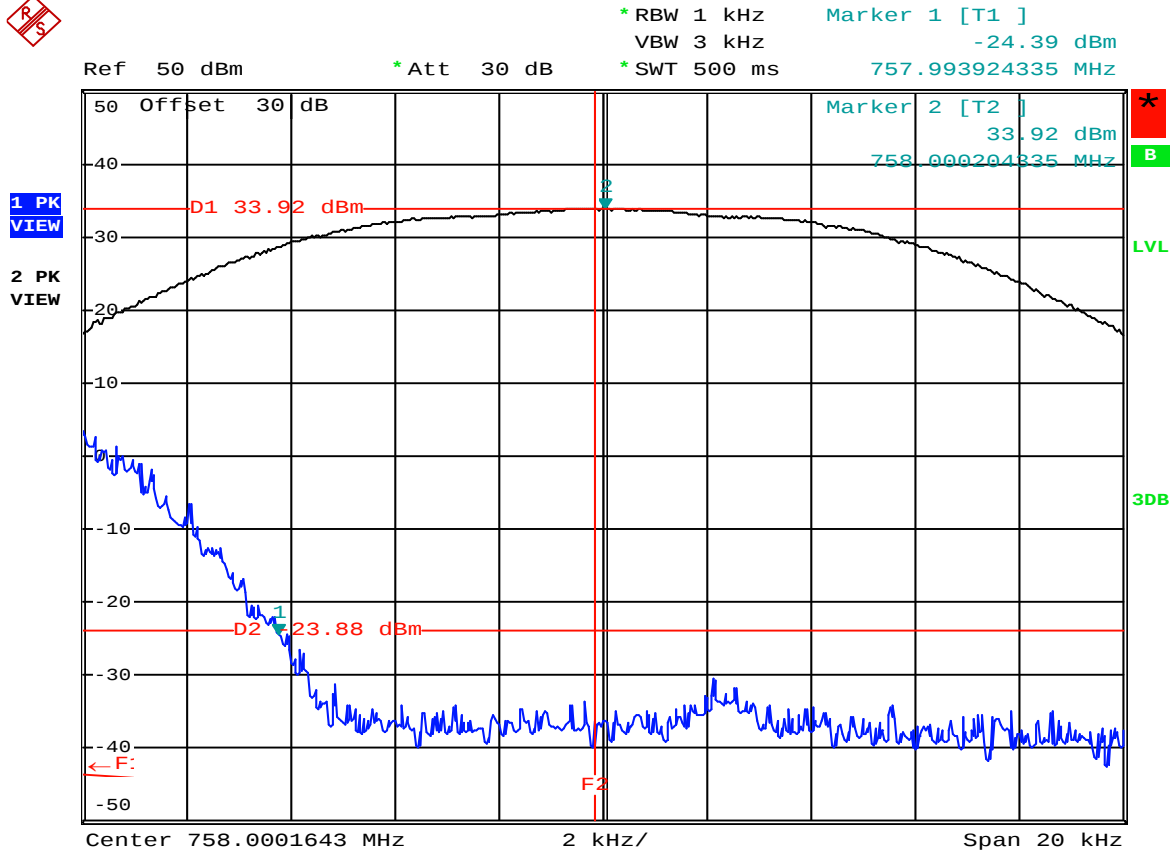
Date: 5.AUG.2016 15:57:56

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	5930
Temp (°C):	0

Upper Band Edge Emissions



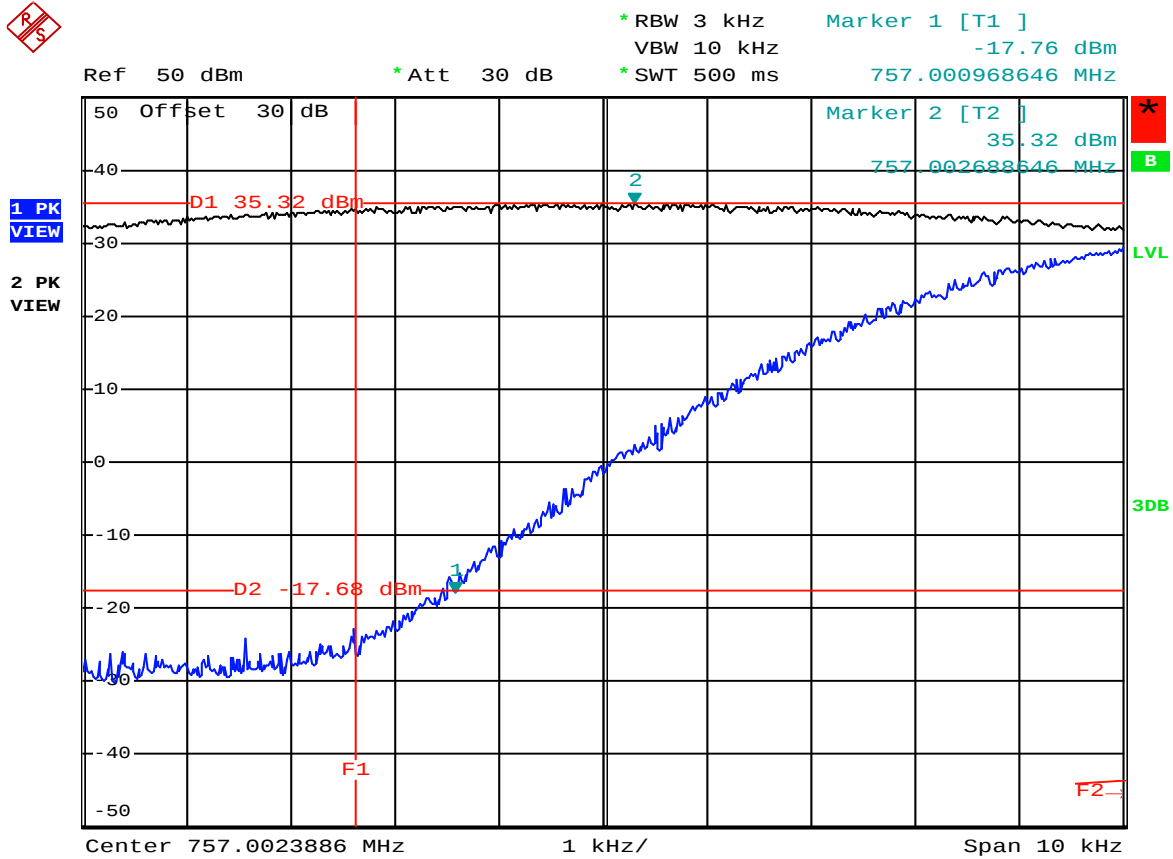
Date: 5.AUG.2016 15:55:11

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6076
Temp (°C):	0

Lower Band Edge Emissions



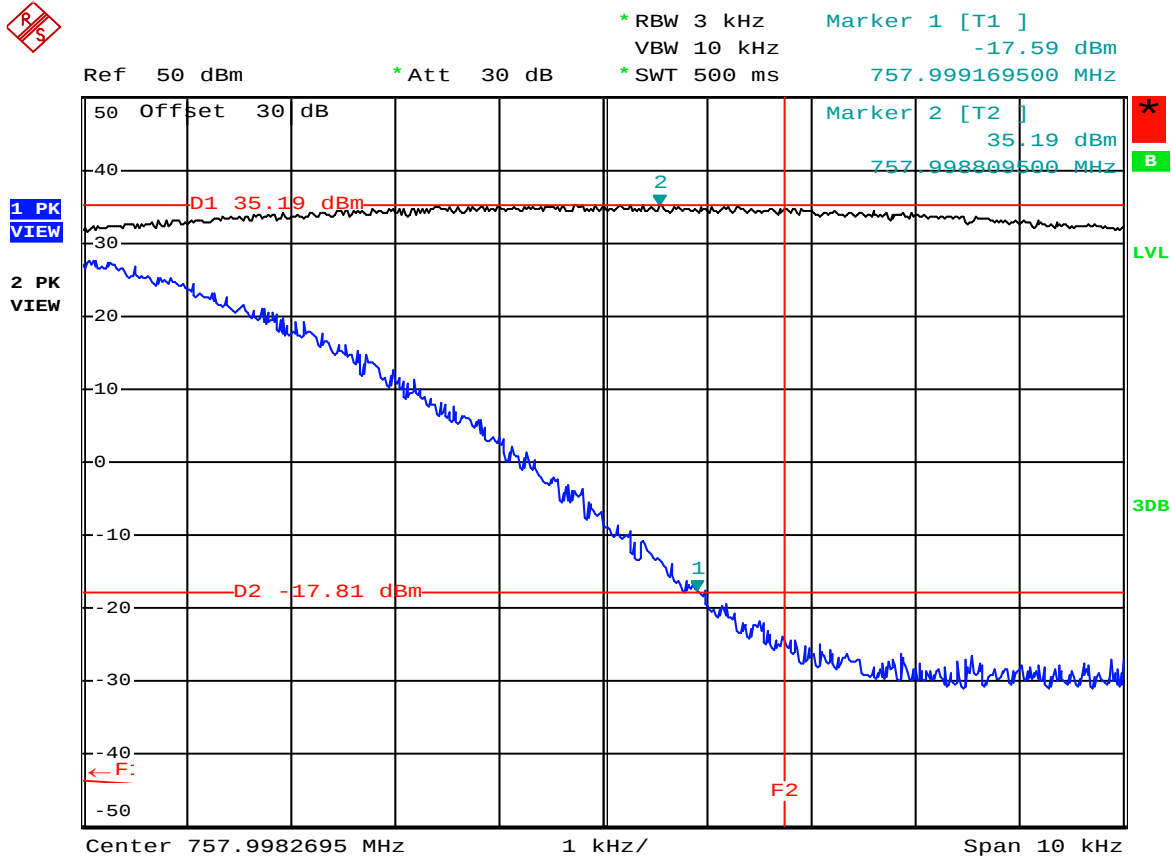
Date: 5.AUG.2016 16:26:28

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	968
Temp (°C):	10

Upper Band Edge Emissions



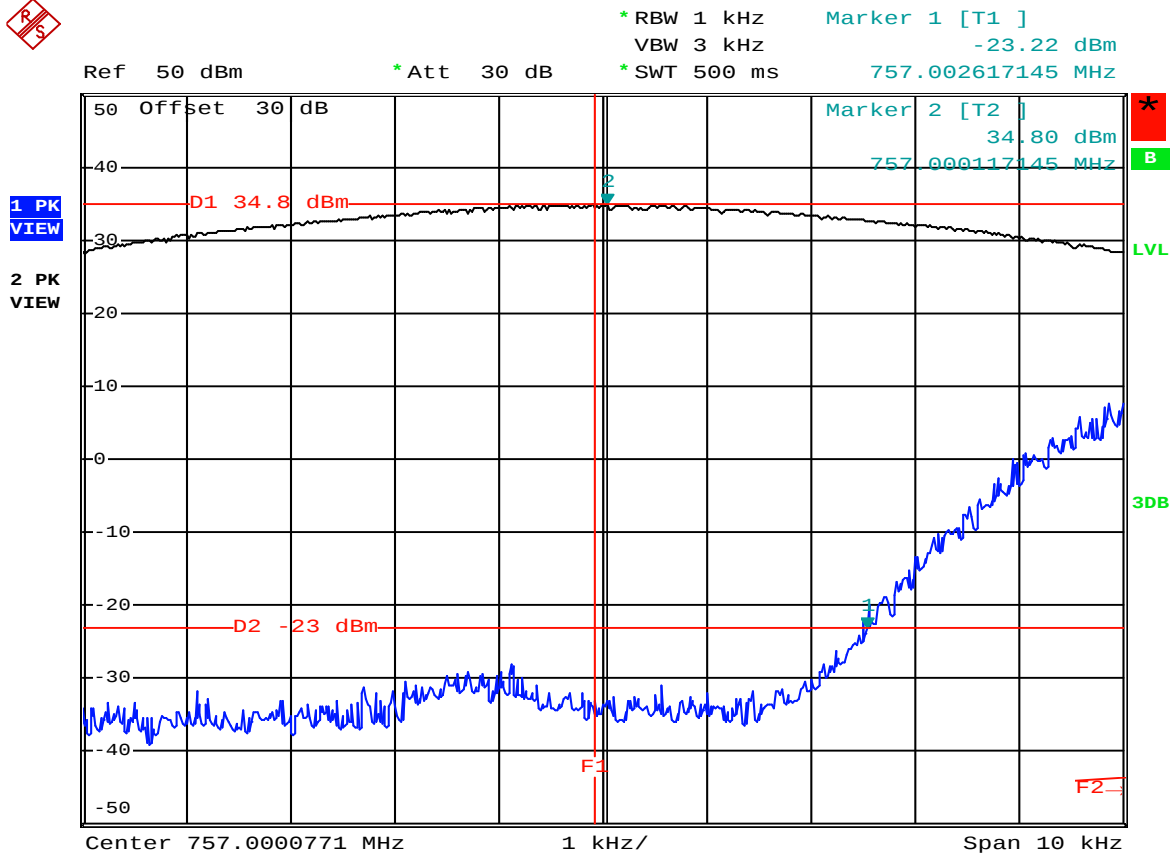
Date: 5.AUG.2016 16:28:49

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	831
Temp (°C):	10

Lower Band Edge Emissions



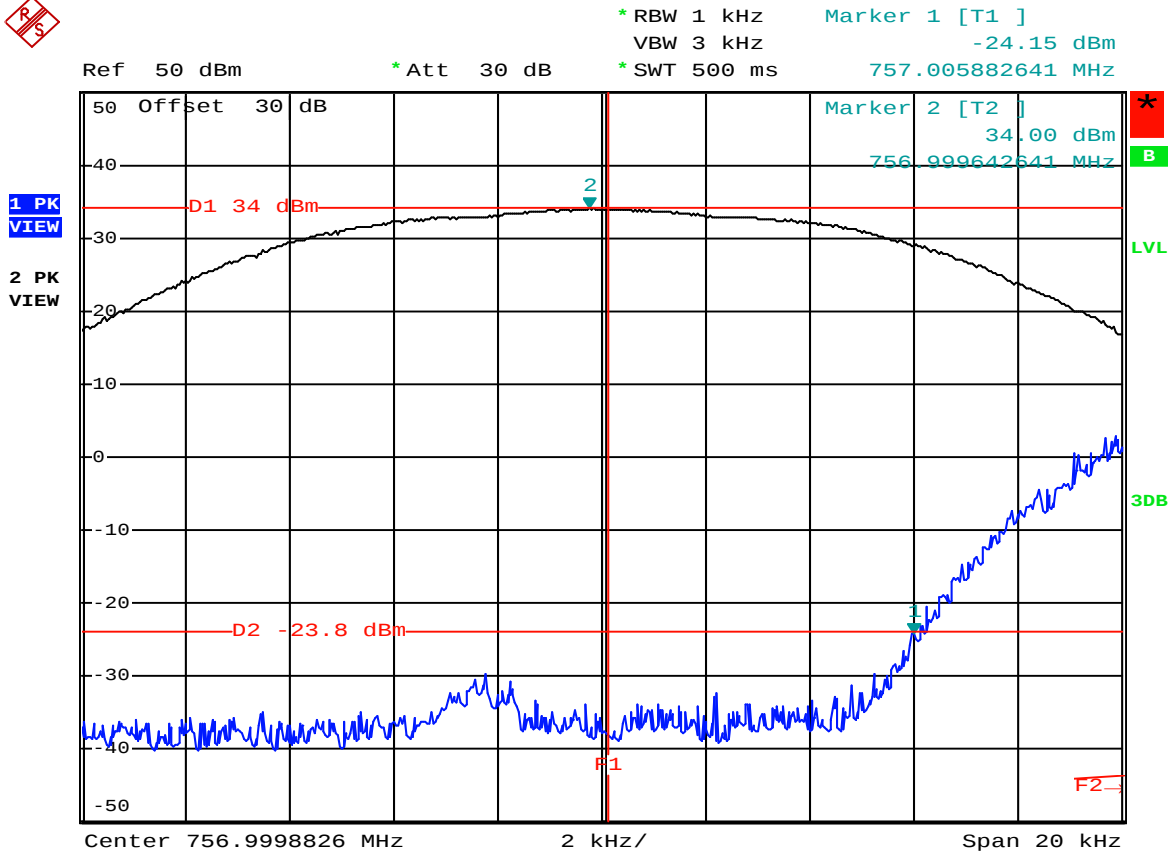
Date: 5.AUG.2016 16:20:49

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2617
Temp (°C):	10

Lower Band Edge Emissions



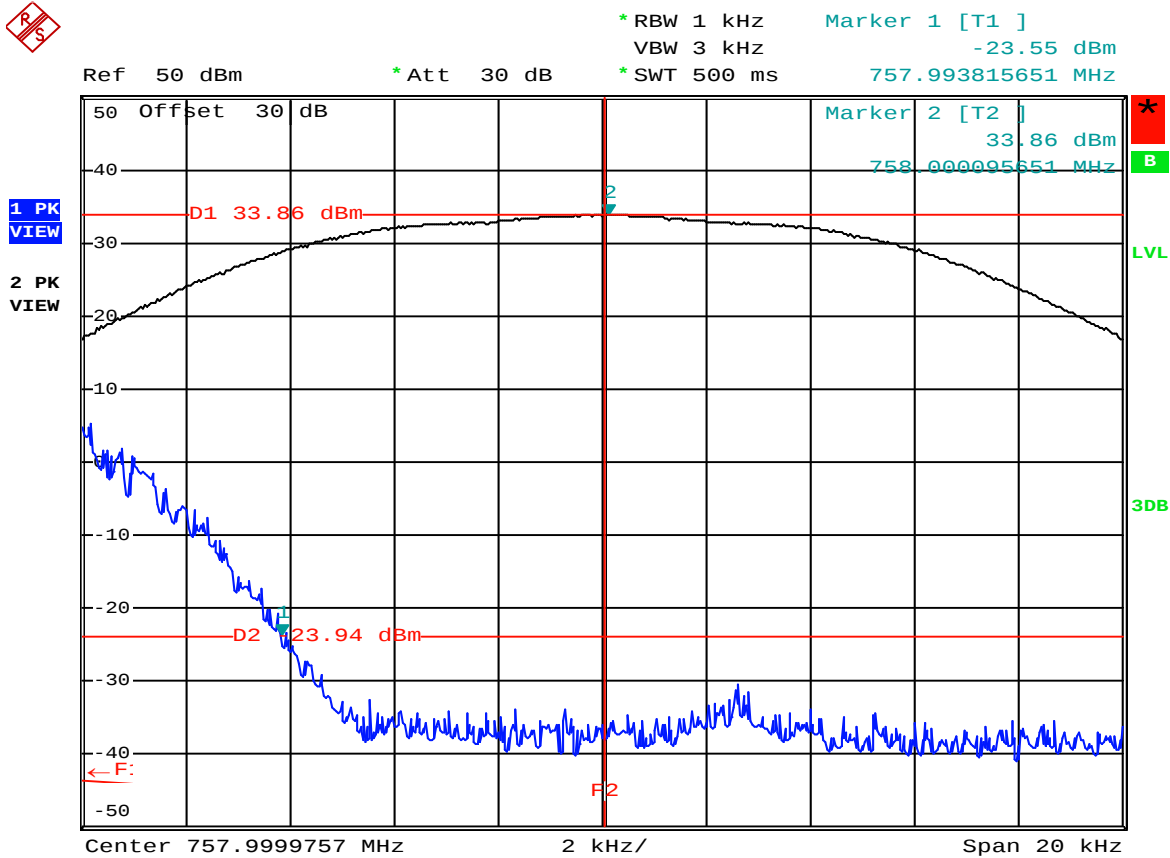
Date: 5.AUG.2016 16:11:46

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	5883
Temp (°C):	10

Upper Band Edge Emissions



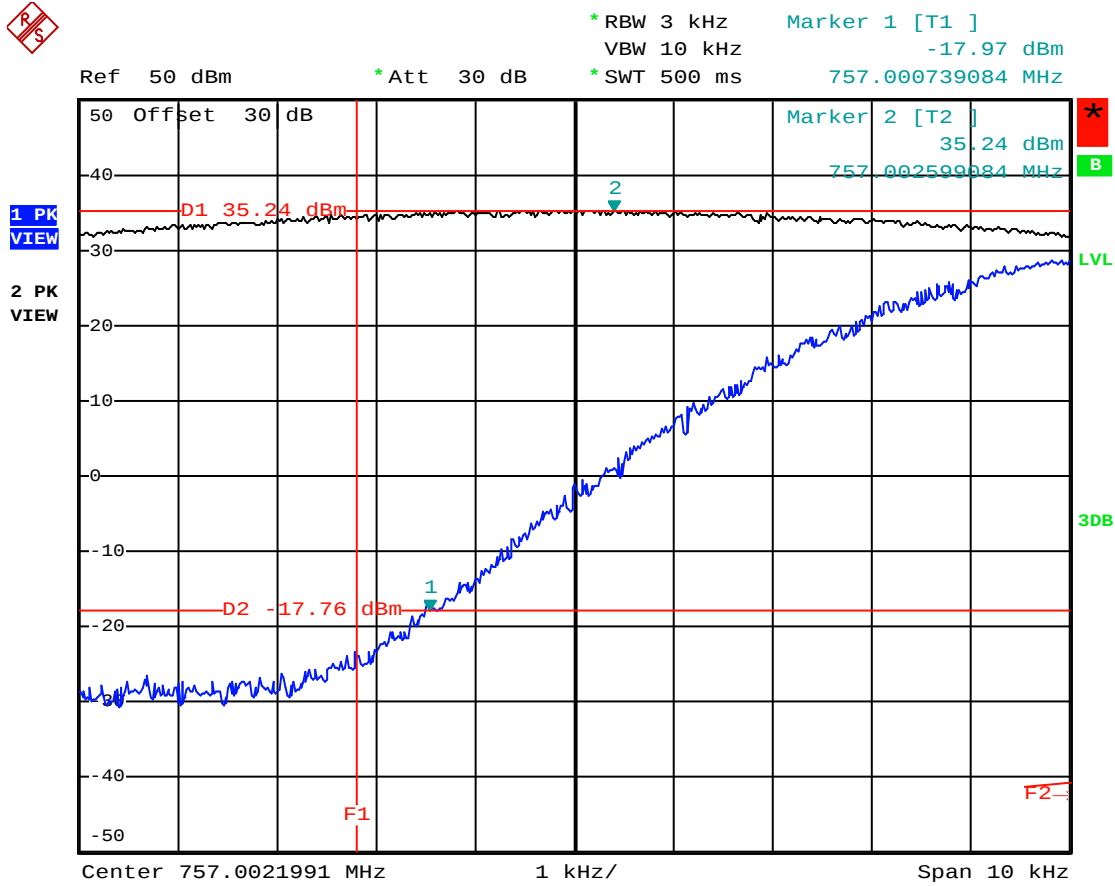
Date: 5.AUG.2016 16:14:06

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6185
Temp (°C):	10

Lower Band Edge Emissions



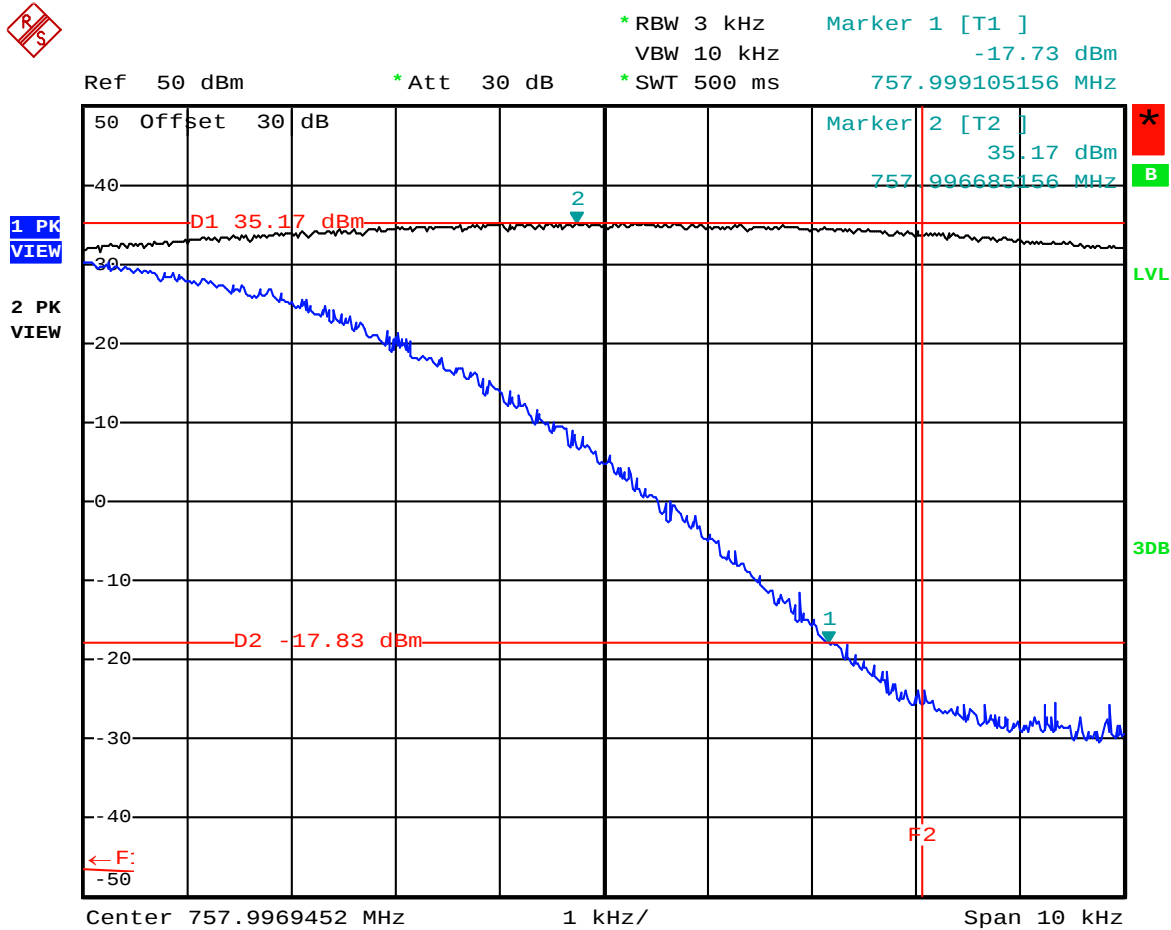
Date: 7.AUG.2016 17:53:37

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	739
Temp (°C):	20

Upper Band Edge Emissions



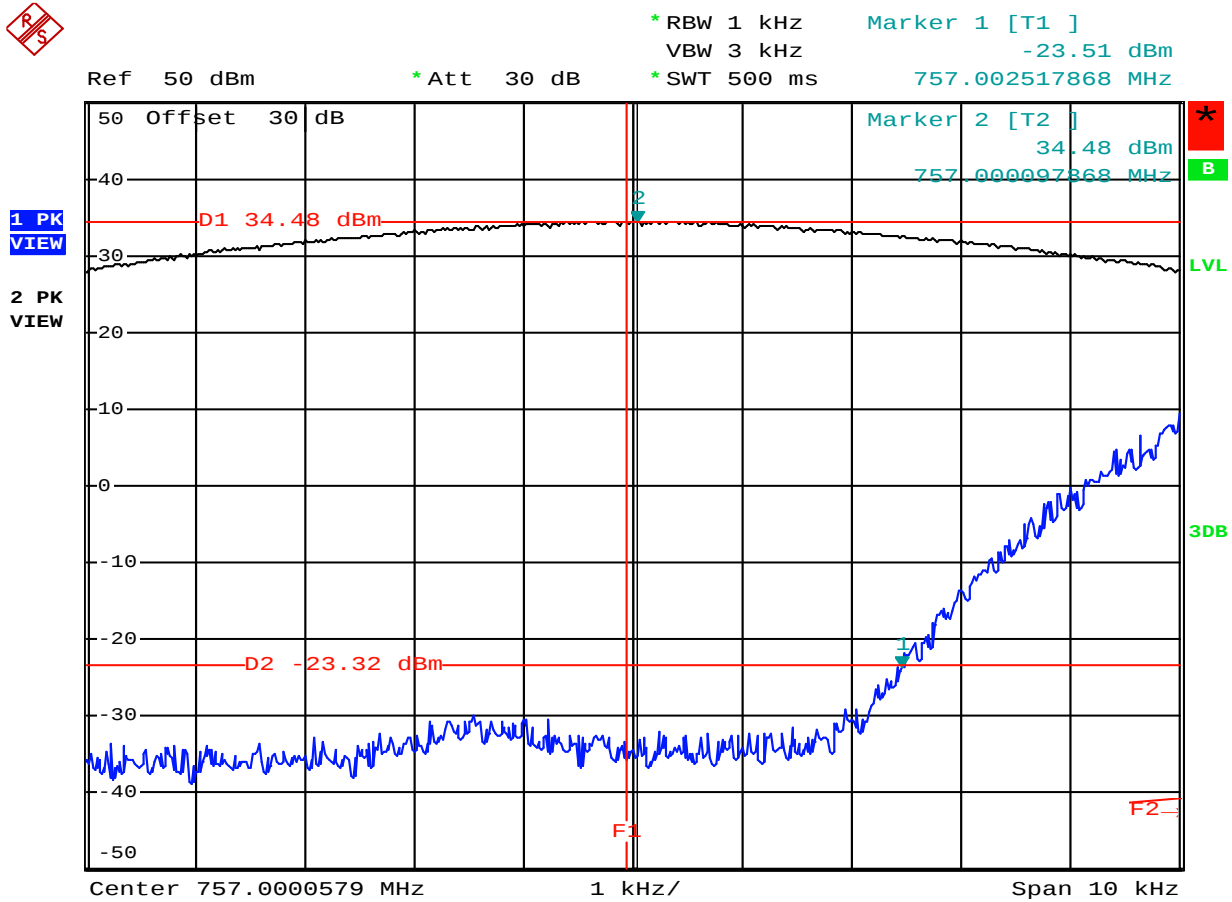
Date: 7.AUG.2016 17:50:43

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	895
Temp (°C):	20

Lower Band Edge Emissions



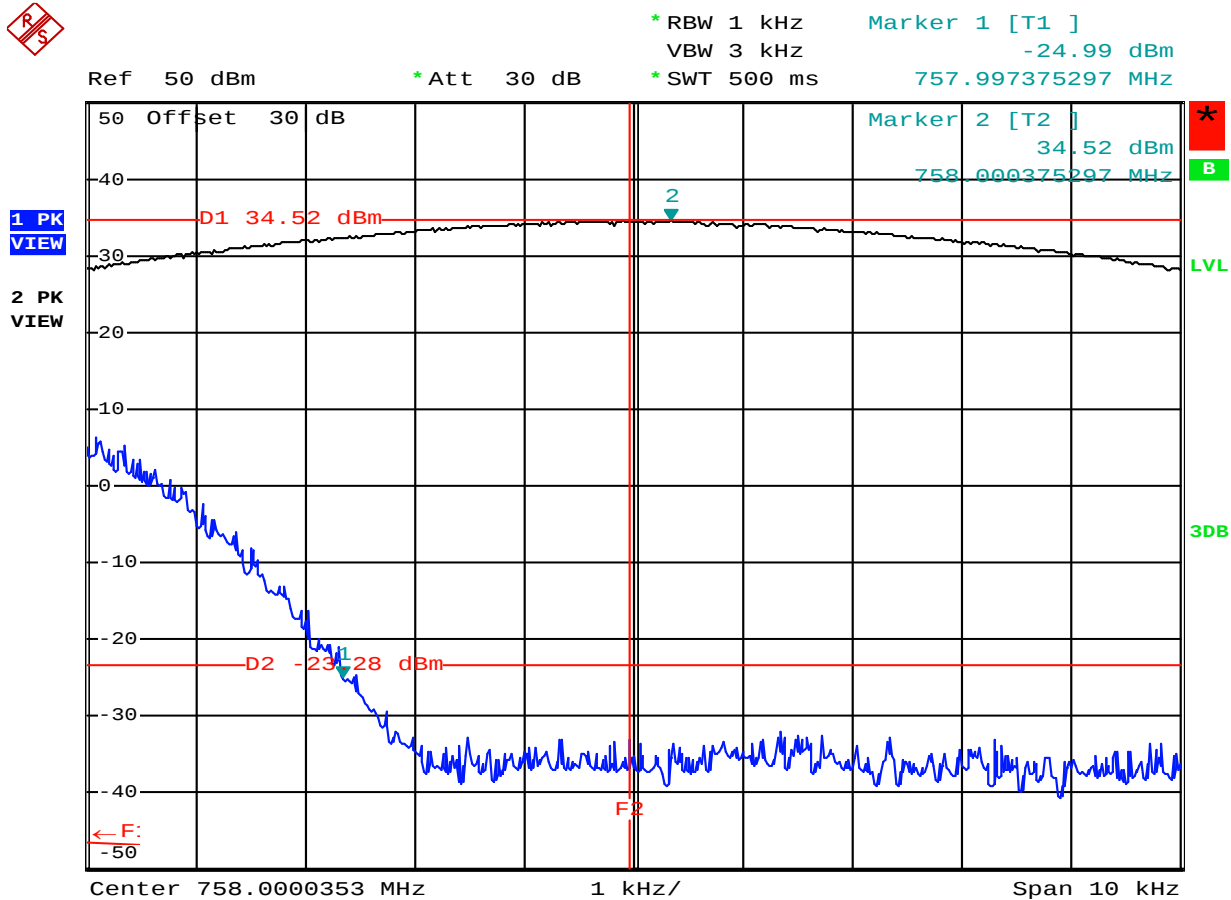
Date: 7.AUG.2016 18:22:26

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2518
Temp (°C):	20

Upper Band Edge Emissions



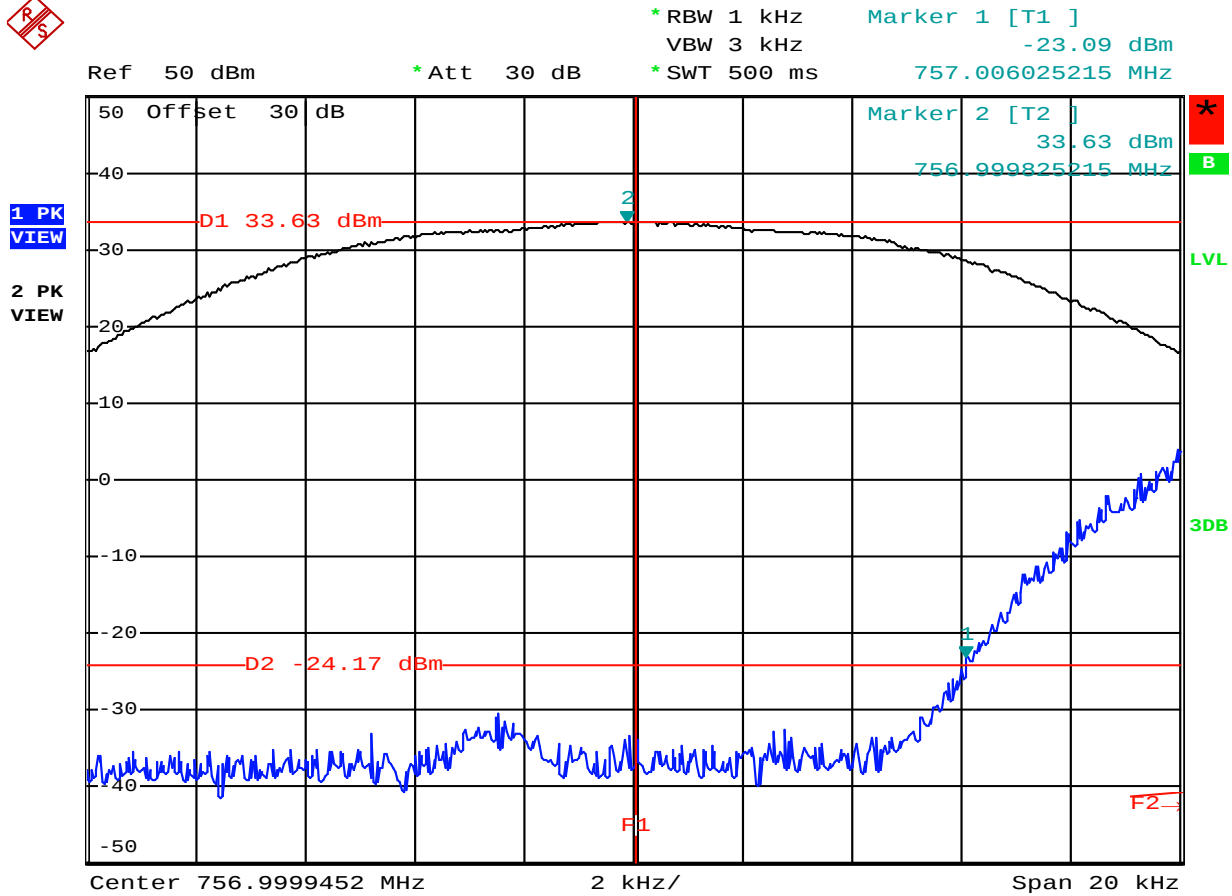
Date: 7.AUG.2016 18:25:11

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2625
Temp (°C):	20

Lower Band Edge Emissions



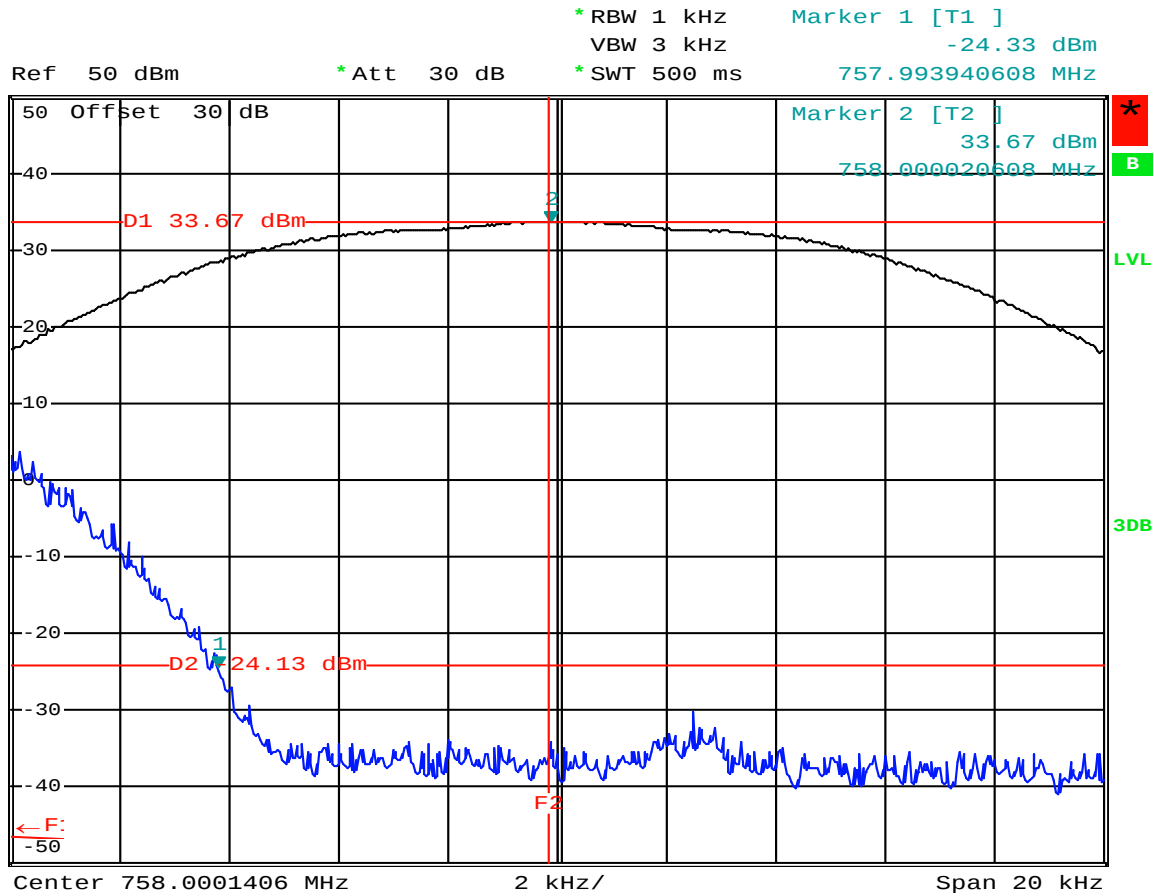
Date: 7.AUG.2016 18:30:56

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6025
Temp (°C):	20

Upper Band Edge Emissions



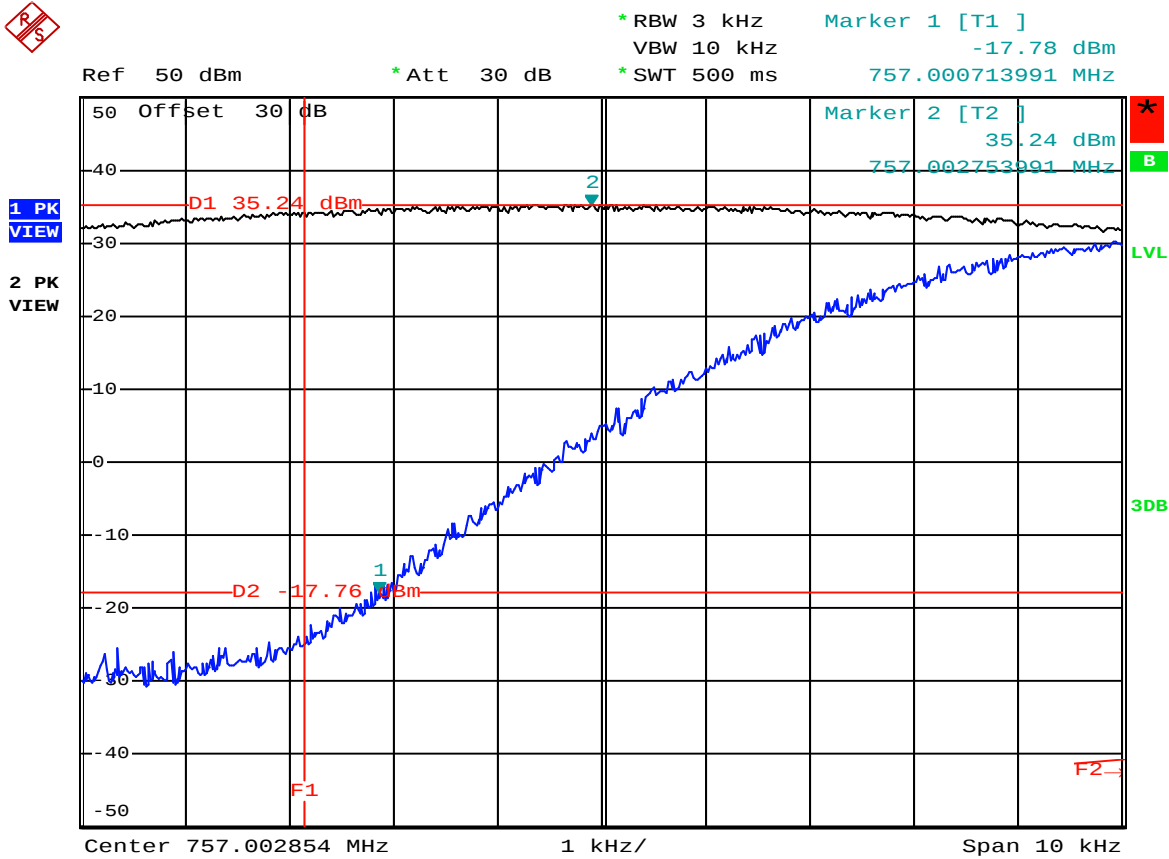
Date: 7.AUG.2016 18:28:26

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6060
Temp (°C):	20

Lower Band Edge Emissions



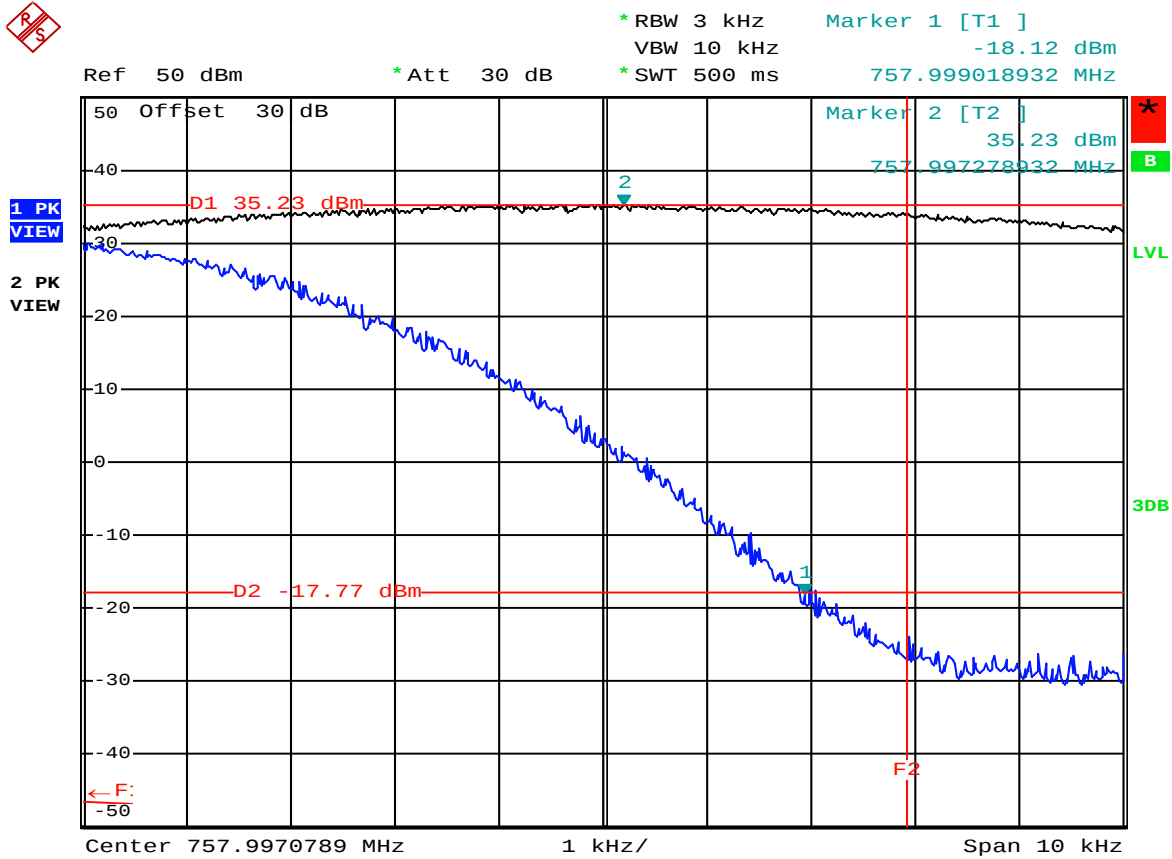
Date: 8.AUG.2016 09:34:57

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	714
Temp (°C):	30

Upper Band Edge Emissions



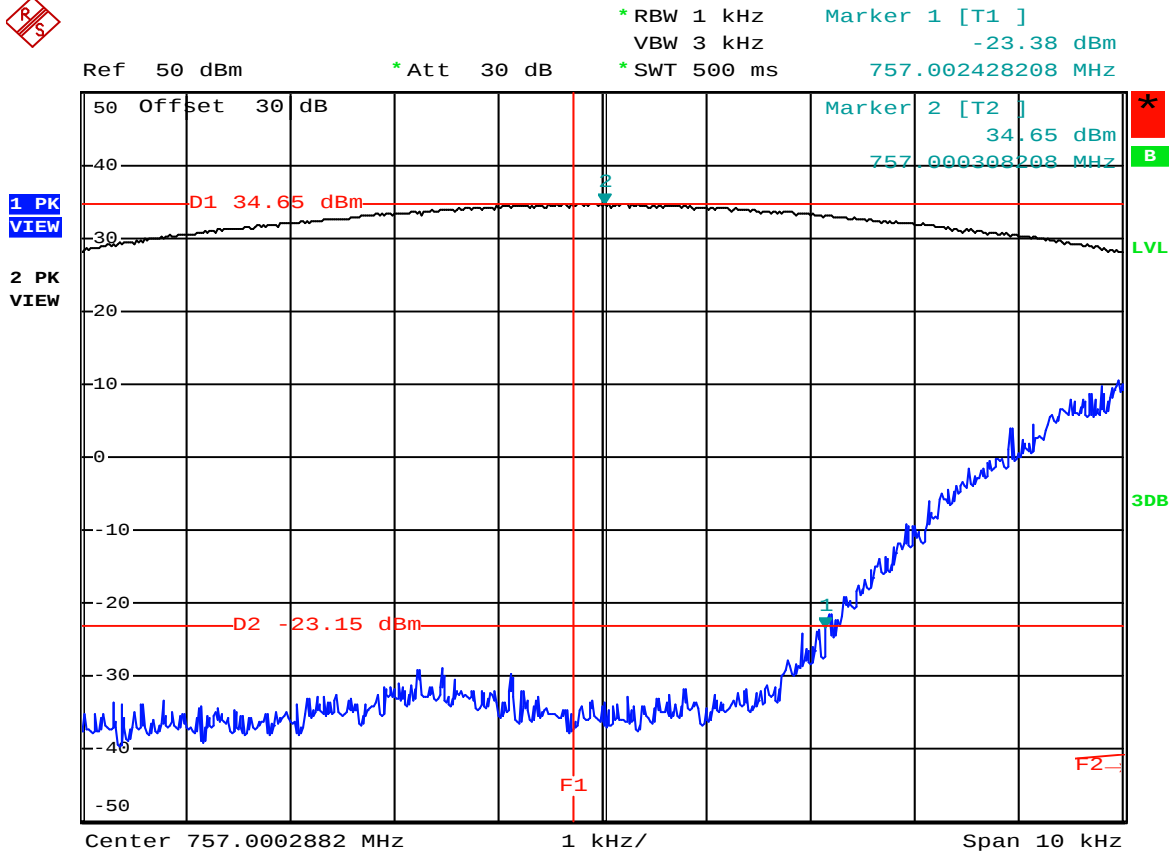
Date: 8.AUG.2016 09:40:10

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	981
Temp (°C):	30

Lower Band Edge Emissions



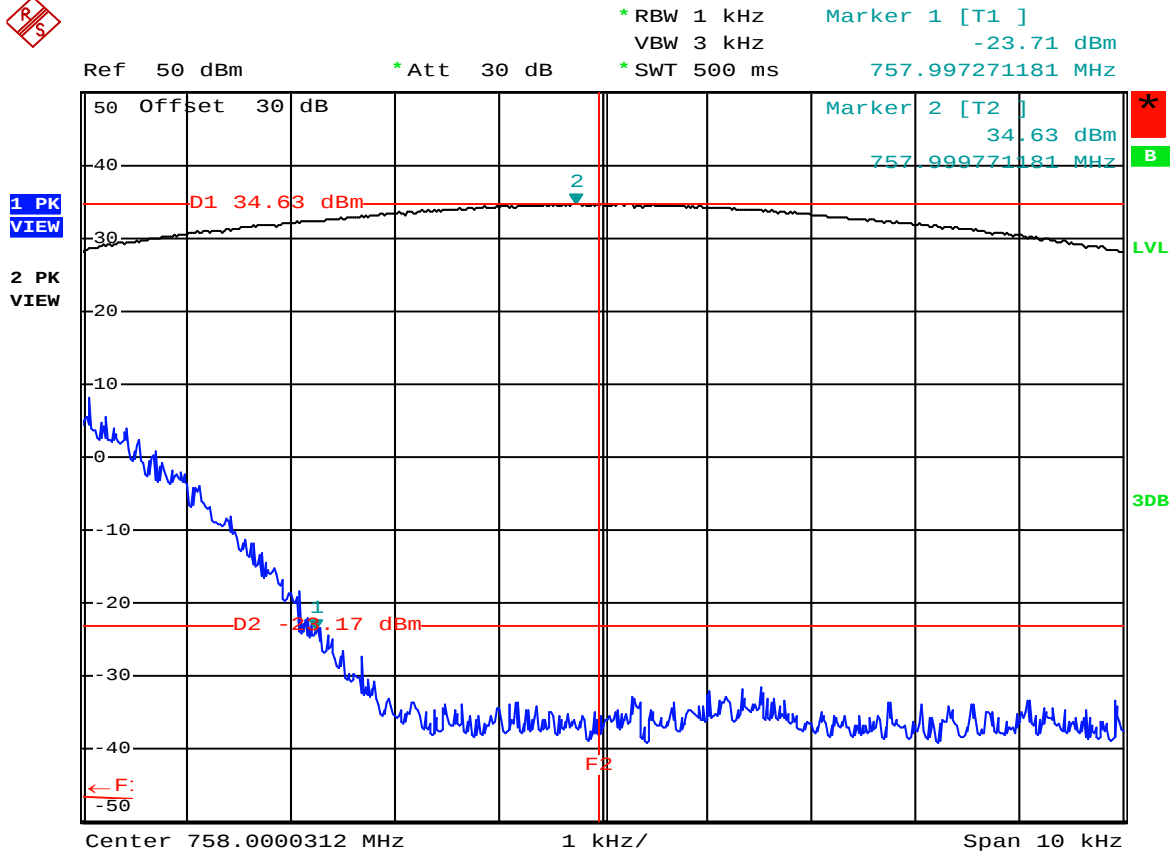
Date: 8.AUG.2016 09:31:15

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2428
Temp (°C):	30

Upper Band Edge Emissions



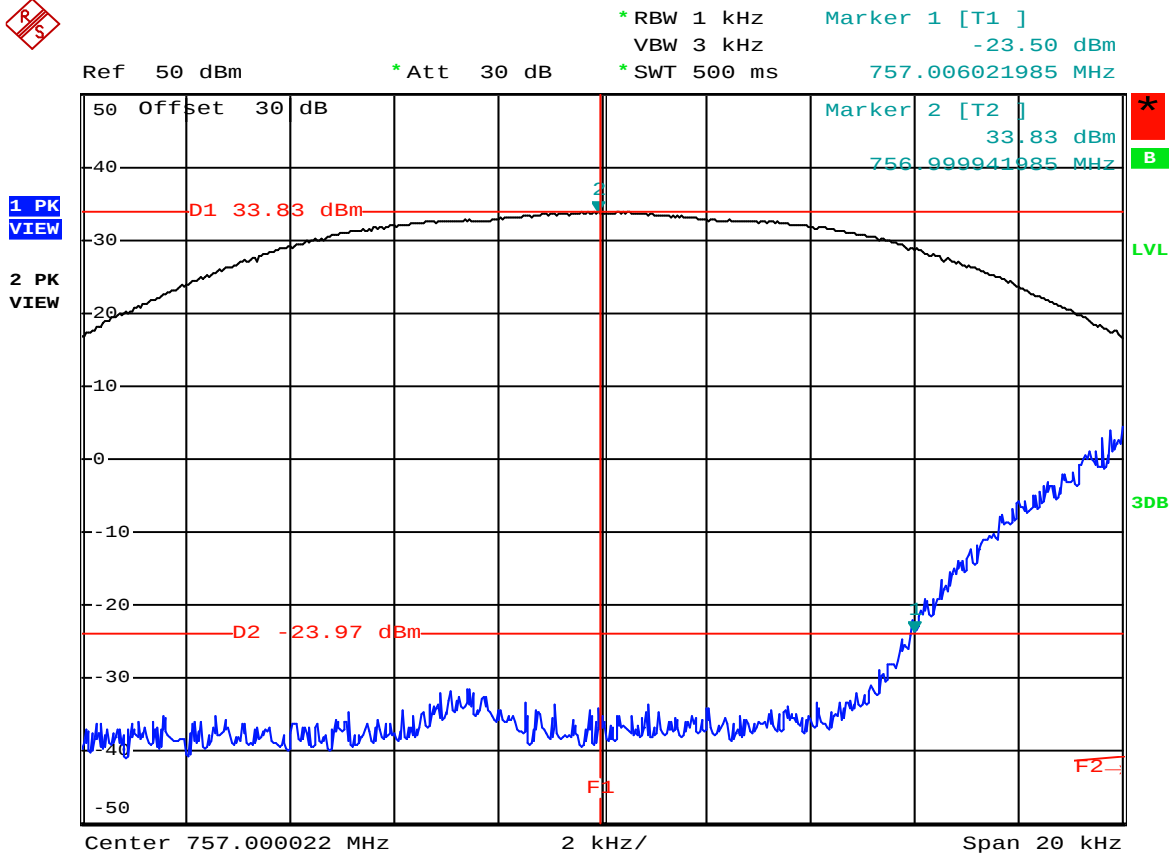
Date: 8.AUG.2016 09:28:32

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2729
Temp (°C):	30

Lower Band Edge Emissions



Date: 8.AUG.2016 09:21:37

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6022
Temp (°C):	30

Upper Band Edge Emissions



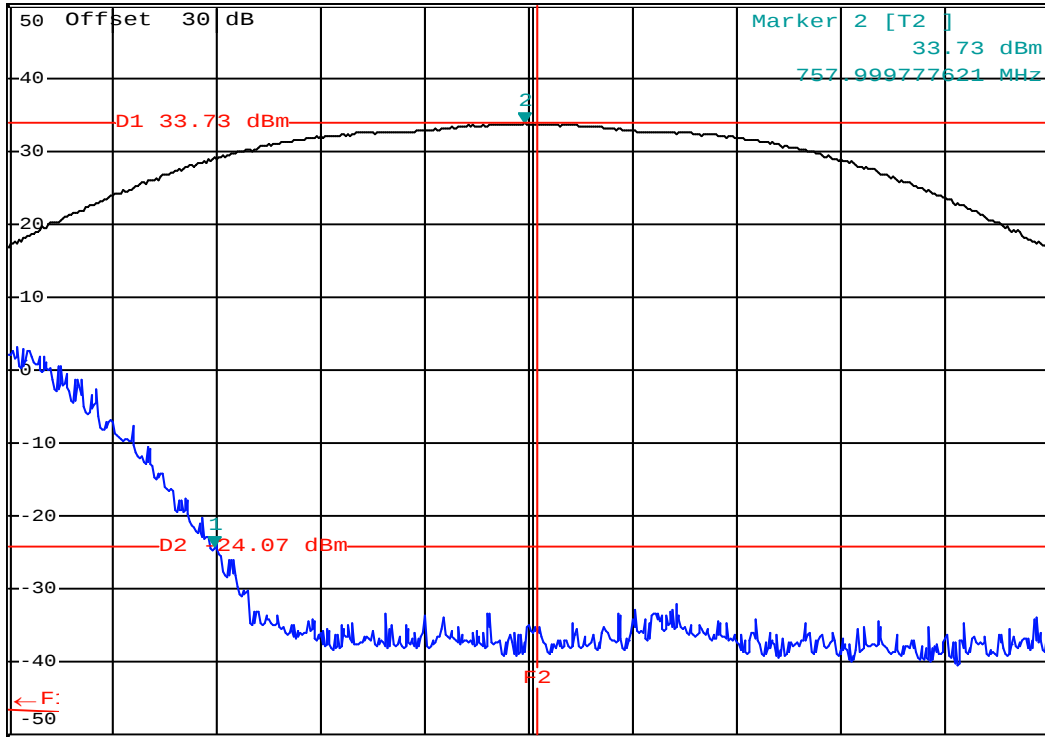
Ref 50 dBm * Att 30 dB * RBW 1 kHz * VBW 3 kHz * SWT 500 ms

Marker 1 [T1]
-24.10 dBm

757.993817621 MHz

1 PK
VIEW

2 PK
VIEW



Center 757.9998576 MHz 2 kHz/ Span 20 kHz

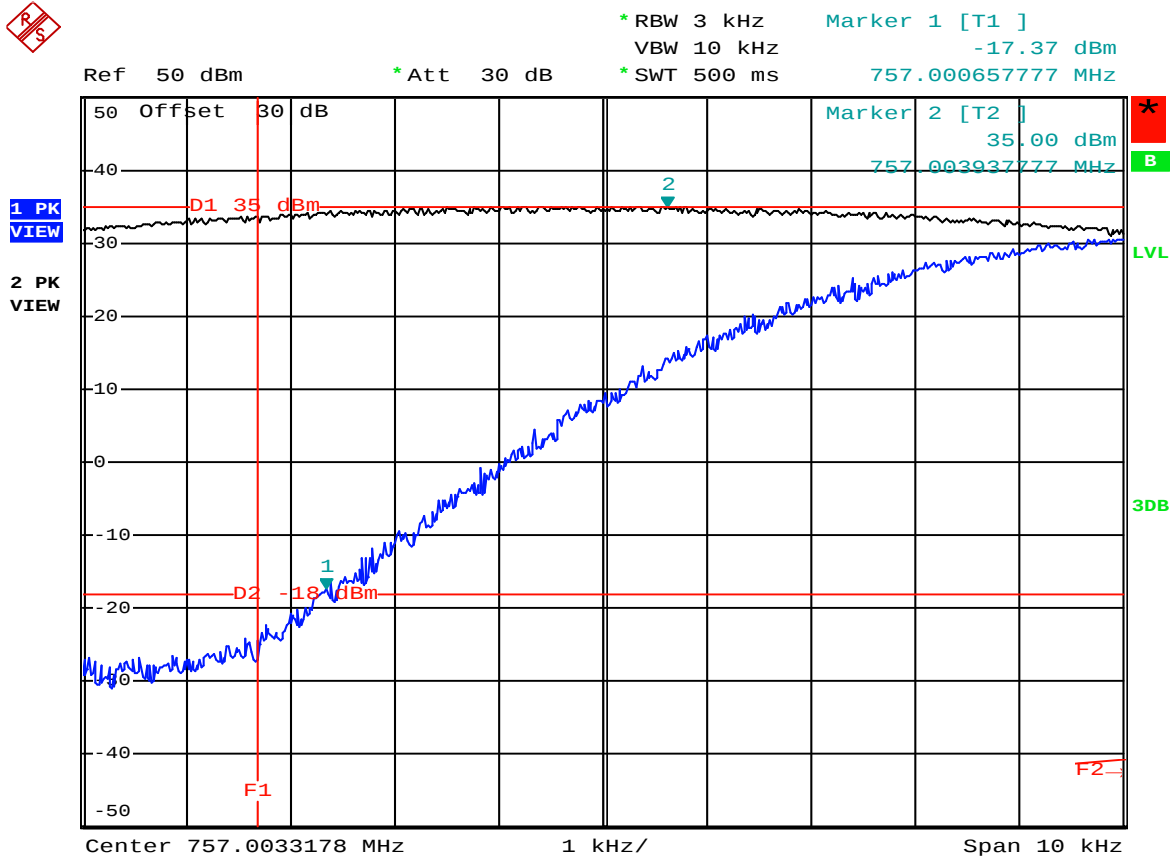
Date: 8.AUG.2016 09:24:29

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6182
Temp (°C):	30

Lower Band Edge Emissions



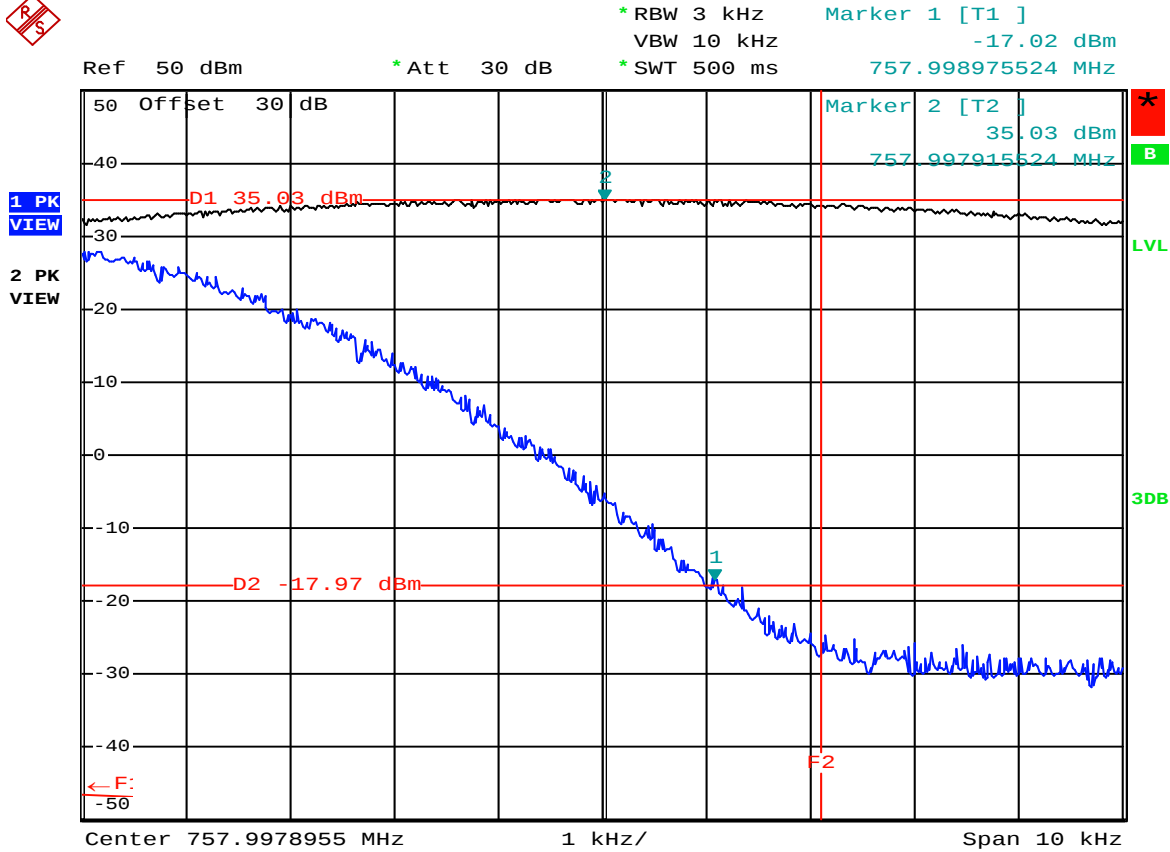
Date: 8.AUG.2016 10:28:32

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	657
Temp (°C):	40

Upper Band Edge Emissions



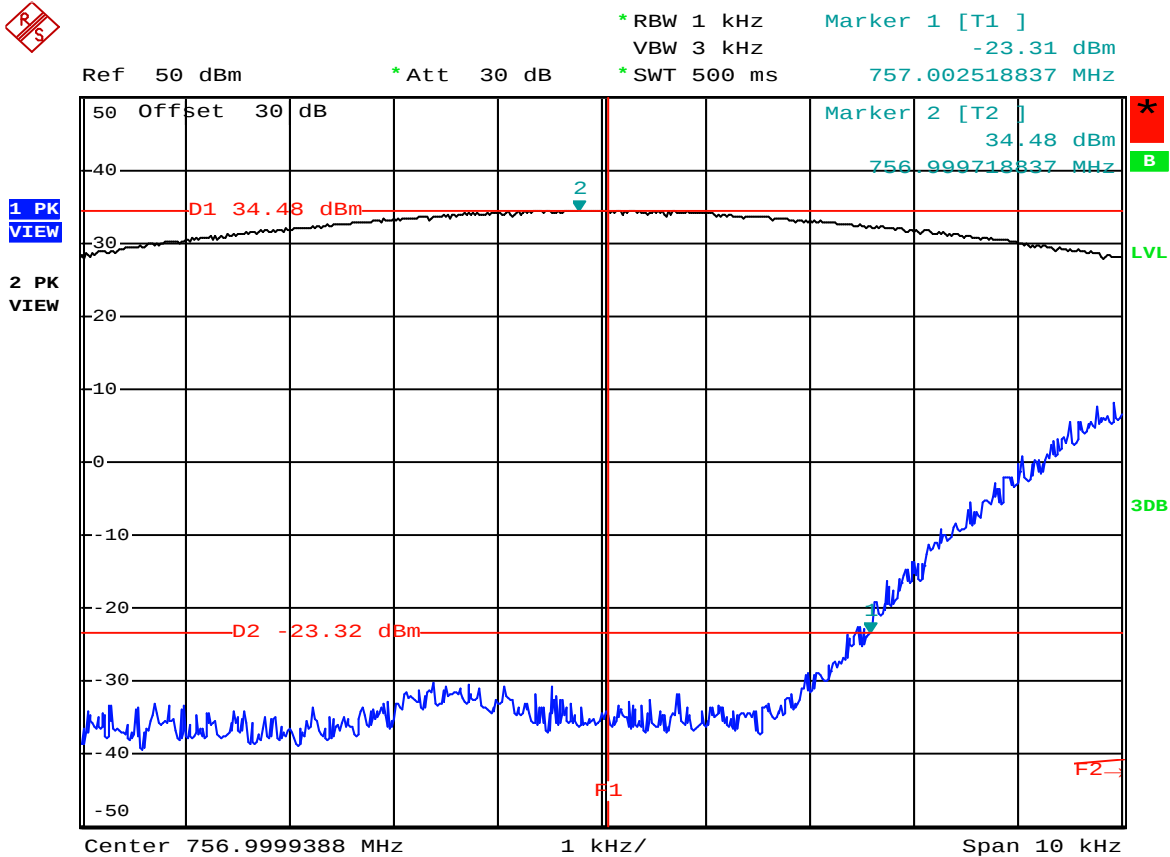
Date: 8.AUG.2016 10:26:19

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	1024
Temp (°C):	40

Lower Band Edge Emissions



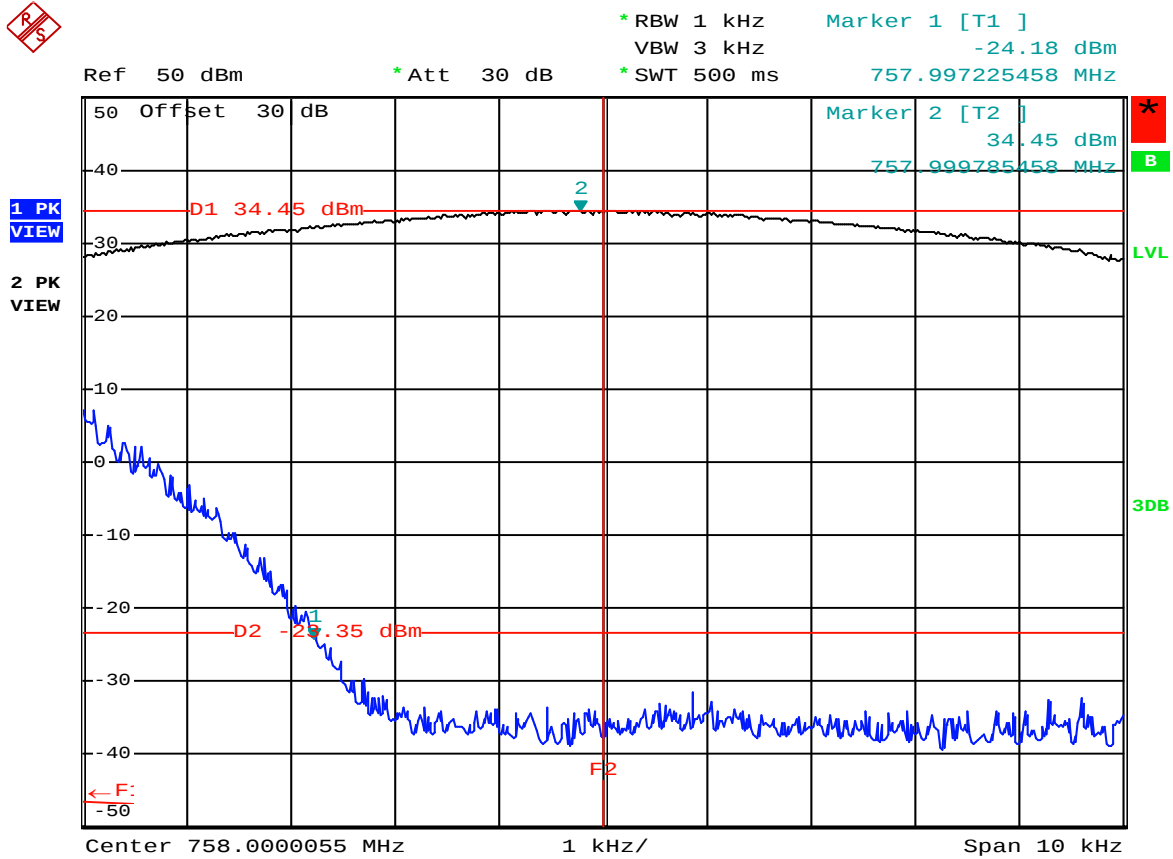
Date: 8.AUG.2016 10:32:45

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2519
Temp (°C):	40

Upper Band Edge Emissions



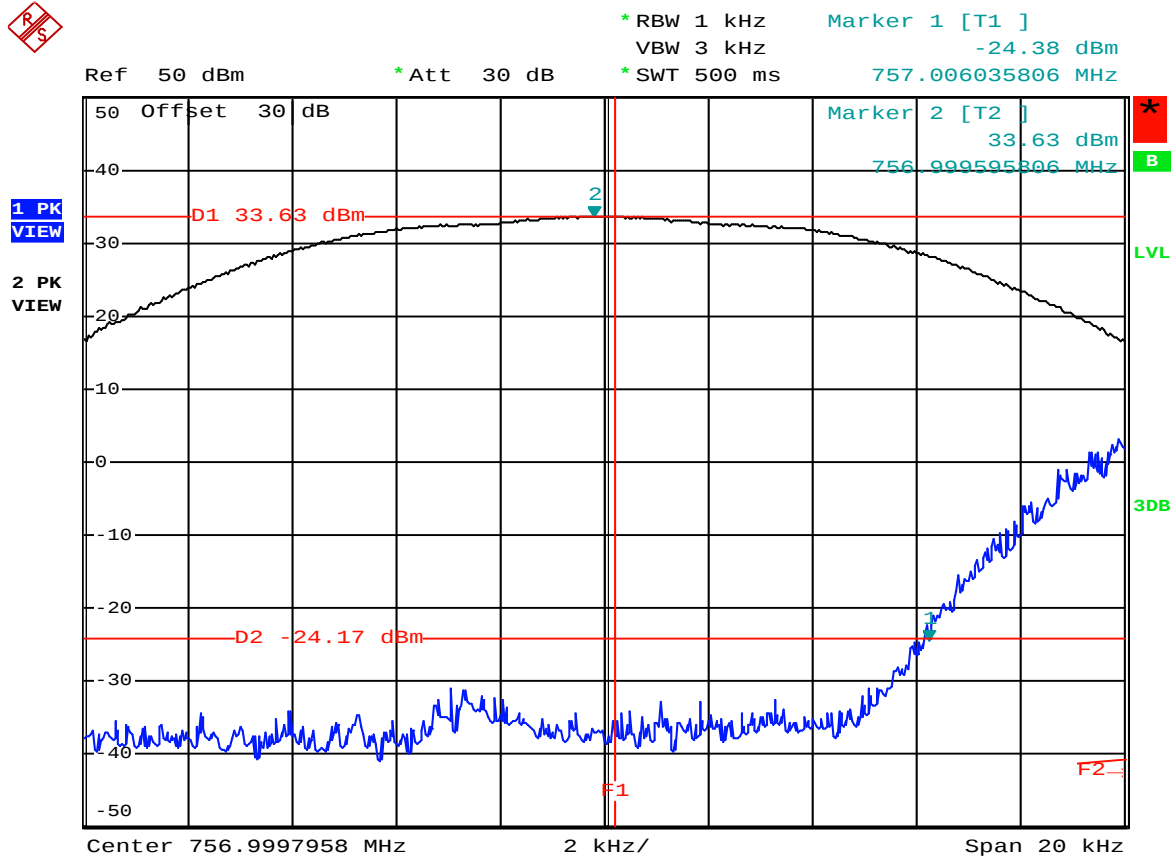
Date: 8.AUG.2016 10:35:11

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2775
Temp (°C):	40

Lower Band Edge Emissions



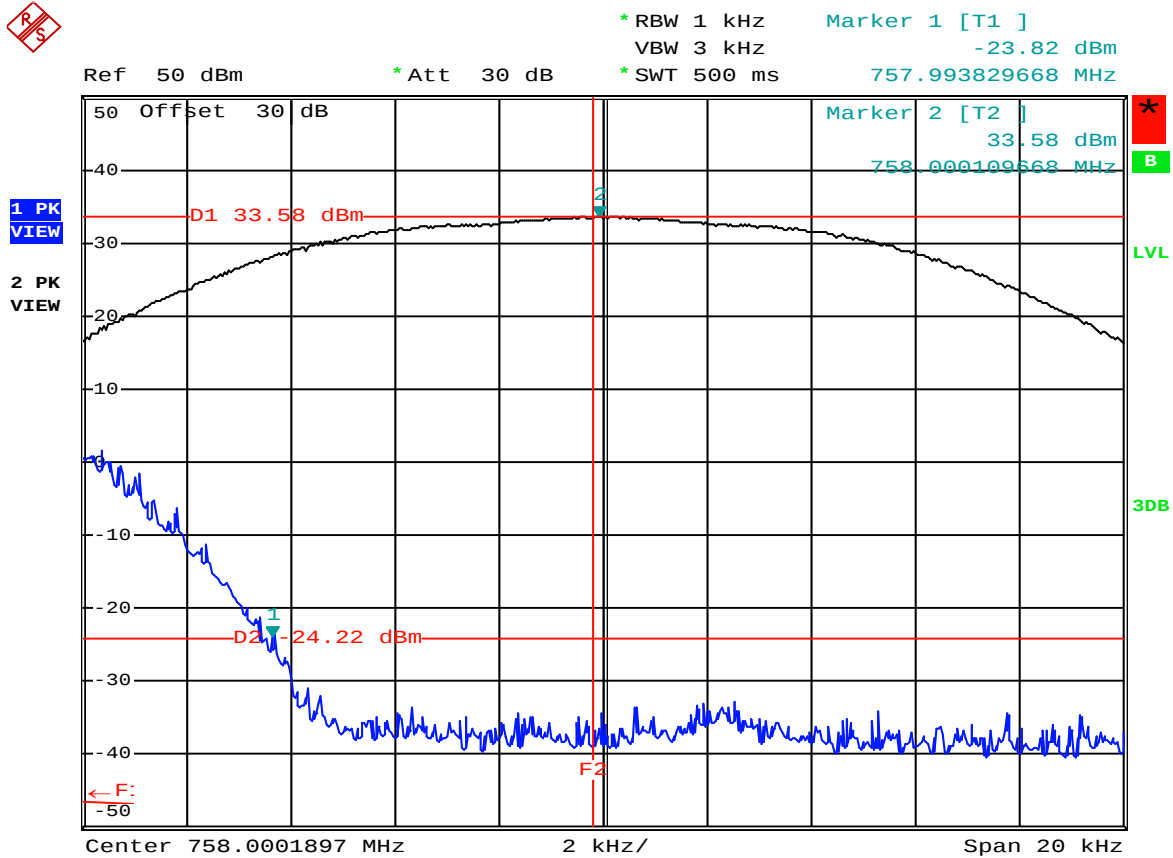
Date: 8.AUG.2016 10:41:42

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6036
Temp (°C):	40

Upper Band Edge Emissions



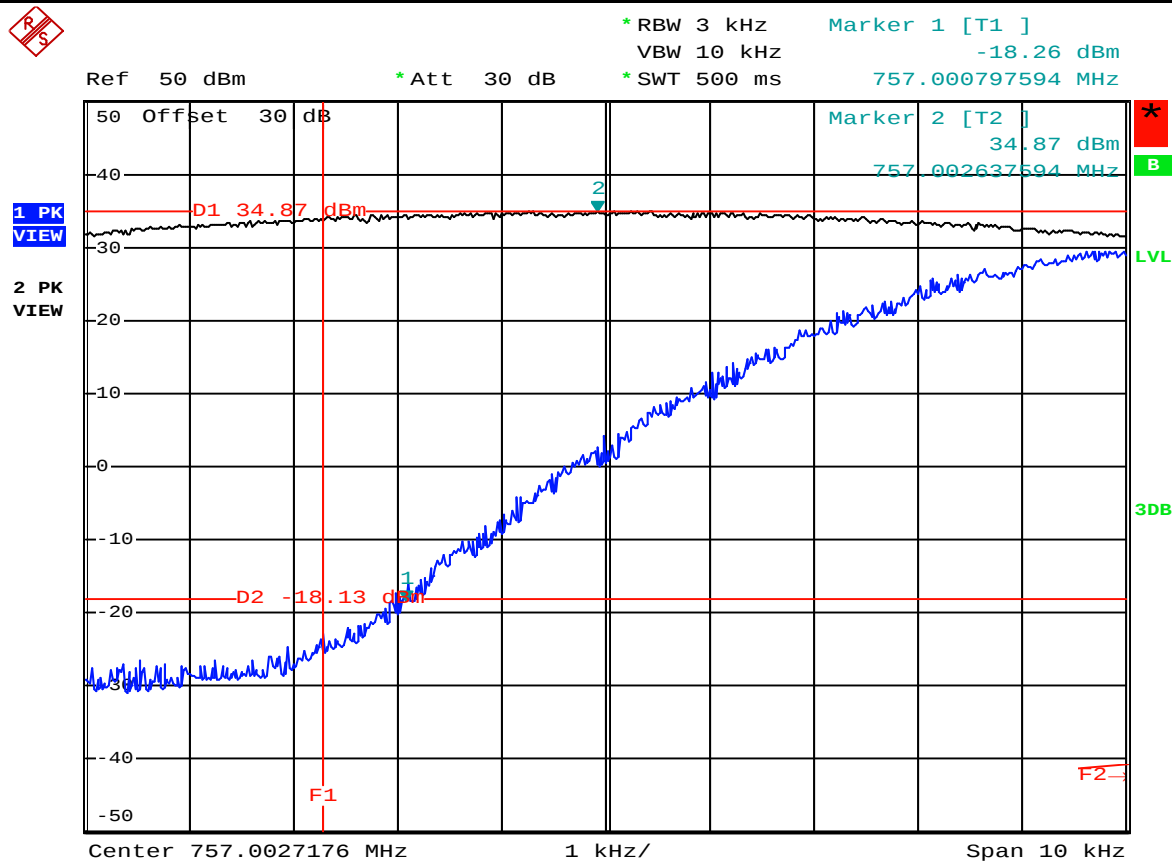
Date: 8.AUG.2016 10:39:16

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6171
Temp (°C):	40

Lower Band Edge Emissions



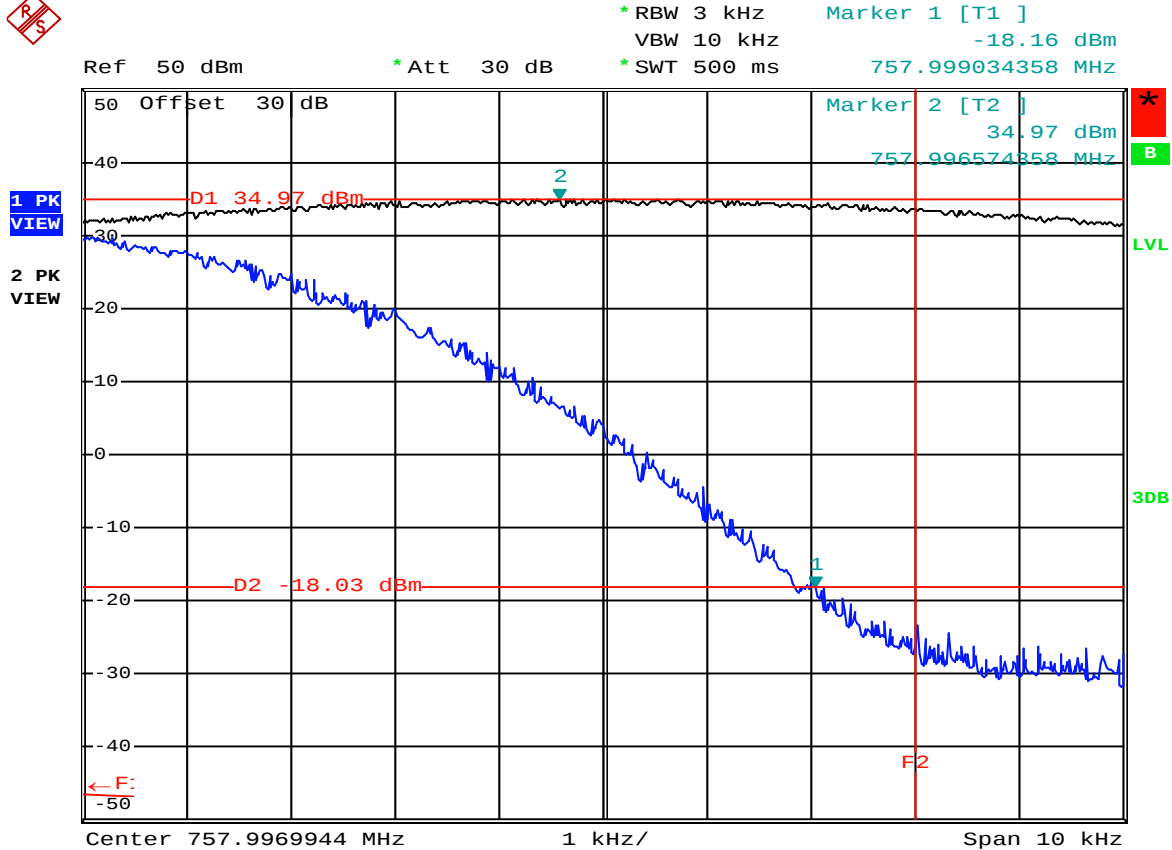
Date: 8.AUG.2016 13:14:12

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	797
Temp (°C):	50

Upper Band Edge Emissions



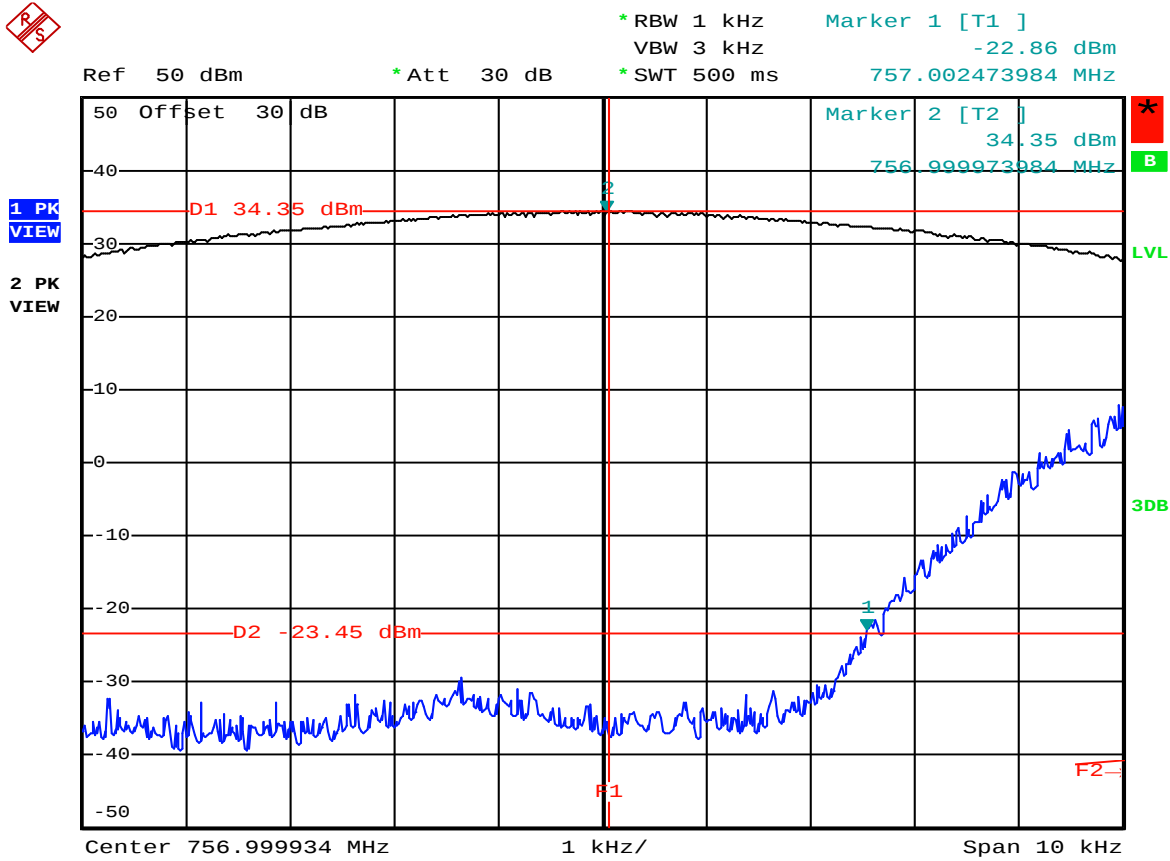
Date: 8.AUG.2016 13:07:21

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	966
Temp (°C):	50

Lower Band Edge Emissions



Date: 8.AUG.2016 11:46:51

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2474
Temp (°C):	50

Upper Band Edge Emissions



* RBW 1 kHz
* Att 30 dB
* SWT 500 ms
Marker 1 [T1]
-28.65 dBm
757.997347867 MHz

Ref 50 dBm

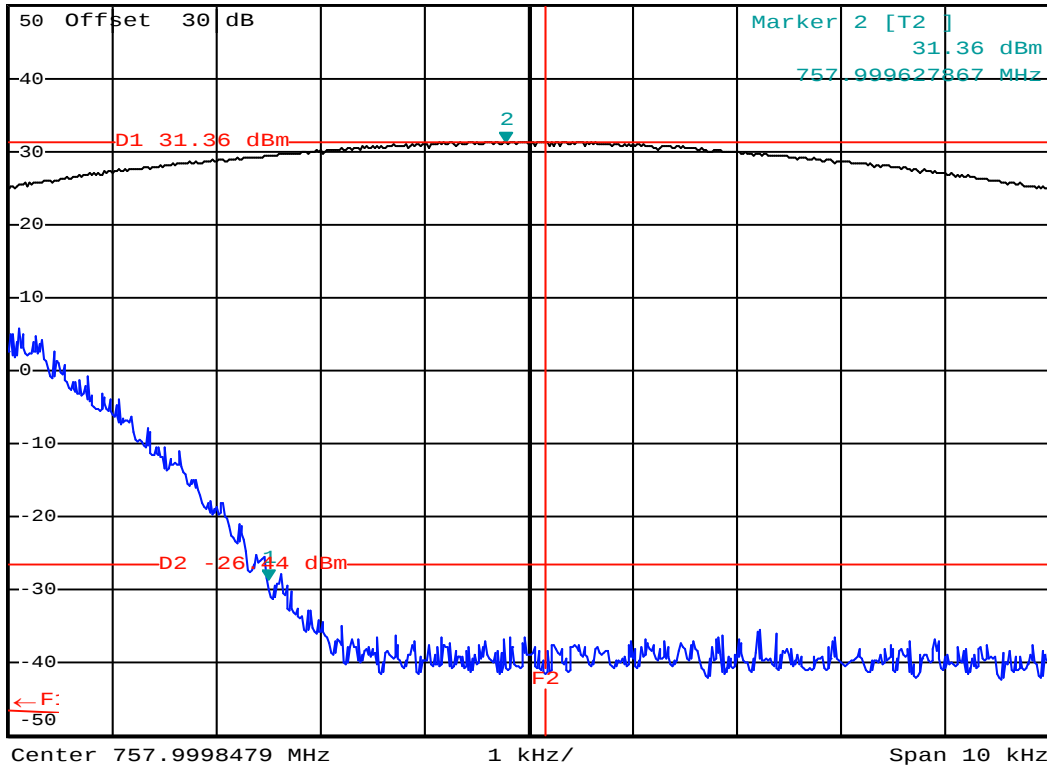
* Att 30 dB

* SWT 500 ms

757.997347867 MHz

1 PK
VIEW

2 PK
VIEW



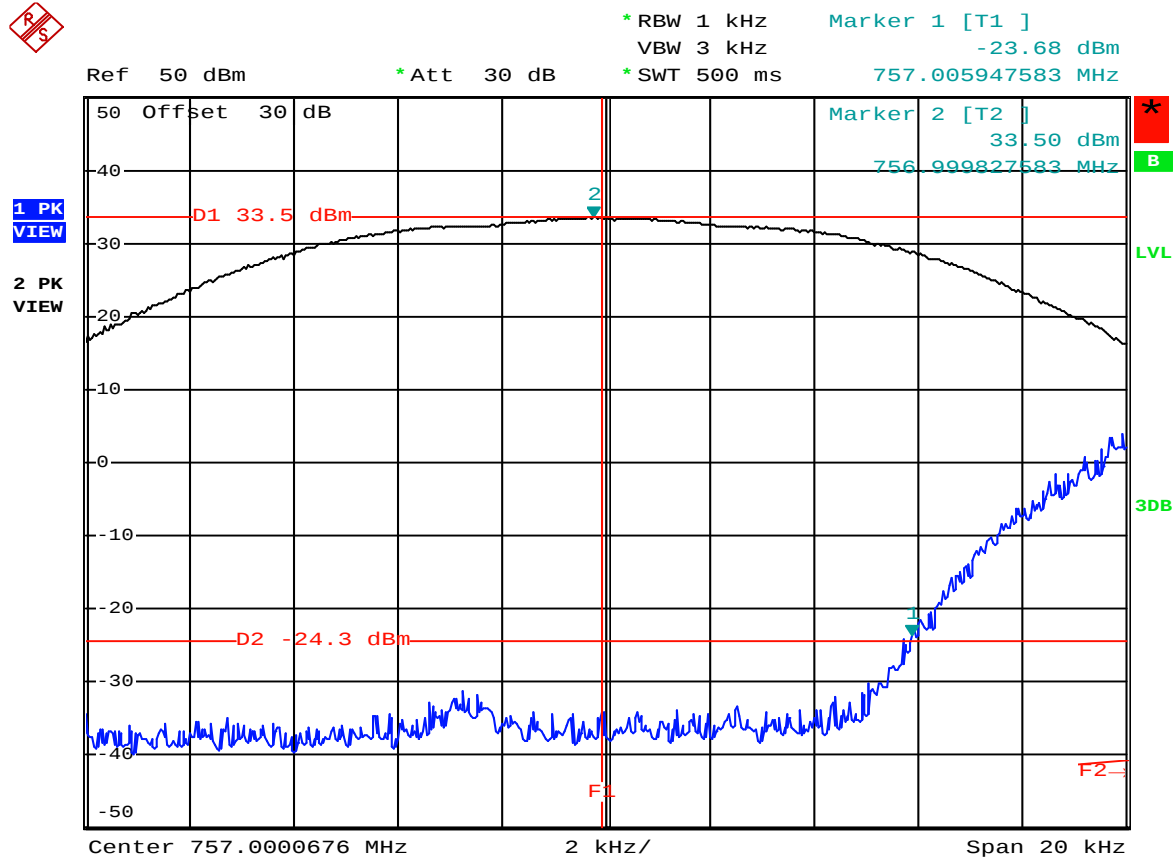
Date: 8.AUG.2016 12:12:06

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2653
Temp (°C):	50

Lower Band Edge Emissions



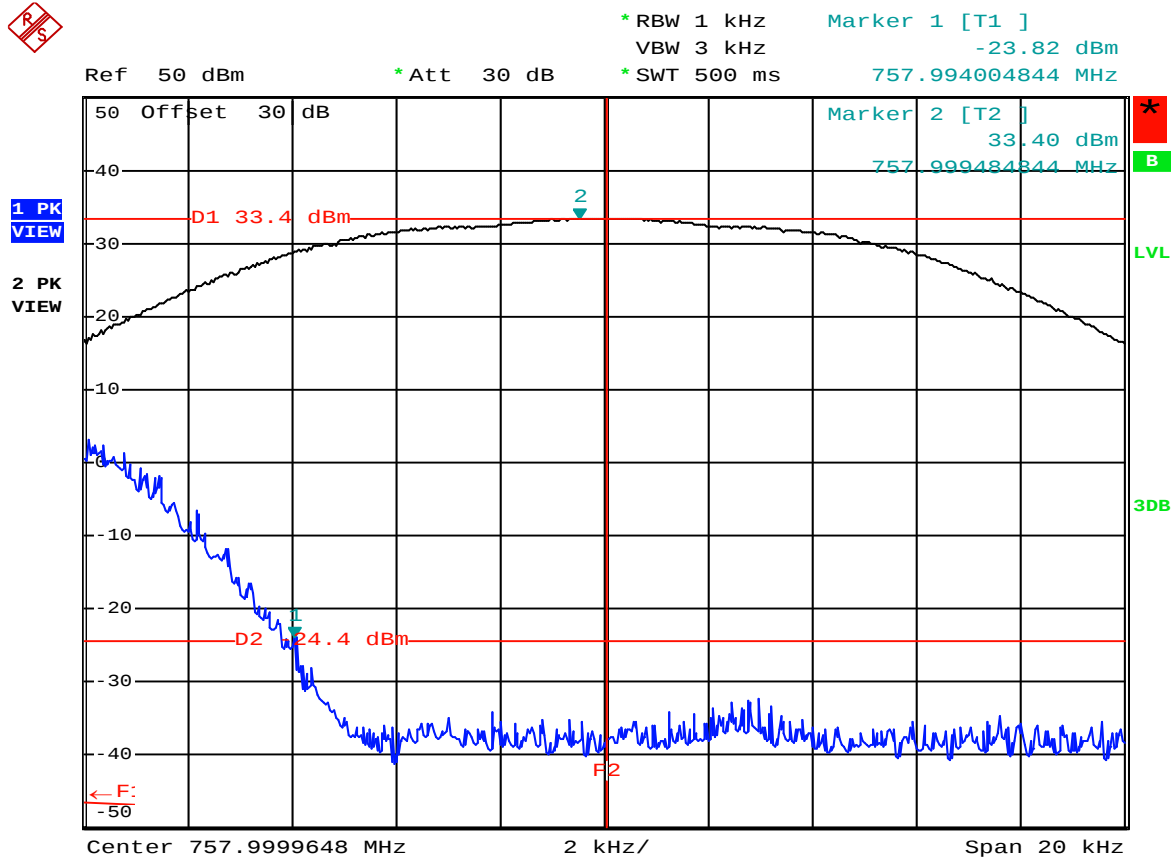
Date: 8.AUG.2016 11:14:07

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	5947
Temp (°C):	50

Upper Band Edge Emissions



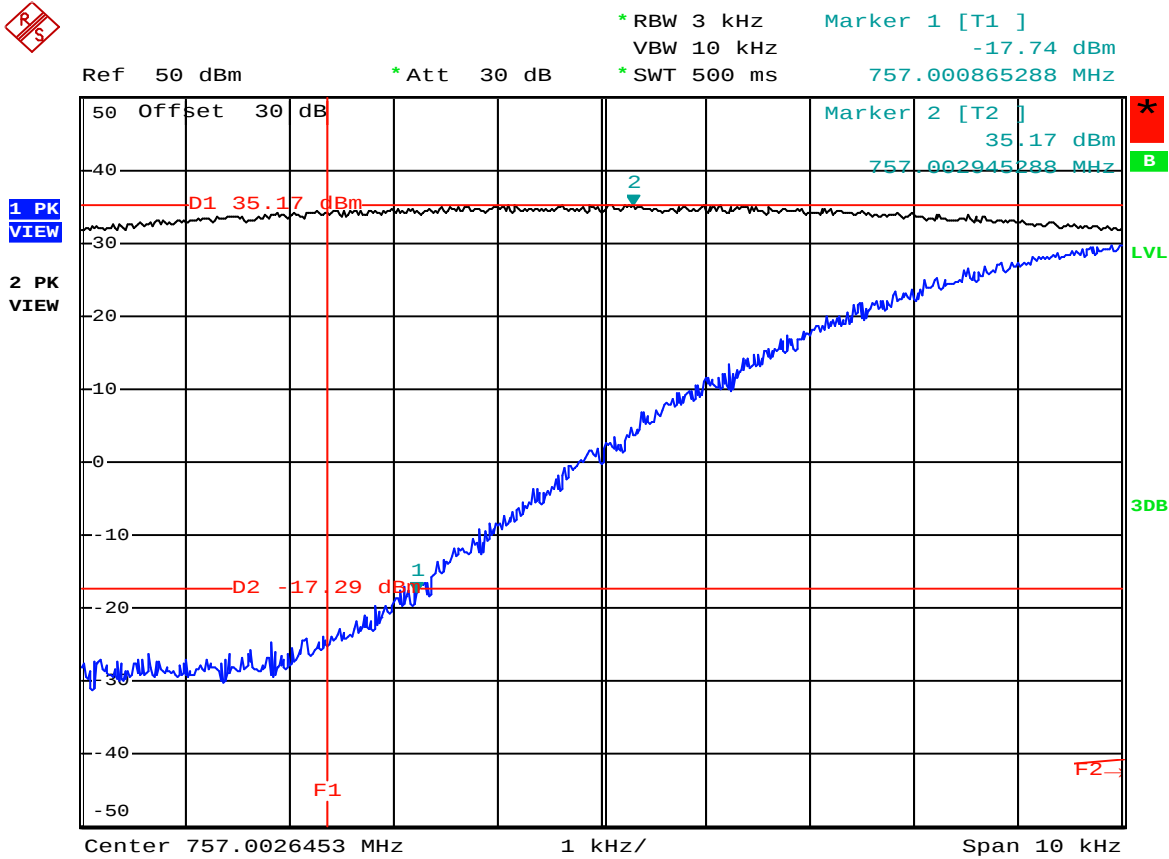
Date: 8.AUG.2016 11:17:42

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	5996
Temp (°C):	50

Lower Band Edge Emissions



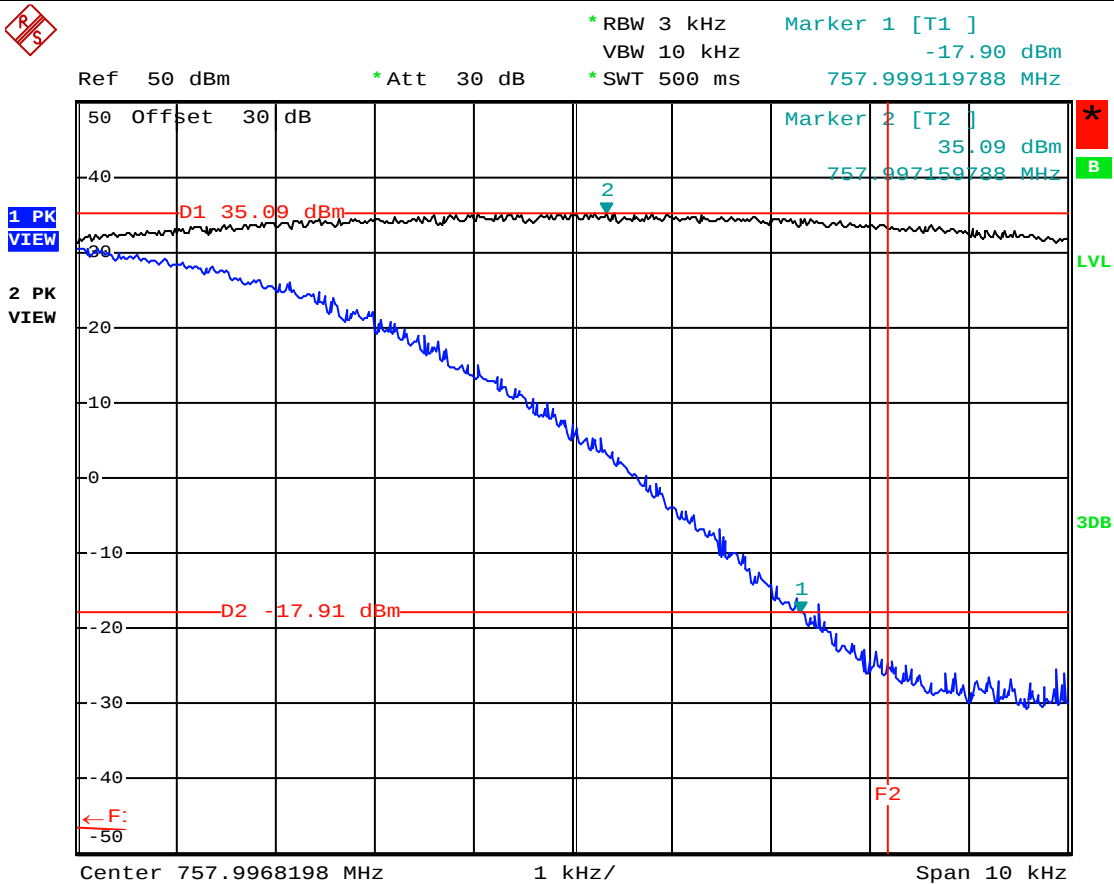
Date: 7.AUG.2016 18:03:19

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	865
Temp (°C):	20
Supply Voltage 10VDC:	10

Upper Band Edge Emissions



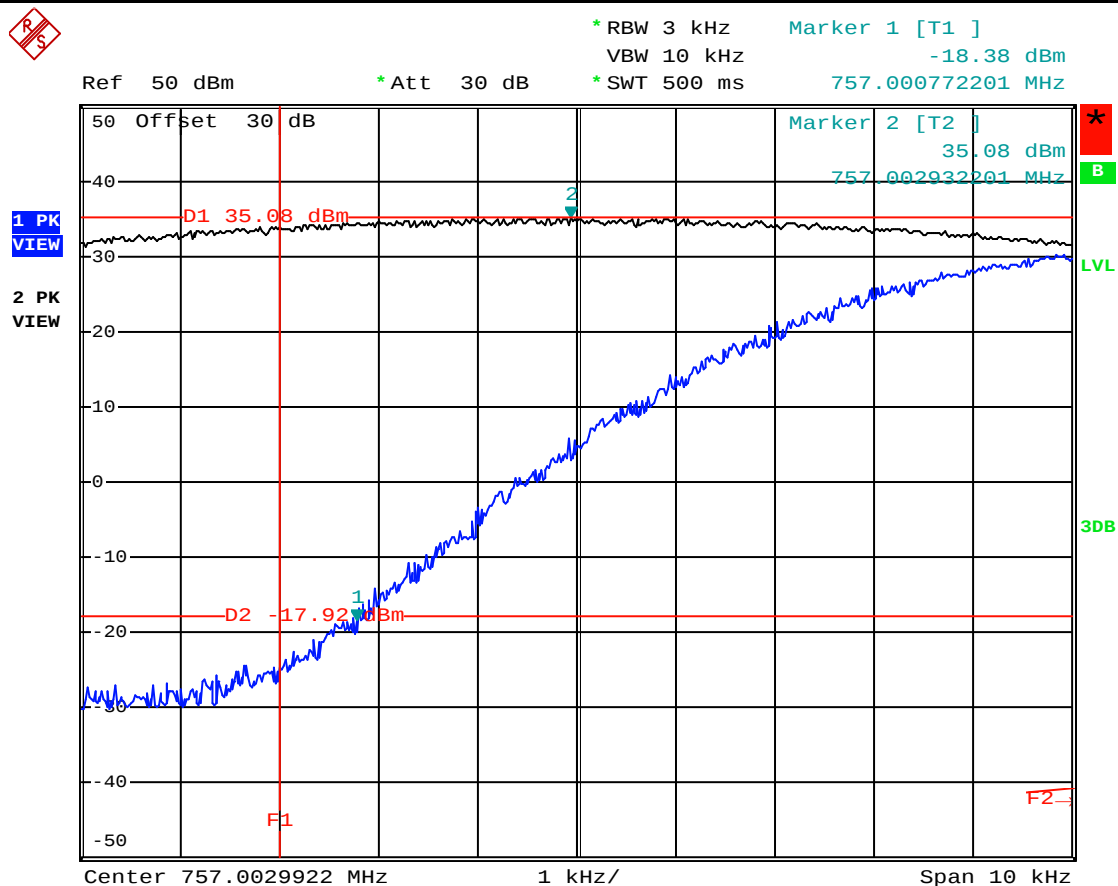
Date: 7.AUG.2016 18:05:59

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	881
Temp (°C):	20
Supply Voltage 10VDC:	10

Lower Band Edge Emissions



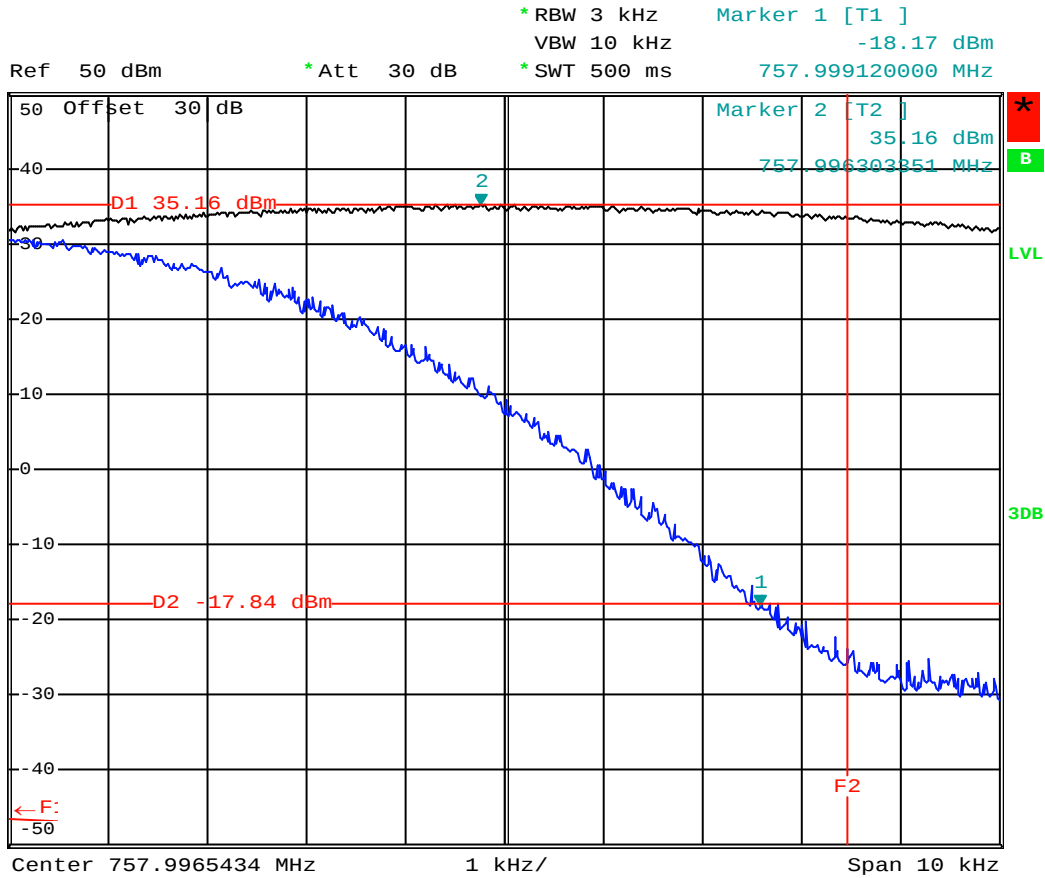
Date: 7.AUG.2016 18:15:11

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	772
Temp (°C):	20
Supply Voltage (VDC):	34.5

Upper Band Edge Emissions



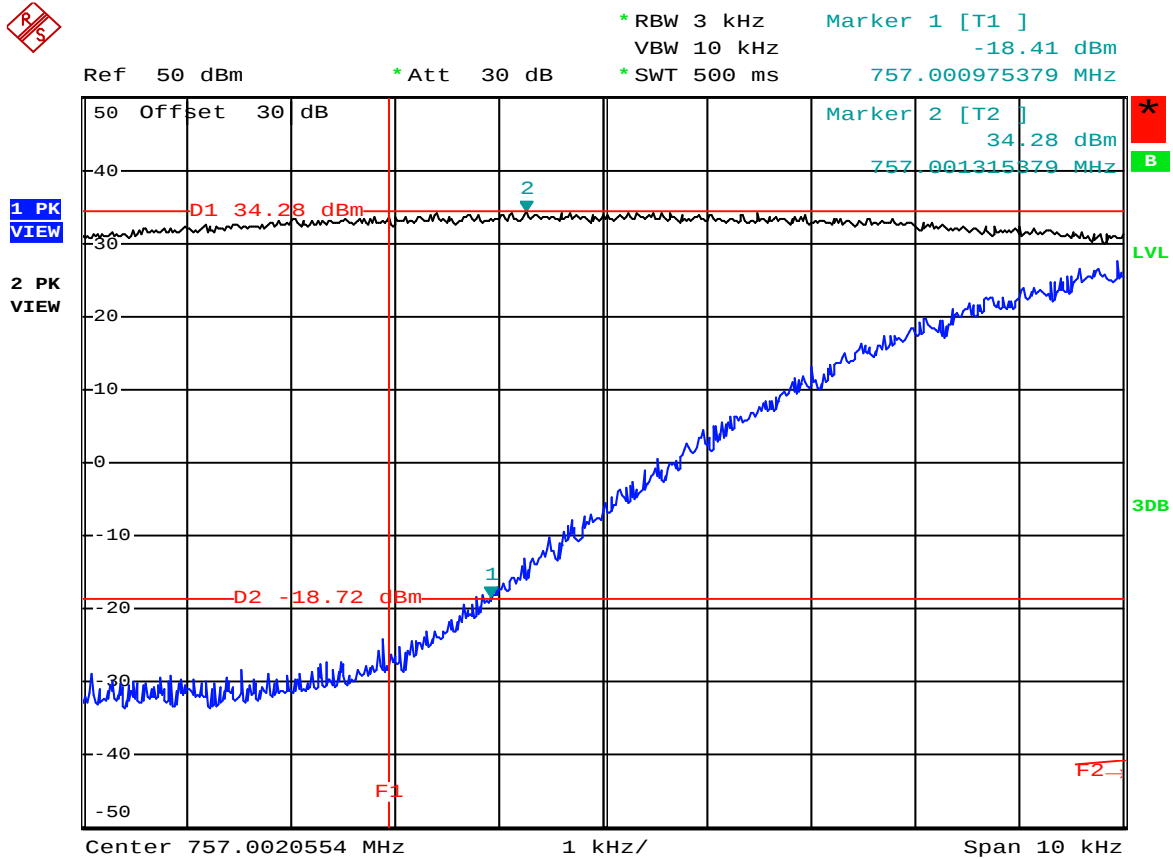
Date: 7.AUG.2016 18:10:04

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	880
Temp (°C):	20
Supply Voltage (VDC):	34.5

Upper Band Edge Emissions - 16QAM



Date: 8.AUG.2016 13:16:25

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

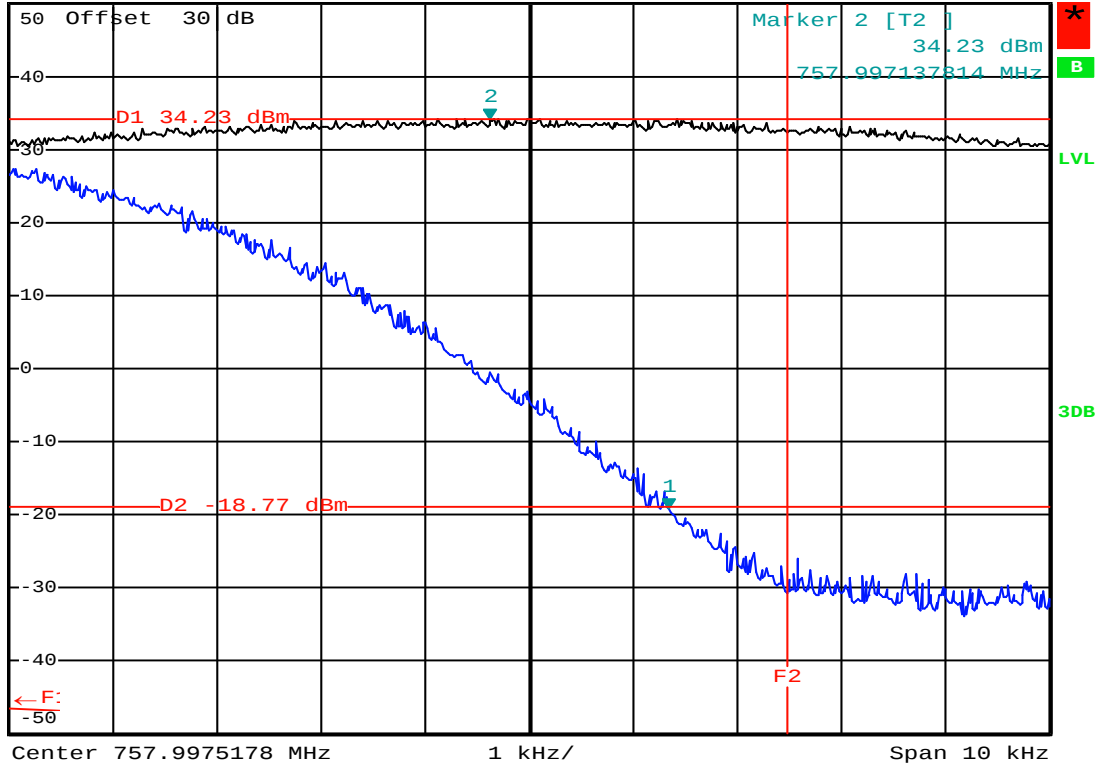
Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	975
Temp (°C):	50

Upper Band Edge Emissions - 16QAM



* RBW 3 kHz
* Att 30 dB
* SWT 500 ms
Marker 1 [T1]
-19.07 dBm
757.99857814 MHz

Ref 50 dBm



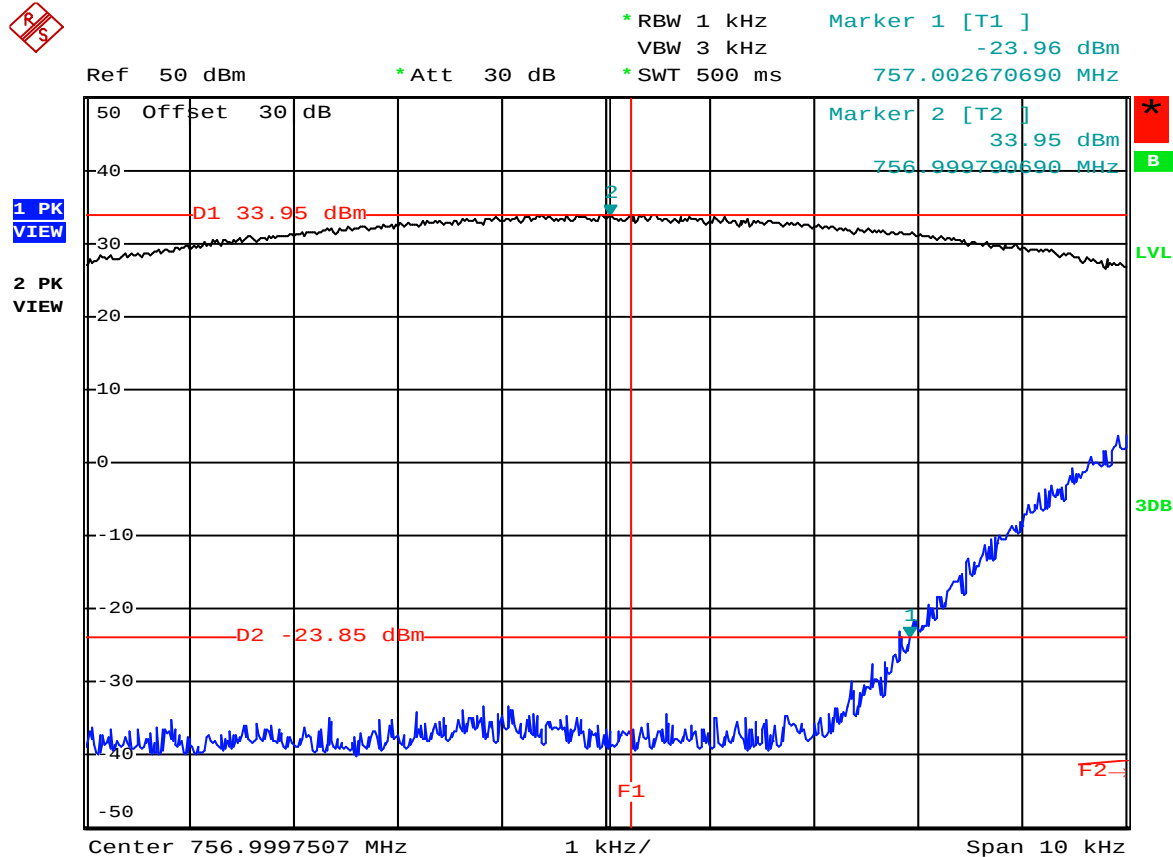
Date: 8.AUG.2016 13:09:28

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	1142
Temp (°C):	50

Upper Band Edge Emissions - 16QAM



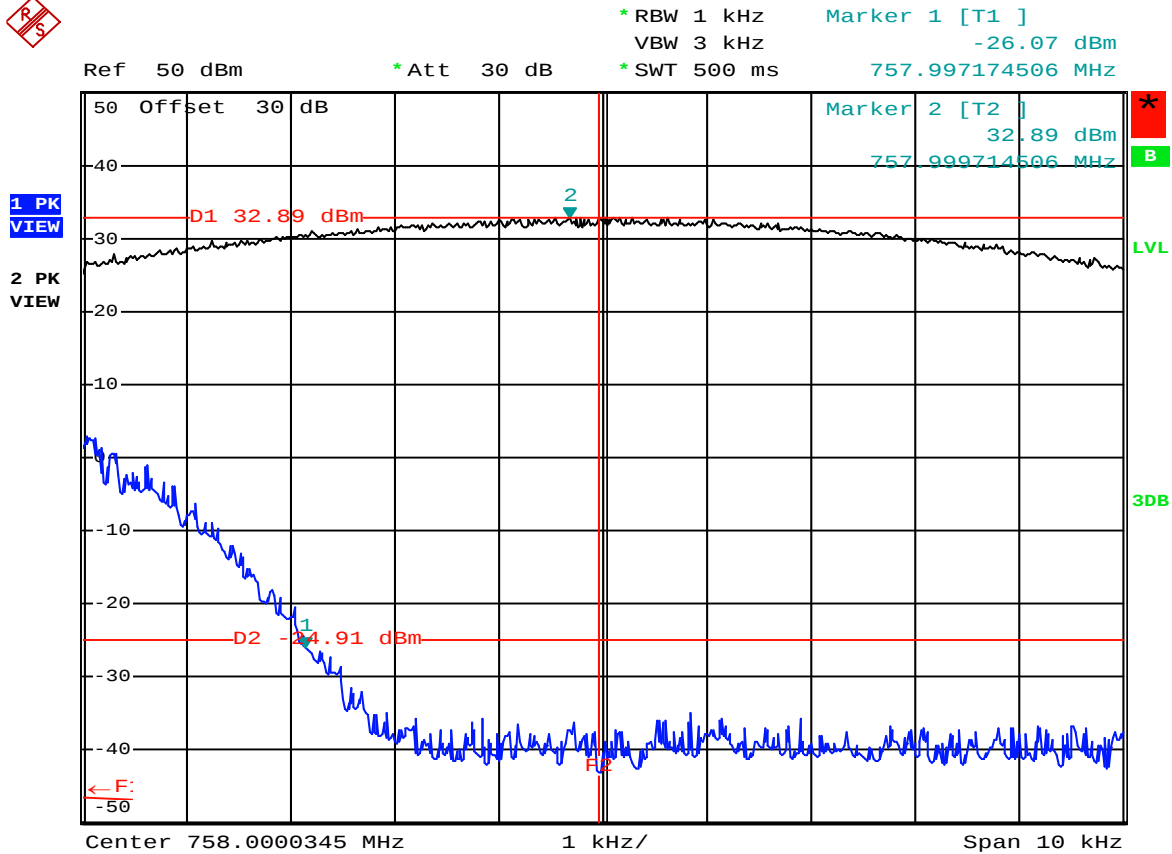
Date: 8.AUG.2016 11:42:56

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2671
Temp (°C):	50

Upper Band Edge Emissions - 16QAM



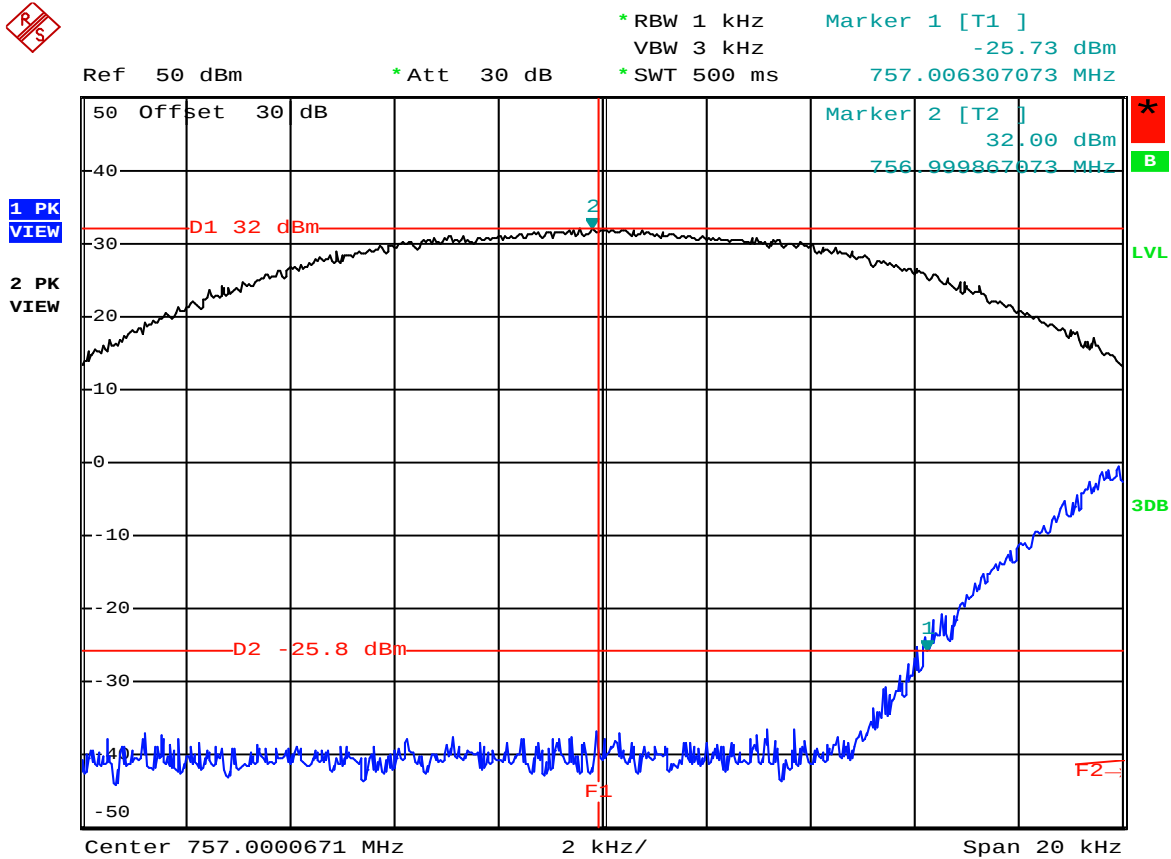
Date: 8.AUG.2016 12:08:28

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2826
Temp (°C):	50

Upper Band Edge Emissions - 16QAM



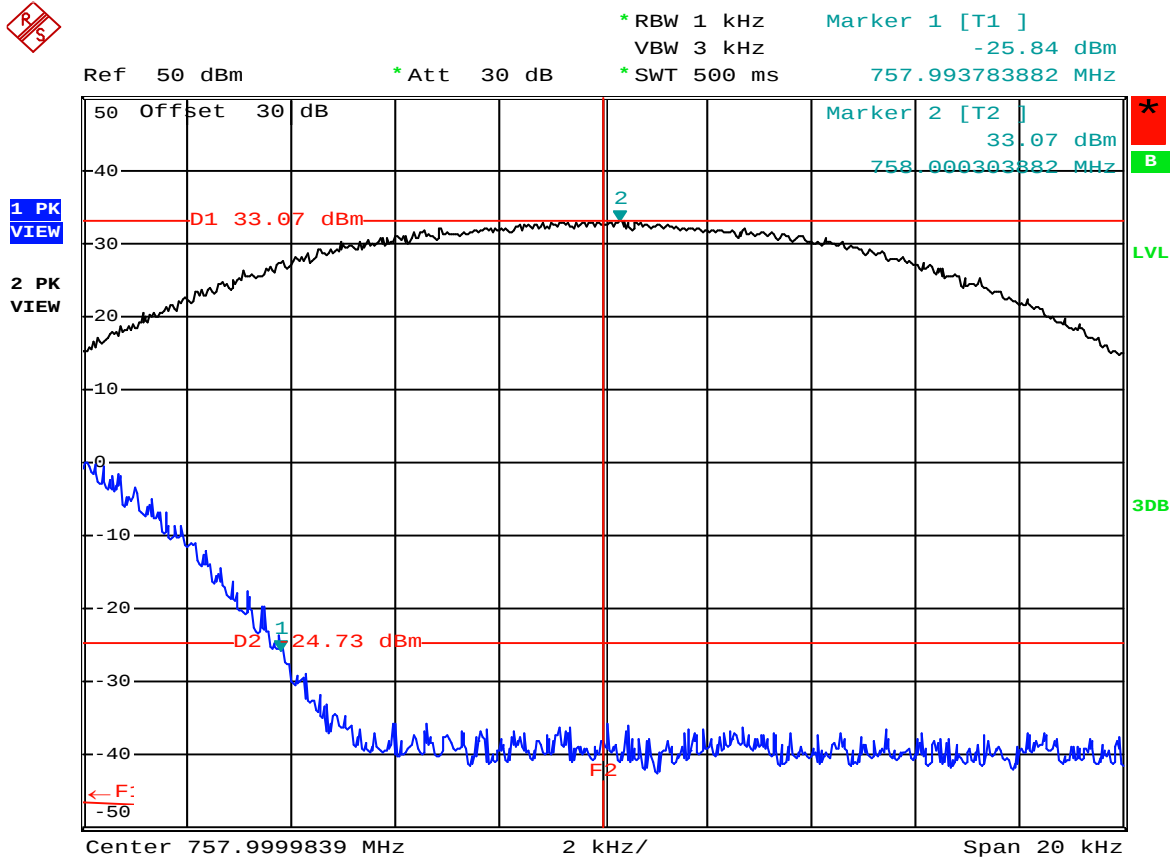
Date: 8.AUG.2016 11:27:18

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6307
Temp (°C):	50

Upper Band Edge Emissions - 16QAM



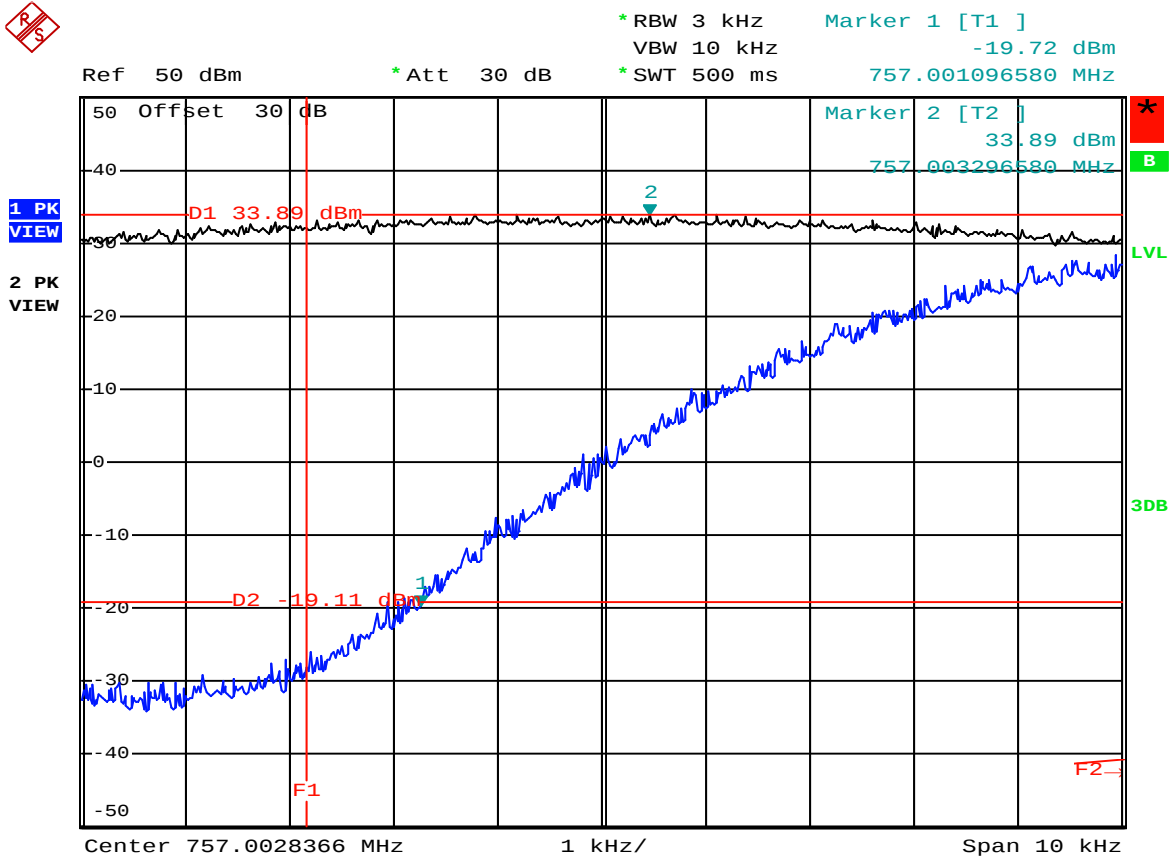
Date: 8.AUG.2016 11:24:10

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6216
Temp (°C):	50

Upper Band Edge Emissions - 64QAM



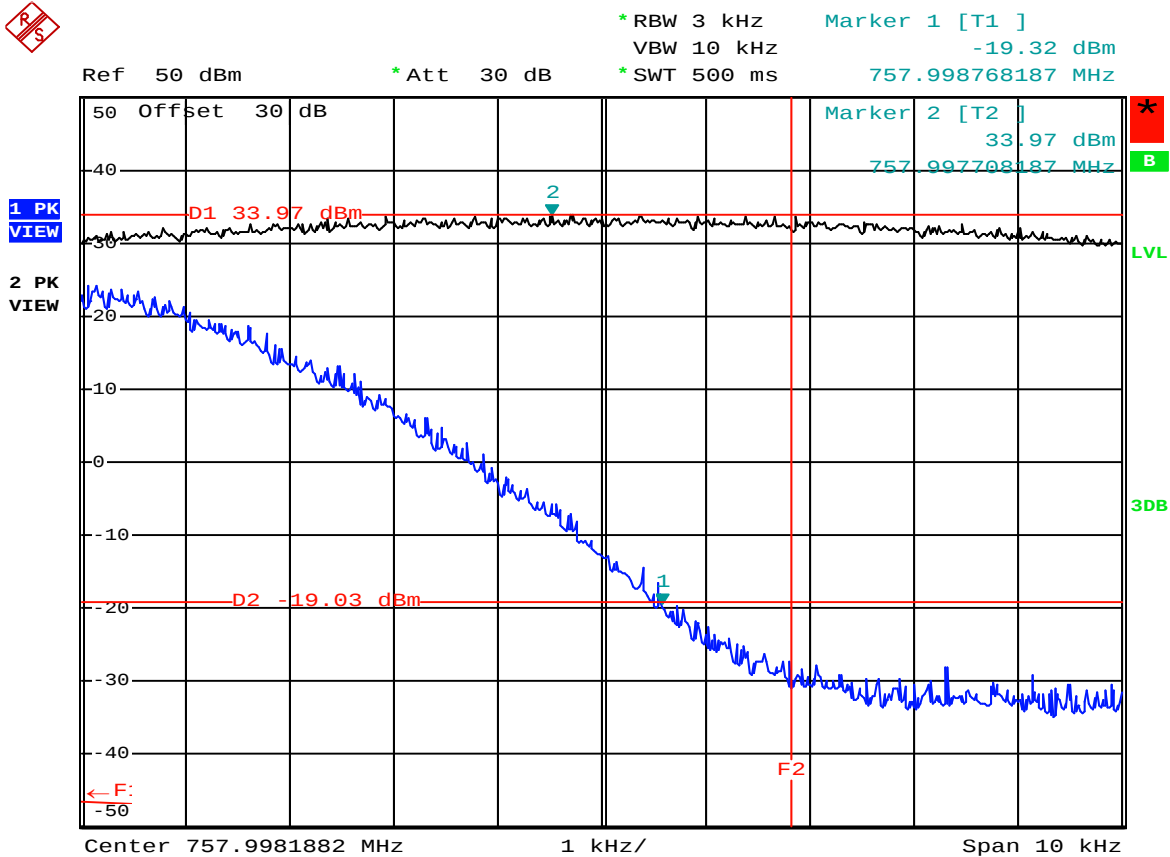
Date: 8.AUG.2016 13:18:26

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.0125
Bandwidth:	12.5kHz
Delta F (Hz):	1097
Temp (°C):	50

Upper Band Edge Emissions - 64QAM



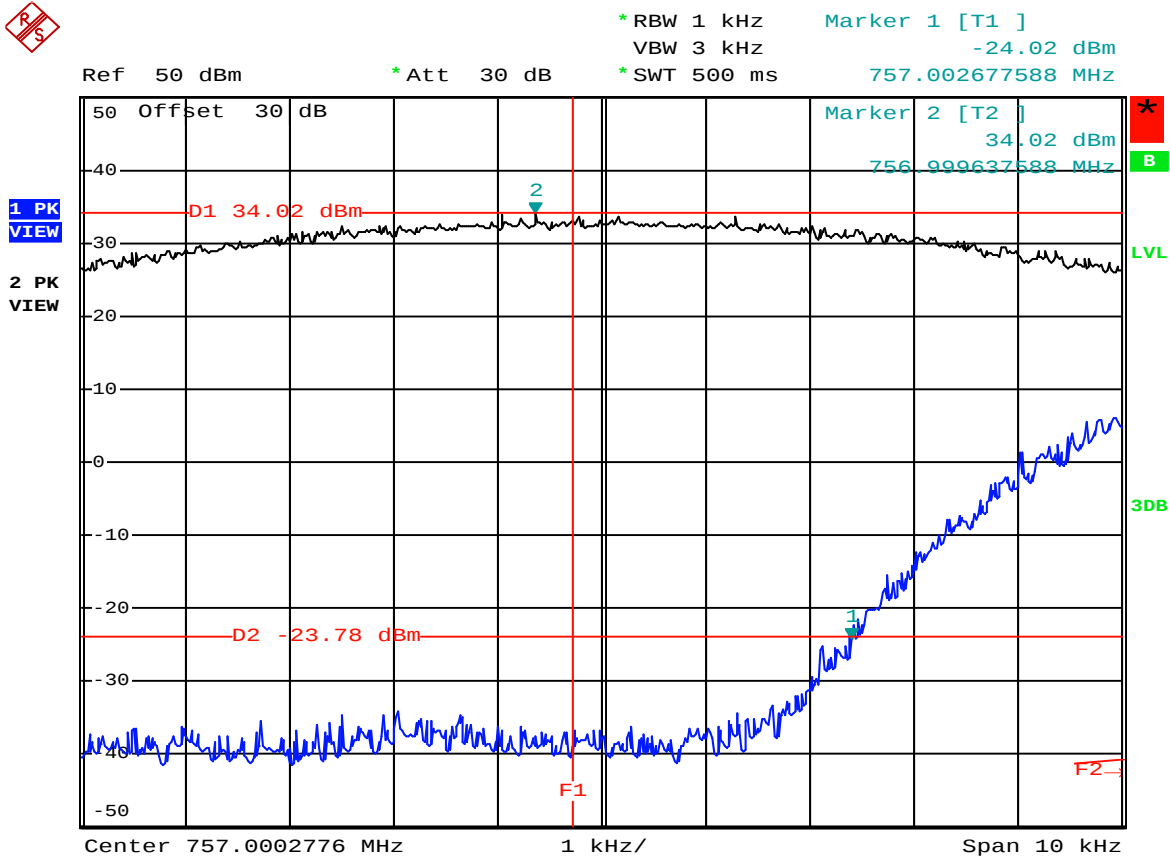
Date: 8.AUG.2016 13:11:44

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.9875
Bandwidth:	12.5kHz
Delta F (Hz):	1232
Temp (°C):	50

Upper Band Edge Emissions - 64QAM



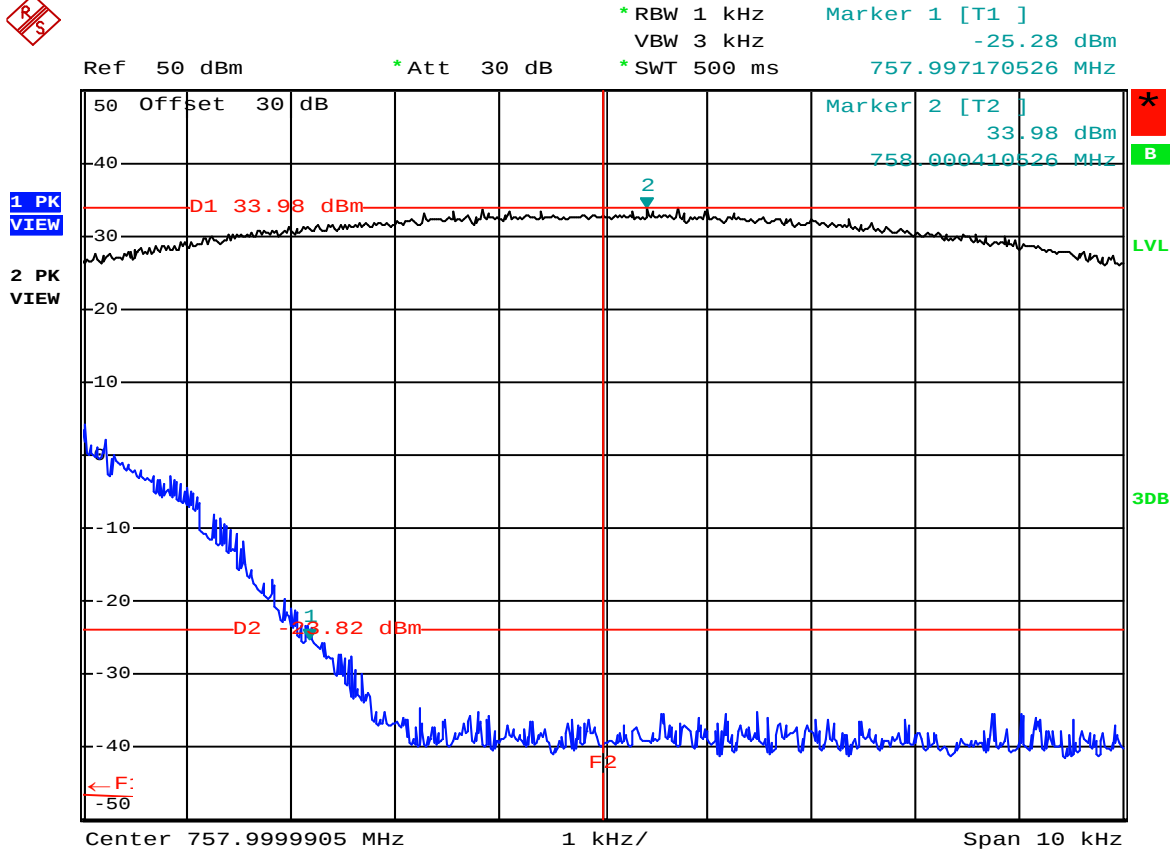
Date: 8.AUG.2016 12:05:38

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.01875
Bandwidth:	25kHz
Delta F (Hz):	2677
Temp (°C):	50

Upper Band Edge Emissions - 64QAM



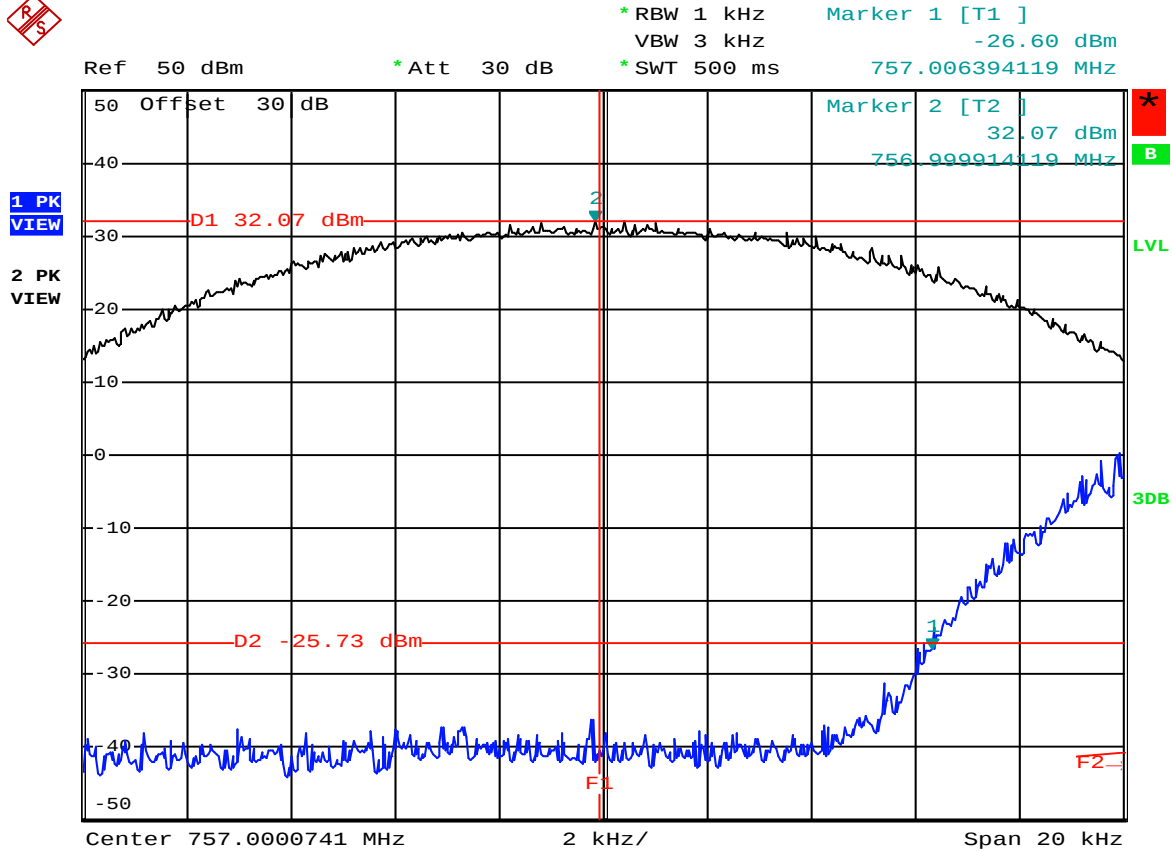
Date: 8.AUG.2016 11:36:49

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.98125
Bandwidth:	25kHz
Delta F (Hz):	2830
Temp (°C):	50

Upper Band Edge Emissions - 64QAM



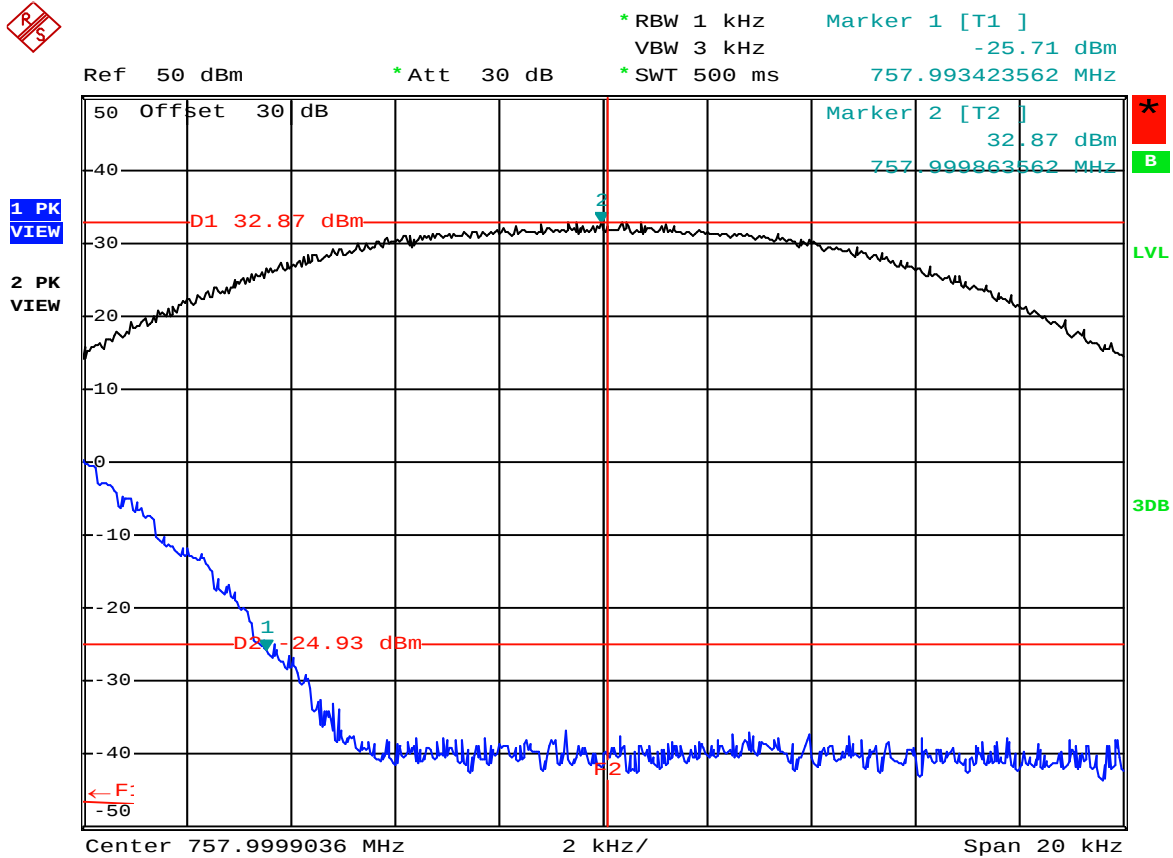
Date: 8.AUG.2016 11:29:56

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.03750
Bandwidth:	50kHz
Delta F (Hz):	6394
Temp (°C):	50

Upper Band Edge Emissions - 64QAM



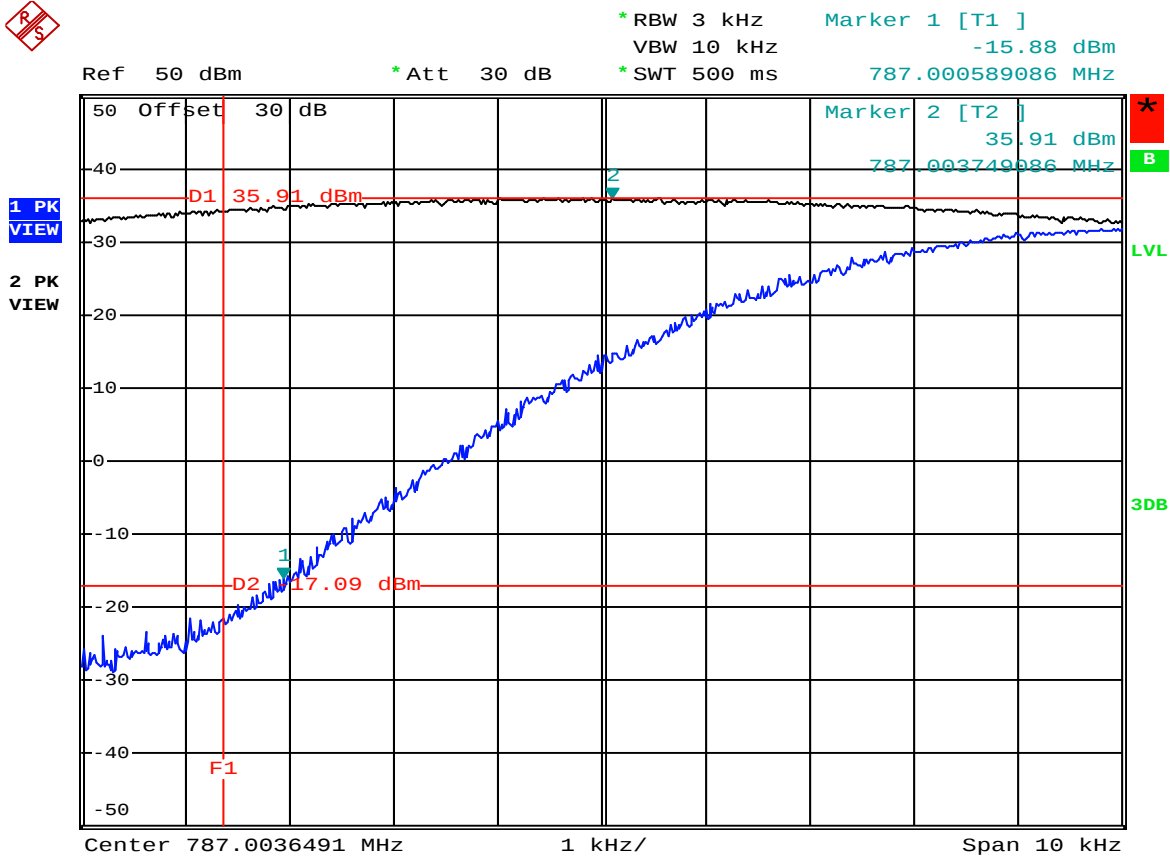
Date: 8.AUG.2016 11:32:21

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	757.96250
Bandwidth:	50kHz
Delta F (Hz):	6577
Temp (°C):	50

Lower Band Edge Emissions



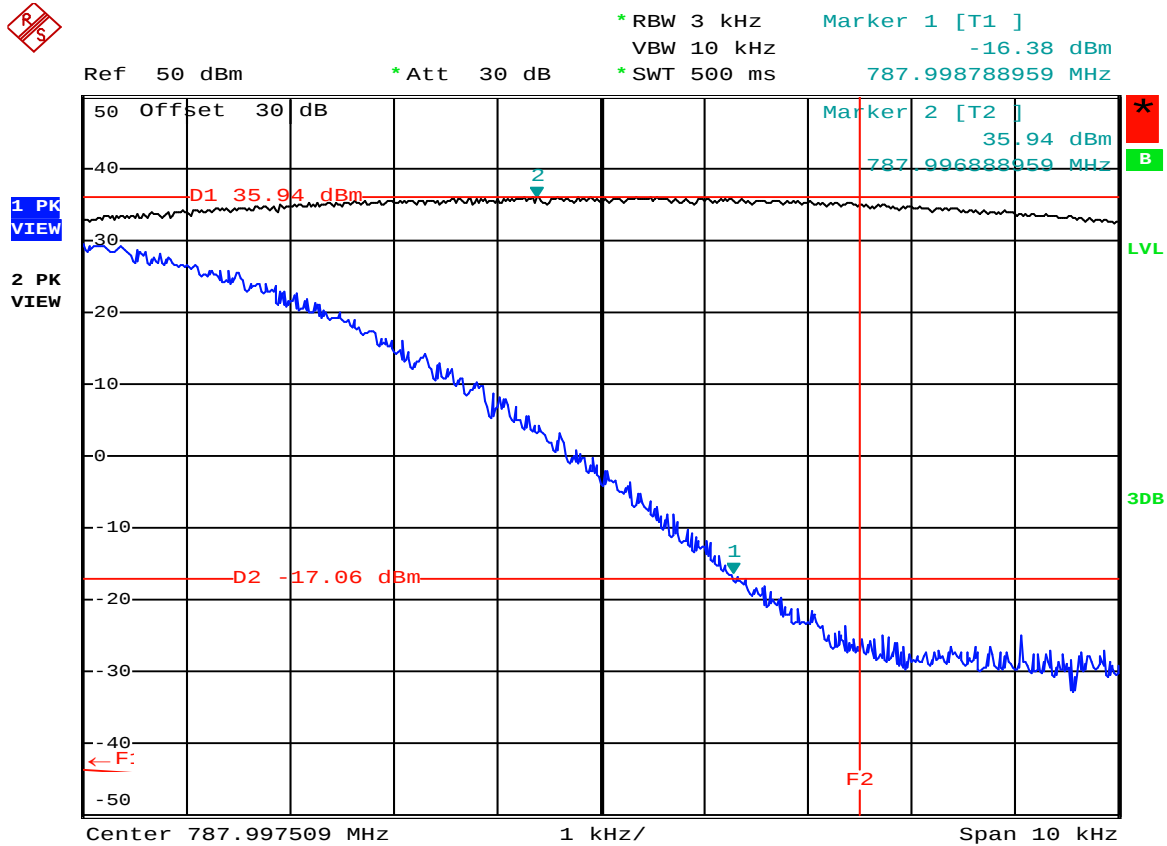
Date: 5.AUG.2016 11:45:22

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.0125
Bandwidth:	12.5kHz
Delta F (Hz):	589
Temp (°C):	-40

Upper Band Edge Emissions



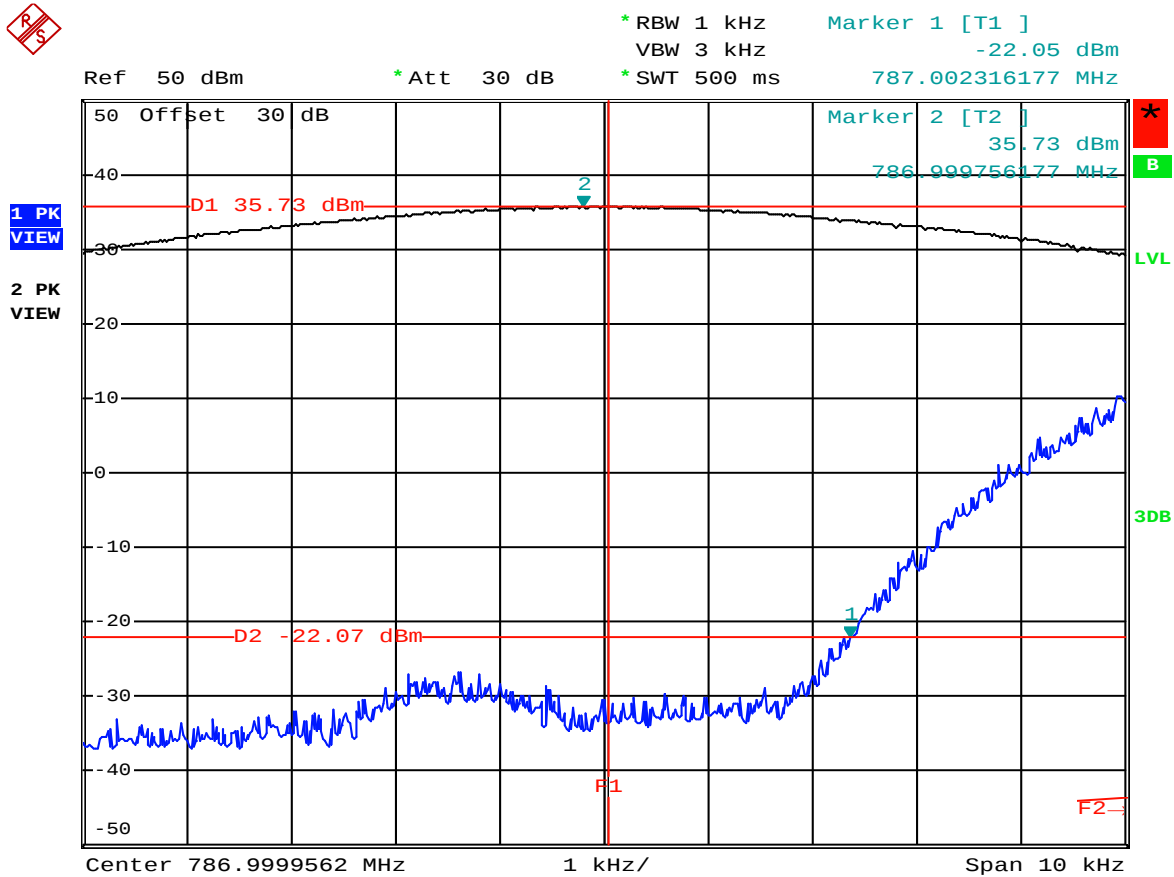
Date: 5.AUG.2016 11:52:53

Plot for Reference Only

Trace 1 RBW: 3kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.9875
Bandwidth:	12.5kHz
Delta F (Hz):	1211
Temp (°C):	-40

Lower Band Edge Emissions



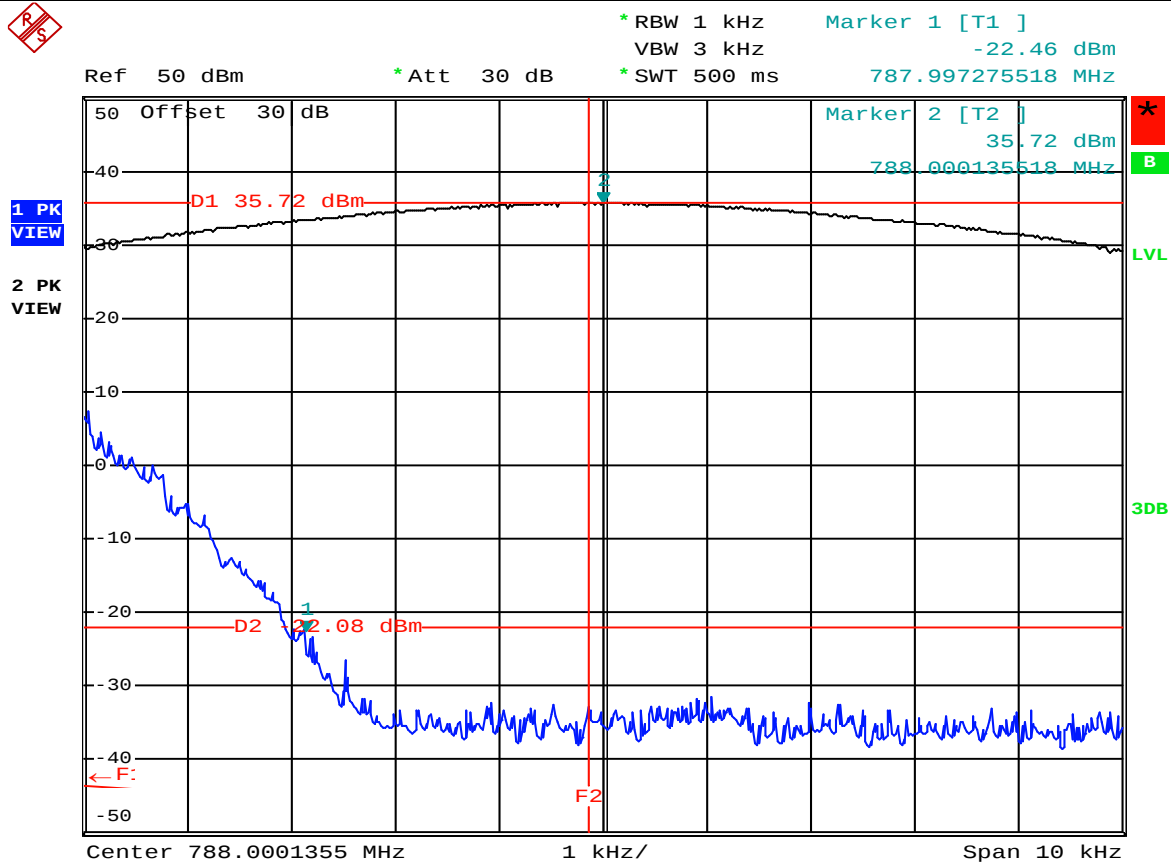
Date: 5.AUG.2016 12:20:15

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.01875
Bandwidth:	25kHz
Delta F (Hz):	2316
Temp (°C):	-40

Upper Band Edge Emissions



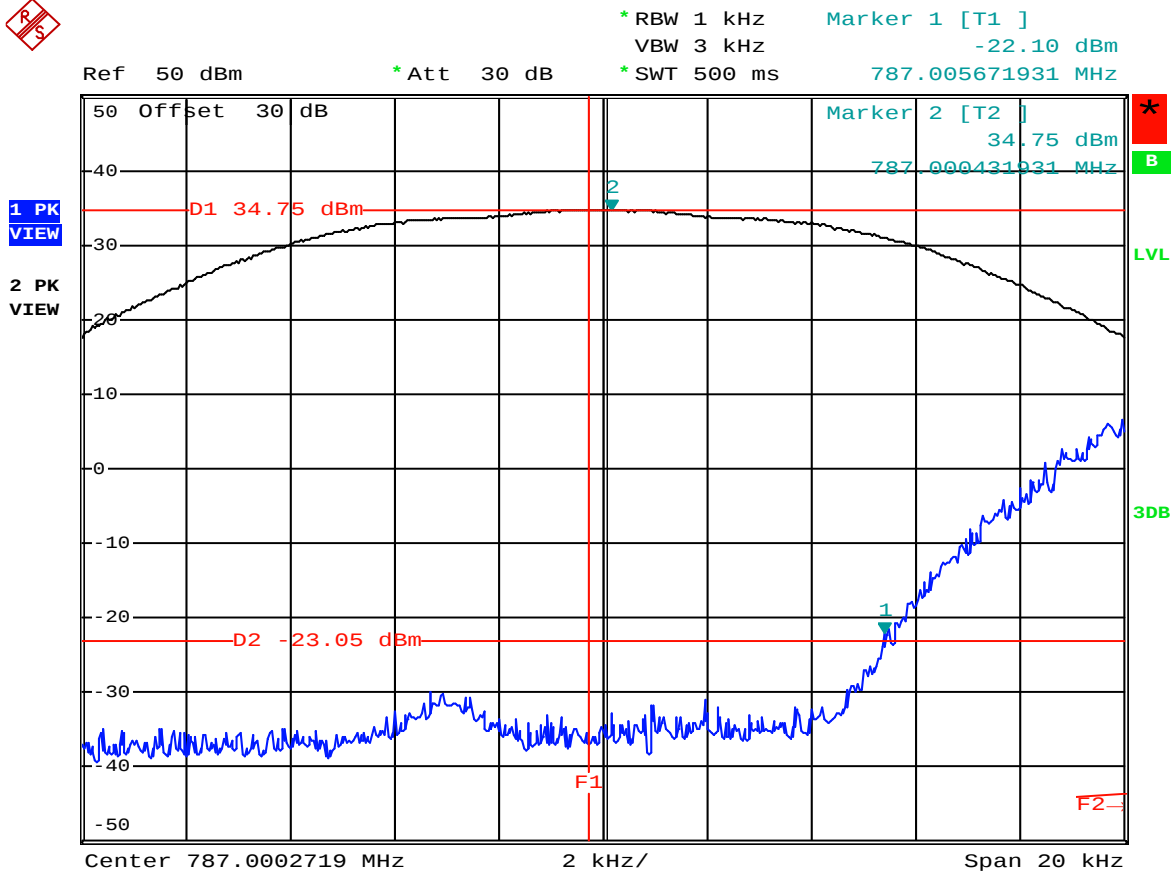
Date: 5.AUG.2016 12:16:38

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.98125
Bandwidth:	25kHz
Delta F (Hz):	2725
Temp (°C):	-40

Lower Band Edge Emissions

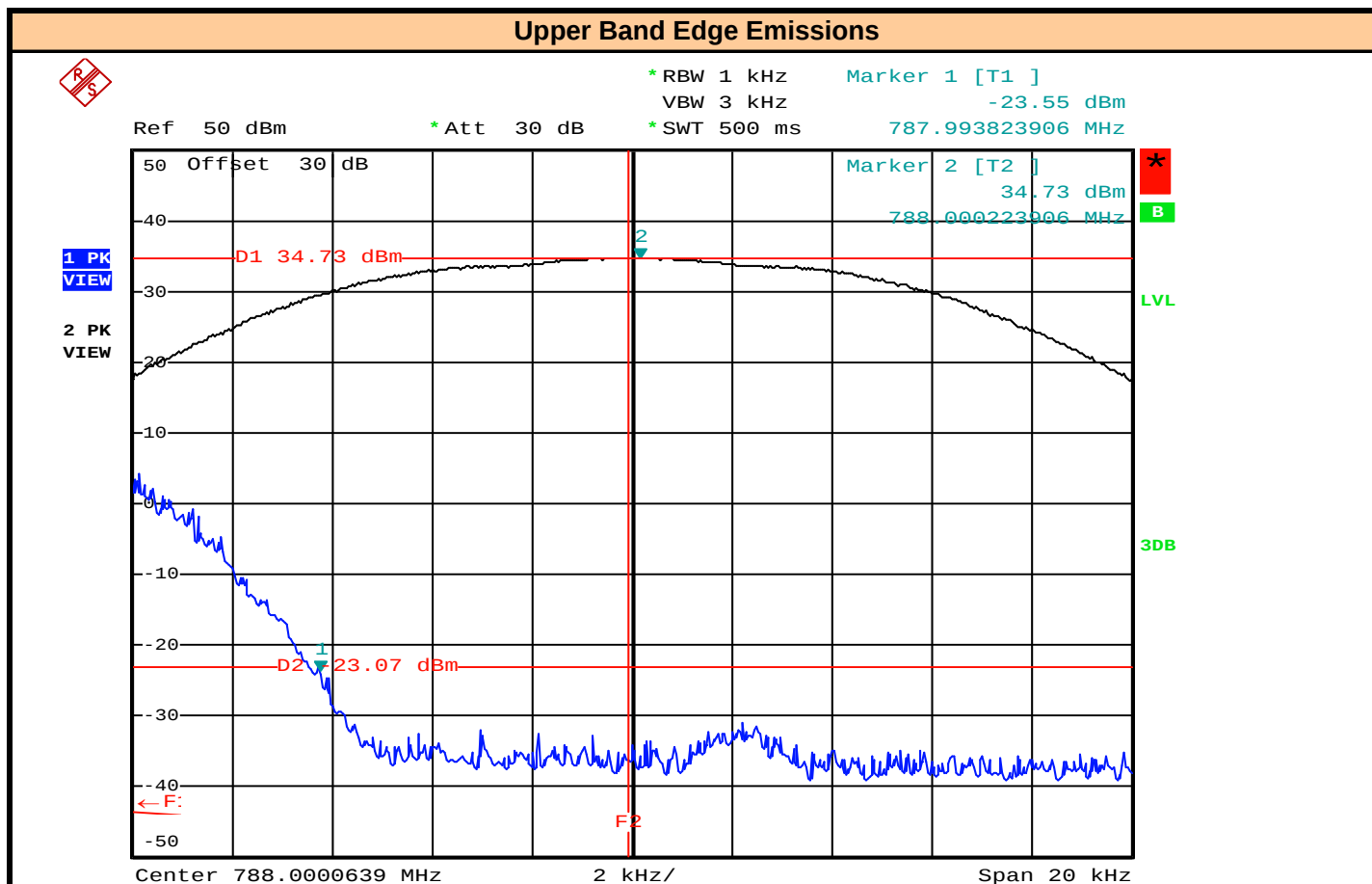


Date: 5.AUG.2016 12:25:56

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.03750
Bandwidth:	50kHz
Delta F (Hz):	5672
Temp (°C):	-40



Date: 5.AUG.2016 12:29:26

Plot for Reference Only

Trace 1 RBW: 1kHz
Trace 2 RBW: 30kHz

Channel Frequency:	787.96250
Bandwidth:	50kHz
Delta F (Hz):	6177
Temp (°C):	-40

Frequency Stability							
Frequency Stability Measurements (Temperature)							
Temp (°C)	Assigned Frequency		Assigned Bandwidth (kHz)	Absolute Displacement from Band Edge [d _{BE}]		Deviation*	
	Lower Band Edge (MHz)	Upper Band Edge (MHz)		Lower Band Edge (Hz)	Upper Band Edge (Hz)	Lower (Hz)	Upper (Hz)
-40	757.01250	757.98750	12.5	540	1119	199	-224
-30	757.01250	757.98750	12.5	810	921	-71	-26
-20	757.01250	757.98750	12.5	967	803	-228	92
-10	757.01250	757.98750	12.5	701	986	38	-91
0	757.01250	757.98750	12.5	720	1018	19	-123
10	757.01250	757.98750	12.5	968	831	-229	64
20	757.01250	757.98750	12.5	739	895	0	0
30	757.01250	757.98750	12.5	714	981	25	-86
40	757.01250	757.98750	12.5	657	1024	82	-129
50	757.01250	757.98750	12.5	797	966	-58	-71
*Maximum Deviation of d _{BE} Referenced to d _{BE} @ 20°C (Hz):						199	92
Limit (Hz):						739	895
Result:						Complies	
-40	757.01875	757.98125	25.0	2336	2810	182	-185
-30	757.01875	757.98125	25.0	2475	2620	43	5
-20	757.01875	757.98125	25.0	2609	2472	-91	153
-10	757.01875	757.98125	25.0	2463	2683	55	-58
0	757.01875	757.98125	25.0	2548	2557	-30	68
10	757.01875	757.98125	25.0	2617	2579	-99	46
20	757.01875	757.98125	25.0	2518	2625	0	0
30	757.01875	757.98125	25.0	2428	2729	90	-104
40	757.01875	757.98125	25.0	2519	2775	-1	-150
50	757.01875	757.98125	25.0	2474	2653	44	-28
*Maximum Deviation of d _{BE} Referenced to d _{BE} @ 20°C (Hz):						182	153
Limit (Hz):						2518	2625
Result:						Complies	
-40	757.03750	757.96250	50.0	5790	6311	235	-251
-30	757.03750	757.96250	50.0	6007	6125	18	-65
-20	757.03750	757.96250	50.0	6085	6157	-60	-97
-10	757.03750	757.96250	50.0	5932	6063	93	-3
0	757.03750	757.96250	50.0	5930	6076	95	-16
10	757.03750	757.96250	50.0	5883	6185	142	-125
20	757.03750	757.96250	50.0	6025	6060	0	0
30	757.03750	757.96250	50.0	6022	6182	3	-122
40	757.03750	757.96250	50.0	6036	6171	-11	-111
50	757.03750	757.96250	50.0	5947	5996	78	64
*Maximum Deviation of d _{BE} Referenced to d _{BE} @ 20°C (Hz):						235	64
Limit (Hz):						6025	6060
Result:						Complies	

Frequency Stability Measurements (Voltage)								
Voltage (VDC)	Temp (°C)	Assigned Frequency		Assigned Bandwidth (kHz)	Absolute Displacement from Band Edge [d _{BE}]		Deviation*	
		Lower Band Edge (MHz)	Upper Band Edge (MHz)		Lower Band Edge (Hz)	Upper Band Edge (Hz)	Lower (Hz)	Upper (Hz)
34.5(115%)	20	757.01250	757.98750	12.5	772	880	-33	15
20(100%)	20	757.01250	757.98750	12.5	739	895	0	0
10(-)	20	757.01250	757.98750	12.5	865	881	-126	14
*Maximum Deviation of d _{BE} Referenced to d _{BE} @ 200C (Hz):							0	15
Limit (Hz):							739	895
Result:							Complies	

Frequency Stability Measurements (Verification)								
Band (MHz)	Temp (°C)	Assigned Frequency		Assigned Bandwidth (kHz)	Absolute Displacement from Band Edge [d _{BE}]		Deviation*	
		Lower Band Edge (MHz)	Upper Band Edge (MHz)		Lower Band Edge (Hz)	Upper Band Edge (Hz)	Lower (Hz)	Upper (Hz)
787	-40	787.01250	787.98750	12.5	589	1211	150	-316
787	-40	787.01875	787.98125	25.0	2316	2725	202	-100
787	-40	787.03750	787.96250	50.0	5672	6177	353	-117
*Maximum Deviation of d _{BE} Referenced to d _{BE} @ 200C (Hz):							353	-100
Result:							Complies	

Frequency Stability Measurements (Modulation)								
Modulation	Temp (°C)	Assigned Frequency		Assigned Bandwidth (kHz)	Absolute Displacement from Band Edge [d _{BE}]		Deviation*	
		Lower Band Edge (MHz)	Upper Band Edge (MHz)		Lower Band Edge (Hz)	Upper Band Edge (Hz)	Lower (Hz)	Upper (Hz)
16QAM	50	757.01250	757.98750	12.5	975	1142	-236	-247
16QAM	50	757.01875	757.98125	25.0	2671	2826	-153	-201
16QAM	50	757.03750	757.96250	50.0	6307	6216	-282	-156
64QAM	50	757.01250	757.98750	12.5	1097	1232	-358	-337
64QAM	50	757.01875	757.98125	25.0	2677	2830	-159	-205
64QAM	50	757.03750	757.96250	50.0	6394	6577	-369	-517
*Maximum Deviation of d _{BE} Referenced to d _{BE} @ 200C (Hz):							-159	-205
Result:							Complies	

APPENDIX I - Equipment List and Calibration

Equipment List						
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval
00003	HP	53181A	3736A05175	Frequency Counter	28 Apr 2014	Triennial
00034	ETS	3115	6267	Double Ridged Guide Horn	02 Dec 2015	Triennial
00047	HP	85685A	2837A00826	RF Preselector	30 Apr 2014	Triennial
00049	HP	85650A	2043A00162	Quasi-peak Adapter	30 Apr 2014	Triennial
00050	Chase	CBL-6111A	1607	Bilog Antenna	25 Apr 2014	Triennial
00051	HP	8566B	2747A05510	Spectrum Analyzer	30 Apr 2014	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 J - Measurement 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

$$U_{LAB} = 5.14\text{dB} \quad U_{CISPR} = 6.3\text{dB}$$

200MHz - 1000MHz

$$U_{LAB} = 5.90\text{dB} \quad U_{CISPR} = 6.3\text{dB}$$

1GHz - 6GHz

$$U_{LAB} = 4.80\text{dB} \quad U_{CISPR} = 5.2\text{dB}$$

6GHz - 18GHz

$$U_{LAB} = 5.1\text{dB} \quad U_{CISPR} = 5.5\text{dB}$$

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 |