ENGINEERING TEST REPORT

OPM15 Module
Model Nos.: OPM15-E1 & OPM15-E0

FCC ID: A3Q-OPM15E1

Applicant:

OMESH Networks Inc.
3 Kilkenny Dr.
Toronto, ON
Canada M1W 1J3

In Accordance With

Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.247

Digital Modulation Systems (DTS)
Operating in 2400– 2483.5 MHz Band

UltraTech's File No.: OMSN-002Q_F15C247

This Test report is Issued under the Authority of
Tri M. Luu, B.A.Sc,
Vice President of Engineering
UltraTech Group of Labs

Date: March 22, 2012

Report Prepared by: Dharmajit Solanki Issued Date: March 22, 2012	Tested by: Mr. Hung Trinh, EMI/RFI Technician Test Dates: February 3 to 16, 2012

The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.
This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.

UltraTech

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FCC	VCCI	Industry Canada / Industrie Canada Approved Test Facility	NVLAP	BSMI	Korea KCC-RRL
91038	1309	46390-2049	NVLAP Lab Code 200093-0	SL2-IN-E-1119R	CA2049

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247
Title:	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15
Purpose of Test:	To gain FCC Equipment Authorization for Frequency Hopping Spread Spectrum Transceiver Operating in the Frequency Band 2400– 2483.5 MHz.
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	[x] Commercial, industrial or business environment [x] Residential environment

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	Year	Title
47 CFR Parts 2 & 15	2010	Code of Federal Regulations – Telecommunication
ANSI C63.4	2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CISPR 22 & EN 55022	2006 2006	Information Technology Equipment - Radio Disturbance Characteristics – Limits and Methods of Measurement
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
996369 D01	2011	Module Certification Guide v01r03
558074 D01	2012	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under §15.247

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	OMESH Networks Inc.
Address:	3 Kilkenny Dr. Toronto, ON Canada M1W 1J3
Contact Person:	Mr. Liang Song Phone #: 416-837-8980 Fax #: 416-977-2796 Email Address: songl@omeshnet.com

MANUFACTURER	
Name:	OMESH Networks Inc.
Address:	3 Kilkenny Dr. Toronto, ON Canada M1W 1J3
Contact Person:	Mr. Liang Song Phone #: 416-837-8980 Fax #: 416-977-2796 Email Address: songl@omeshnet.com

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	OMESH Networks Inc.
Product Name:	OPM15 Module
Model Name or Number:	OPM15-E1
Serial Number:	Test Sample
Type of Equipment:	Digital Transmission System (DTS)
Input Power Supply Type:	2 – 3.6 V DC
Primary User Functions of EUT:	Dynamic Wireless Mesh Networking

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Mobile ▪ Portable ▪ Base Station (fixed use)
Intended Operating Environment:	▪ Commercial, industrial or business environment ▪ Residential environment
Power Supply Requirement:	2 – 3.6 V DC
RF Output Power Rating:	< 5 dBm
Operating Frequency Range:	2405 – 2480 MHz
RF Output Impedance:	50 Ohms
Channel Spacing:	5 MHz
Power Rating:	Low / High
Duty Cycle:	Transceiver 1 : 100 %, Transceiver 2 : <80 %
Modulation Type:	DTS (O-QPSK)
Antenna Connector Type:	Antenna Trace Design: Antenna 1: BGA Soldered ball type antenna connectors for Ceramic Chip Antennas Antenna 2: SMA antenna connectors for Dipole Antennas with pigtails.

2.4. ASSOCIATED ANTENNA DESCRIPTIONS

There are two antenna types

Antenna Description (if more than one antenna, provide a list of all the antennas to be used with the device):		
Manufacturer:	Pulse	Alfa Networks
Type:	Ceramic Chip	Dipole
Model:	W3008C	ARS-N19
Frequency Range:	2400MHz to 2483MHz	2400MHz to 2500MHz
Impedance:	50Om	50Om
Gain (dBi):	2.2dBi	9dBi

The highest gain antenna from each of the above antenna types were selected for testing to represents the worst-case of simultaneous radiated emissions testing. Refer to antennas list exhibit for detailed specifications.

2.5. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Specify minimum length and shielded/non-shielded)
1	VDD	2	BGA Solder Ball	Connected on test jig
2	RESET	1	BGA Solder Ball	Connected on test jig
3	GND	8	BGA Solder Ball	Connected on test jig
4	STA1	1	BGA Solder Ball	Connected on test jig
5	STA2	1	BGA Solder Ball	Connected on test jig
6	STA3	1	BGA Solder Ball	Connected on test jig
7	TXD	1	BGA Solder Ball	Connected on test jig
8	RXD	1	BGA Solder Ball	Connected on test jig
9	ANT1	1	BGA Solder Ball	50Om line
10	ANT2	1	BGA Solder Ball	50Om line

2.6. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	Laptop
Brand name:	Toshiba
Model Name or Number:	PPL
Serial Number:	9321C
Connected to EUT's Port:	Test Jig of the EUT

Ancillary Equipment # 2	
Description:	Test Jig – Reference Trace Design
Brand name:	OMESH Networks Inc.
Connected to EUT's Port:	I/O Port

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	20°C to 24°C
Humidity:	30% to 65%
Pressure:	98 to 110 kPa
Power Input Source:	5.0 VDC

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements.
Special Test Software & Hardware:	Special software provided by the Applicant was installed to allow the EUT to operate in at each channel frequency continuously. For example, the transmitter will be operated at each of lowest, middle and highest frequencies individually continuously during testing. Test jig connected to EUT.
Transmitter Test Antenna:	As specified for each test setup in the report.

Transmitter Test Signals	
Frequency Band(s):	2405 – 2480 MHz
Frequency(ies) Tested: (Near lowest, near middle & near highest frequencies in the frequency range of operation.)	2405, 2440 and 2480 MHz
RF Power Output: (measured maximum output power at antenna terminals)	Transceiver 1: 2.91 dBm Transceiver 2: 3.53 dBm
Normal Test Modulation:	O-QPSK
Modulating Signal Source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Power Line Conducted Emissions were performed in UltraTech's shielded room, 24'(L) by 16'(W) by 8'(H).
- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada Site No.: 2049A-3, Expiry Date: April 14, 2014).

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Requirements	Compliance (Yes/No)
15.207(a)	Power Line Conducted Emissions Measurements	Yes
15.247(a)(2)	6 dB Bandwidth	Yes
15.247(b)(3)	Peak Conducted Output Power - DTS	Yes
15.247(d)	Band-Edge and RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
15.247(d), 15.209 & 15.205	Transmitter Spurious Radiated Emissions	Yes
15.247(e)	Power Spectral Density	Yes
15.247(i) 1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure	Yes
The digital circuit portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices. The engineering test report is available upon request.		

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

The Duty Cycle for Transceiver 2 was reduced to 78% to satisfactorily comply with FCC requirements. The applicant submitted its calculation as submitted with this filing.

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

ANSI C63.10 and FCC Guidance 558074 (2012) – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under §15.247.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement. Refer to Exhibit 7 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER

The essential function of the EUT is to correctly communicate data to and from radios over RF link as Dynamic Wireless Mesh Network.

5.5. COMPLIANCE WITH FCC PART 15 – GENERAL TECHNICAL REQUIREMENTS

FCC Section	FCC Rules	Manufacturer's Clarification
15.31	The hoping function must be disabled for tests, which should be performed with the EUT transmitting on the number of frequencies specified in this Section. The measurements made at the upper and lower ends of the band of operation should be made with the EUT tuned to the highest and lowest available channels.	See Operational Description
15.203	Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT. The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed: ➢ The application (or intended use) of the EUT ➢ The installation requirements of the EUT ➢ The method by which the EUT will be marketed	See Manufacturer Declaration on Modular Approval Request letter.
15.204	Provided the information for every antenna proposed for use with the EUT: ➢ type (e.g. Yagi, patch, grid, dish, etc…), ➢ manufacturer and model number ➢ gain with reference to an isotropic radiator	See proposed antenna list.

5.6. POWER LINE CONDUCTED EMISSIONS [§15.207(a)]

5.6.1. Limit

The equipment shall meet the limits of the following table:

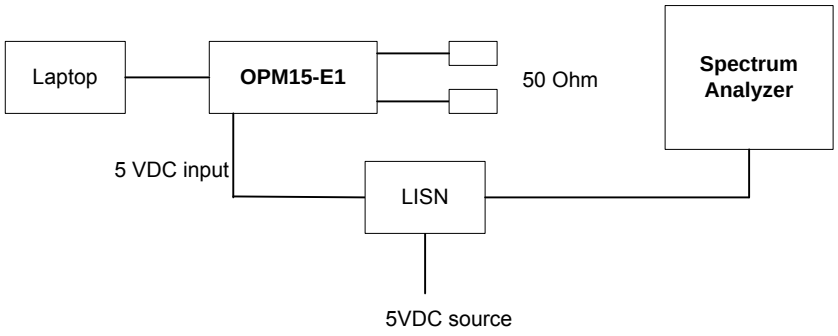
Frequency of emission (MHz)	Class B Conducted Limits (dBμV)		Measuring Bandwidth
	Quasi-peak	Average	
0.15–0.5 .....……..	66 to 56*	56 to 46*	RBW = 9 kHz
0.5–5 .....……..	56	46	VBW ≥ 9 kHz for QP
5-30 ……..	60 ..……..	50	VBW = 1 Hz for Average

*Decreases linearly with the logarithm of the frequency

5.6.2. Method of Measurements

ANSI C63.4

5.6.3. Test Arrangement

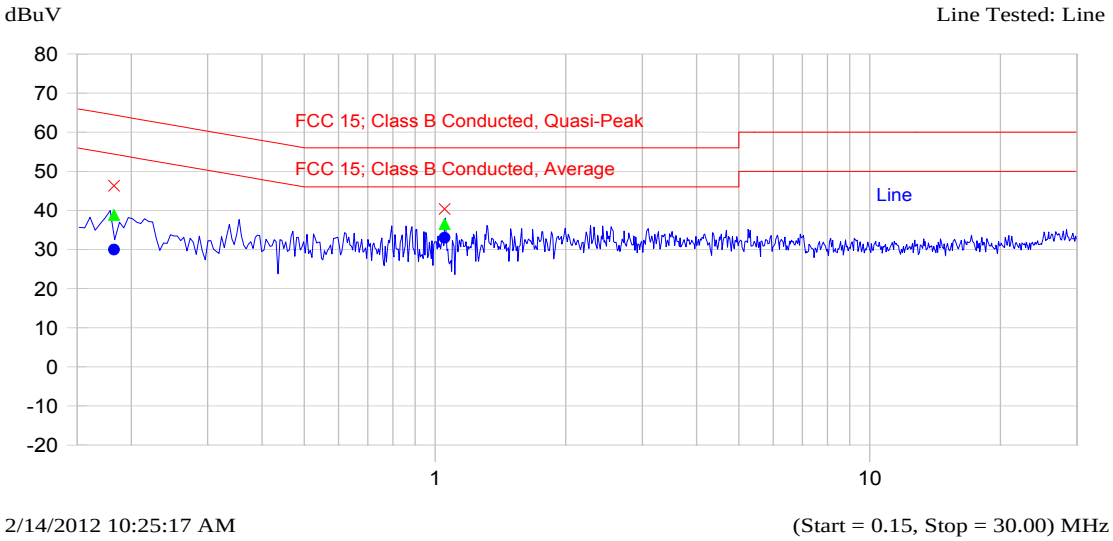


5.6.4. Test Data

Plot 5.6.4.1 DC Power Line Conducted Emissions - Transmitter mode
Line Tested: Positive

Description: 5VDC TX mode.
Setup Name: FCC 15 Class B
Customer Name: Omesh Network Technology
Project Number: OMSN-002Q
Operator Name: Wei
EUT Name: OPM15 Mesh Radio
Date Created: 2/14/2012 9:57:11 AM
Date Modified: 2/14/2012 10:48:49 AM

Current Graph



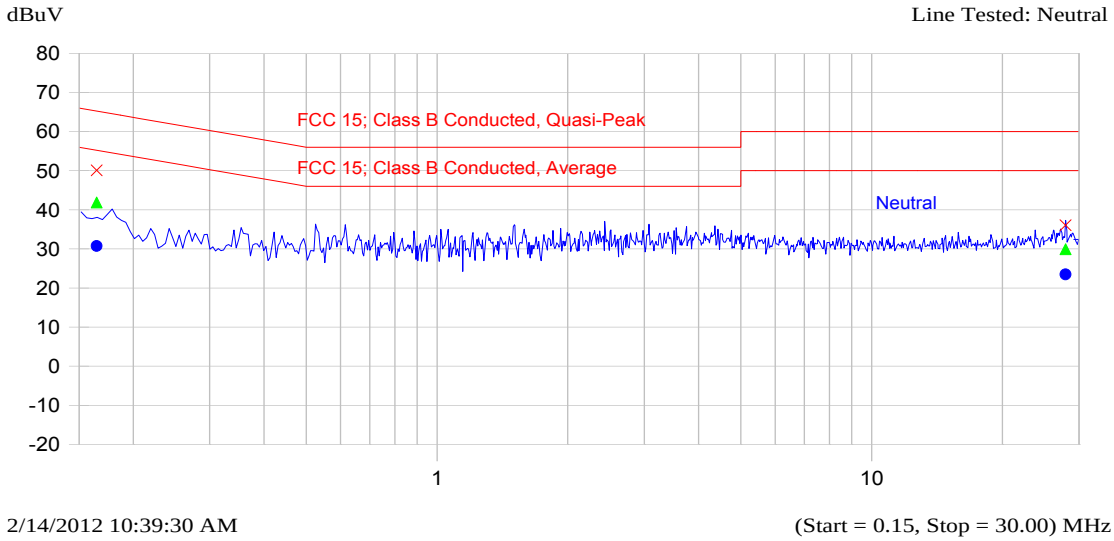
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.183	46.3	38.8	-26.2	30.0	-25.0	Line
1.052	40.4	36.5	-19.5	33.0	-13.0	Line

Plot 5.6.4.2 DC Power Line Conducted Emissions - Transmitter mode
Line Tested: Negative

Description: 5VDC TX mode.
Setup Name: FCC 15 Class B
Customer Name: Omesh Network Technology
Project Number: OMSN-002Q
Operator Name: Wei
EUT Name: OPM15 Mesh Radio
Date Created: 2/14/2012 9:57:11 AM
Date Modified: 2/14/2012 9:57:11 AM

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.165	50.1	41.9	-23.7	30.7	-24.9	Neutral
27.938	36.1	29.9	-30.1	23.5	-26.5	Neutral

5.7. OCCUPIED BANDWIDTH [§ 15.247(a)(2)]

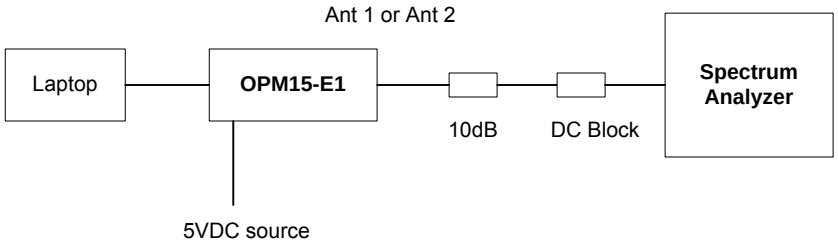
5.7.1. Limit(s)

For a Digital Modulation System, the minimum 6 dB bandwidth shall be at least 500 KHz.

5.7.2. Method of Measurements

ANSI C63.10 and FCC Guidance 558074 (2012) – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under §15.247, RBW= 50 kHz & VBW= 100 kHz

5.7.3. Test Arrangement



5.7.4. Test Data

Transceiver # 1:

Channel	Frequency (MHz)	Modulation	6dB Bandwidth (MHz)	Limit (MHz)
Low	2405	O-QPSK	1.55	Min 0.5
Mid	2440	O-QPSK	1.59	Min 0.5
High	2480	O-QPSK	1.53	Min 0.5

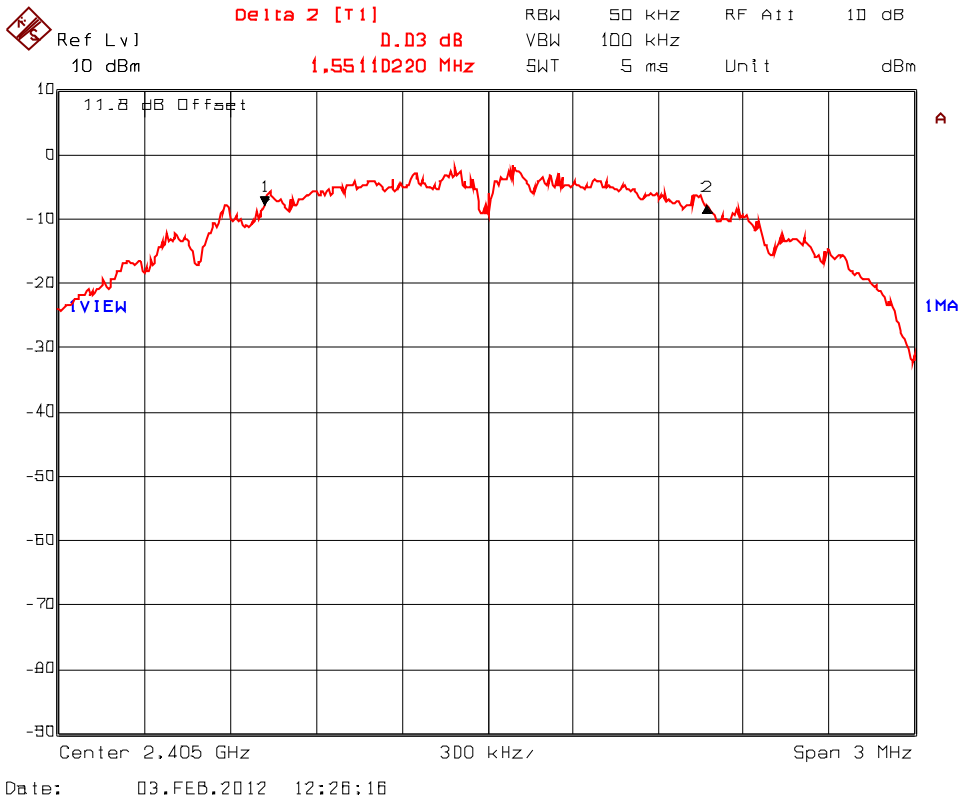
Transceiver # 2:

Channel	Frequency (MHz)	Modulation	6dB Bandwidth (MHz)	Limit (MHz)
Low	2405	O-QPSK	1.44	Min 0.5
Mid	2440	O-QPSK	1.34	Min 0.5
High	2480	O-QPSK	1.58	Min 0.5

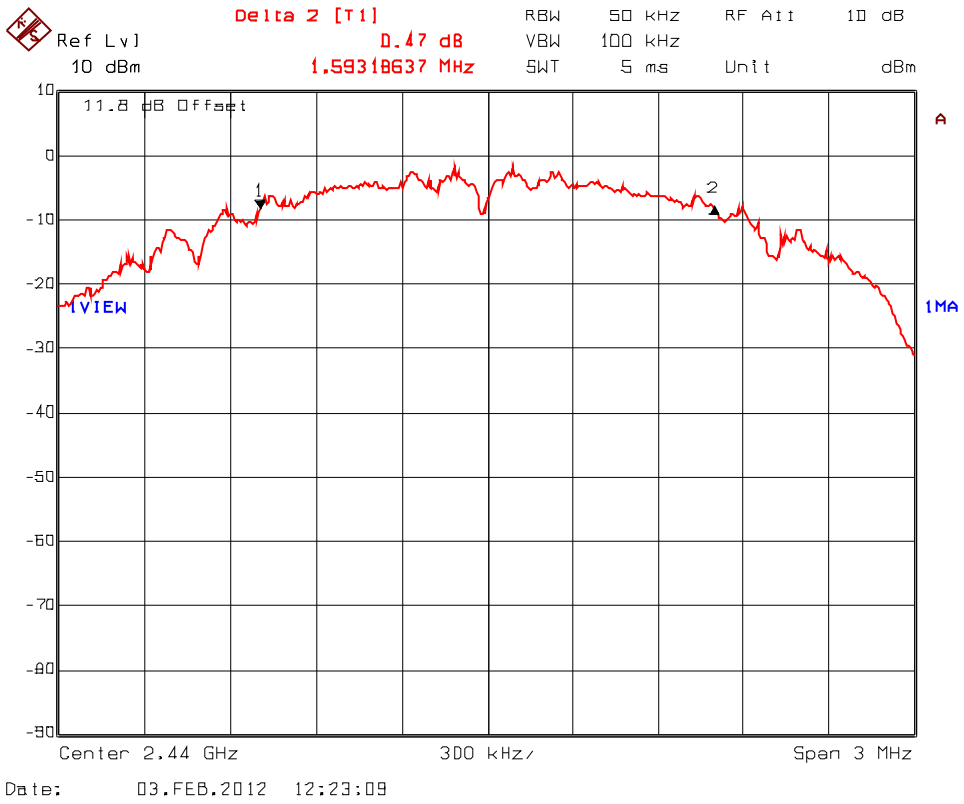
See the following plots for detailed measurements.

Transceiver # 1:

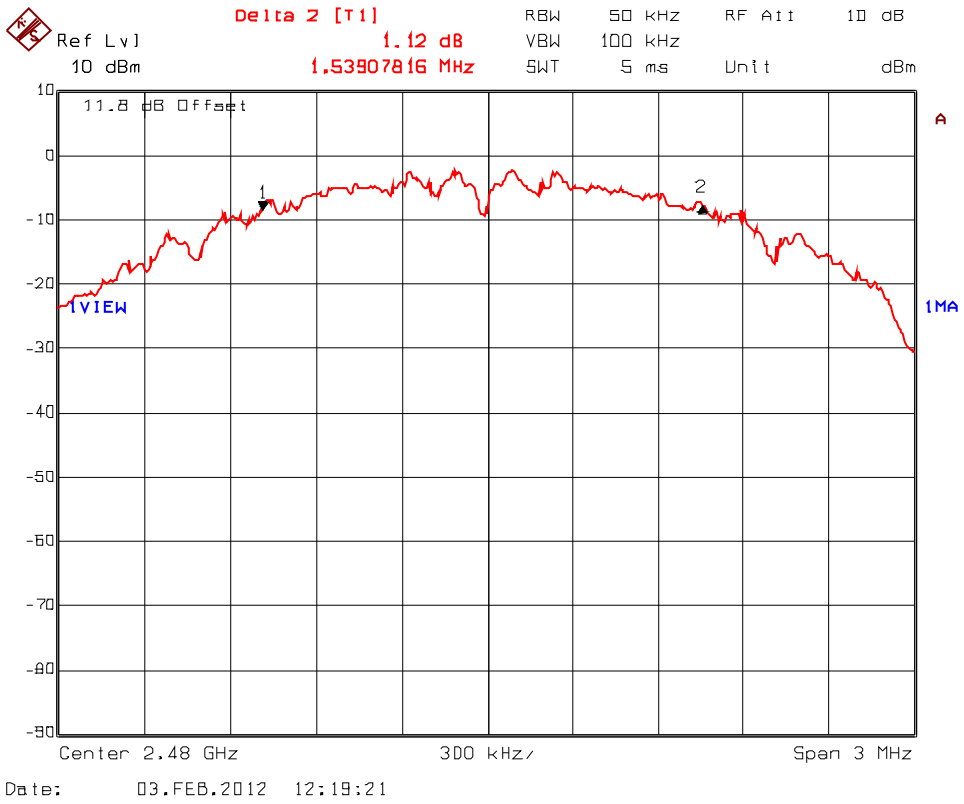
Plot 5.7.4.1. 6 dB Bandwidth
Test Frequency: 2405 MHz



Plot 5.7.4.2. 6 dB Bandwidth
Test Frequency: 2440 MHz

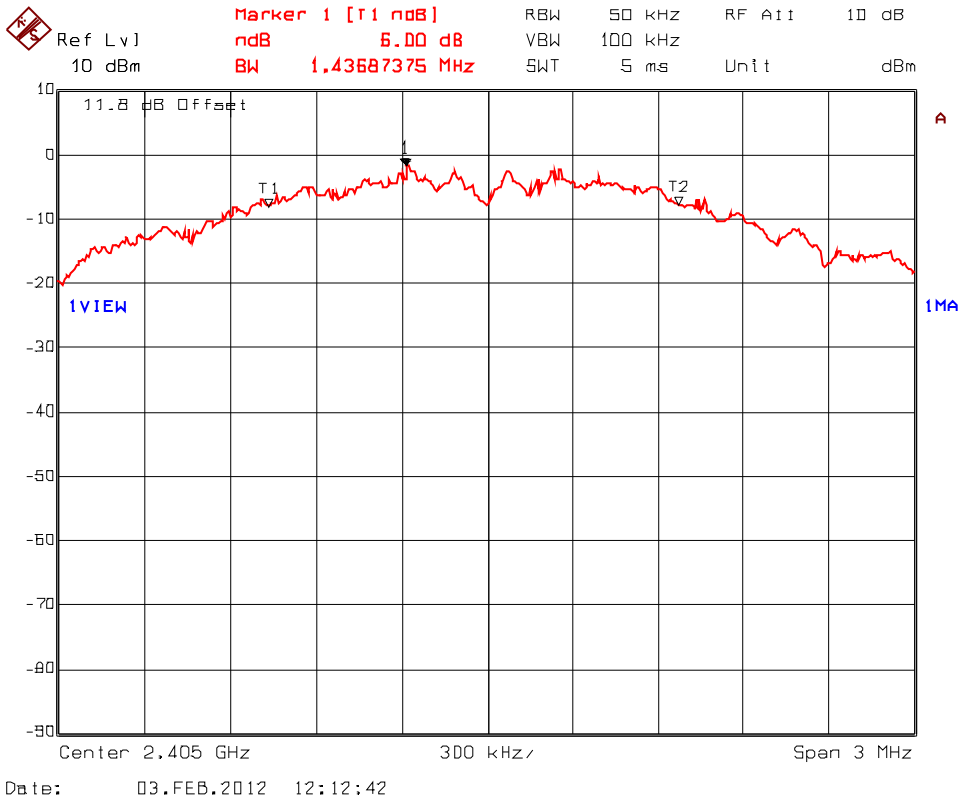


Plot 5.7.4.3. 6 dB Bandwidth
Test Frequency: 2480 MHz



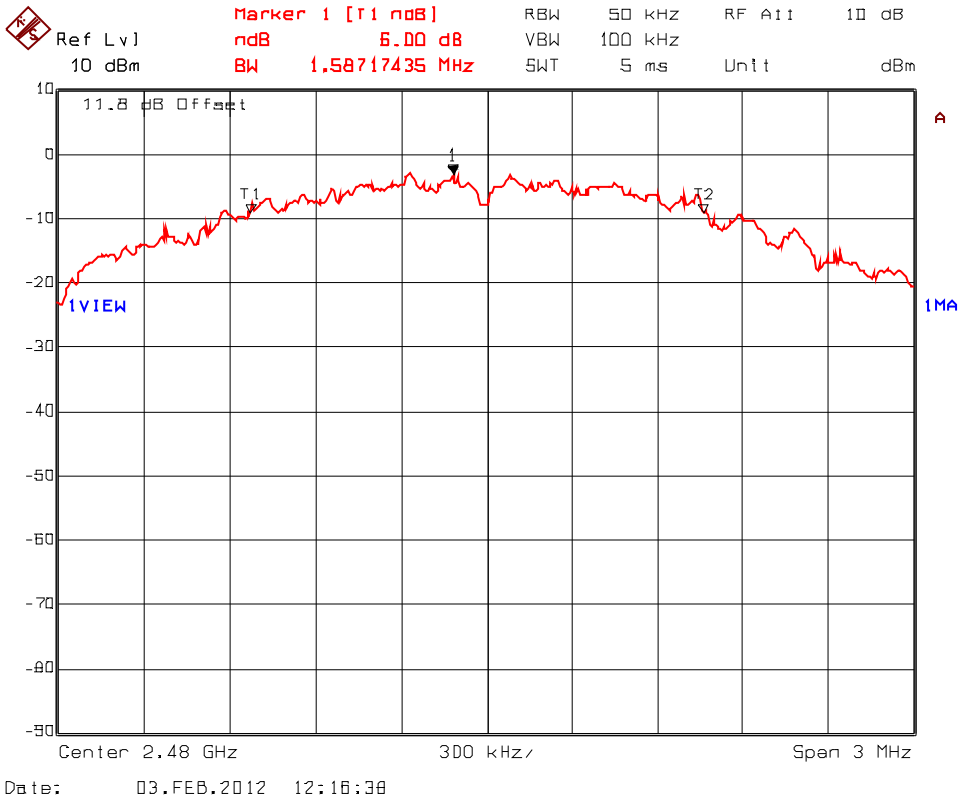
Transceiver # 2:

Plot 5.7.4.4. 6 dB Bandwidth
Test Frequency: 2405 MHz



Plot 5.7.4.5. 6 dB Bandwidth
Test Frequency: 2440 MHz

Plot 5.7.4.6. 6 dB Bandwidth
Test Frequency: 2480 MHz



99% Occupied Bandwidth: For Information Only

Transceiver # 1:

Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	Limit (MHz)
Low	2405	O-QPSK	2.63	Min 0.5
Mid	2440	O-QPSK	2.65	Min 0.5
High	2480	O-QPSK	2.68	Min 0.5

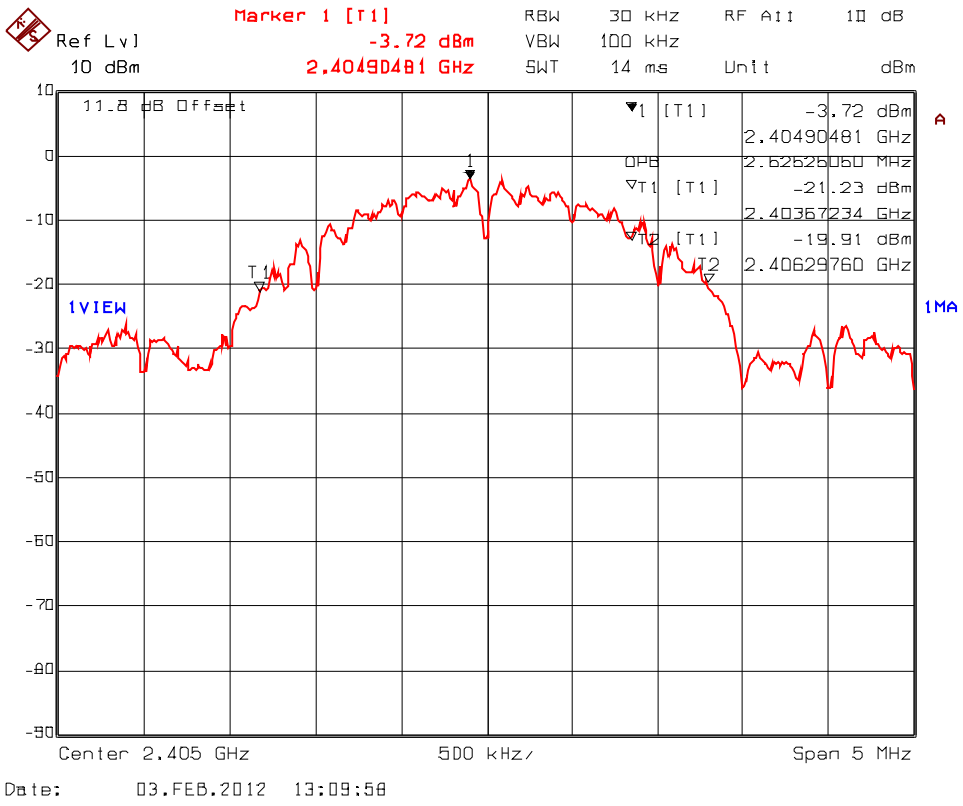
Transceiver # 2:

Channel	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	Limit (MHz)
Low	2405	O-QPSK	3.28	Min 0.5
Mid	2440	O-QPSK	3.29	Min 0.5
High	2480	O-QPSK	3.11	Min 0.5

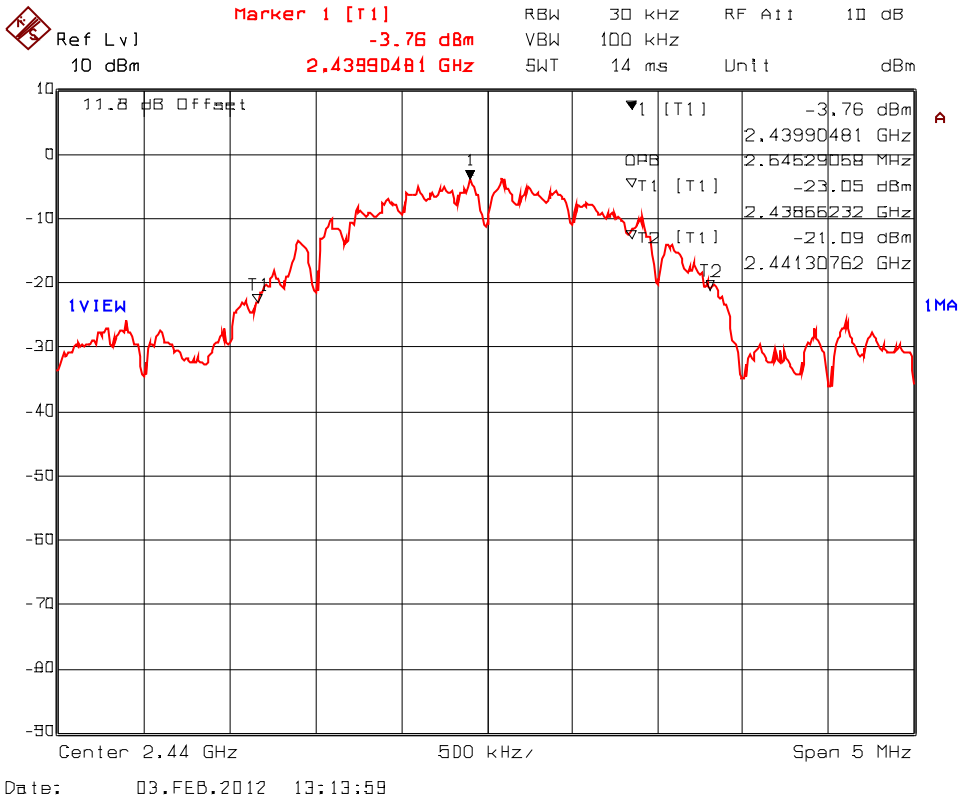
See the following plots for detailed measurements.

Transceiver # 1:

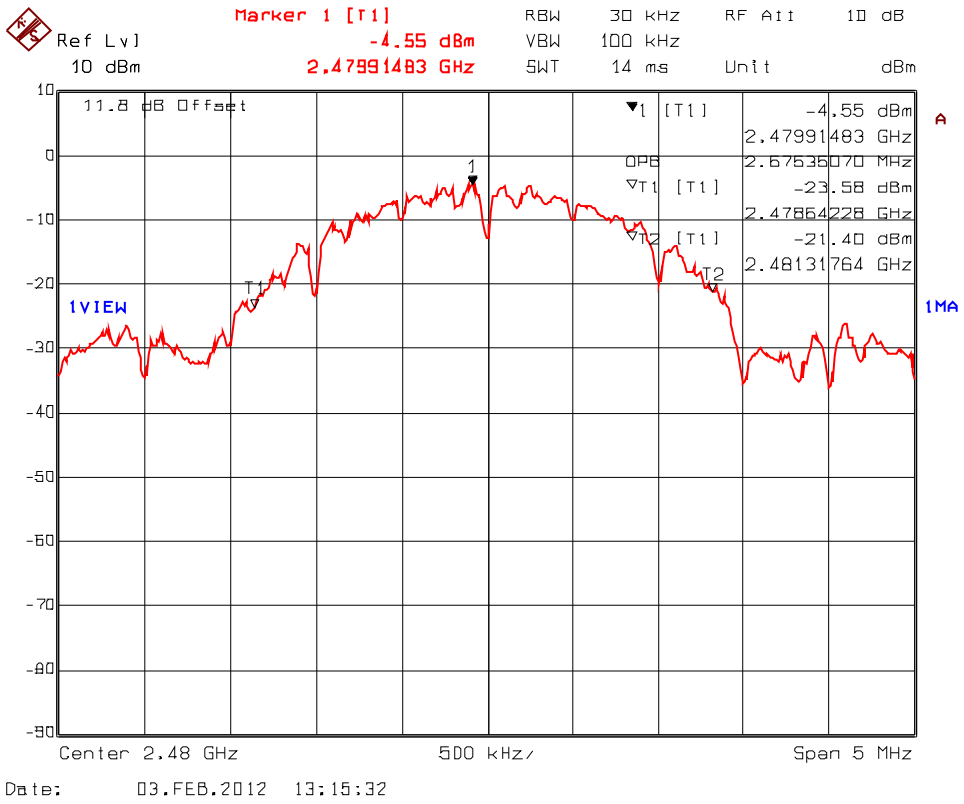
Plot 5.7.4.7. 99% Occupied Bandwidth
Test Frequency: 2405 MHz



Plot 5.7.4.8. 99% Occupied Bandwidth
Test Frequency: 2440 MHz

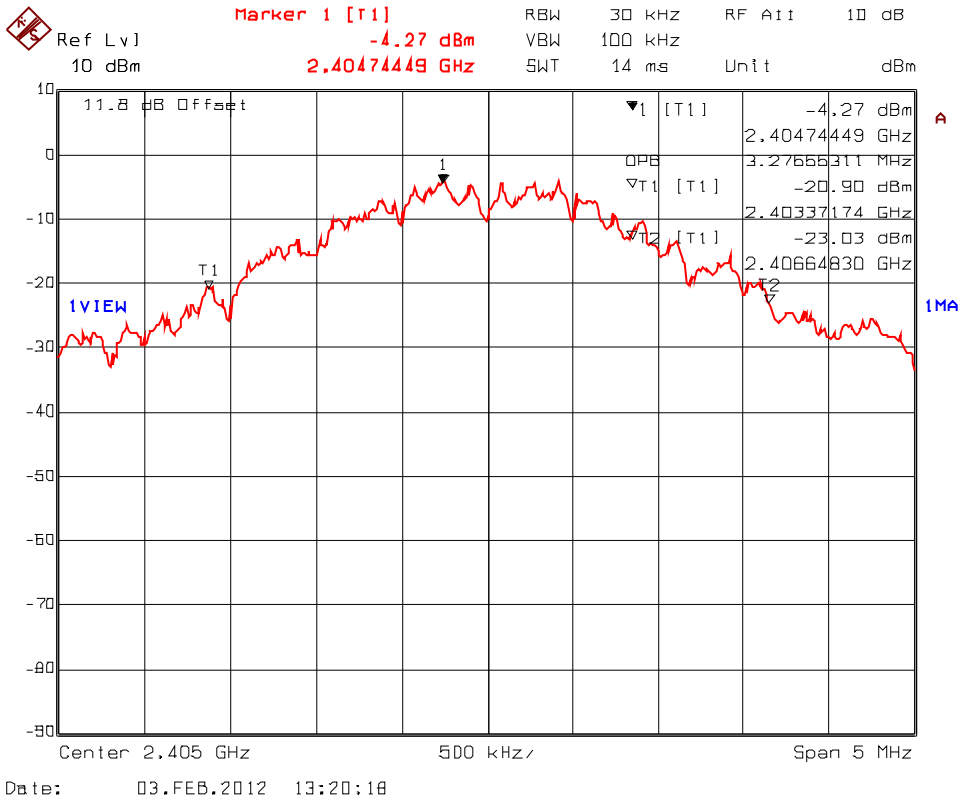


Plot 5.7.4.9. 99% Occupied Bandwidth
Test Frequency: 2480 MHz

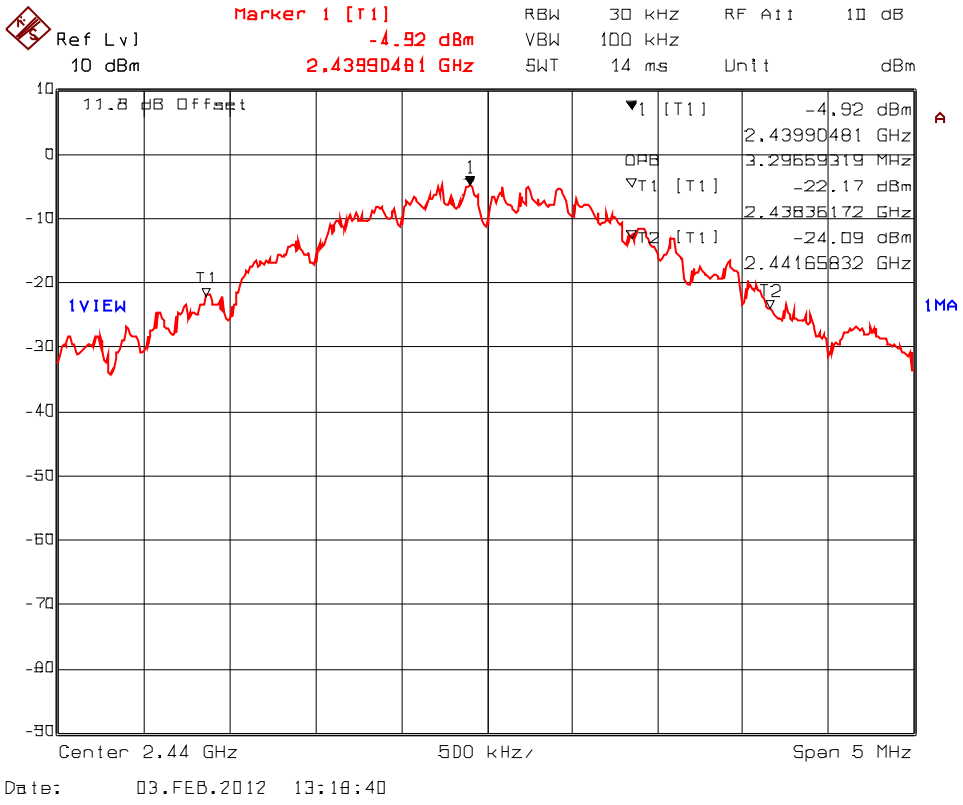


Transceiver # 2:

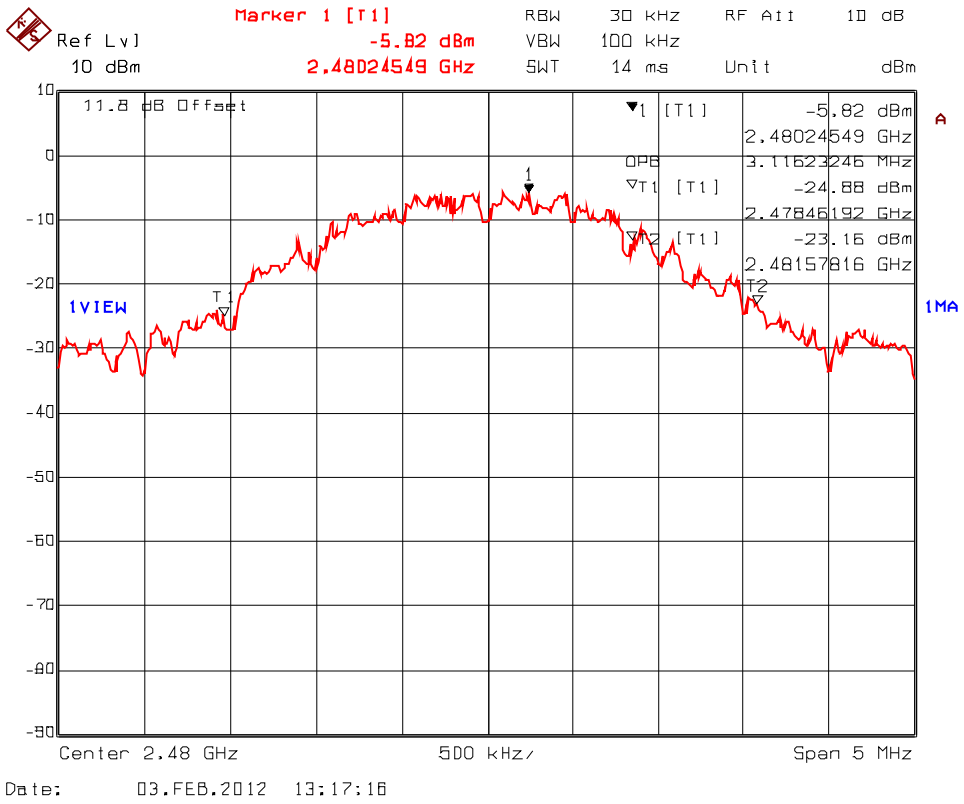
Plot 5.7.4.10. 99% Occupied Bandwidth
Test Frequency: 2405 MHz



Plot 5.7.4.11. 99% Occupied Bandwidth
Test Frequency: 2440 MHz



Plot 5.7.4.12. 99% Occupied Bandwidth
Test Frequency: 2480 MHz



5.8. PEAK CONDUCTED OUTPUT POWER - DTS [§ 15.247(b)(3)]

5.8.1. Limit(s)

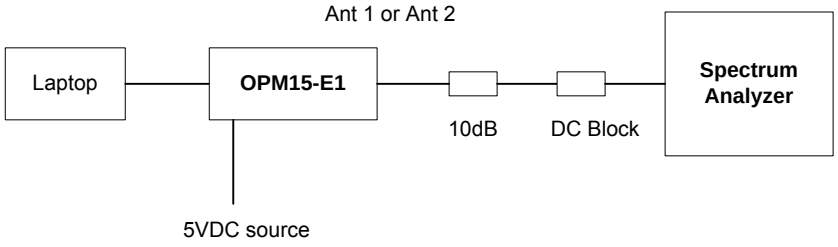
§ 15.247(b)(3): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

§15.247(b)(4): The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.8.2. Method of Measurements & Test Arrangement

ANSI C63.10 and FCC Guidance 558074 (2012) – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under §15.247, RBW= 3 MHz & VBW= 10 MHz

5.8.3. Test Arrangement



5.8.4. Test Data

Mode: High-Power Setting

Transceiver # 1:

Channel	Frequency (MHz)	Modulation	Peak Conducted Power (dBm)	Peak Cond. Power Limit (dBm)	Peak (Note 1) EIRP (dBm)	EIRP Limit (dBm)
Low	2405	O-QPSK	2.91	30	11.91	36
Mid	2440	O-QPSK	2.91	30	11.91	36
High	2480	O-QPSK	2.51	30	11.51	36

Transceiver # 2:

Channel	Frequency (MHz)	Modulation	Peak Conducted Power (dBm)	Peak Cond. Power Limit (dBm)	Peak (Note 1) EIRP (dBm)	EIRP Limit (dBm)
Low	2405	O-QPSK	3.53	30	12.53	36
Mid	2440	O-QPSK	3.16	30	12.16	36
High	2480	O-QPSK	3.03	30	12.03	36

Mode: Low-Power Setting

Transceiver # 1:

Channel	Frequency (MHz)	Modulation	Peak Conducted Power (dBm)	Peak Cond. Power Limit (dBm)	Peak (Note 1) EIRP (dBm)	EIRP Limit (dBm)
Low	2405	O-QPSK	-19.78	30	-10.78	36
Mid	2440	O-QPSK	-19.91	30	-10.91	36
High	2480	O-QPSK	-20.41	30	-11.41	36

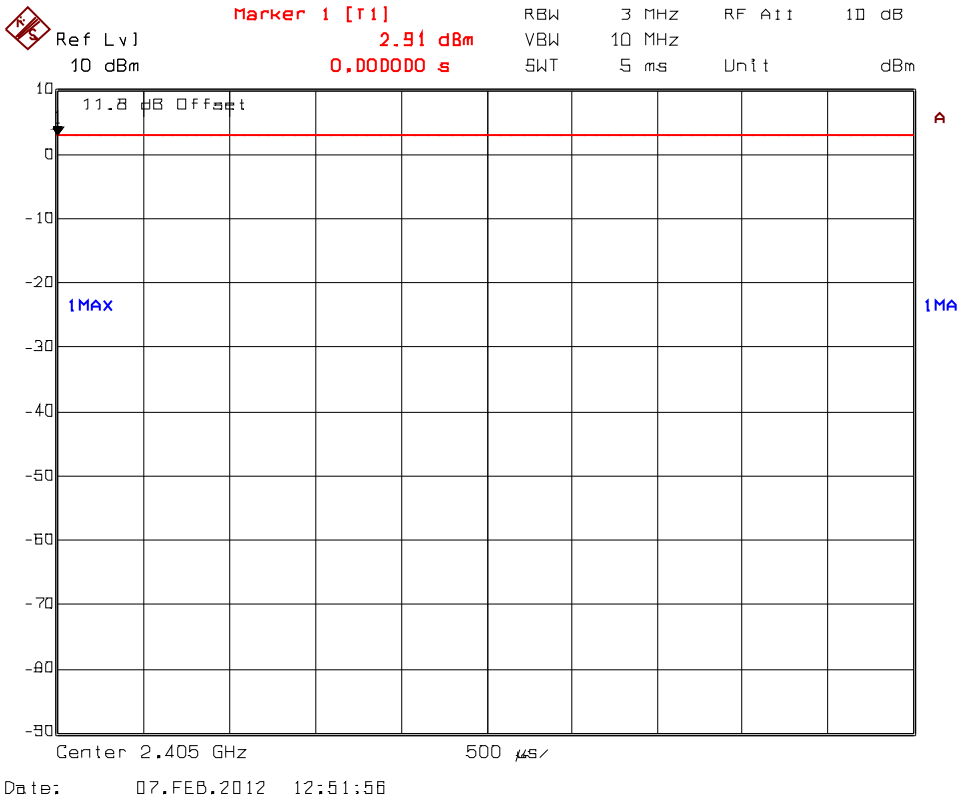
Transceiver # 2:

Channel	Frequency (MHz)	Modulation	Peak Conducted Power (dBm)	Peak Cond. Power Limit (dBm)	Peak (Note 1) EIRP (dBm)	EIRP Limit (dBm)
Low	2405	O-QPSK	-18.99	30	-9.99	36
Mid	2440	O-QPSK	-19.26	30	-10.26	36
High	2480	O-QPSK	-19.26	30	-10.26	36

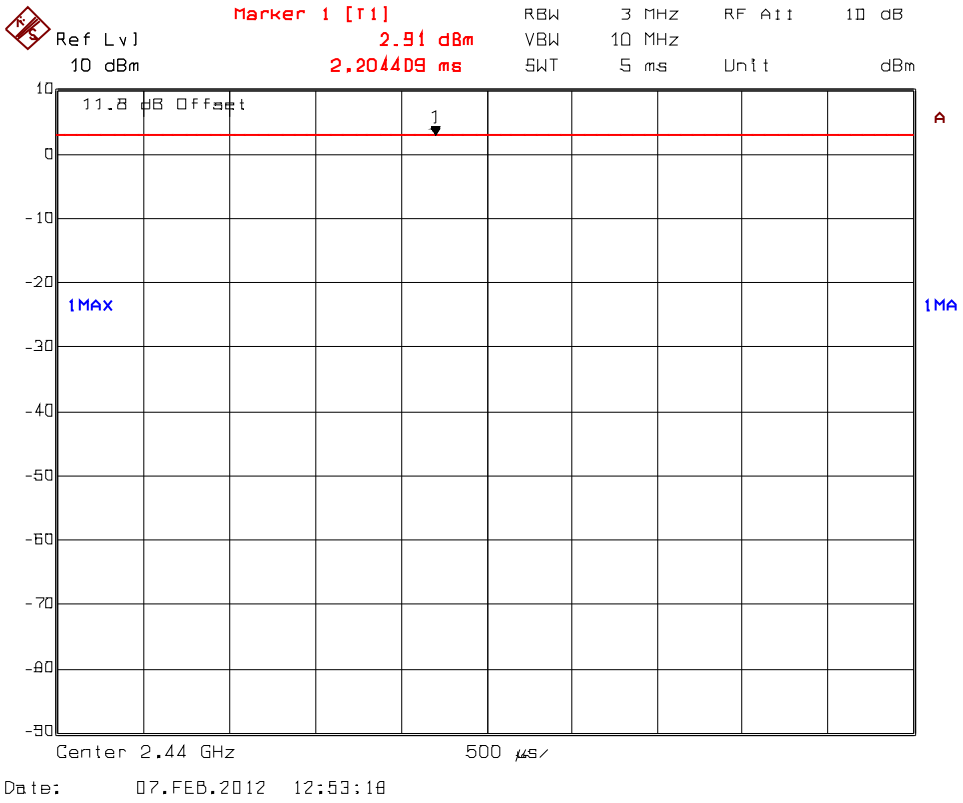
Note 1: The Peak EIRP is calculated as the sum of Peak Conducted Power in dBm and maximum antenna gain using 9dBi gain for dipole antenna as worst case of measurement. Cable Loss of sample 28cm long U-FL-SMA pigtail cable is 0.82dB.

See the following plots for detailed measurements.

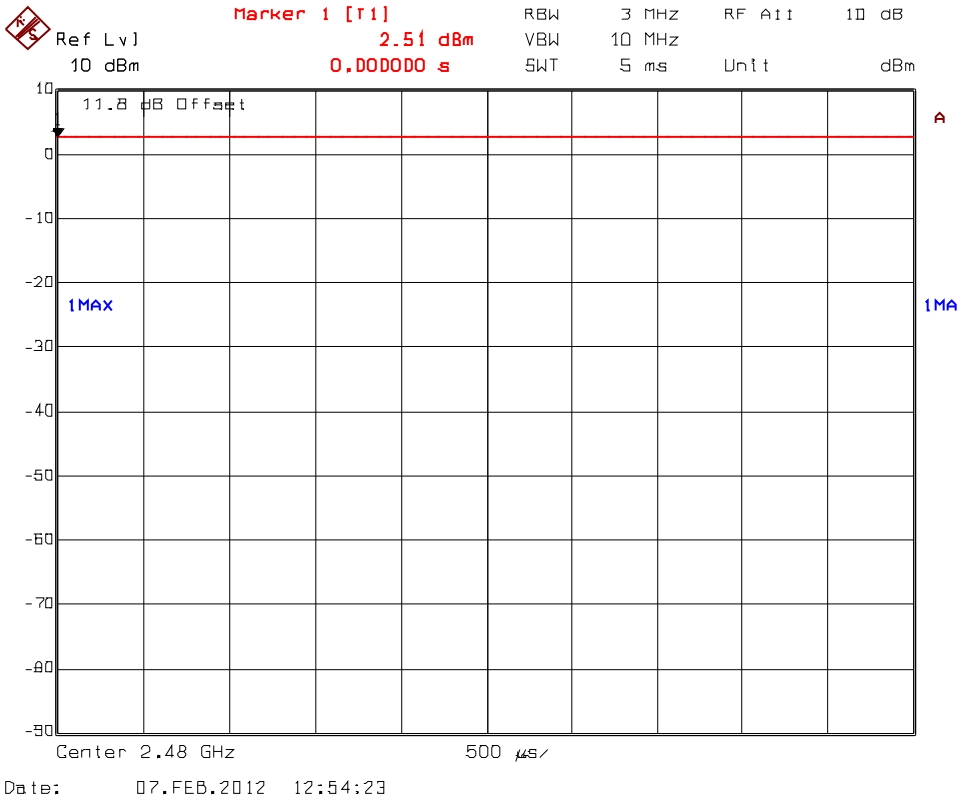
Plot 5.8.4.1. Maximum Peak Conducted Output Power, High Power Setting
Test Frequency: 2405 MHz, , Transceiver 1



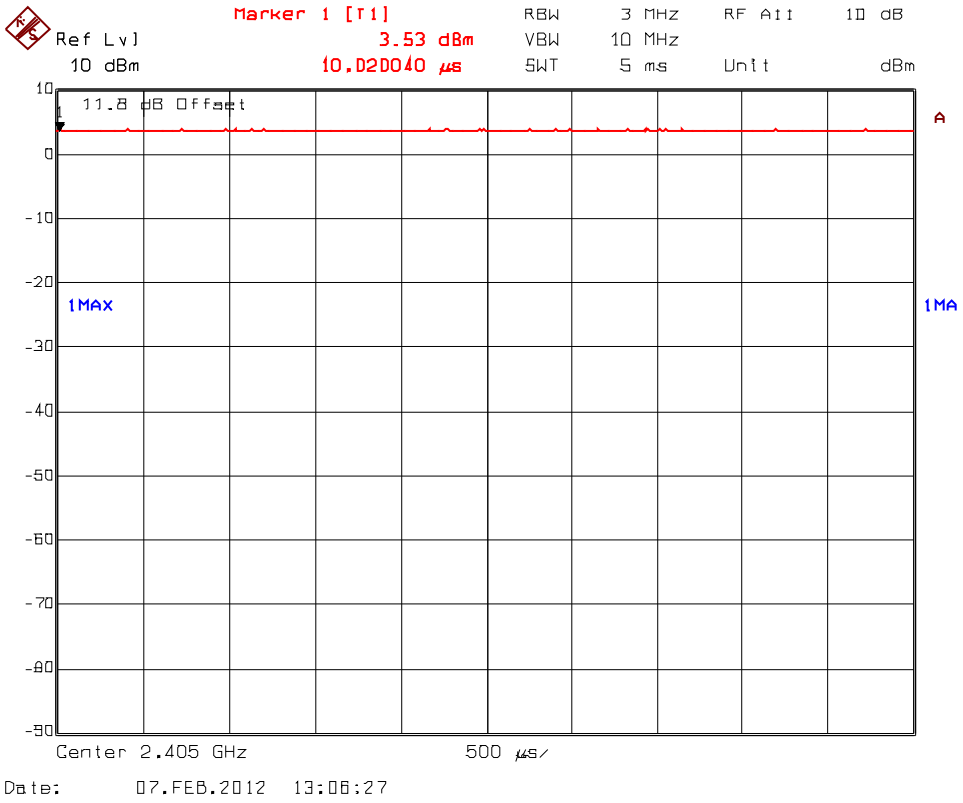
Plot 5.8.4.2. Maximum Peak Conducted Output Power, High Power Setting
Test Frequency: 2440 MHz, , Transceiver 1



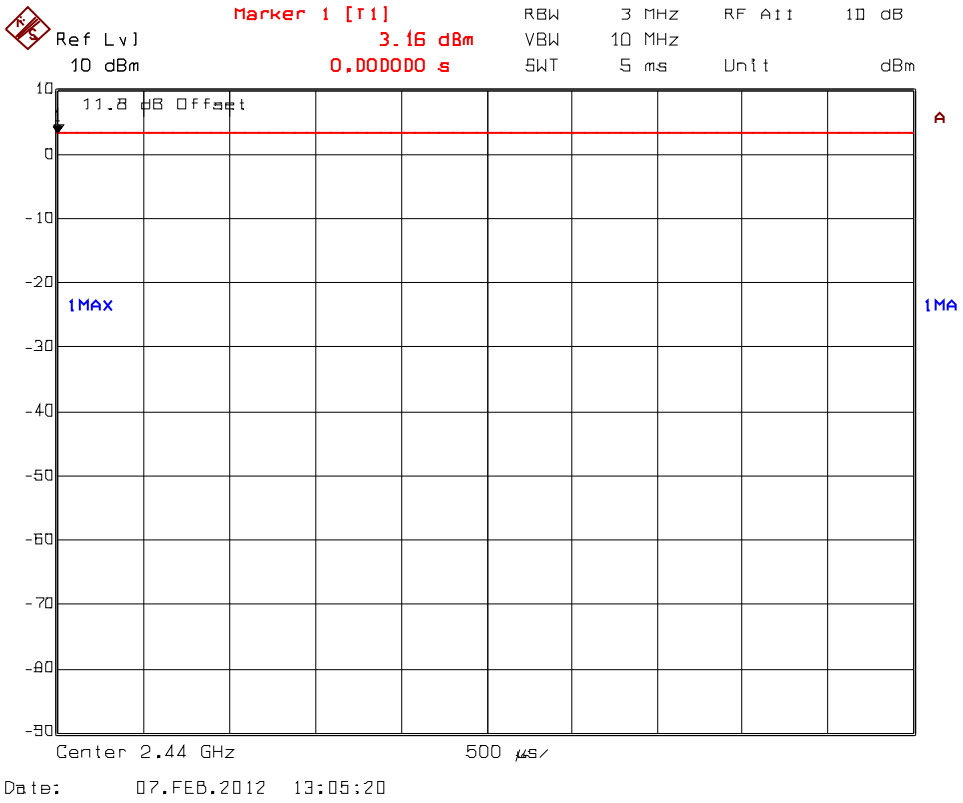
Plot 5.8.4.3. Maximum Peak Conducted Output Power, High Power Setting
Test Frequency: 2480 MHz, , Transceiver 1



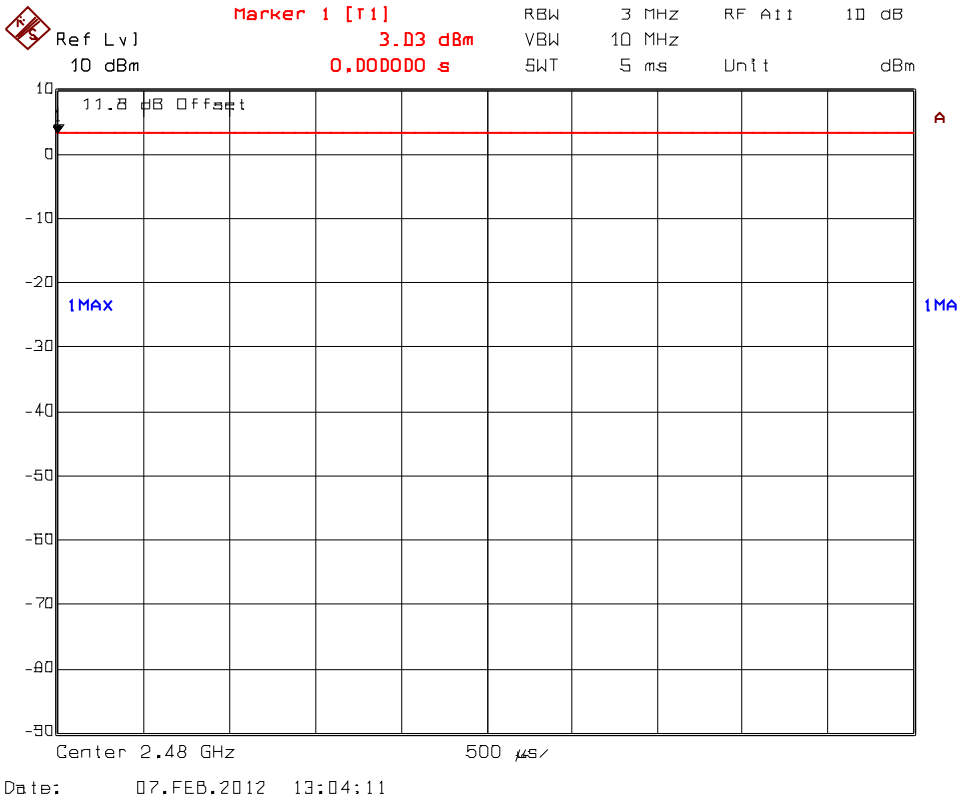
Plot 5.8.4.4. Maximum Peak Conducted Output Power, High Power Setting
Test Frequency: 2405 MHz, , Transceiver 2



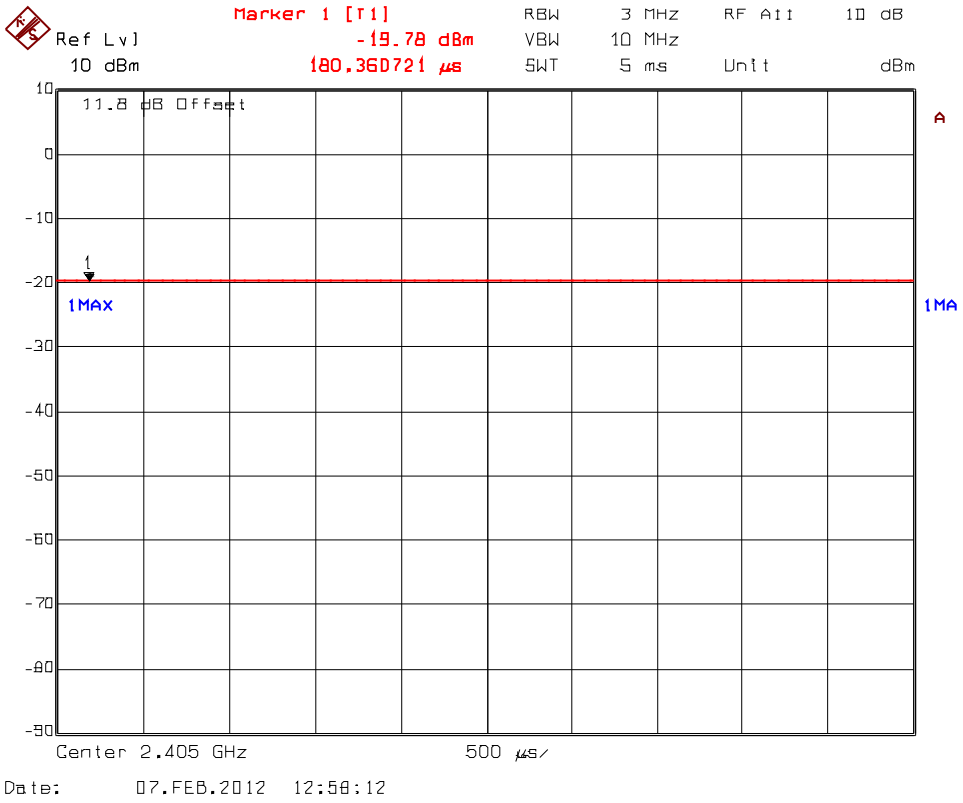
Plot 5.8.4.5. Maximum Peak Conducted Output Power, High Power Setting
Test Frequency: 2440 MHz, , Transceiver 2



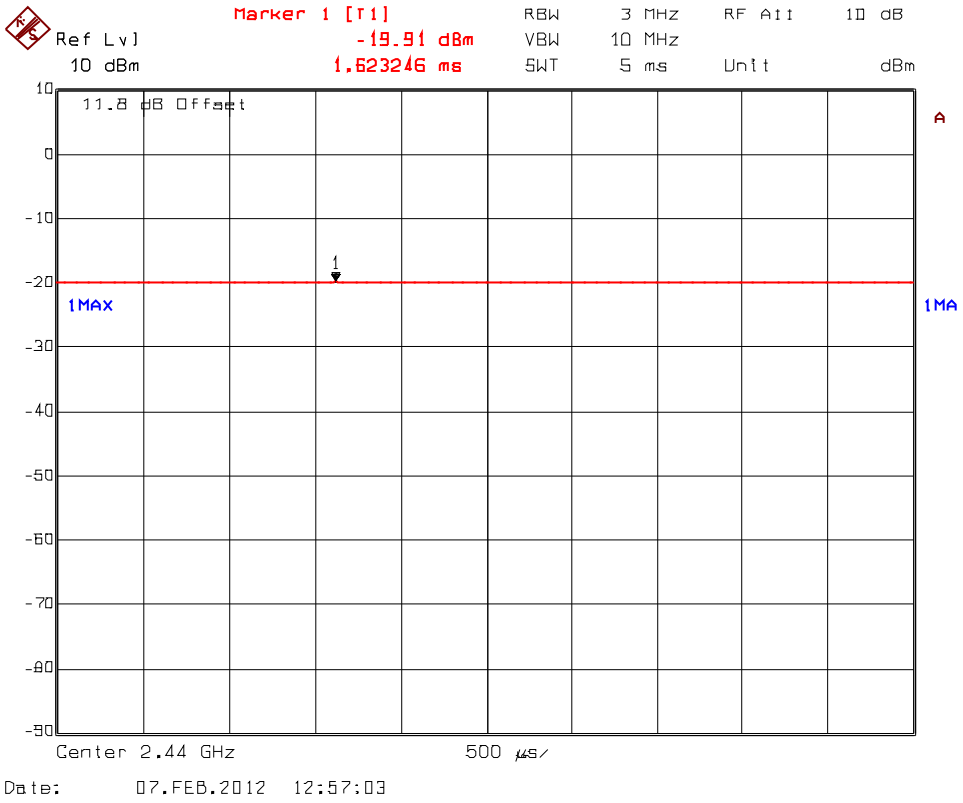
Plot 5.8.4.6. Maximum Peak Conducted Output Power, High Power Setting
Test Frequency: 2480 MHz, Transceiver 2



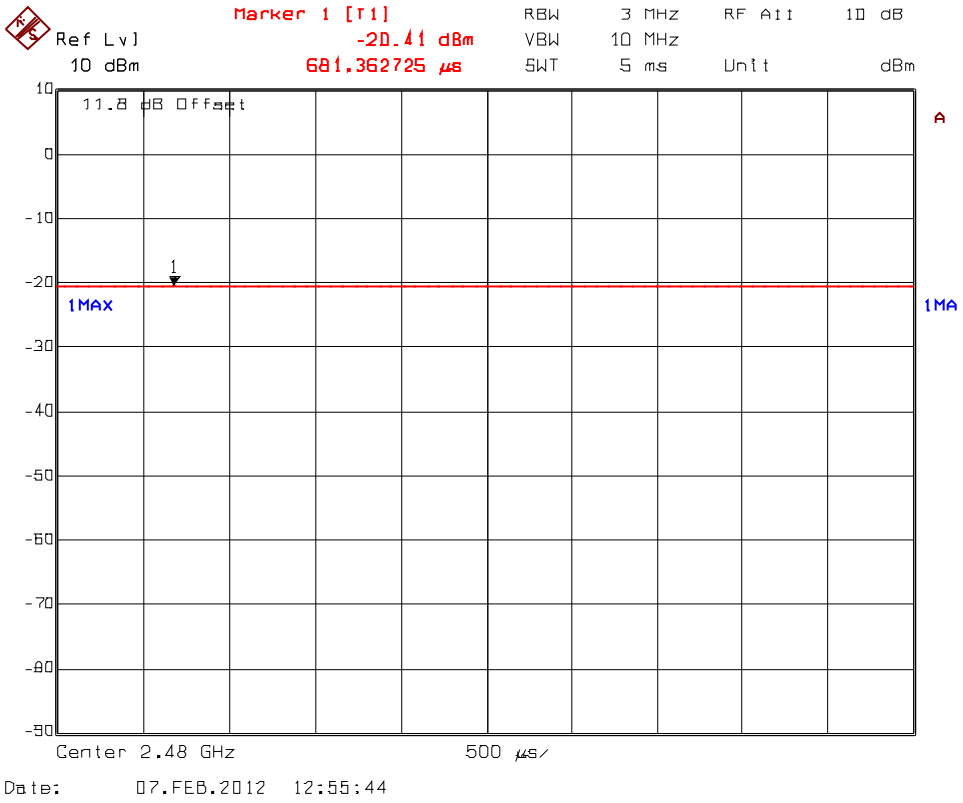
Plot 5.8.4.7. Maximum Peak Conducted Output Power, Low Power Setting
Test Frequency: 2405 MHz, Transceiver 1



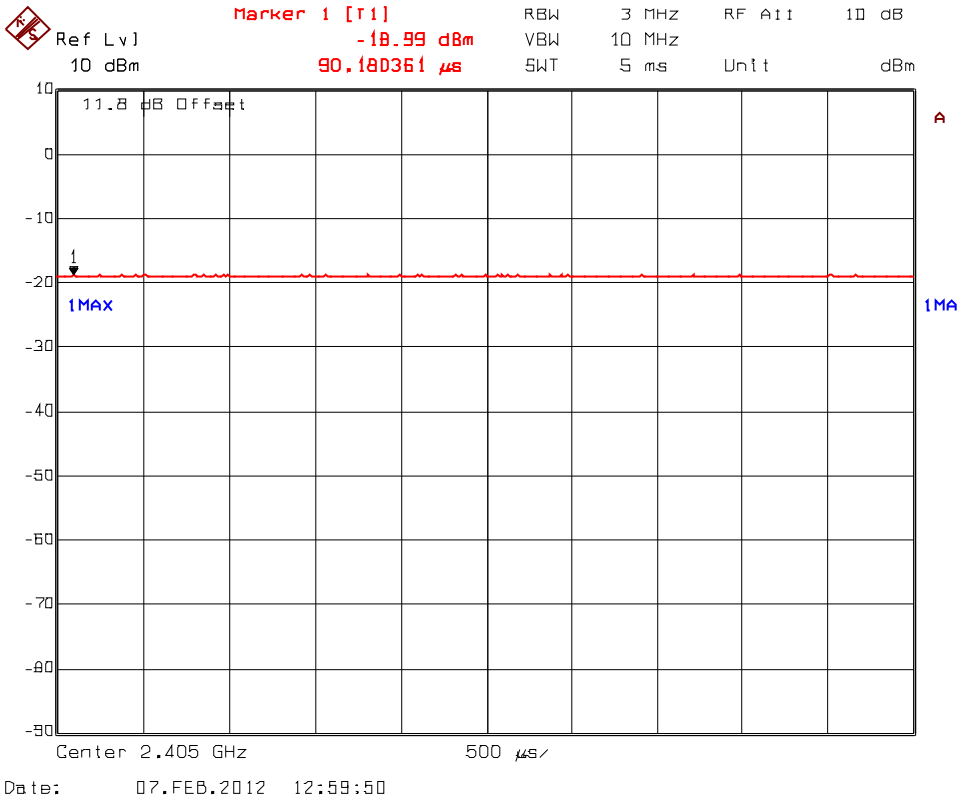
Plot 5.8.4.8. Maximum Peak Conducted Output Power, Low Power Setting
Test Frequency: 2440 MHz, Transceiver 1



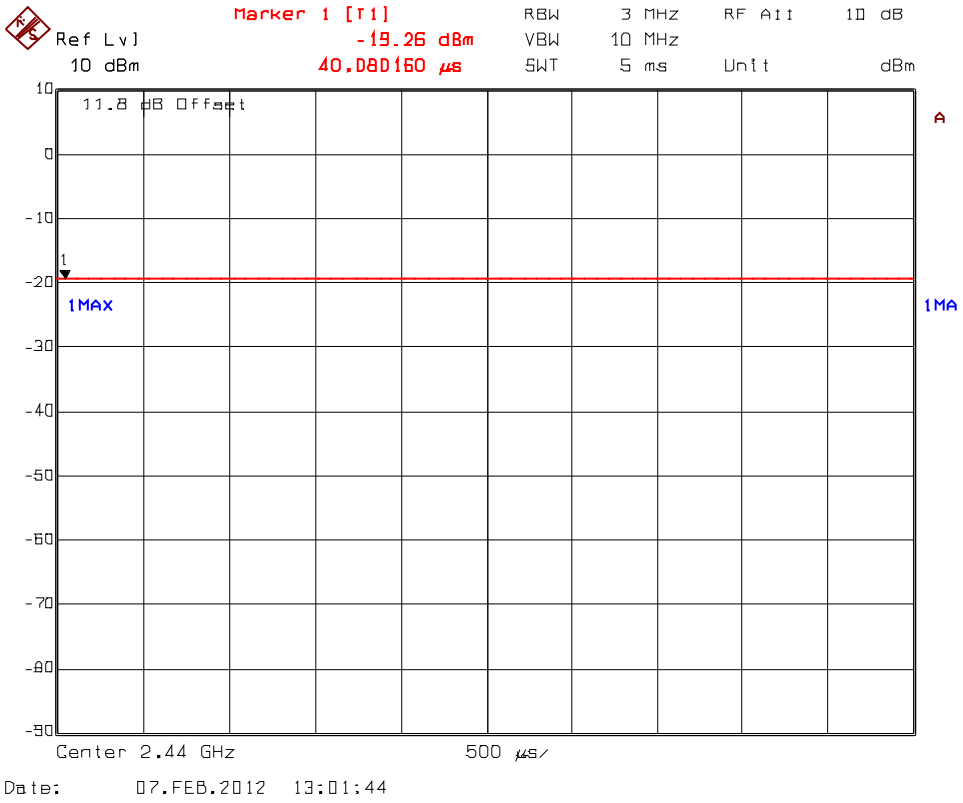
Plot 5.8.4.9. Maximum Peak Conducted Output Power, Low Power Setting
Test Frequency: 2480 MHz, Transceiver 1



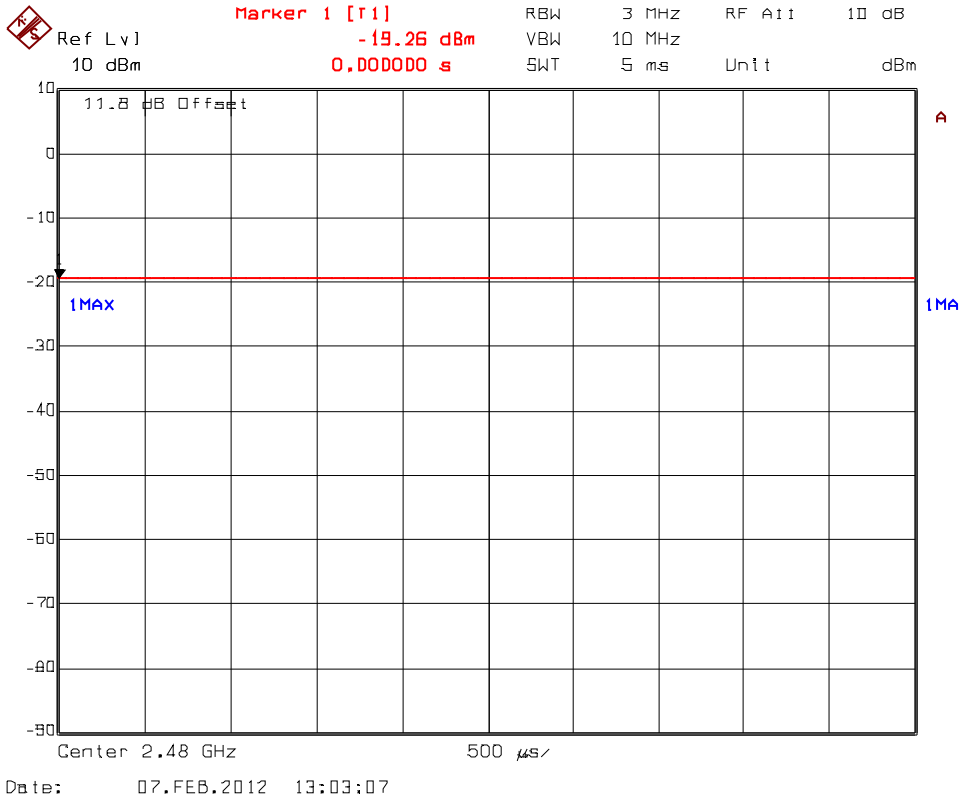
Plot 5.8.4.10. Maximum Peak Conducted Output Power, Low Power Setting
Test Frequency: 2405 MHz, Transceiver 2



Plot 5.8.4.11. Maximum Peak Conducted Output Power, Low Power Setting
Test Frequency: 2440 MHz, Transceiver 2



Plot 5.8.4.12. Maximum Peak Conducted Output Power, Low Power Setting
Test Frequency: 2480 MHz, , Transceiver 2



5.9. TRANSMITTER BAND-EDGE & SPURIOUS CONDUCTED EMISSIONS [§ 15.247(d)]

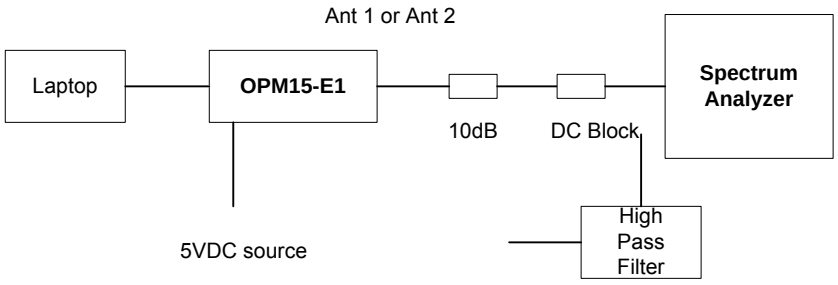
5.9.1. Limit(s)

§ 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.9.2. Method of Measurements

KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247), Section 5.4.1 Band-Edge Conducted Emissions.

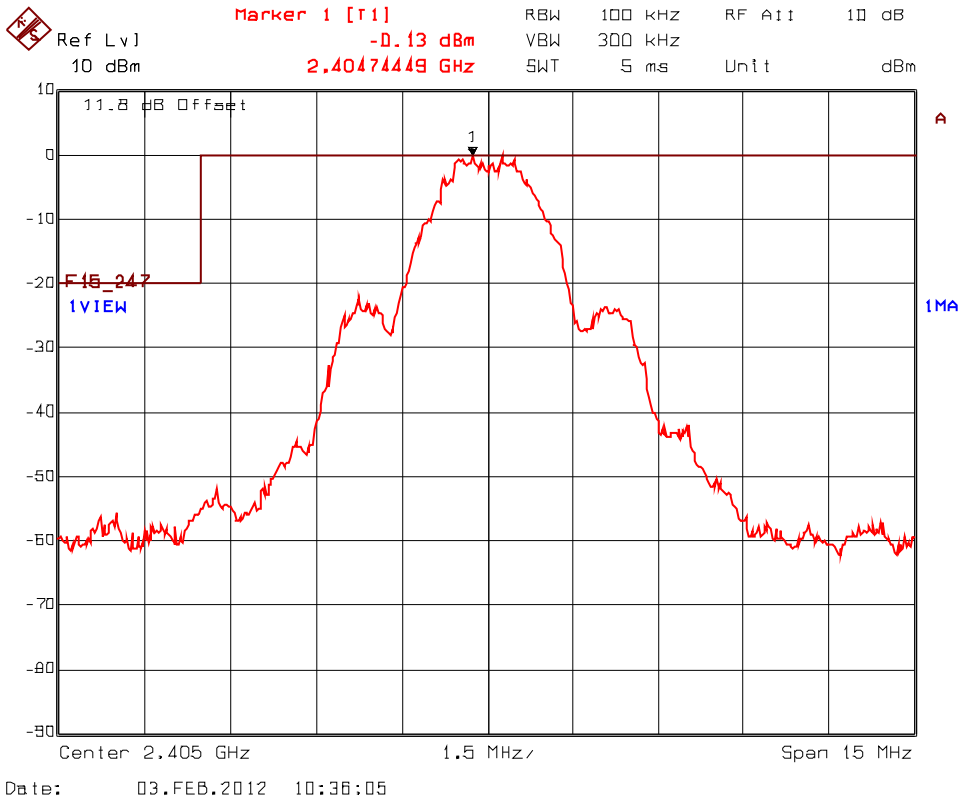
5.9.3. Test Arrangement



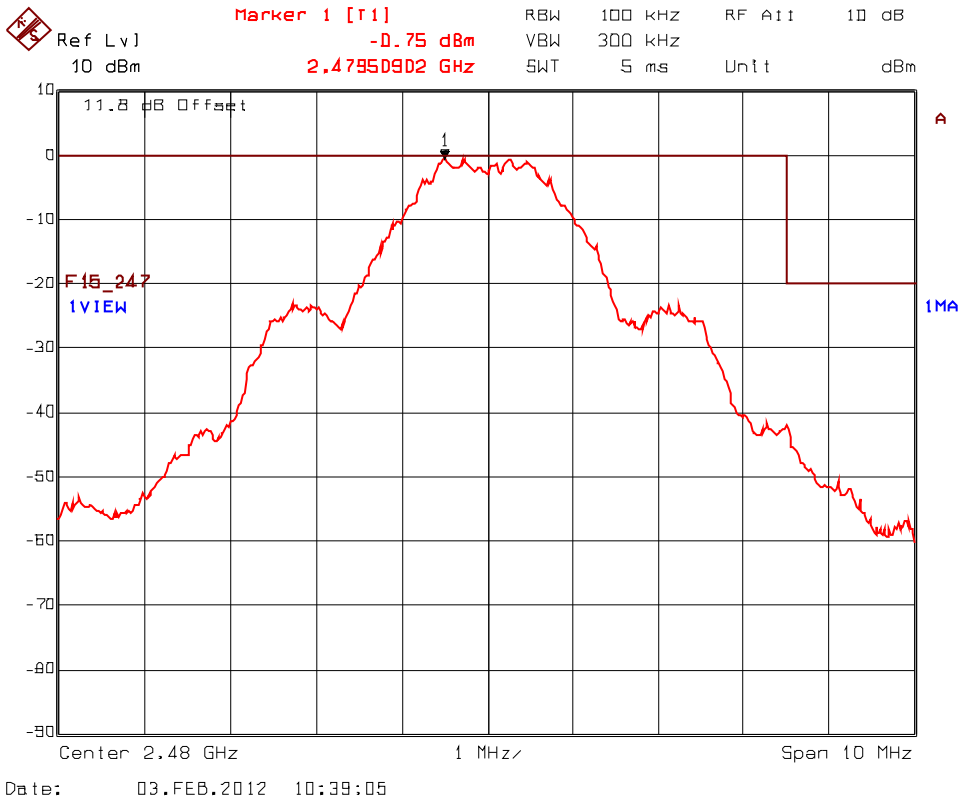
5.9.4. Test Data

5.9.4.1. Band-Edge RF Conducted Emissions

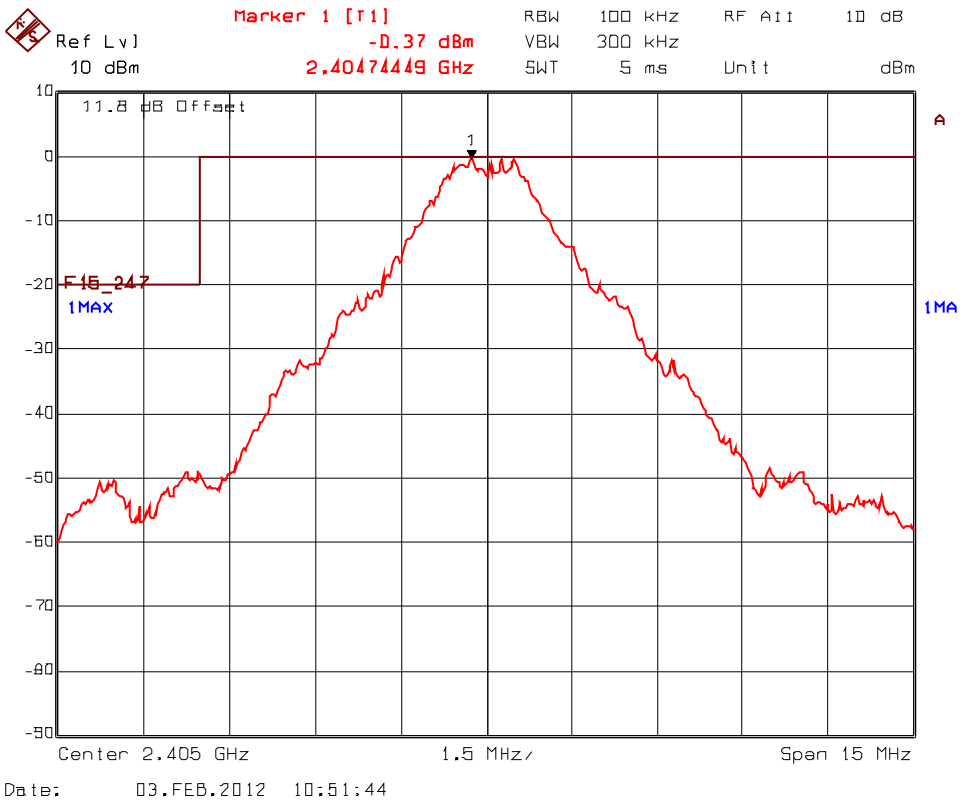
Plot 5.9.4.1.1. Band-Edge RF Conducted Emissions, Transceiver 1
Low End of Frequency Band (2405 MHz)



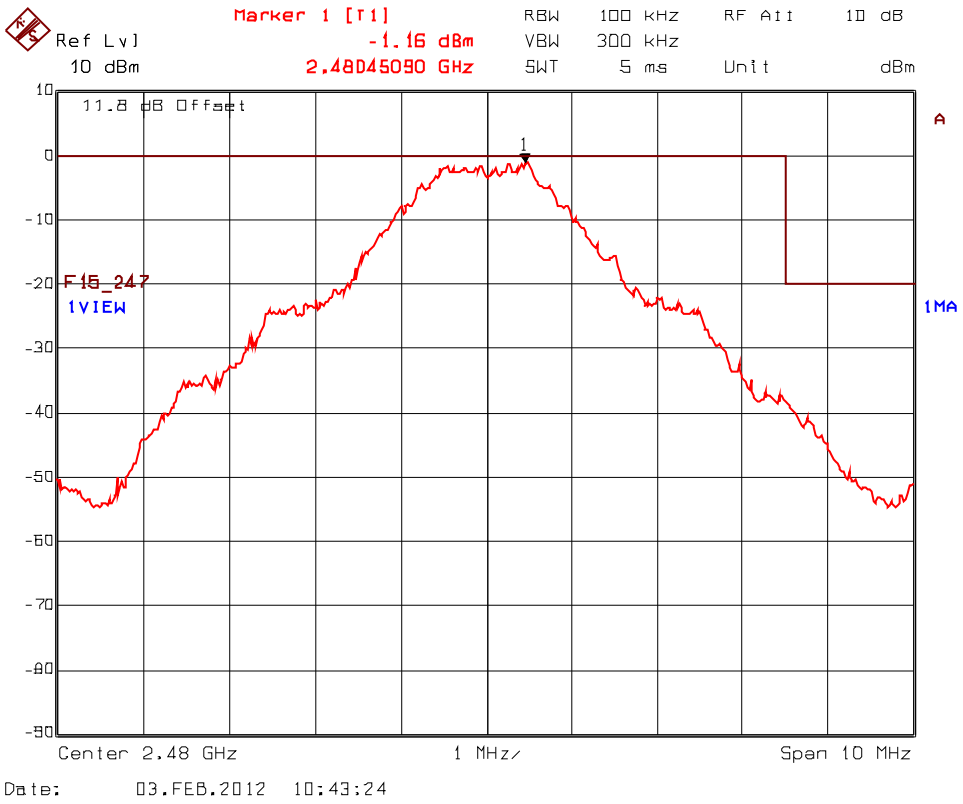
Plot 5.9.4.1.2. Band-Edge RF Conducted Emissions, Transceiver 1
High End of Frequency Band (2480 MHz)



Plot 5.9.4.1.3. Band-Edge RF Conducted Emissions, Transceiver 2
Low End of Frequency Band (2405 MHz)

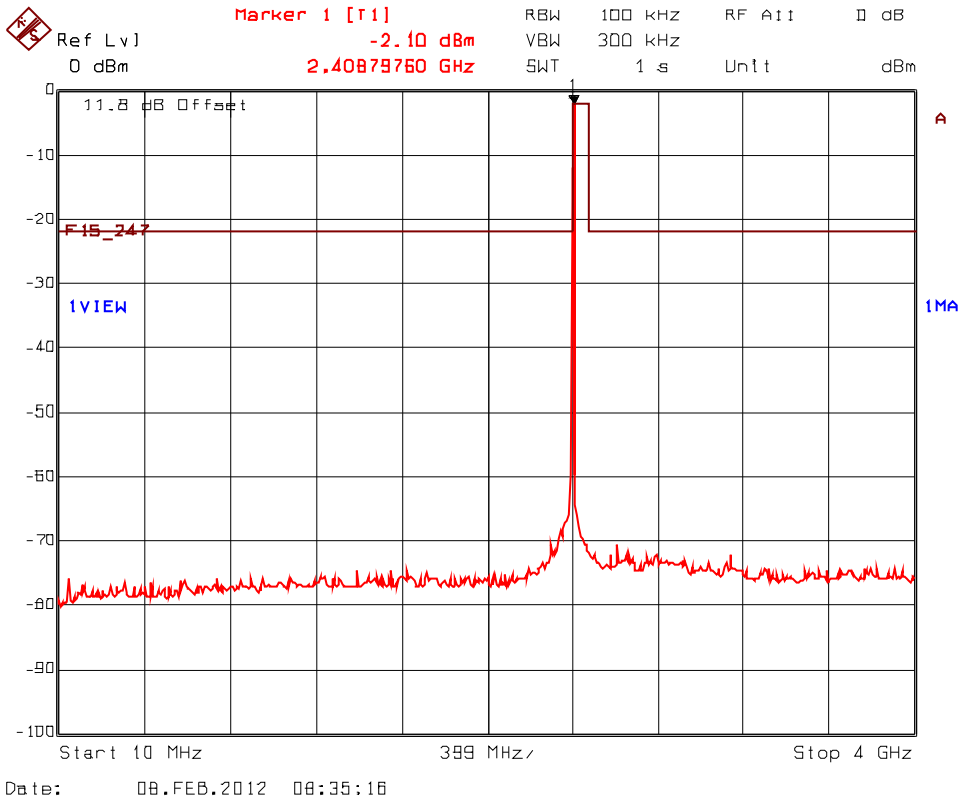


Plot 5.9.4.1.4. Band-Edge RF Conducted Emissions, Transceiver 2
High End of Frequency Band (2480 MHz)

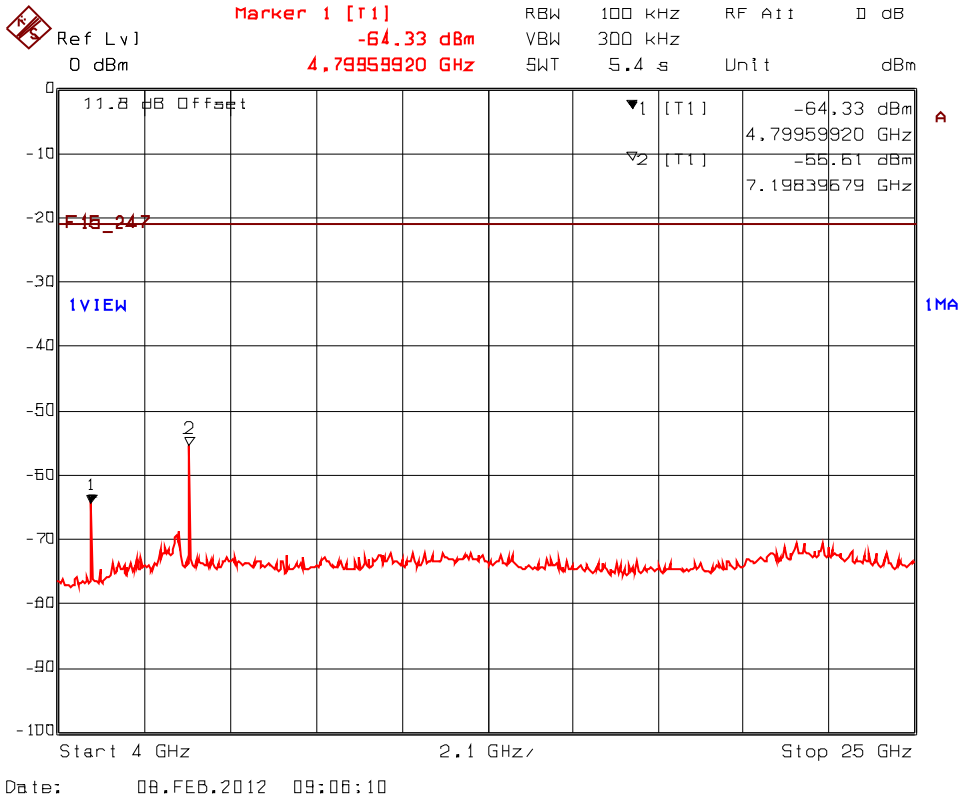


5.9.4.2. Spurious RF Conducted Emissions into Non-Restricted Bands

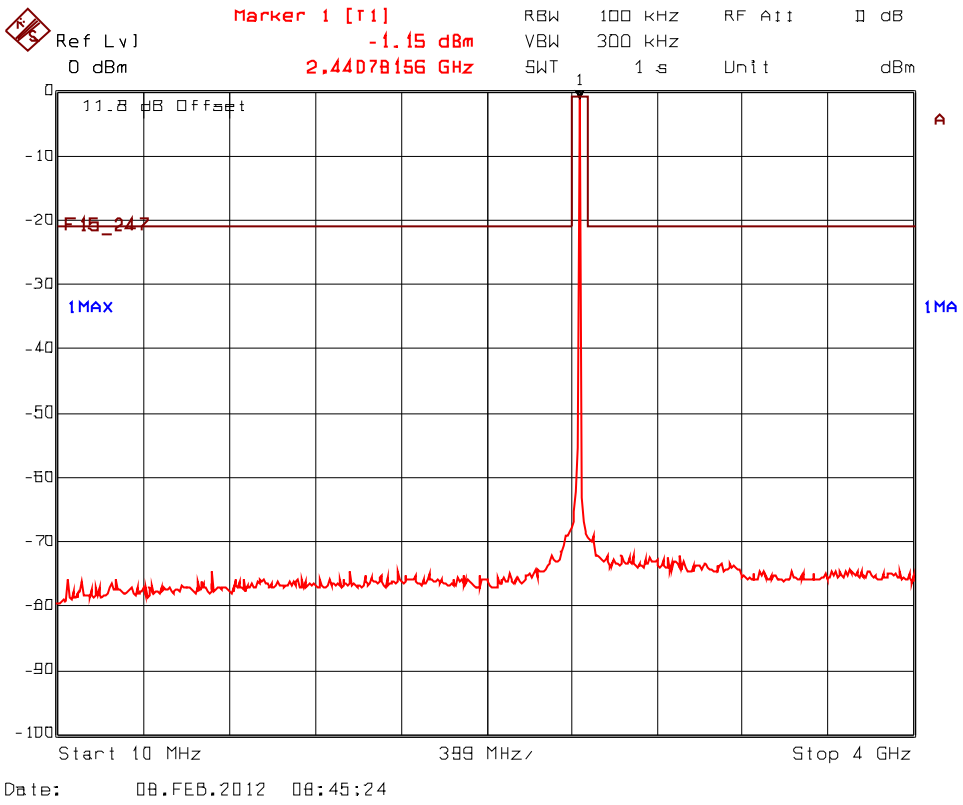
Plot 5.9.4.2.1. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 1
2405 MHz, High Power, 10 MHz – 4.0 GHz



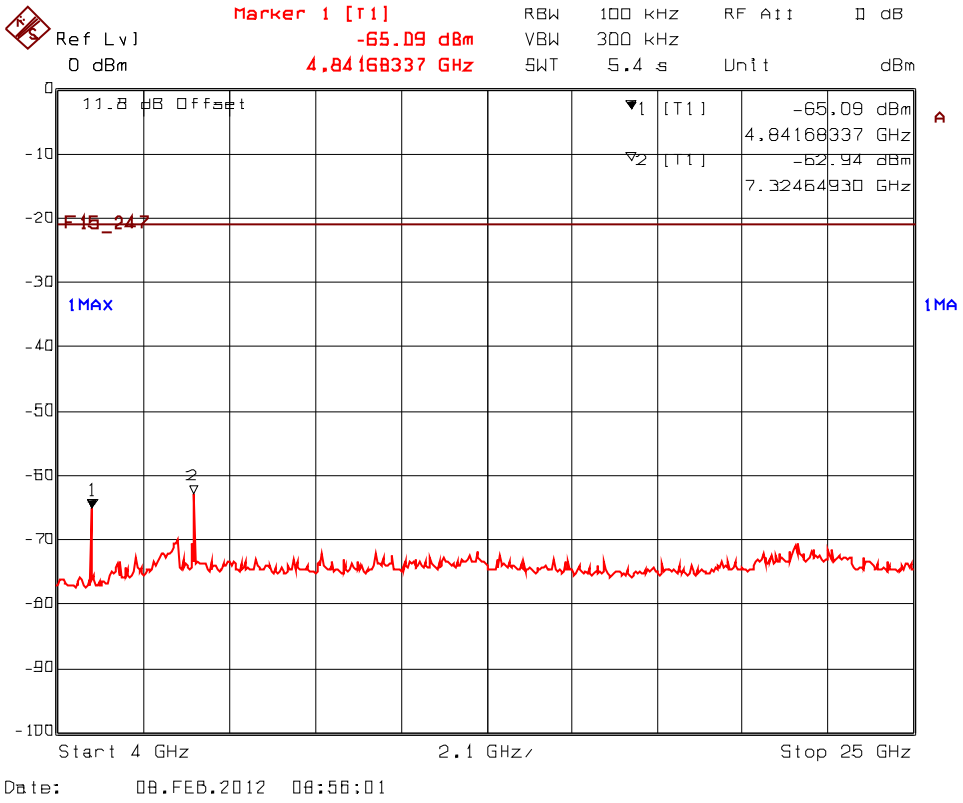
Plot 5.9.4.2.2. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 1
2405 MHz, High Power, 4.0 GHz – 25 GHz



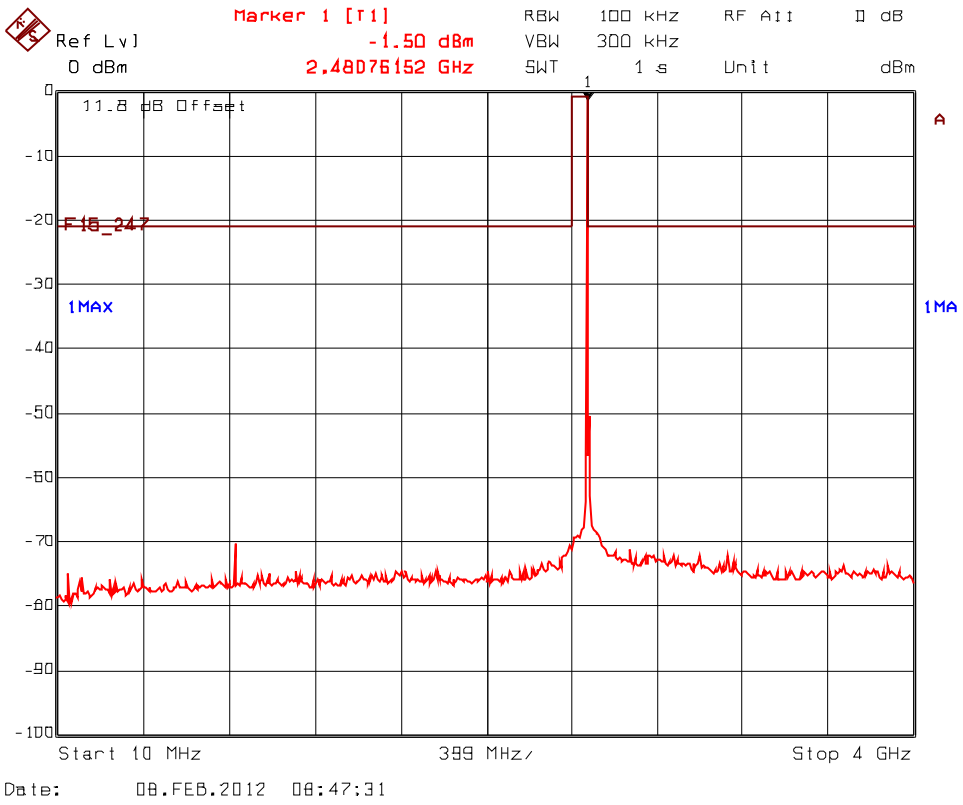
Plot 5.9.4.2.3. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 1
2440 MHz, High Power, 10 MHz – 4.0 GHz



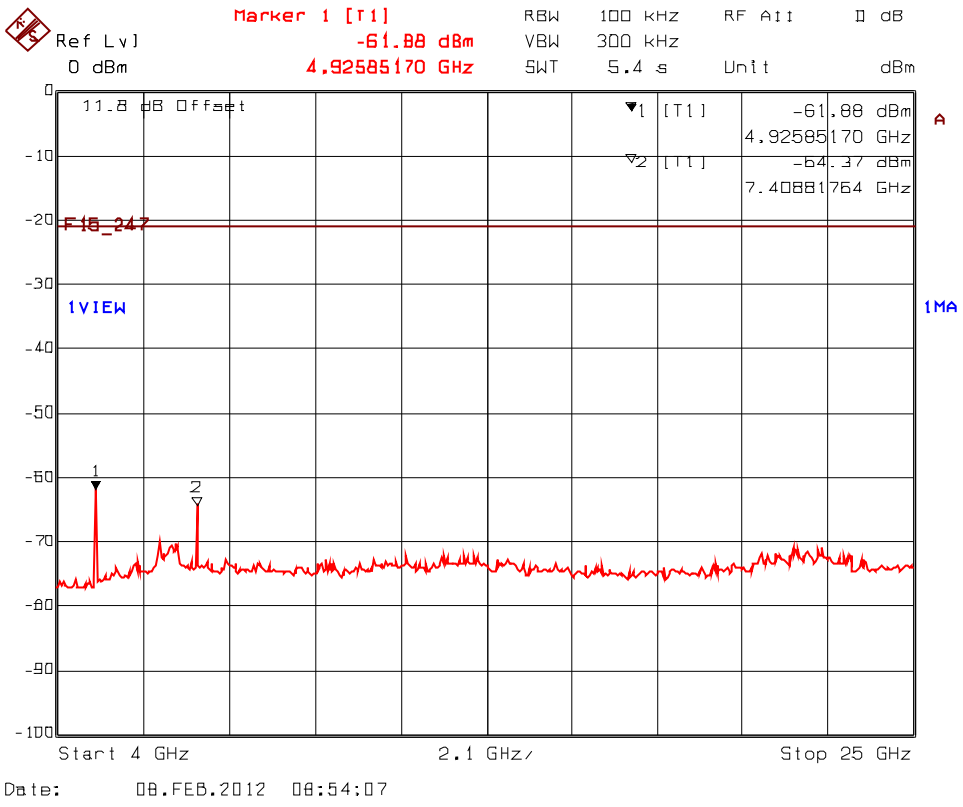
Plot 5.9.4.2.4. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 1
2440 MHz, High Power, 4.0 GHz – 25 GHz



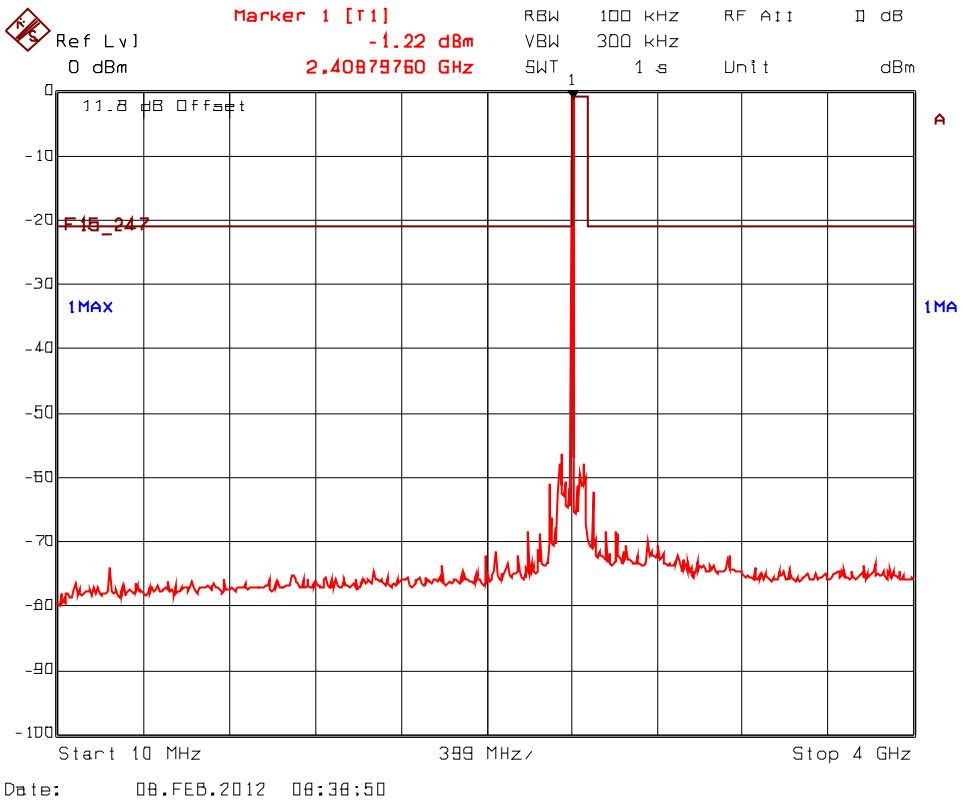
Plot 5.9.4.2.5. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 1
2480 MHz, High Power, 10 MHz – 4.0 GHz



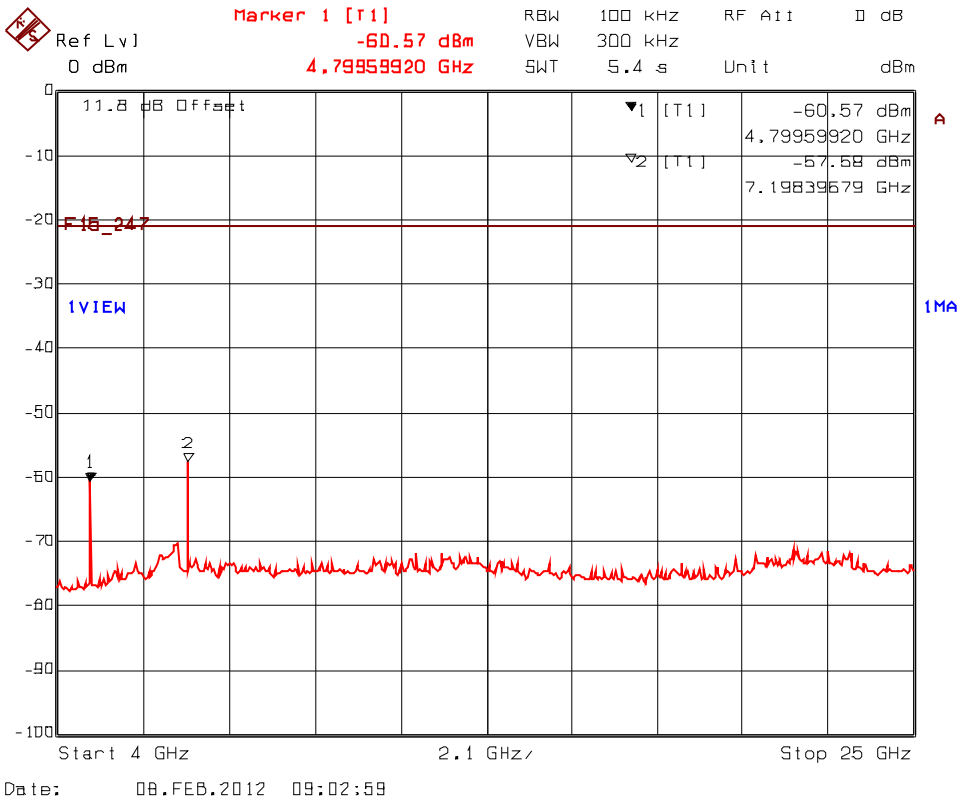
Plot 5.9.4.2.6. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 1
2480 MHz, High Power, 4.0 GHz – 25 GHz



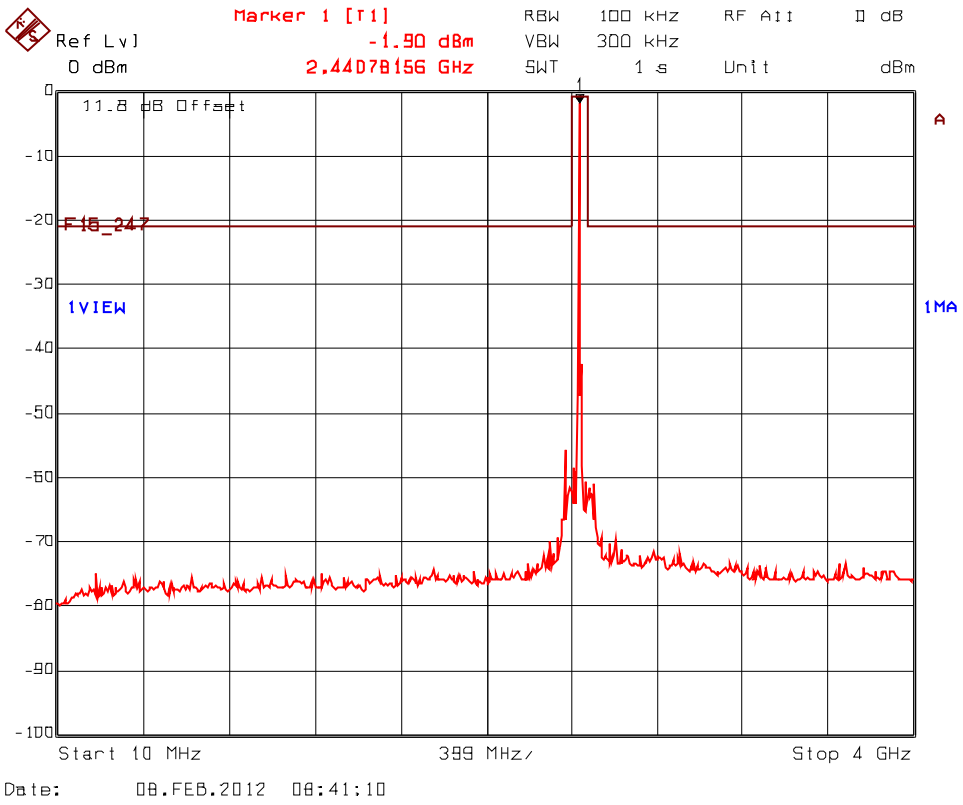
Plot 5.9.4.2.7. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 2
2405 MHz, High Power, 10 MHz – 4.0 GHz



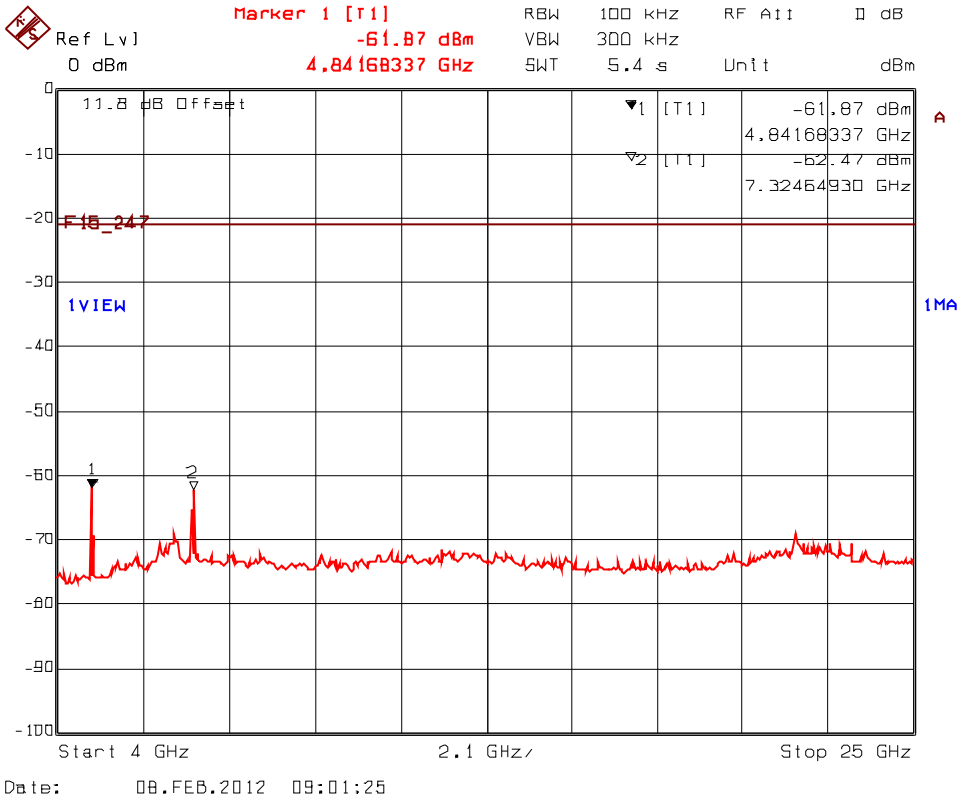
Plot 5.9.4.2.8. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 2
2405 MHz, High Power, 4.0 GHz – 25 GHz



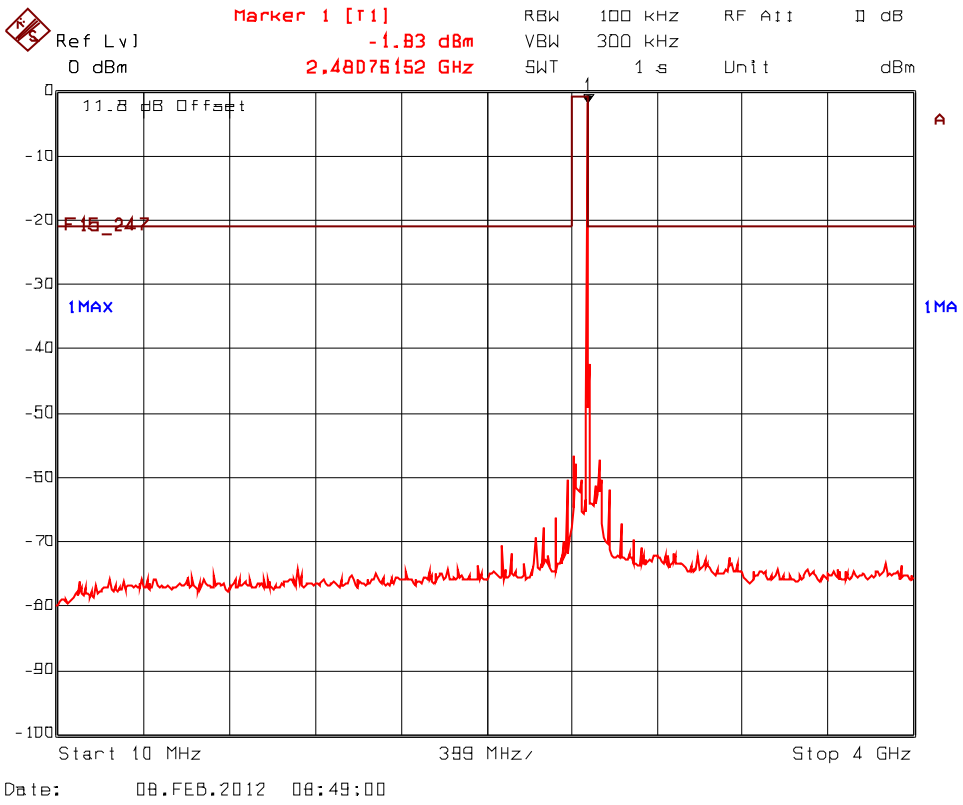
Plot 5.9.4.2.9. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 2
2440 MHz, High Power, 10 MHz – 4.0 GHz



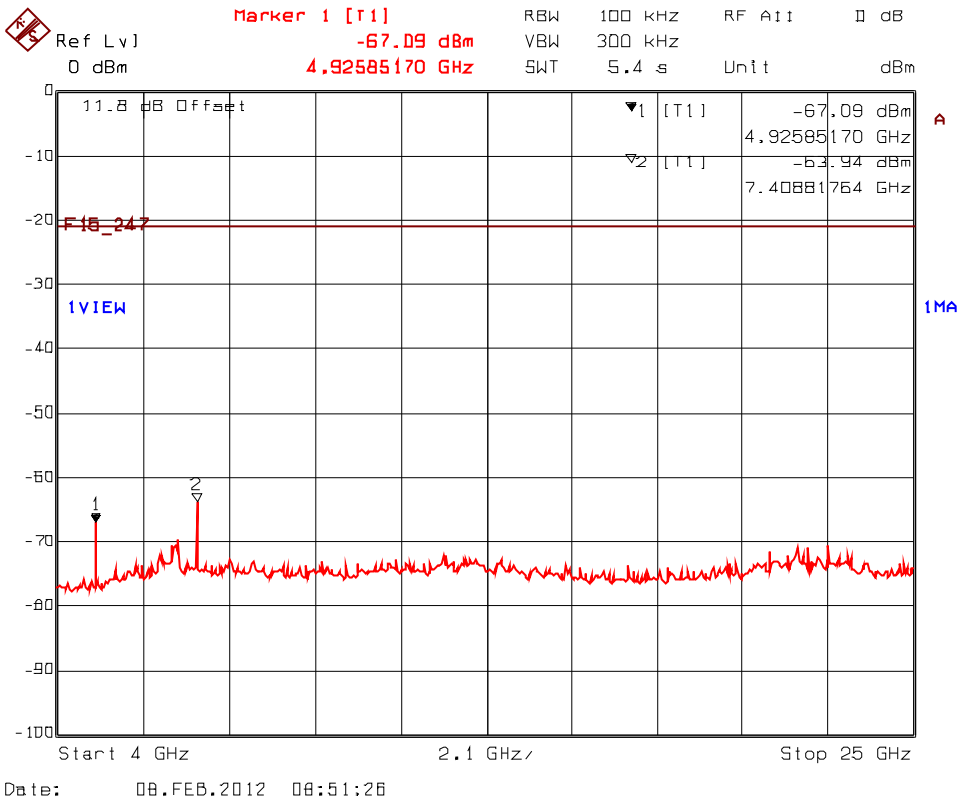
Plot 5.9.4.2.10. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 2
2440 MHz, High Power, 4.0 GHz – 25 GHz



Plot 5.9.4.2.11. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 2
2480 MHz, High Power, 10 MHz – 4.0 GHz

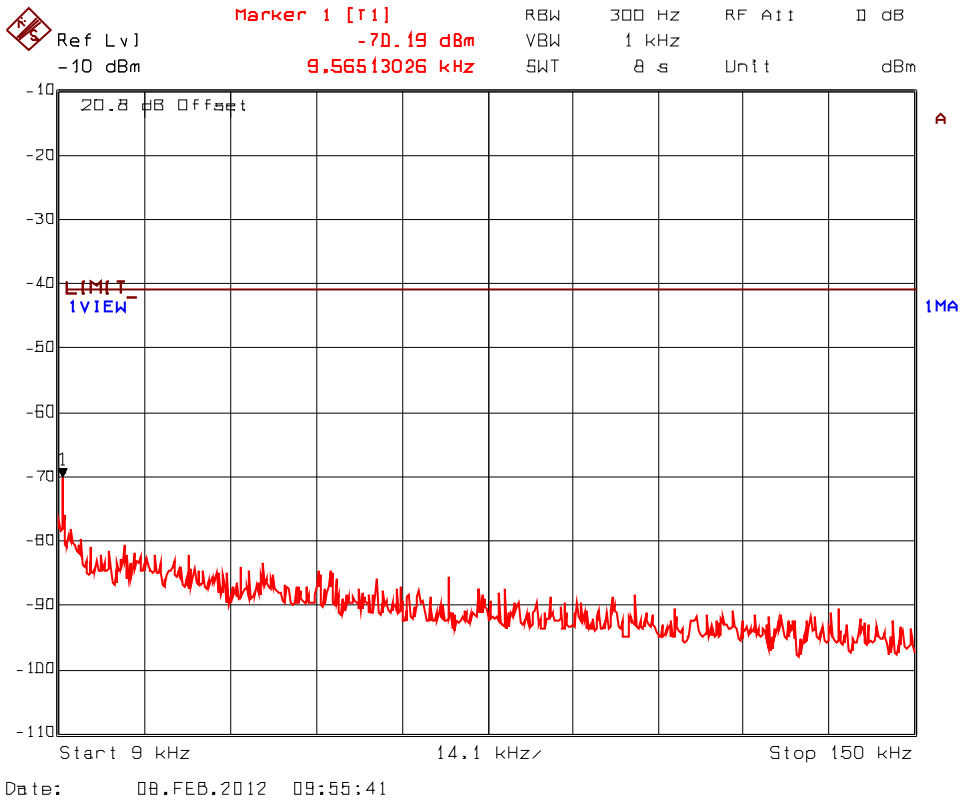


Plot 5.9.4.2.12. Spurious RF Conducted Emissions into Non-Restricted Bands, Transceiver 2
2480 MHz, High Power, 4.0 GHz – 25 GHz

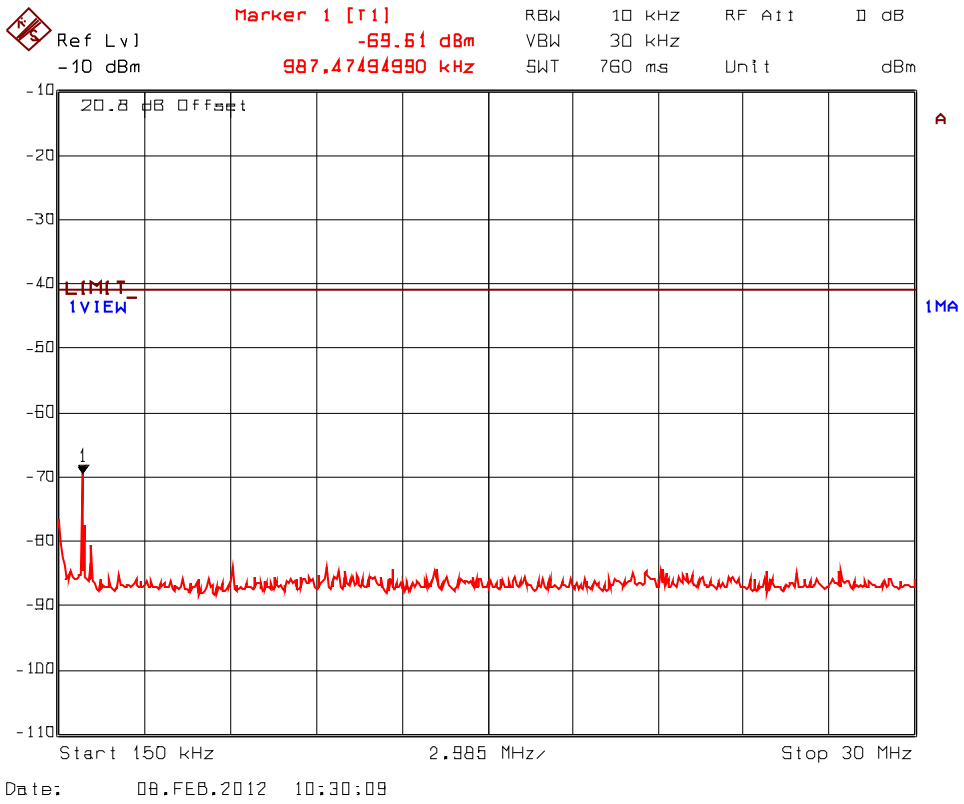


5.9.4.3. Spurious RF Conducted Emissions into Restricted Frequency Bands (Limit -41.2dBm EIRP in Restricted Band)

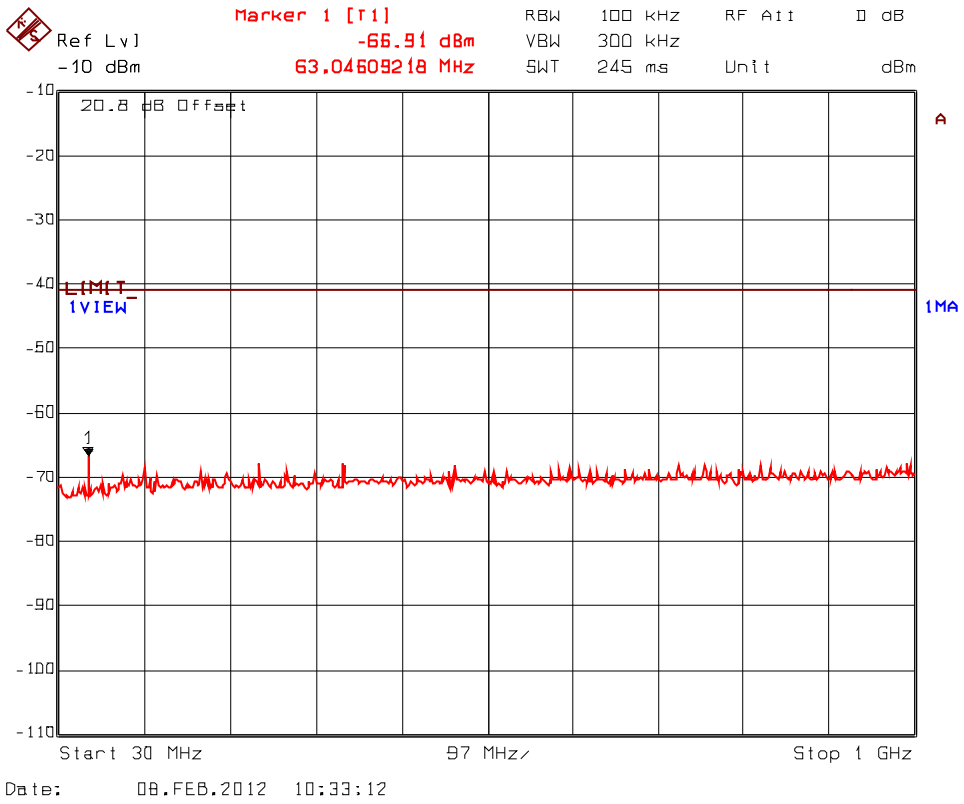
Plot 5.9.4.3.1. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2405 MHz, High Power, 9 kHz – 150 kHz



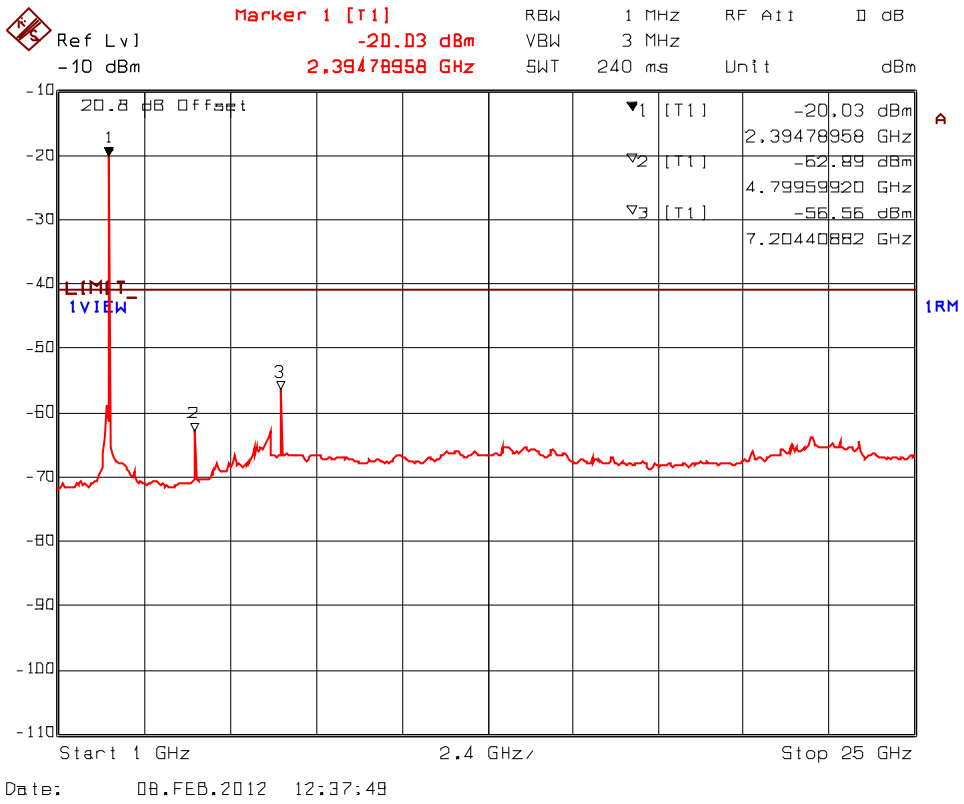
Plot 5.9.4.3.2. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2405 MHz, High Power, 150 kHz – 30 MHz



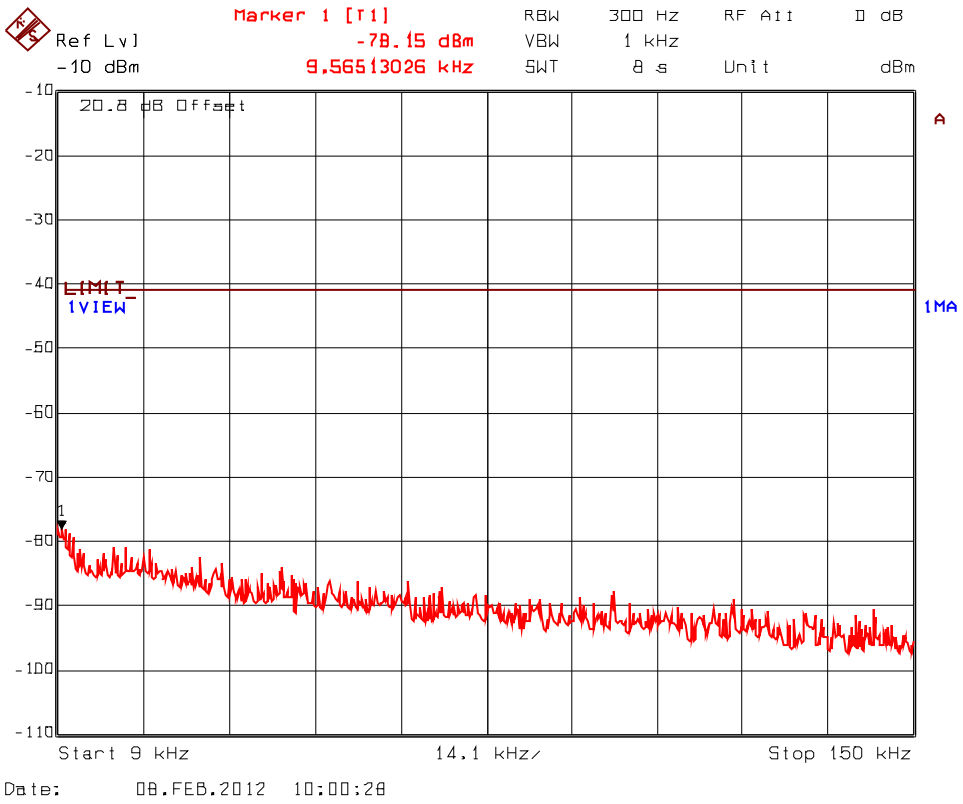
Plot 5.9.4.3.3. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2405 MHz, High Power, 30 MHz – 1.0 GHz



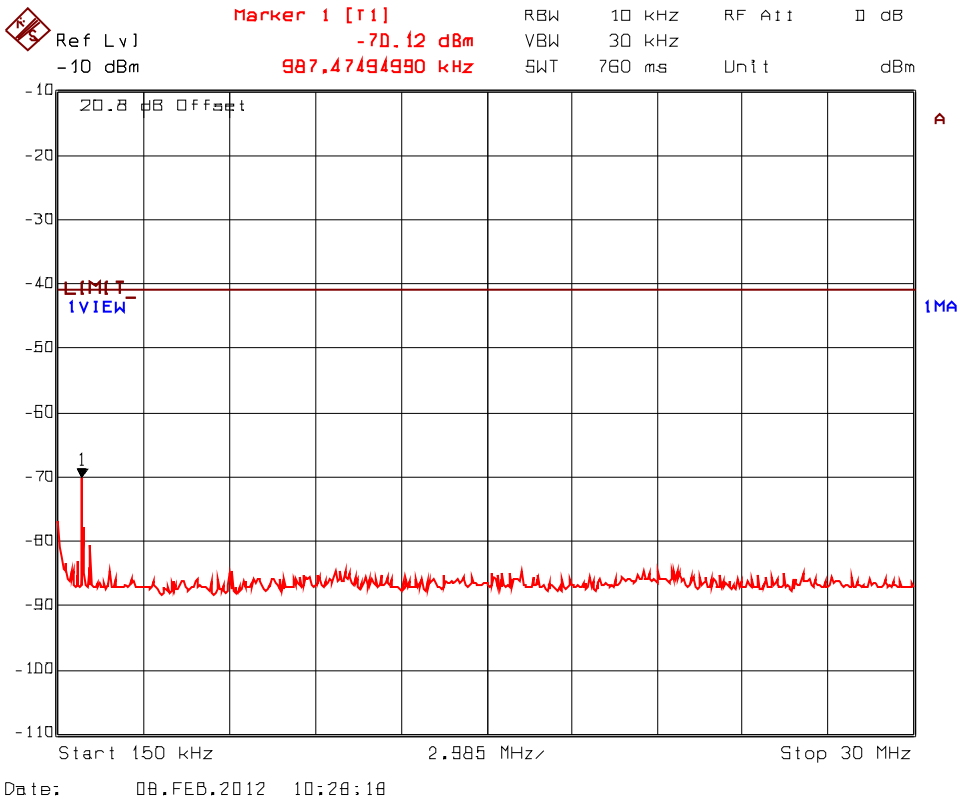
Plot 5.9.4.3.4. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2405 MHz, High Power, 1.0 GHz – 25 GHz



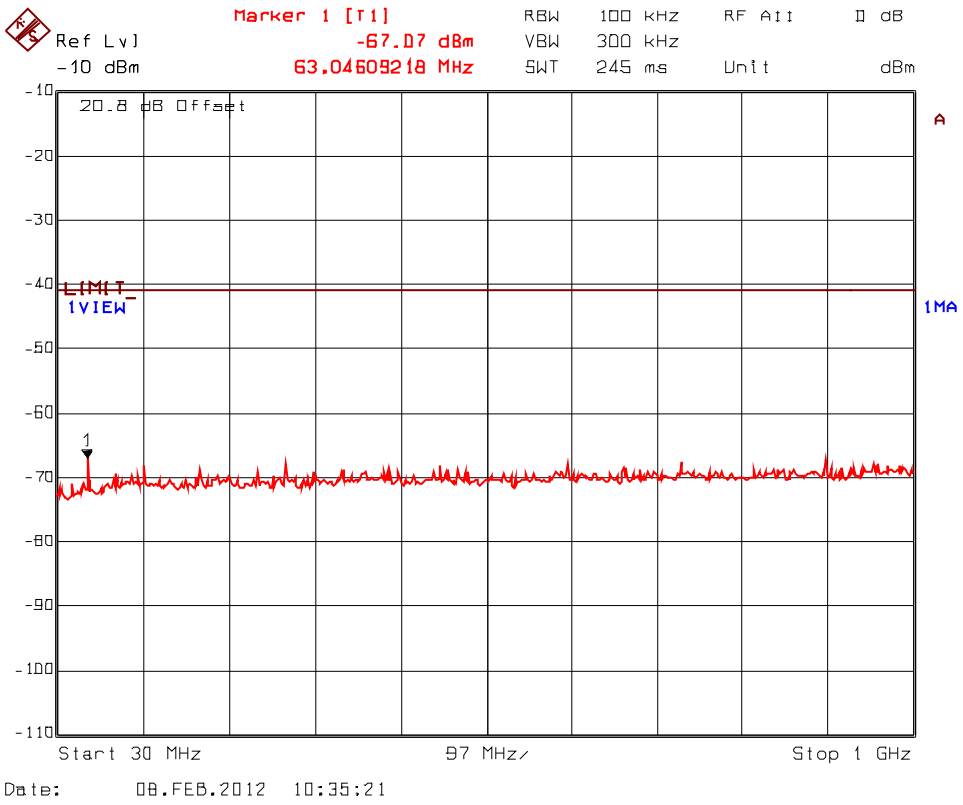
Plot 5.9.4.3.5. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2440 MHz, High Power, 9 kHz – 150 kHz



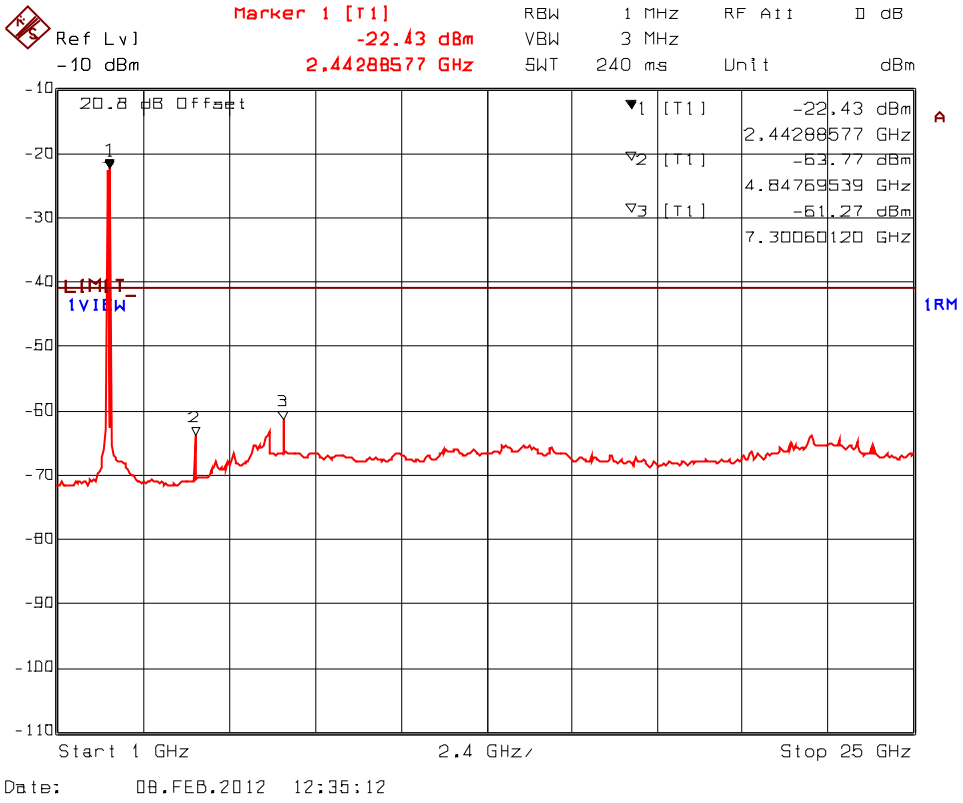
Plot 5.9.4.3.6. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2440 MHz, High Power, 150 kHz – 30 MHz



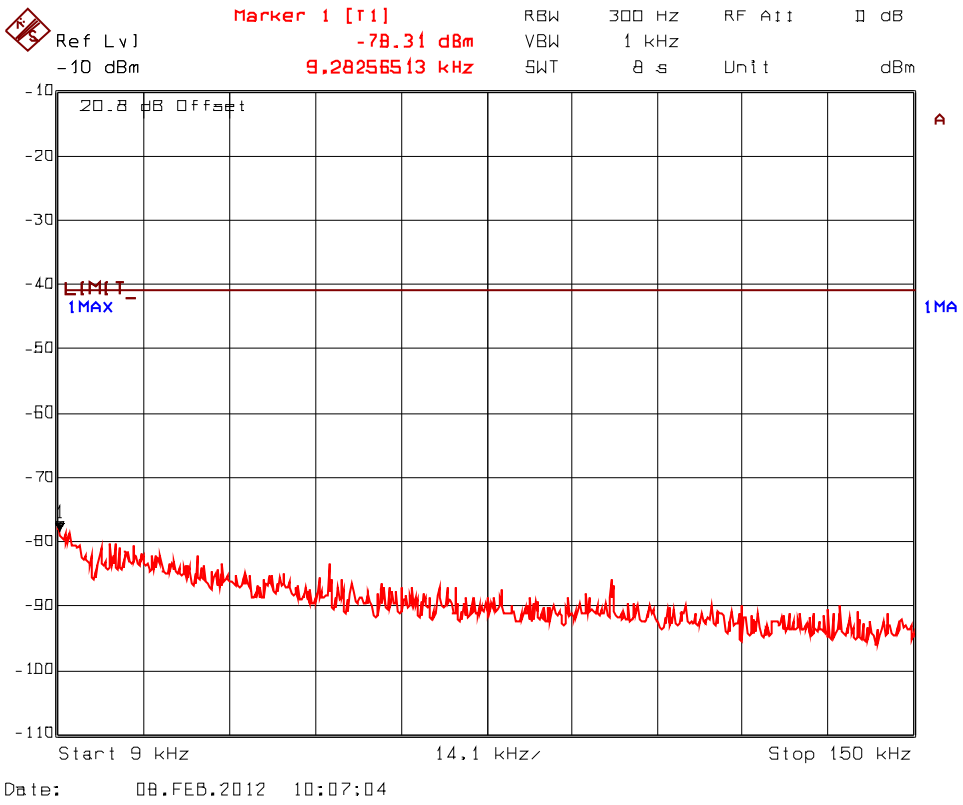
Plot 5.9.4.3.7. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2440 MHz, High Power, 30 MHz – 1.0 GHz



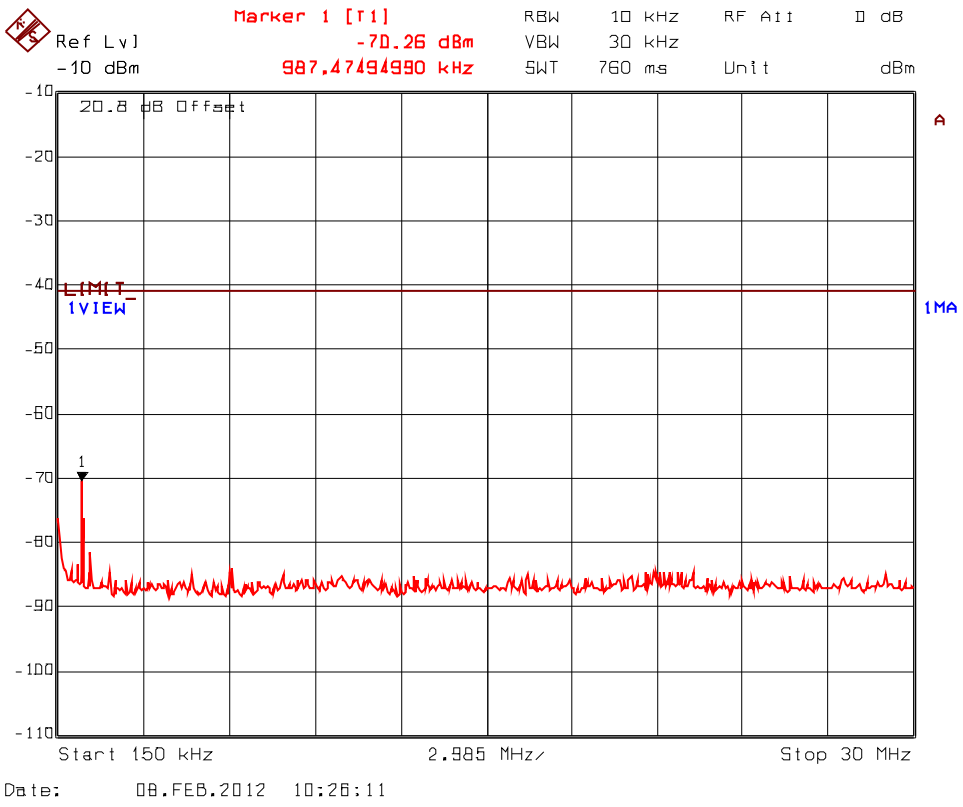
Plot 5.9.4.3.8. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2440 MHz, High Power, 1.0 GHz – 25 GHz



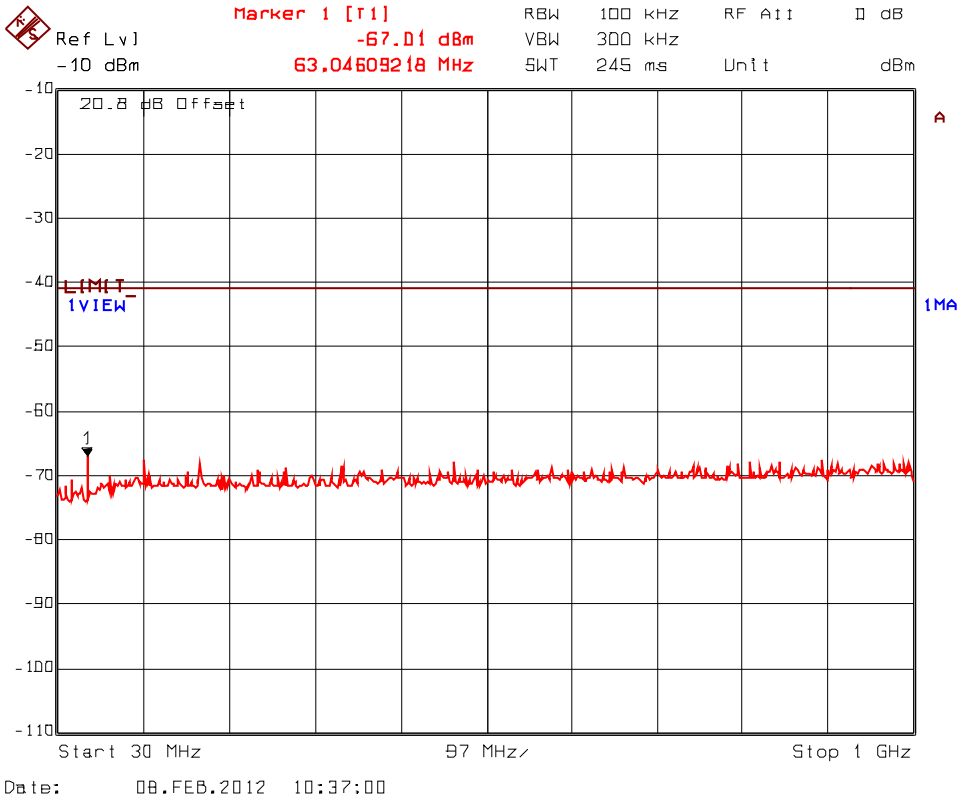
Plot 5.9.4.3.9. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2480 MHz, High Power, 9 kHz – 150 kHz



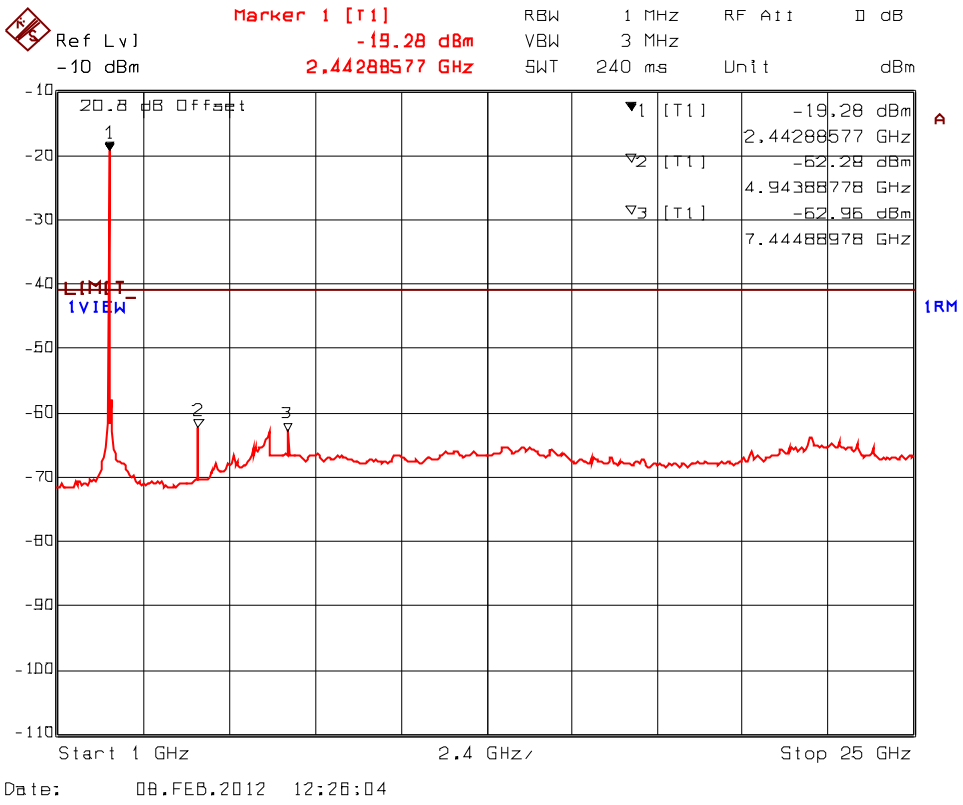
Plot 5.9.4.3.10. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2480 MHz, High Power, 150 kHz – 30 MHz



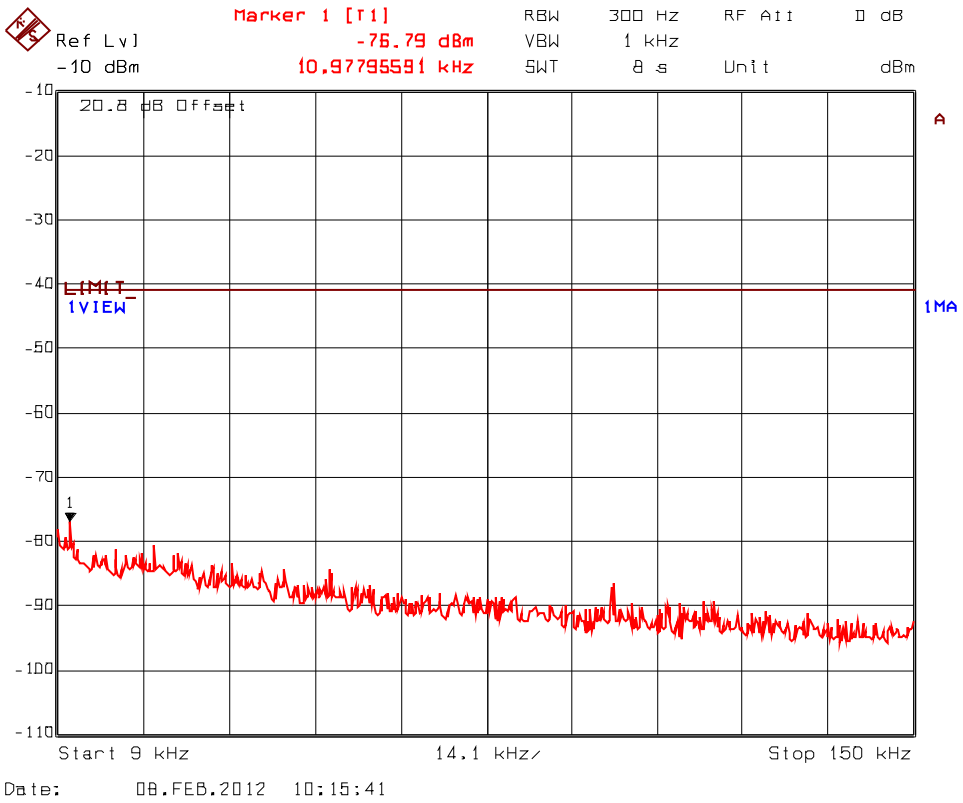
Plot 5.9.4.3.11. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2480 MHz, High Power, 30 MHz – 1.0 GHz



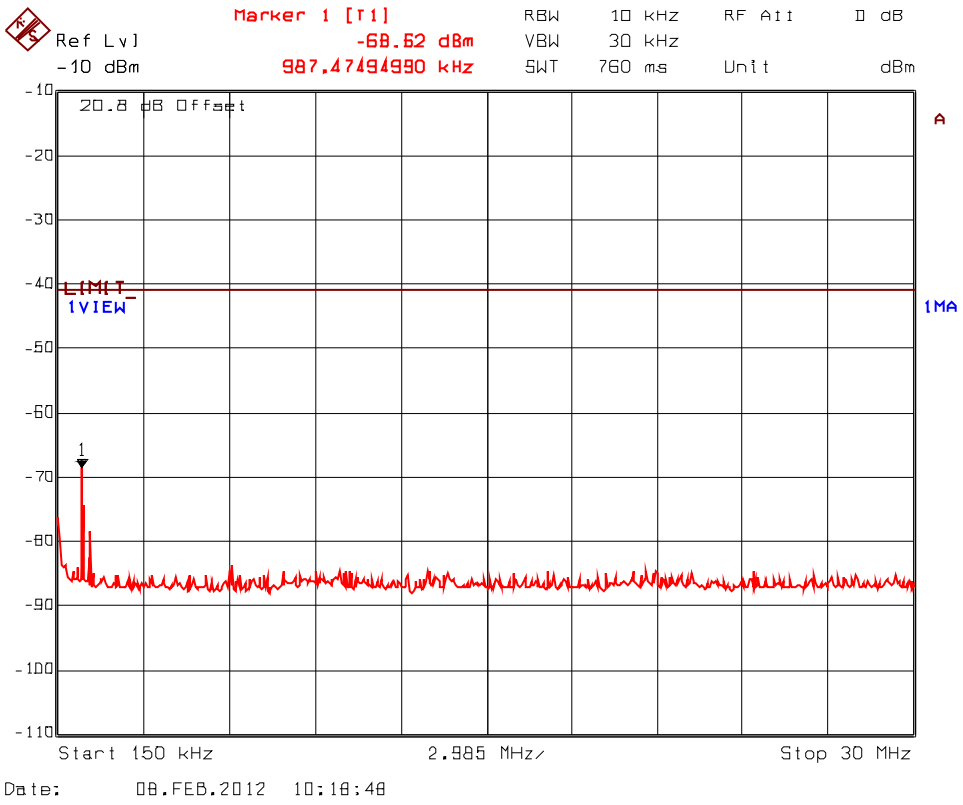
Plot 5.9.4.3.12. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 1
2480 MHz, High Power, 1.0 GHz – 25 GHz



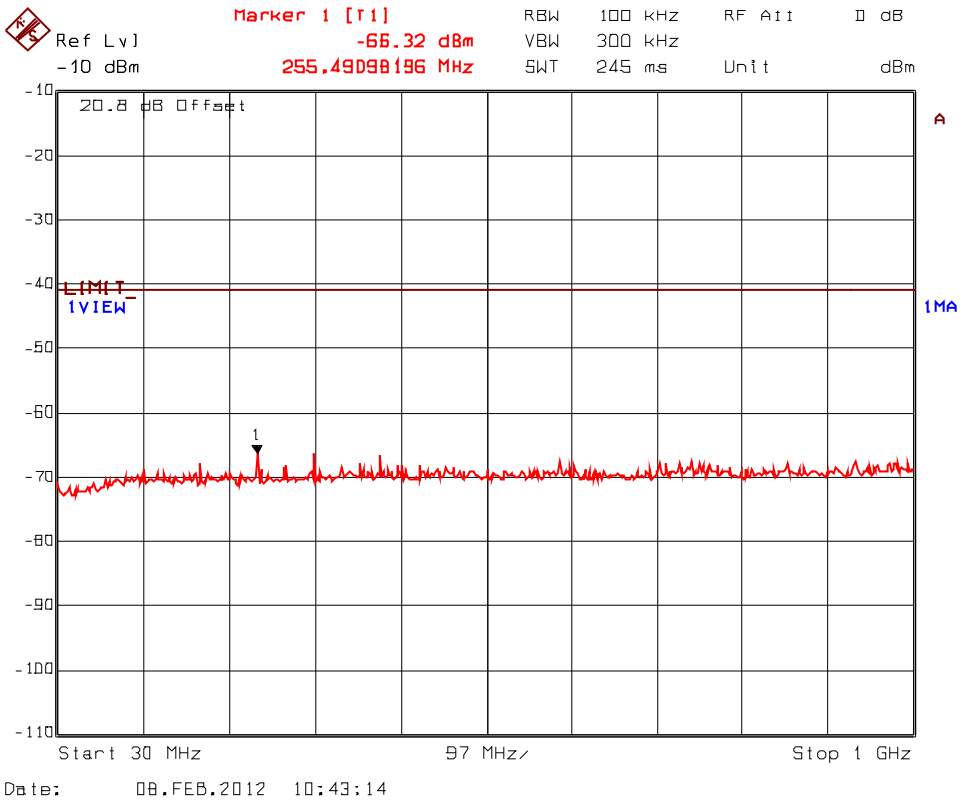
Plot 5.9.4.3.13. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2405 MHz, High Power, 9 kHz – 150 kHz



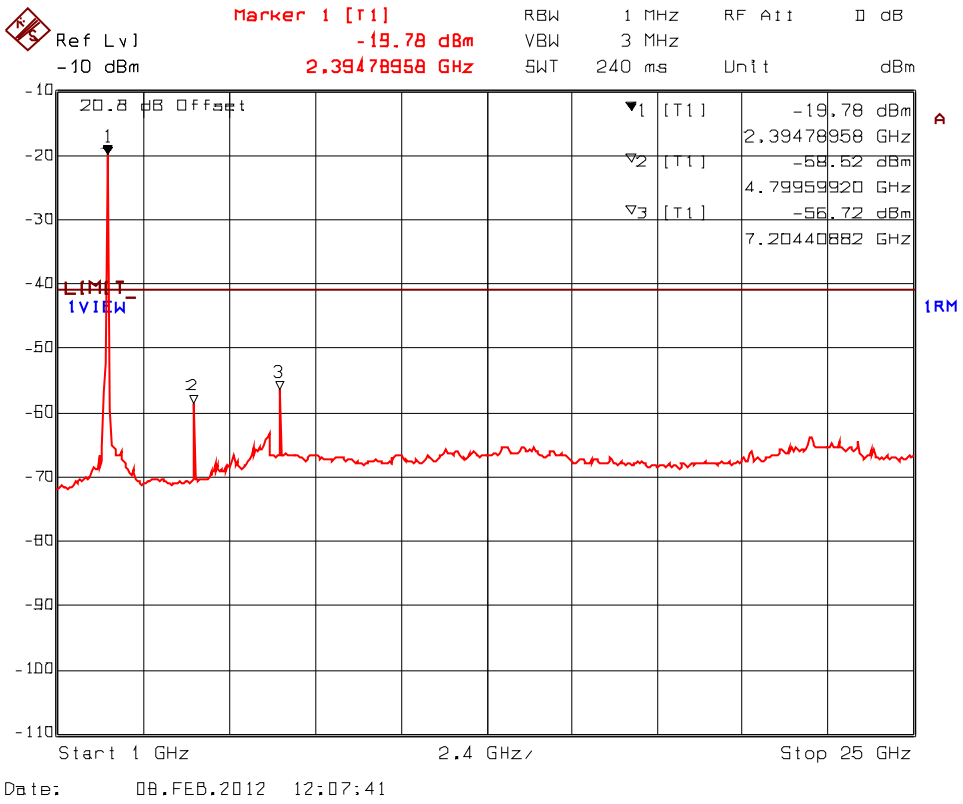
Plot 5.9.4.3.14. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2405 MHz, High Power, 150 kHz – 30 MHz



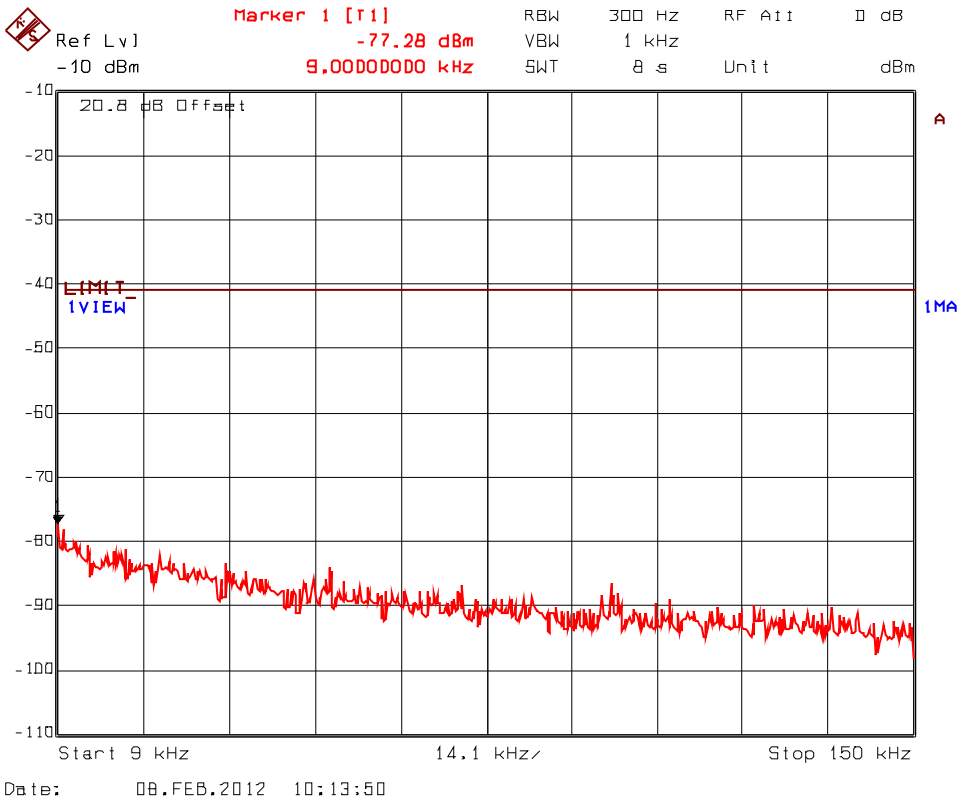
Plot 5.9.4.3.15. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2405 MHz, High Power, 30 MHz – 1.0 GHz



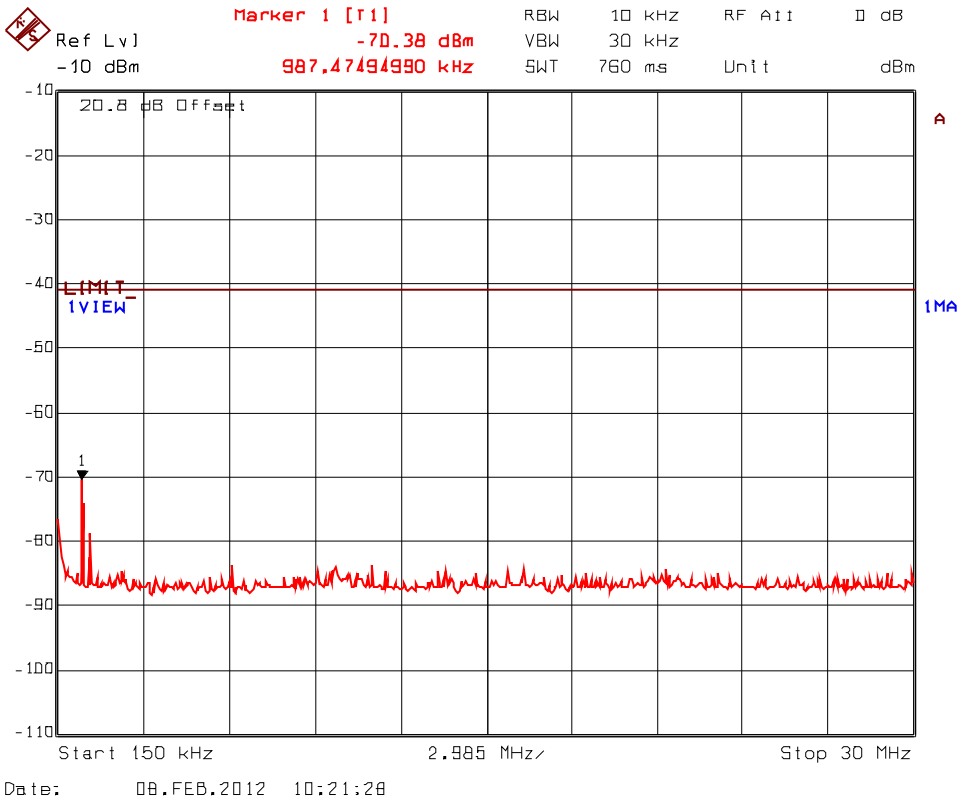
Plot 5.9.4.3.16. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2405 MHz, High Power, 1.0 GHz – 25 GHz



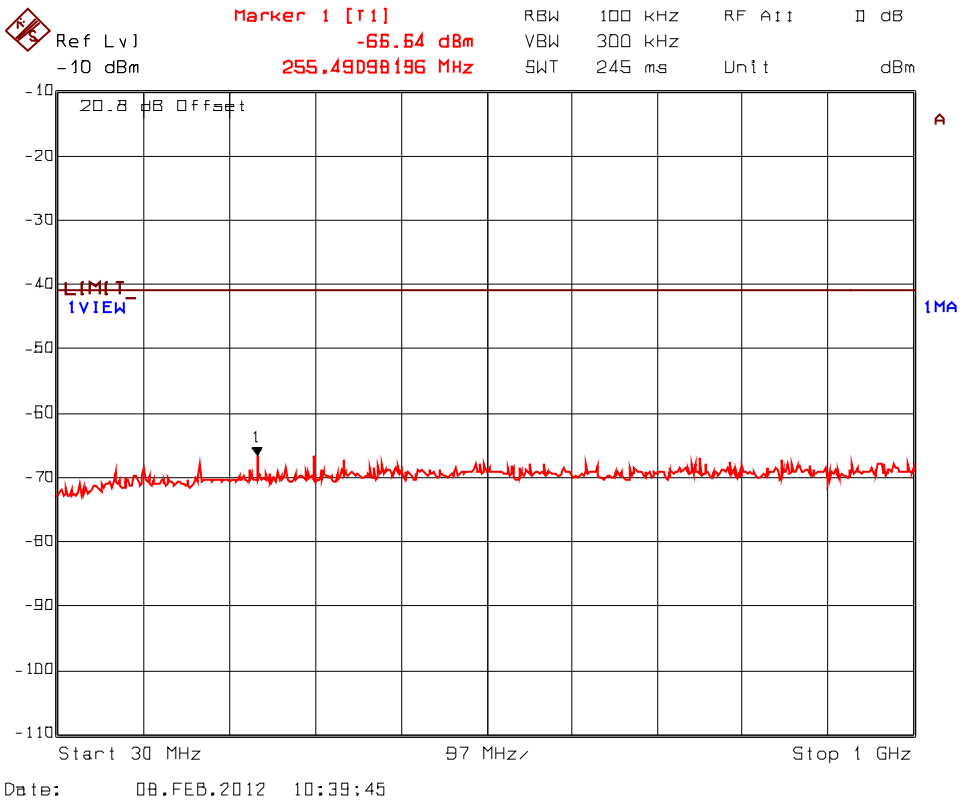
Plot 5.9.4.3.17. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2440 MHz, High Power, 9 kHz – 150 kHz



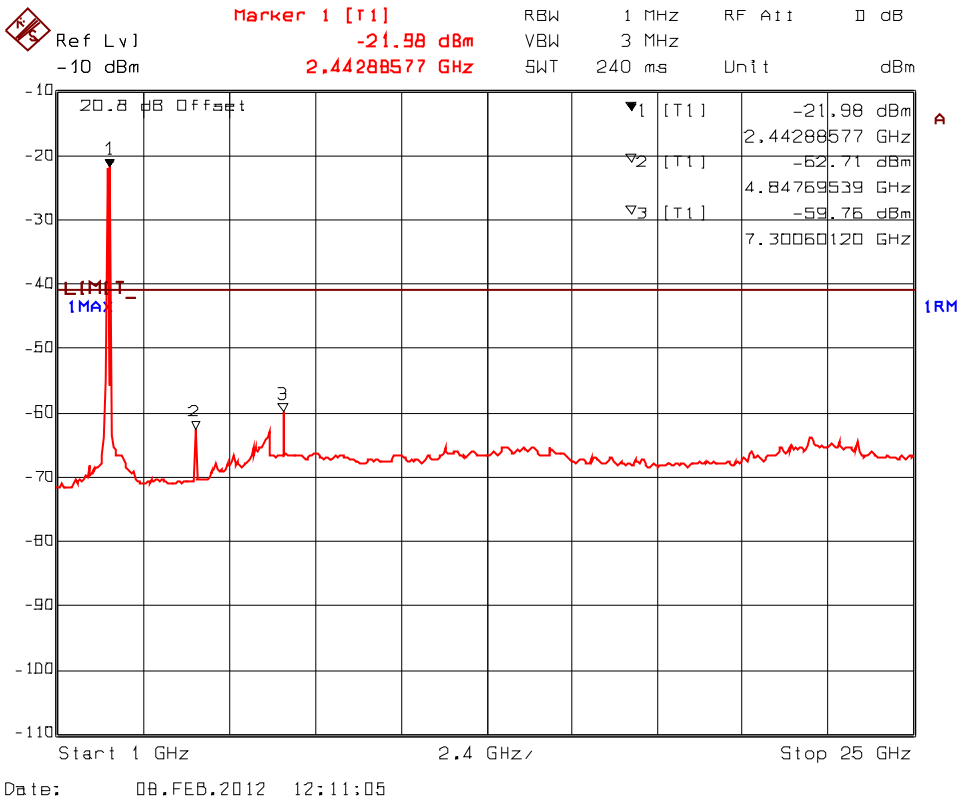
Plot 5.9.4.3.18. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2440 MHz, High Power, 150 kHz – 30 MHz



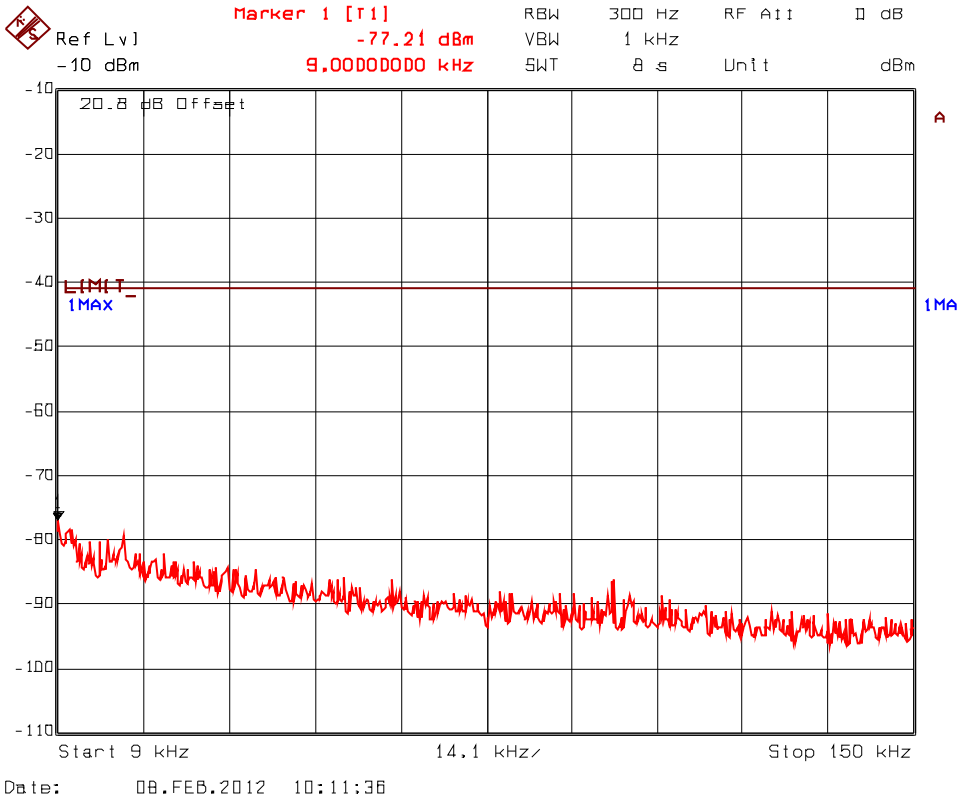
Plot 5.9.4.3.19. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2440 MHz, High Power, 30 MHz – 1.0 GHz



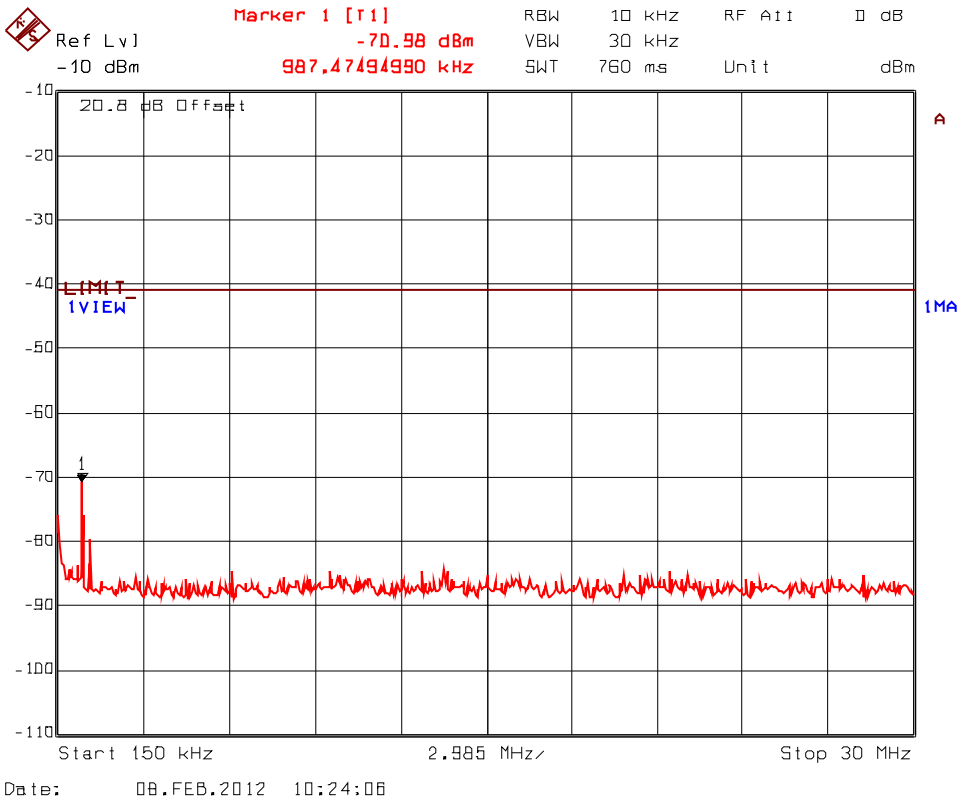
Plot 5.9.4.3.20. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2440 MHz, High Power, 1.0 GHz – 25 GHz



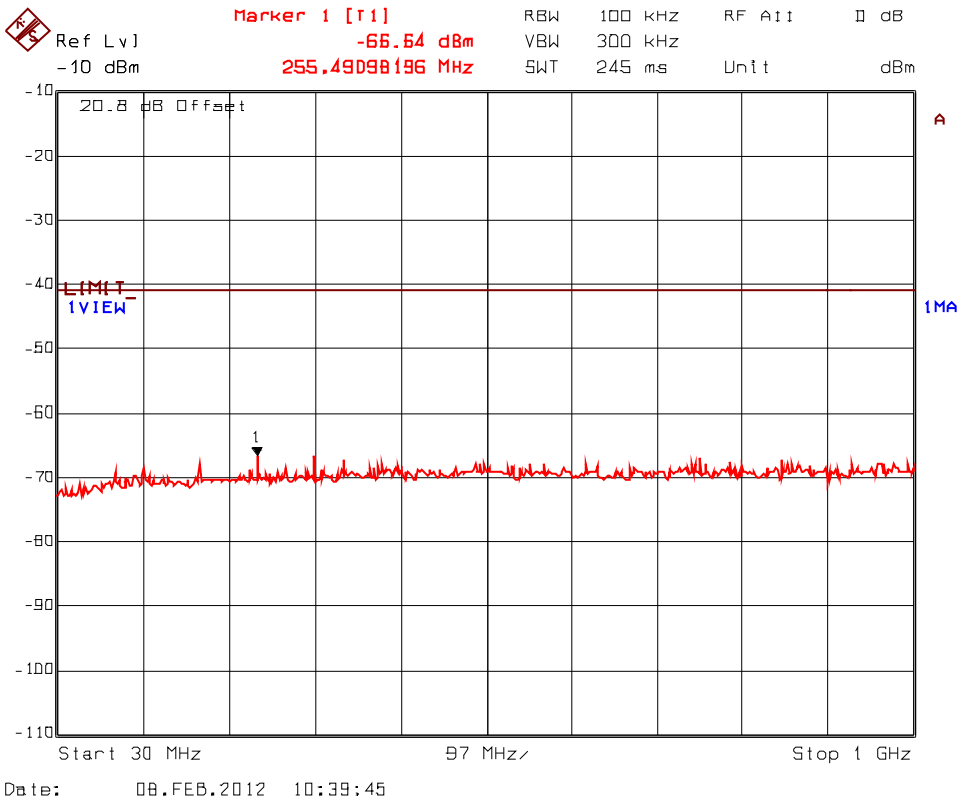
Plot 5.9.4.3.21. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2480 MHz, High Power, 9 kHz – 150 kHz



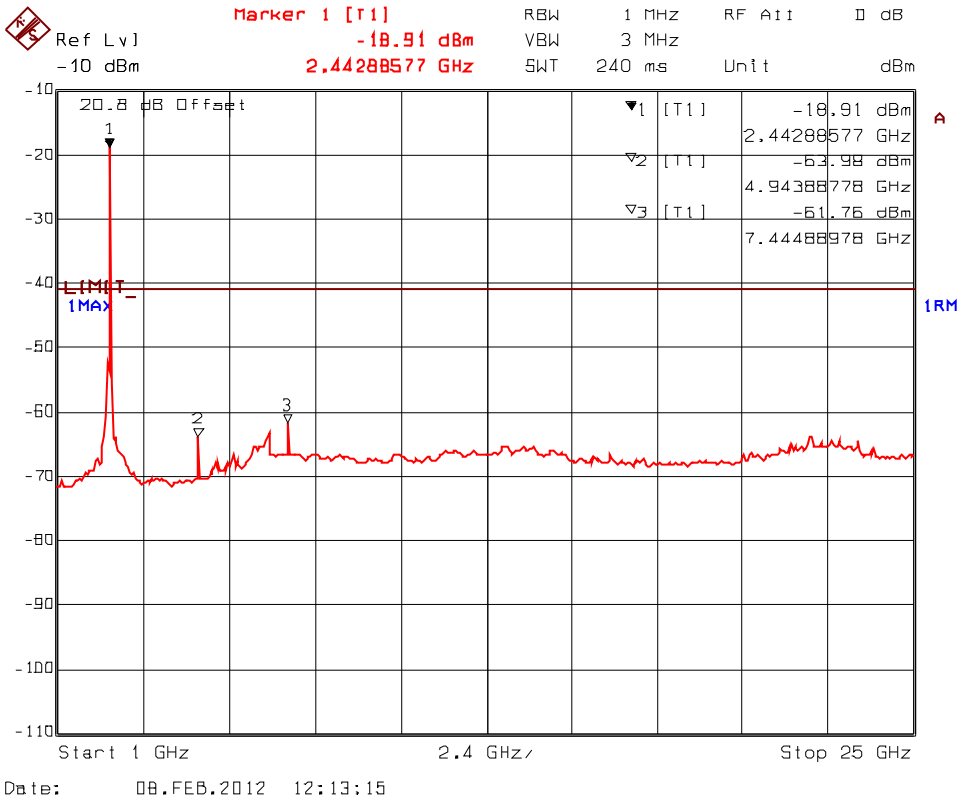
Plot 5.9.4.3.22. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2480 MHz, High Power, 150 kHz – 30 MHz



Plot 5.9.4.3.23. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2480 MHz, High Power, 30 MHz – 1.0 GHz



Plot 5.9.4.3.24. Spurious RF Conducted Emissions into Restricted Bands, Transceiver 2
2480 MHz, High Power, 1.0 GHz – 25 GHz



5.10. TRANSMITTER SPURIOUS RADIATED EMISSIONS AT 3 METERS [§§ 15.247(d), 15.209 & 15.205]

5.10.1. Limit(s)

§ 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Section 15.205(a) - Restricted Bands of Operation

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	([2])
13.36–13.41.			

[1] Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2] Above 38.6

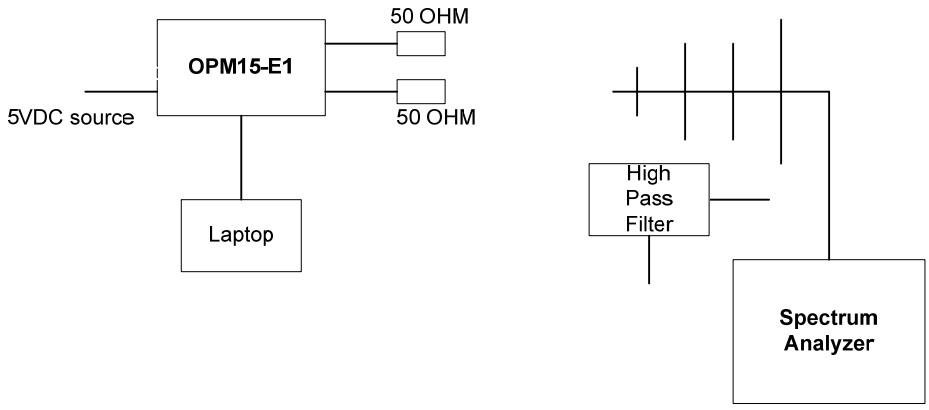
Section 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400 / F (kHz)	300
0.490 - 1.705	24,000 / F (kHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

5.10.2. Method of Measurements

KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247).

5.10.3. Test Arrangement



5.10.4. Test Data

Remarks:

- Antenna ports are terminated with 50 ohm load.
- EUT shall be tested in three orthogonal positions.
- The following test results are the worst-case measurements; only the highest levels are recorded.

5.10.4.1. Transceiver 1

Fundamental Frequency:	2405 MHz
Test Frequency Range:	30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
2405	--	--	V	--	--	--
2405	--	--	H	--	--	--
4810	55.93	50.42	V	54.0	-3.58	Pass*
4810	53.67	46.78	H	54.0	-7.22	Pass*
7215	57.44	43.99	V	54.0	-10.01	Pass
7215	54.78	42.69	H	54.0	-11.31	Pass

* Emission within the restricted frequency bands.

Fundamental Frequency:	2440 MHz
Test Frequency Range:	30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
2440	--	--	V	--	--	--
2440	--	--	H	--	--	--
4880	56.42	50.56	V	54.0	-3.44	Pass*
4880	54.77	48.50	H	54.0	-5.50	Pass*
7320	55.63	43.45	V	54.0	-10.55	Pass*
7320	54.87	41.58	H	54.0	-12.42	Pass*

* Emission within the restricted frequency bands.

Fundamental Frequency:	2480 MHz
Test Frequency Range:	30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
2480	--	--	V	--	--	--
2480	--	--	H	--	--	--
4960	55.87	49.41	V	54.0	-4.59	Pass*
4960	53.36	49.00	H	54.0	-5.00	Pass*
7440	55.33	42.01	V	54.0	-11.99	Pass*
7440	54.57	41.54	H	54.0	-12.46	Pass*

* Emission within the restricted frequency bands.

5.10.4.2. Transceiver 2

Fundamental Frequency:	2405 MHz
Test Frequency Range:	30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level** (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
2405	--	--	V	--	--	--
2405	--	--	H	--	--	--
4810	58.98	50.82	V	54.0	-3.18	Pass*
4810	57.76	49.19	H	54.0	-4.81	Pass*
7215	56.83	42.76	V	54.0	-11.24	Pass
7215	57.60	43.76	H	54.0	-10.24	Pass

- *Emission within the restricted frequency bands.
- ** Average Emissions after applying 80% duty cycle for Transceiver- 2 as declared by the manufacturer = 20 log(0.8) = -1.94 dB

Fundamental Frequency:	2440 MHz
Test Frequency Range:	30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level** (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
2440	--	--	V	--	--	--
2440	--	--	H	--	--	--
4880	59.51	52.60	V	54.0	-1.40	Pass*
4880	58.68	51.68	H	54.0	-2.32	Pass*
7320	55.71	40.59	V	54.0	-13.41	Pass*
7320	55.78	41.89	H	54.0	-12.11	Pass*

- *Emission within the restricted frequency bands.
- ** Average Emissions after applying 80% duty cycle for Transceiver- 2 as declared by the manufacturer = 20 log(0.8) = -1.94 dB

Fundamental Frequency:	2480 MHz
Test Frequency Range:	30 MHz – 25 GHz

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level** (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Margin (dB)	Pass/ Fail
2480	--	--	V	--	--	--
2480	--	--	H	--	--	--
4960	59.47	53.22	V	54.0	-0.78	Pass*
4960	58.86	53.03	H	54.0	-0.97	Pass*
7440	59.47	46.24	V	54.0	-7.76	Pass*
7440	57.13	42.51	H	54.0	-11.49	Pass*

- *Emission within the restricted frequency bands.
- ** Average Emissions after applying 80% duty cycle for Transceiver- 2 as declared by the manufacturer = 20 log(0.8) = -1.94 dB

5.11. POWER SPECTRAL DENSITY [§ 15.247(e)]

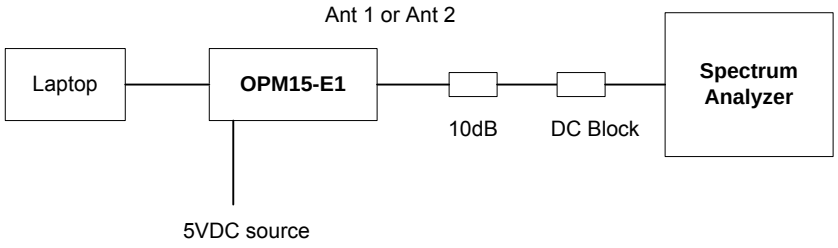
5.11.1. Limit(s)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.11.2. Method of Measurements

KDB Publication No. 558074, D01: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247), Section 5.3.1 Measurement Procedure PKPSD.

5.11.3. Test Arrangement



5.11.4. Test Data

Transceiver # 1:

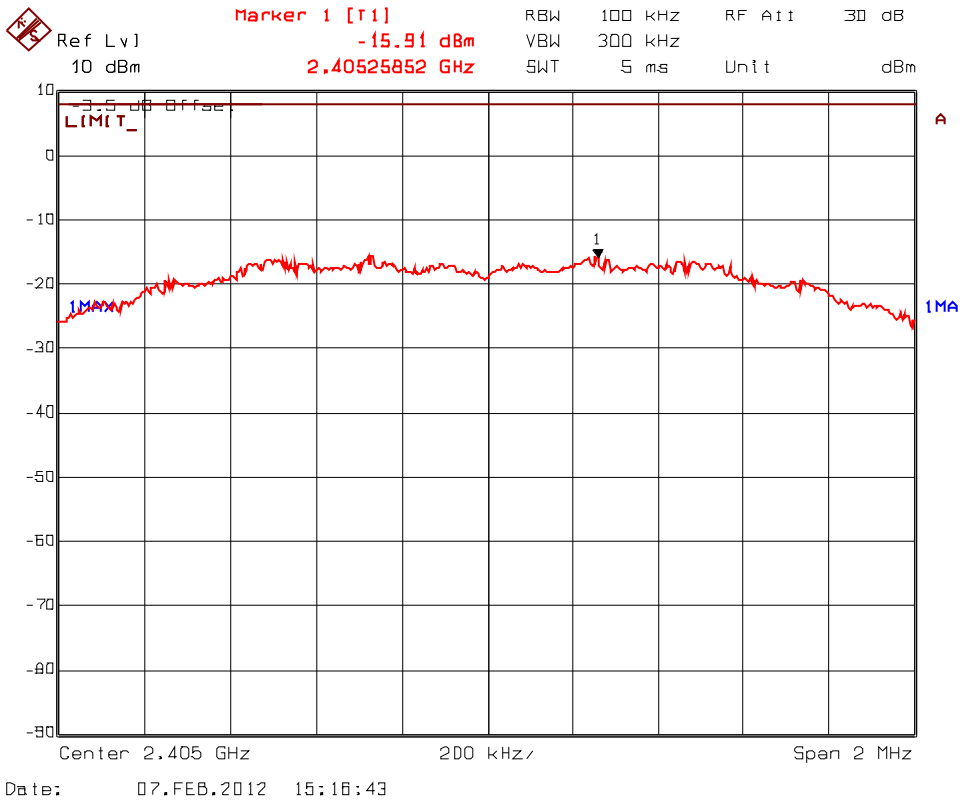
Channel	Frequency (MHz)	Modulation	PSD (dBm)	Limit (dBm)
Low	2405	O-QPSK	-15.91	8
Mid	2440	O-QPSK	-16.20	8
High	2480	O-QPSK	-16.62	8

Transceiver # 2:

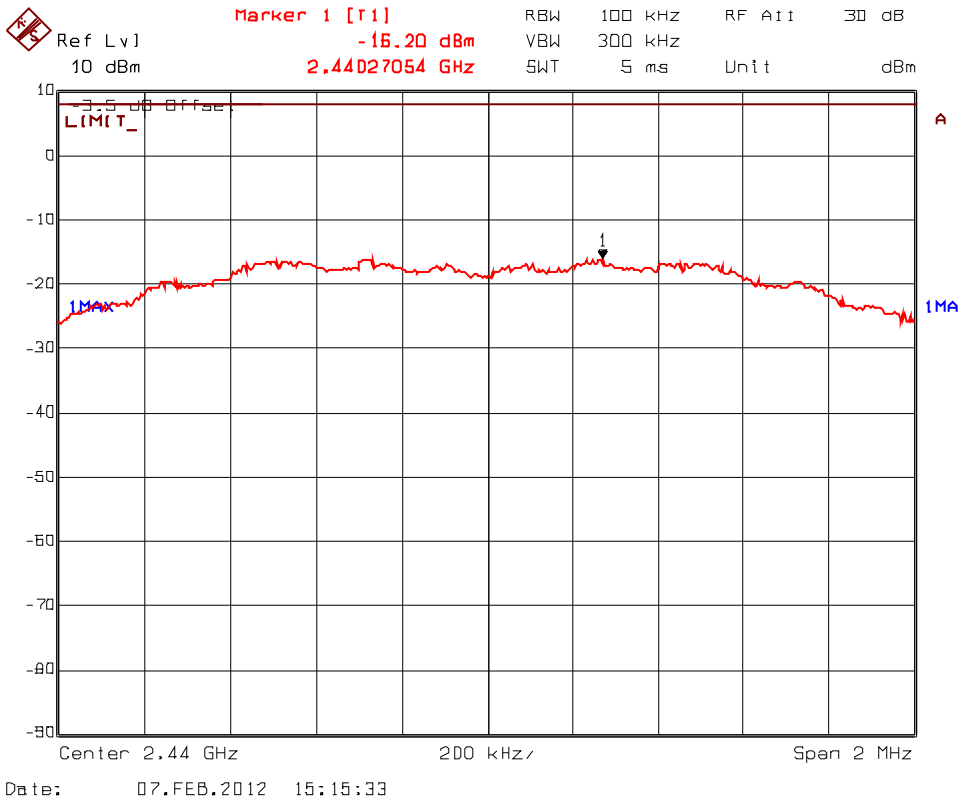
Channel	Frequency (MHz)	Modulation	PSD (dBm)	Limit (dBm)
Low	2405	O-QPSK	-15.17	8
Mid	2440	O-QPSK	-15.84	8
High	2480	O-QPSK	-16.00	8

See the following plots for detailed measurements.

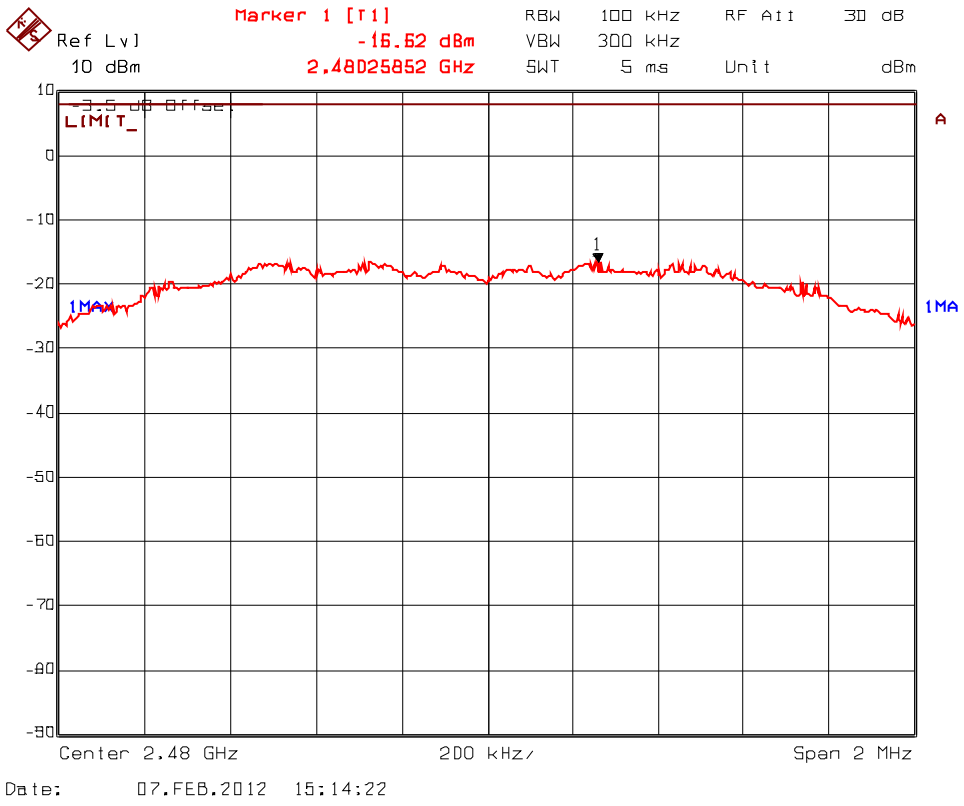
Plot 5.11.4.1. Peak Power Spectral Density
2405 MHz, Transceiver 1



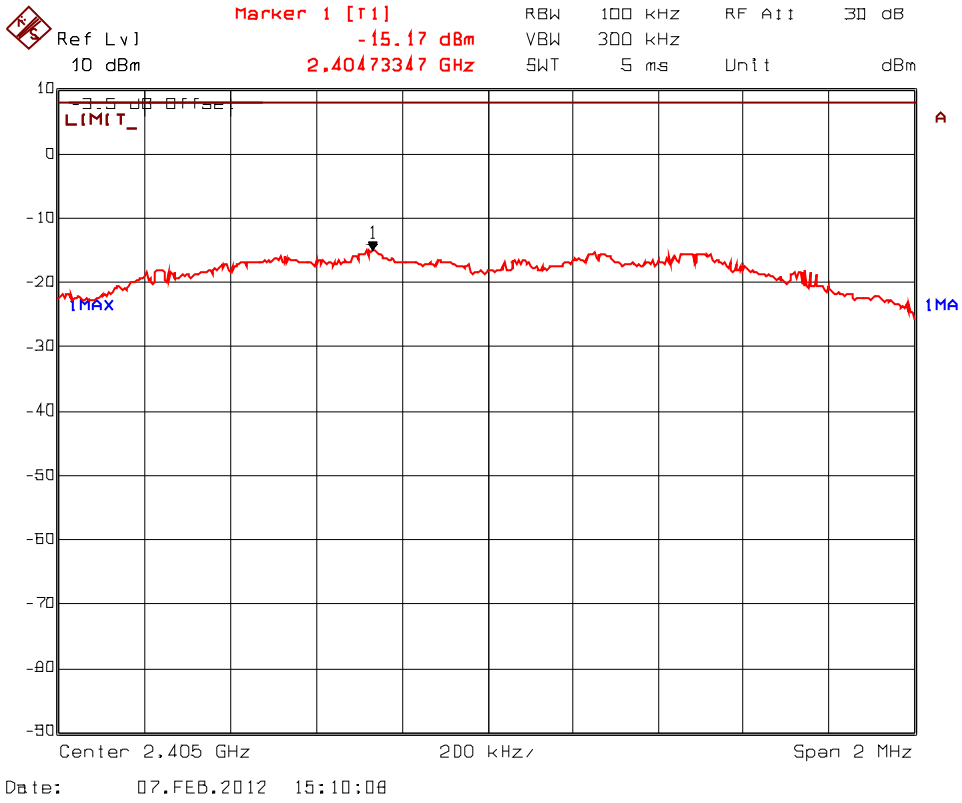
Plot 5.11.4.2. Peak Power Spectral Density
2440 MHz, Transceiver 1



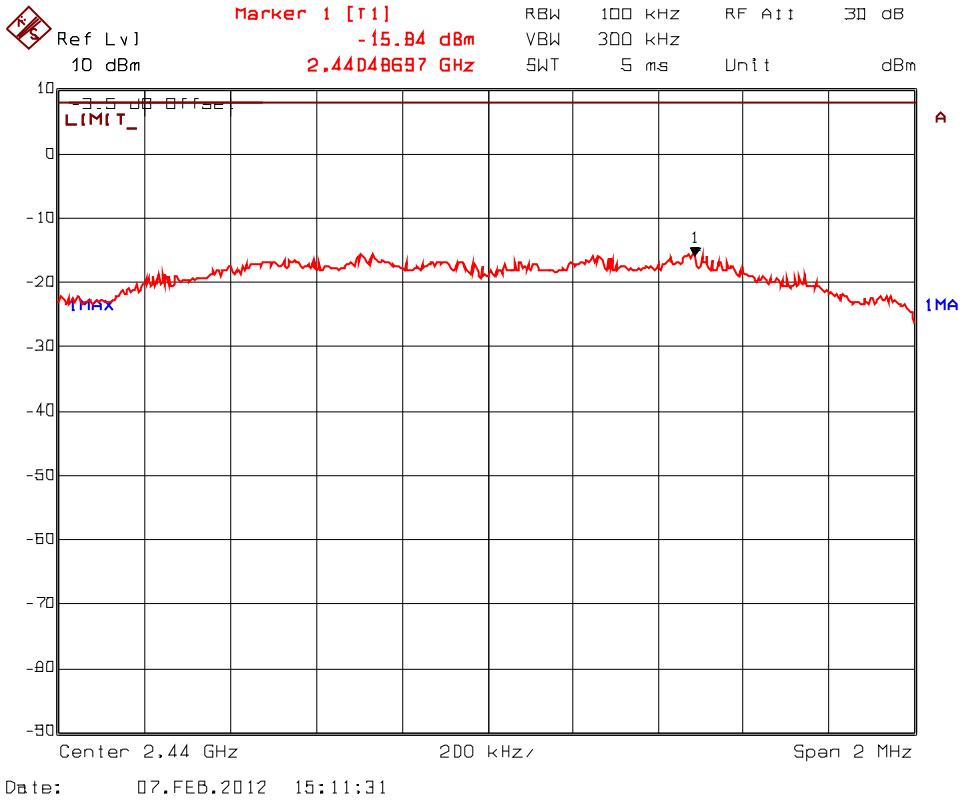
Plot 5.11.4.3. Peak Power Spectral Density
2405 MHz, Transceiver 1



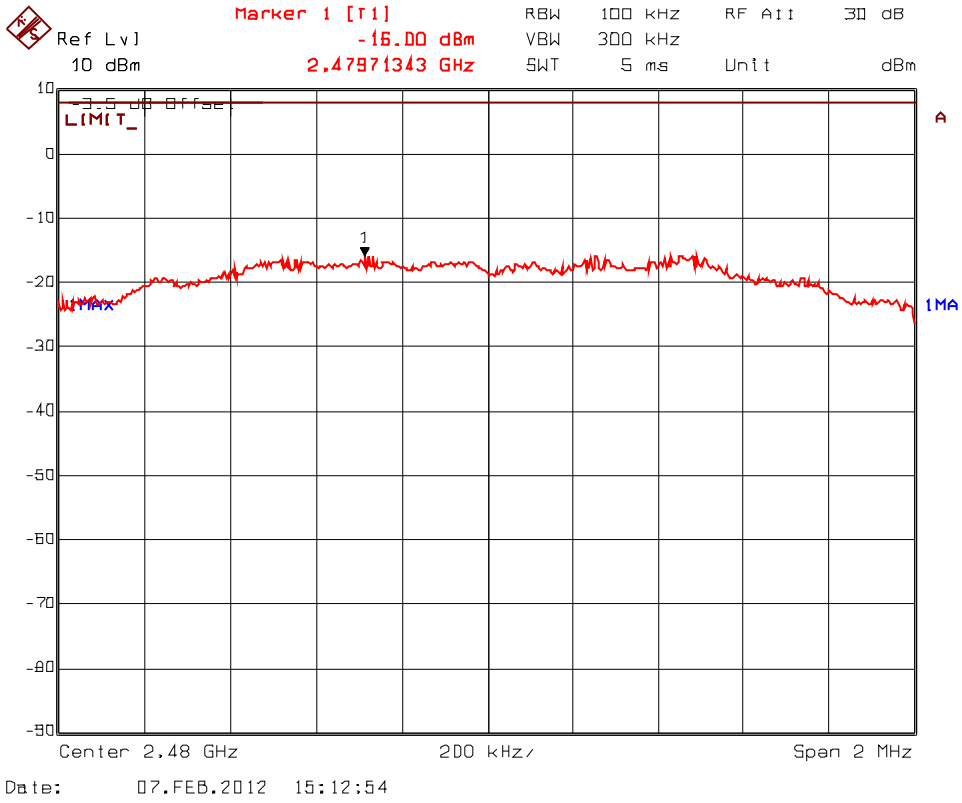
Plot 5.11.4.4. Peak Power Spectral Density
2405 MHz, Transceiver 2



Plot 5.11.4.5. Peak Power Spectral Density
2440 MHz, Transceiver 2



Plot 5.11.4.6. Peak Power Spectral Density
2480 MHz, Transceiver 2



5.12. RF EXPOSURE REQUIRMENTS [§§ 15.247(e)(i), 1.1310 & 2.1091]

The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation.

FCC 47 CFR § 1.1310:

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

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

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

5.12.1. Method of Measurements

Refer to Sections 1.1310, 2.1091.

Spread spectrum transmitters operating under section 15.247 are categorically excluded from routine environmental evaluation to demonstrating RF exposure compliance with respect to MPE and/or SAR limits. These devices are not exempted from compliance (As indicated in Section 15.247(b)(4), these transmitters are required to operate in a manner that ensures that exposure to public users and nearby persons) does not exceed the Commission's RF exposure guidelines (see Section 1.1307 and 2.1093). Unless a device operates at substantially low power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.

For portable transmitters (see Section 2.1093), or devices designed to operate next to a person's body, compliance is determined with respect to the SAR limit (define in the body tissues) for near-field exposure conditions. If the maximum average output power, operating condition configurations and exposure conditions are comparable to those of existing cellular and PCS phones, SAR evaluation may be required in order to determine if such a device complies with SAR limit. When SAR evaluation data is not available, and the additional supporting information cannot assure compliance, the Commission may request that an SAR evaluation be performed, as provided for in Section 1.1307(d).

Average Power Output Measured from both Antennas: EUT was connected Analyzer with AVG detector setting. The Combined average power is 3.92 mW (1.96 + 1.96) mW.

Antenna 1, Setting 0

Frequency (MHz)	Modulation	AVG Power (mW)
2405	O-QPSK	1.96
2440	O-QPSK	1.90
2480	O-QPSK	1.75

Antenna 2, Setting 0

Frequency (MHz)	Modulation	AVG Power (mW)
2405	O-QPSK	1.96
2440	O-QPSK	1.85
2480	O-QPSK	1.80

This module may be used in portable exposure conditions with no restrictions on host platforms when the source-based time-averaged output power is ≤ $60/f_{(GHz)}$ mW as per 2(a)(1) of FCC KDB 447498 v04.

Measured Maximum source-based time-averaged output Power is = 3.92 mW,

SAR is not required as average power (3.92mW) is well below the threshold value of 24 mW for 2.4 GHz Transmitters. Please refer to the FCC KDB inquiry guidance obtained for this module and submitted with this filing for details.

Threshold Value = [60/f(GHz)] mW
= (60/2.5) mW
= 24 mW

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model Nos.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz – 40 GHz	27 Sep 2012
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	15 Mar 2012
RF Amplifier	Hewlett Packard	84498	3008A00769	1 – 26.5 GHz	1 Dec 2012
RF Amplifier	AH System	PAM-0118	225	20 MHz – 18 GHz	15 Mar 2012
High Pass Filter	K & L	11SH10-4000/T12000	4	Cut off 2.4 GHz	Cal. on use
Horn Antenna	Emco	3155	5061	1 – 18 GHz	25 Jan 2013
Biconi-Log Antenna	Emco	3142C	00034792	26 – 3000 MHz	26 April 2012
Horn Antenna	Emco	3160-09	118385	18 – 26.5 GHz	30 May 2012
Attenuator	Pasternack	PE7010-10	-	DC–2 GHz	Cal on use
Attenuator	Pasternack	PE7024-10	-	DC–26.5 GHz	Cal on use
DC Block	Hewlett Packard	11742A	12460	0.045–26.5 GHz	Cal on use
Spectrum Analyzer	Hewlett Packard	HP 8593EM	3710A00223	9 kHz – 22 GHz	25 Apr 2012
LISN	EMCO	3825/2	8907-1531	10 kHz – 100 MHz	07 Apr 2012
Attenuator	Pasternack	PE7010-20	-	DC – 2 GHz	Cal on use
Peak Power Meter	Hewlett Packard	8900D	2131A01044	01 – 18 GHz	13 Jul 2012
Power Sensor	Hewlett Packard	84811A	2551A01484	01 – 18 GHz	13 Jul 2012

EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

7.1. Line Conducted Emission Measurement Uncertainty (0.15-30 MHz)

	Line Conducted Emission Measurement Uncertainty (150 kHz – 30 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 1.57**	**± 1.8**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 3.14**	**± 3.6**

7.2. Radiated Emission Measurement Uncertainty

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 2.15**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.30**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 2.39**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.78**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal & Vertical (1 – 18 GHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)}$	**± 1.87**	Under consideration
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 3.75**	Under consideration