ENGINEERING TEST REPORT

XBee3 Cellular LTE-M
Model: XB3M1
FCC ID: MCQ-XB3M1

Applicant:

Digi International Inc
11001 Bren Road East
Minnetonka, MN 55343

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.: 18DIGI141_FCC15C247

This Test report is Issued under the Authority of Tri M. Luu Vice President of Engineering UltraTech Group of Labs Date: January 9, 2018	
Report Prepared by: Dan Huynh Issued Date: January 9, 2018	Tested by: Hung Trinh Test Dates: December 2 - 4, 2017

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91038 | 1309 | 46390-2049 | AT-1945 | SL2-IN-E-1119R | Korea KCC-RRA 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 – Radio Frequency Devices
Purpose of Test:	Equipment Certification for Digital Modulation Systems (DTS) Operating Under §15.247
Test Procedures:	▪ ANSI C63.4 ▪ ANSI C63.10 ▪ FCC KDB Publication No. 558074 D01 DTS Meas Guidance v04
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 0-19	2017	Code of Federal Regulations (CFR), Title 47 – Telecommunication
ANSI C63.4	2014	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
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
FCC, KDB Publication No. 558074 D01 DTS Meas Guidance v04	2017	Guidance for Performing Compliance Measurements for Digital Transmission Systems (DTS) Operating Under Section 15.247

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

Applicant	
Name:	Digi International Inc
Address:	11001 Bren Road East Minnetonka, MN 55343 USA
Contact Person:	Scott Wilken Phone #: +1 (952) 912-4965 Fax #: n/a Email Address: scott.wilken@digi.com

Manufacturer	
Name:	Digi International Inc
Address:	11001 Bren Road East Minnetonka, MN 55343 USA
Contact Person:	Dan Leveille Phone #: +1 (952) 912-4794 Fax #: n/a Email Address: dan.leveille@digi.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:	Digi International Inc
Product Name:	XBee3 Cellular LTE-M
Model Name or Number:	XB3M1
Serial Number:	Test Sample
Type of Equipment:	Digital Transmission System (DTS)
Input Power Supply Type:	External DC Power Supply
Primary User Functions of EUT:	This embedded RF module provides cellular and Bluetooth Low Energy (BLE) connectivity.

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Mobile Base station (fixed use)
Intended Operating Environment:	Commercial, industrial or business environment Residential environment
Power Supply Requirement:	3.2 - 4.3 VDC, 3.3V (nominal)
RF Output Power Rating:	+11.76 dBm maximum conducted power
Operating Frequency Range:	2402 - 2480 MHz
RF Output Impedance:	50 Ω
Duty Cycle:	Continuous
Modulation Type:	GFSK
Antenna Connector Types:	Integral antenna and U.FL

2.4. ASSOCIATED ANTENNA DESCRIPTIONS

Antenna Type	Maximum Gain (dBi)
Integral Antenna	-2.5
Dipole Antenna	2.1
Flex PCB Antenna	4.4

2.5. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	Cellular RF port	1	U.FL	Shielded
2	BLE RF port	1	U.FL or integral antenna	Shielded
3	Interface I/O (direct connection)	1	Pin header	Direct connection
4	DC power (direct connection)	1	Pin header	Direct connection
5	USB	1	Pin header	Shielded

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:	Test Jig
Brand name:	Digi International
Model Name or Number:	N/A
Serial Number:	N/A
Connected to EUT's Port:	Pin header

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:	21 to 23 ^{o}C
Humidity:	45 to 58%
Pressure:	102 kPa
Power Input Source:	3.3 VDC nominal, 4.3 VDC Max.

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	Test software provided by the Applicant to operate the EUT at each channel frequency continuously and in the range of typical modes of operation.
Special Hardware Used:	Test Jig
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as integral / non-integral antenna equipment as described with the test results.

Transmitter Test Signals	
Frequency Band(s):	2402 - 2480 MHz
Frequency(ies) Tested:	2402 MHz, 2440 MHz, 2480 MHz
RF Power Output: (measured maximum output power at antenna terminals)	+11.76 dBm Peak
Normal Test Modulation:	GFSK
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 ANAB File No.: AT-1945.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Compliance (Yes/No)
15.203	Antenna requirements	Yes*
15.207(a)	AC Power Line Conducted Emissions	Yes
15.247(a)(2)	6 dB Bandwidth	Yes
15.247(b)(3)	Peak Conducted Output Power	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	RF Exposure	Yes

* The EUT complies with the requirement; it employs a unique (non-standard) antenna connector or integral antenna.

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

EXHIBIT 5. TEST DATA

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

5.1.1. Limit(s)

The equipment shall meet the limits of the following table:

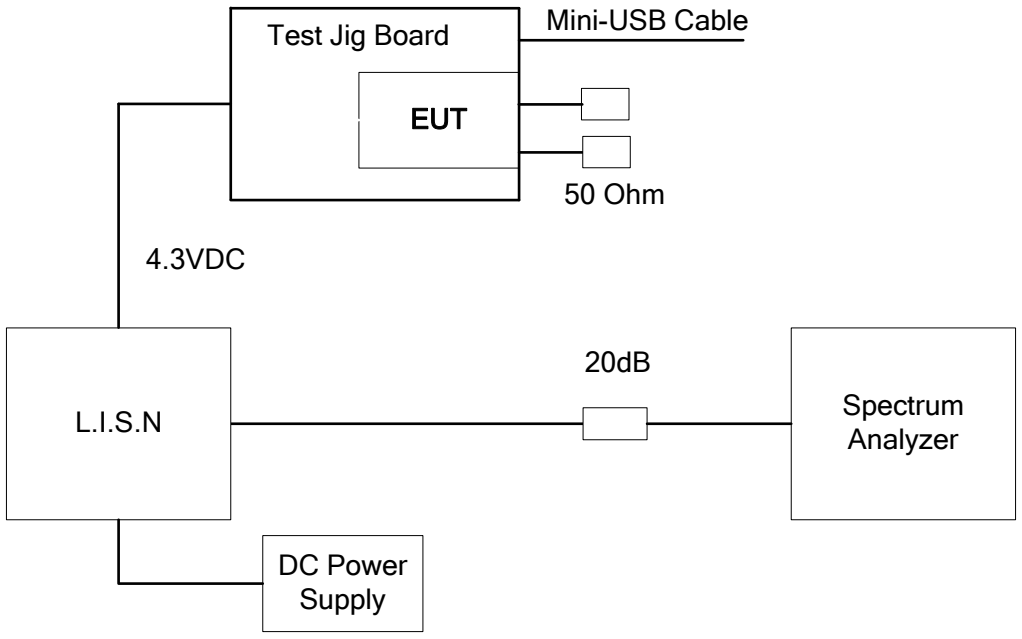
Frequency of emission (MHz)	Conducted Limits (dBμV)	
	Quasi-peak	Average
0.15–0.5 .....……..	66 to 56*	56 to 46*
0.5–5 .....……..	56	46
5-30 ……..	60 ...……..	50

*Decreases linearly with the logarithm of the frequency

5.1.2. Method of Measurements

ANSI C63.4

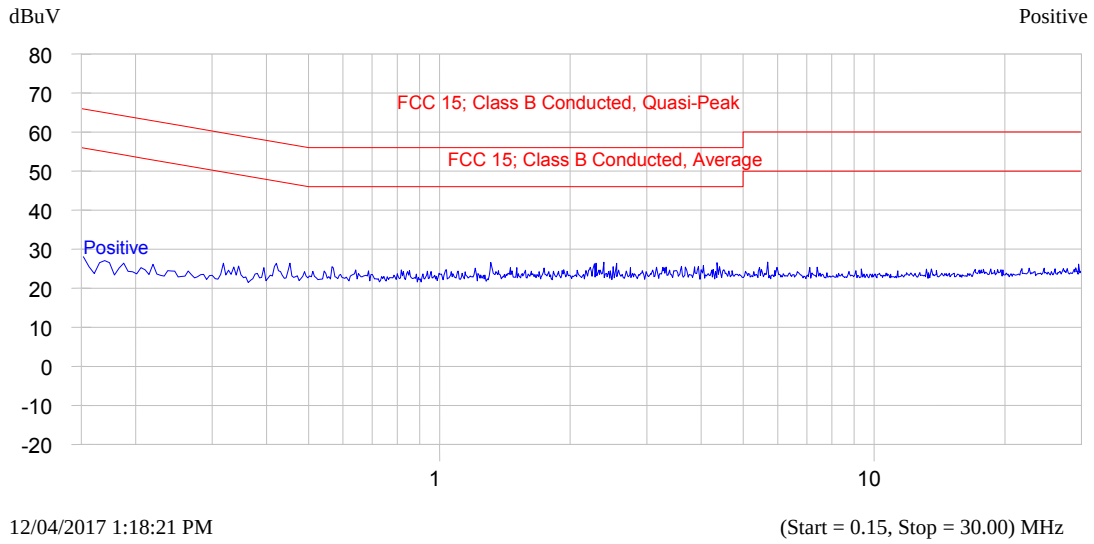
5.1.3. Test Arrangement



5.1.4. Test Data

Plot 5.1.4.1. Power Line Conducted Emissions (Tx Mode)
Line Voltage: 4.3 VDC; Line Tested: Positive

Current Graph

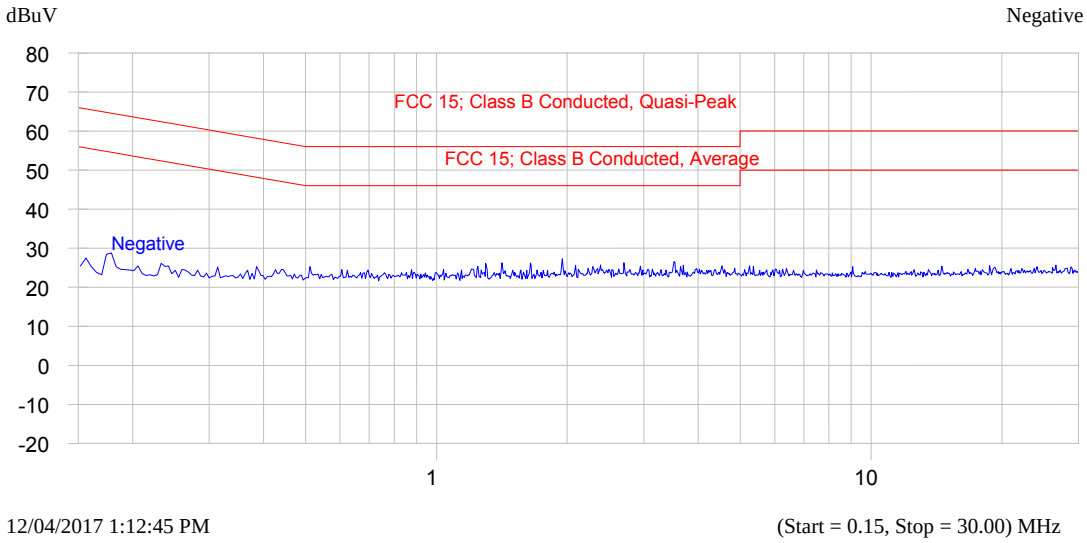


Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.188	39.1	34.2	-29.9	29.2	-24.9	Positive

Plot 5.1.4.2. Power Line Conducted Emissions (Tx Mode)
Line Voltage: 4.3 VDC; Line Tested: Negative

Current Graph

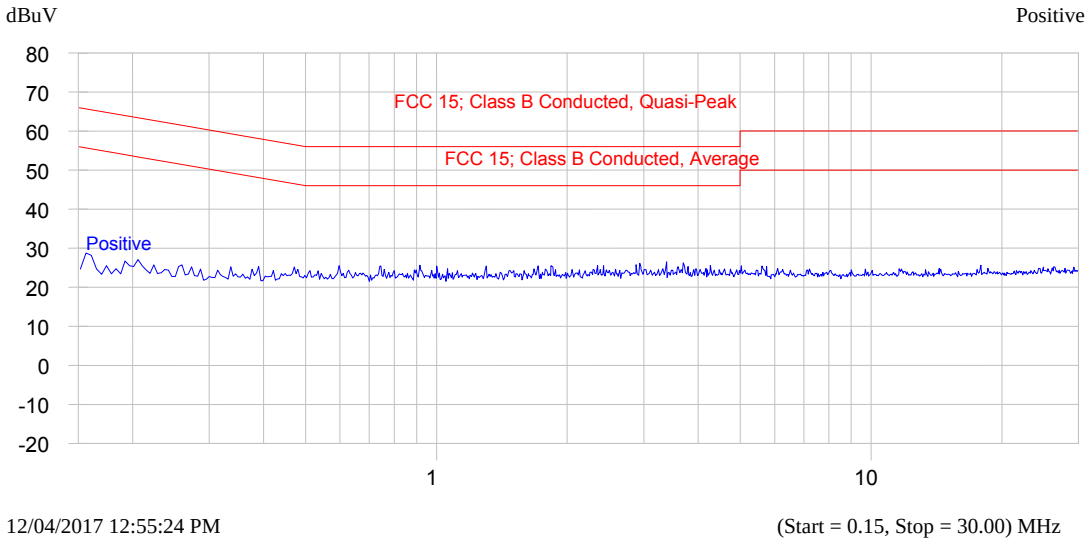


Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.182	37.0	31.7	-32.7	25.9	-28.5	Negative

Plot 5.1.4.3. Power Line Conducted Emissions (Rx Mode)
Line Voltage: 4.3 VDC; Line Tested: Positive

Current Graph

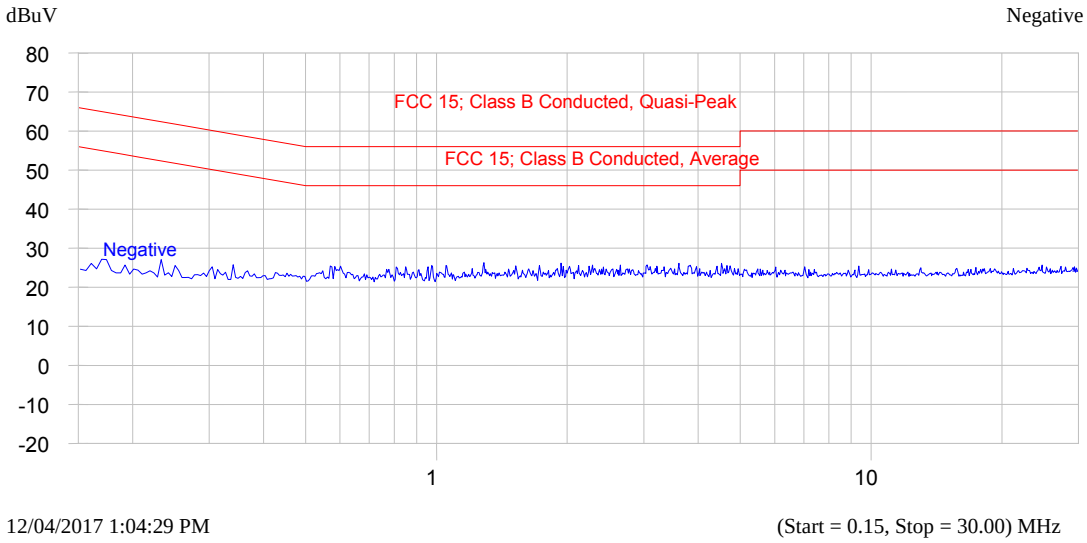


Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.157	39.0	34.4	-31.3	29.1	-26.5	Positive

Plot 5.1.4.4. Power Line Conducted Emissions (Rx Mode)
Line Voltage: 4.3 VDC; Line Tested: Negative

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.172	40.6	34.5	-30.3	29.5	-25.3	Negative

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

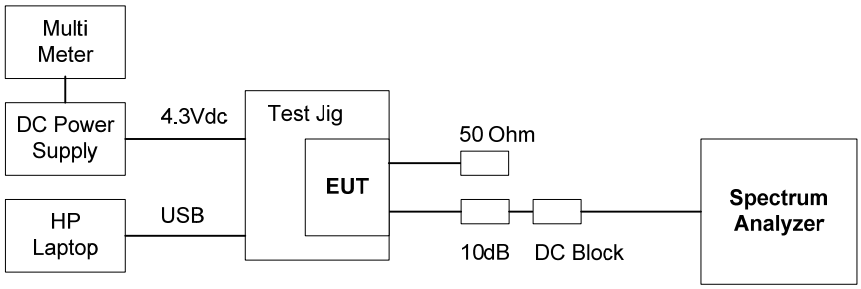
5.2.1. Limit(s)

The minimum 6 dB bandwidth shall be at least 500 kHz.

5.2.2. Method of Measurements

KDB 558074 D01 DTS Meas Guidance v04, Section 8.2 Option 2.

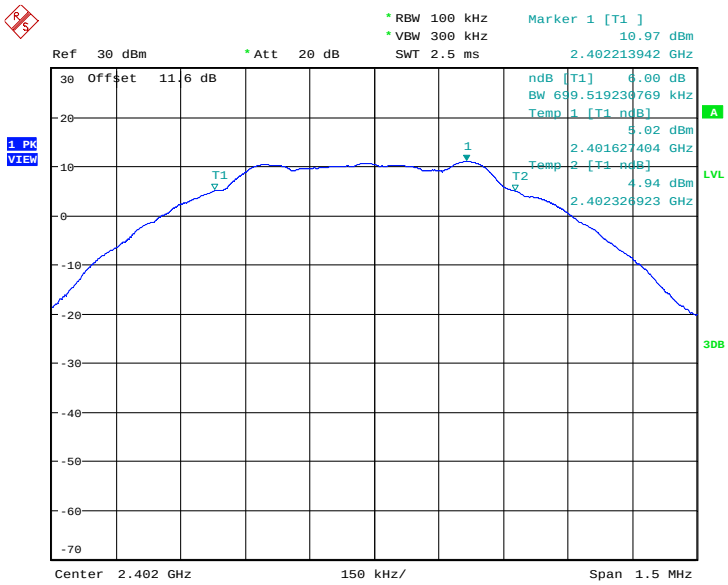
5.2.3. Test Arrangement



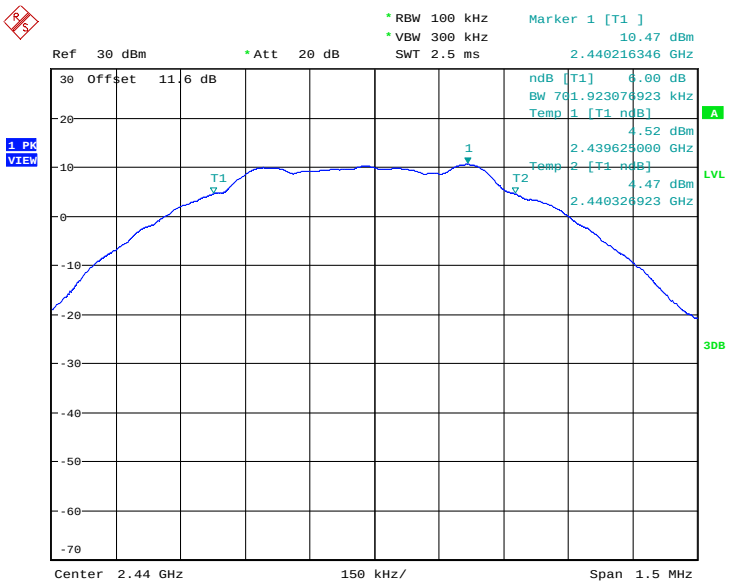
5.2.4. Test Data

Modulation	Power Setting	Data Rate (Mbps)	Channel	Frequency (MHz)	6dB BW (kHz)	Min. Limit (kHz)
GFSK	High Power (130)	1	00	2402	699.52	500
			19	2440	701.92	500
			39	2480	699.52	500
		2	00	2402	1413.46	500
			19	2440	1408.65	500
			39	2480	1413.46	500

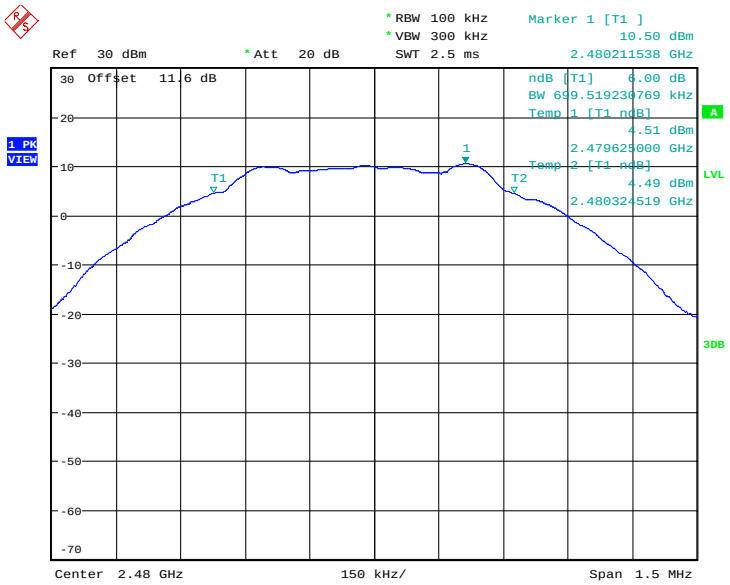
Plot 5.2.4.1. 6 dB Bandwidth, GFSK Modulation, High Power, Channel 00, 2402 MHz, 1 Mbps



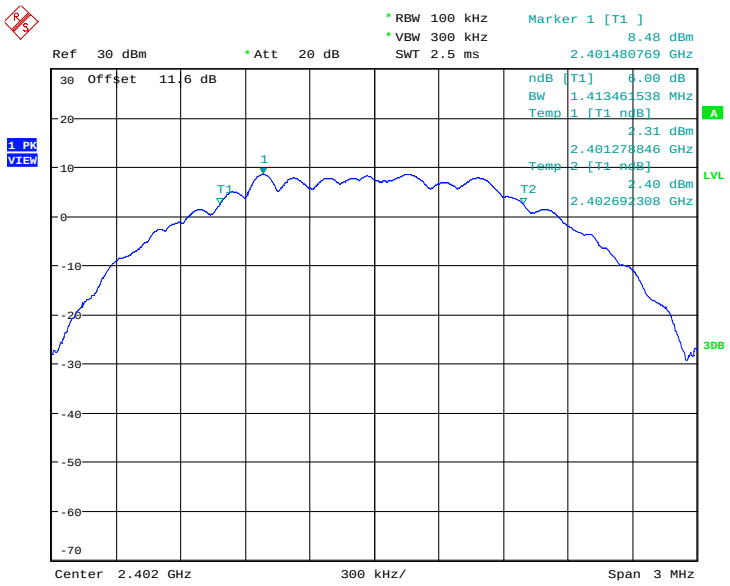
Plot 5.2.4.2. 6 dB Bandwidth, GFSK Modulation, High Power, Channel 19, 2440 MHz, 1 Mbps



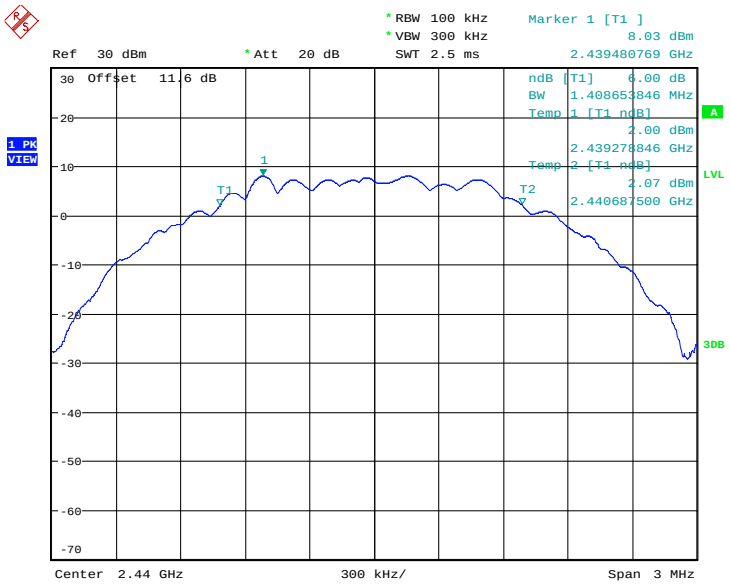
Plot 5.2.4.3. 6 dB Bandwidth, GFSK Modulation, High Power, Channel 39, 2480 MHz, 1 Mbps



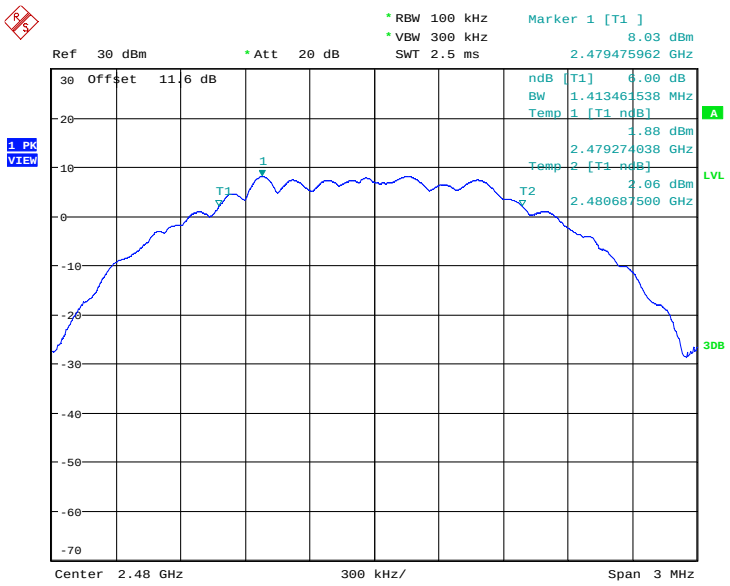
Plot 5.2.4.4. 6 dB Bandwidth, GFSK Modulation, High Power, Channel 00, 2402 MHz, 2 Mbps



Plot 5.2.4.5. 6 dB Bandwidth, GFSK Modulation, High Power, Channel 19, 2440 MHz, 2 Mbps



Plot 5.2.4.6. 6 dB Bandwidth, GFSK Modulation, High Power, Channel 39, 2480 MHz, 2 Mbps



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

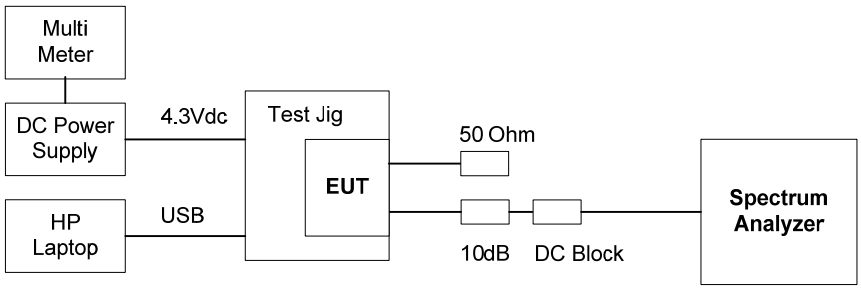
5.3.1. Limit(s)

§ 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.

5.3.2. Method of Measurements & Test Arrangement

KDB 558074 D01 DTS Meas Guidance V04, Section 9.1.1 RBW ≥ DTS bandwidth

5.3.3. Test Arrangement



5.3.4. Test Data

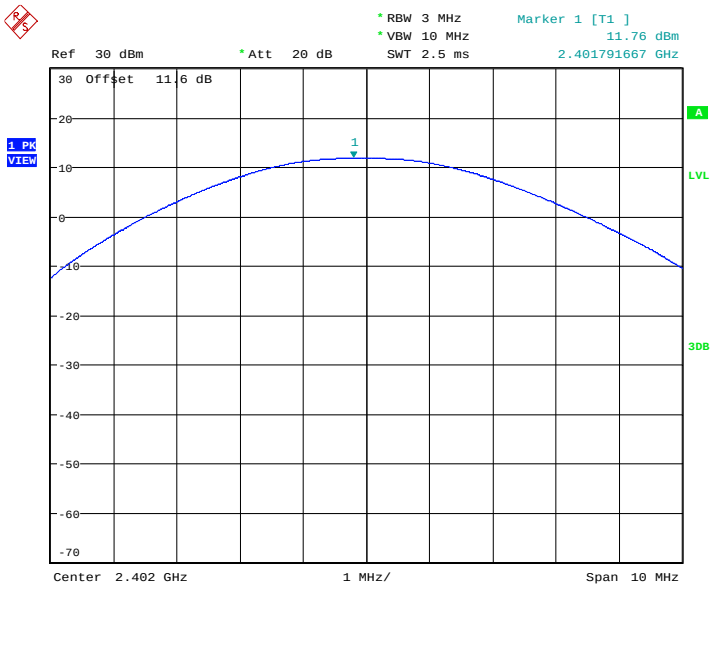
Peak Conducted Power at High and Low Power Settings

Modulation	Power Setting	Data Rate (Mbps)	Channel	Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)
GFSK	High Power (130)	1	00	2402	11.76	30
			19	2440	11.31	30
			39	2480	11.35	30
		2	00	2402	11.72	30
			19	2440	11.34	30
			39	2480	11.37	30
	Low Power (0)	1	00	2402	-0.99	30
			19	2440	-1.23	30
			39	2480	-1.04	30
		2	00	2402	-1.02	30
			19	2440	-1.21	30
			39	2480	-1.05	30

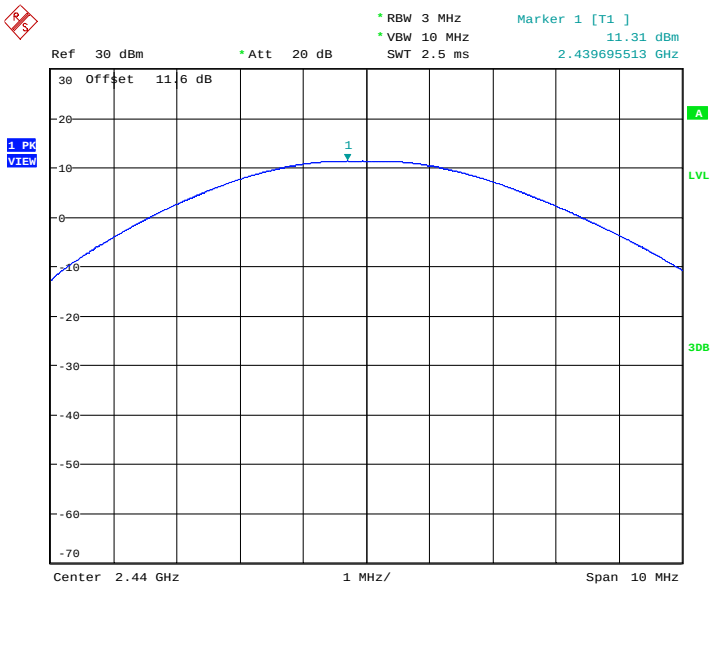
Power Level, Antenna Details and Resulting EIRP Values

Maximum Conducted Power: 11.76 dBm				
Assembly #	**Antenna Type**	**Maximum Gain (dBi)**	**Minimum Insertion / Cable Loss (dBm)**	**EIRP (dBm)**
1	Integral Antenna	-2.5	0	9.26
2	Dipole Antenna	2.1	0	13.86
3	Flex PCB Antenna	4.4	0	16.16

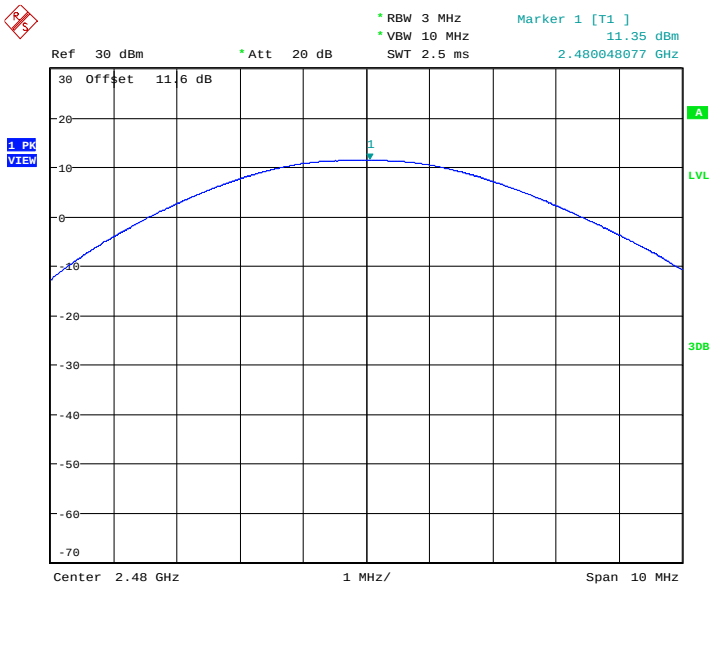
Plot 5.3.4.1. Maximum Peak Conducted Output Power, GFSK Modulation, High Power, 1 Mbps, Ch 00, 2402 MHz



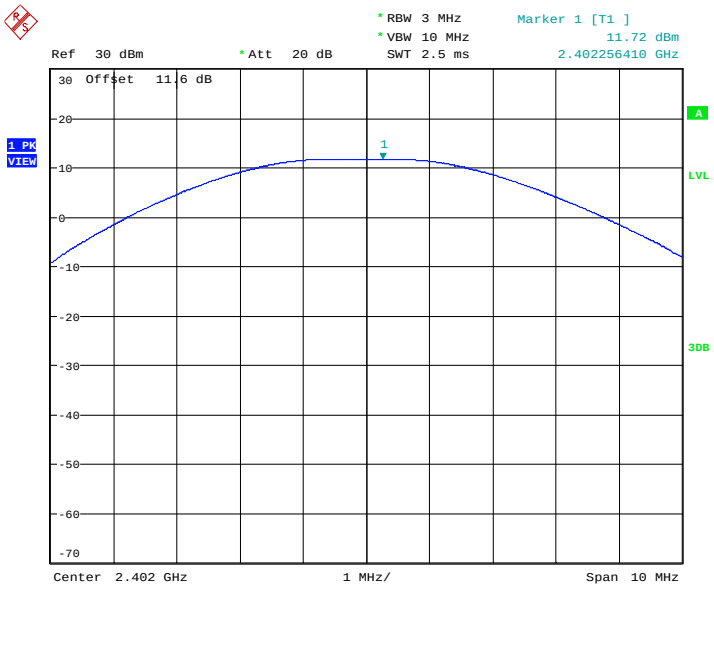
Plot 5.3.4.2. Maximum Peak Conducted Output Power, GFSK Modulation, High Power, 1 Mbps, Ch 19, 2440 MHz



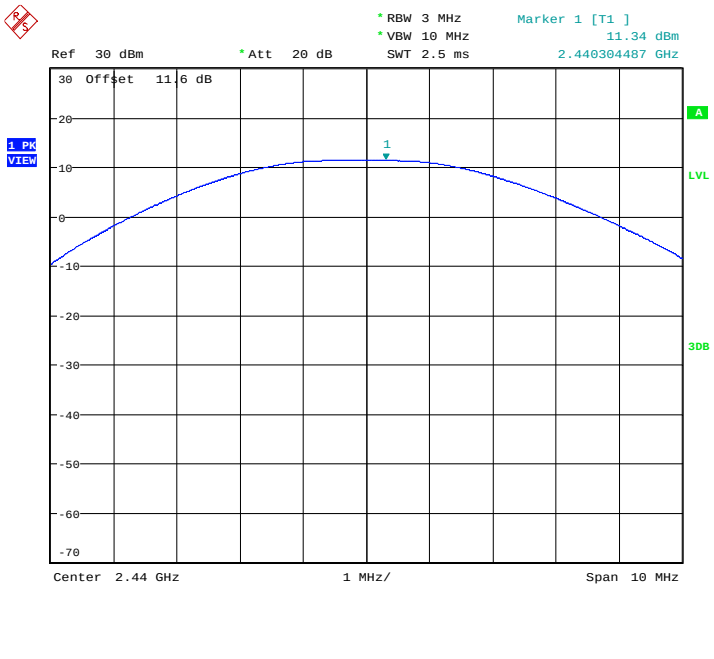
Plot 5.3.4.3. Maximum Peak Conducted Output Power, GFSK Modulation, High Power, 1 Mbps, Ch 39, 2480 MHz



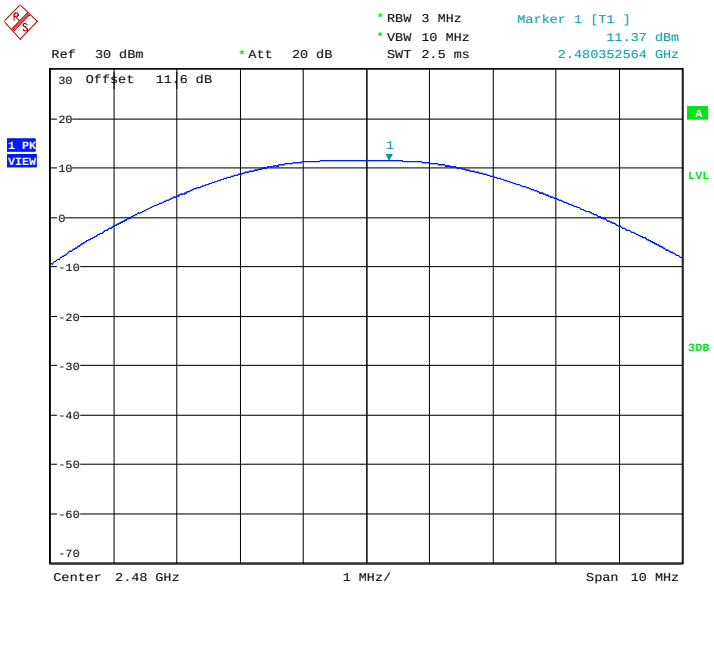
Plot 5.3.4.4. Maximum Peak Conducted Output Power, GFSK Modulation, High Power, 2 Mbps, Ch 00, 2402 MHz



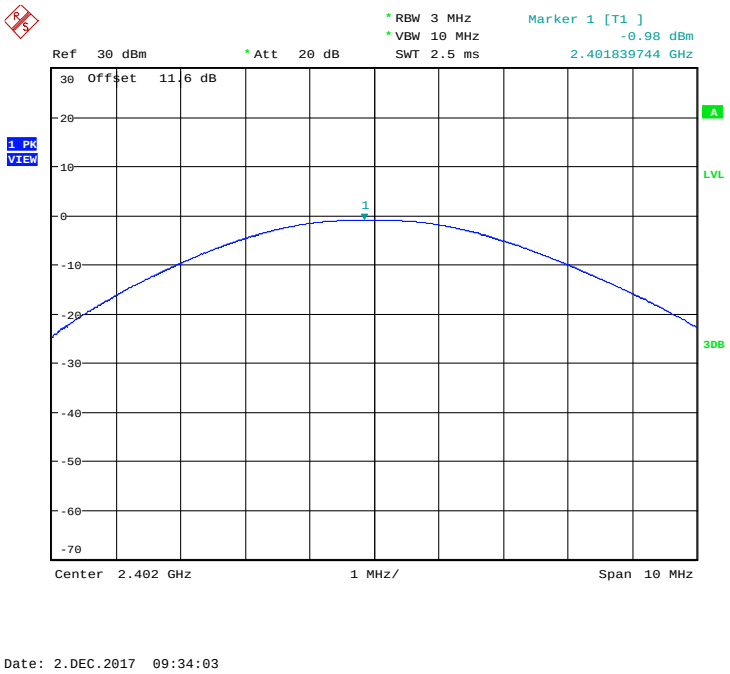
Plot 5.3.4.5. Maximum Peak Conducted Output Power, GFSK Modulation, High Power, 2 Mbps, Ch 19, 2440 MHz



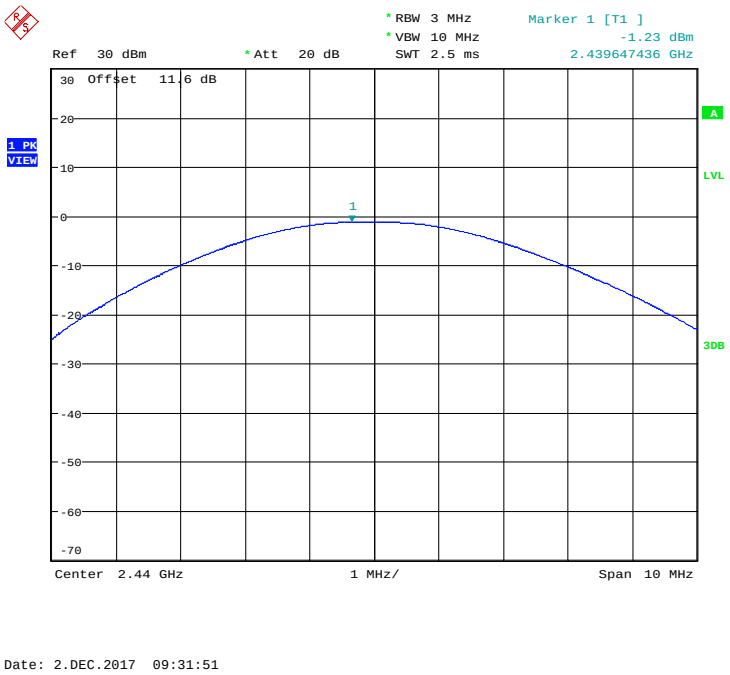
Plot 5.3.4.6. Maximum Peak Conducted Output Power, GFSK Modulation, High Power, 2 Mbps, Ch 39, 2480 MHz



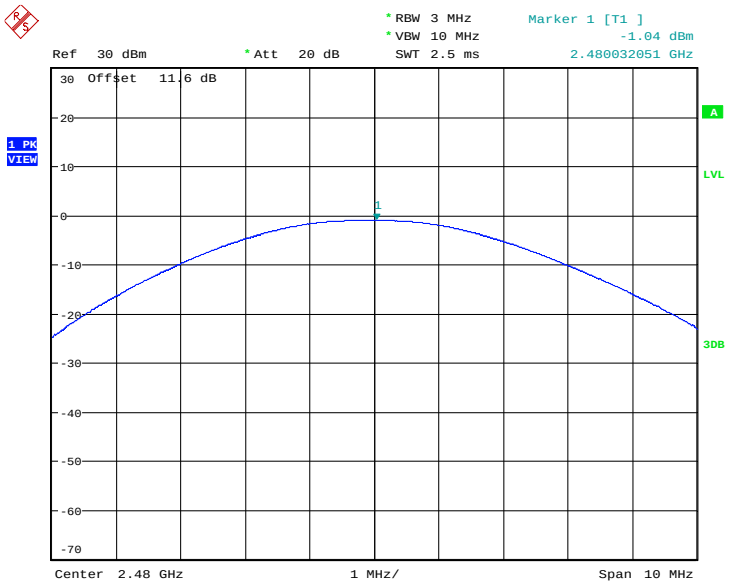
Plot 5.3.4.7. Maximum Peak Conducted Output Power, GFSK Modulation, Low Power, 1 Mbps, Ch 00, 2402 MHz



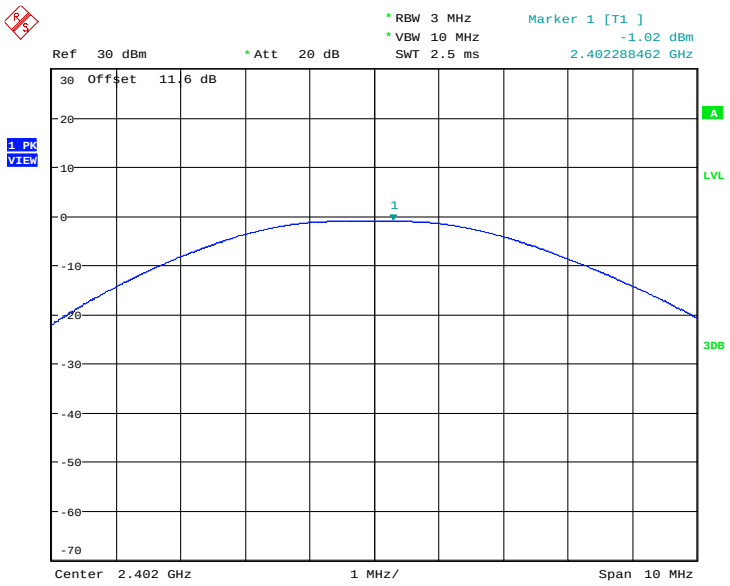
Plot 5.3.4.8. Maximum Peak Conducted Output Power, GFSK Modulation, Low Power, 1 Mbps, Ch 19, 2440 MHz



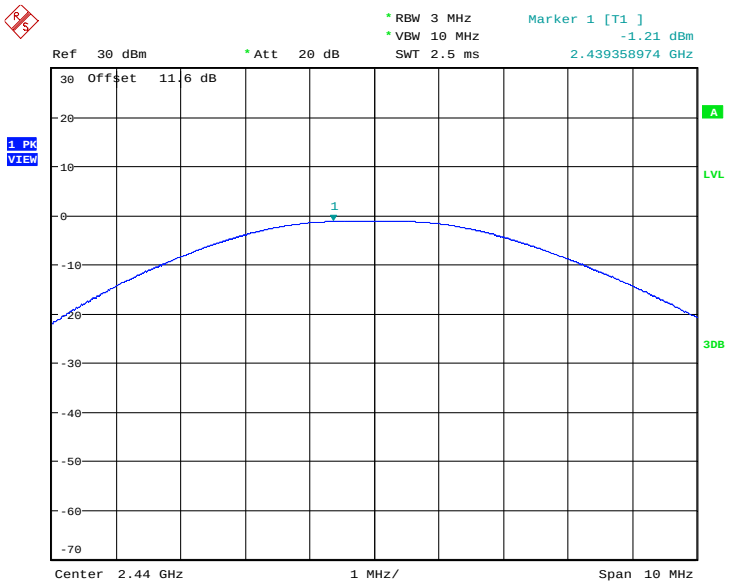
Plot 5.3.4.9. Maximum Peak Conducted Output Power, GFSK Modulation, Low Power, 1 Mbps, Ch 39, 2480 MHz



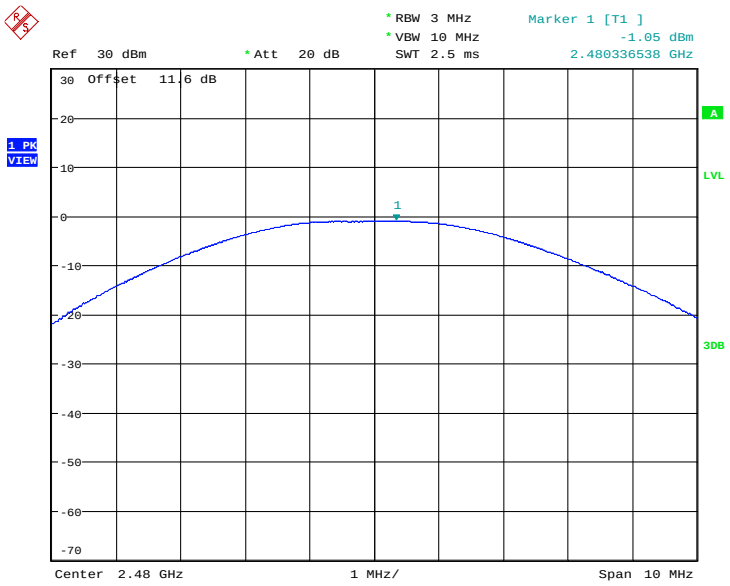
Plot 5.3.4.10. Maximum Peak Conducted Output Power, GFSK Modulation, Low Power, 2 Mbps, Ch 00, 2402 MHz



Plot 5.3.4.11. Maximum Peak Conducted Output Power, GFSK Modulation, Low Power, 2 Mbps, Ch 19, 2440 MHz



Plot 5.3.4.12. Maximum Peak Conducted Output Power, GFSK Modulation, Low Power, 2 Mbps, Ch 39, 2480 MHz



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

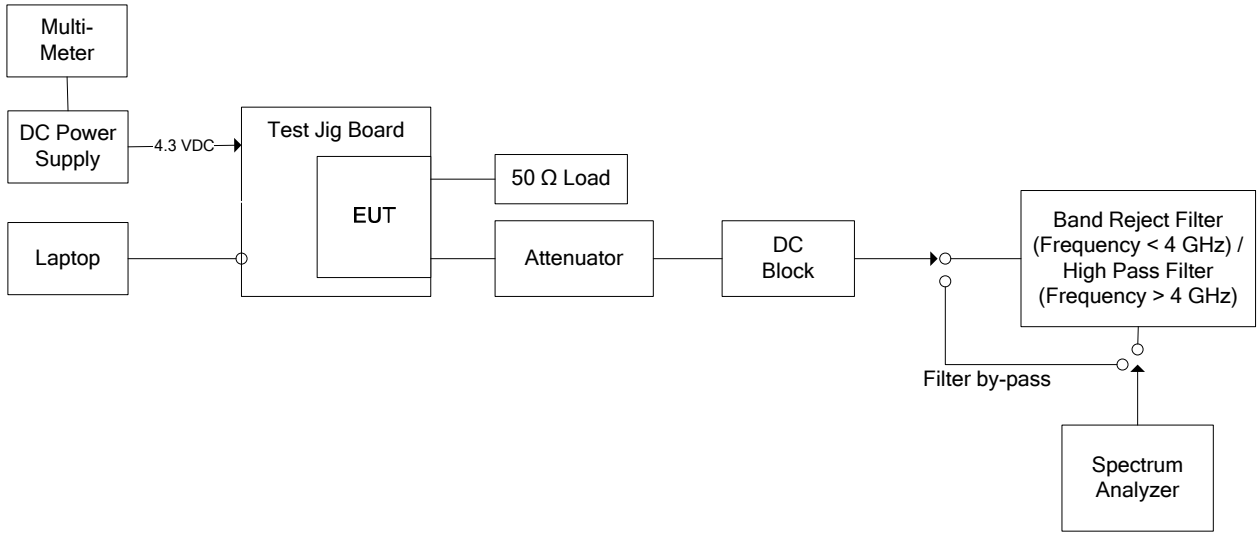
5.4.1. Limit(s)

§ 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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.4.2. Method of Measurements

KDB 558074 D01 DTS Meas Guidance V04, Sections 10, 11 and 13.
ANSI C63.10-2013, 6.10.6.2

5.4.3. Test Arrangement



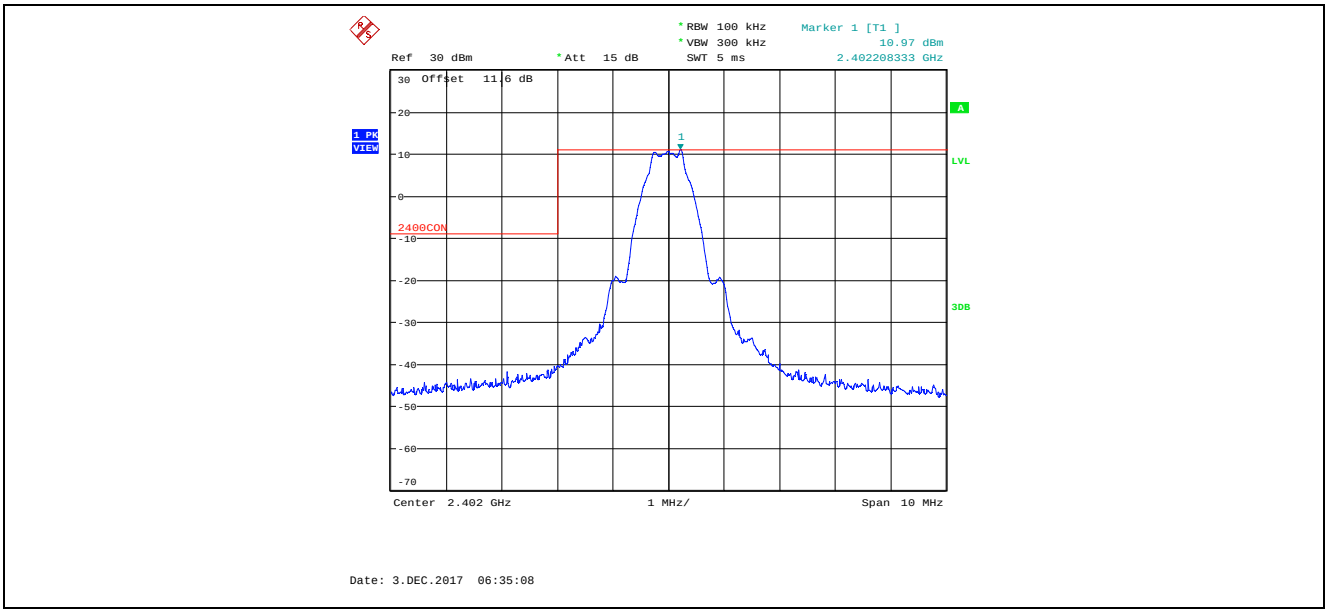
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.4.4. Test Data

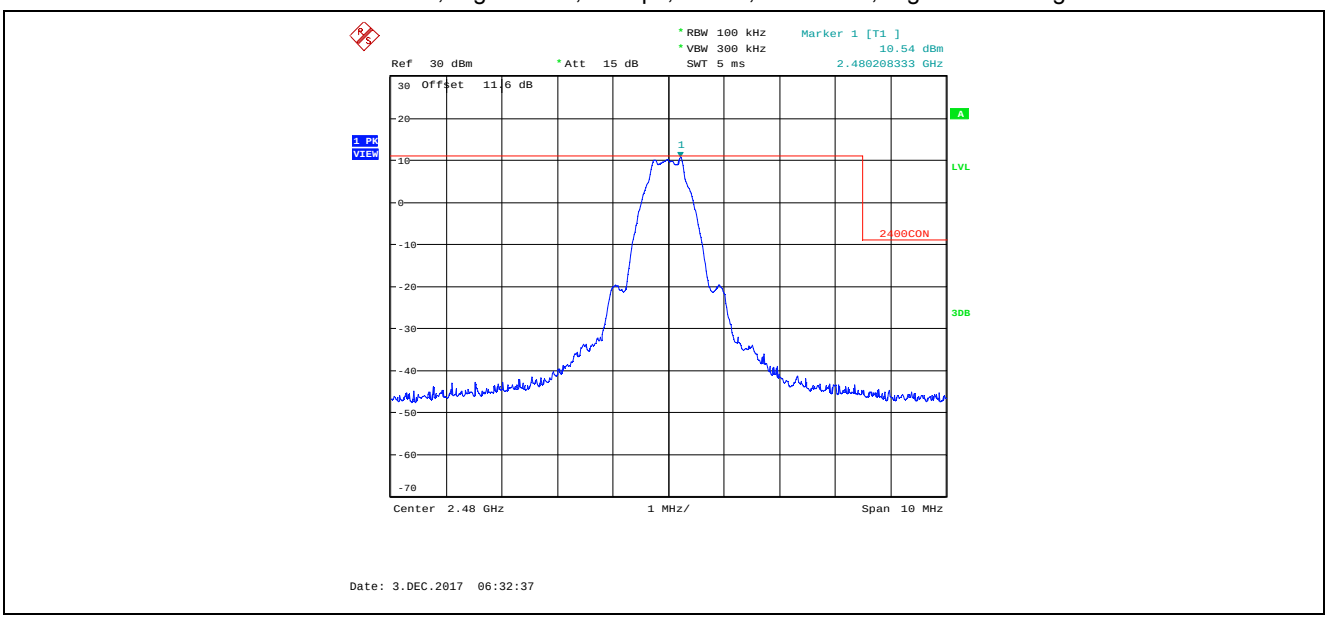
Remark(s): Exploratory tests performed to determined worst-case test configurations, the following test results represent the worst-case.

5.4.4.1. Band-Edge RF Conducted Emissions

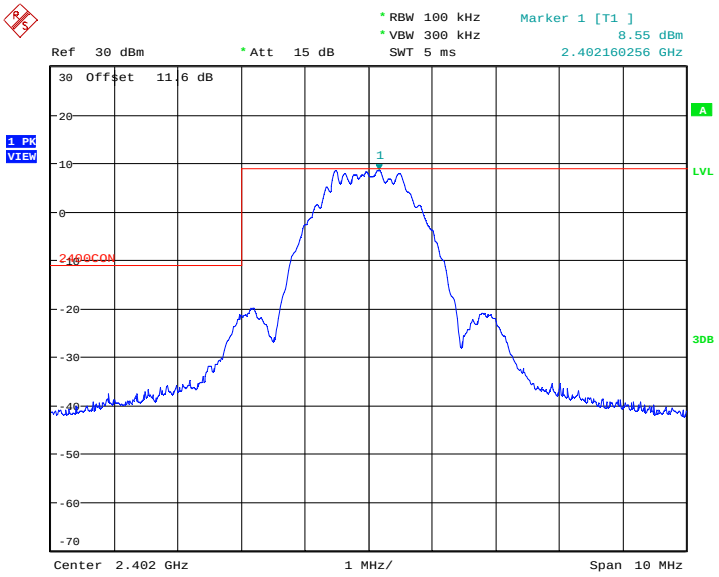
Plot 5.4.4.1.1. Band-Edge RF Conducted Emissions
GFSK Modulation, High Power, 1 Mbps, Ch 00, 2402 MHz, Lower Band-edge



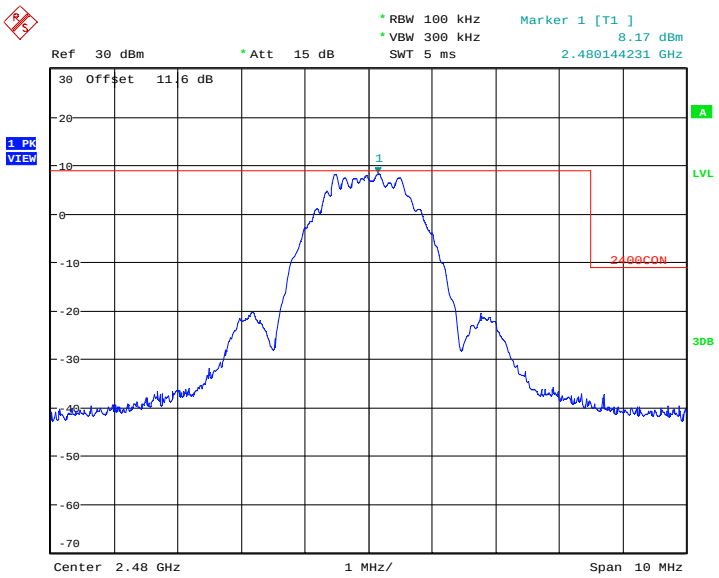
Plot 5.4.4.1.2. Band-Edge RF Conducted Emissions
GFSK Modulation, High Power, 1 Mbps, CH 39, 2480 MHz, Higher Band-edge



Plot 5.4.4.1.3. Band-Edge RF Conducted Emissions
GFSK Modulation, High Power, 2 Mbps, CH 00, 2402 MHz, Lower Band-edge

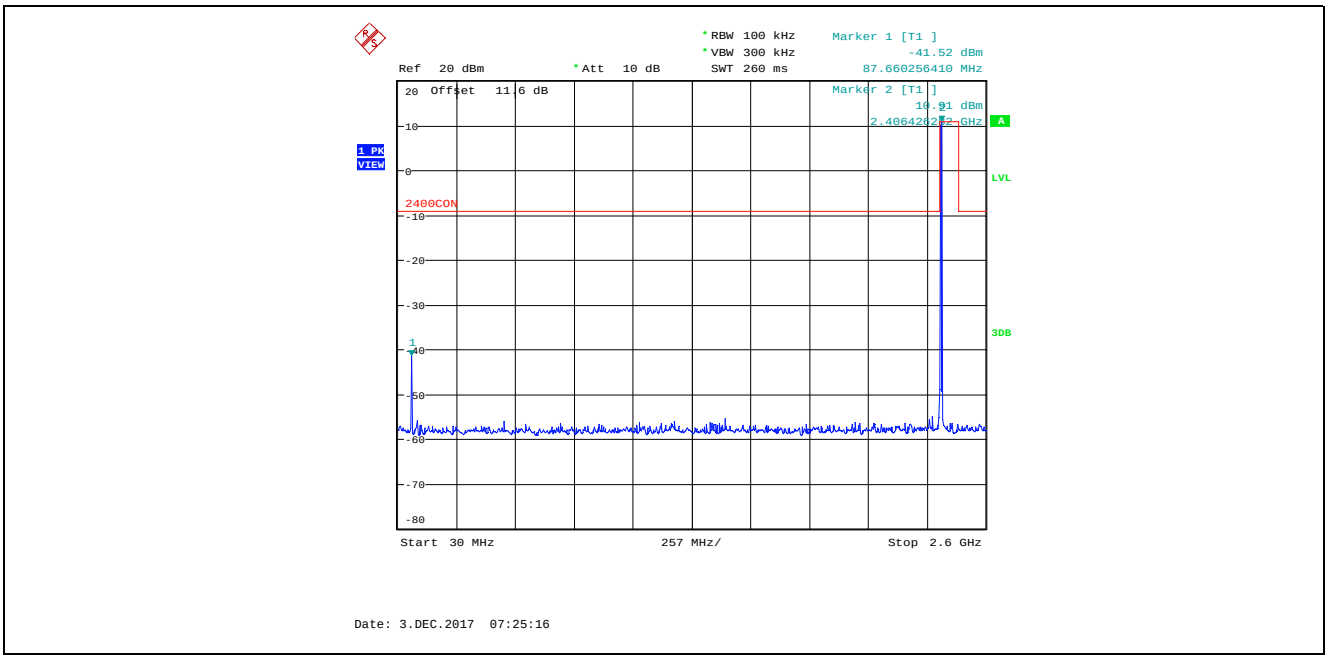


Plot 5.4.4.1.4. Band-Edge RF Conducted Emissions
GFSK Modulation, High Power, 2 Mbps, CH 39, 2480 MHz, Higher Band-edge

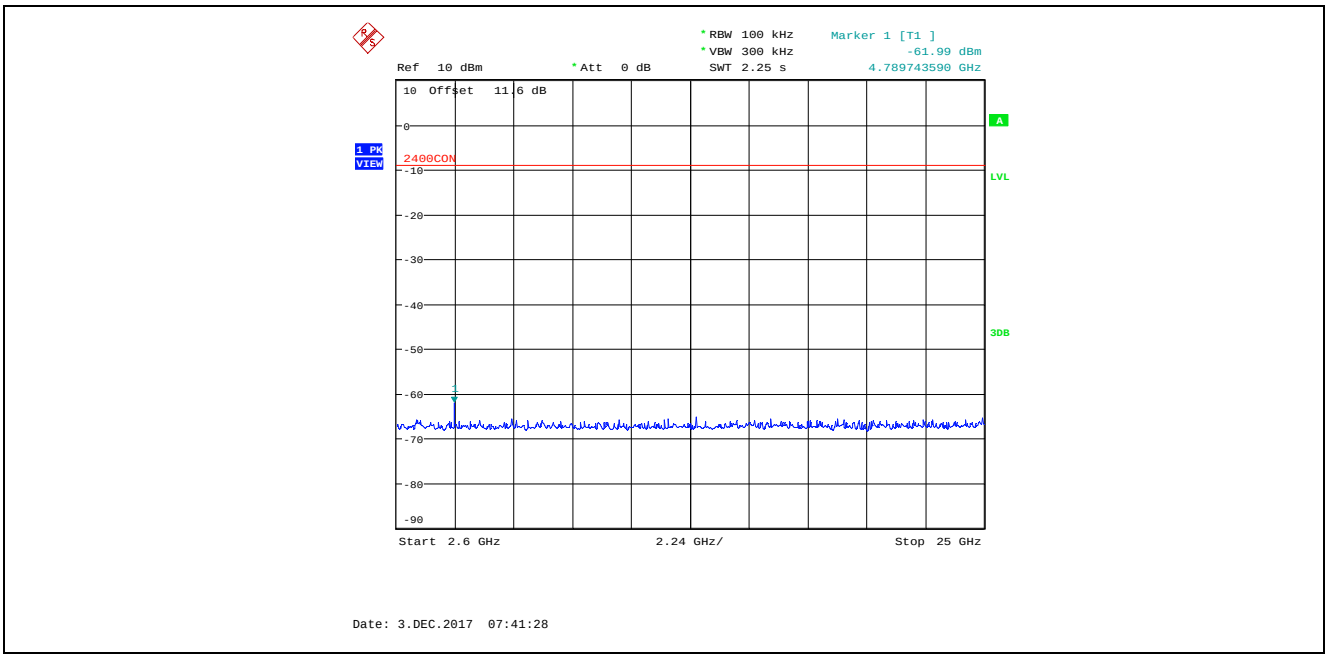


5.4.4.2. Conducted Spurious Emissions in Non-Restricted Frequency Bands, at High and Low Power Levels

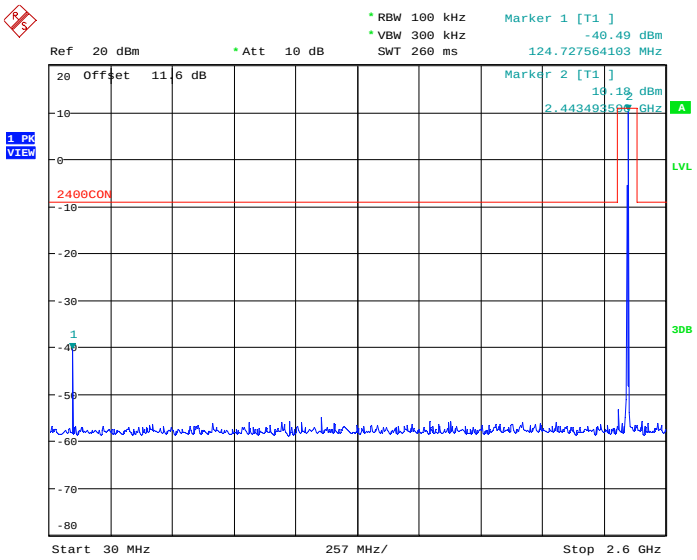
Plot 5.4.4.2.1. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 30 MHz – 2.6 GHz, Peak Detector



Plot 5.4.4.2.2. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 2.6 GHz – 25 GHz, Peak Detector

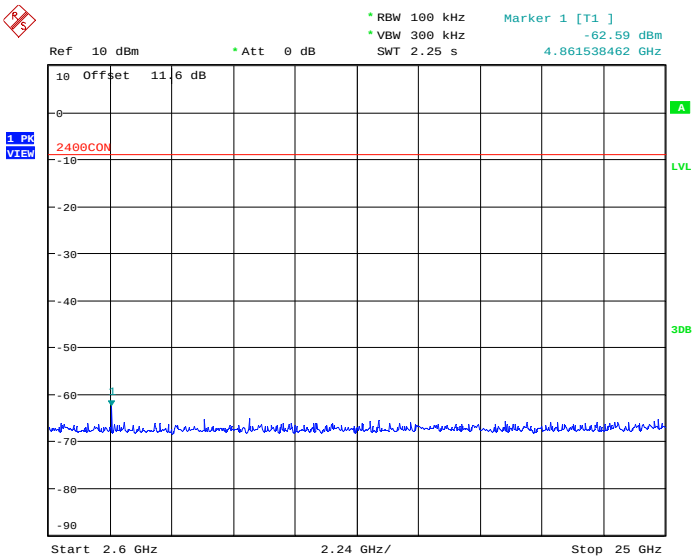


Plot 5.4.4.2.3. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 30 MHz – 2.6 GHz, Peak Detector



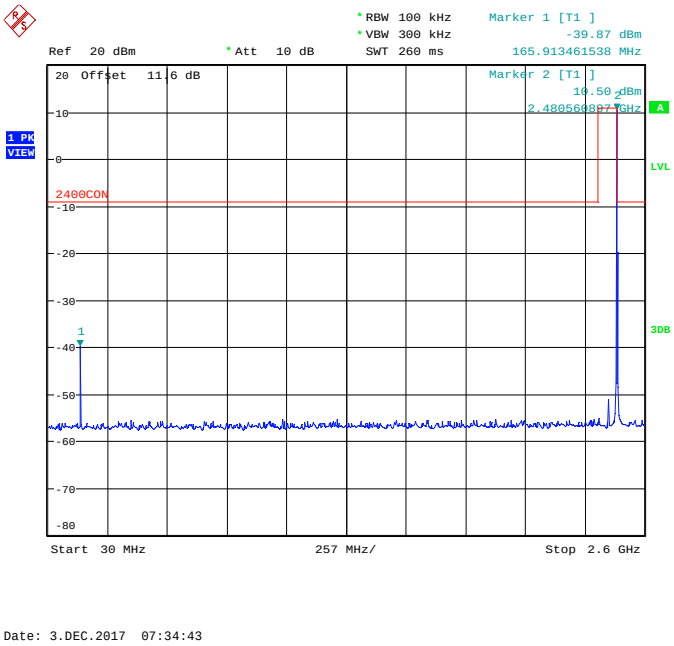
Date: 3.DEC.2017 07:28:15

Plot 5.4.4.2.4. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 2.6 GHz – 25 GHz, Peak Detector

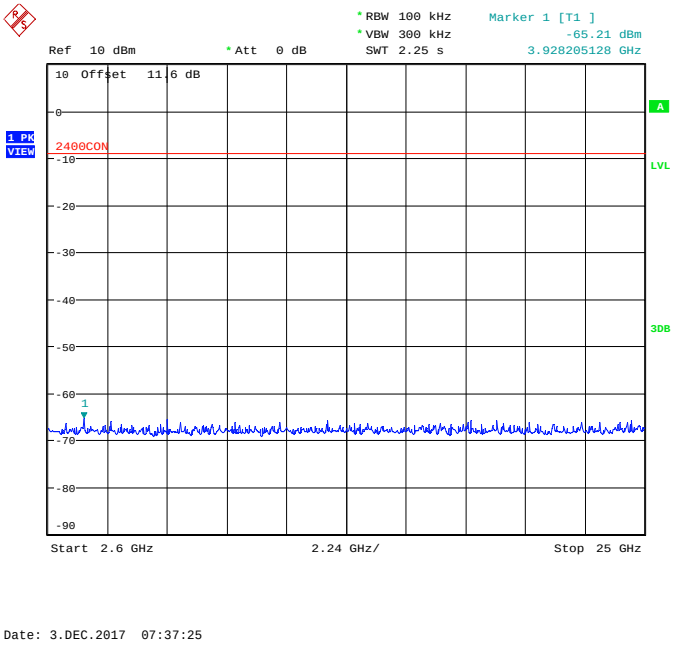


Date: 3.DEC.2017 07:39:21

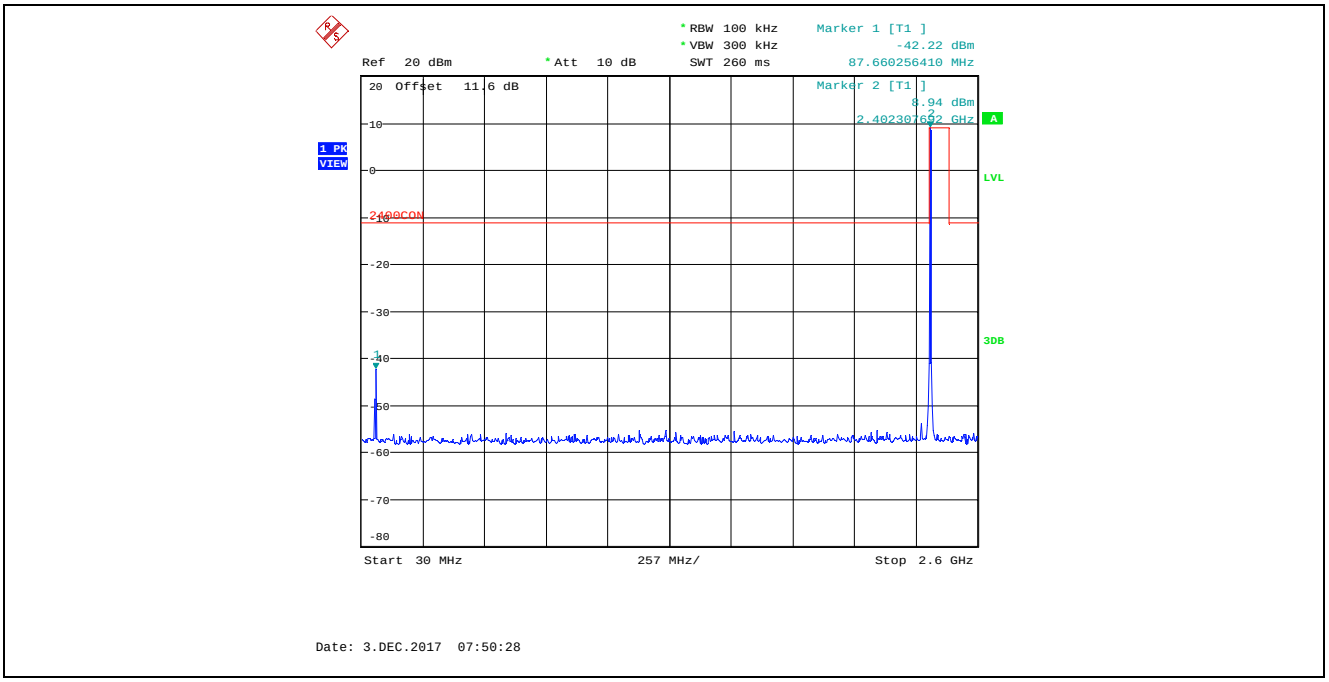
Plot 5.4.4.2.5. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 30 MHz – 2.6 GHz, Peak Detector



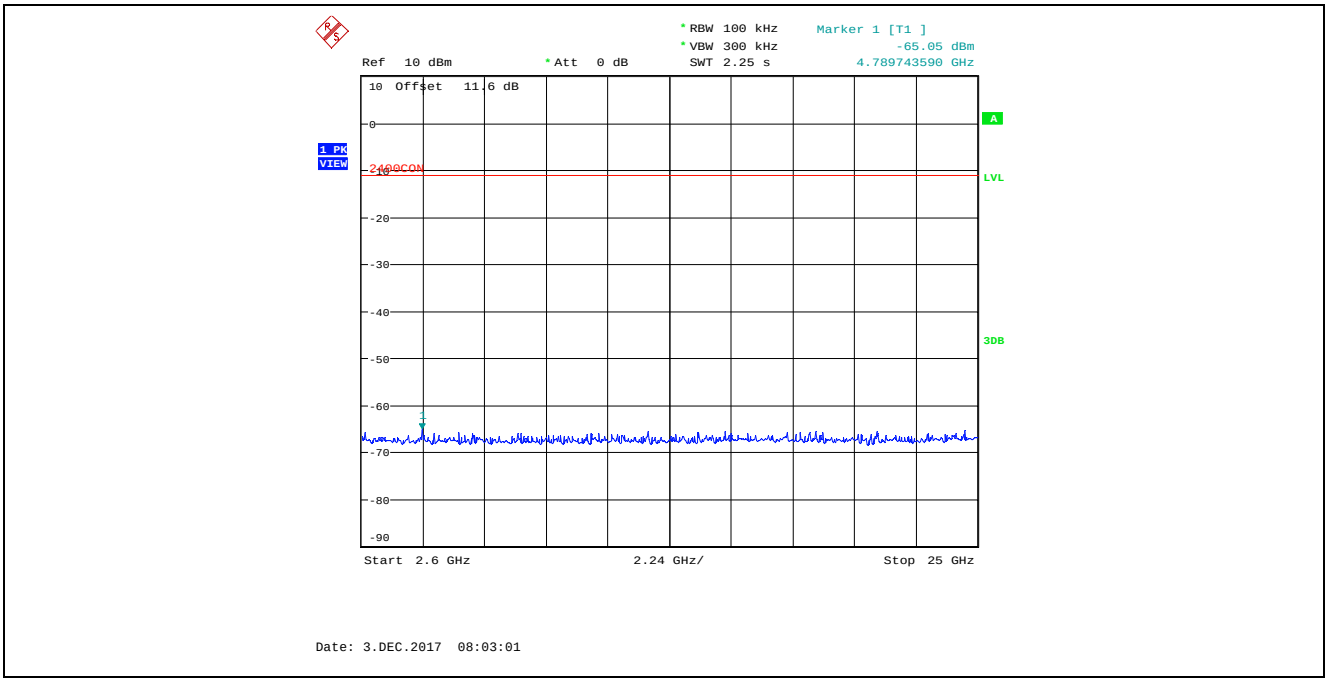
Plot 5.4.4.2.6. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 2.6 GHz – 25 GHz, Peak Detector



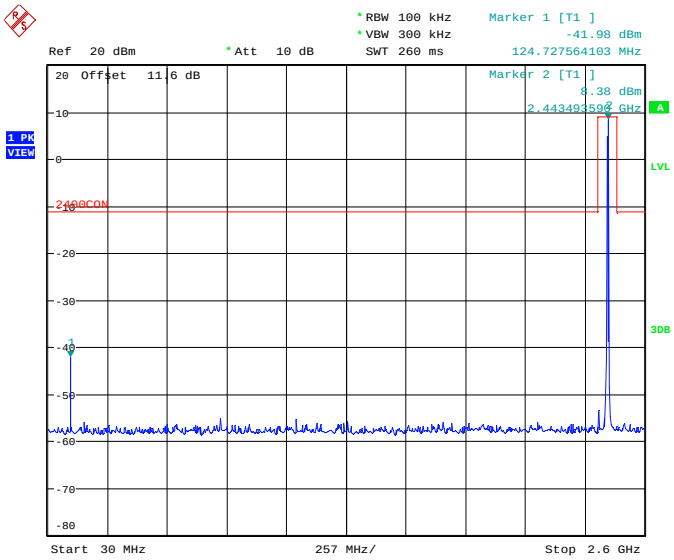
Plot 5.4.4.2.7. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 30 MHz – 2.6 GHz, Peak Detector



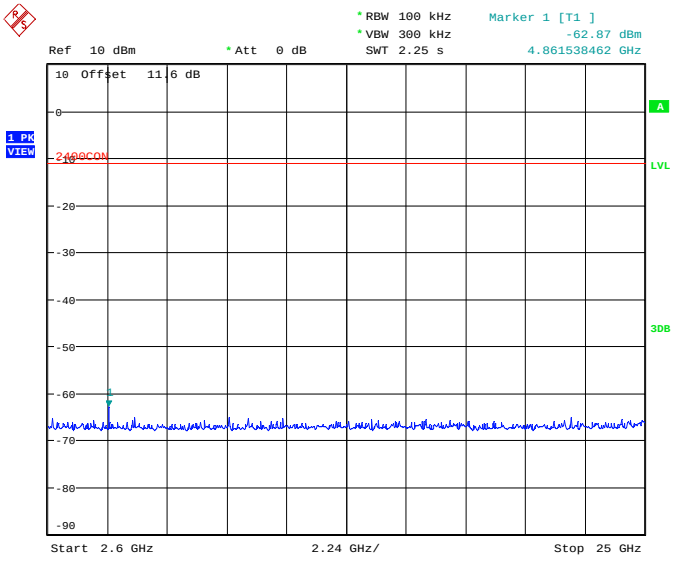
Plot 5.4.4.2.8. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 2.6 GHz – 25 GHz, Peak Detector



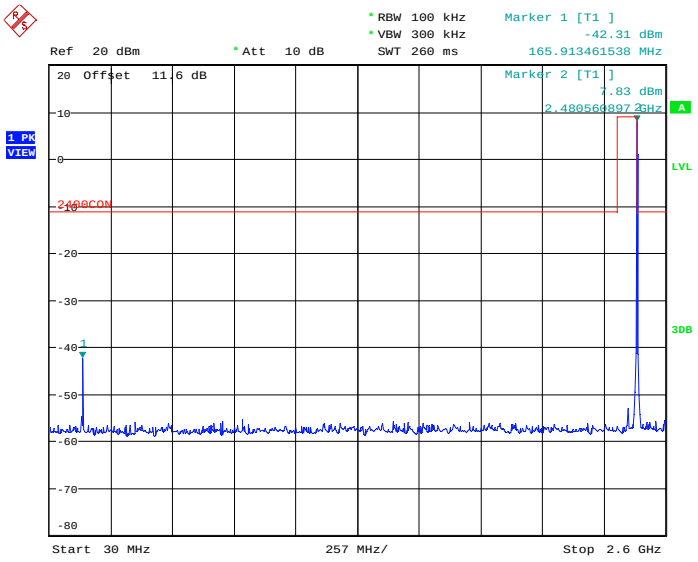
Plot 5.4.4.2.9. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 30 MHz – 2.6 GHz, Peak Detector



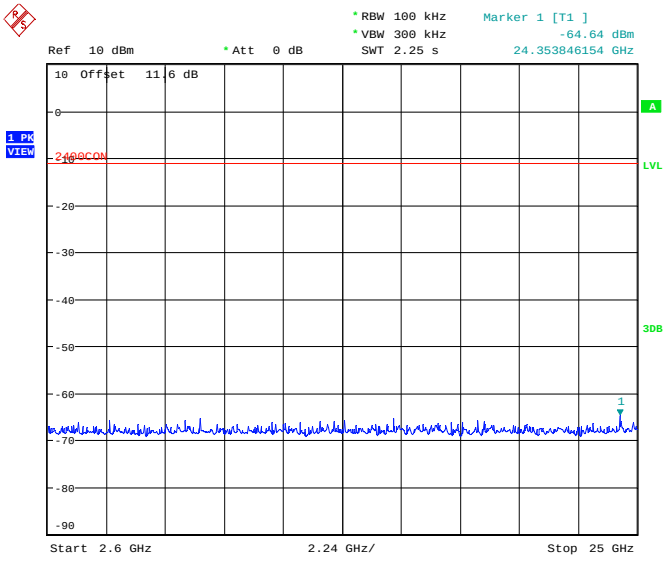
Plot 5.4.4.2.10. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 2.6 GHz – 25 GHz, Peak Detector



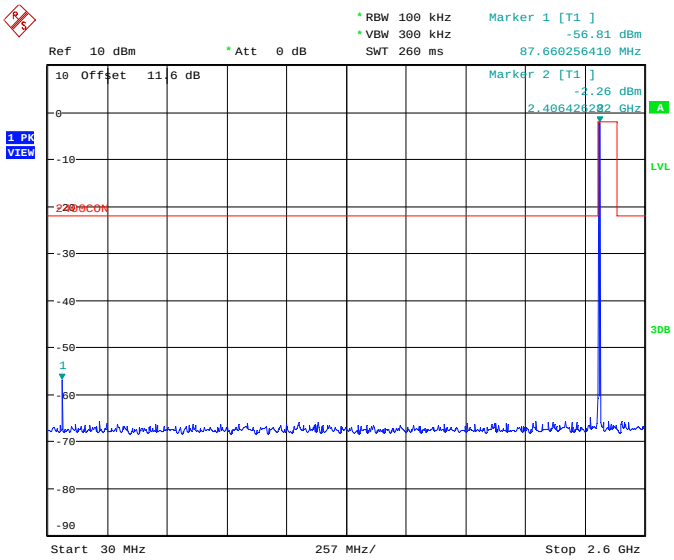
Plot 5.4.4.2.11. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 30 MHz – 2.6 GHz, Peak Detector



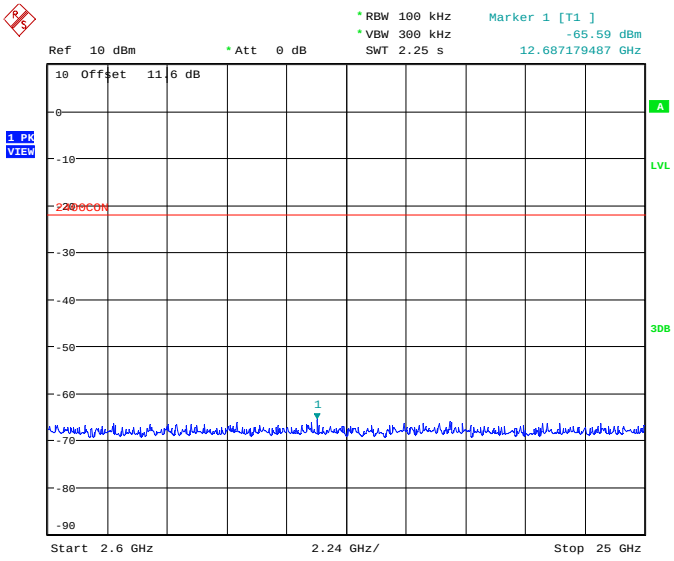
Plot 5.4.4.2.12. Conducted Spurious Emissions in Non-Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 2.6 GHz – 25 GHz, Peak Detector



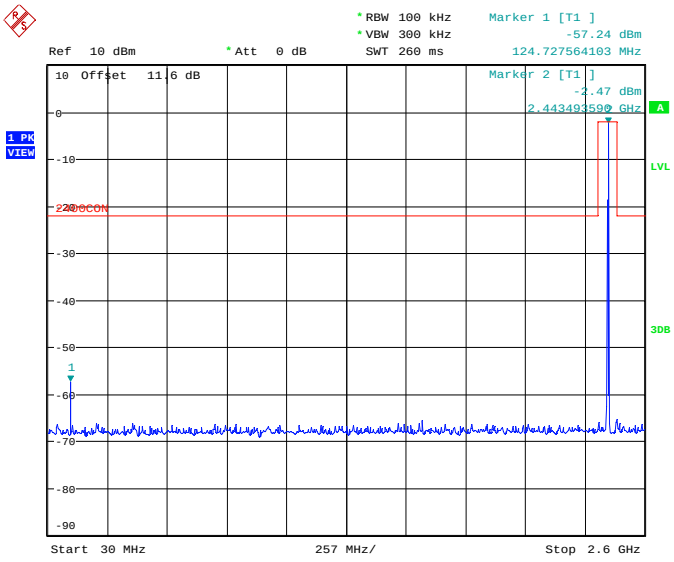
Plot 5.4.4.2.13. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2402 MHz, GFSK Modulation, 1 Mbps, 30 MHz – 2.6 GHz, Peak Detector



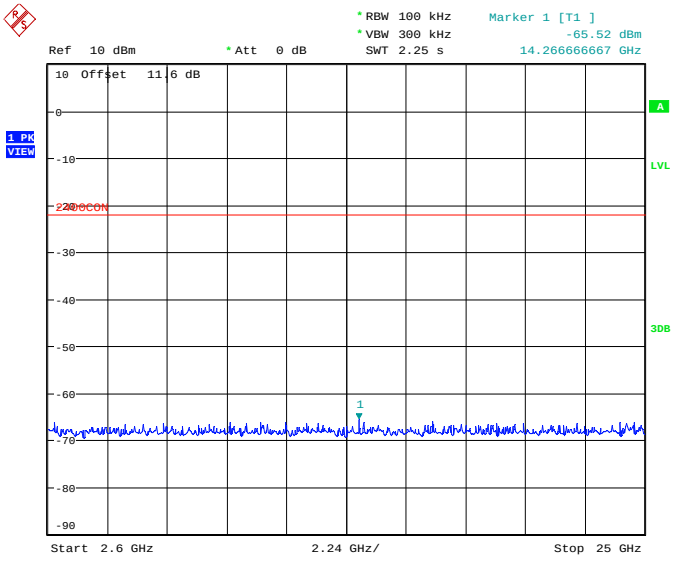
Plot 5.4.4.2.14. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2402 MHz, GFSK Modulation, 1 Mbps, 2.6 GHz – 25 GHz, Peak Detector



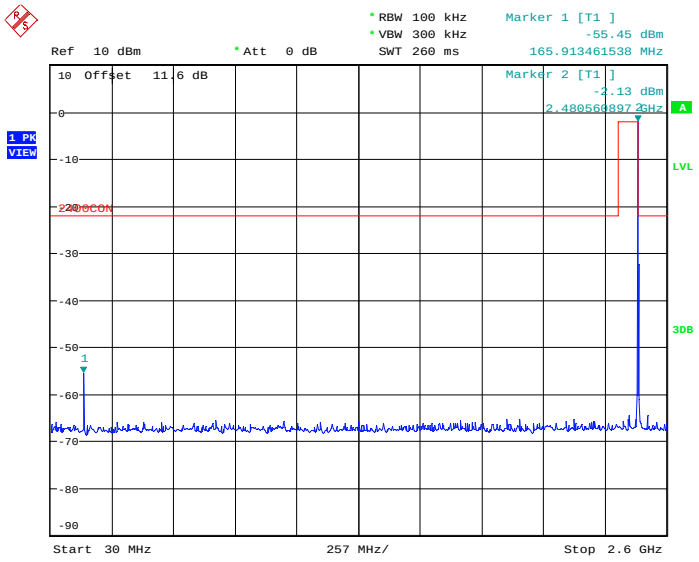
Plot 5.4.4.2.15. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2440 MHz, GFSK Modulation, 1 Mbps, 30 MHz – 2.6 GHz, Peak Detector



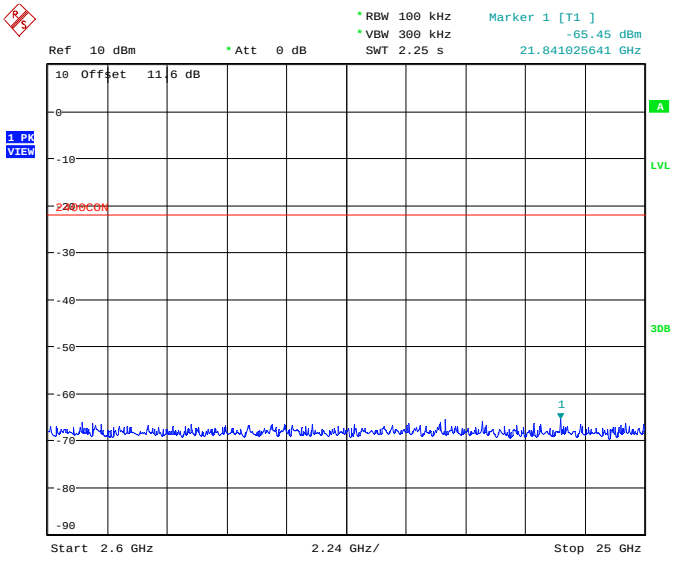
Plot 5.4.4.2.16. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2440 MHz, GFSK Modulation, 1 Mbps, 2.6 GHz – 25 GHz, Peak Detector



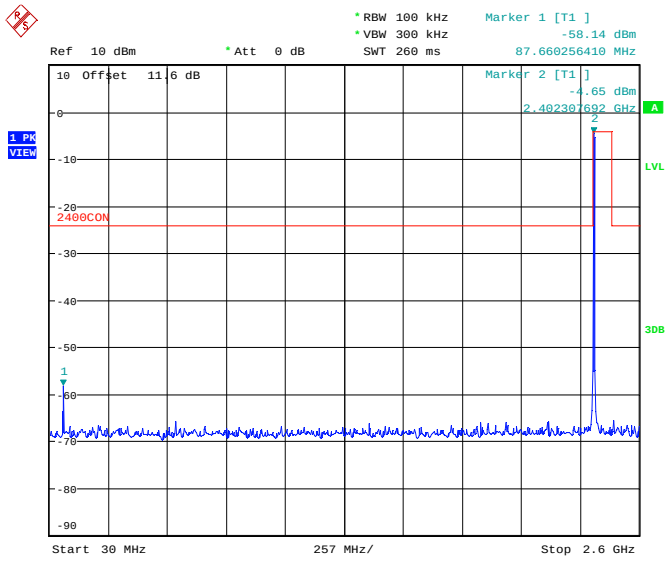
Plot 5.4.4.2.17. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2480 MHz, GFSK Modulation, 1 Mbps, 30 MHz – 2.6 GHz, Peak Detector



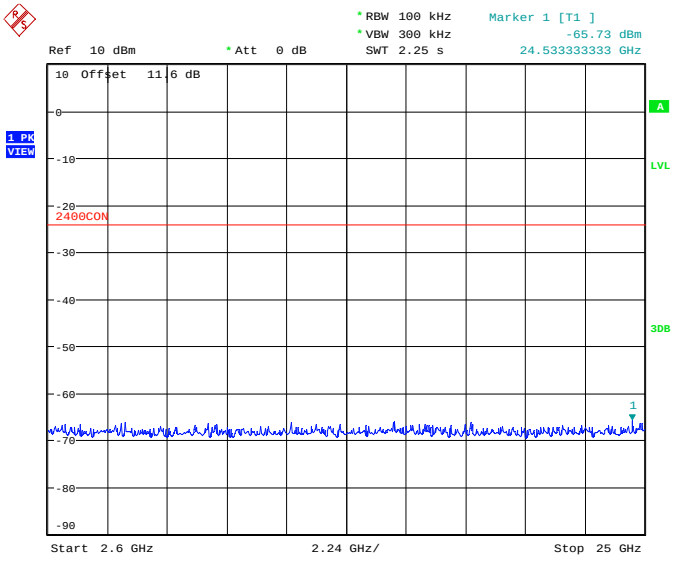
Plot 5.4.4.2.18. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2480 MHz, GFSK Modulation, 1 Mbps, 2.6 GHz – 25 GHz, Peak Detector



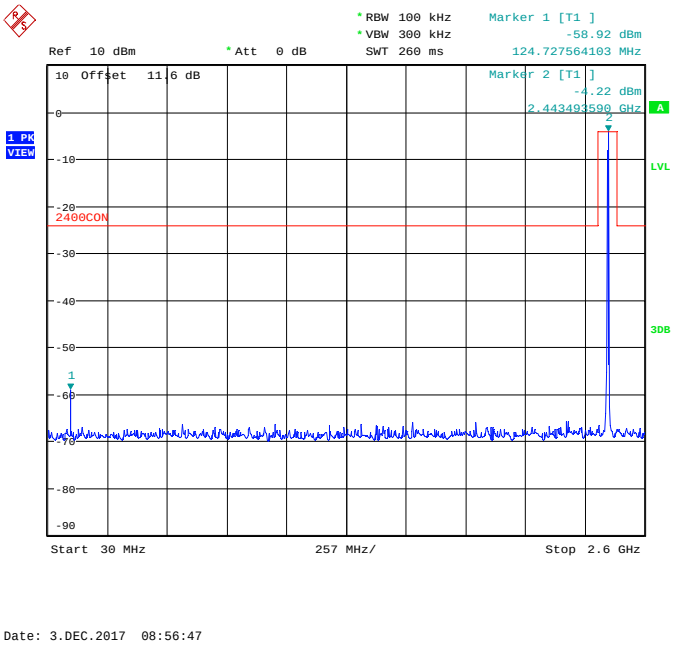
Plot 5.4.4.2.19. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2402 MHz, GFSK Modulation, 2 Mbps, 30 MHz – 2.6 GHz, Peak Detector



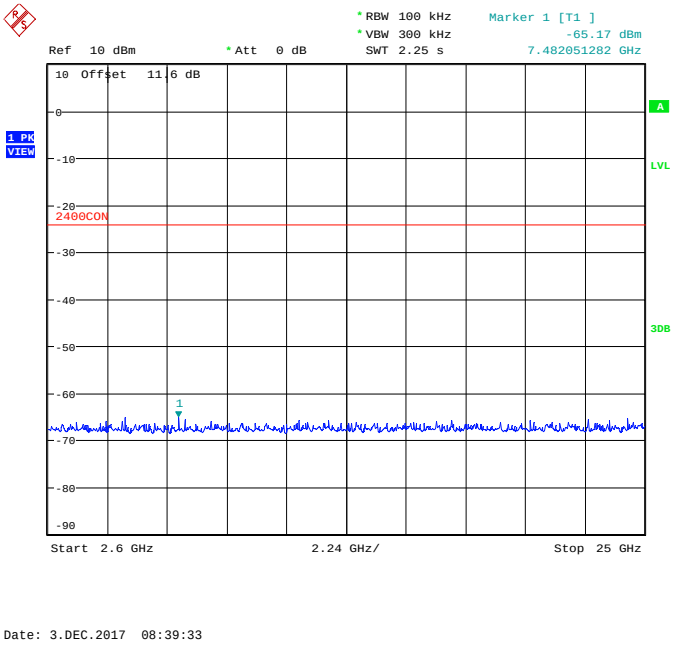
Plot 5.4.4.2.20. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2402 MHz, GFSK Modulation, 2 Mbps, 2.6 GHz – 25 GHz, Peak Detector



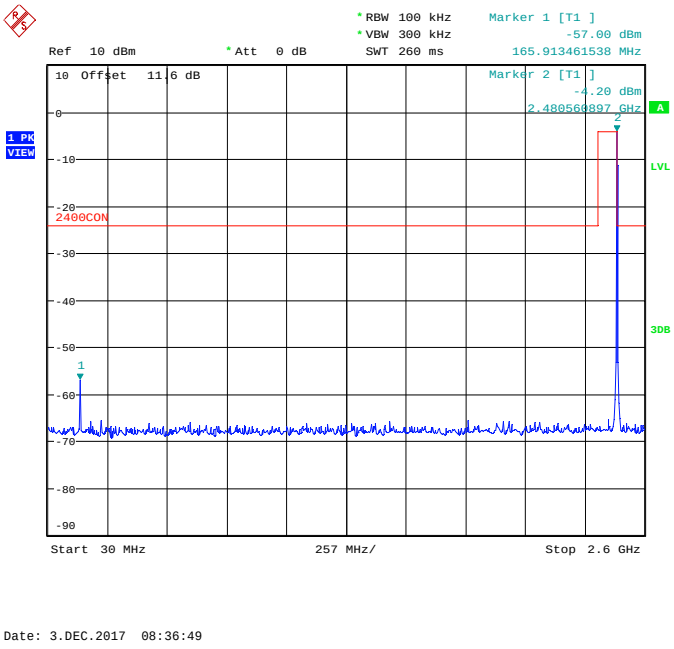
Plot 5.4.4.2.21. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2440 MHz, GFSK Modulation, 2 Mbps, 30 MHz – 2.6 GHz, Peak Detector



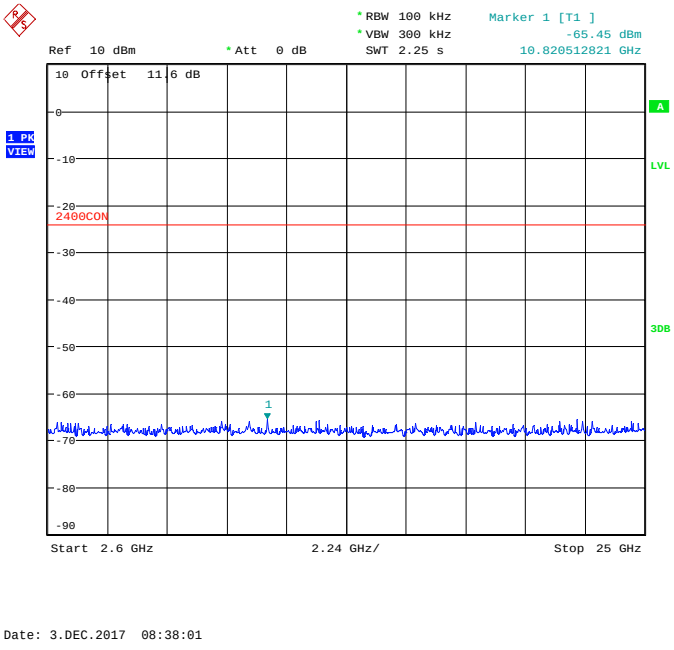
Plot 5.4.4.2.22. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power
2440 MHz, GFSK Modulation, 2 Mbps, 2.6 GHz – 25 GHz, Peak Detector



Plot 5.4.4.2.23. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power 2480 MHz, GFSK Modulation, 2 Mbps, 30 MHz – 2.6 GHz, Peak Detector



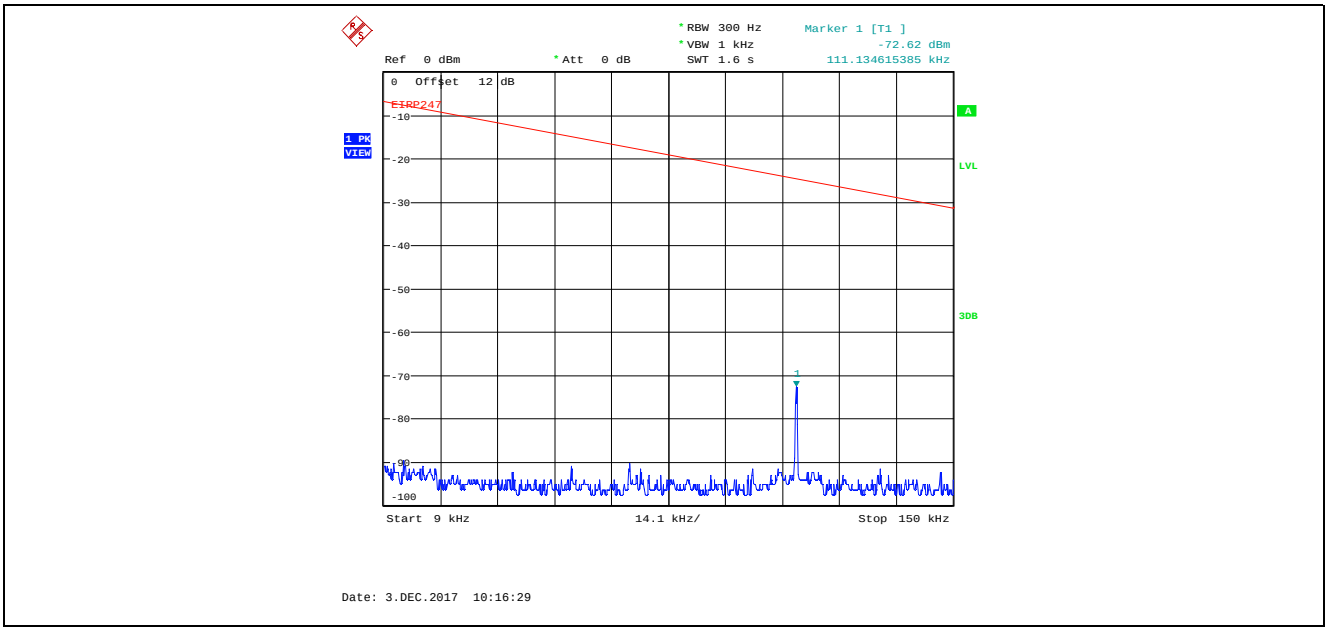
Plot 5.4.4.2.24. Conducted Spurious Emissions in Non-Restricted Frequency Bands, Low Power 2480 MHz, GFSK Modulation, 2 Mbps, 2.6 GHz – 25 GHz, Peak Detector



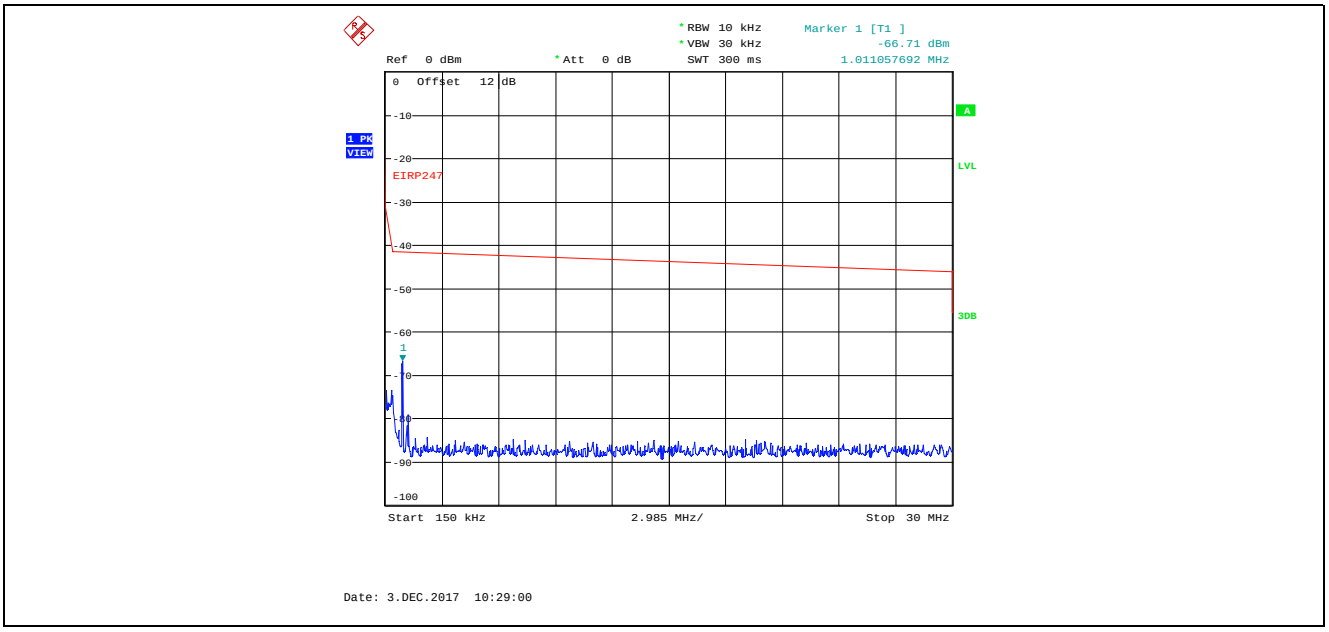
5.4.4.3. Conducted Spurious Emissions in Restricted Frequency Bands with Antenna Assembly Gain of 4.4 dBi)

Remark: Offset = [Insertion Loss] + [Transmit Antenna Gain (in dBi)] + [Maximum Ground Reflection Factor]

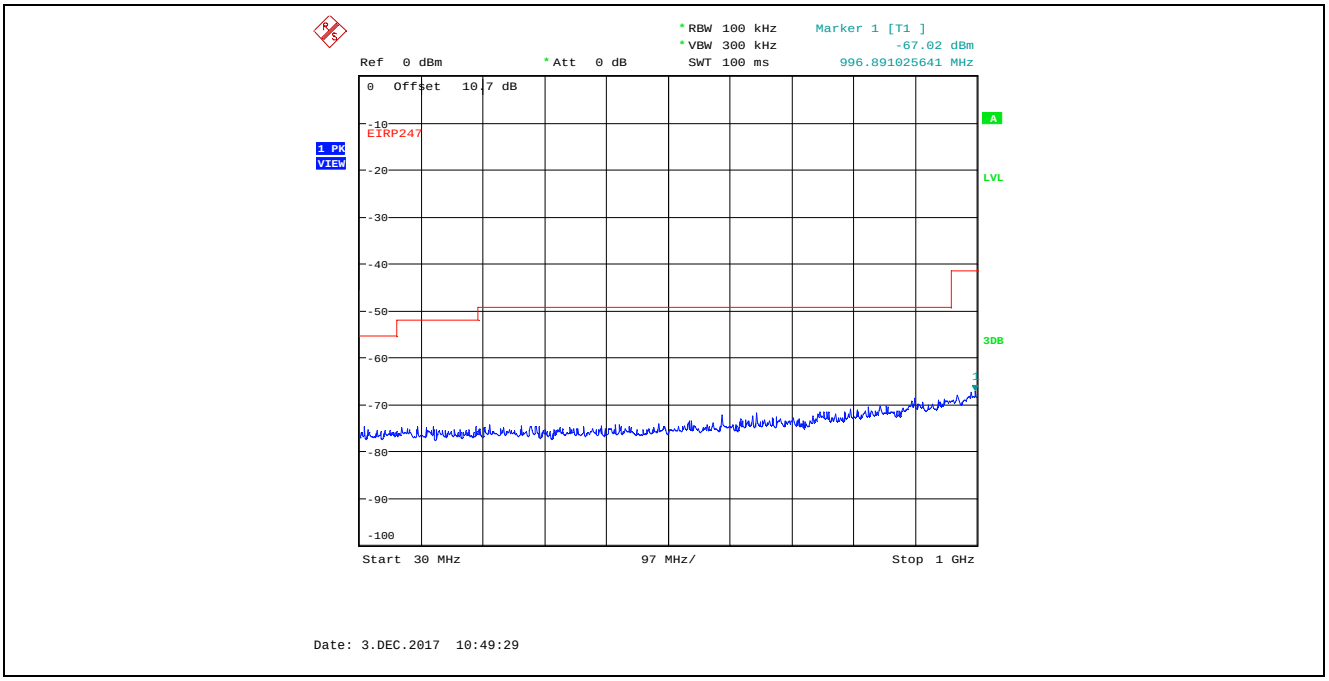
Plot 5.4.4.3.1. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 9 kHz - 150 kHz, Peak Detector



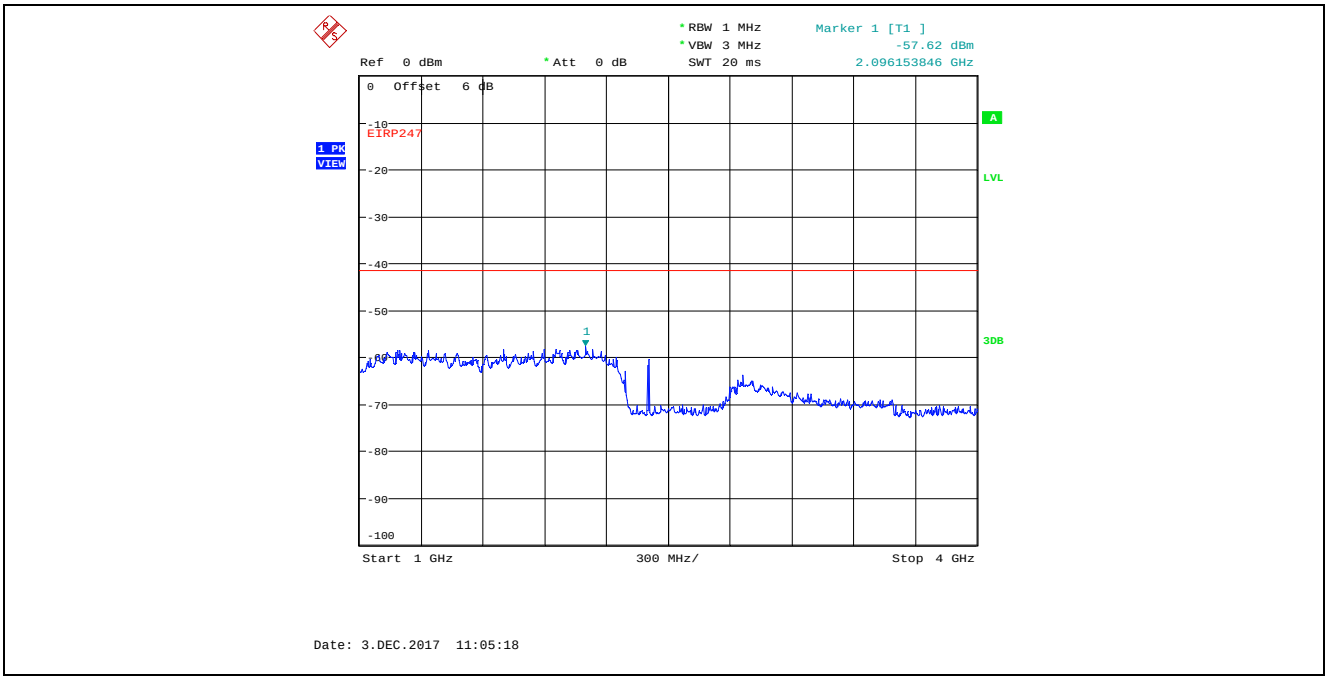
Plot 5.4.4.3.2. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 150 kHz - 30 MHz, Peak Detector



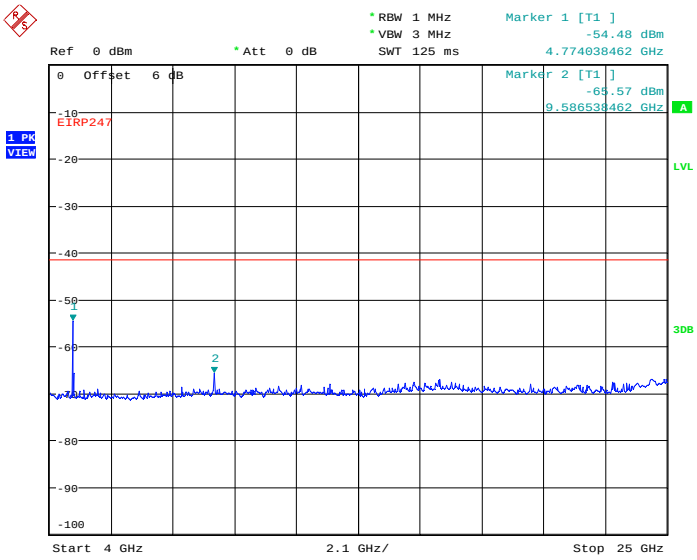
Plot 5.4.4.3.3. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 30 MHz - 1 GHz, Peak Detector



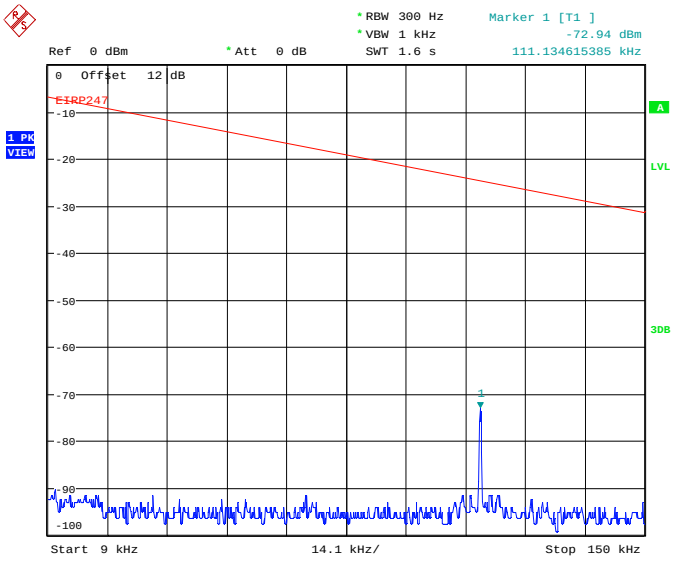
Plot 5.4.4.3.4. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 1 GHz - 4 GHz, Peak Detector



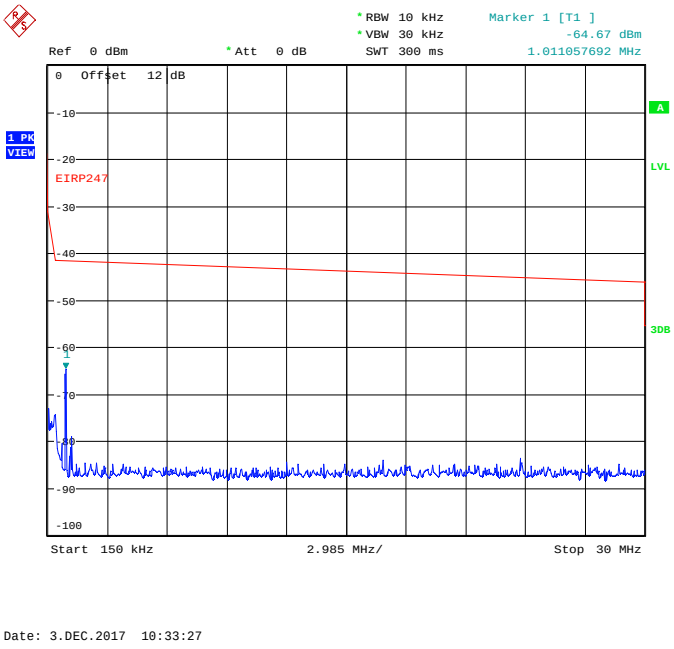
Plot 5.4.4.3.5. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 1 Mbps, 4 GHz - 25 GHz, Peak Detector



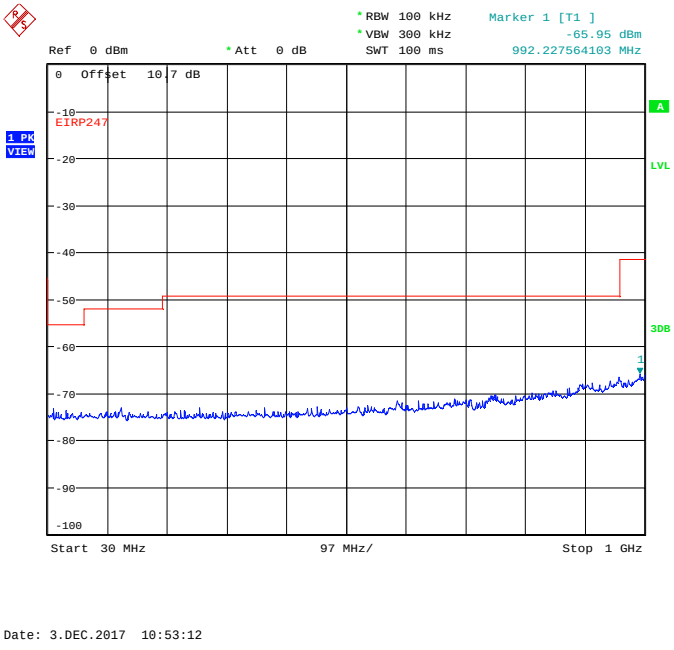
Plot 5.4.4.3.6. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 9 kHz - 150 kHz, Peak Detector



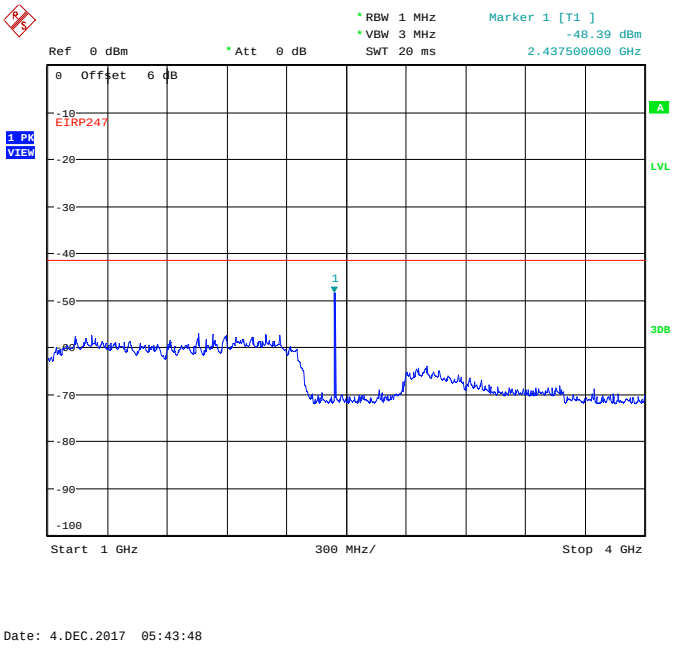
Plot 5.4.4.3.7. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 150 kHz - 30 MHz, Peak Detector



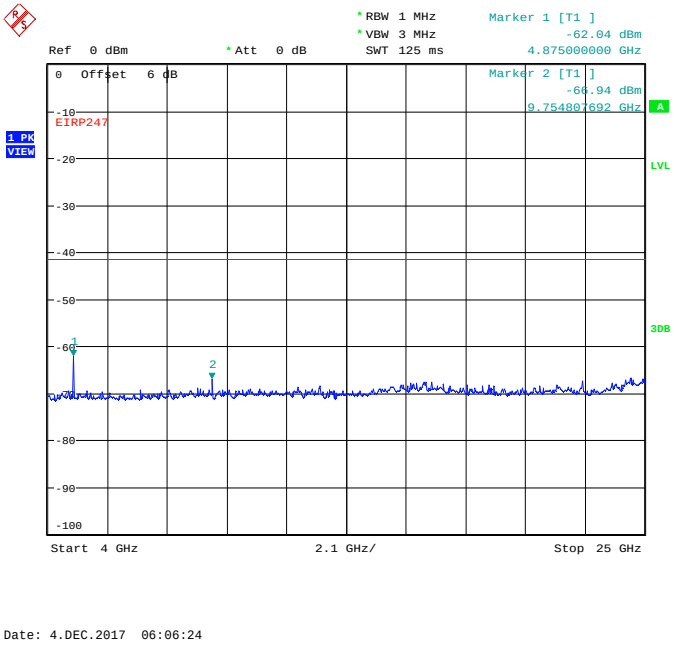
Plot 5.4.4.3.8. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 30 MHz - 1 GHz, Peak Detector



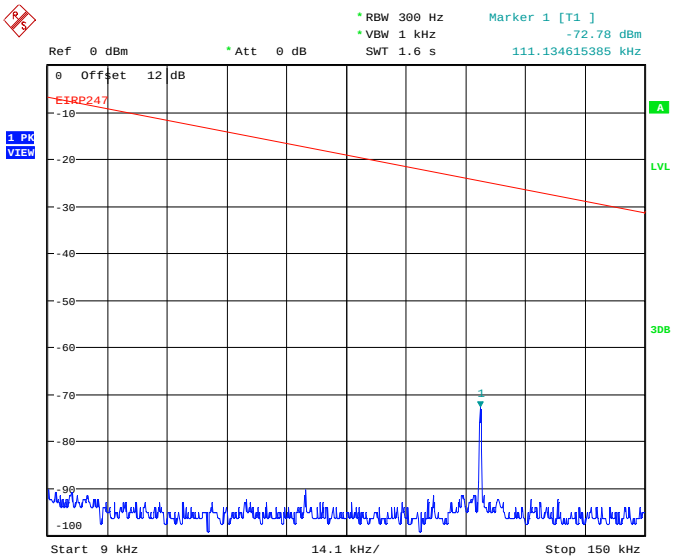
Plot 5.4.4.3.9. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 1 GHz - 4 GHz, Peak Detector



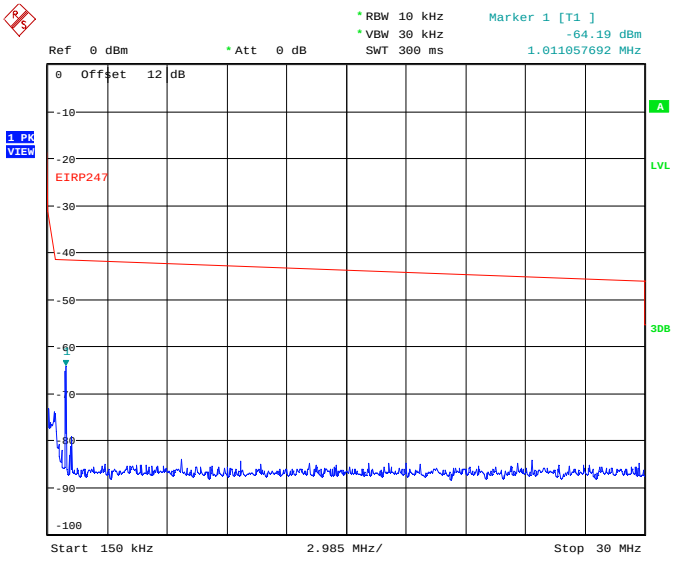
Plot 5.4.4.3.10. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 1 Mbps, 4 GHz - 25 GHz, Peak Detector



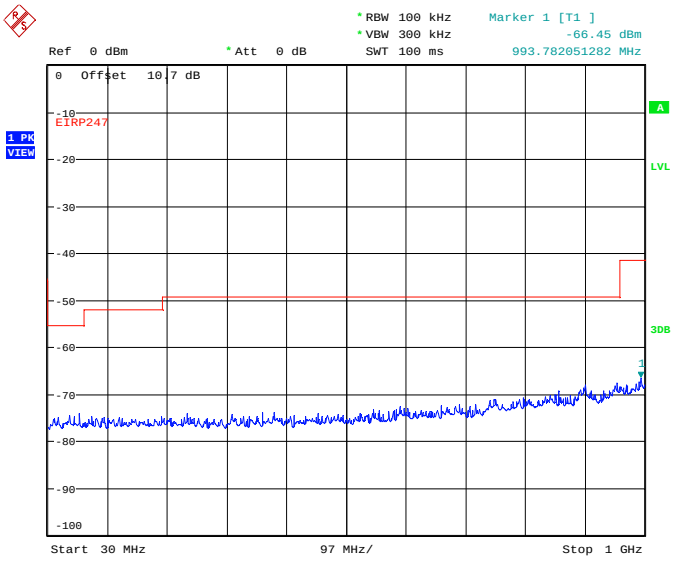
Plot 5.4.4.3.11. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 9 kHz - 150 kHz, Peak Detector



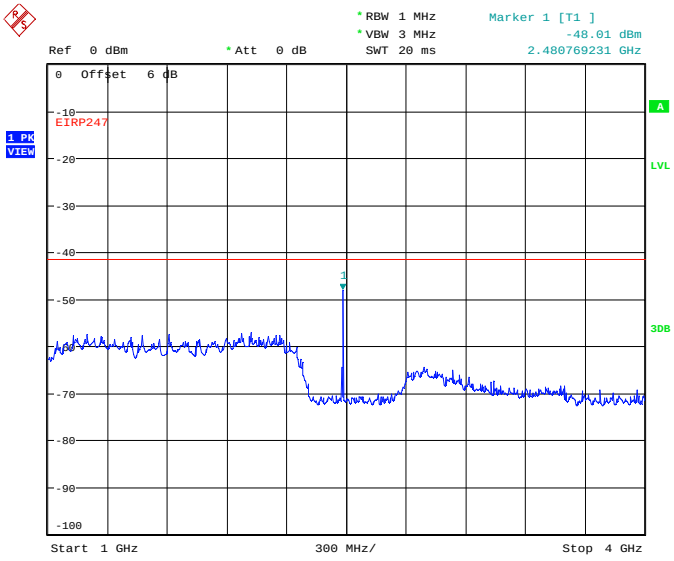
Plot 5.4.4.3.12. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 150 kHz - 30 MHz, Peak Detector



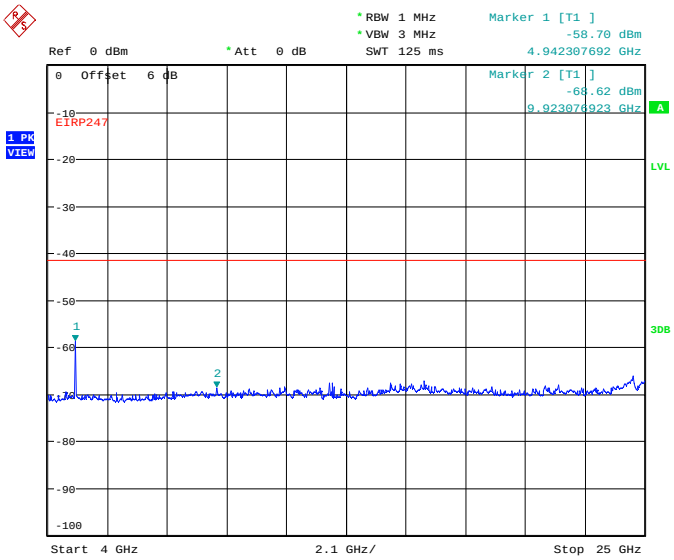
Plot 5.4.4.3.13. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 30 MHz - 1 GHz, Peak Detector



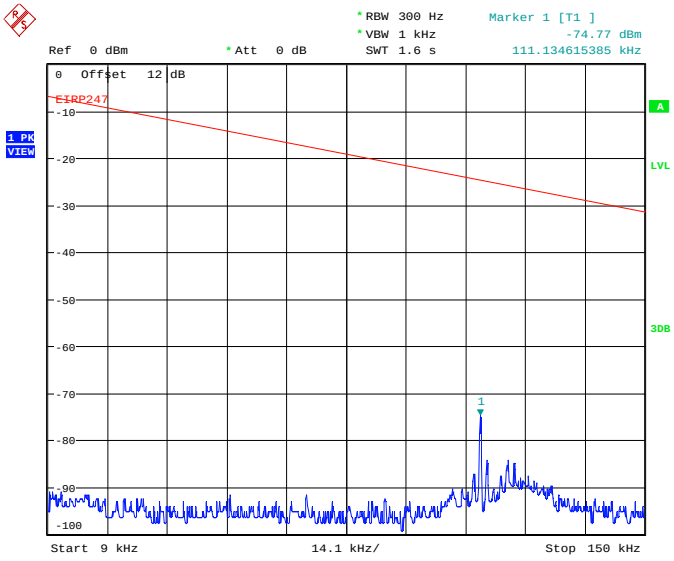
Plot 5.4.4.3.14. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 1 GHz - 4 GHz, Peak Detector



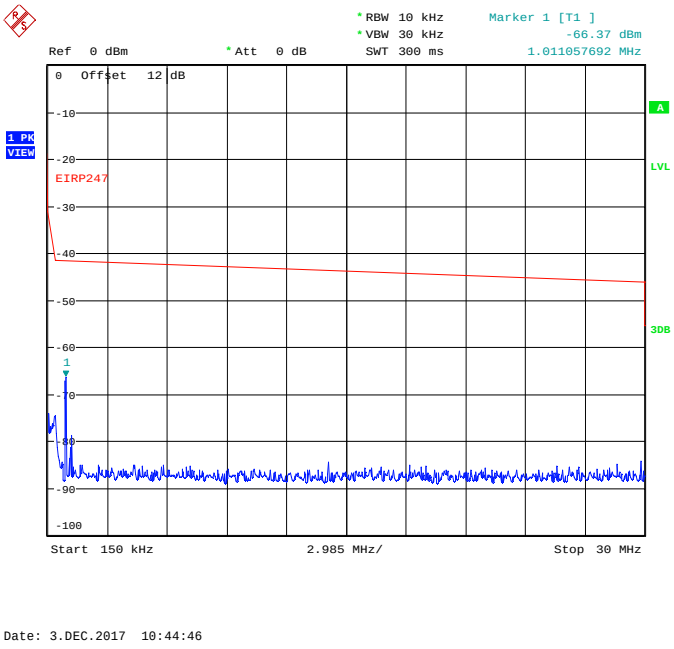
Plot 5.4.4.3.15. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 1 Mbps, 4 GHz - 25 GHz, Peak Detector



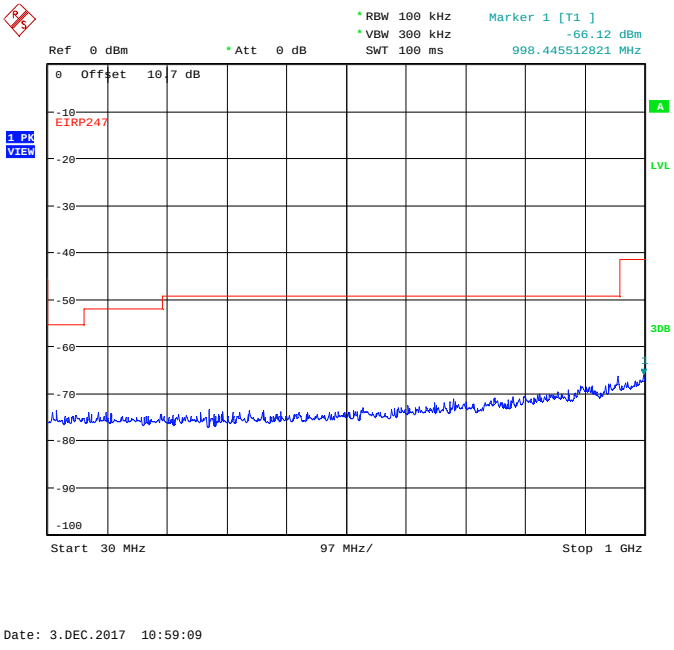
Plot 5.4.4.3.16. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 9 kHz - 150 kHz, Peak Detector



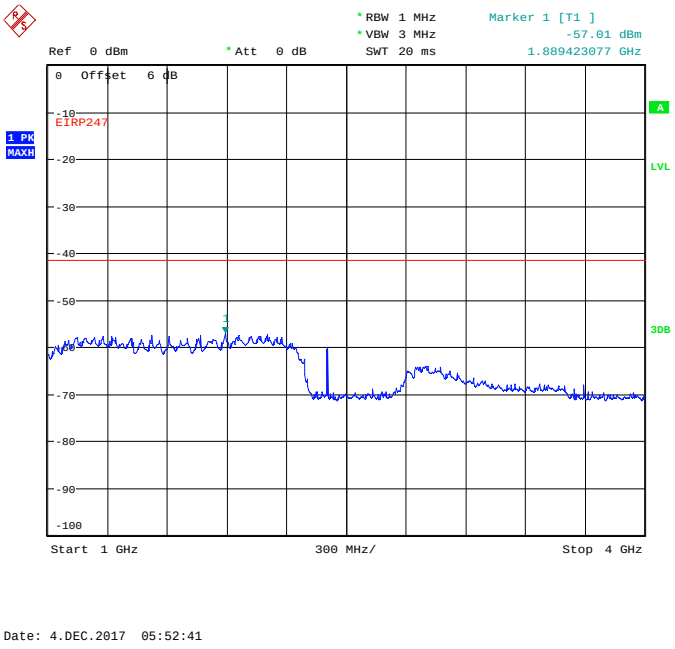
Plot 5.4.4.3.17. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 150 kHz - 30 MHz, Peak Detector



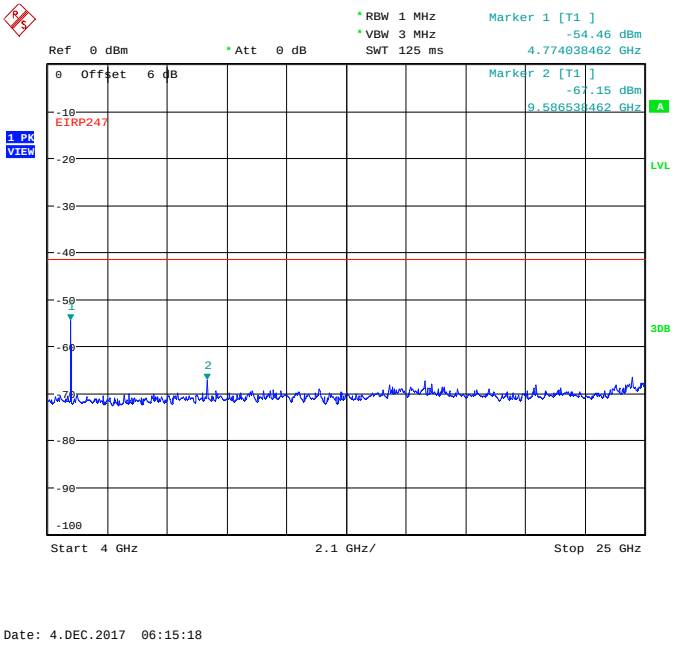
Plot 5.4.4.3.18. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 30 MHz - 1 GHz, Peak Detector



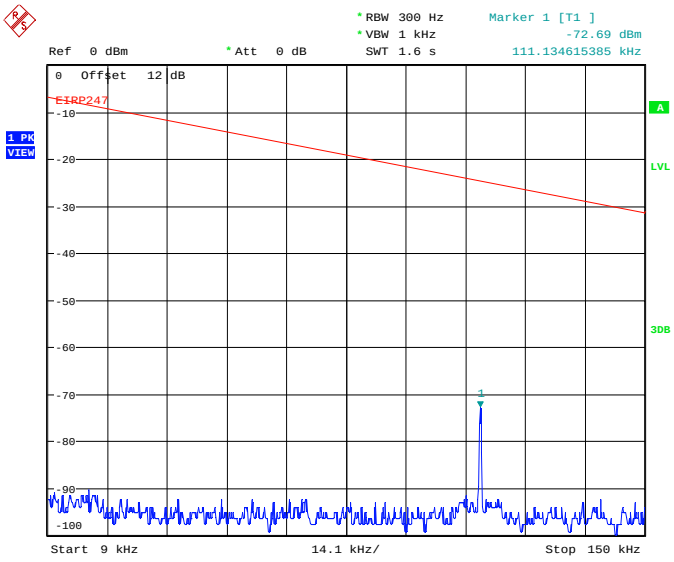
Plot 5.4.4.3.19. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 1 GHz - 4 GHz, Peak Detector



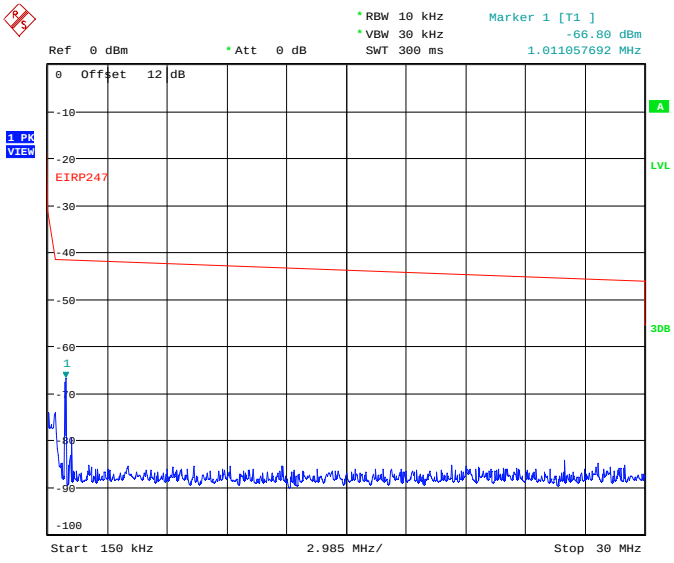
Plot 5.4.4.3.20. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2402 MHz, GFSK Modulation, 2 Mbps, 4 GHz - 25 GHz, Peak Detector



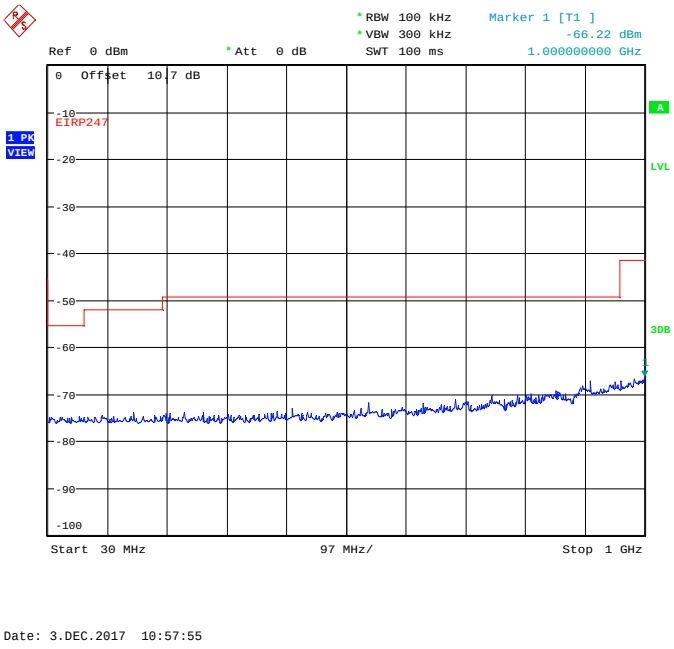
Plot 5.4.4.3.21. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 9 kHz - 150 kHz, Peak Detector



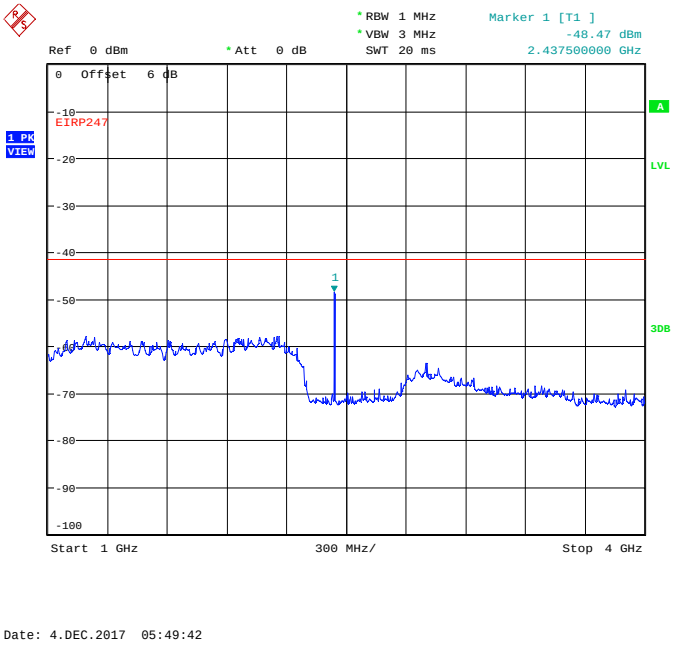
Plot 5.4.4.3.22. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 150 kHz - 30 MHz, Peak Detector



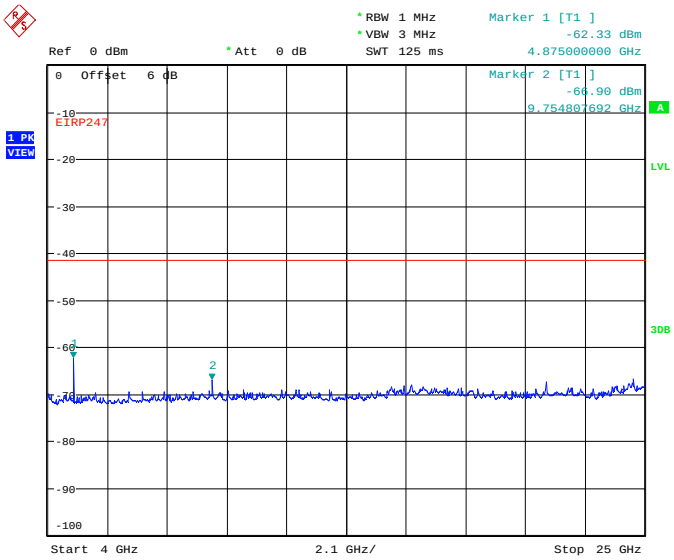
Plot 5.4.4.3.23. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 30 MHz - 1 GHz, Peak Detector



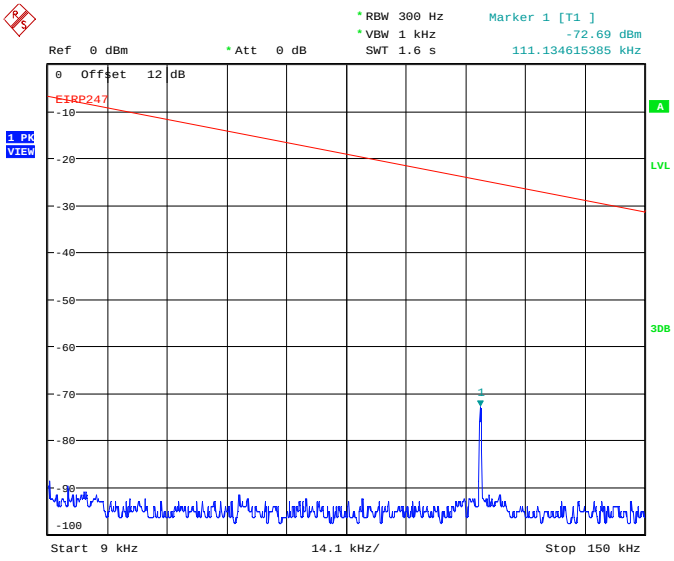
Plot 5.4.4.3.24. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 1 GHz - 4 GHz, Peak Detector



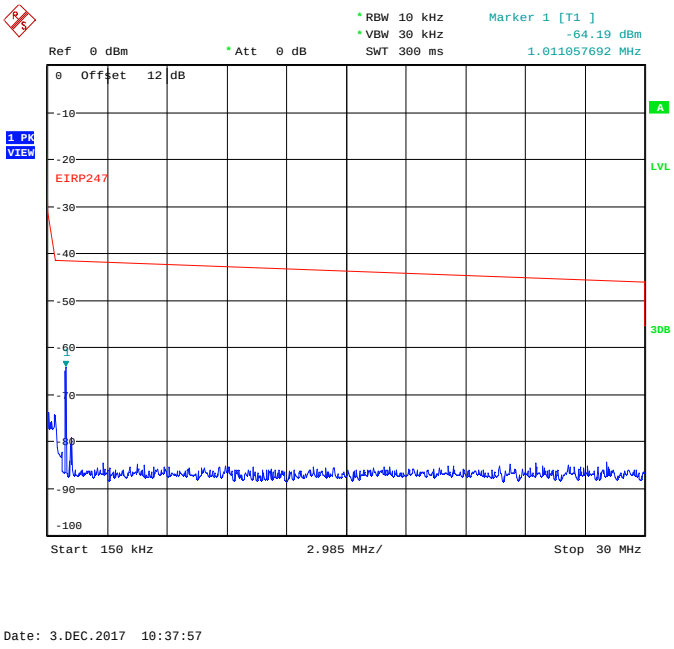
Plot 5.4.4.3.25. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2440 MHz, GFSK Modulation, 2 Mbps, 4 GHz - 25 GHz, Peak Detector



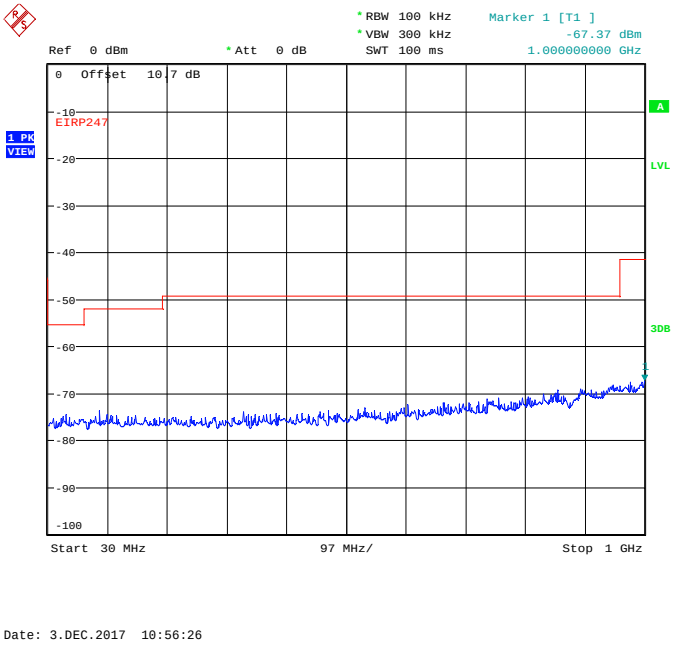
Plot 5.4.4.3.26. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 9 kHz - 150 kHz, Peak Detector



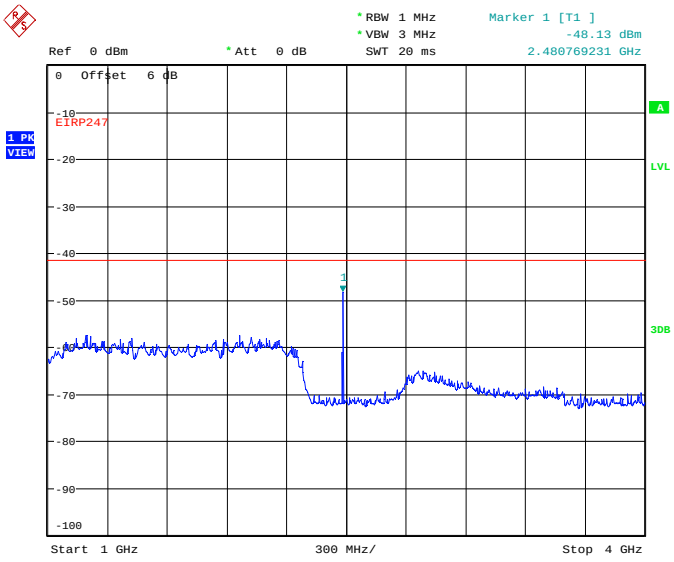
Plot 5.4.4.3.27. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 150 kHz - 30 MHz, Peak Detector



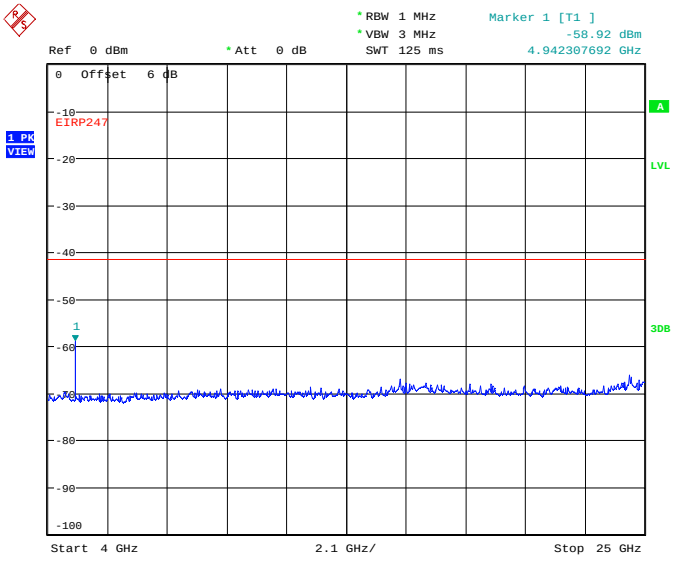
Plot 5.4.4.3.28. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 30 MHz - 1 GHz, Peak Detector



Plot 5.4.4.3.29. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 1 GHz - 4 GHz, Peak Detector



Plot 5.4.4.3.30. Conducted Spurious Emissions in Restricted Frequency Bands, High Power
2480 MHz, GFSK Modulation, 2 Mbps, 4 GHz - 25 GHz, Peak Detector



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

5.5.1. 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

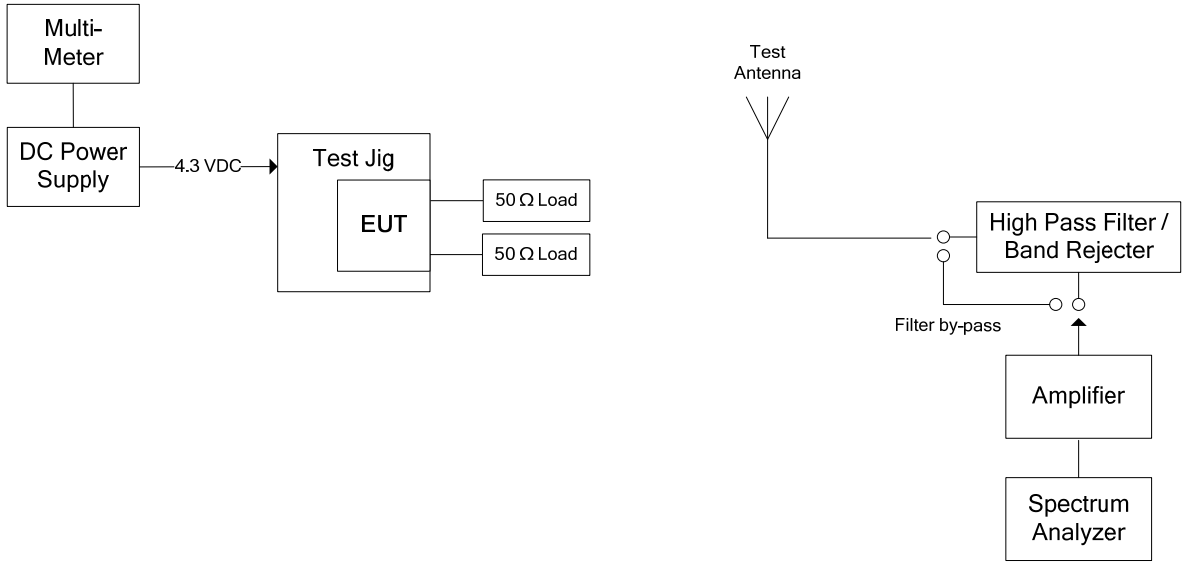
Section 15.209(a) - Field Strength Limits within Restricted Frequency Bands

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

5.5.2. Method of Measurements

KDB 558074 D01 DTS Meas Guidance v04 Section 12.2.7 and ANSI C63.10.

5.5.3. Test Arrangement



5.5.4. Test Data

Remark(s):

- All spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- EUT shall be tested in three orthogonal positions.
- § 15.247 (d) spurious emission limit:
  $E_{dB\mu V/m} = (EIRP_{dBm} - 20\log(d_m) + 104.8) – 20$
- Exploratory tests performed to determined worst-case test configurations, the following test results at high power setting and at 1 Mbps data rate represent the worst-case.

Fundamental Frequency:	2402 MHz						
EIRP:	16.16 dBm						
Frequency Test 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)**	**Limit 15.247 (dBµV/m)**	**Margin (dB)**	**Pass/ Fail**
4804	50.53	40.66	V	54.0	91.4	-13.3	Pass*
4804	50.36	40.76	H	54.0	91.4	-13.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Fundamental Frequency:	2440 MHz						
EIRP:	15.71 dBm						
Frequency Test 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)**	**Limit 15.247 (dBµV/m)**	**Margin (dB)**	**Pass/ Fail**
4880	51.23	41.99	V	54.0	91.0	-12.0	Pass*
4880	50.87	42.26	H	54.0	91.0	-11.7	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Fundamental Frequency:	2480 MHz						
EIRP:	15.75 dBm						
Frequency Test 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)**	**Limit 15.247 (dBµV/m)**	**Margin (dB)**	**Pass/ Fail**
4960	51.13	42.39	V	54.0	91.0	-11.6	Pass*
4960	50.43	41.21	H	54.0	91.0	-12.8	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

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

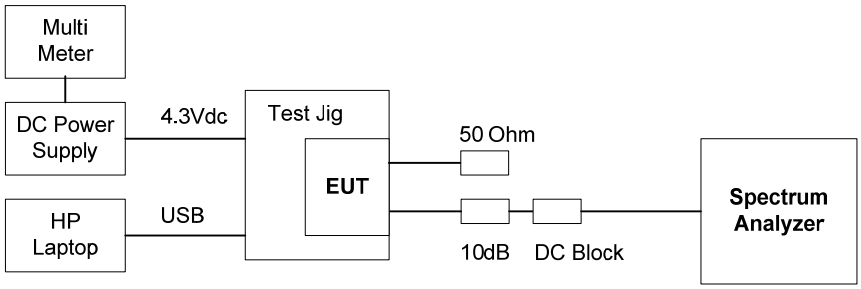
5.6.1. Limit(s)

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.

5.6.2. Method of Measurements

KDB 558074 D01 DTS Meas Guidance V04, Section 10.2 Method PKPSD (peak PSD)

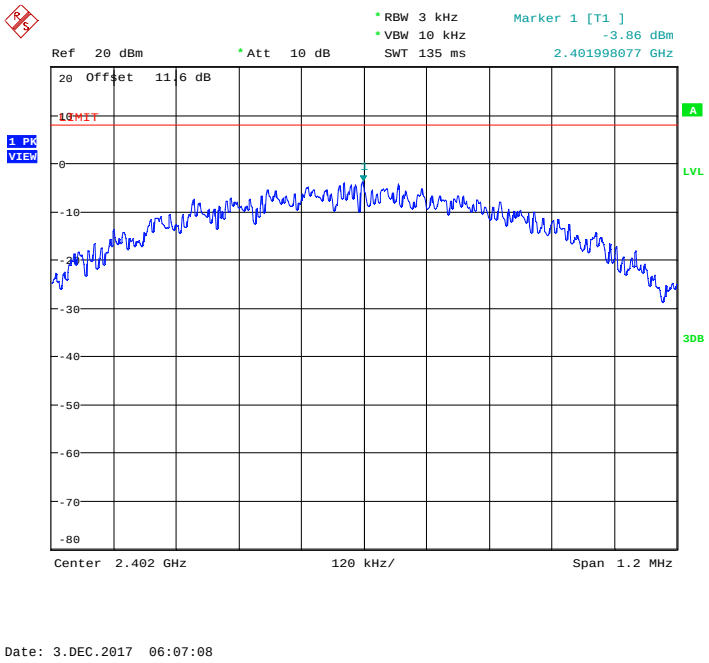
5.6.3. Test Arrangement



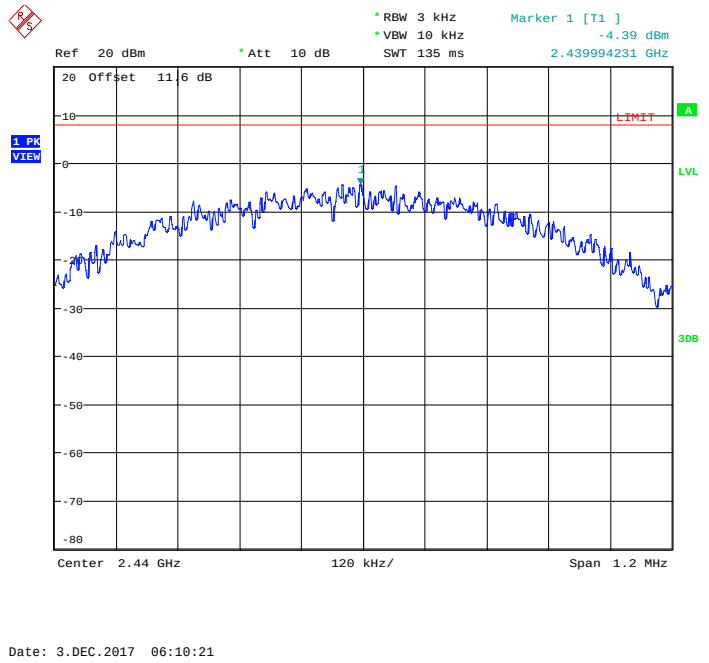
5.6.4. Test Data

Modulation	Power Setting	Data Rate (Mbps)	Channel	Frequency (MHz)	PSD (dBm)	Max. Limit (dBm)	Margin (dBm)
GFSK	High Power (130)	1	00	2402	-3.86	8	-11.86
			19	2440	-4.39	8	-12.39
			39	2480	-4.29	8	-12.29
		2	00	2402	-10.72	8	-18.72
			19	2440	-11.22	8	-19.22
			39	2480	-11.10	8	-19.10

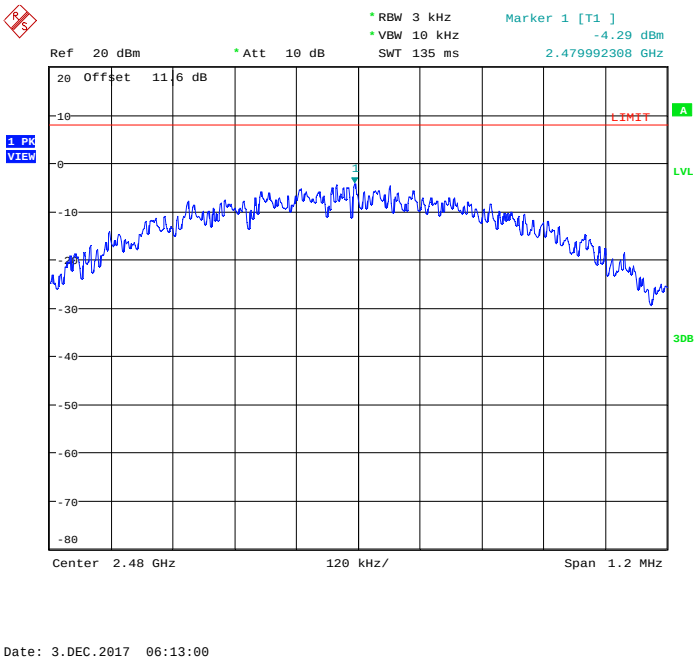
Plot 5.6.4.1. Power Spectral Density, GFSK Modulation, High Power, Channel 00, 2402 MHz, 1 Mbps



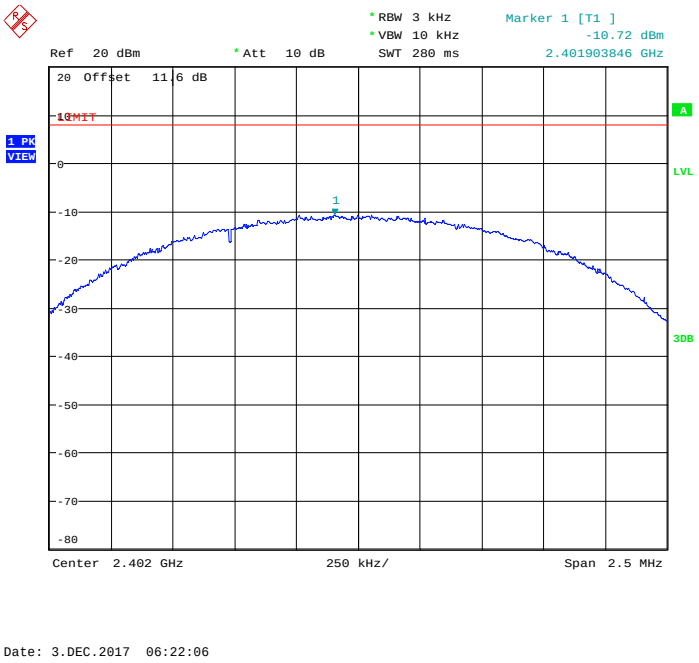
Plot 5.6.4.2. Power Spectral Density, GFSK Modulation, High Power, Channel 19, 2440 MHz, 1 Mbps



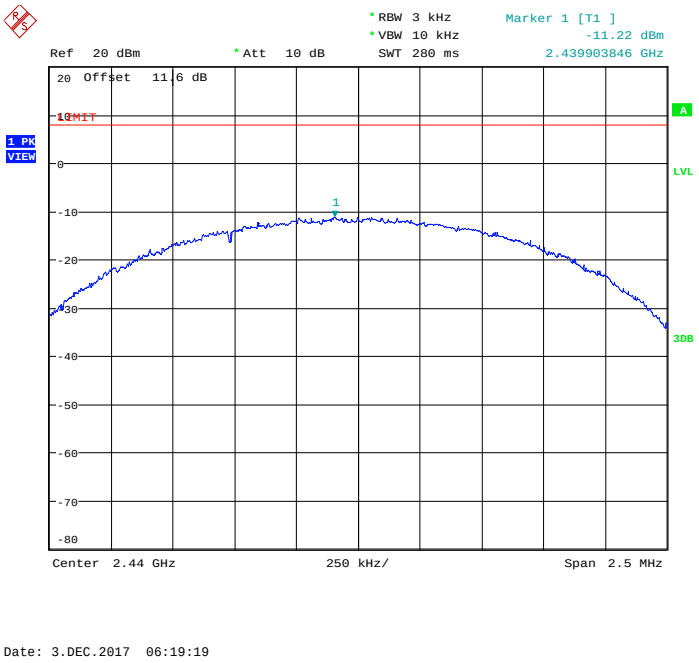
Plot 5.6.4.3. Power Spectral Density, GFSK Modulation, High Power, Channel 39, 2480 MHz, 1 Mbps



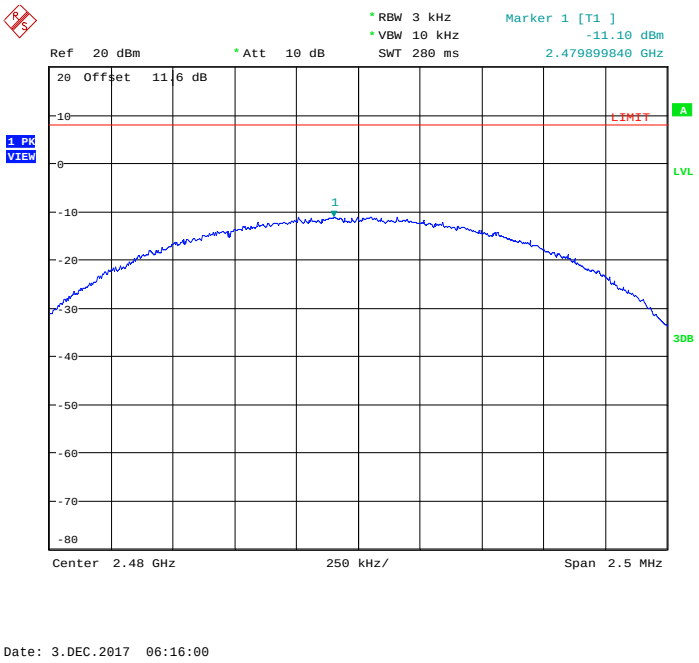
Plot 5.6.4.4. Power Spectral Density, GFSK Modulation, High Power, Channel 00, 2402 MHz, 2 Mbps



Plot 5.6.4.5. Power Spectral Density, GFSK Modulation, High Power, Channel 19, 2440 MHz, 2 Mbps



Plot 5.6.4.6. Power Spectral Density, GFSK Modulation, High Power, Channel 39, 2480 MHz, 2 Mbps



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

5.7.1. Limits

§ **1.1310:** The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

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: 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: 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.

5.7.2. Method of Measurements

Calculation Method of Power Density/RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where, P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

5.7.3. RF Evaluation

Pursuant to KDB 447498 D01 General RF Exposure Guidance v06, Section 7.2:

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0, according to calculated/estimated, numerically modeled, or measured field strengths or power density.

The maximum calculated MPE ratio of the EUT with 4.4 dBi antenna						
Frequency (MHz)	**EUT EIRP (dBm)**	**EUT EIRP (mW)**	**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**FCC MPE Limit (mW/cm^2)**	**MPE Ratio**
2402	16.16	41.305	20	0.008	1.0	0.008

The maximum calculated MPE ratio for the EUT with 4.4 dBi antenna is 0.008, this configuration can be co-located with other antennas provided the sum of the MPE ratios for all the other simultaneous transmitting antennas incorporated in a host device is ≤ 1.0 - 0.008 ≤ 0. 0.992.

The following table addresses the co-location of the EUT with 4.4 dBi antenna and u-blox AG Cellular Module (FCC ID: XPY2AGQN4NNN, IC: 8595A-2AGQN4NNN)

EUT Co-located with u-blox AG Cellular Module (FCC ID: XPY2AGQN4NNN, IC: 8595A-2AGQN4NNN)										
Frequency Band (MHz)	**Frequency (MHz)**	**Conducted Output Power (mW)**	**[1]Conducted Output Power (dBm)**	**[2]Antenna Gain (dBi)**	**Max EUT EIRP (dBm)**	**Max EUT EIRP (mW)**	**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**Power Density FCC Limit (mW/cm^2)**	**FCC Power Density MPE Ratio**
1850-1910	1850	316	25.00	7.12	32.12	1629.30	20	0.324	1.000	**0.324**
1710-1755	1710	316	25.00	6.74	31.74	1492.79	20	0.297	1.000	0.297
824-849	824	316	25.00	4.10	29.10	812.83	20	0.162	0.549	0.294
699-716	699	316	25.00	3.67	28.67	736.21	20	0.146	0.466	0.314
2402-2480 (EUT)	2402	15	11.76	4.4	16.16	41.30	20	0.008	1.000	**0.008**
Worst case sum of the MPE ratios for all simultaneously transmitting antennas:										**0.332**

[1] Conducted output power derived from u-blox AG Cellular Module (FCC ID: XPY2AGQN4NNN, IC: 8595A-2AGQN4NNN) filing.
[2] Maximum antenna gain permitted to be used with u-blox AG Cellular Module (FCC ID: XPY2AGQN4NNN, IC: 8595A-2AGQN4NNN) and EUT in this co-location evaluation.

The following table addresses the co-location of the EUT with 4.4 dBi antenna and General Cellular Module

EUT Co-located with General Cellular Module										
Frequency Band (MHz)	**Frequency (MHz)**	**Conducted Output Power (mW)**	**Conducted Output Power (dBm)**	**Antenna Gain (dBi)**	**Max EUT EIRP (dBm)**	**Max EUT EIRP (mW)**	**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**Power Density FCC Limit (mW/cm^2)**	**FCC Power Density MPE Ratio**
1850-1915	1850	316	25.00	8	33.00	1995.26	20	0.397	1.000	0.397
1710-1755	1710	316	25.00	7	32.00	1584.89	20	0.315	1.000	0.315
814-849	814	316	25.00	5	30.00	1000.00	20	0.199	0.543	0.367
699-716	699	316	25.00	5	30.00	1000.00	20	0.199	0.466	0.427
777-787	777	316	25.00	5.5	30.50	1122.02	20	0.223	0.518	**0.431**
2402-2480 (EUT)	2402	15	11.76	4.4	16.16	41.30	20	0.008	1.000	**0.008**
Worst case sum of the MPE ratios for all simultaneously transmitting antennas:										**0.439**

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Hewlett Packard	HP 8593EM	3412800103	9 kHz - 26.5 GHz	11 May 2018
Attenuator	Pasternack	PE7010-20	09	DC - 2 GHz	13 Mar 2018
LISN Used	EMCO	3825/2R	1165	10 kHz - 30 MHz	03 Nov 2018
DC Power Supply	Xantrex	HPD 60-5SX	63903	0 - 60 Vdc	See Note 1
Spectrum Analyzer	Rohde & Schwarz	FSU26	200946	20 Hz - 26.5 GHz	21 Jul 2018
Attenuator	Hewlett Packard	8493C	0465	DC -18 GHz	See Note 1
DC Block	Hewlett Packard	11742A	12460	0.045 - 26.5 GHz	See Note 1
DC Power Supply	Xantrex	HPD 60-5SX	63903	0 - 60 Vdc	See Note 1
Multi-meter	Fluke	8842A	4142058	20mV - 1kV	13 Sep 2018
Laptop	HP	6910p	CND7412DKX	---	---
High Pass Filter	K & L	11SH10-4000/T12000	4	Cut off 2.4 GHz	See Note 1
Band Reject Filter	Micro-Tronics	BRM50701	105	Cut off 2.4-2.483 GHz	See Note 1
EMI Receiver	Rohde & Schwarz	ESU40	100037	20 Hz - 40 GHz	09 May 2018
RF Amplifier	Com-Power	PAM-0118A	551052	0.5 - 18 GHz	17 Jul 2018
RF Amplifier	Hewlett Packard	84498	3008A00769	1 - 26.5 GHz	01 May 2018
Biconilog	EMCO	3142	9601-1005	26 - 1000 MHz	12 May 2018
Horn Antenna	EMCO	3155	6570	1 – 18 GHz	13 Oct 2018
Horn Antenna	ETS-Lindgren	3160-09	001183858	18 – 26.5 GHz	11 Oct 2018
Note 1: Internal Verification/Calibration check					

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

	Line Conducted Emission Measurement Uncertainty (9 kHz – 30 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	**± 1.44**	**± 1.8**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 2.89**	**± 3.6**

7.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	**Measured (dB)**	**Limit (dB)**
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:** $U = 2u_c(y)$	**± 4.79**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	**Measured (dB)**	**Limit (dB)**
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 @ 3 m, Horizontal & Vertical (1 – 18 GHz):	**Measured (dB)**	**Limit (dB)**
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**