

Test report

347785-4TRFWL

Date of issue: March 7, 2018

Applicant:

GN Netcom Inc.

Product:

BT Transceiver in DECT Base Station

Model:

WHB050BS

FCC ID:

BCE-WHB050BS

IC Reg. Number:

2386C-WHB050BS

Specifications:

◆ **FCC 47 CFR Part 15, Subpart C**


Frequency Hopping Transmitters / Digital Transmission Systems

◆ **RSS-247, Issue 2, February 2017**

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and
Licence-Exempt Local Area Network (LE-LAN) Devices

Test location

Company name	Nemko Canada Inc.
Address	303 River Road
City	Ottawa
Province	Ontario
Postal code	K1V 1H2
Country	Canada
Telephone	+1 613 737 9680
Facsimile	+1 613 737 9691
Toll free	+1 800 563 6336
Website	www.nemko.com
Site number	FCC: CA2040; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by	Frode Sveinsen, Senior Wireless Engineer
Reviewed by	Andrey Adelberg, Senior Wireless/EMC Specialist
Date	March 7, 2018
Signature of reviewer	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

© Nemko Canada Inc.

CONTENTS

1	INFORMATION	4
1.1	Applicant information	4
1.2	Tested Item	4
1.3	Testing dates	4
1.4	Description of Tested Device	4
1.5	Test Conditions	5
1.6	Test Engineer(s)	5
1.7	Antenna Requirement	5
1.8	Other Comments	5
2	TEST REPORT SUMMARY	6
2.1	General	6
2.2	Test Summary	7
3	TEST RESULTS	8
3.1	Power Line Conducted Emissions	8
3.2	Channel Separation	10
3.3	Pseudorandom Hopping Algorithm	16
3.4	Occupancy Time	17
3.5	Occupied Bandwidth	20
3.6	Peak Power Output	23
3.7	Conducted Emissions at Antenna Connector	29
3.8	Restricted Bands of operation	32
3.9	Spurious Emissions (Radiated)	33
3.10	Radiated Emissions, below 1GHz	41
3.11	Radiated Emissions, above 1GHz	43
4	MEASUREMENT UNCERTAINTY	47
5	TEST SETUPS	48
5.1	Conducted Emission Test	48
5.2	Power Line Conducted Emissions Test	48
6	TEST EQUIPMENT USED	49

1 INFORMATION

1.1 Applicant information

Name :	GN Netcom Inc.
Address:	900 Chelmsford Street, Tower II, 8 th Floor Lowell, 1851, MA, USA

1.2 Tested Item

Name:	Jabra
Model name:	WHB050BS
FCC ID:	BCE-WHB050BS
Industry Canada Registration Number:	2386C-WHB050BS
Serial number:	/
Trademark:	Jabra
Hardware identity and/or version:	28-04447
Software identity and/or version:	1.6.4
Tested to ISED Radio Standard (RSS):	RSS-247 Issue 2; RSS-Gen Issue 4
Frequency Range:	2402 – 2480 MHz (FHSS)
Number of Channels:	Minimum 20 and Maximum 79 Channels
Operating Modes :	Adaptive Frequency Hopping
Type of Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Conducted Output Power:	1.44 mW (GFSK) 1.50 mW ($\pi/4$ -DQPSK) 1.68 mW (8DPSK)
Antenna Connector:	None
Number of Antennas:	1
Antenna Diversity Supported:	No
Power Supply:	AC Adaptor Model: AM05E-075A
Interface:	USB, USB for connection to Computer, Phone connection, Phone handset connection, AUX

1.3 Testing dates

Tested in period:	February 12, 2018 to February 16, 2018
--------------------------	--

1.4 Description of Tested Device

The EUT is a DECT Base Station with Bluetooth Transceiver with support for EDR (Enhanced Data Rates)

1.5 Test Conditions

Temperature:	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar
Normal test voltage	120 V _{AC} (Nominal Voltage)

All tests were performed with the EUT powered from the mains through the supplied AC adaptor.

Values above are the limit registered during the test period.

1.6 Test Engineer(s)

Frode Sveinsen / Kevin Rose

1.7 Antenna Requirement

Does the EUT have detachable antenna(s)?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
If detachable, is the antenna connector(s) non-standard?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
The tested equipment has only integral antennas. Conducted tests with a temporary antenna connector.		

Requirement: FCC 15.203, 15.204, 15.317.

1.8 Other Comments

The EUT uses frequency hopping with minimum 20 and maximum 79 hopping channels from 2402 to 2480 MHz.

It was also checked that power variations of ±15 % did not have any influence on Output Power.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, paragraph 15.247 and Industry Canada RSS-247 Issue 2 / RSS-Gen Issue 4 / RSP-100 Issue 11.

All tests were conducted in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

A description of the test facility is on file with the FCC and Industry Canada.

New Submission

Production Unit

Class II Permissive Change

Pre-production Unit

DSS Equipment Code

Family Listing



THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

Nemko Group authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any reproduction of parts of this report requires approval in writing from Nemko Group.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Group accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report.

2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-247 Issue 2, RSS-GEN Issue 4 reference	Result
Supply Voltage Variations	15.31(e)	6.11 (RSS-GEN)	Complies
Number of Operating Frequencies	15.31(m)	5.1 (6)	Complies
Antenna Requirement	15.203	8.3 (RSS-GEN)	Complies
Power Line Conducted Emission	15.107(a) 15.207(a)	8.8 (RSS-GEN)	Complies
Channel Separation	15.247(a)(1)	5.1 (4)	Complies
Pseudorandom Hopping Algorithm	15.247(a)(1)	5.1 (3)	Complies
Time of Occupancy	15.247(a)(1)(iii)	5.1 (5)	Complies
Occupied Bandwidth	15.247(a)(1)	5.1 (7)	Complies
Minimum 6 dB Bandwidth	15.247(a)(2)	5.2 (1)	N/A
Peak Power Output	15.247(b)	5.4 (5)	Complies
Power Spectral Density	15.247(d)	5.2 (2)	N/A
Spurious Emissions (Antenna Conducted)	15.247(c)	5.5	Complies
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	6.13 (RSS-GEN) 8.9 (RSS-GEN)	Complies



3 TEST RESULTS

3.1 Power Line Conducted Emissions

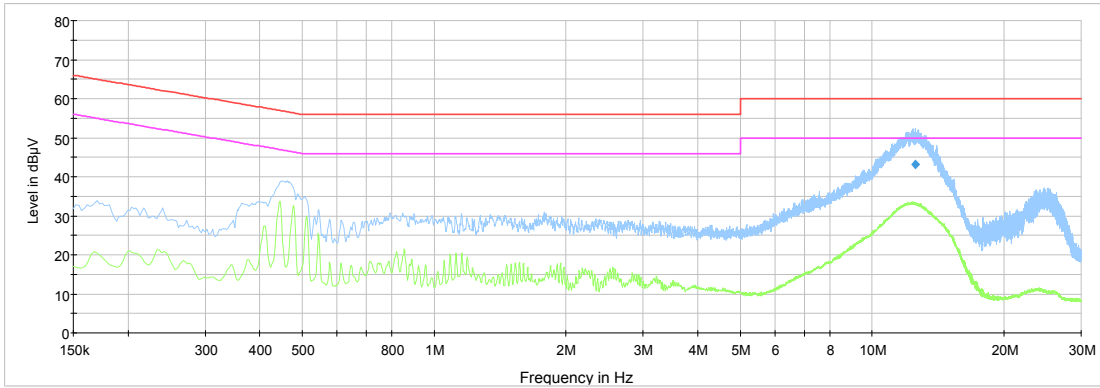
FCC Part 15.207(a)

RSS-213 Clause 6.3, RSS-GEN Clause 8.8

Measurement procedure: ANSI C63.4-2014 using 50 μ H/50 ohms LISN.

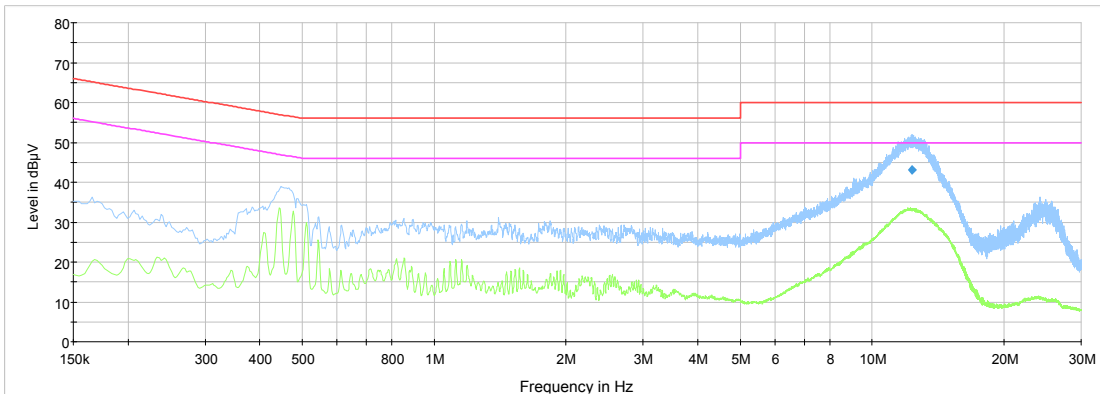
Test Results: Complies

Measurement Data: See attached plots



Jabra CE 120 Vac 60 Hz operational Neutral MN WHB051BS SN 030ABC6BF0
 Preview Result 2-AVG
 Preview Result 1-PK+
 CISPR 32 Mains Q-Peak Class B Limit
 CISPR 32 Mains Average Class B Limit
 Final_Result QPK
 Final_Result CAV

USB Adaptor (120V 60Hz), Phase N



Jabra CE 120 Vac 60 Hz operational Phase MN WHB051BS SN 030ABC6BF0
 Preview Result 2-AVG
 Preview Result 1-PK+
 CISPR 32 Mains Q-Peak Class B Limit
 CISPR 32 Mains Average Class B Limit
 Final_Result QPK
 Final_Result CAV

USB Adaptor (120V 60Hz), Phase L1

3.2 Channel Separation

Para. No.: 15.247 (a)(1)

Test Results: **Complies**

Measurement Data:

Channel Separation:	1.0 MHz
Nominal value for Channel Separation	1.0 MHz

20 dB BW, 2402MHz, GFSK:	946 kHz
20 dB BW, 2441MHz, GFSK:	942 kHz
20 dB BW, 2480MHz, GFSK:	942 kHz
20 dB BW, 2402MHz, $\pi/4$ -DQPSK:	1.24 MHz
20 dB BW, 2441MHz, $\pi/4$ -DQPSK:	1.24 MHz
20 dB BW, 2480MHz, $\pi/4$ -DQPSK:	1.24 MHz
20 dB BW, 2402MHz, 8DPSK:	1.26 MHz
20 dB BW, 2441MHz, 8DPSK:	1.26 MHz
20 dB BW, 2480MHz, 8DPSK:	1.27 MHz

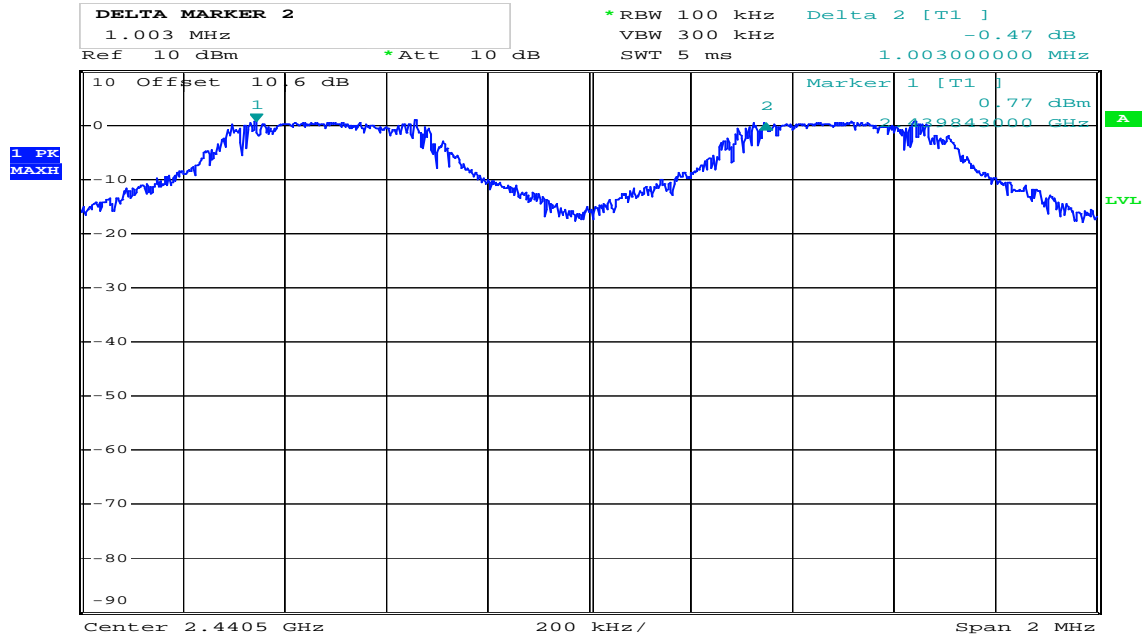
See attached plots

Requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

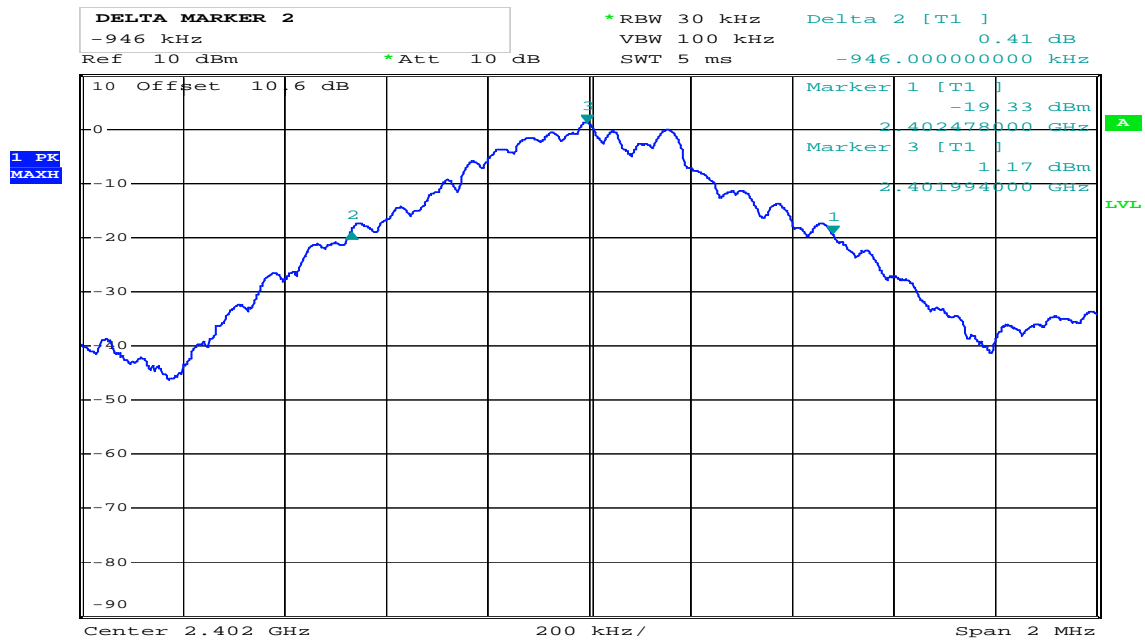
or:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the system operates with an output power no greater than 125 mW.



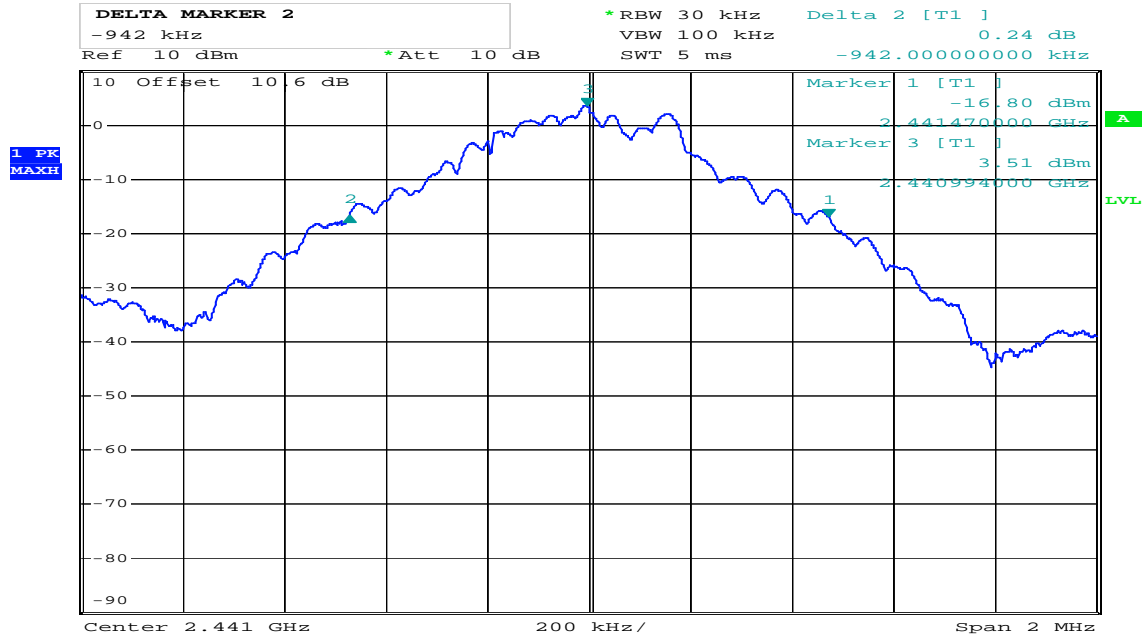
Date: 16.FEB.2018 10:20:20

Channel Separation



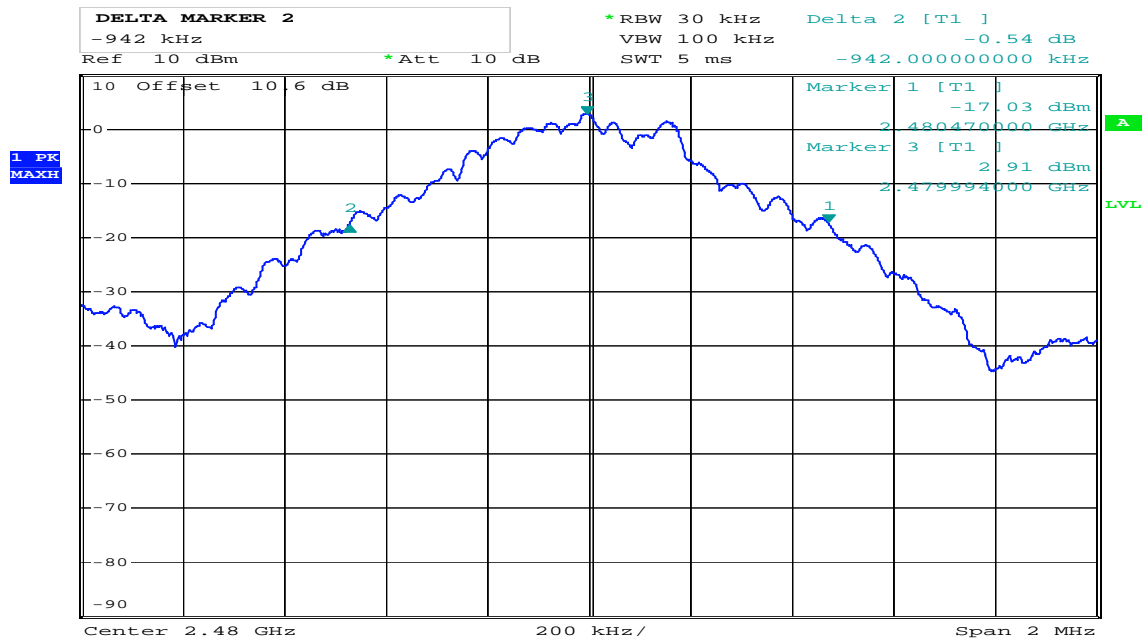
Date: 12.FEB.2018 14:32:00

20dB Bandwidth, 2402 MHz, GFSK



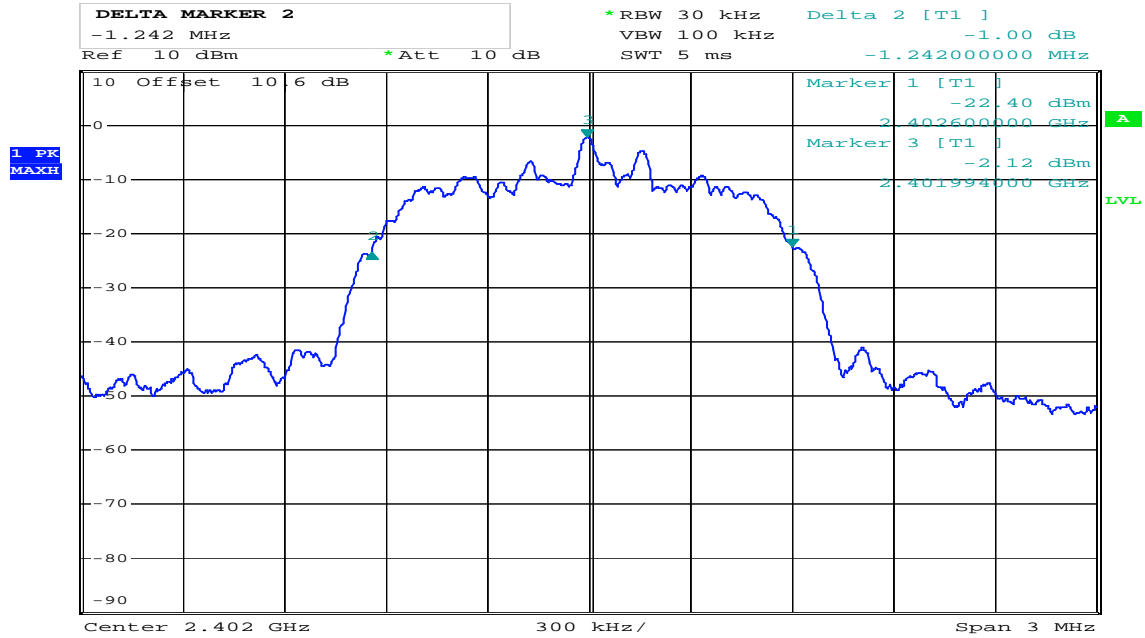
Date: 12.FEB.2018 14:22:33

20dB Bandwidth, 2441 MHz, GFSK



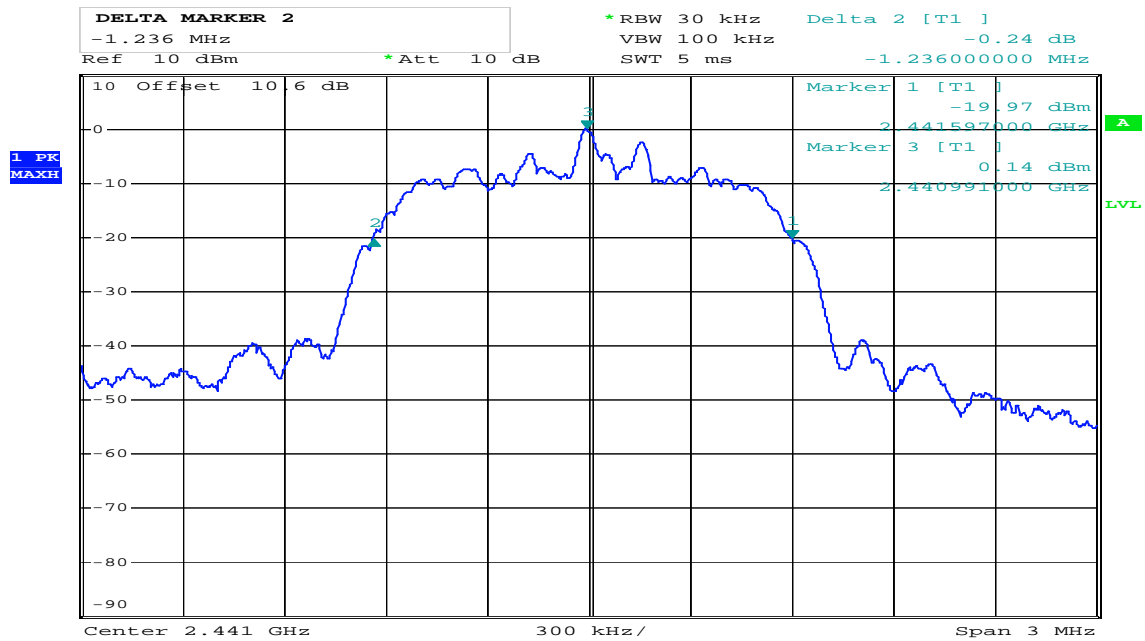
Date: 12.FEB.2018 14:21:17

20dB Bandwidth, 2480 MHz, GFSK



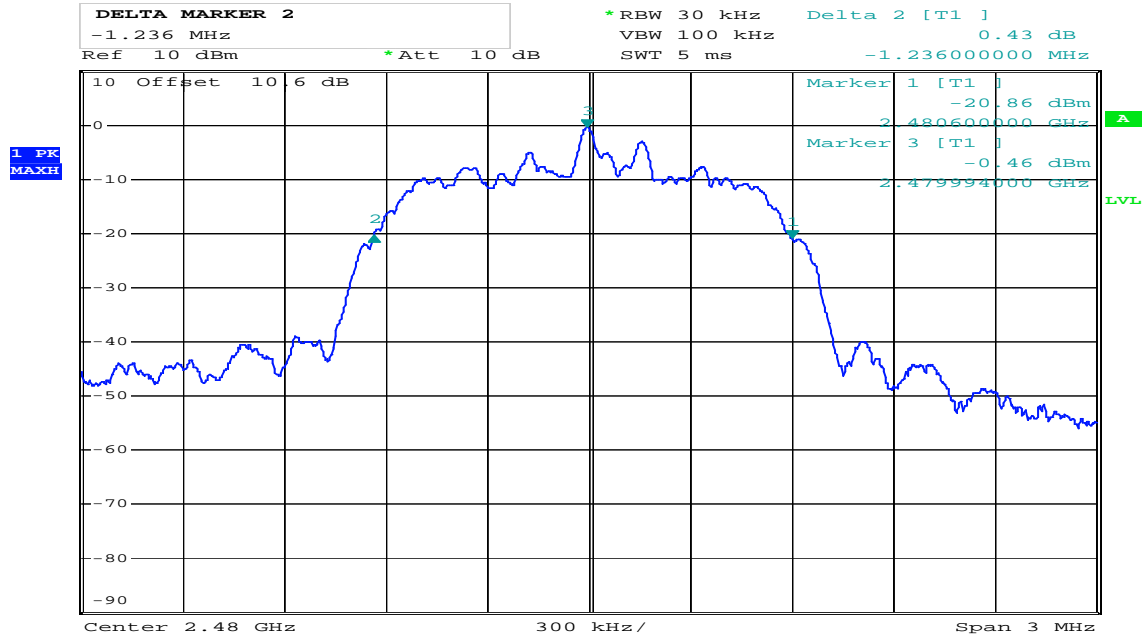
Date: 12.FEB.2018 15:18:05

20dB Bandwidth, 2402 MHz, $\pi/4$ -DQPSK



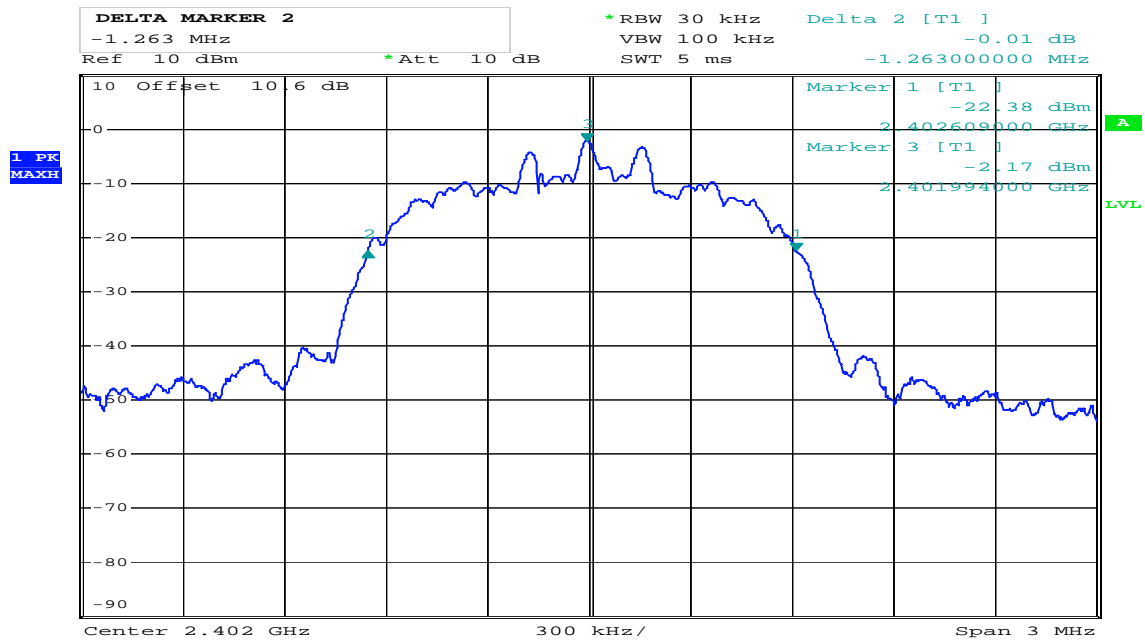
Date: 12.FEB.2018 15:15:26

20dB Bandwidth, 2441 MHz, $\pi/4$ -DQPSK



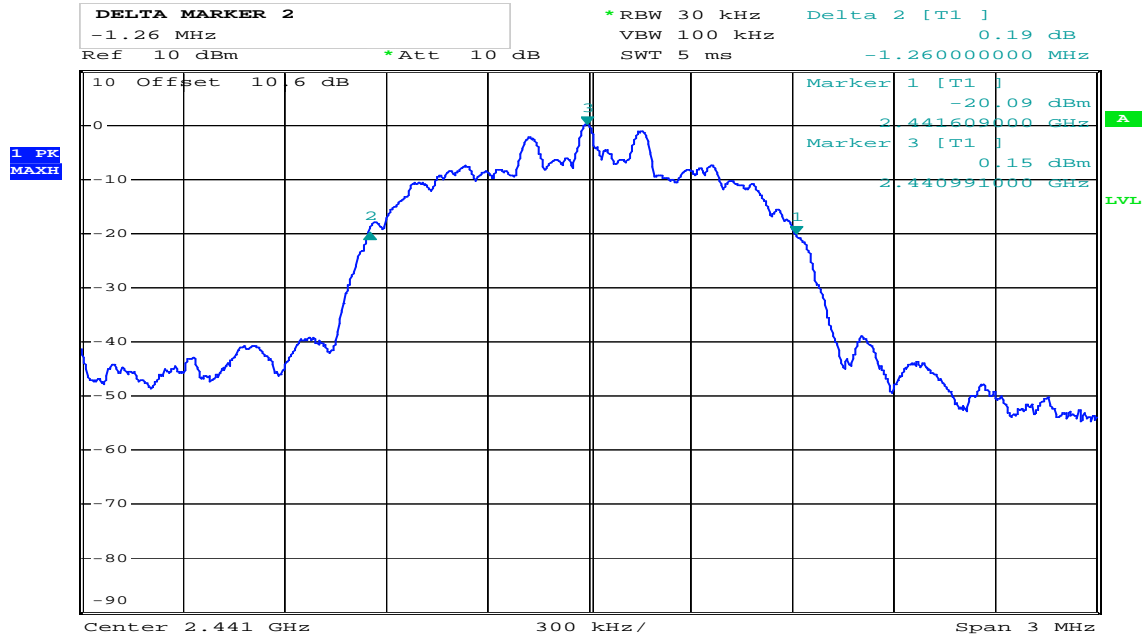
Date: 12.FEB.2018 15:04:38

20dB Bandwidth, 2480 MHz, $\pi/4$ -DQPSK



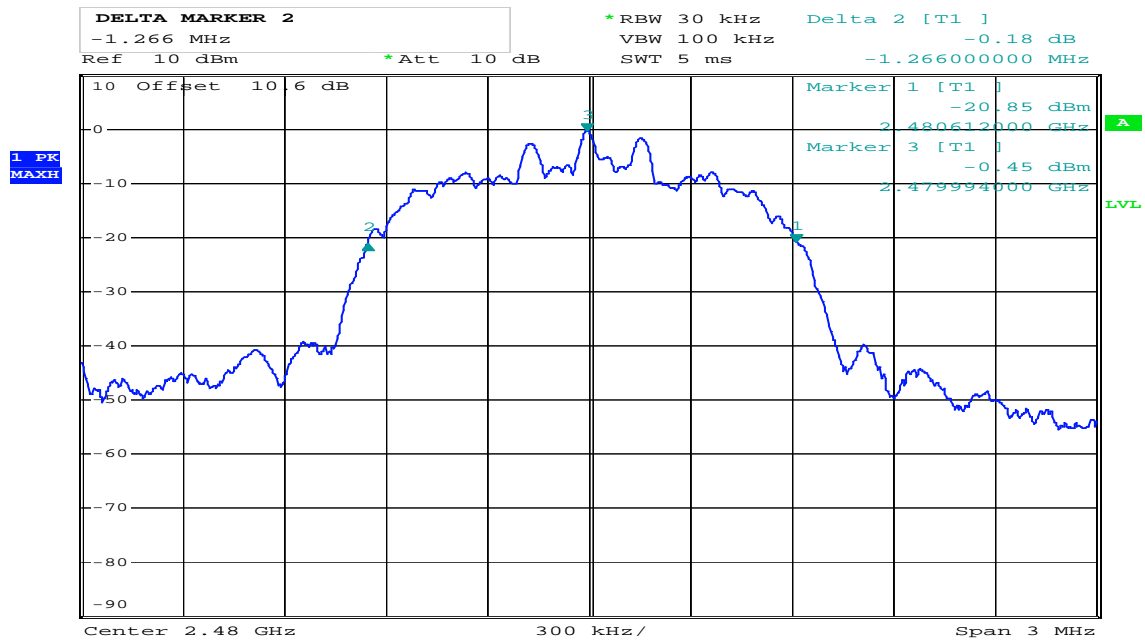
Date: 12.FEB.2018 15:46:47

20dB Bandwidth, 2402 MHz, 8DPSK



Date: 12.FEB.2018 15:43:21

20dB Bandwidth, 2441 MHz, 8DPSK



Date: 12.FEB.2018 15:45:21

20dB Bandwidth, 2480 MHz, 8DPSK

3.3 Pseudorandom Hopping Algorithm

Para. No.: 15.247 (a)(1)

Test Results: Complies

Measurement Data: The EUT uses a proprietary hopping scheme.

Requirements:

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

No requirements for Digital Transmission Systems.

3.4 Occupancy Time

Para. No.: 15.247 (a)(1)(iii)

Test Results: Complies

Measurement Data:

Number of RF Channels:	From 20 to 79
Maximum Length of RF Burst pr. channel	2.91 ms
Slot length	6.27 ms (DH5)
Time between RF Burst on same RF Channel	25.08 ms (DH1) 75.48 ms (DH3) 125.33 ms (DH5)
Time of Occupancy (20 and 79 ch mode)	127.11 ms (DH1) 175.73 ms (DH3) 185.56 ms (DH5)

DH1/2-DH1/3-DH1: Time between RF burst on same channel: $1.254 \times 20 \text{ ms} = 25.08 \text{ ms}$

DH3/2-DH3/3-DH3: Time between RF burst on same channel: $3.774 \times 20 \text{ ms} = 75.48 \text{ ms}$

DH5/2-DH5/3-DH5: Time between RF burst on same channel: $6.267 \times 20 \text{ ms} = 125.33 \text{ ms}$

Time of occupancy: $(0.3985 \times 400 \times 20) / 25.08 = 127.11 \text{ ms}$

Time of occupancy: $(1.658 \times 400 \times 20) / 75.48 = 175.73 \text{ ms}$

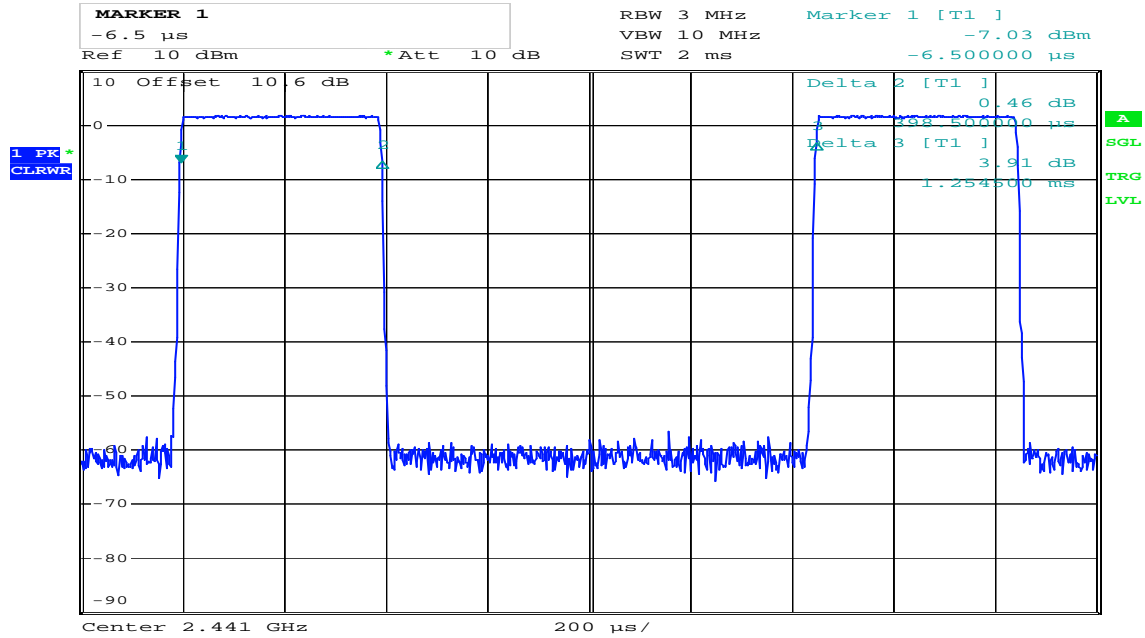
Time of occupancy: $(2.907 \times 400 \times 20) / 125.33 = 185.56 \text{ ms}$

See attached graph.

Requirements:

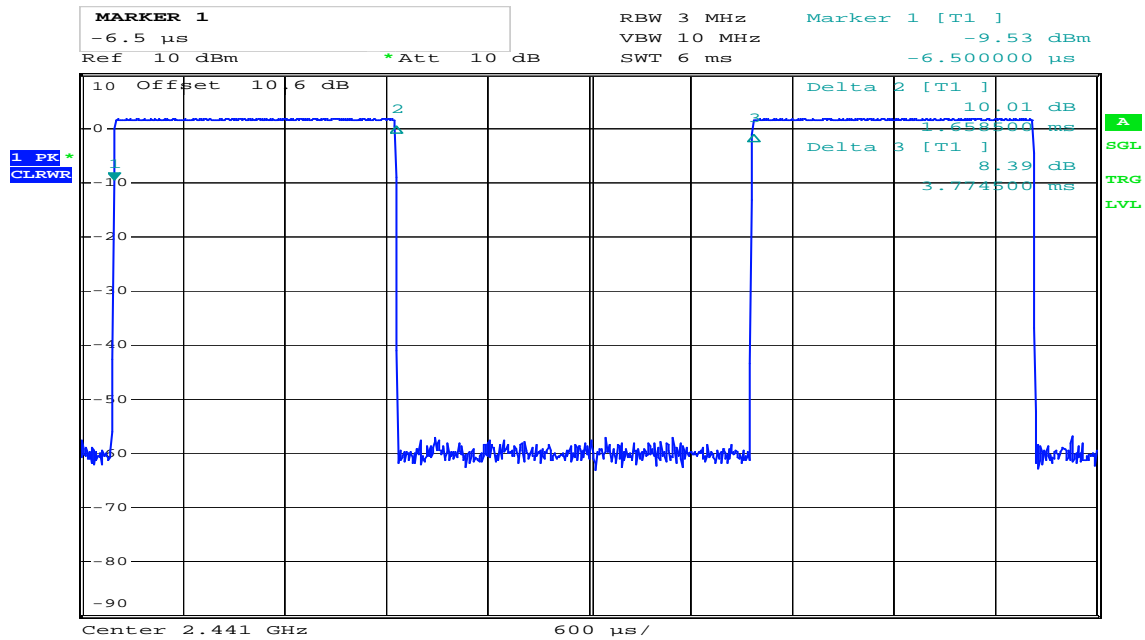
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

No requirements for Digital Transmission Systems.



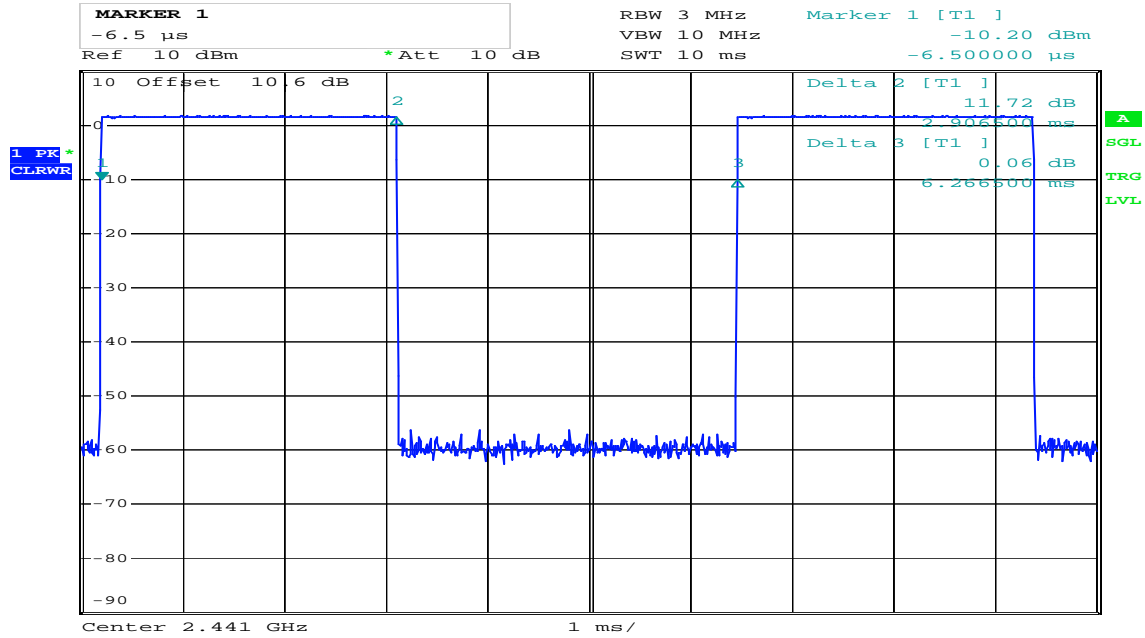
Date: 13.FEB.2018 16:49:40

Burst Length, Hopping Channel, DH1



Date: 13.FEB.2018 16:52:17

Burst Length, Hopping Channel, DH3



Date: 13.FEB.2018 16:47:39

Burst Length, Hopping Channel, DH5

3.5 Occupied Bandwidth

Para. No.: 15.247 (a)(1)(iii)

Test Results: Complies

Measurement Data:

Number of Hopping Channels in use:	20 to 79
Hopping Channel Centre Frequencies:	2402 to 2480 MHz
99% BW, 2441MHz, GFSK:	861 kHz
99% BW, 2441MHz, $\pi/4$ -DQPSK	1.167 MHz
99% BW, 2441MHz, 8DPSK:	1.161 MHz

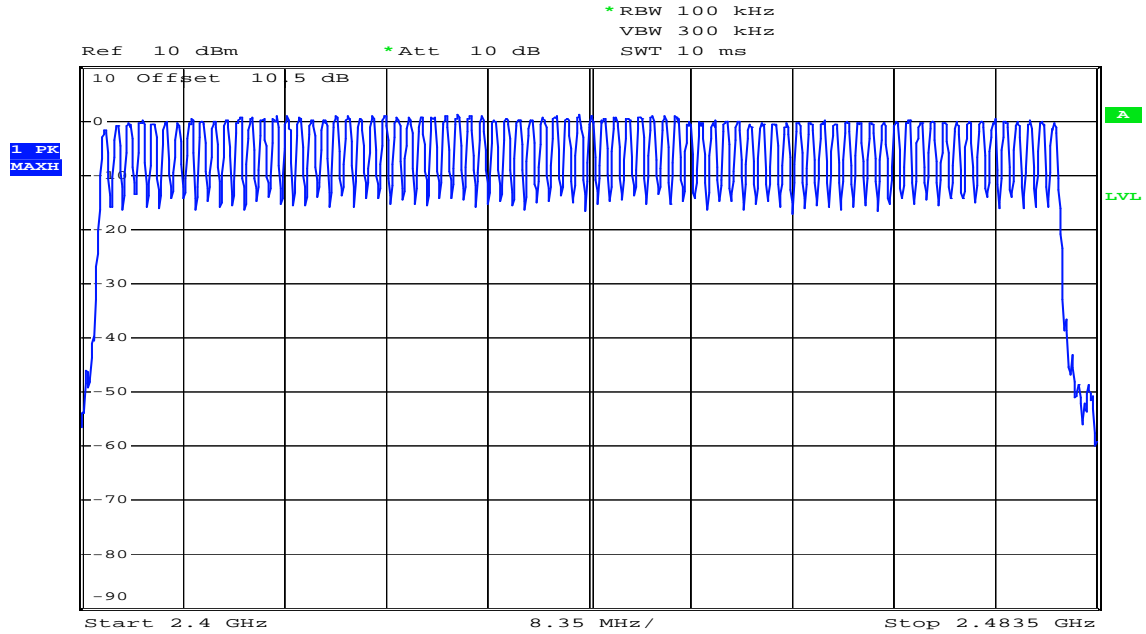
See attached plots.

Requirements:

Frequency hopping systems in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels.
No requirements for bandwidth for this frequency band.

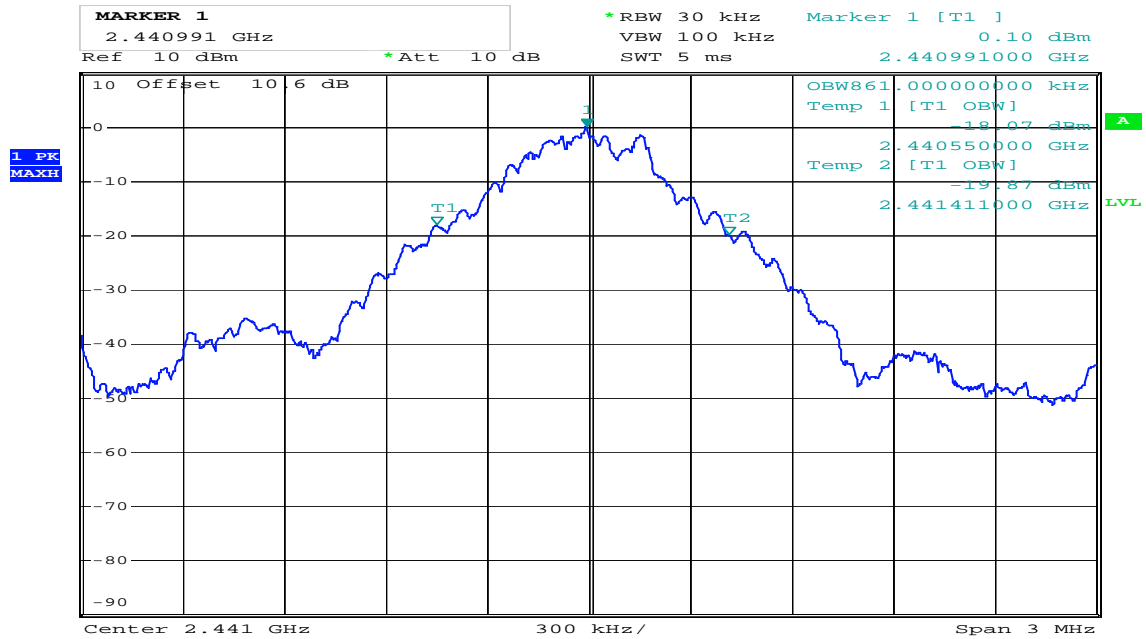
No requirements for Digital Transmission Systems.

No requirement for 99% BW, reported for information only.



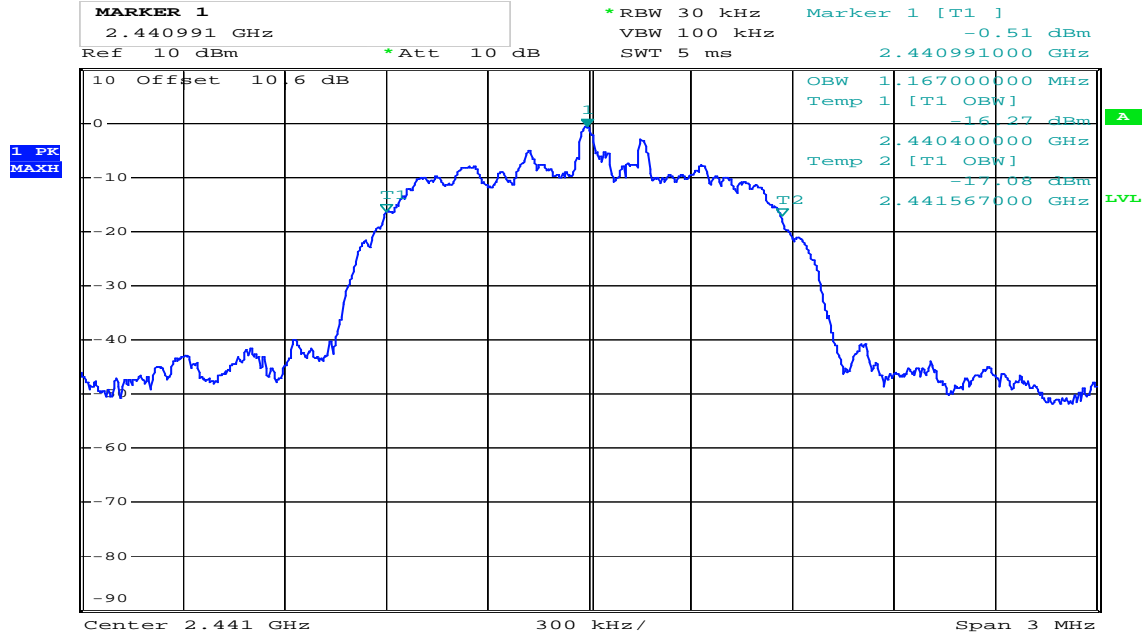
Date: 13.FEB.2018 16:00:08

RF Channels in Use, 79 Ch



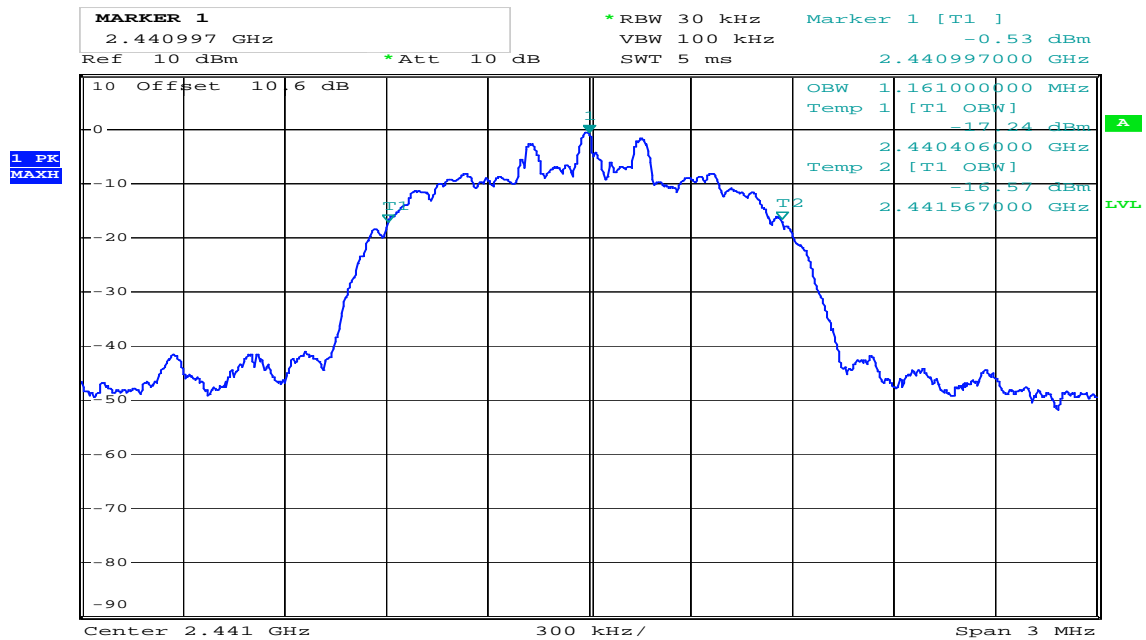
Date: 16.FEB.2018 10:52:31

Occupied Bandwidth, 99%, 2441MHz, GFSK



Date: 16.FEB.2018 10:53:50

Occupied Bandwidth, 99%, 2441MHz, $\pi/4$ -DQPSK



Date: 16.FEB.2018 11:07:04

Occupied Bandwidth, 99%, 2441MHz, 8DPSK

3.6 Peak Power Output

Para. No.: 15.247 (b)

Test Results: Complies

Measurement Data:

Hopping Channels

		2402 MHz	2441 MHz	2480 MHz
GFSK	Peak Power (dBm)	-0.50	1.58	0.97
	Peak Power (Watts)	0.00089	0.00144	0.00125
$\pi/4$ -DQPSK	Peak Power (dBm)	-0.22	1.76	1.24
	Peak Power (Watts)	0.00095	0.00150	0.00133
8DPSK	Peak Power (dBm)	0.23	2.25	1.61
	Peak Power (Watts)	0.00105	0.00168	0.00145
Declared Antenna Gain (dBi)		2.4	3.3	2.7

See attached plots.

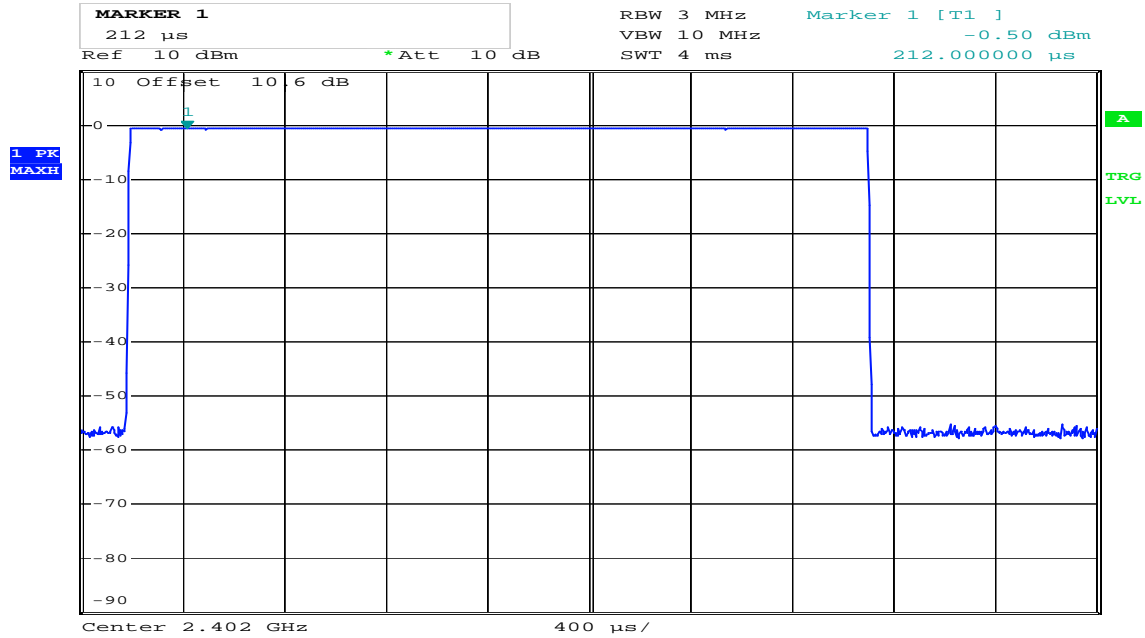
Requirements:

The maximum peak output power shall not exceed the following limits:

For all other frequency hopping systems in the 2400 - 2483.5 MHz band: 0.125 Watts

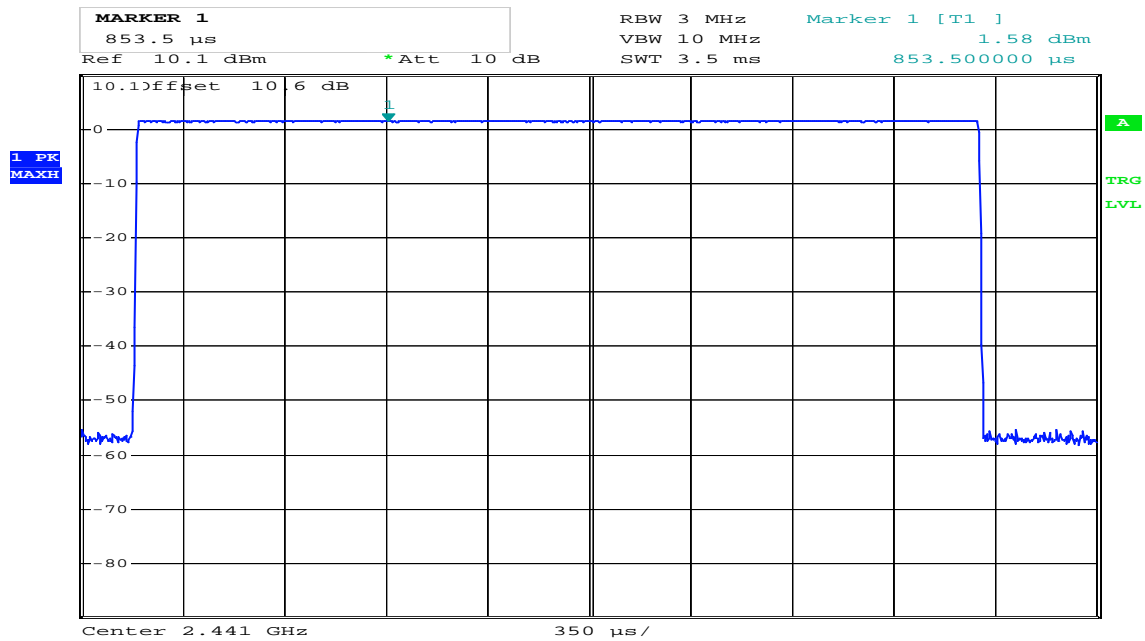
For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



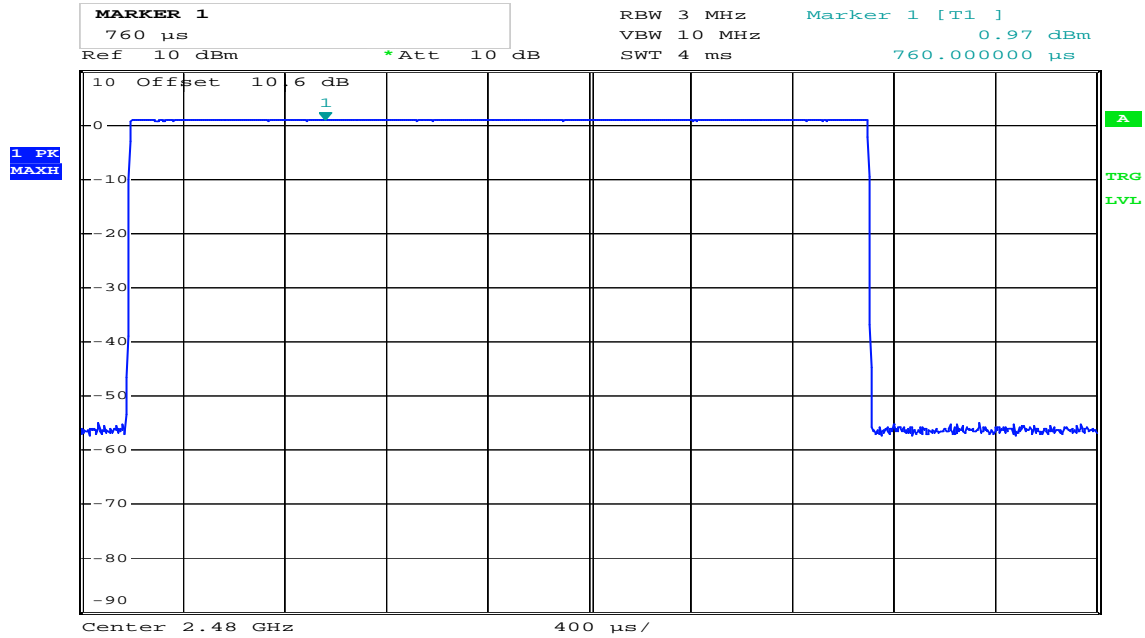
Date: 13.FEB.2018 16:54:23

Conducted Power, 2402 MHz, GFSK



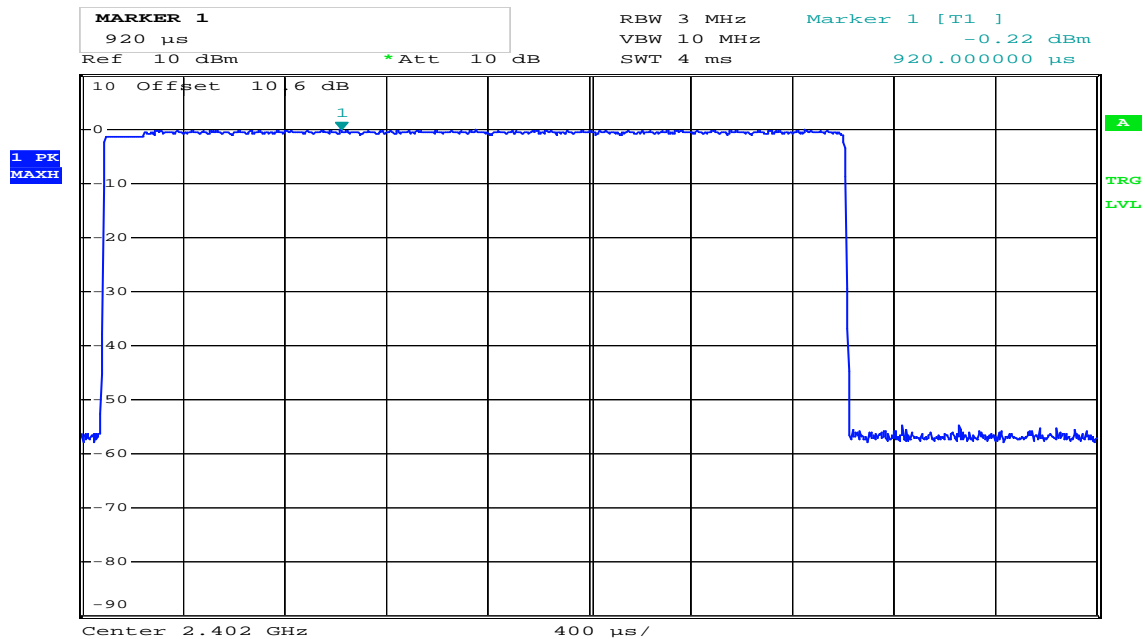
Date: 13.FEB.2018 16:10:53

Conducted Power, 2441 MHz, GFSK



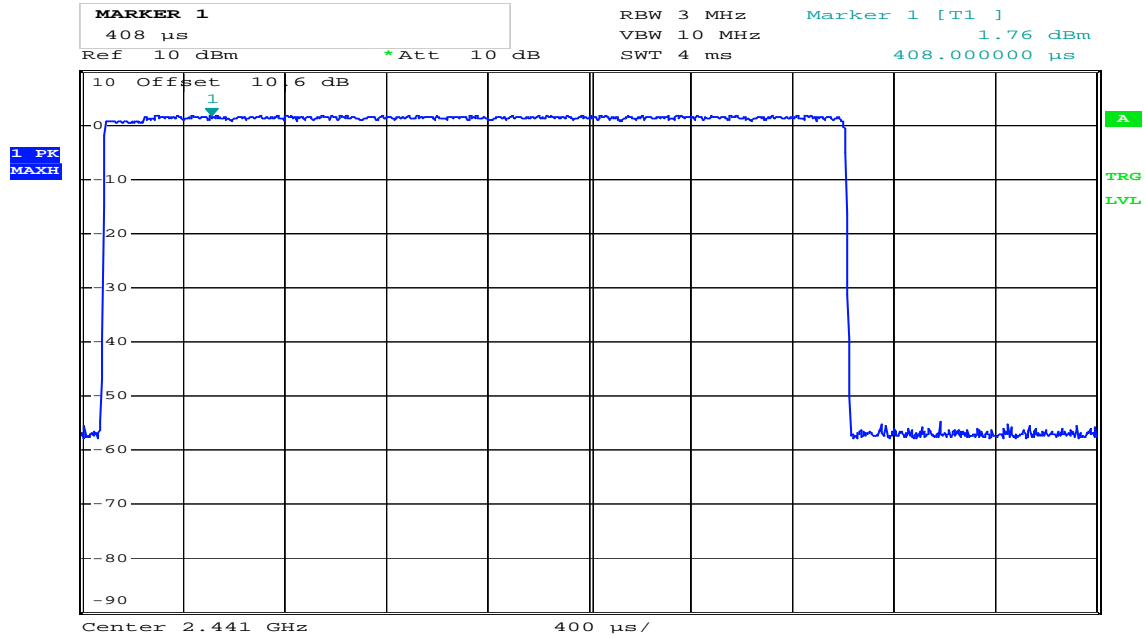
Date: 13.FEB.2018 16:55:06

Conducted Power, 2480 MHz, GFSK



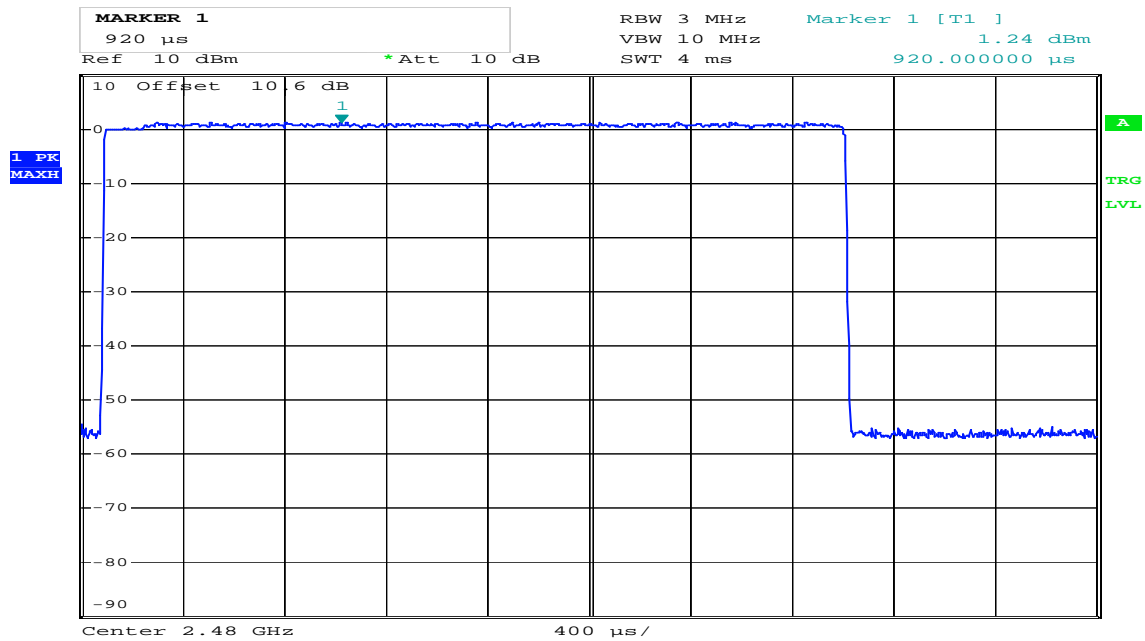
Date: 16.FEB.2018 09:53:28

Conducted Power, 2402 MHz, π/4-DQPSK



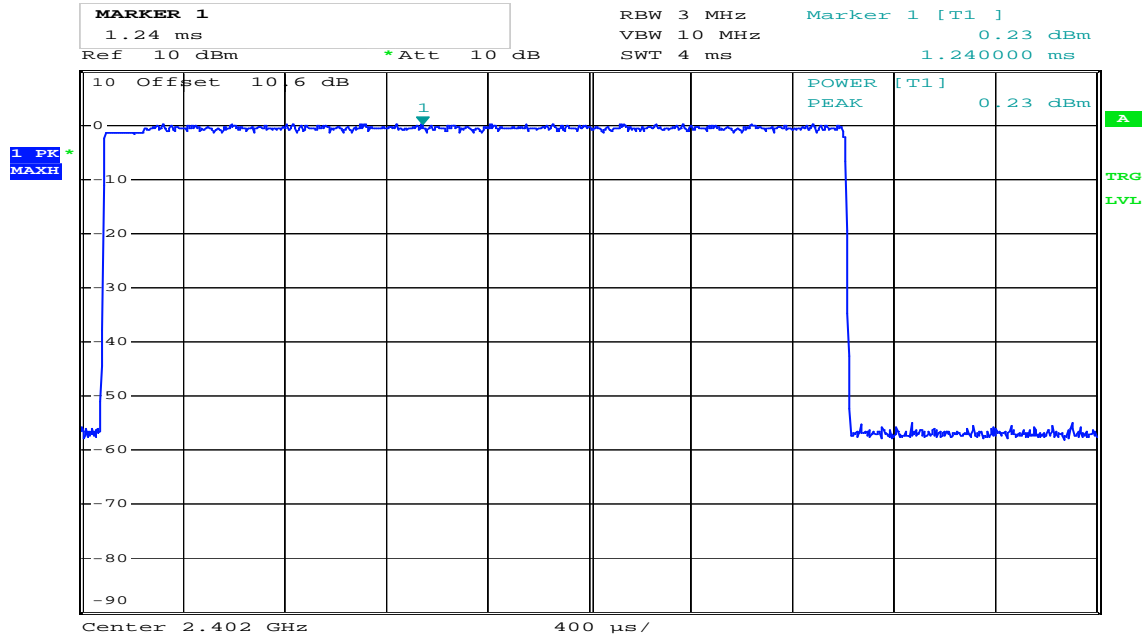
Date: 16.FEB.2018 09:54:04

Conducted Power, 2441 MHz, $\pi/4$ -DQPSK



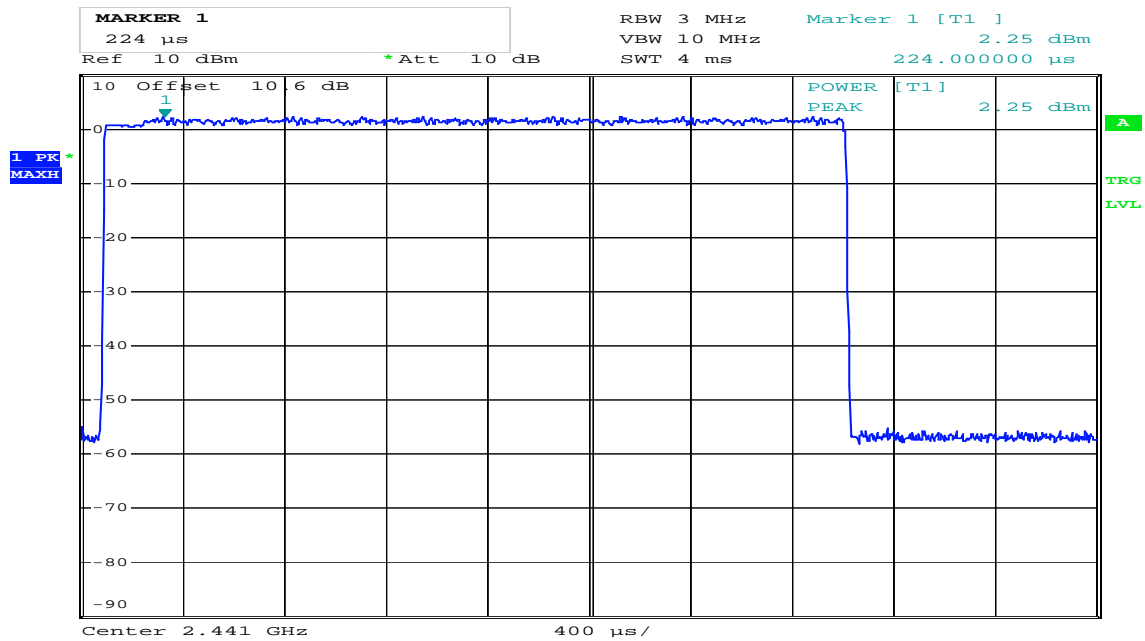
Date: 16.FEB.2018 09:54:47

Conducted Power, 2480 MHz, $\pi/4$ -DQPSK



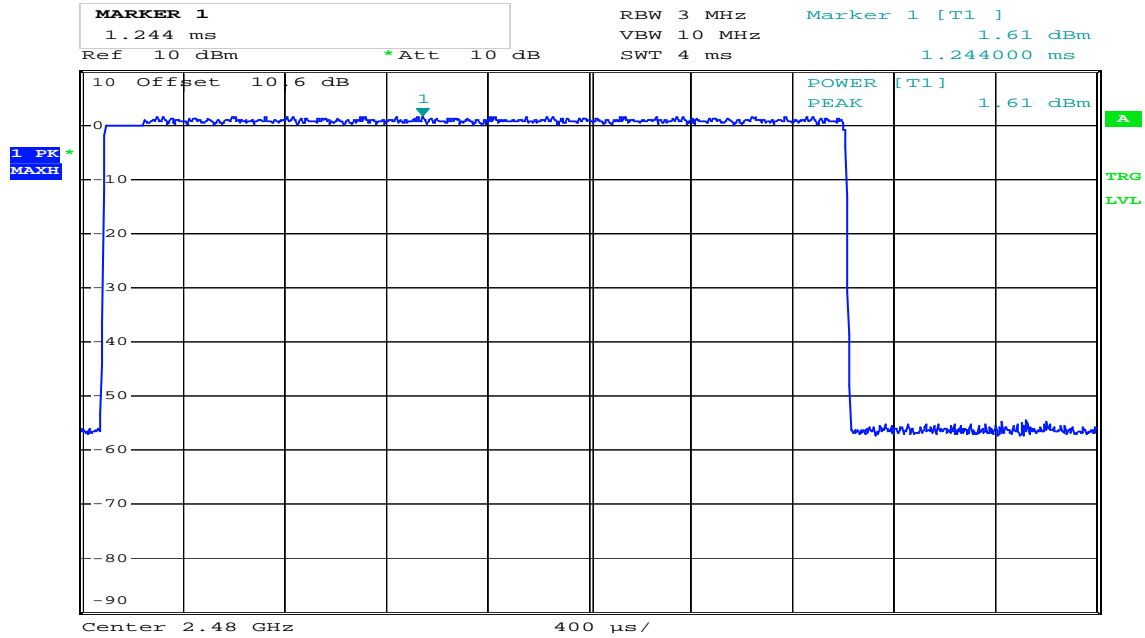
Date: 16.FEB.2018 09:56:55

Conducted Power, 2402 MHz, 8DPSK



Date: 16.FEB.2018 09:56:25

Conducted Power, 2441 MHz, 8DPSK



Date: 16.FEB.2018 09:55:56

Conducted Power, 2480 MHz, 8DPSK



3.7 Conducted Emissions at Antenna Connector

FCC Part 15.247 (d)

Test Results: Complies

Measurement Data:

Carrier Frequency	Highest Value (dBc)	Margin (dB)	Verdict
All	> 50	> 30	Pass

Measured with Peak Detector

Measurements were performed with the EUT in hopping mode

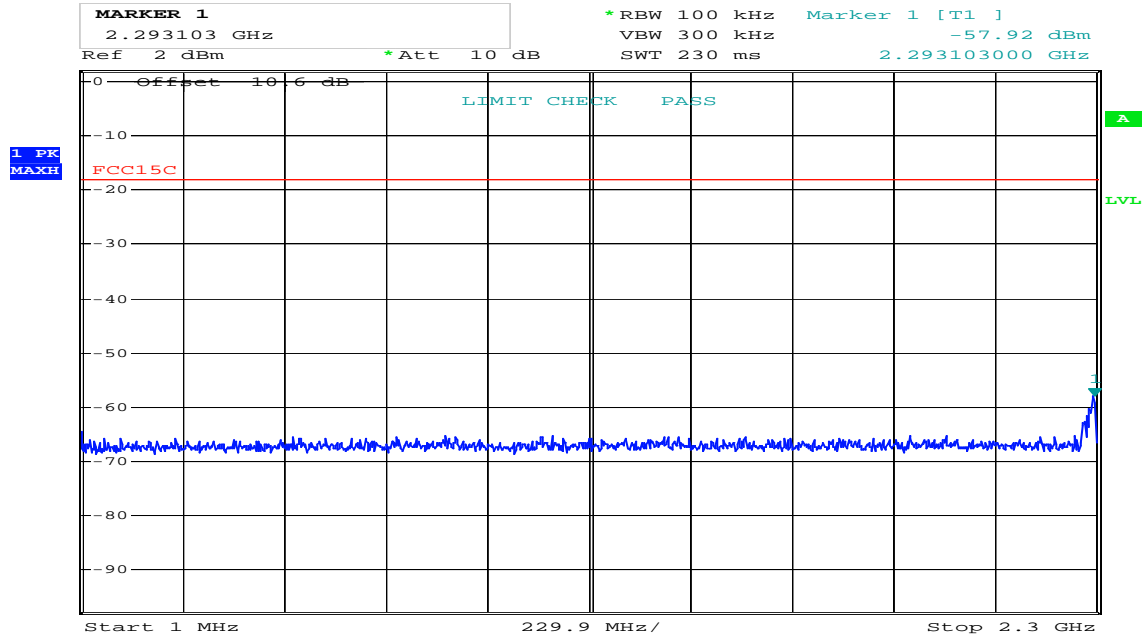
RF conducted power to 25 GHz: see attached plots.

Limit

Peak measurement	RMS averaging
20 dBc or more in 100 kHz bandwidth	30 dBc or more in 100 kHz bandwidth

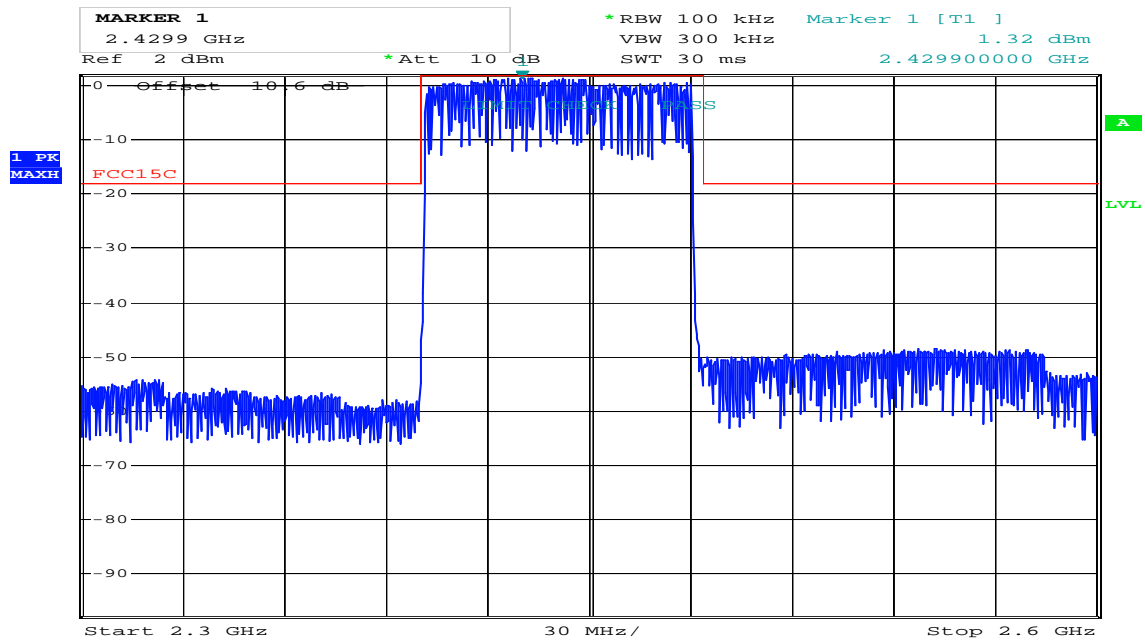
Detector type shall be the same as used for measuring Output Power.

Attenuation below the general limits specified in part 15.209(a) is not required.



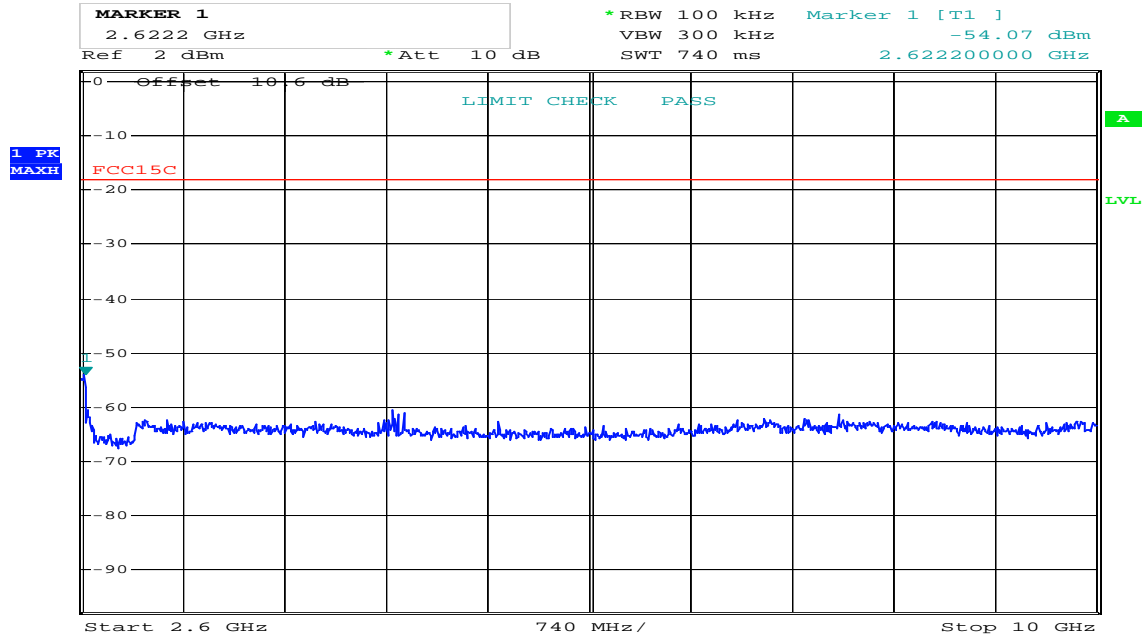
Date: 16.FEB.2018 11:39:14

Conducted Emissions, 1 -2300MHz, Hopping



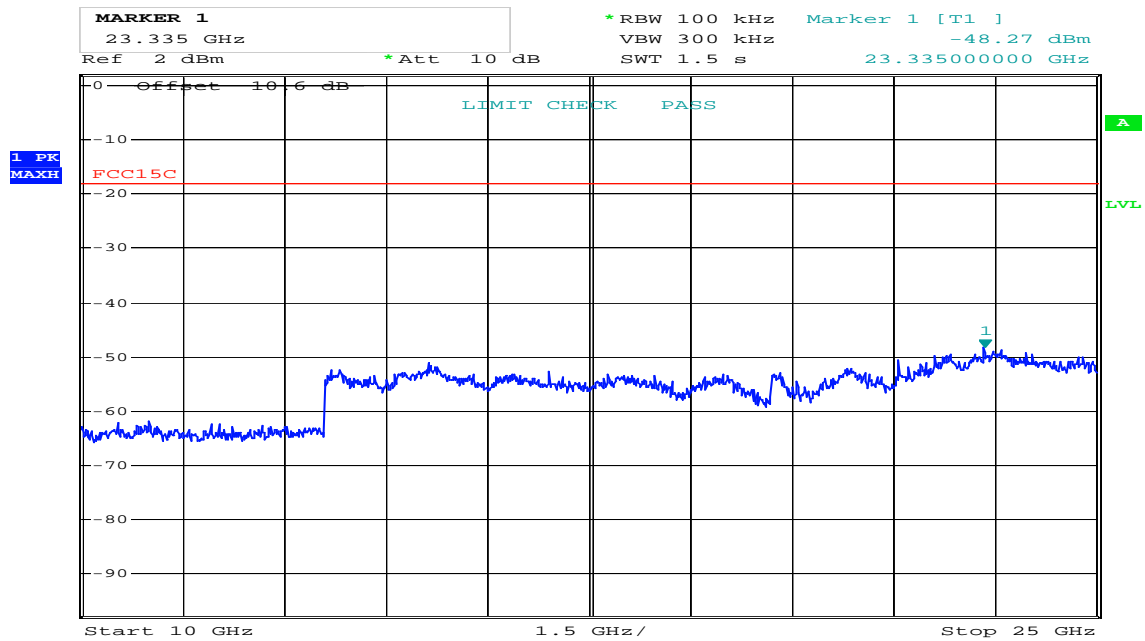
Date: 16.FEB.2018 11:38:07

Conducted Emissions, 2300 -2600MHz, Hopping



Date: 16.FEB.2018 11:40:33

Conducted Emissions, 2600 -10000MHz, Hopping



Date: 16.FEB.2018 11:41:20

Conducted Emissions, 10000 -25000MHz, Hopping

3.8 Restricted Bands of operation

Restricted Bands of operation for FCC and ISED are defined in FCC Part 15.205 and ISED RSS-GEN, Issue 4 clause 8.10.

Generally, no fundamentals are allowed in the restricted bands and all emissions must comply with the limits in FCC 15.209 or RSS-GEN, Issue 4, clause 8.9.

FCC (MHz)	ISED (MHz)	FCC (GHz)	ISED (GHz)
0.090-0.110		0.96-1.24 1.3-1.427	0.96-1.427
0.495-0.505		1.435-1.6265	
2.1735-2.1905		1.6455-1.6465	
	3.020-3.026	1.660-1.710	
4.125-4.128		1.7188-1.7222	
4.17725-4.17775		2.2-2.3	
4.20725-4.20775		2.31-2.39	
	5.677-5.683	2.4835-2.5	
6.215-6.218		2.69-2.9	2.655-2.9
6.26775-6.26825		3.26-3.267	
6.31175-6.31225		3.332-3.339	
8.291-8.294		3.3458-3.358	
8.362-8.366		3.6-4.4	3.5-4.4
8.37625-8.38675		4.5-5.15	
8.41425-8.41475		5.35-5.46	
12.29-12.293		7.25-7.75	
12.51975-12.52025		8.025-8.5	
12.57675-12.57725		9.0-9.2	
13.36-13.41		9.3-9.5	
16.42-16.423		10.6-12.7	
16.69475-16.69525		13.25-13.4	
16.80425-16.80475		14.47-14.5	
25.5-25.67		15.35-16.2	
37.5-38.25		17.7-21.4	
73-74.6		22.01-23.12	
74.8-75.2		23.6-24.0	
108-121.94 123-138	108-138	31.2-31.8	
149.9-150.05		36.43-36.5	
156.52475-156.52525		Above 38.6	
156.7-156.9			
162.0125-167.17			
167.72-173.2			
240-285			
322-335.4			
399.9-410			
608-614			

Frequencies in **Bold** text are specific for FCC or ISED, all other frequencies are common.

3.9 Spurious Emissions (Radiated)

FCC Part 15.209

Test Results: Complies

Measurement Data:

	Calculated field strength (dB μ V/m)		Limit	Margin	
	2390 MHz	2483.5 MHz	dB	dB	
Peak Detector	50.1	62.4	74	24.9	11.6
Average Detector	30.1	42.4	54	20.2	11.6

Average values are calculated from Peak Values.

See attached plots.

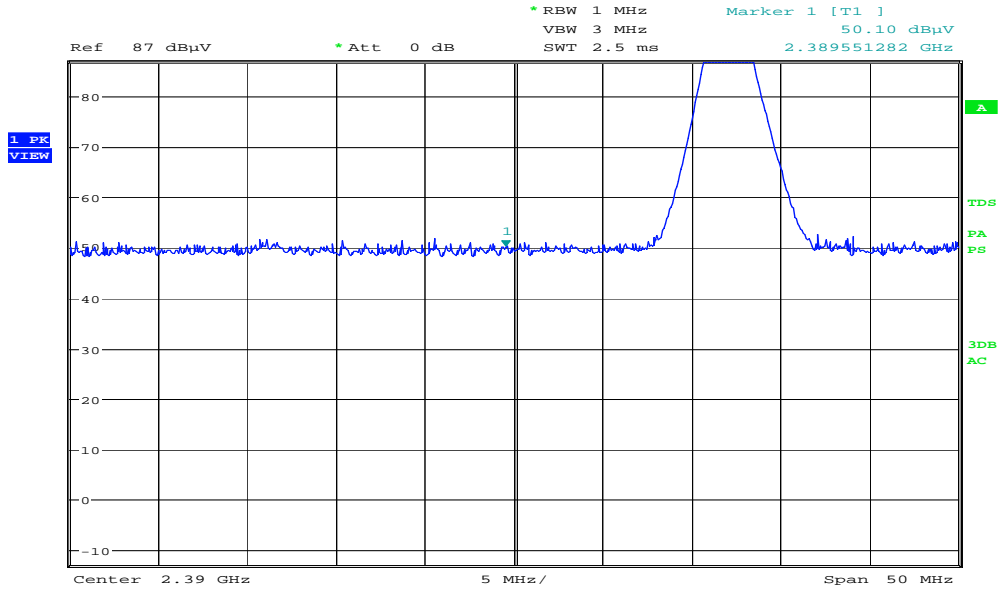
Duty Cycle Correction Factor

Correction Factor = $-20 \times \log(\text{Burst Length} / (\text{Frame Length} * \text{Number of Hopping Channels}))$

$$= -20 \times \log(2.91 / (6.267 * 20)) \text{ dB} = 32.7 \text{ dB}$$

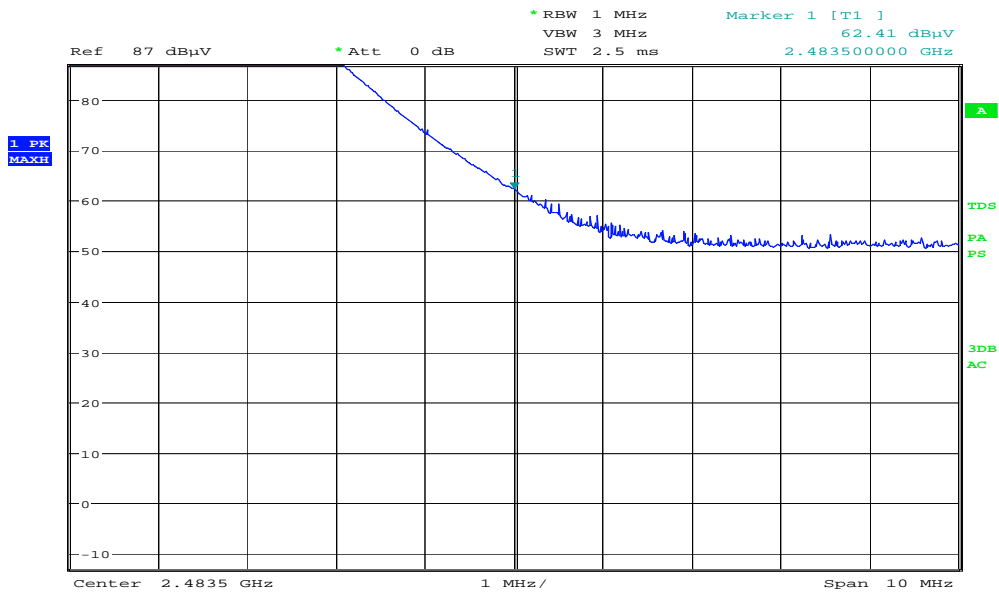
Maximum Allowed Correction Factor = 20 dB

Carrier Freq (MHz)	Modulation	EUT Mode	Measured Conducted Spurious Level (dBm)
2402	GFSK	Hopping OFF	-56.11
2402	GFSK	Hopping ON	-51.40
2480	GFSK	Hopping OFF	-38.17
2480	GFSK	Hopping ON	-38.02
2402	$\pi/4$ -DQPSK	Hopping OFF	-56.01
2402	$\pi/4$ -DQPSK	Hopping ON	-52.80
2480	$\pi/4$ -DQPSK	Hopping OFF	-38.46
2480	$\pi/4$ -DQPSK	Hopping ON	-38.62
2402	8DPSK	Hopping OFF	-54.83
2402	8DPSK	Hopping ON	-52.79
2480	8DPSK	Hopping OFF	-38.58
2480	8DPSK	Hopping ON	-38.56



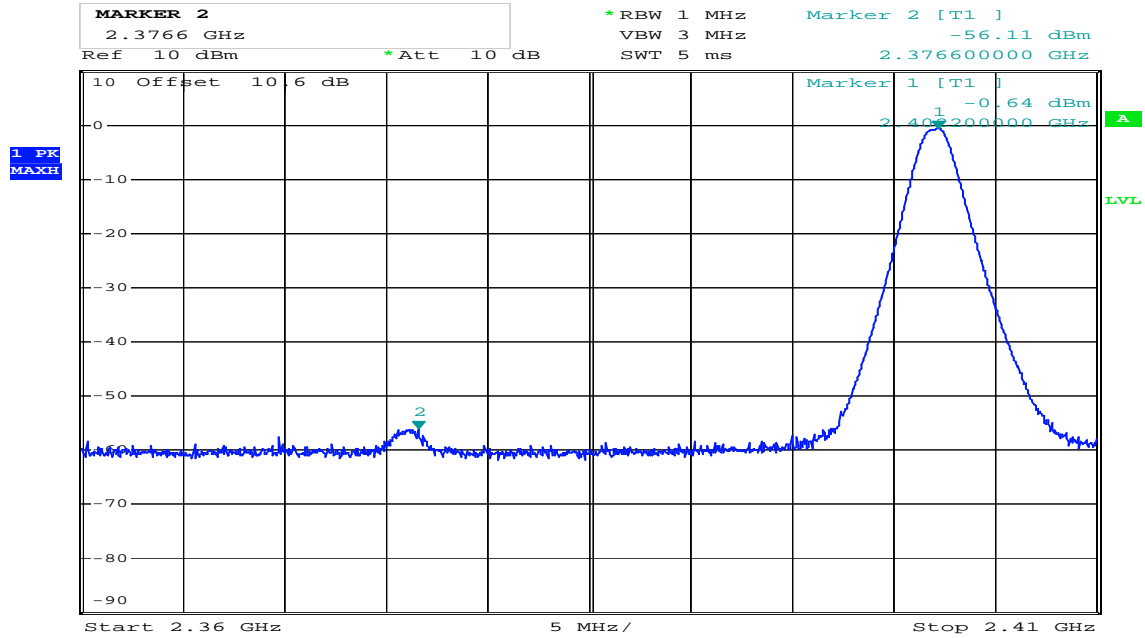
Date: 13.FEB.2018 03:34:01

Radiated Band Edge, Lower, Peak, 2402 MHz, GFSK



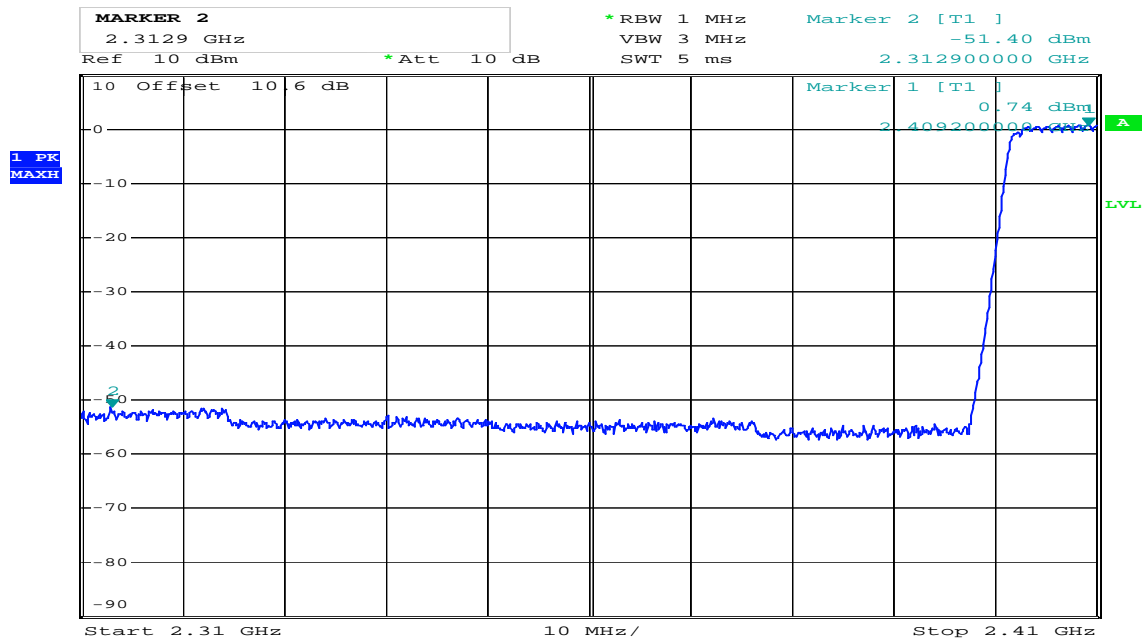
Date: 13.FEB.2018 03:16:30

Radiated Band Edge, Upper, Peak, 2480 MHz, GFSK



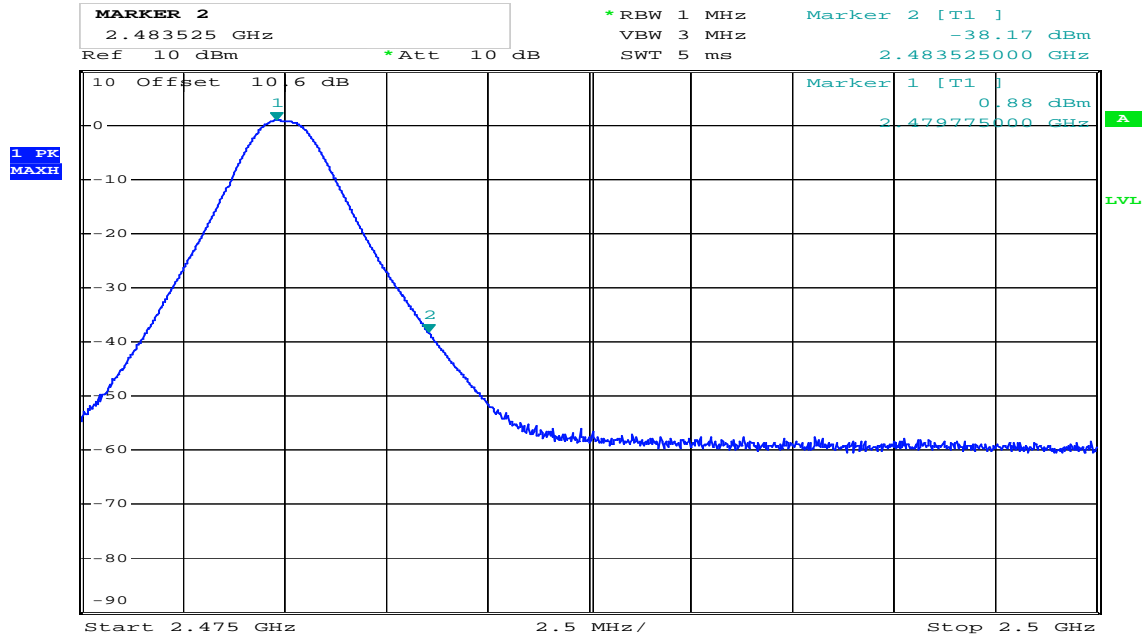
Date: 13.FEB.2018 16:58:53

Conducted Band Edge, Lower, Peak, 2402 MHz, GFSK, Hopping OFF



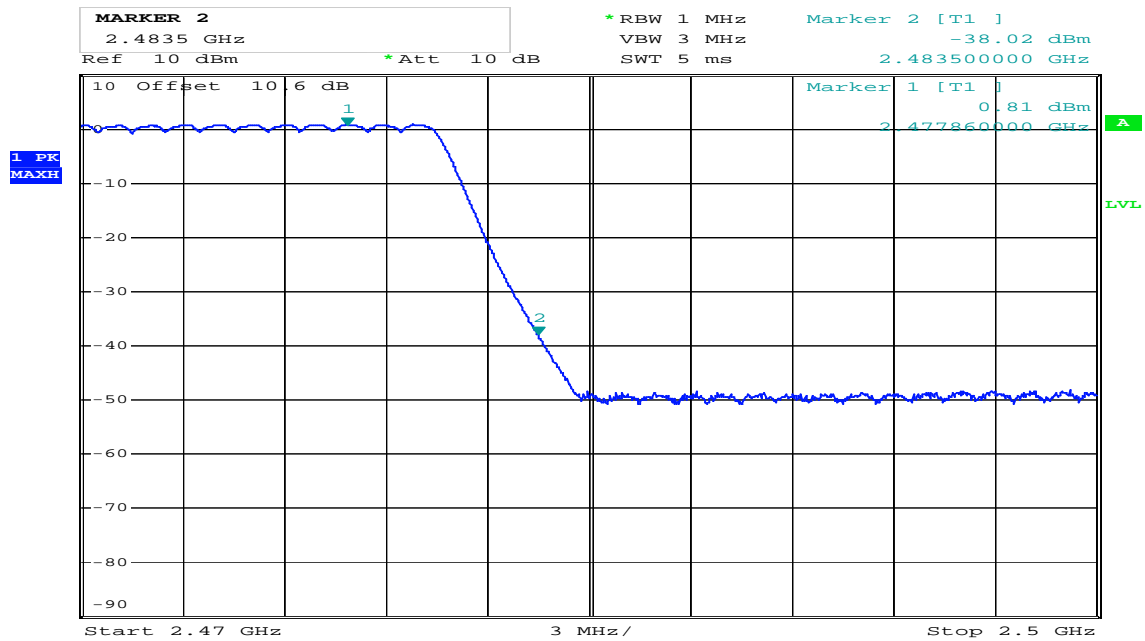
Date: 13.FEB.2018 17:02:23

Conducted Band Edge, Lower, Peak, 2402 MHz, GFSK, Hopping ON



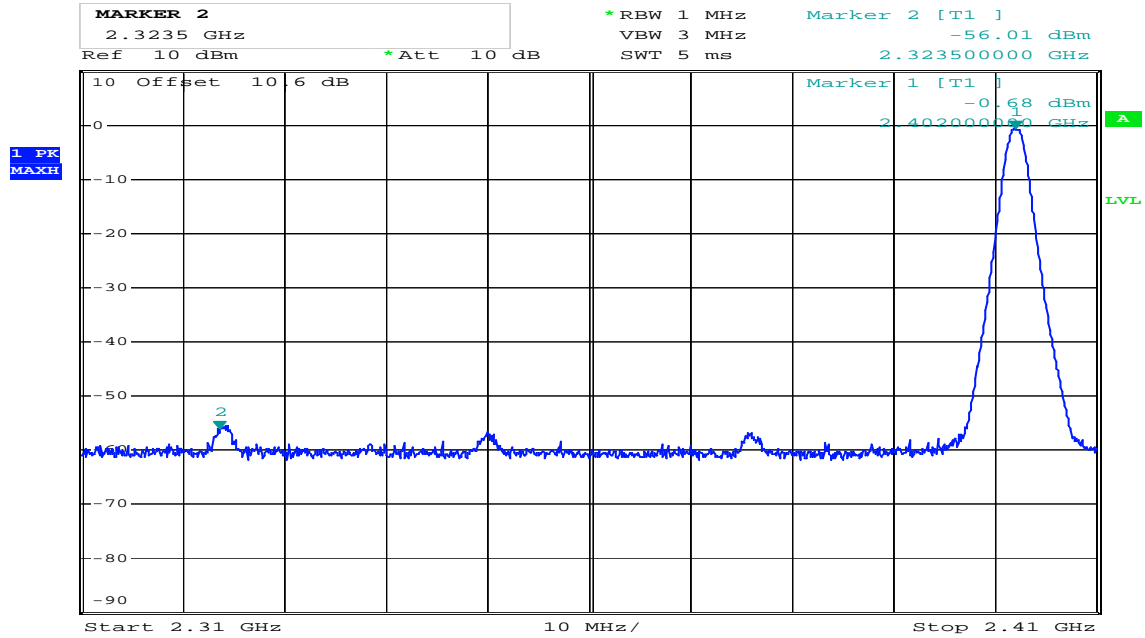
Date: 13.FEB.2018 16:57:38

Conducted Band Edge, Upper, Peak, 2480 MHz, GFSK, Hopping OFF



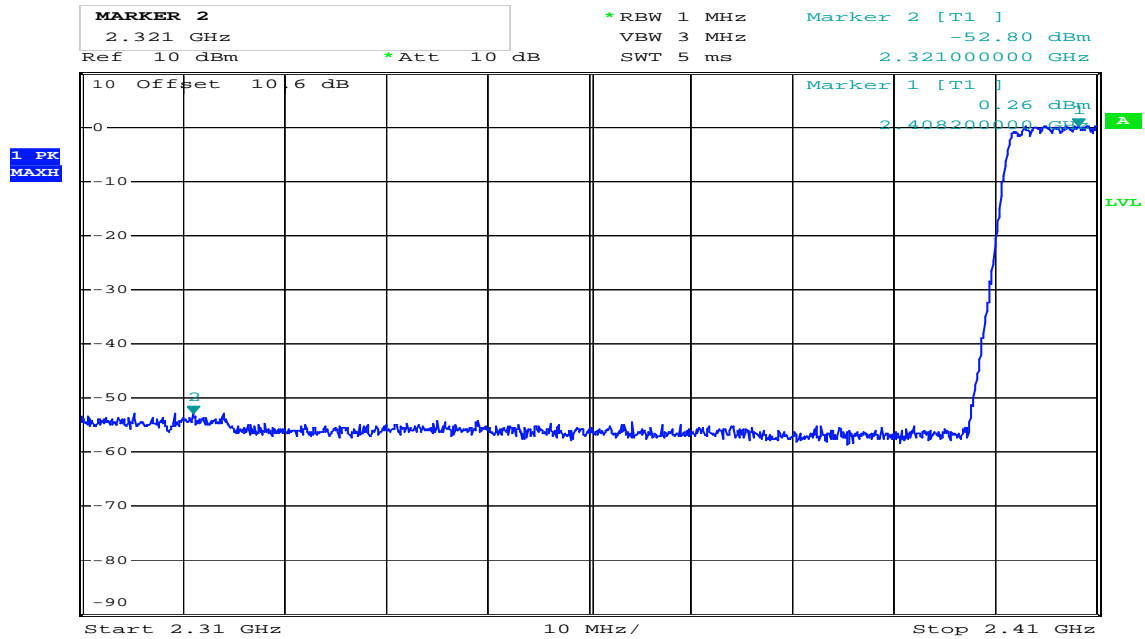
Date: 13.FEB.2018 17:03:26

Conducted Band Edge, Upper, Peak, 2480 MHz, GFSK, Hopping ON



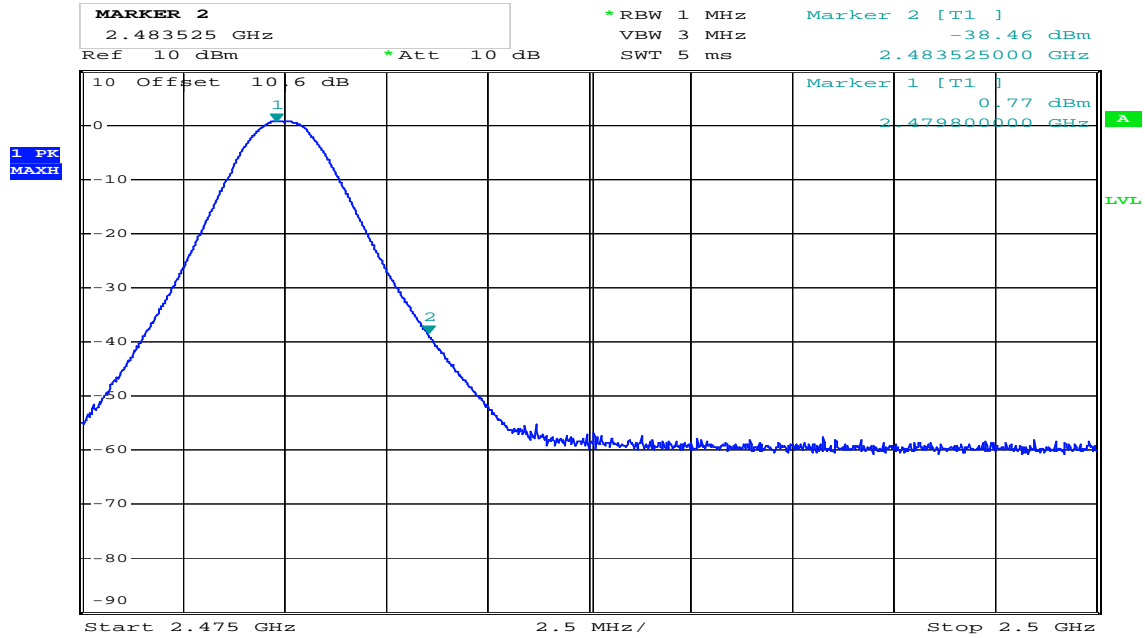
Date: 16.FEB.2018 10:03:44

Conducted Band Edge, Lower, Peak, 2402 MHz, $\pi/4$ -DQPSK, Hopping OFF



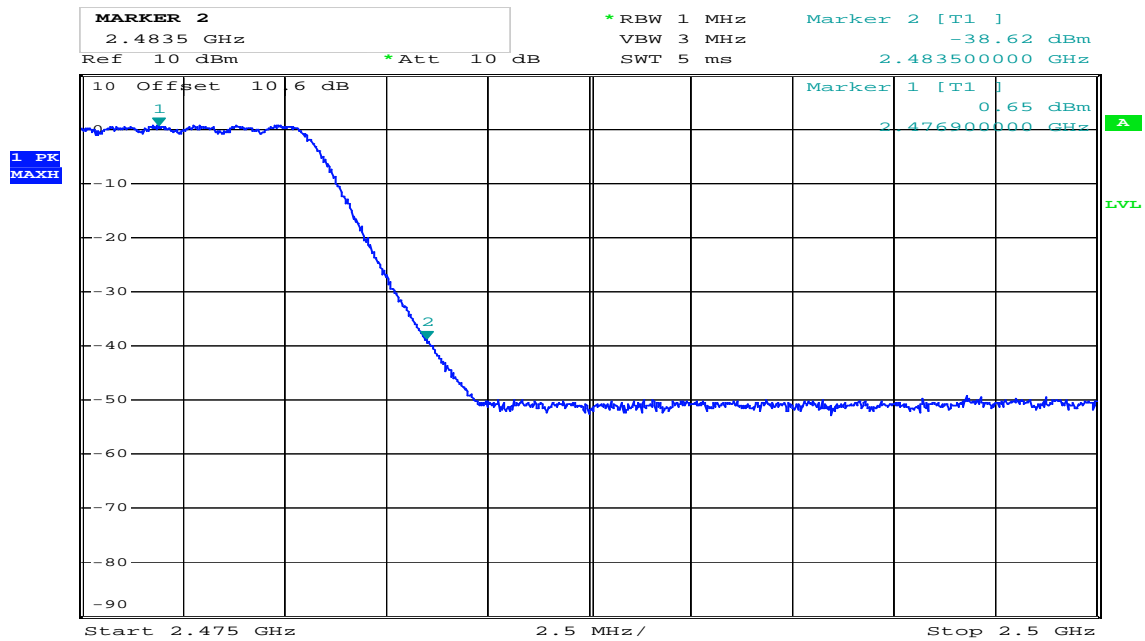
Date: 16.FEB.2018 10:05:25

Conducted Band Edge, Lower, Peak, 2402 MHz, $\pi/4$ -DQPSK, Hopping ON



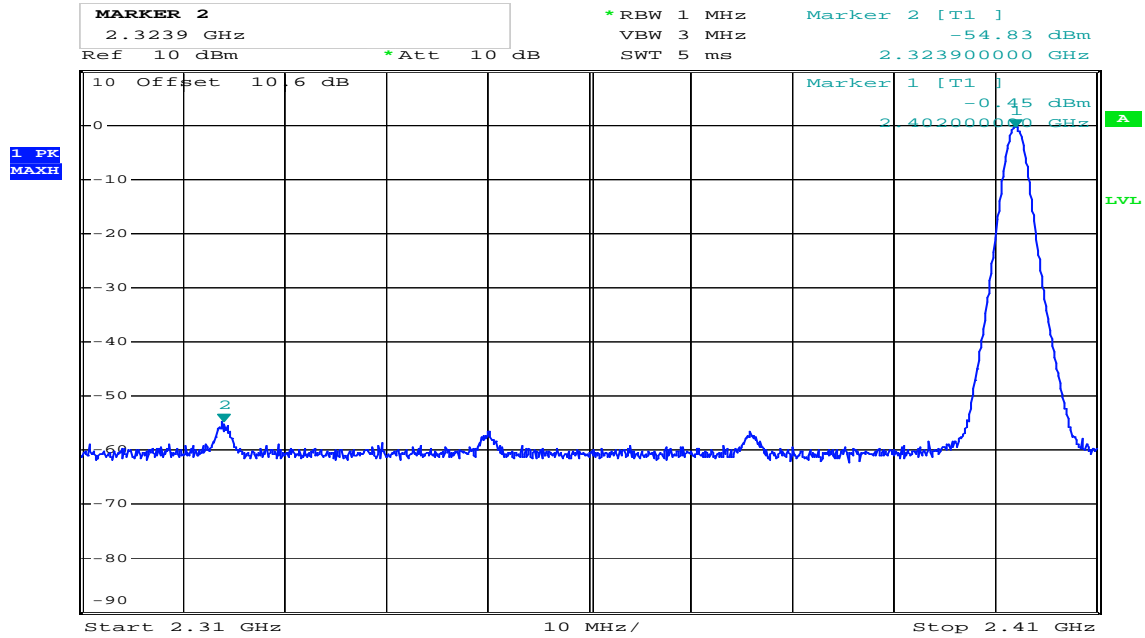
Date: 16.FEB.2018 10:02:52

Conducted Band Edge, Upper, Peak, 2480 MHz, $\pi/4$ -DQPSK, Hopping OFF



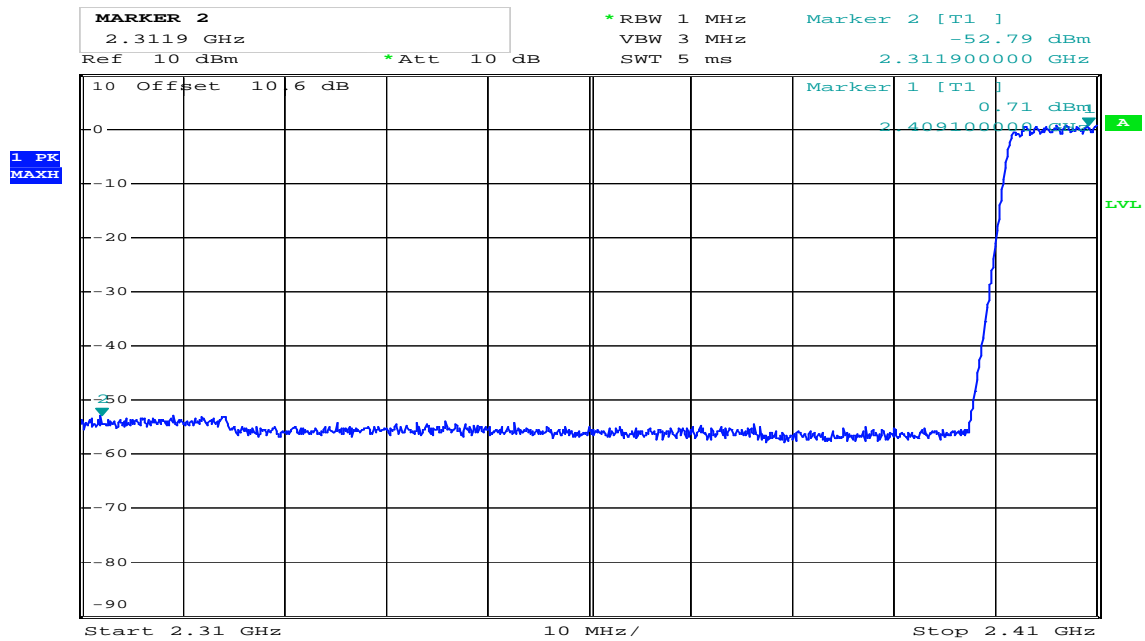
Date: 16.FEB.2018 10:06:38

Conducted Band Edge, Upper, Peak, 2480 MHz, $\pi/4$ -DQPSK, Hopping ON



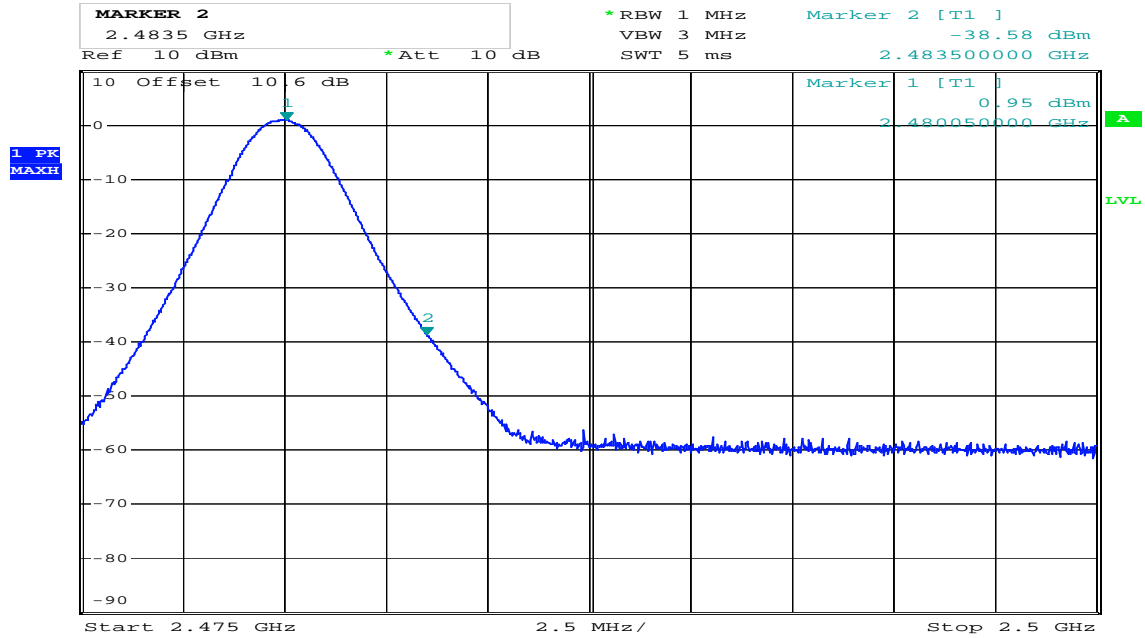
Date: 16.FEB.2018 09:59:43

Conducted Band Edge, Lower, Peak, 2402 MHz, 8DPSK, Hopping OFF



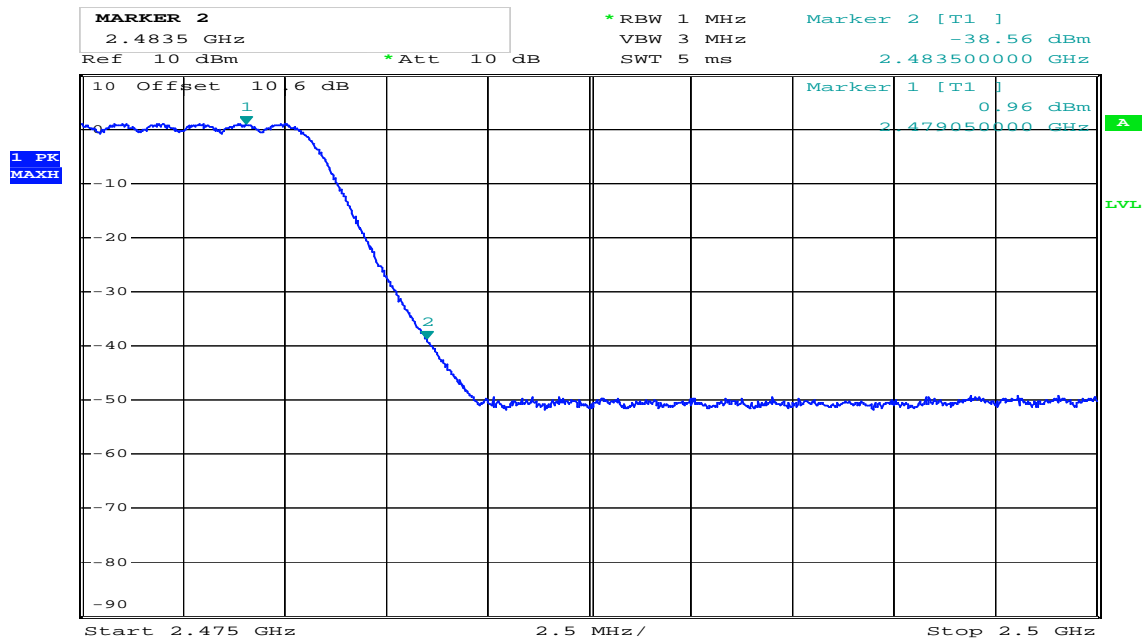
Date: 16.FEB.2018 10:12:45

Conducted Band Edge, Lower, Peak, 2402 MHz, 8DPSK, Hopping ON



Date: 16.FEB.2018 10:00:56

Conducted Band Edge, Upper, Peak, 2480 MHz, 8DPSK, Hopping OFF



Date: 16.FEB.2018 10:10:02

Conducted Band Edge, Upper, Peak, 2480 MHz, 8DPSK, Hopping ON



3.10 Radiated Emissions, below 1GHz

FCC 15.205, 15.209

ISED RSS-GEN, Issue 4, Clause 8.9

Test Results: Complies

Radiated emission 30 – 1000 MHz

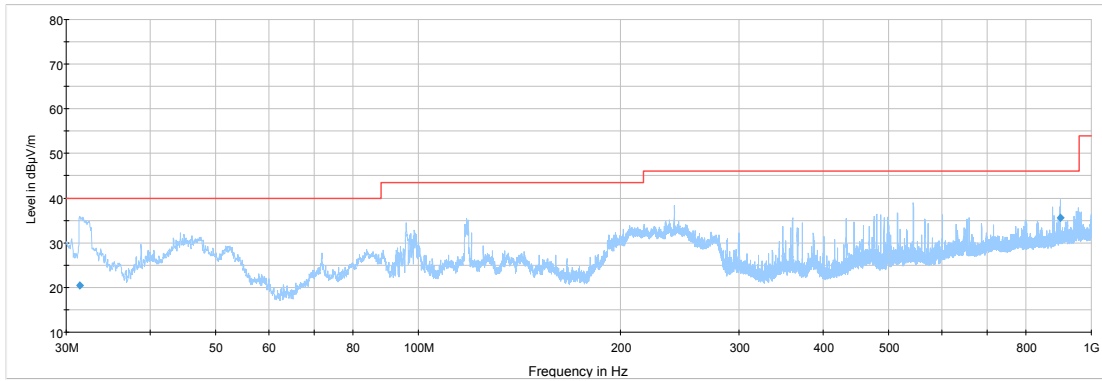
Measuring distance 3m

Tested in burst mode with EUT transmitting on one channel.

See attached plots.

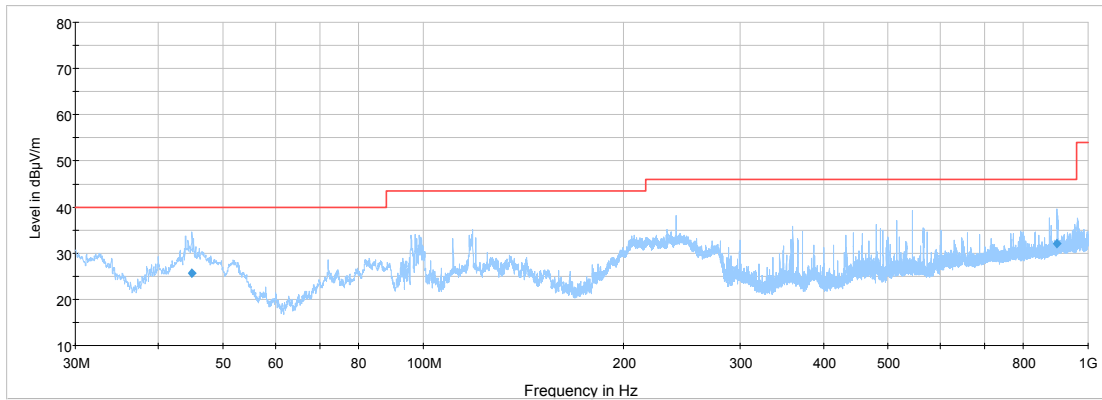
Requirements/Limit

FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 4, clause 8.9 @ frequencies defined in clause 8.10	
Radiated emission limit @3 meters		
Frequency (MHz)	Quasi Peak ($\mu\text{V}/\text{m}$)	Quasi Peak ($\text{dB}\mu\text{V}/\text{m}$)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0



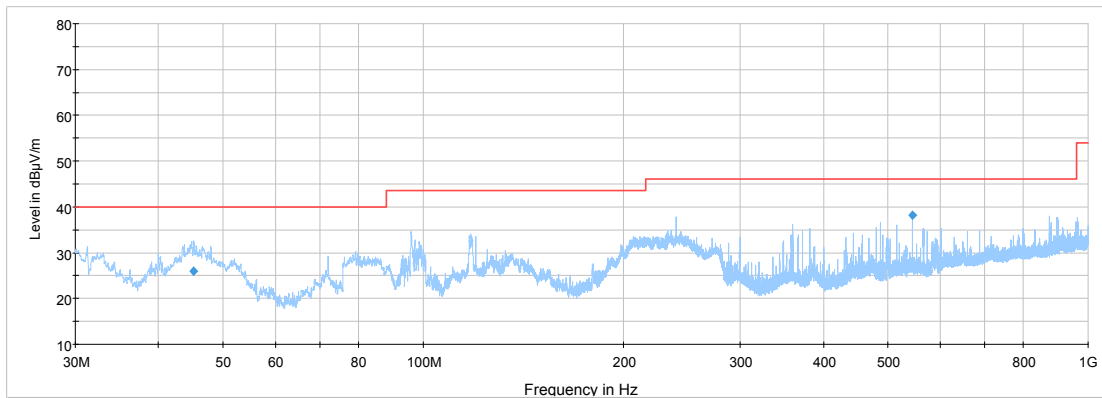
30-1000 MHz RE Jabra Low Channel
 Preview Result 1-PK+
 FCC Part 15 and ICES - Class B 3m Q-Peak Limit
 Final_Result QPK

Radiated Emissions, 30 -1000MHz, Low Channel



30-1000 MHz RE Jabra Mid Channel
 Preview Result 1-PK+
 FCC Part 15 and ICES - Class B 3m Q-Peak Limit
 Final_Result QPK

Radiated Emissions, 30 -1000MHz, Mid Channel



30-1000 MHz RE Jabra High Channel
 Preview Result 1-PK+
 FCC Part 15 and ICES - Class B 3m Q-Peak Limit
 Final_Result QPK

Radiated Emissions, 30 -1000MHz, High Channel



3.11 Radiated Emissions, above 1GHz

FCC 15.205, 15.209

ISED RSS-GEN, Issue 4, Clause 8.9

Test Results: Complies

Measurement Data:

Radiated Emissions, 1-25 GHz

Measuring distance: 3m (1 – 18 GHz)
 1m (18 – 26 GHz)

A pre-scan was performed above 18 GHz and no spurious emissions were detected.

Measured values:

Frequency (MHz)	Channel	Polarization	Max Peak (dBµV/m)	Average (dBµV/m)	Peak Margin (dB)	Av Margin (dB)
1927.403	39	V	45.44	25.44	28.56	28.56
3852.850	78	H	51.89	31.89	22.11	22.11
4905.771	00	V	41.01	21.01	32.99	32.99
4960.061	78	H	46.01	26.01	27.99	27.99
5779.075	00	H	54.92	34.92	19.08	19.08
5781.454	78	H	53.51	33.51	20.49	20.49
9857.525	39	V	46.07	26.07	27.93	27.93
17931.946	00	V	53.31	33.31	20.69	20.69
17903.129	78	V	53.29	33.29	20.71	20.71
17975.696	39	V	54.39	34.39	19.61	19.61

All emissions are below the Average Limit even when measured with Peak Detector.

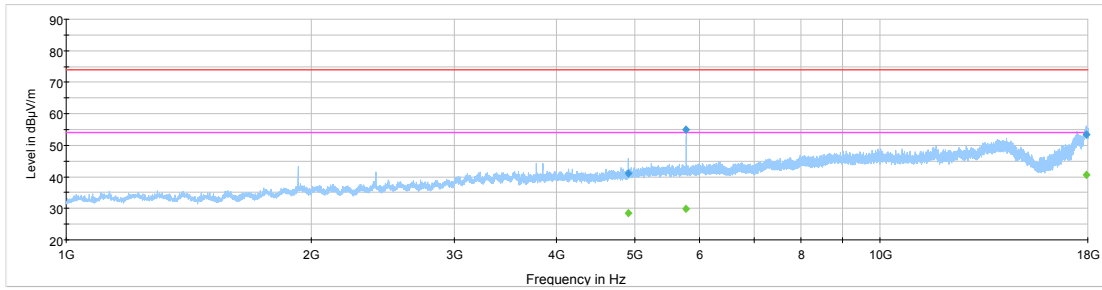
Average Values are calculated from Peak Values by Duty Cycle Correction Factor.

Antenna factor, amplifier gain and cable loss are included in spectrum analyzer "Transducer factor".

See plots.

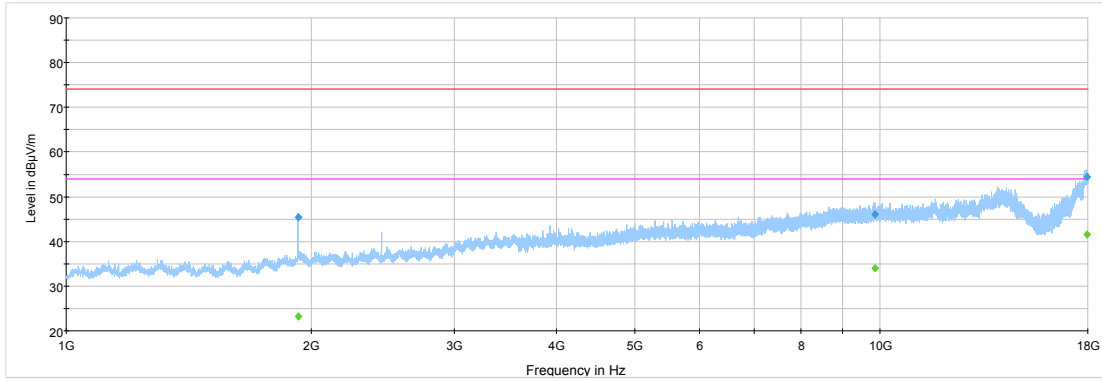
Requirements/Limit

FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 4, clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency (MHz)	AV (dBµV/m)	Peak (dBµV/m)
Above 1 GHz	54.0	74.0



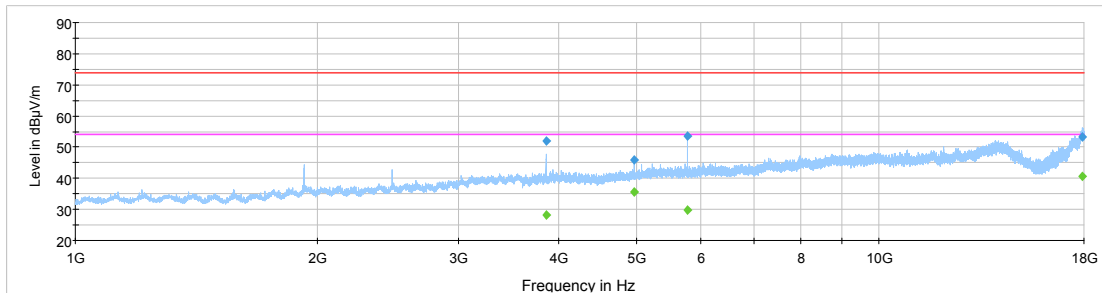
1-18 GHz RE Jabra Low Channel
 Preview Result 1-PK+
 FCC Part 15 and ICES - Class B 3m Peak Limit
 FCC Part 15 and ICES - Class B 3m Average Limit
 Final_Result PK+
 Final_Result CAV

Radiated Emissions, 1 -18 GHz, Low Channel



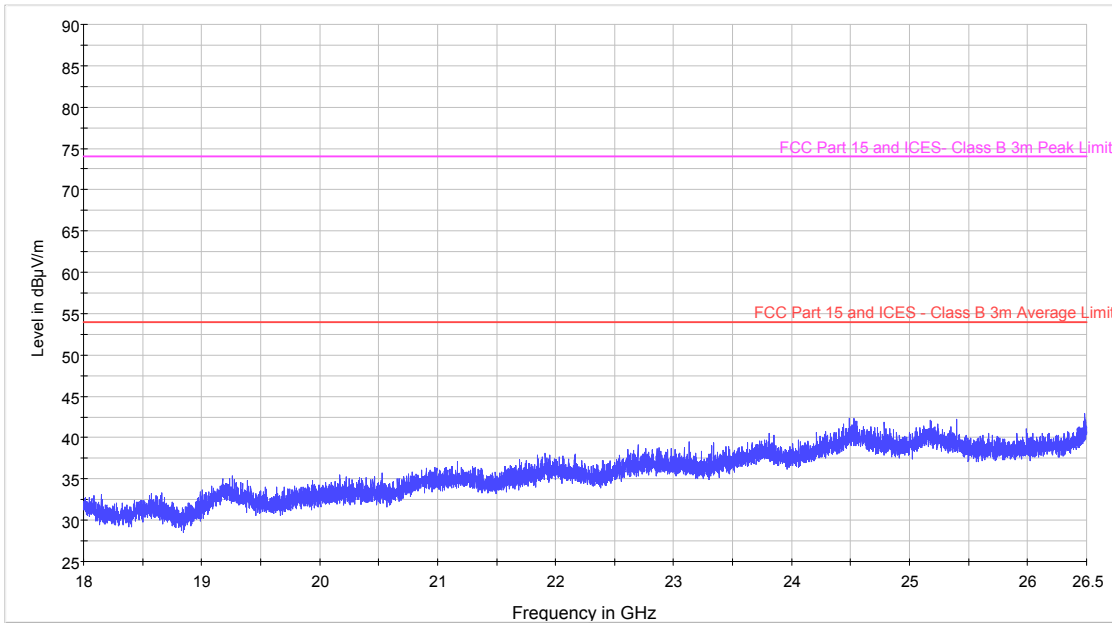
1-18 GHz RE Jabra Mid Channel
 Preview Result 1-PK+
 FCC Part 15 and ICES - Class B 3m Peak Limit
 FCC Part 15 and ICES - Class B 3m Average Limit
 Final_Result PK+
 Final_Result CAV

Radiated Emissions, 1 -18 GHz, Mid Channel



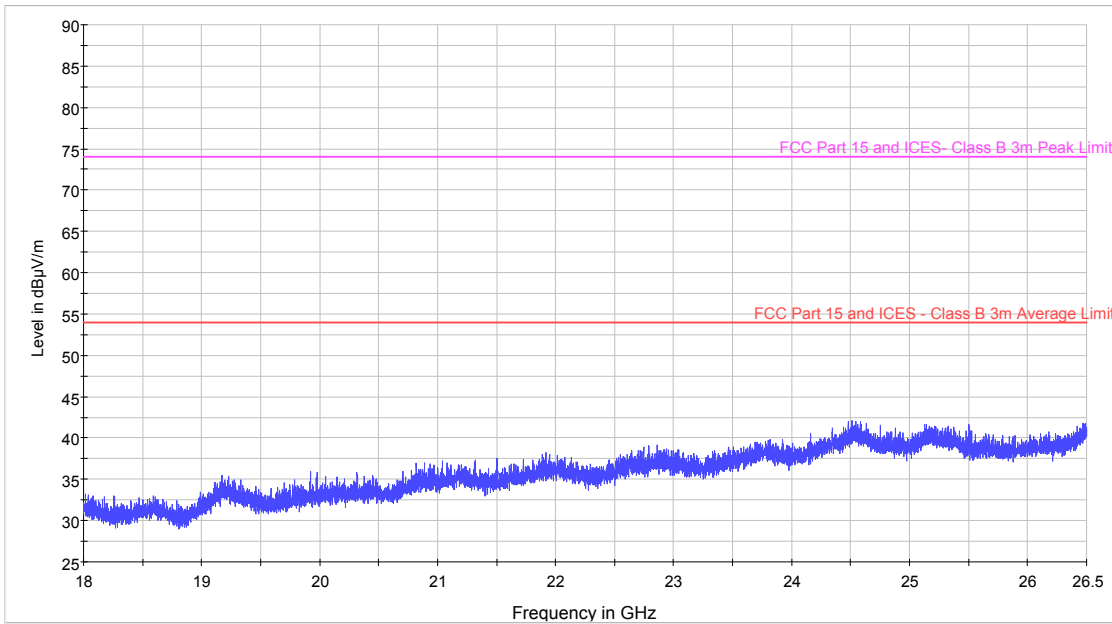
1-18 GHz RE Jabra High Channel
 Preview Result 1-PK+
 FCC Part 15 and ICES - Class B 3m Peak Limit
 FCC Part 15 and ICES - Class B 3m Average Limit
 Final_Result PK+
 Final_Result CAV

Radiated Emissions, 1 -18 GHz, High Channel



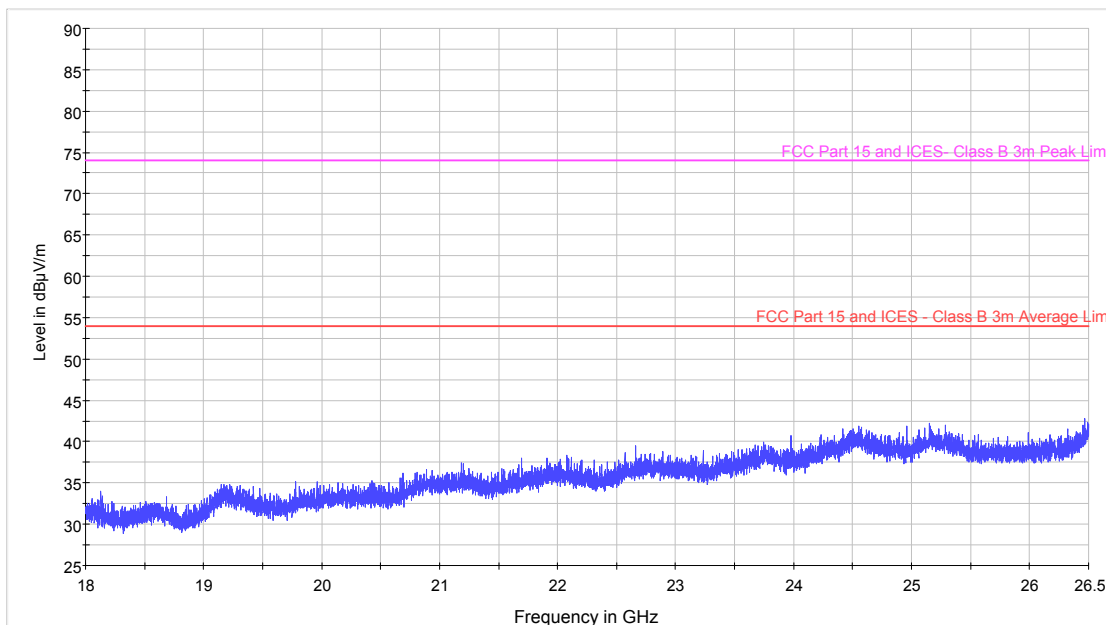
- 18-26 GHz RE Jabra Low Channel
- AVG_MAXH
- PK+_MAXH
- FCC Part 15 and ICES - Class B 3m Average Limit
- FCC Part 15 and ICES- Class B 3m Peak Limit

Pre-scan, 18 - 26 GHz, Low Channel



- 18-26 GHz RE Jabra Mid Channel
- AVG_MAXH
- PK+_MAXH
- FCC Part 15 and ICES - Class B 3m Average Limit
- FCC Part 15 and ICES- Class B 3m Peak Limit

Pre-scan, 18 - 26 GHz, Mid Channel



- 18-26 GHz RE Jabra High Channel
- AVG_MAXH
- PK+_MAXH
- FCC Part 15 and ICES - Class B 3m Average Limit
- FCC Part 15 and ICES - Class B 3m Peak Limit

Pre-scan, 18 - 26 GHz, High Channel

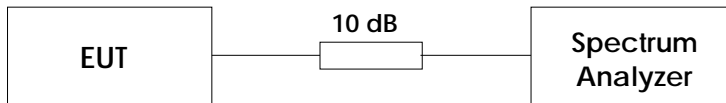
4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		Uncertainty
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted (RBW < 100 kHz)	< 3.6 GHz	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	Frequency	±5 %
	Amplitude	±1.0 dB
Frequency Error		±0.6 ppm
Timing and Jitter Measurements		±2.0 ns
Frame Timing Measurements		±1.4 ppm
Receiver Blocking Levels		±1.0 dB
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

5 Test Setups

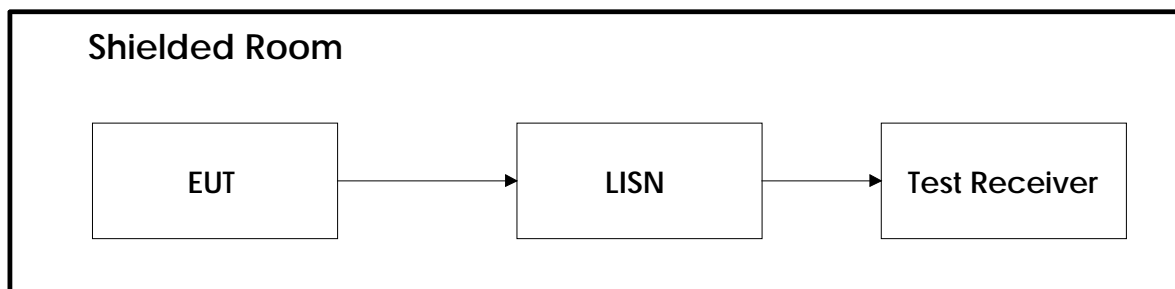
5.1 Conducted Emission Test



Test Set-up 3

This setup is used for all conducted emission tests.

5.2 Power Line Conducted Emissions Test



Test Set-Up 5

6 Test Equipment Used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Testhouse.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSP30	Spectrum Analyzer	Rohde & Schwarz	LR 1551	2017.06	2019.06
2	6810.17B	Attenuator	Suhner	LR 1669	COU	
3	ESU 26	Receiver/spectrum analyzer	Rohde & Schwarz	FA002043	2018.01	2019.01
4	JB3	Hybrid Antenna	Sunol	FA002108		
5	Model 3117	Horn Antenna with Preamp	EMCO	FA002840		
6	ENV216	LISN	Rohde & Schwarz	FA002023	2017.05	2018.05
7	ST18/SMA/N/36	RF Cable	Suhner	LR 1630	COU	

Note: COU – calibrate on use; N/A – Not Applicable

The software listed below has been used for one or more tests.

No.	Manufacturer	Name	Version	Comment
1	Agilent	Intuitlink Data Capture	2.1.0	Screenshots from HP 53310A
2	Rohde & Schwarz	EMC 32	9.26.01	Software for EMC Measurements of Power-Line Conducted Tests



Revision history

Version	Date	Comment	Sign
1.0	2018.03.06	First edition	FS