TESTING CERT #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 adapter card**
Brand Name	**Intel**
Model Name	**Intel® Dual-Band Wireless-AC 8260**
Serial Number	**TA#: H74234-001 / H74231-001** **WF MAC: 34:13:E8:36:93:1D / 34:13:E8:36:93:22** **BT MAC: 34:13:E8:36:93:21 / 34:13:E8:36:93:26** (see section 4)
FCC/IC ID	**FCC ID: PD98260NGH / PD98260NGHU** **IC ID: 1000M-8260NGH**
Antenna type	**SkyCross WIMAX/WLAN Reference Antenna**
Hardware/Software Version	**HW: TF5** **Test SW: DRTU version 1.8.1-01336** **Op SW: 18.10.0.19**
Date of Sample Receipt	**2015-05-11**
Date of Test	**2015-05-20**
Features	**802.11 a/n/ac Wireless LAN + BT 1.2** (see section 5)

Applicant	**Intel Mobile Communications**
Address	**100 Center Point Circle, Suite 200** **Columbia, South Carolina 29210** **USA**
Contact Person	**Steven Hackett**
Telephone/Fax/ Email	**steven.c.hackett@intel.com**

Reference Standards	**FCC CFR Title 47 Part 15C** **RSS-210 issue 8, RSS-Gen issue 4** (see section 1)

Test Report number	**15051101.TR01**
Revision Control	**Rev. 00**

The test results relate only to the samples tested.
The test report shall not be reproduced in full, without written approval of the laboratory.

Issued by	Reviewed by	Approved by
Digitally signed by Jose M. FORTES DN: cn=Jose M. FORTES, o=Intel Mobile Communications, ou=WRF Lab, email=jose.m.fortes.lopez@intel.com, c=FR Date: 2015.05.26 19:49:01 +02'00'	Digitally signed by Jose M. FORTES DN: cn=Jose M. FORTES, o=Intel Mobile Communications, ou=WRF Lab, email=jose.m.fortes.lopez@intel.com, c=FR Date: 2015.05.26 19:49:20 +02'00'	Digitally signed by Nawfal ASRIH DN: cn=Nawfal ASRIH, o=Intel Mobile Communications, ou=Wireless RF Lab, email=nawfal.asrih@intel.com, c=FR Date: 2015.05.26 19:52:00 +02'00' Adobe Acrobat version: 2015.006.00000
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Table of Contents

1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 - Subpart C – §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems - DA 00-705 Released March 30, 2000
4. RSS-210 Issue 8 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
5. RSS-Gen Issue 4 - General Requirements for Compliance of Radio Apparatus.
6. ANSI C63.10-2009 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by IC, with IC Assigned Code 1000Y.
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- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	22ºC ± 2ºC
Humidity	45% ± 2%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of reception	Note
#01	15051101.S02	WiFi/BT High End Module	8260NGW H	WF MAC: 34:13:E8:36:93:1D	2015-05-11	Used for conducted tests
	15051101.S19	Extender board	PCB00495	ASS0495-001, 4955013-084	2015-05-20	
	15051101.S18	AC/DC Adapter	90W 19.5V 4.62A	CN-06C3W2-72438-4C8-44DD-A01	2015-05-20	
	15051101.S17	Laptop	DELL E5440	7CSYN32	2015-05-20	
#02	15051101.S04	WiFi/BT High End Module	8260NGW H	WF MAC: 3413E8369322	2015-05-11	Used for radiated tests
	15051101.S05	Switching power supply SINPRO 5V 6A	SPU60-102	07990495-1249	2015-05-12	
	15051101.S06	Extender board	PCB00495	ASS0495-001, 4950414-019	2015-05-12	
	15051101.S07	USB Cable	E154336	NA	2015-05-12	
	15051101.S08	PCI Cable	Blue cable 1 meter	NA	2015-05-12	
	15051101.S09	Laptop	Dell E5440	9FSYN32	2015-05-12	
	15051101.S10	AC/DC Adapter	90W 19.5V 4.62A	CN-OJCF3V-48661-51S-OPIC-A02	2015-05-12	

NA: Not Applicable

5. EUT features

These are the detailed bands and modes supported by the Equipment Under Test:

802.11a/n/ac	5.2GHz (5150.0 – 5250.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz)
BDR v1.2	2.4GHz (2400.0 – 2483.5 MHz)

6. Remarks and comments

N/A

7. Test Verdicts summary

7.1. BT BR

FCC part	RSS part	Test name	Verdict
15.247 (a) (1)	RSS-210 Clause A8.1 (b)	20dB Bandwidth and Carrier frequency separation	P
15.247 (a) (1) (iii)	RSS-210 Clause A8.1 (d)	Number of hopping channels	P
15.247 (a) (1) (iii)	RSS-210 Clause A8.1 (d)	Time of Occupancy (Dwell Time)	P
15.247 (b) (1)	RSS-210 Clause A8.4 (2)	Maximum Peak Output Power and antenna gain	P
15.247 (d)	RSS-210 Clause A8.5	Out-of-band Emissions (conducted)	P
15.247 (d) 15.209	RSS-210 Clause A8.5	Out-of-band Emissions (radiated)	P

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

8. Document Revision History

Revision #	Date	Modified by	Details
Rev. 00	2015-05-26	J.M. Fortes	First Issue

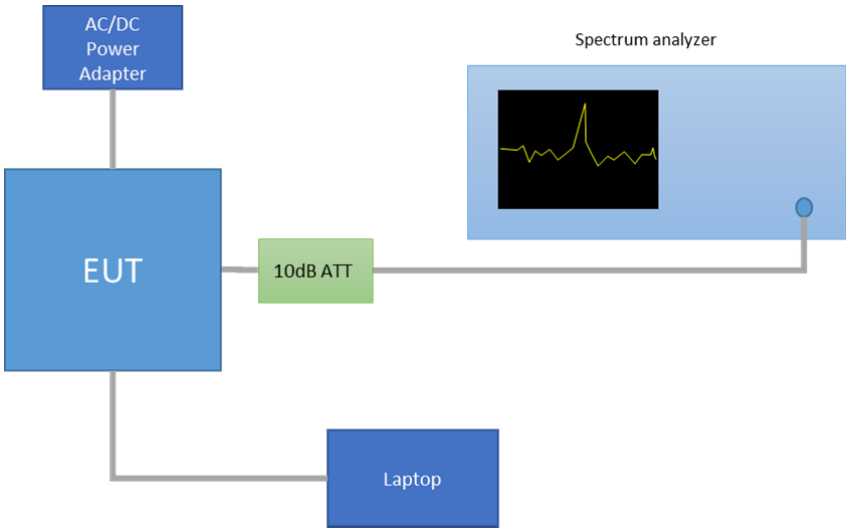
Annex A. Test & System Description

A.1 Measurement system

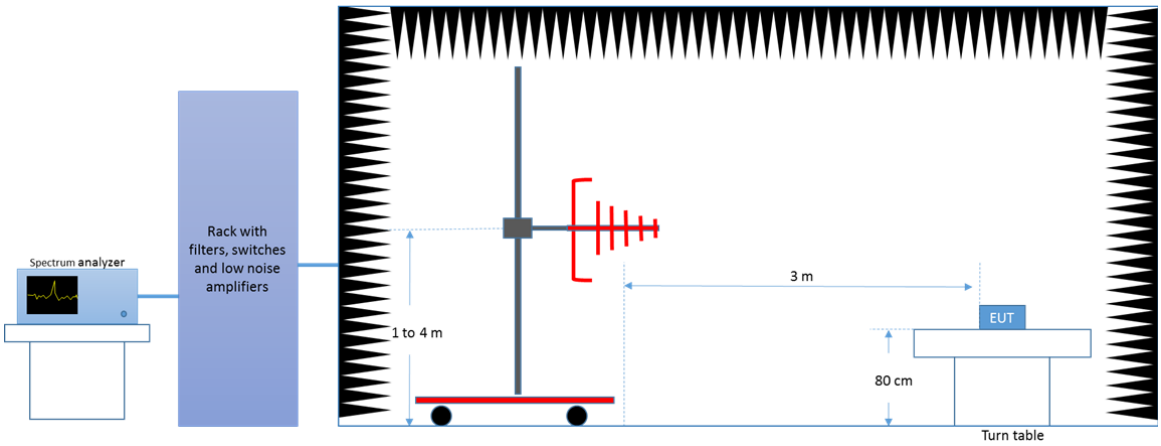
Measurements were performed using the following setups.

The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes.

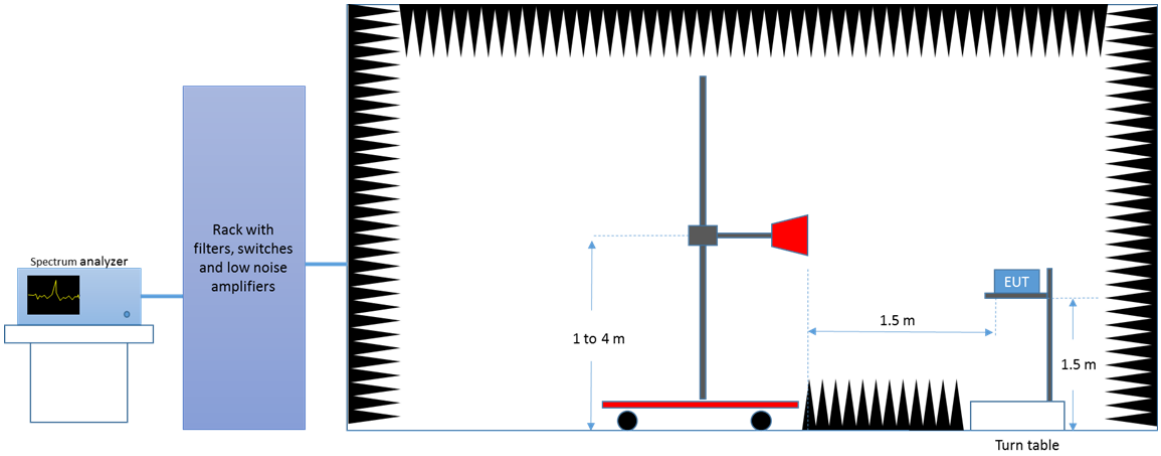
Conducted Setup



Radiated Setup < 1GHz



Radiated Setup > 1GHz



A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0033	Spectrum analyzer	FSV40	101072	Rohde & Schwarz	2014-01-30	2016-01-30

Radiated Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2014-05-03	2016-05-03
0137	Log antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2014-05-03	2016-05-03
0138	Hors antenna 1 GHz – 6.4 GHz	3117	00152266	ETS Lindgren	2014-03-04	2016-03-04
0141	Horn Antenna 6.4 GHz – 18 GHz	3117-PA	00157736	ETS Lindgren	2014-06-03	2016-06-03
0248	Horn Antenna 1 GHz – 18 GHz	3117	00167062	ETS Lindgren	2014-06-23	2016-06-23
0139	Horn Antenna 18GHz – 26GHz	114514	00167100	ETS Lindgren	2014-04-25	2016-04-25
0140	Horn Antenna 26GHz – 40GHz	120722	00169638	ETS Lindgren	2014-06-16	2016-06-16
0135	Anechoic chamber	FACT 3	RFD_FA_100	ETS Lindgren	2014-06-05	2016-06-05

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty [±dB]
Conducted Power (power meter)	±1
Conducted spurious emission	±2.9
Radiated test < 1GHz	± 3.8
Radiated test 1GHz -26 GHz	± 4.7

Annex B. Test Results

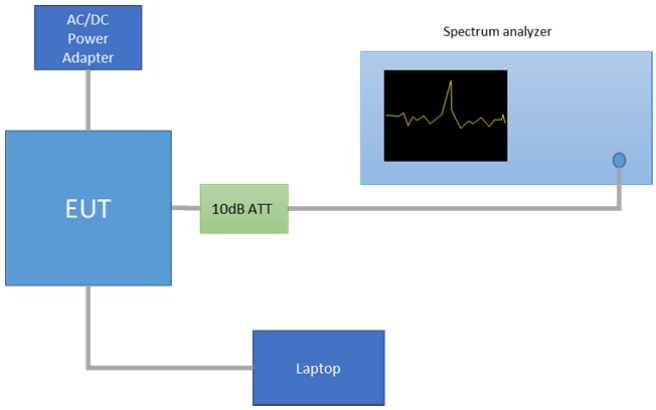
B.1 20dB Bandwidth and Carrier frequency separation

Test limits

FCC part	RSS part	Limits
15.247 (a) (1)	RSS-210 Clause A8.1 (b)	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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test procedure

The setup below was used to measure the 20dB Bandwidth and Carrier frequency separation. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



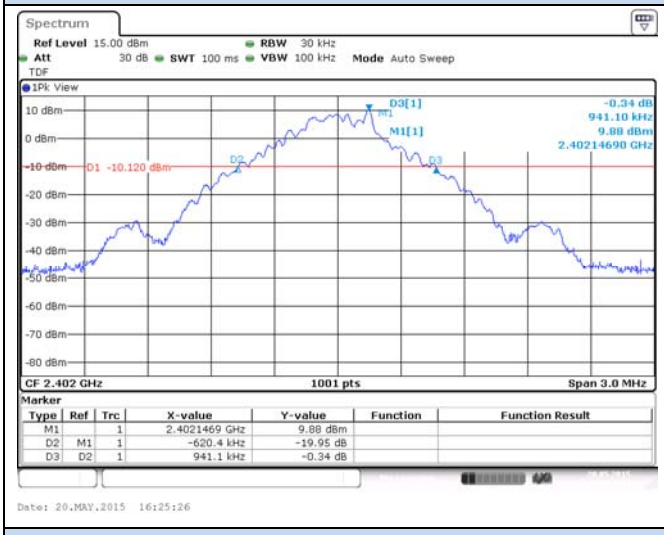
Results tables

Mode	Channel Number	Frequency [MHz]	20dB BW [kHz]	Freq. Separation [kHz]
Basic Rate GFSK	0	2402	941.10	1004.00
	39	2441	937.80	
	78	2480	944.10	

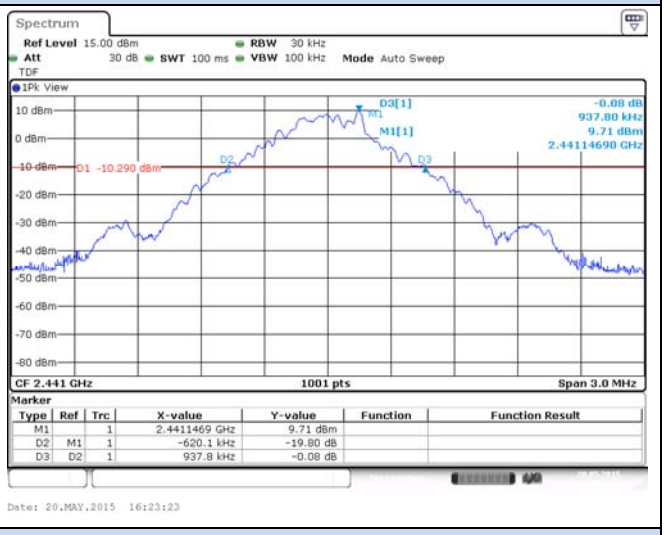
Results screenshot

Basic Rate - GFSK

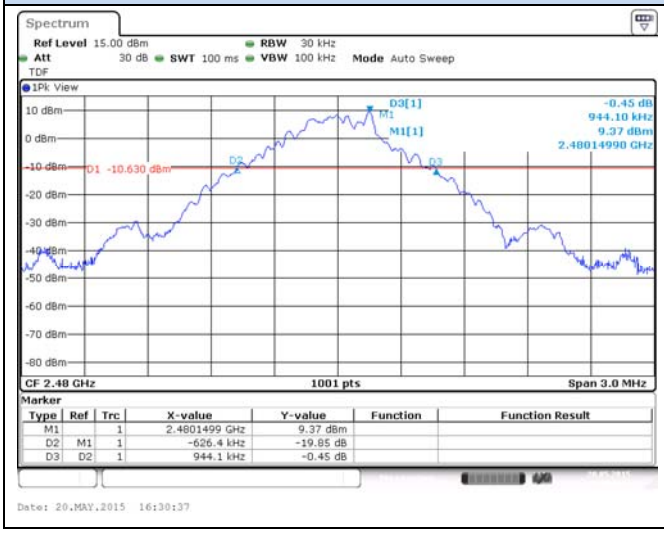
20dB BW – CH0



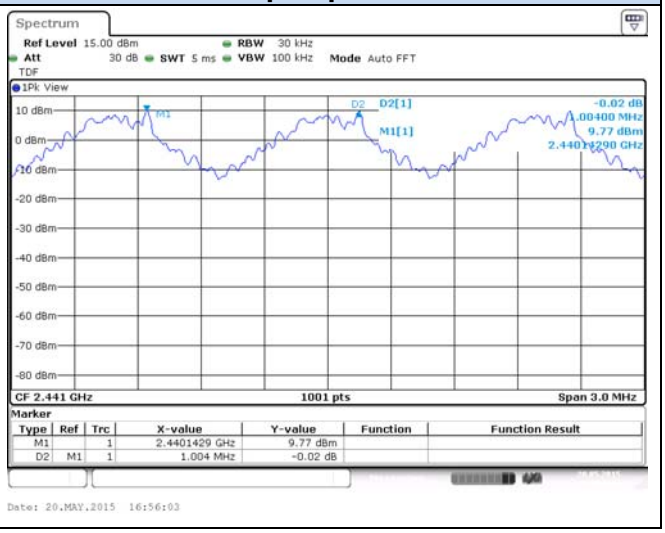
20dB BW – CH39



20dB BW – CH78



Freq. Separation



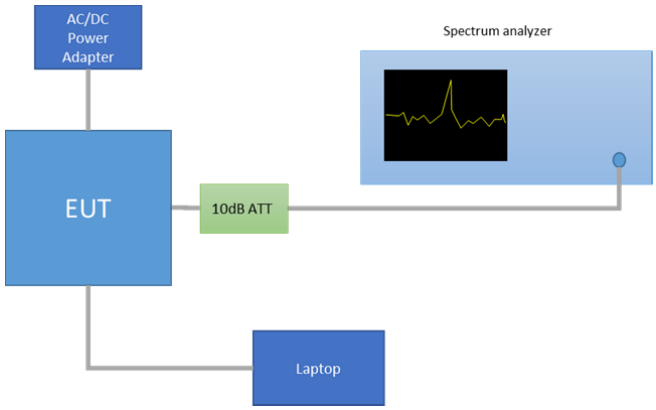
B.2 Number of hopping channels

Test limits

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-210 Clause A8.1 (d)	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

Test procedure

The setup below was used to measure the number of hopping channels. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



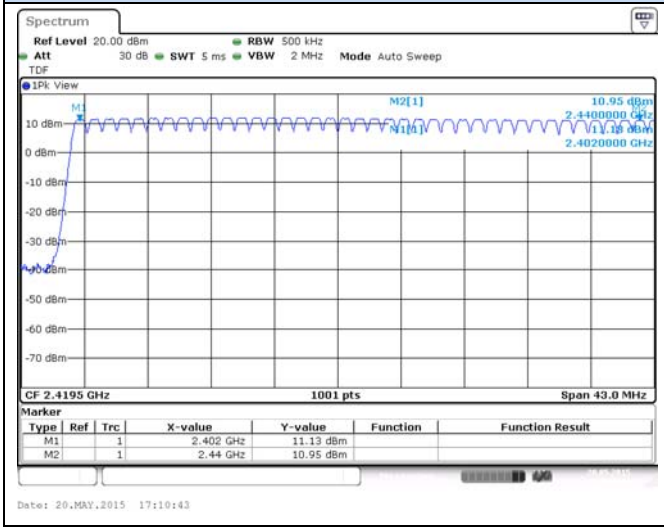
Results tables

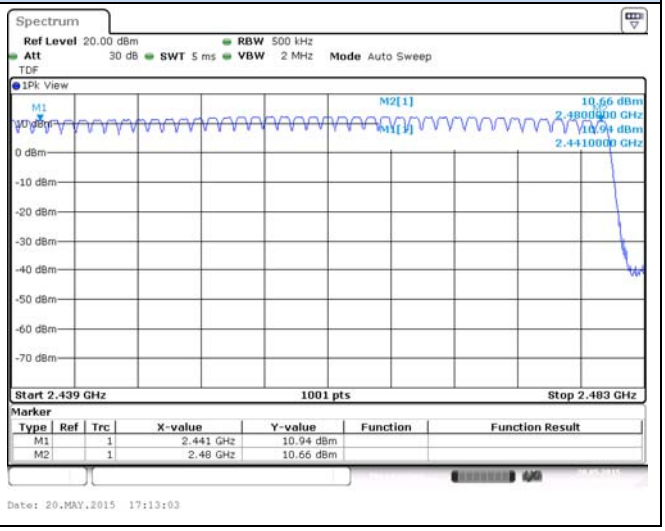
Mode	Number of hopping channels
Basic Rate GFSK	79

Results screenshot

Number of hopping channels

Basic Rate - GFSK	Basic Rate - GFSK





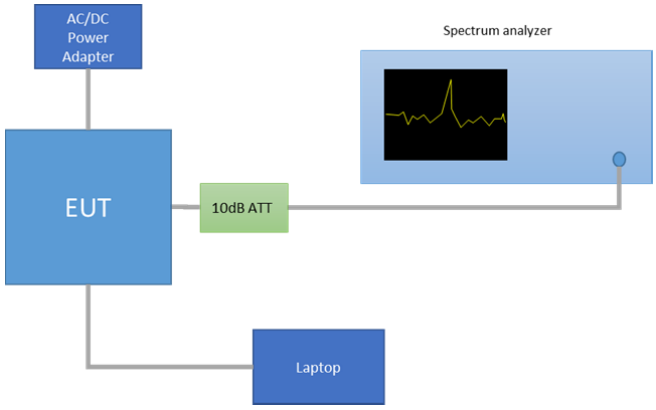
B.3 Time of Occupancy (Dwell Time)

Test limits

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-210 Clause A8.1 (d)	The average time of occupancy (Dwell Time) 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.

Test procedure

The setup below was used to measure the dwell time. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



In the worst case, the system makes 1600 hops per second with 79 channels, providing a 1 timeslot length of 625µs.
A DH1 packet, with independence of the modulation, needs 1 time slot for transmitting and 1 time slot for receiving. Then, the system makes in the worst case 1600/2 = 800 hops per second with 79 channels. So each channel appears 800/79 = 10.13 times per second and, for a period of 0.4 x 79 = 31.6 seconds, each channel appears 10.13 x 31.6 = 320.11 times.

A DH3 packet, with independence of the modulation, needs 3 time slots for transmitting and 1 time slot for receiving. Then, the system makes in the worst case 1600/4 = 400 hops per second with 79 channels. So each channel appears 400/79 = 5.1 times per second and, for a period of 0.4 x 79 = 31.6 seconds, each channel appears 5.1 x 31.6 = 161.16 times.

A DH5 packet, with independence of the modulation, needs 5 time slots for transmitting and 1 time slot for receiving. Then, the system makes in the worst case 1600/6 = 266.67 hops per second with 79 channels. So each channel appears 166.67/79 = 3.37 times per second and, for a period of 0.4 x 79 = 31.6 seconds, each channel appears 3.37 x 31.6 = 106.49 times.

Thus, the total time of occupancy is obtained by multiplying the calculated maximum number of appearances per packet type and the measured Tx-time, as shown in the results screenshots.

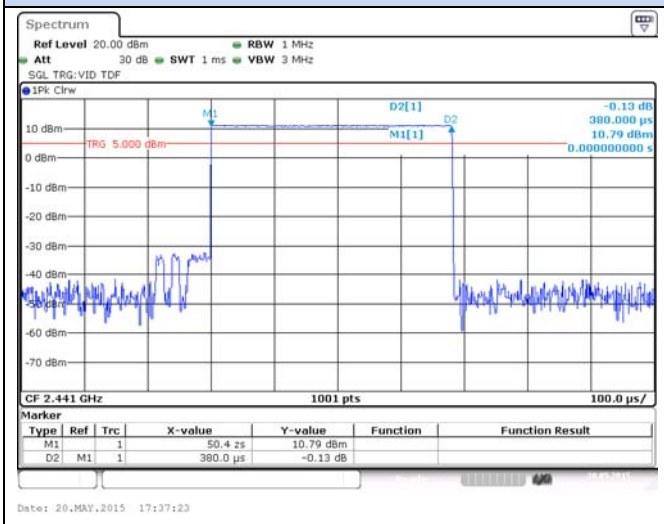
Results tables

Mode	Packet Type	Times of appearance	Tx-time [ms]	Dwell Time [ms]
Basic Rate GFSK	DH1	320.11	0.380	121.64
	DH3	161.16	1.637	263.82
	DH5	106.49	2.885	307.22

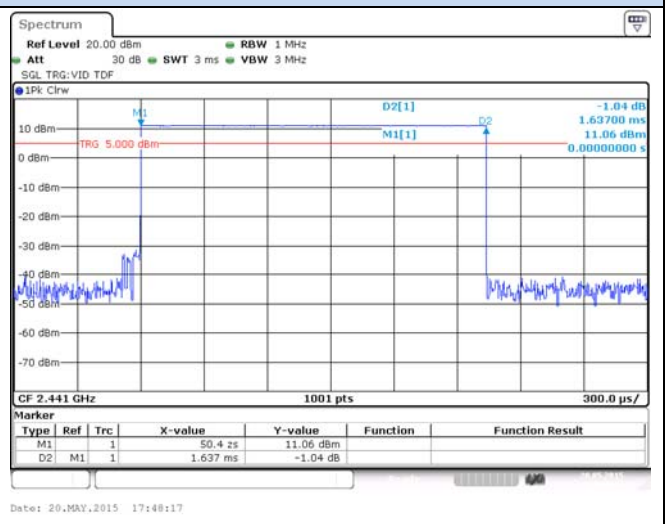
Results Screenshot

Basic Rate - GFSK

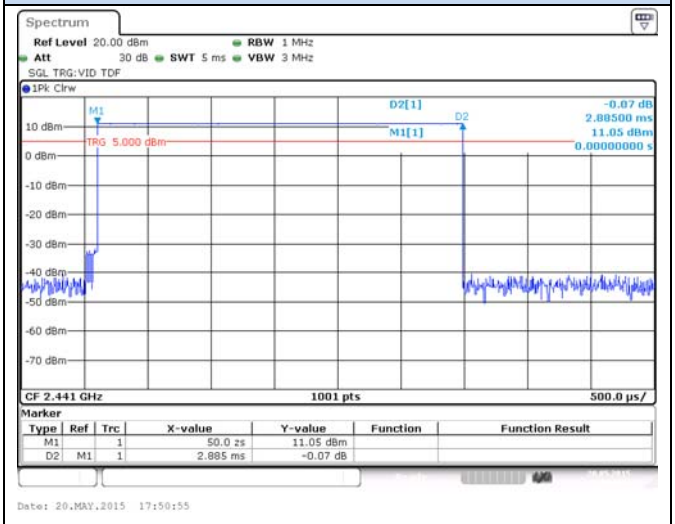
DH1 Tx-time



DH3 Tx-time



DH5 Tx-time



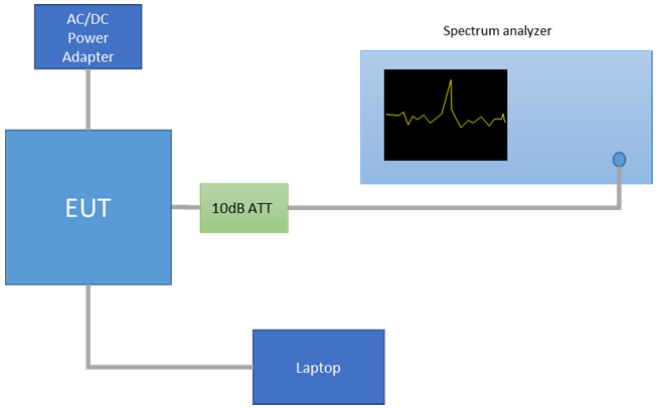
B.4 Maximum Peak Output Power and antenna gain

Test limits

FCC part	RSS part	Limits
15.247 (b) (1)	RSS-210 Clause A8.4 (2)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. (…) (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Test procedure

The setup below was used to measure the maximum peak output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



The declared maximum antenna gain is 3.24dBi.

Results tables

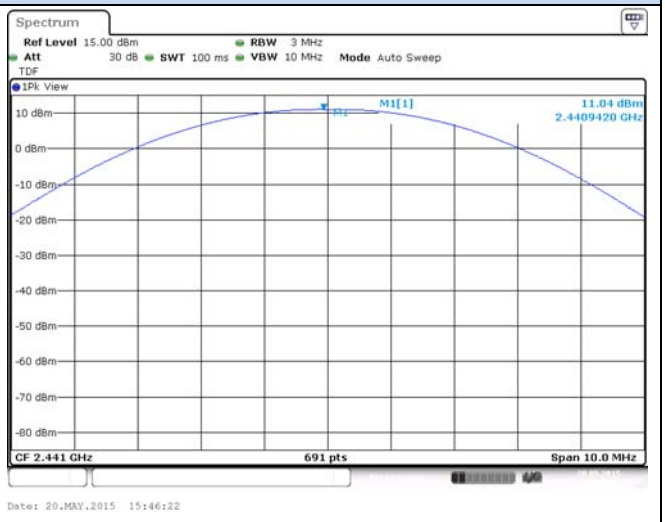
Mode	Channel Number	Frequency [MHz]	Peak Power [dBm]
Basic Rate GFSK	0	2402	11.30
	39	2441	11.04
	78	2480	10.86

Results Screenshot

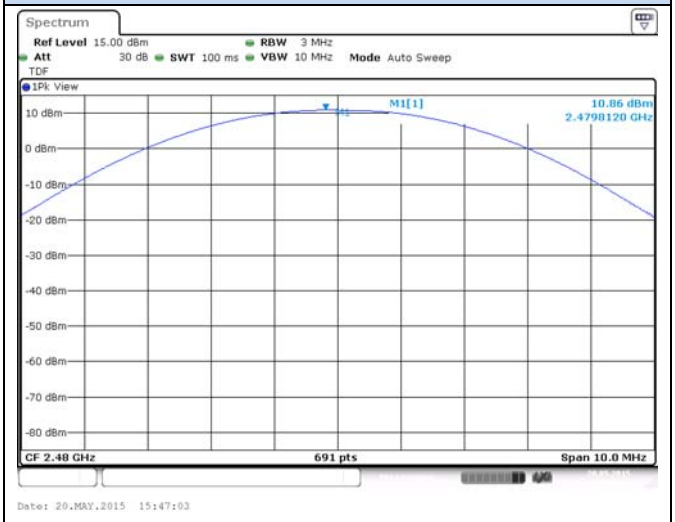
Basic Rate - GFSK

Peak Power - CH0

Peak Power – CH39



Peak Power – CH78



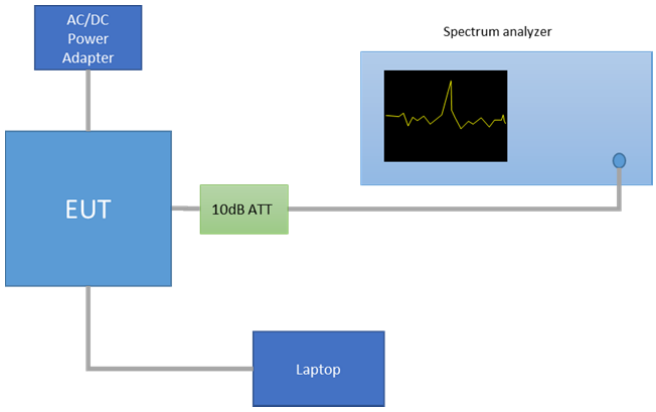
B.5 Out-of-band emissions (conducted)

Test limits

FCC part	RSS part	Limits
15.247 (d)	RSS-210 Clause A8.5	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.

Test procedure

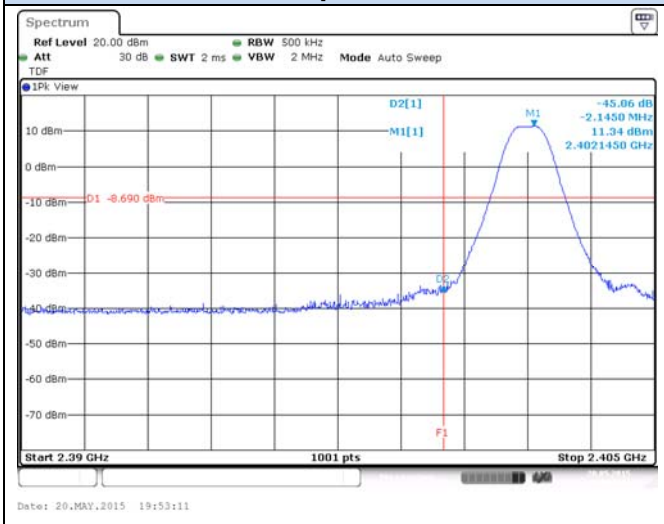
The setup below was used to measure the maximum peak output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



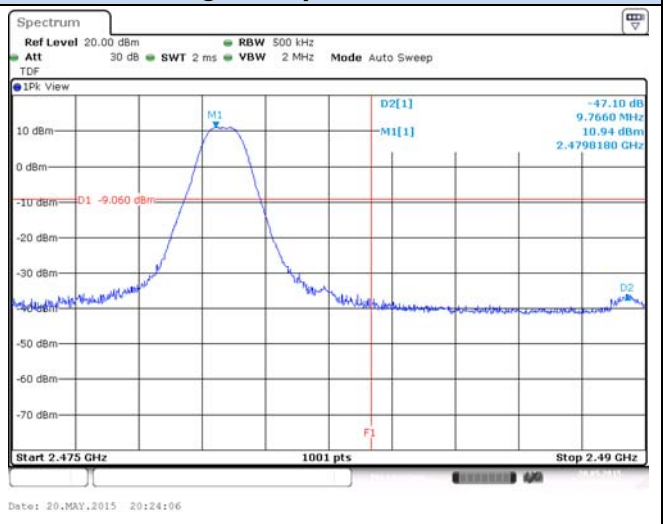
Band Edge results Screenshot

Basic Rate - GFSK

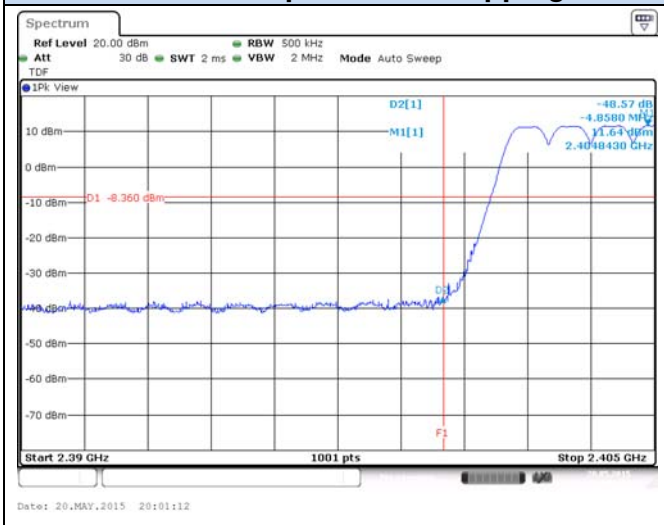
BE Low Freq Section - CH0



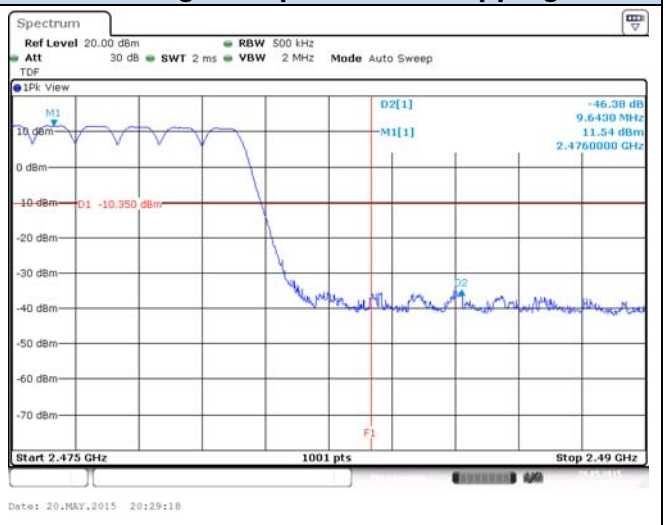
BE High Freq Section – CH78



BE Low Freq Section – Hopping



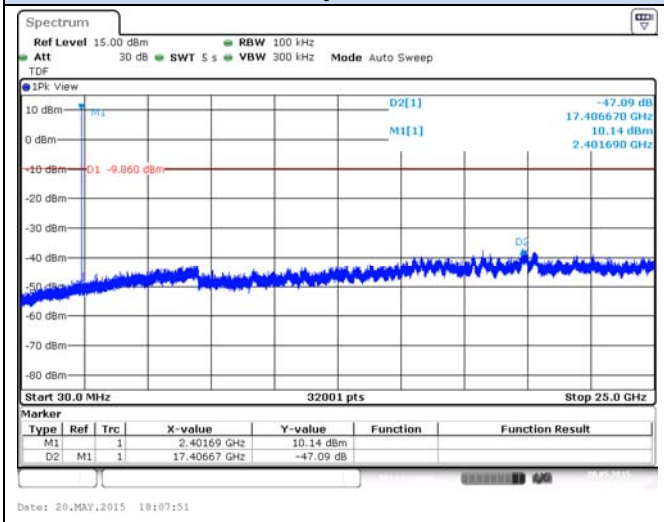
BE High Freq Section – Hopping



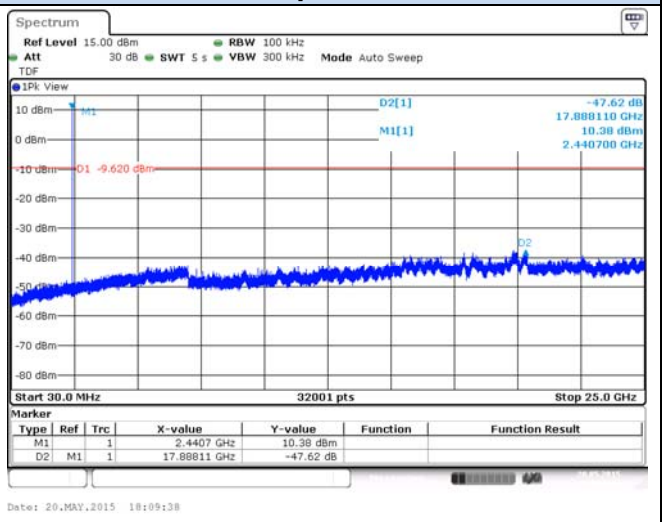
Conducted Spurious results Screenshot

Basic Rate - GFSK

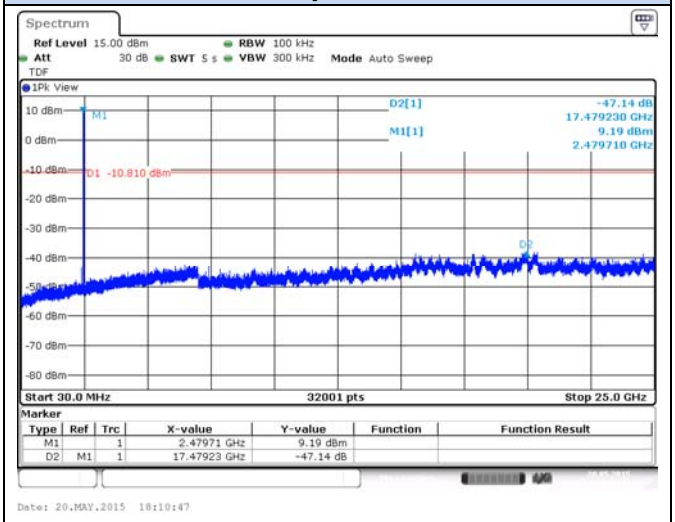
Cond Spur - CH0



Cond Spur – CH39



Cond Spur – CH78



B.6 Radiated spurious emission

Standard references

<table>
<tr><th>FCC part</th><th>RSS part</th><th>Limits</th></tr>
<tr><td>15.247 (d)</td><td>RSS-210 Clause A8.5</td><td>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):

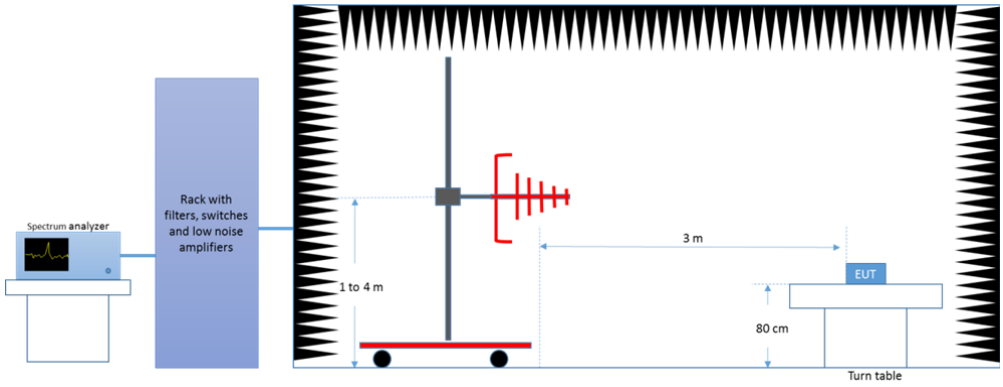
<table>
<tr><th>Freq Range (MHz)</th><th>Field Stregth (µV/m)</th><th>Field Stregth (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>0.009-0.490</td><td>2400/f(kHz)</td><td>-</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/f(kHz)</td><td>-</td><td>300</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>-</td><td>30</td></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>960-25000</td><td>500</td><td>54</td><td>3</td></tr>
</table>

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

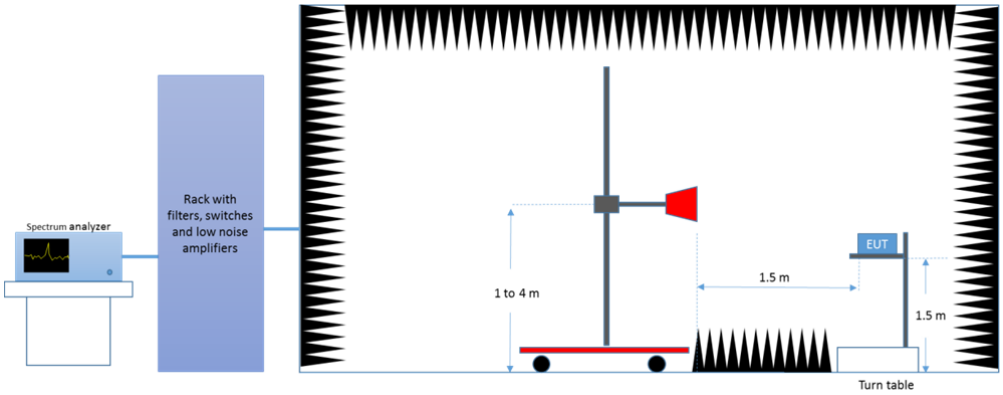
Test procedure

The setup below was used to measure the radiated spurious emissions.
Depending of the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emission was measured on the worst case configuration found.

Radiated Setup < 1GHz

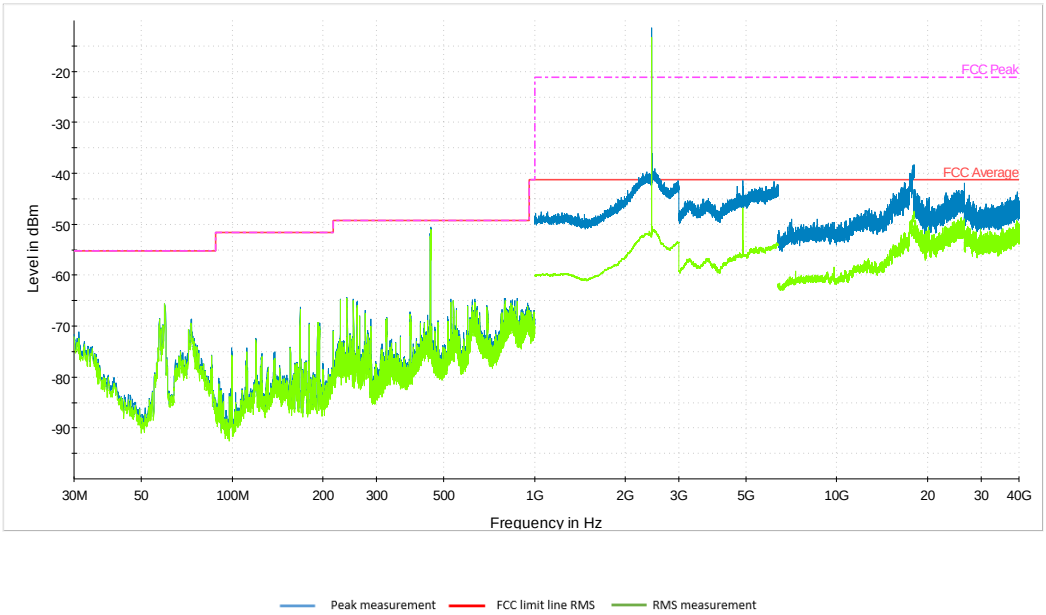


Radiated Setup > 1GHz



Test Results

Basic Rate - GFSK - Channel 39 - Antenna B
30MHz to 40GHz



Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
454.593265		-57.14	208.1	H	112.0	103.1
454.593265	-50.64	---	208.2	H	110.0	-103.2
4881.973529	---	-48.36	139.6	V	224.0	-93.9
4882.000000	-41.38	---	150.0	V	223.0	-93.9
17900.433333	-39.87	---	150.0	H	41.0	-85.2
17900.433333	---	-48.38	150.0	H	41.0	-85.2
18092.906977	-43.52	---	150.0	V	220.0	-91.0
18092.906977	---	-49.31	150.0	H	19.0	-91.0
27434.875000	---	-50.85	150.0	H	107.0	-81.5
27434.875000	-44.24	---	150.0	H	107.0	-81.5