



TEST REPORT

EUT Description	WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card, LTE Coexistence
Brand Name	Intel® Wireless-AC 9560
Model Name	9560D2WL
FCC ID ISED ID	PD99560D2L 1000M-9560D2L
Date of Test Start/End	2018-02-19 / 2018-03-09
Features	802.11ac, Dual Band, 2x2 Wi-Fi + Bluetooth® 5 (see section 5)
Applicant	Intel Mobile Communications
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Reference Standards	FCC CFR Title 47 Part 15 C RSS-247 issue 2, RSS-Gen issue 4 (see section 1)
Test Report identification	180201-02.TR05
Revision Control	Rev. 00 This test report revision replaces any previous test report revision (see section 8)

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

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Table of Contents

1.	S	tandards, reference documents and applicable test methods	3
2.	G	eneral conditions, competences and guarantees	3
3.	Ε	nvironmental Conditions	3
4.	Т	est samples	4
5.	Е	UT Features	4
6.	R	emarks and comments	4
7.	Т	est Verdicts summary	5
7	.1.		
8.	D	ocument Revision History	
Anı		c A. Test & System Description	
А	.1	MEASUREMENT SYSTEM	
	.2	TEST EQUIPMENT LIST	
А	.3	MEASUREMENT UNCERTAINTY EVALUATION	
Anı	nex	KB. Test Results	10
В	3.1	20DB BANDWIDTH AND CARRIER FREQUENCY SEPARATION	10
В	3.2	NUMBER OF HOPPING CHANNELS	14
В	3.3	TIME OF OCCUPANCY (DWELL TIME)	18
В	8.4	MAXIMUM PEAK OUTPUT POWER ANTENNA GAIN	25
В	8.5	OUT-OF-BAND EMISSION (CONDUCTED)	28
В	8.6	RADIATED SPURIOUS EMISSION	54
В	3.7	AC POWER-LINE CONDUCTED EMISSION	62
Anı	nex	c C. Photographs	65
С	2.1	TEST SETUP	65
С).2	TEST SAMPLE	68



1. Standards, reference documents and applicable test methods

- 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. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
- 4. DA 00-705 Released March 30, 2000 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
- 5. RSS-247 Issue 2 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
- 6. RSS-Gen Issue 4 General Requirements for Compliance of Radio Apparatus.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications France SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2005 testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Mobile Communications France SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications France SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED Assigned Code 1000Y.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- \checkmark 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.

3. Environmental Conditions

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

Temperature	22 °C ±3 °C
Humidity	35 % ± 15 %



4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
	180201-02.S01	Module	9560D2WL	WFM: 3413E87ED82B	2018-02-14	
	170524-02.S15	Extender Board	PCB00609_01	6092416-442	2017-05-30	Used for conducted
#01	170000-01.S01	Laptop	Latitude E5470	DPBLMC2	2017-03-28	tests
	170220-04.S04	Adapter 1216SD to M.2	JfP Adapter M2	N/A	2017-04-10	
	180201-02.S03	Module	9560D2WL	WFM:3413E87ED853	2018-02-14	Used for Emission
	170220-02.S03	Extender Board	PCB00609_01	6092416-446	2017-02-20	spurious tests from 30 MHz to 1 GHz and AC power-line conducted emission tests
#02	170000-01.S13	Laptop	Latitude E5470	FT6LMC2	2017-05-30	
	170727-02.S16	Adapter 1216SD to M.2	JfP Adapter M2	N/A	2017-07-27	
	180201-02.S04	Module	9560D2WL	WFM:3413E87ED803	2018-02-14	
	170220-02.S04	Extender Board	PCB00609_01	6092416-493	2017-02-20	Used for Emission
#03	170000-01.S16	Laptop	Latitude E5470	C2HTPF2	2017-06-13	spurious tests from 1GHz to 26.5 GHz
	170727-02.S13	Adapter 1216SD to M.2	JfP Adapter M2	N/A	2017-08-09	

5. EUT Features

Brand Name	Intel® Wireless-AC 9560			
Model Name	9560D2WL			
FCC ID	PD99560D2L			
ISED ID	1000M-9560D2L			
Software Version	11.1807.0-07027			
Driver Version	99.0.28.6			
Prototype / Production	Production			
Supported Radios	802.11b/g/n 802.11a/n/ac	2.4GHz (2400.0 – 2483.5 MHz) 5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz)		
	Bluetooth 5	2.4GHz (2400.0 – 2483.5 MHz)		
Antenna Information		CHAIN A: PIFA antenna. WiFi 2.4GHz & 5GHz and BT CHAIN B: PIFA antenna. WiFi 2.4GHz & 5GHz		
Additional Information				

6. Remarks and comments

N/A



7. Test Verdicts summary

7.1. BT Basic Data Rate / Enhanced Data Rate

FCC part	RSS part	Test name	Verdict
15.247 (a) (1)	RSS-247 Clause 5.1 (a) and (b)	20dB Bandwidth and Carrier frequency separation	Р
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	Number of hopping channels	Р
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	Time of Occupancy (Dwell Time)	Р
15.247 (b) (1)	RSS-247 Clause 5.4 (b)	Maximum Peak Output Power and antenna gain	Р
15.247 (d)	RSS-247 Clause 5.5	Out-of-band Emissions (conducted)	Р
15.247 (d) 15.209	RSS-247 Clause 5.5 RSS GEN Clause 8.9	Out-of-band Emissions (radiated)	Р
15.207	RSS-GEN Clause 8.8	AC power-line conducted emission measurements	Р

8. Document Revision History

Revision #	Date	Modified by	Revision Details
Rev.00	2018-03-08	F. Nsengiyumva Z.Ouachicha	First Issue



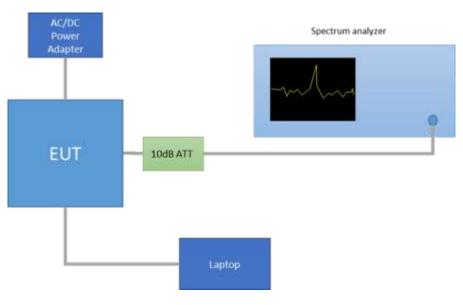
Annex A. Test & System Description

A.1 Measurement System

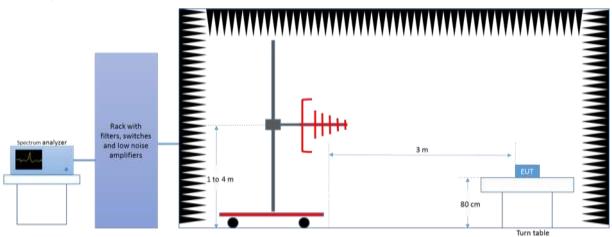
Measurements were performed using the following setups.

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.

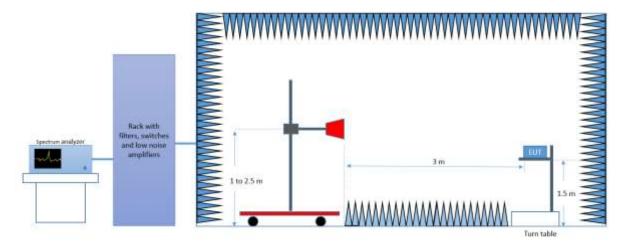
Conducted Setup



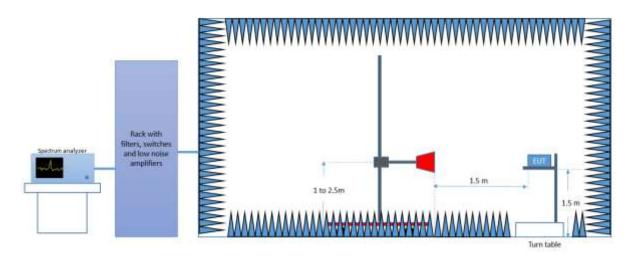
Radiated Setup 30 MHz- 1 GHz



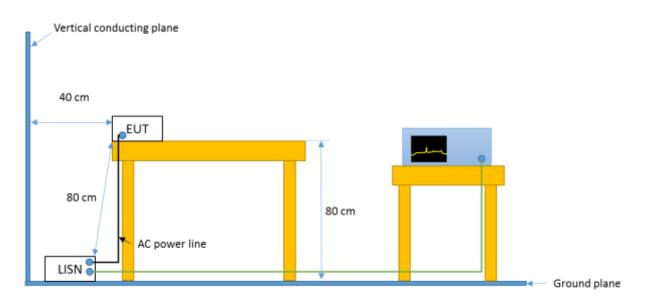
Radiated Setup 1 GHz - 18 GHz



Radiated Setup 18 GHz - 26.5 GHz



AC power-line conducted emission Setup 150 kHz – 30 MHz





A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0316	Spectrum analyzer	FSV30	103309	Rohde & Schwarz	2017-09-22	2019-09-22

Radiated Setup-1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date		
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2016-04-15	2018-04-15		
0137	Log antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2017-12-19	2019-12-19		
0135	Semi Anechoic chamber	FACT 3	5720	ETS Lindgren	2016-04-28	2018-04-28		
0530	Measurement Software	EMC32	100623	Rohde & Schwarz	N/A	N/A		

N/A: Not Applicable

Radiated Setup-2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0420	Spectrum analyzer	FSV40	101556	Rohde & Schwarz	2016-04-14	2018-04-14
0138	Horn antenna 1 GHz – 6.4 GHz	3117	00152266	ETS Lindgren	2016-03-14	2018-03-14
0141	Double Ridged Horn Antenna 1 GHz – 18 GHz	3117	00157736	ETS Lindgren	2016-04-13	2018-04-13
0334	Double Ridged Horn Antenna 18 GHz – 40 GHz	3116C-PA	00196308	ETS Lindgren	2017-08-22	2019-08-22
0337	Full Anechoic chamber	RFD_FA_100	5996	ETS Lindgren	2016-04-28	2018-04-28
0329	Measurement Software	EMC32	100401	Rohde & Schwarz	N/A	N/A

N/A: Not Applicable

Radiated Setup - shared equipments

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0617	Power Sensor 50MHz-18GHz	NRP-Z81	104386	Rohde & Schwarz	2017-05-24	2019-05-24
0618	Power Sensor 50MHz-18GHz	NRP-Z81	104382	Rohde & Schwarz	2017-05-24	2019-05-24



AC power-line conducted emission Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0027	Measurement software	EMC32	1300.7010.02	Rohde & Schwarz	NA	NA
0317	Spectrum Analyzer	FSV30	103308	Rohde & Schwarz	2017-08-05	2019-08-05
0532	LISN	ENV216	101321	Rohde & Schwarz	2016-09-13	2018-09-13
0607	LISN	ENV216	101342	Rohde & Schwarz	2017-09-06	2018-09-06
0538	Transformer	Monophase	TIMM3.15	Montelem	NA	NA
0095	Millivoltmeter	2000	4009301	KEITHLEY	2017-11-13	2019-11-13
0624	AC power source	61604	SM135546	CHROMA	NA	NA
0299	Multimeter	34401A	US36065790	HP	2017-11-14	2019-11-14

N/A: Not Applicable

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty [±dB]
Conducted Power	±1.0
Conducted Spurious Emission	±2.9
Radiated tests <1GHz	±3.8
Radiated tests 1GHz - 40 GHz	±4.7
AC power-line conducted emission	±1.45

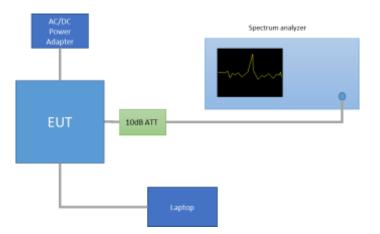


Annex B. Test Results

B.1 20dB Bandwidth and carrier frequency separation

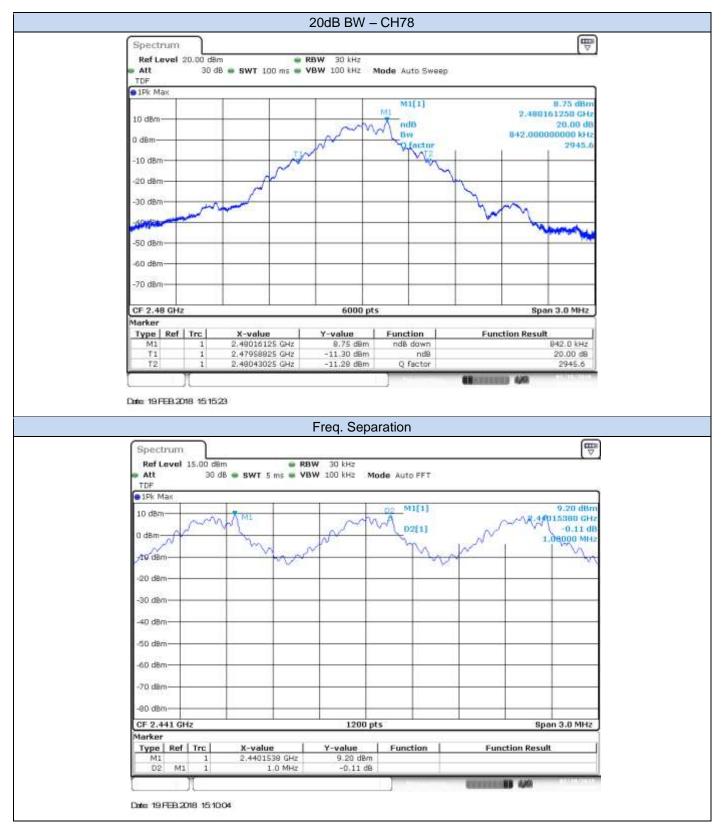
Test limits

FCC part	RSS part	Limits
15.247 (a) (1)	RSS-247 Clause 5.1 (a) and (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.



Results tables:

Mode	Packet Type	Channel Number	Frequency [MHz]	20dB BW [MHz]	Freq. Separation [kHz]
		0	2402	0.838	
Basic Rate GFSK	DH5	39	2441	0.839	1000
GIGIC		78	2480	0.842	
		0	2402	1.401	
EDR π/4-DQPSK	2DH5	39	2441	1.413	1000
		78	2480	1.413	
		0	2402	1.421	
EDR 8-DPSK	3DH5	39	2441	1.422	1000
0.01.01		78	2480	1.428	

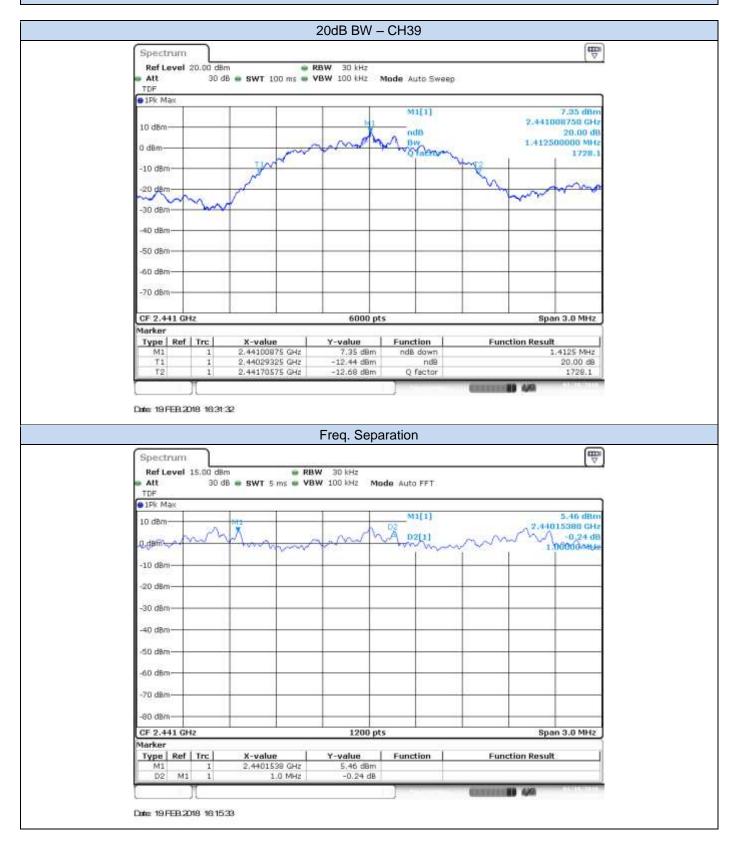


Basic Rate - GFSK





EDR – $\pi/4$ -DQPSK





EDR – 8-DPSK





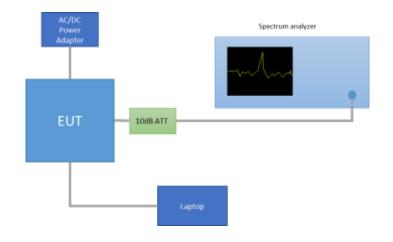
B.2 Number of hopping channels

Test limits

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (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.

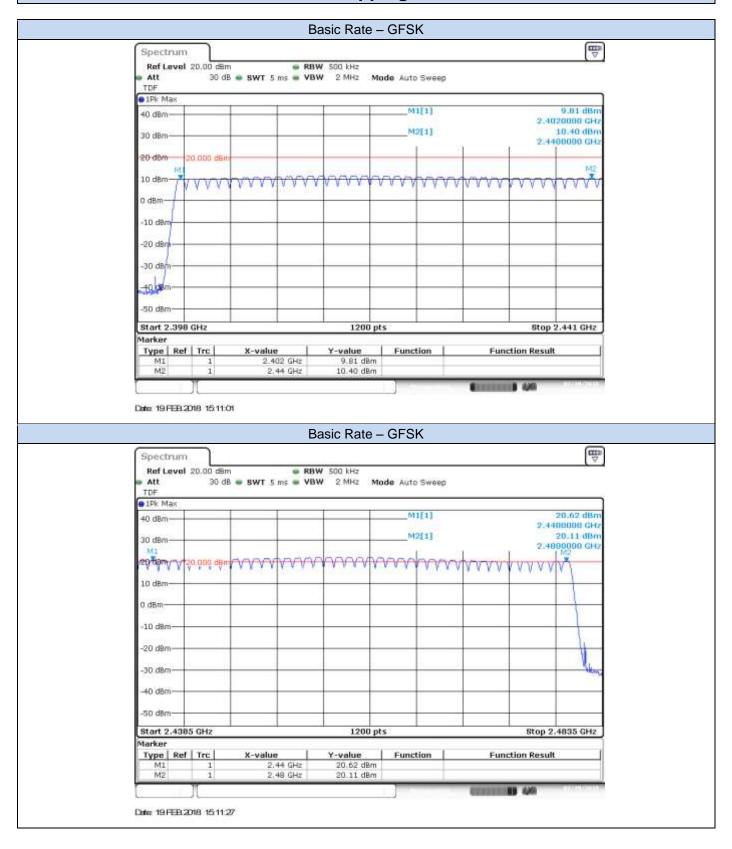


Results tables

Mode	Packet Type	Number of hopping channels
Basic Rate GFSK	DH5	79
EDR π/4-DQPSK	2DH5	79
EDR 8-DPSK	3DH5	79



Number of hopping channels





			1	EDR – π/4	-DPSK			
Spectrun								l∰
	20.00 dBm		· RB	W 500 kHz				14
Att					lode Auto Sweep	1		
TDF 1Pk Max					17			
40 dBm					M1[1]			8.83 dBm
40.0841							2.40	20000 GHz
30 dBm	-	-		-	M2[1]		2.44	9.33 dBm 00000 GHz
20 dBm	20.000 dBm				15	10		Source Since
M	10.000 0011							M2
10 dBm-7	m	~~~~	0000		0000000	man	www	www
0 dBm	7			-			1.1.1.1	
-10 dBm-								
-20 dem-				-		_	-	
-30 dBm								
Jul								
-40 dBm				+ +			1	
-50 dBm								
Start 2.39	R CH2			1200 p	te		Stop 2	2.441 GHz
Marker	0.0112		100	1200 p			atop 2	21411 0012
Type Re		X-value		Y-value	Function	Fur	nction Result	8
M1 M2	1		12 GHz H4 GHz	8.83 dBm 9.33 dBm				
	1		10.0002		1	CANCEL	BB 6/0	or restoration
		9						
				EDR – π/4	-DPSK			_
Spectrur				EDR – π/4	-DPSK			I I I I I
Ref Leve	1 20.00 dBm	1	👄 RB	W 500 kHz				(∰ ∀
Ref Leve Att TDF	1 20.00 dBm	1	👄 RB	W 500 kHz	-DPSK Node Auto Swee	p		(⊞ ∀
Ref Leve Att TDF 1Pk Max	1 20.00 dBm	1	👄 RB	W 500 kHz	1ode Auto Sweej	P		10-
Ref Leve Att TDF	1 20.00 dBm	1	👄 RB	W 500 kHz		p	2,44	(₩ 19.35 dBm
Ref Leve Att TDF 1Pk Max	1 20.00 dBm	1	👄 RB	W 500 kHz	1ode Auto Sweej	p		19.35 dBm 00000 GHz 19.13 dBm
Ref Leve Att TDF 1Pk Max 40 d8m- 30 d8m- M1	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	P		19.35 dBm 00000 GHz
Ref Leve Att TDF 9 1Pk Max 40 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	, 		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 d8m- 30 d8m- M1	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm M1 20 dBm 10 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	, ,		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm 0 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	•		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm M1 20 dBm 10 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	•		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm 0 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	»		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 10 dBm -10 dBm -20 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	•		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm -10 dBm -10 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	•		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 10 dBm -10 dBm -20 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee	·		19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF IPk Max 40 dBm 30 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	Node Auto Swee			19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Leve Att TDF IPk Max 40 dBm 30 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W SOO kHz N	1ode Auto Swee		2.40	19.35 dBm 00000 GHz 19.13 dBm 00000 GHz M2
Ref Levs Att TDF ● 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm 50 dBm	1 20.00 dBm 30 dE	• SWT 5	👄 RB	W 500 kHz	1ode Auto Swee		2.40	19.35 dBm 00000 GHz 19.13 dBm 00000 GHz
Ref Levs Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 10 dBm -10 dBm -20 dBm -30 dBm -50 dBm Start 2.43 Marker Type	el 20.00 dBm 30 dE 20.000 dBm 85 GHz ef Trc	×-value	e RB ms e VB	W 500 kHz N	MI[1] M2[1]		2.40	19.35 dBm 00000 GHz 19.13 dBm 00000 GHz Md Md Md Md Md Md Md Md Md Md Md Md Md
Ref Leve Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm -50 dBm Start 2.43 Marker Type M1	el 20.00 dBm 30 dE 20.000 dBm 20.000 dBm 885 GHz ef Trc 1	• SWT 5	e RB ms e VB	W 500 kHz N W 2 MHz N	MI[1] M2[1] M2[1]		2.40	19.35 dBm 00000 GHz 19.13 dBm 00000 GHz Md Md Md Md Md Md Md Md Md Md Md Md Md
Ref Levs Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 10 dBm -10 dBm -20 dBm -30 dBm -50 dBm Start 2.43 Marker Type	el 20.00 dBm 30 dE 20.000 dBm 85 GHz ef Trc	• SWT 5	e RB ms e VB	W 500 kHz N	MI[1] M2[1] M2[1]	- Fu	2.40	19.35 dBm 00000 GHz 19.13 dBm 00000 GHz Md Md Md Md Md Md Md Md Md Md Md Md Md
Ref Levs Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 10 dBm -10 dBm -20 dBm -30 dBm -50 dBm Start 2.43 Marker Type Re M1 M2	el 20.00 dBm 30 dE 20.000 dBm 20.000 dBm 885 GHz ef Trc 1	X-value 2.4	e RB ms e VB	W 500 kHz N W 2 MHz N	MI[1] M2[1] M2[1]	- Fu	2.40	19.35 dBm 00000 GHz 19.13 dBm 00000 GHz Md Md Md Md Md Md Md Md Md Md Md Md Md



				EDR – 8-	DPSK			
Spectru	2							E
1140 B S S S S S S S S S S S S S S S S S S	1 20.00 dBm	1	e RB	W 500 kHz				1
Att					Inde Auto Swe	ep		
TDF 1Pk Max								
40 dBm-					_M1[1]	_		9.69 dBn
10845-FALLU					M2[1]		2.4	020000 GHa
30 dBm					(det 1)		2.4	400000 GH
20 d8m	20.000 dBm					_		
10 d8m-			12272					MZ
10 dBm	m	WWW W	V 0 V 1		VVVVVV		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.
0 dBm	-							
-10.080				-		_		-
-20 dBm	1				0			1
-30 dam-	-			-				1
-40.d8m								
101224-0								
-50 d8m	1 d						- 1	5 5
Start 2.3	8 GHz			1200	ots	-1	Stop	2.441 GHz
Marker Type R	at Tec	X-value	- i	Y-value	Function	1	Function Resu	lt.
M1	1	2.40	2 GHz	6.88 dBm	1		1 90100000 10030	
M2	1	2.4	4 GHz	9.46 dBm		1.	100 B 449	
					DDOK			
				EDR – 8-	DPSK			
Spectru	m			EDR – 8-	DPSK			E
Ref Lev	el 20.00 dBr			W 500 kHz				(The second seco
100000000000000000000000000000000000000	el 20.00 dBr			W 500 kHz	DPSK Mode Auto Swe	ер		(The second seco
Ref Lev Att TDF 1Pk Max	el 20.00 dBr			W 500 kHz	Mode Auto Swe	ep		
Ref Lev Att TDF	el 20.00 dBr			W 500 kHz		ep	2.	19.49 dBr H00000 GH
Ref Lev Att TDF 1Pk Max	el 20.00 dBr			W 500 kHz	Mode Auto Swe	ep		19.49 dBr H00000 GH 19.28 dBr
Ref Lev Att TDF PIPk Max 40 dBm- 30 dBm- M1	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- M1 20 dBm-	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		19.49 dBr H00000 GH 19.28 dBr 8800000 GH
Ref Lev Att TDF PIPk Max 40 dBm- 30 dBm- M1	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	eb		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- M1 20 dBm-	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm 0 dBm	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- 10 dBm-	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm 0 dBm	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm -10 dBm	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	eb		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- 10 dBm- -10 dBm- -20 dBm- -30 dBm-	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm -10 dBm -20 dBm	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- 10 dBm- -10 dBm- -20 dBm- -30 dBm-	el 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep		19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- 10 dBm- -10 dBm- -20 dBm- -30 dBm- -40 dBm-	et 20.00 dBr 30 d	8 • SWT 5.		W 500 kHz	Mode Auto Swe	ep	2.	19.49 dBn H400000 GH 19.28 dBn 800000 GH 1/12
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- 10 dBm- -10 dBm- -20 dBm- -20 dBm- -40 dBm- -50 dBm- Start 2.4 Marker	el 20.00 der 30 d - 20.000 der 20.000 der 385 GHz		vvvv	3W 500 kHz 3W 2 MHz 1	Mode Auto Swe	ep	2	19.49 dBr H00000 GH 19.28 dBr I800000 GH M2 VM VM 2.4835 GHz
Ref Lev Att TDF 1Pk Max 40 dBm- 30 dBm- 10 dBm- -10 dBm- -20 dBm- -20 dBm- -40 dBm- -50 dBm- Start 2.4 Marker Type R	el 20.00 der 30 d 20.000 der 20.000 der 385 GHz ef Trc	8 • SWT 5	vvvv	SOO kHz SW 2 MHz 1	Mode Auto Swe		2.	19.49 dBr H00000 GH 19.28 dBr I800000 GH M2 VM VM 2.4835 GHz
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Ref Lev Att TDF 1Pk Max 40 dBm 30 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -30 dBm -50 dBm -50 dBm -50 dBm Marker Type R M1	el 20.00 der 30 d 20.000 der 20.000 der 20.000 der 385 GHz ef Trc	X-value 2.4		3W 500 kHz 3W 2 MHz 1 	Mode Auto Swe		2	19.49 dBr H00000 GH 19.28 dBr I800000 GH M2 VM VM 2.4835 GHz

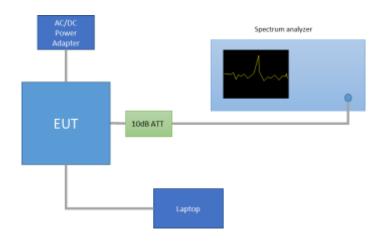


B.3 Time of Occupancy (Dwell Time)

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (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 $0.4 \times 79 = 31.6$ seconds, each channel appears $10.13 \times 31.6 = 320.11$ 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 $0.4 \times 79 = 31.6$ seconds, each channel appears $5.1 \times 31.6 = 161.16$ 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 $0.4 \times 79 = 31.6$ seconds, each channel appears $3.37 \times 31.6 = 106.49$ 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.

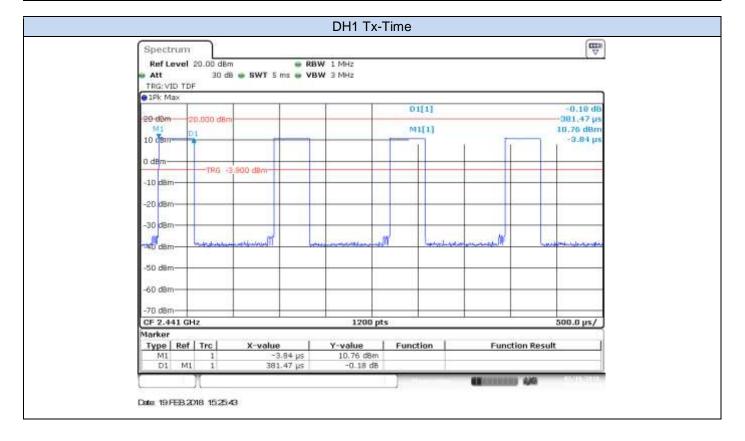


Results tables

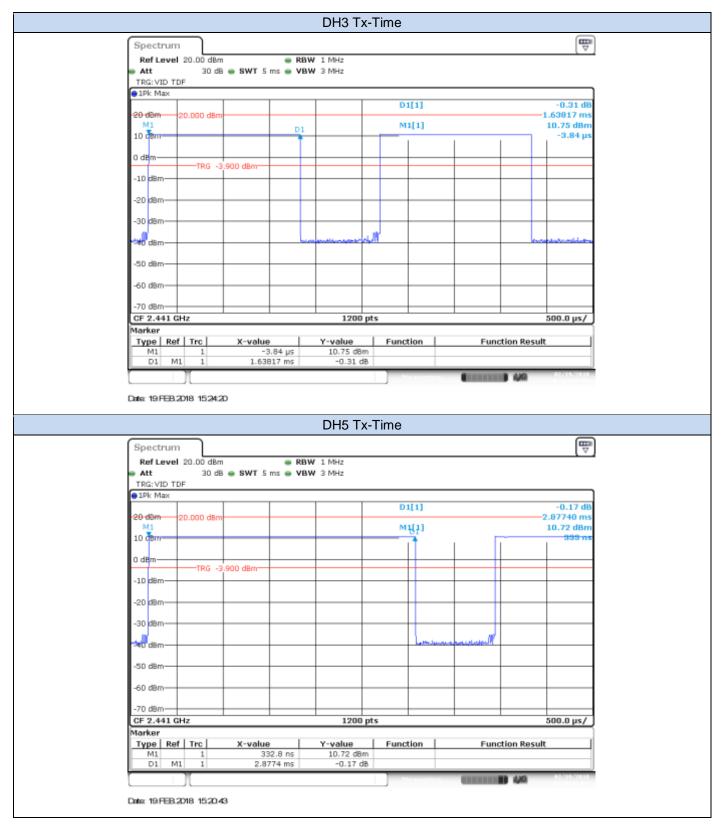
Mode	Packet Type	Times of appearance	Tx-time [ms]	Dwell Time [ms]
Basic Rate	DH1	320.11	0.381	122.112
GFSK	DH3	161.16	1.638	264.007
GFSK	DH5	106.49	2.877	306.414
EDR	2-DH1	320.11	0.392	125.416
π/4-DQPSK	2-DH3	161.16	1.644	264.999
11/4-DQF3K	2-DH5	106.49	2.890	307.747
	3-DH1	320.11	0.385	123.322
EDR 8-DPSK	3-DH3	161.16	1.635	263.576
0-DP3K	3-DH5	106.49	2.886	307.302

Results Screenshot:

BDR – GFSK

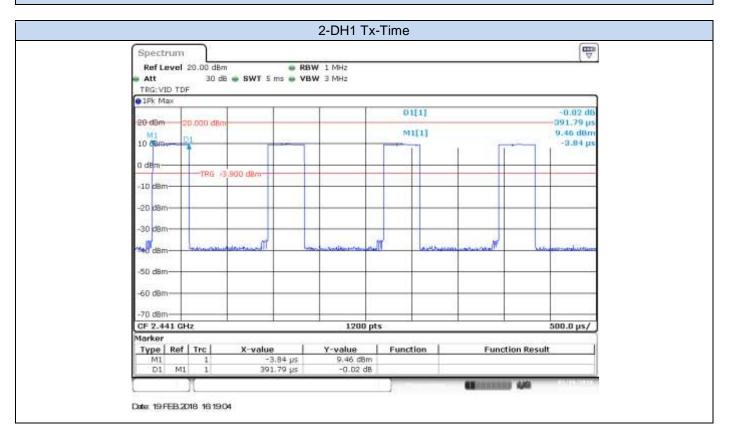




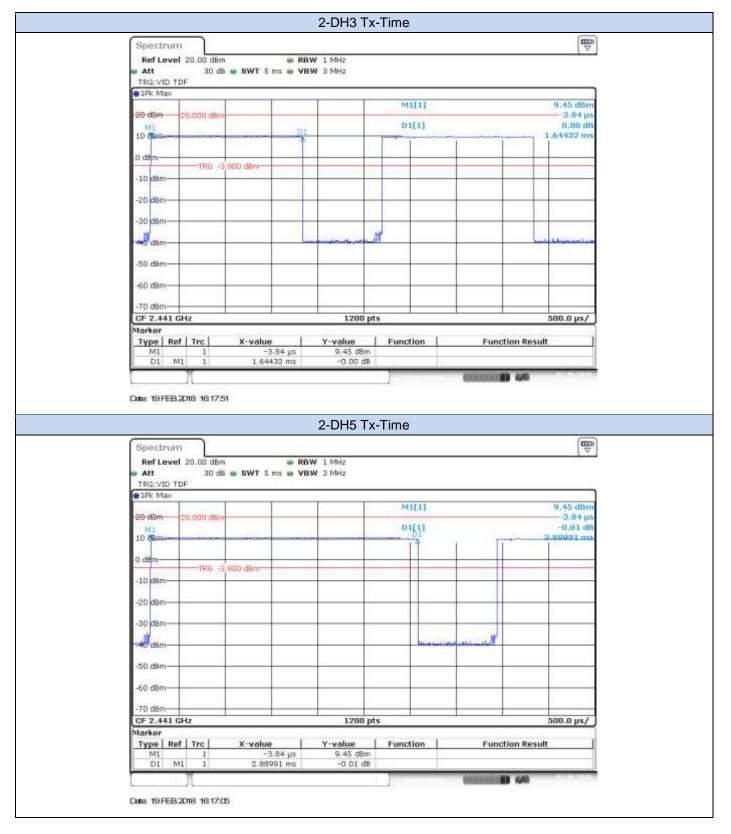




EDR – $\pi/4$ -DQPSK

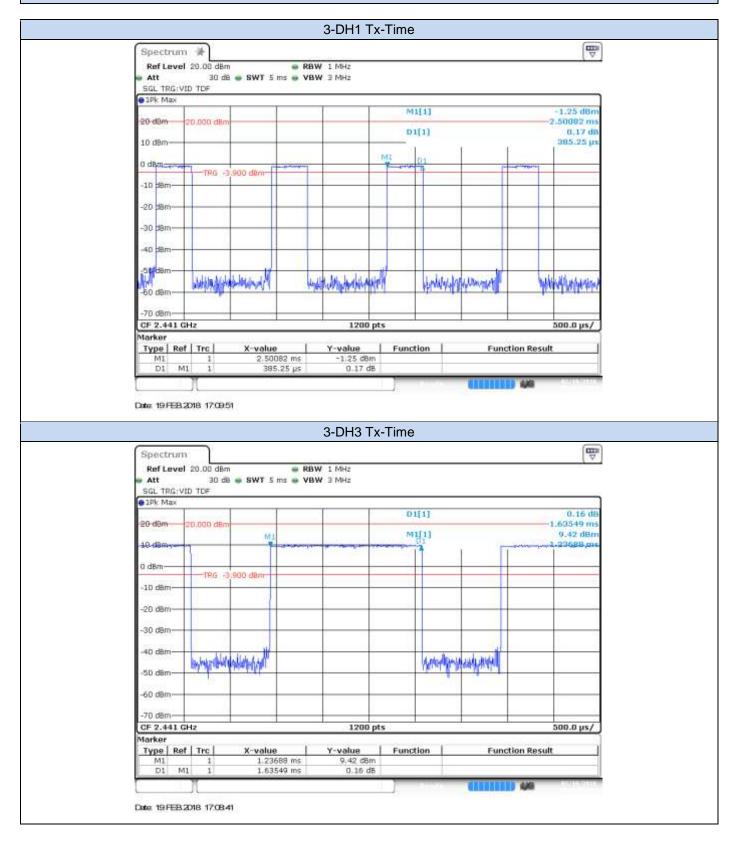








EDR – 8-DPSK





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-60 d8m							
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-70 d8m							
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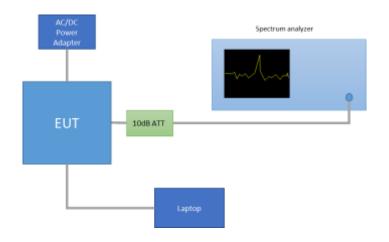
B.4 Maximum Peak Output Power antenna gain

Test Limits

FCC part	RSS part	Limits
15.247	RSS-247	 (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
(b) (1)	Clause 5.4 (b)	 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.

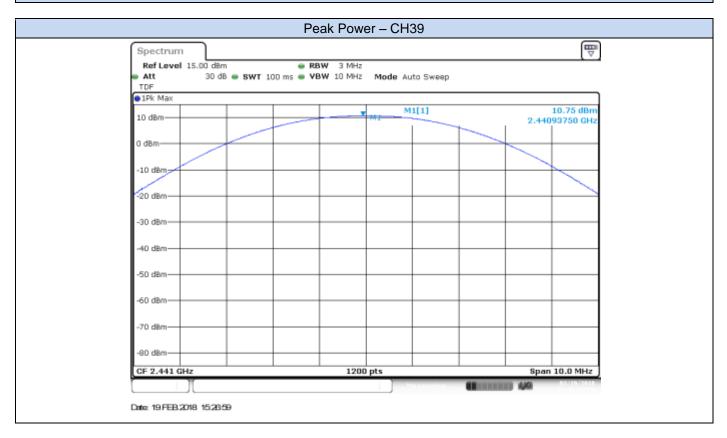
Results tables

Mode	Packet Type	Channel Number	Frequency [MHz]	Peak Power [dBm]	Peak Power [mW]	Peak Power EIRP [dBm]	Peak Power EIRP [mW]
		0	2402	10.09	10.21	13.33	21.53
Basic Rate GFSK	DH5	39	2441	10.75	11.89	13.99	25.06
		78	2480	10.24	10.57	13.48	22.28
		0	2402	9.47	8.85	12.71	18.66
EDR π/4-DQPSK	2DH5	39	2441	10.20	10.47	13.44	22.08
		78	2480	9.81	9.57	13.05	20.18
		0	2402	9.50	8.91	12.74	18.79
EDR 8-DPSK	3DH5	39	2441	10.23	10.54	13.47	22.23
0.01010		78	2480	9.83	9.62	13.07	20.28

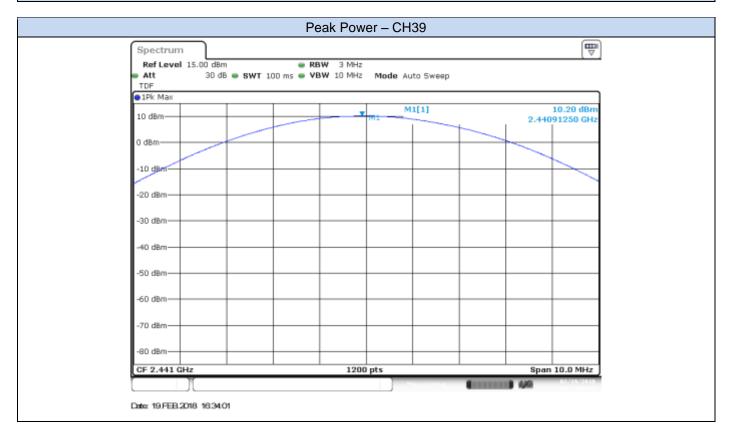


Results Screenshot

Basic Rate - GFSK

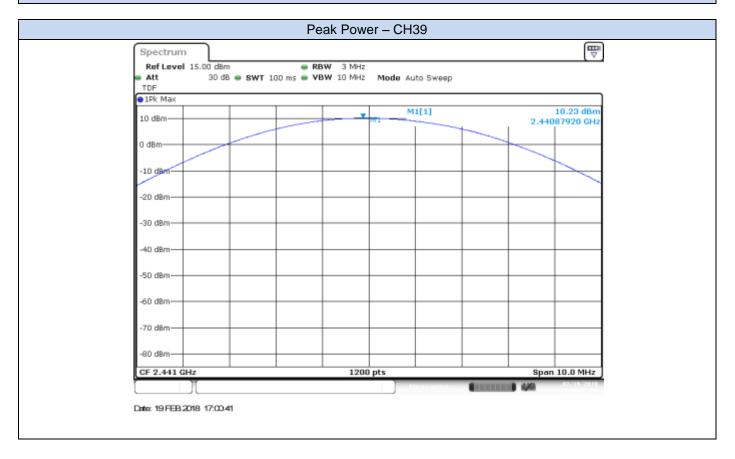


$EDR - \pi/4-DQPSK$





EDR – 8-DPSK





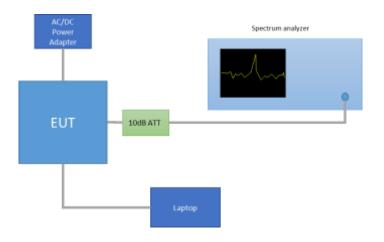
B.5 Out-of-band emission (conducted)

Test limits

FCC part	RSS part	Limits
15.247 (d)	RSS-247 Clause 5.5	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 out-of-band emissions (conducted). 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.



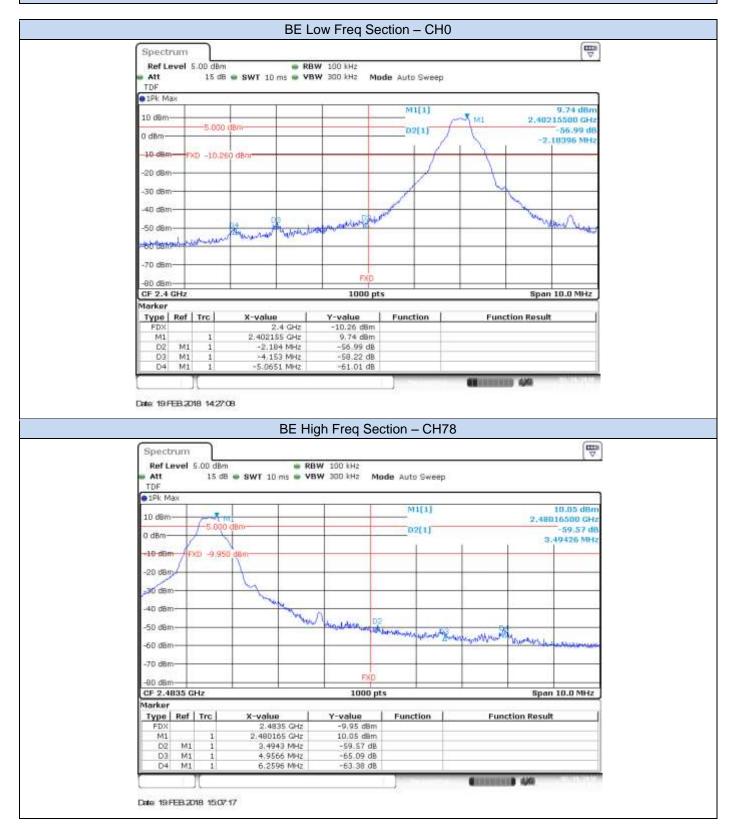


Note: these PSD_{Peak} values are shown just as a reference for the compliance of the Out-of-band Measurements. Thus the RBW used for these measurements was 100 kHz.

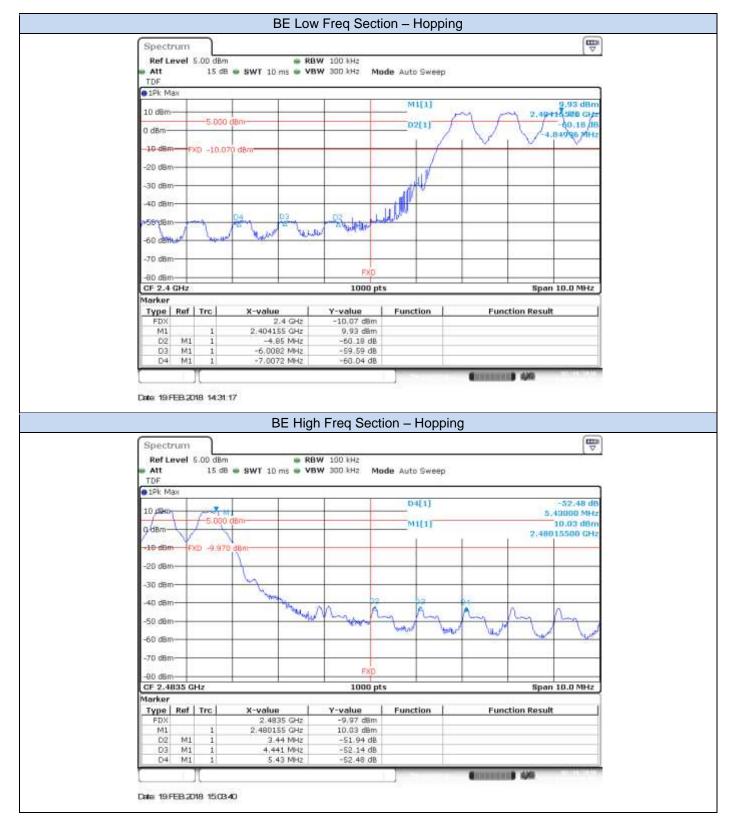
Mode	Packet Type	СН	Frequency [MHz]	PSD Peak [dBm]
Basic Rate - GFSK		0	2402	9.74
	DH5	39	2441	10.50
		78	2480	10.05
EDR – π/4- DQPSK	2DH5	0	2402	8.32
		39	2441	9.24
		78	2480	9.17
EDR – 8-DPSK	3DH5	0	2402	8.31
		39	2441	9.21
		78	2480	9.14



Basic Rate - GFSK





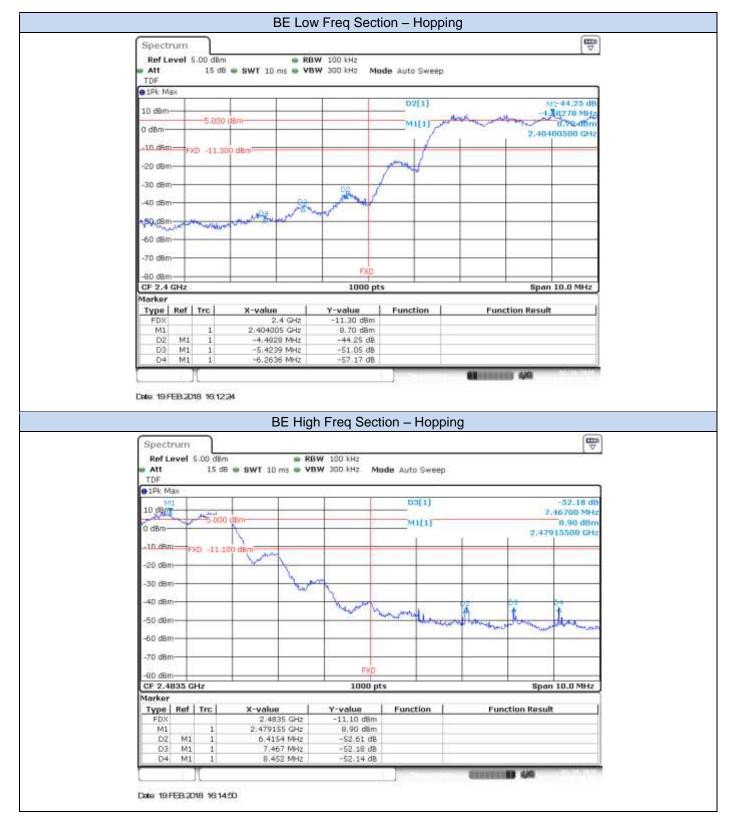




EDR – $\pi/4$ -DQPSK





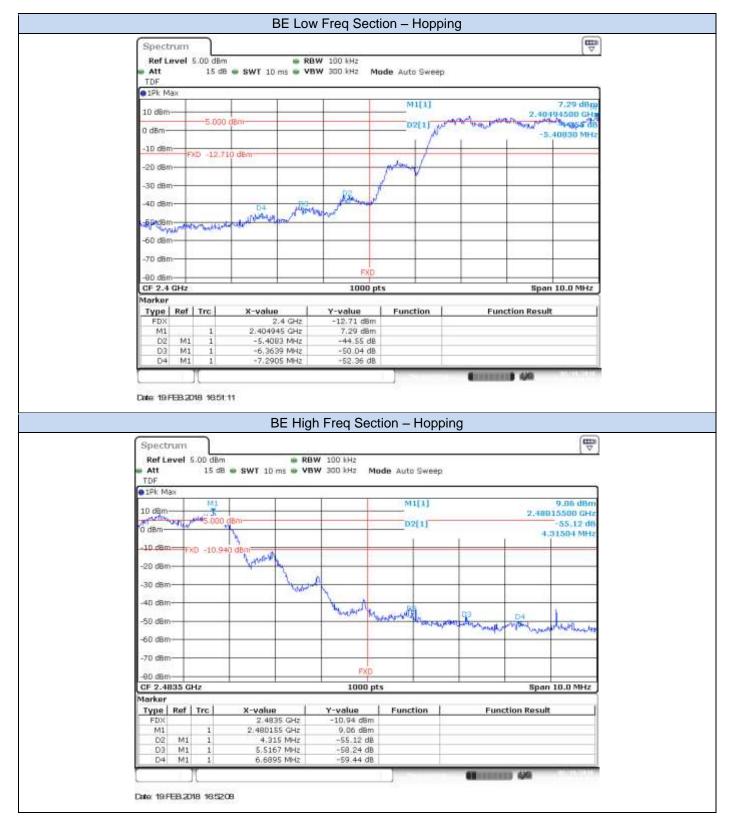




EDR – 8-DPSK



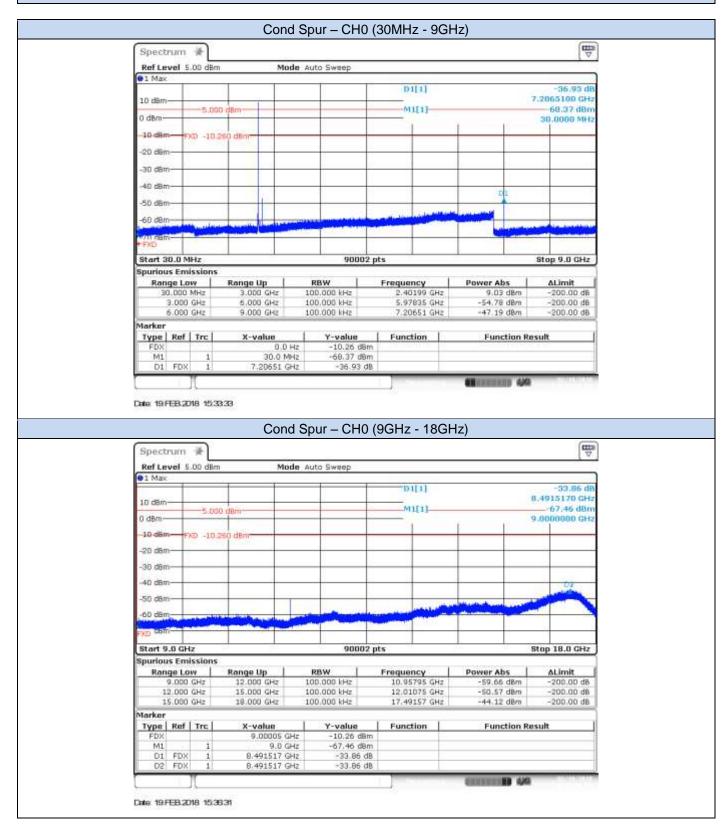






Conducted Spurious results Screenshot

Basic Rate - GFSK





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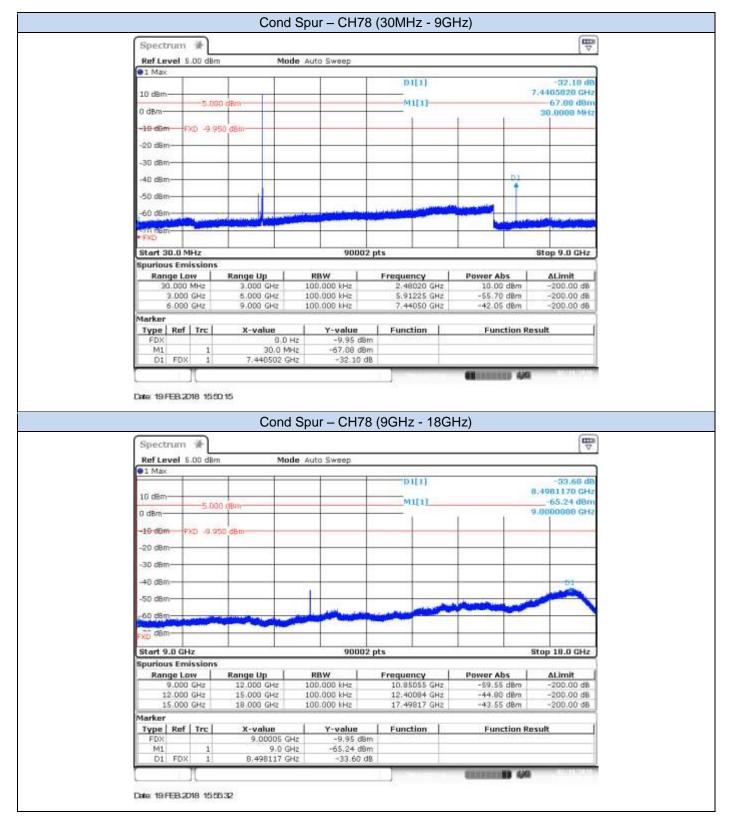


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	1.000		21.000 GHz 24.000 GHz		100.000 kHz 100.000 kHz		375 GHz 823 GHz	-51.62 di -52.40 di		-200.00 dB
	4.000		26.500 GHz		100.000 kHz		082 GHz	-53.07 di		-200.00 dB
Marker										and an output state state
Туре	Ref	Trc	X-value		Y-value	Funct	ion	Functio	on Resu	lt
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	FDX		19.92375		-42.12 dB					
- 04				_				COLUMN TWO IS NOT		



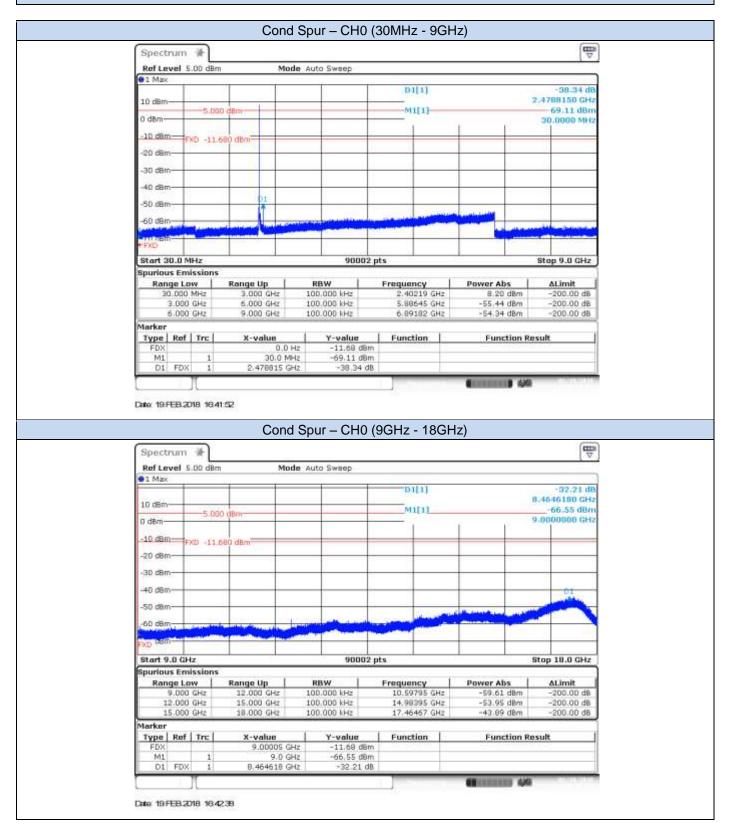




Spect	rum	*									
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							-D1	1[1]		130	-41.72 dt .0068160 GHz
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-20 dBm	-					-	-		-		
-30 dBm	-		-		-	_	-		-		-
-40 dBm	-										
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	-	and the second second		-			-	And a literature			-
+ FXD 80						_					-
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Spuriou	and an interest of the	ACCORPTION AND INCOME.									
Ran	ge Lo	w	Range Up	1	RBW		eque		Power Al		۵Limit
	8.000		21.000 GHz	-	100.000 kHz			855 GHz	-52.17		-200.00 dB -200.00 dB
	4.000		24.000 GHz 26.500 GHz	-	100.000 kHz 100.000 kHz			898 GHZ	-51.67		-200.00 dB
Marker										-	
Type	Ref	Trc	X-value		Y-value		Funct	tion	Fund	ction Res	ult
FDX M1	0.025.03	1000		D Hz GHz	-9.95 d8m			00250 - Si		10000000	0.2
D1	FDX	1	22.006816		-60.03 dan -41.72 di						
-		_					_		COLUMN 2		



EDR – $\pi/4$ -DQPSK





10 dBm	39,58 dB 5500 GHz 9.10 dBm 0000 GHz
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-10.dBm Fx0 -11.680 dBm	1000 Griz
+ Fxo 8m	alian ta
Start 18.0 GHz 90002 pts Stop 20	6.5 GHz
Bpurious Emissions	
18.000 GHz 21.000 GHz 100.000 kHz 19.54355 GHz -51.26 dBm -20 21.000 GHz 24.000 GHz 100.000 kHz 21.55893 GHz -52.21 dBm -20	imit 00.00 dB 00.00 dB 00.00 dB
Marker Yealue Function Function Result FDX 0.0 Hz -11.68 dBm Function Function Result M1 1 18.0 GHz -59.10 dBm 59.58 dB 59.58 dB	



10 dBm 5.000 dBm 6.812 0 dBm 30. 30. -10 dBm FXD -10.760 dBm -20 dBm -30.08m -30.08m -30 dBm -30.08m -30.08m -40 dBm -30.08m -30.08m -40 dBm -30.08m -30.08m -50.08m -30.090 MHz 90002 pts Start 30.0 MHz 90002 pts Stap Start 30.0 MHz 3.000 GHz 100.000 kHz 2.44100 GHz 7.44 dBm 3.000 GHz 5.000 GHz 100.000 kHz 5.93655 GHz -55.36 dBm -30.00 GHz	-43,87 dB 26239 GHz 67,54 dBm .0000 MHz 9 9.0 GHz 200.00 dB 200.00 dB 200.00 dB
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Marker Type Ref Trc X-value Y-value Function Function Result	
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D1 FDX 1 6.812623 GHz 43.87 dB	_
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5 000 dBm M1[1] -6	58.00 dBm 00000 GHz
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Spect	num	*									Em ∀
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							D1[1]				-41.58 dt
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	ige Los		Range Up	1	RBW	Eno	quency	1	Power Ab	. 1	∆Limit
1	8.000	GHz	21.000 GHz		100.000 kHz	1	9.32475 GH		-52.34	dBm	-200.00 dB
	1.000		24.000 GHz	_	100.000 kHz		1.53703 GH		-52.40		-200.00 dB
	4.000	GH2	26.500 GHz		100.000 kHz	2	4,02162 GH	12	-52.01	dBm	-200.00 dB
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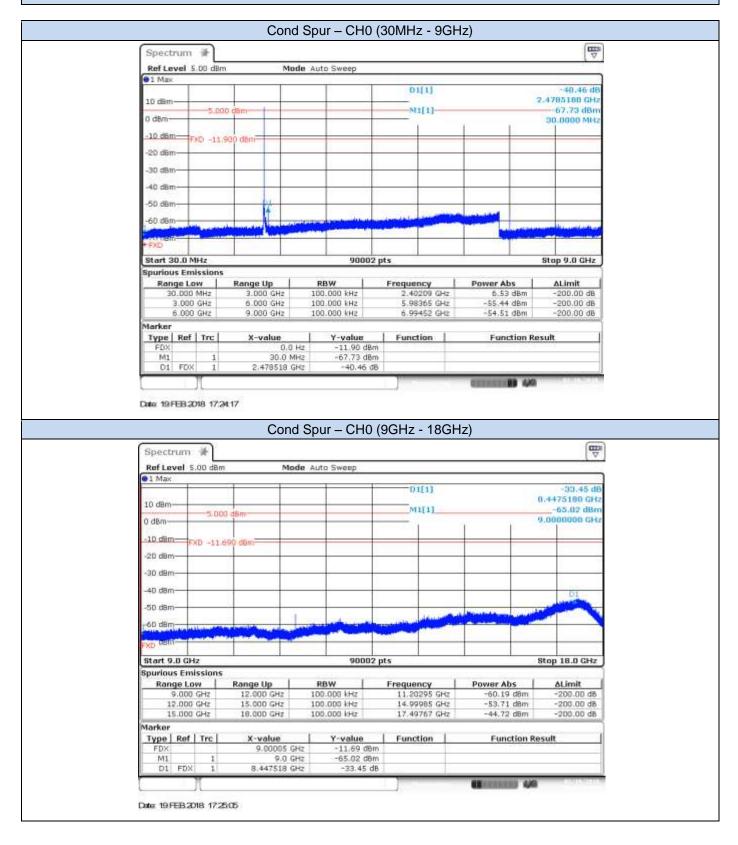
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Ref Level 5	00 dBm	Mor	e Auto Sweep			4
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	0 -10.83	D. ettersor				
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-30 dBm		2.5				
-40 dBm		15				
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FXD						
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Spurious Emi Range Los		Range Up	RBW	Frequency	Power Abs	∆Limit
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3.000		6.000 GHz 9.000 GHz	100.000 kHz 100.000 kHz	5.81346 GHz 7.44050 GHz	-55.62 dBm -47.96 dBm	-200.00 dB -200.00 dB
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Spectrum Ref Level 5	*	Cond	Spur – CH78 de Auto Sweep	8 (9GHz - 18GH	Hz)	(E
Spectrum	*	Cond			Hz)	
Spectrum Ref Level 5. 01 Max	*	Cond		D1[1]		-33.16 d 3,4986170 GH
Spectrum Ref Level 5. 01 Max 10 dim-	*	Cond				-93.16 d 1,4986170 GH 65.16 dBr
Spectrum Ref Level 5. 1 Max 10 dBm- 0 dBm-	₩ 00 dBm 	Cond Mor		D1[1]		-33.16 d 3,4986170 GH
Spectrum Ref Level 5. 1 Max 10 dBm -10 dBm -10 dBm	#	Cond Mor		D1[1]		-93.16 d 1,4986170 GH 65.16 dBr
Spectrum Ref Level 5. 91 Max 10 dBm -10 dBm -20 dBm -20 dBm	₩ 00 dBm 	Cond Mor		D1[1]		-93.16 d 1,4986170 GH 65.16 dBr
Spectrum Ref Level 5: 1 Max 10 dBm -10 dBm -20 dBm -30 dBm	₩ 00 dBm 	Cond Mor		D1[1]		-93.16 d 1,4986170 GH 65.16 dBr
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Spectrum Ref Level 5. 1 Max 10 dBm -10 dBm -20 dBm -20 dBm -20 dBm -50 dBm -50 dBm -50 dBm -50 dBm -50 dBm	★	Cond Mor	de Auto Sweep	D1[1] M1[1]		-33.16 d 3.4986170 GH 65.16 dBr 0.0000000 GH
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Spectrum Ref Level 5. 1 Max 10 dBm -10 dBm -20 dBm -20 dBm -20 dBm -30 dBm -40 dBm -50 dBm	2 ssions	Cond Mor	de Auto Sweep	D1[1] M1[1] pts	Power Abs	-33,16 d 1,4986170 GH -65.16 dB 0.0000000 GH 0.0000000 GH 01 01 01 01 01 01 01 01
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Spect	rum	*								(W)
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					-		D1[1]			-40.61 di
10 dām	-	1,25			-	-	M1[1]		19	.8759500 GH -58.87 dBn
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and the second se	ge Lo		Range Up	1	RBW	F	requency	Power Ab	s I	ALimit
1	8.000	GHz	21.000 GHz		100.000 kHz		19.87595 GHz	-51.44		-200.00 dB
	1.000		24.000 GHz 26.500 GHz		100.000 kHz 100.000 kHz	_	21.48783 GHz 25.62749 GHz	-52.33		-200.00 dB -200.00 dB
Marker	And a lot of the	ante	20.000 GHz	-	100.000 KH2	-	20102149 GH2	-03.17	UBrit	-200,00 08
Type		Tre	X-value		Y-value	1	Function	Func	tion Re:	sult
FDX			0	0 Hz	~10.83 d8m		200000000		100000	XXX
M1	FDX	1	18.0		-58.87 d8m					
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EDR – 8-DPSK





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2	4.000	GHz	26.500 GHz	100.000 kHz		24.01646 GHz	-53.05	dBm	-200.00 dB		
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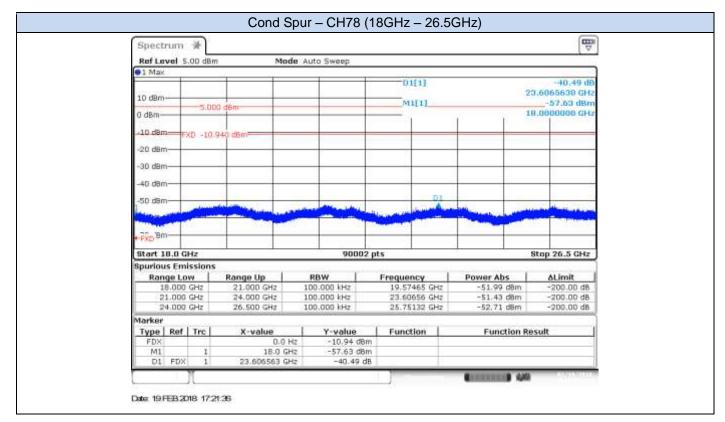


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+ FXD Br	n					-					
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	4.000		26.500 GHz		100.000 kHz			757 GHz	-52.96		-200.00 dB
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2003-21						
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) Data 19FEB.2018 Spectrum -{	*	Cond		(9GHz - 18G		
2000 19 FEB 2016	*	Cond	Spur – CH78 e Auto Sweep			
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Date 19 FEB 2018 Spectrum 1 Ref Level 5.01 9 1 Max 10 10 dBm 9 10 dBm 9 20 dBm 9 -20 dBm -40 dBm	₩ 0 dBm	Cond Med		01[1]	Hz)	-33,46 dE .2845240 GHz -67.38 dBm .000000 GHz
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Standards references

FCC part	RSS part	Limits					
						defined in §15.2 cified in §15.209(
			Freq Range (MHz)	Field Stregth (μV/m)	Field Stregth (dBµV/m)	Meas. Distance (m)	
			30-88	100	40	3	
	RSS-247		88-216	150	43.5	3	
	Clause 5.5	216-960	200	46	3		
15.247 (d)		010000.0	Above 960	500	54	3	
15.209 (a)	RSS GEN Clause 8.9	empl kHz, three For a a lim	oying CISPR qua 110-490 kHz an bands are based verage radiated	asi-peak detecto d above 1000 M d on measureme emission measur measuring with	r except for the 1Hz. Radiated en nts employing ar rements above 1 peak detector fu	sed on measure frequency bands mission limits in average detecto 000 MHz, there i unction, correspo	s 9-90 these or. s also

Test procedure:

The setups below were used to measure the radiated spurious emissions.

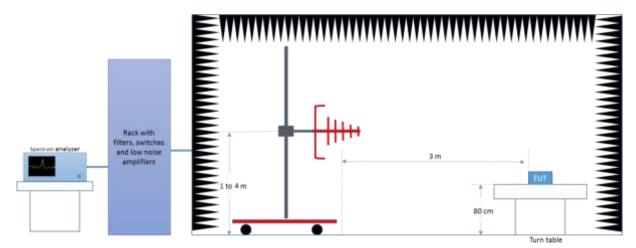
Depending of the frequency range and bands being tested, different antennas and filters were used.

The final measurement is done by varying the antenna height as indicated in the setups below for each band, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.

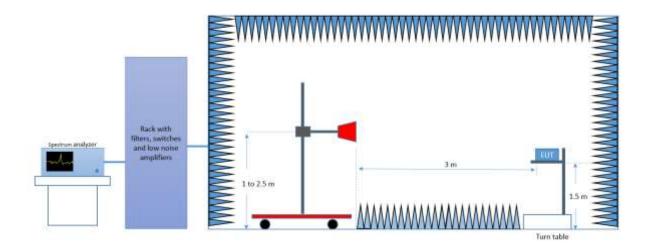
The radiated spurious emission was measured on the worst case configuration found.



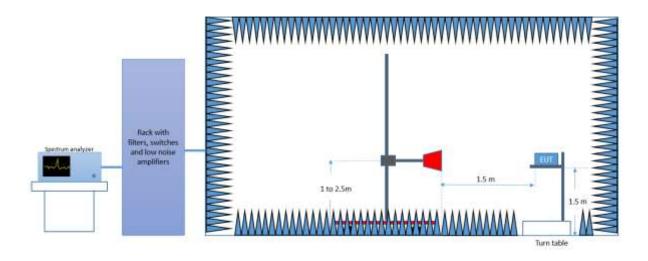
Radiated Setup 30 MHz - 1GHz



Radiated Setup 1 GHz - 18 GHz



Radiated Setup 18 GHz - 26.5 GHz





Sample Calculation

The field strength is deduced from the radiated measurement using the following equation:

$E = 126.8 - 20log(\lambda) + P - G$

where

E is the field strength of the emission at the measurement distance, in $dB\mu V/m$

P is the power measured at the output of the test antenna, in dBm

 λ is the wavelength of the emission under investigation [300/f_{MHz}], in m

G is the gain of the test antenna, in dBi

NOTE - The measured power P includes all applicable instrument correction factors up to the connection to the test

Antenna e.g. cable losses, amplifier gains.

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

E_{SpecLimit} = E_{Meas} + 20log(D_{Meas}/D_{SpecLimit})

where

ESpecLimit is the field strength of the emission at the distance specified by the limit, in dBµV/m

Emeas is the field strength of the emission at the measurement distance, in dBµV/m

D_{Meas} is the measurement distance, in m

DspecLimit is the distance specified by the limit, in m



Test Results

30 MHz – 26.5 GHz, BR – GFSK

Radiated Spurious – CH0 DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	29.7		43.6	13.9
216.0	27.5		43.6	16.1
576.0	38.1		46.0	7.9
1113.4		40.6	54.0	13.4
1189.1	51.4		74.0	22.6
1190.3		42.2	54.0	11.8
2473.4	58.1		74.0	15.9
2478.8		47.4	54.0	6.6
7205.2	49.6		74.0	24.4
7205.7		40.3	54.0	13.7
12009.6		43.0	54.0	11.0
12009.1	52.5		74.0	21.5
24216.3	48.1		74.0	25.9
24256.7		35.0	54.0	19.0

Radiated Spurious – CH39 DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	29.6		43.6	14.0
215.9	27.3		43.6	16.3
576.0	38.2		46.0	7.8
1107.2	51.5		74.0	22.5
1113.4		40.4	54.0	13.6
1190.0	52.0		74.0	22.0
1190.3		42.2	54.0	11.8
2496.3	61.4		74.0	12.6
2503.1		45.7	54.0	8.3
7322.7	48.3		74.0	25.7
7322.7		39.7	54.0	14.3
12204.4	52.8		74.0	21.2
12204.8		43.6	54.0	10.4
21215.1	47.9		74.0	26.1
21197.1		34.3	54.0	19.7



Radiated Spurious – CH78 DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	28.9		43.6	14.7
216.0	26.3		46.0	19.7
576.0	37.8		46.0	8.2
1112.5	50.7		74.0	23.3
1113.4		40.6	54.0	13.4
1189.7	52.9		74.0	21.1
1190.3		42.2	54.0	11.8
7439.7	51.5		74.0	22.5
7439.7		44.6	54.0	9.4
12399.6		44.6	54.0	9.4
12400.6	53.2		74.0	20.8
19907.2	47.6		74.0	26.4
19912.1		34.3	74.0	19.7

30 MHz – 26.5 GHz, EDR – $\pi/4$ -DQPSK

Radiated Spurious – CH0 2DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	28.8		43.6	14.8
216.0	27.2		43.6	16.4
576.0	36.9		46.0	9.1
1113.4		40.6	54.0	13.4
1115.3	51.0		74.0	23.0
1190.3	52.5		74.0	21.5
1190.3		42.4	54.0	11.6
7205.7	48.0		74.0	26.0
7205.7		36.5	54.0	17.5
12009.1		39.8	54.0	14.2
24246.4		35.1	54.0	18.9
24285.8	48.2		74.0	25.8



Radiated Spurious – CH39 2DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	28.8		43.6	14.8
216.0	27.0		46.0	19.0
576.0	38.0		46.0	8.0
1113.4		40.9	54.0	13.1
1151.9		40.6	54.0	13.4
1190.3		42.0	54.0	12.0
1266.9		41.2	54.0	12.8
12204.8	50.0		74.0	24.0
12205.3		39.5	54.0	14.5
25550.5	48.0		74.0	26.0
25972.6		35.1	54.0	18.9

Radiated Spurious – CH78 2DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	28.8		43.6	14.8
216.0	27.2		43.6	16.4
576.0	36.2		46.0	9.8
1190.0	52.5		74.0	21.5
1190.3		42.4	54.0	11.6
7439.2	49.2		74.0	24.8
7439.7		39.4	54.0	14.6
12399.6	51.0		74.0	23.0
12400.1		41.0	54.0	13.0
25952.1		34.5	54.0	19.5
25953.2	46.9		74.0	27.1



30 MHz – 26.5 GHz, EDR – 8-DPSK

Radiated Spurious – CH0 3DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	29.5		43.6	14.1
215.9	27.3		43.6	16.3
576.0	37.1		46.0	8.9
1113.4		40.8	54.0	13.2
1114.1	50.5		74.0	23.5
1190.3	52.5		74.0	21.5
1190.3		42.2	54.0	11.8
7205.7		36.9	54.0	17.1
7205.7	48.1		74.0	25.9
12010.1	50.1		74.0	23.9
12010.1		39.9	54.0	14.1
25984.3	45.5		74.0	28.5
25992.5		34.8	54.0	19.2

Radiated Spurious – CH39 3DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.6	34.0		40.0	6.0
115.2	28.5		43.6	15.1
216.0	27.2		43.6	16.4
576.0	37.1		46.0	8.9
1113.4		40.9	54.0	13.1
1151.9		40.7	54.0	13.3
1190.3		42.1	54.0	11.9
1266.9		41.1	54.0	12.9
12204.8	49.5		74.0	24.5
12204.8		40.1	54.0	13.9
25943.3		34.9	54.0	19.1
25952.8	47.2		74.0	26.8



Radiated Spurious – CH78 3DH5

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
115.2	29.2		43.6	14.4
216.0	25.8		43.6	17.8
576.0	37.1		46.0	8.9
1113.4		40.9	54.0	13.1
1152.2		40.3	54.0	13.7
1189.7	52.8		74.0	21.2
1190.3		42.7	54.0	11.3
7439.2	48.9		74.0	25.1
7440.1		39.2	54.0	14.8
12399.6	50.9		74.0	23.1
12399.6		41.2	54.0	12.8
25960.6	47.2		74.0	26.8
25976.9		34.9	54.0	19.1



B.7 AC power-line conducted emission

Standard references:

FCC part	Limits				
	Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.				
15.207	Eroguanay of amission (MHz)	Conducted li	mit (dBµV)		
	Frequency of emission (MHz)	Quasi-peak	Average		
	0.15-0.5	66 to 56*	56 to 46*		
	0.5-5	56	46		
	5-30 60 50				
*Decreases with the logarithm of the frequency.					

Test procedure:

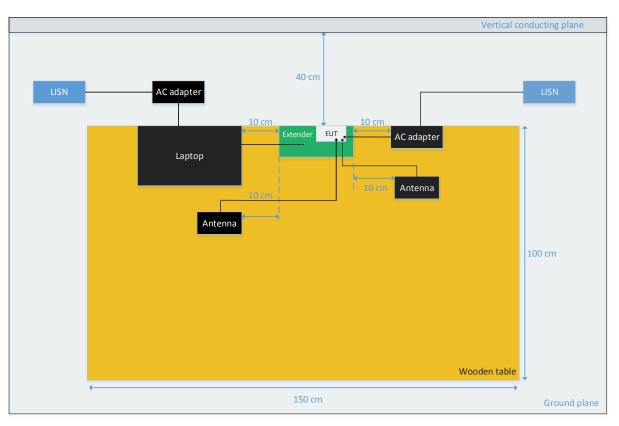
The EUT and peripherals are placed on a wooden table with a nominal size of 1.0 m by 1.5 m, raised 80 cm above the reference ground plane. The EUT is connected to AC-Power line through a Line Impedance Stabilization Network (LISN) to accommodate a 50 Ω /50 μ H coupling impedance for the measurement system. The EUT control PC is considered as a peripheric and therefore is connected to a second LISN which has the measurement port connected to a 50 ohms impedance.

Each measurement is done for each current-carrying conductor (Line and Neutral) at the end plug of the EUT power cord. The EUT is tested for several transmission modes (frequency channel, modulation, etc.) and the result providing the maximum measured emission is reported.

The exploratory measurement is done over the frequency range from 150 kHz to 30 MHz, while the measurement receiver is recording the Peak and Average signal at 10 kHz steps in Max Hold mode. The cables manipulation is performed within the range of likely configurations to determine the maximum emission. Once the EUT cable configuration, arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is found the six highest AC power-line conducted emissions relative to 20 dB of the limit are reported as the final measurement. If fewer than six emission frequencies are within 20 dB of the limit, the noise level is reported. For the final measurement, the measurement receiver records the Quasi Peak values with 9 kHz resolution bandwidth and the average values with 10 kHz resolution bandwidth.

The results present in this report are the maximum spurious levels detected during the measurements. (configuration BT BR 3DH5 Channel 78)





EUT arrangement for AC power-line conducted emission tests

Sample Calculation:

The measured level at the spectrum analyzer in dBuV is corrected by a transducer factor taking into account the losses of the RF cable and the LISN as follows:

Conducted Emission level $(dBuV) = SA_{Level} + RFCable_{Losses} + LISN_{Losses}$

Where:

SA_{Level} is the voltage level displayed on the measurement receiver, in dBuV.

RFCable_{Losses} is the value of the cable losses between the LISN and the measurement receiver, in dB. LISN_{Losses} is the value of the insertion losses of the LISN, in dB.

Test Results:

150kHz – 30MHz, all modes

AC power-line	e conducted – Phase L'	1
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Frequency	Max Peak	Avg	Limit	Margin
MHz	dBµV	dBµV	dBµV	dB
0.16	51.1		65.6	14.5
0.16		27.9	55.7	27.8
0.38	43.0		59.4	16.4
0.38		28.5	49.5	21.0
3.82	40.7		56.0	15.3
3.78		29.2	46.0	16.8
6.36	43.5		60.0	16.5
6.32		28.1	50.0	21.9
13.55	52.0		60.0	8.0
13.56		38.4	50.0	11.6
26.03	30.6		60.0	29.4
26.13		17.3	50.0	32.7

Note: The emissions found do not change with the modulation and/or frequency.

AC power-line conducted – Neutral N

Frequency	Max Peak	Avg	Limit	Margin
MHz	dBµV	dBµV	dBµV	dB
0.16	53.6		65.7	12.1
0.16		28.6	55.7	27.1
0.37	44.2		59.6	15.4
0.37		28.1	49.7	21.6
2.94	33.4		56.0	22.6
2.93		22.2	46.0	23.8
4.21	41.1		56.0	14.9
4.30		29.6	46.0	16.4
13.56	46.3		60.0	13.7
13.56		41.8	50.0	8.2
18.29	38.6		60.0	21.4
18.22		27.2	50.0	22.8

Note: The emissions found do not change with the modulation and/or frequency.