N° 1-6736
Scope available
on www.cofrac.fr

TEST REPORT

EUT Description	**2x2 Wi-Fi and BT, M.2 1216 adapter card**
Brand Name	**Intel®**
Model Name	**BE211D2W, BE211D2W M**
Date of Test Start/End	**2025-07-10 / 2025-07-21**
Features	**2x2 Wi-Fi - Bluetooth®** (see section 1)

Applicant	**Intel Corporation SAS**
Address	**425 Rue de Goa – Le Cargo B6 – 06600 Antibes, FRANCE**
Contact Person	**Irina Vicente**
Telephone/Fax/ Email	**irina.vicente@intel.com**

Reference Standards	**ETSI EN 300 328 V2.2.2** **(see section 1)**

Test Report identification	**250522-02.TR02**
Revision Control	**Rev. 02** **This test report revision replaces any previous test report revision** **(see section 8)**

The test results relate only to the samples tested.
Reference to accreditation shall be used only by full reproduction of test report.

Reviewed by

Digitally signed by zayd
DN: cn=zayd, email=zayd.ouachicha@intel.com, c=US
Date: 2026.01.28 17:04:08 +01'00'

Zayd OUACHICHA
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Table of Contents

1. Standards, reference documents and applicable test methods

1. ETSI EN300 328 v2.2.2, Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

2. General conditions, competences and guarantees

- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
- ✓ 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.
- ✓ 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	Min: 24.95°C Max: 25.43°C Avg: 25.23°C
Humidity	Min: 31.76% Max: 64.06% Avg: 42.93%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	250528-01.S01	Module	BE211D2W	289200F964C4	2025-05-28	Used for RF Conducted tests
	240000-01.S03	Extender MotherBoard	PCB00887-008_A	2202207569	2024-12-12	
	210916-09.S03	Laptop	HP Warpath 14LX	000176090Y	2021-12-10	
#02	250528-01.S07	Module	BE211D2W	289200F96596	2025-05-28	Used for Radiated Spurious Emissions tests
	200803-01.S01	Extender	ADEXELEC	139245	2020-08-31	
	170000-01.S57	Adapter	BNJ C0 V3	ASS00959-00-0C	2025-03-24	
	200611-03.S30	Test PC	Latitude 5401	6DJLK13	2020-08-19	
	230223-02.S48	Triband Antenna	-	006	2023-04-20	
	230526-09.S08	Triband Antenna	-	016	2023-07-06	
#03	250528-01.S07	Module	BE211D2W	289200F96596	2025-05-28	Used for Radiated Spurious Emissions tests
	200904-01.S14	Extender	ADEXELEC	12	2023-06-22	
	170000-01.S56	Adapter	BNJ C0 V3	E1578726888186A	2025-03-24	
	170000-01.S55	Test PC	LATITUDE 5530	004250000000002AA521	2025-03-24	
	230526-09.S06	Triband Antenna	-	014	2023-07-06	
	230526-09.S05	Triband Antenna	-	013	2023-07-06	
#04	250528-01.S07	Module	BE211D2W	289200F96596	2025-05-28	Used for Rx Radiated Spurious Emission tests
	170000-01.S57	Adapter	BNJ C0 V3	ASS00959-00-0C	2025-03-24	
	200615-05.S06	Test PC (Host)	Dell Latitude 7940	63QRMQ2	2020-06-12	

5. EUT Features

The herein information is provided by the customer.

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

<table>
<tr><td>Brand Name</td><td>Intel®</td></tr>
<tr><td>Model Name</td><td>BE211D2W, BE211D2W M</td></tr>
<tr><td>Software Version</td><td>DRTU.08927.99.0.99</td></tr>
<tr><td>Driver Version</td><td>23.162.25264.11807 (RFC RF Tests) / 23.160.25212.8026 (RFR RF Tests)</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n/ax/be 2.4GHz
802.11a/n/ac/ax/be 5.2GHz
5.3GHz
5.6GHz
5.8GHz
802.11ax/be 6.0GHz
Bluetooth 2.4GHz</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><th>Transmitter</th><th>Chain A(1)</th><th>Chain B(2)</th></tr>
<tr><td>Manufacturer</td><td>Intel WRF Lab</td><td>Intel WRF Lab</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>WRF-Tri Band-Antenna</td><td>WRF-Tri Band-Antenna</td></tr>
<tr><td>Antenna peak gain (dBi)</td><td>+3.0</td><td>+3.0</td></tr>
</table>
</td></tr>
</table>

6. Remarks and comments

1. According to the applicant declaration the device is operating as an adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. so it is considered as receiver category 1.

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

7.1. BT Basic Rate / Enhanced Data Rate

Mode	ETSI clause	Test	Verdict
2.4GHz	4.3.1.2	RF output power	P
	4.3.1.3	Duty Cycle, Tx-sequence, TX gap	P
	4.3.1.4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	P
	4.3.1.5	Hopping Frequency Separation	P
	4.3.1.6	Medium Utilization (MU) factor	NA
	4.3.1.7	Adaptivity (Adaptive Frequency Hopping)	P
	4.3.1.8	Occupied Channel Bandwidth	P
	4.3.1.9	Transmitter unwanted emissions in the out-of-band domain	P
	4.3.1.10	Transmitter unwanted emissions in the spurious domain	P
	4.3.1.11	Receiver spurious emissions	P
	4.3.1.12	Receiver Blocking	P

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

8. Document Revision History

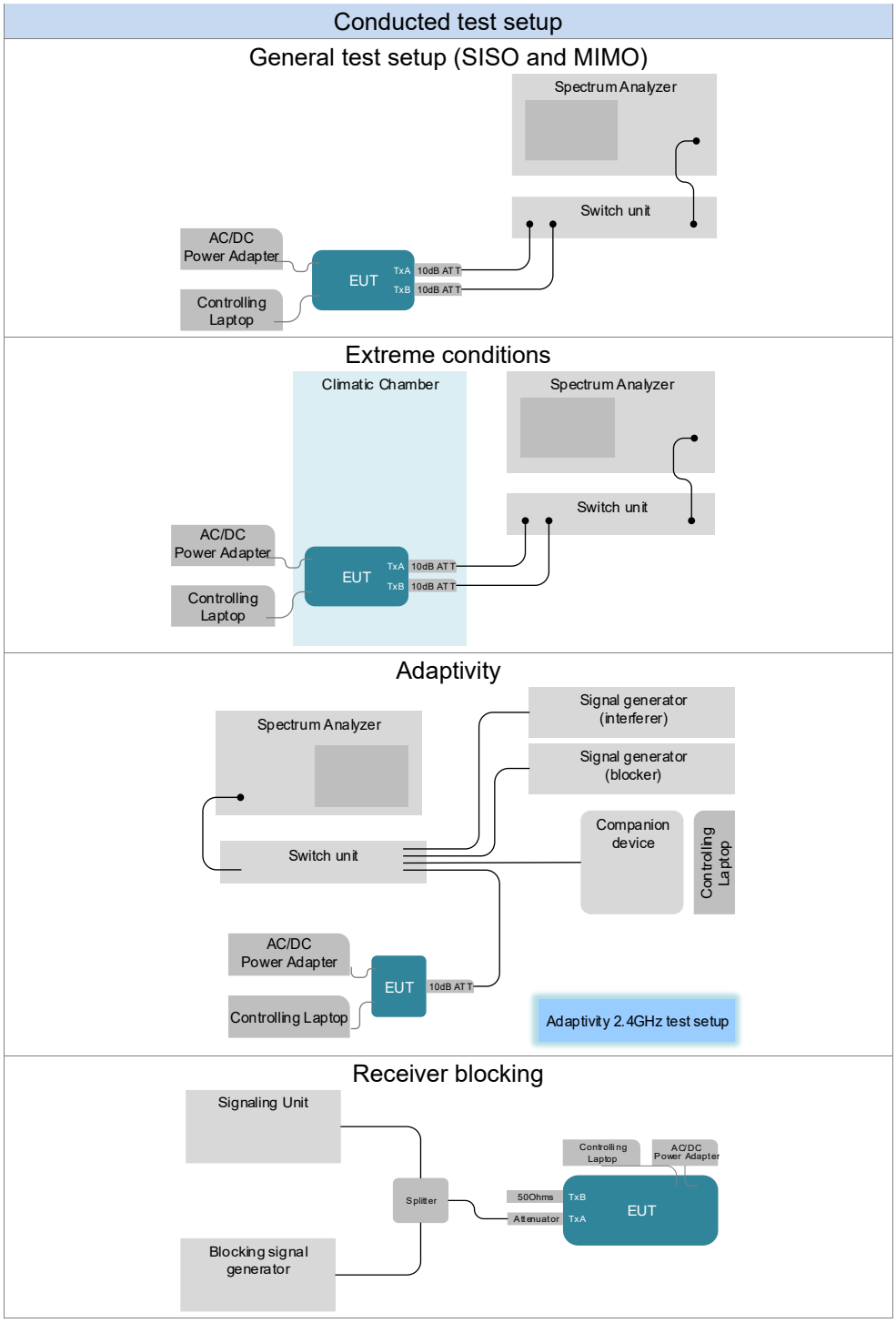
Revision #	Modified by	Revision Details
Rev. 00	T.GAMAIN K. RIDA	First Issue
Rev.01	Z.OUACHICHA	Digital signature issue updated
Rev. 02	T.GAMAIN	Editorial typo in sections B.3 and B.6 upon customer request

Annex A. Test & System Description

A.1 Measurement System

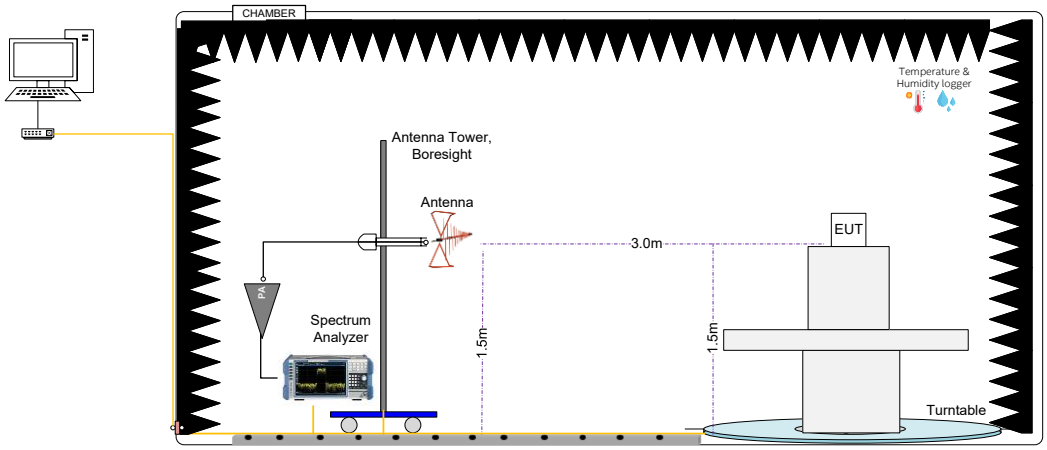
Measurements were performed using the following setups and made in accordance to the general provisions of ETSI EN 300 328 V2.2.2

Rohde & Schwarz TS8997 system with the switching unit OSP120, OSP B-157 and software EMC32 were employed. The DUT was installed in a test fixture and then 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, using the Intel proprietary tool DRTU.
Setups for conducted and radiated measurements are shown below.

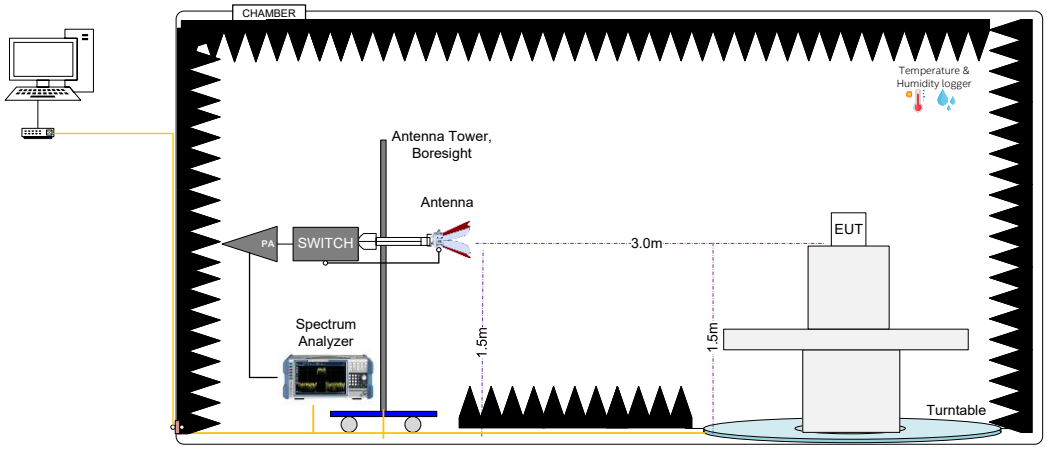


Radiated test setup

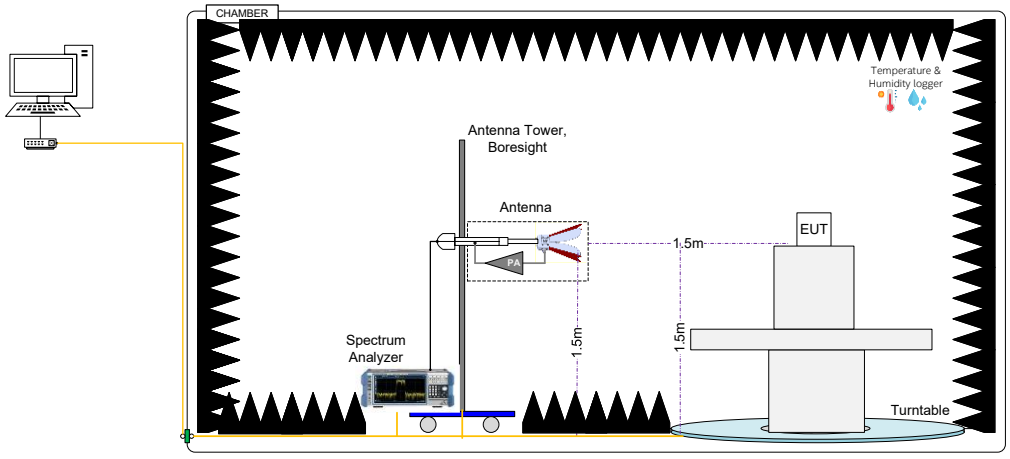
Radiated Setup 30 MHz - 1 GHz (Transmitter tests)



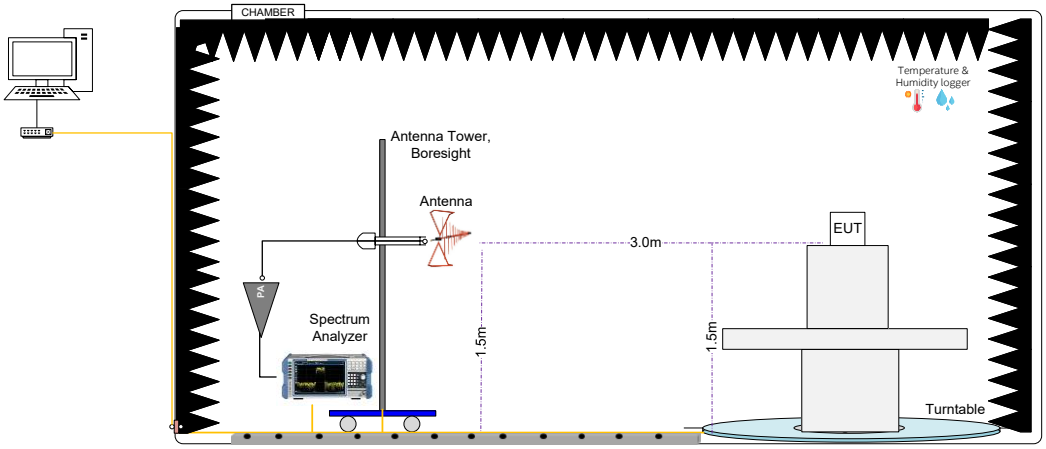
Radiated Setup 1 GHz – 11 GHz (Transmitter tests)



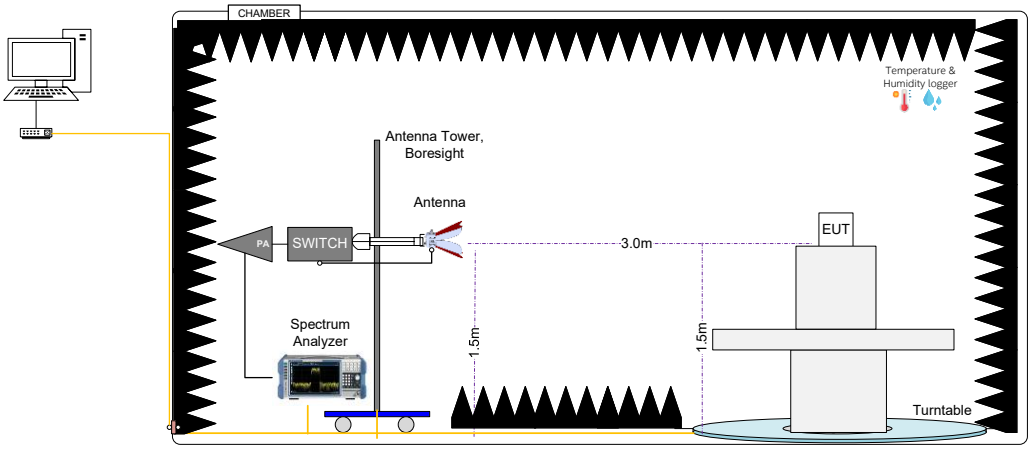
Radiated Setup 11 GHz – 12.75 GHz (Transmitter tests)



Radiated Setup 30 MHz – 1 GHz (Receiver tests)



Radiated Setup 1 GHz – 12.75 GHz (Receiver tests)



A.2 Test Equipment List

Conducted setup #01 (RF Tests)

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
017-015	Switch unit	OSP 120	101172	Rohde & Schwarz	2024-05-22	2026-05-22
481-000	Access point 802.11n	AIR-CAP3502E-A-K9	FTX1438S6P4	Cisco	N/A	N/A
017-003	DC Power supply	E3640A	MY40006885	Agilent	N/A	N/A
133-000	Oscilloscope	RTE1052	101135	Rohde & Schwarz	2024-03-04	2026-03-04
299-000	Multimeter	34401A	US360546853146A00597	HPAgilent	2024-03-14	2026-03-14
311-000	Climatic chamber	SLT34/40	56746020930010	Secasi	2023-12-20	2025-12-20
017-038	Spectrum analyzer	FSVA3013	102344	Rohde & Schwarz	2024-05-29	2026-05-29
017-000	Measurement Software	WMS32 V11.40	200226	Rohde & Schwarz	N/A	N/A
412-000	Measurement Software	DRTU Power Finder V2	N/A	WRF Lab	N/A	N/A
094-004	Temp & Humidity Logger	RMS-HCD-S	24050483	Rotronic	2024-09-02	2026-09-02
237-000	10dB directional coupler	MC2047-10	01-062	Fairview	2025-02-24	2026-02-24
017-005	RF Cable 0.5m	PE3CA1039	-	Pasternack	2025-02-24	2026-02-24
017-006	RF Cable 1.2m	PE3C0666	-	Pasternack	2025-02-24	2026-02-24
017-007	Cable SMA Male to ML51-P	HRMP-ML51LP	DTR178-100RS	Hirose	2025-02-24	2026-02-24
017-008	Cable SMA Male to ML51-P	HRMP-ML51LP	DTR178-100RS	Hirose	2025-02-24	2026-02-24
281-000	Thermometer	t3000FC	46320036	Fluke	2024-04-17	2026-04-17
053-000	Thermometer	t3000FC	46320032	Fluke	2023-12-13	2025-12-13
017-011	RF Cable 2m	0900670672000PJ	1936949	Radiall	2025-02-24	2026-02-24
017-012	RF Cable 2m	0900670672000PJ	1936947	Radiall	2025-02-24	2026-02-24
017-019	10dB attenuator	-	-	Pasternack	2025-02-24	2026-02-24
017-020	10dB attenuator	-	-	Pasternack	2025-02-24	2026-02-24
008-025	Power Sensor	NRP-Z57	101280	Rohde & Schwarz	2024-05-22	2026-05-22

Receiver blocking Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
125-000	Communication tester	CMW500	129337	Rohde & Schwarz	2025-05-28	2027-05-28
098-000	Signal generator	SMW200A	103732	Rohde & Schwarz	2023-07-26	2025-07-26
018-005	SMA-SMA 45cm RF Cable	FMC020285-18	-	Fairview Microwave	2025-02-21	2026-02-21
094-004	Temp & Humidity Logger	RMS-HCD-S	24050483	Rotronic	2024-09-02	2026-09-02
018-000	2 Way SMA Power Divider	PE2084	-	Pasternack	2025-02-21	2026-02-21
016-003	SMA-SMA 45cm RF Cable	FMC0202085-18	-	Fairview Microwave	2025-02-21	2026-02-21
018-006	SMA-SMA 45cm RF Cable	FMC0202085-18	-	Fairview Microwave	2025-02-21	2026-02-21

N/A: Not Applicable

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
006-000	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2024-01-17	2026-01-17
006-001	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
094-002	Temp & Humidity Logger	RMS-HCD-S	24050486	Rotronic	2024-09-02	2026-09-02
006-011	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
006-002	Switch & Positioning systems	EMCenter	00159757	ETS-Lindgren	N/A	N/A
147-000	Spectrum analyzer	FSW43	101847	Rohde & Schwarz	2025-03-07	2027-03-07
006-008	Measurement SW, v11.3	EMC32	100623	Rohde & Schwarz	N/A	N/A
301-000	Amplifier 9kHz-1300MHz	8447F	3113A07440	HP	2025-02-11	2026-02-11
006-067	Low Pass Filter 1.6GHz	LPM17671	G002	Micro-Tronics	2025-02-11	2026-02-11
007-034	Broadband RF Power Amplifier 0.5-40.0GHz	DEPA0540-43	2024A02	Diamond Engineering	2025-02-11	2026-02-11
189-000	Double Horn Ridged antenna 10GHz-40GHz	3116C	227716	ETS-Lindgren	2024-05-29	2026-05-29
057-000	Double ridged horn antenna (1GHz to 18GHz)	ETS-Lindgren-3117	167062	ETS-Lindgren	2024-07-23	2026-07-23
006-061	Bi-Log Periodic antenna	CBL6143A	61382	Teseq	2024-11-13	2026-11-13
006-068	RF Switch DC-40GHz	LPM17671	G002	Mini-Circuits	2025-02-11	2026-02-11
261-000	RF Amplifier Used for 1 GHz-11GHz	ETS-Lindgren-3117-PA	00157993	ETS-Lindgren	2025-02-11	2026-02-11
009-007	Filter HPF 11GHz	Mini-Circuits-ZHSS-k11G+	84931831830	Mini-Circuits	2025-02-11	2026-02-11
006-051	RF Cable 1.0m	CBL-1.5M-SMSM+	202879	Mini-Circuits	2025-03-12	2026-03-12
006-066	Cable 7m – 25MHz to 40GHz	R286304174	20.46.370	Radiall	2025-02-10	2026-02-10
006-063	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2025-02-10	2026-02-10
006-064	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2025-02-10	2026-02-10
006-065	Cable 60cm – 25MHz to 1GHz	PE300-24	-	Pasternack	2025-02-10	2026-02-10

N/A: Not Applicable

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
007-000	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2024-01-18	2026-01-18
138-000	Spectrum Analyzer	FSV40**	101556	Rohde & Schwarz	2024-02-27	2026-02-27
137-000	Spectrum Analyzer	FSW67*	103266	Rohde & Schwarz	2025-02-11	2027-02-11
007-007	Double Ridge Horn Antenna (1- 18GHz)	3117	00152266	ETS Lindgren	2024-03-26	2026-03-26
059-000	Double-ridged horn antenna + PA (1 GHz to 18 GHz)	3117-PA	201542	ETS-Lindgren	2023-09-26	2025-09-26
026-008	Low noise amplifier 1-18GHz	LA1018N3209	J10100000407	A-INFO	2025-02-19	2026-02-19
007-004	Switch & Positioner	EMCenter	00162359	ETS Lindgren	N/A	N/A
007-006	EMControl & EMSwitch	EMCenter	00151232	ETS Lindgren	N/A	N/A
007-036	SMA-SMA 6.5m Cable	140-8500-11-51-001	001	Atem	2025-03-12	2026-03-12
007-005	Measurement SW, v11.30.00	EMC32	100401	Rohde & Schwarz	N/A	N/A
007-001	Styrofoam Column, 151mm	-	-	-	N/A	N/A
007-002	Turntable	-	-	ETS Lindgren	N/A	N/A
007-003	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
007-015	N-SMA 1.5m Cable	-	-	Spirent	2025-02-19	2026-02-19
007-018	SMA-SMA 1.2m Cable	0500990991200KE	-	Radiall	2025-02-19	2026-02-19
007-022	N-SMA 1.5m Cable	0501050991500GX	19.23.493	Radiall	2025-02-10	2026-02-10
094-001	Temp & Humidity Logger	RMS-HCD-S	24050487	Rotronic	2024-09-02	2026-09-02

*Used from 12/06/2025 to 16/06/2025
**Used since 17/06/2025

N/A: Not Applicable

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
412-000	DRTU Power finder V2.1	-	-	Intel	NA	NA
139-000	Power Sensor	NRP-Z81	104383	Rohde & Schwarz	2025-05-20	2027-05-20
140-000	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2024-04-04	2026-04-04

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

Measurement type	Uncertainty	Unit
Occupied Channel Bandwidth	±6.18	%
RF Output Power, conducted	±0.99	dB
Power Spectral Density, conducted	±0.99	dB
Unwanted Emission, conducted	±1.53	dB
Radiated test < 1GHz	±4.03	dB
Radiated test 1GHz –12.75 GHz	±4.01	dB
Temperature	±0.23	ºC
Supply voltages	<±0.01	%
Time	±0.01	%

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
RF output power, duty cycle	T.GAMAIN
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	T.GAMAIN
Hopping frequency separation	T.GAMAIN
Adaptivity (Adaptive Frequency Hopping)	T.GAMAIN
Occupied channel bandwidth	T.GAMAIN
Transmitter unwanted emission in the out-of-band domain	T.GAMAIN
Transmitter unwanted emissions in the spurious domain	K. RIDA
Receiver spurious emissions	K. RIDA
Receiver blocking	T.GAMAIN

B.1 Test Conditions

ETSI clause	Conditions	ETSI EN 300 328 V2.2.2 Annex E
5.1.2.1	The normal temperature and humidity conditions for tests shall be any convenient combination of temperature and humidity within the following ranges: • Temperature: +15 °C to +35 °C; • Relative humidity: 20 % to 75 %.	
5.1.2.2	The normal test voltage for the equipment shall be the nominal voltage for which the equipment was designed.	**"Information provided by the customer"**
5.1.3	Some tests in the present document need to be repeated at extreme temperatures. Where that is the case, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.	

B.2 RF output Power

Test limits

ETSI clause	Limits
4.3.1.2.3	The RF output power for FHSS equipment shall be equal to or less than 20 dBm. For non-adaptive FHSS equipment, where the manufacturer has declared an RF output power lower than 20 dBm e.i.r.p., the RF output power shall be equal to or less than that declared value. This limit shall apply for any combination of power level and intended antenna assembly.

Test conditions

ETSI clause	Conditions
5.4.2.1	The measurements for RF output power shall be performed at both normal environmental conditions and at the extremes of the operating temperature range. The equipment shall be operated under its worst case configuration (for example modulation, bandwidth, data rate, power) with regards to the requirement being tested.

Test procedure

The conducted setups shown in section *Test & System Description* were used to measure the RF output power accordingly with ETSI EN 300 328 V2.2.2 §5.3.2. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

Results tables

RF Output Power				Normal Conditions Ambient Temparature +23°C		Extreme Conditions High Temparature +50°C		Extreme Conditions Low Temparature -10°C	
Mode	Rate	Duty cycle [%]	Chain	Measured Conducted [dBm]	EIRP [dBm]	Measured Conducted [dBm]	EIRP [dBm]	Measured Conducted [dBm]	EIRP [dBm]
Bluetooth Classic	DH5	76.8	SISO A	14.7	17.7	14.5	17.5	14.3	17.3
			SISO B	15.2	18.2	14.4	17.4	15.2	18.2
		76.8	MIMO A	13.9	16.9	13.5	16.5	13.5	16.5
			MIMO B	13.9	16.9	13.7	16.7	13.6	16.6
	2-DH5	76.8	SISO A	12.6	15.6	12.5	15.5	13.2	16.2
			SISO B	12.5	15.5	12.4	15.4	13.1	16.1
		76.8	MIMO A	12.8	15.8	12.5	15.5	13.3	16.3
			MIMO B	12.6	15.6	12.3	15.3	13.2	16.2
	3-DH5	76.9	SISO A	12.5	15.5	12.2	15.2	12.0	15.0
			SISO B	12.4	15.4	12.1	15.1	12.9	15.9
		76.9	MIMO A	12.6	15.6	12.3	15.3	12.2	15.2
			MIMO B	12.6	15.6	12.3	15.3	13.1	16.1
Bluetooth LE FHSS	LE1M	84.8	SISO A	15.1	18.1	14.5	17.5	14.2	17.2
			SISO B	14.7	17.7	14.4	17.4	14.2	17.2
		84.8	MIMO A	13.8	16.8	13.4	16.4	13.9	16.9
			MIMO B	13.9	16.9	13.7	16.7	13.8	16.8

B.3 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

Test limits

ETSI clause	Limits
4.3.1.4.3.2	Adaptive FHSS equipment Adaptive FHSS equipment shall be capable of operating over a minimum of 70 % of the band specified in table 1. **Table 1: Service frequency bands** Transmit: 2 400 MHz to 2 483,5 MHz Receive: 2 400 MHz to 2 483,5 MHz The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options: Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use. Option 2: The occupation probability for each frequency shall be between ((1 / U) × 25 %) and 77 % where U is the number of hopping frequencies in use. The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

Test conditions

ETSI clause	Conditions
5.4.4.1	These measurements shall only be performed at normal test conditions. The equipment shall be configured to operate at its maximum Dwell Time and maximum Duty Cycle. The measurement shall be performed on a minimum of two (active) hopping frequencies chosen arbitrary from the actual hopping sequence.

Test procedure

The conducted setup shown in section *Test & System Description* was used to measure the Accumulated Transmit Time accordingly with ETSI EN 300 328 V2.2.2 §5.4.4.2.1. Minimum Frequency Occupation and Hopping Sequence. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Results tables

Dwell Time

Mode	Rate	Channel	Freq [MHz]	Chain	Accumulated Transmit Time (ms)	Measurement Time (ms)
Bluetooth Basic Rate	DH5	0	2402	SISO A	66.22	6000
				SISO B	66.22	6000
				MIMO A	57.58	6000
				MIMO B	66.22	6000
		78	2480	SISO A	51.83	6000
				SISO B	60.46	6000
				MIMO A	46.06	6000
				MIMO B	63.34	6000
Bluetooth Enhanced Data Rate	2-DH5	0	2402	SISO A	60.63	6000
				SISO B	80.95	6000
				MIMO A	64.70	6000
				MIMO B	64.17	6000
		78	2480	SISO A	83.57	6000
				SISO B	85.58	6000
				MIMO A	63.32	6000
				MIMO B	76.54	6000
	3-DH5	0	2402	SISO A	84.94	6000
				SISO B	56.88	6000
				MIMO A	64.07	6000
				MIMO B	89.54	6000
		78	2480	SISO A	61.10	6000
				SISO B	63.18	6000
				MIMO A	68.71	6000
				MIMO B	91.91	6000
Bluetooth Low Energy FHSS	LE1M	1	2404	SISO A	135.76	6000
				SISO B	159.88	6000
				MIMO A	83.37	6000
				MIMO B	153.31	6000
		38	2478	SISO A	137.89	6000
				SISO B	160.80	6000
				MIMO A	74.03	6000
				MIMO B	151.21	6000

$Measurement\ Time_{ms} = 400_{ms} \times 15\ (minimum\ hoppping\ frequencies) = 6000ms$

Minimum Frequency Occupation

Mode	Rate	Channel	Freq [MHz]	Chain	Minimum Frequency Occupation (ms)	Limit (ms)	Measurement Time (ms)
Bluetooth Basic Rate	DH5	0	2402	SISO A	2.88	0	126400
				SISO B	11.51	0	126400
				MIMO A	5.75	0	126400
				MIMO B	2.87	0	126400
		78	2480	SISO A	5.76	0	126400
				SISO B	2.88	0	126400
				MIMO A	5.75	0	126400
				MIMO B	2.88	0	126400
Bluetooth Enhanced Data Rate	2-DH5	0	2402	SISO A	3.48	0	126400
				SISO B	3.60	0	126400
				MIMO A	3.51	0	126400
				MIMO B	9.29	0	126400
		78	2480	SISO A	2.88	0	126400
				SISO B	2.88	0	126400
				MIMO A	7.13	0	126400
				MIMO B	9.46	0	126400
	3-DH5	0	2402	SISO A	3.37	0	126400
				SISO B	1.67	0	126400
				MIMO A	2.88	0	126400
				MIMO B	3.88	0	126400
		78	2480	SISO A	0.82	0	126400
				SISO B	9.47	0	126400
				MIMO A	0.66	0	126400
				MIMO B	0.68	0	126400
Bluetooth Low Energy FHSS	LE1M	1	2404	SISO A	6.36	0	126400
				SISO B	8.26	0	126400
				MIMO A	4.15	0	126400
				MIMO B	7.13	0	126400
		38	2478	SISO A	6.36	0	126400
				SISO B	8.61	0	126400
				MIMO A	3.74	0	126400
				MIMO B	7.00	0	126400

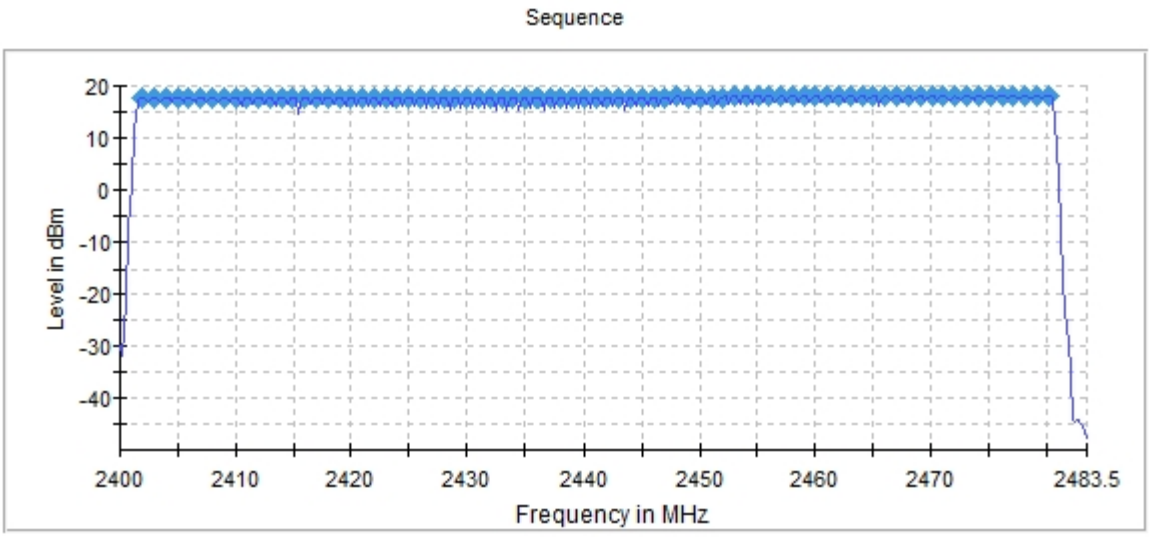
Hopping sequence

Mode	Rate	Chain	Hopping Frequencies
Bluetooth Basic Rate	DH5	SISO A	79
		SISO B	79
		MIMO A	79
		MIMO B	79
Bluetooth Enhanced Data Rate	2-DH5	SISO A	79
		SISO B	79
		MIMO A	79
		MIMO B	79
	3-DH5	SISO A	79
		SISO B	79
		MIMO A	79
		MIMO B	79
Bluetooth Low Energy FHSS	LE1M	SISO A	37
		SISO B	37
		MIMO A	37
		MIMO B	37

Hopping Sequence Results

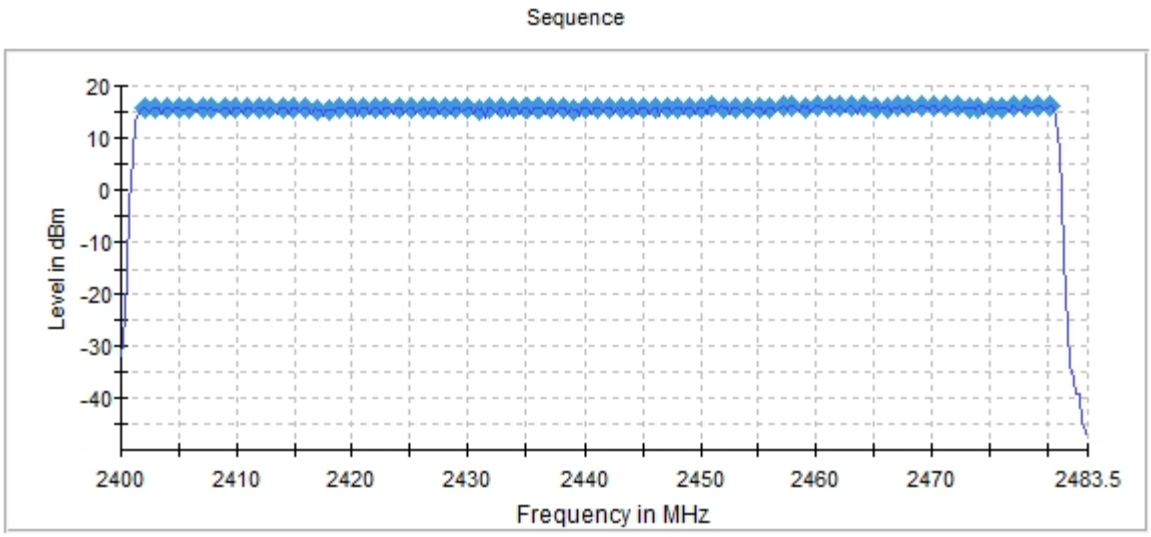
BR - GFSK – SISO A

DH5



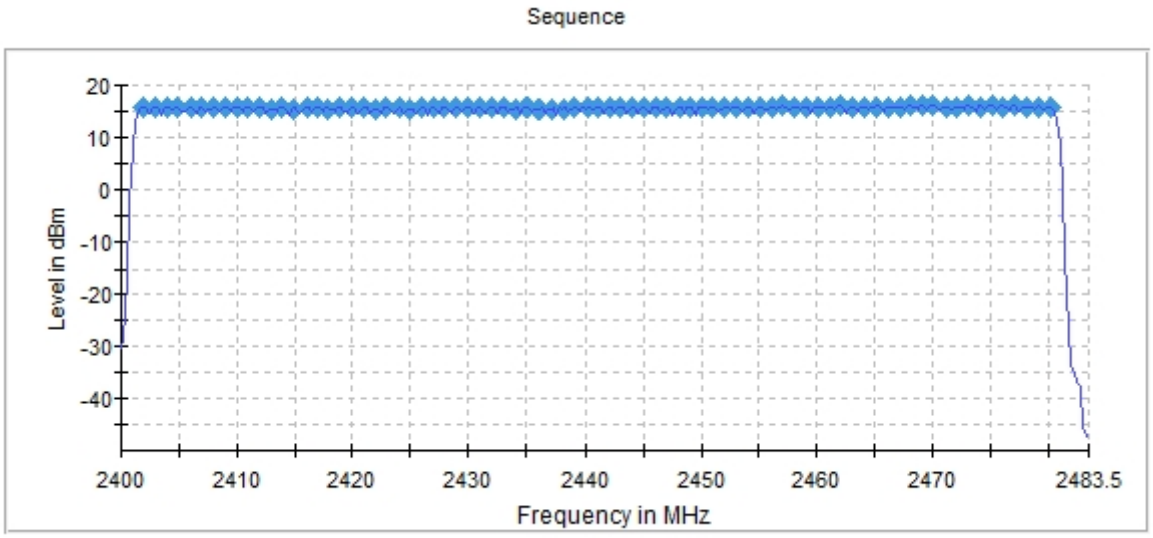
EDR - π/4 DQPSK – SISO A

2DH5



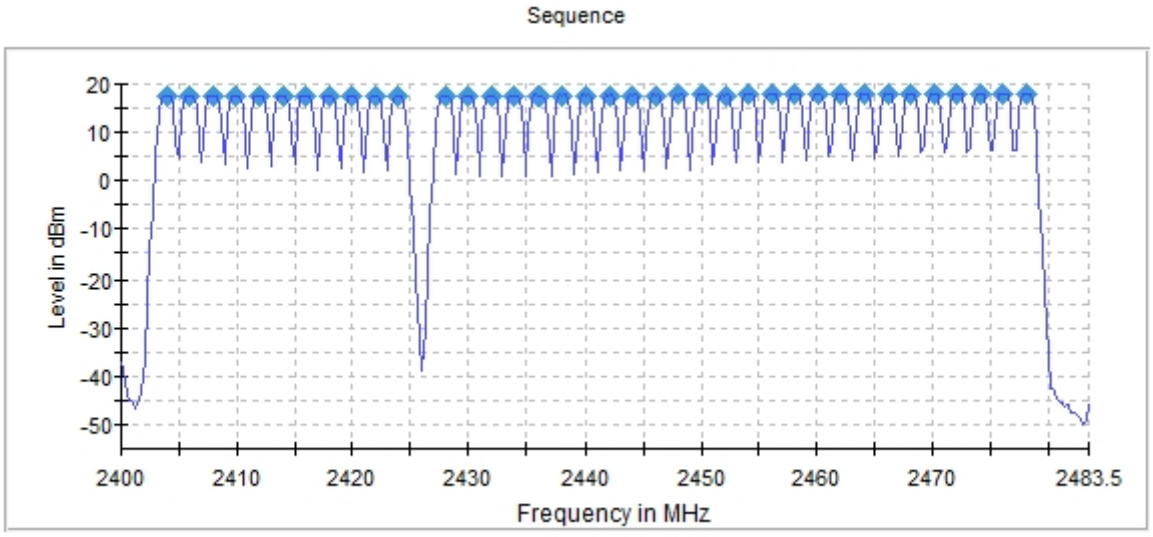
EDR - 8PSK – SISO A

3DH5



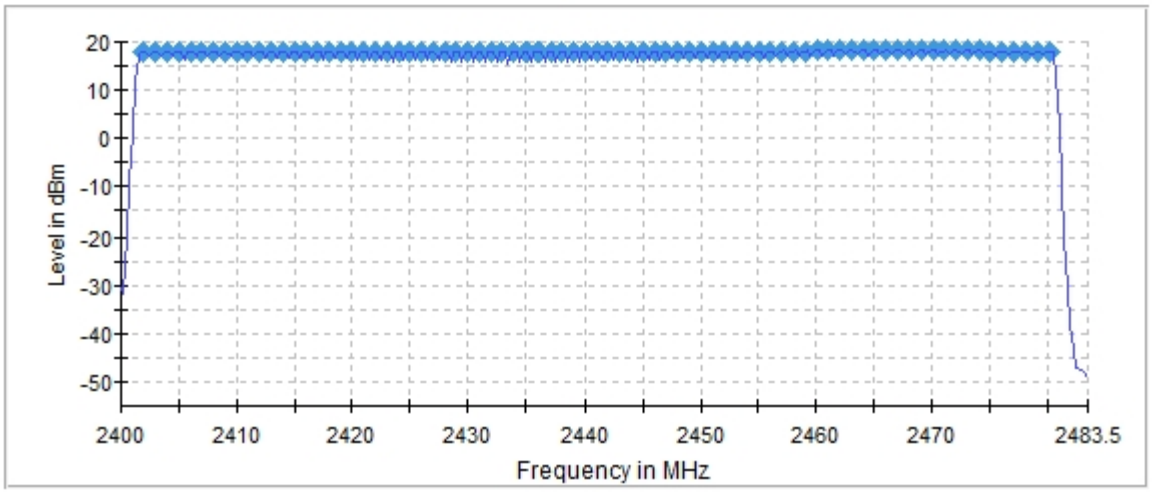
LE – 1M – SISO A

1M



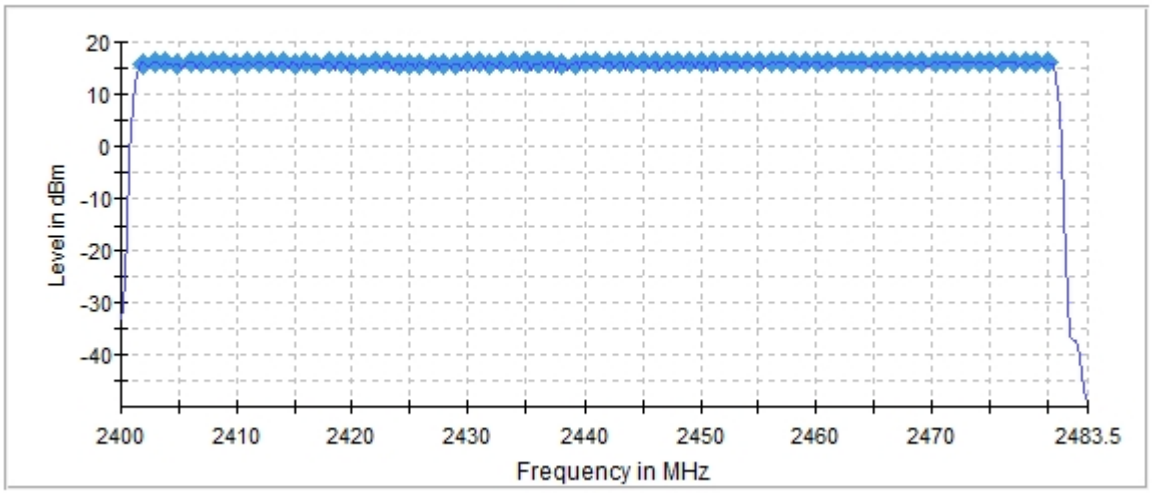
BR - GFSK – SISO B

DH5

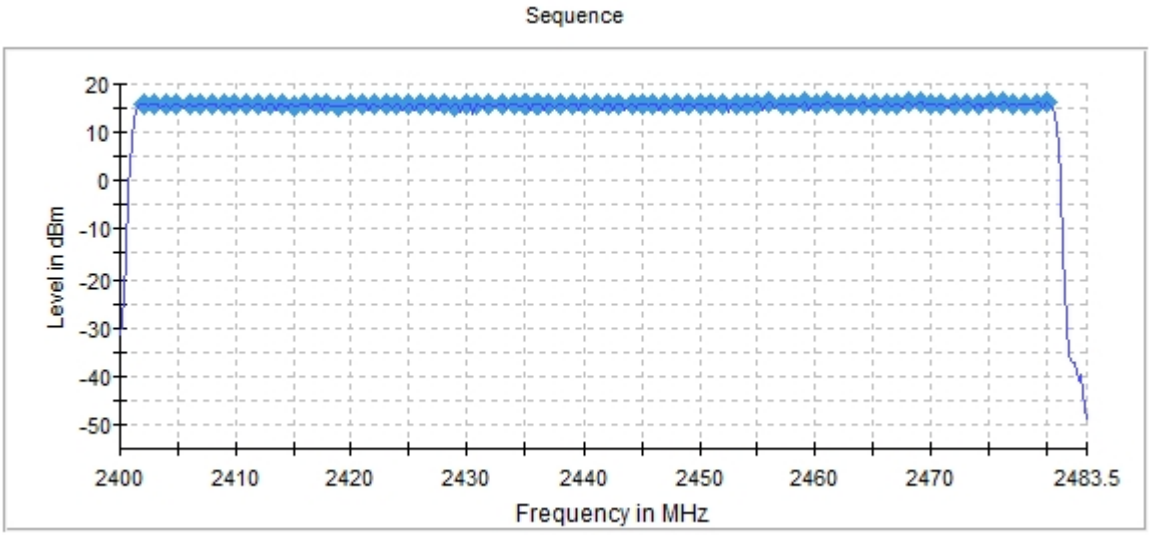


EDR - π/4 DQPSK – SISO B

2DH5

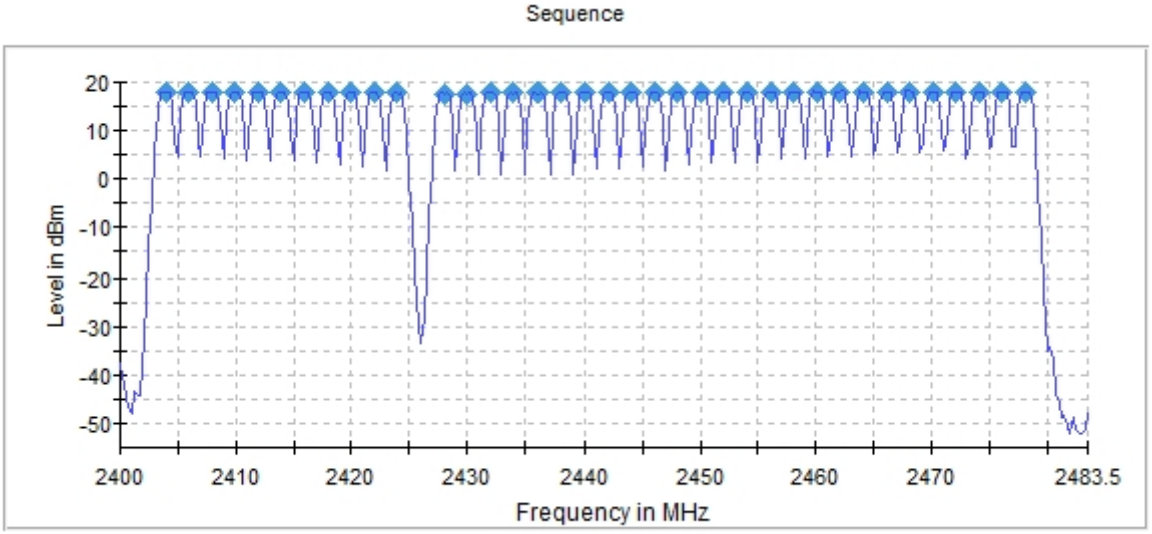


EDR - 8PSK – SISO B



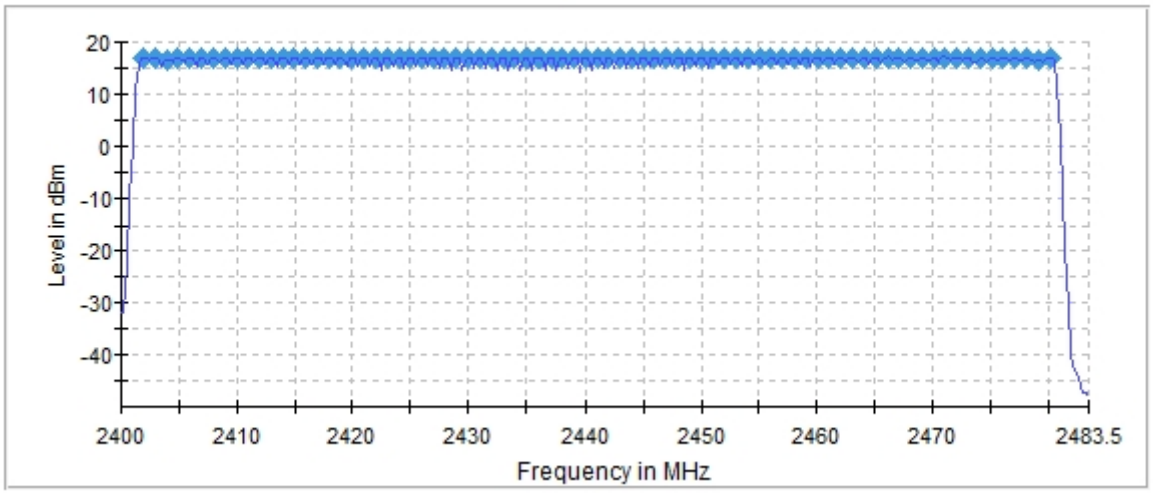
3DH5

LE – 1M – SISO B

1M


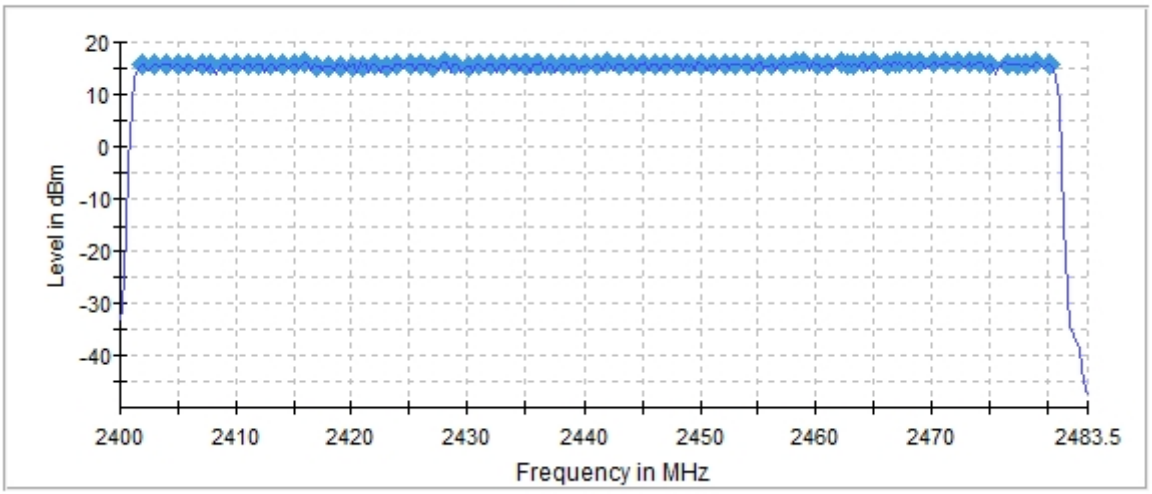
BR - GFSK – MIMO A

DH5



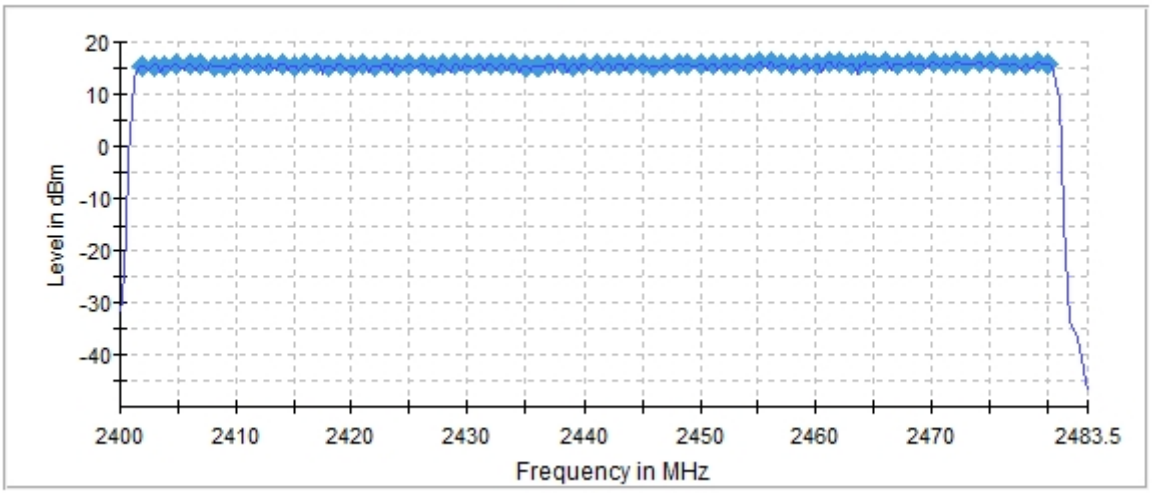
EDR - π/4 DQPSK – MIMO A

2DH5



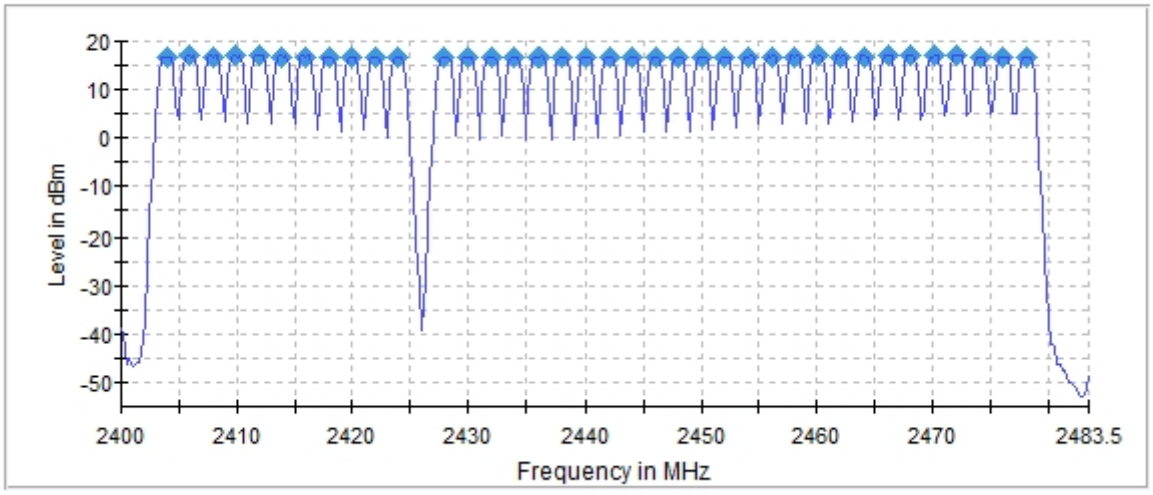
EDR - 8PSK – MIMO A

3DH5



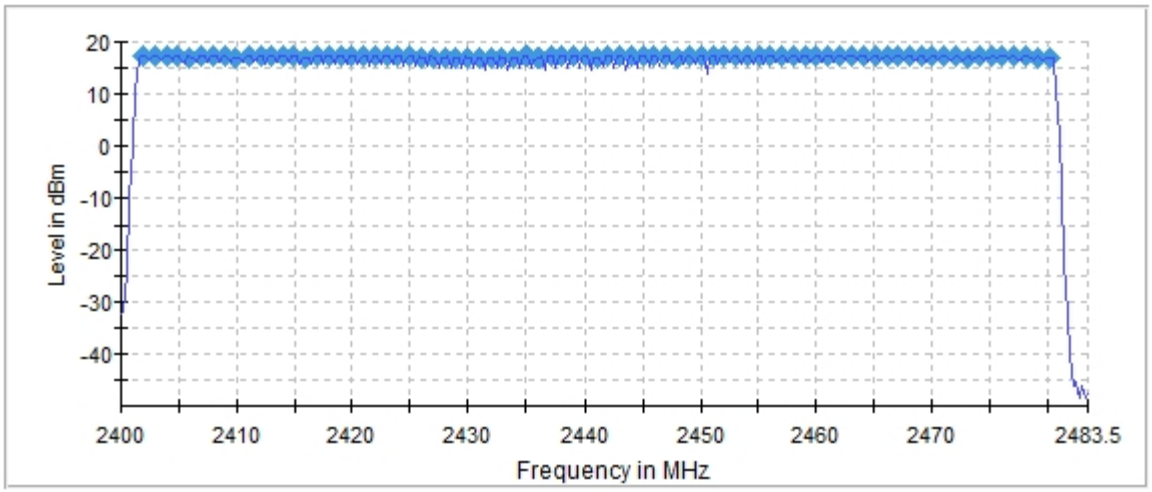
LE – 1M – MIMO A

1M



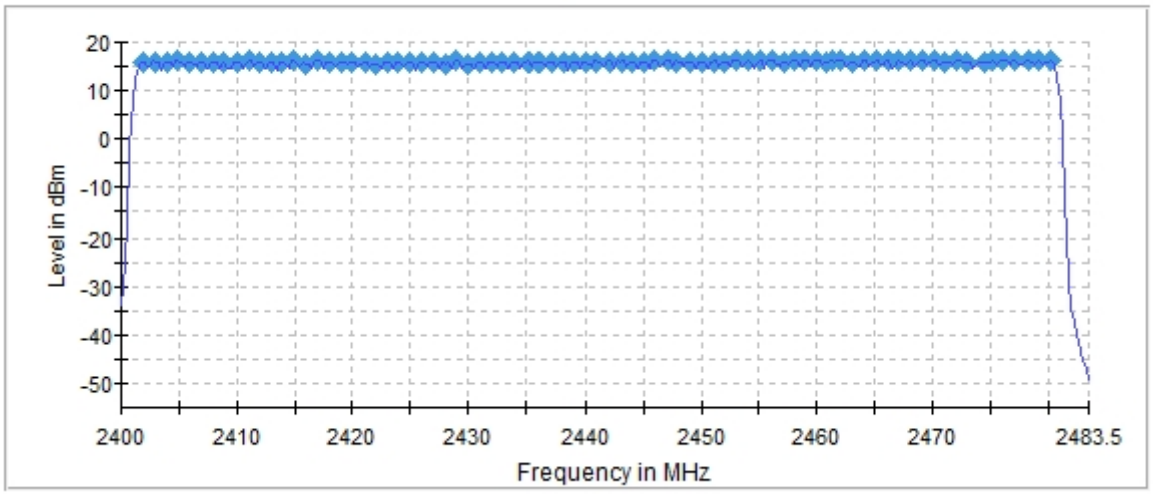
BR - GFSK – MIMO B

DH5



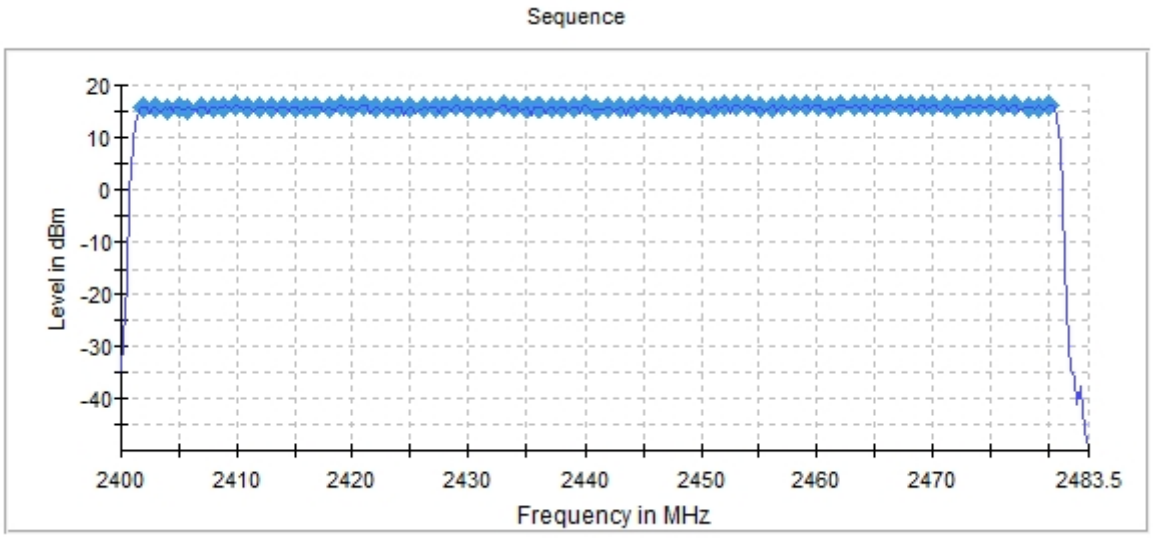
EDR - π/4 DQPSK – MIMO B

2DH5



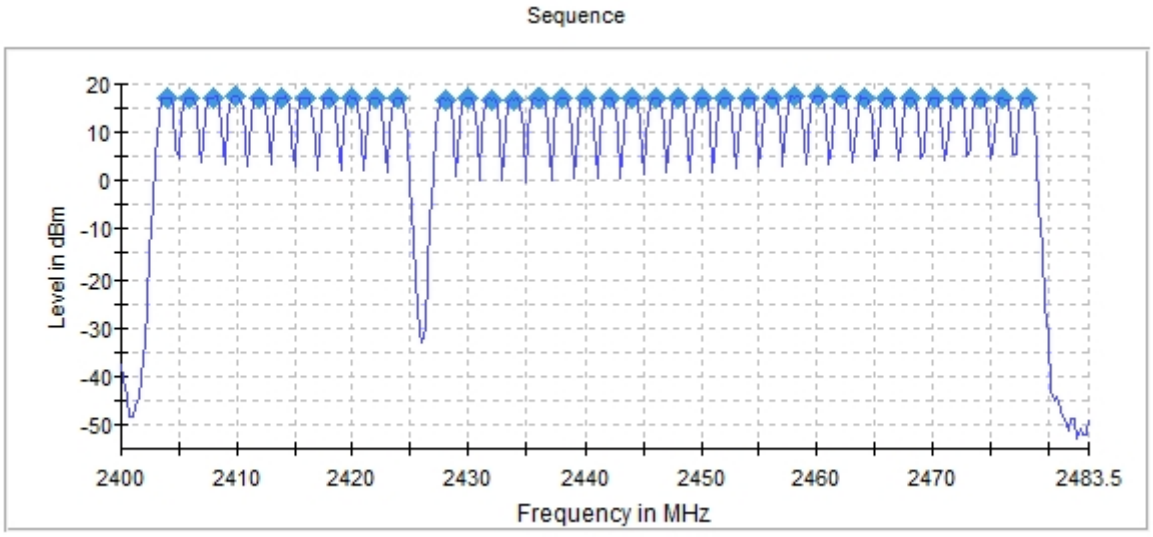
EDR - 8PSK – MIMO B

3DH5



LE – 1M – MIMO B

1M



B.4 Hopping frequency separation

Tests limits

ETSI clause	Limits
4.3.1.5.3.2	For adaptive FHSS equipment, the minimum Hopping Frequency Separation shall be 100 kHz

Test conditions

ETSI clause	Conditions
5.4.5.1	These measurements shall only be performed at normal test conditions. The measurement shall be performed on two adjacent hopping frequencies.

Test procedure

The conducted setup shown in section *Test & System Description* was used to measure the hopping frequency separation accordingly with ETSI EN 300 328 V2.2.2 §5.4.5.2.1. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on the measured parameters.

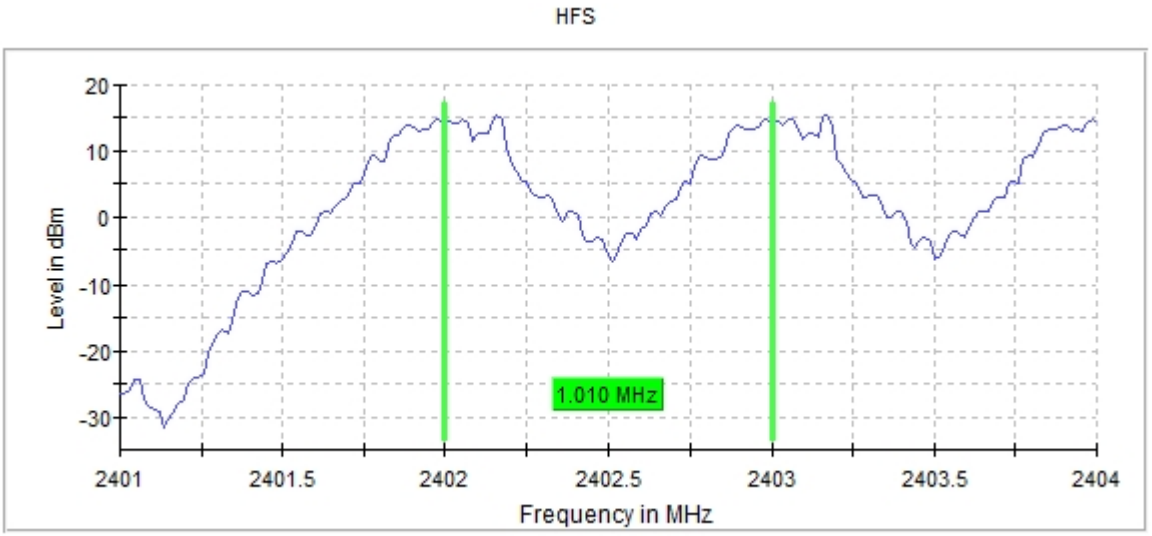
Results tables

Mode	Rate	Chain	Hopping Frequency Separation [MHz]
Bluetooth Basic Rate	DH5	SISO A	1.01
		SISO B	1.02
		MIMO A	1.02
		MIMO B	1.02
Bluetooth Enhanced Data Rate	2-DH5	SISO A	0.84
		SISO B	1.14
		MIMO A	1.01
		MIMO B	1.01
	3-DH5	SISO A	0.97
		SISO B	1.02
		MIMO A	0.99
		MIMO B	1.02
Bluetooth Low Energy FHSS	LE1M	SISO A	2.01
		SISO B	2.04
		MIMO A	2.04
		MIMO B	2.04

Results screenshot

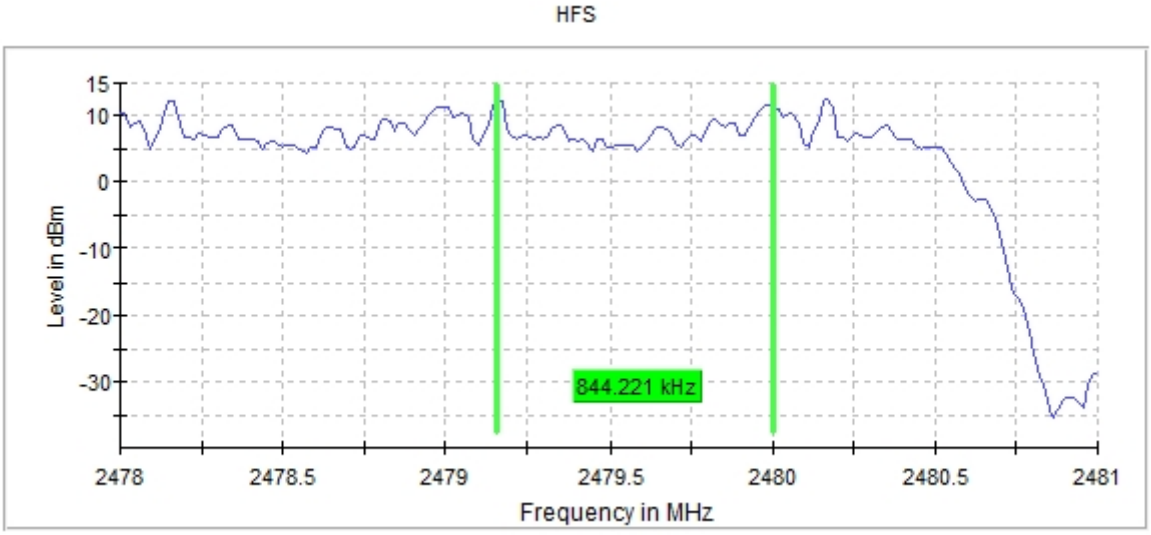
BR - GFSK – SISO A

DH5



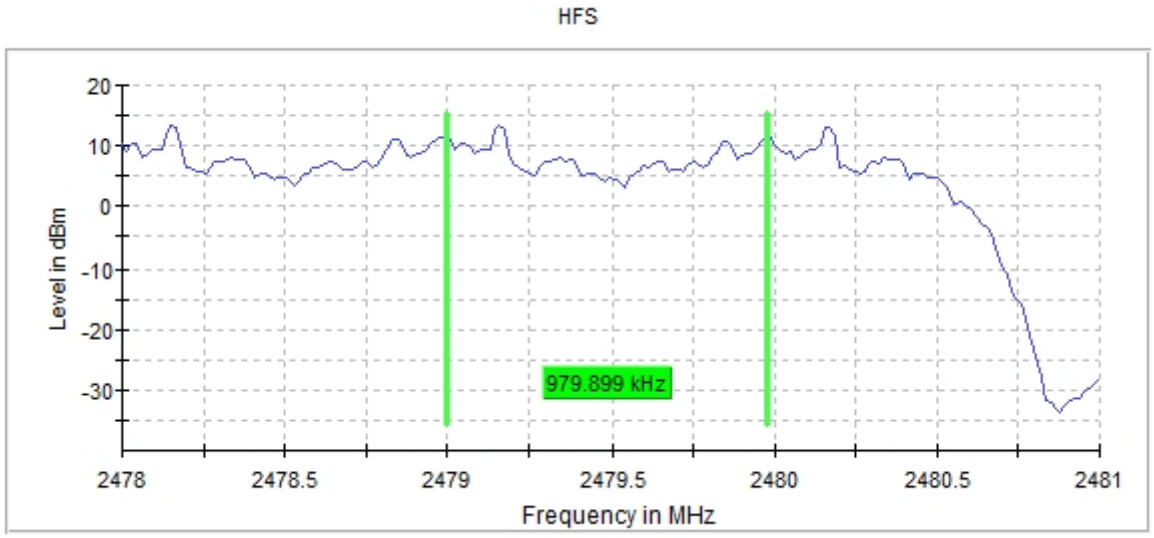
EDR - π/4 DQPSK – SISO A

2DH5



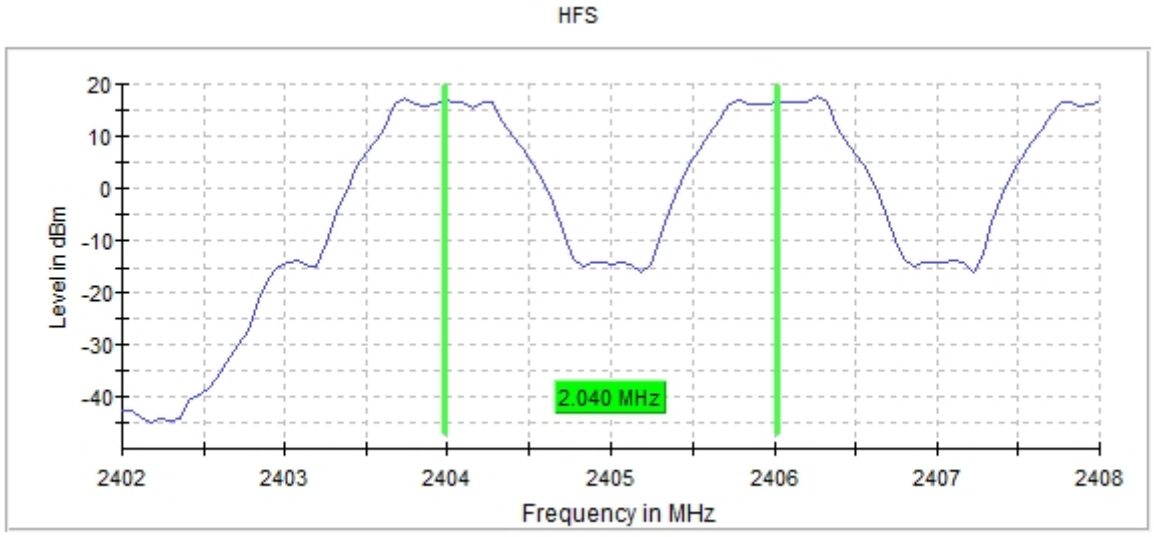
EDR - 8PSK – SISO A

3DH5



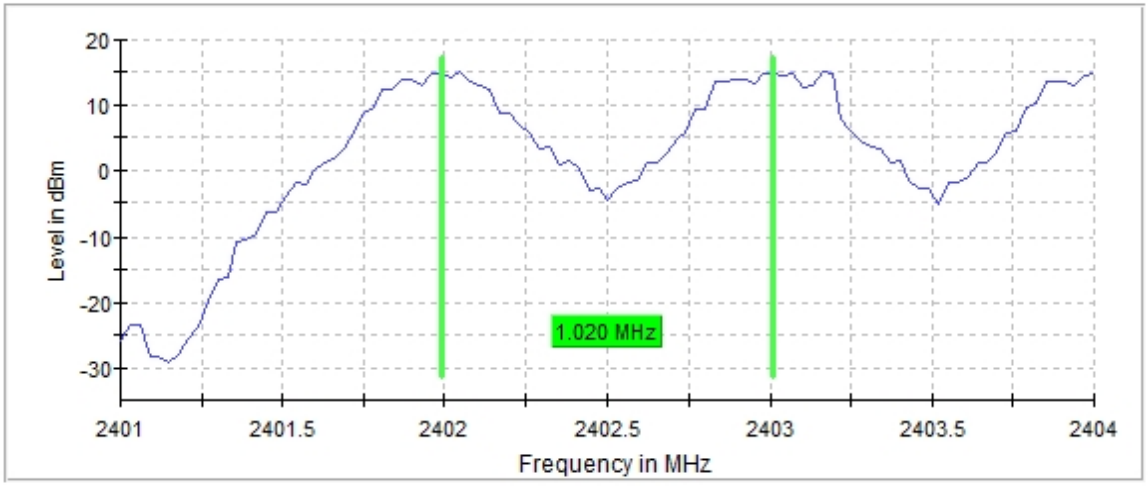
LE – 1M – SISO A

1M



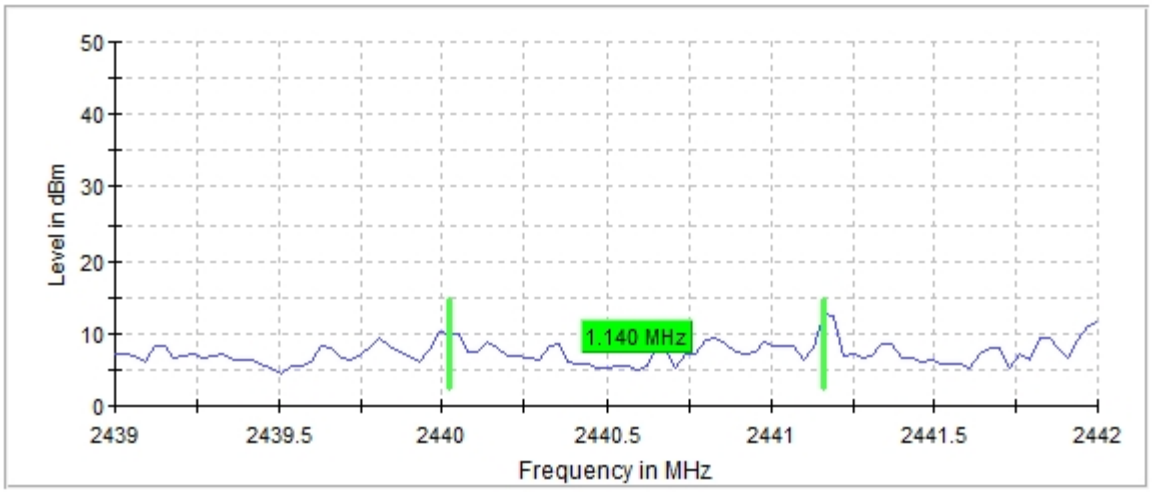
BR - GFSK – SISO B

DH5



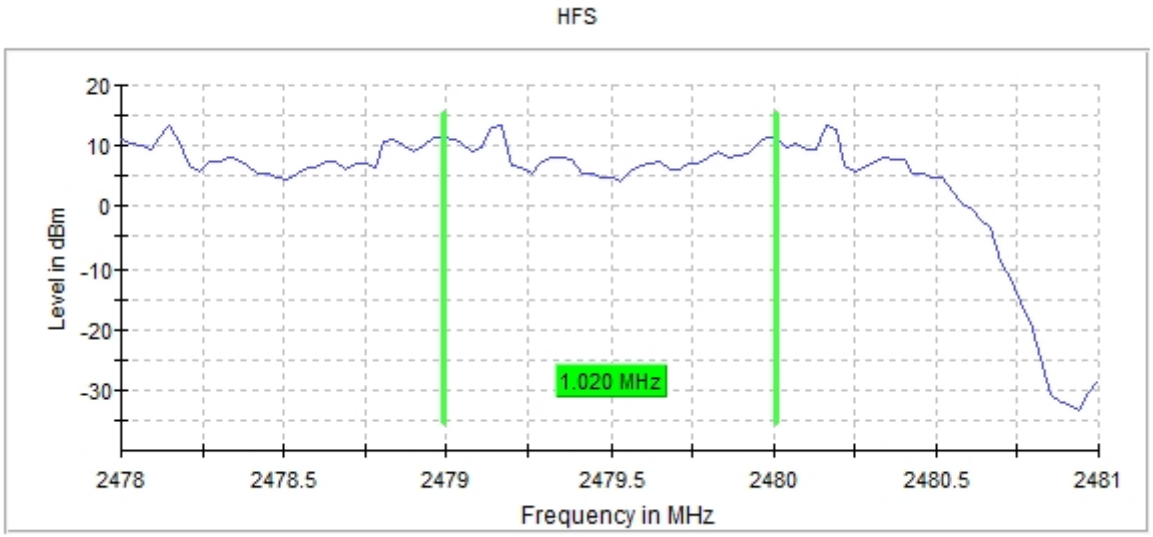
EDR - π/4 DQPSK – SISO B

2DH5



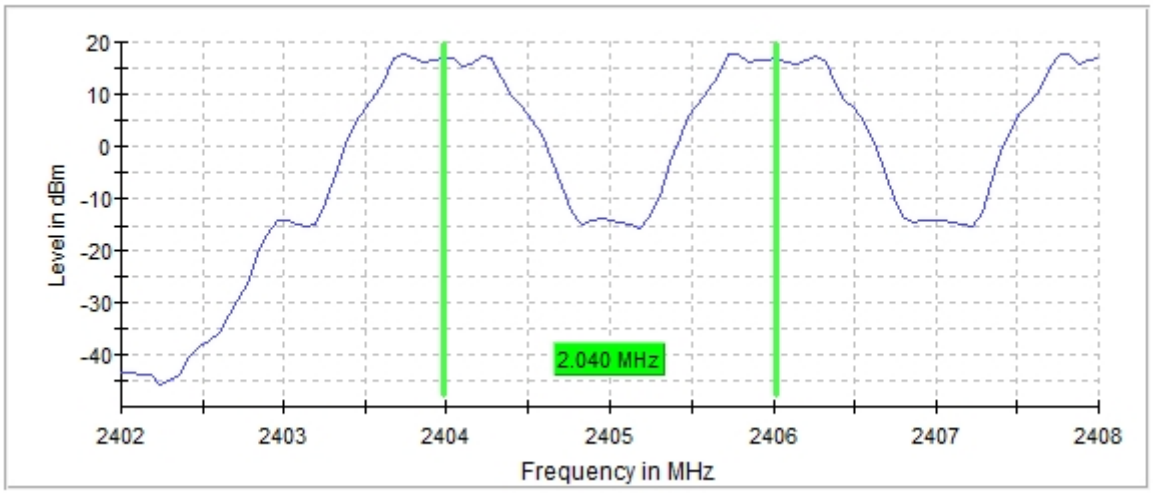
EDR - 8PSK – SISO B

3DH5



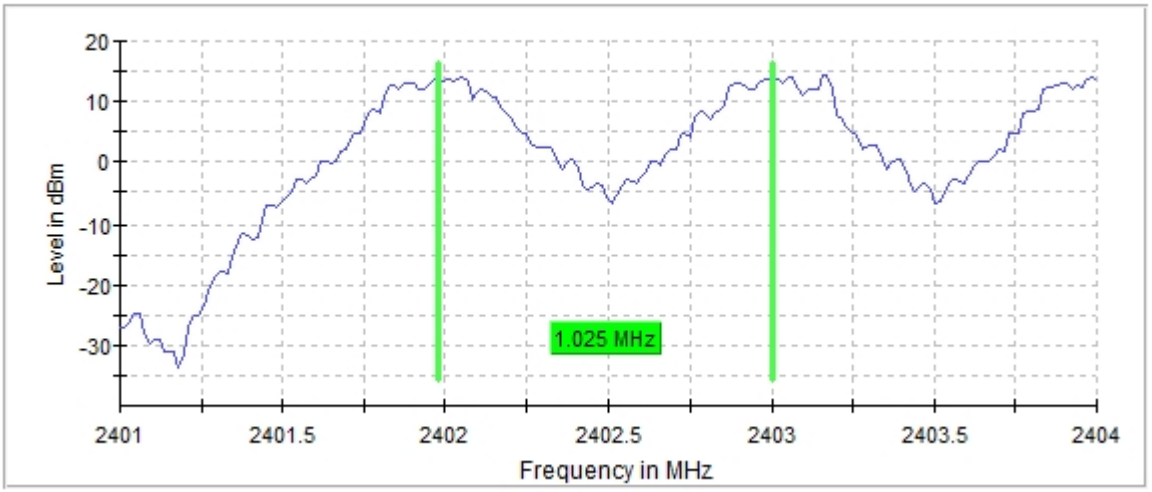
LE – 1M – SISO B

1M



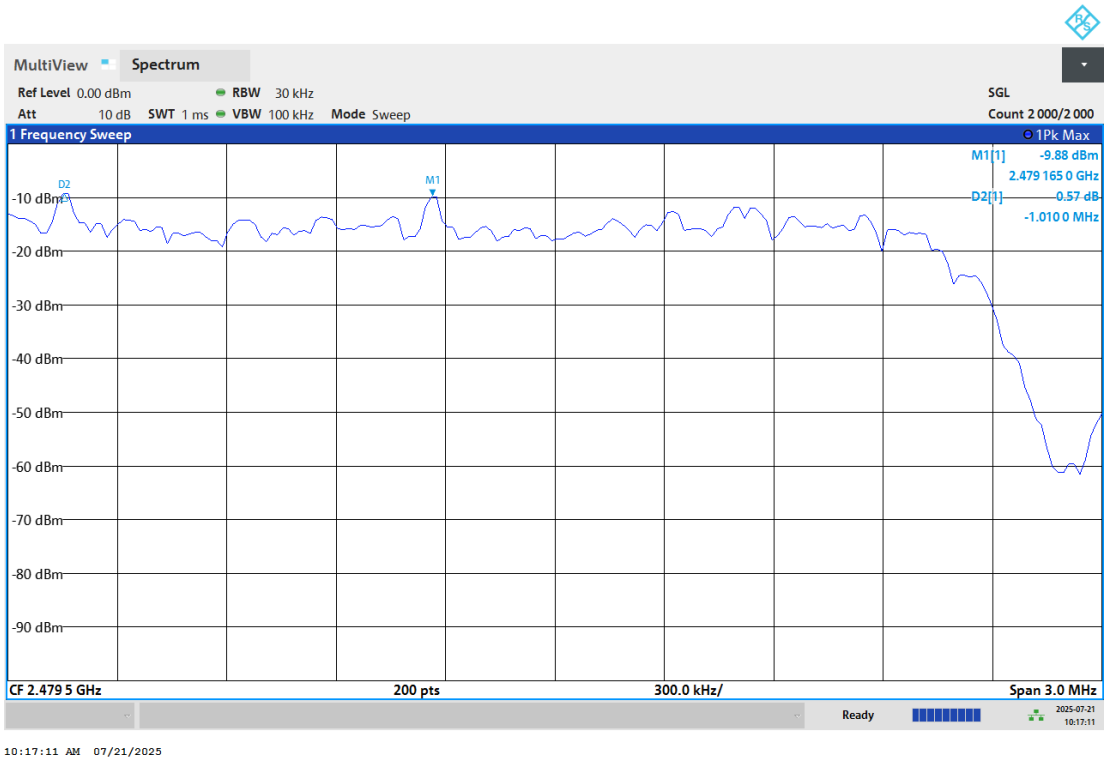
BR - GFSK – MIMO A

DH5



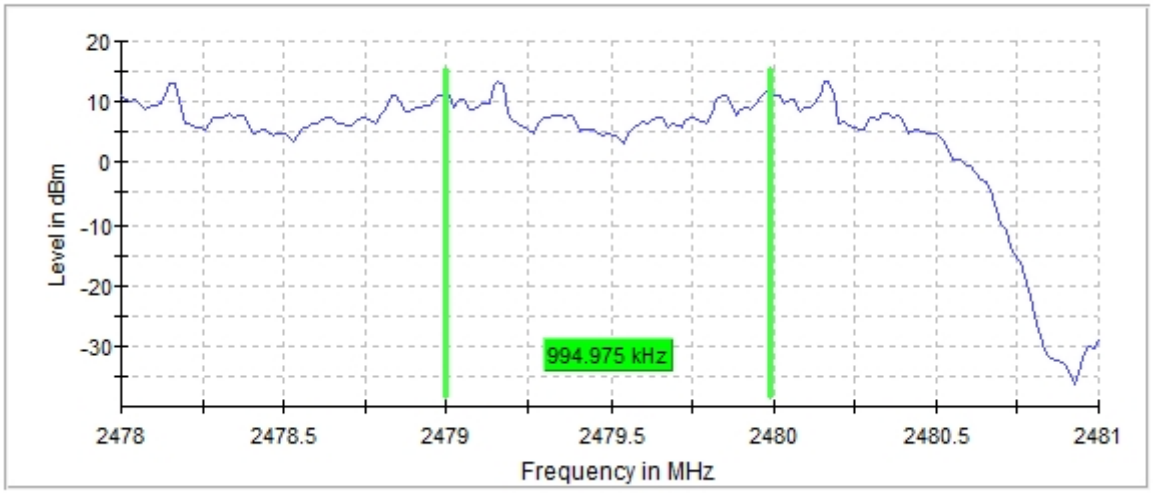
EDR - π/4 DQPSK – MIMO A

2DH5



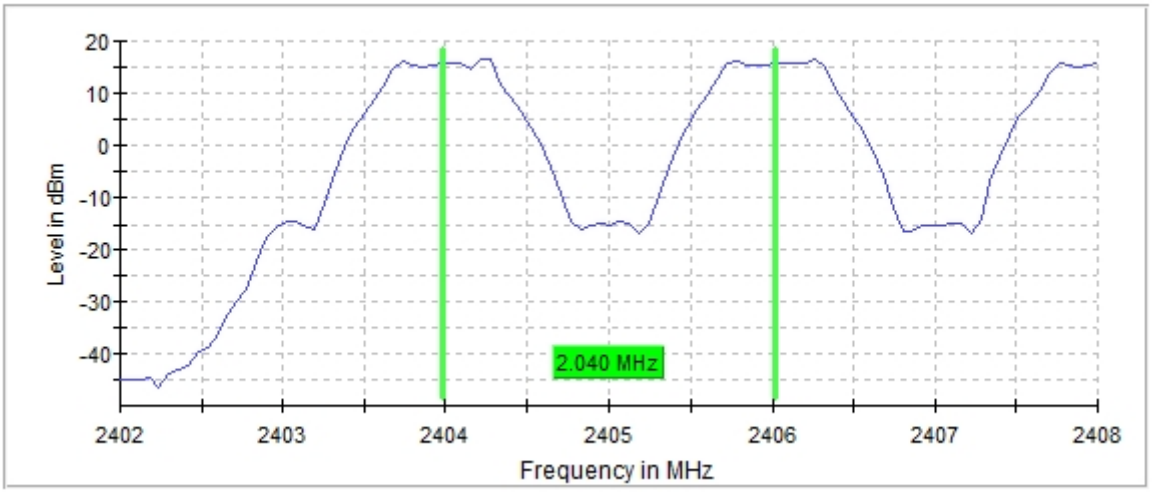
EDR - 8PSK – MIMO A

3DH5



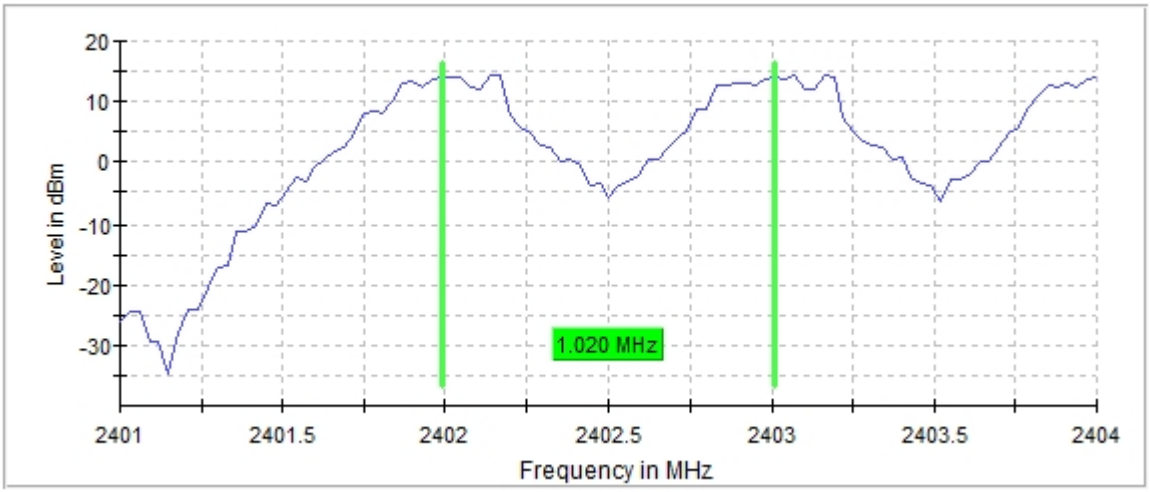
LE – 1M – MIMO A

1M



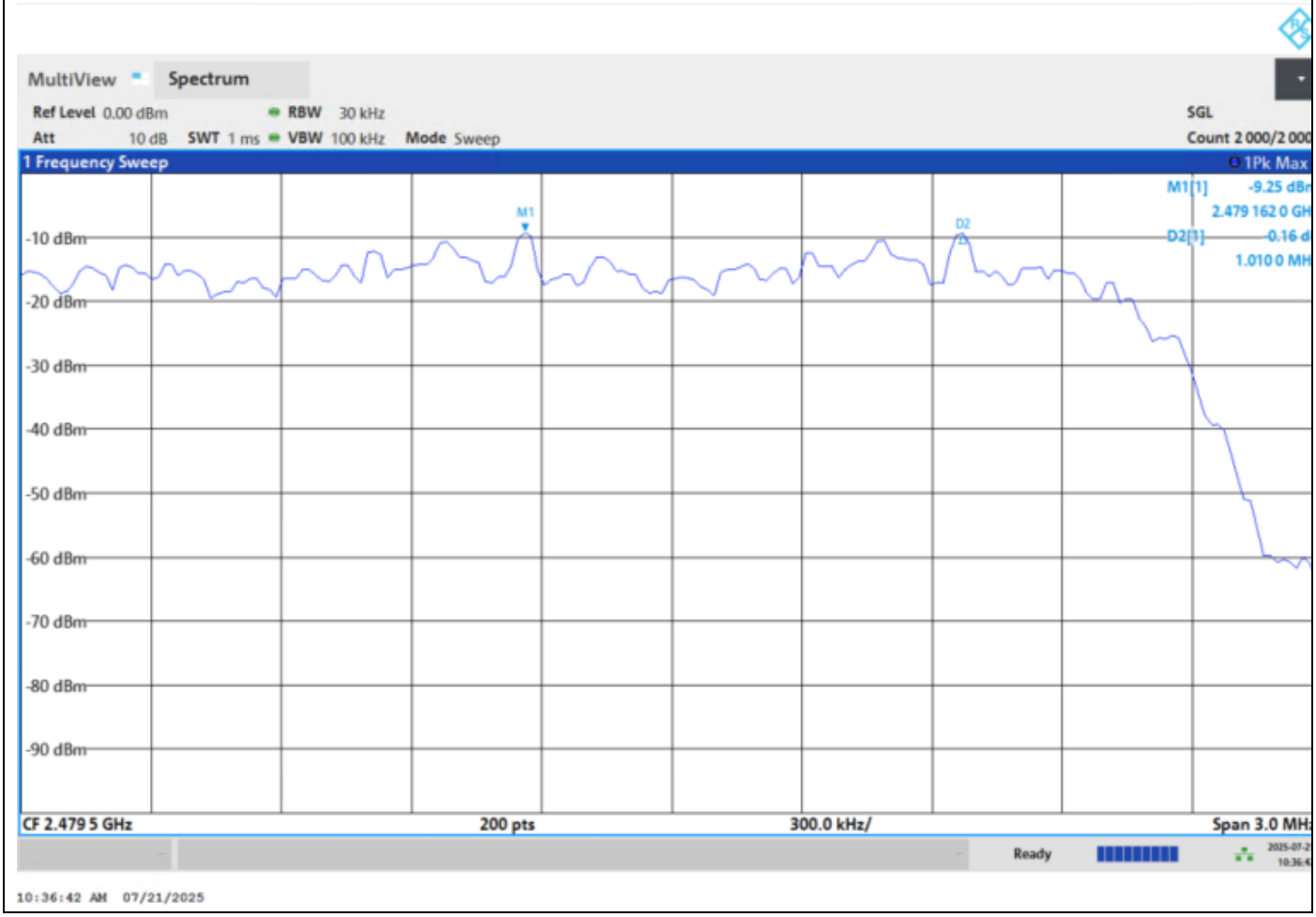
BR - GFSK – MIMO B

DH5



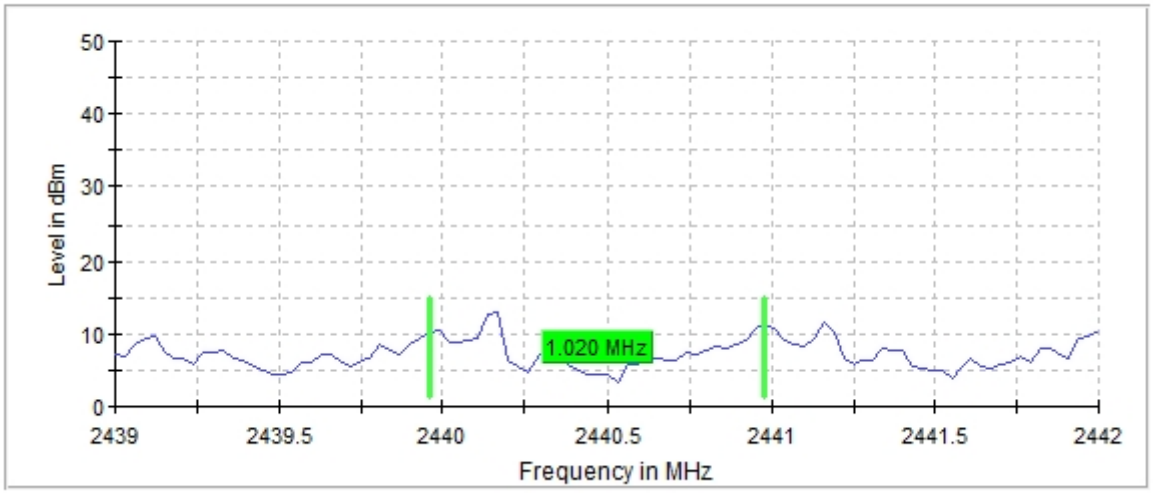
EDR - π/4 DQPSK – MIMO B

2DH5



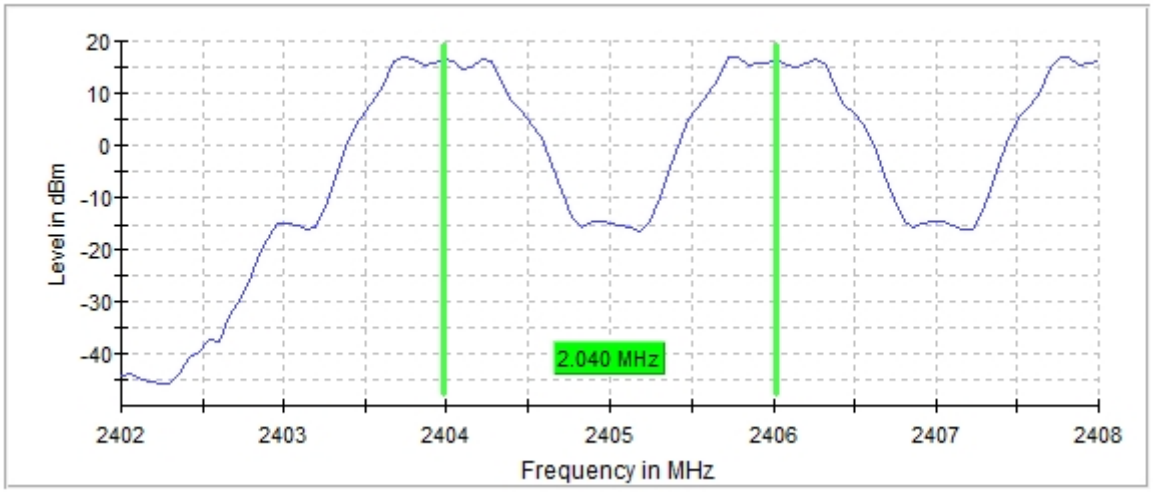
EDR - 8PSK – MIMO B

3DH5



LE – 1M – MIMO B

1M



B.5 Adaptivity (Adaptive Frequency Hopping)

Test limits

ETSI clause	Limits
4.3.1.7.2.2	*Adaptive FHSS using LBT.* Adaptive FHSS equipment using LBT shall comply with the following minimum set of requirements: 1) At the start of every dwell time, before transmission on a hopping frequency, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The CCA observation time shall be not less than 0,2 % of the Channel Occupancy Time with a minimum of 18 µs. If the equipment finds the hopping frequency to be clear, it may transmit immediately. 2) If it is determined that a signal is present with a level above the detection threshold defined in step 5 the hopping frequency shall be marked as 'unavailable'. Then the equipment may jump to the next frequency in the hopping scheme even before the end of the dwell time, but in that case the 'unavailable' channel cannot be considered as being 'occupied' and shall be disregarded with respect to the requirement of the minimum number of hopping frequencies as defined in clause 4.3.1.4.3.2. Alternatively, the equipment can remain on the frequency during the remainder of the dwell time. However, if the equipment remains on the frequency with the intention to transmit, it shall perform an Extended CCA check in which the (unavailable) channel is observed for a random duration between the value defined for the CCA observation time in step 1 and 5 % of the Channel Occupancy Time defined in step 3. If the Extended CCA check has determined the frequency to be no longer occupied, the hopping frequency becomes available again. If the Extended CCA time has determined the channel still to be occupied, it shall perform new Extended CCA checks until the channel is no longer occupied. 3) The total time during which an equipment has transmissions on a given hopping frequency without reevaluating the availability of that frequency is defined as the Channel Occupancy Time. The Channel Occupancy Time for a given hopping frequency, which starts immediately after a successful CCA, shall be less than 60 ms followed by an Idle Period of minimum 5 % of the Channel Occupancy Time with a minimum of 100 µs. After the Idle Period has expired, the procedure as in step 1 shall be repeated before having new transmissions on this hopping frequency during the same dwell time. For LBT based adaptive FHSS equipment with a dwell time < 60 ms, the maximum Channel Occupancy Time is limited by the dwell time. 4) 'Unavailable' channels may be removed from or may remain in the Hopping Sequence, but in any case: - apart from Short Control Signalling Transmissions referred to in clause 4.3.1.7.4, there shall be no transmissions on 'unavailable' channels; - a minimum of N hopping frequencies as defined in clause 4.3.1.4.3.2 shall always be maintained. 5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to: TL = -70 dBm/MHz + 10 × log10 (100 mW / Pout) (Pout in mW e.i.r.p.) 6) The equipment shall comply with the requirements defined in step 1 to step 4 of the present clause in the presence of an unwanted CW signal as defined in table 2.

5.4.6.2.1.2	**Table 2: Unwanted Signal parameters** Wanted signal mean power from companion device (dBm) / Unwanted signal frequency (MHz) / Unwanted CW signal power (dBm) sufficient to maintain the link (see note 2) / 2395 or 2488.5 (see note 1) / -35 (see note 3) NOTE 1 : The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1. NOTE 2: A typical conducted value which can be used in most cases is -50 dBm/MHz. NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain. Step4, Note 2: The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time.

Test conditions

ETSI clause	Conditions
5.4.6.1	These measurements shall only be performed at normal test conditions.

Test procedure

The adaptivity setup shown in section *Test & System Description* was used to measure adaptivity. The EUT (client) is connected to a companion device through a power splitter and an attenuator. Proprietary software was used on the EUT to configure a normal transmission with sufficient payload.

Interference and unwanted signals are emulated by using a modulated signal and a continuous wave (CW) respectively, generated by the vector signal generator (VSG) and the continuous wave generator.

The power levels for the signals are as follows:
EUT = max power level
Interference signal (modulated signal), considering antenna gain = -67dBm/MHz at antenna connector
Unwanted signal (CW) = -32dBm

The frequency used for the interference signal is the same as the transmission frequency of the tested channel. The unwanted signal is fixed at 2488.5 MHz for the lowest channel tested and to 2395 MHz for the highest channel tested.

Results tables

2423 MHz

Normal Operation

DutyCycle DUT (%)	Monitoring Length (ms)	COT Max (ms)	Limit Max (ms)	COT Min (ms)	Number of COTs	Idle Time Min (ms)	Idle Time Max (ms)	Idle Time Limit Min (ms)
5.84	10000.00	7.266	15.000	0.122	311	0.722	108.367	0.500

Reaction on Interferer and Blocker

DC in max DC Evaluation Window (%)	Limit Max (%)	Result	Length of max DC Evaluation Window (ms)	Start of max DC Evaluation Window (ms)
4.047	10.000	**PASS**	15.000	2832.136

Stop of max DC Evaluation Window (ms)	Interferer On (ms)	Blocker On (ms)	Monitoring Offset (ms)	Monitoring Start (ms)	Monitoring Length (ms)
2847.136	1000.00	62000.00	15.000	1015.000	121985.000

2474 MHz

Normal Operation

DutyCycle DUT (%)	Monitoring Length (ms)	COT Max (ms)	Limit Max (ms)	COT Min (ms)	Number of COTs	Idle Time Min (ms)	Idle Time Max (ms)	Idle Time Limit Min (ms)
5.517	10000.000	7.266	15.000	0.116	289	1.046	173.981	0.500

Reaction on Interferer and Blocker

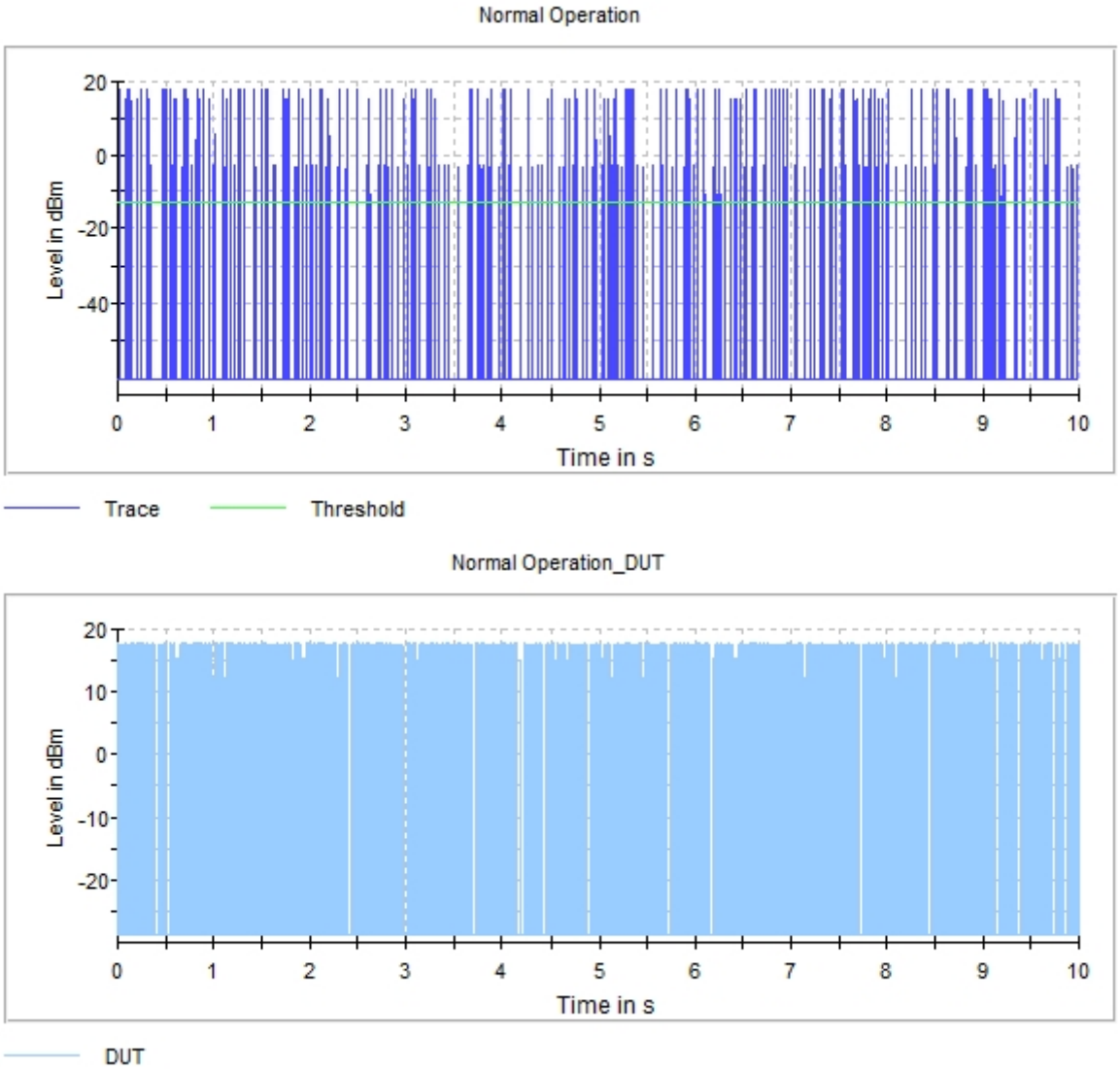
DC in max DC Evaluation Window (%)	Limit Max (%)	Result	Length of max DC Evaluation Window (ms)	Start of max DC Evaluation Window (ms)
6.780	10.000	**PASS**	15.000	1238.455

Stop of max DC Evaluation Window (ms)	Interferer On (ms)	Blocker On (ms)	Monitoring Offset (ms)	Monitoring Start (ms)	Monitoring Length (ms)
1253.455	1000.000	62000.000	15.000	1015.000	121985.000

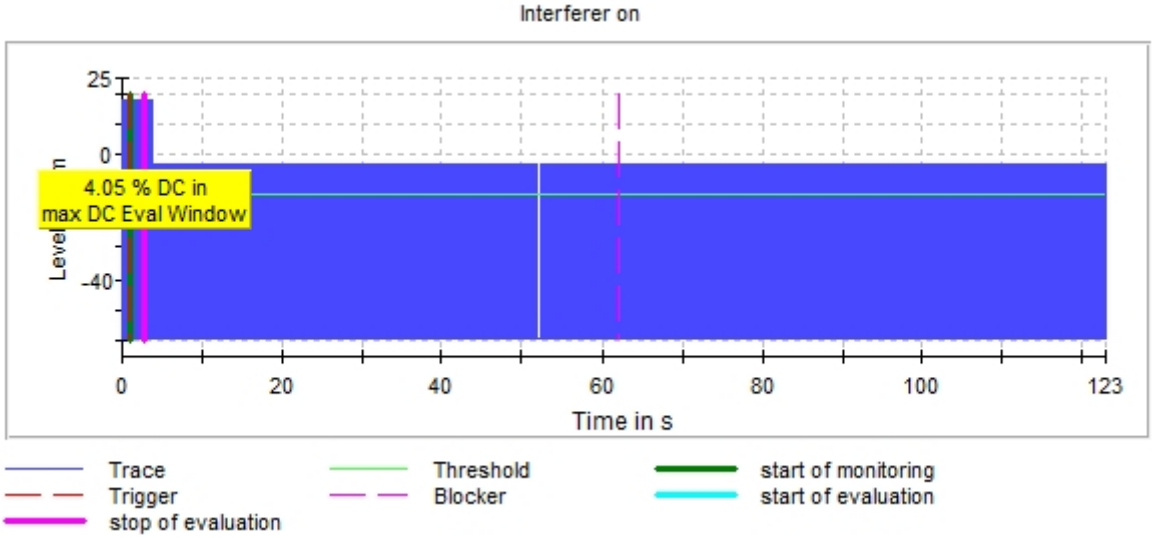
Results Screenshot

2423 MHz

Normal Operation

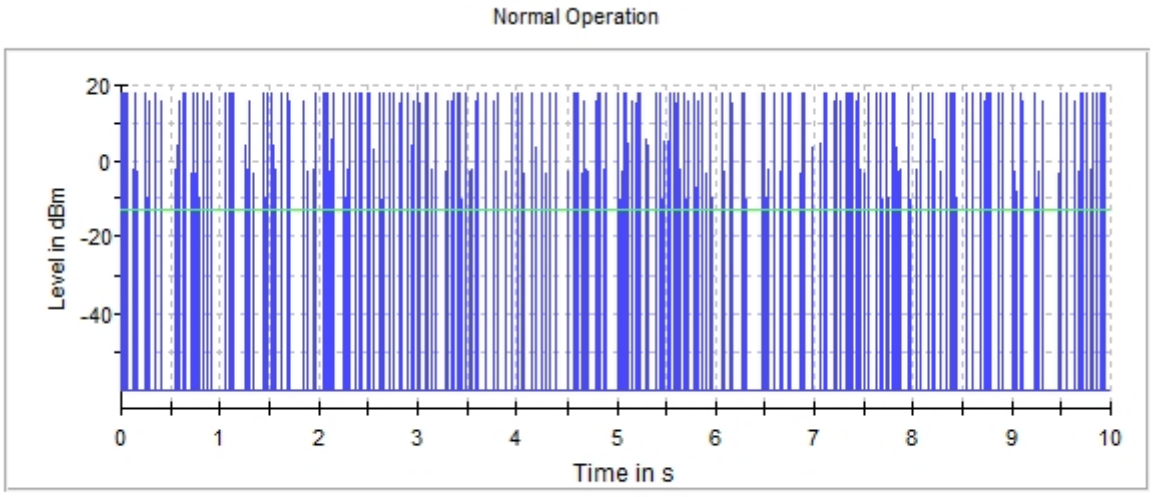


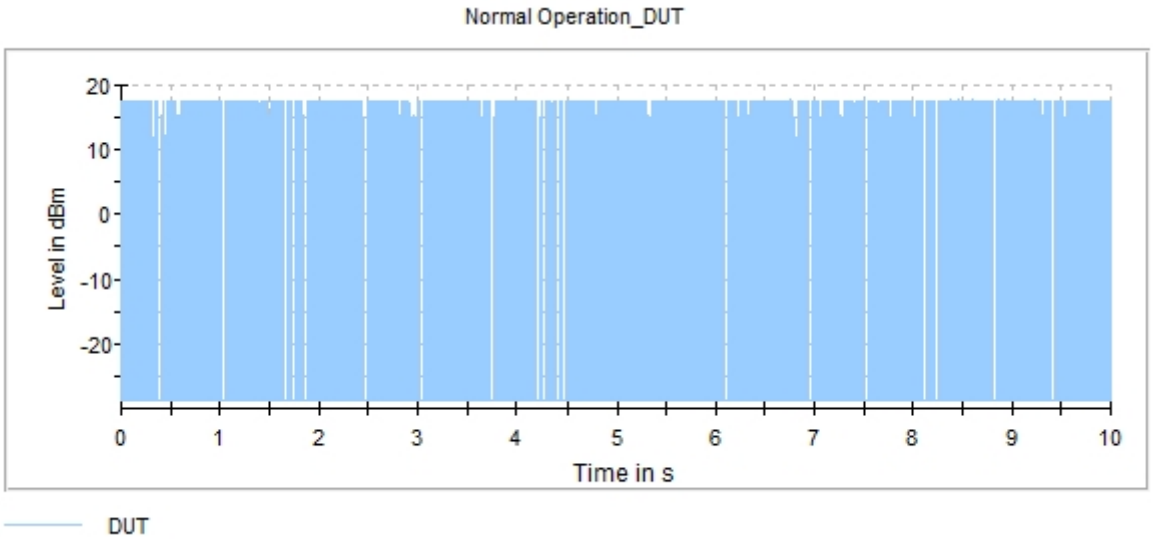
Reaction on Interferer and Blocker



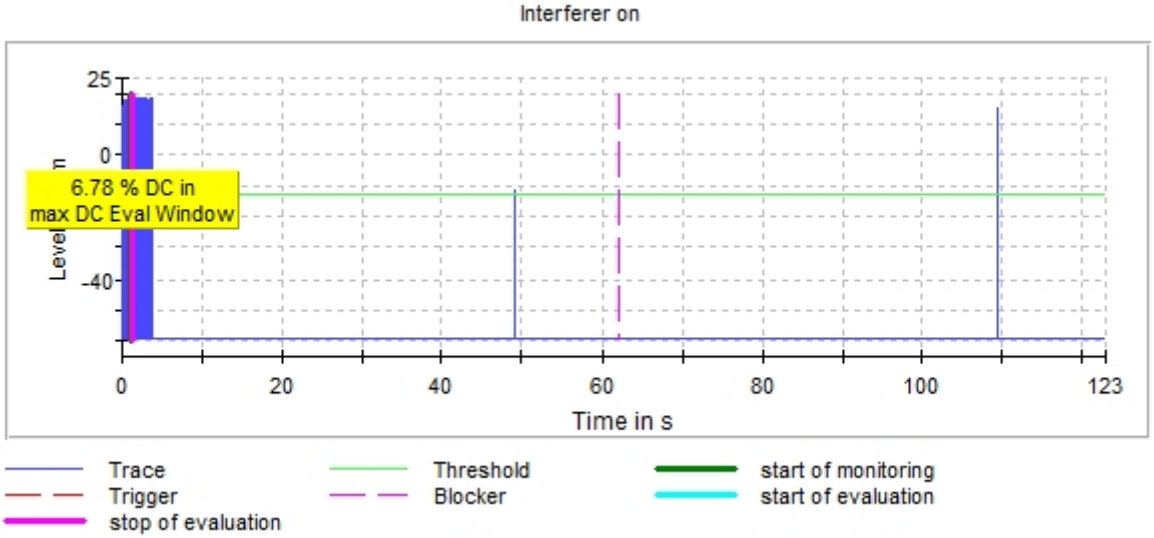
2474 MHz

Normal Operation





Reaction on Interferer and Blocker



B.6 Occupied Channel Bandwidth

Test limits

ETSI clause	Limits
4.3.1.8.3	The Occupied Channel Bandwidth for each hopping frequency shall be within the band given in table 1. *(2.4 GHz to 2.4835 GHz)*

Test conditions

ETSI clause	Conditions
5.4.7.1	These measurements shall only be performed at normal test conditions. The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range.

Test procedure

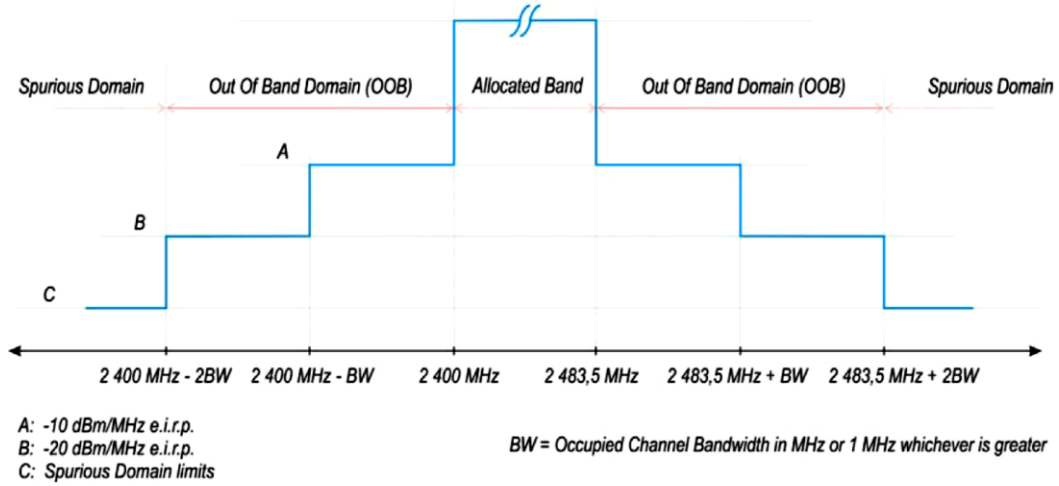
The conducted setup shown in section *Test & System Description* was used to measure the occupied channel bandwidth accordingly with ETSI EN 300 328 V2.2.2 §5.4.7.2.1. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Results tables

Mode	Rate	Channel	Freq [MHz]	Chain	Occupied Bandwidth [MHz]	Low Frequency [MHz]	High Frequency [MHz]
Bluetooth Basic Rate	DH5	0	2402	SISO A	0.79	2401.60	2402.39
				SISO B	0.80	2401.60	2402.40
				MIMO A	0.79	2401.60	2402.39
				MIMO B	0.80	2401.60	2402.40
		78	2480	SISO A	0.79	2479.60	2480.39
				SISO B	0.79	2479.60	2480.39
				MIMO A	0.79	2479.60	2480.39
				MIMO B	0.81	2479.59	2480.40
Bluetooth Enhanced Data Rate	2DH5	0	2402	SISO A	0.99	2401.50	2402.49
				SISO B	0.99	2401.50	2402.49
				MIMO A	0.99	2401.50	2402.49
				MIMO B	0.99	2401.50	2402.49
		78	2480	SISO A	0.99	2479.50	2480.49
				SISO B	0.99	2479.20	2480.49
				MIMO A	0.99	2479.50	2480.49
				MIMO B	0.99	2479.50	2480.49
	3DH5	0	2402	SISO A	0.99	2401.50	2402.50
				SISO B	0.99	2401.50	2402.50
				MIMO A	0.99	2401.50	2402.50
				MIMO B	0.99	2401.51	2402.50
		78	2480	SISO A	1.00	2479.50	2480.50
				SISO B	0.99	2479.50	2480.50
				MIMO A	0.99	2479.50	2480.50
				MIMO B	0.99	2479.50	2480.50
Bluetooth Low Energy FHSS	LE1M	1	2404	SISO A	0.93	2403.53	2404.46
				SISO B	0.93	2403.53	2404.46
				MIMO A	0.93	2403.53	2404.46
				MIMO B	0.92	2403.53	2404.45
		38	2478	SISO A	0.93	2477.53	2478.46
				SISO B	0.93	2477.53	2478.46
				MIMO A	0.93	2477.53	2478.46
				MIMO B	0.92	2477.53	2478.45

B.7 Transmitter unwanted emission in the out-of-band domain

Test limits

ETSI clause	Limits
4.3.1.9.3	The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1 

Test conditions

ETSI clause	Limits
5.4.8.1	These measurements shall only be performed at normal test conditions. For FHSS equipment, the measurements shall be performed during normal operation (hopping).

Test procedure

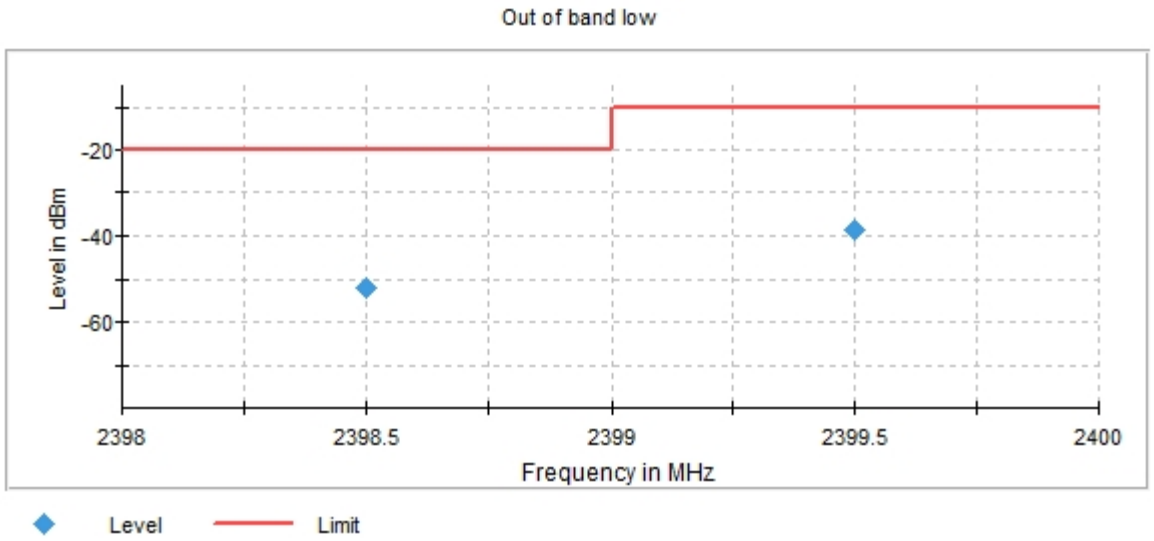
The conducted setup shown in section *Test & System Description* was used to measure the unwanted emissions in the out of band domain (Band Edge) accordingly with ETSI EN 300 328 V2.2.2 §5.4.8.2.1. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

Antenna gain is taken into account and added by the software to the measurements. EMC32 provides the mask and the frequency limits based in the measured channel bandwidth. Maximum values for each limit level (-10dBm and -20dBm) are pointed by markers.

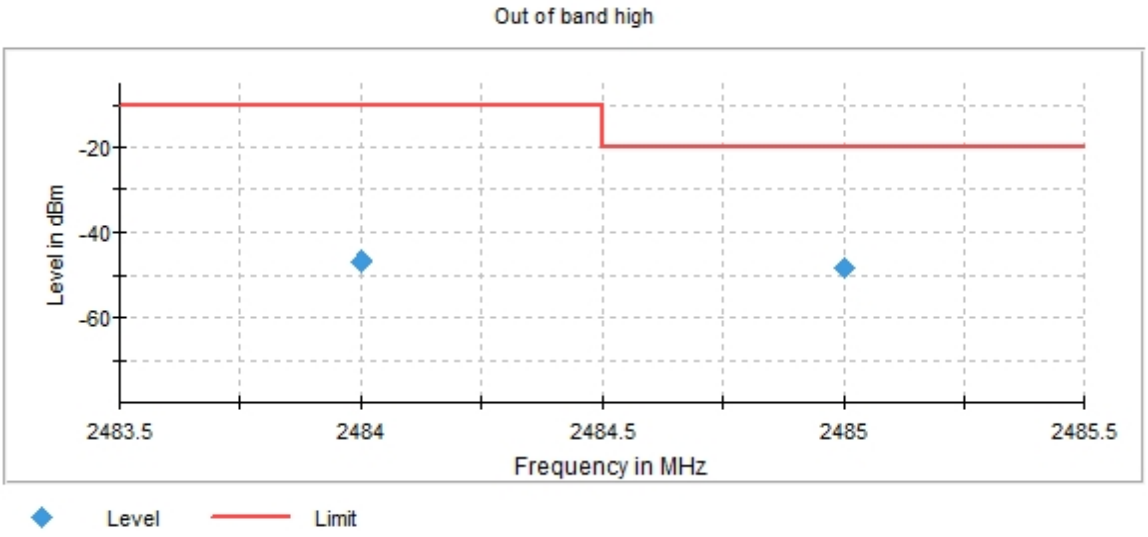
Results screenshot

BR – DH5 – SISO A

UNWANTED OOB Low Freq Section

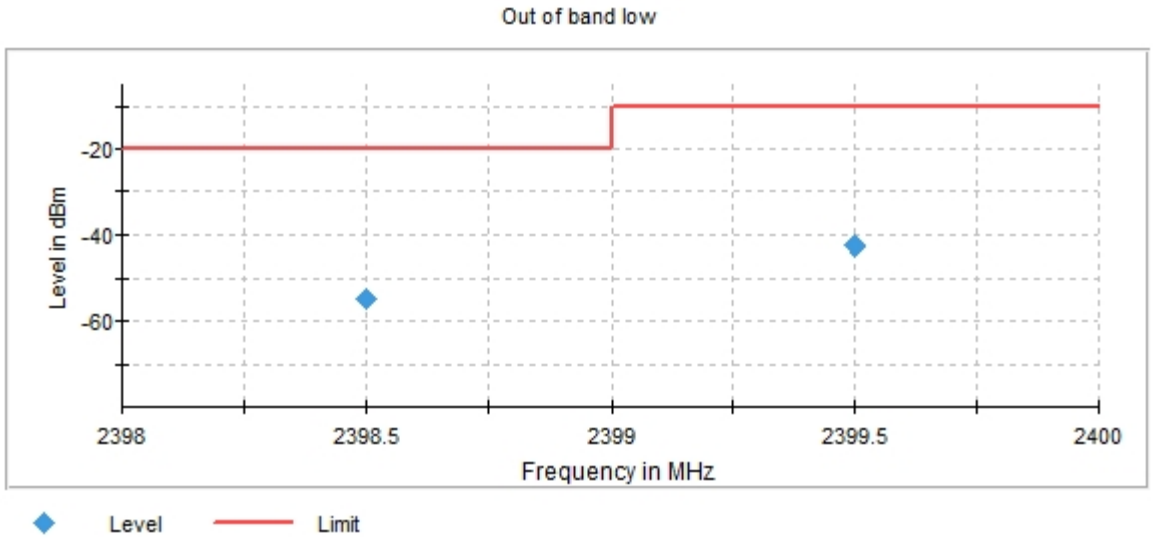


UNWANTED OOB High Freq Section

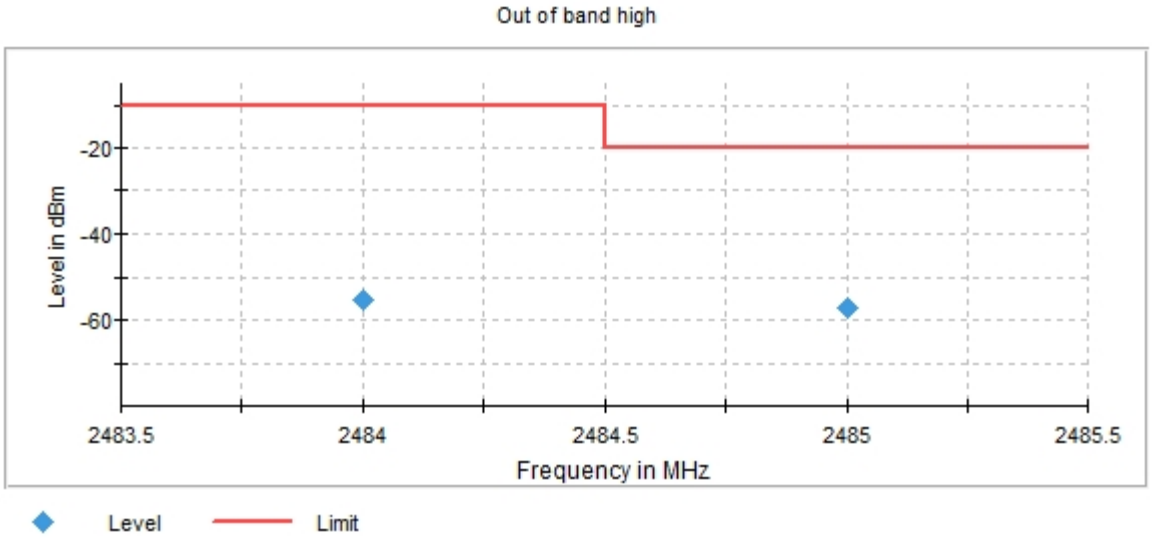


EDR – 2DH5 – SISO A

UNWANTED OOB Low Freq Section

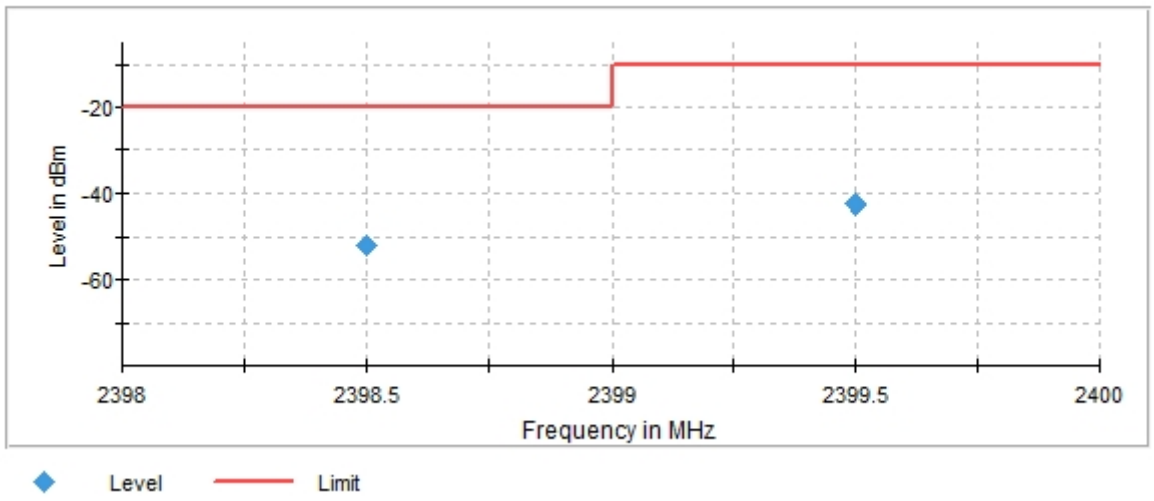


UNWANTED OOB High Freq Section

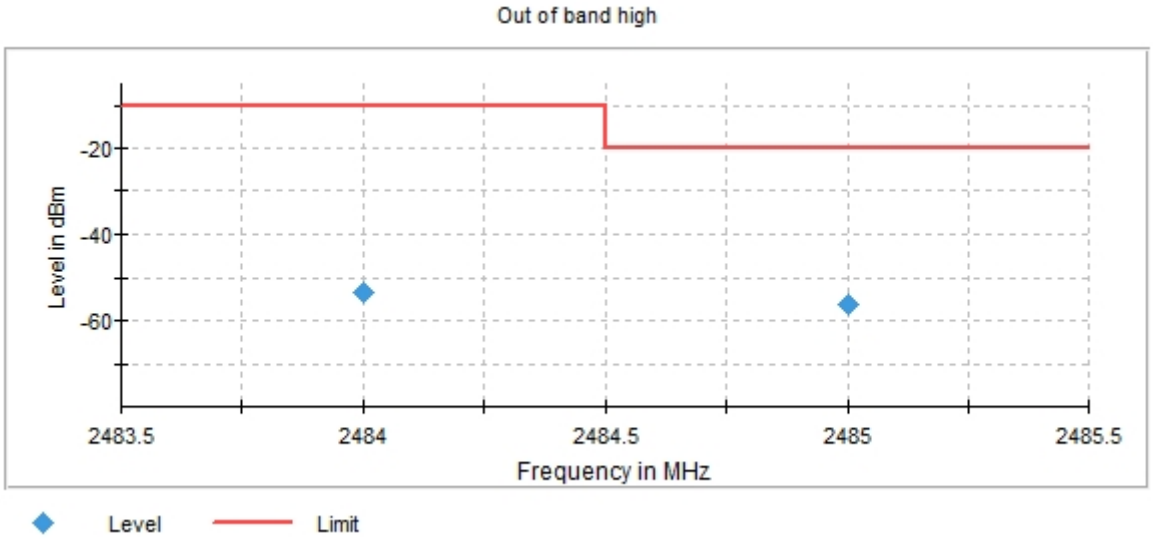


EDR – 3DH5 – SISO A

UNWANTED OOB Low Freq Section

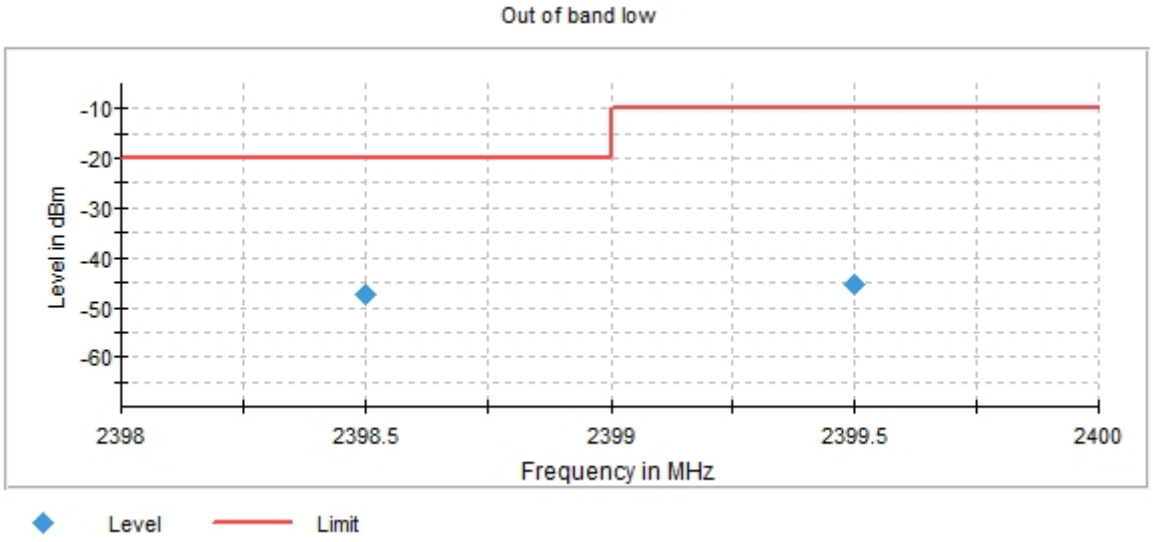


UNWANTED OOB High Freq Section

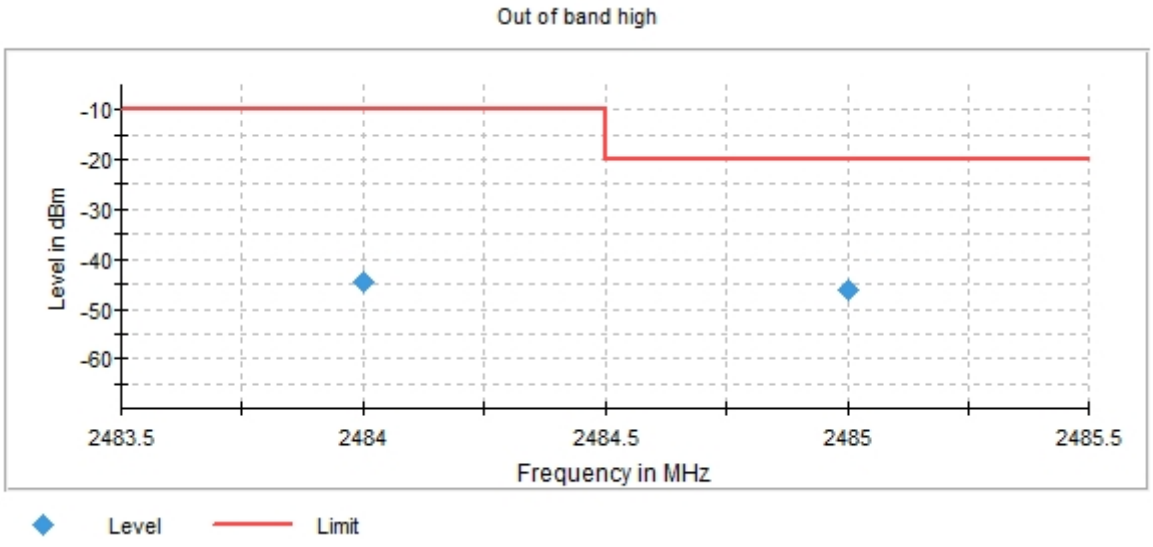


LE – 1M – SISO A

UNWANTED OOB Low Freq Section

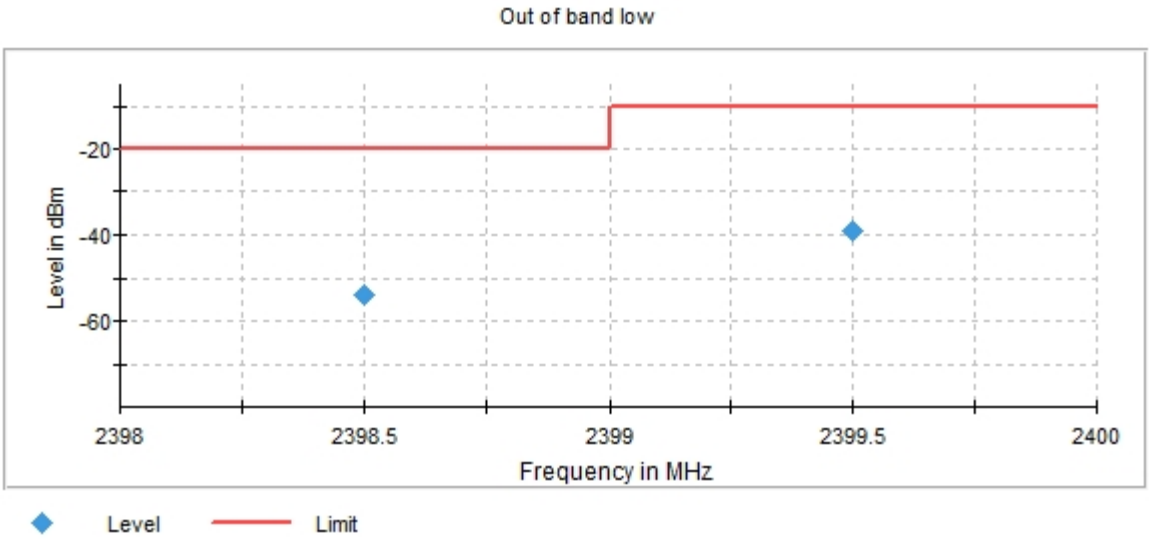


UNWANTED OOB High Freq Section

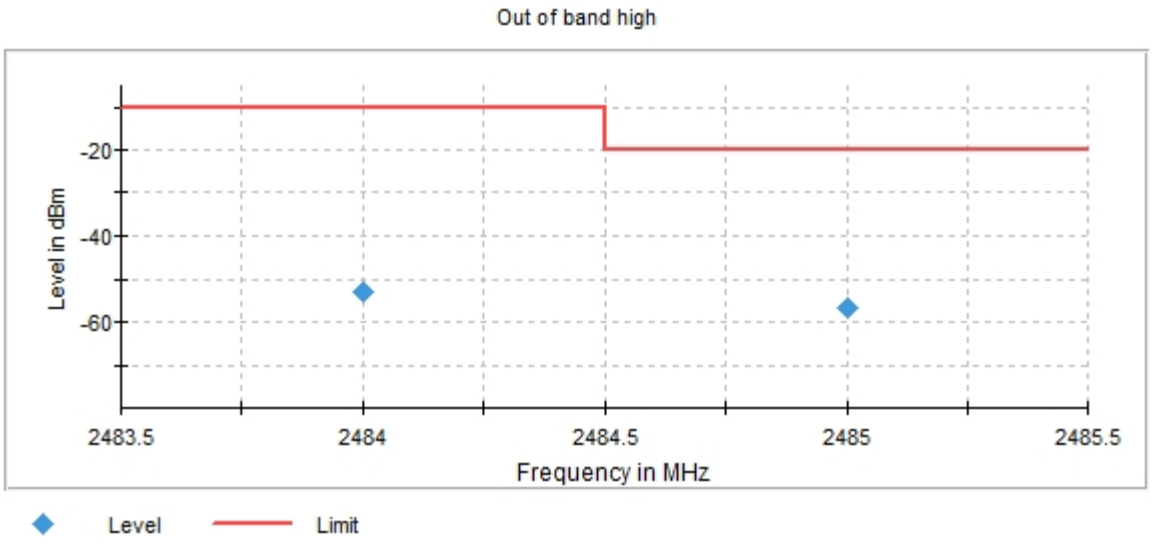


BR – DH5 – SISO B

UNWANTED OOB Low Freq Section

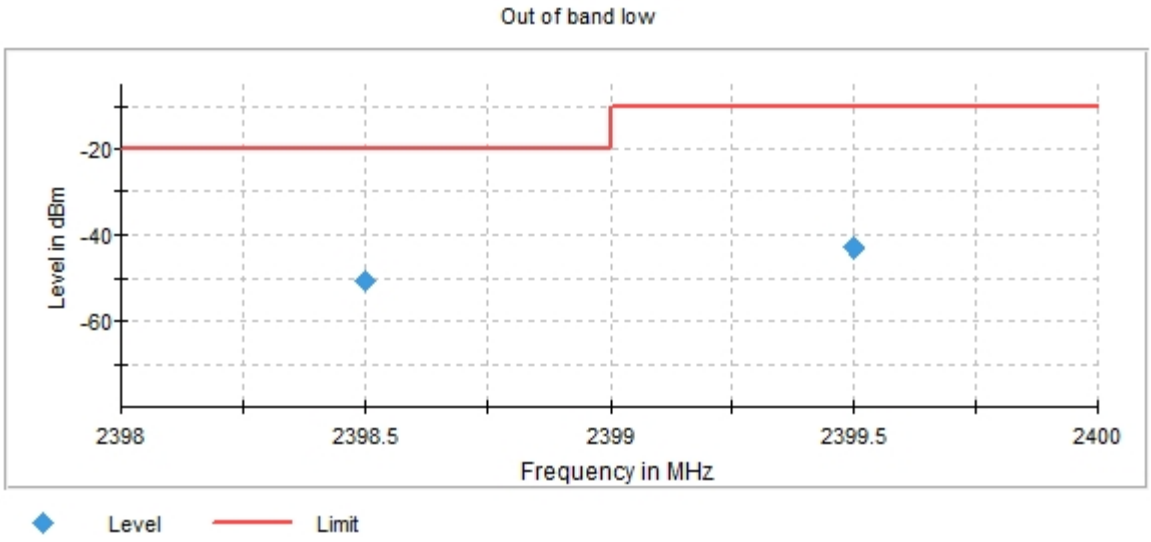


UNWANTED OOB High Freq Section

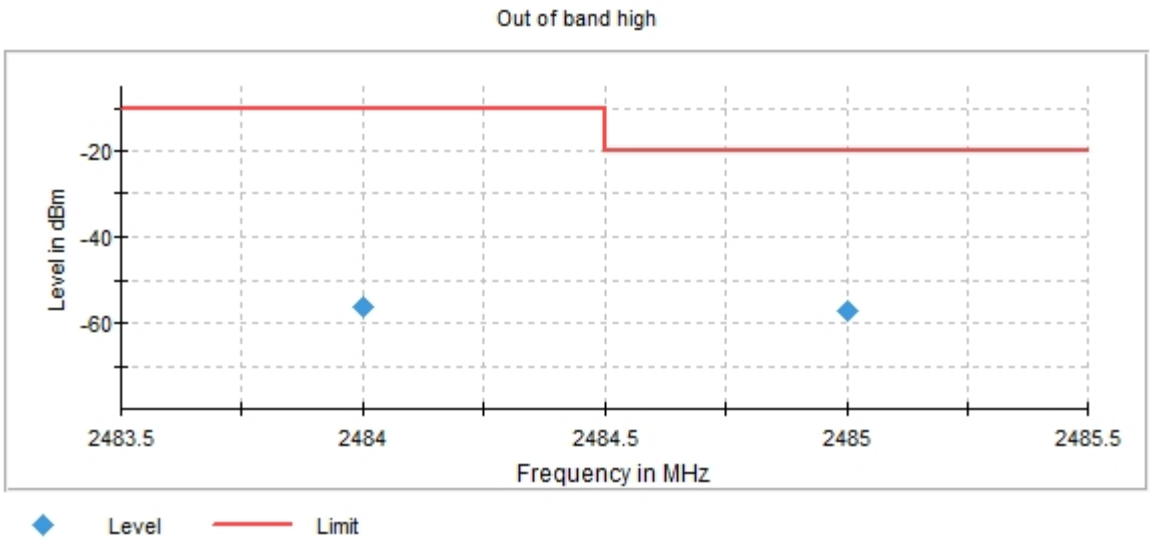


EDR – 2DH5 – SISO B

UNWANTED OOB Low Freq Section

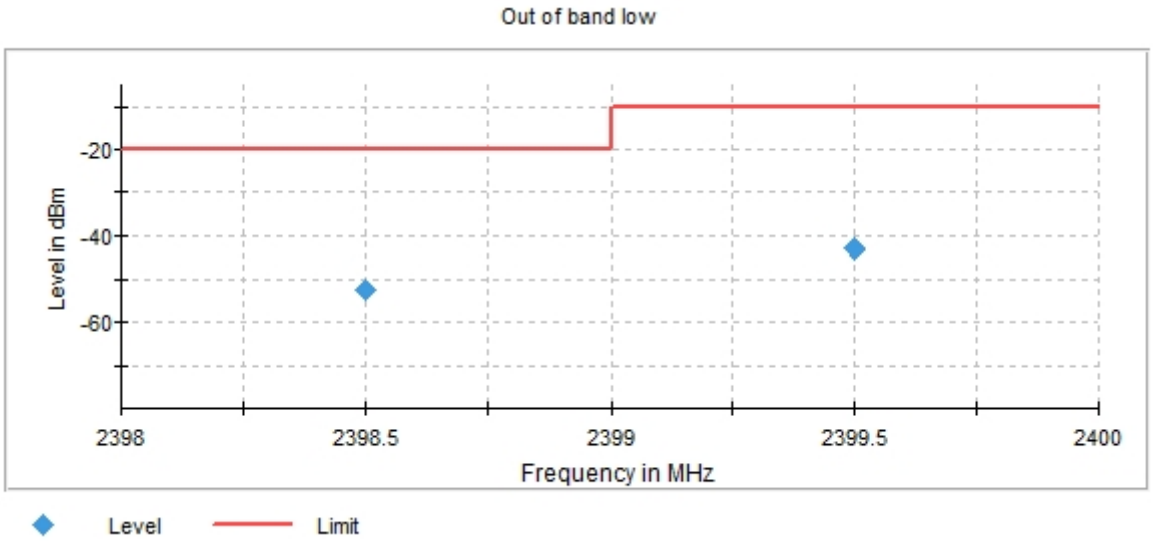


UNWANTED OOB High Freq Section

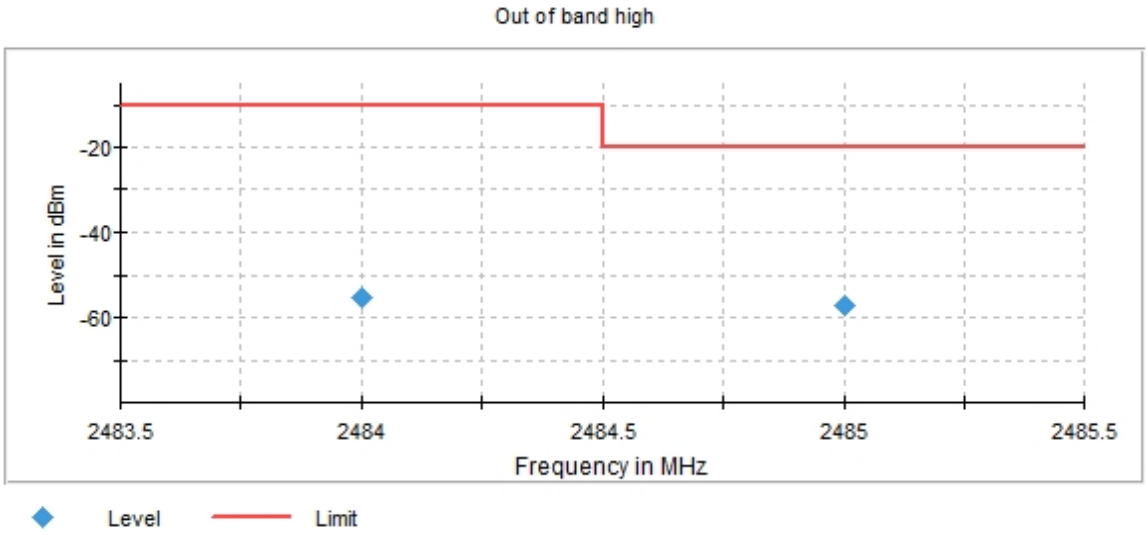


EDR – 3DH5 – SISO B

UNWANTED OOB Low Freq Section

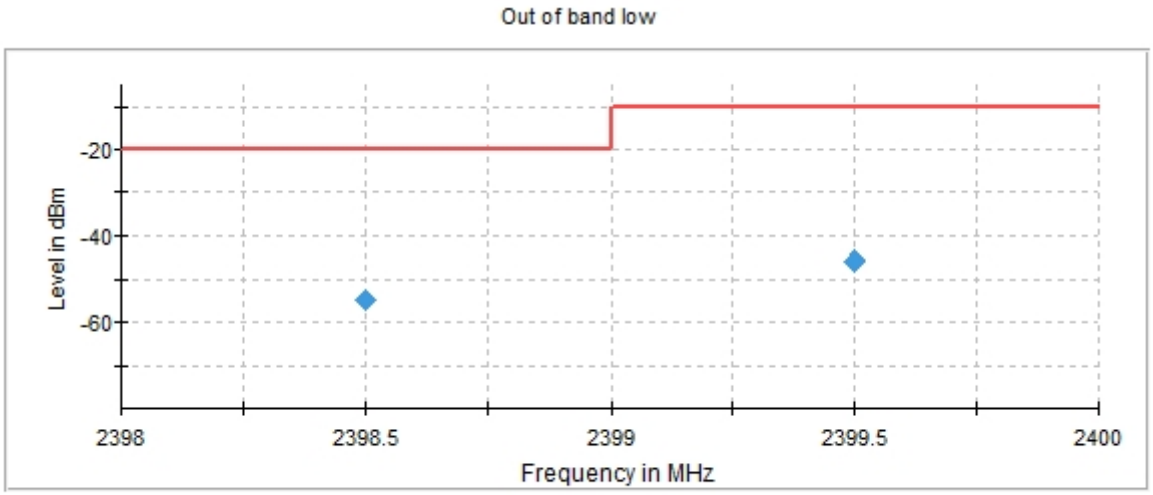


UNWANTED OOB High Freq Section

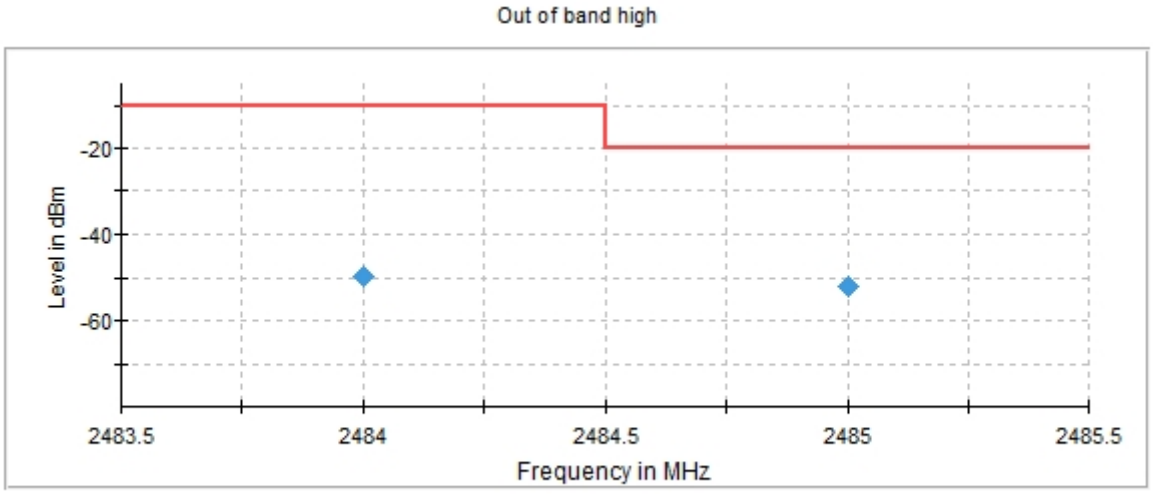


LE – 1M – SISO B

UNWANTED OOB Low Freq Section

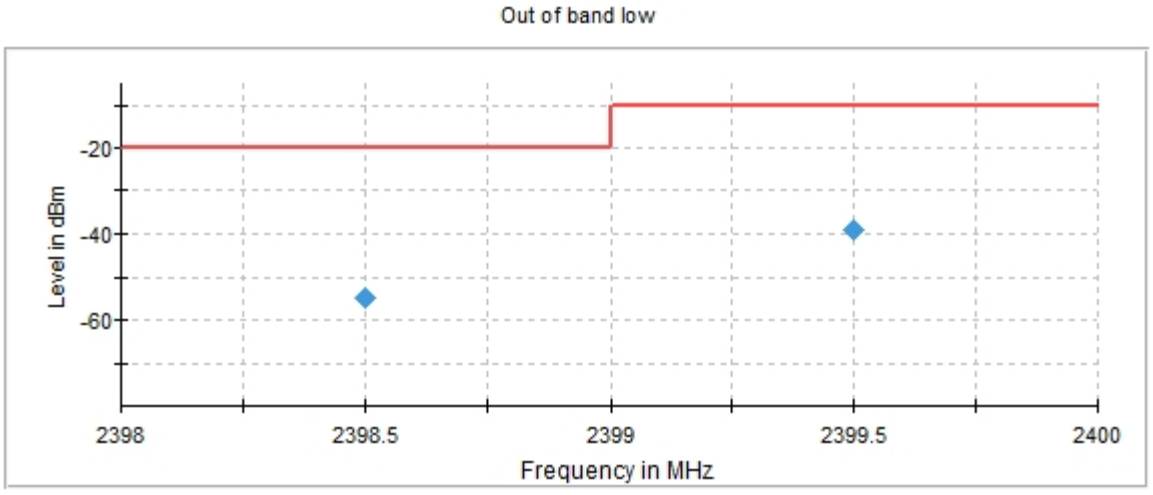


UNWANTED OOB High Freq Section

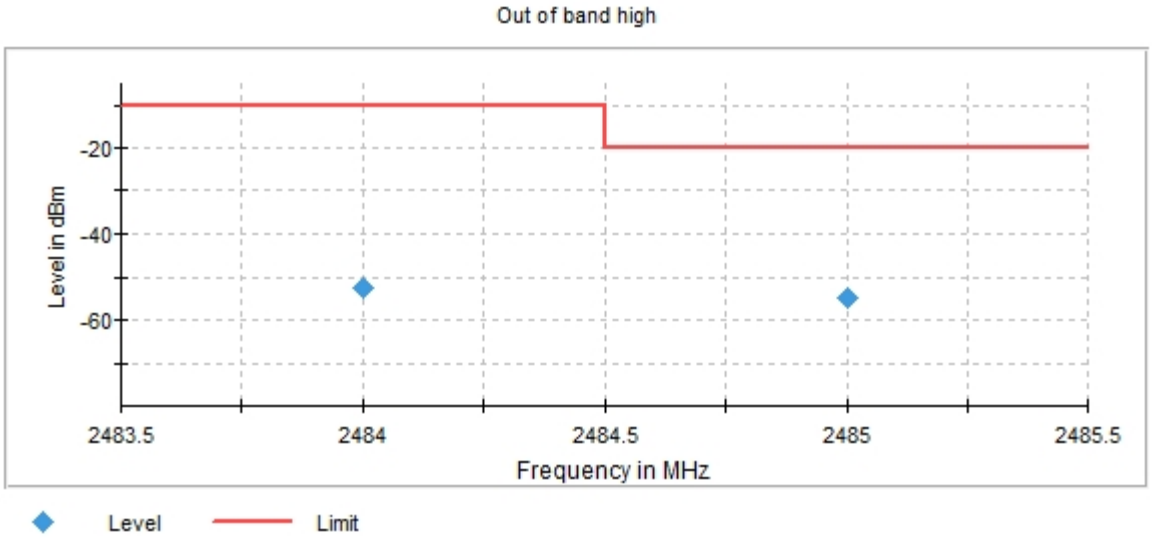


BR – DH5 – MIMO A

UNWANTED OOB Low Freq Section

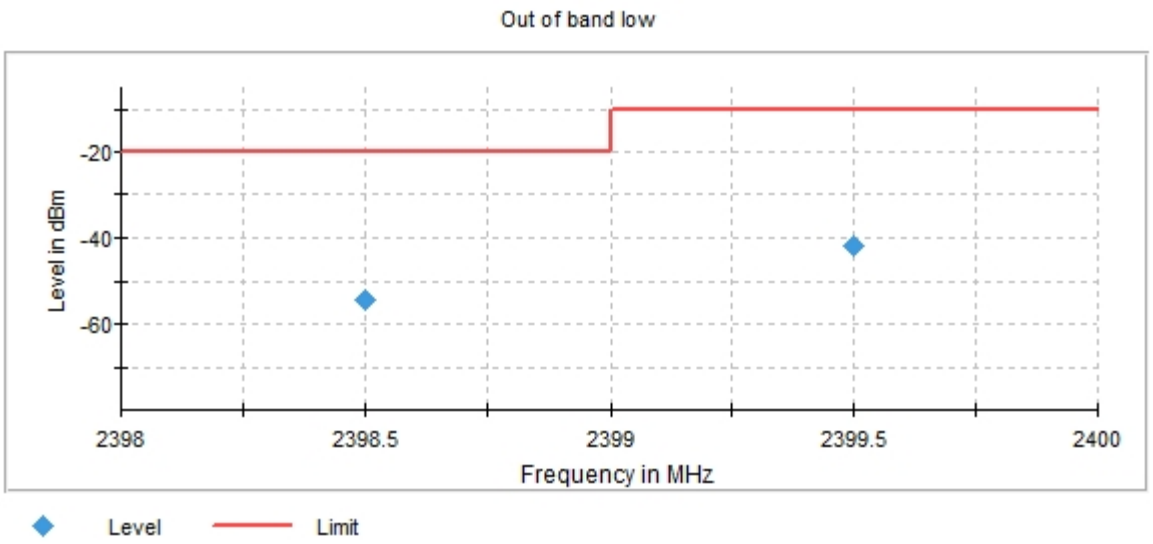


UNWANTED OOB High Freq Section

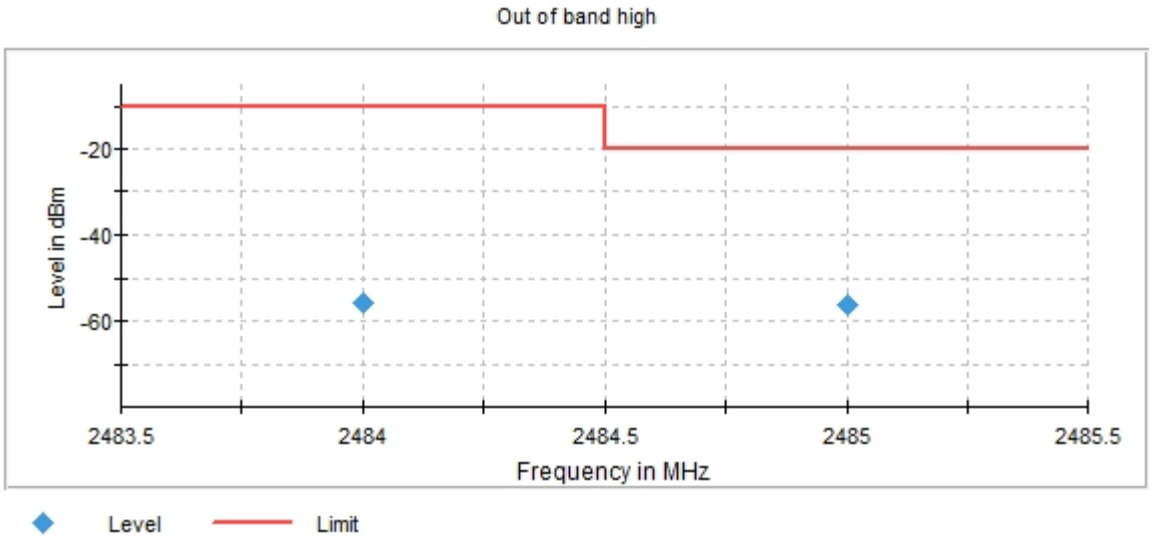


EDR – 2DH5 – MIMO A

UNWANTED OOB Low Freq Section

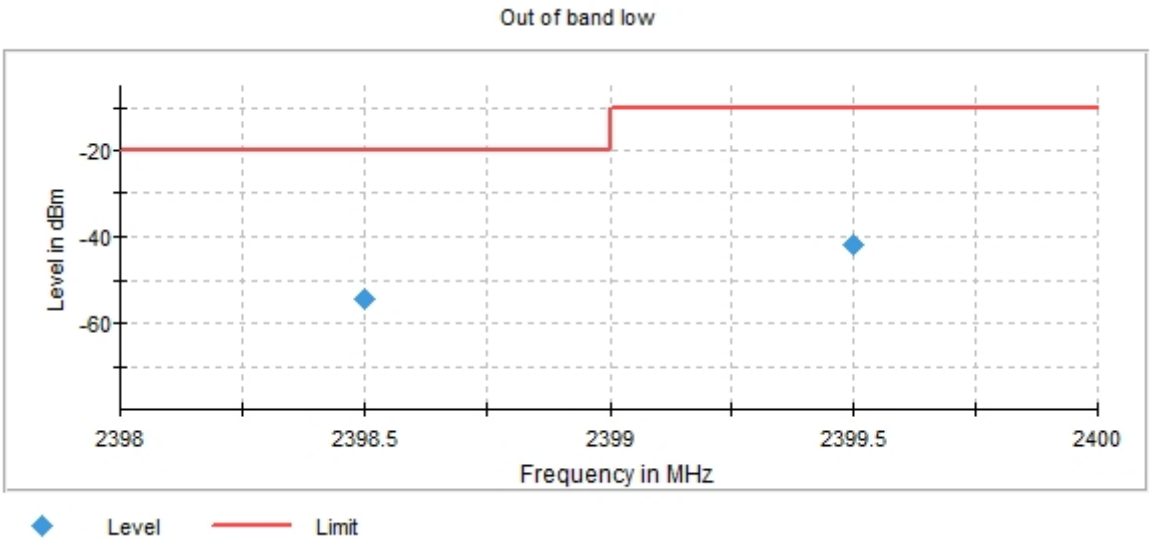


UNWANTED OOB High Freq Section

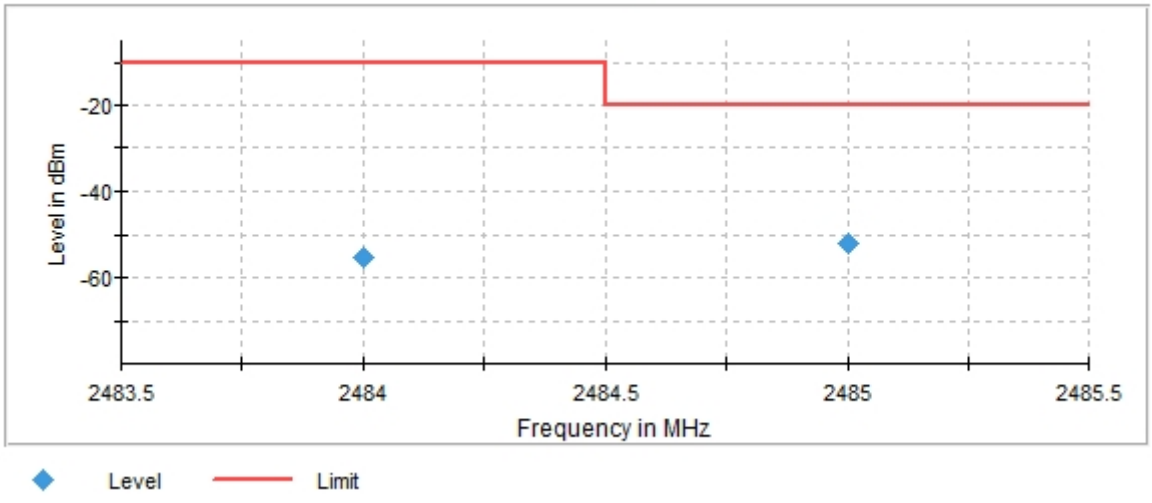


EDR – 3DH5 – MIMO A

UNWANTED OOB Low Freq Section

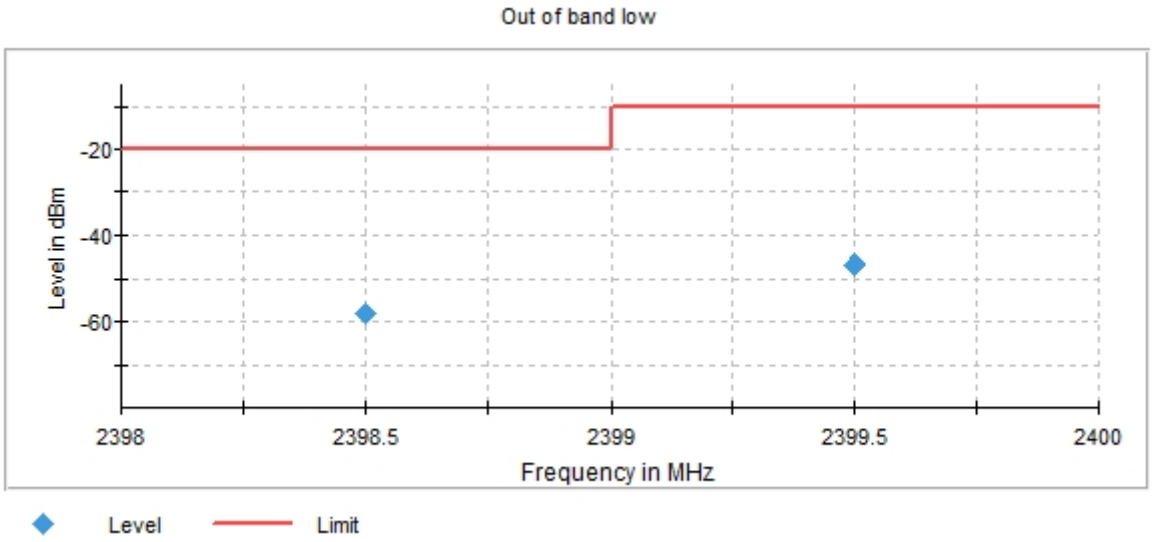


UNWANTED OOB High Freq Section

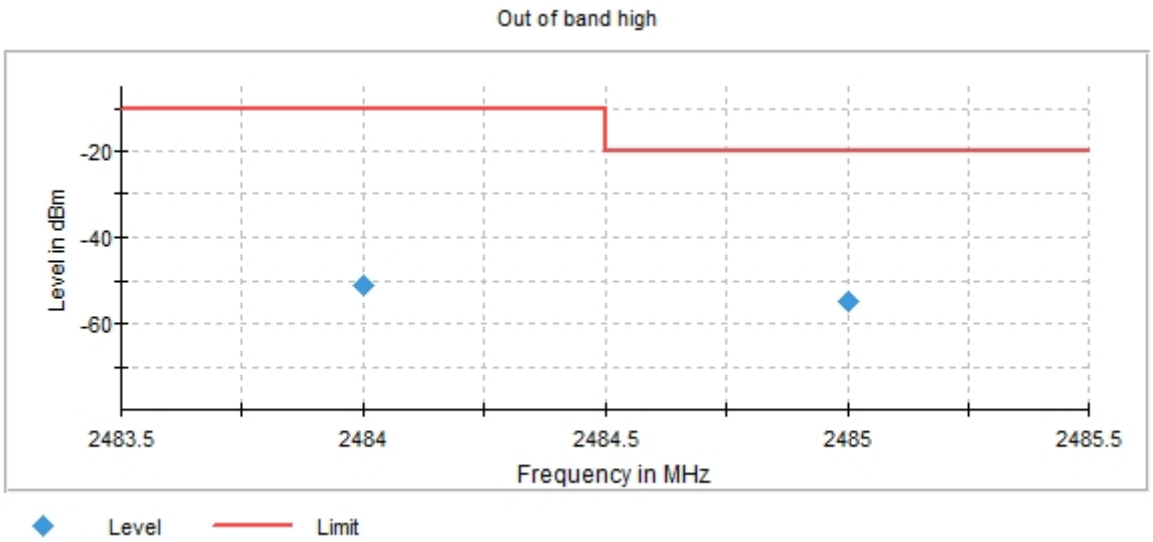


LE – 1M – MIMO A

UNWANTED OOB Low Freq Section

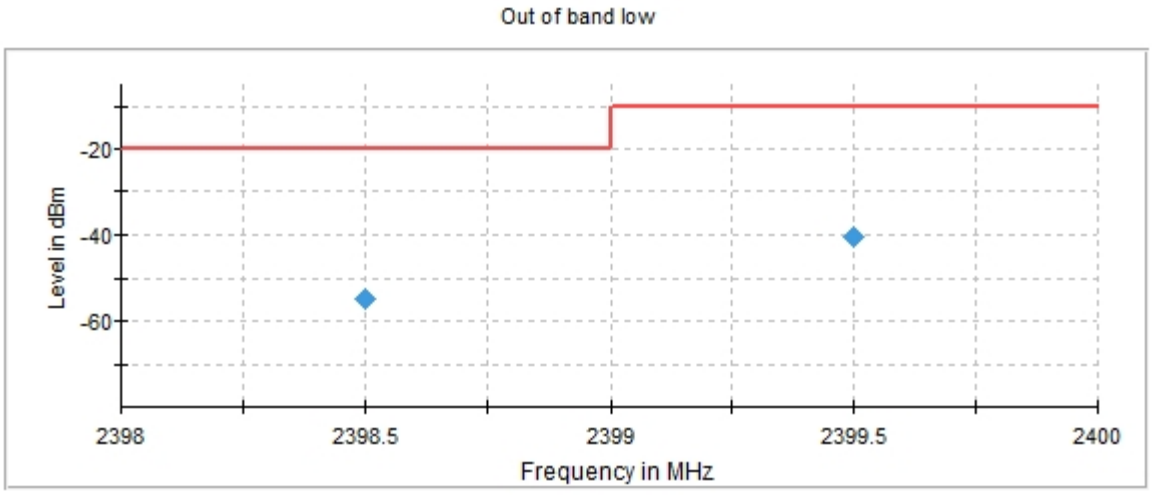


UNWANTED OOB High Freq Section

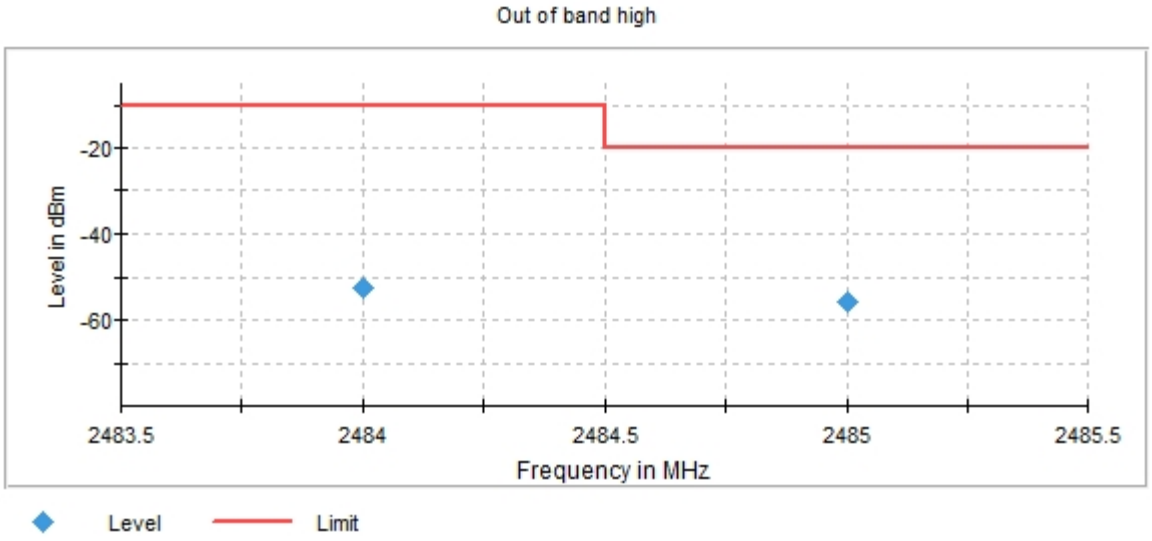


BR – DH5 – MIMO B

UNWANTED OOB Low Freq Section

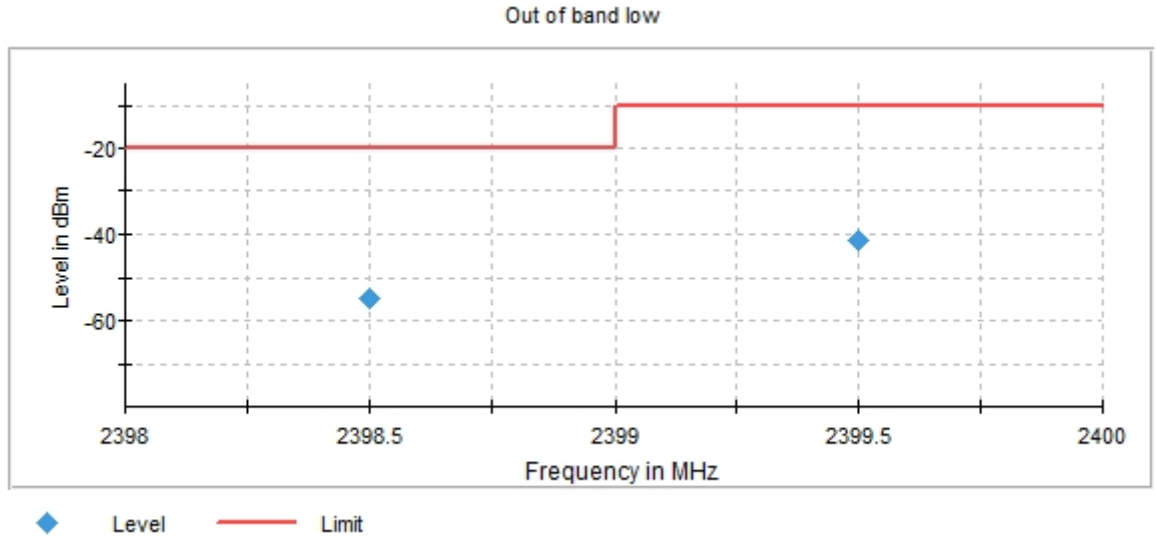


UNWANTED OOB High Freq Section

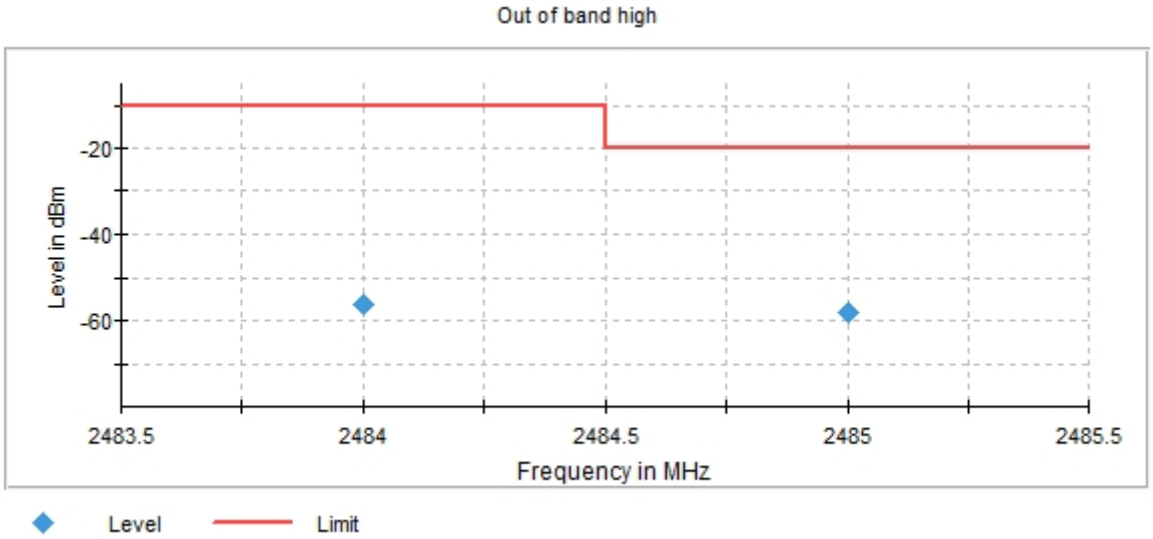


EDR – 2DH5 – MIMO B

UNWANTED OOB Low Freq Section

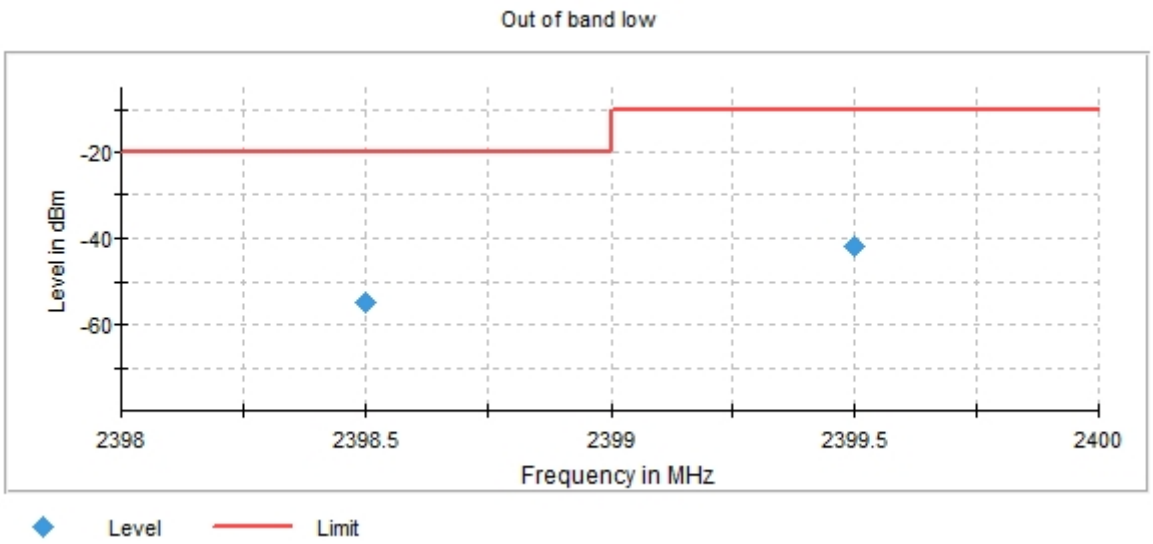


UNWANTED OOB High Freq Section

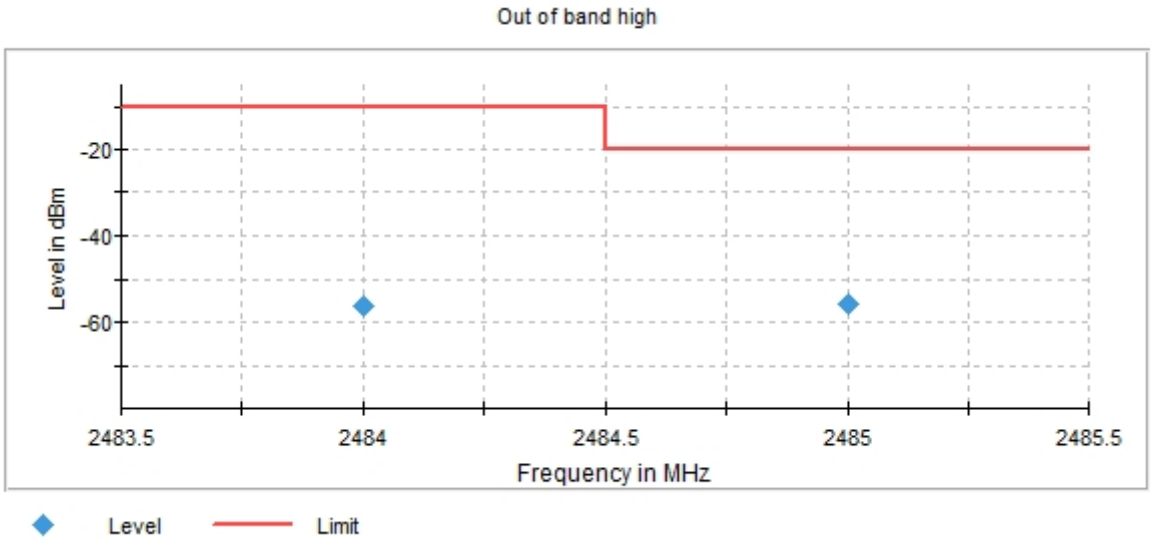


EDR – 3DH5 – MIMO B

UNWANTED OOB Low Freq Section

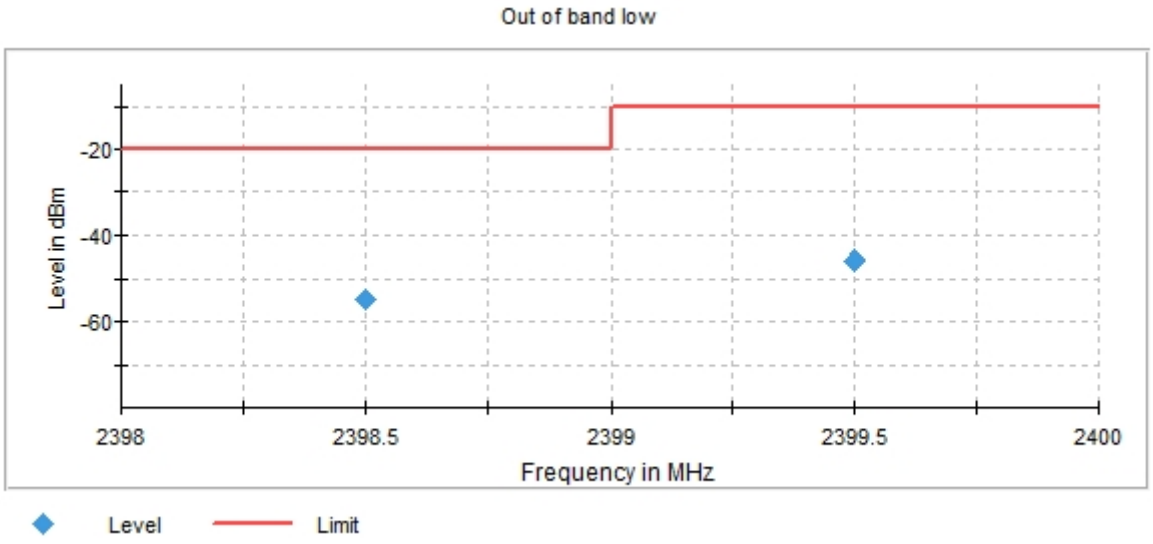


UNWANTED OOB High Freq Section

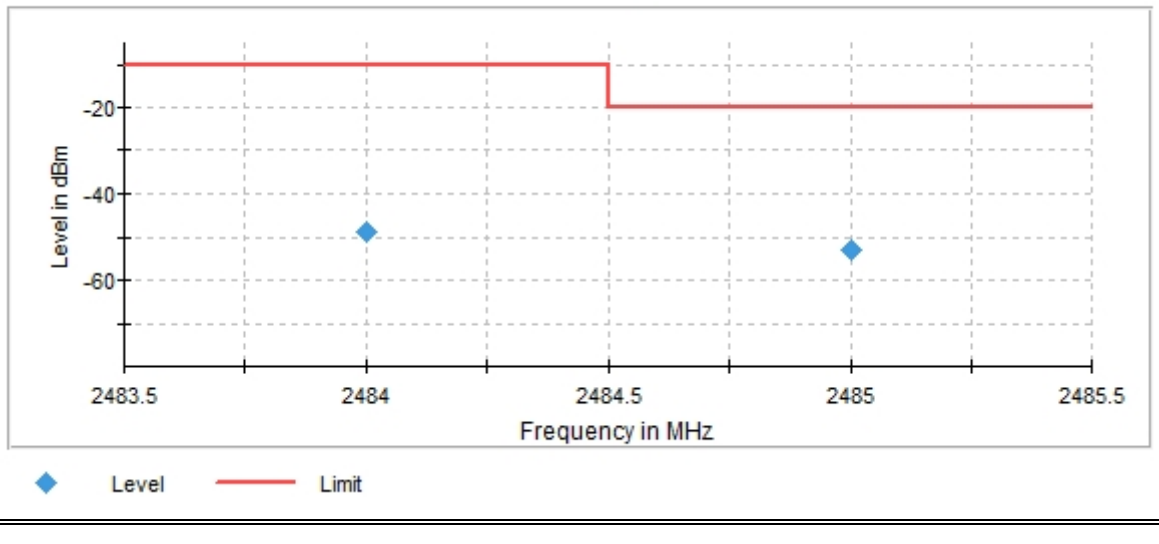


LE – 1M – MIMO B

UNWANTED OOB Low Freq Section



UNWANTED OOB High Freq Section



B.8 Transmitter unwanted emissions in the spurious domain

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.3.1.10.3</td><td>The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4.
For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

Table 4: Transmitter limits for spurious emissions
<table>
<tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>74 MHz to 87.5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>87.5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>470 MHz to 694 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>694 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>1 GHz to 12.75 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
</table></td></tr>
</table>

Test conditions

ETSI clause	Limits
5.4.8.1	These measurements shall only be performed at normal test conditions. For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. When this is not possible, the measurement shall be performed during normal operation (hopping).

Test procedure

The radiated setups (transmitter) shown in section *Test & System Description* were used to measure the transmission spurious emissions accordingly with ETSI EN 300 328 V2.2.2 §5.4.9.2.1. Depending of the frequency range and bands being tested, different antennas and filters were used, in consequence different setups are employed.

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 on the low and high channel for each transmission mode.

The identified worst-case among all tested cases were retained and reported in this test report.

Test Results

30 MHz – 1 GHz, Tx Spurious Emissions

Tx Spurious Emissions - All modes

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
62.5	-80.0	RMS	-51.9	28.2	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

Tx Spurious Emissions – 1 GHz to 12.75 GHz

Tx Spurious Emissions – BR, GFSK, DH5, 2480 MHz

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
6370.0	-53.1	RMS	-30.0	23.1	H

B.9 Receiver spurious emissions

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.3.1.11.3</td><td>The spurious emissions of the receiver shall not exceed the values given in table below.

For emissions radiated by the cabinet or for emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.
<table>
<tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 1GHz</td><td>-57 dBm</td><td>100 kHz</td></tr>
<tr><td>1GHz to 12.75 GHz</td><td>-47 dBm</td><td>1 MHz</td></tr>
</table>
</td></tr>
</table>

Test conditions

ETSI clause	Limits
5.4.10.1	These measurements shall only be performed at normal test conditions. Testing shall be performed when the equipment is in a receive-only mode. For FHSS equipment, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. These frequencies shall be recorded. When disabling the normal hopping is not possible, the measurement shall be performed during normal operation (hopping).

Test procedure

The radiated setups (receiver) shown in section *Test & System Description* were used to measure the receiver spurious emissions accordingly with ETSI EN 300 328 V2.2.2 §5.4.10.2.2. Depending of the frequency range and bands being tested, different antennas and filters were used, in consequence different setups are employed.

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 selected from each transmission mode on the low and high channel

The identified worst-case among all tested cases were retained and reported in this test report.

Test Results

30 MHz – 1 GHz, Rx spurious emissions

Rx Spurious Emissions – All modes

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
424.7	-75.2	RMS	-54.9	20.3	H

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

Rx Spurious Emissions – 1 GHz to 12.75 GHz

Rx Spurious Emissions – BR, EDR, 8-DPSK, 3-DH5, 2480 MHz

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
10750.0	-57.7	RMS	-47.0	10.7	H

B.10 Receiver Blocking

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.3.1.12.3

4.3.1.12.4</td><td>
The minimum performance criterion shall be a PER less than or equal to 10 %.

While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table below.

Receiver blocking parameters for Receiver Category 1 equipment
<table>
<tr><th>Wanted signal mean power from companion device (dBm) (see notes 1 and 4)</th><th>Blocking signal frequency (MHz)</th><th>Blocking signal power (dBm) (see note 4)</th><th>Type of blocking signal</th></tr>
<tr><td>(-133 dBm + 10 × log₁₀(OCBW)) or -68 dBm whichever is less (see note 2)</td><td>2380
2504
2300
2584</td><td rowspan="2">-34</td><td rowspan="2">CW</td></tr>
<tr><td>(-139 dBm + 10 × log₁₀(OCBW)) or -74 dBm whichever is less (see note 3)</td><td>2300
2330
2360
2524
2584
2674</td></tr>
<tr><td colspan="4">
NOTE 1: OCBW is in Hz
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3 In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.
</td></tr>
</table>
</td></tr>
</table>

Test conditions

ETSI clause	Conditions
5.4.11.1	These measurements shall only be performed at normal test conditions.

Test procedure

The receiver blocking setup shown in section *Test & System Description* was used to measure receiver blocking signal. The signaling Unit is a CMW500.

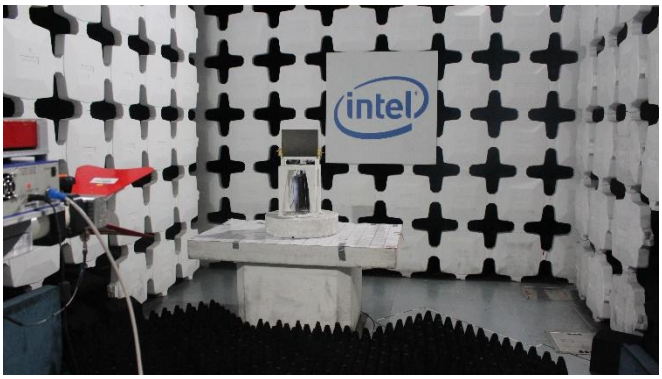
The packet error rate (PER) is measured with the CMW500. The blocking signal is emulated by the Signal generator SMW200A. Antenna gain and insertion loss are taken into account.

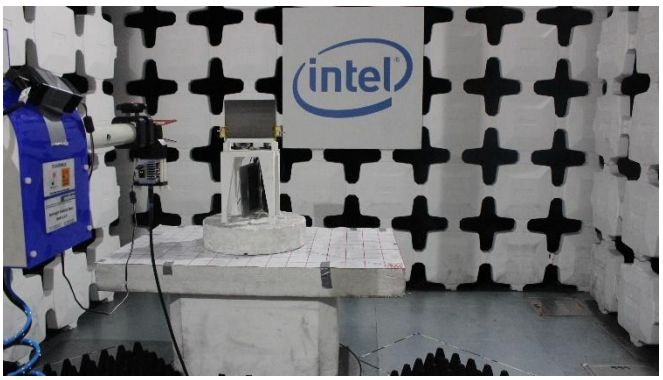
Test results

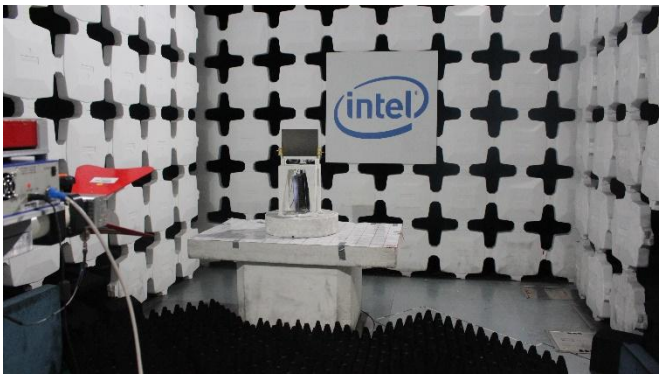
Configuration	99% Occupied bandwidth [MHz]	Wanted signal mean power from companion device (dBm)	PER [%] Without blocking signal	Blocking signal [MHz]	Blocking signal Power at DUT input [dBm]	PER [%] With Blocking signal	Verdict
		Without blocking signal		With blocking signal			
BT DH5-Hopping Chain A	0.790	-70.97	0.00	2380	-36	0.00	PASS
		-70.97	0.00	2504	-36	0.04	PASS
		-76.97	0.16	2300	-36	0.20	PASS
		-76.97	0.16	2360	-36	0.08	PASS
		-76.97	0.16	2330	-36	0.00	PASS
		-76.97	0.16	2524	-36	0.04	PASS
		-76.97	0.16	2584	-36	0.12	PASS
		-76.97	0.16	2674	-36	0.04	PASS

Annex C. Photographs

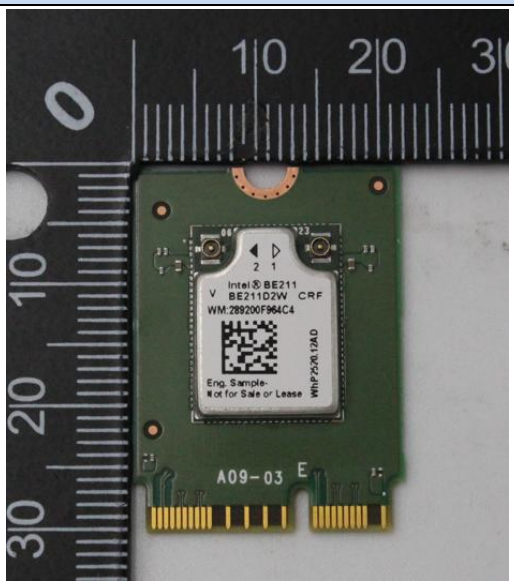
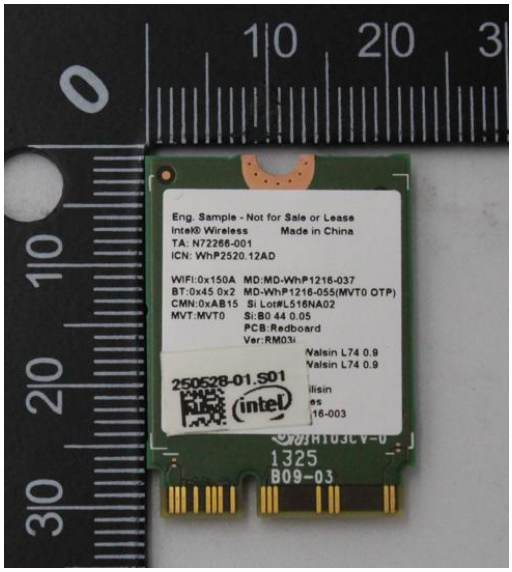
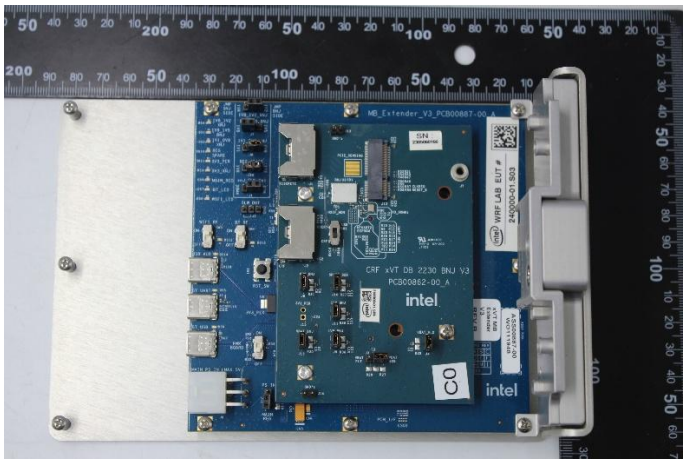
C.1 Test Setup

Radiated Setup 30 MHz – 1 GHz (Transmitter tests)	Radiated Setup 1 GHz – 11 GHz (Transmitter tests)
	

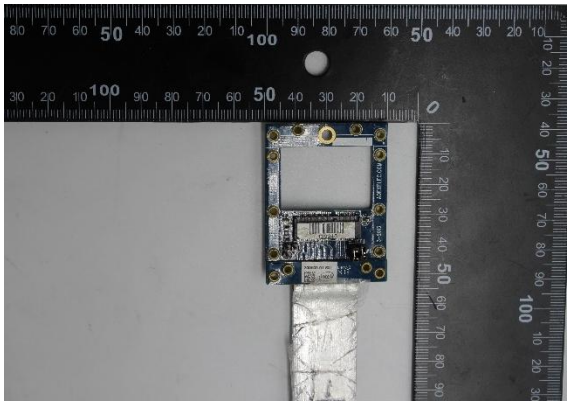
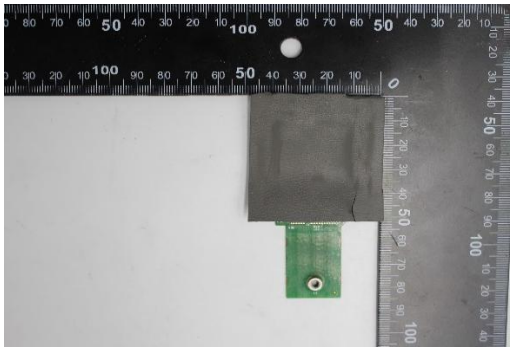
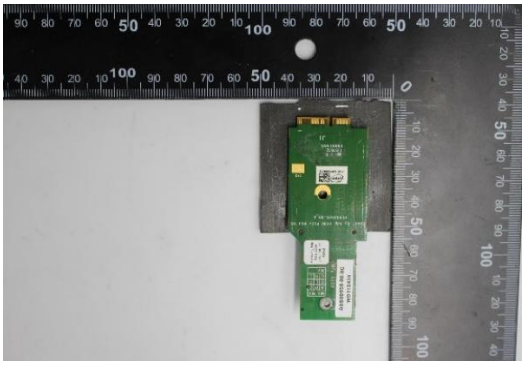
Radiated Setup 11 GHz – 12.75 GHz (Transmitter tests)


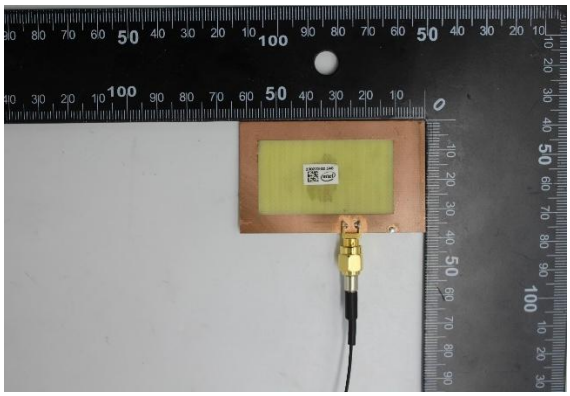
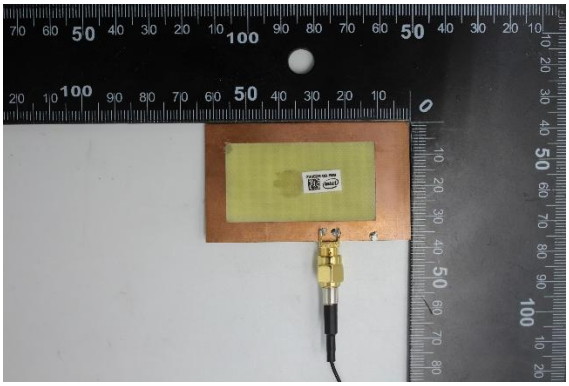
Radiated Setup 30 MHz – 1 GHz (Receiver tests)	Radiated Setup 1 GHz – 12.75 GHz (Receiver tests)
	

C.2 Test Sample

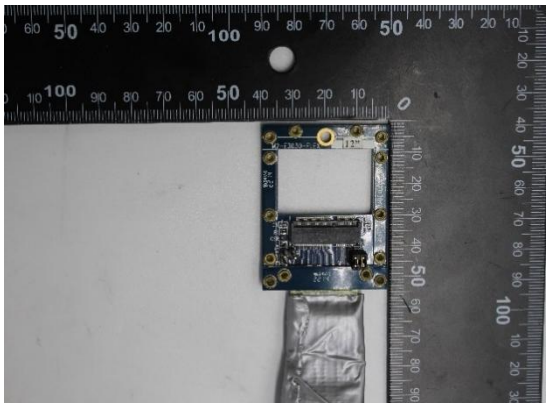
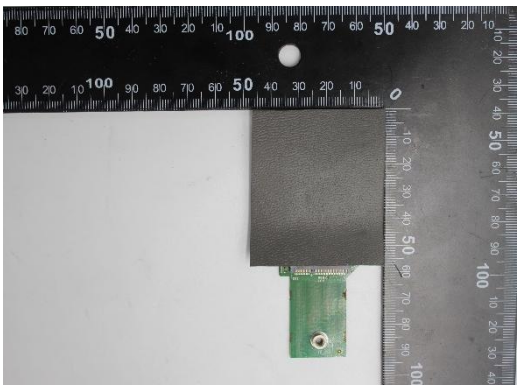
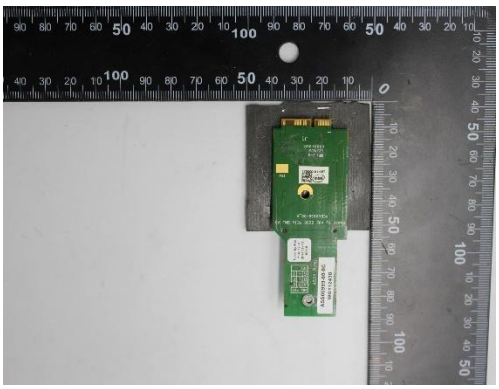
Sample #01	
Module Front	Module Back
	
Extender board	Laptop
	

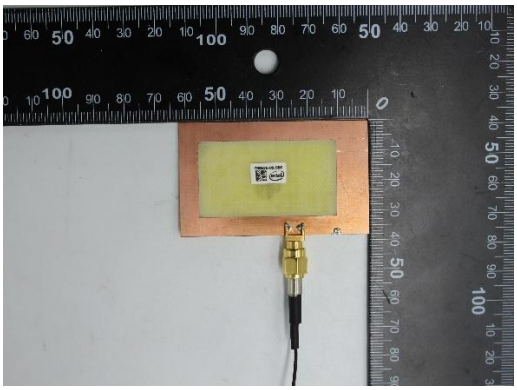
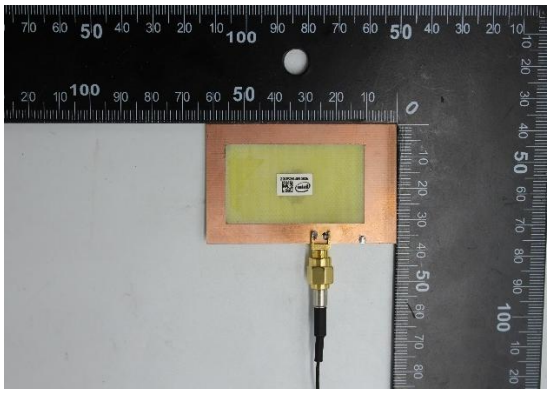
Sample #02

Module Front	Module Back
	
Extender board	**Laptop**
	
Adaptor Front	**Adaptor Back**
	

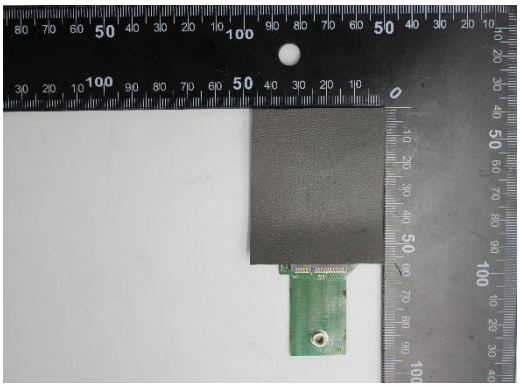
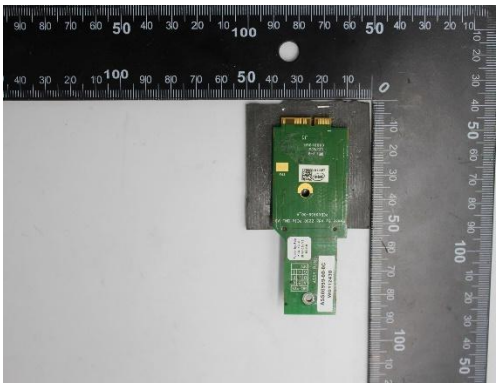
PIFA antenna (Main)	PIFA antenna (Aux)
	

Sample #03

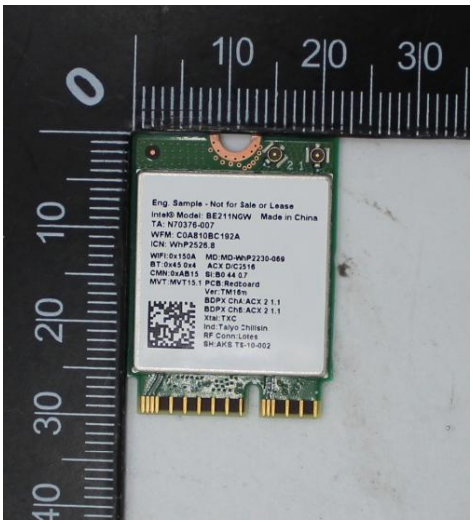
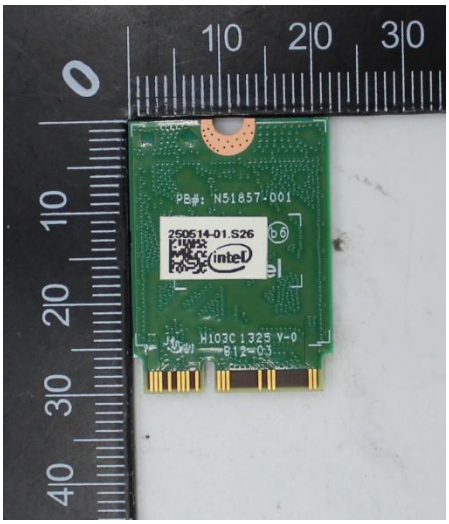
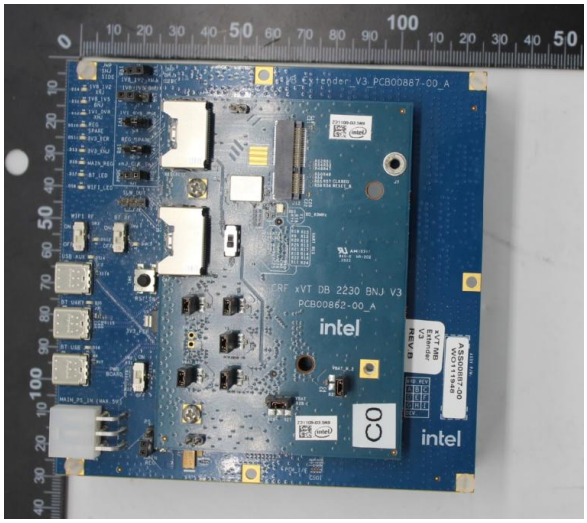
Module Front	Module Back
	
Extender board	**Laptop**
	
Adaptor Front	**Adaptor Back**
	

PIFA antenna (Main)	PIFA antenna (Aux)
	

Sample #04

Module Front	Module Back
	
Adaptor Front	**Adaptor Back**
	
Laptop Rx (Host)	
	

Sample #05

Module Front	Module Back
	
Extender board	**Laptop**
	

End of the report

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