RF TEST REPORT

Applicant	:	SHENZHEN FENDA TECHNOLOGY CO., LTD.
Address	:	Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China
Manufacturer	:	SHENZHEN FENDA TECHNOLOGY CO., LTD.
Address	:	Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China
Factory	:	SHENZHEN FENDA TECHNOLOGY CO., LTD.
Address	:	Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China
EUT	:	Computer Multimedia Speaker
Brand Name	:	F&D
Model No.	:	PA300, PA200, PA928, PA948, PA310, PA100, PA388 (For model difference refer to section 2)
Measurement Standard	:	ETSI EN 300328 V2.2.2: 2019
Receipt Date of Samples	:	November 11, 2020
Date of Tested	:	November 12, 2020 to December 18, 2020
Date of Report	:	December 22, 2020

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by

Alina Guo / Project Engineer

Approved by

Iori Fan / Authorized Signatory

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Revision History

Report Number	Description	Issued Date
NTC2011116EV00	Initial Issue	2020-12-22

1. Summary of Test Result

ETSI EN 300328 V2.2.2	Description of Test	Result	Remarks
4.3.1.2 / 4.3.2.2	RF Output Power	Pass	----
4.3.2.3	Power Spectral Density (Modulations other than FHSS equipment)	N/A	----
4.3.1.3 / 4.3.2.4	Duty cycle, Tx-Sequence, Tx-gap (Non-adaptive equipment)	N/A see note 1	----
4.3.1.4	Dwell time, Minimum Frequency Occupation & Hopping Sequence (FHSS equipment)	Pass	----
4.3.1.5	Hopping Frequency Separation (FHSS equipment)	Pass	----
4.3.1.6 / 4.3.2.5	Medium Utilisation (Non-adaptive equipment)	N/A see note 2	----
4.3.1.7 / 4.3.2.6	Adaptivity	N/A see note 2	----
4.3.1.8 / 4.3.2.7	Occupied Channel Bandwidth	Pass	----
4.3.1.9 / 4.3.2.8	Transmitter unwanted emission in the OOB domain	Pass	----
4.3.1.10 / 4.3.2.9	Transmitter unwanted emissions in the spurious domain	Pass	----
4.3.1.11 / 4.3.2.10	Receiver spurious emissions	Pass	----
4.3.1.12 / 4.3.2.11	Receiver Blocking	Pass	----
4.3.1.13 / 4.3.2.12	Geo-location capability	N/A see note 3	----

Note:

1. These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode. This EUT only works in adaptive mode, these tests are not applicable this EUT
2. These requirements do not apply for equipment with a maximum declared RF Output power of less than 10dBm EIRP or for equipment when operating in a mode where the RF Output power is less than 10dBm EIRP.
3. Only for equipment with geo-location capability.

2. General Description of EUT

Product Information	
Product name:	Computer Multimedia Speaker
Main Model Name:	PA300
Additional Model Name:	PA200, PA928, PA948, PA310
Model Difference:	These models have the same circuit schematic, construction, PCB Layout and critical components. The difference is model number only due to trading purpose.
S/N:	PA300EF204000001
Brand Name:	F&D
Hardware Version:	V1.0
Software Version:	V1.0
Temperature Range:	0 to 40℃ (Declared by manufacturer)
Rating:	AC 100-240V 50/60Hz DC 12V from internal battery
Typical arrangement:	Table-top
I/O Port:	USB Port*1, MIC Port*2, AC Port*1, Optical Port*1, AUX Port*1
Accessories	
Adapter:	N/A
Cable:	AC Mains: 1.5m unshielded Audio Line: 1.2m unshielded
Other:	IR Remote * 1
Additional information	
Note:	According to these model difference, all tests were carried on model PA300
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

Technical Specification (Bluetooth)	
Bluetooth Version:	V5.0
Frequency Range:	2402-2480MHz
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Number of Channel:	79
Channel Space:	1MHz
Antenna Type:	PCB antenna
Antenna Gain:	0dBi (Declared by manufacturer)
Adaptive/Non-Adaptive Equipment:	Adaptive equipment
Receiver Category:	Category 3

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	24721
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	----	----

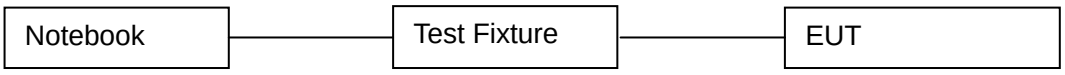
3. Test Channels and Modes Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet type, data rates and antenna ports (if EUT with antenna diversity architecture).

----	Mode	Frequency (MHz)	Modulation Technology	Modulation
1.	TX (Hopping)	2402-2480	FHSS	GFSK / 8DPSK
2.	TX	2402	FHSS	GFSK / 8DPSK
3.	TX	2480	FHSS	GFSK / 8DPSK
4.	RX	2402	FHSS	GFSK / 8DPSK
5.	RX	2480	FHSS	GFSK / 8DPSK

4. Configuration of EUT

TX /RX Mode



5. Modification of EUT

No modifications are made to the EUT during all test items.

6. Description of Support Device

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks
1.	Notebook	Lenovo	02213DC	0A33012	Power cord, 1.8m, unshielded	---
2.	Power supply (Notebook)	Taida	92P1154	N/A		---
3.	Test fixture	---	---	---	----	Provided by manufacturer

Test software	FrequencyTool_v0.2.8.exe

7. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and Authorizations	:	The Laboratory has been assessed and proved to be in compliance with CNAS/CL01 Listed by CNAS, August 13, 2018 The Certificate Registration Number is L5795. The Certificate is valid until August 13, 2024 The Laboratory has been assessed and proved to be in compliance with ISO17025 Listed by A2LA, November 01, 2017 The Certificate Registration Number is 4429.01 The Certificate is valid until December 31, 2021 Listed by FCC, November 06, 2017 Test Firm Registration Number: 907417 Listed by Industry Canada, June 08, 2017 The Certificate Registration Number. Is 46405-9743A
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

8. Applicable Standards and References

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards: ETSI EN 300328 V2.2.2

9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

10. Test Conditions

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks
1.	RF Output Power	1	AC 230V / 50Hz	Ray	See note 1
2.	Hopping Sequence	1	AC 230V / 50Hz	Ray	See note 1
3.	Dwell Time	1	AC 230V / 50Hz	Ray	See note 1
4.	Minimum Frequency Occupation	1	AC 230V / 50Hz	Ray	See note 1
5.	Occupied Channel Bandwidth	2, 3	AC 230V / 50Hz	Ray	See note 1
6.	Transmitter unwanted emission in the OOB domain	1	AC 230V / 50Hz	Ray	See note 1
7.	Transmitter unwanted emissions in the spurious domain	2, 3	AC 230V / 50Hz DC 12V	Ray	See note 1
8.	Receiver spurious emissions	4, 5	AC 230V / 50Hz	Ray	See note 1
9.	Receiver Blocking	4, 5	AC 230V / 50Hz	Ray	See note 1

Note:

1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35℃, 30~70%, 86~106kPa
2. Only the worst voltage was recorded in the report.

11. Measurement Uncertainty

No.	Test Item	Uncertainty	Remarks
1.	RF Output Power, conducted	±1.06dB	---
2.	Occupied Channel Bandwidth	±1.42 x10-4% MHz	---
3.	Transmitter unwanted emissions in the spurious domain, radiated	Below 1GHz: ±4.68 dB Above 1GHz: ±5.14 dB	---
4.	Receiver spurious emissions, radiated		---
5.	Temperature	±0.8℃	---
6.	Humidity	±3.2%	---
7.	DC and low frequency voltages	±0.1%	---
8.	Time	±5%	---
9.	Duty cycle	±5%	---

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

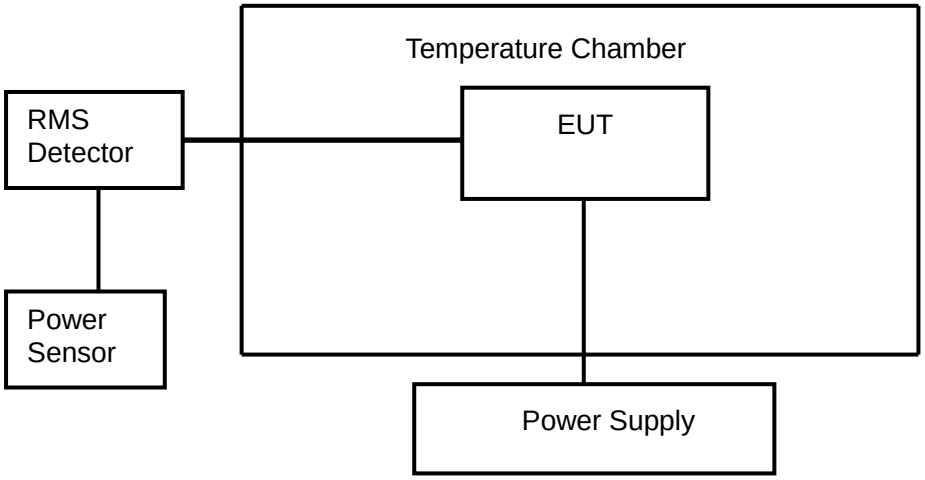
12. Test Items and Results

12.1 RF Output Power

LIMIT

Frequency Band	Limit
2400 ~ 2483.5 MHz	Equivalent isotropic radiated power (e.i.r.p.) ≤20 dBm

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

1. Please refer to ETSI EN 300328 (V2.2.2) clause 5.4.2.2.1.2 for conducted measurement method.
2. The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.

TEST RESULTS

PASS

Please refer to the following table.

Humidity: 50 %		Temperature : 23 ℃		Test Date: November 27, 2020		
Antenna Gain:	0dBi		Cable Loss:	1.5 dB		
Mode	Data Rate (Mbps)	Temperature (℃)	Reading Level (dBm)	EIRP (dBm)	Limit (dBm)	Result
GFSK (Hopping)	1	25	-2.50	-1.00	20	PASS
	1	0	-2.76	-1.26	20	PASS
	1	45	-2.69	-1.19	20	PASS
8DPSK (Hopping)	3	25	-4.15	-2.65	20	PASS
	3	0	-4.72	-3.22	20	PASS
	3	45	-5.51	-4.01	20	PASS

Sample of data calculate:
EIRP(dBm)= Reading Output Power(dBm)+Cable Loss(dB)+Antenna Gain(dBi)

12.2 Dwell Time, Minimum Frequency Occupation and Hopping Sequence

LIMIT

Dwell Time	
Test Condition	**Limit**
Non-adaptive frequency hopping systems	≤ 15 ms
Adaptive frequency hopping systems	≤ 400 ms

Minimum Frequency Occupation Time	
Test Condition	**Limit**
Non-adaptive frequency hopping systems	Equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.
Adaptive frequency hopping systems	

Hopping sequence(s)	
Test Condition	**Limit**
Non-adaptive frequency hopping systems	≥15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz, whichever is the greater.
Adaptive frequency hopping systems	Operating frequency band ≥58.45MHz (Operating over a minimum of 70 % of the operating in the band 2,4 GHz to 2,4835 GHz)
	≥15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz, whichever is the greater.

BLOCK DIAGRAM OF TEST SETUP

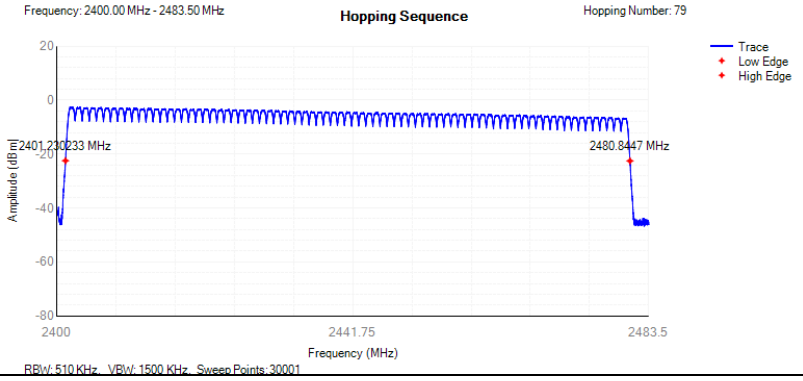
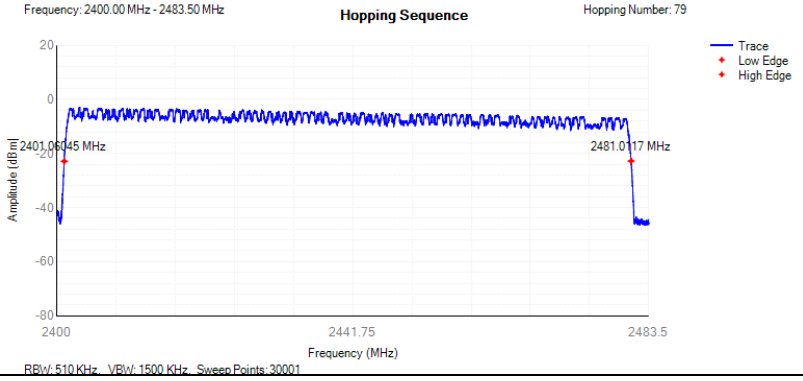
TEST PROCEDURES

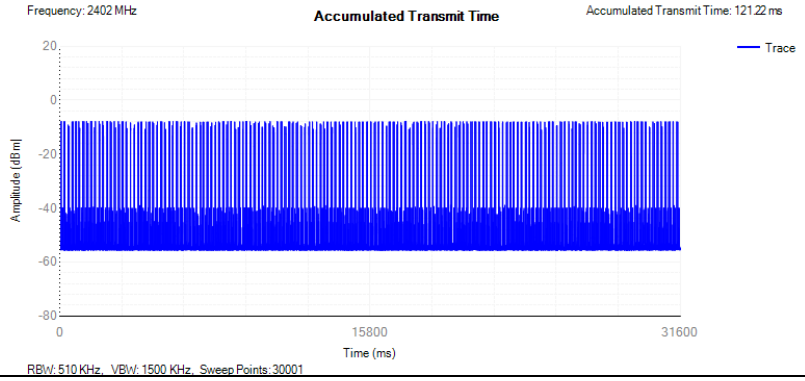
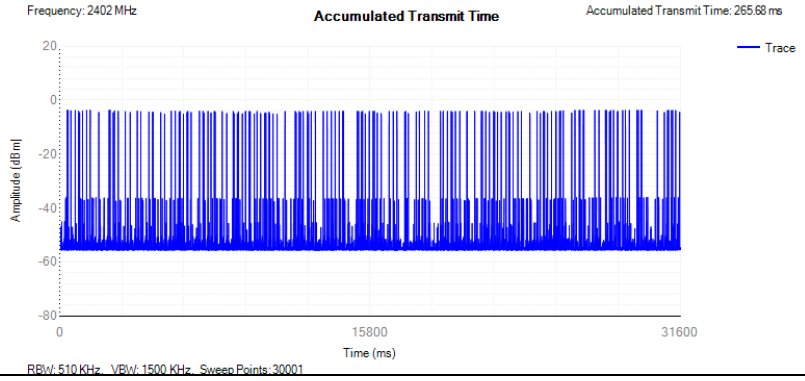
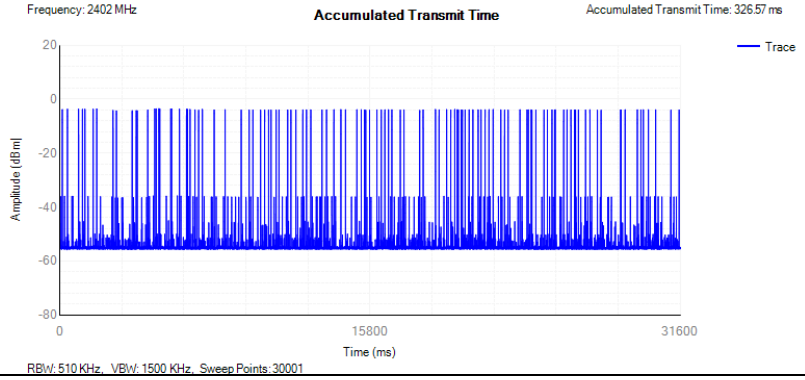
1. Please refer to ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.4.2.1 for conducted measurement method.
2. The measurements shall be performed at normal environmental condition.

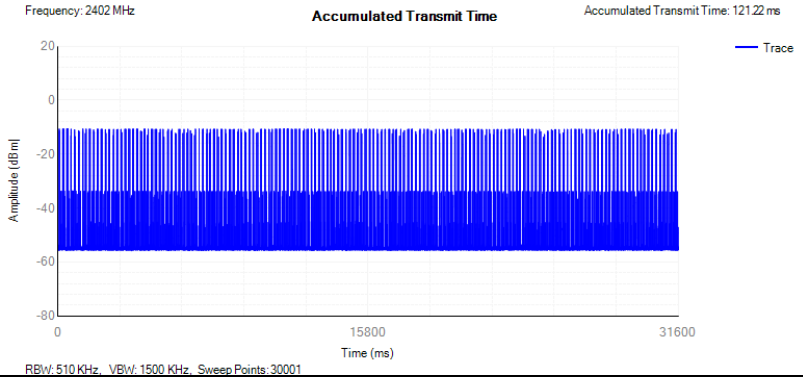
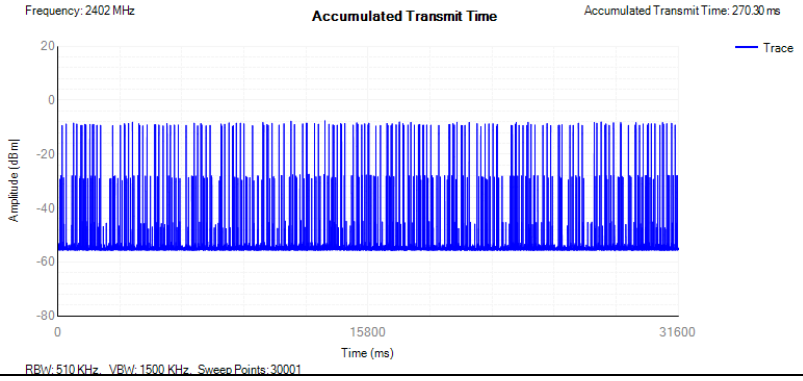
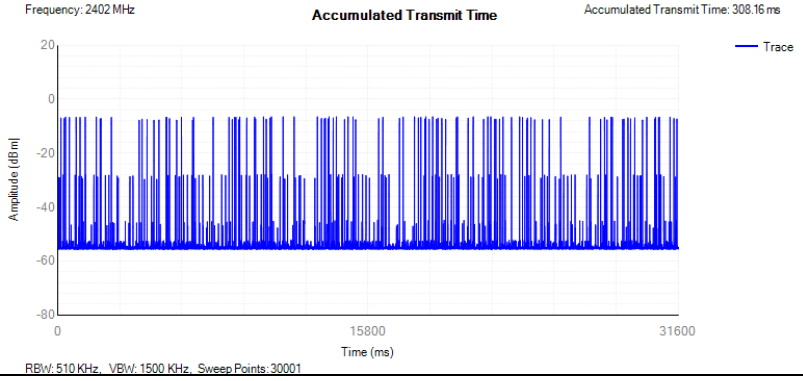
TEST RESULTS

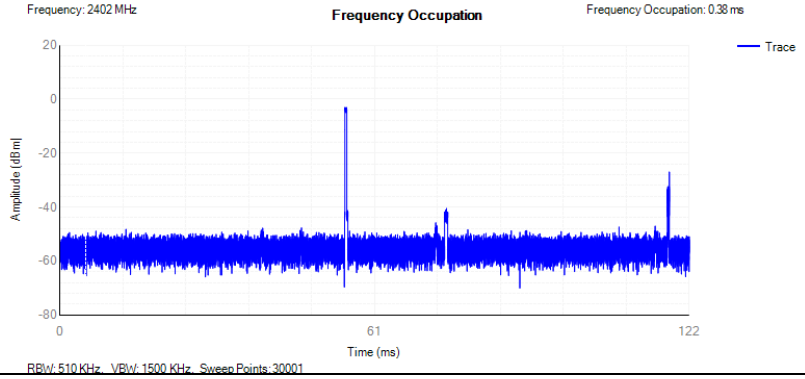
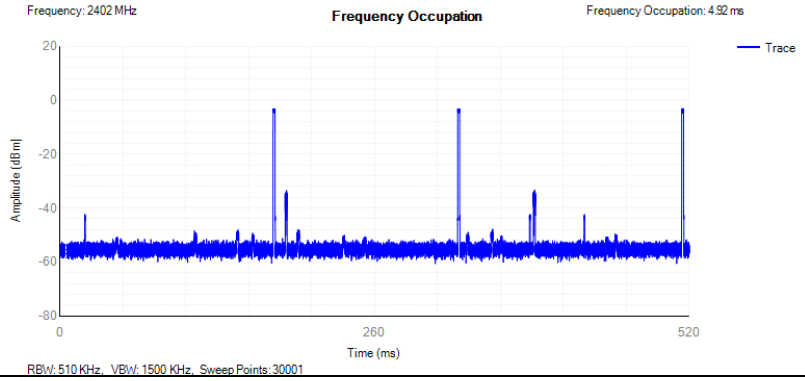
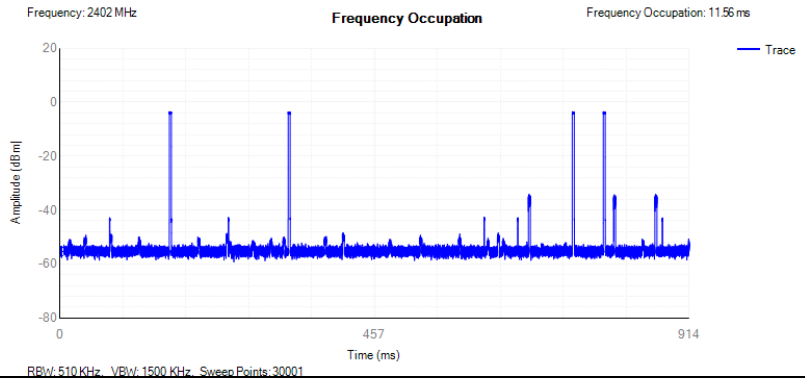
PASS

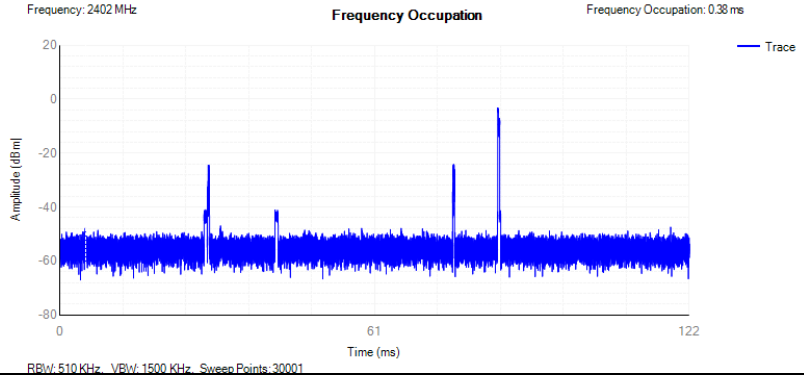
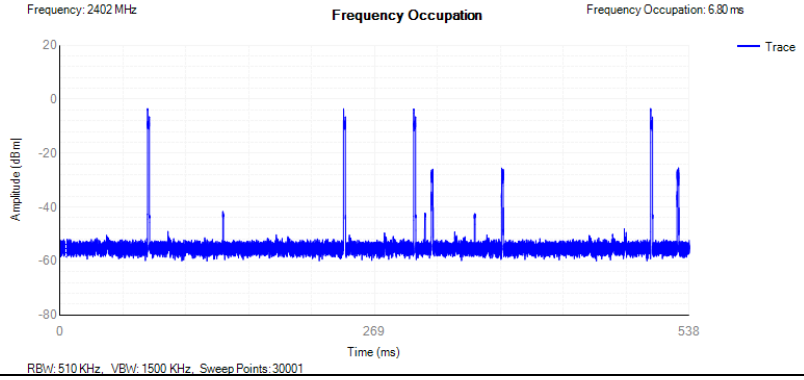
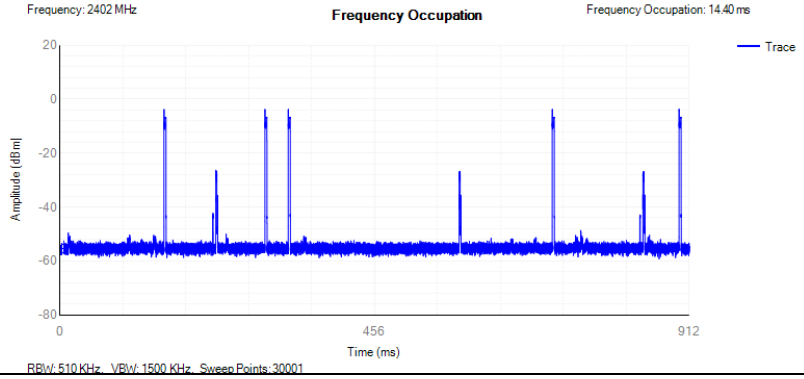
Please refer to the following table.

Hopping Sequence				
Humidity: 50 %		Temperature : 23 ℃	Test Date: November 27, 2020	
Hopping Channels	Hopping Channels Limits	Min. Hopping Range (%)	Min. Hopping Range Limit(%)	Result
GFSK (DH5)				
79	15	95.34	70.00%	PASS
8DPSK (3-DH5)				
79	15	95.75	70.00%	PASS
Test Plots				
GFSK (DH5)				
8DPSK (3-DH5)				

Dwell Time					
Humidity: 50 %		Temperature : 23 ℃		Test Date: November 27, 2020	
Packet Type	Number of Hopping Channel	Number of transmission in a period (channel number *0.4sec Period (Sec)	Dwell Time	Limit (ms)	Result
GFSK					
DH1	79	31.6	121.22	400	PASS
DH3	79	31.6	265.68	400	PASS
DH5	79	31.6	326.57	400	PASS
Test Plots					
DH1					
DH3					
DH5					

Dwell Time					
Humidity: 50 %		Temperature : 23 ℃		Test Date: November 27, 2020	
Packet Type	Number of Hopping Channel	Number of transmission in a period (channel number *0.4sec Period (Sec)	Dwell Time	Limit (ms)	Result
8DPSK					
3-DH1	79	31.6	121.22	400	PASS
3-DH3	79	31.6	270.30	400	PASS
3-DH5	79	31.6	308.16	400	PASS
Test Plots					
3-DH1					
3-DH3					
3-DH5					

Minimum Frequency Occupation				
Humidity: 50 %		Temperature : 23 ℃	Test Date: November 27, 2020	
Packet Type	Number of Hopping Channel	Number of times (hopping frequency of hopping sequence)	Minimum Limit	Result
GFSK				
DH1	79	1	≥1	PASS
DH3	79	3	≥1	PASS
DH5	79	4	≥1	PASS
Test Plots				
DH1				
DH3				
DH5				

Minimum Frequency Occupation				
Humidity: 50 %		Temperature : 23 ℃	Test Date: November 27, 2020	
Packet Type	Number of Hopping Channel	Number of times (hopping frequency of hopping sequence)	Minimum Limit	Result
8DPSK				
3-DH1	79	1	≥1	PASS
3-DH3	79	4	≥1	PASS
3-DH5	79	5	≥1	PASS
Test Plots				
3-DH1				
3-DH3				
3-DH5				

12.3 Occupied Channel Bandwidth

LIMIT

Condition	Limit
All types of equipment	Shall fall completely within the band 2400 to 2483.5 MHz
For non-adaptive using wide band modulations other than FHSS system and e.i.r.p > 10dBm	Less than 20MHz
For non-adaptive Frequency Hopping system and e.i.r.p > 10dBm	Less than 5MHz

BLOCK DIAGRAM OF TEST SETUP

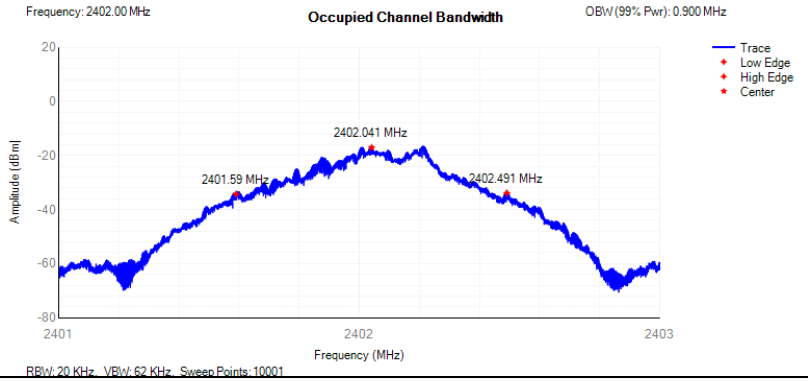
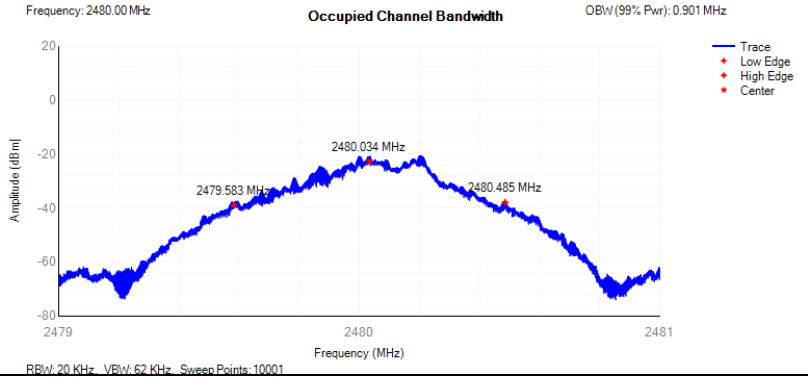
TEST PROCEDURES

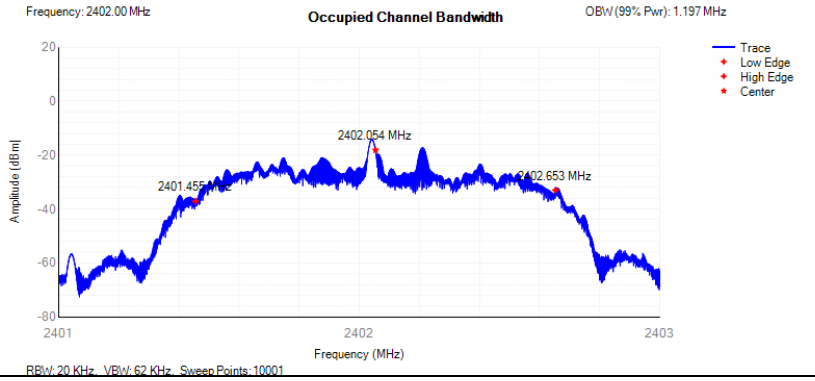
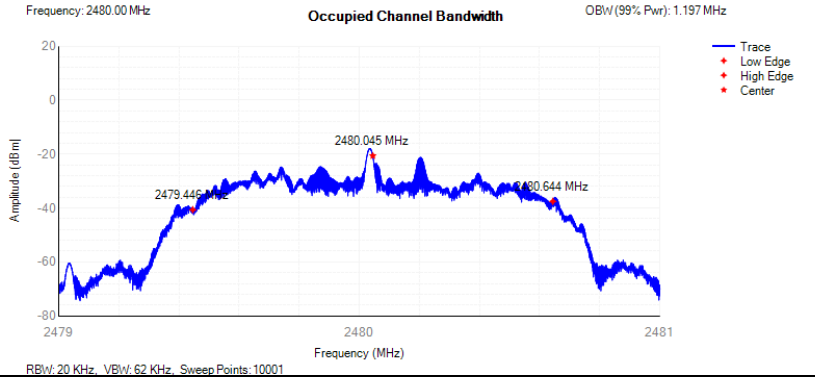
1. Please refer to ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.7.2.1 for conducted measurement method.
2. The measurements shall be performed at normal environmental condition.

TEST RESULTS

PASS

Please refer to the following table.

Temperature: 23 ℃		Humidity: 50 %		Test Date: November 27, 2020		
GFSK						
Test Frequency (MHz)	Packet Type	99% Bandwidth (MHz)	FL at 99% BW (KHz)	FH at 99% BW (KHz)	Limit	Results
2402	DH5	900	2401.590	2402.491	FL > 2.4 GHz and FH < 2.4835 GHz	PASS
2480	DH5	901	2479.583	2480.485		PASS
Test Frequency (MHz)	Packet Type	Test Plots				
2402	DH5					
2480	DH5					

Temperature: 23 ℃		Humidity: 50 %		Test Date: November 27, 2020		
8DPSK						
Test Frequency (MHz)	Packet Type	99% Bandwidth (MHz)	FL at 99% BW (KHz)	FH at 99% BW (KHz)	Limit	Results
2402	3-DH5	1197	2401.455	2402.653	FL > 2.4 GHz and FH < 2.4835 GHz	PASS
2480	3-DH5	1197	2479.446	2480.644		PASS
Test Frequency (MHz)	Packet Type	Test Plots				
2402	3-DH5					
2480	3-DH5					

12.4 Hopping Frequency Separation

LIMIT

Condition	Limit
Nom-adaptive frequency hopping systems	The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth of a single hop, with a minimum separation of 100 kHz.
Adaptive frequency hopping systems	The minimum Hopping Frequency Separation shall be 100 kHz.

BLOCK DIAGRAM OF TEST SETUP

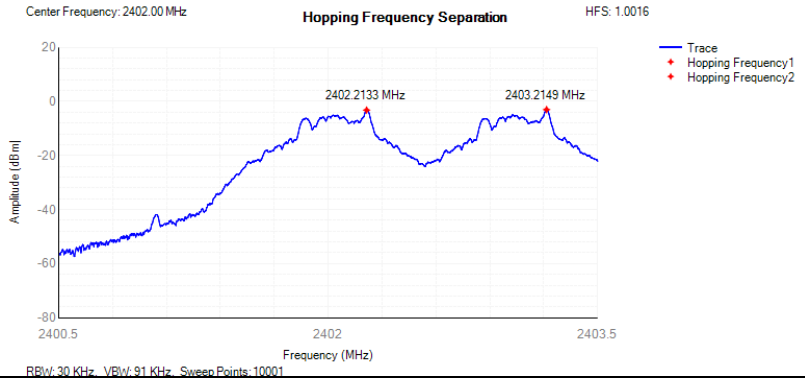
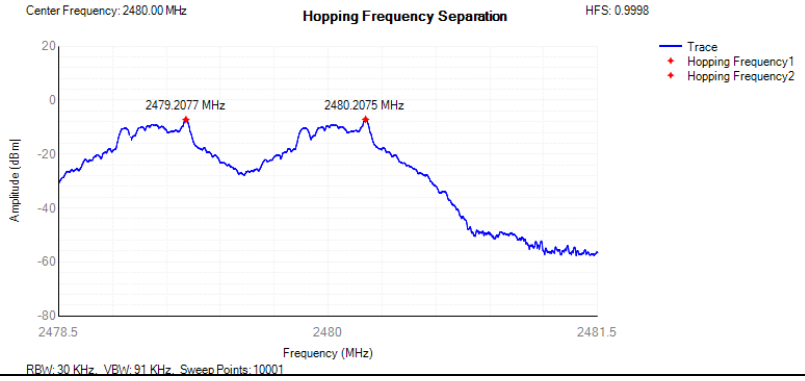
TEST PROCEDURES

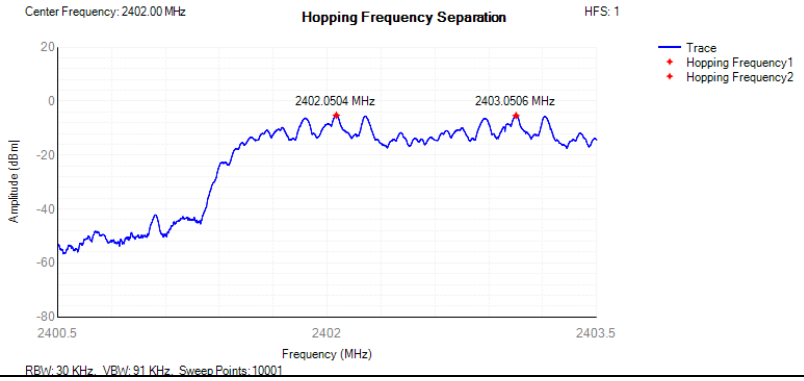
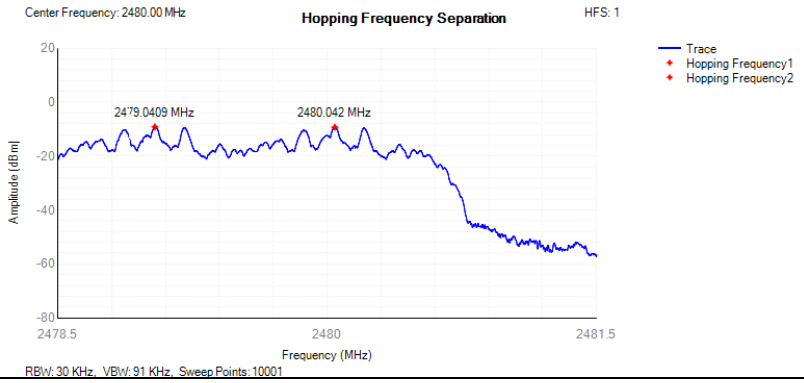
1. Please refer to ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.5.2.1 for conducted measurement method.
2. The measurements shall be performed at normal environmental condition.

TEST RESULTS

PASS

Please refer to the following table.

Temperature: 23 ℃	Humidity: 50 %	Test Date: November 27, 2020		
GFSK				
Test Frequency (MHz)	Packet Type	Channel Separation (KHz)	Limit (MHz) Minimum	Results
2402	DH5	1001.6	0.1	PASS
2480	DH5	999.8	0.1	PASS
Test Frequency (MHz)	Packet Type	Test Plots		
2402	DH5	
2480	DH5	

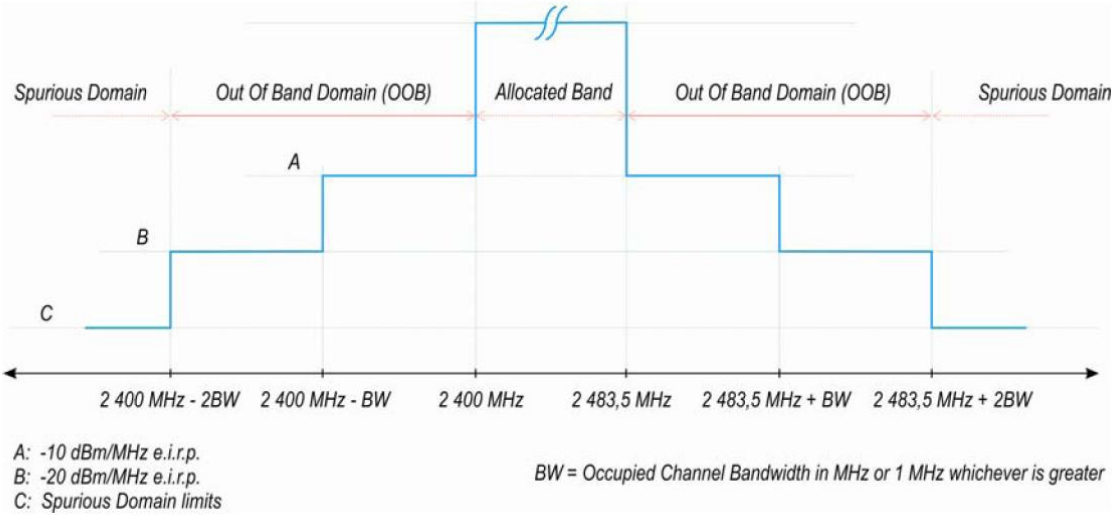
Temperature: 23 ℃	Humidity: 50 %	Test Date: November 27, 2020		
8DPSK				
Test Frequency (MHz)	Packet Type	Channel Separation (KHz)	Limit (MHz) Minimum	Results
2402	3-DH5	1000	0.1	PASS
2480	3-DH5	1000	0.1	PASS
Test Frequency (MHz)	Packet Type	Test Plots		
2402	3-DH5			
2480	3-DH5			

12.5 Transmitter Unwanted Emissions in the OUT-OF BAND Domain

LIMIT

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask

Transmit mask



BLOCK DIAGRAM OF TEST SETUP

TEST PROCEDURES

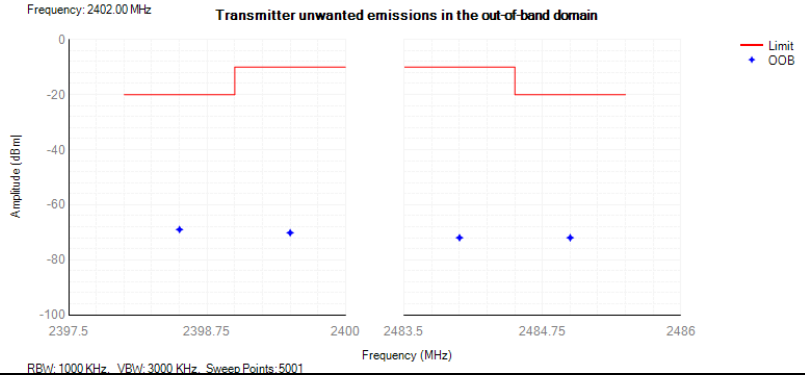
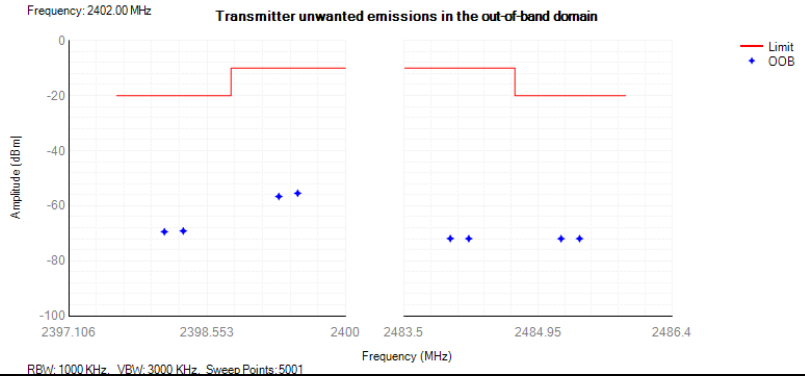
1. Please refer to ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.8.2.1 for conducted measurement method.
2. The measurements shall be performed at normal environmental conditions.

TEST RESULTS

PASS

Please refer to the following test plots.

Temperature: 23 ℃	Humidity: 50 %		Test Date: November 27, 2020		
Test Mode	2400-BW~2400/ 2483.5+BW ~2483.5 (dBm/MHz)	Limit (dBm/MHz)	2400-2*BW~2400 -BW/2483.5+2*BW ~2483.5+BW (dBm/MHz)	Limit (dBm/MHz)	Results
GFSK (Hopping)	-70.18	10	-69.00	20	PASS
8DPSK (Hopping)	-55.45	10	-59.16	20	PASS

Test Mode	Test Plots
GFSK (Hopping)	
8DPSK (Hopping)	

12.6 Transimitter Spurious Emissions and Receiver Spurious Emissions

LIMIT

Limits for EN 300 328: Clause 4.3.1.10.3, Table 4: Transmitter limits for spurious emissions.

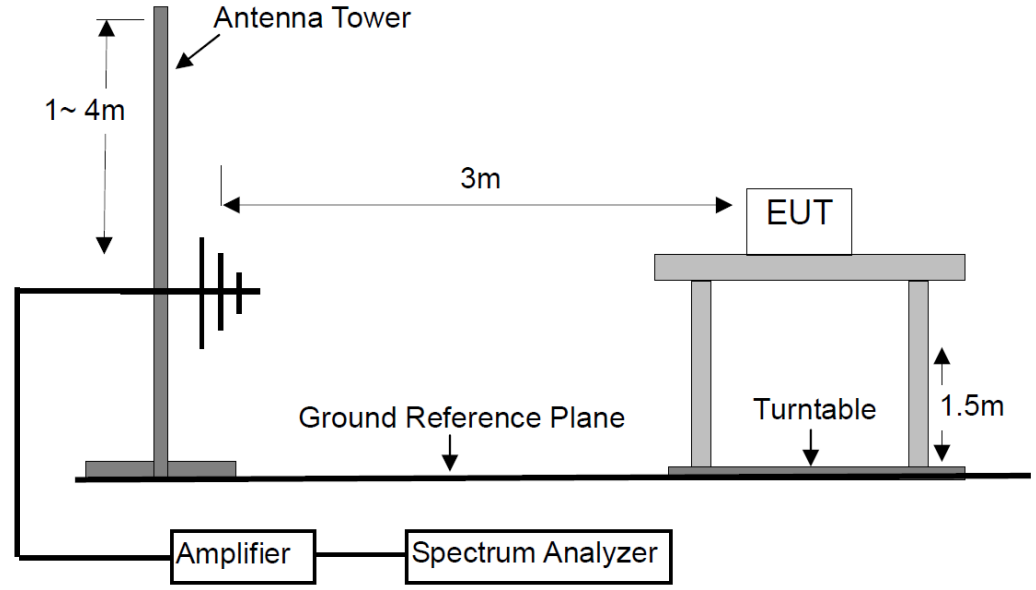
Frequency Range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47MHz	-36 dBm	100KHz
47 MHz to 74MHz	-54 dBm	100KHz
74 MHz to 87.5MHz	-36 dBm	100KHz
87.5 MHz to 118MHz	-54 dBm	100KHz
118 MHz to 174MHz	-36 dBm	100KHz
174 MHz to 230MHz	-54 dBm	100KHz
230 MHz to 470MHz	-36 dBm	100KHz
470 MHz to 862MHz	-54 dBm	100KHz
862 MHz to 1GHz	-36 dBm	100KHz
1GHz to 12.75GHz	-30 dBm	1MHz

Limits for EN 300 328: Clause 4.3.1.11.3, Table 5: Spurious emission limits for receivers

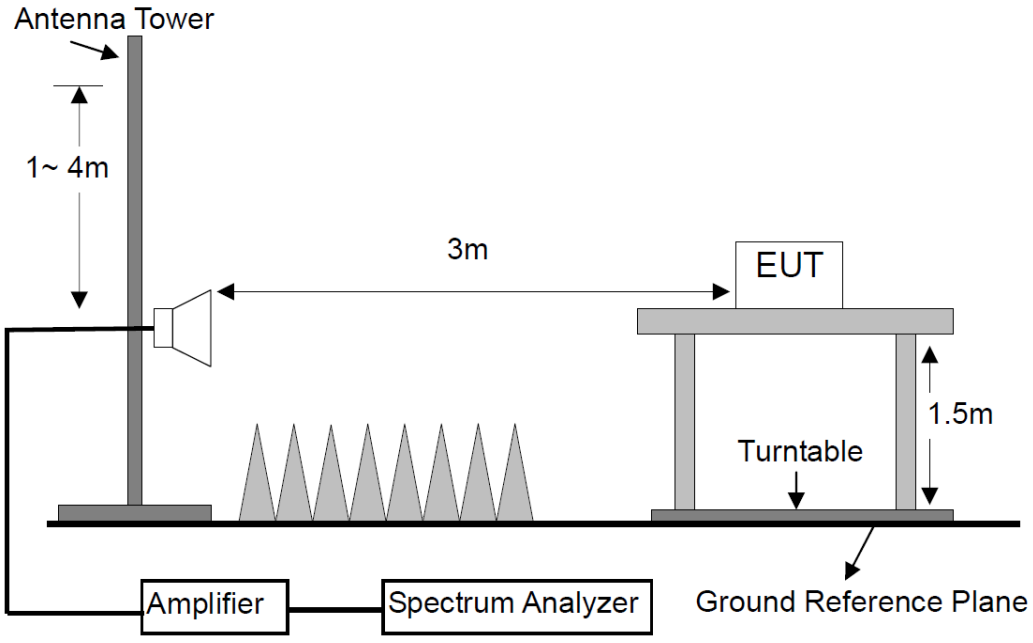
Frequency Range	Maximum power	Bandwidth
30 MHz to 1GHz	-57 dBm	100KHz
1GHz to 12.75GHz	-47 dBm	1MHz

BLOCK DIAGRAM OF TEST SETUP

For Radiated Emission 30-1000MHz



For Radiated Emission Above 1000MHz.



TEST PROCEDURES

1. Please refer to ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.9.2.2 and ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.10.2.2 for radiated measurement method.
2. The measurements shall be performed at normal environmental condition.

TEST RESULTS

PASS

Please refer to the following pages.

Test Date: November 28, 2020		Temperature : 23 ℃		Humidity: 50 %
Test Mode: TX (GFSK, The Worst Case)		Test frequency range: 0.03 – 12.75GHz		
Frequency (MHz)	Antenna Polarization	Emission level (dBm)	Limit (dBm)	Margin (dB)
Below 1GHz - Low Channel				
202.6600	Vertical	-76.03	-54.00	-22.03
218.1800	Vertical	-74.50	-54.00	-20.50

640.1300	Horizontal	-75.80	-54.00	-21.80
687.6599	Horizontal	-76.72	-54.00	-22.72

Below 1GHz - High Channel				
202.6600	Vertical	-74.12	-54.00	-20.12
218.1800	Vertical	-75.18	-54.00	-21.18

218.1800	Horizontal	-79.36	-54.00	-25.36
640.1300	Horizontal	-81.07	-54.00	-27.07

Above 1GHz – Low Channel				
4804	Vertical	-52.07	-30.00	-22.07
7206	Vertical	-53.53	-30.00	-23.53

4804	Horizontal	-47.98	-30.00	-17.98
7206	Horizontal	-52.69	-30.00	-22.69

Above 1GHz – High Channel				
4960	Vertical	-51.76	-30.00	-21.76
7440	Vertical	-52.95	-30.00	-22.95

4960	Horizontal	-48.76	-30.00	-18.76
7440	Horizontal	-52.39	-30.00	-22.39

Note:

1. Emission Level (dBm) = Reading level (dBm)+Correction Factor (dB)
2. Data of measurement within this frequency range shown " ---" in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.

Test Date: November 28, 2020		Temperature : 23 ℃		Humidity: 50 %
Test Mode: RX (GFSK, The Worst Case)		Test frequency range: 0.03 – 12.75GHz		
Frequency (MHz)	Antenna Polarization	Emission level (dBm)	Limit (dBm)	Margin (dB)
Below 1GHz - Low Channel				
202.6600	Vertical	-74.53	-57.00	-17.53
218.1800	Vertical	-73.50	-57.00	-16.50

218.1800	Horizontal	-77.81	-57.00	-20.81
320.0300	Horizontal	-74.86	-57.00	-17.86

Below 1GHz - High Channel				
202.6600	Vertical	-73.12	-57.00	-16.12
218.1800	Vertical	-74.18	-57.00	-17.18

730.3400	Horizontal	-81.85	-57.00	-24.85
995.1500	Horizontal	-77.00	-57.00	-20.00

Above 1GHz – Low Channel				
2402	Vertical	-69.01	-47.00	-22.01

2402	Horizontal	-68.91	-47.00	-21.91

Above 1GHz – High Channel				
2480	Vertical	-69.01	-47.00	-22.01

2480	Horizontal	-68.99	-47.00	-21.99

Note:

1. Emission Level (dBm) = Reading level (dBm)+Correction Factor (dB)
2. Data of measurement within this frequency range shown " ---" in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.

12.7 Receiver Blocking

LIMIT

Adaptive equipment using wide band modulations, shall comply with the requirements defined in clauses 4.3.2.11.3 and clauses 4.3.2.11.4 in the presence of a blocking signal with characteristics as below table.

(1) Receiver Blocking parameters for Receiver Category 1 equipment

Receiver Category 1 Equipment			
Wanted signal mean power from companion device (dBm) (See note 1 and 4)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (See note 4)	Type of blocking signal
(-133dBm+10x$\log_{10}$(OCBW) Or -68dBm whichever is less (See note 2)	2 380 2 504	-34	CW
(-139dBm+10x$\log_{10}$(OCBW) Or -74dBm whichever is less (See note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

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.

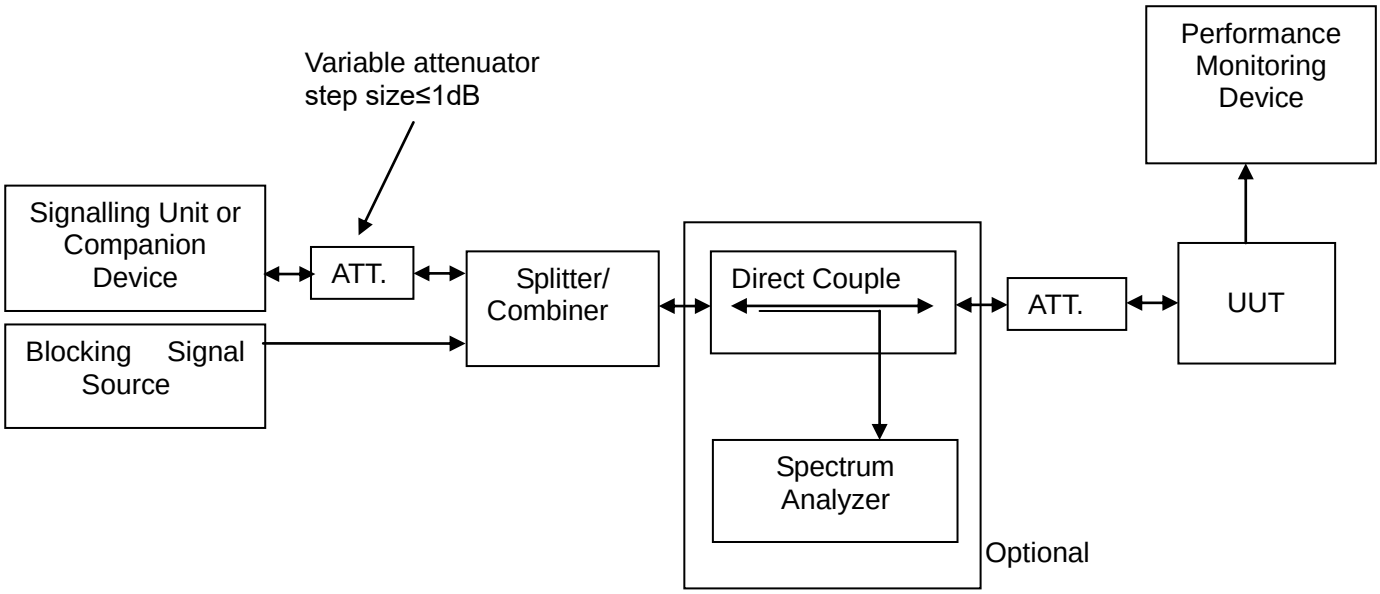
(2) Receiver Blocking parameters receiver category 2 equipment

Receiver Category 2 Equipment			
Wanted signal mean power from companion device (dBm) (See note 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (See note 3)	Type of blocking signal
(-139dBm+10xlog$_{10}$(OCBW)+10dB) Or -74dBm+10dB) whichever is less(See note 2)	2 380 2 504 2 300 2 584	-34	CW
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: 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.			

(3) Receiver Blocking parameters receiver category 3 equipment

Receiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm) (See note 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (See note 3)	Type of blocking signal
(-139dBm+10xlog$_{10}$(OCBW)+20dB) Or -74dBm+20dB) whichever is less(See note 2)	2 380 2 504 2 300 2 584	-34	CW
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 the test may be performed using a wanted signal up to Pmin + 30 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: 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.			

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

1. Please refer to ETSI EN 300328 ($V_{2.2.2}$) clause 5.4.11.2.1 for conducted measurement method.
2. The measurements shall be performed at normal environmental condition.

TEST RESULTS

Pass.

Please refer to following data tables.

Temperature: 20 ℃	Humidity : 53 %	Test Date: November 27, 2020		
Antenna Assembly Gain: 0 dBi				
☐ Category 1	☐ Category 2		☒ Category 3	
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm)	PER(%)	PER Limit (%)
GFSK Low channel (OCBWmin:0.900MHz)				
-59.46	2380	-34	0	10
	2504		0	10
	2 300		0	10
	2 584		0	10
GFSK High channel (OCBWmin:0.901MHz)				
-59.45	2380	-34	0	10
	2504		0	10
	2 300		0	10
	2 584		0	10
8DPSK Low channel (OCBWmin:1.197MHz)				
-58.22	2380	-34	0	10
	2504		0	10
	2 300		0	10
	2 584		0	10
8DPSK High channel (OCBWmin:1.197MHz)				
-58.22	2380	-34	0	10
	2504		0	10
	2 300		0	10
	2 584		0	10

13. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2020	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2020	1 Year
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 13, 2020	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2020	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2020	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-172	Mar. 22, 2019	2 Year
7.	Power Sensor	DARE	RPR3006W	15I00041SNO 64	Mar. 13, 2020	1 Year
8.	Communication Tester	Rohde & Schwarz	CMW500	149004	Mar. 13, 2020	1 Year
9.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2020	1 Year
10.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2020	1 Year
11.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2020	1 Year
12.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2020	1 Year
13.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 14, 2020	1 Year
14.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2020	1 Year
15.	L.I.S.N	Rohde & Schwarz	ESH2-Z5	893606/014	Mar. 13, 2020	1 Year
16.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2020	1 Year
17.	Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	Mar. 13, 2020	1 Year
18.	DC Source	Maynuo	MY8811	N/A	Mar. 13, 2020	1 Year
19.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
20.	Chamber	SAEMC	9*7*7m	N/A	Jun. 20, 2019	2 Year
21.	Test Software	EZ	EZ_EMC	N/A	N/A	N/A

APPENDIX I - Information as required by ETSI EN 300328 V2.2.2

In accordance with EN 300 328, clause 5.4.1, the following information is provided by the supplier.

a)	The type of modulation used by the equipment:	☒ FHSS ☐ Other forms of modulation
b)	In case of FHSS modulation:	In case of non-Adaptive Frequency Hopping equipment: The number of Hopping Frequencies: 79
		In case of Adaptive Frequency Hopping Equipment: The maximum number of Hopping Frequencies: 79 ; minimum: 79
		The (Average) Dwell Time: 317.365
c)	Adaptive / non-adaptive equipment:	☐ Non-adaptive Equipment ☒ Adaptive Equipment without the possibility to switch to a non-adaptive mode ☐ Adaptive Equipment which can also operate in a non-adaptive mode
d)	In case of adaptive equipment:	The maximum Channel Occupancy Time (COT) implemented by the equipment: ms ☒ The equipment has implemented an LBT based DAA mechanism
		In case of equipment using modulation different from FHSS: ☐ The equipment is Frame Based equipment ☐ The equipment is Load Based equipment ☐ The equipment can switch dynamically between Frame Based and Load Based equipment
		The CCA time implemented by the equipment: µs
		☐ The equipment has implemented an non-LBT based DAA mechanism ☐ The equipment can operate in more than one adaptive mode
e)	In case of non-adaptive Equipment:	The maximum RF Output Power (e.i.r.p.): -1.00 dBm
		The maximum (corresponding) Duty Cycle: %
		Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and orresponding power levels to be declared):
f)	The worst case operational mode for each of the following tests:	RF Output Power GFSK
		Power Spectral Density N/A
		Duty cycle, Tx-Sequence, Tx-gap N/A
		Accumulated Transmit time, Frequency Occupation & Hopping Sequence (only for FHSS equipment)
		Hopping Frequency Separation (only for FHSS equipment) GFSK
		Medium Utilisation N/A
		Adaptivity & Receiver Blocking GFSK
		Nominal Channel Bandwidth 8DPSK
		Transmitter unwanted emissions in the OOB domain 8DPSK
		Transmitter unwanted emissions in the spurious domain GFSK
		Receiver spurious emissions GFSK

g)	The different transmit operating modes (tick all that apply):	☒ Operating mode 1: Single Antenna Equipment ☒ Equipment with only 1 antenna ☐ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time ☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
		☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming ☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode) ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1 ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2 NOTE: Add more lines if more channel bandwidths are supported.
		☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming ☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode) ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1 ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2 NOTE: Add more lines if more channel bandwidths are supported.
h)	In case of Smart Antenna Systems:	The number of Receive chains:_____
		The number of Transmit chains: _____ ☐ symmetrical power distribution; ☐ asymmetrical power distribution
		In case of beam forming, the maximum beam forming gain: NOTE: Beam forming gain does not include the basic gain of a single antenna.
i)	Operating Frequency Range(s) of the equipment:	Operating Frequency Range 1: 2402 MHz to 2480 MHz Operating Frequency Range 2:_____MHz to _____MHz
j)	Nominal Channel Bandwidth(s):	Nominal Channel Bandwidth 1: 901 KHz Nominal Channel Bandwidth 2: 1197 KHz Nominal Channel Bandwidth 3:_____KHz Nominal Channel Bandwidth 4:_____KHz
k)	Type of Equipment (stand-alone, combined, plug-in radio device, etc.)	☒ Stand-alone ☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment) ☐ Plug-in radio device (Equipment intended for a variety of host systems) ☐ Other _____
l)	The normal and the extreme operating conditions that apply to the equipment:	Normal operating conditions (if applicable): Operating temperature range: 25 ° C Other (please specify if applicable), Extreme operating conditions: Operating temperature range: Minimum: 0 ° C Maximum: 45 ° C
		Details provided are for the: ☒ stand-alone equipment ☐ combined (or host) equipment ☐ test jig

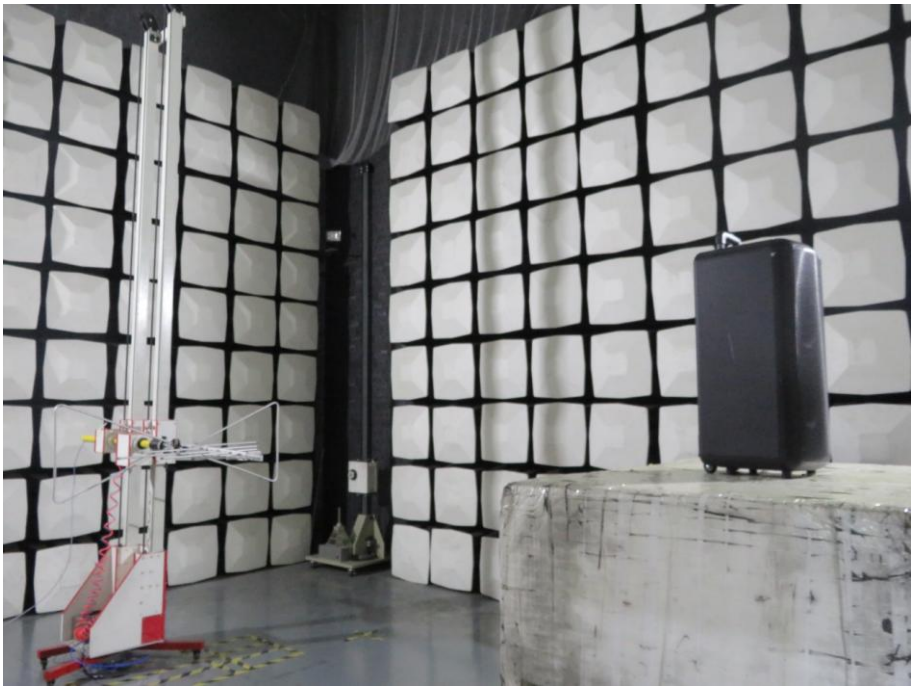
<table>
<tr><td>m)</td><td>The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:</td><td>
Antenna Type:
☒ PCB Antenna: Antenna Gain: -0.68 dBi
If applicable, additional beamforming gain (excluding basic antenna gain):____dB
☐ Temporary RF connector provided
☐ No temporary RF connector provided
☐ Dedicated Antennas (equipment with antenna connector)
☐ Single power level with corresponding antenna(s)
☐ Multiple power settings and corresponding antenna(s)
Number of different Power Levels: _____
Power Level 1:_____dBm
Power Level 2:_____dBm
Power Level 3:_____dBm
NOTE 1: Add more lines in case the equipment has more power levels..
NOTE 2: These power levels are conducted power levels (at antenna connector).
For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable
Power Level 1:_____
Number of antenna assemblies provided for this power level:
<table>
<tr><th>Assembly #</th><th>Gain (dBi)</th><th>e.i.r.p.(dBm)</th><th>Part number or model name</th></tr>
<tr><td>1</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td></tr>
</table>
Note: Add more rows in case more antenna assemblies are supported for this power level.
Power Level 2:_____
Number of antenna assemblies provided for this power level:
<table>
<tr><th>Assembly #</th><th>Gain (dBi)</th><th>e.i.r.p.(dBm)</th><th>Part number or model name</th></tr>
<tr><td>1</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td></tr>
</table>
Note: Add more rows in case more antenna assemblies are supported for this power level.
Power Level 3:_____
Number of antenna assemblies provided for this power level:
<table>
<tr><th>Assembly #</th><th>Gain (dBi)</th><th>e.i.r.p.(dBm)</th><th>Part number or model name</th></tr>
<tr><td>1</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td></tr>
</table>
Note: Add more rows in case more antenna assemblies are supported for this power level.
</td></tr>
</table>

n)	The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:	Details provided are for the: ☒ stand-alone equipment ☐ combined (or host) equipment ☐ test jig Supply Voltage: ☒ AC mains State AC voltage _____ V ☒ DC State, DC voltage 12 V In case of DC, indicate the type of power source ☐ Internal Power Supply ☐ External Power Supply or AC/DC adapter ☒ Battery ☐ Other: _____
o)	Describe the test modes available which can facilitate testing:	The EUT provides TX Mode to control RF signal transmission
p)	The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):	Bluetooth®
q)	If applicable, the statistical analysis referred to in clause 5.4.1 q)	(to be provided as separate attachment)
r)	If applicable, the statistical analysis referred to in clause 5.4.1 r)	(to be provided as separate attachment)
s)	Geo-location capability supported by the equipment:	☐ Yes ☐ The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user ☐ No
t)	Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):	/
E.3	Combination for testing	/
		/
		/
		/
		/

E.4 Additional information provided by the applicant		
E.4.1	Modulation:	ITU Class(es) of emission: F1D, G1D Can the transmitter operate unmodulated? ☒ yes ☐ no
E.4.2	Duty Cycle	The transmitter is intended for: ☐ Continuous duty ☐ Intermittent duty ☒ Continuous operation possible for testing purposes
E.4.3	About the UUT	☒ The equipment submitted are representative production models ☐ If not, the equipment submitted are pre-production models ? ☐ If pre-production equipment are submitted, the final production equipment will be identical in all respects with the equipment tested ☐ If not, supply full details
E.4.4	Additional items and/or supporting equipment provided	☐ Spare batteries (e.g. for portable equipment) ☐ Battery charging device ☐ External Power Supply or AC/DC adapter ☐ Test Jig or interface box ☐ RF test fixture (for equipment with integrated antennas) ☐ Host System Manufacturer: Model #: Model name: ☐ Combined equipment Manufacturer: Model #: Model name: ☒ User Manual ☒ Technical documentation (Handbook and circuit diagrams)

APPENDIX II – Photographs of Test Set-up

Radiated Emission Below 1 GHz



Radiated Emission Above 1 GHz

(For photographs of EUT, please refer to report NTC2011115EV00)

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