TEST REPORT

Application No.:	HKEM2101000105AT
Applicant:	Wise Ally Holdings Limited
Address of Applicant:	Unit 3203-3207 , Tower 1 , Enterprise Square Five , Kowloon Bay , Hong Kong
Equipment Under Test (EUT):	
EUT Name:	Rapid Response Button
Model No.:	AP82
FCC ID:	2AGEG-AP82
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2021-02-09
Date of Test:	2021-02-09 to 2021-02-16
Date of Issue:	2021-02-16
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Law Man Kit
EMC Manager

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2021-02-16*		*Original*

Authorized for issue by:				
				
		Leo Xu /Project Engineer		Date: 2021-02-16
				
		Law Man Kit /Reviewer		Date: 2021-02-16

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

Declaration of EUT Family Grouping:
N/A

Abbreviation:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

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4 General Information

4.1 Details of E.U.T.

	Power supply:	Adaptor Model: IEC 005 Input: AC 100 V - 240 V, 50/60 Hz, 0.75 A Output: DC 5 V, 1 A or Battery Model: SD364040 Output: DC 3.7 V, 1.85 Wh
	Test voltage:	AC 120 V
	Cable:	Power Cable: 18.8 cm unshielded 4-wire USB cable Data Cable: 18.8 cm unshielded 4-wire USB cable
	Antenna Gain:	2 dBi
	Antenna Type:	PIFA Antenna
	Bluetooth Version:	V4.2 Classic
	Channel Spacing:	1MHz
	Modulation Type:	GFSK
	Number of Channels:	79
	Operation Frequency:	2402MHz to 2480MHz
	Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
	Series No.:	A1
	Firmware Version:	1.0.8
	Hardware Version:	4.2

Frequency List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**2402**	**40**	**2441**
1	2403	41	2443
2	2404	42	2444
3	2405	43	2445
4	2406	44	2446
5	2407	45	2447
6	2408	46	2448
7	2409	47	2449
8	2410	48	2450
9	2411	49	2451
10	2412	50	2452
11	2413	51	2453
12	2414	52	2454
13	2415	53	2455
14	2416	54	2456
15	2417	55	2457
16	2418	56	2458
17	2419	57	2459
18	2420	58	2460
19	2421	59	2461
20	2422	60	2462
21	2423	61	2463
22	2424	62	2464
23	2425	63	2465
24	2426	64	2466
25	2427	65	2467
26	2428	66	2468
27	2429	67	2469
28	2430	68	2470
29	2431	69	2471
30	2432	70	2472
31	2433	71	2473
32	2434	72	2474
33	2435	73	2475
34	2436	74	2476
35	2437	75	2477
36	2438	76	2478
37	2439	77	2479
38	2440	**78**	**2480**
39	2441		

The frequencies under test are bolded.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	DELL	P75F	H55LXQ2
Linear Adaptor	SGS HK Ltd	IEC 005	N/A
ESP_RF_test_tool_v2.5.exe	PricewaterhouseCoopers Advisory Services LLC	N/A	N/A

4.3 Modulation configure

RF software:	ESP_RF_test_tool_v2.5.exe			
Modulation	**Packet**	**Packet Type**	**Packet Size**	**Power**
GFSK	DH1	5	Default	4
	DH3	5	Default	4
	DH5	5	Default	4

Remark:

1. 4 value was set in test software as maximum output power setting.

4.4 Measurement Uncertainty

RF

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 10^{-8}
2	Duty cycle	± 0.37%
3	Occupied Bandwidth	± 3%
4	RF conducted power (30MHz-40GHz)	1.5dB
5	RF power density	1.5dB
6	Conducted Spurious emissions	1.5dB
7	RF Radiated power & Radiated Spurious emission test	4.9dB (30MHz-1GHz)
		4.6dB (1GHz-6GHz)
		4.7dB (6GHz-18GHz)
		5.6dB (18GHz-40GHz)
8	Temperature test	± 1℃
9	Humidity test	± 3%
10	Supply voltages	± 1.5%
11	Time	± 3%

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2” and is documented in the test lab quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.5 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **HOKLAS (Lab Code: 009)**

SGS Hong Kong Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2017 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **IAS Accreditation (Lab Code: TL-187)**

SGS Hong Kong Limited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS Hong Kong Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS Hong Kong Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2020/08/31	2021/08/30
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	E005	2020/05/12	2021/05/11
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	E028	2020/09/12	2021/09/11
EMC32 Test software	Rohde & Schwarz	Version 10	N/A	N/A	N/A

Conducted Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

Carrier Frequencies Separation					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

Hopping Channel Number					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

Dwell Time					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

Conducted Band Edges Measurement					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

Conducted Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	CAL IN USE	CAL IN USE
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/09/21	2021/09/20
WMS32 Test software	Rohde & Schwarz	N/A	Version 11	N/A	N/A

Radiated Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2020/08/09	2021/08/08
Coaxial Cable	SGS	N/A	E167	2020/07/20	2021/07/19
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2020/05/18	2021/05/18
TRILOG Super Broadb. Test Antenna, (25) 30-1000 MHz	Schwarzbeck	9168-1110	E311	2020/02/13	2022/02/12
EMC32 Test software	Rohde & Schwarz	Version 10	N/A	N/A	N/A
Spectrum Analyzer 9kHz - 30GHz	Rohde & Schwarz	FSP30	E204	2020/05/11	2021/05/10
Horn Antenna 1 - 18GHz	Schwarzbeck	BBHA9120D	E211	2020/03/11	2022/03/10
Preamplifier 33dB, 1 - 18GHz	Schwarzbeck	BBV9718	E214	2020/04/09	2021/04/08
Band Reject Filter 2.4-2.5GHz	Wainwright	WRCJV 2400/2500-2100	E206	2019/04/24	2021/04/23
RF cable SMA to SMA 10000mm	HUBER+SUHNER	SF104-26.5/2*11SMA 45	E207	2020/09/21	2021/09/20
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	N/A	N/A
Turntable with Controller	ChamPro	EM1000	E238	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2020/09/12	2021/09/11
Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2020/09/12	2021/09/11
Barometer with digital thermometer	SATO	7612-00	E218	2020/4/23	2021/4/22
Conditional Chamber	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2020/8/31	2021/8/30

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

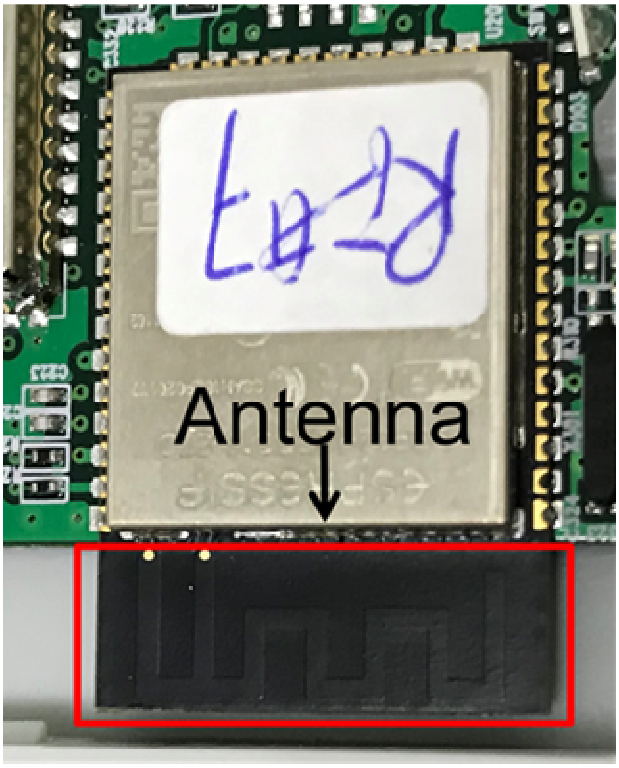
6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2 dBi.

Antenna location: Refer to internal photo.

6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1): According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: 29 -1 = 511 bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g): According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h): According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

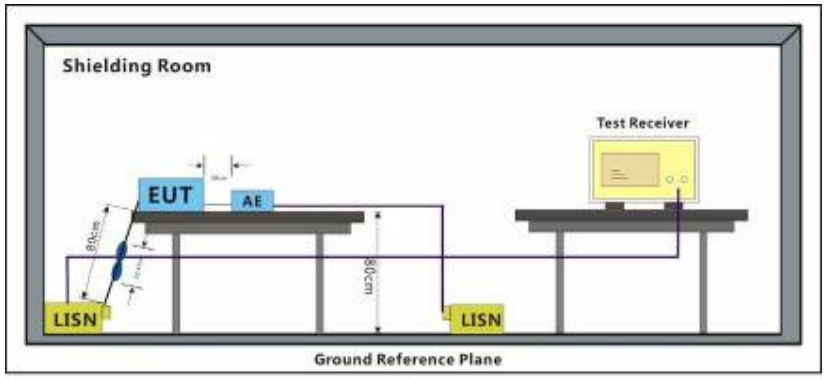
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Test mode a: Charge + TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

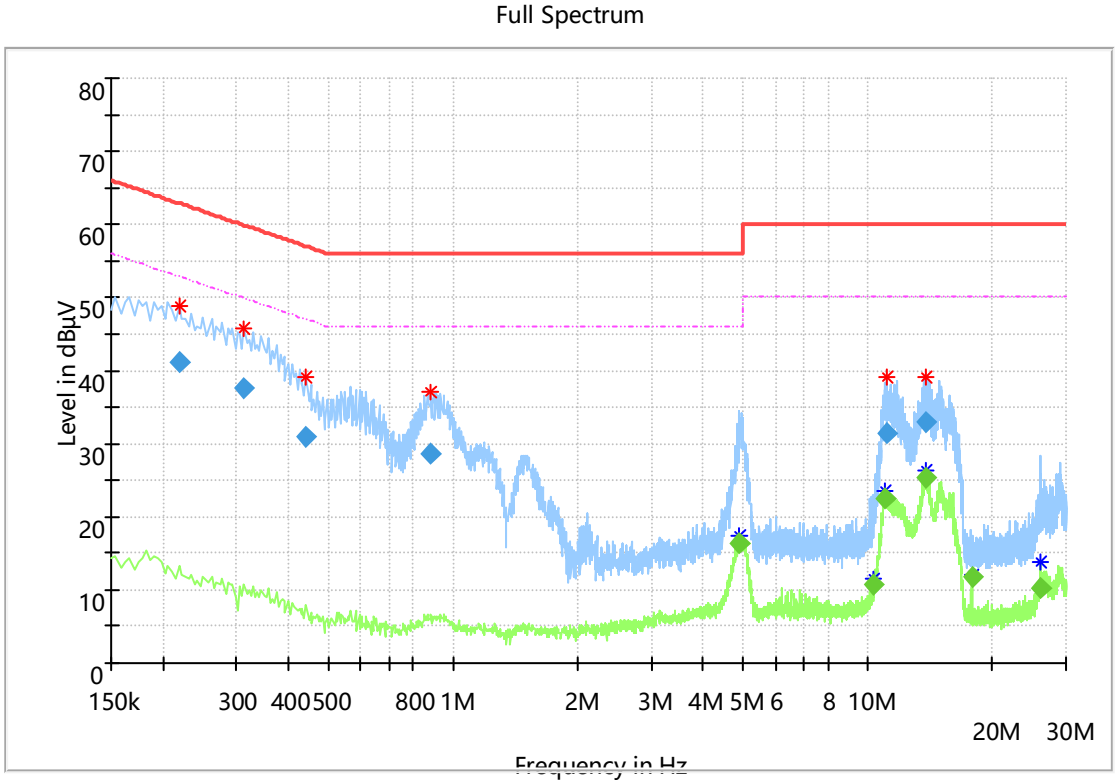
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

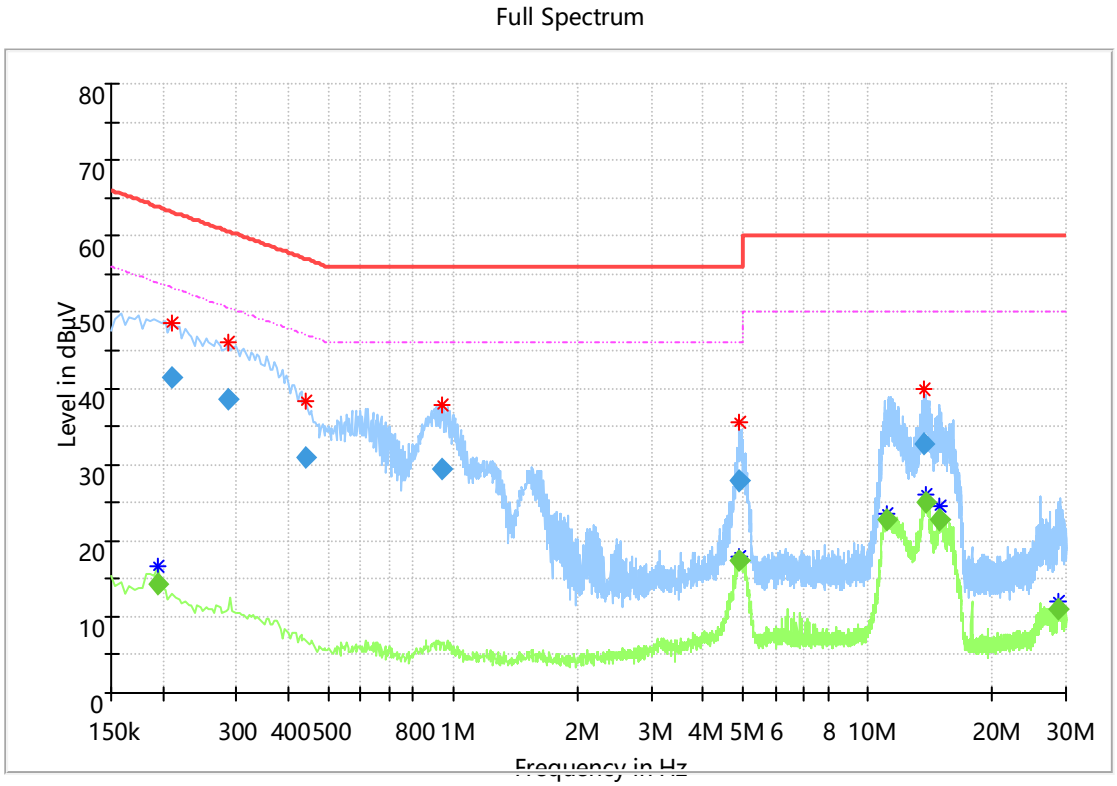
Remark: LISN=Read Level+ Cable Loss+ LISN Factor

Mode:a; Line:Live Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.218000	41.1	---	62.9	21.8	10.1	Pass
0.314000	37.6	---	59.9	22.2	10.0	Pass
0.442000	30.8	---	57.0	26.2	10.1	Pass
0.882000	28.6	---	56.0	27.4	10.1	Pass
4.890000	---	16.4	46.0	29.6	10.1	Pass
10.354000	---	10.8	50.0	39.3	10.1	Pass
11.022000	---	22.4	50.0	27.6	10.2	Pass
11.146000	31.5	---	60.0	28.5	10.6	Pass
13.778000	33.0	---	60.0	27.0	11.0	Pass
13.862000	---	25.3	50.0	24.7	11.3	Pass
17.778000	---	11.9	50.0	38.2	11.2	Pass
25.950000	---	10.3	50.0	39.7	11.1	Pass

Mode:a; Line:Neutral Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.194000	---	14.4	53.9	39.4	10.1	Pass
0.210000	41.4	---	63.2	21.8	10.0	Pass
0.286000	38.5	---	60.6	22.2	10.1	Pass
0.442000	31.0	---	57.0	26.1	10.1	Pass
0.938000	29.4	---	56.0	26.6	10.1	Pass
4.902000	---	17.4	46.0	28.6	10.1	Pass
4.910000	27.8	---	56.0	28.2	10.2	Pass
11.070000	---	22.7	50.0	27.3	10.6	Pass
13.718000	32.6	---	60.0	27.4	11.0	Pass
13.798000	---	25.0	50.0	25.0	11.3	Pass
14.934000	---	22.6	50.0	27.4	11.2	Pass
28.818000	---	11.1	50.0	39.0	11.1	Pass

7.2 Conducted Peak Output Power

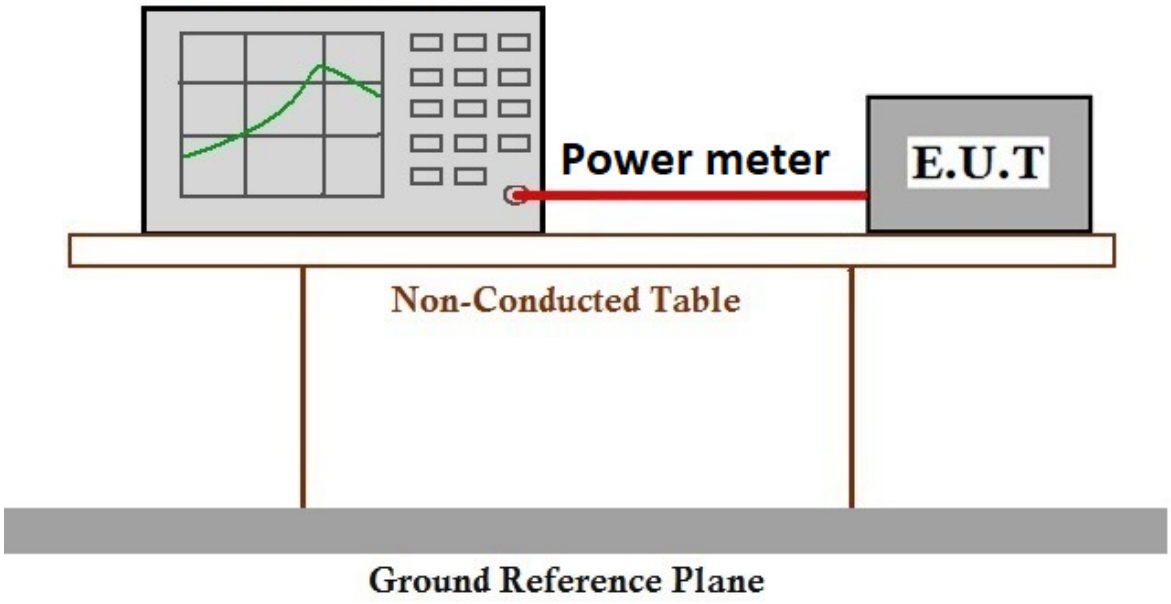
Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.5
Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 50 % RH :
Test mode b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.5
The detailed test data see: Appendix 15.247

7.3 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)

Test Method: ANSI C63.10 (2013) Section 7.8.7

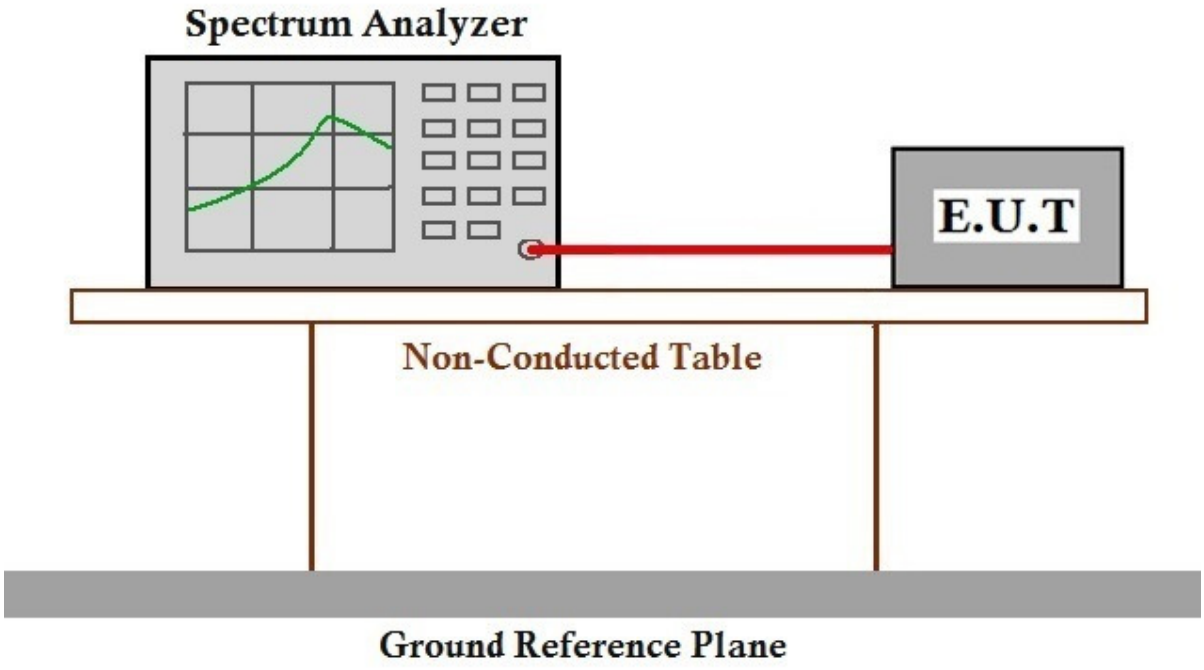
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Test mode b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.7

The detailed test data see: Appendix 15.247

7.4 Carrier Frequencies Separation

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.2
Limit:	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

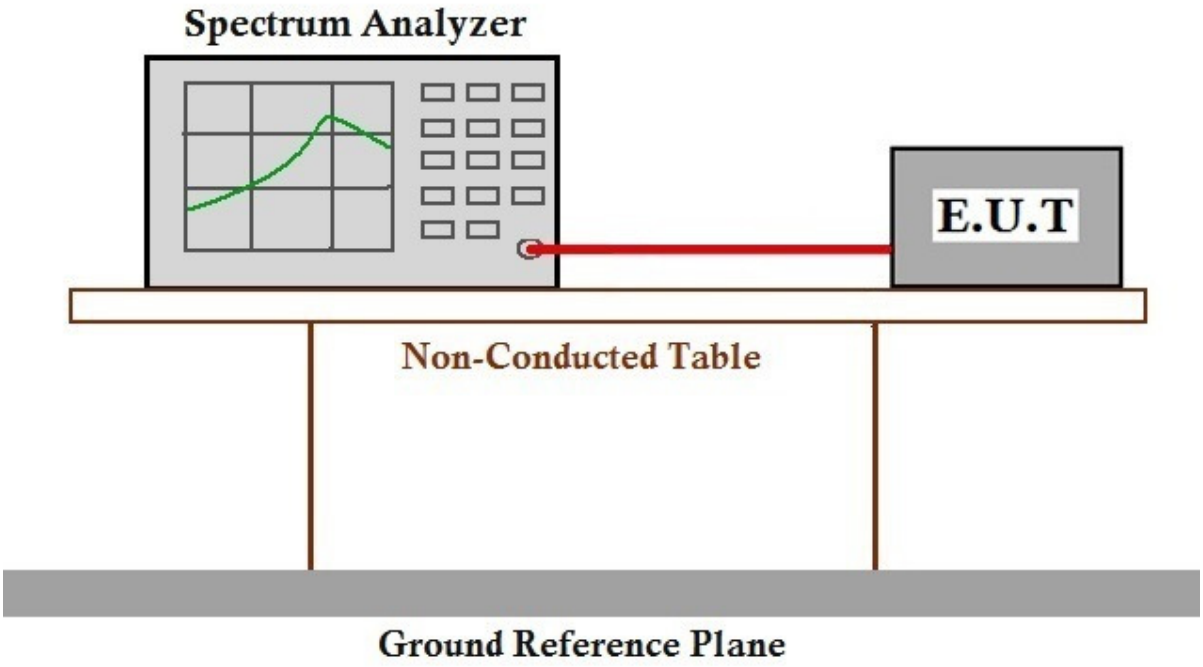
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Test mode: a: Charge + TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.2

The detailed test data see: Appendix 15.247

7.5 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

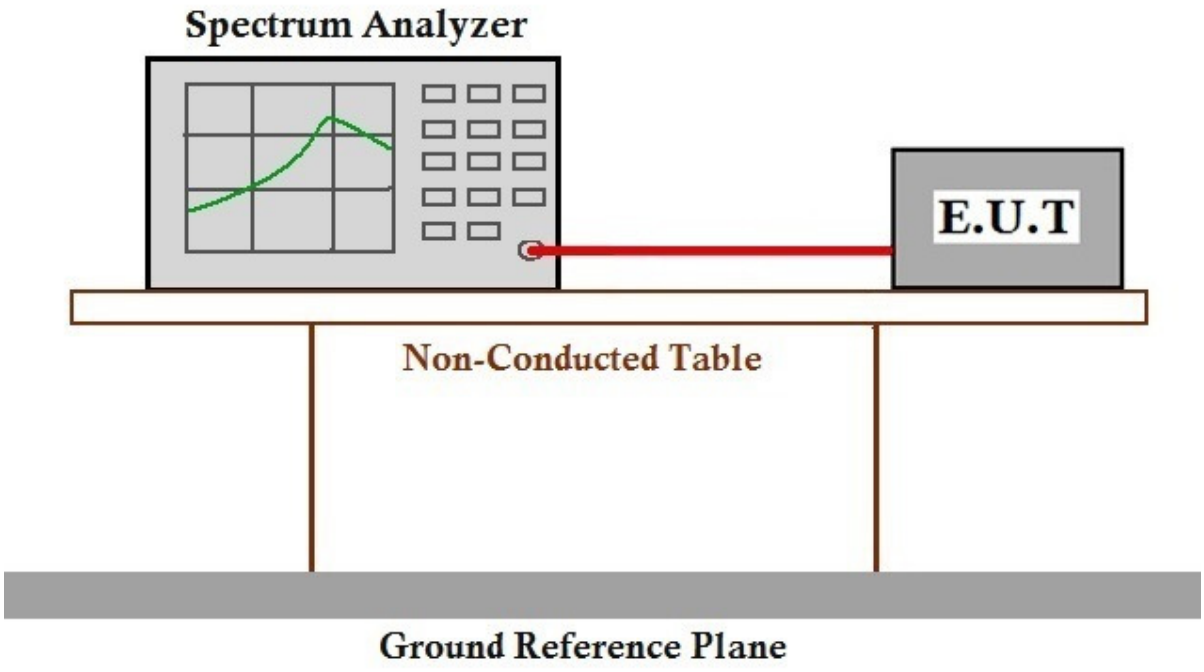
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Test mode a: Charge + TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.3

The detailed test data see: Appendix 15.247

7.6 Dwell Time

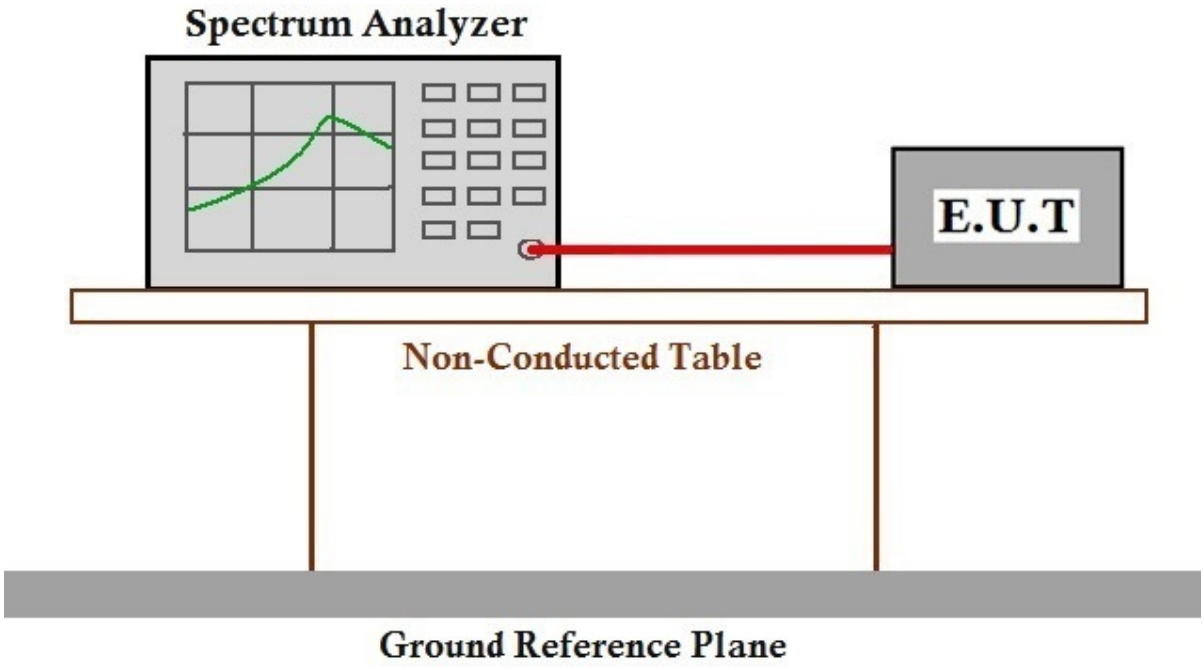
Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method: ANSI C63.10 (2013) Section 7.8.4
Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 50 % RH :
Test mode a: Charge + TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.4
The detailed test data see: Appendix 15.247

7.7 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.6
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

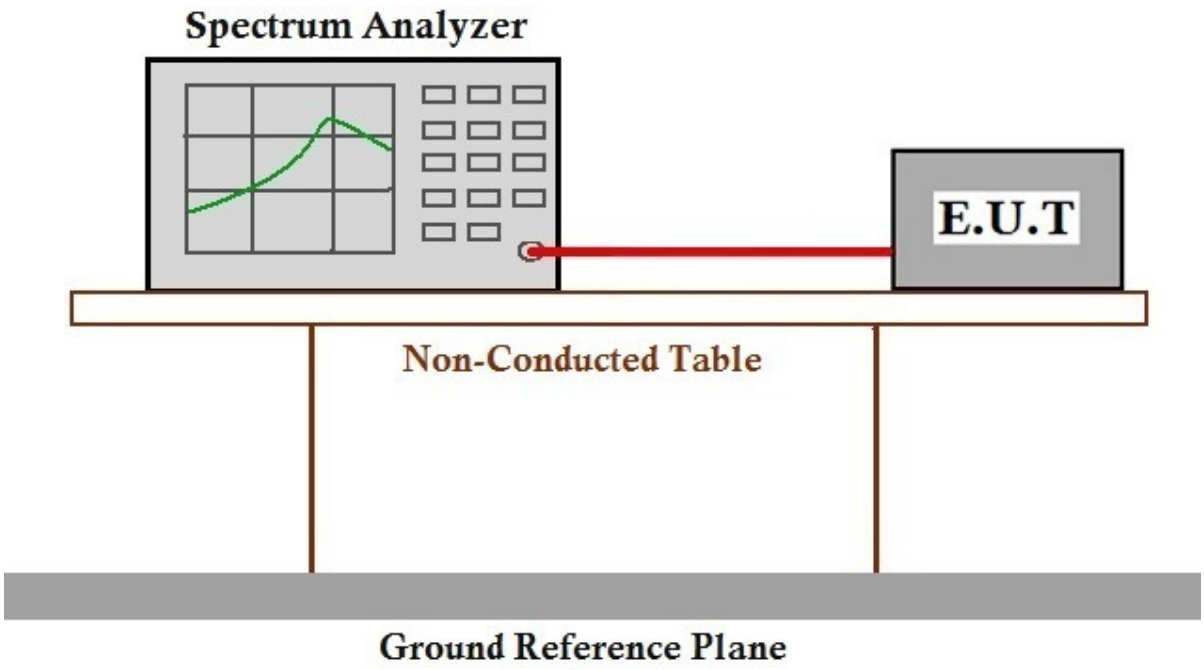
7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Pretest these modes to find the worst case:	a: Charge + TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.
	b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.
The worst case for final test:	a: Charge + TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.
	b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.6

The detailed test data see: Appendix 15.247

7.8 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.8
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

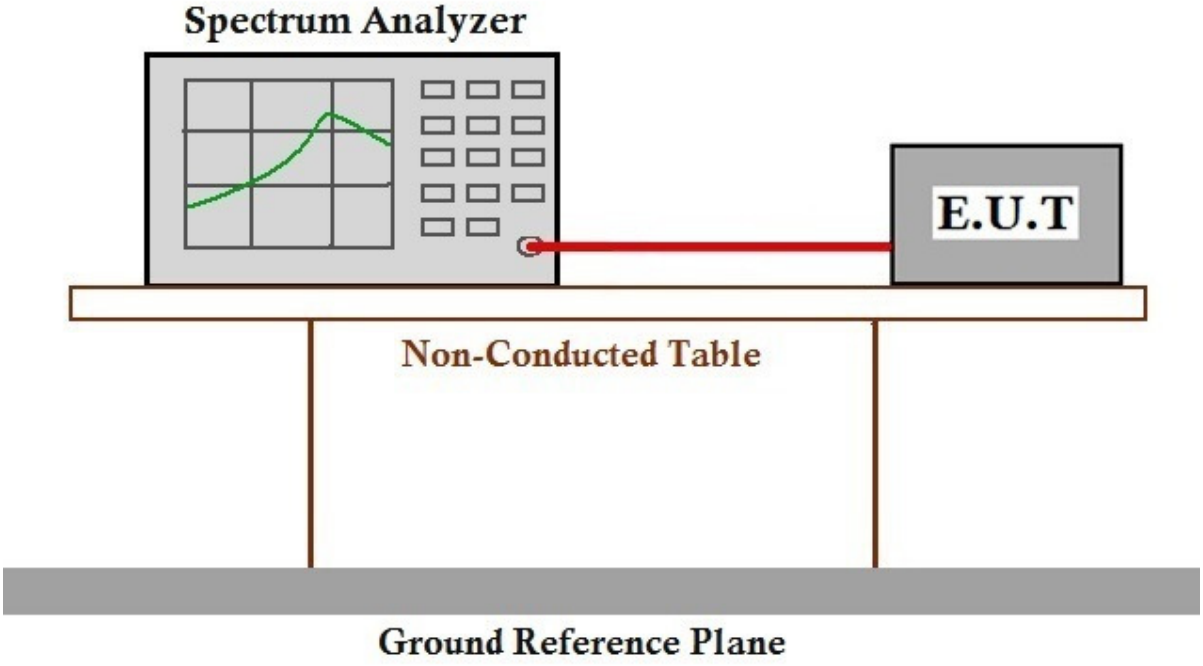
7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Test mode b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.8.2 Test Setup Diagram



7.8.3 Measurement Procedure and Data

The test method: ANSI C63.10 (2013) Section 7.8.8

The detailed test data see: Appendix 15.247

7.9 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

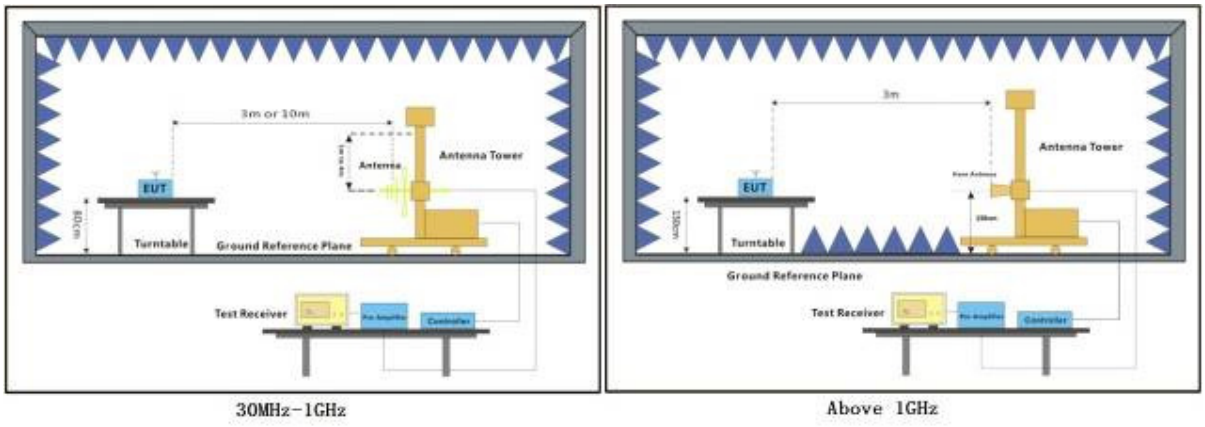
7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH :

Test mode b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

7.9.2 Test Setup Diagram



30MHz-1GHz Above 1GHz

7.9.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
2390.000	H	50.4	37.3	74.0	54.0	Pass
2483.500	H	58.9	50.6	74.0	54.0	Pass
2390.000	V	50.5	37.3	74.0	54.0	Pass
2483.500	V	56.5	47.4	74.0	54.0	Pass

7.10 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

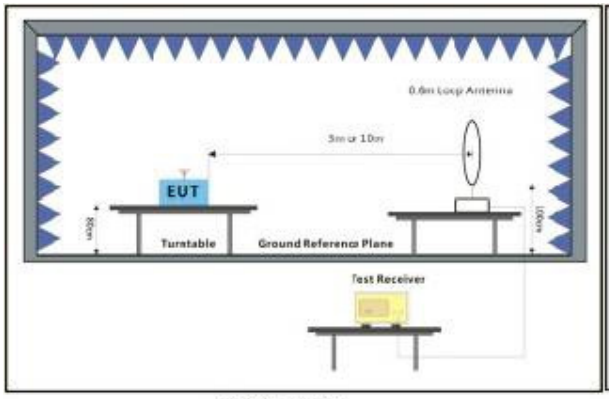
7.10.1 E.U.T. Operation

Operating Environment:

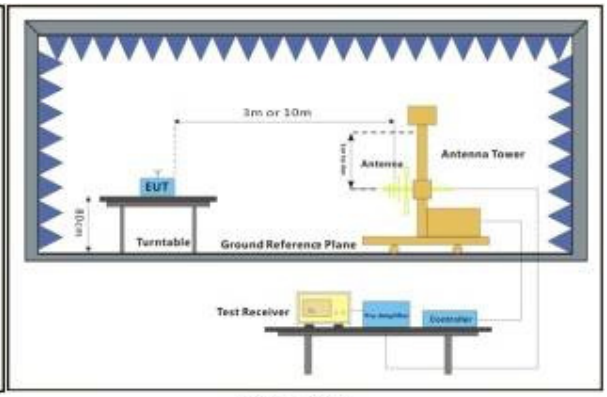
Temperature: 25 °C Humidity: 50 % RH :

Test mode b: Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case (DH5) is recorded in the report.

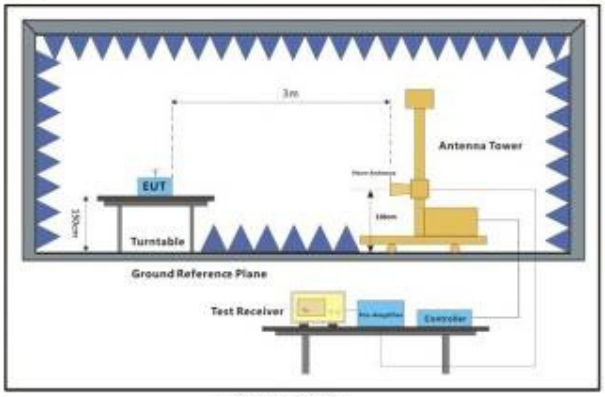
7.10.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.10.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

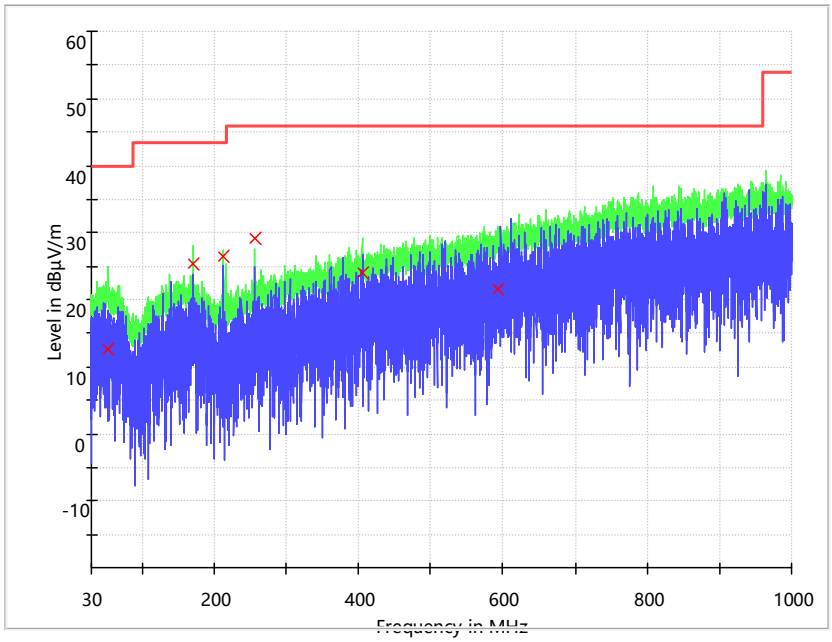
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

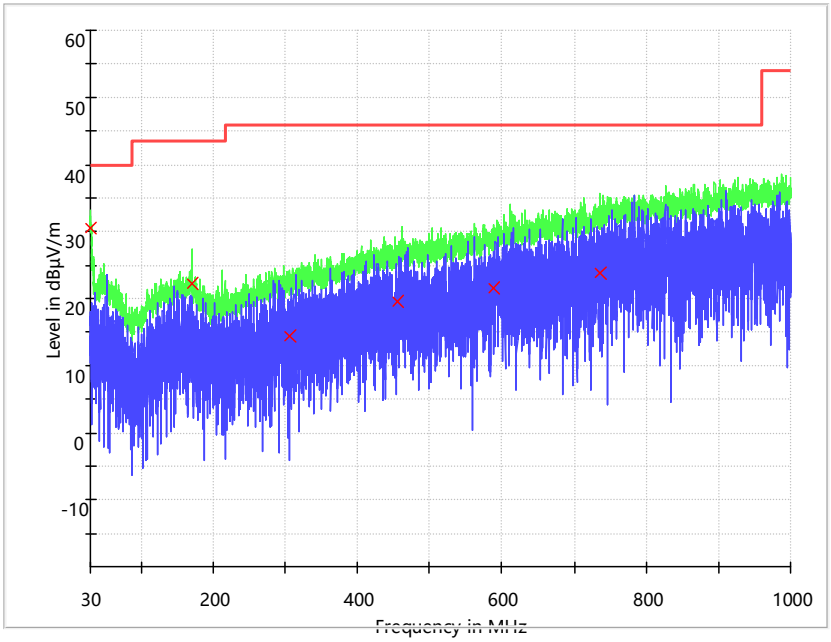
Radiated emission below 1GHz

Mode:b; Polarization:Horizontal; Modulation:GFSK;



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
52.379286	12.7	H	14.2	27.3	40.0	Pass
170.372857	25.4	H	14.0	18.1	43.5	Pass
212.983571	26.4	H	11.1	17.1	43.5	Pass
255.594286	29.2	H	13.1	16.8	46.0	Pass
404.974286	24.0	H	17.6	22.0	46.0	Pass
593.639286	21.7	H	21.8	24.4	46.0	Pass

Mode:b; Polarization:Vertical; Modulation:GFSK;



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
30.000000	30.5	V	12.5	9.5	40.0	Pass
170.372857	22.2	V	14.0	21.3	43.5	Pass
305.757143	14.4	V	15.0	31.6	46.0	Pass
455.899286	19.5	V	18.8	26.5	46.0	Pass
587.957857	21.5	V	21.5	24.5	46.0	Pass
736.367857	23.9	V	24.2	22.1	46.0	Pass

Remark: Only the worst case is shown.

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1996.000	H	45.8	24.3	74.0	54.0	PASS
4804.000	H	48.2	37.2	74.0	54.0	PASS
7206.000	H	48.4	34.8	74.0	54.0	PASS
1991.500	V	49.0	27.4	74.0	54.0	PASS
4804.000	V	49.7	39.6	74.0	54.0	PASS
7206.000	V	48.6	34.7	74.0	54.0	PASS

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1998.000	H	45.5	24.6	74.0	54.0	PASS
4883.000	H	45.9	33.0	74.0	54.0	PASS
7400.000	H	49.6	35.9	74.0	54.0	PASS
1992.000	V	48.9	25.4	74.0	54.0	PASS
4882.500	V	50.1	39.4	74.0	54.0	PASS
7326.000	V	48.8	35.7	74.0	54.0	PASS

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1997.500	H	45.3	24.1	74.0	54.0	PASS
4960.500	H	47.0	35.9	74.0	54.0	PASS
7440.000	H	50.1	36.3	74.0	54.0	PASS
1996.000	V	48.3	25.5	74.0	54.0	PASS
4960.500	V	50.2	39.5	74.0	54.0	PASS
7440.000	V	49.6	36.2	74.0	54.0	PASS

8 Photographs

8.1 EUT Constructional Details (EUT Photos)

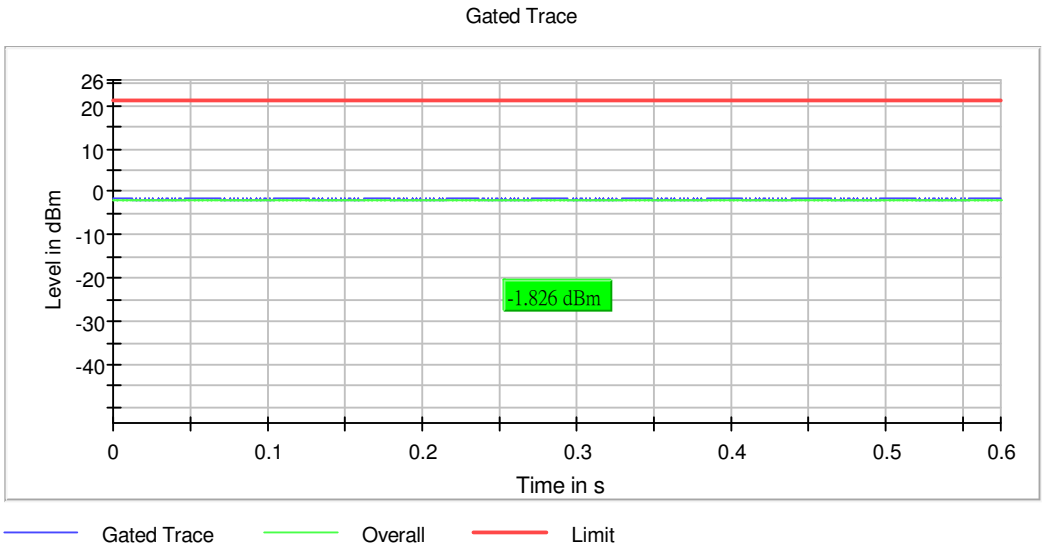
Refer to the appendices setup, external and internal photos.

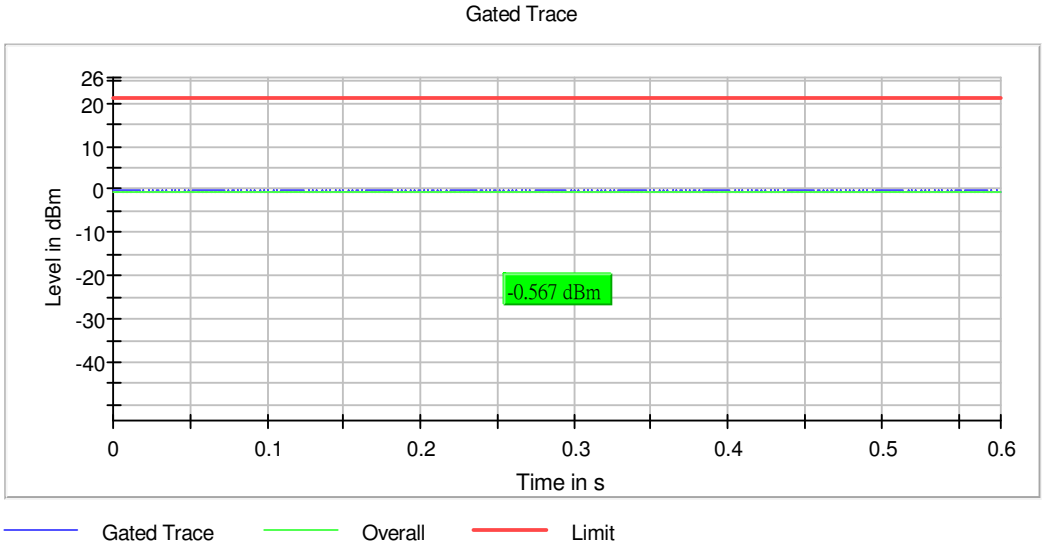
9 Appendix 15.247

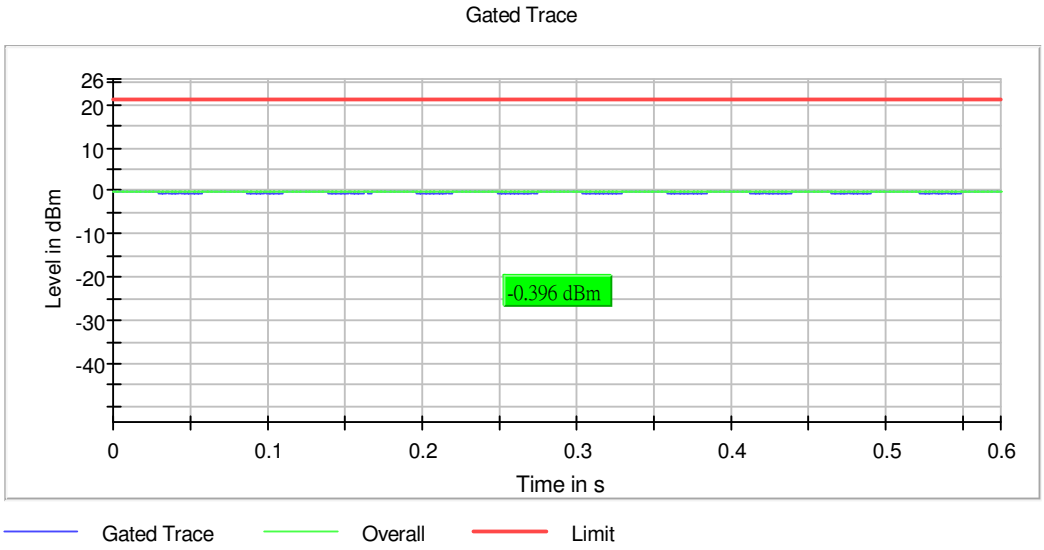
9.1 Peak conducted output power

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2402.000000	-1.8	21.0	PASS
2441.000000	-0.6	21.0	PASS
2480.000000	-0.4	21.0	PASS

Remark: Antenna gain is 2 dBi



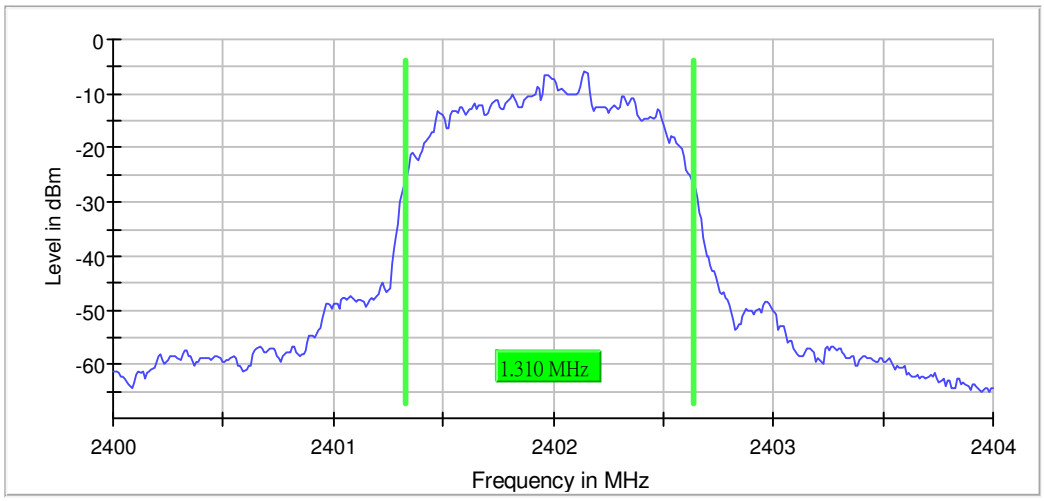




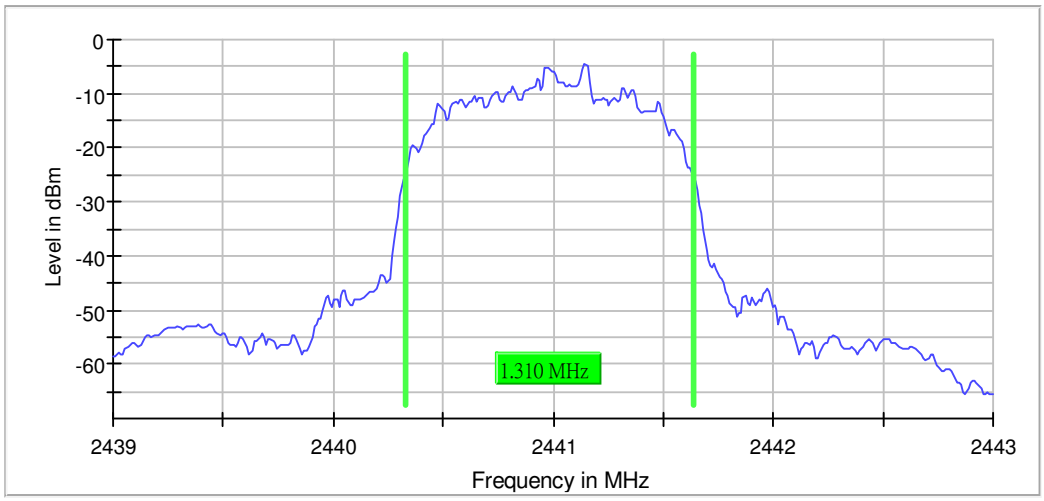
Remark: Cable loss 0.8dB was considered and set in system configuration.

9.2 20dB Bandwidth

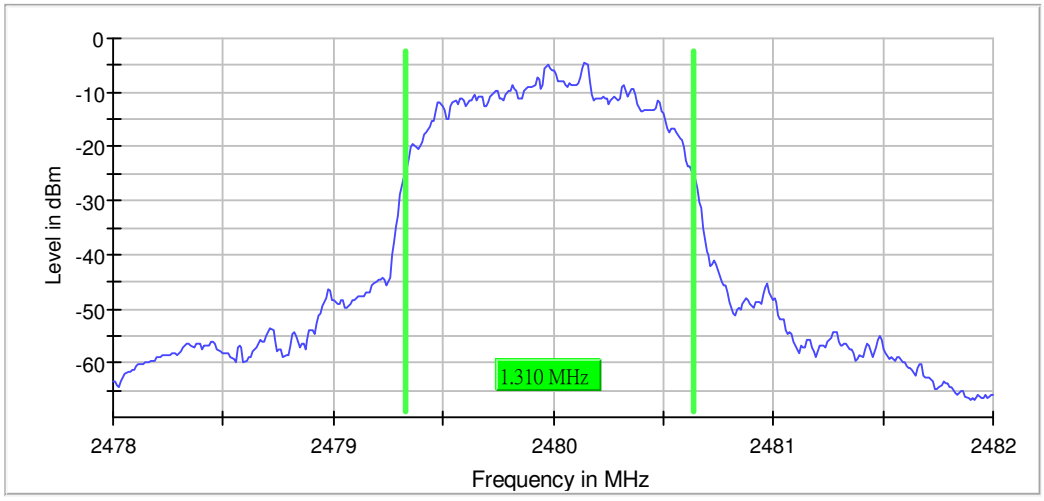
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.310000	---	---	2401.325000	2402.635000
2441.000000	1.310000	---	---	2440.325000	2441.635000
2480.000000	1.310000	---	---	2479.325000	2480.635000



20 dB Bandwidth



20 dB Bandwidth



Measurement

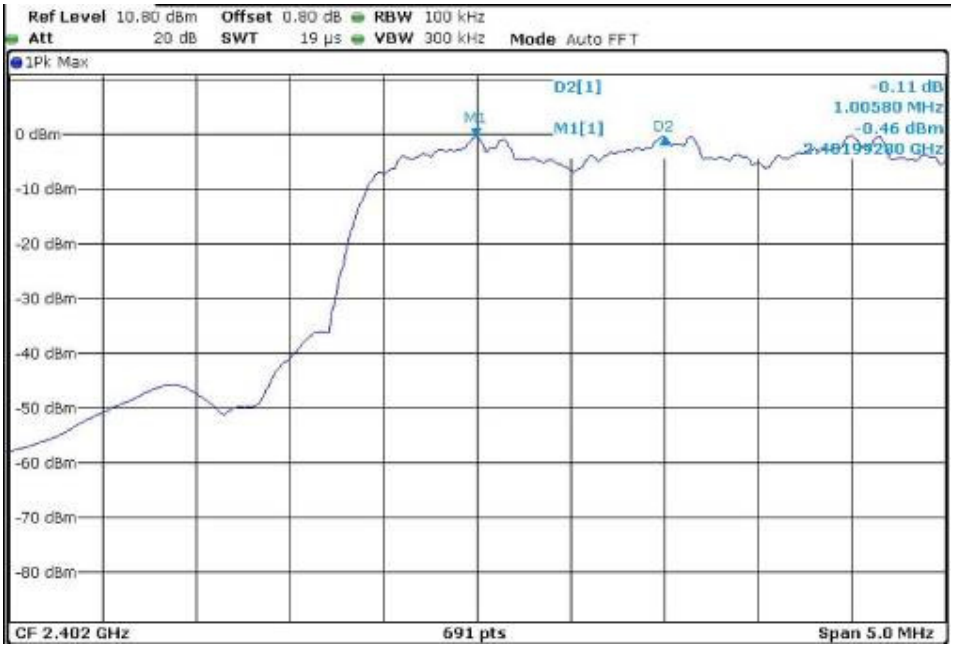
Setting	Instrument Value	Target Value
Start Frequency	2.47800 GHz	2.47800 GHz
Stop Frequency	2.48200 GHz	2.48200 GHz
Span	4.000 MHz	4.000 MHz
RBW	20.000 kHz	>= 20.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	400	~ 400
Sweeptime	94.824 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB

Remark: Cable loss 0.8dB was considered and set in system configuration.

9.3 Carrier Frequency Separation

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit (MHz)	Result
2402.000000	1.005800	0.873333	PASS

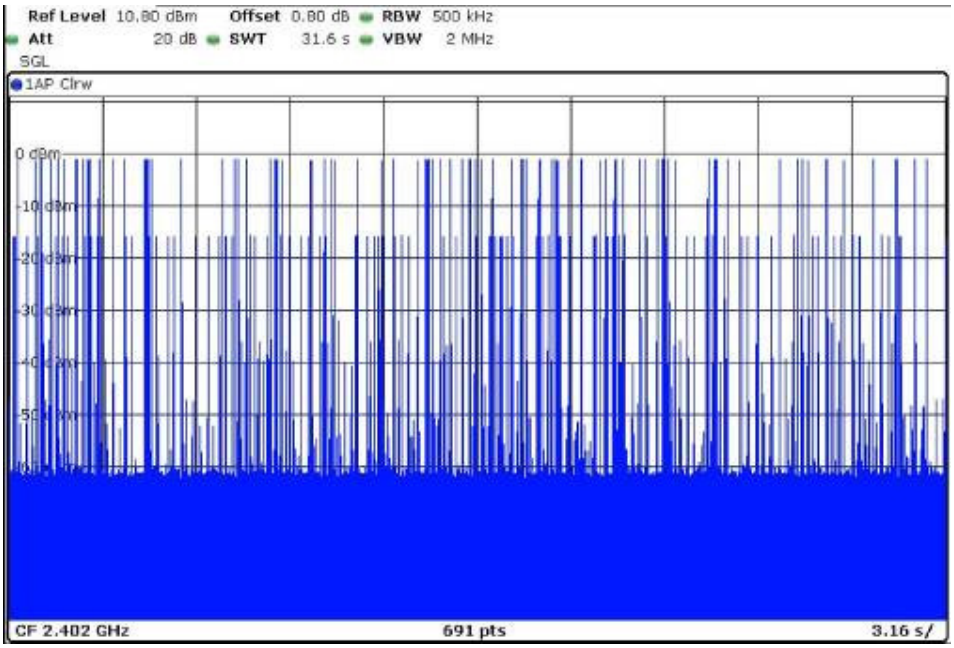
Remark: Limit = 2/3* 20dB Bandwidth

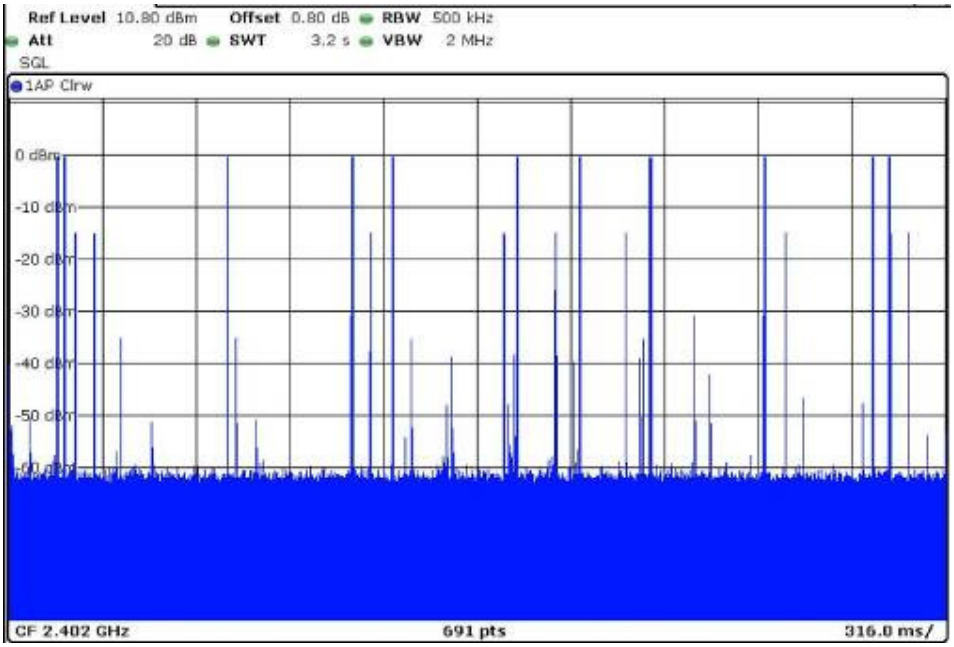


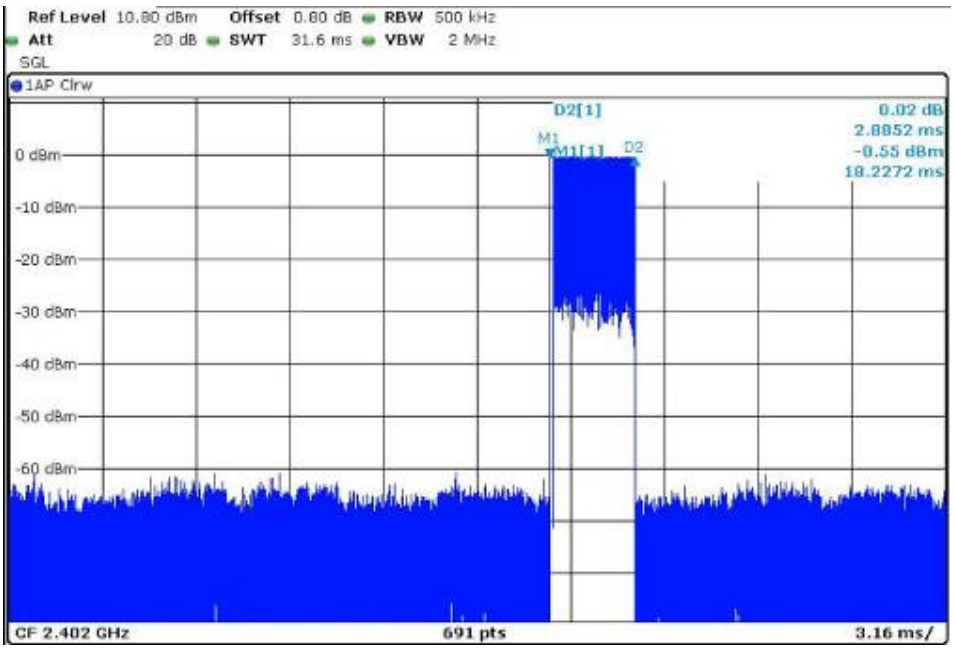
9.4 Dwell Time

Channel (MHz)	Width of Burst (ms)	Number of Burst(s)	Active Channels	Measurement Time (s)	Dwell Time (ms)	Limit (ms)	Result
2441.000	2.8852	110	79	31.6	317.372	≤400	Pass

*Remark: the channel shown is the worst case.

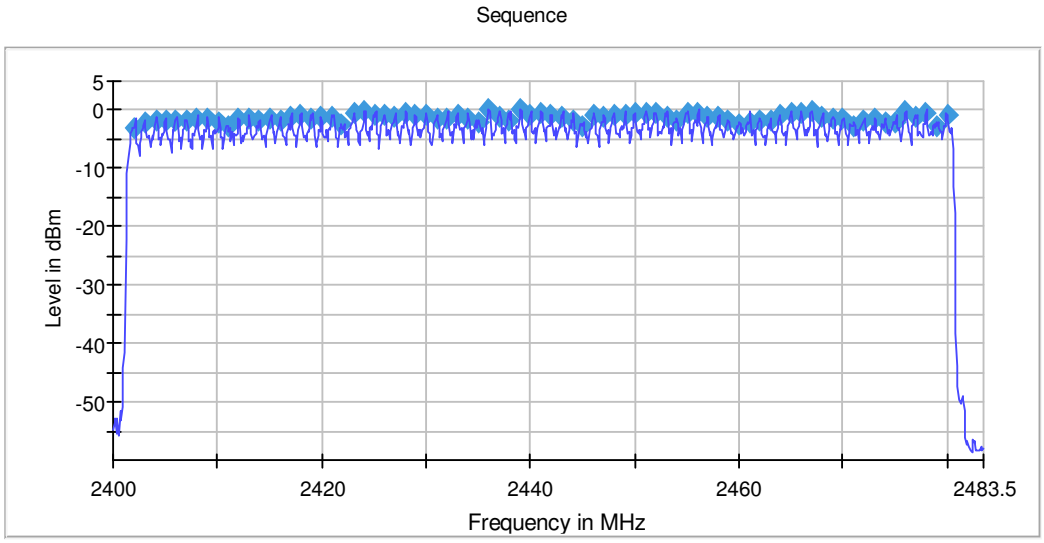



Ref Level 10.80 dBm Offset 0.80 dB RBW 500 kHz
Att 20 dB SWT 3.2 s VBW 2 MHz
SGL
1AP Clrw
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.402 GHz
691 pts
316.0 ms/


Ref Level 10.80 dBm Offset 0.80 dB RBW 500 kHz
Att 20 dB SWT 31.6 ms VBW 2 MHz
SGL
1AP Clrw
D2[1]
0.02 dB
2.8852 ms
M1
M1[1]
D2
-0.55 dBm
18.2272 ms
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.402 GHz
691 pts
3.16 ms/

9.5 Hopping Frequencies

Channels	Limit Min	Result
79	15	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 149.500 kHz
VBW	100.000 kHz	>= 100.000 kHz
SweepPoints	835	~ 835
Sweeptime	1.020 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	130 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Remark: Cable loss 0.8dB was considered and set in system configuration.

9.6 Conducted Band Edge Measurement

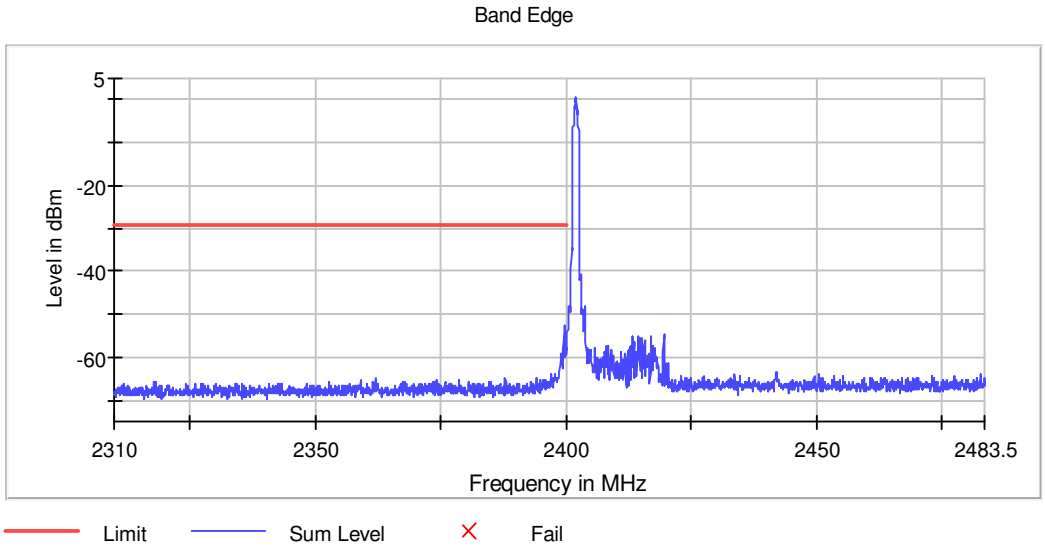
Non-hopping mode

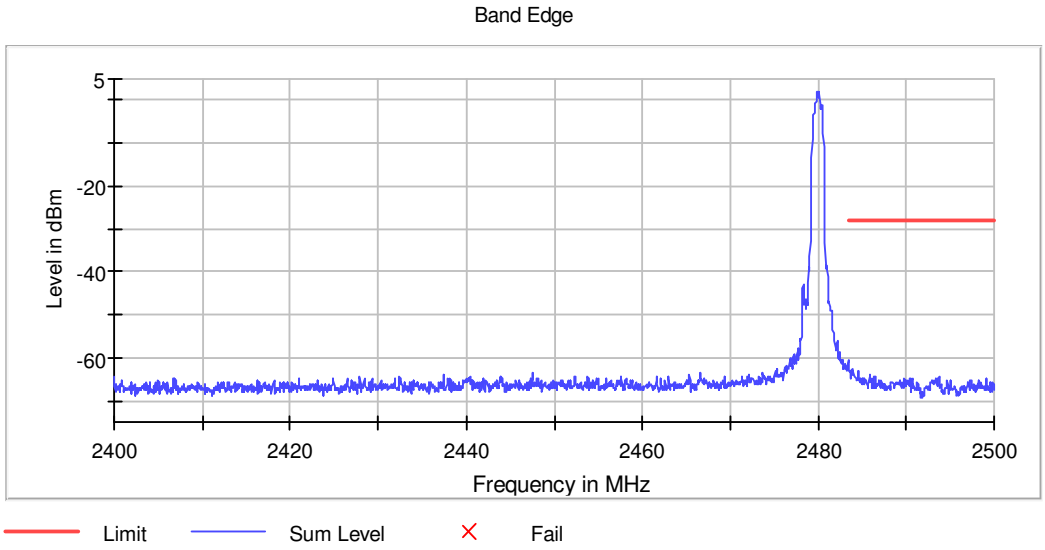
Inband Peak

Frequency (MHz)	Level (dBm)
2402.125000	0.6
2480.175000	2.1

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.625000	-52.8	23.4	-29.4	PASS
2483.875000	-62.9	35.0	-27.9	PASS

Remark: Limit = Inband peak – 30dB





Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.01 dB	0.50 dB

Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
Sweeptime	37.969 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Remark: Cable loss 0.8dB was considered and set in system configuration.

Hopping mode

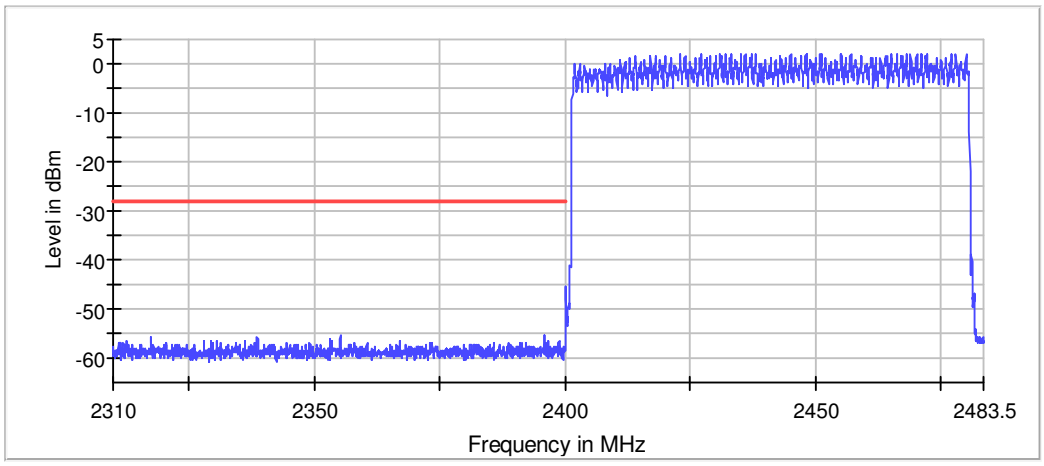
Inband Peak

Frequency (MHz)	Level (dBm)
2478.025000	2.1
2435.175000	2.1

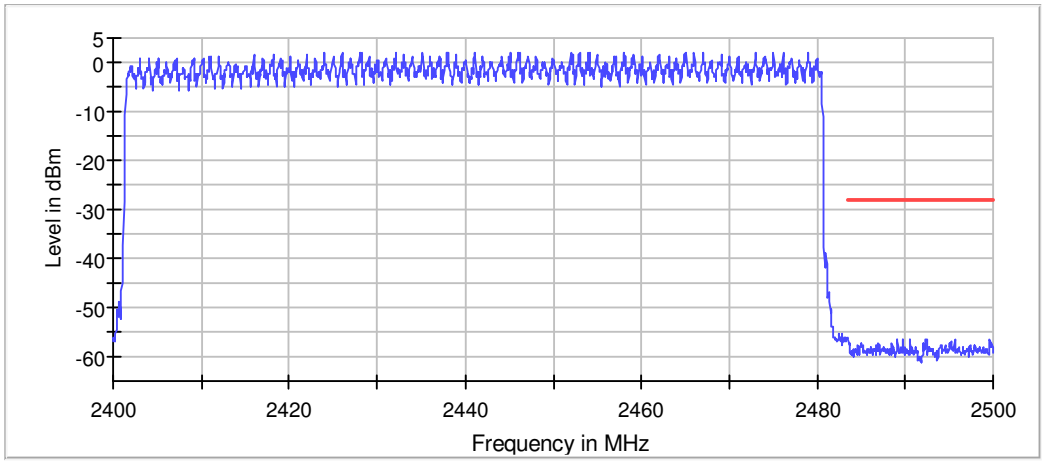
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2395.975000	-55.4	27.5	-27.9	PASS
2483.575000	-56.4	28.5	-27.9	PASS

Remark: Limit = Inband peak – 30dB

Band Edge



Band Edge



Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	129 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

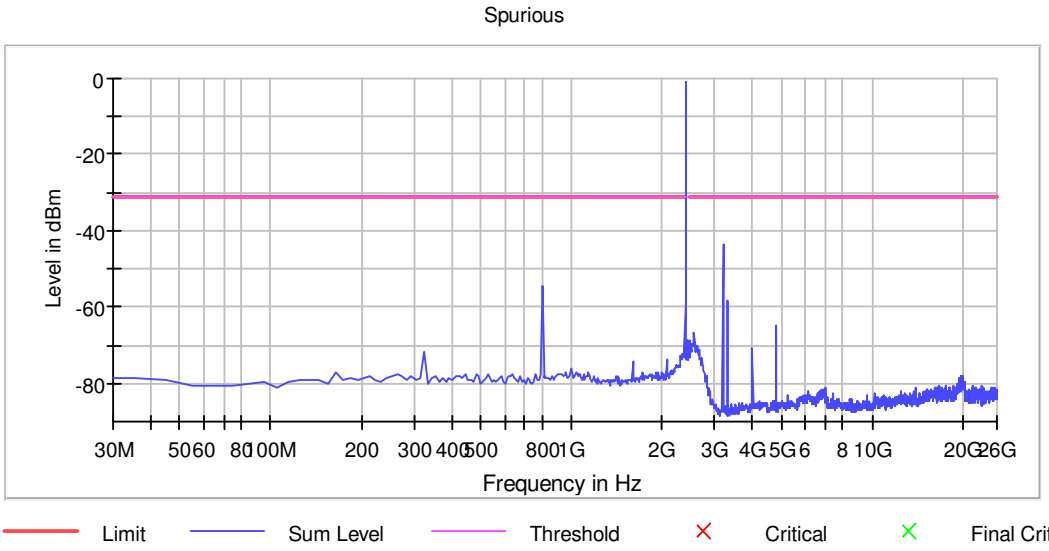
Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
Sweeptime	37.969 us	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

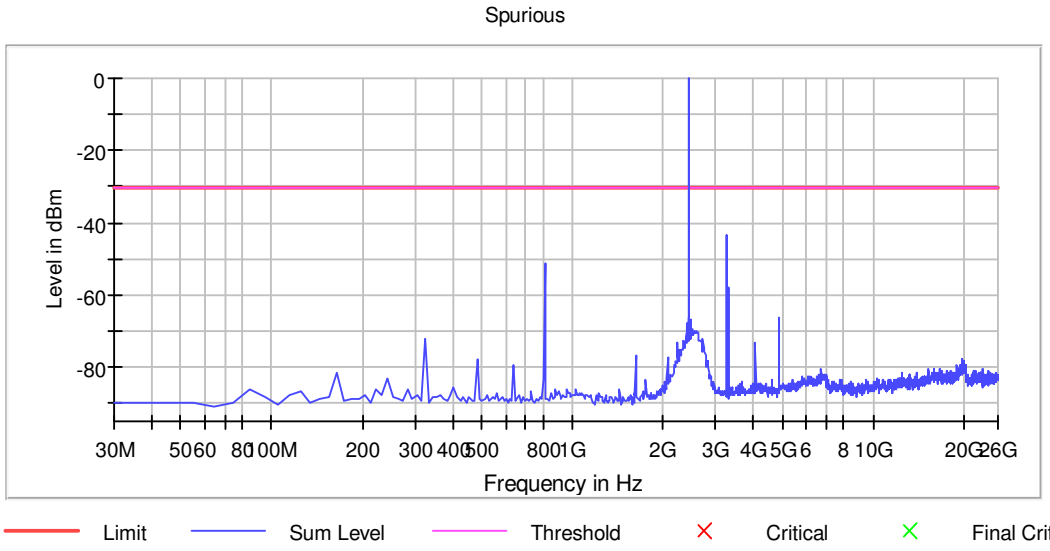
Remark: Cable loss 0.8dB was considered and set in system configuration.

9.7 Conducted spurious emission

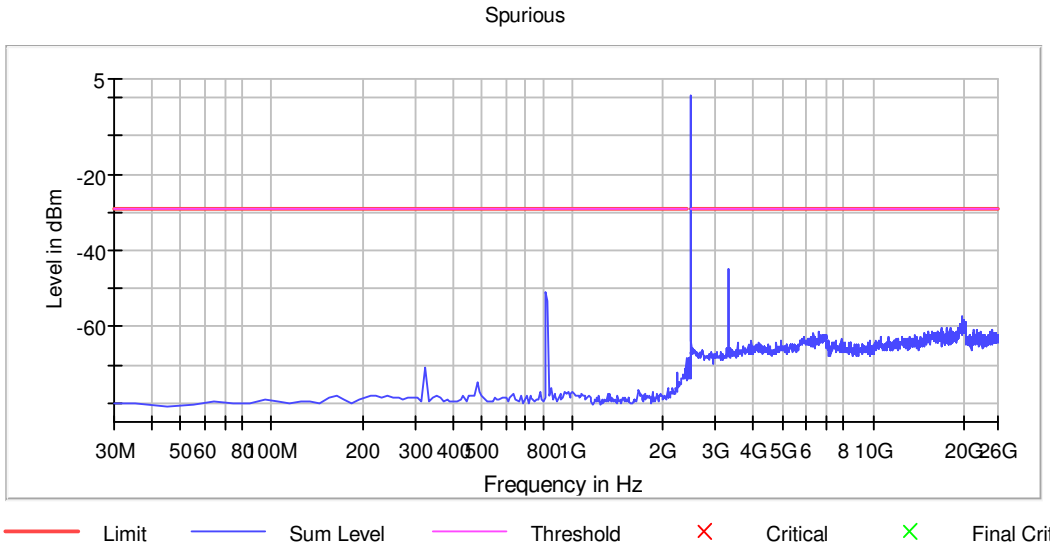
Lowest Channel



Middle Channel



Highest Channel



Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
Sweeptime	23.700 ms	AUTO
Reference Level	-20.000 dBm	-30.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.34 dB	0.50 dB

Remark: Cable loss 0.8dB was considered and set in system configuration.

- End of the Report -