FCC/ISED RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Navigation and Multimedia device

ISSUED TO
Robert Bosch Car Multimedia GmbH

Robert-Bosch-Str. 200, 31139 Hildesheim, Germany

Tested by: Hu Chao
Hu Chao
(Engineer)
Date Aug. 01, 2018

Approved by: BALUN
Wei Yanquan
(Chief Engineer)
Date Aug. 01, 2018

Report No.:	BL-SZ1870190-602
EUT Name:	Navigation and Multimedia device
Model Name:	AIVIH61L0
Brand Name:	Bosch
Test Standard:	47 CFR Part 15 Subpart C
	RSS-Gen (Issue 5, April 2018)
	RSS-247 (Issue 2, February 2017)
FCC ID:	YBN-AIVIH61L0
ISED Number:	9595A-AIVIH61L0
Test conclusion:	Pass
Test Date:	Jul. 17, 2018 ~ Jul. 20, 2018
Date of Issue:	Aug. 01, 2018

Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
TEL: +86-755-66850100, FAX: +86-755-61824271
Email: qc@baluntek.com
www.baluntek.com

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Aug. 01, 2018	Initial Issue

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196. The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025.The accreditation certificate is 4344.01. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20℃ to 25℃
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

(1) The test report reference to the report template version v5.10.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Robert Bosch Car Multimedia GmbH
Address	Robert-Bosch-Str. 200, 31139 Hildesheim, Germany

2.2 Manufacturer Information

Manufacturer	Robert Bosch Car Multimedia GmbH
Address	Robert-Bosch-Str. 200, 31139 Hildesheim, Germany

2.3 Factory Information

Factory 1	Bosch Car Multimedia Portugal, S.A.
Address 1	Rua Max Grundig, 35-Lomar, 4705-820 Braga
Factory 2	Robert Bosch (Malaysia)
Address 2	Free Trade Zone 11900, Bayan Lepas, Penang

2.4 General Description for Equipment under Test (EUT)

EUT Name	Navigation and Multimedia device
Model Name Under Test	AIVIH61L0
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	001
Software Version	X322(0548)
Dimensions (Approx.)	17*33*17.2cm
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Note: Not applicable.

2.6 Technical Information

Network and Wireless connectivity	Bluetooth 4.0 (BR+EDR) WIFI 802.11a, 802.11b, 802.11g and 802.11n (HT20/40), 802.11ac

The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	FHSS
Modulation Type	GFSK, ∏/4-DQPSK, 8-DPSK
Product Type	☒ Mobile ☐ Portable ☐ Fix Location
Transfer Rate	DH5: 1 Mbps 2DH5: 2 Mbps 3DH5: 3 Mbps
Frequency Range	The frequency range used is 2400 MHz to 2483.5 MHz.
Number of channel	79 (at intervals of 1 MHz)
Tested Channel	0 (2402 MHz), 39 (2441 MHz), 78 (2480 MHz)
Antenna Type	Integrated Antenna
Antenna Gain	5.3dBi
Antenna System(MIMO Smart Antenna)	N/A

All channel was listed on the following table:

Channel number	Freq. (MHz)	Channel number	Freq. (MHz)	Channel number	Freq. (MHz)	Channel number	Freq. (MHz)
0	**2402**	21	2423	42	2444	63	2465
1	2403	22	2424	43	2445	64	2466
2	2404	23	2425	44	2446	65	2467
3	2405	24	2426	45	2447	66	2468
4	2406	25	2427	46	2448	67	2469
5	2407	26	2428	47	2449	68	2470
6	2408	27	2429	48	2450	69	2471
7	2409	28	2430	49	2451	70	2472
8	2410	29	2431	50	2452	71	2473
9	2411	30	2432	51	2453	72	2474
10	2412	31	2433	52	2454	73	2475
11	2413	32	2434	53	2455	74	2476
12	2414	33	2435	54	2456	75	2477
13	2415	34	2436	55	2457	76	2478
14	2416	35	2437	56	2458	77	2479
15	2417	36	2438	57	2459	**78**	**2480**
16	2418	37	2439	58	2460	-	-
17	2419	38	2440	59	2461	-	-
18	2420	**39**	**2441**	60	2462	-	-
19	2421	40	2442	61	2463	-	-
20	2422	41	2443	62	2464	-	-

2.7 Additional Instructions

EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually. And the software is installed on the lab test computer.
Test Software Version	Dut labtool V2.0.0.89

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Miscellaneous Wireless Communications Services
2	RSS-Gen (Issue 5, Apr. 2018)	General Requirements for Compliance of Radio Apparatus
3	RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSs), Frequency Hopping Systems(FHSs) and Licence-Exemp Local Area Network (LE-LAN) Devices
4	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	ISED Part No.	Channel	Test Result	Verdict	Remark
1	Antenna Requirement	15.203	RSS-247, 5.4 (6)	N/A	--	Pass	Note [1]
2	Number of Hopping Frequencies	15.247(a)	RSS-247, 5.1 (4)	Hopping Mode	ANNEX A.1	Pass	Note [2, 4]
3	Peak Output Power and E.I.R.P	15.247(b)	RSS-247, 5.4 (2)	Low/Middle/ High	ANNEX A.2	Pass	--
4	Occupied Bandwidth	15.247(a)	RSS-247, 5.1 (1)	Low/Middle/ High	ANNEX A.3	Pass	Note [2, 4]
5	Carrier Frequency Separation	15.247(a)	RSS-247, 5.1 (2)	Hopping Mode	ANNEX A.4	Pass	Note [2, 4]
6	Time of Occupancy (Dwell time)	15.247(a)	RSS-247, 5.1 (4)	Hopping Mode	ANNEX A.5	Pass	Note [2, 4]
7	Conducted Spurious Emission & Authorized-band band-edge	15.247(d)	RSS-247, 5.5	Low/Middle/ High	ANNEX A.6	Pass	Note [2, 4]
8	Conducted Emission	15.207	RSS-GEN, 8.8	Low/Middle/ High	ANNEX A.7	N/A	Note [2, 5]
9	Radiated Spurious Emission	15.209 15.247(d)	RSS-247, 5.5	Hopping Mode, Low/Middle/ High	ANNEX A.8	Pass	Note [2]
10	Band Edge(Restricted-band band-edge)	15.209 15.247(d)	RSS-247, 5.5	Hopping Mode, Low/Middle/ High	ANNEX A.9	Pass	Note [2]
11	Receiver Spurious Emissions	--	RSS-Gen, 7.1.2	--	--	N/A	Note [3]

Note [1]: The Antenna is fixed install and not removable.

Note [2]: Because of the modulation of Π/4-DQPSK same as 8-DPSK, and the test results are basically the same with them, so we chose 8-DPSK as a typical representative to appear on the report. Another we will show all the modes on the RF output power test item

Note [3]: Only radio communication receivers operating in stand-alone mode within the band 30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable.

Note [4]: This report is partial report and referencing to the "original" report BTL-FCCP-1-1807C078 by BTL Inc. (FCC ID: YBN-AIVIL42P0) and report BTL-ISEDR-1-1807C078 by BTL Inc. (IC: 9595A-AIVIL42P0). This report just test Output Power, Radiated Spurious Emission and Band Edge(Restricted-band band-edge) after evaluation.

Note [5]: The EUT only powered by battery, so the Conducted Emission test is not applicable.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	13.6 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-40	101544	2018.06.11	2019.06.10
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2018.06.11	2019.06.10
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2017.09.07	2018.09.06
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2018.06.11	2019.06.10
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2018.06.11	2019.06.10
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ITECH	IT6720	6001030107 17610007	2018.06.21	2019.06.20
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2017.11.07	2019.11.08
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2017.07.22	2019.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2017.07.11	2019.07.10
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2018.06.21	2019.06.20
Test Antenna-Horn (18-40 GHz)	A-INFO	LB-180400KF	J211060273	2017.01.06	2019.01.05
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20
laptop	Lenovo	X220	4286A17	N/A	N/A
Software	BALUN	BL410R	2.1.1.345	N/A	N/A
RF cable	Balun	Balun1	SRD01	2018.04.25	2018.10.24
RF cable	Balun	Balun2	SRD02	2018.04.25	2018.10.24
RF cable	Balun	EMC1	EMC01	2018.04.25	2018.10.24
RF cable	Huber&suhner	Boa-flex I	N/A	2018.04.25	2018.10.24
RF cable	Huber&suhner	Steel-flex I	N/A	2018.04.25	2018.10.24

4.3 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

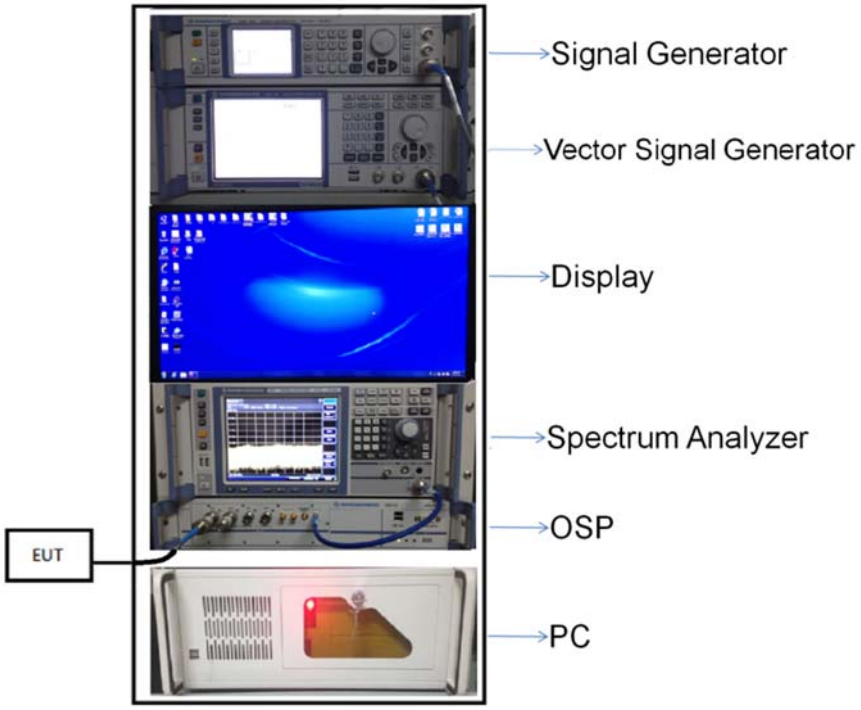
Measurement	Value
Occupied Channel Bandwidth	±4%
RF output power, conducted	±1.4 dB
Power Spectral Density, conducted	±2.5 dB
Unwanted Emissions, conducted	±2.8 dB
All emissions, radiated	±5.4 dB
Temperature	±1°C
Humidity	±4%

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

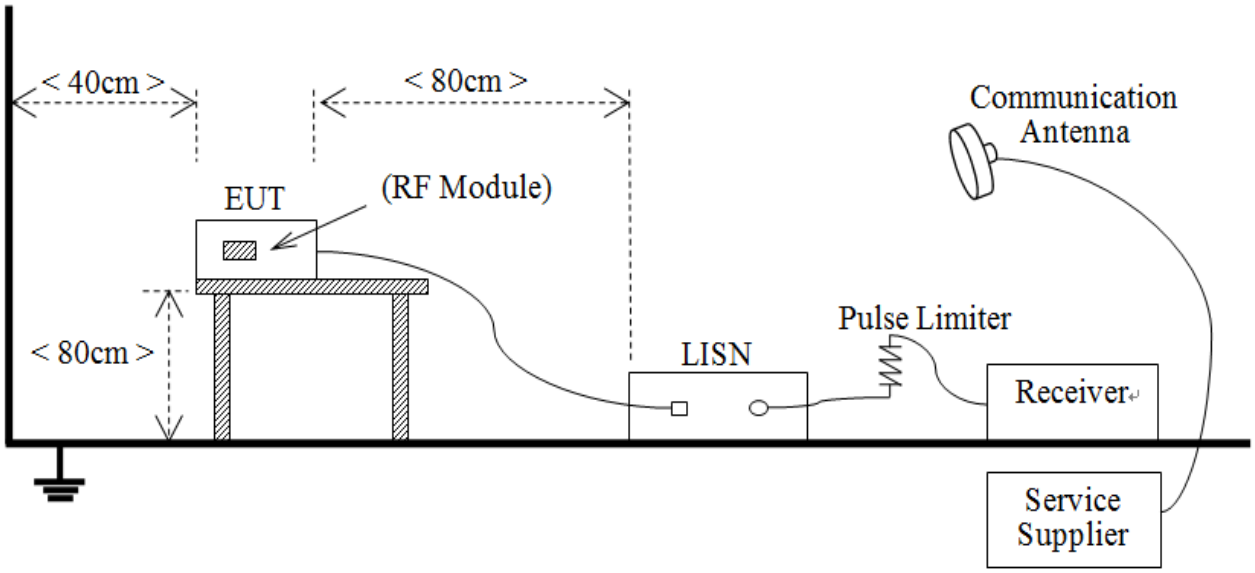
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

For example: the measurement value is 10 dBm and the cable 0.5dBm used, then the final result of EUT:
Conducted value (dBm) = 10 dBm + 0.5 dB = 10.5 dBm



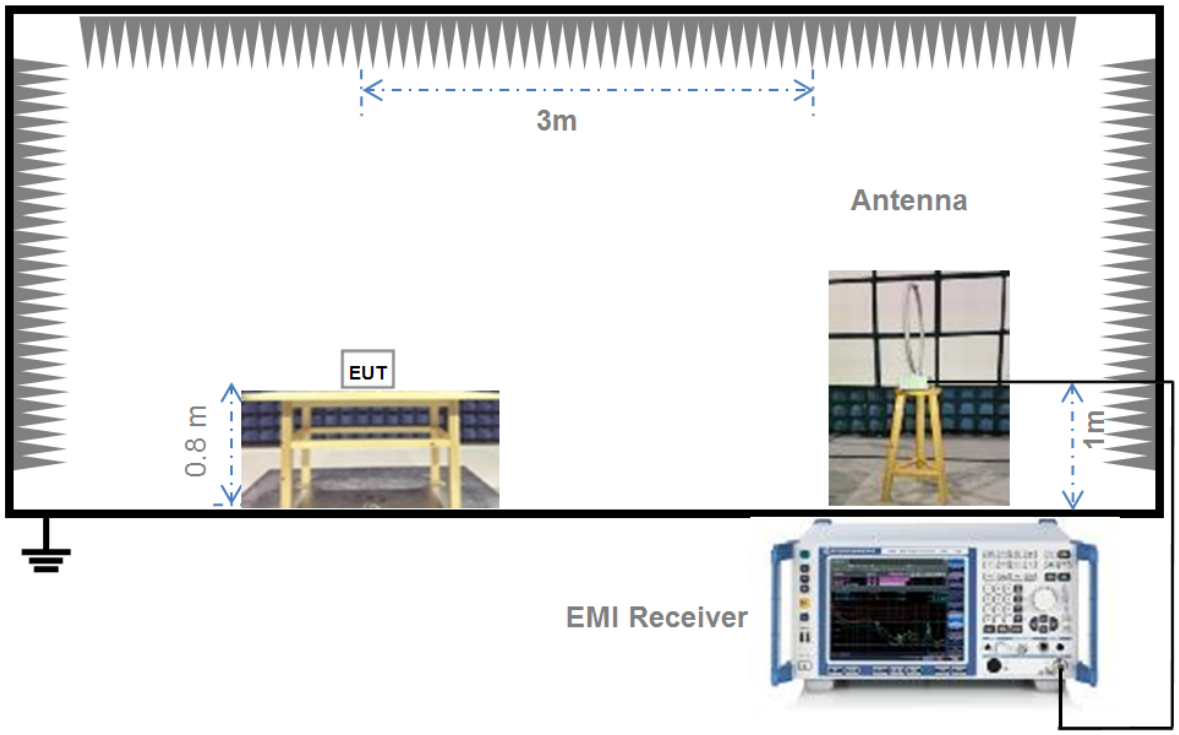
(Diagram 1)

4.4.2 For AC Power Supply Port Test



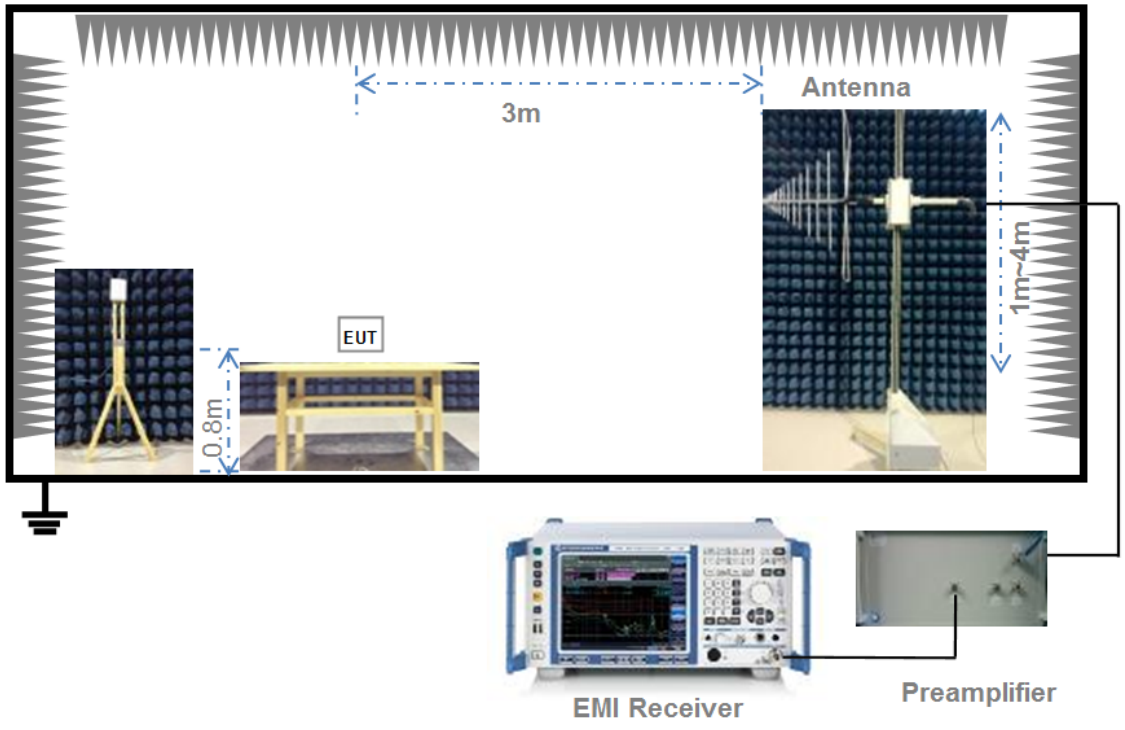
(Diagram 2)

4.4.3 For Radiated Test (Below 30 MHz)



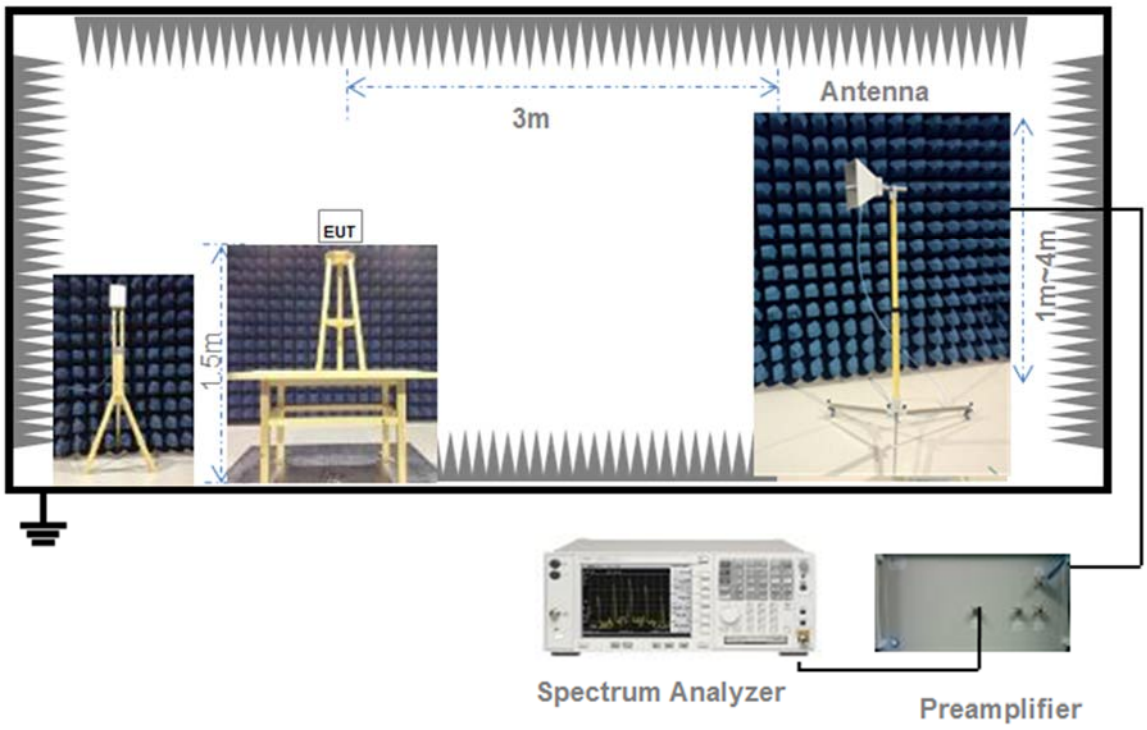
(Diagram 3)

4.4.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

4.5 Measurement Results Explanation Example

4.5.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.

4.5.2 For radiated band edges and spurious emission test:

Per part 15.35(c), the EUT Bluetooth average emission level could be determined by the peak emission level applying duty cycle correction factor, to represent averaging over the whole pulse train.
The average level is derived from the peak level corrected with “Duty cycle correction factor”.
Average Emission Level (dBuV/m) = Peak Emission Level (dBuV/m) + Duty cycle correction factor (dB)
Duty cycle correction factor (dB) = 20 * log (Duty cycle).
Duty cycle = on time / 100 milliseconds
On time = dwell time * hopping number in 100 ms
For example: bluetooth with dwell time 2.9 ms and 3 hops in 100 ms, then
Duty cycle correction factor (dB) = 20 * log ((2.9 * 3) / 100) = -21.21 dB
Following shows an average computation example with duty cycle correction factor = -21.21 dB, and the peak emission level is 45.61 dBuV/m.
Example:
Average Emission Level (dBuV/m) = Peak Emission Level (dBuV/m) + duty cycle correction factor (dB)
= 45.61 + (-21.21) = 24.4 (dBuV/m)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

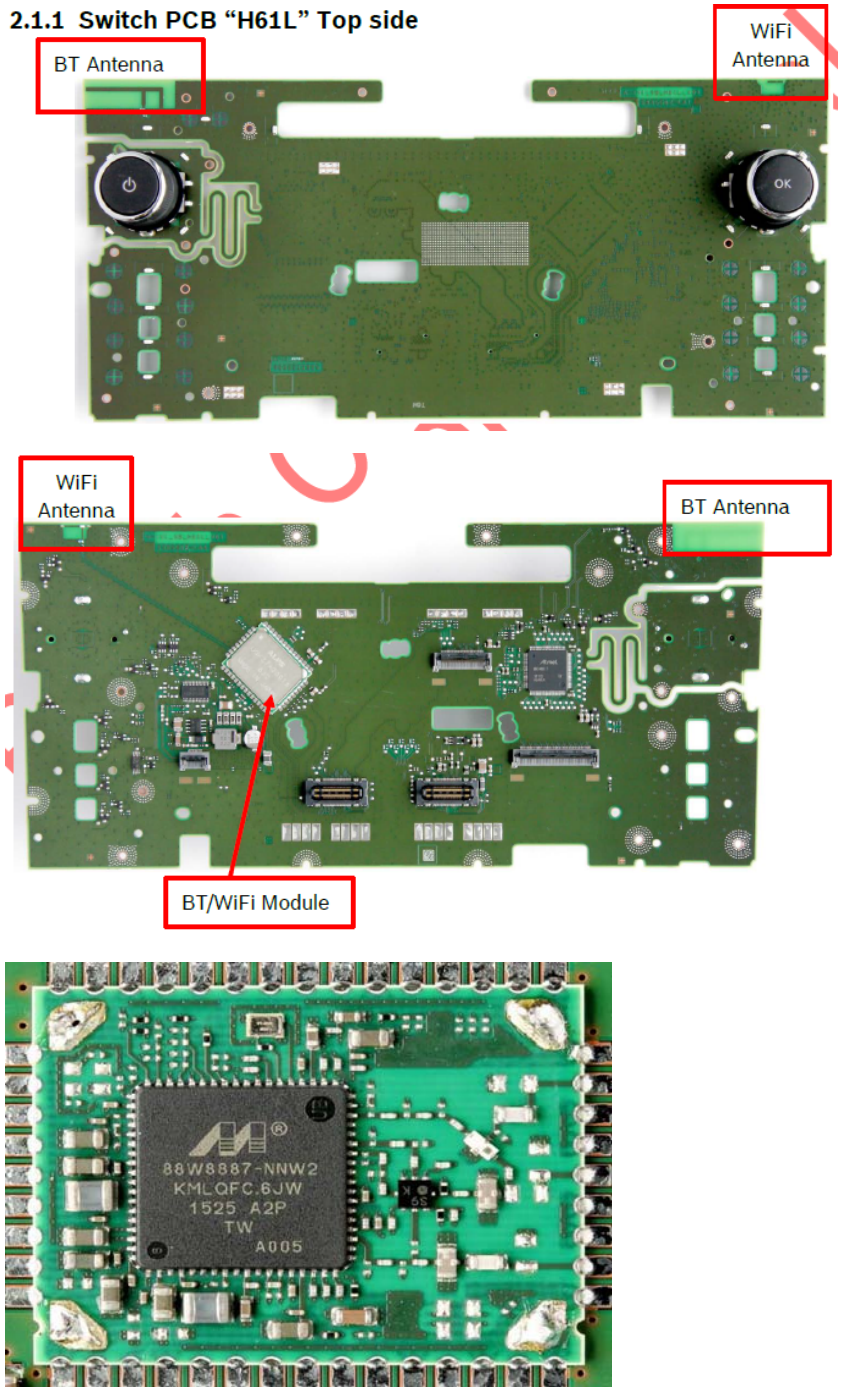
FCC §15.203 & 15.247(b); RSS-247, 5.4 (6)

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Reference Documents	Item
Photo	

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Number of Hopping Frequencies

5.2.1 Limit

FCC §15.247(a) (1) (iii); RSS-247, 5.1 (4)

Frequency hopping systems operating in the 2400 MHz to 2483.5 MHz bands shall use at least 15 hopping frequencies.

5.2.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 Peak Output Power and E.I.R.P

5.3.1 Test Limit

FCC § 15.247(b)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247, 5.4 (2)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W and the e.i.r.p. shall not exceed 0.5 W if the hopset uses less than 75 hopping channels (see Section 5.4(5) for exceptions).

5.3.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize.

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Occupied Bandwidth

5.4.1 Limit

FCC §15.247(a); RSS-247, 5.1 (1)

Measurement of the 20dB bandwidth of the modulated signal.

5.4.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW = in the range of 1% to 5% of the OBW

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

5.4.4 Test Result

Please refer to ANNEX A.3.

5.5 Carrier Frequency Separation

5.5.1 Limit

FCC §15.247(a); RSS-247, 5.1 (2)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

5.5.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span

Video (or Average) Bandwidth (VBW) ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

5.5.4 Test Result

Please refer to ANNEX A.4.

5.6 Time of Occupancy (Dwell time)

5.6.1 Limit

FCC §15.247(a); RSS-247, 5.1 (4)

Frequency hopping systems in the 2400 MHz - 2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

5.6.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The average time of occupancy on any channel within the Period can be calculated with formulas:
For GFSK and 8-DPSK:
For DH1 package type

{Total of Dwell} = {Pulse Time} * (1600 / 2) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

For DH3 package type

{Total of Dwell} = {Pulse Time} * (1600 / 4) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

For DH5 package type

{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

For AFH Mode:
For DH1 package type

{Total of Dwell} = {Pulse Time} * (800 / 2) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

For DH3 package type

{Total of Dwell} = {Pulse Time} * (800 / 4) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

For DH5 package type

{Total of Dwell} = {Pulse Time} * (800 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

5.6.4 Test Result

Please refer to ANNEX A.5

5.7 Conducted Spurious Emission & Authorized-band band-edge

5.7.1 Limit

FCC §15.247(d); RSS-247, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.7.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

5.7.4 Test Result

Please refer to ANNEX A.6.

5.8 Conducted Emission

5.8.1 Limit

FCC §15.207; RSS-GEN, 8.8

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.8.2 Test Setup

See section 4.4.2 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.8.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.
Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.8.4 Test Result

Please refer to ANNEX A.7.

5.9 Radiated Spurious Emission

5.9.1 Limit

FCC §15.209&15.247(d); RSS-247, 5.5

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

Note:

1. Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].
2. In the emission tables above, the tighter limit applies at the band edges.
3. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
4. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.9.2 Test Setup

See section 4.4.3 to 4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.9.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW

Sweep = auto
Detector function = peak
Trace = max hold
For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

5.9.4 Test Result

Please refer to ANNEX A.8.

5.10 Band Edge (Restricted-band band-edge)

5.10.1 Limit

FCC §15.209&15.247(d)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

5.10.2 Test Setup

See section 4.4.3 to 4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.10.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

5.10.4 Test Result

Please refer to ANNEX A.9.

ANNEX A TEST RESULT

A.1 Number of Hopping Frequency

Note: The Number of Hopping Frequency please refer to the Report No. BTL-FCCP-1-1807C078 (which issued by BTL INC. on Jul. 25, 2018), **Section 5.NUMBER OF HOPPING CHANNEL.**

A.2 Peak Output Power and E.I.R.P

Peak Power Test Data

Channel	Measured Output Peak Power		Limit		Verdict
	GFSK		dBm	mW	
	dBm	mW			
Low	-4.36	0.37	30	1000	Pass
Middle	-4.85	0.33			Pass
High	-4.09	0.39			Pass

Channel	Measured Output Peak Power				Limit		Verdict
	∏/4-DQPSK		8-DPSK		dBm	mW	
	dBm	mW	dBm	mW			
Low	-4.56	0.35	-4.42	0.36	21	125	Pass
Middle	-4.85	0.33	-4.85	0.33			Pass
High	-5.14	0.31	-4.69	0.34			Pass

A.3 20 dB and 99% bandwidth

Note: The 20 dB and 99% bandwidth please refer to the Report No. BTL-FCCP-1-1807C078 (which issued by BTL INC. on Jul. 25, 2018), **Section 8.BANDWIDTH TEST.**

A.4 Hopping Frequency Separation

Note: The Hopping Frequency Separation please refer to the Report No. BTL-FCCP-1-1807C078 (which issued by BTL INC. on Jul. 25, 2018), **Section 7. HOPPING CHANNEL SEPARATION MEASUREMENT.**

A.5 Average Time of Occupancy

Note: The Average Time of Occupancy please refer to the Report No. BTL-FCCP-1-1807C078 (which issued by BTL INC. on Jul. 25, 2018), **Section 6.AVERAGE TIME OF OCCUPANCY.**

A.6 Conducted Spurious Emissions & Authorized-band band-edge

Note: The Conducted Spurious Emissions & Authorized-band band-edge please refer to the Report No. BTL-FCCP-1-1807C078 (which issued by BTL INC. on Jul. 25, 2018), **Section 10.ANTENNA CONDUCTED SPUROUS EMISSION.**

A.7 Conducted Emissions

Note: Not applicable.

A.8 Radiated Spurious Emission

Test Data and Plots

Note [1]: The symbol of "--" in the table which means not application.

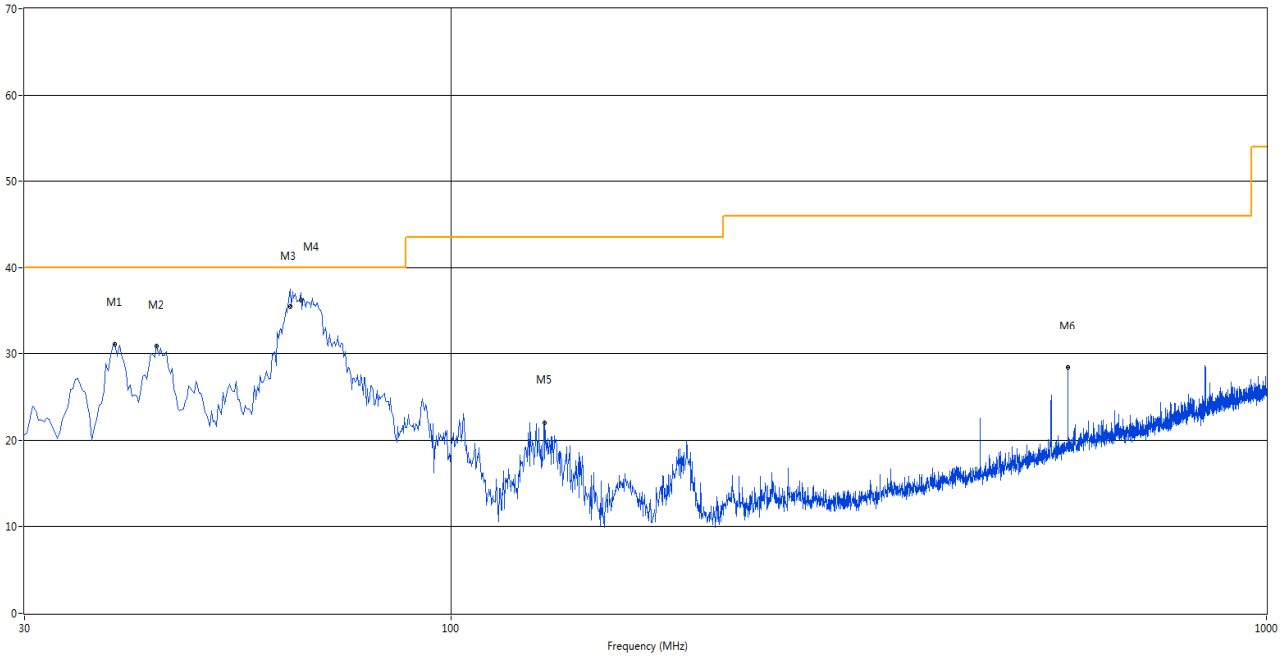
Note [2]: For the test data above 1 GHz, according the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note [3]: The EUT is working in the Normal link mode below 1 GHz.

Note [4]: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

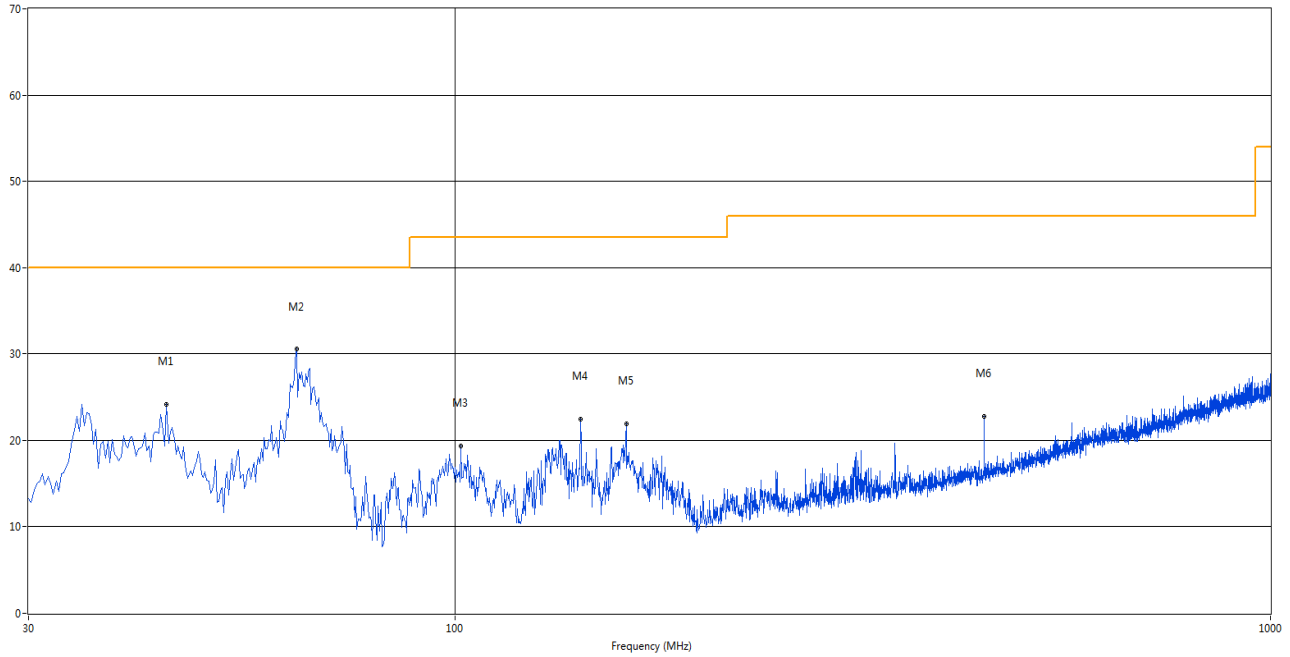
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	38.730	31.03	-25.10	40.0	8.97	Peak	128.30	100	Vertical	Pass
2	43.580	30.82	-23.53	40.0	9.18	Peak	185.50	100	Vertical	Pass
3	63.269	42.72	-25.09	40.0	-2.72	Peak	93.30	102	Vertical	N/A
3*	63.269	35.57	-25.09	40.0	4.43	QP	93.30	102	Vertical	Pass
4	65.608	42.68	-25.25	40.0	-2.68	Peak	84.30	100	Vertical	N/A
4*	65.608	36.29	-25.25	40.0	3.71	QP	84.30	100	Vertical	Pass
5	130.152	21.97	-27.60	43.5	21.53	Peak	198.70	100	Vertical	Pass
6	571.260	28.37	-14.55	46.0	17.63	Peak	189.80	100	Vertical	Pass

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	44.307	24.10	-23.60	40.0	15.90	Peak	130.30	200	Horizontal	Pass
2	63.950	30.55	-25.05	40.0	9.45	Peak	179.10	200	Horizontal	Pass
3	101.780	19.31	-24.38	43.5	24.19	Peak	341.90	200	Horizontal	Pass
4	142.520	22.41	-27.80	43.5	21.09	Peak	254.40	200	Horizontal	Pass
5	162.163	21.92	-27.18	43.5	21.58	Peak	107.10	100	Horizontal	Pass
6	445.645	22.71	-17.66	46.0	23.29	Peak	240.30	100	Horizontal	Pass

Test Data and Plots (1 GHz ~ 10th Harmonic)

Note 1: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

Note 2: The spurious from 12.75GHz-25GHz is noise only, do not show on the report.

GFSK LOW CHANNEL 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1840.476	33.01	-14.59	54.0	-20.99	AV	229	150	Vertical	Pass
1	1840.476	47.27	-14.59	74.0	-26.73	Peak	229	150	Vertical	Pass
2**	1991.826	33.15	-14.22	54.0	-20.85	AV	267	150	Vertical	Pass
2	1991.826	46.65	-14.22	74.0	-27.36	Peak	267	150	Vertical	Pass
3**	2402.000	88.95	-11.21	54.0	34.95	AV	351	150	Vertical	N/A
3	2402.000	93.36	-11.21	74.0	19.36	Peak	351	150	Vertical	N/A
4**	3117.935	37.92	-8.18	54.0	-16.08	AV	191	150	Vertical	Pass
4	3117.935	45.98	-8.18	74.0	-28.02	Peak	191	150	Vertical	Pass
5**	3694.467	33.69	-6.13	54.0	-20.31	AV	196	150	Vertical	Pass
5	3694.467	44.37	-6.13	74.0	-29.63	Peak	196	150	Vertical	Pass
6**	4640.150	35.85	-3.58	54.0	-18.15	AV	352	150	Vertical	Pass
6	4640.150	46.70	-3.58	74.0	-27.31	Peak	352	150	Vertical	Pass

GFSK LOW CHANNEL 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1583.568	33.48	-15.46	54.0	-20.52	AV	240	150	Horizontal	Pass
1	1583.568	41.44	-15.46	74.0	-32.56	Peak	240	150	Horizontal	Pass
2**	2111.341	36.30	-11.21	54.0	-17.70	AV	235	150	Horizontal	Pass
2	2111.341	43.46	-11.21	74.0	-30.55	Peak	235	150	Horizontal	Pass
3**	2402.000	83.96	-10.97	54.0	29.96	AV	338	150	Horizontal	N/A
3	2402.000	87.55	-10.97	74.0	13.55	Peak	338	150	Horizontal	N/A
4**	2639.796	31.47	-11.00	54.0	-22.53	AV	322	150	Horizontal	Pass
4	2639.796	41.65	-11.00	74.0	-32.35	Peak	322	150	Horizontal	Pass
5**	3167.824	35.10	-7.86	54.0	-18.90	AV	221	150	Horizontal	Pass
5	3167.824	44.11	-7.86	74.0	-29.89	Peak	221	150	Horizontal	Pass
6**	3645.762	34.28	-5.22	54.0	-19.72	AV	310	150	Horizontal	Pass
6	3645.762	45.04	-5.22	74.0	-28.96	Peak	310	150	Horizontal	Pass

GFSK MIDDLE CHANNEL 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1840.500	33.49	-14.36	54.0	-20.51	AV	227	150	Vertical	Pass
1	1840.500	48.09	-14.36	74.0	-25.91	Peak	227	150	Vertical	Pass
2**	1992.000	33.45	-13.71	54.0	-20.55	AV	265	150	Vertical	Pass
2	1992.000	47.50	-13.71	74.0	-26.50	Peak	265	150	Vertical	Pass
3**	2441.000	89.07	-10.93	54.0	35.07	AV	359	150	Vertical	N/A
3	2441.000	94.02	-10.93	74.0	20.02	Peak	359	150	Vertical	N/A
4**	3118.500	38.61	-7.31	54.0	-15.39	AV	189	150	Vertical	Pass
4	3118.500	46.39	-7.31	74.0	-27.61	Peak	189	150	Vertical	Pass
5**	3695.250	34.09	-5.39	54.0	-19.91	AV	194	150	Vertical	Pass
5	3695.250	44.71	-5.39	74.0	-29.29	Peak	194	150	Vertical	Pass
6**	4640.250	36.06	-2.59	54.0	-17.94	AV	360	150	Vertical	Pass
6	4640.250	47.20	-2.59	74.0	-26.80	Peak	360	150	Vertical	Pass

GFSK MIDDLE CHANNEL 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1584.000	33.99	-15.35	54.0	-20.01	AV	238	150	Horizontal	Pass
1	1584.000	41.75	-15.35	74.0	-32.25	Peak	238	150	Horizontal	Pass
2**	2112.000	36.42	-11.85	54.0	-17.58	AV	233	150	Horizontal	Pass
2	2112.000	43.65	-11.85	74.0	-30.35	Peak	233	150	Horizontal	Pass
3**	2441.000	84.01	-10.93	54.0	30.01	AV	336	150	Horizontal	N/A
3	2441.000	88.41	-10.93	74.0	14.41	Peak	336	150	Horizontal	N/A
4**	2640.000	32.18	-10.12	54.0	-21.82	AV	320	150	Horizontal	Pass
4	2640.000	42.49	-10.12	74.0	-31.51	Peak	320	150	Horizontal	Pass
5**	3168.000	35.20	-7.22	54.0	-18.80	AV	219	150	Horizontal	Pass
5	3168.000	44.54	-7.22	74.0	-29.46	Peak	219	150	Horizontal	Pass
6**	3646.500	35.15	-4.92	54.0	-18.85	AV	308	150	Horizontal	Pass
6	3646.500	45.06	-4.92	74.0	-28.94	Peak	308	150	Horizontal	Pass

GFSK HIGH CHANNEL 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1839.768	32.56	-14.92	54.0	-21.45	AV	232	150	Vertical	Pass
1	1839.768	46.43	-14.92	74.0	-27.57	Peak	232	150	Vertical	Pass
2**	1991.378	33.05	-14.64	54.0	-20.95	AV	270	150	Vertical	Pass
2	1991.378	46.46	-14.64	74.0	-27.54	Peak	270	150	Vertical	Pass
3**	2480.000	88.43	-10.15	54.0	34.43	AV	354	150	Vertical	N/A
3	2480.000	93.30	-10.15	74.0	19.30	Peak	354	150	Vertical	N/A
4**	3117.366	36.96	-8.45	54.0	-17.04	AV	193	150	Vertical	Pass
4	3117.366	45.84	-8.45	74.0	-28.16	Peak	193	150	Vertical	Pass
5**	3693.998	32.84	-6.32	54.0	-21.16	AV	199	150	Vertical	Pass
5	3693.998	44.34	-6.32	74.0	-29.66	Peak	199	150	Vertical	Pass
6**	4639.930	35.61	-4.28	54.0	-18.39	AV	355	150	Vertical	Pass
6	4639.930	46.40	-4.28	74.0	-27.60	Peak	355	150	Vertical	Pass

GFSK HIGH CHANNEL 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1582.872	32.63	-15.77	54.0	-21.37	AV	243	150	Horizontal	Pass
1	1582.872	41.32	-15.77	74.0	-32.68	Peak	243	150	Horizontal	Pass
2**	2111.273	35.85	-12.29	54.0	-18.15	AV	237	150	Horizontal	Pass
2	2111.273	43.15	-12.29	74.0	-30.85	Peak	237	150	Horizontal	Pass
3**	2480.000	83.36	-10.15	54.0	29.36	AV	340	150	Horizontal	N/A
3	2480.000	86.56	-10.15	74.0	12.56	Peak	340	150	Horizontal	N/A
4**	2639.043	31.25	-11.31	54.0	-22.75	AV	325	150	Horizontal	Pass
4	2639.043	41.41	-11.31	74.0	-32.59	Peak	325	150	Horizontal	Pass
5**	3166.870	34.35	-8.22	54.0	-19.65	AV	223	150	Horizontal	Pass
5	3166.870	43.41	-8.22	74.0	-30.59	Peak	223	150	Horizontal	Pass
6**	3645.212	34.08	-6.01	54.0	-19.92	AV	313	150	Horizontal	Pass
6	3645.212	44.21	-6.01	74.0	-29.80	Peak	313	150	Horizontal	Pass

8-DPSK LOW CHANNEL 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1840.051	32.22	-15.49	54.0	-21.78	AV	231	150	Vertical	Pass
1	1840.051	46.45	-15.49	74.0	-27.55	Peak	231	150	Vertical	Pass
2**	1991.750	32.86	-14.82	54.0	-21.14	AV	269	150	Vertical	Pass
2	1991.750	46.62	-14.82	74.0	-27.38	Peak	269	150	Vertical	Pass
3**	2402.000	88.92	-11.21	54.0	34.92	AV	354	150	Vertical	N/A
3	2402.000	92.79	-11.21	74.0	18.79	Peak	354	150	Vertical	N/A
4**	3116.984	37.20	-8.51	54.0	-16.80	AV	193	150	Vertical	Pass
4	3116.984	45.82	-8.51	74.0	-28.18	Peak	193	150	Vertical	Pass
5**	3694.348	33.10	-6.71	54.0	-20.90	AV	198	150	Vertical	Pass
5	3694.348	43.48	-6.71	74.0	-30.52	Peak	198	150	Vertical	Pass
6**	4640.142	34.85	-3.75	54.0	-19.15	AV	355	150	Vertical	Pass
6	4640.142	46.69	-3.75	74.0	-27.31	Peak	355	150	Vertical	Pass

8-DPSK LOW CHANNEL 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1582.788	32.53	-15.93	54.0	-21.47	AV	243	150	Horizontal	Pass
1	1582.788	40.82	-15.93	74.0	-33.18	Peak	243	150	Horizontal	Pass
2**	2110.483	35.99	-13.21	54.0	-18.02	AV	237	150	Horizontal	Pass
2	2110.483	42.82	-13.21	74.0	-31.18	Peak	237	150	Horizontal	Pass
3**	2402.000	83.61	-11.21	54.0	29.61	AV	341	150	Horizontal	N/A
3	2402.000	87.02	-11.21	74.0	13.02	Peak	341	150	Horizontal	N/A
4**	2639.638	30.75	-11.03	54.0	-23.25	AV	324	150	Horizontal	Pass
4	2639.638	40.87	-11.03	74.0	-33.13	Peak	324	150	Horizontal	Pass
5**	3167.005	34.35	-8.09	54.0	-19.65	AV	223	150	Horizontal	Pass
5	3167.005	43.26	-8.09	74.0	-30.74	Peak	223	150	Horizontal	Pass
6**	3645.203	33.84	-6.02	54.0	-20.16	AV	313	150	Horizontal	Pass
6	3645.203	44.25	-6.02	74.0	-29.75	Peak	313	150	Horizontal	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1839.483	31.98	-15.76	54.0	-22.02	AV	235	150	Vertical	Pass
1	1839.483	46.13	-15.76	74.0	-27.87	Peak	235	150	Vertical	Pass
2**	1990.682	32.70	-14.79	54.0	-21.30	AV	272	150	Vertical	Pass
2	1990.682	46.38	-14.79	74.0	-27.63	Peak	272	150	Vertical	Pass
3**	2441.000	88.23	-10.93	54.0	34.23	AV	356	150	Vertical	N/A
3	2441.000	93.08	-10.93	74.0	19.08	Peak	356	150	Vertical	N/A
4**	3117.040	36.02	-8.52	54.0	-17.98	AV	196	150	Vertical	Pass
4	3117.040	45.21	-8.52	74.0	-28.79	Peak	196	150	Vertical	Pass
5**	3693.841	32.40	-6.82	54.0	-21.60	AV	201	150	Vertical	Pass
5	3693.841	43.67	-6.82	74.0	-30.33	Peak	201	150	Vertical	Pass
6**	4639.812	35.14	-5.26	54.0	-18.86	AV	357	150	Vertical	Pass
6	4639.812	45.80	-5.26	74.0	-28.20	Peak	357	150	Vertical	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1582.073	32.48	-16.20	54.0	-21.52	AV	246	150	Horizontal	Pass
1	1582.073	40.41	-16.20	74.0	-33.60	Peak	246	150	Horizontal	Pass
2**	2110.390	35.24	-13.17	54.0	-18.76	AV	239	150	Horizontal	Pass
2	2110.390	43.11	-13.17	74.0	-30.89	Peak	239	150	Horizontal	Pass
3**	2441.000	82.48	-10.93	54.0	28.48	AV	343	150	Horizontal	N/A
3	2441.000	86.22	-10.93	74.0	12.22	Peak	343	150	Horizontal	N/A
4**	2638.690	30.91	-12.19	54.0	-23.09	AV	327	150	Horizontal	Pass
4	2638.690	41.32	-12.19	74.0	-32.68	Peak	327	150	Horizontal	Pass
5**	3166.616	34.27	-8.63	54.0	-19.73	AV	226	150	Horizontal	Pass
5	3166.616	43.23	-8.63	74.0	-30.77	Peak	226	150	Horizontal	Pass
6**	3644.247	33.72	-6.60	54.0	-20.29	AV	316	150	Horizontal	Pass
6	3644.247	43.35	-6.60	74.0	-30.65	Peak	316	150	Horizontal	Pass

8-DPSK HIGH CHANNEL 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1839.657	32.19	-15.50	54.0	-21.81	AV	235	150	Vertical	Pass
1	1839.657	45.77	-15.50	74.0	-28.23	Peak	235	150	Vertical	Pass
2**	1990.388	32.90	-15.39	54.0	-21.11	AV	272	150	Vertical	Pass
2	1990.388	45.58	-15.39	74.0	-28.42	Peak	272	150	Vertical	Pass
3**	2480.000	88.25	-10.15	54.0	34.25	AV	357	150	Vertical	N/A
3	2480.000	92.30	-10.15	74.0	18.30	Peak	357	150	Vertical	N/A
4**	3116.603	36.28	-9.40	54.0	-17.72	AV	196	150	Vertical	Pass
4	3116.603	45.54	-9.40	74.0	-28.46	Peak	196	150	Vertical	Pass
5**	3693.540	32.50	-7.02	54.0	-21.50	AV	201	150	Vertical	Pass
5	3693.540	43.63	-7.02	74.0	-30.37	Peak	201	150	Vertical	Pass
6**	4639.316	34.78	-4.56	54.0	-19.22	AV	357	150	Vertical	Pass
6	4639.316	45.91	-4.56	74.0	-28.09	Peak	357	150	Vertical	Pass

8-DPSK HIGH CHANNEL 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1582.803	32.49	-16.42	54.0	-21.51	AV	245	150	Horizontal	Pass
1	1582.803	40.42	-16.42	74.0	-33.58	Peak	245	150	Horizontal	Pass
2**	2110.794	35.37	-13.23	54.0	-18.64	AV	240	150	Horizontal	Pass
2	2110.794	42.40	-13.23	74.0	-31.60	Peak	240	150	Horizontal	Pass
3**	2480.000	83.06	-10.15	54.0	29.06	AV	343	150	Horizontal	N/A
3	2480.000	85.61	-10.15	74.0	11.61	Peak	343	150	Horizontal	N/A
4**	2638.397	30.39	-12.29	54.0	-23.62	AV	327	150	Horizontal	Pass
4	2638.397	41.05	-12.29	74.0	-32.95	Peak	327	150	Horizontal	Pass
5**	3166.758	33.39	-8.89	54.0	-20.61	AV	226	150	Horizontal	Pass
5	3166.758	43.16	-8.89	74.0	-30.84	Peak	226	150	Horizontal	Pass
6**	3644.843	33.43	-6.14	54.0	-20.57	AV	315	150	Horizontal	Pass
6	3644.843	43.84	-6.14	74.0	-30.17	Peak	315	150	Horizontal	Pass

Hopping Mode:

GFSK MODE 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit(dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1839.797	33.43	-15.29	54.0	-20.57	AV	229	150	Vertical	Pass
1	1839.797	47.48	-15.29	74.0	-26.53	Peak	229	150	Vertical	Pass
2**	1991.728	33.02	-14.11	54.0	-20.98	AV	267	150	Vertical	Pass
2	1991.728	47.29	-14.11	74.0	-26.72	Peak	267	150	Vertical	Pass
3**	2438.000	88.95	-11.02	54.0	34.95	AV	351	150	Vertical	N/A
3	2438.000	93.55	-11.02	74.0	19.55	Peak	351	150	Vertical	N/A
4**	3118.475	37.68	-7.56	54.0	-8.60	AV	191	150	Vertical	Pass
4	3118.475	45.40	-7.56	74.0	-28.60	Peak	191	150	Vertical	Pass
5**	3694.681	33.74	-6.34	54.0	-20.26	AV	196	150	Vertical	Pass
5	3694.681	44.27	-6.34	74.0	-29.73	Peak	196	150	Vertical	Pass
6**	4639.267	35.58	-3.47	54.0	-18.42	AV	352	150	Vertical	Pass
6	4639.267	46.47	-3.47	74.0	-27.53	Peak	352	150	Vertical	Pass

GFSK MODE 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit(dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1583.043	33.64	-15.97	54.0	-20.36	AV	240	150	Horizontal	Pass
1	1583.043	41.43	-15.97	74.0	-32.57	Peak	240	150	Horizontal	Pass
2**	2111.607	36.40	-12.42	54.0	-17.60	AV	235	150	Horizontal	Pass
2	2111.607	43.03	-12.42	74.0	-30.97	Peak	235	150	Horizontal	Pass
3**	2438.000	83.30	-11.02	54.0	29.30	AV	338	150	Horizontal	N/A
3	2438.000	87.48	-11.02	74.0	13.48	Peak	338	150	Horizontal	N/A
4**	2639.303	31.68	-10.99	54.0	-12.15	AV	322	150	Horizontal	Pass
4	2639.303	41.85	-10.99	74.0	-32.15	Peak	322	150	Horizontal	Pass
5**	3167.388	34.42	-7.66	54.0	-19.58	AV	221	150	Horizontal	Pass
5	3167.388	43.75	-7.66	74.0	-30.25	Peak	221	150	Horizontal	Pass
6**	3645.672	34.80	-5.27	54.0	-19.20	AV	310	150	Horizontal	Pass
6	3645.672	45.02	-5.27	74.0	-28.98	Peak	310	150	Horizontal	Pass

8-DPSK MODE 1 GHz to 12.75 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit(dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1838.743	31.31	-16.13	54.0	-22.69	AV	237	150	Vertical	Pass
1	1838.743	46.03	-16.13	74.0	-27.98	Peak	237	150	Vertical	Pass
2**	1989.688	32.39	-15.68	54.0	-21.61	AV	275	150	Vertical	Pass
2	1989.688	46.06	-15.68	74.0	-27.94	Peak	275	150	Vertical	Pass
3**	2438.000	87.90	-11.02	54.0	33.90	AV	358	150	Vertical	N/A
3	2438.000	92.68	-11.02	74.0	18.68	Peak	358	150	Vertical	N/A
4**	3116.762	35.44	-9.07	54.0	-9.71	AV	198	150	Vertical	Pass
4	3116.762	44.29	-9.07	74.0	-29.71	Peak	198	150	Vertical	Pass
5**	3693.784	32.17	-7.81	54.0	-21.83	AV	204	150	Vertical	Pass
5	3693.784	43.38	-7.81	74.0	-30.62	Peak	204	150	Vertical	Pass
6**	4638.993	35.06	-5.84	54.0	-18.94	AV	350	150	Vertical	Pass
6	4638.993	44.91	-5.84	74.0	-29.09	Peak	350	150	Vertical	Pass

8-DPSK MODE 1 GHz to 12.75 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit(dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1581.938	31.53	-16.59	54.0	-22.47	AV	248	150	Horizontal	Pass
1	1581.938	39.98	-16.59	74.0	-34.02	Peak	248	150	Horizontal	Pass
2**	2110.279	34.62	-13.46	54.0	-19.38	AV	241	150	Horizontal	Pass
2	2110.279	42.48	-13.46	74.0	-31.52	Peak	241	150	Horizontal	Pass
3**	2438.000	82.25	-11.02	54.0	28.25	AV	345	150	Horizontal	N/A
3	2438.000	86.05	-11.02	74.0	12.05	Peak	345	150	Horizontal	N/A
4**	2637.738	30.22	-12.80	54.0	-13.04	AV	330	150	Horizontal	Pass
4	2637.738	40.96	-12.80	74.0	-33.04	Peak	330	150	Horizontal	Pass
5**	3166.109	33.63	-9.62	54.0	-20.37	AV	228	150	Horizontal	Pass
5	3166.109	43.23	-9.62	74.0	-30.77	Peak	228	150	Horizontal	Pass
6**	3643.347	33.23	-7.38	54.0	-20.77	AV	318	150	Horizontal	Pass
6	3643.347	43.29	-7.38	74.0	-30.71	Peak	318	150	Horizontal	Pass

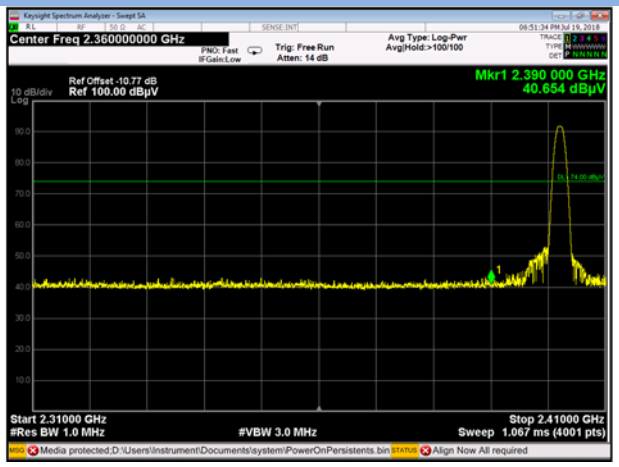
A.9 Band Edge (Restricted-band band-edge)

Note [1]: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.
Note [2]: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.
Note [3]: According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
Note [4]: The Level (dBuV/m) has been corrected by factor.

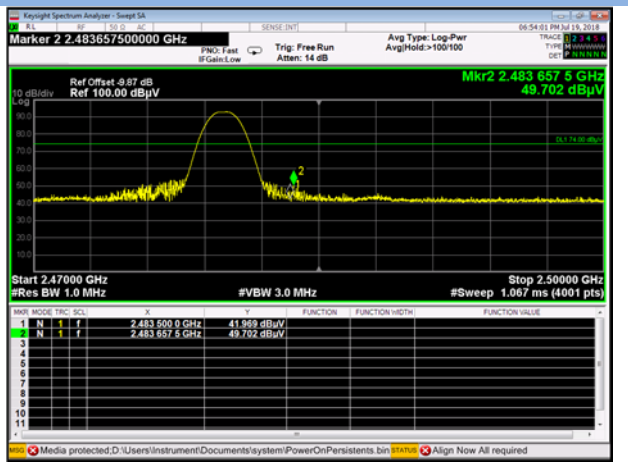
Test Mode	Test Channel	Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Margin (dB)	Remark	Verdict
GFSK	Low	2390.00	40.65	-10.77	74	33.35	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK	High	2483.50	49.70	-9.87	74	24.30	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK	Low	2390.00	41.35	-10.77	74	32.65	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK	High	2483.50	42.48	-9.87	74	31.52	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping)	Low	2390.00	41.58	-10.77	74	32.42	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping	High	2483.50	42.30	-9.87	74	31.70	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	Low	2390.00	40.80	-10.77	74	33.20	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	High	2483.50	41.80	-9.87	74	32.2	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass

Test Plots

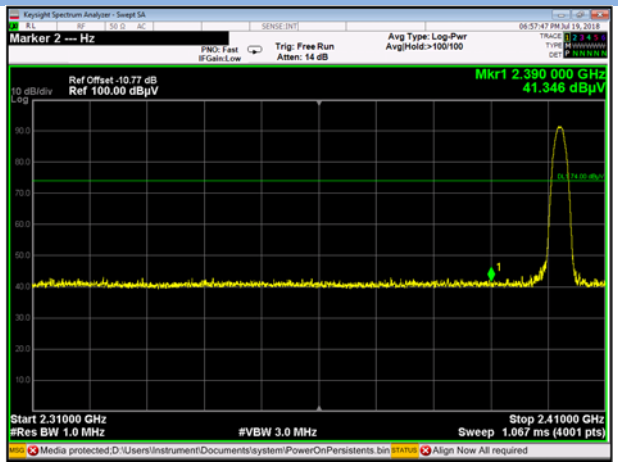
GFSK LOW CHANNEL , PEAK



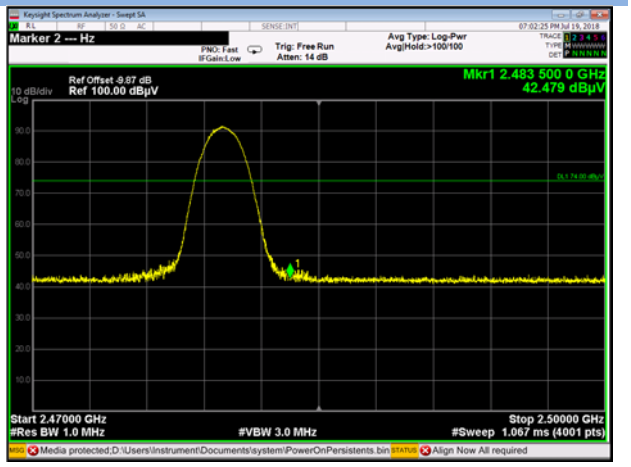
GFSK HIGH CHANNEL , PEAK



8-DPSK LOW CHANNEL , PEAK

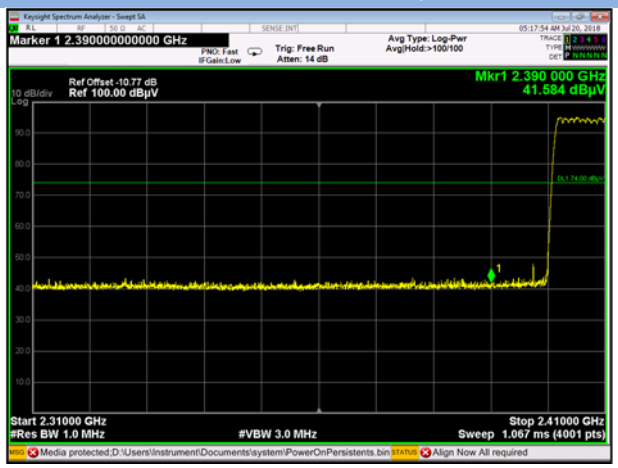


8-DPSK HIGH CHANNEL , PEAK

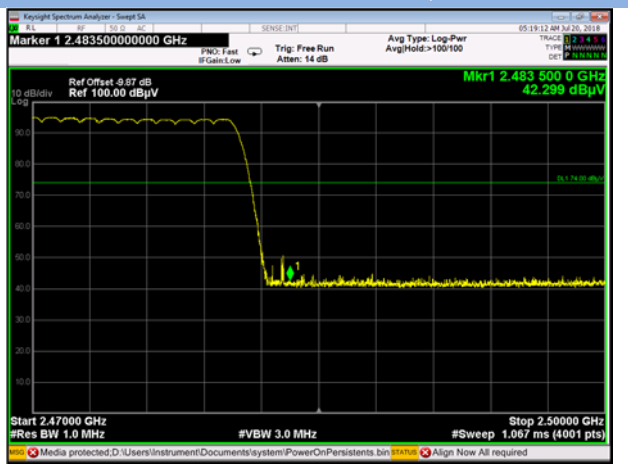


Hopping Mode:

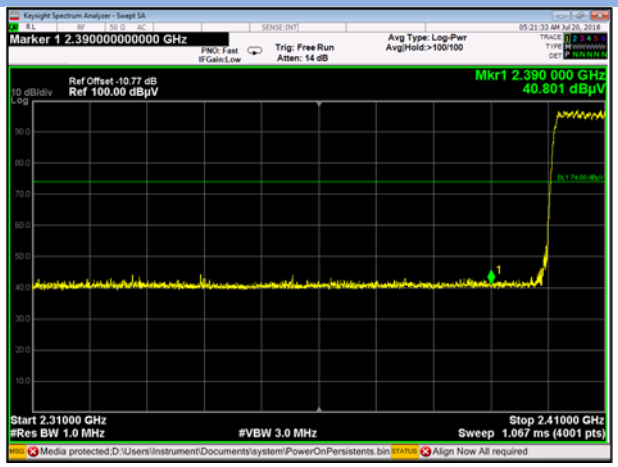
GFSK LOW FREQUENCY BAND, PEAK



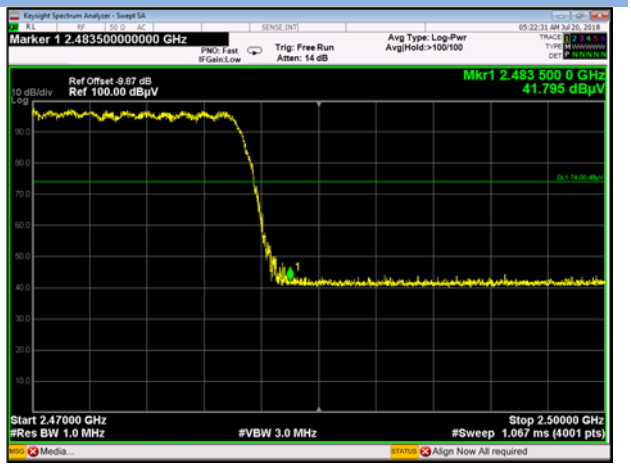
GFSK HIGH FREQUENCY BAND, PEAK



8-DPSK LOW FREQUENCY BAND, PEAK



8-DPSK HIGH FREQUENCY BAND, PEAK



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1870190-AR2.PDF”.

--END OF REPORT--