FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

TROLLEY SPEAKER

ISSUED TO
GUANGZHOU ADS AUDIO SCIENCE & TECHNOLOGY CO., LTD.

SHIMA INDUSTRIAL PARK, XINSHI TOWN, BAIYUN DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, P. R. CHINA

Tested by: Cao Shaodong (Engineer)
Date: Dec. 29, 2016

Approved by: Wei Yanquan (Chief Engineer)
Date: Dec. 29, 2016

Report No.:	BL-SZ1630350-601
EUT Type:	TROLLEY SPEAKER
Model Name:	PBX-12 (Please refer to section 2.4 for details.)
Brand Name:	QFX ■■■a/d/s/ AWV
Test Standard:	47 CFR Part 15 Subpart C
FCC ID:	2AHVS-TROLLEY-0001
Test conclusion:	Pass
Test Date:	Nov. 10, 2016 ~ Nov. 17, 2016
Date of Issue:	Dec. 29, 2016

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Dec. 19, 2016	Initial Issue
Rev. 02	Dec. 29, 2016	Replace Radiated Test Photos

TABLE OF CONTENTS

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
Fax Number	+86 755 6182 4271

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 has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. 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% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

(1) The test report reference to the report template version v5.5.

(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	GUANGZHOU ADS AUDIO SCIENCE & TECHNOLOGY CO., LTD.
Address	SHIMA INDUSTRIAL PARK, XINSHI TOWN, BAIYUN DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, P. R. CHINA

2.2 Manufacturer Information

Manufacturer	GUANGZHOU ADS AUDIO SCIENCE & TECHNOLOGY CO., LTD.
Address	SHIMA INDUSTRIAL PARK, XINSHI TOWN, BAIYUN DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, P. R. CHINA

2.3 Factory Information

Factory	GUANGZHOU ADS AUDIO SCIENCE & TECHNOLOGY CO., LTD.
Address	SHIMA INDUSTRIAL PARK, XINSHI TOWN, BAIYUN DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, P. R. CHINA

2.4 General Description for Equipment under Test (EUT)

EUT Type	TROLLEY SPEAKER
Model Name Under Test	PBX-12
Series Model Name	PBX-12, TV12BP, PBX-15, TV15BP, TV10BP, TAN212BP, TAN215BP, DA160A, DA180B, DB160A, TW08BP, TW10BP, TW12BP, TW15BP, CYC-T12BP, CYC-T15BP, TAJ12AP, TK15AP, TK08AP, E-15
Description of Model name differentiation	The above product with same circuit, PCB layout, electrical parts, materials and wiring structures. Only different decorative accessories and color is different. Materials of decorative accessories is the same.
Hardware Version	VER1.2
Software Version	VER1.2
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
Network and Wireless connectivity	Bluetooth 3.0

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	HENG KAIDA
	Model No.	HKD-2211
	Serial No.	N/A
	Capacitance	2200 mAh
	Rated Voltage	11.1 V
	Limit Charge Voltage	N/A
Ancillary Equipment 2	Charger	
	Brand Name	N/A
	Model No.	PLP-AE135150U
	Serial No.	N/A
	Rated Input	100-240 V~, 0.8 A, 50/60 Hz
	Rated Output	13.5 V⎓, 1500 mA
Ancillary Equipment 3	Remote Control	
	Length	9 cm

2.6 Technical Information

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 and portable
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	PCB Antenna
Antenna Gain	1.3 dBi (All involve the antenna gain test item, has been included in the final results)
About the Product	Only the Bluetooth 3.0 was tested in this report.

2.7 Additional Instructions

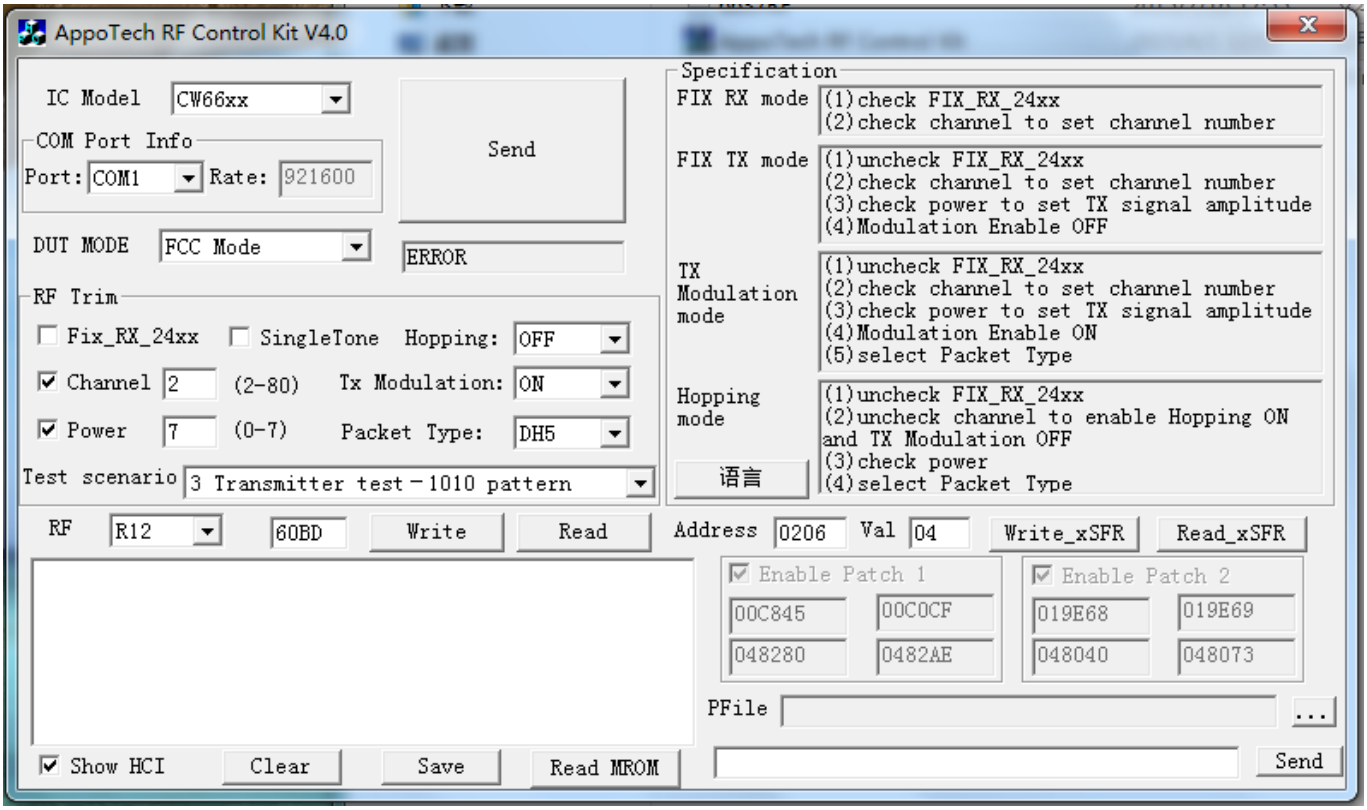
EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

During testing. Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power level setup in software			
Test Software Version	AppoTech RF Control Kit V4.0		
Mode	Channel	Frequency (MHz)	Soft Set
DH5	CH0	2402	Power parameter Settings is 7.
	CH39	2441	
	CH78	2480	
2DH5	CH0	2402	
	CH39	2441	
	CH78	2480	
3DH5	CH0	2402	
	CH39	2441	
	CH78	2480	

Run Software:



3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-15 Edition)	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	ISED Part No.	Test Result	Verdict	Remark
1	Antenna Requirement	15.203	RSS-Gen 8.3	--	Pass	Note1
2	20 dB and 99% Bandwidth	15.215(c)	RSS-Gen 6.6	ANNEX A.1	Pass	
3	AC Conducted Emission	15.207	RSS-Gen 8.8	ANNEX A.2	Pass	
4	Radiated Spurious Emission	15.249(a)	RSS-210 B.10 RSS-Gen 8.9	ANNEX A.3	Pass	
5	Band Edge(Restricted-band band-edge)	15.249(a)	RSS-210 B.10 RSS-Gen 8.10	ANNEX A.4	Pass	
Note 1: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.						

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	11.1 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2016.07.13	2017.07.12
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	177746	2016.07.13	2017.07.12
Signal Generator	ROHDE&SCHWARZ	SMB100A	260592	2016.07.13	2017.07.12
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2016.07.13	2017.07.12
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2016.11.08	2017.11.07
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2016.07.13	2017.07.12
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2016.07.13	2017.07.12
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2016.07.13	2017.07.12
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2016.07.13	2017.07.12
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2015.02.28	2017.02.27
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

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.

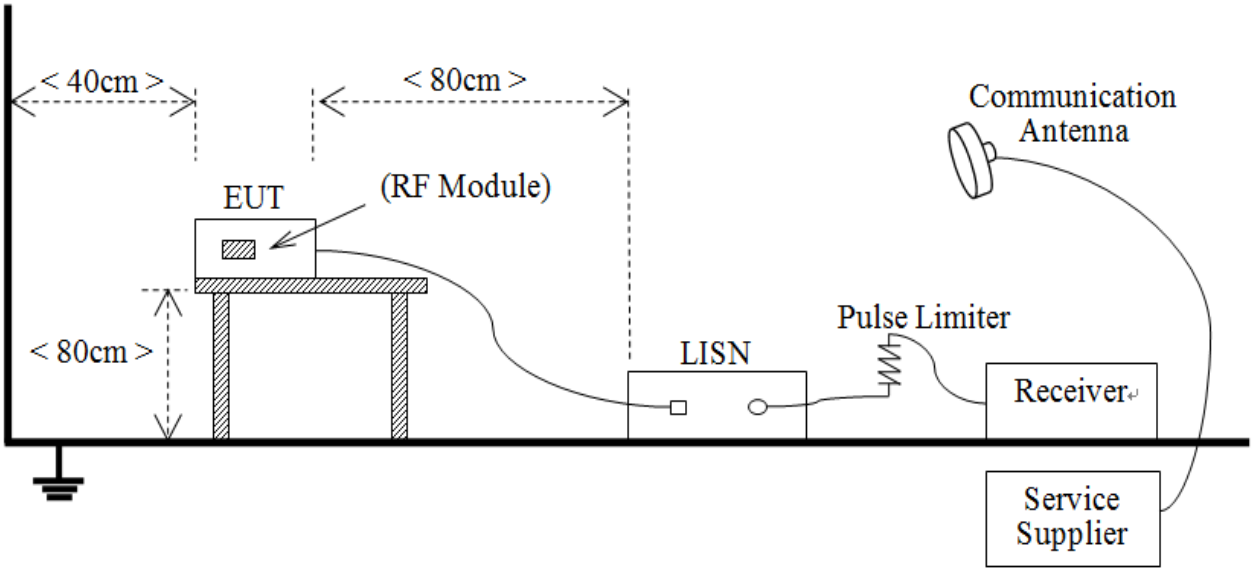
Measurement	Value
Occupied Channel Bandwidth	±4%
RF output power, conducted	±1.4 dB
Power Spectral Density, conducted	±2.5 dB
Unwanted Emissions, conducted	±2.8 dB
All emissions, radiated	±5.4 dB
Temperature	±1°C
Humidity	±4%

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

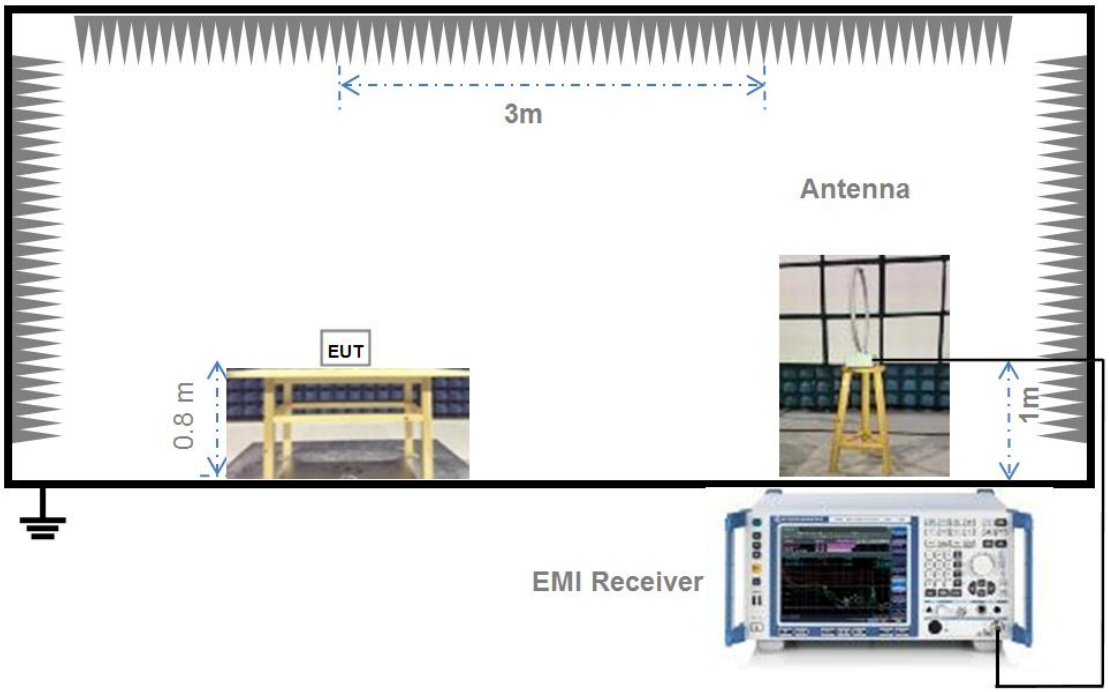
(Diagram 1)

4.4.2 For AC Power Supply Port Test



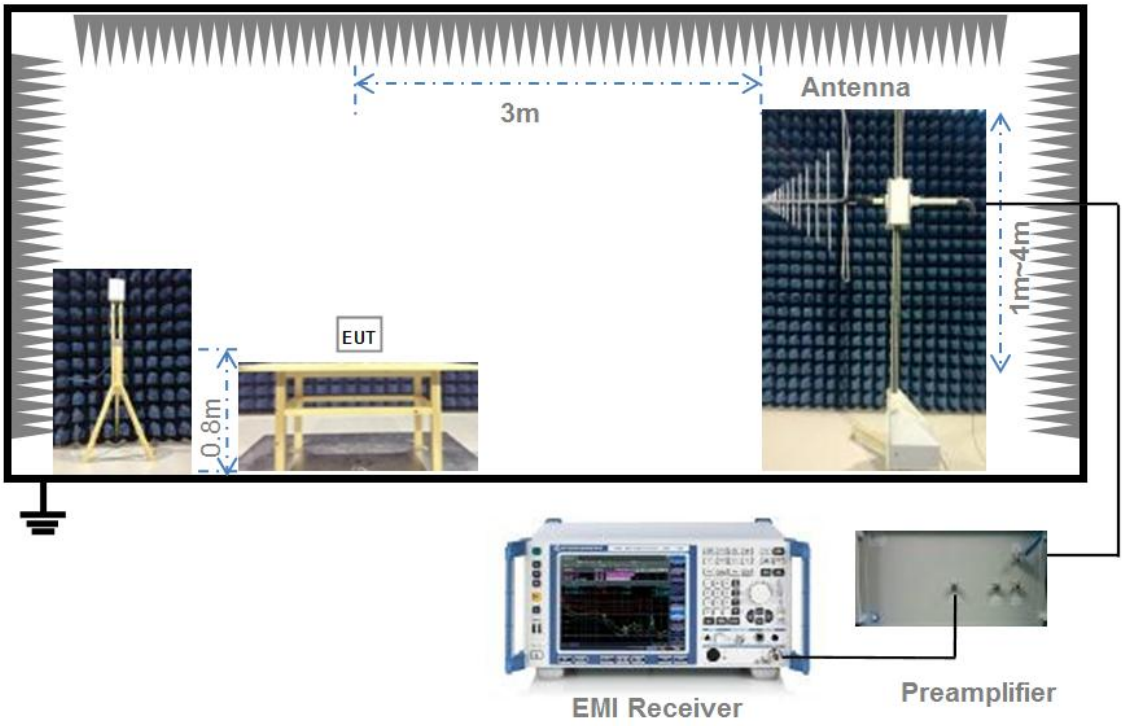
(Diagram 2)

4.4.3 For Radiated Test (Below 30 MHz)



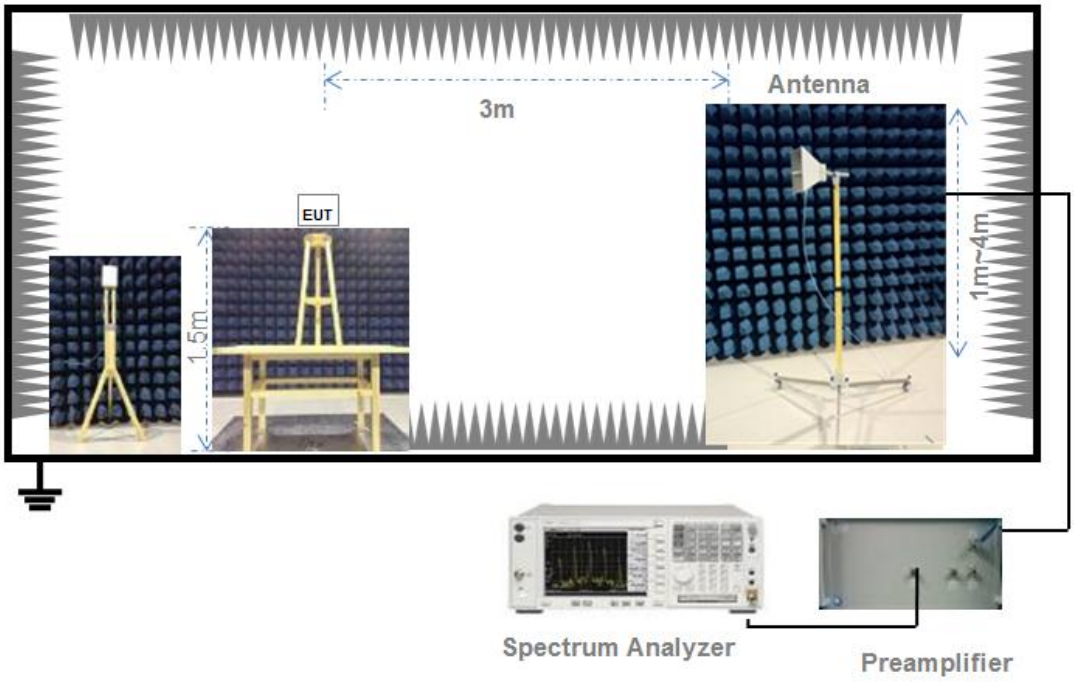
(Diagram 3)

4.4.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Standard Applicable

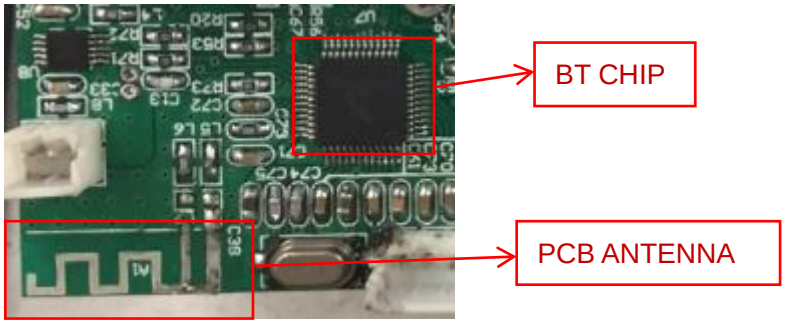
FCC §15.203 & 15.247(b); RSS-Gen 8.3

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:

Protected Method	Description
The antenna is An embedded-in	An embedded-in antenna design is used.

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 20 dB and 99% Bandwidth

5.2.1 Limit

FCC §15.215(c);

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

RSS-Gen 6.6

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured

5.2.2 Test Setups

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

Use the following spectrum analyzer settings:

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

RBW ≥ 1% of the 20 dB bandwidth

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 AC Conducted Emission

5.3.1 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

5.3.2 Test Setups

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 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.
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.

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Radiated Spurious Emission

5.4.1 Limit

FCC §15.249(a); RSS-210 B.10& RSS-Gen 8.9

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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. 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 20 dB above the maximum permitted average limit.

2. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.4.2 Test Setups

See section 4.4.2-4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 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

5.4.4 Test Result

Please refer to ANNEX A.3.

5.5 Band Edge (Restricted-band band-edge)

5.5.1 Limit

FCC §15.249(a); RSS-210 B.10&RSS-Gen 8.10

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).

5.5.2 Test Setups

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.

5.5.3 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.

5.5.4 Test Result

Please refer to ANNEX A.4.

ANNEX A TEST RESULT

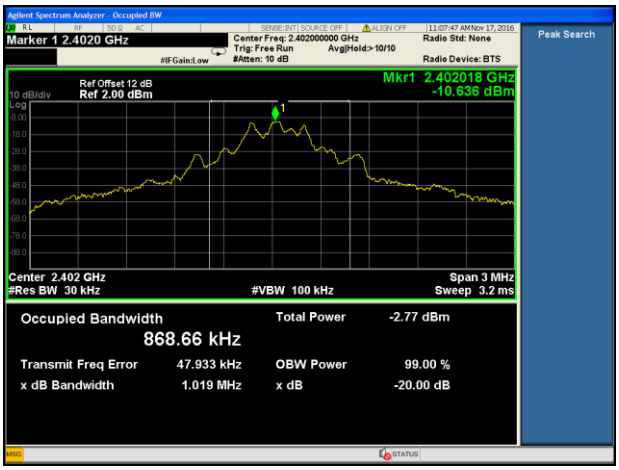
A.1 20 dB and 99% Bandwidth

Test Data

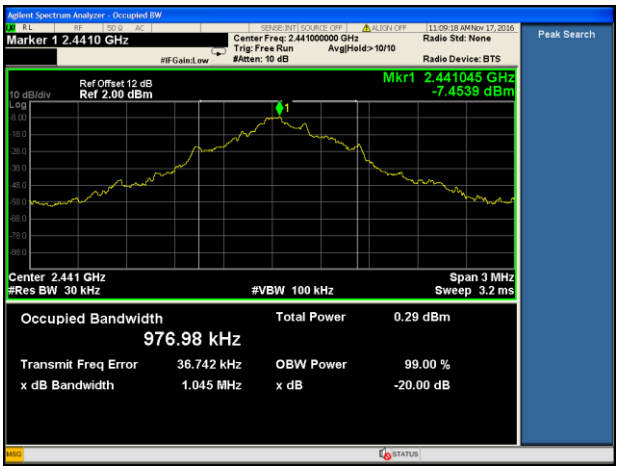
GFSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.019	0.869
Middle	1.045	0.977
High	1.043	0.993
8-DPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.089	1.159
Middle	1.212	1.236
High	1.217	1.298

Test plots

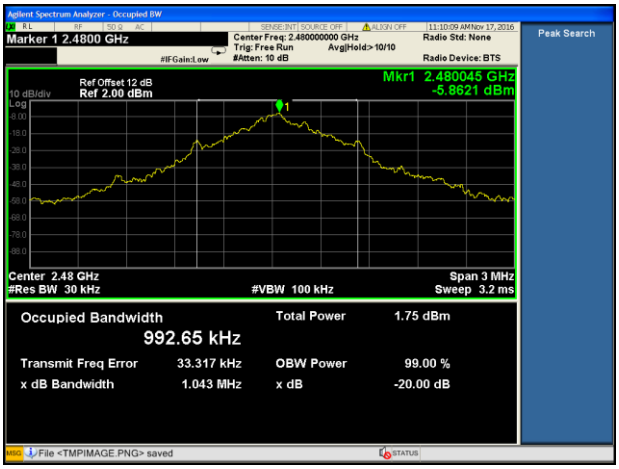
GFSK LOW CHANNEL



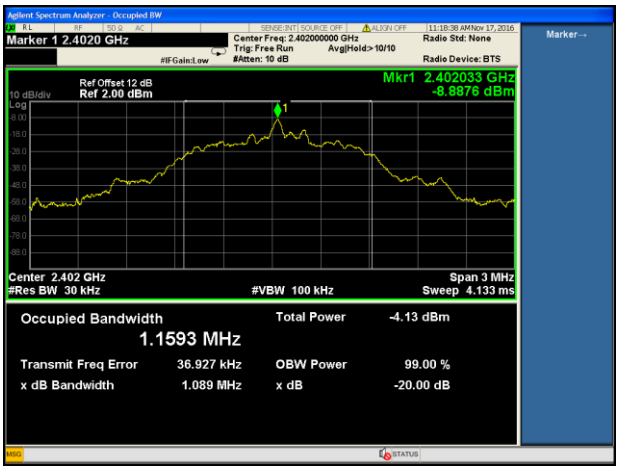
GFSK MIDDLE CHANNEL



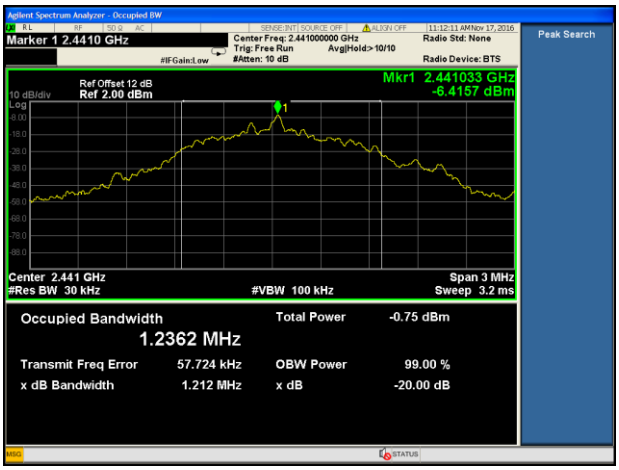
GFSK HIGH CHANNEL



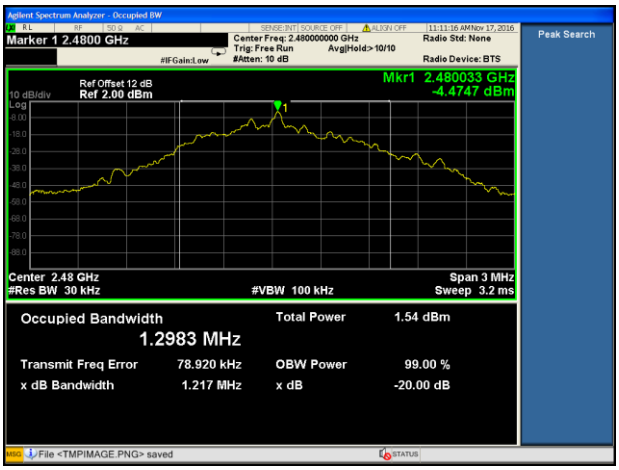
8-DPSK LOW CHANNEL



8-DPSK MIDDLE CHANNEL



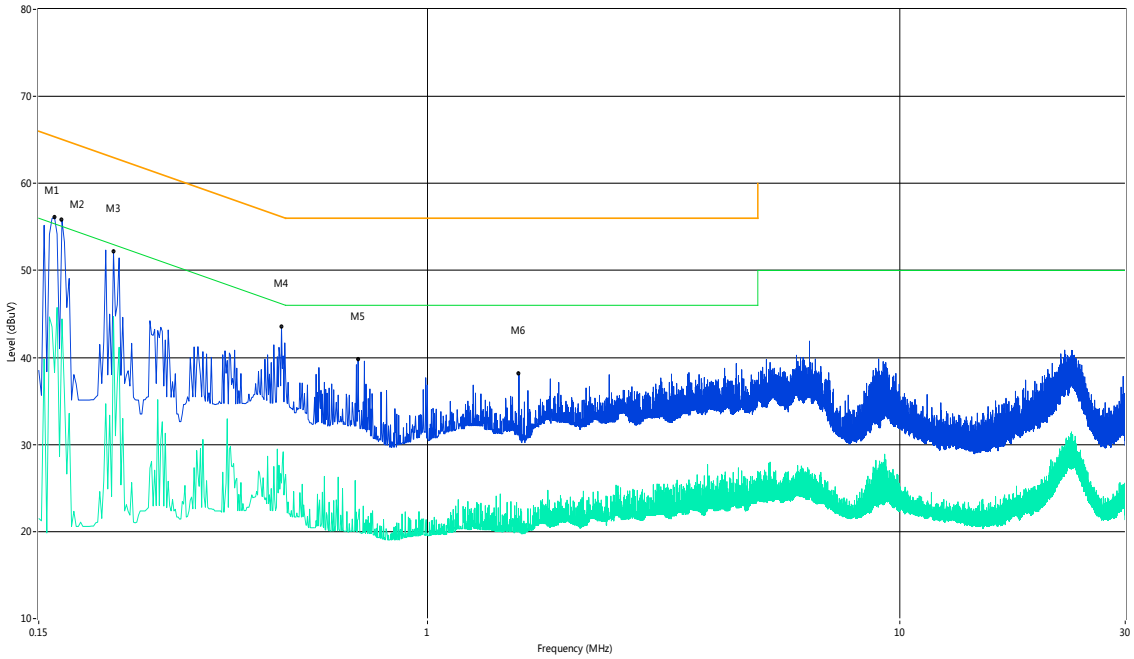
8-DPSK HIGH CHANNEL



A.2 AC Conducted Emission

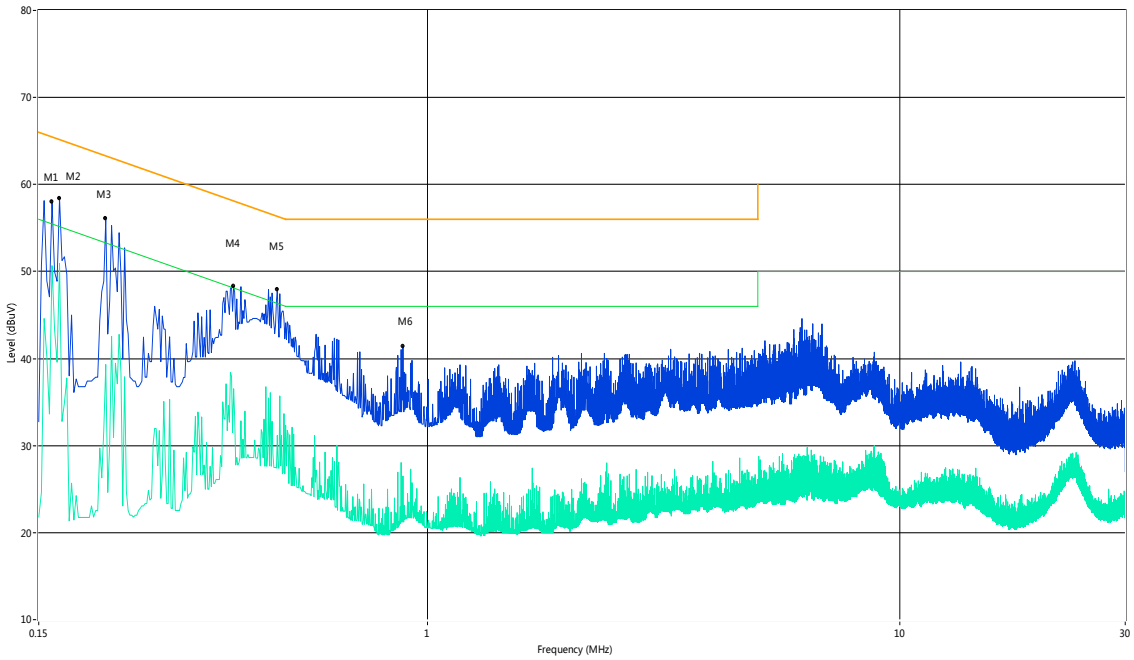
Note 1: The EUT is working in the Normal link mode.
Note 2: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.162	56.1	11.00	65.4	9.30	Peak	L Line	Pass
1**	0.162	38.3	11.00	55.4	17.10	AV	L Line	Pass
2	0.168	55.8	11.00	65.1	9.30	Peak	L Line	Pass
2**	0.168	44.4	11.00	55.1	10.70	AV	L Line	Pass
3	0.216	52.1	11.00	63.0	10.90	Peak	L Line	Pass
3**	0.216	44.7	11.00	53.0	8.30	AV	L Line	Pass
4	0.490	43.5	11.00	56.2	12.70	Peak	L Line	Pass
4**	0.490	25.6	11.00	46.2	20.60	AV	L Line	Pass
5	0.712	39.7	11.00	56.0	16.30	Peak	L Line	Pass
5**	0.712	21.4	11.00	46.0	24.60	AV	L Line	Pass
6	1.560	38.2	11.00	56.0	17.80	Peak	L Line	Pass
6**	1.560	21.8	11.00	46.0	24.20	AV	L Line	Pass

PHASE N

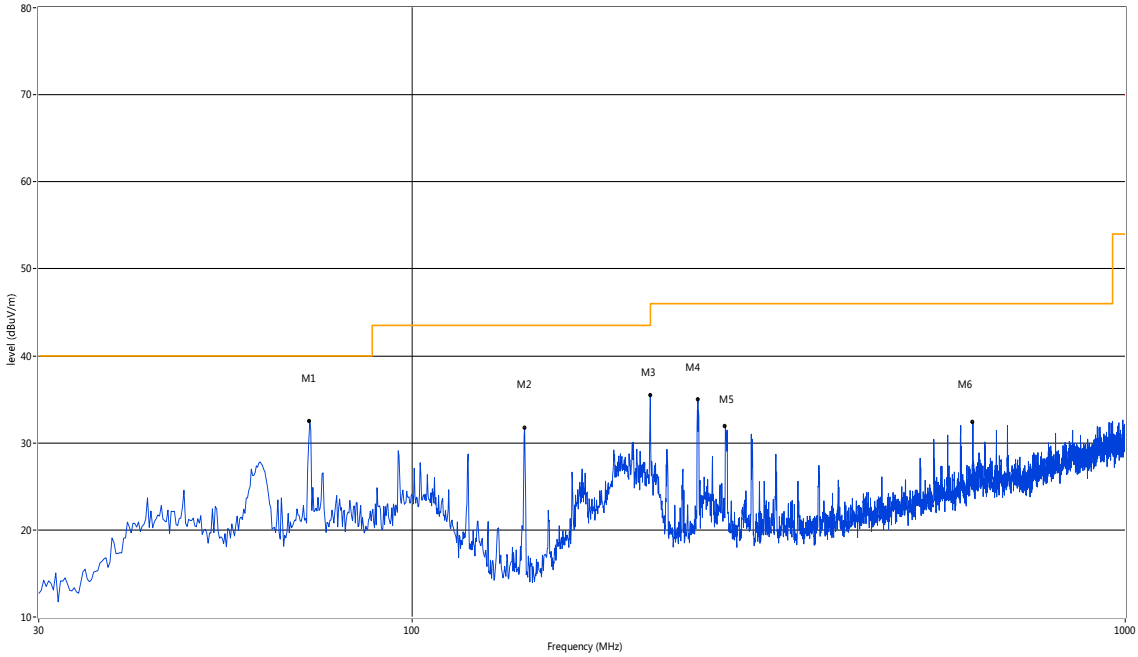


No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.160	58.1	11.00	65.5	7.40	Peak	N Line	Pass
1**	0.160	50.7	11.00	55.5	4.80	AV	N Line	Pass
2	0.166	58.4	11.00	65.2	6.80	Peak	N Line	Pass
2**	0.166	50.9	11.00	55.2	4.30	AV	N Line	Pass
3	0.208	56.1	11.00	63.3	7.20	Peak	N Line	Pass
3**	0.208	39.3	11.00	53.3	14.00	AV	N Line	Pass
4	0.388	48.3	11.00	58.1	9.80	Peak	N Line	Pass
4**	0.388	36.5	11.00	48.1	11.60	AV	N Line	Pass
5	0.480	48.0	11.00	56.3	8.30	Peak	N Line	Pass
5**	0.480	31.2	11.00	46.3	15.10	AV	N Line	Pass
6	0.886	41.4	11.00	56.0	14.60	Peak	N Line	Pass
6**	0.886	26.5	11.00	46.0	19.50	AV	N Line	Pass

A.3 Radiated Emission

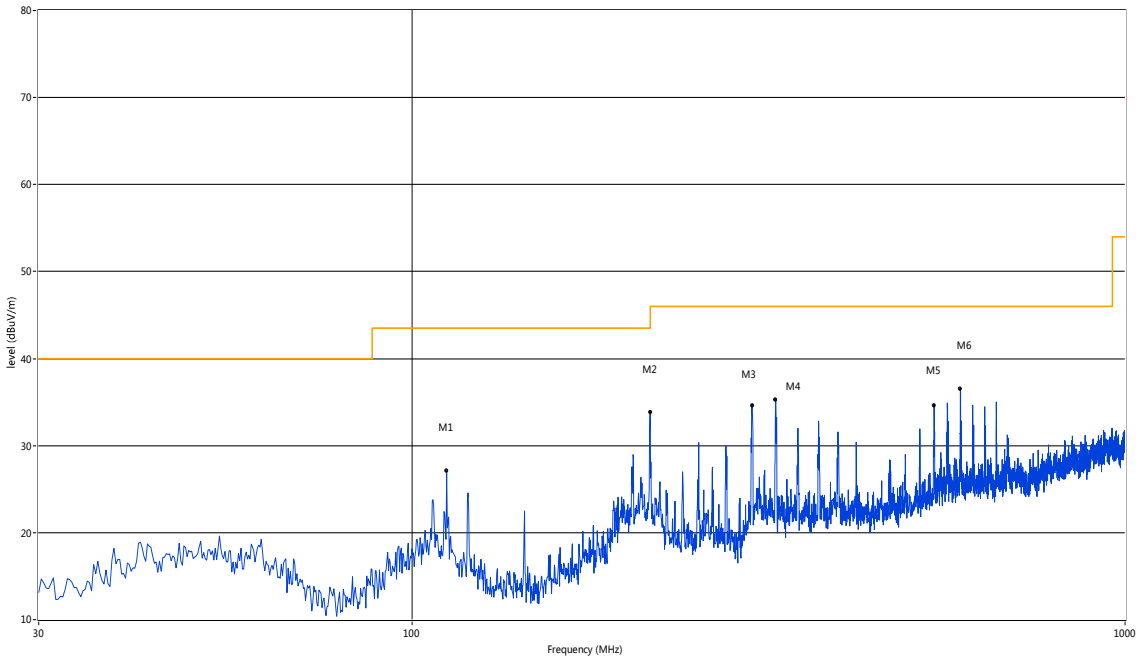
Note 1: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.
Note 2: The EUT is working in the Normal link mode below 1 GHz.

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	71.942	32.51	-23.54	40.0	7.49	Peak	95.60	100	Vertical	Pass
2	143.947	31.71	-23.56	43.5	11.79	Peak	246.70	100	Vertical	Pass
3	215.951	35.43	-20.06	43.5	8.07	Peak	241.50	100	Vertical	Pass
4	251.832	34.97	-18.86	46.0	11.03	Peak	201.40	100	Vertical	Pass
5	275.106	31.91	-18.48	46.0	14.09	Peak	166.20	100	Vertical	Pass
6	611.612	32.38	-10.47	46.0	13.62	Peak	44.10	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	111.945	27.06	-20.52	43.5	16.44	Peak	76.10	100	Horizontal	Pass
2	215.951	33.83	-20.06	43.5	9.67	Peak	0.00	100	Horizontal	Pass
3	300.077	34.61	-17.61	46.0	11.39	Peak	360.00	100	Horizontal	Pass
4	323.837	35.27	-16.81	46.0	10.73	Peak	12.50	100	Horizontal	Pass
5	539.850	34.61	-12.21	46.0	11.39	Peak	250.40	100	Horizontal	Pass
6	587.853	36.53	-11.25	46.0	9.47	Peak	61.30	100	Horizontal	Pass

Test Data (1 GHz ~ 10th Harmonic)

Note 1: The marked spikes near 2400 MHz is the fundamental signal.

Note 2: Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Note 3: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Note 4: Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Note 5: Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

DH5 LOW CHANNEL 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2213.66	49.22	3.77	74	24.78	Peak	182.6	150	Vertical	Pass
2	**2401.9**	86.11	0.09	114.0	27.9	Peak	224.4	150	Vertical	Pass[Note1]
3	3555.16	52.67	5.36	74	21.34	Peak	175.5	150	Vertical	Pass
4	9829.87	45.28	18.76	74	28.72	Peak	7.3	150	Vertical	Pass
5	16628.95	45.25	9.36	74	28.75	Peak	205.6	150	Vertical	Pass
6	21216.31	49.46	12.38	74	24.54	Peak	169.1	150	Vertical	Pass

DH5 LOW CHANNEL 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2114.88	48.69	3.37	74	25.31	Peak	249.3	150	Horizontal	Pass
2	**2403.2**	82.06	0.09	114.0	31.9	Peak	107.3	150	Horizontal	Pass[Note1]
3	5946.17	51.13	12.67	74	22.87	Peak	336.8	150	Horizontal	Pass
4	7504.99	42.17	18.59	74	31.83	Peak	66.9	150	Horizontal	Pass
5	16150.58	46.10	9.44	74	27.90	Peak	177.4	150	Horizontal	Pass
6	24620.63	43.94	11.83	74	30.06	Peak	70.6	150	Horizontal	Pass

DH5 MIDDLE CHANNEL 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2083.65	50.05	4.05	74	23.95	Peak	223.9	150	Vertical	Pass
2	**2440.26**	87.25	0.77	114.0	26.8	Peak	149.1	150	Vertical	Pass[Note1]
3	3554.41	51.23	5.26	74	22.78	Peak	179.8	150	Vertical	Pass
4	10391.43	44.01	18.46	74	29.99	Peak	48.8	150	Vertical	Pass
5	12255.82	44.93	9.06	74	29.07	Peak	171.6	150	Vertical	Pass
6	20397.67	44.11	8.79	74	29.89	Peak	2.6	150	Vertical	Pass

DH5 MIDDLE CHANNEL 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2246.52	48.08	3.52	74	25.92	Peak	311.5	150	Horizontal	Pass
2	**2441.06**	82.35	0.71	114.0	31.7	Peak	37	150	Horizontal	Pass[Note1]
3	5944.29	51.33	12.55	74	22.67	Peak	356.4	150	Horizontal	Pass
4	6707.57	43.02	14.82	74	30.98	Peak	59.5	150	Horizontal	Pass
5	15360.23	46.79	9.58	74	27.21	Peak	59.7	150	Horizontal	Pass
6	18407.24	48.58	11.22	74	25.42	Peak	242.5	150	Horizontal	Pass

DH5 HIGH CHANNEL 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2335.11	49.26	4.36	74	24.74	Peak	105.8	150	Vertical	Pass
2	**2480.21**	87.77	0.09	114.0	26.2	Peak	215.5	150	Vertical	Pass[Note1]
3	3552.64	51.94	5.21	74	22.07	Peak	226.9	150	Vertical	Pass
4	10997.92	46.18	16.44	74	27.83	Peak	249.5	150	Vertical	Pass
5	12289.52	49.59	9.37	74	24.41	Peak	357.5	150	Vertical	Pass
6	19628.95	46.04	11.10	74	27.96	Peak	82.4	150	Vertical	Pass

DH5 HIGH CHANNEL 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2192.56	47.44	3.29	74	26.56	Peak	66.3	150	Horizontal	Pass
2	**2480.71**	82.21	0.77	114.0	31.8	Peak	39.3	150	Horizontal	Pass[Note1]
3	5944.10	52.72	12.60	74	21.28	Peak	309	150	Horizontal	Pass
4	11784.11	45.96	14.17	74	28.04	Peak	9.8	150	Horizontal	Pass
5	16379.37	44.70	11.41	74	29.30	Peak	70.4	150	Horizontal	Pass
6	22024.96	48.00	12.18	74	26.00	Peak	231.7	150	Horizontal	Pass

3DH5 LOW CHANNEL 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2162.27	49.23	3.42	74	24.78	Peak	184.8	150	Vertical	Pass
2	**2402.63**	87.40	2.14	114.0	26.6	Peak	245.5	150	Vertical	Pass[Note1]
3	3511.06	52.04	5.14	74	21.96	Peak	105.2	150	Vertical	Pass
4	8201.33	46.72	17.43	74	27.28	Peak	98.3	150	Vertical	Pass
5	16306.57	43.51	9.05	74	30.49	Peak	225.6	150	Vertical	Pass
6	22723.79	43.32	9.26	74	30.68	Peak	192.6	150	Vertical	Pass

3DH5 LOW CHANNEL 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2191.56	48.34	3.35	74	25.66	Peak	120.2	150	Horizontal	Pass
2	**2402.68**	85.73	0.96	114.0	28.3	Peak	92.3	150	Horizontal	Pass[Note1]
3	5686.50	52.22	11.42	74	21.78	Peak	53.4	150	Horizontal	Pass
4	6449.25	43.97	18.30	74	30.03	Peak	256.6	150	Horizontal	Pass
5	13311.56	45.63	11.53	74	28.37	Peak	135.9	150	Horizontal	Pass
6	24950.08	47.55	9.76	74	26.45	Peak	43.2	150	Horizontal	Pass

3DH5 MIDDLE CHANNEL 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2164.51	50.74	3.64	74	23.27	Peak	31.9	150	Vertical	Pass
2	**2440.87**	88.23	1.42	114.0	25.8	Peak	134.8	150	Vertical	Pass[Note1]
3	3510.34	51.78	5.23	74	22.22	Peak	139.3	150	Vertical	Pass
4	6741.27	43.78	15.07	74	30.22	Peak	80.9	150	Vertical	Pass
5	13176.37	43.72	9.76	74	30.28	Peak	157	150	Vertical	Pass
6	23871.88	45.79	10.59	74	28.21	Peak	101.4	150	Vertical	Pass

3DH5 MIDDLE CHANNEL 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2215.51	49.12	3.35	74	24.88	Peak	316.6	150	Horizontal	Pass
2	**2441.02**	85.77	1.22	114.0	28.2	Peak	243.3	150	Horizontal	Pass[Note1]
3	5681.82	52.18	11.64	74	21.82	Peak	120.3	150	Horizontal	Pass
4	11267.47	46.97	15.18	74	27.03	Peak	217	150	Horizontal	Pass
5	13540.35	43.12	9.91	74	30.88	Peak	204.2	150	Horizontal	Pass
6	20996.67	45.96	10.74	74	28.04	Peak	308.2	150	Horizontal	Pass

3DH5 HIGH CHANNEL 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2213.54	50.85	3.57	74	23.16	Peak	1.3	150	Vertical	Pass
2	**2480.17**	88.48	1.81	114.0	25.5	Peak	105.8	150	Vertical	Pass[Note1]
3	3507.18	52.23	5.18	74	21.77	Peak	229.7	150	Vertical	Pass
4	8965.06	49.49	13.62	74	24.51	Peak	12.2	150	Vertical	Pass
5	15557.82	46.12	11.76	74	27.88	Peak	49.6	150	Vertical	Pass
6	18334.44	43.85	12.36	74	30.15	Peak	22.3	150	Vertical	Pass

3DH5 HIGH CHANNEL 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2102.69	47.78	3.06	74	26.22	Peak	136.5	150	Horizontal	Pass
2	**2480.38**	84.98	1.22	114.0	29.0	Peak	156.6	150	Horizontal	Pass[Note1]
3	5685.20	51.87	11.62	74	22.13	Peak	182.9	150	Horizontal	Pass
4	11334.86	46.07	14.46	74	27.93	Peak	152.4	150	Horizontal	Pass
5	14538.69	45.09	9.78	74	28.91	Peak	94	150	Horizontal	Pass
6	23622.30	47.80	11.23	74	26.20	Peak	67.2	150	Horizontal	Pass

Hopping Mode:

GFSK MODE 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2113.67	48.72	3.75	74	25.28	Peak	36.5	150	Vertical	Pass
2	**2402.31**	86.22	0.72	114.0	27.8	Peak	197.3	150	Vertical	Pass[Note1]
3	3554.11	52.46	5.21	74	21.55	Peak	333.6	150	Vertical	Pass
4	9919.72	48.71	14.17	74	25.29	Peak	78.5	150	Vertical	Pass
5	15568.22	46.79	9.15	74	27.21	Peak	233.7	150	Vertical	Pass
6	22094.84	43.88	11.80	74	30.12	Peak	297.2	150	Vertical	Pass

GFSK MODE 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2214.82	48.95	3.29	74	25.05	Peak	156.7	150	Horizontal	Pass
2	**2404.88**	82.48	0.77	114.0	31.5	Peak	249.9	150	Horizontal	Pass[Note1]
3	5944.79	52.67	12.71	74	21.33	Peak	90.1	150	Horizontal	Pass
4	11323.63	42.63	18.38	74	31.37	Peak	122.5	150	Horizontal	Pass
5	13529.95	44.39	9.31	74	29.61	Peak	353.4	150	Horizontal	Pass
6	20477.54	46.16	11.73	74	27.85	Peak	67.1	150	Horizontal	Pass

8-DPSK MODE 1 GHz to 25 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2262.34	49.19	3.33	74	24.82	Peak	88.1	150	Vertical	Pass
2	**2470.8**	89.08	1.22	114.0	24.9	Peak	302.6	150	Vertical	Pass[Note1]
3	3509.89	51.44	5.18	74	22.56	Peak	240.9	150	Vertical	Pass
4	11570.72	47.10	14.18	74	26.90	Peak	11	150	Vertical	Pass
5	14289.10	41.59	10.75	74	32.41	Peak	329.3	150	Vertical	Pass
6	21705.49	45.71	11.10	74	28.29	Peak	295.4	150	Vertical	Pass

8-DPSK MODE 1 GHz to 25 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2312.81	47.76	3.17	74	26.24	Peak	273.9	150	Horizontal	Pass
2	**2471.08**	85.88	1.49	114.0	28.1	Peak	335	150	Horizontal	Pass[Note1]
3	5687.98	51.98	11.64	74	22.02	Peak	168.2	150	Horizontal	Pass
4	11525.79	41.35	17.14	74	32.65	Peak	43.9	150	Horizontal	Pass
5	15162.65	44.97	9.03	74	29.04	Peak	354.9	150	Horizontal	Pass
6	24970.05	44.70	11.32	74	29.30	Peak	353.5	150	Horizontal	Pass

A.4 Band Edge(Restricted-band band-edge)

Test Data and Test Plots

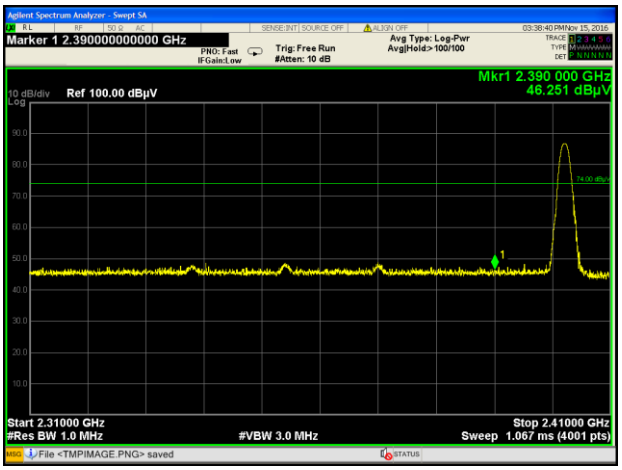
Note 1: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.

Note 2: 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.

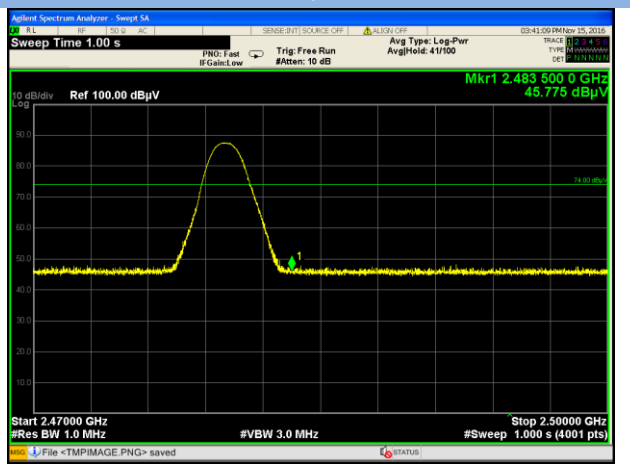
Test Mode	Test Channel	Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Remark	Verdict
GFSK	Low	2390.00	46.25	74	27.75	PEAK	Pass
		2390.00	N/A	54	N/A	AVERAGE	Pass
GFSK	HIGH	2483.50	45.78	74	28.23	PEAK	Pass
		2483.50	N/A	54	N/A	AVERAGE	Pass
8-DPSK	Low	2390.00	44.30	74	29.70	PEAK	Pass
		2390.00	N/A	54	N/A	AVERAGE	Pass
8-DPSK	HIGH	2483.50	44.09	74	29.92	PEAK	Pass
		2483.50	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping)	Low	2390.00	46.15	74	27.85	PEAK	Pass
		2390.00	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping	HIGH	2483.50	45.21	74	28.79	PEAK	Pass
		2483.50	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	Low	2390.00	44.91	74	29.09	PEAK	Pass
		2390.00	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	HIGH	2483.50	45.33	74	28.67	PEAK	Pass
		2483.50	N/A	54	N/A	AVERAGE	Pass

Test Plots

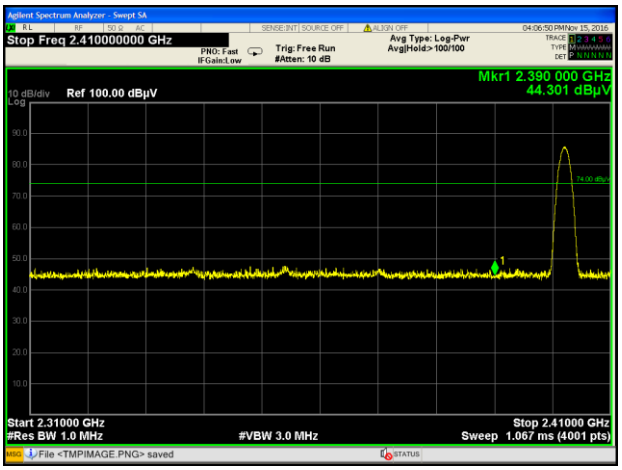
GFSK LOW CHANNEL , PEAK



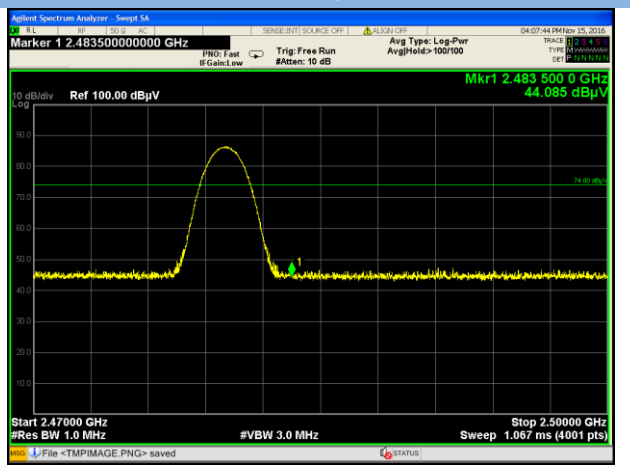
GFSK HIGH CHANNEL , PEAK



8-DPSK LOW CHANNEL , PEAK

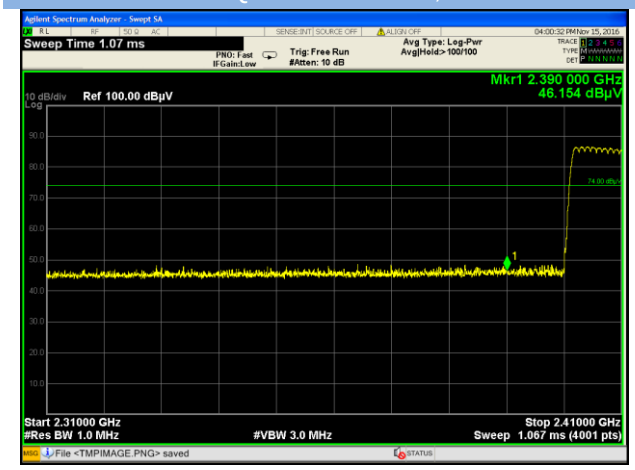


8-DPSK HIGH CHANNEL , PEAK

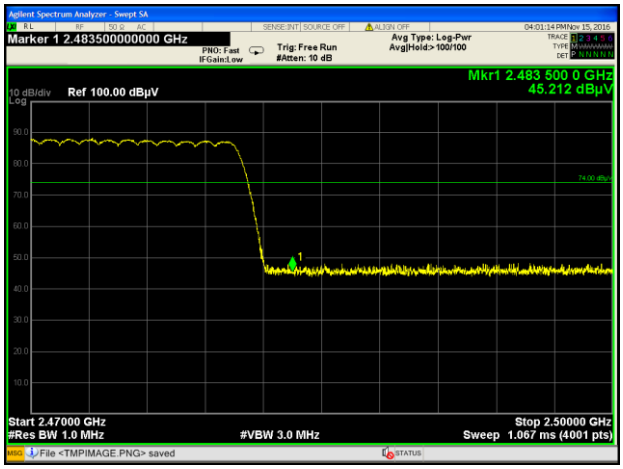


Hopping Mode:

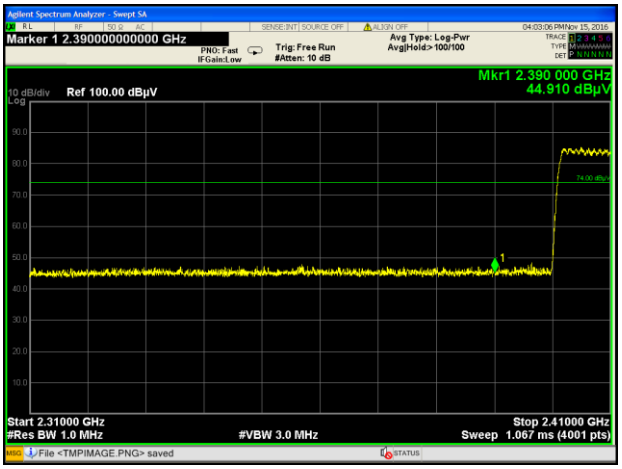
GFSK LOW FREQUENCY BAND, PEAK



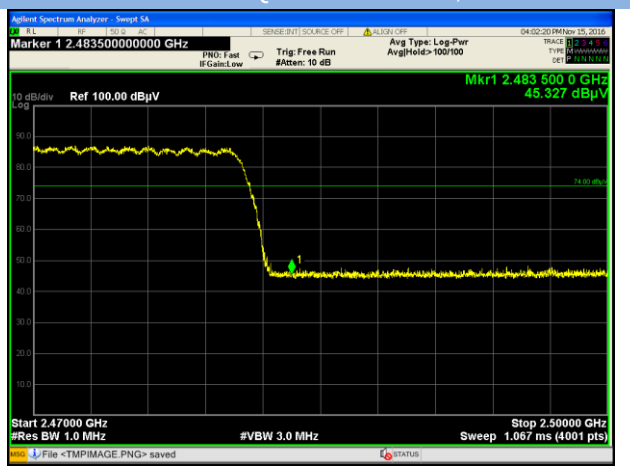
GFSK HIGH FREQUENCY BAND, PEAK



8-DPSK LOW FREQUENCY BAND, PEAK



8-DPSK HIGH FREQUENCY BAND, PEAK



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1630350-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ1630350-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ1630350-AI.PDF”.

--END OF REPORT--