FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

REMOTE CONTROL DOG TRAINING COLLAR

ISSUED TO
ShenZhen BenKei Technology Co., Ltd

4 Floor, 18 Building, LangKou Industrial, Langkou Community, DaLang Street, LongHua District, ShenZhen.

Report No.:	BL-SZ1820104-601
EUT Name:	REMOTE CONTROL DOG TRAINING COLLAR
Model Name:	YD-4020(refer section 2.4)
Brand Name:	Home Pet
Test Standard:	47 CFR Part 15 Subpart C
FCC ID:	2AO5I-4020
Test Conclusion:	Pass
Test Date:	Apr. 23, 2018 ~ Apr. 26, 2018
Date of Issue:	May 16, 2018

Prepared by: Hu Chao
Hu Chao
(Engineer)
Date: May 16, 2018

Approved by:
Wei Yaquan
(Chief Engineer)
Date: May 16, 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
Rev. 01	May 16, 2018	Initial Issue

TABLE OF CONTENTS

1 ADMINISTRATIVE DATA (GENERAL INFORMATION) 5

1.1 Identification of the Testing Laboratory 5

1.2 Identification of the Responsible Testing Location 5

1.3 Laboratory Condition 5

1.4 Announce 5

2 PRODUCT INFORMATION 7

2.1 Applicant Information 7

2.2 Manufacturer Information 7

2.3 Factory Information 7

2.4 General Description for Equipment under Test (EUT) 7

2.5 Ancillary Equipment 7

2.6 Technical Information 8

3 SUMMARY OF TEST RESULTS 9

3.1 Test Standards 9

3.2 Verdict 9

4 GENERAL TEST CONFIGURATIONS 10

4.1 Test Environments 10

4.2 Test Equipment List 10

4.3 Measurement Uncertainty 11

4.4 Description of Test Setup 12

4.4.1 For AC Power Supply Port Test 12

4.4.2 For Radiated Test (Below 30 MHz) 12

4.4.3 For Radiated Test (30 MHz-1 GHz) 13

4.4.4 For Radiated Test (Above 1 GHz) 13

5 TEST ITEMS 14
5.1 Antenna Requirements 14
5.1.1 Relevant Standards 14
5.1.2 Antenna Anti-Replacement Construction 14
5.1.3 Antenna Gain 15
5.2 Conducted Emission 16
5.2.1 Limit 16
5.2.2 Test Setup 16
5.2.3 Test Procedure 16
5.2.4 Test Result 16
5.3 20 dB Bandwidth 17
5.3.1 Limit 17
5.3.2 Test Setup 17
5.3.3 Test Procedure 17
5.3.4 Test Result 17
5.4 Field Strength of Fundamental Emissions and Radiated Emissions 18
5.4.1 Limit 18
5.4.2 Test Setup 18
5.4.3 Test Procedure 18
5.4.4 Test Result 19
5.5 Transmitting Time 20
5.5.1 Limit 20
5.5.2 Test Setup 20
5.5.3 Test Procedure 20
5.5.4 Test Result 20
ANNEX A TEST RESULT 21
A.1 Conducted Emission 21
A.2 Bandwidth 25
A.3 Duty cycle 26
A.4 Field Strength of Fundamental Emissions 27
A.5 Radiated Emissions 28
A.6 Transmitter Time 32

ANNEX B TEST SETUP PHOTOS..... 33
ANNEX C EUT EXTERNAL PHOTOS..... 33
ANNEX D EUT INTERNAL PHOTOS..... 33

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 v5.4.

(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	ShenZhen BenKei Technology Co., Ltd
Address	4 Floor, 18 Building, LangKou Industrial, Langkou Community, DaLang Street, LongHua District, ShenZhen.

2.2 Manufacturer Information

Manufacturer	ShenZhen BenKei Technology Co., Ltd
Address	4 Floor, 18 Building, LangKou Industrial, Langkou Community, DaLang Street, LongHua District, ShenZhen.

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	REMOTE CONTROL DOG TRAINING COLLAR	
Under Test Model Name	YD-4020	
Series Model Name	YD-4020, YD-4000	
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name.	
Hardware Version	4020-1TX (Remote Control)	4020-1RX (Receiver)
Software Version	4020TX (Remote Control)	4020RX (Receiver)
Dimensions (Approx.)	N/A	
Weight (Approx.)	N/A	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery 1 (Remote Control)	
	Brand Name	N/A
	Model No.	OAK 503040
	Serial No.	N/A
	Capacity	600 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.2 V
Ancillary Equipment 2	Battery 2 (Receiver)	
	Brand Name	N/A
	Model No.	602030
	Serial No.	N/A
	Capacity	300 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.2 V
Ancillary Equipment 3	USB Cable	
	Length (Approx.)	1.2 m

2.6 Technical Information

Modulation Type	ASK
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Operating Frequency	433.92 MHz.
Antenna Type	Dipole Antenna
Antenna Gain	0 dBi

All channel was listed on the following table:

Channel number	Freq.(MHz)
1	433.92

Note: The above EUT information in section 2.4 and 2.6 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-16 Edition)	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	--	Pass Note
2	Conducted Emission	15.207	ANNEX A.1	Pass
3	20 dB Bandwidth	15.231(c)	ANNEX A.2	Pass
4	Duty Cycle	15.35	ANNEX A.3	Pass
5	Field Strength of Fundamental Emissions	15.231(b)	ANNEX A.4	Pass
6	Radiated Emissions	15.209 15.231(b)	ANNEX A.5	Pass
7	Transmitting Time	15.231(a)	ANNEX A.6	Pass
Note: Please refer to section 5.1				

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 to102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	3.7 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2017.06.12	2018.06.11
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2017.06.12	2018.06.11
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2017.09.07	2018.09.06
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2017.06.22	2018.06.21
LISN	SCHWARZBECK	NSLK 8127	8127-687	2017.06.22	2018.06.21
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2017.06.12	2018.06.11
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2017.06.12	2018.06.11
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2017.06.22	2018.06.21
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2017.06.27	2018.06.26
Test Antenna-Rod(9 kHz-30 MHz)	SCHWARZBECK	VAMP 9243	9243-556	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	2016.07.12	2018.07.11
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2017.06.22	2018.06.21
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6m*7.35m	N/A	2016.08.09	2018.08.08
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

4.3 Measurement Uncertainty

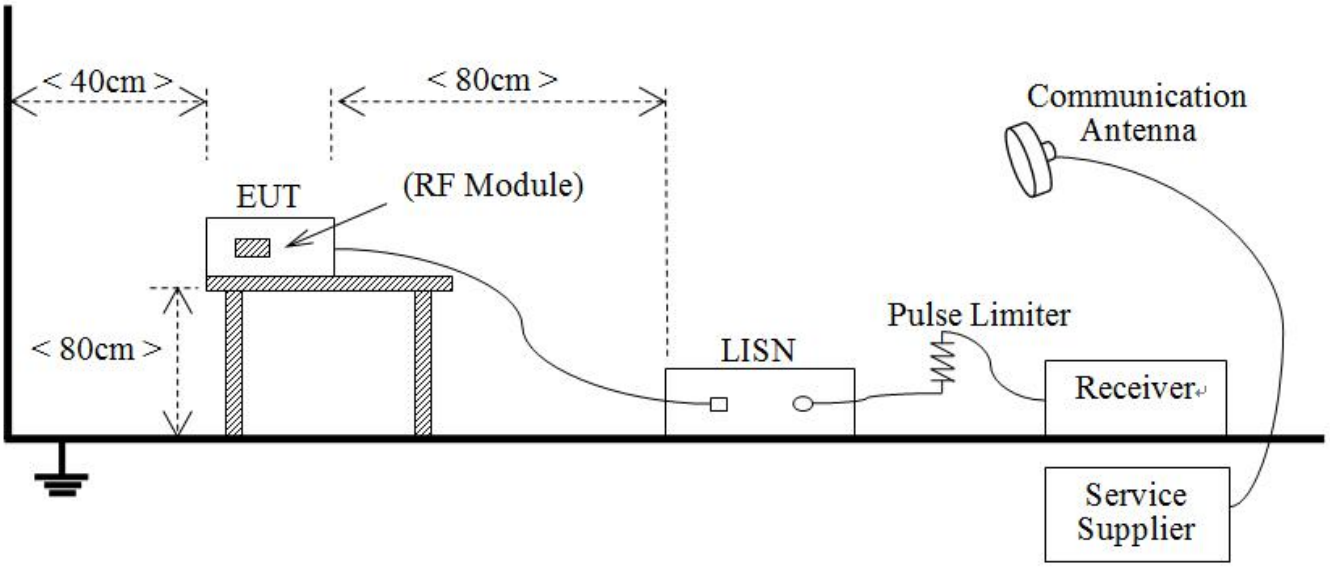
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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%

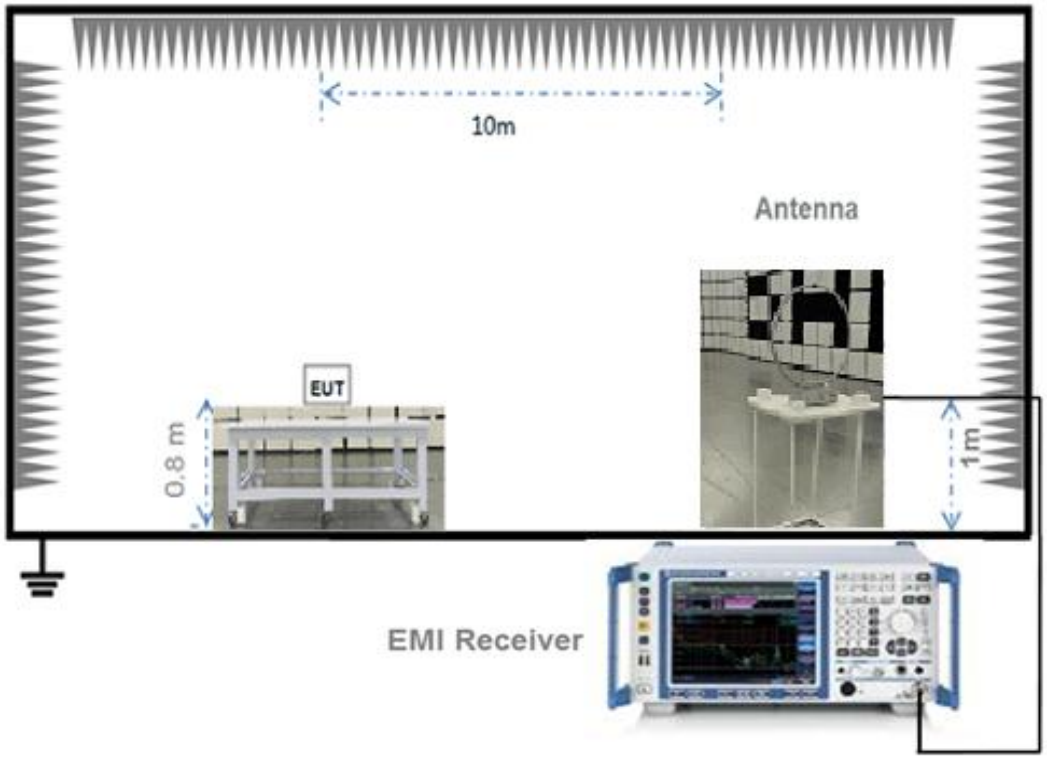
4.4 Description of Test Setup

4.4.1 For AC Power Supply Port Test



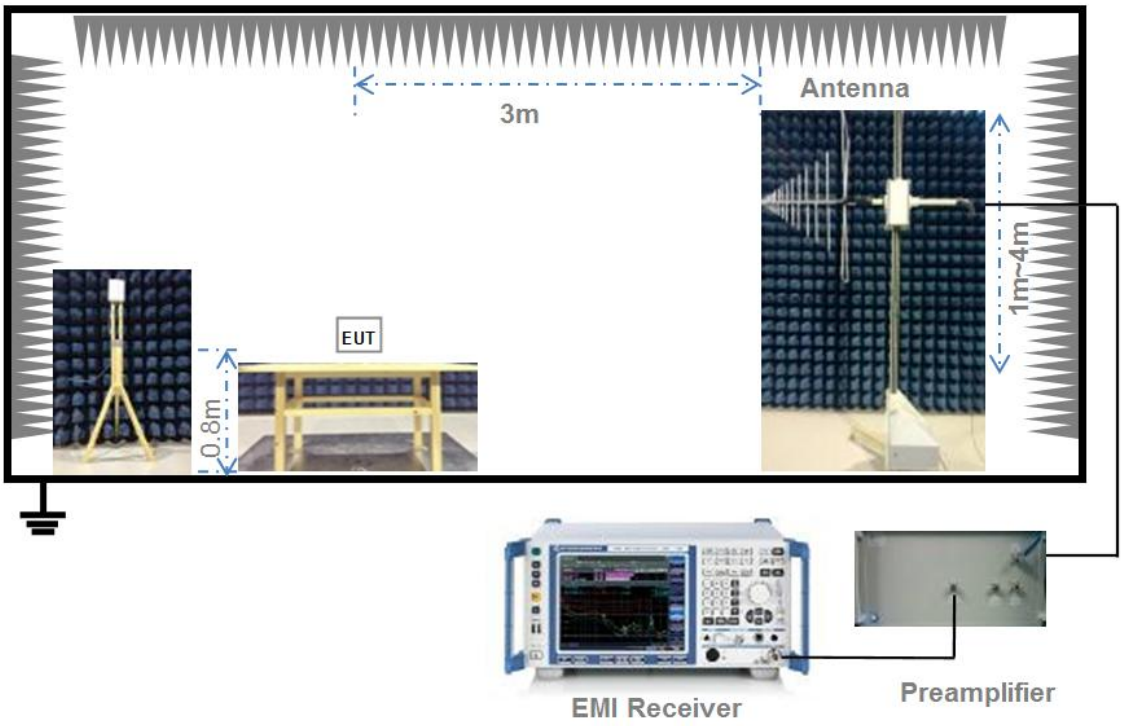
(Diagram 1)

4.4.2 For Radiated Test (Below 30 MHz)



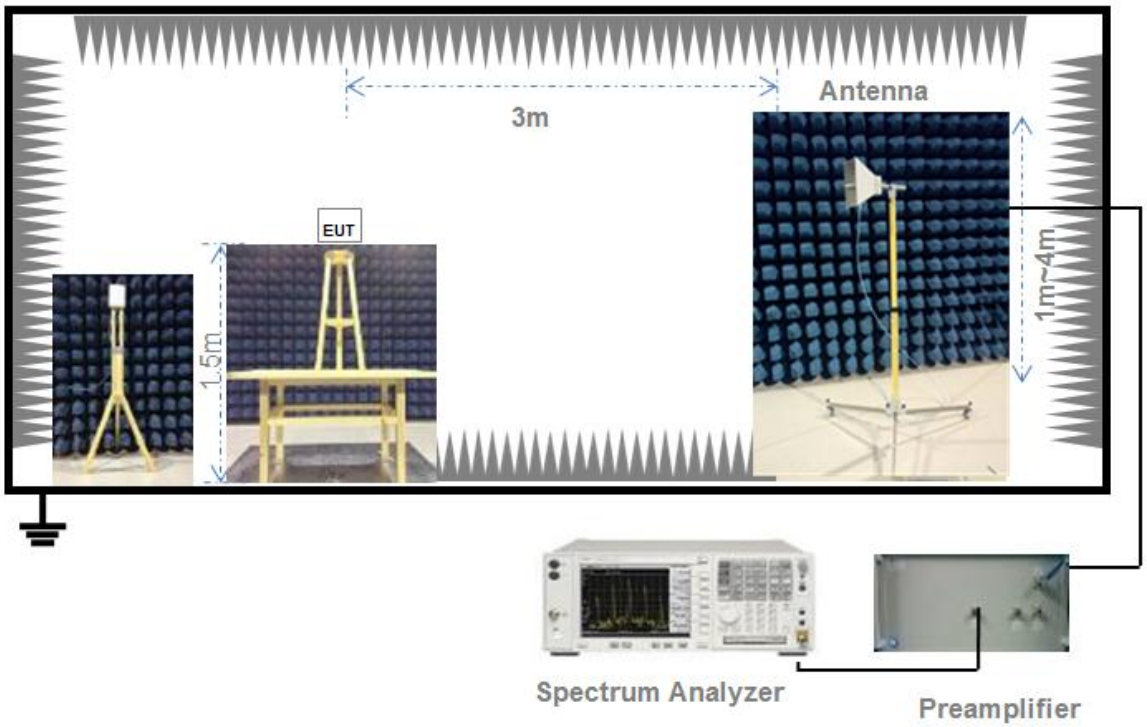
(Diagram 2)

4.4.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 3)

4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 4)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203 & 15.247(b)

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 embedded in the product.	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 Conducted Emission

5.2.1 Limit

FCC §15.207

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)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56*	56 to 46*
0.50 - 5	56	46
5 - 30	60	50

5.2.2 Test Setup

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

5.2.3 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.

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 20 dB Bandwidth

5.3.1 Limit

FCC §15.231

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3.2 Test Setup

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

5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth

RBW = 100 kHz

VBW ≥ 300 kHz

Sweep = auto

Detector function = peak

Trace = max hold

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Field Strength of Fundamental Emissions and Radiated Emissions

5.4.1 Limit

FCC §15.231 & §15.209

According to FCC section 15.231(b), In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	[1]1250 to 3750	125 to 375
174-260	3750	375
260-470	[1]3750 to 12500	375 to 1250
Above 470	12500	1250
[1]Linear interpolations.		

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)
0.009 - 0.490	2400/F(kHz)
0.490 - 1.705	24000/F(kHz)
1.705 - 30.0	30
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

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 Setup

See section 4.4.2 to 4.4.4 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 30 MHz 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.4 & A.5.

5.5 Transmitting Time

5.5.1 Limit

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

5.5.2 Test Setup

See section 4.4.3 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 transmitter was activated, the spectrum analyzer single sweep was triggered while a command on the EUT was activated and plots were captured

5.5.4 Test Result

Please refer to ANNEX A.6.

ANNEX A TEST RESULT

A.1 Conducted Emission

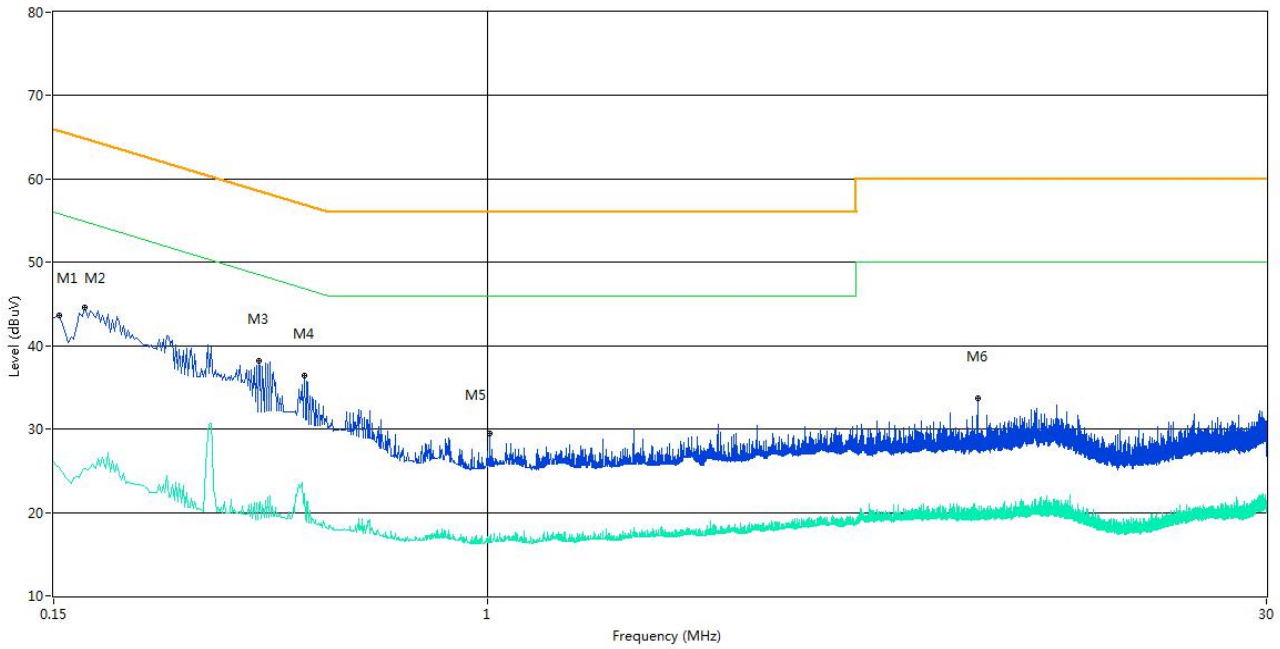
Note [1]: The EUT is working in the Normal link mode.

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.

Test Data and Plots

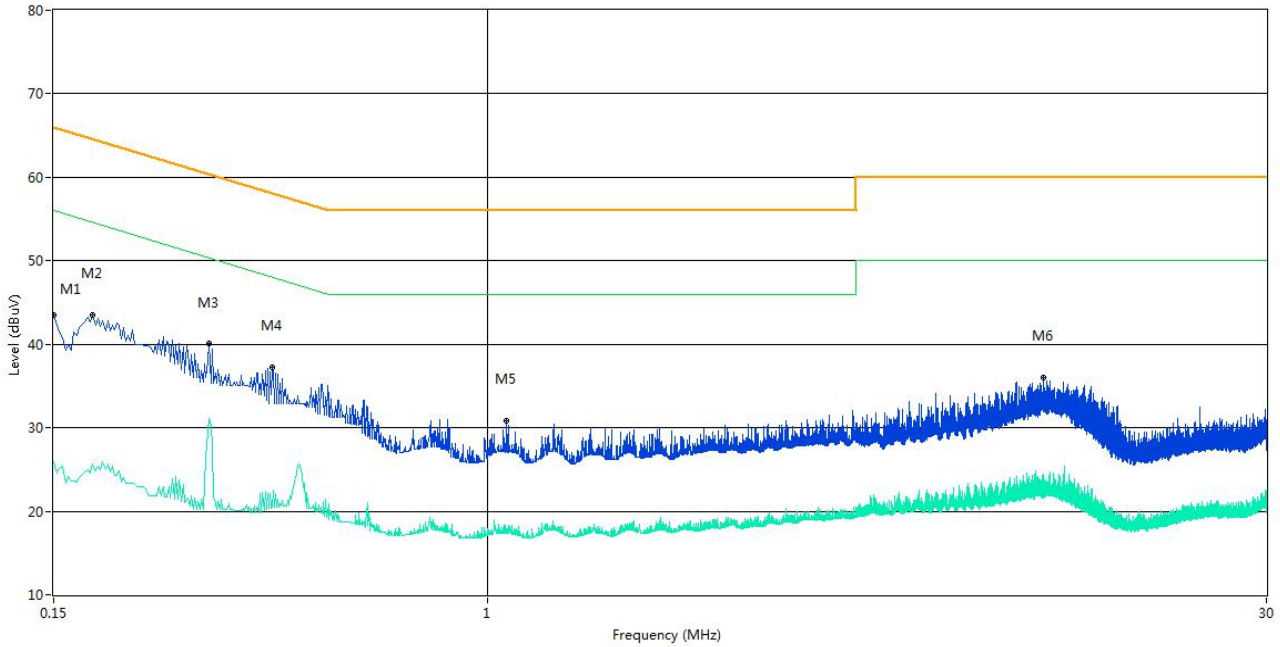
Remote Control

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.154	43.7	10.04	65.8	22.10	Peak	L Line	Pass
1**	0.154	25.3	10.04	55.8	30.50	AV	L Line	Pass
2	0.172	44.5	10.04	64.9	20.40	Peak	L Line	Pass
2**	0.172	25.2	10.04	54.9	29.70	AV	L Line	Pass
3	0.368	38.2	10.04	58.5	20.30	Peak	L Line	Pass
3**	0.368	20.8	10.04	48.5	27.70	AV	L Line	Pass
4	0.448	36.5	10.04	56.9	20.40	Peak	L Line	Pass
4**	0.448	22.3	10.04	46.9	24.60	AV	L Line	Pass
5	1.008	29.5	10.06	56.0	26.50	Peak	L Line	Pass
5**	1.008	17.0	10.06	46.0	29.00	AV	L Line	Pass
6	8.488	33.6	10.27	60.0	26.40	Peak	L Line	Pass
6**	8.488	20.2	10.27	50.0	29.80	AV	L Line	Pass

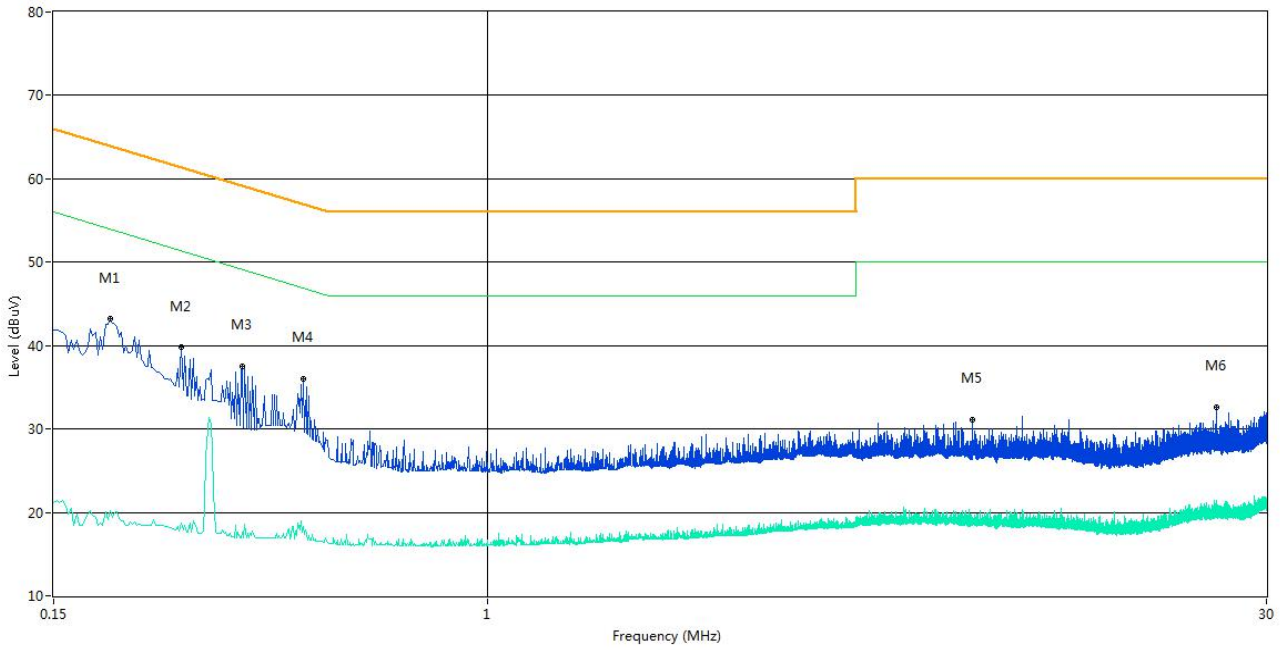
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.150	43.5	10.04	66.0	22.50	Peak	N Line	Pass
1**	0.150	25.9	10.04	56.0	30.10	AV	N Line	Pass
2	0.178	43.5	10.04	64.6	21.10	Peak	N Line	Pass
2**	0.178	25.7	10.04	54.6	28.90	AV	N Line	Pass
3	0.296	40.1	10.04	60.4	20.30	Peak	N Line	Pass
3**	0.296	31.0	10.04	50.4	19.40	AV	N Line	Pass
4	0.390	37.2	10.04	58.1	20.90	Peak	N Line	Pass
4**	0.390	19.4	10.04	48.1	28.70	AV	N Line	Pass
5	1.086	30.8	10.06	56.0	25.20	Peak	N Line	Pass
5**	1.086	17.6	10.06	46.0	28.40	AV	N Line	Pass
6	11.304	35.9	10.35	60.0	24.10	Peak	N Line	Pass
6**	11.304	23.3	10.35	50.0	26.70	AV	N Line	Pass

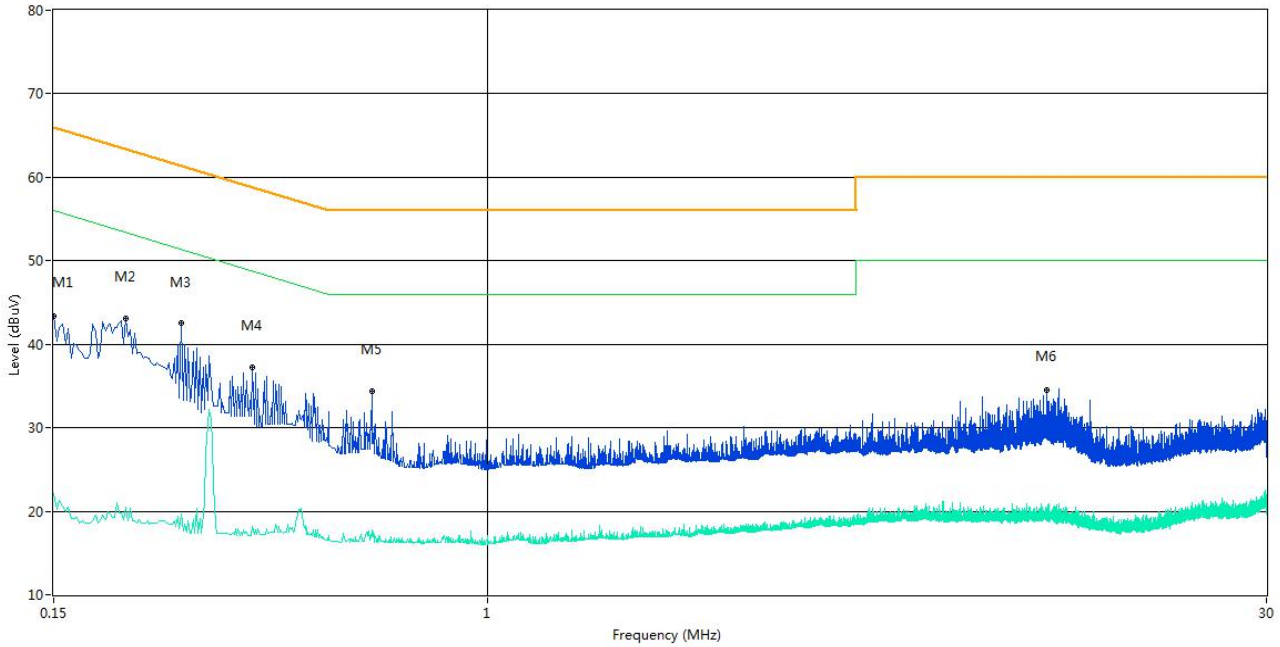
Receiver

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.192	43.2	10.04	63.9	20.70	Peak	L Line	Pass
1**	0.192	20.2	10.04	53.9	33.70	AV	L Line	Pass
2	0.262	39.8	10.04	61.4	21.60	Peak	L Line	Pass
2**	0.262	18.7	10.04	51.4	32.70	AV	L Line	Pass
3	0.342	37.6	10.04	59.2	21.60	Peak	L Line	Pass
3**	0.342	17.6	10.04	49.2	31.60	AV	L Line	Pass
4	0.446	36.1	10.04	56.9	20.80	Peak	L Line	Pass
4**	0.446	18.4	10.04	46.9	28.50	AV	L Line	Pass
5	8.308	31.1	10.26	60.0	28.90	Peak	L Line	Pass
5**	8.308	19.4	10.26	50.0	30.60	AV	L Line	Pass
6	24.084	32.5	10.71	60.0	27.50	Peak	L Line	Pass
6**	24.084	19.5	10.71	50.0	30.50	AV	L Line	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.150	43.3	10.04	66.0	22.70	Peak	N Line	Pass
1**	0.150	22.1	10.04	56.0	33.90	AV	N Line	Pass
2	0.206	43.1	10.04	63.4	20.30	Peak	N Line	Pass
2**	0.206	20.4	10.04	53.4	33.00	AV	N Line	Pass
3	0.262	42.5	10.04	61.4	18.90	Peak	N Line	Pass
3**	0.262	19.7	10.04	51.4	31.70	AV	N Line	Pass
4	0.358	37.2	10.04	58.8	21.60	Peak	N Line	Pass
4**	0.358	18.2	10.04	48.8	30.60	AV	N Line	Pass
5	0.602	34.4	10.05	56.0	21.60	Peak	N Line	Pass
5**	0.602	17.8	10.05	46.0	28.20	AV	N Line	Pass
6	11.468	34.5	10.35	60.0	25.50	Peak	N Line	Pass
6**	11.468	20.1	10.35	50.0	29.90	AV	N Line	Pass

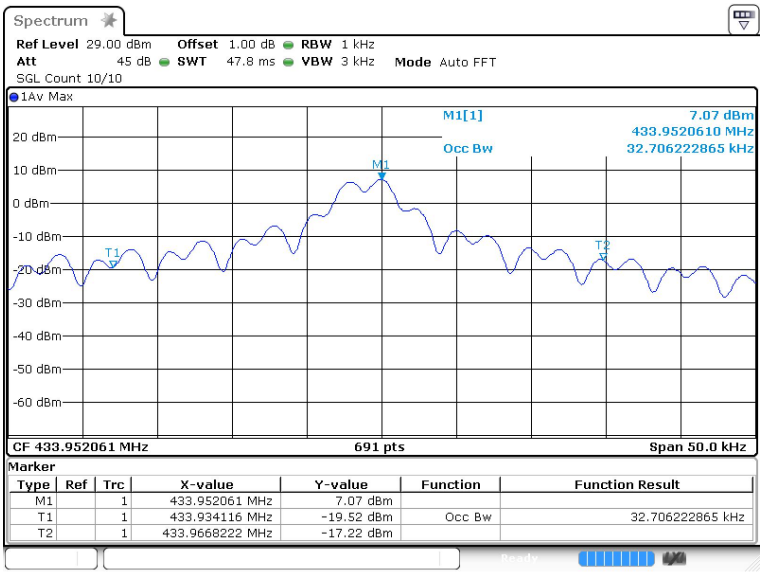
A.2 Bandwidth

Test Data

Frequency (MHz)	99% OBW (KHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Verdict
433.92	32.71	8.68	433920*0.25%=1084.80	Pass

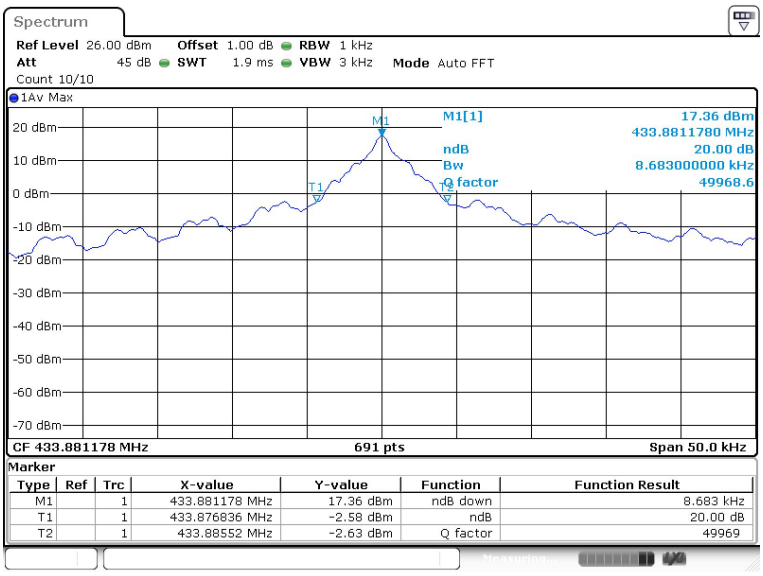
Test plots

99% OBW



Date: 28.FEB.2018 15:10:49

20 dB Bandwidth



Date: 28.FEB.2018 15:19:50

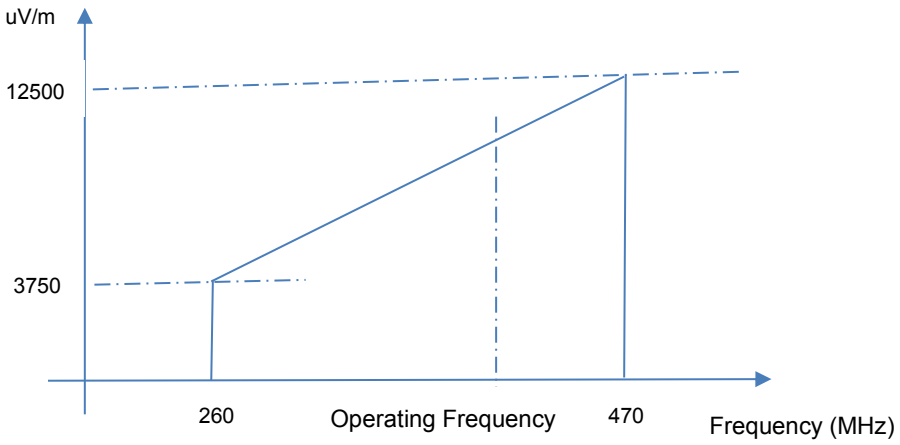
A.3 Duty cycle

Test Data and Plot

The Duty Cycle of the EUT is about 1%-5% ,calculated at a maximum of 5%.

Data Transmissions	Number of pulses
Duty cycle	10%
Duty cycle correction factor	10*log(5/100)=-13.01

A.4 Field Strength of Fundamental Emissions



The Field Strength of Fundamental Emissions (Operating Frequency) is:
3750 uV/m = 20*log (3750) dBuV/m = 71.48 dBuV/m

12500 uV/m = 20*log (12500) dBuV/m = 81.94 dBuV/m

Test Data

Field Strength of Fundamental Emissions and Field strength of spurious emissions Value					
Operating Frequency (MHz)	Field Strength (dBuV/m)	Detector	Limit @3m (dBuV/m)	Margin (dB)	Antenna
433.9	90.10	PEAK	100.8	10.70	Vertical
	89.78	PEAK	100.8	11.02	Horizontal
	77.09	AVERAGE	80.8	3.71	Vertical
	76.77	AVERAGE	80.8	4.03	Horizontal
867.8	38.58	PEAK	80.8	42.22	Vertical
	38.20	PEAK	80.8	42.60	Horizontal
	25.57	AVERAGE	60.8	35.23	Vertical
	25.19	AVERAGE	60.8	35.61	Horizontal

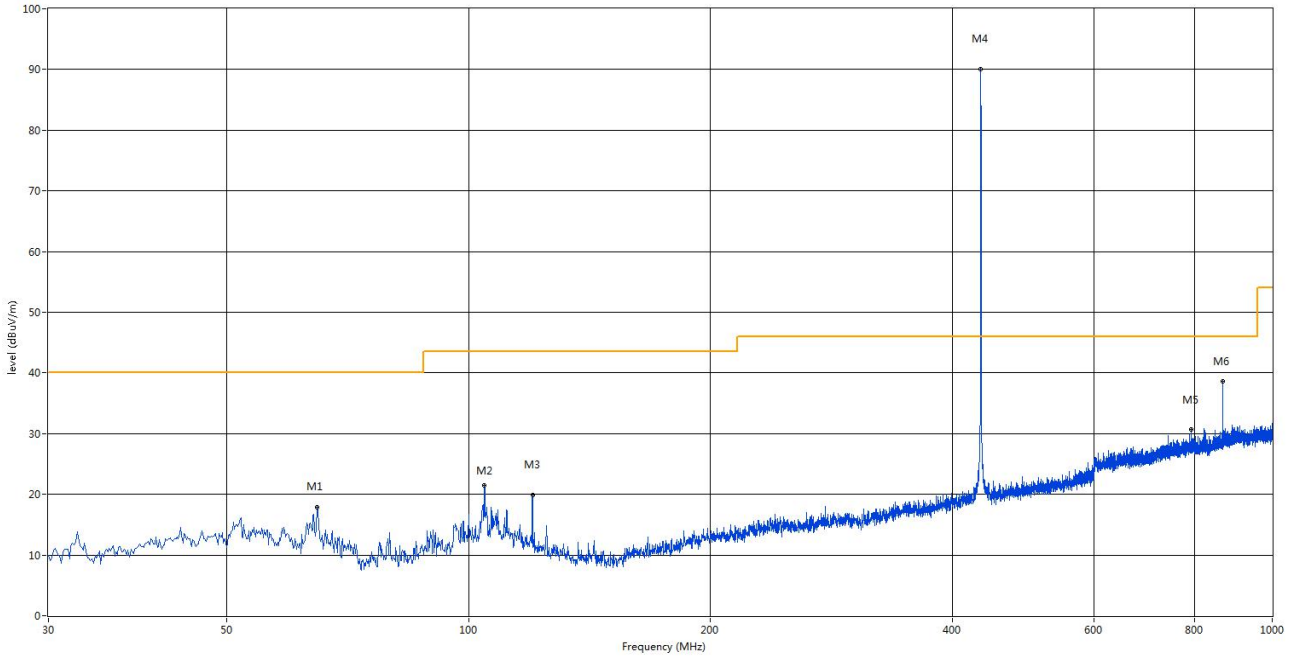
A.5 Radiated Emissions

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 verdict please refer to the A.3 field strength of fundamental emissions and field strength of spurious emissions value.

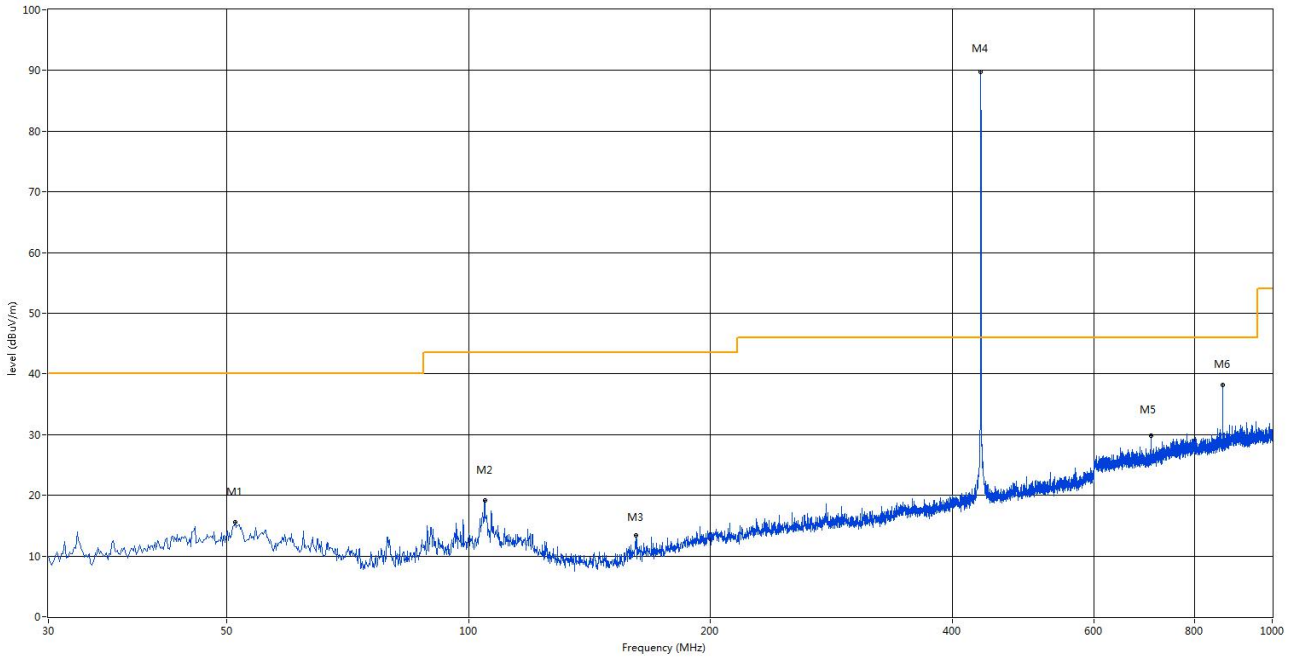
Test Data and Plots (30 MHz ~ 10th Harmonic)

30 MHz to 1 GHz, ANT V



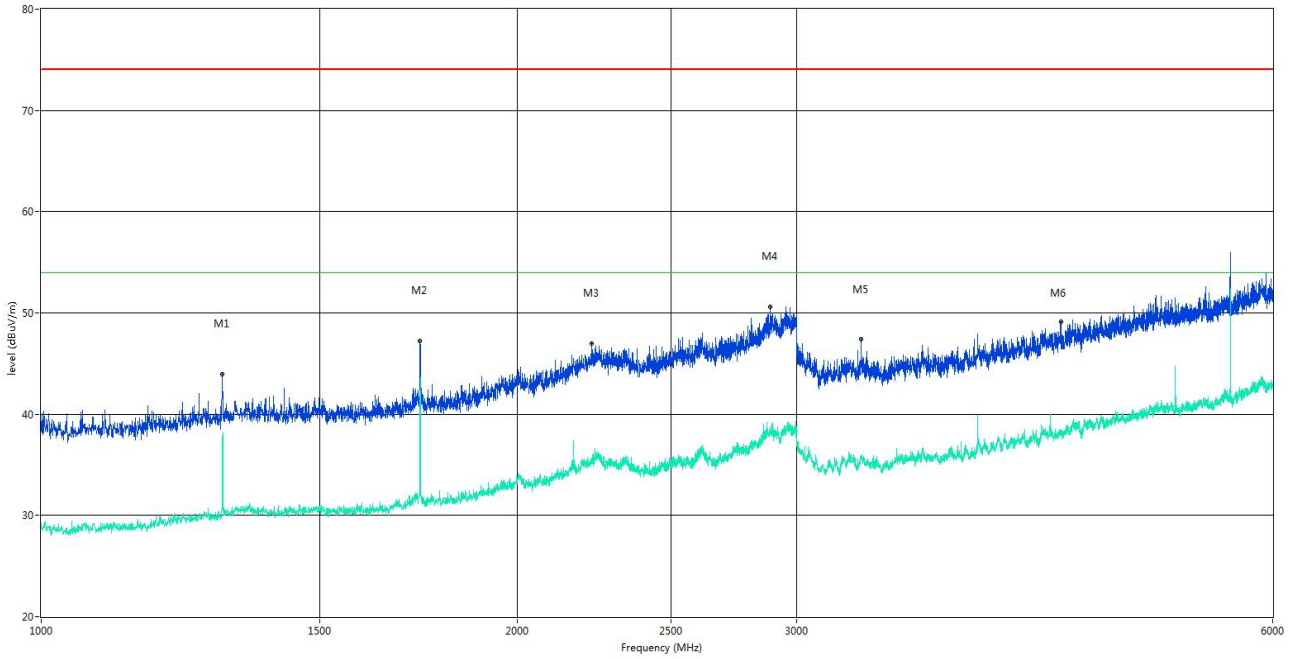
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	64.770	17.83	-25.21	40.0	22.17	Peak	29.00	100	Vertical	Pass
2	104.670	21.53	-24.21	43.5	21.97	Peak	243.00	100	Vertical	Pass
3	120.060	19.84	-26.01	43.5	23.66	Peak	359.00	100	Vertical	Pass
4	433.845	90.10	-16.98	46.0	-44.10	Peak	136.00	100	Vertical	N/A
5	792.400	30.66	-9.31	46.0	15.34	Peak	193.00	100	Vertical	Pass
6	867.800	38.58	-8.35	46.0	7.42	Peak	199.00	100	Vertical	Pass

30 MHz to 1 GHz, ANT H



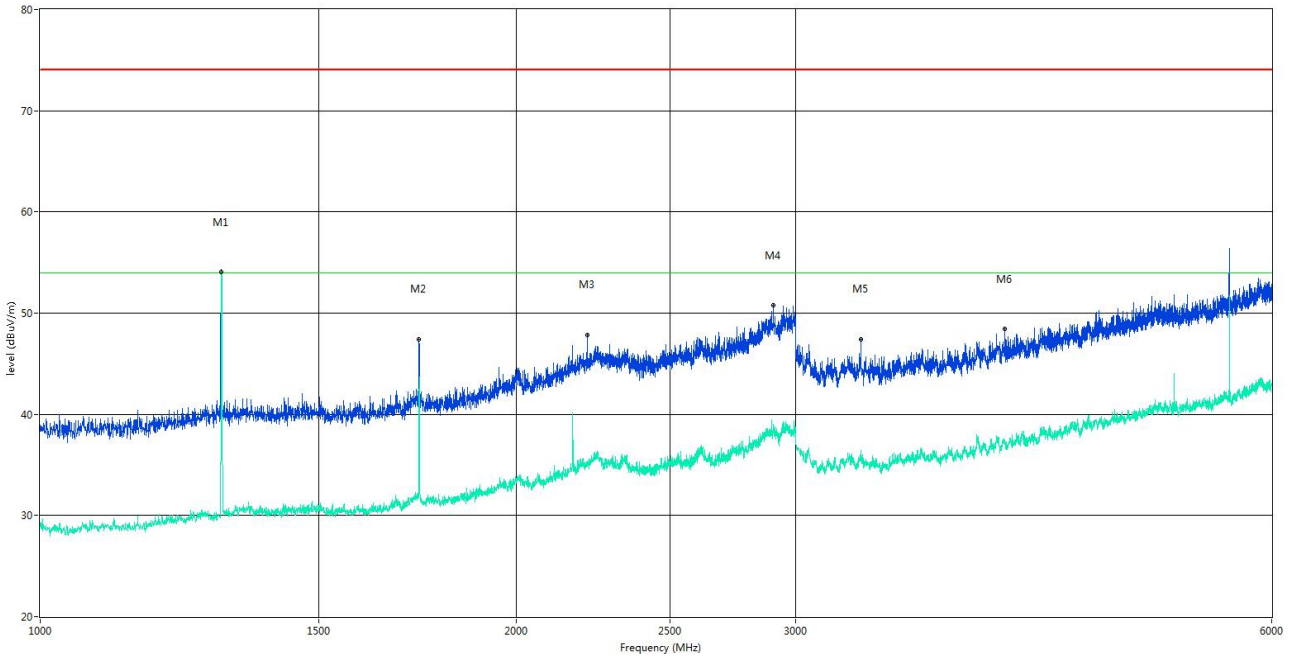
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	51.233	15.57	-23.32	40.0	24.43	Peak	1.00	100	Horizontal	Pass
2	104.812	19.22	-24.20	43.5	24.28	Peak	262.00	100	Horizontal	Pass
3	161.670	13.33	-26.85	43.5	30.17	Peak	67.00	100	Horizontal	Pass
4	433.845	89.78	-16.98	46.0	-43.78	Peak	136.00	100	Horizontal	N/A
5	706.300	29.76	-11.18	46.0	16.24	Peak	186.00	100	Horizontal	Pass
6	867.700	38.20	-8.36	46.0	7.80	Peak	205.00	100	Horizontal	Pass

1 GHz to 6 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1301.500	34.5	-10.46	54.0	19.50	AV	3.00	100	Vertical	Pass
1	1301.500	43.93	-10.46	74.0	30.07	Peak	3.00	100	Vertical	Pass
2**	1735.500	41.0	-10.36	54.0	13.00	AV	2.00	100	Vertical	Pass
2	1735.500	47.26	-10.36	74.0	26.74	Peak	2.00	100	Vertical	Pass
3**	2226.500	35.1	-5.84	54.0	18.90	AV	2.00	100	Vertical	Pass
3	2226.500	46.97	-5.84	74.0	27.03	Peak	2.00	100	Vertical	Pass
4**	2889.000	38.8	-1.41	54.0	15.20	AV	72.00	100	Vertical	Pass
4	2889.000	50.61	-1.41	74.0	23.39	Peak	72.00	100	Vertical	Pass
5**	3296.250	35.7	-4.76	54.0	18.30	AV	5.00	100	Vertical	Pass
5	3296.250	47.37	-4.76	74.0	26.63	Peak	5.00	100	Vertical	Pass
6**	4408.500	38.4	-2.95	54.0	15.60	AV	2.00	100	Vertical	Pass
6	4408.500	49.14	-2.95	74.0	24.86	Peak	2.00	100	Vertical	Pass

1 GHz to 6 GHz, ANT H



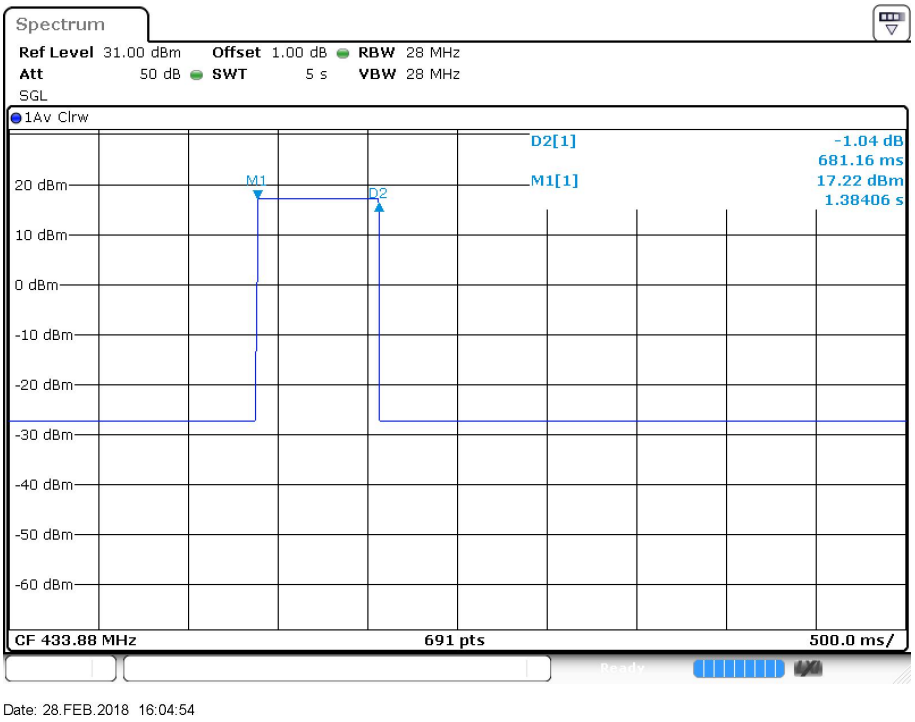
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	1301.500	53.10	-10.46	54.0	0.90	AV	3.00	100	Horizontal	Pass
1	1301.500	54.12	-10.46	74.0	19.88	Peak	3.00	100	Horizontal	Pass
2**	1735.500	41.3	-10.36	54.0	12.70	AV	1.00	100	Horizontal	Pass
2	1735.500	47.40	-10.36	74.0	26.60	Peak	1.00	100	Horizontal	Pass
3**	2217.000	35.3	-5.42	54.0	18.70	AV	204.00	100	Horizontal	Pass
3	2217.000	47.84	-5.42	74.0	26.16	Peak	204.00	100	Horizontal	Pass
4**	2905.500	38.3	-0.86	54.0	15.70	AV	4.00	100	Horizontal	Pass
4	2905.500	50.75	-0.86	74.0	23.25	Peak	4.00	100	Horizontal	Pass
5**	3300.750	35.8	-4.79	54.0	18.20	AV	214.00	100	Horizontal	Pass
5	3300.750	47.42	-4.79	74.0	26.58	Peak	214.00	100	Horizontal	Pass
6**	4071.000	37.1	-4.14	54.0	16.90	AV	1.00	100	Horizontal	Pass
6	4071.000	48.41	-4.14	74.0	25.59	Peak	1.00	100	Horizontal	Pass

A.6 Transmitter Time

Test Data and Plot

The active time is less than 1 seconds

Active time



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1820104-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ1820104-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ1820104-AI.PDF”.

--END OF REPORT--