TEST REPORT

Report Number	:	TZ0103241204FRF14
Product Name	:	Bluetooth Sleeping Speaker With LED Light
Model/Type reference	:	L28LRGB, 51810716, L28F, L28L, L28FRGB
FCC ID	:	2AA4B-L28LRGB
Prepared for	:	SHENZHEN E-WONDERLAND ELECTRONIC CO., LTD D501,Zhihui Chuangxin Center,Qianjin Rd 2,Baoan District,Shenzhen,China

Prepared By	:	Shenzhen Tongzhou Testing Co.,Ltd. 1st Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China
Standards	:	FCC CFR Title 47 Part 15 Subpart C, ANSI C63.10: 2013
Date of Test	:	2024-12-24 ~ 2025-01-03
Date of Issue	:	2025-01-07

Prepared by	:	Nancy Li (File administrators)	Nancy Li
Reviewed by	:	Max Zhang (Technical Manager)	Max Zhang
Approved by	:	Andy Zhang (General Manager)	Andy Zhang

** Report Revise Record **

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2025-01-07	Valid	Initial release

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1. GENERAL INFORMATION

1.1. Client Information

Applicant	:	SHENZHEN E-WONDERLAND ELECTRONIC CO., LTD
Address	:	D501,Zhihui Chuangxin Center,Qianjin Rd 2,Baoan District,Shenzhen,China
Manufacturer	:	SHENZHEN E-WONDERLAND ELECTRONIC CO., LTD
Address	:	D501,Zhihui Chuangxin Center,Qianjin Rd 2,Baoan District,Shenzhen,China

1.2. Description of Device (EUT)

Product Name	:	Bluetooth Sleeping Speaker With LED Light
Trade Mark	:	/
Model Number	:	L28LRGB, 51810716, L28F, L28L, L28FRGB
Model Declaration	:	All the same except for the model name
Test Model	:	L28LRGB
Power Supply	:	Input: 9V/2A Output: Speaker 5W, Wireless charger 15W max
Hardware version	:	V1.0
Software version	:	V003

1.3. Wireless Function Tested in this Report

WPT		
Operation Frequency	:	110.5 – 205 kHz
Test Frequency	:	130.158 kHz
Modulation Technology	:	ASK
Antenna Type and Gain	:	Coil Antenna with 0dBi Gain

Note 1: Antenna position refer to EUT Photos.
Note 2: the above information was supplied by the applicant.

1.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:
●supplied by the manufacturer

○supplied by the lab

○	Adapter	Model:	MDY-10-EH
		Input:	100-240V~ 50/60Hz 0.7A
		Output:	DC 5V, 3A; 9V, 2A

1.5. Description of Test Facility

FCC

Designation Number: CN1275
Test Firm Registration Number: 167722
Shenzhen Tongzhou Testing Co.,Ltd has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA

Certificate Number: 5463.01
Shenzhen Tongzhou Testing Co.,Ltd has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

IC

ISED#: 22033
CAB identifier: CN0099
Shenzhen Tongzhou Testing Co.,Ltd has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4 and CISPR 16-1-4:2010

1.6. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the Shenzhen Tongzhou Testing Co.,Ltd’s quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.7. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.08dB	(1)
		30MHz~1000MHz	±3.92dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±2.71dB	(1)

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

1.8. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Test Modes:		
Mode 1	EUT + Wireless charger tester (Full Load: 99% of 15W)	Record
Mode 2	EUT + Wireless charger tester (Half Load: 50% of 15W)	Pre-test
Mode 3	EUT + Wireless charger tester (Null Load: <1%)	Pre-test
Note: All test modes were pre-tested, but we only recorded the worst case in this report.		

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen Tongzhou Testing Co.,Ltd

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.
According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 under the FCC Rules Part 15 Subpart C.

2.3. Test Sample

Sample ID	Description
TZ0103241204–1#	Normal sample

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
1	WPT Test Load	YBZ	EPP	/	/	/	/

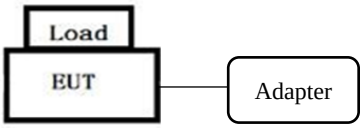
3.3. Block Diagram/Schematics

Please refer to the related document

3.4. Equipment Modifications

Shenzhen Tongzhou Testing Co.,Ltd has not done any modification on the EUT.

3.5. Configuration of Tested System



4. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Sample ID	Result
§15.215	Occupied Bandwidth	TZ0103241204–1#	Compliant
§15.209	Radiated Emissions	TZ0103241204–1#	Compliant
§15.207(a)	Conducted Emissions	TZ0103241204–1#	Compliant
§15.203	Antenna Requirements	TZ0103241204–1#	Compliant
Note 1: The wireless output function of the EUT cannot operate when is in normal charged.			

Remark: The measurement uncertainty is not included in the test result.

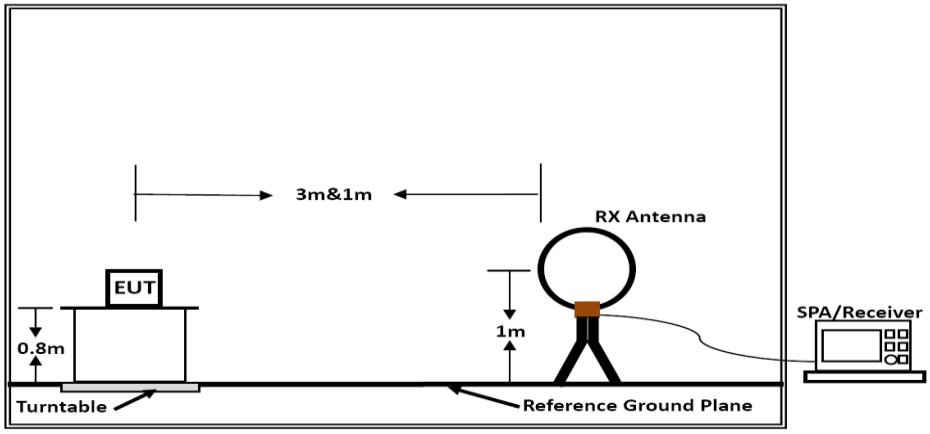
5. TEST RESULT

5.1. Bandwidth Measurement

5.1.1. Standard Applicable

CFR 47 Part 15.215(c).

5.1.2. Block Diagram of Test Setup



Below 30MHz

5.1.3. Test Procedures

Set the parameters of SPA as below:

1. Centre frequency = Operation Frequency
2. The resolution bandwidth of 100 Hz and the video bandwidth of 300 Hz were used.
3. Span: 2..5kHz, Sweep time: Auto
4. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
5. Measured the spectrum width with power higher than 20dB below carrier.
6. Record the plots and reported.

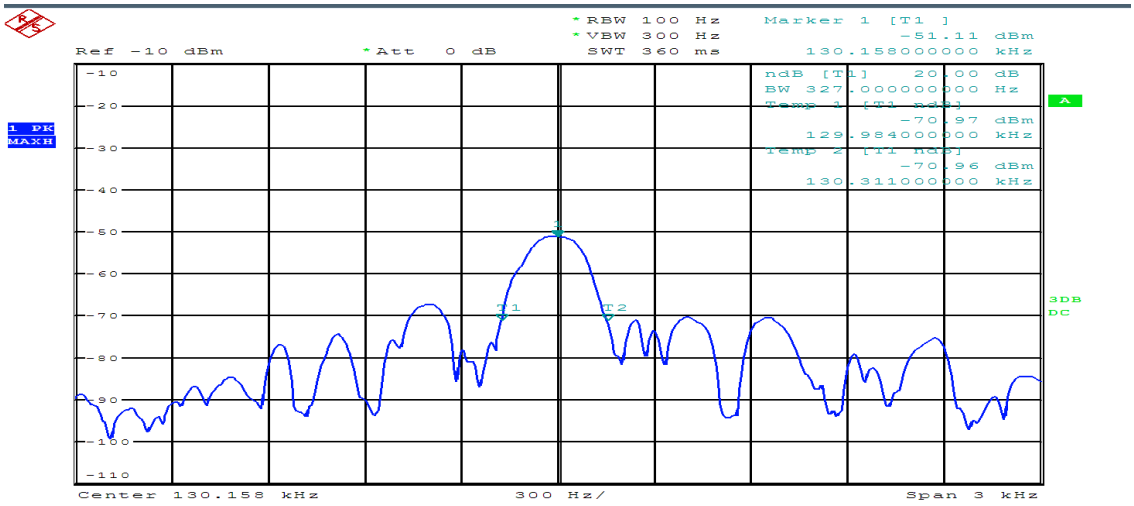
5.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.1.5. Test Result

Temperature	22.8℃	Humidity	55%
Test Engineer	Tony Luo	Configurations	Mode 1

Mode	Freq (kHz)	20dB Bandwidth (Hz)	Limit (kHz)	Conclusion
Tx Mode	130.158	327	/	PASS



5.2. Radiated Emissions Measurement

5.2.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.Android 10-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510MHz.
\2\ Above 38.6
According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.2.2. Measuring Instruments and Setting

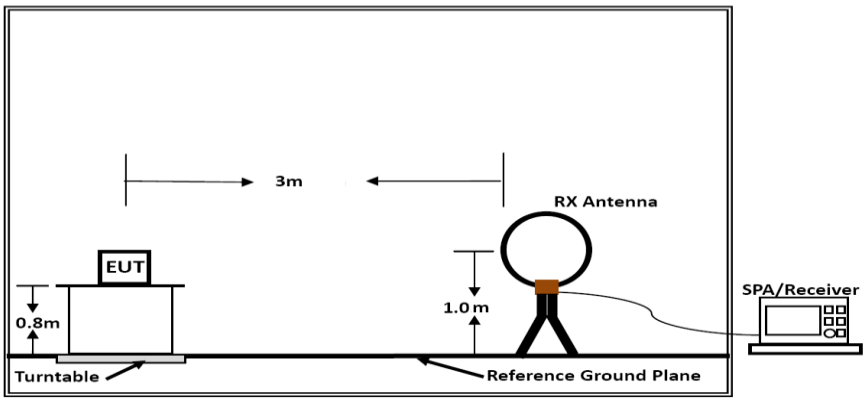
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 3 MHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 3 MHz for Average

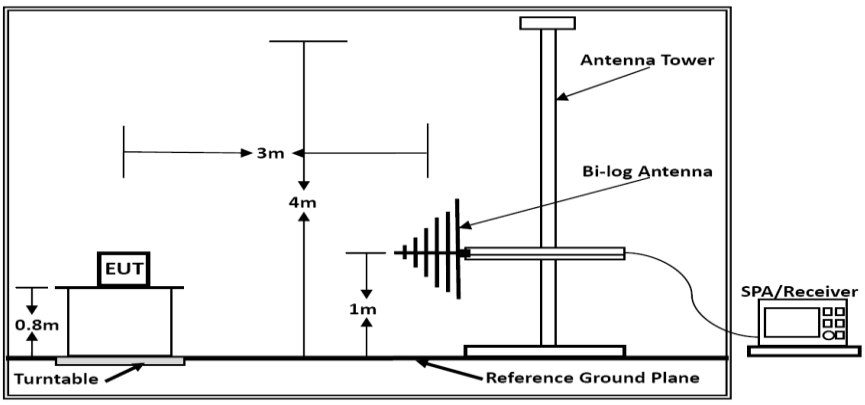
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

5.2.3. Block Diagram of Test Setup

For radiated emissions below 30MHz



Below 30MHz



Below 1GHz

5.2.4. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:
--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
--- If the EUT is a floor standing device, it is placed on the ground.
--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
--- The measurement distance is 3 meter.
--- The EUT was set into operation.
Premeasurement:
--- The turntable rotates from 0° to 315° using 45° steps.
--- The antenna height is 1.0 meter.
--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions
Final measurement:
--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:
--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
--- Auxiliary equipment and cables were positioned to simulate normal operation conditions
--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
--- The measurement distance is 3 meter.
--- The EUT was set into operation.
Premeasurement:
--- The turntable rotates from 0° to 315° using 45° steps.
--- The antenna is polarized vertical and horizontal.
--- The antenna height changes from 1 to 3 meter.
--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.
Final measurement:
--- The final measurement will be performed with minimum the six highest peaks.
--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.
--- The final measurement will be done with QP detector with an EMI receiver.
--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

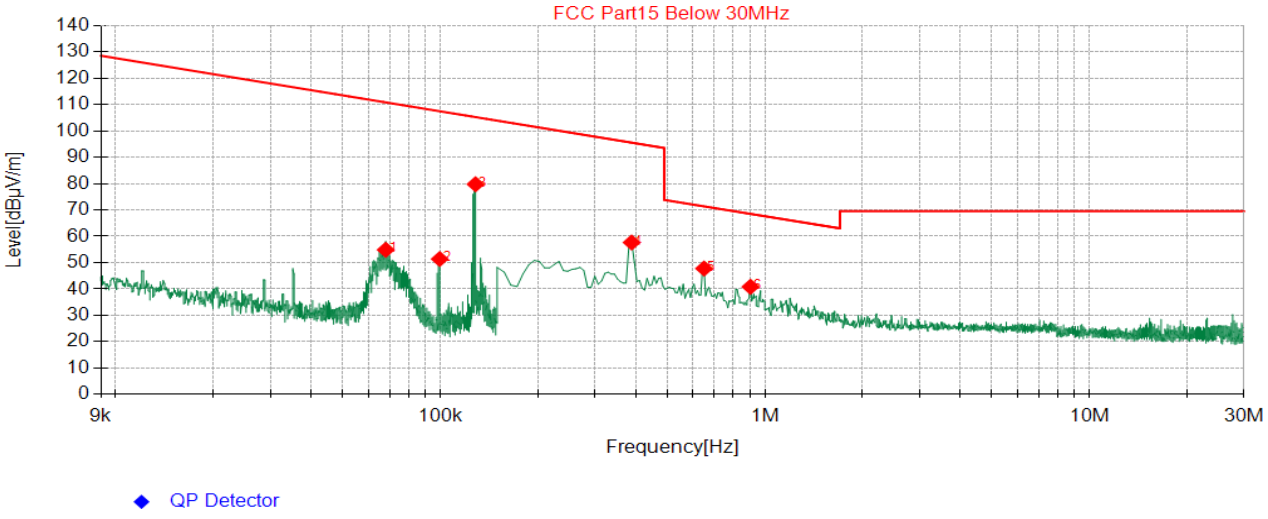
5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Test Results

Results of Radiated Emissions (9kHz-30MHz)

Temperature	22.5℃	Humidity	56%
Test Engineer	Tony Luo	Configurations	Mode 1



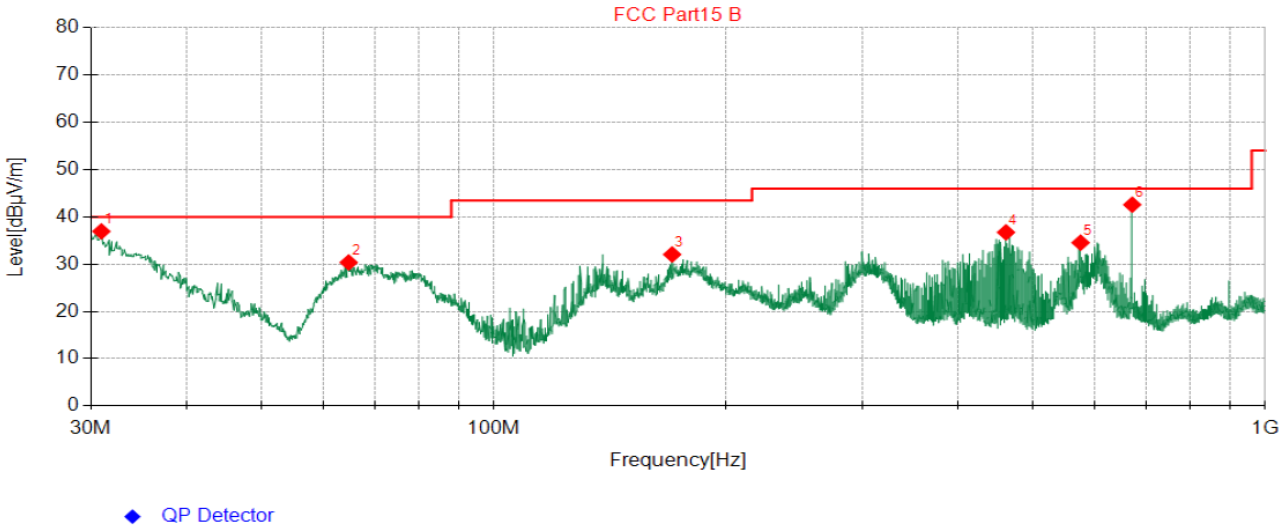
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	0.0679	34.30	20.57	54.87	110.81	55.94	100	101
2	0.0996	30.97	20.40	51.37	107.45	56.08	100	113
3	0.1302	59.98	19.77	79.75	105.23	25.48	100	119
4	0.3888	37.47	20.17	57.64	95.53	37.89	100	164
5	0.65	27.46	20.30	47.76	71.35	23.59	100	156
6	0.9037	20.53	20.30	40.83	68.50	27.67	100	173

Note:
Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
Limit line = specific limits (dBuV) + distance extrapolation factor.
Measured at antenna position coaxial and coplanar, only record the Coaxial.

Results of Radiated Emissions (30MHz~1GHz)

Temperature	22.5℃	Humidity	56%
Test Engineer	Tony Luo	Configurations	Mode 1

Vertical

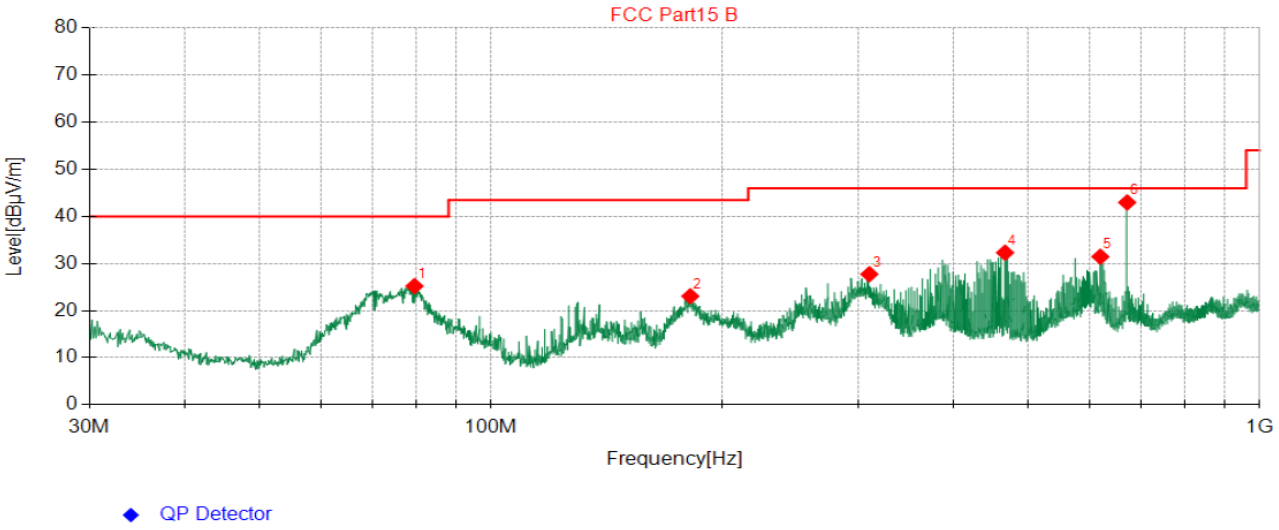


Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.97	53.19	-16.19	37.00	40.00	3.00	100	29	Vertical
2	64.79	47.34	-16.88	30.46	40.00	9.54	100	234	Vertical
3	170.1	50.20	-18.06	32.14	43.50	11.36	100	234	Vertical
4	461.0	45.62	-8.83	36.79	46.00	9.21	100	266	Vertical
5	575.9	40.81	-6.19	34.62	46.00	11.38	100	19	Vertical
6	672.0	47.31	-4.69	42.62	46.00	3.38	100	227	Vertical

***Note:
1. Level [dBµV/m] = Reading [dBµV] + Factor [dB/m]
2. Margin [dB] = Limit [dBµV/m] - Level [dBµV/m]

Horizontal



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	79.47	45.31	-19.98	25.33	40.00	14.67	300	347	Horizontal
2	181.5	40.49	-17.30	23.19	43.50	20.31	100	96	Horizontal
3	310.4	40.36	-12.52	27.84	46.00	18.16	100	318	Horizontal
4	466.1	41.11	-8.73	32.38	46.00	13.62	100	252	Horizontal
5	620.2	36.88	-5.34	31.54	46.00	14.46	100	72	Horizontal
6	672.0	47.69	-4.69	43.00	46.00	3.00	100	49	Horizontal

***Note:
1. Level [dBµV/m] = Reading [dBµV] + Factor [dB/m]
2. Margin [dB] = Limit [dBµV/m] - Level [dBµV/m]

5.3. AC Power line conducted emissions

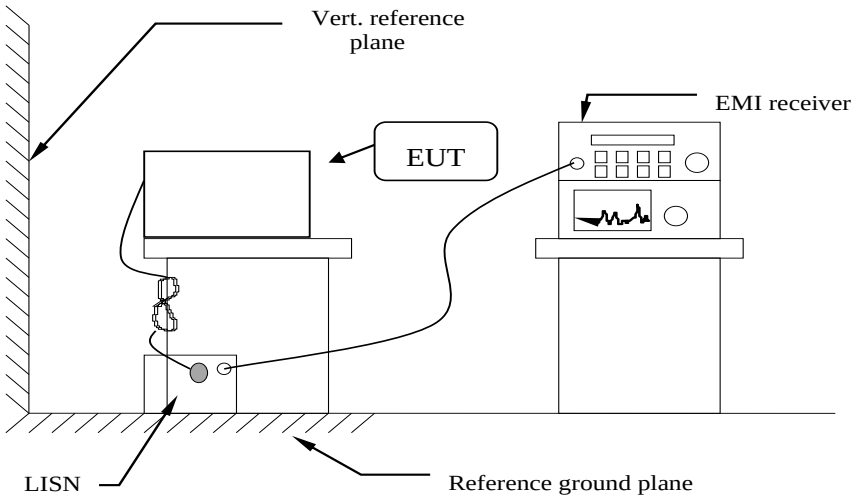
5.3.1. Standard Applicable

According to §15.207 (a): For an intentional radiator which 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 or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.3.2. Block Diagram of Test Setup

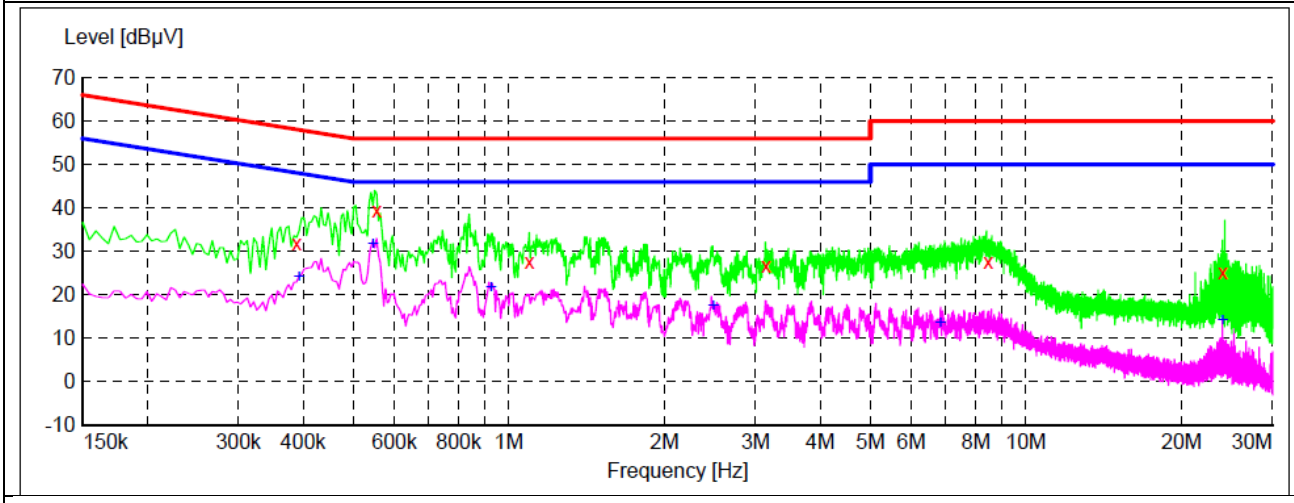


Note: the distance between LISN and Vertical reference plane is 40 cm and the distance between LISN and EUT is 80 cm.

5.3.3. Test Results

Temperature	22.5℃	Humidity	56%
Test Engineer	Tony Luo	Configurations	Mode 1

Neutral Line

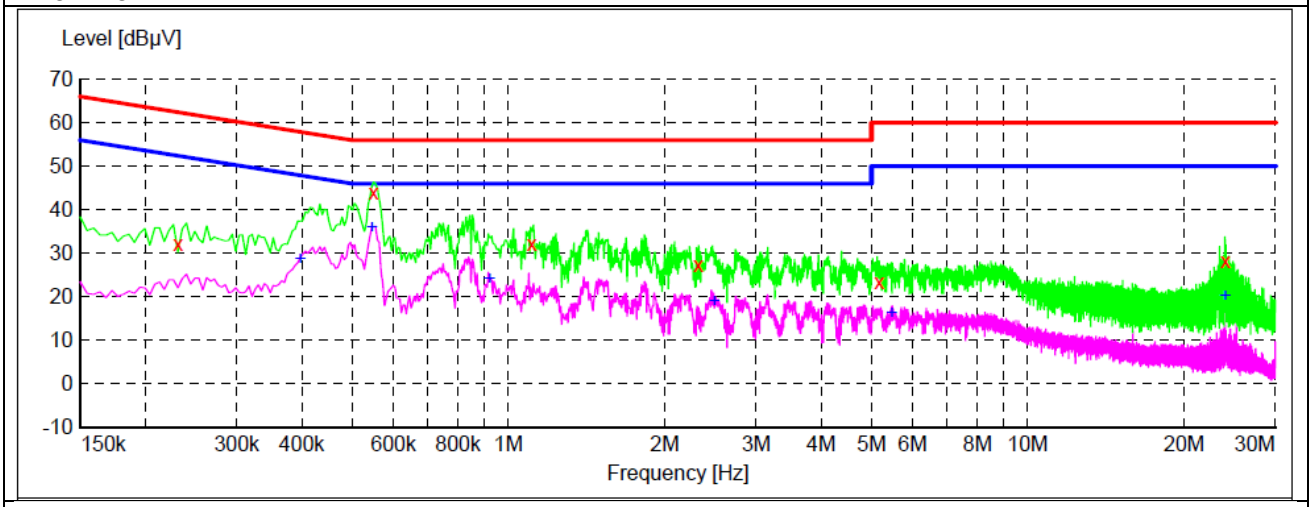


Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.388500	31.70	10.0	58	26.4	QP	N	GND
0.555000	39.40	9.9	56	16.6	QP	N	GND
1.095000	27.70	9.8	56	28.3	QP	N	GND
3.142500	26.50	9.7	56	29.5	QP	N	GND
8.457000	27.50	9.8	60	32.5	QP	N	GND
24.013500	25.10	10.1	60	34.9	QP	N	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.393000	24.30	10.0	48	23.7	AV	N	GND
0.546000	31.90	9.9	46	14.1	AV	N	GND
0.924000	21.90	9.8	46	24.1	AV	N	GND
2.485500	17.70	9.7	46	28.3	AV	N	GND
6.819000	13.70	9.8	50	36.3	AV	N	GND
24.004500	14.10	10.1	50	35.9	AV	N	GND

Note:
1. Margin(dB)= Limit(dBµV) - Level(dBµV)
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

Live Line



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.231000	32.00	10.5	62	30.4	QP	L1	GND
0.550500	43.90	9.9	56	12.1	QP	L1	GND
1.108500	32.20	9.8	56	23.8	QP	L1	GND
2.319000	27.40	9.7	56	28.6	QP	L1	GND
5.172000	23.40	9.8	60	36.6	QP	L1	GND
23.995500	28.20	10.1	60	31.8	QP	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.397500	28.80	10.0	48	19.1	AV	L1	GND
0.546000	36.00	9.9	46	10.0	AV	L1	GND
0.919500	24.20	9.8	46	21.8	AV	L1	GND
2.490000	19.10	9.7	46	26.9	AV	L1	GND
5.473500	16.30	9.8	50	33.7	AV	L1	GND
24.004500	20.40	10.1	50	29.6	AV	L1	GND

Note:
1. Margin(dB)= Limit(dBµV) - Level(dBµV)
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

5.4. Antenna Requirements

5.4.1. Standard Applicable

According to antenna requirement of §15.203.
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 re-placed 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 Sections 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 Section 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.

5.4.2. Antenna Connected Construction

The antenna is an Internal antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

5.4.3. Results

Compliance

6. LIST OF MEASURING EQUIPMENTS

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Loop Antenna	schwarzbeck	FMZB1519 B	00023	2022/11/13	2025/11/12
2	Wideband Antenna	schwarzbeck	VULB 9163	958	2022/11/13	2025/11/12
3	EMI Test Receiver	R&S	ESCI	100849/003	2024/1/4	2025/1/3
4	Controller	MF	MF7802	N/A	N/A	N/A
5	Amplifier	schwarzbeck	BBV 9743	209	2024/1/4	2025/1/3
6	Amplifier	Tonscend	TSAMP-05 18SE	--	2024/1/4	2025/1/3
7	RF Cable(below 1GHz)	HUBER+SUHN ER	RG214	N/A	2024/1/4	2025/1/3
8	RE test software	Tonscend	JS32-RE	V5.0.0.0	N/A	N/A

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF EUT

Please refer to separated files for Internal Photos of the EUT.

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