

TEST REPORT

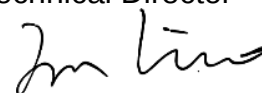
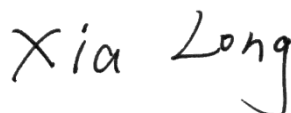
Applicant: Shenzhen Zhuoyou Technology Co., Ltd.
Address: 1st Floor, Building 16, Dawangshan Second Industrial Zone, Dawangshan Community, Shajing Street, Baoan District, Shenzhen
Equipment Type: Wireless Charger Alarm Clock
Model Name: YC-100(refer section 2.4)
Brand Name: TECHFROG
FCC ID: 2A4KG-22TFAC100
Test Standard: 47 CFR Part 15 Subpart C (refer section 3.1)
Test Date : Feb. 21, 2022 - Feb. 22, 2022
Date of Issue: Feb. 28, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Chong**Checked by:** Xia Long**Approved by:** Liao Jianming

Technical Director

Feb.28, 2022Feb.28, 2022Feb.28, 2022

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Feb. 25, 2022</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Feb. 28, 2022</u>	<u>Add the FCC ID number</u>

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1 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
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

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Shenzhen Zhuoyou Technology Co., Ltd.
Address	1st Floor, Building 16, Dawangshan Second Industrial Zone, Dawangshan Community, Shajing Street, Baoan District, Shenzhen

2.2 Manufacturer Information

Manufacturer	Shenzhen Zhuoyou Technology Co., Ltd.
Address	1st Floor, Building 16, Dawangshan Second Industrial Zone, Dawangshan Community, Shajing Street, Baoan District, Shenzhen

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Wireless Charger Alarm Clock
Model Name Under Test	YC-100
Series Model Name	YC-100,200,300,400,500,600,700,800,900
Description of Model name differentiation	All models have the same electrical parameters and internal circuit structure, just different names
Hardware Version	REV02
Software Version	REV01
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	Lithium Cell
	Model No.	CR2032
	Serial No.	N/A
	Capacity	N/A
	Rated Voltage	3 V
	Limited Voltage	N/A
Ancillary Equipment 2	Type - C Cable	
	Brand Name	N/A
	Model No.	N/A
	Length (Approx.)	1.5 m

2.6 Technical Information

Network and Wireless connectivity	Qi
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The requirement for the following technical information of the EUT was tested in this report:

Operating Frequency	120~150kHz
Product Type	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type	Coil Antenna
About Product	The EUT support the QI technology.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

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

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.209,15.215(b)	Pass	Annex A.1
2	Conducted Emission, AC Ports	15.207	Pass	Annex A.2
3	20 dB Bandwidth	15.215(c)	N/A	Annex A.3

Note 1: The 20 dB Bandwidth is only applicable to operating frequencies above 160kHz, while the operating frequency of EUT is low 160kHz, so this test item is not applicable.

Note 2: The EUT have two test modes as follow:

Mode 1:
EUT + Type-c Cable + Type-c Connector + Adapter + QI TX

Mode 2:
EUT + Type-c Cable + Type-c Connector + Adapter + iPhone + QI Link

3.3 Test 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
Conducted emissions (9 kHz-30 MHz)	4.28 dB
Radiated emissions (9 kHz-30 MHz)	3.22 dB
Radiated emissions (30 MHz-1 GHz)-10m	4.80 dB
Radiated emissions (30 MHz-1 GHz)-3m	4.76 dB
Radiated emissions (1 GHz-18 GHz)-3m	4.88 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

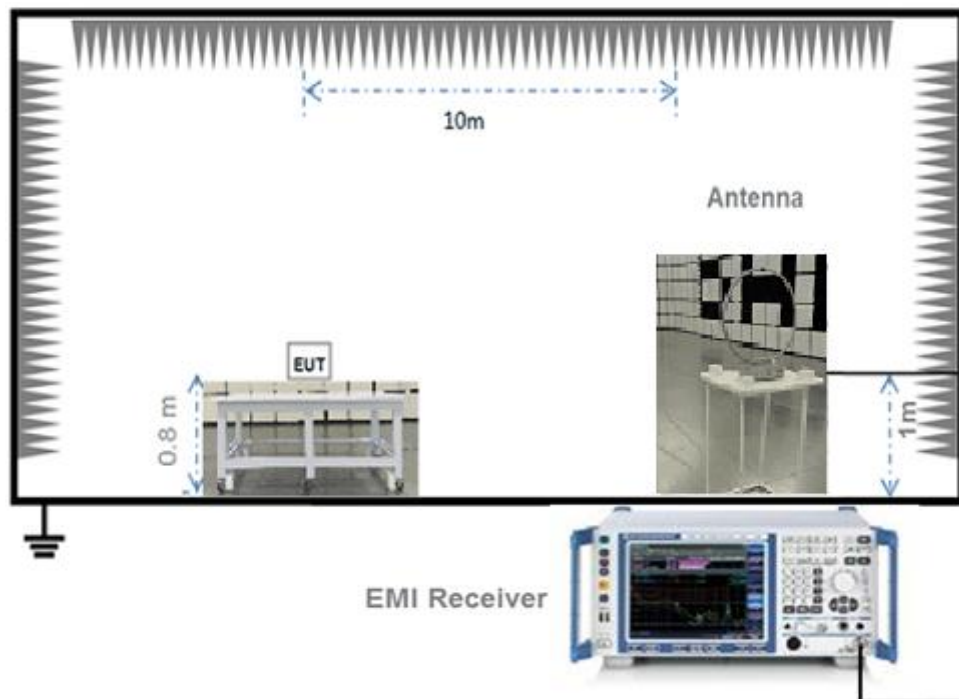
Relative Humidity	30% to 60%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	USB 5V/9V/12V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.10.10	2022.10.09
Test Antenna- Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna- Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	N/A	2021.08.15	2024.08.14
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2021.10.10	2022.10.09
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.08	2022.06.07
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	N/A	2019.08.16	2022.08.15
Adapter	XIAOMI	AD651	N/A	--	--
iPhone	APPLE	iPhone12	N/A	--	--
Type-c Connector	N/A	N/A	N/A	--	--
Test Software	BALUN	BL410_E	V19.918	--	--

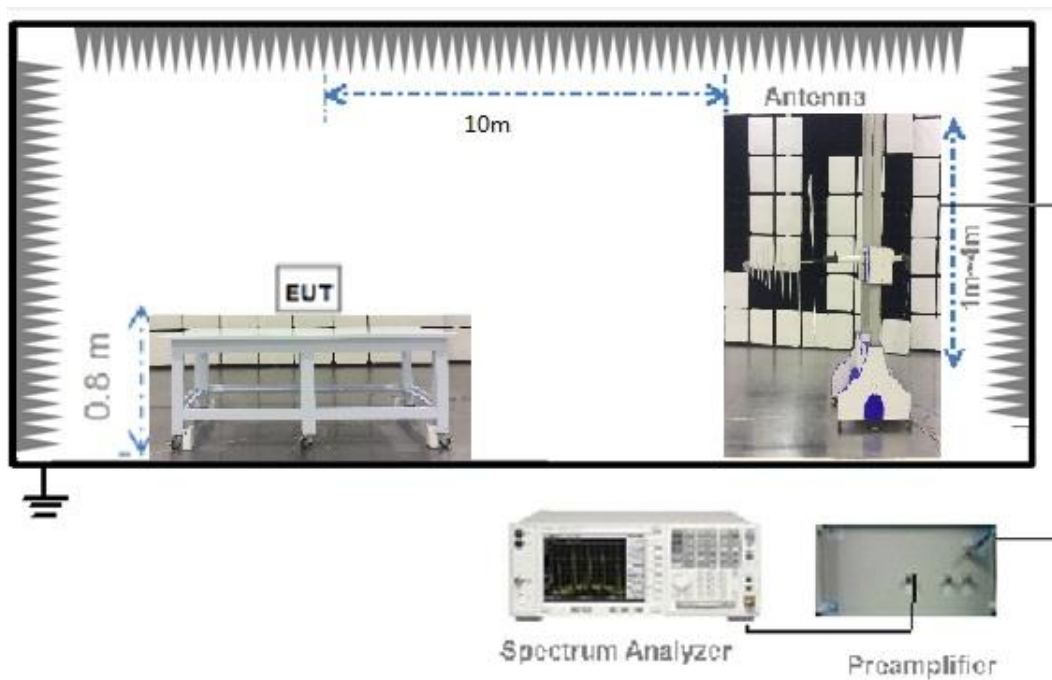
4.3 Test Setups

Test Setup 1



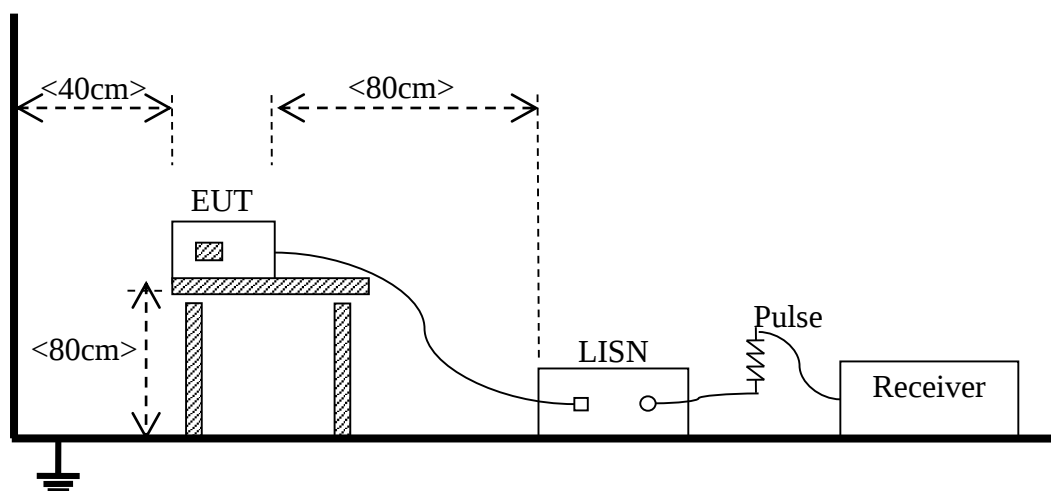
For Radiated Emission Test (Below 30 MHz))

Test Setup 2



(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 3



(For Conducted Emission, AC Ports Test)

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	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 ($\text{dB}\mu\text{V/m}$) = $20 \times \log [\text{Field Strength } (\mu\text{V/m})]$.
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) For above 1000 MHz, limit field strength of harmonics: 54 $\text{dB}\mu\text{V/m}@3\text{ m}$ (AV) and 74 $\text{dB}\mu\text{V/m}@3\text{ m}$ (PK)
- 4) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). For example, at the frequency 9 kHz, limit @10m = $20 \times \log (2400/f) + 40 \log (d_{\text{limit}}/d_{\text{measure}})$ where limit = 300m, $d_{\text{measure}}=10\text{m}$. limit @10m = $20 \times \log (2400/9) + 40 \log (300/10) = 107.5$ ($\text{dB}\mu\text{V/m}$).
- 5) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided, When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements). For example, at the frequency 30 MHz, limit @10m = $20 \times \log (100) + 20 \log (d_{\text{limit}}/d_{\text{measure}})$ where limit = 3m, $d_{\text{measure}}=10\text{m}$. limit @10m = $20 \times \log (100) + 20 \log (3/10) = 29.5$ ($\text{dB}\mu\text{V/m}$).

5.1.1.2 Test Setup

Refer to 4.3 section (test setup 1 to test setup 2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

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.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

NOTE:

1. Results (dBuV/m) = Reading (dBuV/m) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Over limit = Results – Limit.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

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

NOTE:

- 1) The limit is applicable to Class B ITE.
- 2) The lower limit shall apply at the band edges.
- 3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.3 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are 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.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

NOTE:

1. Results (dBuV) = Reading (dBuV) + Factor (dB)

The reading level is calculated by software which is not shown in the sheet

2. Factor = Insertion loss + Cable loss

3. Over limit = Results – Limit.

5.1.3 20 dB Bandwidth

5.1.3.1 Limit

FCC §15.215(c)

The 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ($10 \cdot \log 1\% = 20$ dB) taking the total RF output power.

5.1.3.2 Test Setup

Refer to 4.3 section test (test setup 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = between 2 and 5 times the OBW

RBW = 1%~5% of the OBW

Sweep = auto

Detector function = peak

Trace = max hold

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

5.1.3.4 Test Result

Please refer to ANNEX A.3.

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note¹: The symbol of "--" in the table which means not application.

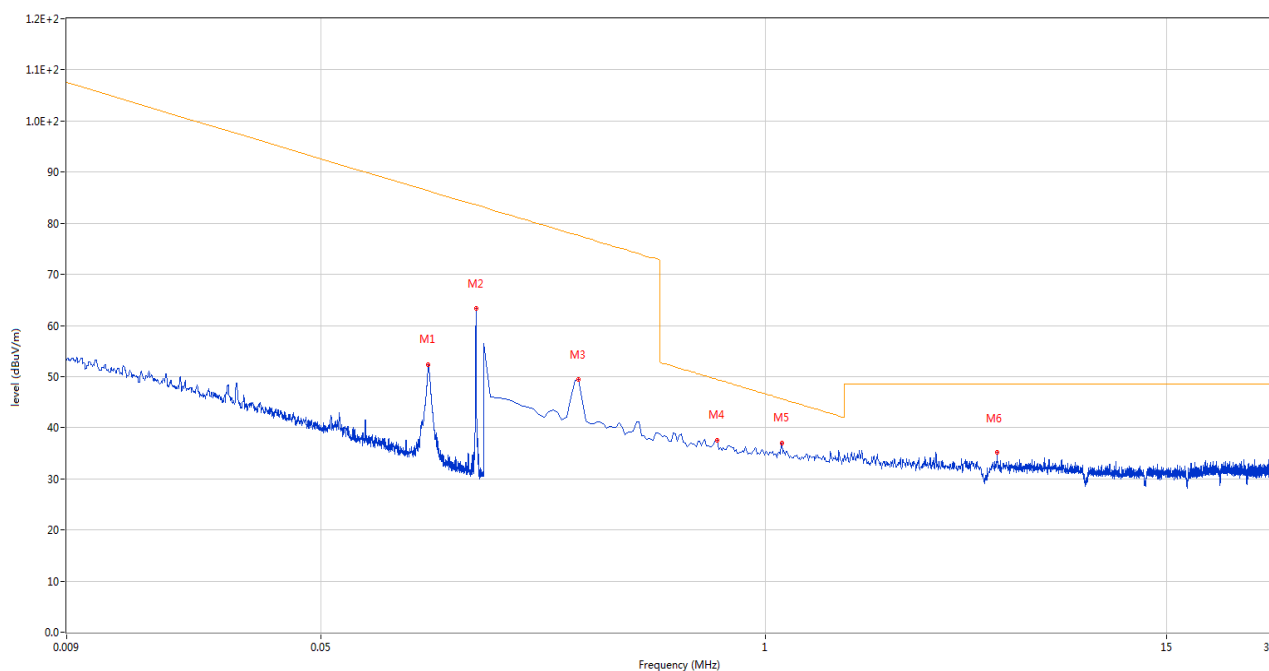
Note²: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note³: All USB 5V/9V/12V inputs were tested, and only the worst data is reflected in the report. The worst data of USB 12V input is shown here

QI Test Data and Plots

Mode 1:

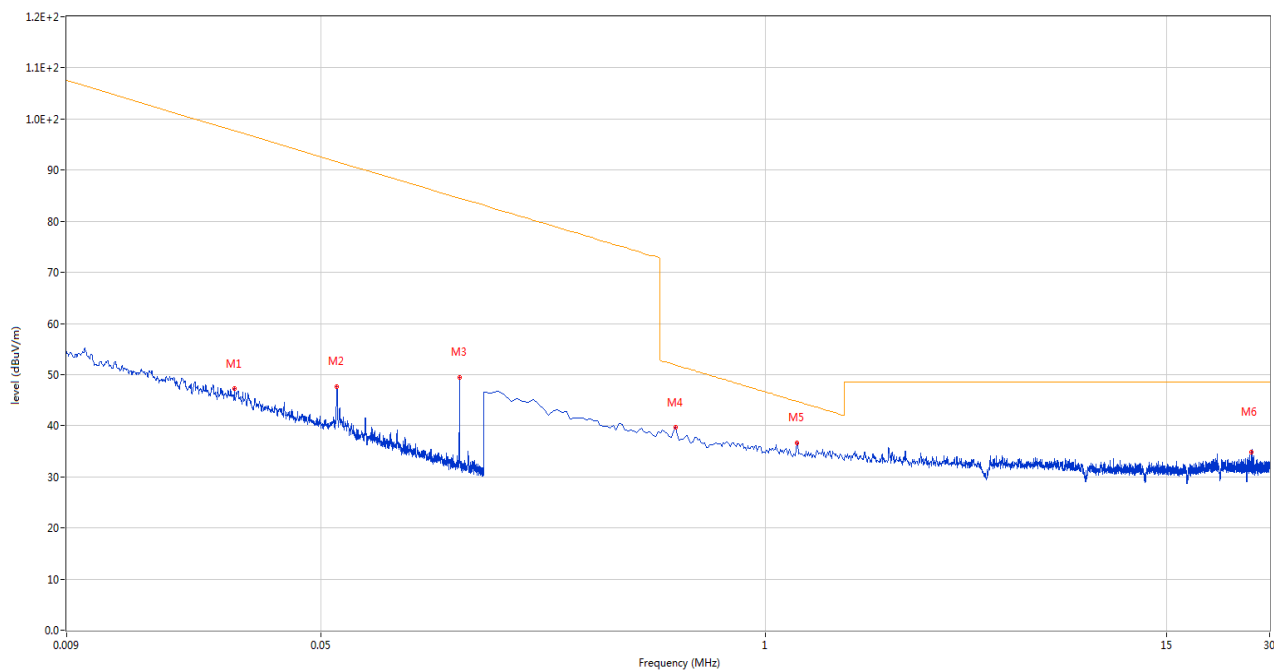
A.1.1 Test Antenna Vertical, 9 kHz –30 MHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.103	52.23	20.17	86.3	-34.07	Peak	360.00	100	Vertical	Pass
2	0.142	63.23	20.15	83.6	-20.37	Peak	356.00	100	Vertical	N/A
3	0.284	49.36	20.13	77.6	-28.24	Peak	359.00	100	Vertical	Pass
4	0.725	37.62	20.41	49.4	-11.78	Peak	255.00	100	Vertical	Pass
5	1.120	36.96	20.56	45.6	-8.64	Peak	237.00	100	Vertical	Pass
6	4.777	35.17	20.77	48.5	-13.33	Peak	104.00	100	Vertical	Pass

Mode 2:

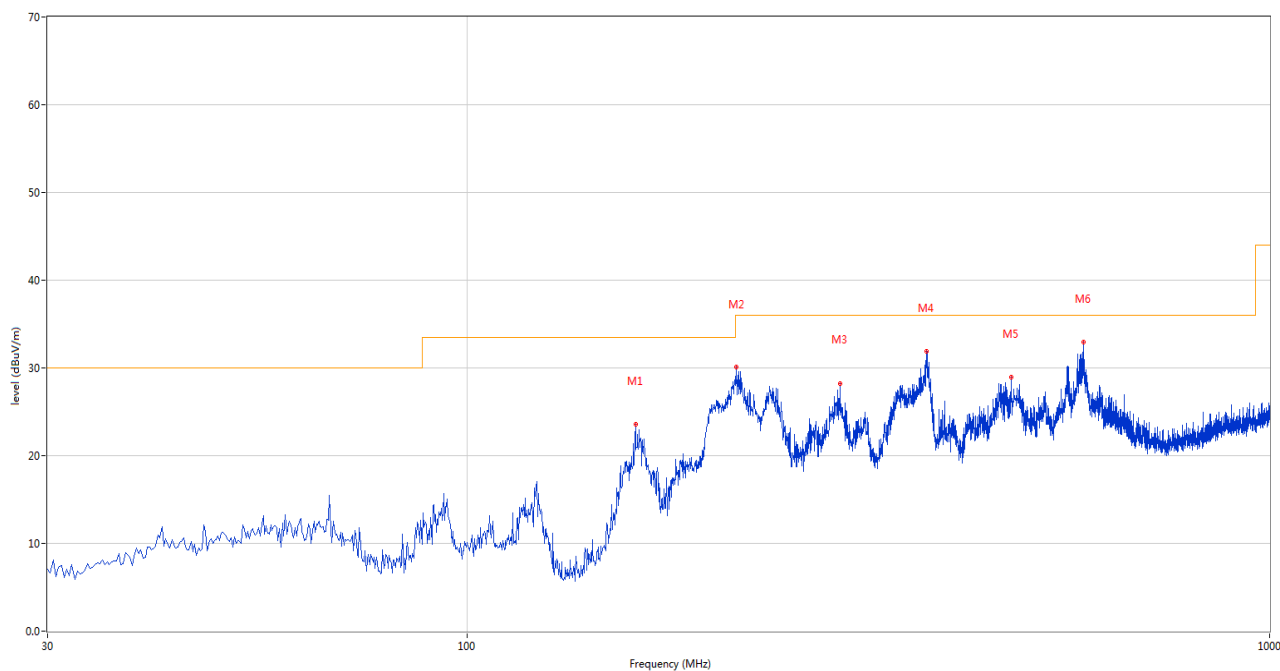
A.1.2 Test Antenna Vertical, 9 kHz –30 MHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.028	47.01	20.17	97.7	-50.69	Peak	212.00	100	Vertical	Pass
2	0.056	47.40	20.21	91.7	-44.30	Peak	150.00	100	Vertical	Pass
3	0.127	49.41	20.15	84.5	-35.09	Peak	318.00	100	Vertical	N/A
4	0.546	39.63	20.30	51.9	-12.27	Peak	356.00	100	Vertical	Pass
5	1.240	36.67	20.49	44.7	-8.03	Peak	9.00	100	Vertical	Pass
6	26.470	34.76	21.20	48.5	-13.74	Peak	9.00	100	Vertical	Pass

Mode 1:

A.1.3 Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	162.129	23.57	-30.80	33.5	-9.93	Peak	360.00	200	Horizontal	Pass
2	216.193	30.12	-27.83	36.0	-5.88	Peak	295.00	200	Horizontal	Pass
3	291.592	28.24	-25.25	36.0	-7.76	Peak	124.00	200	Horizontal	Pass
4	373.294	31.85	-23.27	36.0	-4.15	Peak	351.00	200	Horizontal	Pass
5	476.331	28.91	-20.91	36.0	-7.09	Peak	215.00	200	Horizontal	Pass
6	585.671	32.92	-18.30	36.0	-3.08	Peak	18.00	200	Horizontal	Pass

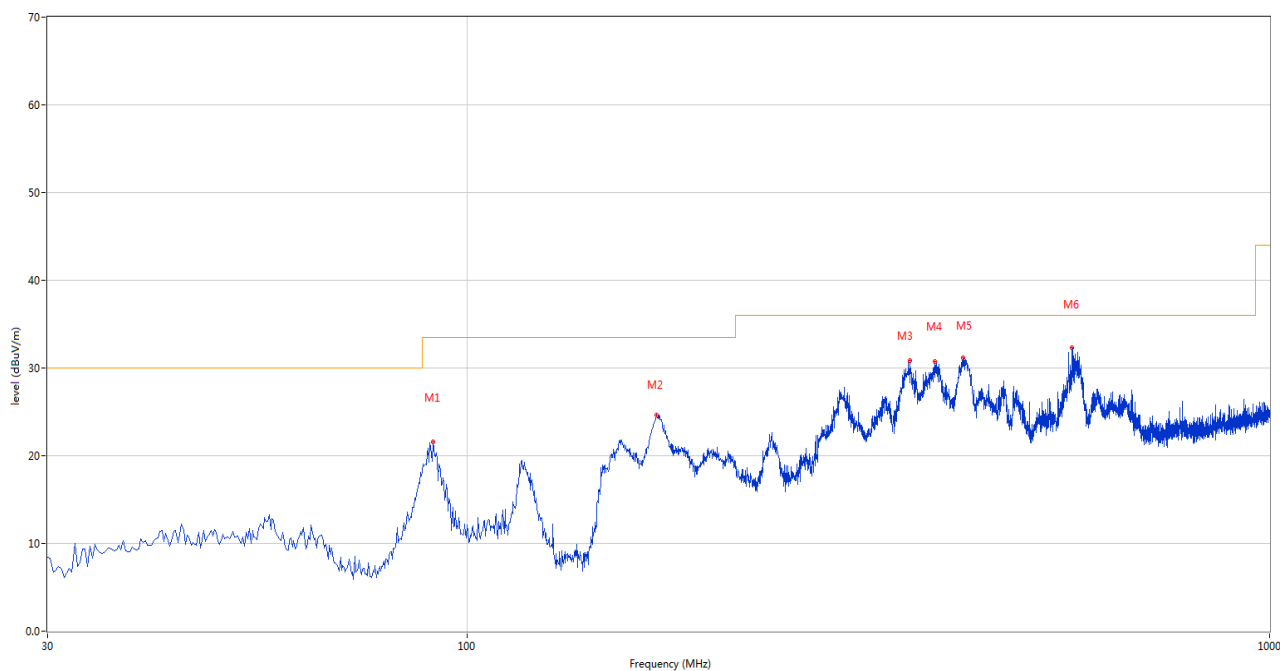
A.1.4 Test Antenna Vertical, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	67.336	25.97	-29.27	30.0	-4.03	Peak	199.00	100	Vertical	Pass
2	123.582	28.98	-30.44	33.5	-4.52	Peak	220.00	100	Vertical	Pass
3	164.705	31.35	-30.53	33.5	-2.15	Peak	315.00	100	Vertical	N/A
3*	164.705	26.27	-30.53	33.5	-7.23	QP	315.00	100	Vertical	Pass
4	216.682	35.35	-27.82	36.0	-0.65	Peak	310.00	106	Vertical	N/A
4*	216.682	30.63	-27.82	36.0	-5.37	QP	310.00	106	Vertical	Pass
5	232.170	33.97	-26.82	36.0	-2.03	Peak	0.00	100	Vertical	N/A
5*	232.170	28.91	-26.82	36.0	-7.09	QP	0.00	100	Vertical	Pass
6	290.080	33.68	-25.32	36.0	-2.32	Peak	174.00	100	Vertical	N/A
6*	290.080	27.54	-25.32	36.0	-8.46	QP	174.00	100	Vertical	Pass

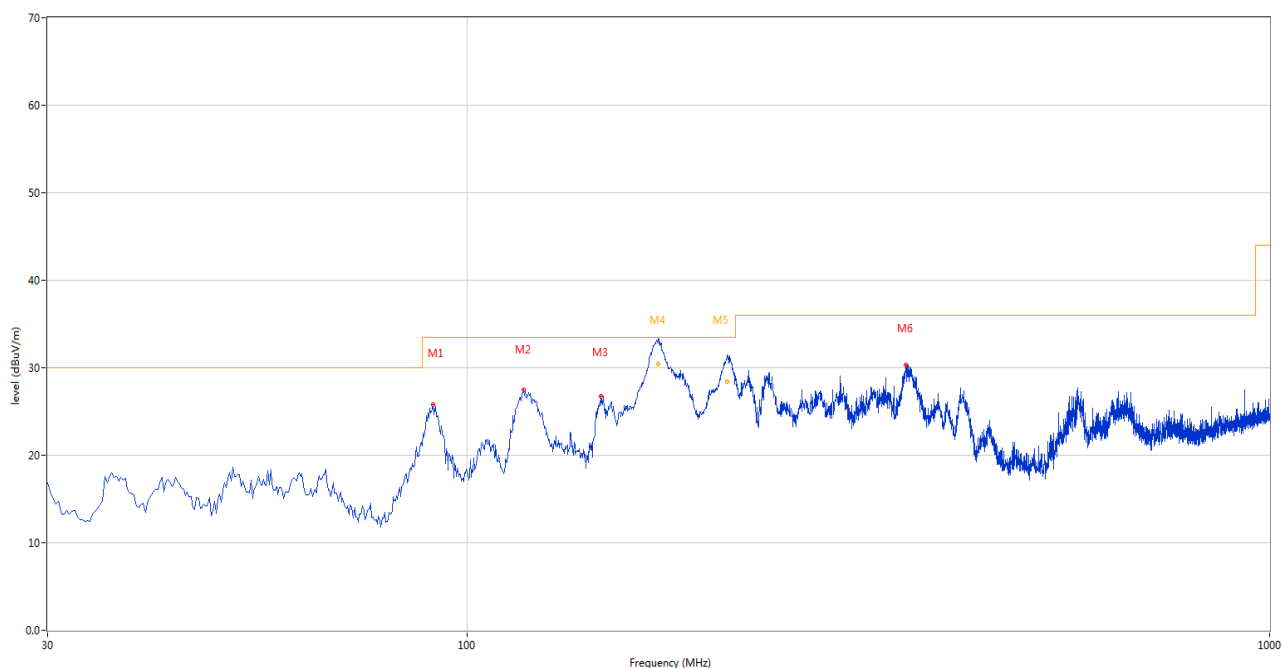
Mode 2:

A.1.5 Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	90.610	21.60	-29.55	33.5	-11.90	Peak	216.00	200	Horizontal	Pass
2	172.069	24.62	-30.25	33.5	-8.88	Peak	337.00	200	Horizontal	Pass
3	356.566	30.83	-23.34	36.0	-5.17	Peak	221.00	200	Horizontal	Pass
4	382.749	30.71	-22.99	36.0	-5.29	Peak	216.00	200	Horizontal	Pass
5	414.509	31.16	-21.97	36.0	-4.84	Peak	360.00	200	Horizontal	Pass
6	567.003	32.27	-18.95	36.0	-3.73	Peak	236.00	200	Horizontal	Pass

A.1.6 Test Antenna Vertical, 30 MHz – 1 GHz



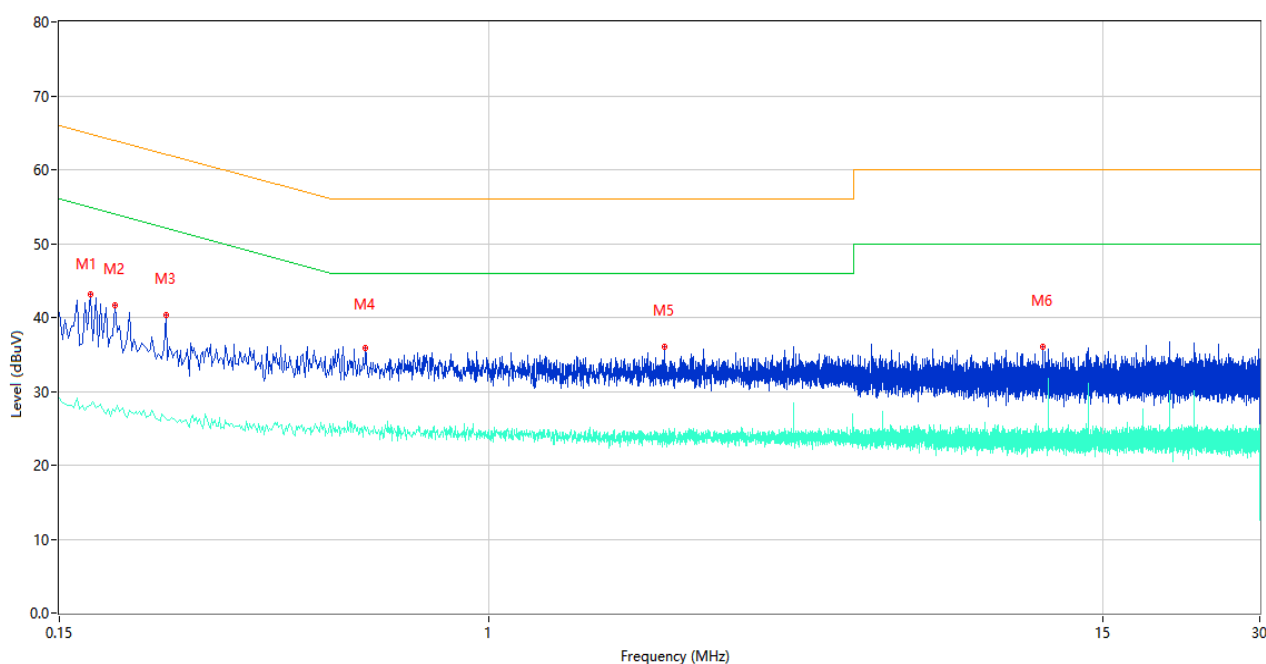
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	90.610	25.76	-29.55	33.5	-7.74	Peak	98.00	100	Vertical	Pass
2	117.521	27.52	-29.28	33.5	-5.98	Peak	300.00	100	Vertical	Pass
3	146.856	26.78	-31.48	33.5	-6.72	Peak	159.00	100	Vertical	Pass
4	172.815	31.70	-30.23	33.5	-1.80	Peak	270.00	108	Vertical	N/A
4*	172.815	30.41	-30.23	33.5	-3.09	QP	270.00	108	Vertical	Pass
5	210.953	31.01	-27.85	33.5	-2.49	Peak	320.00	127	Vertical	N/A
5*	210.953	28.45	-27.85	33.5	-5.05	QP	320.00	127	Vertical	Pass
6	351.960	30.36	-23.33	36.0	-5.64	Peak	63.00	100	Vertical	Pass

A.2 Conducted Emission

Note: All USB 5V/9V/12V inputs were tested, and only the worst data is reflected in the report. The worst data of USB 12V input is shown here

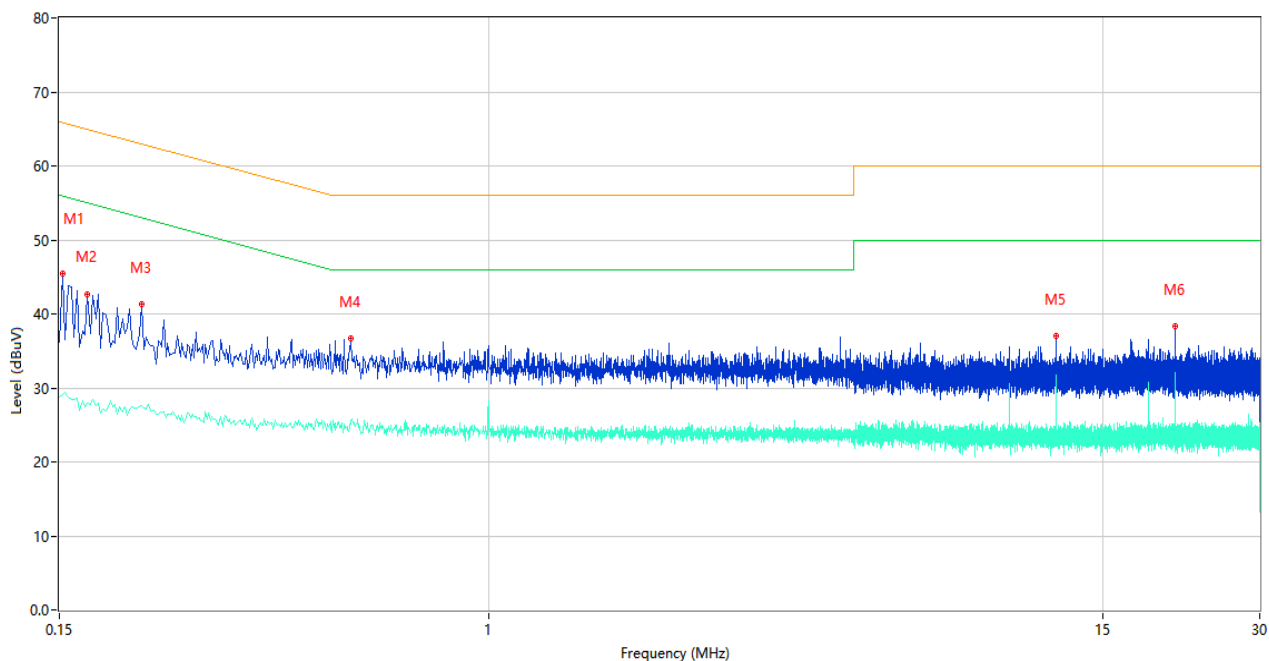
QI Test Data and Plots

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.172	43.06	10.98	64.86	-21.80	Peak	L	Pass
1**	0.172	28.13	10.98	54.86	-26.73	AV	L	Pass
2	0.192	41.73	10.96	63.95	-22.22	Peak	L	Pass
2**	0.192	27.32	10.96	53.95	-26.63	AV	L	Pass
3	0.240	40.34	10.93	62.10	-21.76	Peak	L	Pass
3**	0.240	26.35	10.93	52.10	-25.75	AV	L	Pass
4	0.580	35.92	10.89	56.00	-20.08	Peak	L	Pass
4**	0.580	24.98	10.89	46.00	-21.02	AV	L	Pass
5	2.164	35.98	10.74	56.00	-20.02	Peak	L	Pass
5**	2.164	23.61	10.74	46.00	-22.39	AV	L	Pass
6	11.506	35.97	10.67	60.00	-24.03	Peak	L	Pass
6**	11.506	24.09	10.67	50.00	-25.91	AV	L	Pass

A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.152	45.48	10.99	65.89	-20.41	Peak	N	Pass
1**	0.152	29.11	10.99	55.89	-26.78	AV	N	Pass
2	0.170	42.70	10.98	64.96	-22.26	Peak	N	Pass
2**	0.170	27.91	10.98	54.96	-27.05	AV	N	Pass
3	0.216	41.28	10.94	62.97	-21.69	Peak	N	Pass
3**	0.216	27.64	10.94	52.97	-25.33	AV	N	Pass
4	0.544	36.71	10.90	56.00	-19.29	Peak	N	Pass
4**	0.544	25.13	10.90	46.00	-20.87	AV	N	Pass
5	12.224	37.04	10.68	60.00	-22.96	Peak	N	Pass
5**	12.224	31.34	10.68	50.00	-18.66	AV	N	Pass
6	20.612	38.30	10.67	60.00	-21.70	Peak	N	Pass
6**	20.612	30.91	10.67	50.00	-19.09	AV	N	Pass

A.3 20 dB Bandwidth

Note: Not applicable.

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-EC2220320-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-EC2220320-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-EC2220320-AI.PDF”.

--END OF REPORT--

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
3. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
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