

FCC/ISED

RF

TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Rugged Smart Phone

ISSUED TO
Shenzhen UniStrong Science & Technology Co., Ltd.

B, 4-4Factory, Zhengcheng Road, FuyongBaoan District, Shenzhen,
China



Tested by: Xia Long
Xia Long
(Engineer)

Date Mar. 15, 2019

Approved by: Wei Yanquan
Wei Yanquan
(Chief Engineer)

Date Mar. 15, 2019

Report No.: BL-EC1930222-402
EUT Name: Rugged Smart Phone
Model Name: UT12
Brand Name: UniStrong
Test Standard: 47 CFR Part 15 Subpart C
RSS-210 Issue 9 (2016-8)
RSS-Gen Issue 5 (2018-4)
FCC ID: 2AOPD-UT10
ISED Number: 11546A-UT10
Test Conclusion: Pass
Test Date: Mar. 11, 2019
Date of Issue: Mar. 15, 2019

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Mar. 15, 2019</u>	<u>Initial Issue</u>

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

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

1.2 Identification of the Responsible Testing Location

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

1.3 Laboratory Condition

Ambient Temperature	20°C to 25°C
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 v6.2.
- (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 UniStrong Science & Technology Co., Ltd.
Address	B, 4-4Factory, Zhengcheng Road, FuyongBaoan District, Shenzhen, China

2.2 Manufacturer Information

Manufacturer	Shenzhen UniStrong Science & Technology Co., Ltd.
Address	B, 4-4Factory, Zhengcheng Road, FuyongBaoan District, Shenzhen, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Rugged Smart Phone
Model Name Under Test	UT12
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	SJYEnergy
	Model No.	BA7800
	Serial No.	N/A
	Capacity	8000 mAh
	Rated Voltage	3.8 V
	Limit Charge Voltage	4.35 V
Ancillary Equipment 2	Adapter	
	Brand Name	N/A
	Model No.	ASUC71W
	Serial No.	N/A
	Rated Input	100-240 V~, 0.7 A, 50/60 Hz
	Rated Output	5 V= 3 A
Ancillary Equipment 3	USB Cable	
	Model No.	N/A
	Length (Approx.)	0.8 m

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EGPRS 850/900/1800/1900 MHz; 3G Network WCDMA/HSDPA/HSUPA Band 1/2/5/8; CDMA Band Class 0; EVDO Rel. 0/Rev. A Band Class 0; 4G Network LTE FDD Band 1/2/3/4/5/7/8/17/20/28; LTE TDD Band 38/40/41; Bluetooth, GPS, GLONASS, NFC, BDS
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The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	ASK
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Frequency Range	13.56 MHz
Receiver Categorization	3
Number of channel	1
Tested Channel	1
Antenna Type	PIFA Antenna

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-17 Edition)	Miscellaneous Wireless Communications Services
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	RSS-Gen (Issue 5, Apr. 2018)	General Requirements for Compliance of Radio Apparatus
4	RSS-210 (Issue 9, August 2016)	Licence-Exempt Radio Apparatus: Category I Equipment

3.2 Verdict

No.	Description	FCC Part No.	ISED Part No.	Test Result	Verdict
1	Radiated Emissions	15.225(d) 15.209	RSS-210 B.6	ANNEX A.1	Pass

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

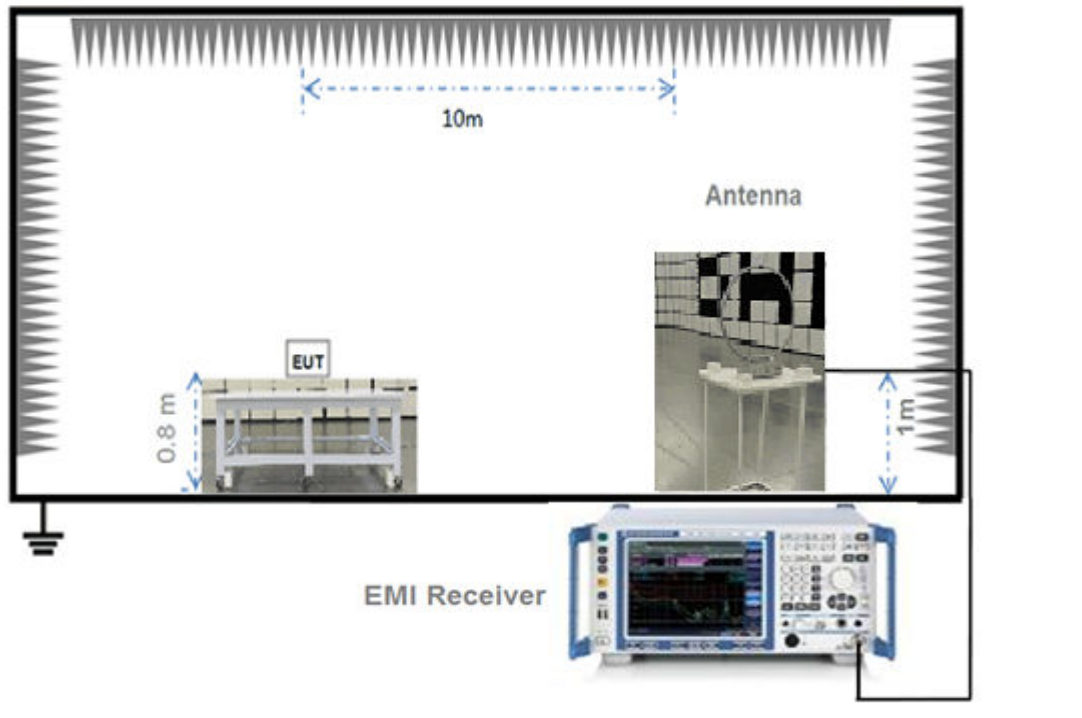
Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	3.8 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2018.06.11	2019.06.10
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	260592	2018.06.11	2019.06.10
Signal Generator	ROHDE&SCHWARZ	SMB100A	177746	2018.06.11	2019.06.10
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2018.06.11	2019.06.10
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2018.11.06	2019.11.05
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2018.06.13	2019.06.12
LISN	SCHWARZBECK	NSLK 8127	8127-687	2018.06.13	2019.06.12
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2018.06.11	2019.06.10
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2018.06.11	2019.06.10
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2018.06.21	2019.06.20
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2018.06.26	2019.06.25
Test Antenna-Rod(9 kHz-30 MHz)	SCHWARZBECK	VAMP 9243	9243-556	2017.11.07	2019.11.08
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2017.07.22	2019.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2018.07.11	2019.07.10
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2018.06.21	2019.06.20
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2018.06.21	2019.06.20
Anechoic Chamber	EMC Electronic Co., Ltd	9m*6m*6m	N/A	2017.02.21	2020.02.20
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6m*7.35m	N/A	2017.02.21	2020.02.20
Shielded Enclosure	ChangNing	CN-130701	130703	--	--
Test Software	BALUN	BL410_E	V18.626	--	--

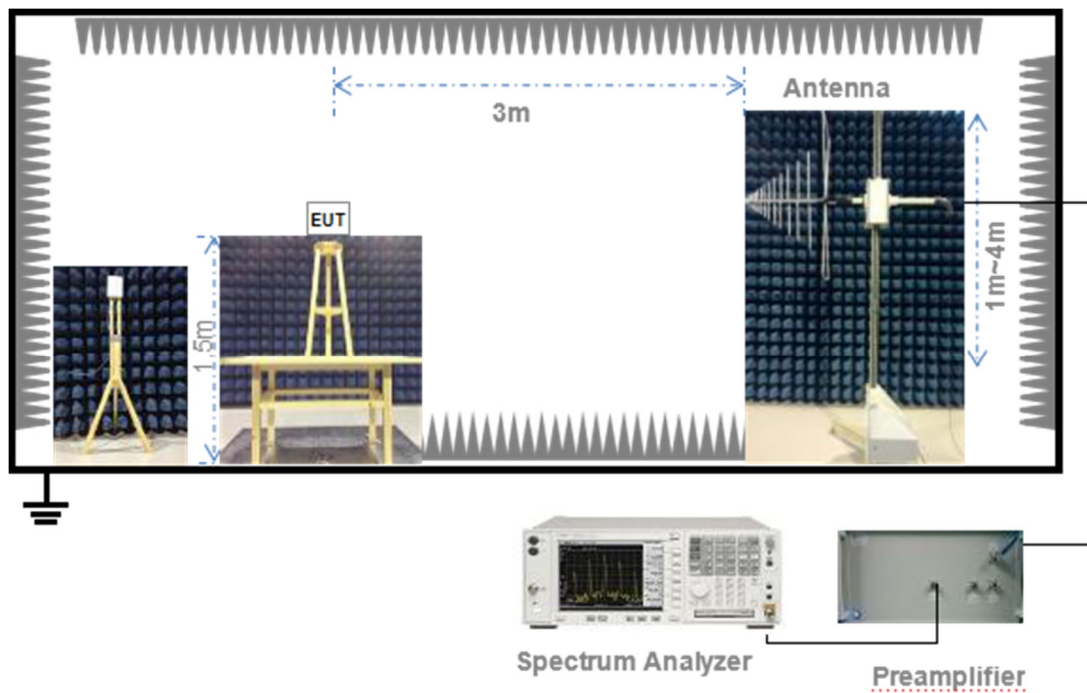
Description of Test Setup

4.2.1 For Radiated Test (Below 30 MHz)



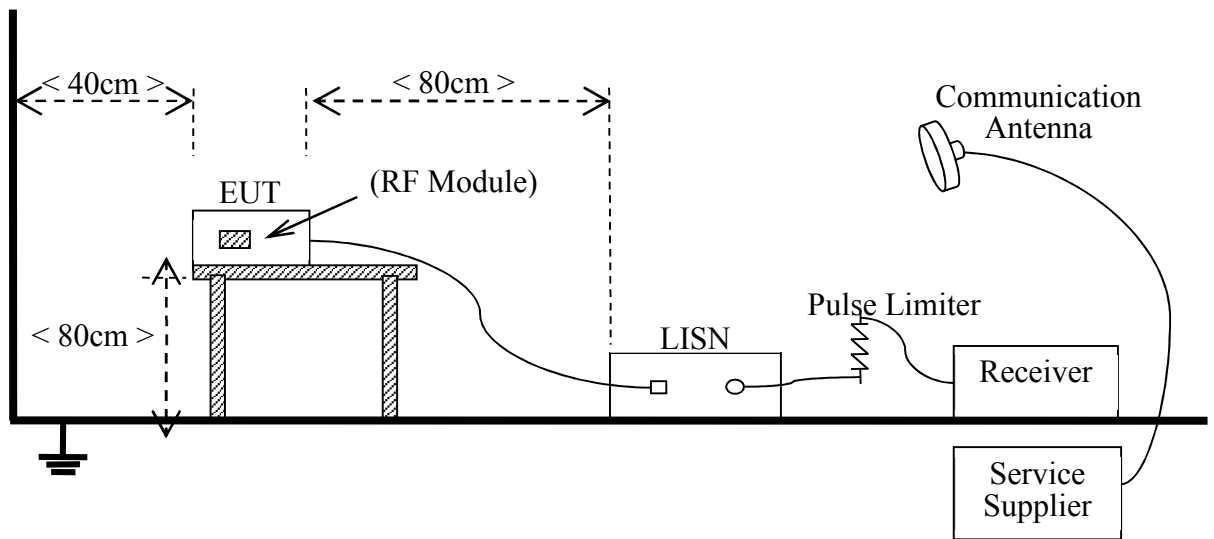
(Diagram 1)

4.2.2 For Radiated Test (30 MHz-1 GHz)



(Diagram 2)

4.2.3 For AC Power Supply Port Test



(Diagram 3)

5 TEST ITEMS

5.1 Field Strength of Fundamental Emissions and Radiated Emissions

5.1.1 Limit

FCC §15.225(a), (b), (c); RSS-210 B.6

According to FCC section 15.225, for <30 MHz, Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 10 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 KHz. (Note: During testing the receive antenna was rotated about its axis to maximize the emission from the EUT)

There was no detected Restricted bands and Radiated suprious emission below 30MHz. The 30m limit was converted to 3m Limit using square factor(x) as it was found by measurements as follows; 3 m Limit(dBuV/m) = $20\log(X)+40\log(30/3)= 20\log(15848)+40\log(30/3) = 124\text{dBuV}$

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 range (MHz)	Field Strength@30m		Field Strength@10m	Field Strength@3m
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
Below 13.110	30	29.5	48.58	69.5
13.110 ~ 13.410	106	40.5	59.58	80.5
13.410 ~ 13.553	334	50.5	69.58	90.5
13.553 ~13.567	15848	84	103.08	124
13.567 ~ 13.710	334	50.5	69.58	90.5
13.710 ~14.010	106	40.5	59.58	80.5
Above 14.010	30	29.5	48.58	69.5

NOTE:

1. Field Strength ($\text{dB}\mu\text{V/m}$) = $20*\log[\text{Field Strength } (\mu\text{V/m})]$.
2. In the emission tables above, the tighter limit applies at the band edges.

FCC §15.225(d)

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 ($\mu\text{V/m}$)
0.009 - 0.490	$2400/F(\text{kHz})$
0.490 - 1.705	$24000/F(\text{kHz})$
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).

5.1.2 Test Setup

See section 4.1.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.1.3 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 $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.1.4 Test Result

Please refer to ANNEX A.1

NOTE:

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

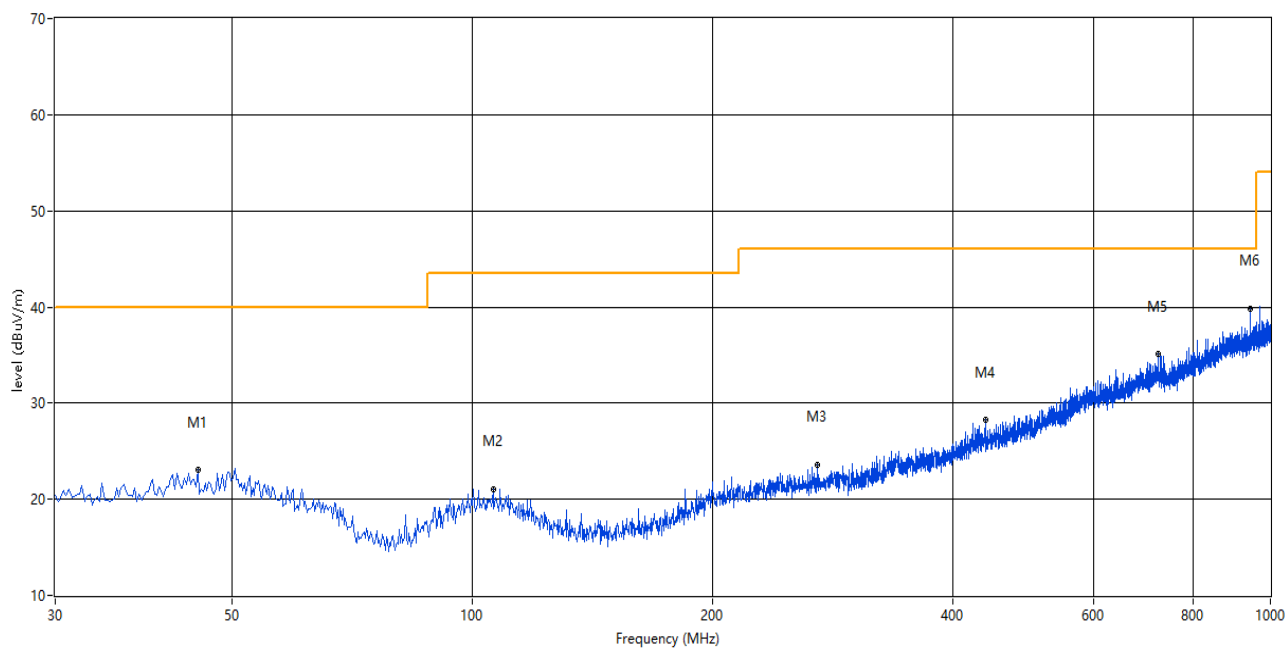
3. Over limit = Results – Limit.

ANNEX A TEST RESULT

A.1 Radiated Emissions

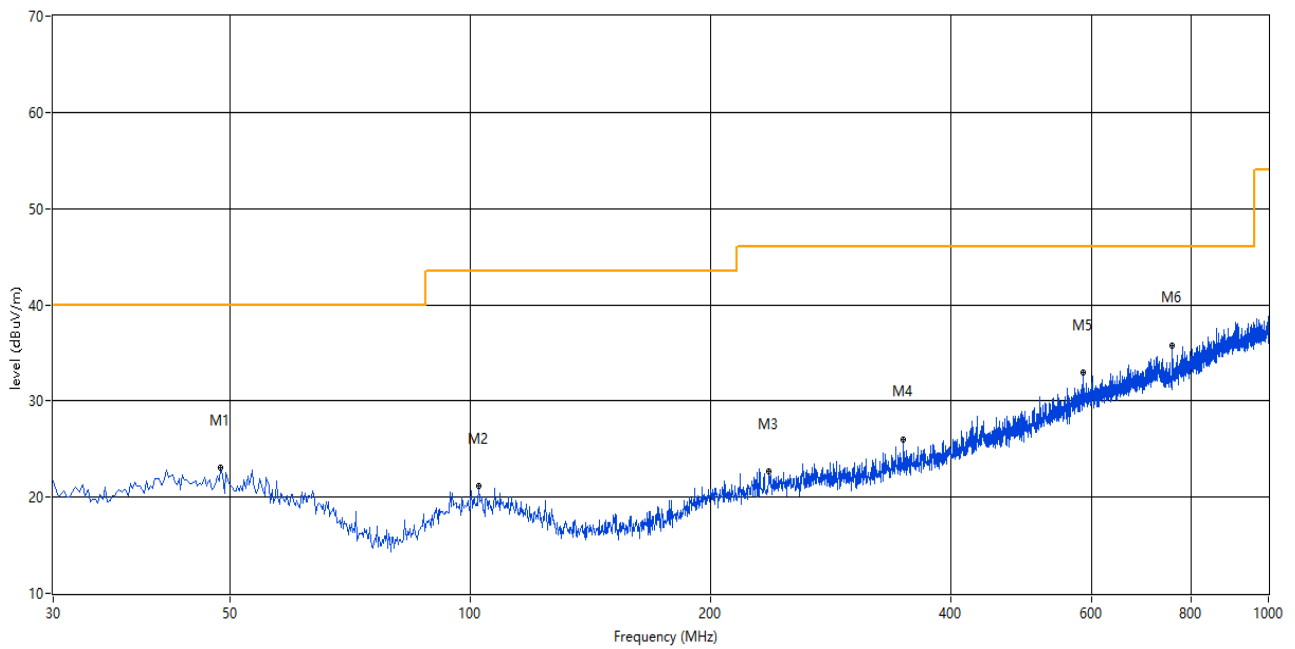
Test Data and Plots (30 MHz ~ 10th Harmonic)(at 3m chamber)

Above 30 MHz ANT-V



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
45.274	23.12	--	--	-25.55	--	40.0	--	16.88	83.90	100	Vertical	Pass
106.126	20.97	--	--	-27.77	--	43.5	--	22.53	280.60	100	Vertical	Pass
270.257	23.61	--	--	-25.95	--	46.0	--	22.39	5.10	100	Vertical	Pass
439.723	28.24	--	--	-22.23	--	46.0	--	17.76	188.90	100	Vertical	Pass
722.649	35.13	--	--	-16.06	--	46.0	--	10.87	340.40	100	Vertical	Pass
943.269	39.79	--	--	-12.08	--	46.0	--	6.21	37.50	100	Vertical	Pass

Below 30 MHz ANT -H



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
48.668	23.02	--	--	-25.58	--	40.0	--	16.98	58.30	100	Horizontal	Pass
102.489	21.16	--	--	-27.78	--	43.5	--	22.34	58.30	100	Horizontal	Pass
236.801	22.64	--	--	-26.69	--	46.0	--	23.36	171.00	100	Horizontal	Pass
349.050	26.03	--	--	-24.33	--	46.0	--	19.97	324.90	100	Horizontal	Pass
585.186	32.95	--	--	-18.56	--	46.0	--	13.05	82.60	100	Horizontal	Pass
758.045	35.81	--	--	-15.55	--	46.0	--	10.19	243.90	100	Horizontal	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-EC1930222-AE2.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-EC1930222--AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-EC1930222--AI.PDF”.

--END OF REPORT--