

FCC

EMC

TEST REPORT

ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.

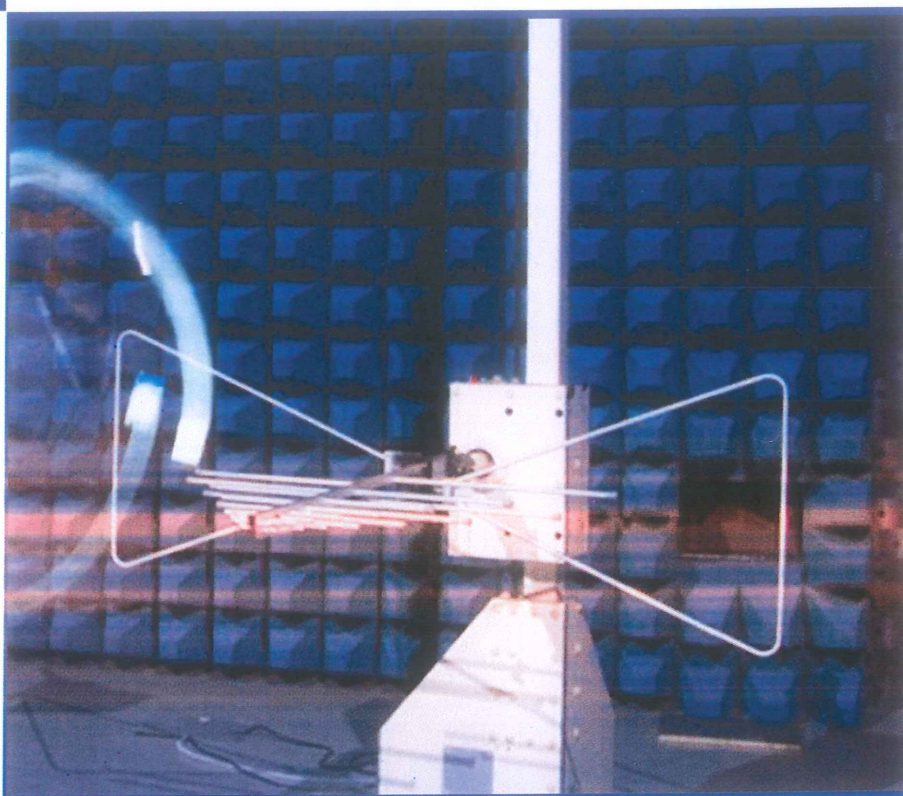


FOR

Intel Dual Band Wireless-AC 3165

ISSUED TO  
Handheld Group AB

Kinnegatan 17, 53133 Lidköping Sweden



Tested by: Xia Long  
Xia Long  
(Engineer)

Date: May 17, 2017

Approved by: Wei Yanquan  
Wei Yanquan  
(Chief Engineer)

Date: May 17, 2017

Report No.: BL-SZ1670309-401

EUT Name: Intel Dual Band Wireless-AC 3165

Model Name: 3165NGW

Brand Name: Handheld

Test Standard: 47 CFR Part 15 Subpart B

FCC ID: YY3-1824V1

Test Conclusion: Pass

Test Date: Nov. 11, 2016 ~ Nov. 18, 2016

Date of Issue: May 17, 2017

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**Revision History**

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>May 15, 2017</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>May 17, 2017</u>	<u>Increase the relevant description of the Test Configurations on page 10</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
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	<p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625.</p> <p>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.</p>
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~25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

## 1.4 Announce

- (1) The test report reference to the report template version v6.3.
- (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	Handheld Group AB
Address	Kinnegatan 17, 53133 Lidköping Sweden

### 2.2 Manufacturer Information

Manufacturer	INTEL MOBILE COMMUNICATIONS
Address	100 Center Point Circle, Suite 200 Columbia, South Carolina, 29210 USA

### 2.3 General Description for Equipment under Test (EUT)

EUT Name	Intel Dual Band Wireless-AC 3165
Model Name Under Test	3165NGW
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	IBWHH-210
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
The Highest Speed of Processor	N/A
Network and Wireless connectivity	Bluetooth, WIFI, GPS

## 2.4 Ancillary Equipment

Ancillary Equipment	Rugged Tablet PC (Host)	
	Brand Name	Handheld
	Model No.	ALGIZ 8X
	Serial No.	N/A

## 2.5 Technical Information

N/A



### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 15 Subpart B (10-1-15 Edition)	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

#### 3.2 Verdict

No.	Description	FCC Rule	ISED Rule	Test Verdict	Result
1	Radiated Emission	15.109	Class B	Pass	Annex A .1
2	Conducted Emission, AC Ports	15.107	Class B	Pass	Annex A .2

#### 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)	3.23 dB
Radiated emissions (30 MHz-1 GHz)	4.30 dB
Radiated emissions (1 GHz-18 GHz)	4.81 dB
Radiated emissions (18 GHz-40 GHz)	5.71 dB

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C~26°C	AC 120 V/60 Hz	50%-55%	100 to 102 kPa

### 4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2016.07.19	2018.07.18	<input checked="" type="checkbox"/>
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1600	2016.07.12	2018.07.11	<input type="checkbox"/>
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60 *7.35m	N/A	2016.08.09	2018.08.08	<input checked="" type="checkbox"/>

Radiated Emission Test For Frequency Above 1 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2016.09.09	2017.09.08	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21	<input type="checkbox"/>
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21	<input checked="" type="checkbox"/>
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.24	2019.02.23	<input checked="" type="checkbox"/>

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04	<input checked="" type="checkbox"/>
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04	<input checked="" type="checkbox"/>
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	<input checked="" type="checkbox"/>



### 4.3 Test Enclosure list

Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	N/A	N/A	N/A	N/A	Special Handled	<input type="checkbox"/>
Laptop	Apple	A1465	N/A	N/A	N/A	<input type="checkbox"/>
Printer	HP	DESKJET 1000	N/A	N/A	N/A	<input type="checkbox"/>
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Mouse	Logitech	M100	N/A	N/A	N/A	<input checked="" type="checkbox"/>
USB disk	Kingston	N/A	N/A	N/A	N/A	<input checked="" type="checkbox"/>
TF Card	Kingston	N/A	N/A	N/A	N/A	<input checked="" type="checkbox"/>
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input checked="" type="checkbox"/>
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	<input type="checkbox"/>
Audio Cable	N/A	N/A	N/A	0.5 m	Shielded with core	<input type="checkbox"/>
iPhone	Apple	A1586	N/A	N/A	N/A	<input type="checkbox"/>
Bluetooth Earphone	SAMSUNG	Gear Circle	N/A	N/A	N/A	<input checked="" type="checkbox"/>
GPS/GLONASS Vector signal generator	R&S	N5172B EXG	N/A	N/A	N/A	<input checked="" type="checkbox"/>
WIFI Router	TP-LINK	TL-WDR7500	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Earphone	N/A	OPPO	N/A	1.1 m	N/A	<input type="checkbox"/>
Car Battery	Camel	55530	N/A	N/A	12 V/55 Ah	<input type="checkbox"/>
Artificial load	N/A	N/A	N/A	N/A	2.5 $\Omega$ /100 W	<input type="checkbox"/>
Artificial load	N/A	N/A	N/A	N/A	5 $\Omega$ /100 W	<input type="checkbox"/>
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	<input type="checkbox"/>
USB Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
DC Power Supply	ITECH	IT6863A	60001401068 7210006	N/A	N/A	<input type="checkbox"/>
LCD Monitor	SAMSUNG	UA32C4000P	N/A	N/A	N/A	<input type="checkbox"/>
RJ45 Cable	N/A	N/A	N/A	1.5 m	Shielded with core	<input type="checkbox"/>
Wireless Speaker	One World Technologies	P761	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Television	SAMSUNG	UA32C4000P	N/A	N/A	N/A	<input checked="" type="checkbox"/>

## 4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The Camera Test mode</u> EUT + Host + Mouse + Keyboard + Television + HDMI Cable + TF Card
TC02	<u>The Video Play test mode</u> EUT + Host + Mouse + Keyboard + Television + HDMI Cable + TF Card + WIFI Link + BT Link
TC03	<u>The USB test mode</u> EUT + Host + Mouse + Television + HDMI Cable + USB Disk + TF Card + GPS RX

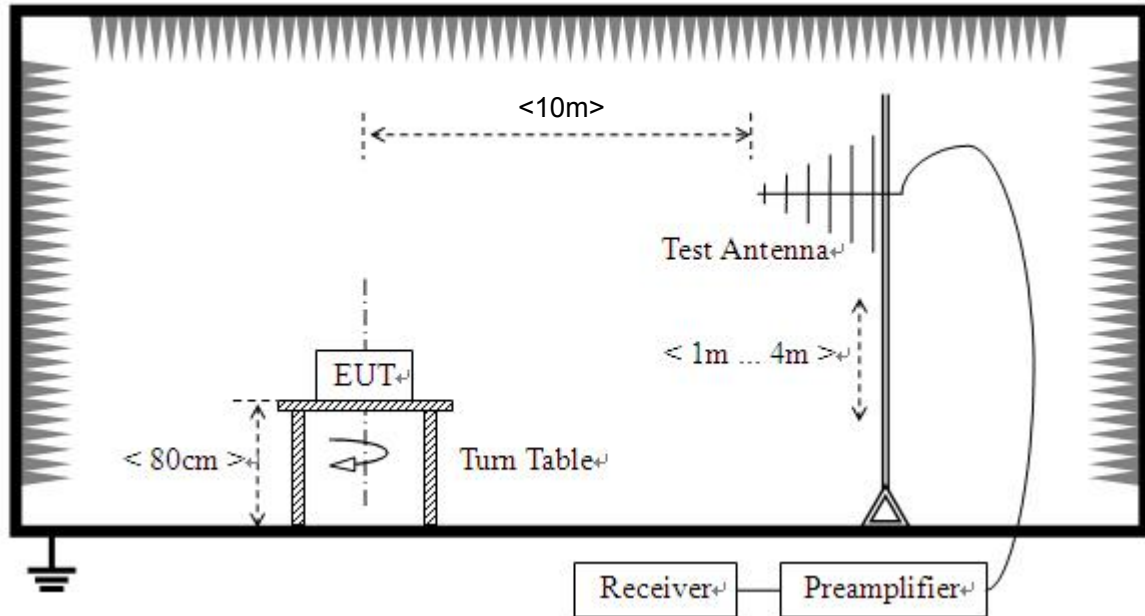
Note: TC01 camera test mode will record the contents stored in the TF card.

TC02 video play test mode is to read the TF card in the video file.

TC03 USB test mode USB disk and TF card and EUT for data transmission.

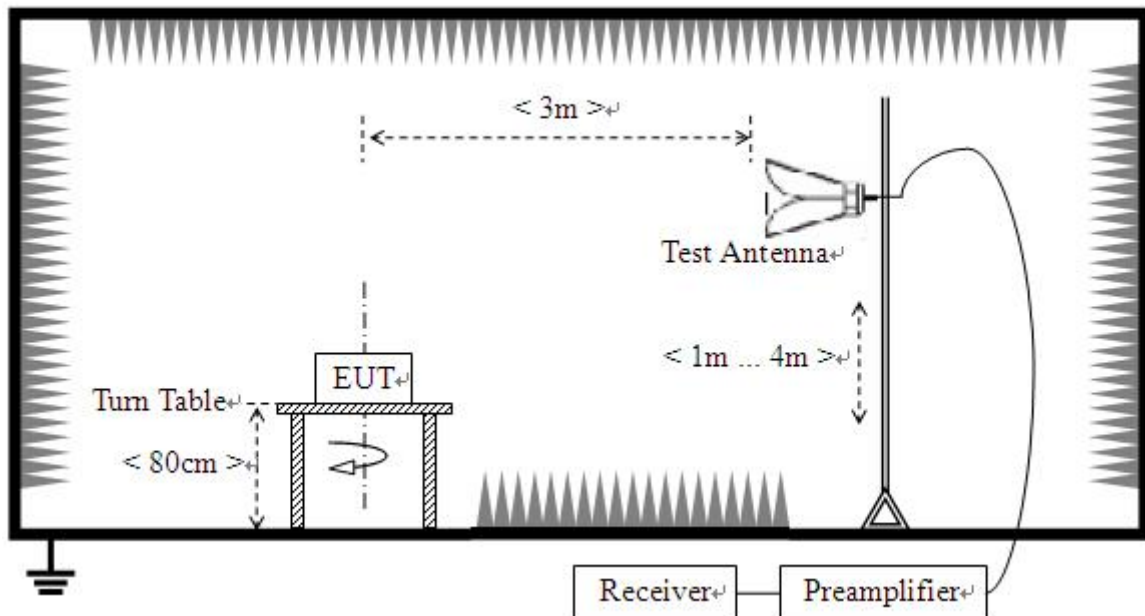
## 4.5 Test Setups

### Test Setup 1



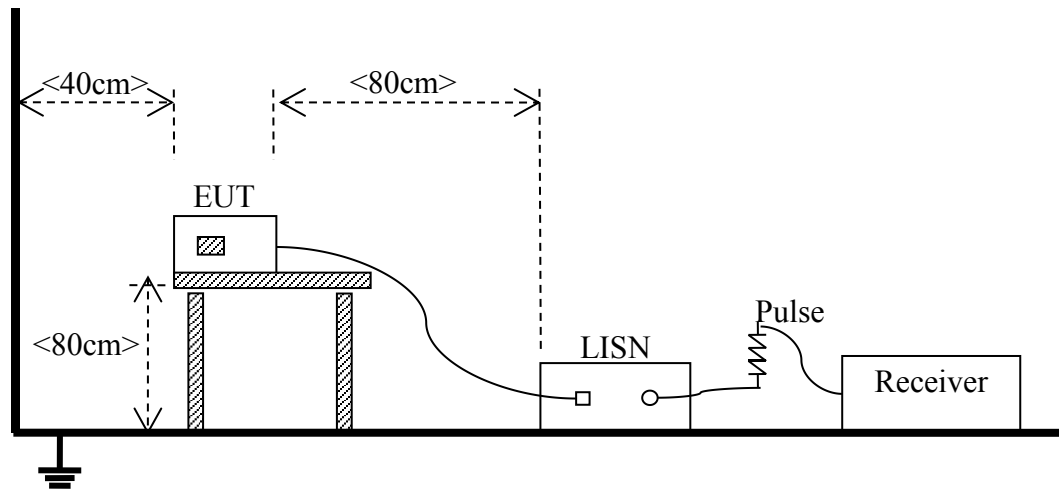
(For Radiated Emission Test (30 MHz-1 GHz))

### Test Setup 2



(For Radiated Emission Test (above 1 GHz))

### Test Setup 3



(For Conducted Emission, AC Ports Test)

## 4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1&2
	Test Configuration	TC01~TC03 <sup>Note</sup>
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 3
	Test Configuration	TC01~TC03 <sup>Note</sup>
Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report. The Camera Test Mode is the worst mode in this report.		

## 5 TEST ITEMS

### 5.1 Emission Tests

#### 5.1.1 Radiated Emission

##### 5.1.1.1 Limit

Frequency range (MHz)	Class B (at 3 m)		Class A (at 10 m)	
	Field Strength ( $\mu\text{V/m}$ )	Field Strength (dB $\mu\text{V/m}$ )	Field Strength ( $\mu\text{V/m}$ )	Field Strength (dB $\mu\text{V/m}$ )
30 - 88	100	40	90	39
88 - 216	150	43.5	150	43.5
216 - 960	200	46	210	46.4
Above 960	500	54	300	49.5

NOTE:

- 1) Field Strength (dB $\mu\text{V/m}$ ) =  $20 \cdot \log [\text{Field Strength } (\mu\text{V/m})]$ .
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) The limits using ANSI C63.4.

##### 5.1.1.2 Test Setup

Refer to 4.5 section (test setups1 to test setups2) for radiated emission test, the photo of test setup please refer to ANNEX B.

##### 5.1.1.3 Test Procedure

The test employing the methods of measurement described in the publication referenced in Section 3(b) (ANSI C63.4);

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.



## 5.1.2 Conducted Emission

### 5.1.2.1 Test Limit

Frequency range (MHz)	Class A	
	Quasi-peak (dB $\mu$ V)	Average (dB $\mu$ V)
0.15 - 0.50	79	66
0.50 - 30	73	60

Frequency range (MHz)	Class B	
	Quasi-peak (dB $\mu$ V)	Average (dB $\mu$ V)
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

#### NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.
- 3) The limit using ANSI C63.4.

### 5.1.2.2 Test Setup

Refer to 4.5 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 test employing the methods of measurement described in the publication referenced in Section 3(b) (ANSI C63.4);

The EUT is connected to the power mains through a LISN which provides 50  $\Omega$ /50  $\mu$ H 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.

## ANNEX A TEST RESULTS

### A.1 Radiated Emission

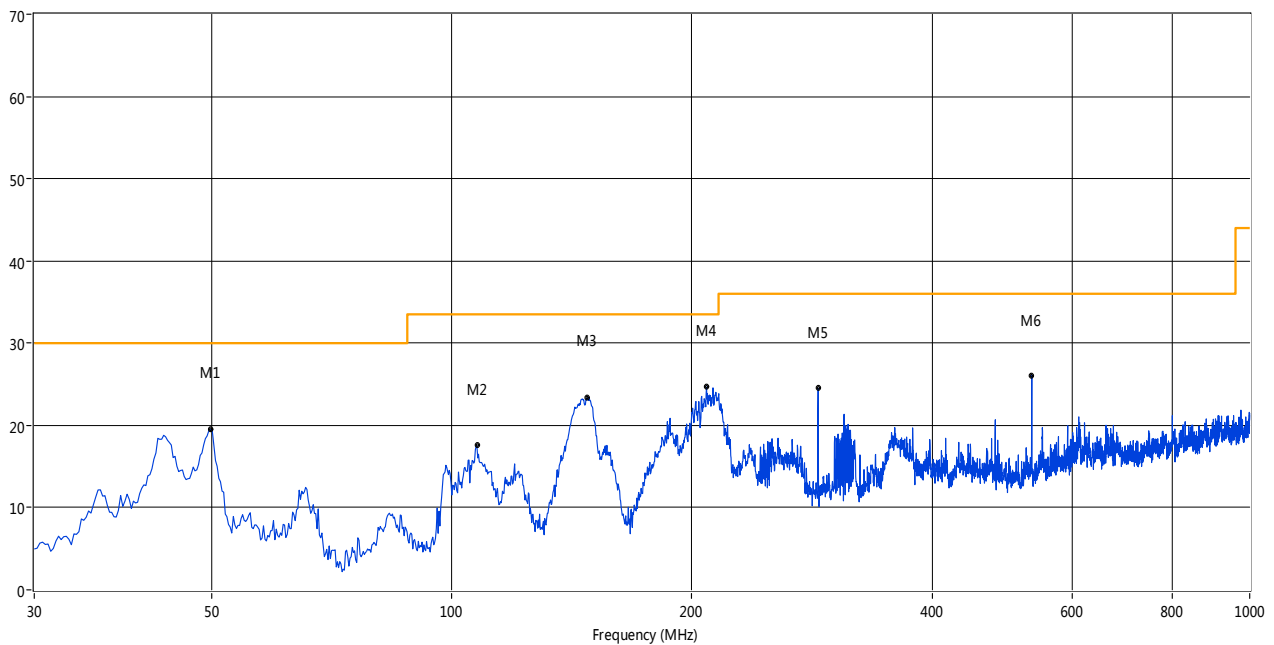
Note 1: The symbol of “--” in the table which means not application.

Note 2: 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.

#### Test Data and Plots

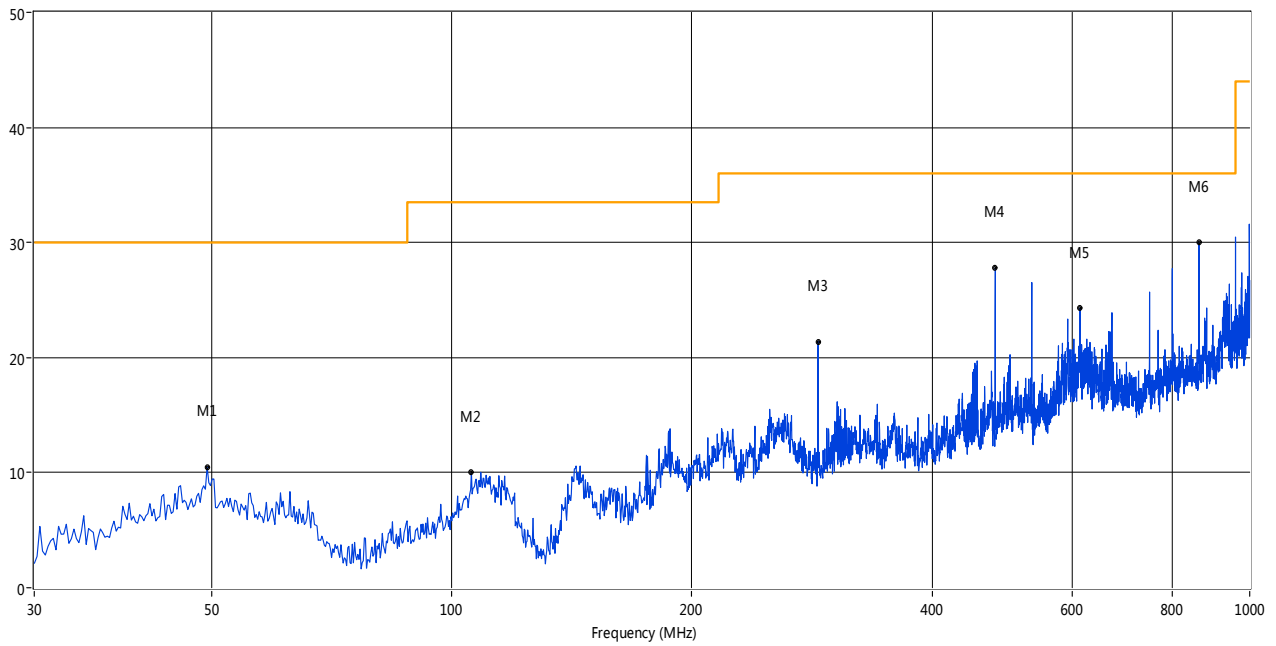
#### The Camera Test Mode

##### A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



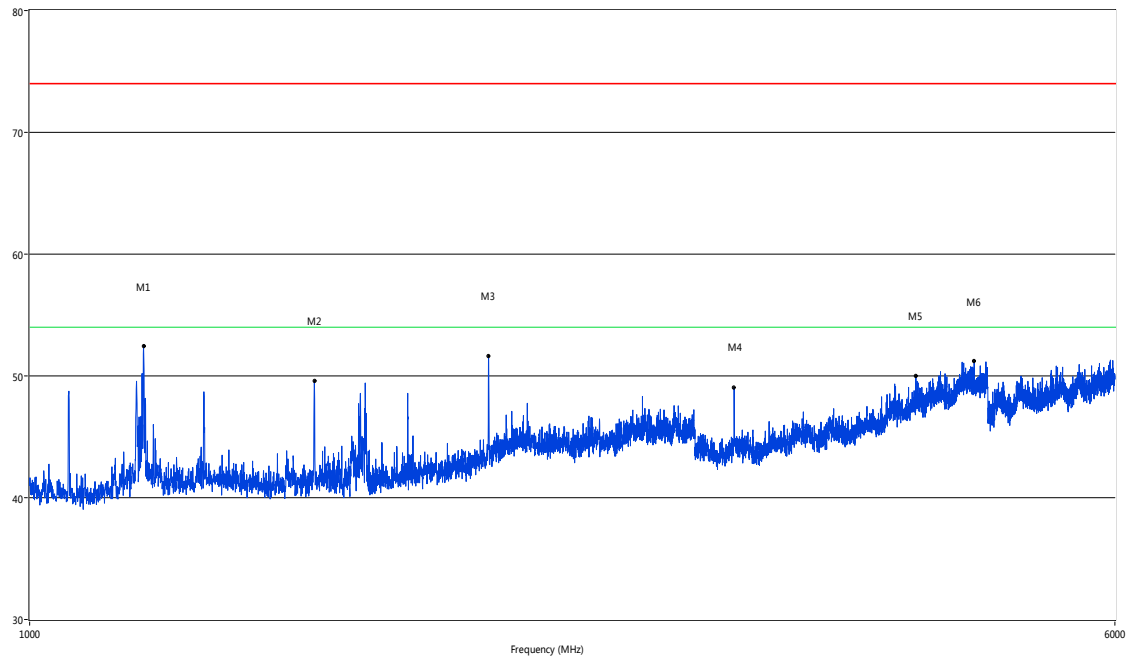
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	49.880	19.50	-13.98	30.0	10.50	Peak	154.00	100	Vertical	Pass
2	107.581	17.55	-16.03	33.5	15.95	Peak	154.00	100	Vertical	Pass
3	148.068	23.40	-19.57	33.5	10.10	Peak	0.00	100	Vertical	Pass
4	208.678	24.68	-16.07	33.5	8.82	Peak	355.00	100	Vertical	Pass
5	287.956	24.51	-13.72	36.0	11.49	Peak	335.00	100	Vertical	Pass
6	533.304	26.08	-8.25	36.0	9.92	Peak	360.00	100	Vertical	Pass

## A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



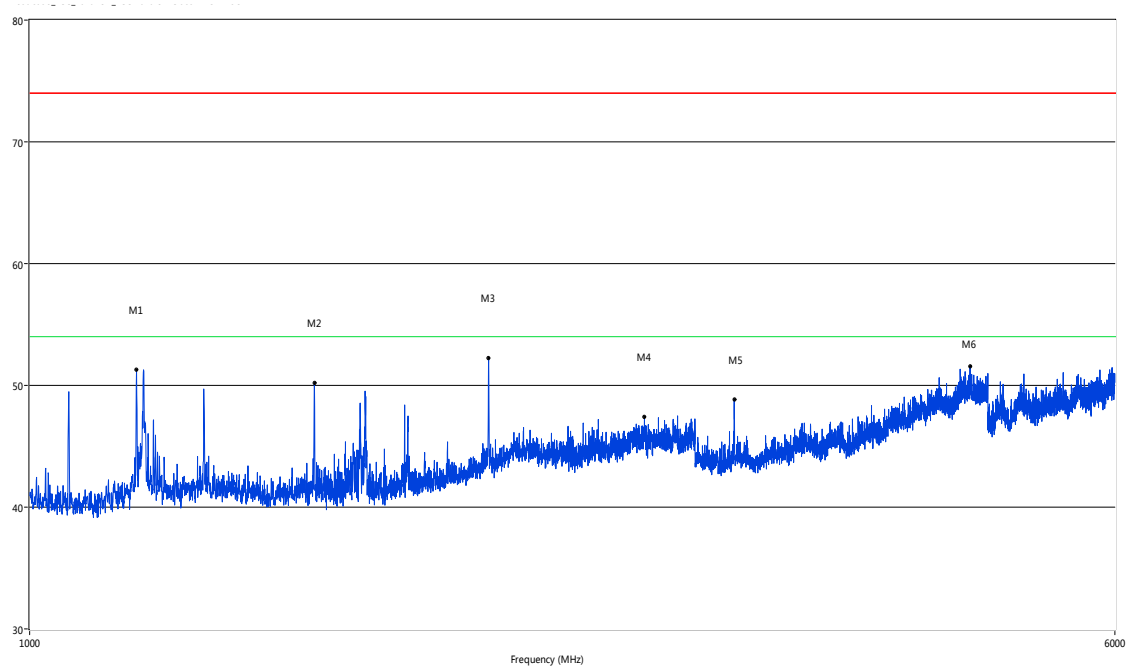
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	49.395	10.50	-13.92	30.0	19.50	Peak	66.00	100	Horizontal	Pass
2	105.884	10.09	-15.69	33.5	23.41	Peak	73.00	100	Horizontal	Pass
3	287.956	21.40	-13.72	36.0	14.60	Peak	319.00	100	Horizontal	Pass
4	479.968	27.83	-9.69	36.0	8.17	Peak	0.00	100	Horizontal	Pass
5	612.824	24.30	-6.87	36.0	11.70	Peak	206.00	100	Horizontal	Pass
6	863.992	29.98	-3.29	36.0	6.02	Peak	223.00	100	Horizontal	Pass

### A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1206.95	52.45	-5.17	74.0	21.55	Peak	298.80	100	Vertical	Pass
2	1599.85	49.60	-4.33	74.0	24.40	Peak	18.60	100	Vertical	Pass
3	2133.22	51.65	-1.07	74.0	22.35	Peak	294.60	100	Vertical	Pass
4	3199.45	49.05	9.22	74.0	24.95	Peak	0.80	100	Vertical	Pass
5	4319.67	49.99	12.10	74.0	24.01	Peak	187.00	100	Vertical	Pass
6	4756.06	51.19	13.58	74.0	22.81	Peak	221.70	100	Vertical	Pass

#### A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



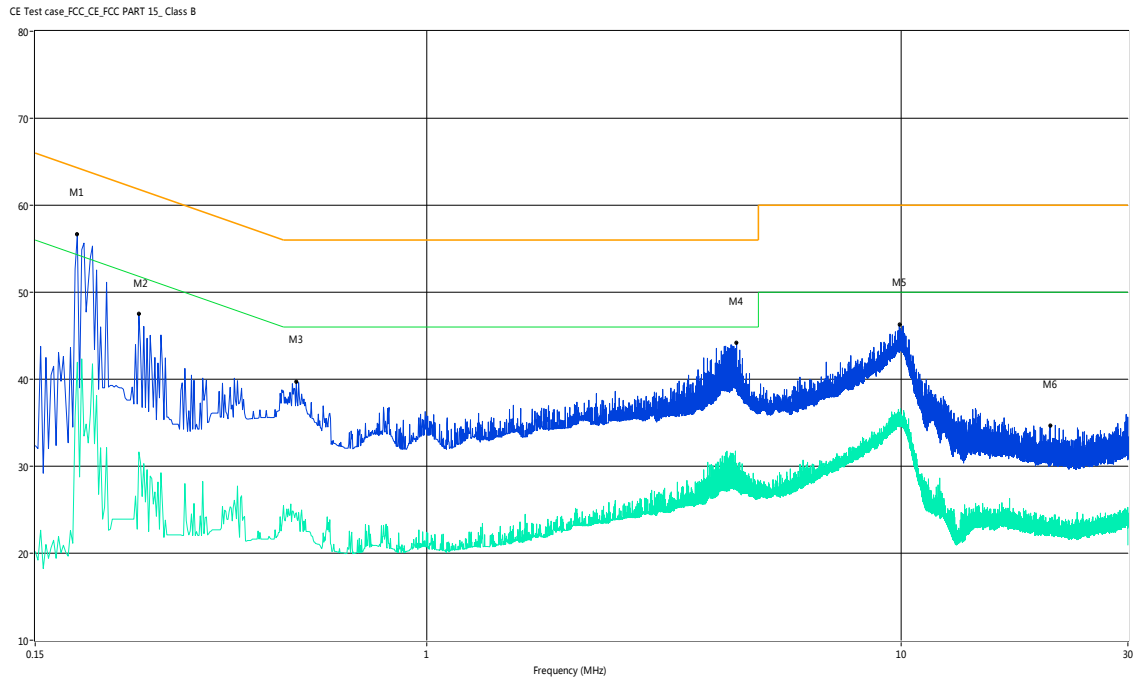
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1192.95	51.28	-5.39	74.0	22.72	Peak	303.50	100	Horizontal	Pass
2	1599.85	50.21	-4.33	74.0	23.79	Peak	328.60	100	Horizontal	Pass
3	2133.72	52.26	-1.04	74.0	21.74	Peak	282.50	100	Horizontal	Pass
4	2759.56	47.45	1.90	74.0	26.55	Peak	-0.00	100	Horizontal	Pass
5	3200.20	48.88	9.22	74.0	25.12	Peak	359.40	100	Horizontal	Pass
6	4723.82	51.54	13.63	74.0	22.46	Peak	271.40	100	Horizontal	Pass

## A.2 Conducted Emission

### Test Data and Plots

#### The Camera Test Mode

##### A.2.1 L Phase

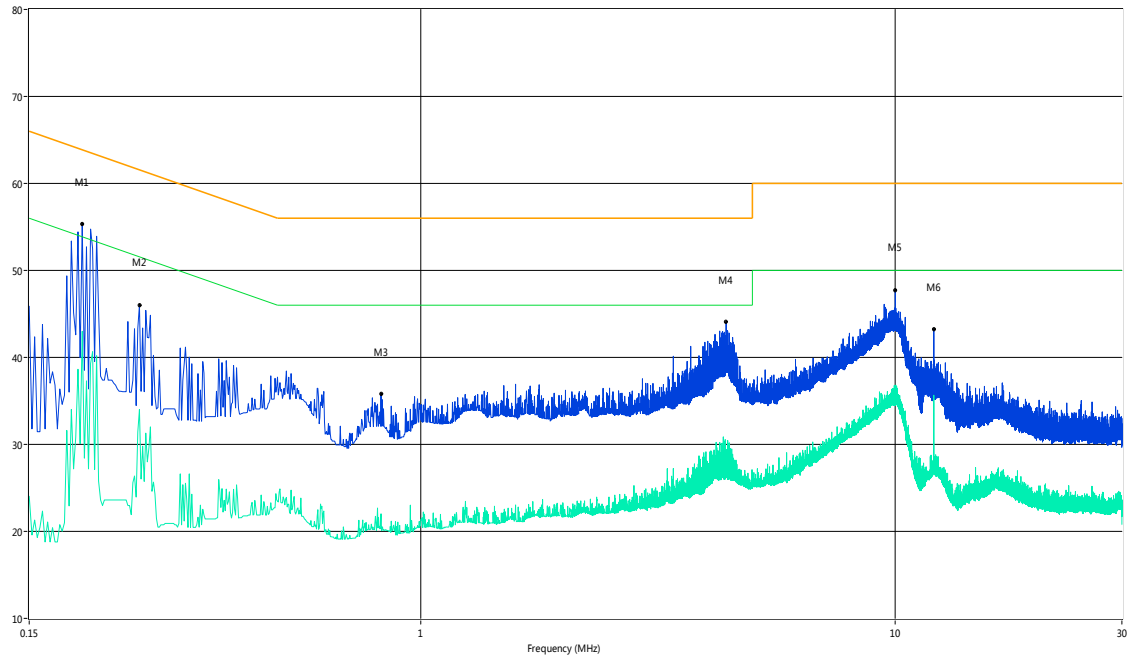


No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.18	56.6	11.00	65.0	8.40	Peak	L Line	Pass
1**	0.18	42.0	11.00	55.0	13.00	AV	L Line	Pass
2	0.25	47.5	11.00	63.2	15.70	Peak	L Line	Pass
2**	0.25	31.6	11.00	53.2	21.60	AV	L Line	Pass
3	0.53	39.7	11.00	56.0	16.30	Peak	L Line	Pass
3**	0.53	24.6	11.00	46.0	21.40	AV	L Line	Pass
4	4.50	44.2	11.00	56.0	11.80	Peak	L Line	Pass
4**	4.50	30.3	11.00	46.0	15.70	AV	L Line	Pass
5	9.90	46.3	11.00	60.0	13.70	Peak	L Line	Pass
5**	9.90	34.9	11.00	50.0	15.10	AV	L Line	Pass
6	20.56	34.7	11.00	60.0	25.30	Peak	L Line	Pass
6**	20.56	23.4	11.00	50.0	26.60	AV	L Line	Pass



## A.2.2 N Phase

CE Test case\_FCC\_CE\_FCC PART 15, Class B



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.19	55.3	11.00	64.7	9.40	Peak	N Line	Pass
1**	0.19	43.0	11.00	54.7	11.70	AV	N Line	Pass
2	0.26	46.0	11.00	63.0	17.00	Peak	N Line	Pass
2**	0.26	34.0	11.00	53.0	19.00	AV	N Line	Pass
3	0.83	35.8	11.00	56.0	20.20	Peak	N Line	Pass
3**	0.83	22.0	11.00	46.0	24.00	AV	N Line	Pass
4	4.40	44.1	11.00	56.0	11.90	Peak	N Line	Pass
4**	4.40	29.4	11.00	46.0	16.60	AV	N Line	Pass
5	10.00	47.7	11.00	60.0	12.30	Peak	N Line	Pass
5**	10.00	35.9	11.00	50.0	14.10	AV	N Line	Pass
6	12.05	43.2	11.00	60.0	16.80	Peak	N Line	Pass
6**	12.05	35.7	11.00	50.0	14.30	AV	N Line	Pass

## **ANNEX B TEST SETUP PHOTOS**

Please refer the document “BL-SZ1670309-AE.PDF”.

## **ANNEX C EUT EXTERNAL PHOTOS**

Please refer the document “BL-SZ1670309-AW.PDF”.

## **ANNEX D EUT INTERNAL PHOTOS**

Please refer the document “BL-SZ1670309-AI.PDF”.

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