

FCC/ISED

EMC

TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

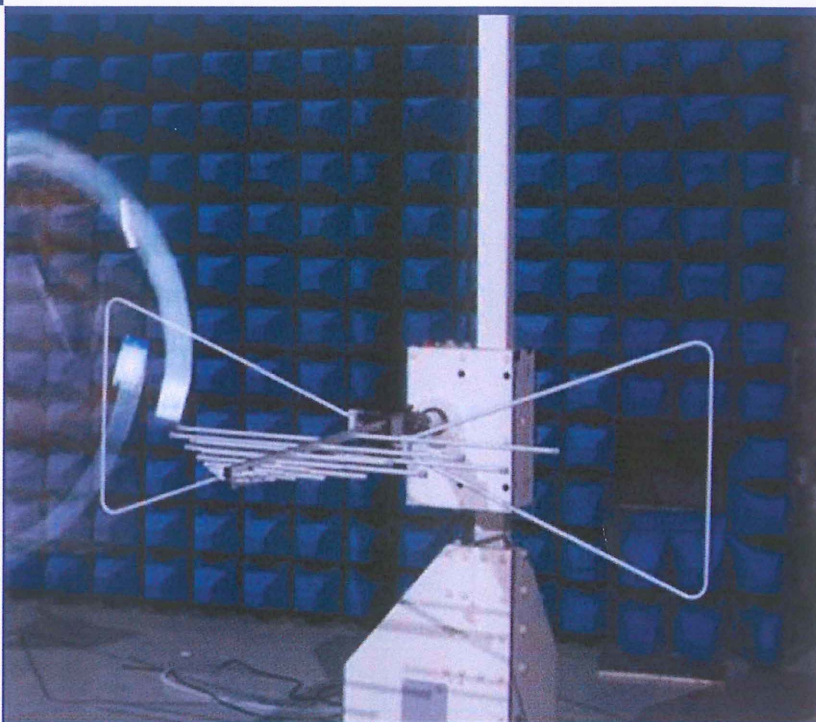


FOR

3-Axis Gimbal Camera

Yuneec Technology Co., Limited

Unit 2301, 23/F, 9 Chong Yip Street, Kwun Tong, Kowloon,
Hong Kong.



Tested by:

Xia Long

(Engineer)

Date:

Jan. 02, 2020

Approved by:

Wei Yanguan

(Chief Engineer)

Date:

Jan. 02, 2020

Report No.: BL-EC19C0036-401

EUT Name: 3-Axis Gimbal Camera

Model Name: E30Z

Brand Name: YUNEEC

Test Standard: 47 CFR Part 15 Subpart B
ICES-003 (Issue 6, January 2016)

FCC ID: 2ACS5-E30Z

Test Conclusion: Pass

Test Date: Nov. 25, 2019 ~ Dec. 16, 2019

Date of Issue: Jan. 02, 2020

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jan. 02, 2020</u>	<u>Initial Issue</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	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 refer to the BALUN report mode v2.2.
- (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	Yunee Technology Co., Limited
Address	Unit 2301, 23/F, 9 Chong Yip Street, Kwun Tong, Kowloon, Hong Kong.

2.2 Manufacturer Information

Manufacturer	Yunee International (China) Co., Ltd.
Address	No.388 East Zhengwei Road, Jinxi Town, Kunshan, Jiangsu 215324, China

2.3 Factory Information

Factory	Yunee International (China) Co., Ltd.
Address	No.388 East Zhengwei Road, Jinxi Town, Kunshan, Jiangsu 215324, China

2.4 General Description for Equipment under Test (EUT)

EUT Name	3-Axis Gimbal Camera
Model Name Under Test	E30Z
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

Not Applicable

2.6 Technical Information

The Highest Speed of Processor	N/A
Network and Wireless connectivity	WIFI

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 15 Subpart B (10-1-18 Edition)	Unintentional Radiators
2	ICES-003 (Issue 6, January 2016)	Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement
3	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	ICES-003 6.1	Pass	Annex A .1
2	Conducted Emission, AC Ports	15.107	ICES-003 6.2	N/A ^{Note1}	Annex A .2
Note ¹ : The EUT was powered by battery for normally use.					

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)	2.96 dB
Radiated emissions (30 MHz-1 GHz)	3.66 dB
Radiated emissions (1 GHz-18 GHz)	5.57 dB
Radiated emissions (18 GHz-40 GHz)	6.12 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)	22°C to 25°C	DC 12 V Form Battery	45% to 55%	100 kPa to 102 kPa

4.2 Test Equipment List

Radiated Emission Test F						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2019.10.29	2020.10.28	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2018.08.22	2020.08.21	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2018.07.11	2020.07.10	☒
Test Antenna-Horn	A-INFO	LB-180400KF	J211060273	2019.01.05	2021.01.04	☒
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2020.02.20	☒

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2019.06.13	2020.06.12	☐
LISN	SCHWARZBECK	NSLK 8127	8127-687	2019.07.04	2020.07.03	☐
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.4m*3.1m*2.8m	N/A	2018.08.16	2021.08.15	☐

4.3 Test Enclosure list

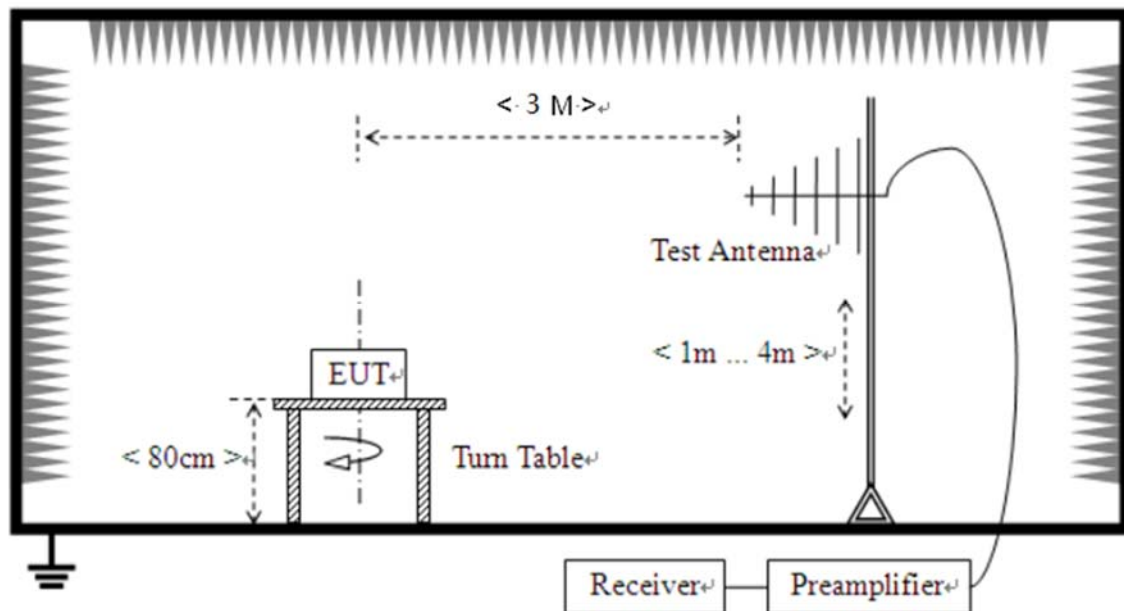
Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	N/A	N/A	N/A	N/A	Special Handled	☐
Laptop	Apple	A1465	N/A	N/A	N/A	☐
Printer	HP	DESKJET 1000	N/A	N/A	N/A	☐
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	☐
Mouse	Logitech	M100	N/A	N/A	N/A	☐
USB disk	Kingston	N/A	N/A	N/A	N/A	☐
TF Card	Kingston	N/A	N/A	N/A	N/A	☒
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	☐
Audio Cable	N/A	N/A	N/A	0.5 m	Shielded with core	☐
iPhone	Apple	A1586	N/A	N/A	N/A	☐
Bluetooth Earphone	SAMSUNG	Gear Circle	N/A	N/A	N/A	☐
Wireless Communications Test Set	R&S	CMW500	142028	N/A	Cal. Due 2019.06.14	☐
WIFI Router	TP-LINK	TL-WDR7500	N/A	N/A	N/A	☐
Earphone	N/A	OPPO	N/A	1.1 m	N/A	☐
Car Battery	Camel	55530	N/A	N/A	12 V/55 Ah	☐
Artificial load	N/A	N/A	N/A	N/A	2.5 Ω /100 W	☐
Artificial load	N/A	N/A	N/A	N/A	5 Ω /100 W	☐
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	☐
USB Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DC Power Supply	ITECH	IT6863A	60001401068 7210006	N/A	N/A	☐
LCD Monitor	SAMSUNG	UA32C4000P	N/A	N/A	N/A	☐
RJ45 Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
Drone	N/A	N/A	N/A	N/A	N/A	☒
Note 1: The Drone provided by the manufacturer.						

4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The Video Record Test Mode</u> EUT + TF Card + WIFI Link + Drone + Battery

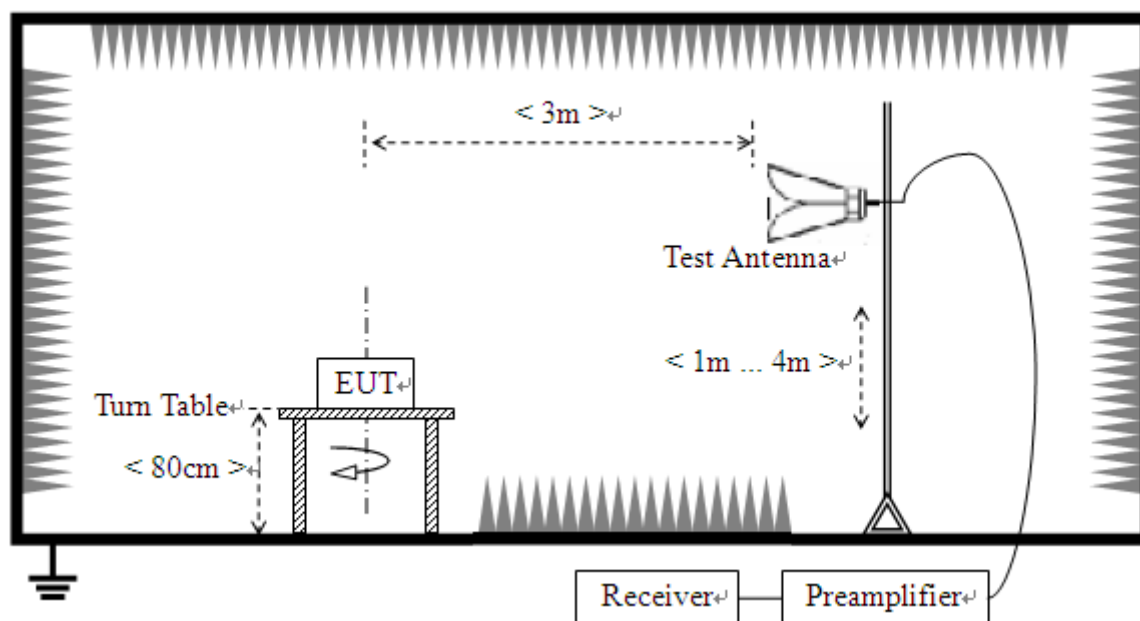
4.5 Test Setups

Test Setup 1



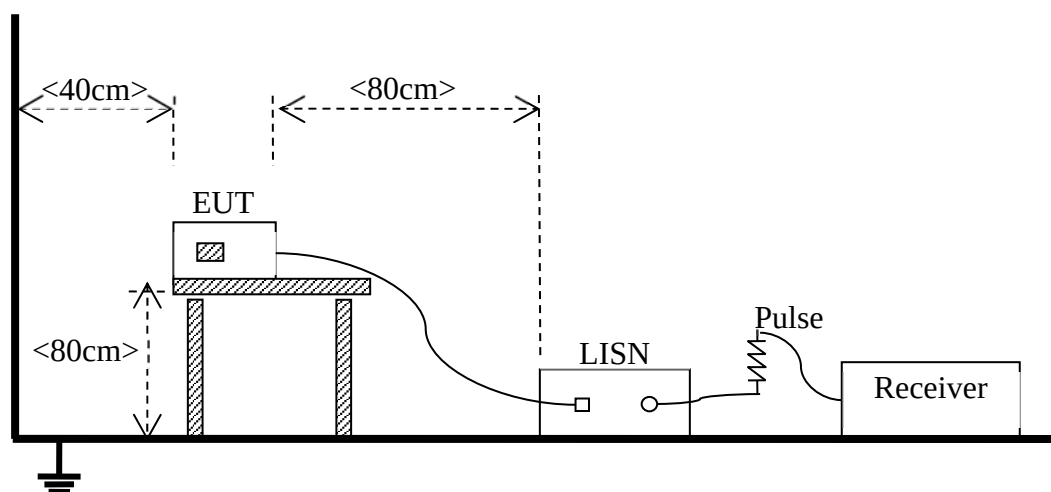
(For Radiated Emission Test (30 MHz-1 GHz))

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

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 B (at 10 m)	Class A (at 10 m)	
	Field Strength (μV/m)	Field Strength (dBμV/m)	Field Strength (dBμV/m)	Field Strength (μV/m)	Field Strength (dBμV/m)
30 - 88	100	40	30	90	39
88 - 216	150	43.5	33.5	150	43.5
216 - 960	200	46	36	210	46.4
Above 960	500	54	44	300	49.5

NOTE:

- 1) Field Strength (dBμV/m) = 20*log [Field Strength (μV/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 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

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.

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.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

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

Frequency range (MHz)	Class B	
	Quasi-peak (dB μ V)	Average (dB μ 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 Ω /50 μ 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.

NOTE:

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

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.

ANNEX A TEST RESULTS

A.1 Radiated Emission

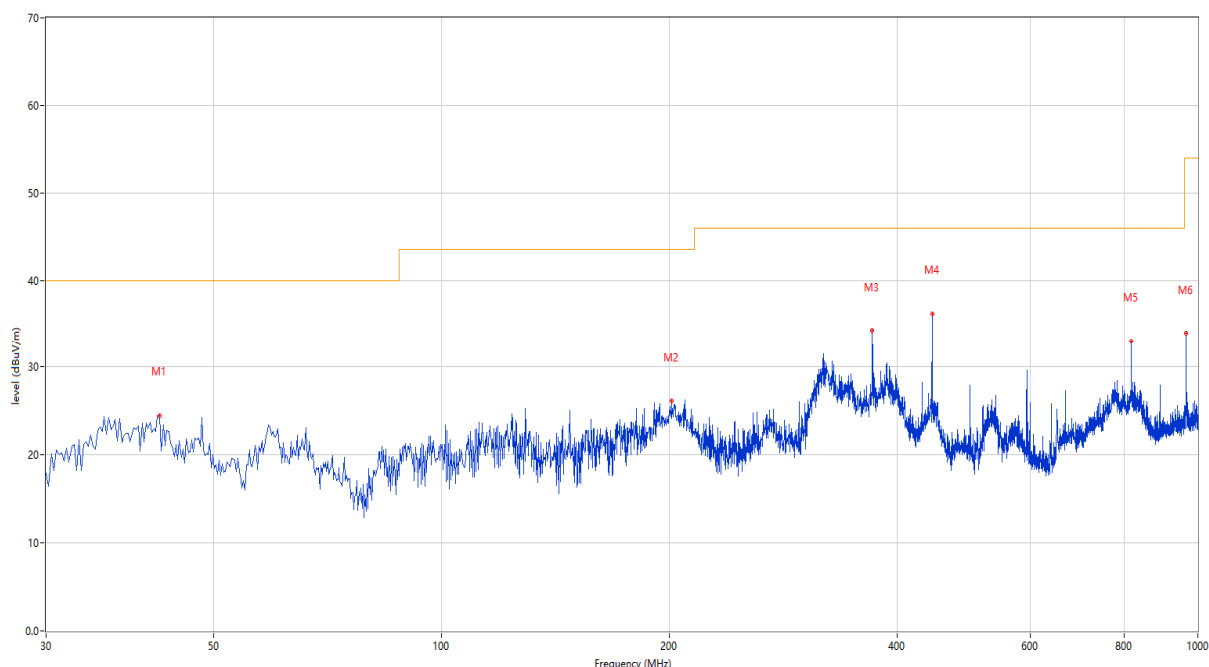
Note 1: The symbol of “--” in the table which means not application.

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.

Note 3: This frequency which near 5.2 GHz with circle should be ignored because they are WIFI carrier frequency

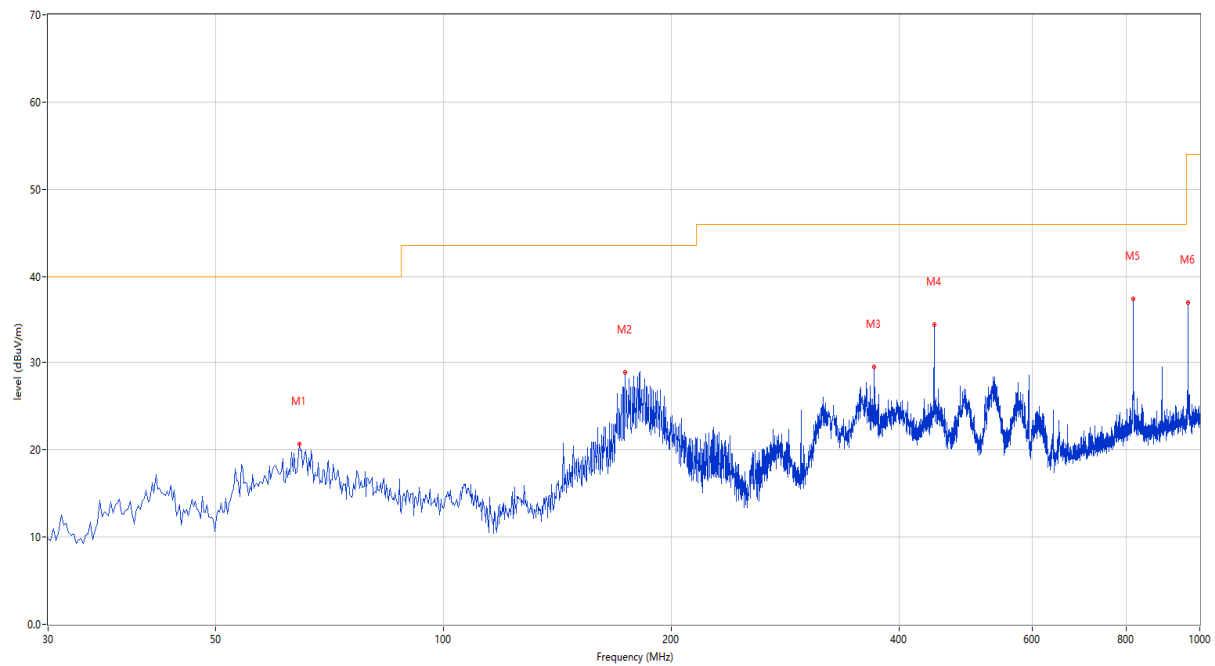
Test Data and Plots

A.1.1 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	42.367	24.50	-24.53	40.0	-15.50	Peak	261.00	100	Vertical	Pass
2	201.690	26.14	-25.91	43.5	-17.36	Peak	128.00	200	Vertical	Pass
3	371.198	34.25	-21.93	46.0	-11.75	Peak	255.00	100	Vertical	Pass
4	445.402	36.17	-20.46	46.0	-9.83	Peak	6.00	100	Vertical	Pass
5	816.670	33.04	-12.89	46.0	-12.96	Peak	99.00	100	Vertical	Pass
6	965.322	33.90	-10.37	54.0	-20.10	Peak	35.00	100	Vertical	Pass

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

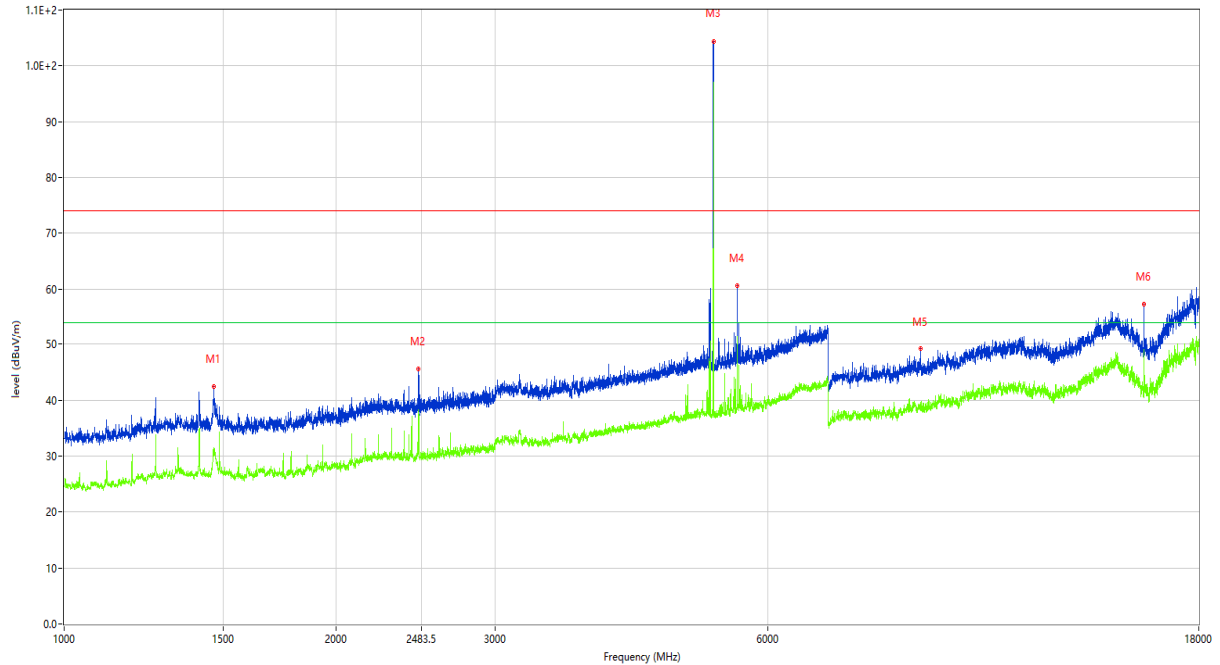


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	64.435	20.63	-26.22	40.0	-19.37	Peak	147.00	300	Horizontal	Pass
2	173.803	28.93	-27.83	43.5	-14.57	Peak	347.00	100	Horizontal	Pass
3	371.198	29.56	-21.93	46.0	-16.44	Peak	350.00	100	Horizontal	Pass
4	445.402	34.42	-20.46	46.0	-11.58	Peak	99.00	200	Horizontal	Pass
5	816.670	37.41	-12.89	46.0	-8.59	Peak	343.00	100	Horizontal	Pass
6	965.322	36.96	-10.37	54.0	-17.04	Peak	76.00	200	Horizontal	Pass

Test Data and Plots (Above 1 GHz)

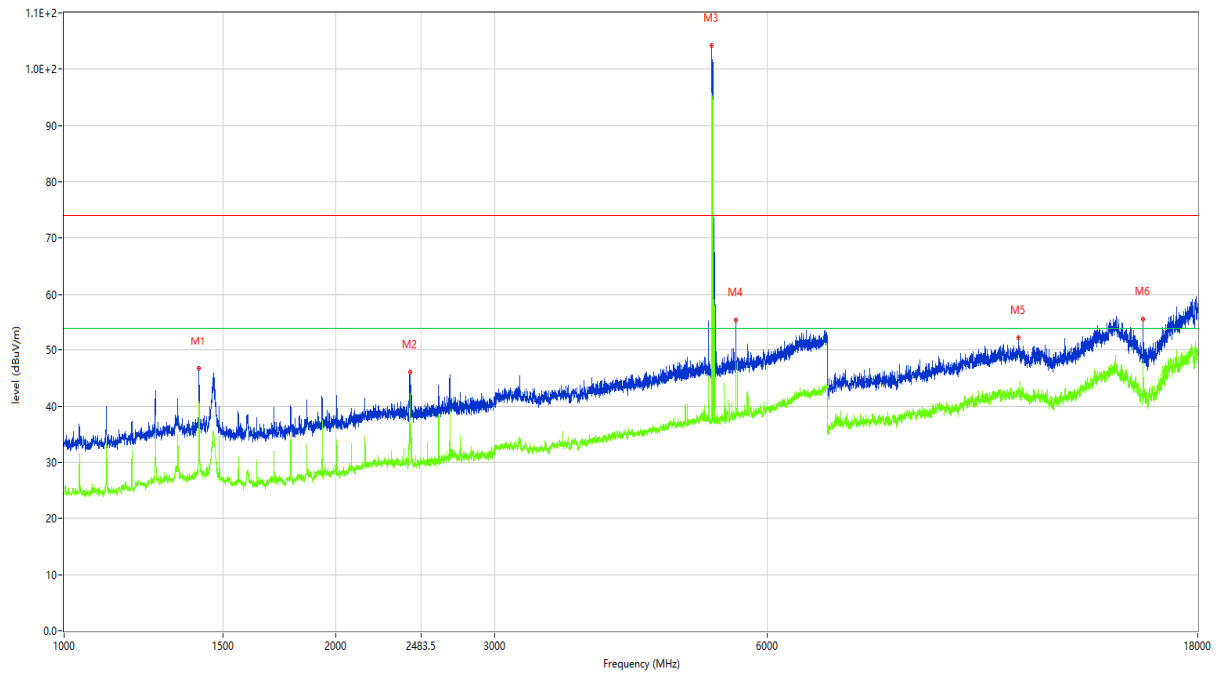
Note: The Radiated Emission from 18G-40G is noise only, do not show on the report

A.1.3 Test Antenna Vertical, 1 GHz – 18 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1465.500	42.35	-16.06	74.0	-31.65	Peak	171.00	100	Vertical	Pass
1**	1465.500	31.39	-16.06	54.0	-22.61	AV	171.00	100	Vertical	Pass
2	2467.000	45.55	-11.62	74.0	-28.45	Peak	198.00	100	Vertical	Pass
2**	2467.000	34.46	-11.62	54.0	-19.54	AV	198.00	100	Vertical	Pass
3	5227.000	104.43	-1.94	74.0	30.43	Peak	21.00	100	Vertical	N/A
3**	5227.000	96.69	-1.94	54.0	42.69	AV	21.00	100	Vertical	N/A
4	5556.000	60.57	-1.25	74.0	-13.43	Peak	82.00	100	Vertical	Pass
4**	5556.000	51.27	-1.25	54.0	-2.73	AV	82.00	100	Vertical	Pass
5	8864.500	49.24	3.15	74.0	-24.76	Peak	25.00	100	Vertical	Pass
5**	8864.500	38.90	3.15	54.0	-15.10	AV	25.00	100	Vertical	Pass
6	15657.000	57.32	6.56	74.0	-16.68	Peak	157.00	100	Vertical	Pass
6**	15657.000	47.44	6.56	54.0	-6.56	AV	157.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 18 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1410.500	46.64	-16.08	74.0	-27.36	Peak	126.00	100	Horizontal	Pass
1**	1410.500	36.15	-16.08	54.0	-17.85	AV	126.00	100	Horizontal	Pass
2	2414.000	46.06	-11.53	74.0	-27.94	Peak	166.00	100	Horizontal	Pass
2**	2414.000	38.82	-11.53	54.0	-15.18	AV	166.00	100	Horizontal	Pass
3	5212.000	104.14	-1.86	74.0	30.14	Peak	30.00	100	Horizontal	N/A
3**	5212.000	85.43	-1.86	54.0	31.43	AV	30.00	100	Horizontal	N/A
4	5541.000	55.51	-1.76	74.0	-18.49	Peak	281.00	100	Horizontal	Pass
4**	5541.000	47.69	-1.76	54.0	-6.31	AV	281.00	100	Horizontal	Pass
5	11389.000	52.31	6.74	74.0	-21.69	Peak	197.00	100	Horizontal	Pass
5**	11389.000	42.25	6.74	54.0	-11.75	AV	197.00	100	Horizontal	Pass
6	15665.250	55.67	6.79	74.0	-18.33	Peak	311.00	100	Horizontal	Pass
6**	15665.250	47.53	6.79	54.0	-6.47	AV	311.00	100	Horizontal	Pass

A.2 Conducted Emission

Note: Not applicable

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-EC19C0036-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-EC19C0036-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-EC19C0036-AI.PDF”.

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