



BUREAU
VERITAS

Test Report No.: FS190822N030



Certificate # 2951.01

FCC TEST REPORT

Applicant	VITEC IMAGING SOLUTIONS SPA
Address	CASSOLA(VI) VIA VALSUGANA 100 CAP 36022

Manufacturer or Supplier	Golden Trees technology Co.,Ltd.
Address	NO.3 Nan Tong Blvd, Bao Long Industrial Area Long Gang District, Shenzhen, China
Product	Beamo LED Light
Brand Name	JOBY
Model	JB01579-BWW
Additional Model & Model Difference	JB01635-BWW; JB01578-BWW
Date of tests	Jul. 18, 2019 ~ Aug. 22, 2019

The submitted sample of the above equipment has been tested for according to the requirements of the following standards:

FCC Part 15, Subpart B, Class B

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Evans He Project Engineer / EMC Department	Approved by David Huang Supervisor / EMC Department

Date: Aug 22, 2019

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FS190822N030	Original release	Aug 22, 2019



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD			
Standard Section	Test Item	Result	Remark
FCC Part 15, Subpart B, Class B (sDoC)	Conducted test	PASS	Meets limits minimum passing margin is -16.39dB at 0.505MHz
	Radiated Emission Test (30MHz ~ 1GHz)	PASS	Meets limits minimum passing margin is -14.06dB at 339.43MHz
	Radiated Emission Test (Above 1GHz)	PASS	Meets limits minimum passing margin is -26.53dB at 724.5 MHz

Remark: 1. Please refer to FCC part 2 2.1077 for sDoC compliance information requirement

2. Test Lab Information:

Lab: Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

Test Lab Address: Zone A, Floor 1, Building 2 Wan Ye Long Technology Park
South Side of Zhoushi Road, Bao'an District Shenzhen, Guangdong, 518108,
People's Republic of China

1.1 MEASUREMENT UNCERTAINTY

Where relevant, 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	Frequency	Uncertainty
Conducted emission	0.15MHz ~ 30MHz	+/- 2.70 dB
Radiated emissions	30MHz~1GHz	+/- 3.74 dB
	Above 1GHz	+/- 4.66 dB



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2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Beamo LED Light
MODEL NO.	JB01579-BWW
ADDITIONAL MODEL	JB01635-BWW; JB01578-BWW
POWER SUPPLY	DC 3.7V from Li-ion or DC 5V from USB
CABLE SUPPLIED	Type C Line:0.5m
THE HIGHEST OPERATING FREQUENCY	2480MHz

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 190822N030) for detailed product photo.
4. Additional models (see about table) are identical with the test model JB01635-BWW; JB01578-BWW except the color of the appearance and model name for trading purpose.



2.2 DESCRIPTION OF TEST MODES

The EUT were tested under the following modes, the final worst mode was marked in boldface and recorded in this report.

CONDUCTED EMISSION TEST:

Test Mode	Test Voltage
Charging+Normal Working	DC 5V from USB

RADIATED EMISSION TEST (BELOW 1GHZ):

Test Mode	Test Voltage
Battery+ Normal Working	DC 3.7V from Battery
Charging+ Normal Working	DC 5V from USB

RADIATED EMISSION TEST (ABOVE1GHZ):

Test Mode	Test Voltage
Battery+ Normal Working	DC 3.7V from Battery
Charging+ Normal Working	DC 5V from USB

2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit without any other necessary accessories or support units.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Adapter	TECNO	A8-501000	N/A	N/A
2	Phone	Apple	A1530	N/A	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	Type C Line :Unshielded, Detachable 0.5m;



3 EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD: FCC Part 15, Subpart B (Section: 15.107)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	8471241027	Jan. 04,19	Jan. 03,20
Artificial Mains Network	SCHWARZBECK	8127	8127713	Jan. 04,19	Jan. 03,20
ISN	Com-Power	ISN T800	34373	Jan. 04,19	Jan. 03,20
Test software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

NOTE: 1. The test was performed at Shielded Room 843.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRRG/CHINA and NIM/CHINA.



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3.1.3 TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2014 (section 7).

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

NOTE:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

3.1.4 DEVIATION FROM TEST STANDARD

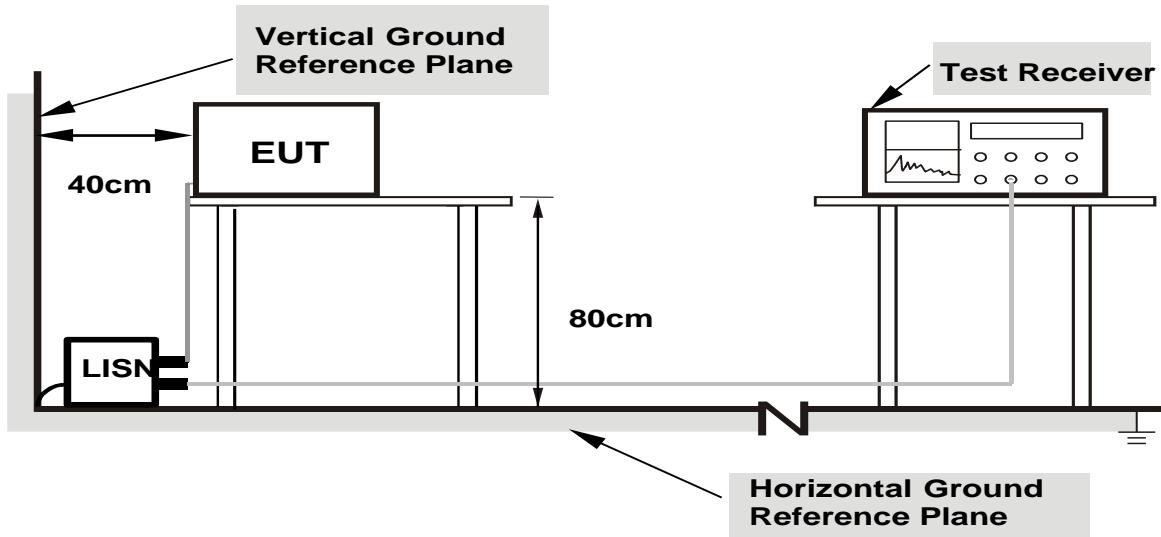
No deviation.



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3.1.5 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

3.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. EUT was operated according to the type description in manufacturer's specifications or the User's Manual.

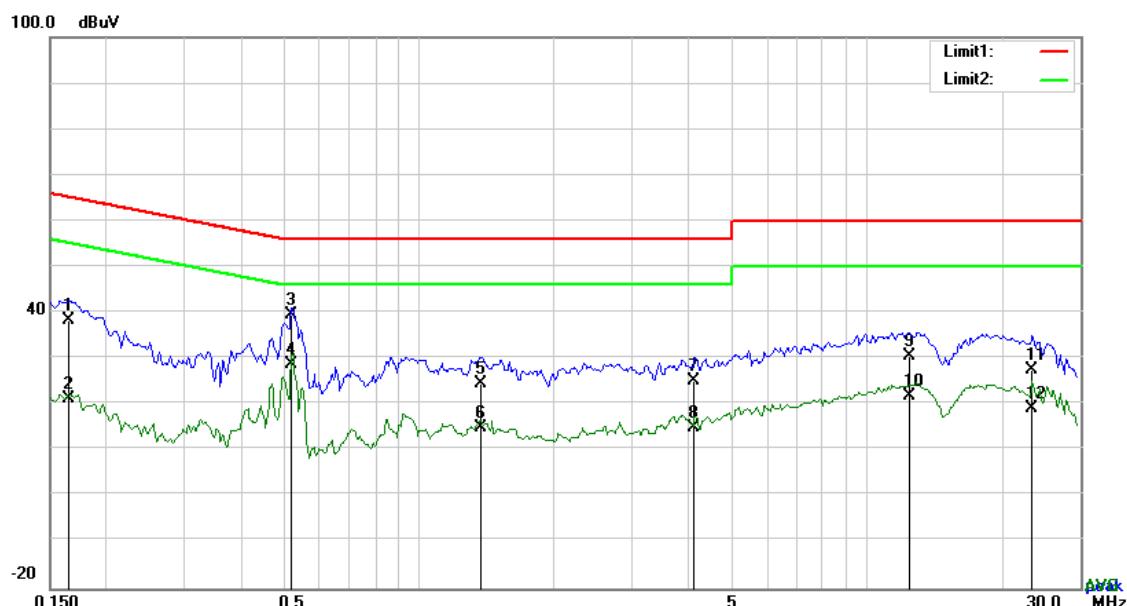


3.1.7 TEST RESULTS

TEST MODE	Charging+Normal Working	6DB BANDWIDTH	9 kHz
TEST VOLTAGE	DC 5V from USB	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24deg. C, 69% RH	TESTED BY	Caden

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	L1	0.1656	28.24	QP	10.12	38.36	65.18	-26.82
2	L1	0.1656	11.26	AVG	10.12	21.38	55.18	-33.80
3	L1	0.5205	29.51	QP	10.10	39.61	56.00	-16.39
4	L1	0.5205	18.69	AVG	10.10	28.79	46.00	-17.21
5	L1	1.3738	14.51	QP	10.14	24.65	56.00	-31.35
6	L1	1.3738	4.94	AVG	10.14	15.08	46.00	-30.92
7	L1	4.1271	14.84	QP	10.18	25.02	56.00	-30.98
8	L1	4.1271	4.66	AVG	10.18	14.84	46.00	-31.16
9	L1	12.4731	20.23	QP	10.29	30.52	60.00	-29.48
10	L1	12.4731	11.56	AVG	10.29	21.85	50.00	-28.15
11	L1	23.4438	16.93	QP	10.49	27.42	60.00	-32.58
12	L1	23.4438	8.67	AVG	10.49	19.16	50.00	-30.84

REMARKS: The emission levels of other frequencies were very low against the limit.





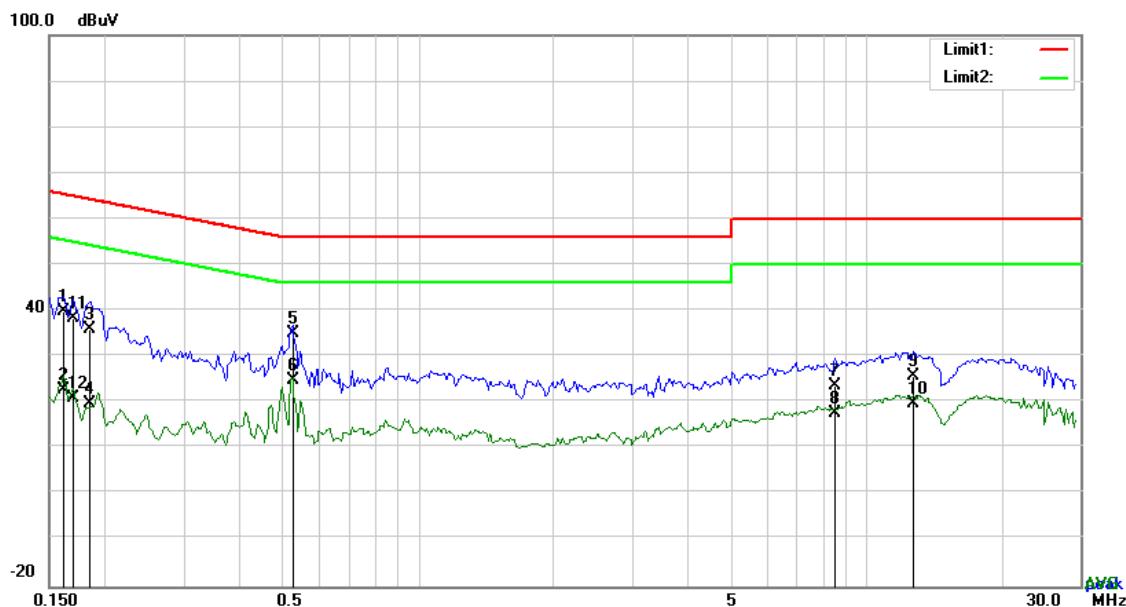
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TEST MODE	Charging+Normal Working	6DB BANDWIDTH	9 kHz
TEST VOLTAGE	DC 5V from USB	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24deg. C, 69% RH	TESTED BY	Caden

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	N	0.1617	29.62	QP	10.14	39.76	65.38	-25.62
2	N	0.1617	12.73	AVG	10.14	22.87	55.38	-32.51
3	N	0.1695	28.24	QP	10.14	38.38	64.98	-26.60
4	N	0.1695	10.89	AVG	10.14	21.03	54.98	-33.95
5	N	0.1851	25.91	QP	10.14	36.05	64.25	-28.20
6	N	0.1851	9.49	AVG	10.14	19.63	54.25	-34.62
7	N	0.5244	25.02	QP	10.12	35.14	56.00	-20.86
8	N	0.5244	14.87	AVG	10.12	24.99	46.00	-21.01
9	N	8.5029	13.27	QP	10.25	23.52	60.00	-36.48
10	N	8.5029	7.32	AVG	10.25	17.57	50.00	-32.43
11	N	12.7578	15.52	QP	10.29	25.81	60.00	-34.19
12	N	12.7578	9.48	AVG	10.29	19.77	50.00	-30.23

REMARKS: The emission levels of other frequencies were very low against the limit.





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3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: FCC Part 15, Subpart B (Section: 15.109)

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B/ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5		
88-216	43.5	33.1	40	30
216-230				
230-960	46.4	35.6		
960-1000	49.5	43.5	47	37

Radiated Emissions Limits at 3 meters (dB μ V/m)		
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B
30-88	49.5	40
88-216	54	43.5
216-230		
230-960	56.9	46
960-1000	60	54
1000-3000	Avg: 60	Avg: 54
Above 3000	Peak: 80	Peak: 74



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FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Note: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dB_{UV}/m) = 20 log Emission level (uV/m).

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



3.2.2 TEST INSTRUMENTS

FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06-100262-eQ	Jan. 04, 19	Jan. 03, 20
Bilog Antenna	Sunol Sciences	JB6	A110712	Feb. 07, 19	Feb. 06, 20
Active Antenna	CMO-POWER	AL-130	121031	Feb. 07, 19	Feb. 06, 20
Signal Amplifier	HP	8447E	443008	Jan. 24,19	Jan. 23,20
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 18,18	Oct. 17,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

NOTE: 1. The test was performed in 966 Chamber (a 3m Semi-anechoic chamber).

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRRG/CHINA and NIM/CHINA(except 3m Semi-anechoic Chamber).

3. The FCC Site Registration No. is 749762.

FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06-100262-eQ	Jan. 04, 19	Jan. 03, 20
MXA signal analyzer	Agilent	N9020A	MY49100060	Jan. 04, 19	Jan. 03, 20
Horn Antenna	COM-POWER	HAH-118	71259	Jan. 25,19	Jan. 24,20
Horn Antenna	COM-POWER	HAH-118	71283	Feb. 01, 19	Jan 31, 20
AMPLIFIER	EM Electronic Corporation	EM01G26G	60613	Jan. 24,19	Jan. 23,20
AMPLIFIER	Emc Instruments Corporation	Emc012645	980077	Jan. 04, 19	Jan. 03,20
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 18,18	Oct. 17,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

NOTE: 1. The test was performed in 966 Chamber (a 3m Semi-anechoic chamber).

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRRG/CHINA and NIM/CHINA(except 3m Semi-anechoic Chamber).

3. The FCC Site Registration No. is 749762.



3.2.3 TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2014 (section 12).

<Frequency Range below 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

NOTE:

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Result level (dBuV/m) = Reading level(dBuV/m) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier)
5. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
6. Margin value = Result level – Limit value



<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Result level (dB_{UV}/m) = Reading level(dB_{UV}/m) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier)
5. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
6. Margin value = Result level – Limit value

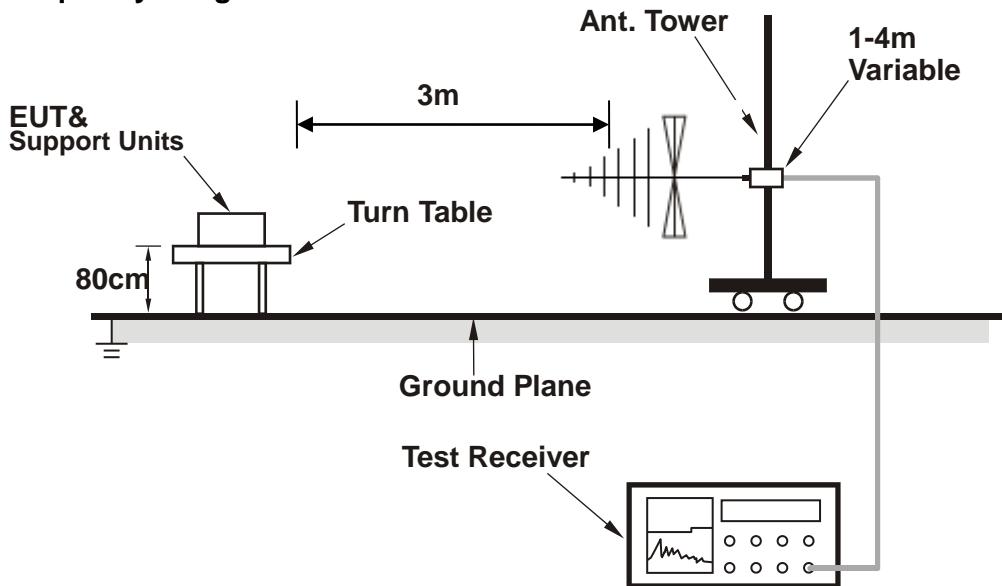
3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

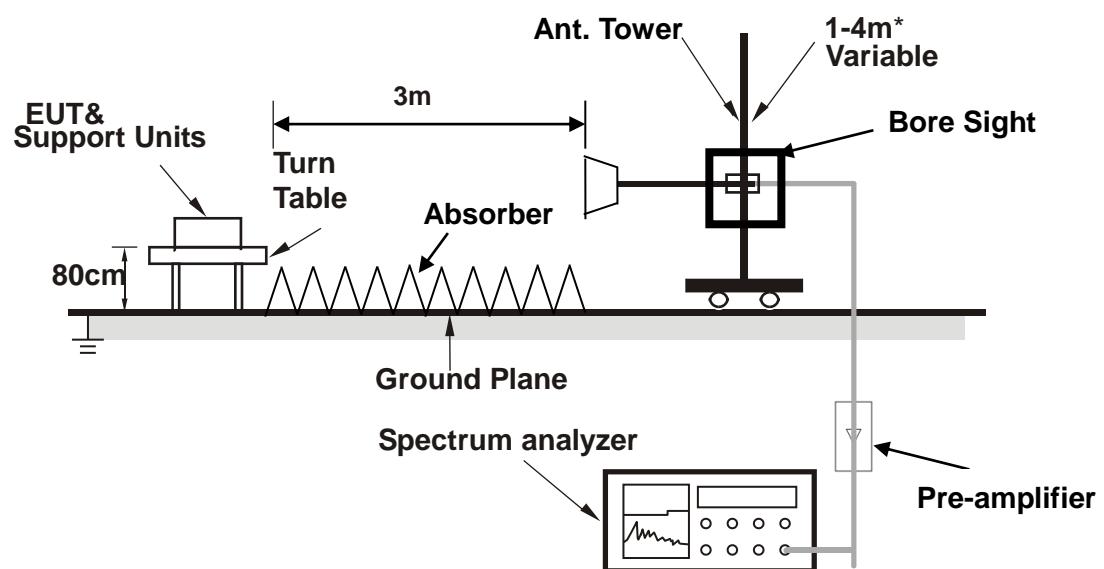


3.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

3.2.6 EUT OPERATING CONDITIONS

See items 3.1.6.

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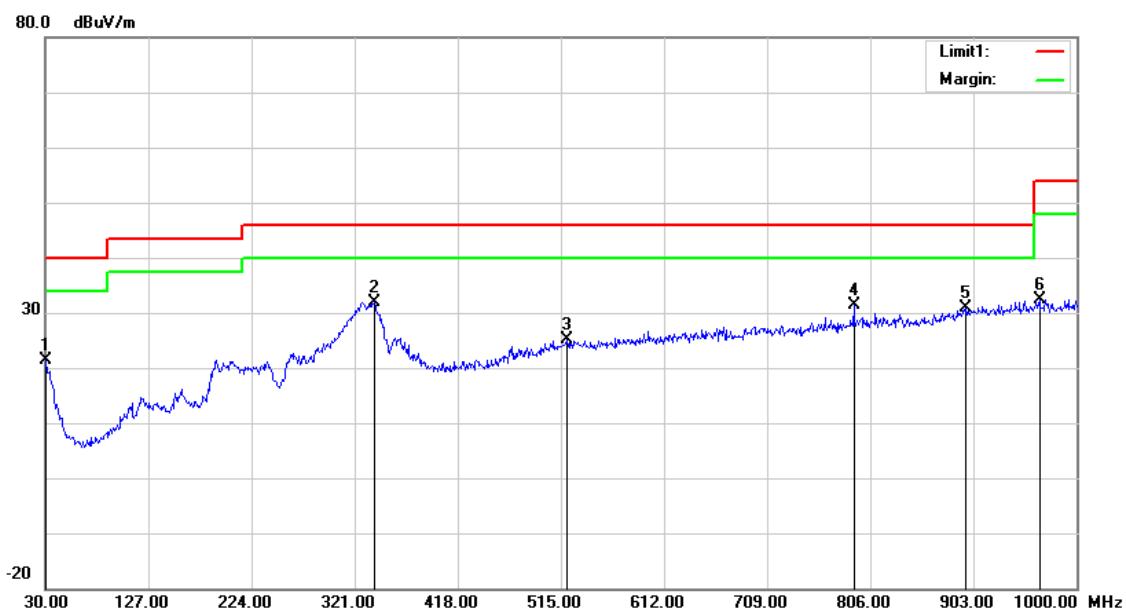
3.2.7 TEST RESULTS (BELOW 1GHz)

TEST MODE	Charging+Normal Working	FREQUENCY RANGE	30-1000 MHz
TEST VOLTAGE	DC 5V from USB	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 65% RH	TESTED BY: Caden	

ANTENNA POLARITY & test distance: HORIZONTAL at 3m										
No.	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	30.9700	24.00	19.48	22.27	0.13	21.34	40.00	-18.66	100	308
2	339.4300	37.81	14.49	22.18	1.82	31.94	46.00	-14.06	100	198
3	520.8200	25.67	19.12	21.76	2.19	25.22	46.00	-20.78	100	179
4	790.4800	27.81	22.11	21.17	2.54	31.29	46.00	-14.71	100	129
5	896.2100	25.28	23.73	20.89	2.65	30.77	46.00	-15.23	100	252
6	965.0800	26.73	23.70	20.76	2.72	32.39	54.00	-21.61	100	216

REMARKS:

1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.





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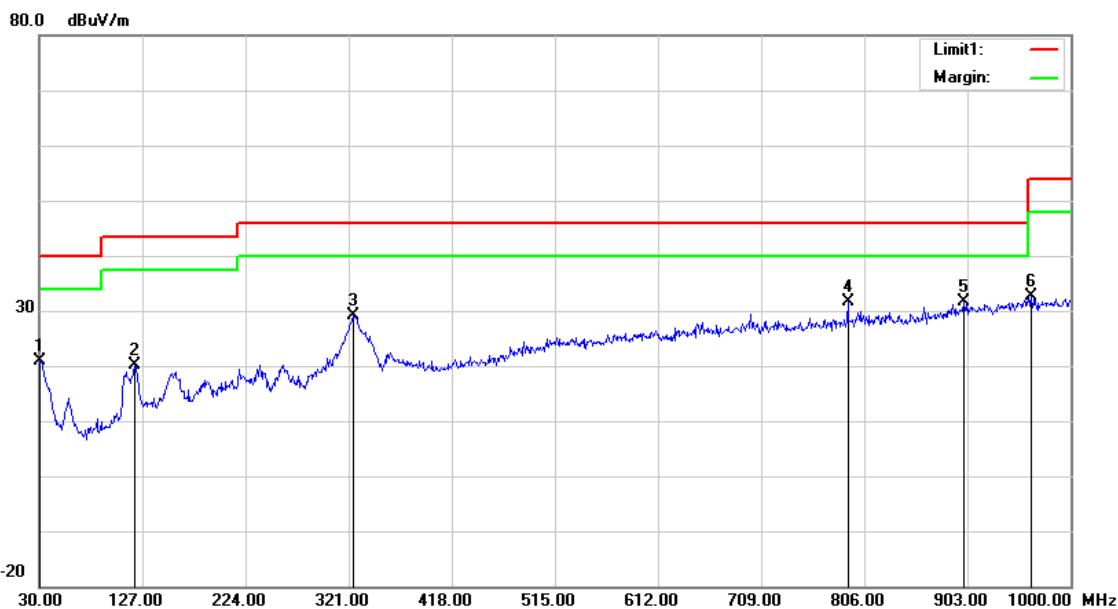
Test Report No.: FS190822N030

TEST MODE	Charging+Normal Working	FREQUENCY RANGE	30-1000 MHz
TEST VOLTAGE	DC 5V from USB	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 65% RH	TESTED BY: Caden	

ANTENNA POLARITY & test distance: VERTICAL at 3m											
No.	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree	
	(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	30.0000	22.94	20.10	22.28	0.13	20.89	40.00	-19.11	100	120	
2	119.2400	30.58	11.01	22.36	0.95	20.18	43.50	-23.32	100	274	
3	324.8800	35.49	14.20	22.22	1.78	29.25	46.00	-16.75	100	34	
4	790.4800	28.14	22.11	21.17	2.54	31.62	46.00	-14.38	100	146	
5	899.1200	25.93	23.86	20.88	2.65	31.56	46.00	-14.44	100	88	
6	963.1400	26.90	23.70	20.76	2.72	32.56	54.00	-21.44	100	187	

REMARKS:

1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.





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3.2.8 TEST RESULTS (ABOVE 1GHz)

TEST MODE	Charging+Normal Working							
TEST VOLTAGE	DC 5V from USB				FREQUENCY RANGE	1-18 GHz		
ENVIRONMENTAL CONDITIONS	25deg. C, 65% RH				TESTED BY: Caden			

Frequency (MHz)	Read_level (dB μ V/m)	Azimuth	Height (cm)	Polarity (H/V)	Factors (dB)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector (PK/AV)
1011.6	38.95	62	100	H	-18.48	57.43	74	-35.05	PK
1011.6	25.44	62	100	H	-18.48	43.92	54	-28.56	AV
1274.5	40.61	218	100	H	-16.97	57.58	74	-33.39	PK
1274.5	26.41	218	100	H	-16.97	43.38	54	-27.59	AV
1389.7	40.85	195	100	H	-17.75	58.6	74	-33.15	PK
1389.7	26.77	195	100	H	-17.75	44.52	54	-27.23	AV
1147.2	39.54	235	100	V	-17.26	56.8	74	-34.46	PK
1147.2	25.35	235	100	V	-17.26	42.61	54	-28.65	AV
1554.8	42.19	168	100	V	-16.97	59.16	74	-31.81	PK
1554.8	27.54	168	100	V	-16.97	44.51	54	-26.46	AV
1724.5	42.26	305	100	V	-13.75	56.01	74	-31.74	PK
1724.5	27.47	305	100	V	-13.75	41.22	54	-26.53	AV

REMARKS: 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 1GHz to 18GHz.
4. Only emissions significantly above equipment noise floor are reported.



4 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST





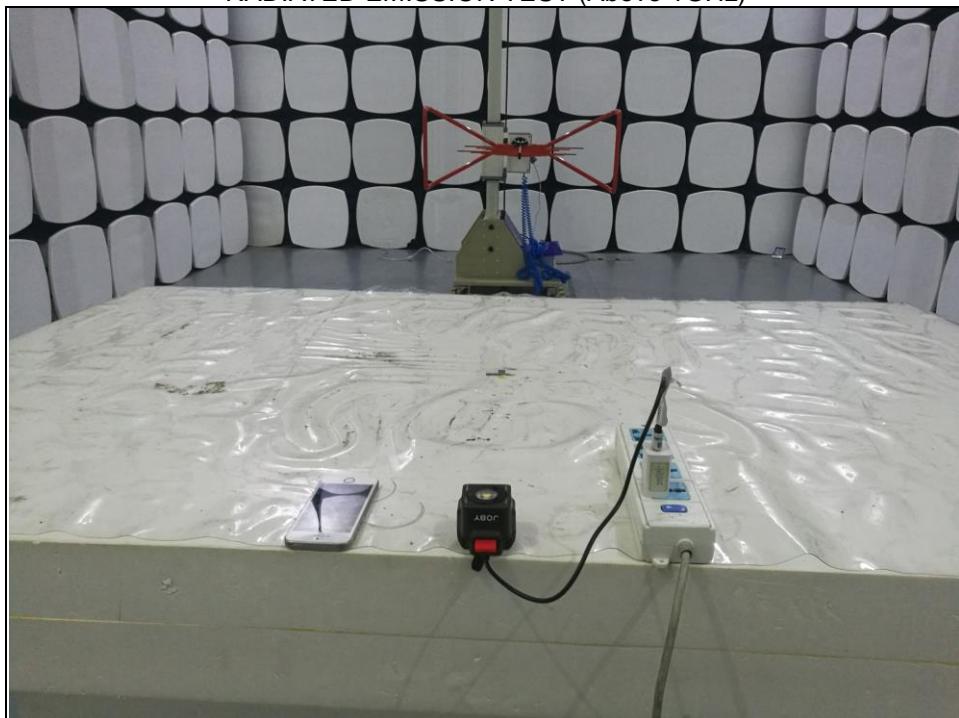
BUREAU
VERITAS

Test Report No.: FS190822N030

RADIATED EMISSION TEST (30MHz-1GHz)



RADIATED EMISSION TEST (Above 1GHz)



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**BUREAU
VERITAS** Test Report No.: FS190822N030

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

---END---