FCC Test Report

Report No.: AGC10849211002FE01

FCC ID	:	VTJ-M1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Brama S-C
BRAND NAME	:	SoloProtect
MODEL NAME	:	M1
APPLICNAT	:	SoloProtect Limited
DATE OF ISSUE	:	Dec. 14, 2021
STANDARD(S)	:	FCC Part 15B Rules
REPORT VERSION	:	V1.0

***A**ttestation of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 14, 2021	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	SoloProtect Limited
Address	Suzy Lamplugh House, 1 Vantage Drive, Sheffild, South Yorkshire, S9 1RG
Manufacturer	Shenzhen Unicair Communication Technology Co., Ltd.
Address	8-9/F, Block1, Wutong Island, Shunchang Rd., Xixiang, Bao'an District, Shenzhen China.
Factory	Dongguan Unicair Communication Technology Co.,Ltd.
Address	49 Yinhu Road, Qiaotou Town, Dongguan City, Guangdong Province, China
Product Designation	Brama S-C
Brand Name	SoloProtect
Test Model	M1
Date of test	Oct. 14, 2021~Dec. 14, 2021
Deviation	No any deviation from the test method.
Condition of Test Sample	Normal
Report Template	AGCRT-US-IT/AC

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2014. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.
The test results of this report relate only to the tested sample identified in this report.

Prepared By — Eder Zhan — Eder Zhan (Project Engineer) — Dec. 14, 2021

Reviewed By — Calvin Liu — Calvin Liu (Reviewer) — Dec. 14, 2021

Approved By — Max Zhang — Max Zhang Authorized Officer — Dec. 14, 2021

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2. SYSTEM DESCRIPTION

EUT test procedure:

1. Connect EUT and peripheral devices (PC) through USB port.
2. Power on the EUT, use the software to transfer data between EUT and PC.
3. Make sure the EUT operates normally during the test.

Test Mode

TEST MODE DESCRIPTION		
NO.	**TEST MODE DESCRIPTION**	**WORST**
1	USB (connection for data transferring)	V
Note: 1. V means EMI worst mode		

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3. MEASUREMENT UNCERTAINTY

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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4. PRODUCT INFORMATION

Housing Type	Plastic and metal
EUT Input Rating	DC 3.85V by battery

I/O Port Information (☒Applicable ☐Not Applicable)

I/O Port of EUT			
I/O Port Type	**Number**	**Specific**	**Tested With**
USB Port	1	-	1

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5. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
PC	Xiaomi Inc.	--	--	--	--
Adapter	Xiaomi Inc.	--	--	--	1.25m Unshielded

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong,China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 11, 2021	May 10, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	R&S	ES-K1(Ver.V1. 71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Apr. 14, 2021	Apr. 13, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 05, 2021	Dec. 04, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 19, 2021	Sep. 18, 2023
preamplifier	ChengYi	EMC184045SE	980508	Sep.16, 2021	Sep.15, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2023
Broadband Preamplifier	SCHWARZBECK	3117PA	00225134	Sep.03, 2020	Sep.02, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Jan. 08, 2021	Jan. 07, 2023
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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6. TEST ITEMS AND THE RESULTS

Test item	Test Requirement	Test Method	Class/Severity	Result
CONDUCTED EMISSION	FCC Part 15.107 Rules	ANSI C63.4:2014	Class B	Pass
RADIATED EMISSION	FCC Part 15.109 Rules	ANSI C63.4:2014	Class B	Pass

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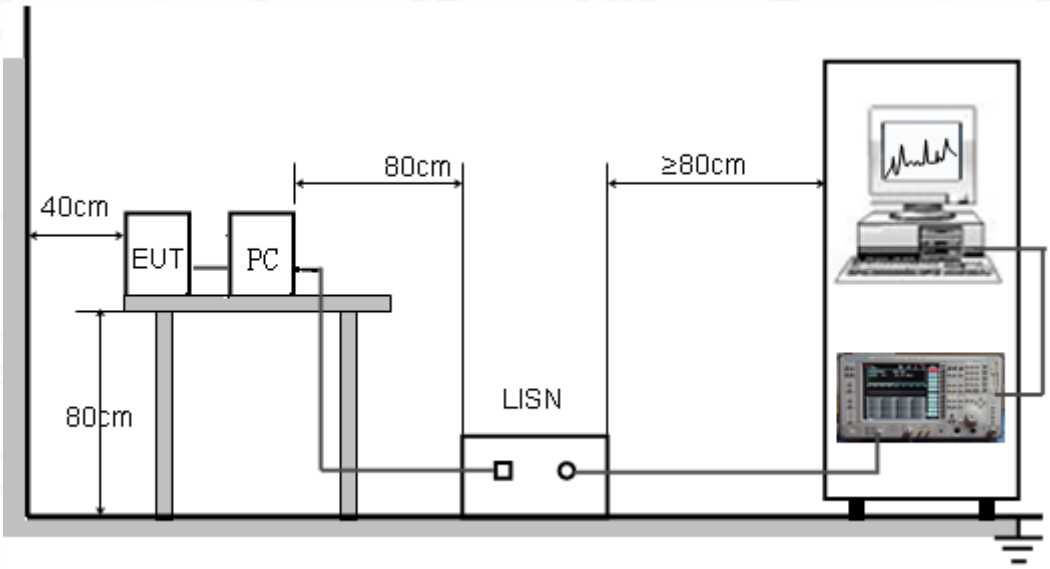
7. FCCLINE CONDUCTED EMISSION TEST

7.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

Note:
1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

7.2. BLOCK DIAGRAM OF TEST SETUP



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7.3. PROCEDURE OF LINE CONDUCTED EMISSION TEST

(1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

(2) Support equipment, if needed, was placed as per ANSI C63.4.

(3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

(4) The EUT received DC 5V power from PC with receive AC120V/60Hz power from a LISN.

(5) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

(6) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

(7) During the above scans, the emissions were maximized by cable manipulation.

(8) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.

(9) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The test data of the worst case condition (mode 1) was reported on the Summary Data page.

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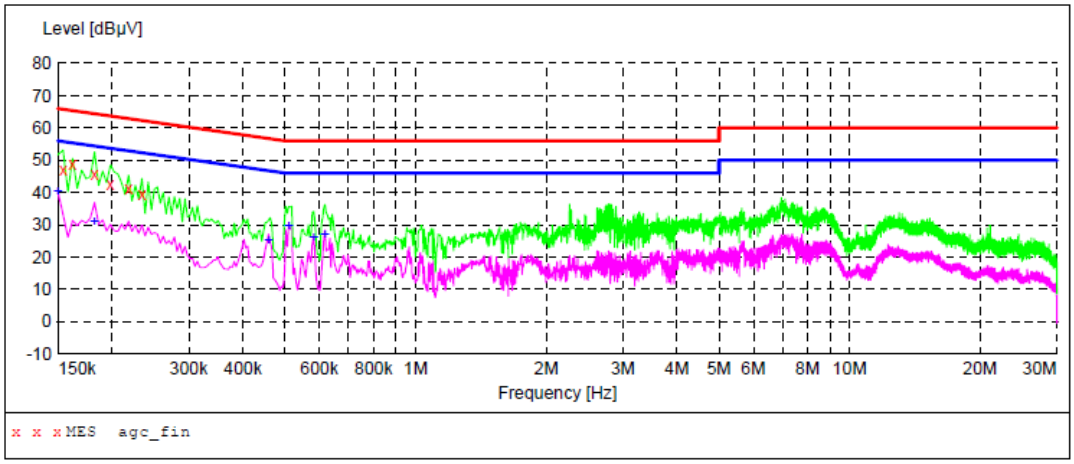
7.4. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.154000	47.20	7.6	66	18.6	QP	L1
0.162000	48.60	7.6	65	16.8	QP	L1
0.182000	45.90	7.6	64	18.5	QP	L1
0.198000	42.70	7.7	64	21.0	QP	L1
0.218000	41.00	7.7	63	21.9	QP	L1
0.234000	39.20	7.7	62	23.1	QP	L1

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.150000	40.20	7.6	56	15.8	AV	L1
0.182000	30.90	7.6	54	23.5	AV	L1
0.458000	25.30	8.0	47	21.4	AV	L1
0.510000	29.80	8.0	46	16.2	AV	L1
0.582000	26.10	8.0	46	19.9	AV	L1
0.618000	26.90	8.0	46	19.1	AV	L1

RESULT: PASS

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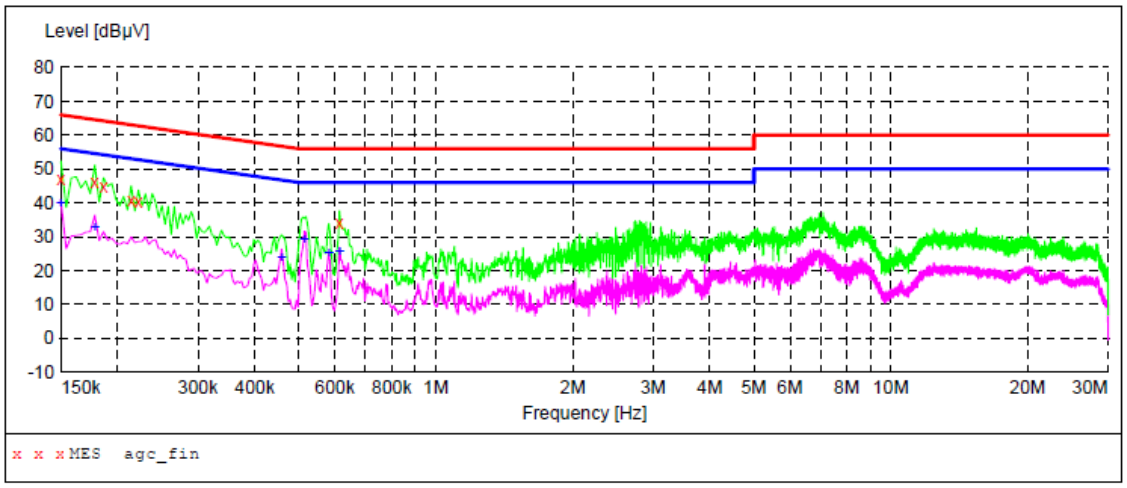
LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.150000	46.90	7.6	66	19.1	QP	N
0.178000	46.30	7.6	65	18.3	QP	N
0.186000	44.80	7.6	64	19.4	QP	N
0.214000	40.90	7.7	63	22.1	QP	N
0.222000	40.50	7.7	63	22.2	QP	N
0.614000	34.30	8.0	56	21.7	QP	N

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.150000	40.00	7.6	56	16.0	AV	N
0.178000	32.60	7.6	55	22.0	AV	N
0.458000	24.00	8.0	47	22.7	AV	N
0.514000	29.30	8.0	46	16.7	AV	N
0.582000	25.40	8.0	46	20.6	AV	N
0.614000	25.80	8.0	46	20.2	AV	N

RESULT: PASS

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8. FCC RADIATED EMISSION TEST

8.1. EXCEPT FOR CLASS A DIGITAL DEVICES, THE FIELD STRENGTH OF RADIATED EMISSIONS FROM UNINTENTIONAL RADIATORS AT A DISTANCE OF 3 METERS SHALL NOT EXCEED THE FOLLOWING VALUES:

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m/ Q.P.)
30~88	3	40.0
88~216	3	43.5
216~960	3	46.0
Above 960	3	54.0

Note: The lower limit shall apply at the transition frequency.

8.1.1 The following table is the setting of spectrum analyzer and receiver:

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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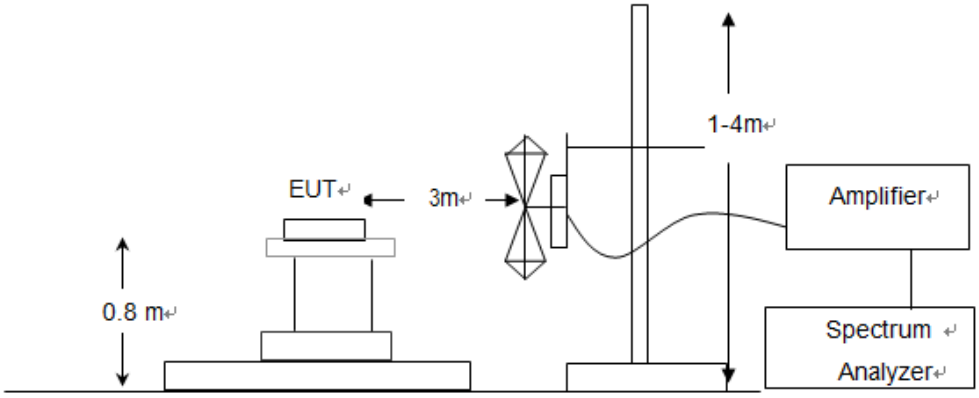
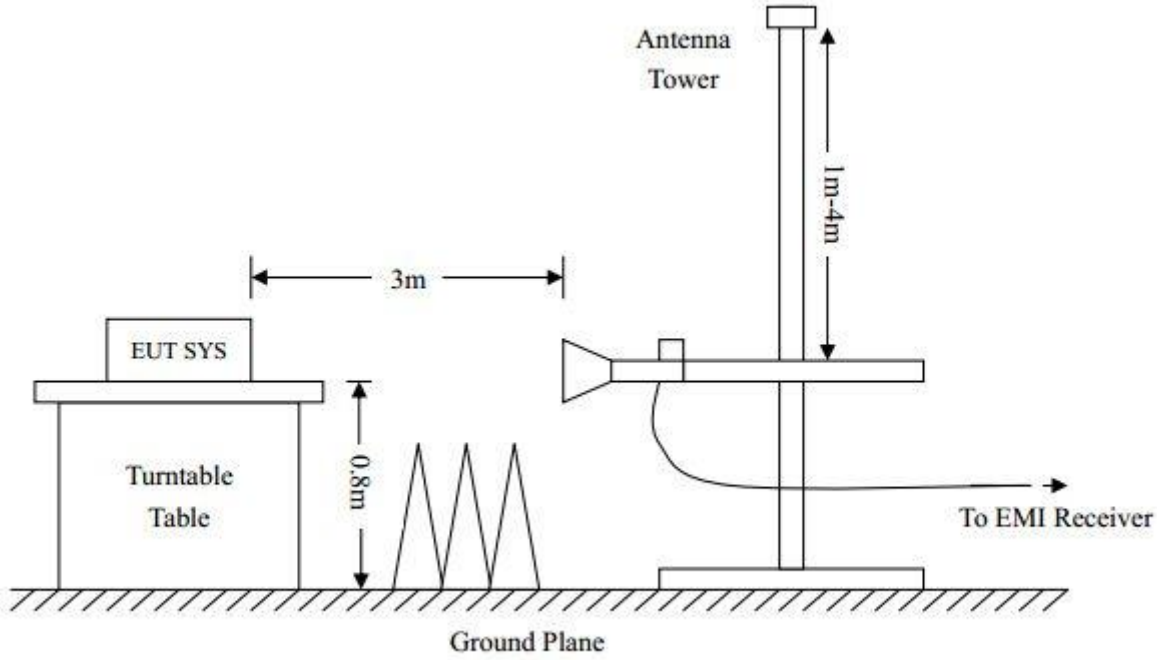
8.2. BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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8.3. PROCEDURE OF RADIATED EMISSION TEST

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 3MHz VBW for average reading in spectrum analyzer. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
11. The test data of the worst case condition (mode 1) was reported on the Summary Data page.

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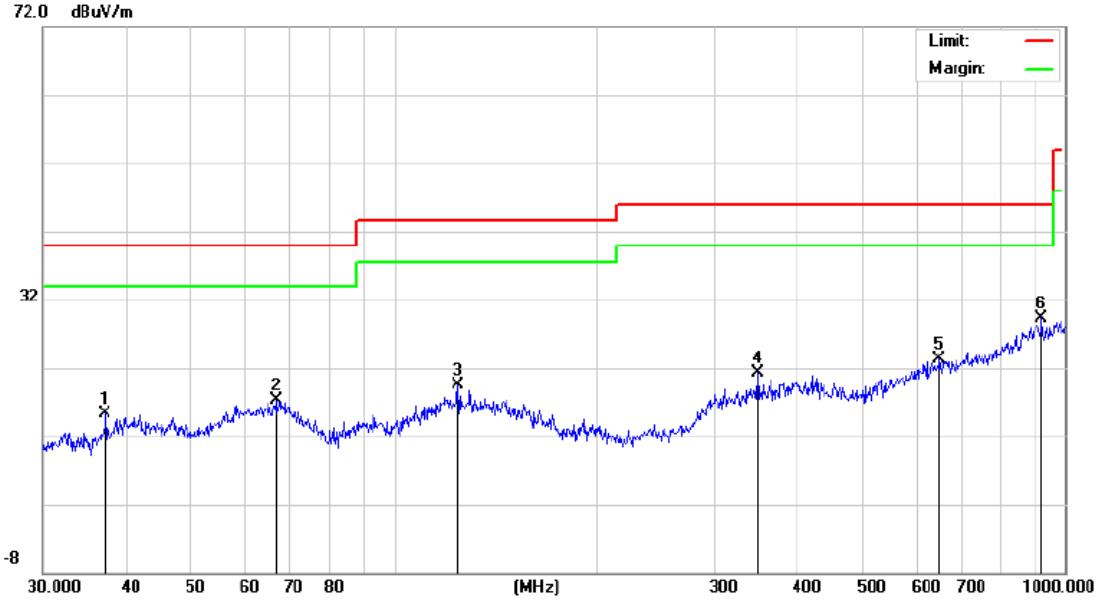
8.4. TEST RESULT OF RADIATED EMISSION TEST

RADIATED EMISSION TEST AT 3M DISTANCE-HORIZONTAL



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		37.1550	6.73	8.51	15.24	40.00	-24.76	peak
2		66.7325	5.42	11.90	17.32	40.00	-22.68	peak
3		124.5690	6.67	12.89	19.56	43.50	-23.94	peak
4		348.0274	6.80	14.52	21.32	46.00	-24.68	peak
5		649.6597	5.75	17.55	23.30	46.00	-22.70	peak
6	*	922.5157	6.35	22.89	29.24	46.00	-16.76	peak

RESULT: PASS

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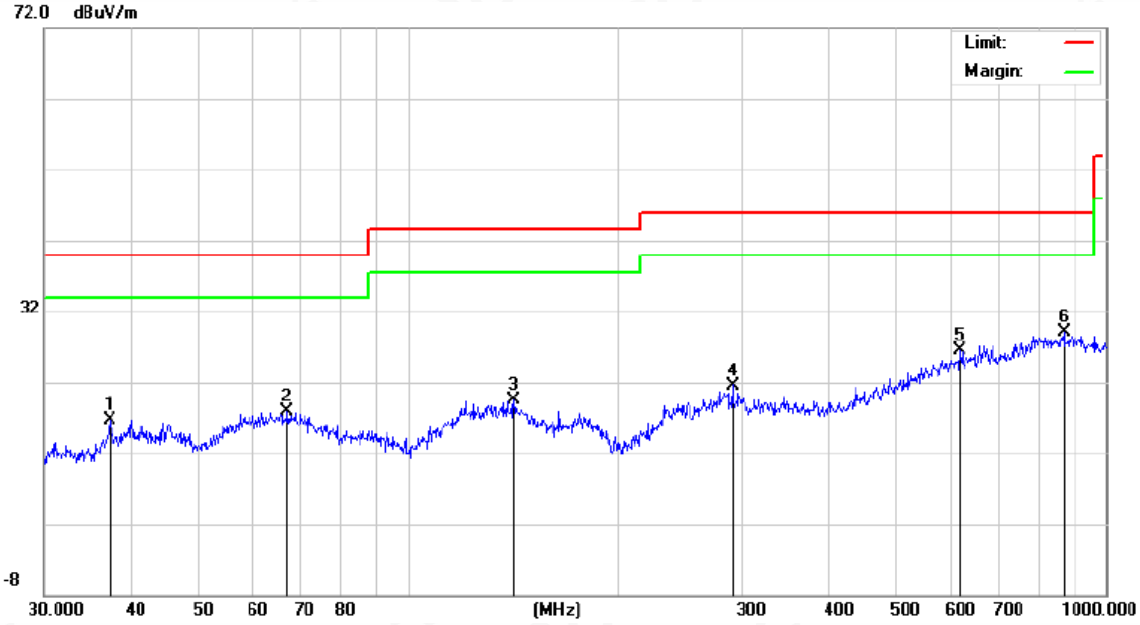
RADIATED EMISSION TEST AT 3M DISTANCE-VERTICAL



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		37.2855	8.14	8.59	16.73	40.00	-23.27	peak
2		66.9669	5.88	12.04	17.92	40.00	-22.08	peak
3		141.3298	6.43	13.09	19.52	43.50	-23.98	peak
4		291.0360	6.92	14.68	21.60	46.00	-24.40	peak
5		616.3718	6.46	19.98	26.44	46.00	-19.56	peak
6	*	869.1302	6.55	22.57	29.12	46.00	-16.88	peak

RESULT: PASS

Note: 1.Measurement = Reading + Factor, Over = Measurement-Limit .

2. The “Factor” value can be calculated automatically by software of measurement system.

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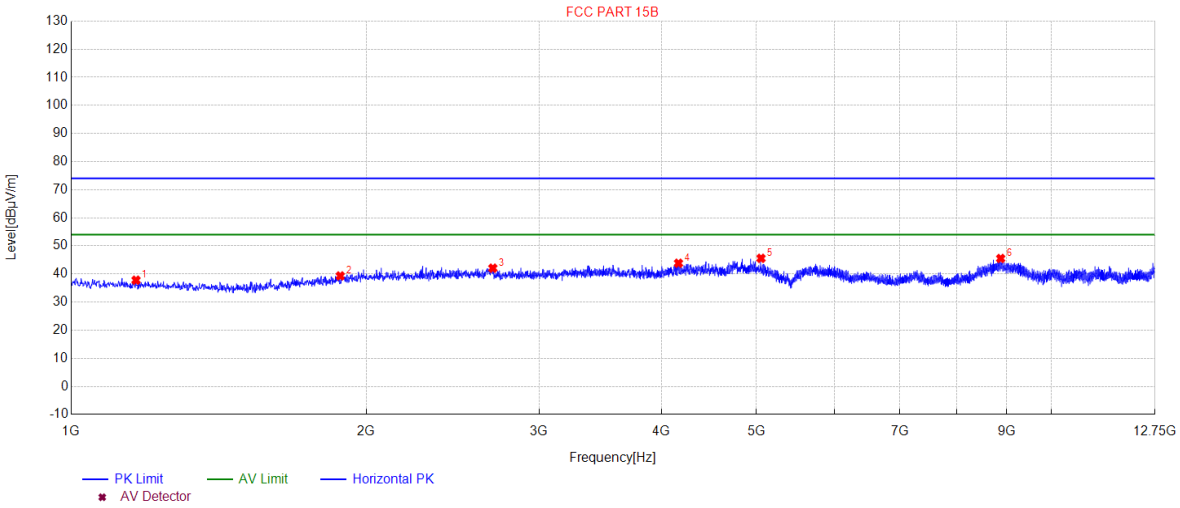
RADIATED EMISSION ABOVE 1GHZ TEST AT 3M DISTANCE –HORIZONTAL



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1164.5165	37.79	-16.80	74.00	36.21	150	250	Horizontal
2	1881.3381	39.31	-13.08	74.00	34.69	150	130	Horizontal
3	2692.1692	42.06	-9.57	74.00	31.94	150	40	Horizontal
4	4163.4163	43.82	-6.08	74.00	30.18	150	170	Horizontal
5	5054.1554	45.57	-4.78	74.00	28.43	150	110	Horizontal
6	8873.2873	45.52	0.71	74.00	28.48	150	180	Horizontal

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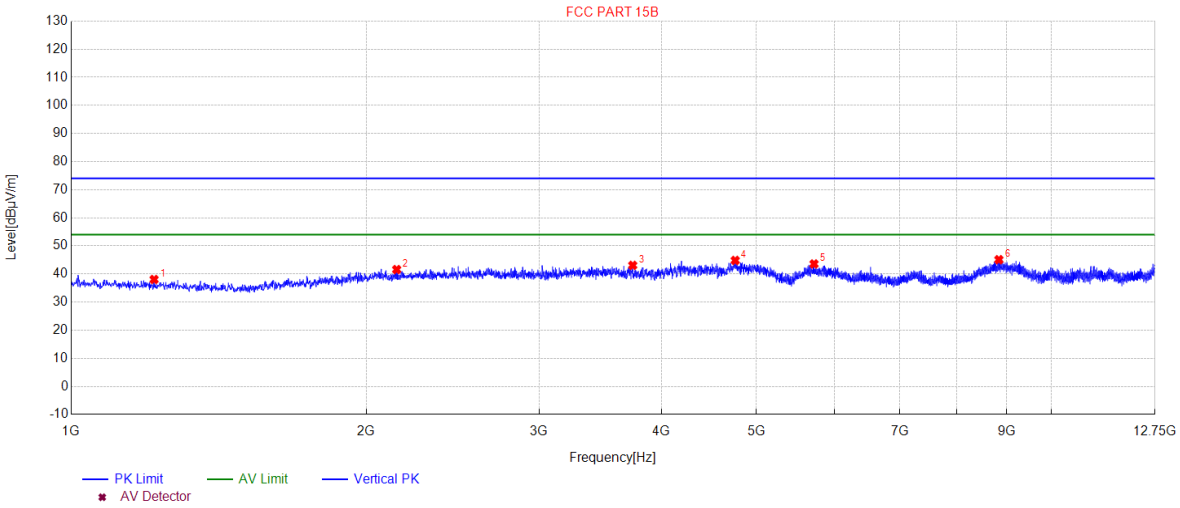
RADIATED EMISSION ABOVE 1GHZ TEST AT 3M DISTANCE –VERTICAL



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1215.0465	38.04	-16.85	74.00	35.96	150	290	Vertical
2	2148.0898	41.57	-11.20	74.00	32.43	150	190	Vertical
3	3739.1989	43.07	-7.07	74.00	30.93	150	260	Vertical
4	4756.8507	44.82	-4.95	74.00	29.18	150	220	Vertical
5	5723.9724	43.57	-4.57	74.00	30.43	150	340	Vertical
6	8835.6836	45.08	0.44	74.00	28.92	150	140	Vertical

Note: 1. Emissions range from 6GHz to 12.5GHz have 20dB margin. No recording in the test report.
2. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin= Limit –Measurement.
3. The “Factor” value can be calculated automatically by software of measurement system.

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC10849211002AP04

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC10849211002AP03

----END OF REPORT----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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