



FCC TEST REPORT

FCC ID:2AREB-12-2145

Report Number : ZKT-2201050106E

Date of Test Jan. 05, 2022 to Jan. 13, 2022

Date of issue : Jan. 13, 2022

Total number of pages 22

Test Result : PASS

Testing Laboratory : **Shenzhen ZKT Technology Co., Ltd.**

Address : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name : **TWELVE SOUTH, LLC**

Address : 1503 KING ST STE201 Charleston, SC29405, USA

Manufacturer's name : **Shenzhen Future Charger Technology co. ,LTD**

Address : Yongfengtian Industrial Park, fenghuang third industrial zone, Fuyong town, Baoan District, Shenzhen, China

Test specification:

Standard : FCC CFR Title 47 Part 15 Subpart C

Test procedure : /

Non-standard test method : N/A

Test Report Form No. : TRF-EL-107_V0

Test Report Form(s) Originator : ZKT Testing

Master TRF : Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Product name : **HiRise 3**

Trademark : N/A

Model/Type reference : 12-2146
12-2145

Ratings : Input: DC 9V 2A
Wireless Output Phone: 10W Max
Wireless Output TWS: 5W Max
Wireless Output Watch: 3W Max



Testing procedure and testing location:

Testing Laboratory.....: **Shenzhen ZKT Technology Co., Ltd.**

Address.....: 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Tested by (name + signature).....: **Alen He**

Reviewer (name + signature).....: **Joe Liu**

Approved (name + signature).....: **Lake Xie**





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1. VERSION

Report No.	Version	Description	Approved
ZKT-2201050106E	Rev.01	Initial issue of report	Jan. 13, 2022



2. TEST SUMMARY

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Spurious Emission	15.209(a)(f)	Pass
20dB Bandwidth	15.215	Pass

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report



2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.
Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street,
Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225
Designation Number: CN1299
IC Registered No.: 27033
CAB identifier: CN0110

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	3m camber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8dB
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59°C



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

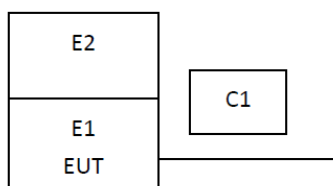
Product Name:	HiRise 3
Model No.:	12-2146 12-2145
Model Difference:	Only for different model name.
Serial No.:	N/A
Hardware version:	H1.0
Software version:	S1.0
Operation Frequency:	115kHz ~ 148KHz
Modulation type:	MSK
Antenna Type:	Inductive loop coil Antenna
Antenna gain:	0dBi
Test description:	Full load, half load and no load are tested, and the worst is full load.
Power supply:	Input: DC 9V 2A Wireless Output Phone: 10W Max Wireless Output TWS: 5W Max Wireless Output Watch: 3W Max

3.2 Test mode

Test Modes:		
Mode 1	AC/DC Adapter (9V/2A) + EUT + Mobile Phone XIAOMI (10W)	
Mode 2	AC/DC Adapter (9V/2A) + EUT + Mobile Phone XIAOMI (7.5W)	
Mode 3	AC/DC Adapter (9V/2A) + EUT + Mobile Phone XIAOMI (5W)	
Mode 4	AC/DC Adapter (9V/2A) + EUT + TWS XIAOMI (5W)	
Mode 5	AC/DC Adapter (9V/2A) + EUT + Watch XIAOMI (3W)	
Mode 6	AC/DC Adapter (9V/2A) + EUT + Mobile Phone XIAOMI (10W)+ TWS XIAOMI (5W)	
Mode 7	AC/DC Adapter (9V/2A) + EUT + Mobile Phone XIAOMI (10W)+ Watch XIAOMI (3W)	
Mode 8	AC/DC Adapter (9V/2A) + EUT + Mobile Phone XIAOMI (10W)+ TWS XIAOMI (5W)+ Watch XIAOMI (3W)	Record
Note: All test modes were pre-tested, but we only recorded the worst case in this report.		

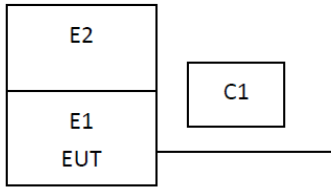
3.3 Block Diagram of EUT Configuration

Conducted Emission





Radiated Emission



3.4 Test Conditions

Temperature: 23~26°C

Relative Humidity: 54~63 %

3.5 Description Of Support Units (Conducted Mode)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E1	HiRise 3	N/A	12-2146	N/A	EUT
E2	Phone	XIAOMI	DL01	N/A	Auxiliary
E2	Watch	XIAOMI	DL02	N/A	Auxiliary
E2	TWS	XIAOMI	DL03	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C1	NO	NO	1.0M	DC cable unshielded

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.



3.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY45109572	Sep. 22, 2021	Sep. 21, 2022
2	Spectrum Analyzer (1GHz-40GHz)	Agilent	E4446A	100363	Sep. 22, 2021	Sep. 21, 2022
3	Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	Sep. 22, 2021	Sep. 21, 2022
4	Bilog Antenna (30MHz-1400MHz)	Schwarzbeck	VULB9168	00877	Sep. 22, 2021	Sep. 21, 2022
5	Horn Antenna (1GHz-18GHz)	SCHWARZBEC K	BBHA9120D	1541	Sep. 22, 2021	Sep. 21, 2022
6	Horn Antenna (18GHz-40GHz)	A.H. System	SAS-574	588	Sep. 22, 2021	Sep. 21, 2022
7	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	N/A	Sep. 22, 2021	Sep. 21, 2022
8	Amplifier (1GHz-40GHz)	全聚达	DLE-161	097	Sep. 22, 2021	Sep. 21, 2022
9	Loop Antenna (9KHz-30MHz)	SCHWARZBEC K	FMZB1519B	014	Sep. 22, 2021	Sep. 21, 2022
10	RF cables1 (9kHz-30MHz)	N/A	9kHz-30MHz	N/A	Sep. 22, 2021	Sep. 21, 2022
11	RF cables2 (30MHz-1GHz)	N/A	30MHz-1GHz	N/A	Sep. 22, 2021	Sep. 21, 2022
12	RF cables3 (1GHz-40GHz)	N/A	1GHz-40GHz	N/A	Sep. 22, 2021	Sep. 21, 2022
13	CMW500 Test	R&S	CMW500	106504	Sep. 22, 2021	Sep. 21, 2022
14	ESG Signal Generator	Agilent	E4421B	GB40051203	Sep. 22, 2021	Sep. 21, 2022
15	Signal Generator	Agilent	N5182A	MY47420215	Sep. 22, 2021	Sep. 21, 2022
16	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
17	MWRF Test system	MW	MW100-RPCB	\	\	\
17	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\
18	RF Software	MW	MTS8310	V2.0.0.0	\	\
19	Turntable	MF	MF-7802BS	\	\	\
20	Antenna tower	MF	MF-7802BS	\	\	\

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	N/A	Sep. 22, 2021	Sep. 21, 2022
2	LISN	CYBERTEK	EM5040A	N/A	Sep. 22, 2021	Sep. 21, 2022
3	Test Cable	N/A	C01	N/A	Sep. 22, 2021	Sep. 21, 2022
4	Test Cable	N/A	C02	N/A	Sep. 22, 2021	Sep. 21, 2022
5	EMI Test Receiver	R&S	ESCI3	101421	Sep. 22, 2021	Sep. 21, 2022



6	Triple-Loop Antenna	LAPLACE	RF300	9194	Sep. 22, 2021	Sep. 21, 2022
7	Absorbing Clamp	DZ	ZN23201	N/A	Sep. 22, 2021	Sep. 21, 2022
8	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	\	\



4. CONDUCTED EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quas -peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) *Decreases with the logarithm of the frequency.

4.1.2 TEST PROCEDURE

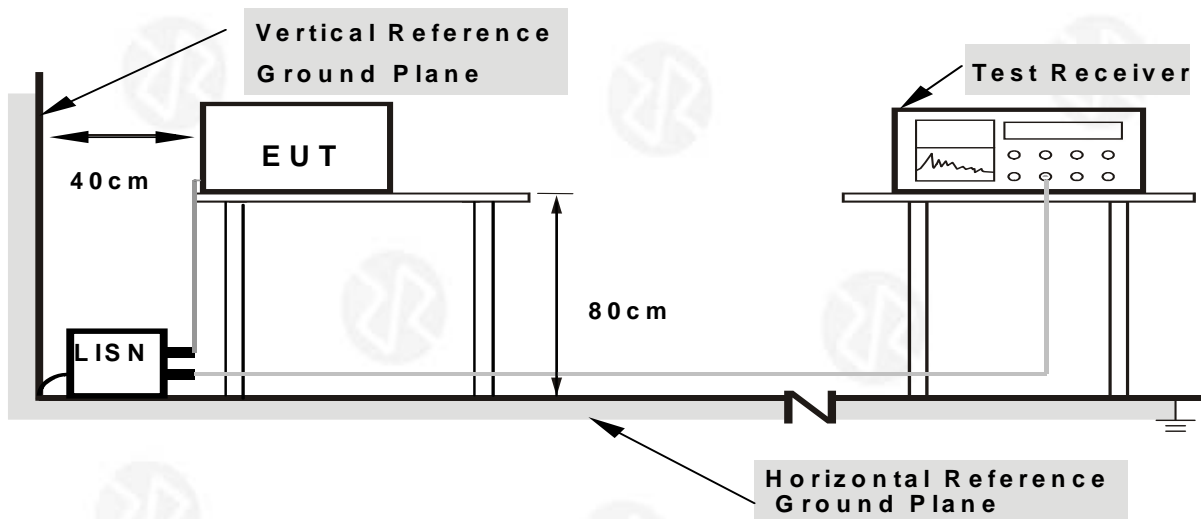
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation



4.1.4 TEST SETUP



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

4.1.5 EUT OPERATING CONDITIONS

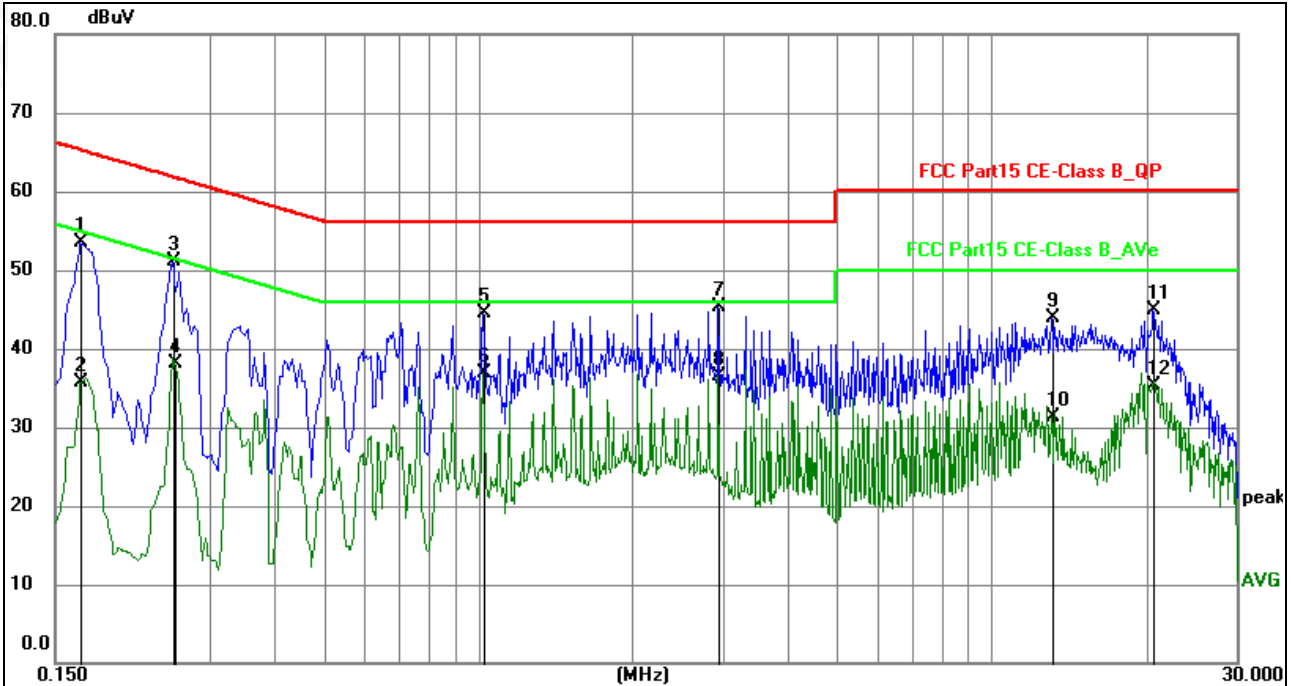
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.



4.1.6 Test Result

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz		



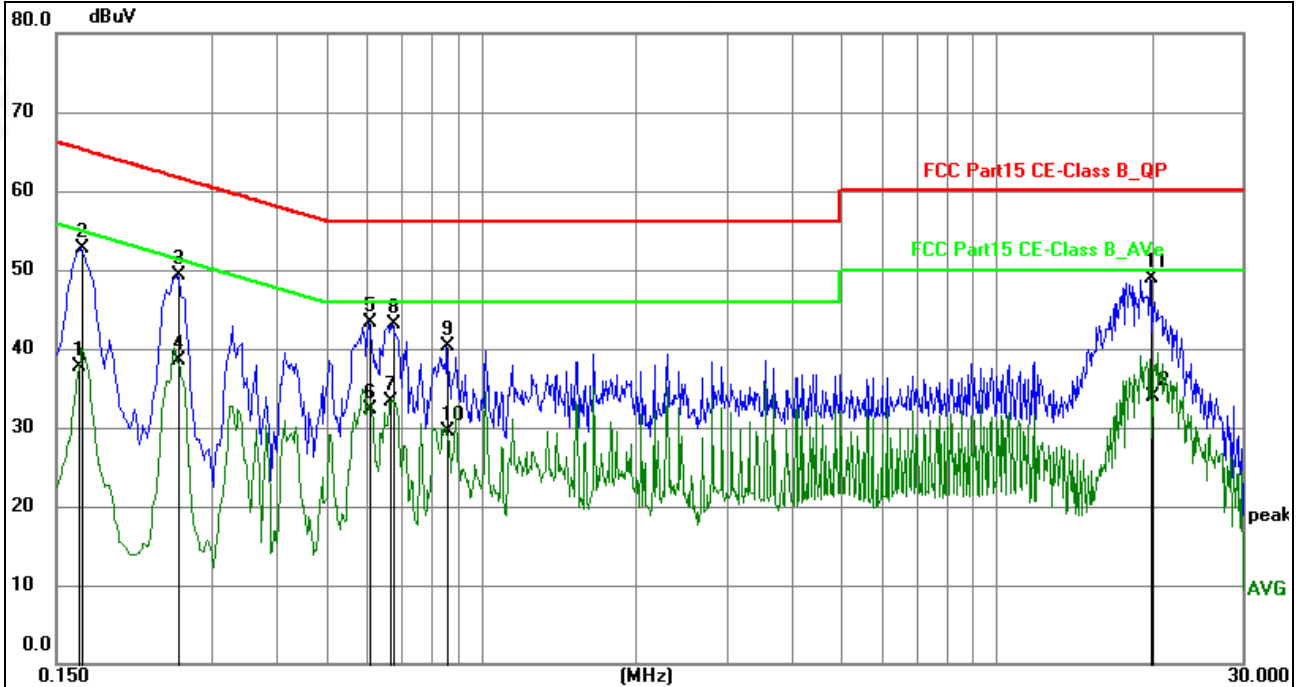
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1680	40.89	12.61	53.50	65.06	-11.56	QP	P	
2	0.1680	23.05	12.61	35.66	55.06	-19.40	AVG	P	
3	0.2535	39.46	11.67	51.13	61.64	-10.51	QP	P	
4	0.2562	26.50	11.66	38.16	51.55	-13.39	AVG	P	
5	1.0230	34.11	10.43	44.54	56.00	-11.46	QP	P	
6	1.0230	26.39	10.43	36.82	46.00	-9.18	AVG	P	
7	2.9400	35.38	9.96	45.34	56.00	-10.66	QP	P	
8	2.9400	26.50	9.96	36.46	46.00	-9.54	AVG	P	
9	13.0875	35.03	8.89	43.92	60.00	-16.08	QP	P	
10	13.0875	22.33	8.89	31.22	50.00	-18.78	AVG	P	
11	20.7015	34.95	9.87	44.82	60.00	-15.18	QP	P	
12	20.7015	25.52	9.87	35.39	50.00	-14.61	AVG	P	

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1658	24.97	12.66	37.63	55.17	-17.54	AVG	P	
2	0.1680	40.16	12.61	52.77	65.06	-12.29	QP	P	
3	0.2580	37.67	11.65	49.32	61.50	-12.18	QP	P	
4	0.2580	26.90	11.65	38.55	51.50	-12.95	AVG	P	
5	0.6044	32.80	10.52	43.32	56.00	-12.68	QP	P	
6	0.6044	21.86	10.52	32.38	46.00	-13.62	AVG	P	
7	0.6683	22.87	10.51	33.38	46.00	-12.62	AVG	P	
8	0.6719	32.65	10.51	43.16	56.00	-12.84	QP	P	
9	0.8608	29.83	10.47	40.30	56.00	-15.70	QP	P	
10	0.8608	18.99	10.47	29.46	46.00	-16.54	AVG	P	
11	19.9364	39.14	9.85	48.99	60.00	-11.01	QP	P	
12	20.0625	24.05	9.86	33.91	50.00	-16.09	AVG	P	

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor



5. RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 1GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	

5.1 Radiated Emission Limits

Limits for frequency below 30MHz

Frequency	Limit (uV/m)	Measurement Distance(m)	Remark
0.009-0.490	2400/F(kHz)	300	Quasi-peak Value
0.490-1.705	24000/F(kHz)	30	Quasi-peak Value
1.705-30	30	30	Quasi-peak Value

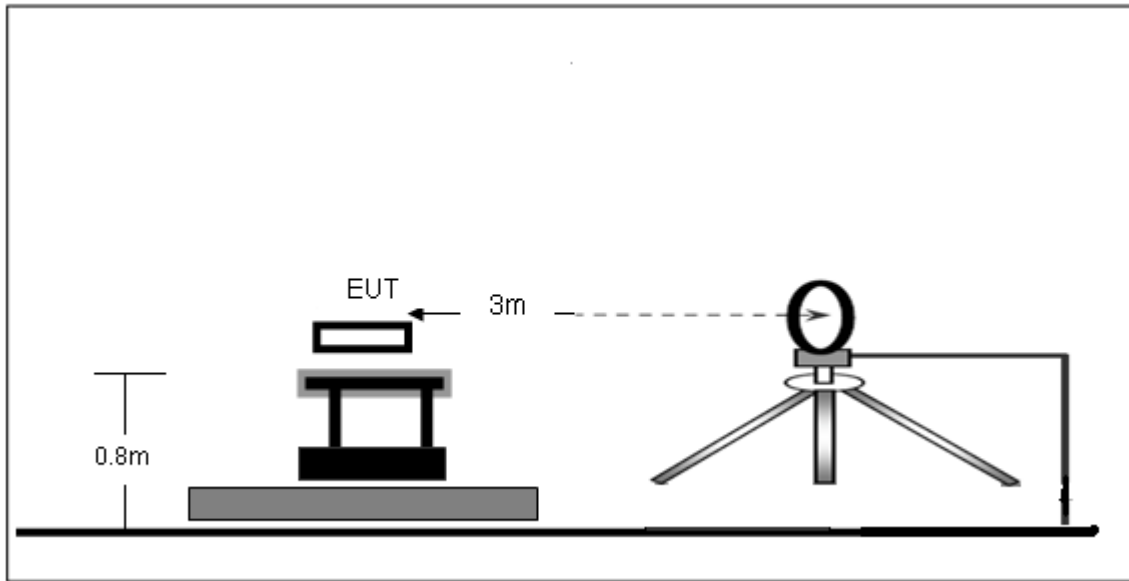
Limits for frequency Above 30MHz

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.00	Quasi-peak Value
88MHz-216MHz	43.50	Quasi-peak Value
216MHz-960MHz	46.00	Quasi-peak Value
960MHz-1GHz	54.00	Quasi-peak Value
Above 1GHz	54.00	Average Value
	74.00	Peak Value

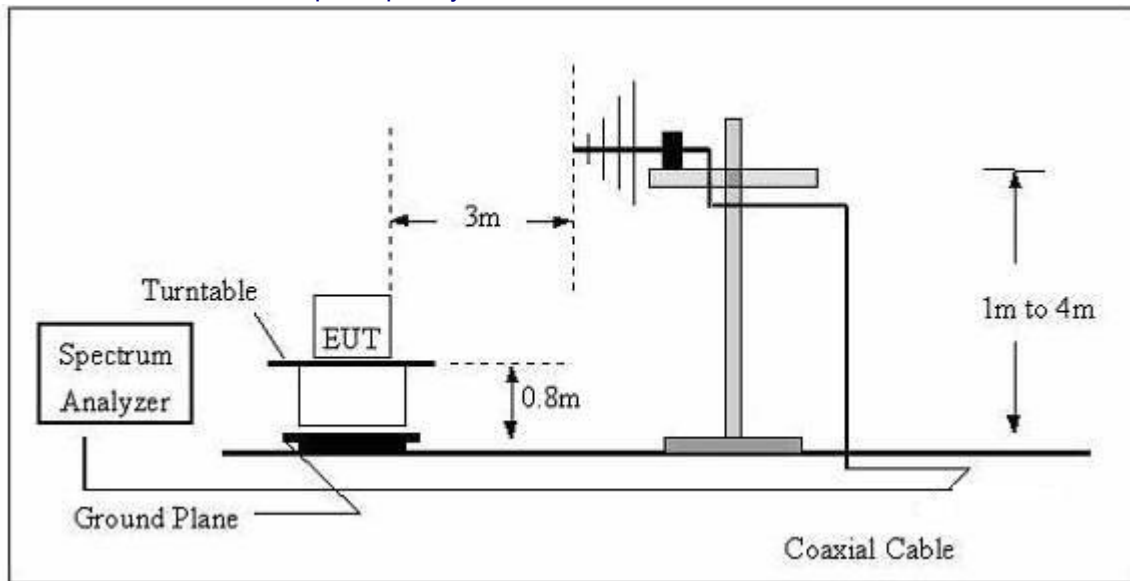


5.2 Anechoic Chamber Test Setup Diagram

(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.205 limits.

5.3 Test Procedure

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement.

5.4 DEVIATION FROM TEST STANDARD

No deviation



5.5 Test Result

Measurement data:

Note: Limit dBuV/m @3m = Limit dBuV/m @300m+ 80

Limit dBuV/m @3m = Limit dBuV/m @30m + 40

9 kHz~30 MHz

Frequency (kHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
24.80	39.86	20.15	60.01	139.72	-79.71	PK
24.80	31.22	20.15	51.37	119.72	-68.35	AV
56.76	51.17	20.33	71.5	132.53	-61.03	PK
56.76	41.68	20.33	62.01	112.53	-50.52	AV
121.72	68.29	20.55	88.84	125.91	-37.07	PK
121.72	59.57	20.55	80.12	105.91	-25.79	AV
688.60	33.66	20.64	54.30	70.89	-16.59	QP
971.66	38.16	21.26	59.42	67.91	-8.49	QP
1229.48	30.17	22.32	52.49	65.86	-13.37	QP

Note:

Pre-scan in the all of mode, the worst case in of was recorded.

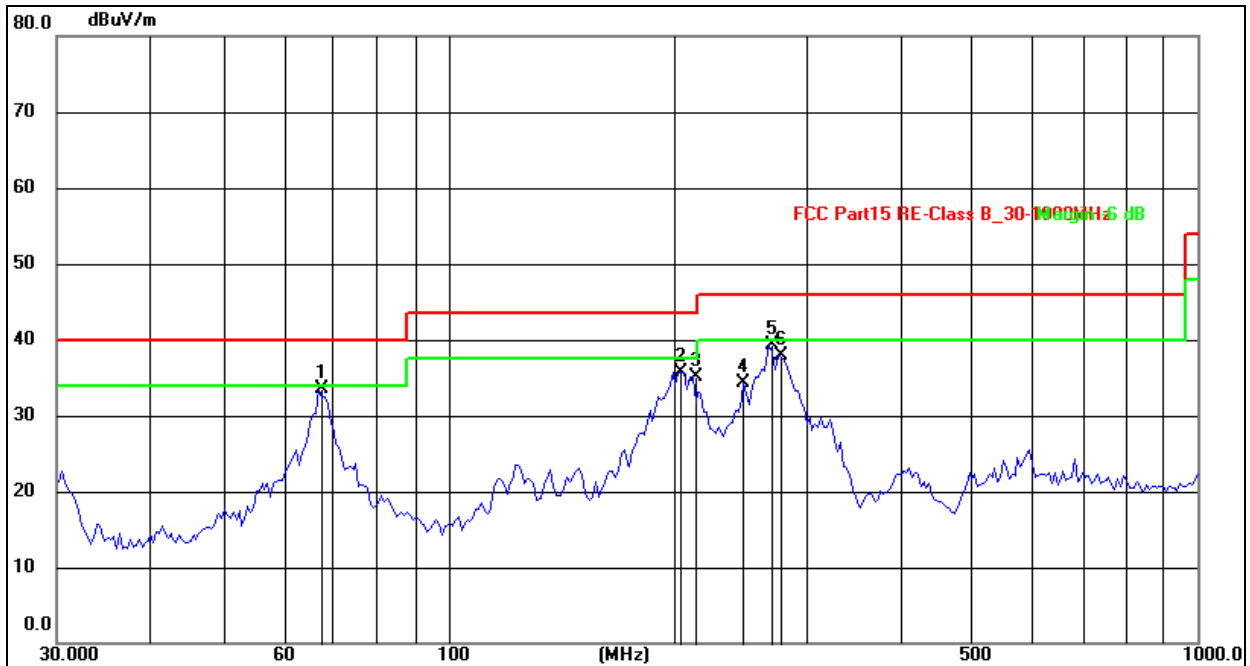
Factor = antenna factor + cable loss – pre-amplifier.

Margin = Emission Level- Limit.



30MHz-1GHz

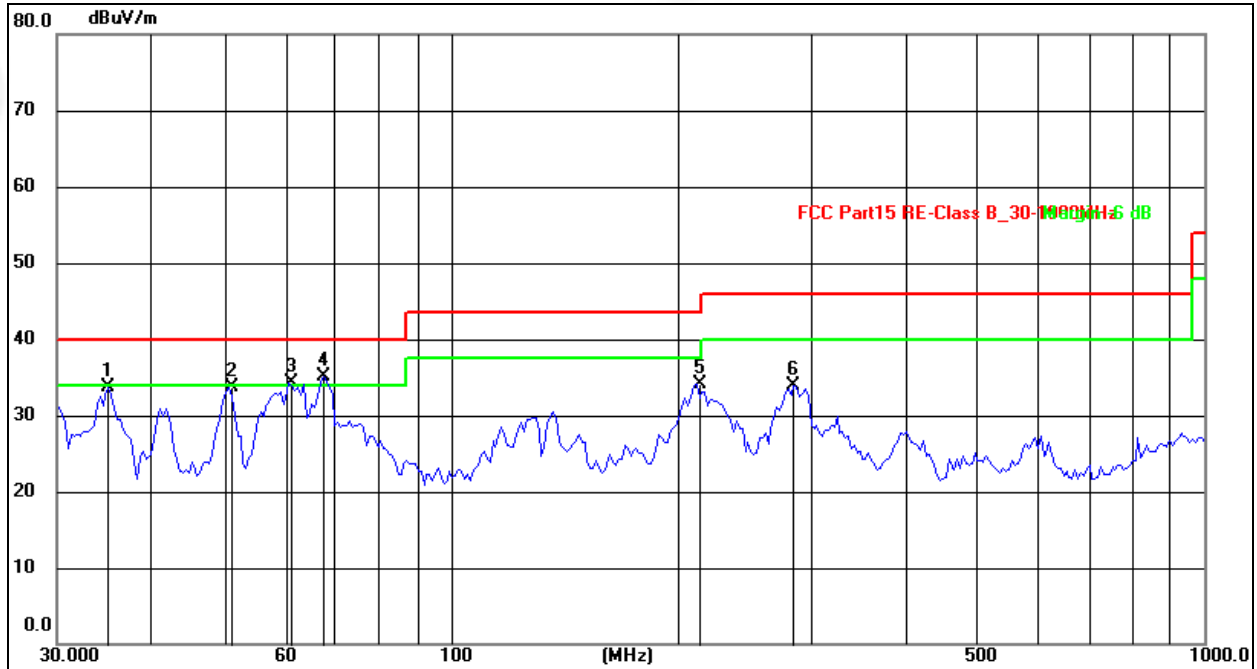
Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	67.2022	49.68	-16.15	33.53	40.00	-6.47	QP
2	204.5961	55.34	-19.61	35.73	43.50	-7.77	QP
3	211.8977	54.48	-19.31	35.17	43.50	-8.33	QP
4	248.1165	51.80	-17.46	34.34	46.00	-11.66	QP
5	268.4853	55.98	-16.73	39.25	46.00	-6.75	QP
6	275.6399	54.18	-16.37	37.81	46.00	-8.19	QP



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	35.1276	51.30	-17.58	33.72	40.00	-6.28	QP
2	50.7637	51.09	-17.36	33.73	40.00	-6.27	QP
3	61.0245	52.65	-18.42	34.23	40.00	-5.77	QP
4	67.7938	54.23	-19.12	35.11	40.00	-4.89	QP
5	211.8977	55.68	-21.63	34.05	43.50	-9.45	QP
6	285.4768	54.56	-20.64	33.92	46.00	-12.08	QP

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.



6. BANDWIDTH TEST

1. Set RBW = 10Hz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

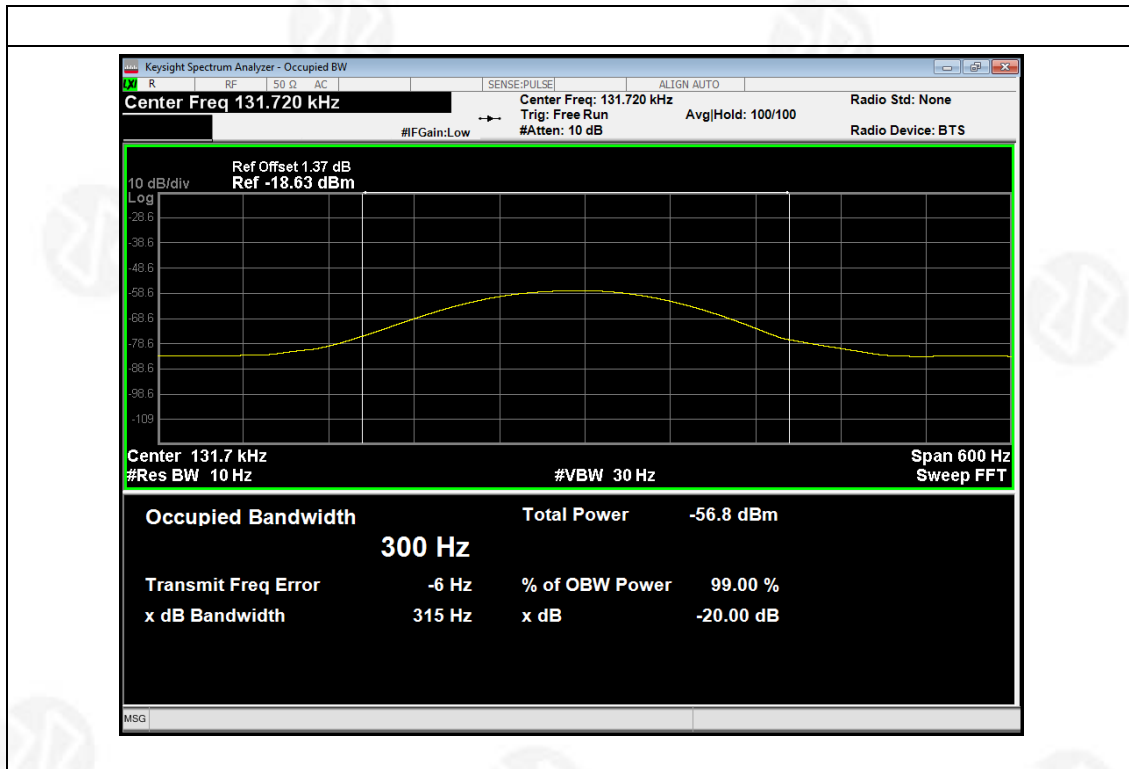
TEST SETUP





Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101kPa		

Frequency (KHz)	20dB bandwidth (Hz)	99% bandwidth (Hz)	Result
131.7	315	300	Pass





7. TEST SETUP PHOTO

Reference to the appendix I for details.

8. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

******* END OF REPORT *******