

TEST REPORT

Product Name : ACEBOTT Programmable STEM Building Kits

Brand Name : ACEBOTT,  ACEBOTT

Model : QE001

Series Model : QE028, QE032, QE035, QE007, QD001, QD020, QD022, QA009, QA019

FCC ID : 2BQVF-QE001

Applicant : ACEBOTT Co., Ltd.

Address : Room 305, Building 212, Tairan Science Park, Terra 4th Rd, Futian District, ShenZhen, China

Manufacturer : ACEBOTT Co., Ltd.

Address : Room 305, Building 212, Tairan Science Park, Terra 4th Rd, Futian District, ShenZhen, China

Standard(s) : FCC CFR Title 47 Part 15 Subpart C Section 15.225

Date of Receipt : July 11, 2025

Date of Test : July 11, 2025~July 24, 2025

Issued Date : July 25, 2025

Issued By: Dongguan Yaxu (AiT) Technology Limited

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Reviewed by: Emiya Lin
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Approved by: Simba Huang
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Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Dongguan Yaxu (AiT) Technology Limited. If there is a need to alter or revise this document, the right belongs to Dongguan Yaxu (AiT) Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.

Report Revise Record

Report Version	Issued Date	Notes
M1	July 25, 2025	Initial Release

Contents

1	TEST SUMMARY	4
1.1	TEST STANDARDS	4
1.2	TEST SUMMARY	4
1.3	TEST FACILITY	5
1.4	MEASUREMENT UNCERTAINTY	6
2	GENERAL INFORMATION	7
2.1	ENVIRONMENTAL CONDITIONS	7
2.2	GENERAL DESCRIPTION OF EUT	7
2.3	SPECIAL ACCESSORIES	8
2.4	EQUIPMENT LIST FOR THE TEST	8
3	TEST CONDITIONS AND RESULTS	10
3.1	CONDUCTED EMISSIONS TEST	10
3.2	RADIATED EMISSIONS	13
3.3	20DB BANDWIDTH	18
3.4	FREQUENCY STABILITY	19
4	TEST SETUP PHOTOGRAPHS OF EUT	21
5	PHOTOS OF EUT	21

1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.225](#): Operation within the band 13.110–14.010 MHz

[ANSI C63.10:2013](#): American National Standard for Testing Unlicensed Wireless Devices

1.2 Test Summary

FCC PART 15 .225		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 2.1049	20dB Bandwidth	PASS
FCC Part 15.225(a) (b) (c)	In-band Emissions	PASS
FCC Part 15.225(d)/15.209	Out-of-band Emissions	PASS
FCC Part 15.225(e)	Frequency Stability Tolerance	PASS

1.3 Test Facility

Test Laboratory:

Dongguan Yaxu (AiT) Technology Limited

No. 22, Jinqianling 3rd Street, Jitigang, Huangjiang, Dongguan, Guangdong, China

CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on April 18, 2022

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Dongguan Yaxu (AiT) Technology Limited's quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Asia Hongke laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	9KHz~30MHz ± 1.20 dB	(1)
Radiated Emission	9KHz~30MHz ± 3.10 dB	(1)
Radiated Emission	30MHz~1GHz ± 3.75 dB	(1)
Radiated Emission	1GHz~18GHz ± 3.88 dB	(1)
Radiated Emission	18GHz-40GHz ± 3.88 dB	(1)
RF power, conducted	30MHz~6GHz ± 0.16 dB	(1)
RF power density, conducted	± 0.24 dB	(1)
Spurious emissions, conducted	± 0.21 dB	(1)
Temperature	$\pm 1^\circ\text{C}$	(1)
Humidity	$\pm 3\%$	(1)
DC and low frequency voltages	$\pm 1.5\%$	(1)
Time	$\pm 2\%$	(1)
Duty cycle	$\pm 2\%$	(1)

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

2 GENERAL INFORMATION

2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 General Description of EUT

Product Name:	ACEBOTT Programmable STEM Building Kits
Model/Type reference:	QE001
Serial Model:	QE028, QE032, QE035, QE007, QD001, QD020, QD022, QA009, QA019
Power Supply:	DC 5V from the USB port DC 7-12V from the DC port (DC 9V 6*1.5V "AA" Battery)
Hardware Version:	N/A
Software Version:	N/A
Sample(s) Status:	AiTDG-250711004-1

RF ID:

Operation frequency:	13.56MHz
Modulation :	ASK
No. of Channel :	1
Antenna type:	PCB Antenna

Remark:

The above DUT's information was declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual..

2.3 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Serial No.	Provided by	Other
/	/	/	/	/	/
/	/	/	/	/	/

2.4 Equipment List for the Test

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI Measuring Receiver	R&S	ESR	101160	2024.09.23	2025.09.22
2	Spectrum Analyzer	R&S	FSV40	101470	2024.09.23	2025.09.22
3	Low Noise Pre Amplifier	SCHWARZBECK	BBV 9745	00282	2024.09.23	2025.09.22
4	Low Noise Pre Amplifier	CESHENG	CSKJLNA231016A	CSKJLNA231016A	2024.09.23	2025.09.22
5	Passive Loop	ETS	6512	00165355	2024.09.04	2026.09.03
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9168	01434	2024.08.29	2027.08.28
7	Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	452	2024.08.29	2027.08.28
8	Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367	2023.09.12	2026.09.11
9	6dB Attenuator	JFW	50FPE-006	4360846-949-1	2024.09.24	2025.09.23
10	EMI Test Receiver	R&S	ESPI	100771	2024.09.23	2025.09.22
11	LISN	R&S	NNLK 8129	8130179	2024.09.24	2025.09.23
12	LISN	R&S	ESH3-Z5	892785/016	2024.09.23	2025.09.22
13	Pulse Limiter	R&S	ESH3-Z2	102789	2024.09.24	2025.09.23
14	RF Automatic Test system	TST	TSTPASS	21033016	2024.09.23	2025.09.22
15	Vector Signal Generator	Agilent	N5182A	MY50143009	2024.09.23	2025.09.22
16	Analog signal generator	Agilent	E8257	MY51554256	2024.09.23	2025.09.22
17	Spectrum Analyzer	Agilent	N9020A	MY51289843	2024.09.23	2025.09.22
18	Spectrum Analyzer	Agilent	N9020A	MY53421570	2024.09.23	2025.09.22
19	Power Sensor	Agilent	8481A	MY41097697	2024.09.23	2025.09.22
20	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2024.09.24	2025.09.23
21	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	2024.09.24	2025.09.23
22	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A
23	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A

24	RF Software	TST	TSTPASS	Version 2.0	N/A	N/A
25	RF Software	cesheng	WCS-WCN	Version 2024.6.20	N/A	N/A
26	temporary antenna connector(Note)	NTS	R001	N/A	N/A	N/A

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

3 TEST CONDITIONS AND RESULTS

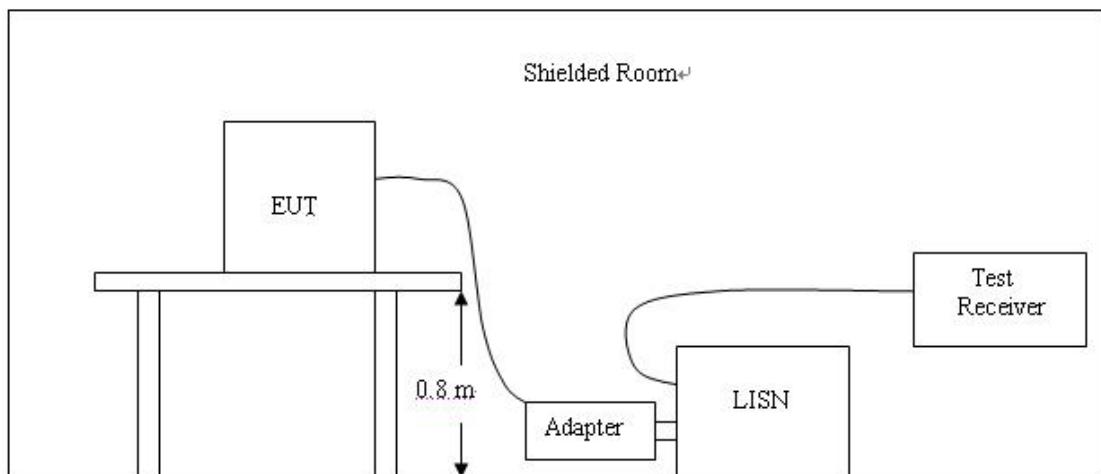
3.1 Conducted Emissions Test

LIMIT

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

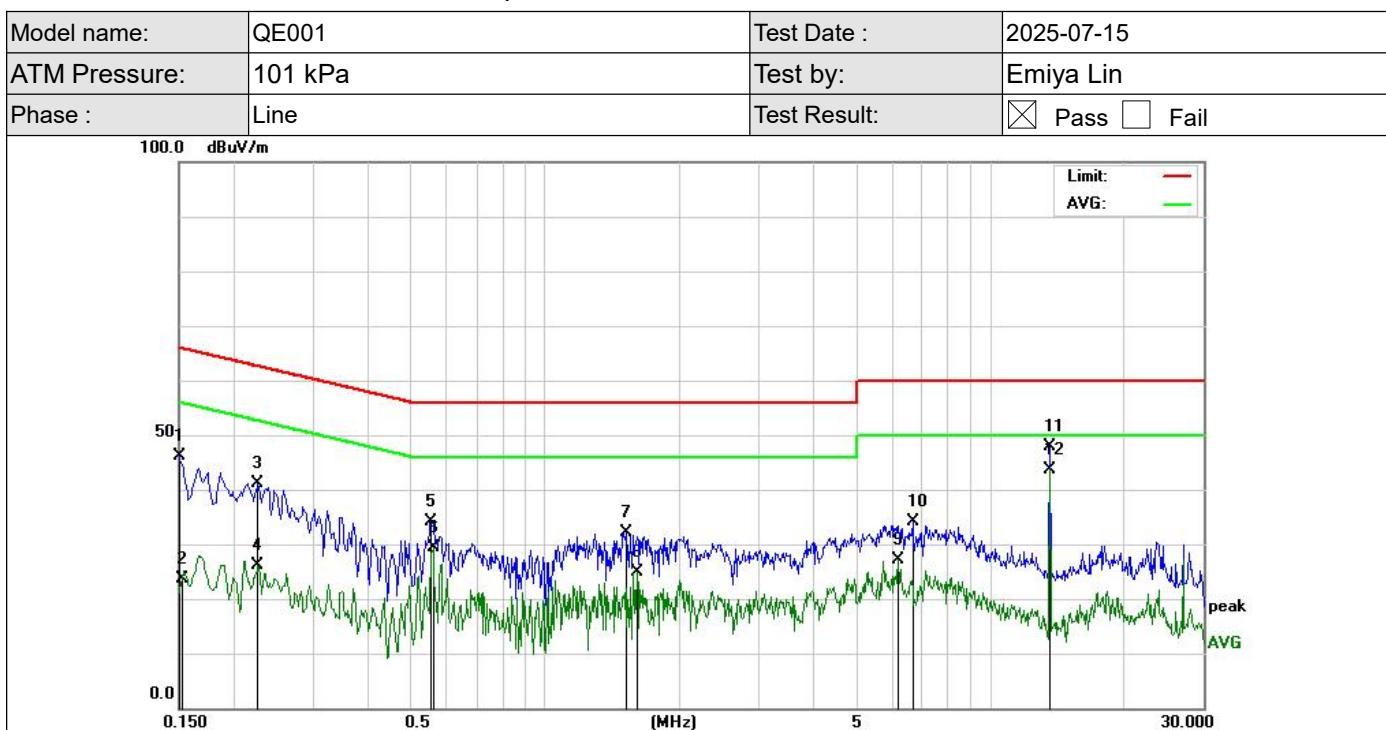


TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. 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 C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. 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.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark: Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:



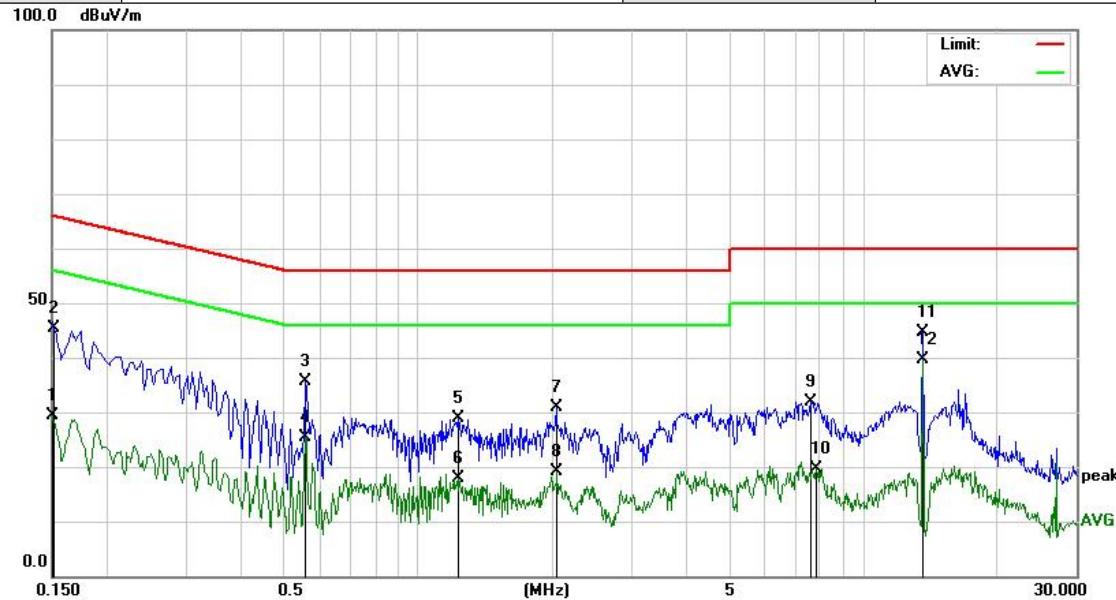
Remark: Factor = insertion loss of LISN + Cable loss + insertion loss of Pulse Limiter + insertion loss of Switch.

Measurement Result = Reading Level + Correct Factor;

Over Limit = Measurement Result - Limit;

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
		MHz	dBuV/m	dB	dBuV/m	dB	Detector
1		0.1500	34.14	11.94	46.08	65.99	-19.91 QP
2		0.1524	11.63	11.88	23.51	55.86	-32.35 AVG
3		0.2260	30.22	10.96	41.18	62.59	-21.41 QP
4		0.2260	15.14	10.96	26.10	52.59	-26.49 AVG
5		0.5540	24.12	10.00	34.12	56.00	-21.88 QP
6		0.5581	19.34	10.00	29.34	46.00	-16.66 AVG
7		1.5140	22.27	9.97	32.24	56.00	-23.76 QP
8		1.6060	14.93	9.97	24.90	46.00	-21.10 AVG
9		6.2057	17.01	10.13	27.14	50.00	-22.86 AVG
10		6.6817	23.98	10.15	34.13	60.00	-25.87 QP
11		13.5579	46.59	1.37	47.96	60.00	-12.04 QP
12 *		13.5579	42.38	1.37	43.75	50.00	-6.25 AVG

Model name:	QE001	Test Date :	2025-07-15
ATM Pressure:	101 kPa	Test by:	Emiya Lin
Phase :	Neutral	Test Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail



Remark: Factor =insertion loss of LISN + Cable loss +insertion loss of Pulse Limiter +insertion loss of Switch.

Measurement Result=Reading Level +Correct Factor;

Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
1		0.1500	17.56	11.94	29.50	55.99	-26.49
2		0.1516	33.50	11.90	45.40	65.91	-20.51
3		0.5580	25.69	10.00	35.69	56.00	-20.31
4		0.5580	15.46	10.00	25.46	46.00	-20.54
5		1.2257	18.91	9.95	28.86	56.00	-27.14
6		1.2338	7.81	9.95	17.76	46.00	-28.24
7		2.0419	20.93	9.99	30.92	56.00	-25.08
8		2.0499	9.23	9.99	19.22	46.00	-26.78
9		7.5857	21.80	10.18	31.98	60.00	-28.02
10		7.8498	9.42	10.19	19.61	50.00	-30.39
11		13.5617	43.37	1.37	44.74	60.00	-15.26
12 *		13.5617	38.36	1.37	39.73	50.00	-10.27

3.2 Radiated Emissions

Limit

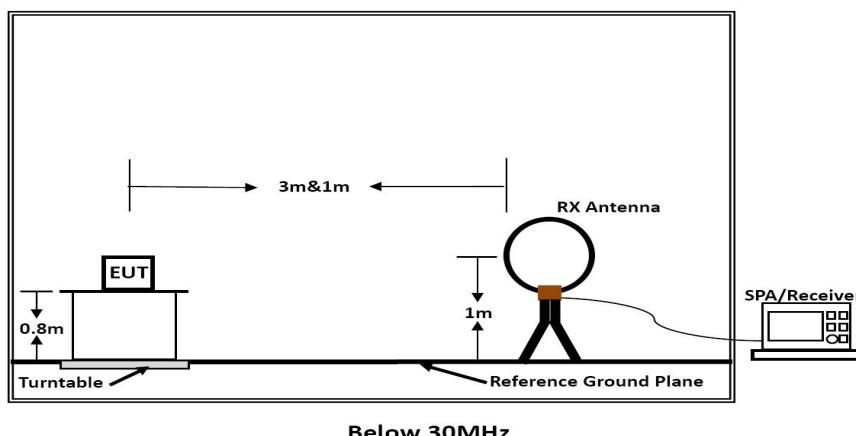
- a The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.
- b Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- c Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- d The field strength of any emissions appearing outside of the 13.110– 14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Radiated emission limits

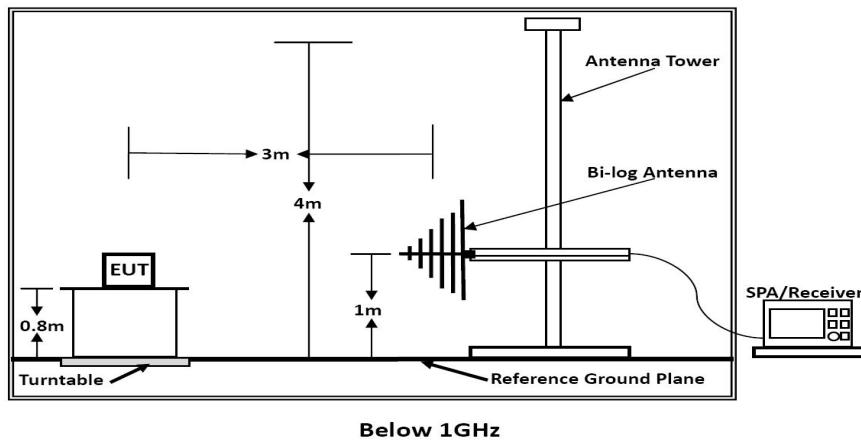
Frequency(MHz)	Distance(Meters)	Radiated(dBuV/m)	Radiated(μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-13.110	3	69.54	30
13.110-13.410	3	80.50	106
13.410-13.553	3	90.47	334
13.553-13.567	3	124.00	15848
13.567-13.710	3	90.47	334
13.710-14.010	3	80.50	106
14.010-30.0	3	69.54	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

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



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 1GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bi-log Antenna	3

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP

TEST RESULTS

Below 30MHz

Frequency(MHz):		13.56MHz		Polarity:	Antenna Position 0	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
3.745	14.14	22.03	36.17	69.54	-33.37	PEAK
13.376	20.76	22.58	43.34	80.50	-37.16	PEAK
13.441	33.68	22.59	56.27	90.47	-34.20	PEAK
13.567	43.03	22.62	65.65	124.00	-58.35	PEAK
13.647	33.96	22.63	56.59	90.47	-33.88	PEAK
13.975	20.28	22.7	42.98	80.50	-37.52	PEAK
19.163	12.95	22.74	35.69	69.54	-33.85	PEAK

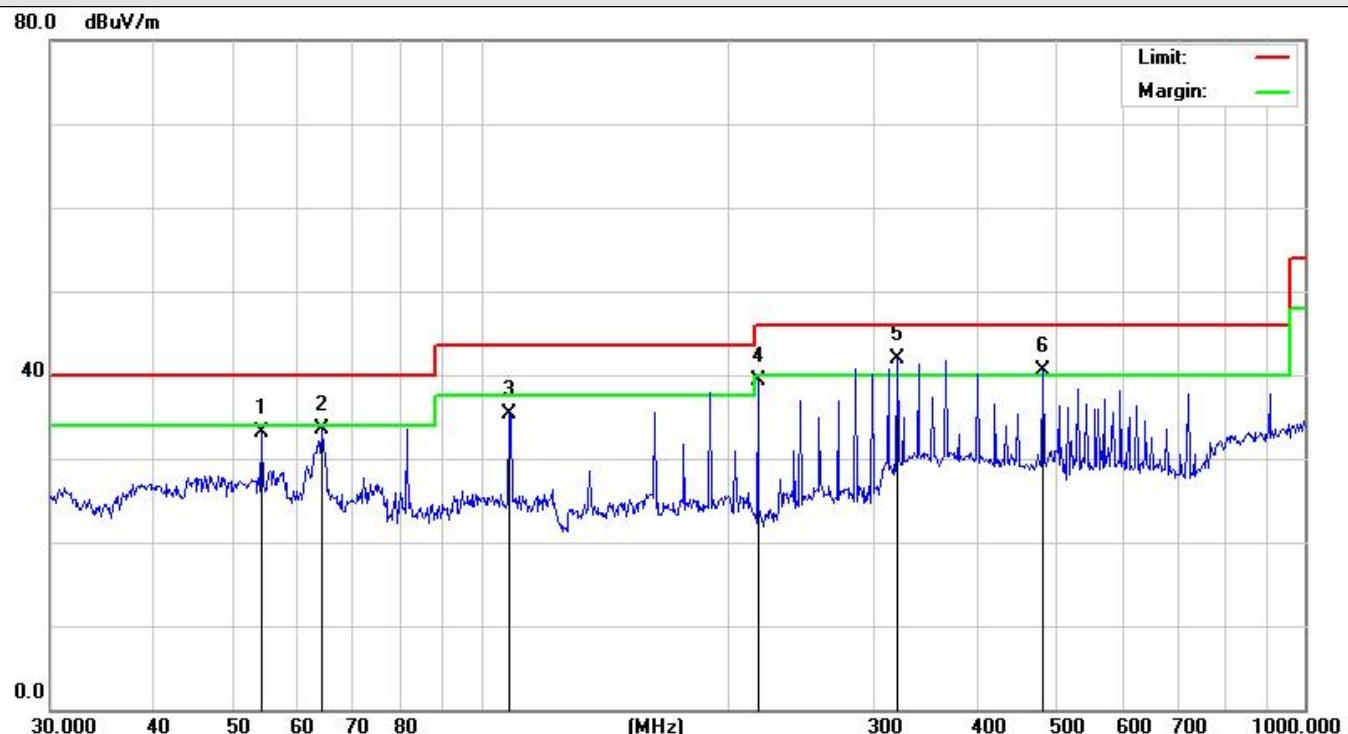
Frequency(MHz):		13.56MHz		Polarity:	Antenna Position 90	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
8.653	12.71	22.07	34.78	69.54	-34.76	PEAK
13.289	22.11	22.56	44.67	80.50	-35.83	PEAK
13.526	34	22.61	56.61	90.47	-33.86	PEAK
13.567	42.77	22.62	65.39	124.00	-58.61	PEAK
13.59	32.56	22.62	55.18	90.47	-35.29	PEAK
13.95	20.85	22.69	43.54	80.50	-36.96	PEAK

REMARKS:

1. Emission level (dB μ V/m) = Reading (dB μ V)+ Factor (dB/m)
2. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)
3. Margin value = Emission level-Limit value.
4. Other emission levels are attenuated 20dB below the limit and not recorded in report.

For 30MHz-1GHz

Model name:	QE001	Test Date :	2025-07-15
Polarization :	Vertical	Test Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail



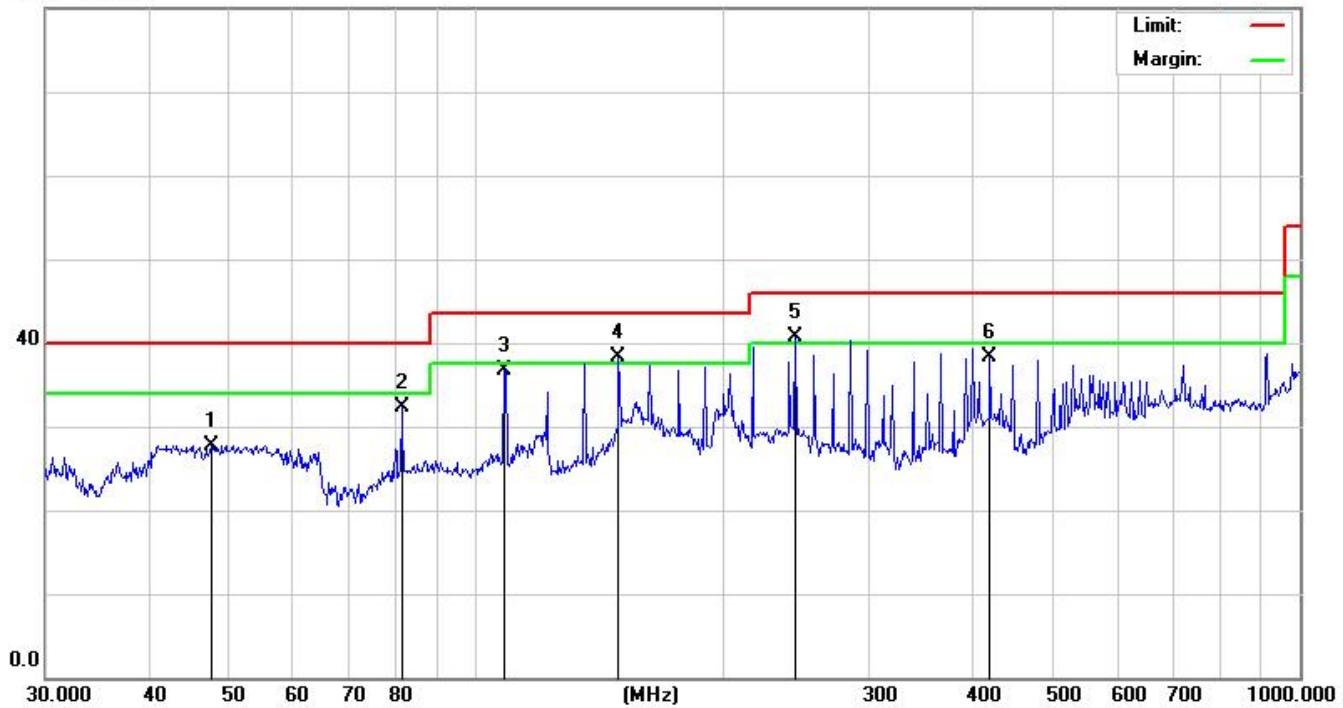
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Measurement Result=Reading Level +Correct Factor;

Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		54.0709	33.75	-0.68	33.07	40.00	-6.93	QP
2		64.2074	36.19	-2.68	33.51	40.00	-6.49	QP
3		108.2664	37.16	-1.79	35.37	43.50	-8.13	QP
4		216.7828	38.91	0.34	39.25	46.00	-6.75	QP
5	*	319.9368	38.84	3.09	41.93	46.00	-4.07	QP
6	!	480.5276	35.21	5.20	40.41	46.00	-5.59	QP

Model name:	QE001	Test Date :	2025-07-15
Polarization :	Horizontal	Test Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

80.0 dBuV/m


Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Measurement Result=Reading Level +Correct Factor;

Over Limit= Measurement Result- Limit;

No.	Mk.	Freq. MHz	Reading	Correct	Measure-	Limit dBuV/m	Over dB	Over Detector
			Level dBuV	Factor dB	ment dBuV/m			
1		47.8260	24.80	2.89	27.69	40.00	-12.31	QP
2		81.2116	37.35	-5.12	32.23	40.00	-7.77	QP
3		108.2664	37.84	-1.19	36.65	43.50	-6.85	QP
4	*	148.9624	39.10	-0.82	38.28	43.50	-5.22	QP
5	!	244.2321	41.34	-0.64	40.70	46.00	-5.30	QP
6		420.5803	31.14	7.09	38.23	46.00	-7.77	QP

3.3 20dB Bandwidth Limit

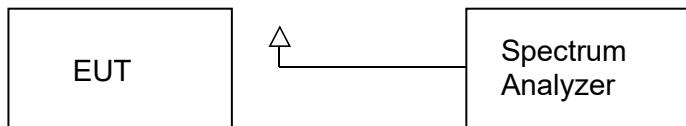
No limit for 20dB bandwidth.

Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration



Test Results

Modulation	Frequency(MHz)	20dB bandwidth (KHz)	99%dB bandwidth (KHz)	Result
ASK	13.56	0.176	0.650	Pass

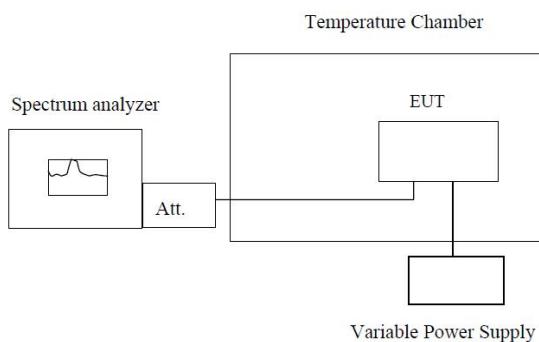


3.4 Frequency Stability

LIMIT

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 15%) or endpoint, record the maximum frequency change.

TEST RESULTS

Reference Frequency: 13.56MHz					
Voltage (V)	Temperature (°C)	Frequency (MHz)	Frequency Deviation(Hz)	Deviation (%)	Result
12.0	+20(Ref)	13.56012	124	0.000914%	Pass
	-20	13.56018	179	0.001320%	Pass
	-10	13.56019	189	0.001394%	Pass
	0	13.56014	135	0.000996%	Pass
	+10	13.56016	164	0.001209%	Pass
	+20	13.56018	178	0.001313%	Pass
	+25	13.56012	118	0.000870%	Pass
	+30	13.56007	70	0.000516%	Pass
	+40	13.56009	89	0.000656%	Pass
	+50	13.56006	63	0.000465%	Pass
13.2	+20	13.56018	180	0.001327%	Pass
10.8	+20	13.56009	87	0.000642%	Pass

4 Test Setup Photographs of EUT

Please refer to separated files for Test Setup Photos of the EUT.

5 Photos of EUT

Please refer to separated files for External Photos of the EUT.

*****End of Report*****