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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

Test Report

Report No. :	CQASZ20190200042E-05
Applicant:	Azpen Shenzhen MingTel Digital Technology CO., LTD.
Address of Applicant:	2nd F, 9th Building, DeTai Industrial Park, Longhua District, Shenzhen, China
Manufacturer:	Azpen Shenzhen MingTel Digital Technology CO., LTD.
Address of Manufacturer:	2nd F, 9th Building, DeTai Industrial Park, Longhua District, Shenzhen, China
Product:	10.1"Quad Core Dual SIM 4G Calling Tablet
All Model No.:	G1058A, G1058, G1058B, G1058H, G1058S, G7XX, G8XX, G9XX, G10XX, A7XX, A8XX, A9XX, A10XX (X represents 0 to 9,A to Z Blank)
Test Model No.:	G1058A
Brand Name:	N/A
FCC ID:	2AEHNG1058
Standards:	47 CFR Part 2, 47 CFR Part 22 subpart H 47 CFR Part 24 subpart E 47 CFR Part 27
Test Method:	ANSI C63.26-2015
Date of Test:	2019-03-04 to 2019-06-04
Date of Issue:	2019-06-04
Test Result:	**PASS ***

Tested By： Daisy Qin

(Daisy Qin)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO.,LTD. CQA 华夏准测 APPROVED

* In the configuration tested, the EUT complied with the standards specified above.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190200042E-05	Rev.01	Initial report	2019-06-04

2 Content

3 Test Summary

3.1 Cellular Band (824-849 MHz Paired With 869-894 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913,	ERP ≤ 7 W(38.45dBm)	Section 1 of Appendix A	PASS
Peak-Average Ratio	--	--	Section 2 of Appendix A	PASS
Bandwidth	§2.1049	OBW: No limit EBW: No limit	Section 3 of Appendix A	PASS
Band Edge Compliance	§2.1051, §22.917,	≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix A	PASS
Spurious emissions at antenna terminals	§2.1051, §22.917,	F≤ -13dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix A	PASS
Field strength of spurious radiation	§2.1051, §22.917,	≤ -13dBm	Section 6 of Appendix A	PASS
Frequency stability	§2.1055, §22.355,	≤ ±2.5ppm.	Section 7 of Appendix A	PASS

3.2 PCS Band (1850-1910 MHz paired with 1930-1990 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232	EIRP ≤ 2 W(33dBm)	Section 1 of Appendix A	PASS
Peak-Average Ratio	§2.1046, §24.232	≤13dB	Section 2 of Appendix A	PASS
Bandwidth	§2.1049	OBW: No limit EBW: No limit	Section 3 of Appendix A	PASS
Band Edge Compliance	§2.1051, §24.238	≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix A	PASS
Spurious emissions at antenna terminals	§2.1051, §24.238	≤ -13dBm/1MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix A	PASS
Field strength of spurious radiation	§2.1051, §24.238	≤ -13dBm	Section 6 of Appendix A	PASS
Frequency stability	§2.1055, §24.235	Within authorized frequency block	Section 7 of Appendix A	PASS

3.3 BRS&EBS Band2 (1850-1910 MHz paired with 1930-1990 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232	EIRP ≤ 2 W(33dBm)	Section 1 of Appendix A	PASS
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix A	PASS
Bandwidth	§2.1049	OBW: No limit EBW: No limit	Section 3 of Appendix A	PASS
Band Edge Compliance	§2.1051, §24.238	≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix A	PASS
Spurious emissions at antenna terminals	§2.1051, §24.238	≤ -13dBm/1MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix A	PASS
Field strength of spurious radiation	§2.1051, §24.238	≤ -13dBm	Section 6 of Appendix A	PASS
Frequency stability	§2.1055, §24.235	Within authorized frequency block	Section 7 of Appendix A	PASS

3.4 BRS&EBS Band4 (1710-1755 MHz Paired With 2110-2155 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50,	ERP ≤ 2 W(33dBm)	Section 1 of Appendix A	PASS
Peak-Average Ratio	§27.50,	≤13dB	Section 2 of Appendix A	PASS
Bandwidth	§2.1049	OBW: No limit EBW: No limit	Section 3 of Appendix A	PASS
Band Edge Compliance	§2.1051, §27.53,	≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix A	PASS
Spurious emissions at antenna terminals	§2.1051, §27.53,	F≤ -13dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix A	PASS
Field strength of spurious radiation	§2.1051, §27.53,	≤ -13dBm	Section 6 of Appendix A	PASS
Frequency stability	§2.1055, §27.54,	≤ ±2.5ppm.	Section 7 of Appendix A	PASS

3.5 BRS&EBS Band5 (824-849 MHz Paired With 869-894 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913,	ERP ≤ 2 W(33dBm)	Section 1 of Appendix A	PASS
Peak-Average Ratio	--	--	Section 2 of Appendix A	PASS
Bandwidth	§2.1049	OBW: No limit EBW: No limit	Section 3 of Appendix A	PASS
Band Edge Compliance	§2.1051, §22.917,	≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix A	PASS
Spurious emissions at antenna terminals	§2.1051, §22.917,	F≤ -13dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix A	PASS
Field strength of spurious radiation	§2.1051, §22.917,	≤ -13dBm	Section 6 of Appendix A	PASS
Frequency stability	§2.1055, §22.355,	≤ ±2.5ppm.	Section 7 of Appendix A	PASS

3.6 BRS&EBS Band12 (699-716 MHz Paired With 729-746 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50,	ERP ≤ 3 W(34.77dBm)	Section 1 of Appendix A	PASS
Peak-Average Ratio	--	--	Section 2 of Appendix A	PASS
Bandwidth	§2.1049	OBW: No limit EBW: No limit	Section 3 of Appendix A	PASS
Band Edge Compliance	§2.1051, §27.53,	≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix A	PASS
Spurious emissions at antenna terminals	§2.1051, §27.53,	F≤ -13dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix A	PASS
Field strength of spurious radiation	§2.1051, §27.53,	≤ -13dBm	Section 6 of Appendix A	PASS
Frequency stability	§2.1055, §27.54,	≤ ±2.5ppm.	Section 7 of Appendix A	PASS

4 General Information

4.1 Client Information

Applicant:	Shenzhen MingXun Digital Technlongy CO.,Ltd
Address of Applicant:	201 2/F, Building 9, Detai Technology Park, No. 460 Huarong Road, Dalang Street, Longhua New District, Shenzhen, China
Manufacturer:	Shenzhen MingXun Digital Technlongy CO.,Ltd
Address of Manufacturer:	201 2/F, Building 9, Detai Technology Park, No. 460 Huarong Road, Dalang Street, Longhua New District, Shenzhen, China

4.2 General Description of EUT

Product Name:	10.1"Quad Core Dual SIM 4G Calling Tablet
Model No.:	G1058A, G1058, G1058B, G1058H, G1058S, G7XX, G8XX, G9XX, G10XX, A7XX, A8XX, A9XX, A10XX (X represents 0 to 9,A to Z Blank)
Test Model No.:	G1058A
Trade Mark:	N/A
Hardware Version:	U101 MAIN PCB V2.0
Software Version:	U101.M.V0.2.XHD.20171220.2894
Sample Type:	☐ Mobile ☒ Portable ☐ Fix Location
Antenna Type:	Integral antenna
Antenna Gain:	GSM850: 0.6dBi, GSM1900: 0.8dBi WCDMA Band 2: 0.8Bi, WCDMA Band 5: 0.5dBi, FDD-LTE Band 2: 0.7dBi, FDD-LTE Band 4: 1.8dBi, FDD-LTE Band 5: 1.0dBi, FDD-LTE Band 12: 0.5dBi,
Power Supply:	lithium battery: DC3.7V 6000mA; Charge by Adapter Adapter: Model: K-T100502000U Input: AC100-240V 50/60Hz 0.35A(Max); Output: DC5V 2000mA

Note:

1. All model: G1058A, G1058, G1058B, G1058H, G1058S, G7XX, G8XX, G9XX, G10XX, A7XX, A8XX, A9XX, A10XX (X represents 0 to 9,A to Z Blank)

2. Only the model G1058A, was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4.3 Technical Specification

Characteristics	Description	
Radio System Type	☒ GSM ☒ UMTS ☒ LTE	
Supported Frequency Range	GSM850 /WCDMA850	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	GSM1900 /WCDMA1900	Transmission (TX): 1850 to 1910 MHz
		Receiving (RX): 1930 to 1990 MHz
	LTE BAND2	Transmission (TX): 1850 to 1910 MHz
		Receiving (RX): 1930 to 1990 MHz
	LTE BAND4	Transmission (TX): 1710 to 1785 MHz
		Receiving (RX): 1805 to 1880 MHz
	LTE BAND5	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	LTE BAND12	Transmission (TX): 699 to 716 MHz
		Receiving (RX): 729 to 746 MHz
Target TX Output Power	GSM850: 33dBm , GSM1900: 30.5dBm WCDMA850: 23.5dBm, WCDMA1900: 23dBm LTE BAND2: 21.5dBm, LTE BAND4: 21.5dBm LTE BAND5: 22dBm, LTE BAND12: 22dBm	
Supported Channel Bandwidth	GSM system:	☒200 kHz
	UMTS system:	☒5 MHz
	LTE BAND2	☒1.4MHz☒3MHz☒5 MHz☒10 MHz ☒15 MHz☒20 MHz
	LTE BAND4	☒1.4MHz☒3MHz☒5 MHz☒10 MHz ☒15 MHz☒20 MHz
	LTE BAND5	☒1.4MHz☒3MHz☒5 MHz☒10 MHz
	LTE BAND12	☒1.4MHz☒3MHz☒5 MHz☒10 MHz
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	GSM850:	247KGXW, 248KG7W
	GSM1900:	246KGXW, 254KG7W
	UMTS850:	4M18F9W
	UMTS1900:	4M19F9W
	LTE BAND2:	1M07G7D (1.4 MHz QPSK modulation), 1M08W7D (1.4 MHz 16QAM modulation) 2M68G7D (3 MHz QPSK modulation), 2M67W7D (3 MHz 16QAM modulation) 4M49G7D (5 MHz QPSK modulation), 4M47W7D (5 MHz 16QAM modulation) 8M97G7D (10 MHz QPSK modulation), 8M95W7D (10 MHz 16QAM modulation) 13M4G7D (15 MHz QPSK modulation), 13M5W7D (15 MHz 16QAM modulation) 17M9G7D (20 MHz QPSK modulation), 17M9W7D (20 MHz 16QAM modulation)
	LTE BAND4:	1M07G7D (1.4 MHz QPSK modulation), 1M08W7D (1.4 MHz 16QAM modulation) 2M68G7D (3 MHz QPSK modulation), 2M67W7D (3 MHz 16QAM modulation) 4M48G7D (5 MHz QPSK modulation),

		4M48W7D (5 MHz 16QAM modulation) 8M96G7D (10 MHz QPSK modulation), 8M97W7D (10 MHz 16QAM modulation) 13M4G7D (15 MHz QPSK modulation), 13M4W7D (15 MHz 16QAM modulation) 17M9G7D (20 MHz QPSK modulation), 17M9W7D (20 MHz 16QAM modulation)
	LTE BAND5:	1M08G7D (1.4 MHz QPSK modulation), 1M08W7D (1.4 MHz 16QAM modulation) 2M68G7D (3 MHz QPSK modulation), 2M67W7D (3 MHz 16QAM modulation) 4M50G7D (5 MHz QPSK modulation), 4M48W7D (5 MHz 16QAM modulation) 8M94G7D (10 MHz QPSK modulation), 8M94W7D (10 MHz 16QAM modulation)
	LTE BAND12:	1M08G7D (1.4 MHz QPSK modulation), 1M08W7D (1.4 MHz 16QAM modulation) 2M67G7D (3 MHz QPSK modulation), 2M68W7D (3 MHz 16QAM modulation) 4M50G7D (5 MHz QPSK modulation), 4M47W7D (5 MHz 16QAM modulation) 8M99G7D (10 MHz QPSK modulation), 8M96W7D (10 MHz 16QAM modulation)

4.4 Test Mode

Test Mode	Test Modes Description
GSM/TM1	GSM system, GPRS, GMSK modulation
GSM/TM2	GSM system, EGPRS, 8PSK modulation
UMTS/TM1	UMTS system, WCDMA, QPSK modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

4.5 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	52%	
Atmospheric Pressure:	1005Pa	
Temperature	TN	25 °C
Voltage :	VL	3.6V
	VN	3.7V
	VH	4.2V

NOTE: VL= lower extreme test voltage
VN= nominal voltage
VH= upper extreme test voltage
TN= normal temperature

4.6 Test Frequency

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM850	TX	Channel 128	Channel 192	Channel 251
		824.2MHz	836.6MHz	848.8MHz
	RX	Channel 128	Channel 192	Channel 251
		869.2MHz	881.6MHz	893.8MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA850	TX	Channel 4132	Channel 4182	Channel 4233
		826.4MHz	836.4MHz	846.6MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4 MHz	881.4 MHz	891.6 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM1900	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0MHz	1909.8MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA1900	TX	Channel 512	Channel 661	Channel 810
		1852.4MHz	1880.0MHz	1907.6MHz
	RX	Channel 512	Channel 661	Channel 810
		1932.4 MHz	1960.0 MHz	1987.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 2 1.4MHz	TX	Channel 18607	Channel 18900	Channel 19193
		1850.7 MHz	1880 MHz	1909.3 MHz
	RX	Channel 607	Channel 900	Channel 1193
		1930.7 MHz	1960 MHz	1989.3 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 2 3MHz	TX	Channel 18615	Channel 18900	Channel 19185
		1851.5 MHz	1880 MHz	1908.5 MHz
	RX	Channel 615	Channel 900	Channel 1185
		1931.5 MHz	1960 MHz	1988.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 2 5MHz	TX	Channel 18625	Channel 18900	Channel 19175
		1852.5 MHz	1880 MHz	1907.5 MHz
	RX	Channel 625	Channel 900	Channel 1175
		1932.5 MHz	1960 MHz	1987.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 2 10MHz	TX	Channel 18650	Channel 18900	Channel 19150
		1855 MHz	1880 MHz	1905 MHz
	RX	Channel 650	Channel 900	Channel 1150
		1935 MHz	1960 MHz	1985 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 2 15MHz	TX	Channel 18675	Channel 18900	Channel 19125
		1857.5 MHz	1880 MHz	1902.5 MHz
	RX	Channel 675	Channel 900	Channel 3375
		1937.5 MHz	1960 MHz	1982.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 2 20MHz	TX	Channel 18700	Channel 18900	Channel 19100
		1860 MHz	1880 MHz	1900 MHz
	RX	Channel 700	Channel 900	Channel 1100
		1940 MHz	1960 MHz	1980 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 4 1.4MHz	TX	Channel 19957	Channel 20176	Channel 20393
		1710.7 MHz	1732.5 MHz	1754.3 MHz
	RX	Channel 1957	Channel 2175	Channel 2393
		2110.7MHz	2132.5 MHz	2154.3 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 4 3MHz	TX	Channel 19965	Channel 20176	Channel 20385
		1711.5 MHz	1732.5 MHz	1753.5 MHz
	RX	Channel 1965	Channel 2175	Channel 2386
		2111.5 MHz	2132.5 MHz	2153.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 4 5MHz	TX	Channel 19976	Channel 20176	Channel 20375
		1712.5 MHz	1732.5 MHz	1752.5 MHz
	RX	Channel 1975	Channel 2175	Channel 2376
		2112.5 MHz	2132.5 MHz	2152.5MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 4 10MHz	TX	Channel 20000	Channel 20176	Channel 20350
		1715 MHz	1732.5 MHz	1750 MHz
	RX	Channel 2000	Channel 2175	Channel 2350
		2115 MHz	2132.5 MHz	2160 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 4 15MHz	TX	Channel 20025	Channel 20176	Channel 20325
		1717.5 MHz	1732.5 MHz	1747.5 MHz
	RX	Channel 2026	Channel 2175	Channel 2325
		2117.6 MHz	2132.5 MHz	2147.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 4 20MHz	TX	Channel 20050	Channel 20176	Channel 20300
		1720 MHz	1732.5 MHz	1745 MHz
	RX	Channel 2050	Channel 2175	Channel 2300
		2120 MHz	2132.5 MHz	2145 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 5 1.4MHz	TX	Channel 20407	Channel 20525	Channel 20643
		824.7 MHz	836.5 MHz	848.3 MHz
	RX	Channel 2407	Channel 2525	Channel 2643
		869.7 MHz	881.5 MHz	893.3 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 5 3MHz	TX	Channel 20415	Channel 20525	Channel 20635
		825.5 MHz	836.5 MHz	847.5 MHz
	RX	Channel 2415	Channel 2525	Channel 2635
		870.5 MHz	881.5 MHz	892.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 5 5MHz	TX	Channel 20425	Channel 20525	Channel 20625
		826.5 MHz	836.5 MHz	846.5 MHz
	RX	Channel 2425	Channel 2525	Channel 2625
		881.5 MHz	881.5 MHz	891.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 5 10MHz	TX	Channel 20450	Channel 20525	Channel 20600
		829 MHz	836.5 MHz	844 MHz
	RX	Channel 2450	Channel 2525	Channel 2600
		874 MHz	881.5 MHz	889 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 12 1.4MHz	TX	Channel 23017	Channel 23095	Channel 23173
		699.7 MHz	707.5 MHz	715.3 MHz
	RX	Channel 5017	Channel 5095	Channel 5173
		729.7 MHz	737.5 MHz	745.3 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 12 3MHz	TX	Channel 23025	Channel 23095	Channel 23165
		700.5 MHz	707.5 MHz	714.5 MHz
	RX	Channel 5025	Channel 5095	Channel 5165
		730.5 MHz	737.5 MHz	744.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 12 5MHz	TX	Channel 23035	Channel 23095	Channel 23155
		701.5 MHz	707.5 MHz	713.5 MHz
	RX	Channel 5035	Channel 5095	Channel 5155
		731.5 MHz	737.5 MHz	743.5 MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE BAND 12 10MHz	TX	Channel 23060	Channel 23095	Channel 23130
		704 MHz	707.5 MHz	711 MHz
	RX	Channel 5060	Channel 5095	Channel 5130
		734 MHz	737.5 MHz	741 MHz

4.7 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.8 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L5785)

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

4.9 Measurement uncertainty

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	3×10-8	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

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

4.10Deviation from Standards

None.

4.11Abnormalities from Standard Conditions

None.

4.12Other Information Requested by the Customer

None.

5 Description of Tests

5.1 Conducted Output Power

Measurement Procedure:

The transmitter output was connected to a calibrated coaxial cable, attenuator and power meter, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the power reading. The tests were performed at three frequencies (low channel, middle channel and high channel) and on the highest power levels, which can be setup on the transmitters.

Note: Reference test setup 1

5.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure:

Below 1GHz test procedure as below:

1). The EUT was powered ON and placed on a 0.8m high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8). Calculate power in dBm by the following formula:

ERP (dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pg is the generator output power into the substitution antenna.

Above 1GHz test procedure as below:

1). Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2). Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

Where:

Pg is the generator output power into the substitution antenna.

3). Test the EUT in the lowest channel, the middle channel the Highest channel

4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5). Repeat above procedures until all frequencies measured was complete.

Note: Reference test setup 2

5.3 Occupied Bandwidth

Measurement Procedure:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel, middle channel and high channel).The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

Note: Reference test setup 1

5.4 Band Edge at Antenna Terminals

Measurement Procedure:

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 100kHz or 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. The EUT emission bandwidth is measured as the width of the signal between two points, outside of which all emission are attenuated at least 26dB below the transmitter power. The video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to peak or peak hold power.

Note: Reference test setup 1

5.5 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure:

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee’s frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Note: Reference test setup 1

5.6 Peak-Average Ratio

Measurement Procedure:

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

Note: Reference test setup 1

5.7 Field Strength of Spurious Radiation

Measurement Procedure:

Below 1GHz test procedure as below:

1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5). A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6). The output power into the substitution antenna was then measured.

7). Steps 5) and 6) were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pd is the dipole equivalent power, Pg is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic

source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB]. The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10log10(Power [Watts]).

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber
2) Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

Where:

Pg is the generator output power into the substitution antenna.

3. Test the EUT in the lowest channel, the middle channel the Highest channel
4. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.
5. Repeat above procedures until all frequencies measured was complete

Note: Reference test setup 3

5.8 Frequency Stability / Temperature Variation

Measurement Procedure:

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E (2016). The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

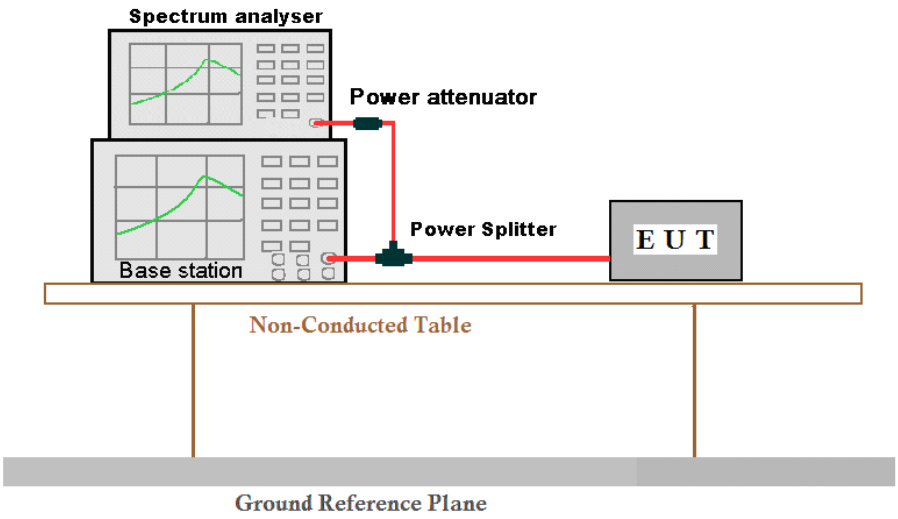
Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Note: Reference test setup 4

5.9 Test Setups

5.9.1 Test Setup 1



5.9.2 Test Setup 2

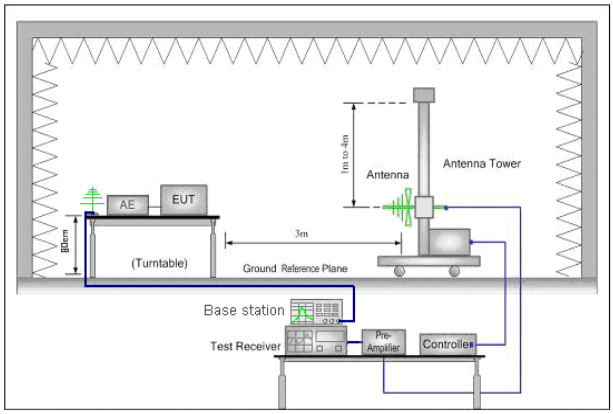


Figure 1. 30MHz to 1GHz

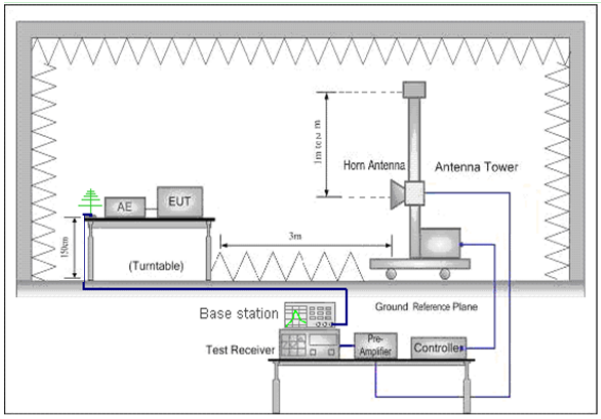


Figure 2. above 1GHz

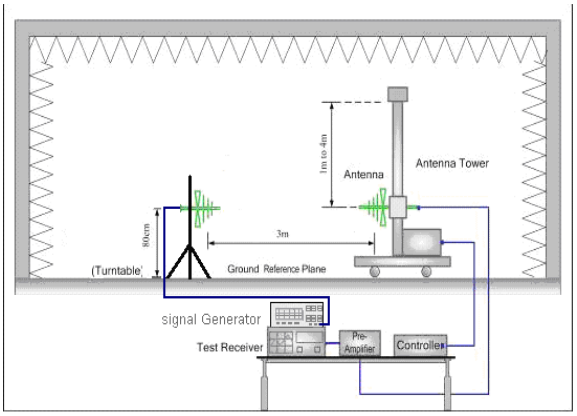


Figure 1. 30MHz to 1GHz

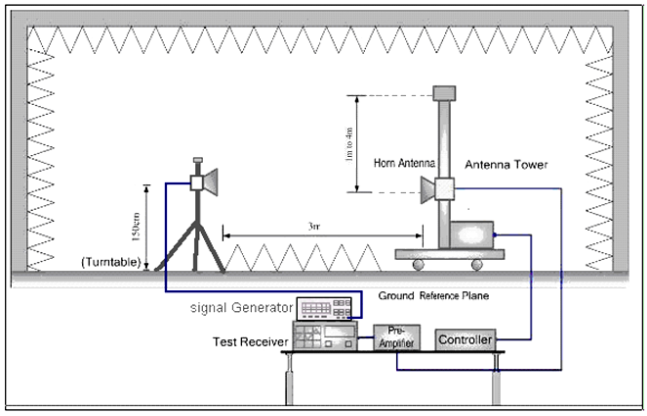


Figure 2. above 1GHz

5.9.3 Test Setup 3

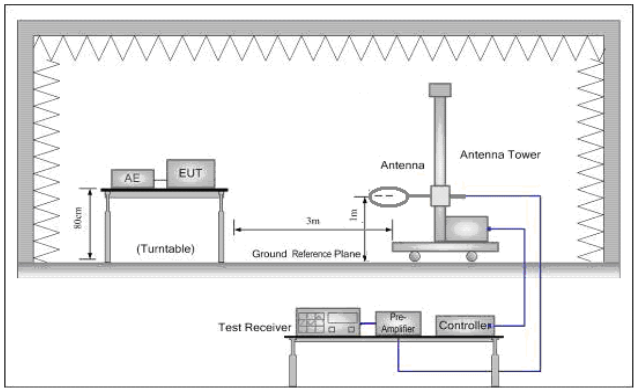


Figure 1. Below 30MHz

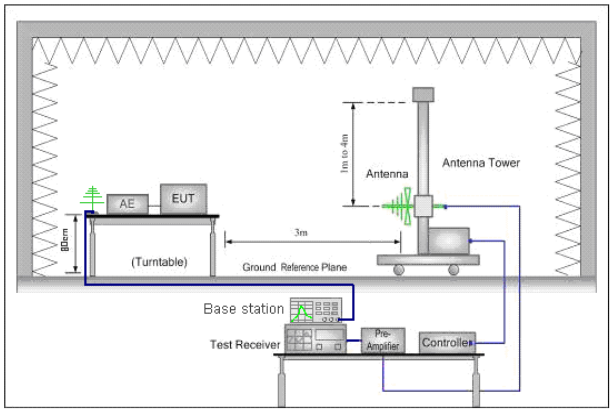


Figure 2. 30MHz to 1GHz

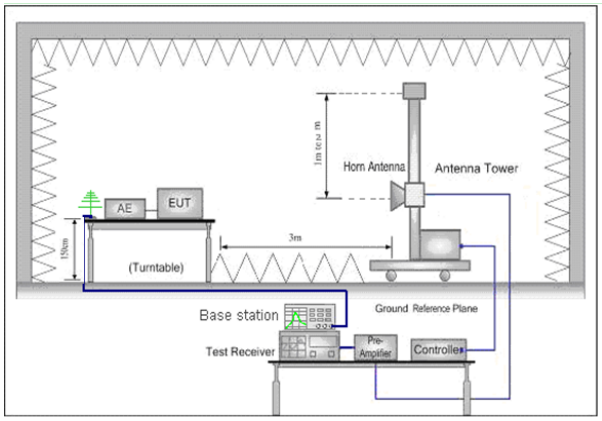


Figure 3. above 1GHz

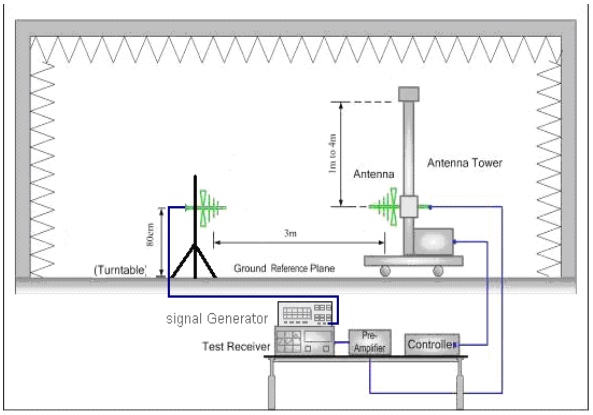


Figure 2. 30MHz to 1GHz

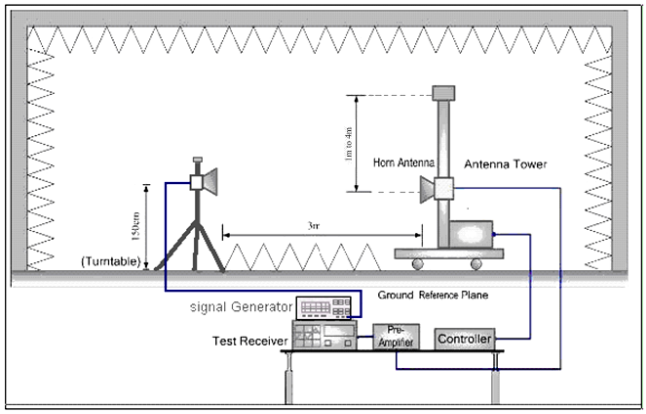
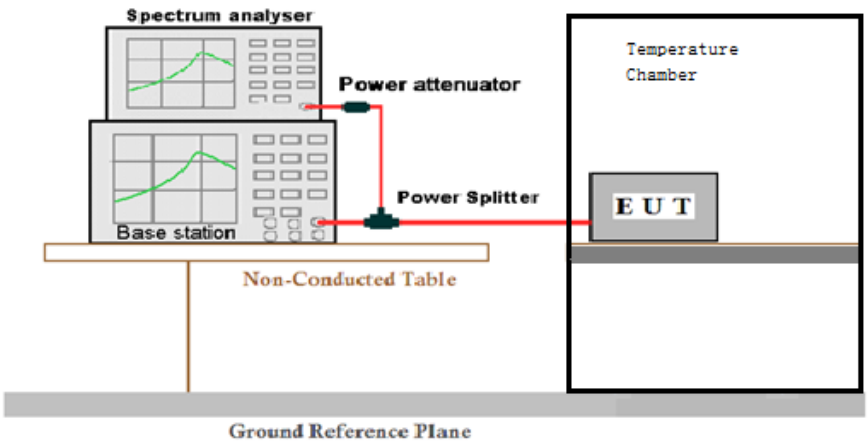


Figure 3. above 1GHz

5.9.4 Test Setup 4



5.10 Test Conditions

Test Case		Test Conditions	
Transmit Output Power Data	Average Power, Total	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
	Average Power, Spectral Density (if required)	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
Peak-to-Average Ratio (if required)		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
Modulation Characteristics		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (M= middle channe)
		Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1;
Bandwidth	Occupied Bandwidth	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
	Emission Bandwidth (if required)	Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
Band Edges Compliance		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1

	RF Channels (TX)	L, H (L= low channel, H= high channel)
	Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
Spurious Emission at Antenna Terminals	Test Environment	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	RF Channels (TX)	L, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2
Field Strength of Spurious Radiation	Test Environment	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 2
	Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2 NOTE: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Frequency Stability	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) VL, VN and VH of Rated Voltage at Ambient Climate.
	Test Setup	Test Setup 4
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2

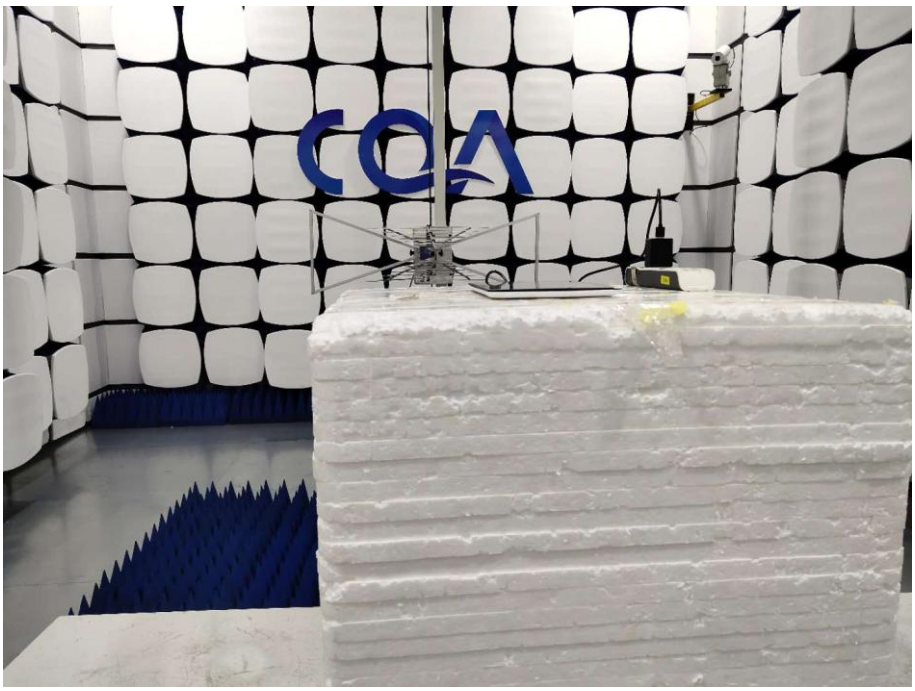
6 Main Test Equipment

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Spectrum Analyzer	Agilent	E4440A	CQA-116	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/10/28	2020/10/27
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	CQA-022	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
H & T Chamber	Auchno	OJN-9606	CQA-CB2	2018/12/24	2019/12/23

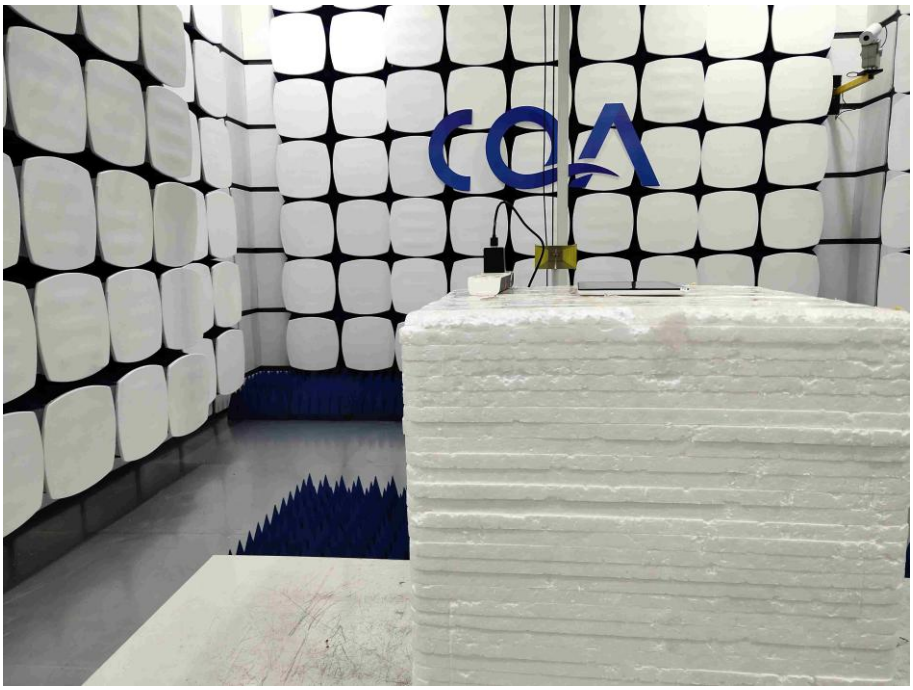
7 Photographs - EUT Test Setup

7.1 Radiated Spurious Emission

30MHz~1GHz:



Above 1GHz:



8 Photographs - EUT Constructional Details

Refer to Photographs of EUT Constructional Details for CQASZ20190200042E-01.

The End