RADIO TEST REPORT-LTE
47 CFR FCC Part 2&22&24&27&90

Client Information:

Applicant: Hyperconnect Lab Inc.

Applicant add.: 1259 El Camino Real #222 Menlo Park, CA 94025

Product Information:

Product Name: Pebble Tracker

Model No.: CS-PEBBLETRKR-01

Serial Model: N/A

Brand Name: Pebble

Report No.: AIT21091002W2

FCC ID: 2A25ICS-PEBBLETRKR

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

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Guangdong, China

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Date of Receipt: Sep. 10, 2021 Date of Test: Sep. 12, 2021~ Sep. 26, 2021

Date of Issue: Sep. 29, 2021 Test Result: Pass

This device described above has been tested by Dongguan Yaxu (AiT) Technology Limited 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.

Reviewed by: Simba Huang Simba Huang

Approved by: Seal.chen Seal.chen

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1. SUMMARY OF TEST

1.1 TEST FACILITY

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

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 Aug.04, 2020

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.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **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** %.

No.	Item	Uncertainty
1	Conducted Emission Test	±1.20dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±3.75dB
5	All emissions,radiated(>1G)	±3.88dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Manufacturer:	SHENZHEN CCFROM CO.,LIMITED
Manufacturer Address:	10/F.ChuangzhanCenter(ANHUIBuilding)Futian,shenzhen, China
Equipment :	Pebble Tracker
Trade Mark:	Pebble
Model Name:	CS-PEBBLETRKR-01
Serial Model:	N/A
NB-IOT	
Support Band:	NB-IOT FDD Band 2 NB-IOT FDD Band 4 NB-IOT FDD Band 26 NB-IOT FDD Band 66
SIM CARD :	The EUT has one SIM Card sockets
Power Class:	E-UTRA :3
Modulation Mode:	BPSK/QPSK
Antenna:	PIFA Antenna
H/W No.:	N/A
S/W No.:	N/A
Model different:	N/A

2.2 LIST OF TEST EQUIPMENTS

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	R&S	FSV40	101470	2021.08.30	2022.08.29
2	EMI Measuring Receiver	R&S	ESR	101160	2021.08.30	2022.08.29
3	Low Noise Pre Amplifier	HP	HP8447E	AiT-F01319	2021.08.30	2022.08.29
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2021.08.30	2022.08.29
5	Passive Loop	ETS	6512	00165355	2020.09.05	2022.09.04
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2021.08.28	2022.08.27
7	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2021.08.28	2022.08.27
8	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367d	2020.11.24	2023.11.23
9	EMI Test Receiver	R&S	ESCI	100124	2021.08.30	2022.08.29
10	LISN	Kyoritsu	KNW-242	8-837-4	2021.08.30	2022.08.29
11	LISN	R&S	ESH3-Z2	0357.8810.54-101161-S2	2021.08.30	2022.08.29
12	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2021.08.30	2022.08.29
13	RF Automatic Test system	MW	MW100-RFCB	21033016	2021.08.30	2022.08.29
14	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2021.08.30	2022.08.29
15	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
16	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.						

2.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Product Specification Subjective To This Standard	
Tx Frequency	NB-IOT Band 2:1850~1910MHz NB-IOT Band 4:1710~1755MHz NB-IOT Band 26:814~849MHz NB-IOT Band 66:1710~1780MHz
Rx Frequency	NB-IOT Band 2:1930 ~1990MHz NB-IOT Band 4:2110~2155MHz NB-IOT Band 26:859~894MHz NB-IOT Band 66:2110~2200MHz
Bandwidth	NB-IOT Band 2: 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz NB-IOT Band 4: 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz /20MHz NB-IOT Band 26: 1.4MHz / 3MHz / 5MHz / 10MHz/ 15MHz NB-IOT Band 66: 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz /20MHz
Maximum Power	NB-IOT Band 2: 24.92 dBm NB-IOT Band 4: 24.68 dBm NB-IOT Band 26(L): 23.21dBm NB-IOT Band 26(U): 24.92 dBm NB-IOT Band 66: 24.87 dBm
Type of Modulation	BPSK/QPSK

List of Frequencies under Test

Operation bands	Mode	Frequencies under Test					
		Uplink			Downlink		
		Range	EARFCN	Frequencies (MHz)	Range	EARFCN	Frequencies (MHz)
2	Standalone	Low	18601	1850.1000	Low	601	1930.1000
		Mid	18900	1880.0000	Mid	900	1960.0000
		High	19199	1909.9000	High	1199	1989.9000
4	Standalone	Low	19951	1710.1000	Low	1951	2110.1000
		Mid	20175	1732.5000	Mid	2175	2132.5000
		High	20399	1754.9000	High	2399	2154.9000
26(L)	Standalone	Low	26691	814.1000	Low	8691	859.1000
		Mid	26740	819.0000	Mid	8740	864.0000
		High	26789	823.9000	High	8789	868.9000
26(U)	Standalone	Low	26791	824.1000	Low	8791	869.1000
		Mid	26915	836.5000	Mid	8915	881.5000
		High	27039	848.9000	High	9039	893.9000
66	Standalone	Low	131973	1710.1000	Low	66437	2110.1000
		Mid	132322	1745.0000	Mid	66786	2145.0000
		High	132671	1779.9000	High	67135	2179.9000

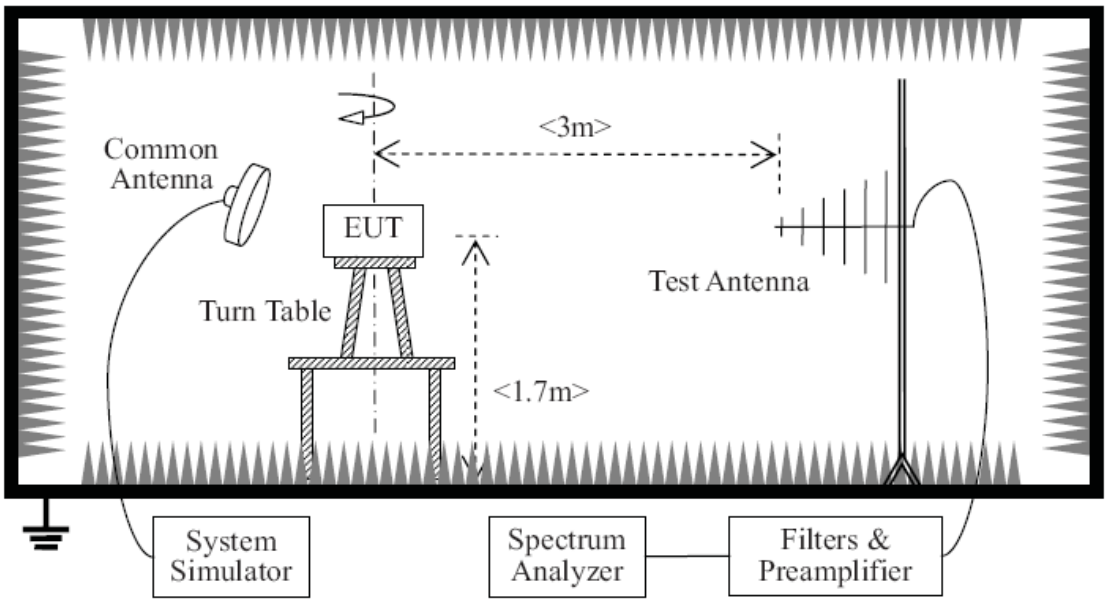
2.4 TEST CONFIGURATION OF EQUIPMENT UNDER TEST

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 and ANSI C63.26 2015 Power Meas. License Digital Systems with maximum output power. Radiated measurements are performed by rotating the EUT in three different orthogonal test planes tofind the maximum emission.
Remark:
1. The mark ‘v’means that this configuration is chosen for testing
2. The mark ‘-’means that this bandwidth is not supported.
3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated

ITEMS	Band	Subcarrier Spacing (KHz)		Modulation		Test Channel		
		3.75	15	BPSK	QPSK	L	M	H
Max. Output Power, E.R.P.& E.I.R.P.	2	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v
	26	v	v	v	v	v	v	v
	66	v	v	v	v	v	v	v
Peak-to-Average Ratio	2	v	v	v	v		v	
	4	v	v	v	v		v	
	26	v	v	v	v		v	
	66	v	v	v	v		v	
26dB&99% Bandwidth	2	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v
	26	v	v	v	v	v	v	v
	66	v	v	v	v	v	v	v

2.5 TEST SETUP

1. Radiated Spurious Emission Test Setup



The EUT, which is powered by USB 5V, is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. LTE FDD band Power Control Level = 3), and only the test result of the maximum output power was recorded.

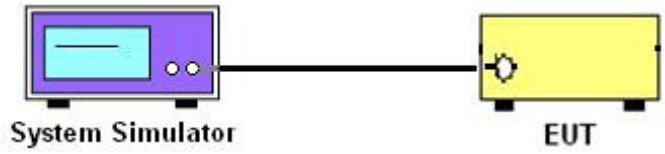
3. CONDUCTED OUTPUT POWER

3.1 DESCRIPTION OF THE CONDUCTED OUTPUT POWER MEASUREMENT

3.1.1 MEASUREMENT METHOD

A system simulator was used to establish communication with the eut. Its parameters were set to force the eut transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.
Configuration follows KDB 971168 D01 v03r01.

3.1.2 TEST SETUP



3.1.3 TEST PROCEDURES

1. The transmitter output port was connected to system simulator.

2. Set EUT at maximum power through the system simulator.

3. Select lowest/middle/highest channels for each band and different modulation.

4. Measure and record the power level from the system simulator.

5. Limit

Operating band	FCC Limit	ISED Limit
Band 2	EIRP 2 watts	EIRP 2 watts
Band 4	EIRP 1 watts	EIRP 1 watts
Band 26 Lower Band	< 100 watts	N/A
Band 26 Upper Band	ERP 7 watts	ERP 11.5 watts
Band 66	EIRP 1 watts	EIRP 1 watts

Note: ERP or EIRP = $P_{Meas} + G_T$
Where ERP or EIRP: effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g. dBm)
P_{Meas}: measured transmitter output power, in dBm
G_T: gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

3.1.4 TEST RESULTS

Band	Modulation	Channel	Subcarrier Space (KHz)	RB Configure	Result (dBm)	EIRP (dBm) | (watts)		Limit (watts)	Verdict
Band 2	BPSK	18601	3.75	1@0	6.27	7.33	0.01	2	PASS
				1@47	6.23	7.29	0.01	2	PASS
			15	1@0	6.35	7.41	0.01	2	PASS
				1@11	6.32	7.38	0.01	2	PASS
Band 2	BPSK	18602	3.75	1@0	23.26	24.32	0.27	2	PASS
				1@47	23.27	24.33	0.27	2	PASS
			15	1@0	21.11	22.17	0.16	2	PASS
				1@11	21.08	22.14	0.16	2	PASS
Band 2	QPSK	18601	3.75	1@0	6.27	7.33	0.01	2	PASS
				1@47	6.25	7.31	0.01	2	PASS
			15	1@0	6.43	7.49	0.01	2	PASS
				1@11	6.33	7.39	0.01	2	PASS
				3@3	6.49	7.55	0.01	2	PASS
Band 2	QPSK	18602	3.75	1@0	23.3	24.36	0.27	2	PASS
				1@47	23.3	24.36	0.27	2	PASS
			15	1@0	21.25	22.31	0.17	2	PASS
				1@11	21.18	22.24	0.17	2	PASS
				3@3	23.53	24.59	0.29	2	PASS
Band 2	BPSK	18900	3.75	1@0	23.3	24.36	0.27	2	PASS
				1@47	23.25	24.31	0.27	2	PASS
			15	1@0	21.14	22.2	0.17	2	PASS
				1@11	21.04	22.1	0.16	2	PASS
Band 2	QPSK	18900	3.75	1@0	23.37	24.43	0.28	2	PASS
				1@47	23.27	24.33	0.27	2	PASS
			15	1@0	21.29	22.35	0.17	2	PASS
				1@11	21.2	22.26	0.17	2	PASS
				3@3	23.5	24.56	0.29	2	PASS
Band 2	BPSK	19198	3.75	1@0	22.67	23.73	0.24	2	PASS
				1@47	22.53	23.59	0.23	2	PASS
			15	1@0	21.26	22.32	0.17	2	PASS
				1@11	21.32	22.38	0.17	2	PASS
Band 2	BPSK	19199	3.75	1@0	6.45	7.51	0.01	2	PASS
				1@47	6.43	7.49	0.01	2	PASS
			15	1@0	6.45	7.51	0.01	2	PASS
				1@11	6.41	7.47	0.01	2	PASS
Band 2	QPSK	19198	3.75	1@0	22.79	23.85	0.24	2	PASS
				1@47	22.78	23.84	0.24	2	PASS
			15	1@0	21.45	22.51	0.18	2	PASS
				1@11	21.42	22.48	0.18	2	PASS
				3@3	23.86	24.92	0.31	2	PASS
Band 2	QPSK	19199	3.75	1@0	6.55	7.61	0.01	2	PASS
				1@47	6.47	7.53	0.01	2	PASS
			15	1@0	6.52	7.58	0.01	2	PASS
				1@11	6.48	7.54	0.01	2	PASS
				3@3	6.51	7.57	0.01	2	PASS

Band	Modulation	Channel	Subcarrier Space (KHz)	RB Configure	Result (dBm)	EIRP (dBm)	(watts)	Limit (watts)	Verdict
Band 4	BPSK	19951	3.75	1@0	6.51	7.57	0.01	1	PASS
				1@47	6.37	7.43	0.01	1	PASS
			15	1@0	6.37	7.43	0.01	1	PASS
				1@11	6.44	7.5	0.01	1	PASS
Band 4	BPSK	19952	3.75	1@0	23.52	24.58	0.29	1	PASS
				1@47	23.46	24.52	0.28	1	PASS
			15	1@0	21.22	22.28	0.17	1	PASS
				1@11	21.3	22.36	0.17	1	PASS
Band 4	QPSK	19951	3.75	1@0	6.54	7.6	0.01	1	PASS
				1@47	6.47	7.53	0.01	1	PASS
			15	1@0	6.49	7.55	0.01	1	PASS
				1@11	6.41	7.47	0.01	1	PASS
				3@3	6.4	7.46	0.01	1	PASS
Band 4	QPSK	19952	3.75	1@0	23.59	24.65	0.29	1	PASS
				1@47	23.54	24.6	0.29	1	PASS
			15	1@0	21.09	22.15	0.16	1	PASS
				1@11	21.47	22.53	0.18	1	PASS
				3@3	23.62	24.68	0.29	1	PASS
Band 4	BPSK	20175	3.75	1@0	22.51	23.57	0.23	1	PASS
				1@47	22.58	23.64	0.23	1	PASS
			15	1@0	21.39	22.45	0.18	1	PASS
				1@11	21.55	22.61	0.18	1	PASS
Band 4	QPSK	20175	3.75	1@0	22.9	23.96	0.25	1	PASS
				1@47	22.75	23.81	0.24	1	PASS
			15	1@0	21.13	22.19	0.17	1	PASS
				1@11	21.1	22.16	0.16	1	PASS
				3@3	23.21	24.27	0.27	1	PASS
Band 4	BPSK	20398	3.75	1@0	22.53	23.59	0.23	1	PASS
				1@47	22.44	23.5	0.22	1	PASS
			15	1@0	22.12	23.18	0.21	1	PASS
				1@11	22.37	23.43	0.22	1	PASS
Band 4	BPSK	20399	3.75	1@0	6.56	7.62	0.01	1	PASS
				1@47	6.44	7.5	0.01	1	PASS
			15	1@0	6.66	7.72	0.01	1	PASS
				1@11	6.65	7.71	0.01	1	PASS
Band 4	QPSK	20398	3.75	1@0	22.72	23.78	0.24	1	PASS
				1@47	22.69	23.75	0.24	1	PASS
			15	1@0	22.45	23.51	0.22	1	PASS
				1@11	22.35	23.41	0.22	1	PASS
				3@3	23.51	24.57	0.29	1	PASS
Band 4	QPSK	20399	3.75	1@0	6.6	7.66	0.01	1	PASS
				1@47	6.52	7.58	0.01	1	PASS
			15	1@0	6.75	7.81	0.01	1	PASS
				1@11	6.69	7.75	0.01	1	PASS
				3@3	6.76	7.82	0.01	1	PASS

Band 26 (Part 22)

Band	Modulation	Channel	Subcarrier Space (KHz)	RB Configure	Result (dBm)	ERP (dBm) | (watts)		Limit (watts)		Verdict
Band 26	BPSK	26791	3.75	1@0	6.33	7.39	0.01	7	11.5	PASS
				1@47	6.32	7.38	0.01	7	11.5	PASS
			15	1@0	6.32	7.38	0.01	7	11.5	PASS
				1@11	6.29	7.35	0.01	7	11.5	PASS
Band 26	BPSK	26792	3.75	1@0	23.01	24.07	0.26	7	11.5	PASS
				1@47	23	24.06	0.25	7	11.5	PASS
			15	1@0	23.84	24.9	0.31	7	11.5	PASS
				1@11	23.86	24.92	0.31	7	11.5	PASS
Band 26	QPSK	26791	3.75	1@0	6.38	7.44	0.01	7	11.5	PASS
				1@47	6.31	7.37	0.01	7	11.5	PASS
			15	1@0	6.45	7.51	0.01	7	11.5	PASS
				1@11	6.37	7.43	0.01	7	11.5	PASS
				3@3	6.36	7.42	0.01	7	11.5	PASS
Band 26	QPSK	26792	3.75	1@0	23.14	24.2	0.26	7	11.5	PASS
				1@47	23.07	24.13	0.26	7	11.5	PASS
			15	1@0	21.08	22.14	0.16	7	11.5	PASS
				1@11	21.01	22.07	0.16	7	11.5	PASS
				3@3	23.22	24.28	0.27	7	11.5	PASS
Band 26	BPSK	26915	3.75	1@0	22.51	23.57	0.23	7	11.5	PASS
				1@47	22.52	23.58	0.23	7	11.5	PASS
			15	1@0	22.31	23.37	0.22	7	11.5	PASS
				1@11	22.88	23.94	0.25	7	11.5	PASS
Band 26	QPSK	26915	3.75	1@0	22.79	23.85	0.24	7	11.5	PASS
				1@47	22.76	23.82	0.24	7	11.5	PASS
			15	1@0	21.02	22.08	0.16	7	11.5	PASS
				1@11	21.54	22.6	0.18	7	11.5	PASS
				3@3	23.27	24.33	0.27	7	11.5	PASS
Band 26	BPSK	27038	3.75	1@0	22.58	23.64	0.23	7	11.5	PASS
				1@47	22.42	23.48	0.22	7	11.5	PASS
			15	1@0	21.01	22.07	0.16	7	11.5	PASS
				1@11	21.95	23.01	0.20	7	11.5	PASS
Band 26	BPSK	27039	3.75	1@0	6.39	7.45	0.01	7	11.5	PASS
				1@47	6.31	7.37	0.01	7	11.5	PASS
			15	1@0	6.38	7.44	0.01	7	11.5	PASS
				1@11	6.36	7.42	0.01	7	11.5	PASS
Band 26	QPSK	27038	3.75	1@0	22.72	23.78	0.24	7	11.5	PASS
				1@47	22.56	23.62	0.23	7	11.5	PASS
			15	1@0	21.14	22.2	0.17	7	11.5	PASS
				1@11	21.15	22.21	0.17	7	11.5	PASS
				3@3	23.35	24.41	0.28	7	11.5	PASS
Band 26	QPSK	27039	3.75	1@0	6.46	7.52	0.01	7	11.5	PASS
				1@47	6.38	7.44	0.01	7	11.5	PASS
			15	1@0	6.47	7.53	0.01	7	11.5	PASS
				1@11	6.41	7.47	0.01	7	11.5	PASS
				3@3	6.42	7.48	0.01	7	11.5	PASS

Band 26 (Part 90)

Band	Modulation	Channel	Subcarrier Space (KHz)	RB Configure	Result (dBm)	Limit (watts)	Verdict
Band 26	BPSK	26691	3.75	1@0	5.32	100	PASS
				1@47	5.30	100	PASS
			15	1@0	5.38	100	PASS
				1@11	5.35	100	PASS
Band 26	BPSK	26692	3.75	1@0	22.51	100	PASS
				1@47	22.52	100	PASS
			15	1@0	22.82	100	PASS
				1@11	22.84	100	PASS
Band 26	QPSK	26691	3.75	1@0	5.40	100	PASS
				1@47	5.34	100	PASS
			15	1@0	5.37	100	PASS
				1@11	5.40	100	PASS
				3@3	5.33	100	PASS
Band 26	QPSK	26692	3.75	1@0	22.79	100	PASS
				1@47	22.69	100	PASS
			15	1@0	21.01	100	PASS
				1@11	21.96	100	PASS
				3@3	23.19	100	PASS
Band 26	BPSK	26740	3.75	1@0	22.71	100	PASS
				1@47	22.59	100	PASS
			15	1@0	22.18	100	PASS
				1@11	21.94	100	PASS
Band 26	QPSK	26740	3.75	1@0	22.75	100	PASS
				1@47	22.68	100	PASS
			15	1@0	21.04	100	PASS
				1@11	22.05	100	PASS
				3@3	23.21	100	PASS
Band 26	BPSK	26788	3.75	1@0	23.06	100	PASS
				1@47	22.99	100	PASS
			15	1@0	22.94	100	PASS
				1@11	22.85	100	PASS
Band 26	BPSK	26789	3.75	1@0	5.33	100	PASS
				1@47	5.30	100	PASS
			15	1@0	5.36	100	PASS
				1@11	5.37	100	PASS
Band 26	QPSK	26788	3.75	1@0	23.08	100	PASS
				1@47	23.02	100	PASS
			15	1@0	21.05	100	PASS
				1@11	22.96	100	PASS
				3@3	23.18	100	PASS
Band 26	QPSK	26789	3.75	1@0	5.54	100	PASS
				1@47	5.36	100	PASS
			15	1@0	5.43	100	PASS
				1@11	5.36	100	PASS
				3@3	5.42	100	PASS

Band	Modulation	Channel	Subcarrier Space (KHz)	RB Configure	Result (dBm)	EIRP (dBm) | (watts)		Limit (watts)	Verdict
Band 66	BPSK	131973	3.75	1@0	6.54	7.6	0.01	1	PASS
				1@47	6.51	7.57	0.01	1	PASS
			15	1@0	6.41	7.47	0.01	1	PASS
				1@11	6.37	7.43	0.01	1	PASS
Band 66	BPSK	131974	3.75	1@0	23.56	24.62	0.29	1	PASS
				1@47	23.55	24.61	0.29	1	PASS
			15	1@0	21.27	22.33	0.17	1	PASS
				1@11	21.28	22.34	0.17	1	PASS
Band 66	QPSK	131973	3.75	1@0	6.52	7.58	0.01	1	PASS
				1@47	6.55	7.61	0.01	1	PASS
			15	1@0	6.43	7.49	0.01	1	PASS
				1@11	6.49	7.55	0.01	1	PASS
				3@3	6.49	7.55	0.01	1	PASS
Band 66	QPSK	131974	3.75	1@0	23.65	24.71	0.30	1	PASS
				1@47	23.64	24.7	0.30	1	PASS
			15	1@0	21.59	22.65	0.18	1	PASS
				1@11	21.45	22.51	0.18	1	PASS
				3@3	23.68	24.74	0.30	1	PASS
Band 66	BPSK	132322	3.75	1@0	23.37	24.43	0.28	1	PASS
				1@47	23.28	24.34	0.27	1	PASS
			15	1@0	21.18	22.24	0.17	1	PASS
				1@11	21.04	22.1	0.16	1	PASS
Band 66	QPSK	132322	3.75	1@0	23.43	24.49	0.28	1	PASS
				1@47	23.34	24.4	0.28	1	PASS
			15	1@0	21.28	22.34	0.17	1	PASS
				1@11	21.21	22.27	0.17	1	PASS
				3@3	23.65	24.71	0.30	1	PASS
Band 66	BPSK	132670	3.75	1@0	22.56	23.62	0.23	1	PASS
				1@47	22.55	23.61	0.23	1	PASS
			15	1@0	23.4	24.46	0.28	1	PASS
				1@11	23.29	24.35	0.27	1	PASS
Band 66	BPSK	132671	3.75	1@0	6.43	7.49	0.01	1	PASS
				1@47	6.41	7.47	0.01	1	PASS
			15	1@0	6.61	7.67	0.01	1	PASS
				1@11	6.52	7.58	0.01	1	PASS
Band 66	QPSK	132670	3.75	1@0	22.85	23.91	0.25	1	PASS
				1@47	22.76	23.82	0.24	1	PASS
			15	1@0	23.52	24.58	0.29	1	PASS
				1@11	23.46	24.52	0.28	1	PASS
				3@3	23.81	24.87	0.31	1	PASS
Band 66	QPSK	132671	3.75	1@0	6.49	7.55	0.01	1	PASS
				1@47	6.44	7.5	0.01	1	PASS
			15	1@0	6.67	7.73	0.01	1	PASS
				1@11	6.59	7.65	0.01	1	PASS
				3@3	6.69	7.75	0.01	1	PASS

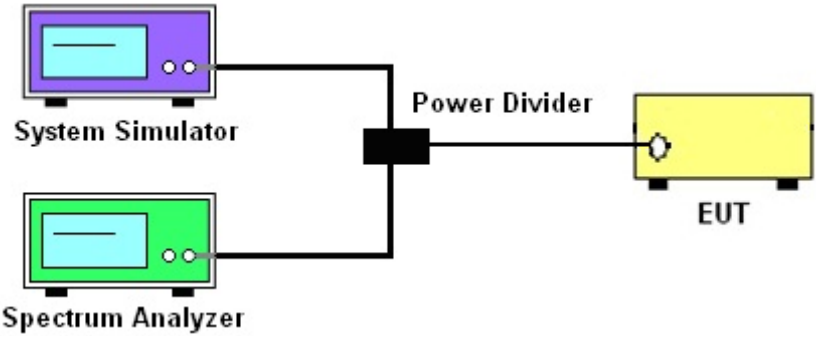
4. PEAK-TO-AVERAGE RATIO

4.1 DESCRIPTION OF THE CONDUCTED OUTPUT POWER MEASUREMENT

4.1.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1.3 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.1.3 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

4.1.2 TEST SETUP



4.1.3 TEST PROCEDURES

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.7 and ANSI C63.26 2015 Section 5.2.6

2. The EUT was connected to spectrum and system simulator via a power divider

3. Select lowest, middle, and highest channels for each band and different modulation.

4. Set the test probe and measure the peak and average power of the spectrum analyzer

5. Record the deviation as Peak to Average Ratio.

LTE BW	1.4M	3M	5M	10M	15M	20M
Span	3MHz	6MHz	10MHz	20MHz	30MHz	40MHz
RBW	30kHz	30kHz	100kHz	100kHz	300kHz	300kHz
VBW	100kHz	100kHz	300kHz	300kHz	1000kHz	1000kHz
Detector	PK/AVG	PK/AVG	PK/AVG	PK/AVG	PK/AVG	PK/AVG
Trace	Max	Max	Max	Max	Max	Max
Sweep Count	Auto	Auto	Auto	Auto	Auto	Auto

4.1.4 TEST RESULTS

NB-IoT Band 2 PAR [dB]				
Mode	Modulation	Subcarrier Space (KHz)	RB Configure	Middle
				P-A
Band 2 Standalone	BPSK	3.75	1@0	0.51
			1@47	3.15
		15	1@0	1.48
			1@11	1.56
	QPSK	3.75	1@0	2.12
			1@47	1.33
		15	1@0	1.58
			1@11	1.48
			3@3	6.83
Limit				≤13dB

NB-IoT Band 4 PAR [dB]				
Mode	Modulation	Subcarrier Space (KHz)	RB Configure	Middle
				P-A
Band 4 Standalone	BPSK	3.75	1@0	1.00
			1@47	2.14
		15	1@0	1.44
			1@11	1.50
	QPSK	3.75	1@0	1.97
			1@47	0.17
		15	1@0	1.51
			1@11	1.42
			3@3	6.14
Limit				≤13dB

NB-IoT Band 26(Part 22) PAR [dB]				
Mode	Modulation	Subcarrier Space (KHz)	RB Configure	Middle
				P-A
Band 26 (Part 22) Standalone	BPSK	3.75	1@0	1.34
			1@47	1.56
		15	1@0	1.28
			1@11	1.36
	QPSK	3.75	1@0	1.34
			1@47	0.88
		15	1@0	1.38
			1@11	1.30
			3@3	5.60
Limit				≤13dB

NB-IoT Band 26(Part 90) PAR [dB]				
Mode	Modulation	Subcarrier Space (KHz)	RB Configure	Middle
				P-A
Band 26 (Part 90) Standalone	BPSK	3.75	1@0	1.23
			1@47	1.55
		15	1@0	1.29
			1@11	1.38
	QPSK	3.75	1@0	1.34
			1@47	1.28
		15	1@0	1.39
			1@11	1.29
			3@3	6.55
Limit				/

NB-IoT Band 66 PAR [dB]				
Mode	Modulation	Subcarrier Space (KHz)	RB Configure	Middle
				P-A
Band 66 Standalone	BPSK	3.75	1@0	1.22
			1@47	1.74
		15	1@0	1.46
			1@11	1.52
	QPSK	3.75	1@0	1.41
			1@47	1.48
		15	1@0	1.55
			1@11	1.50
			3@3	6.99
Limit				≤13dB

Note: Test chart See Appendix D

5. OCCUPIED BANDWIDTH

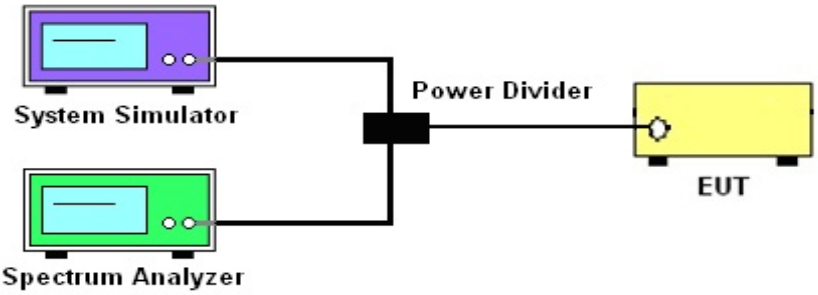
5.1 DESCRIPTION OF OCCUPIED BANDWIDTH MEASUREMENT

5.1.1 MEASUREMENT METHOD

1. The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

2. The 26 db emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 db below the maximum in-band spectral density of the modulated signal. spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

5.1.2 TEST SETUP



5.1.3 TEST PROCEDURES

1. The testing follows FCC KDB 971168 D01 v03r01 Section 4.2 and 4.3.

2. The EUT was connected to spectrum and system simulator via a power divider.

3. Select lowest, middle, and highest channels for each band and different modulation.

4. Set the test probe and measure the Occupied Bandwidth of the spectrum analyzer.

5. Measure and record the Occupied Bandwidth from the Spectrum Analyzer.

LTE BW	1.4M	3M	5M	10M	15M	20M
Span	3MHz	6MHz	10MHz	20MHz	30MHz	40MHz
RBW	30kHz	30kHz	100kHz	100kHz	300kHz	300kHz
VBW	100kHz	100kHz	300kHz	300kHz	1000kHz	1000kHz
Detector	PK	PK	PK	PK	PK	PK
Trace	Max	Max	Max	Max	Max	Max
Sweep Count	Auto	Auto	Auto	Auto	Auto	Auto

5.1.4 MEASUREMENT RESULT

NB-IoT Band 2 Bandwidth [kHz]/Standalone								
Modulation	Subcarrier Space (KHz)	RB Configure	Lowest		Middle		Highest	
			99% BW	26dB BW	99% BW	26dB BW	99% BW	26dB BW
BPSK	3.75	1@0	55.55	37.29	56.01	37.31	53.93	34.92
	15	1@0	114.28	113.8	123.12	114.4	127.26	112.3
QPSK	3.75	1@0	60.78	38.36	58.82	37.32	57.06	37.63
	15	1@0	116.81	114.5	125.61	100.6	120.12	113.1
	15	12@0	190.92	245.4	187.33	246.7	184.84	248.9

NB-IoT Band 4 Bandwidth [kHz]/Standalone								
Modulation	Subcarrier Space (KHz)	RB Configure	Lowest		Middle		Highest	
			99% BW	26dB BW	99% BW	26dB BW	99% BW	26dB BW
BPSK	3.75	1@0	53.31	36.88	52.46	36.85	53.4	35.15
	15	1@0	117.61	103.1	129.54	116.6	118.01	89.71
QPSK	3.75	1@0	59.22	37.82	59.54	38.19	55.21	37.06
	15	1@0	125.84	116.7	120.16	114.1	115.58	114.4
	15	12@0	188.62	245.8	190.68	250.7	186.24	254.6

NB-IoT Band 26 (Part 22) Bandwidth [kHz]/Standalone								
Modulation	Subcarrier Space (KHz)	RB Configure	Lowest		Middle		Highest	
			99% BW	26dB BW	99% BW	26dB BW	99% BW	26dB BW
BPSK	3.75	1@0	54.18	37.24	52.18	35.02	55.17	37.06
	15	1@0	120.43	100.4	131.82	119.5	124.18	130.2
QPSK	3.75	1@0	59.75	40.72	62.64	41.46	57.30	37.94
	15	1@0	116.61	117.3	124.42	128.9	120.44	101.2
	15	12@0	185.1	234	190.92	258.6	184.51	249

NB-IoT Band 26 (Part 90) Bandwidth [kHz]/Standalone								
Modulation	Subcarrier Space (KHz)	RB Configure	Lowest		Middle		Highest	
			99% BW	26dB BW	99% BW	26dB BW	99% BW	26dB BW
BPSK	3.75	1@0	54.31	36.02	54.54	34.66	54.67	37.28
	15	1@0	121.97	116.8	126.9	114.6	117.16	118
QPSK	3.75	1@0	59.30	41.42	59.89	38.45	58.41	37.96
	15	1@0	122.36	129.3	118.3	115.1	117.18	129.8
	15	12@0	189.53	243.8	189.5	244.7	189.7	244

NB-IoT Band 66 Bandwidth [kHz]/Standalone								
Modulation	Subcarrier Space (KHz)	RB Configure	Lowest		Middle		Highest	
			99% BW	26dB BW	99% BW	26dB BW	99% BW	26dB BW
BPSK	3.75	1@0	53.46	34.99	53.82	35.3	53.05	33.25
	15	1@0	118	102	118.11	115.8	128.33	128.5
QPSK	3.75	1@0	58.63	37.44	57.13	37.47	59.65	37.77
	15	1@0	124.81	116.5	116.42	114.4	114.53	128.3
	15	12@0	187.36	250.3	188.68	250.1	185.29	250

Note: Test chart See Appendix A

6. CONDUCTED BAND EDGE

6.1 DESCRIPTION OF CONDUCTED BAND EDGE MEASUREMENT

6.1.1 MEASUREMENT METHOD

1. §22.917(a) For operations in the 824 – 849 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

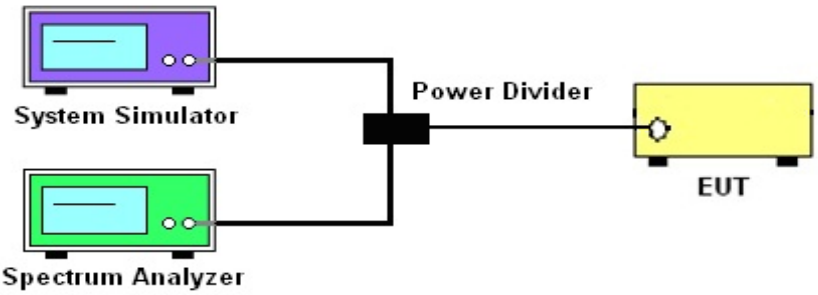
2. §24.238 (a)
For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed

3. §27.53 (h)
For operations in the 1710 – 1755 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4. §27.53(m)(4)
For operations in the 2500 MHz ~ 2570 MHz band this section, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHzand 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licenseesoperating on frequencies below 2495 MHz may also submit a documented interference complaintagainst BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

5. §27.53 (g)
For operations in the 698 -746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

6.1.2 TEST SETUP



6.1.3 TEST PROCEDURES

1. The testing FCC KDB 971168 D01 v03r01 Section 6.0 and ANSI C63.26 2015 Section 5.7.

2. The EUT was connected to spectrum analyzer and system simulator via a power divider.

3. The band edges of low and high channels for the highest RF powers were measured. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.

4. Set spectrum analyzer with RMS/AVG detector.

5. The RF fundamental frequency should be excluded against the limit line in the operating frquency band.

6.The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
= P(W)- [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.

Band 7:
= P(W)- [55 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [55 + 10log(P)] (dB)
= -25dBm.

	LTE					
LTE BW	1.4M	3M	5M	10M	15M	20M
Span	12MHz	13MHz	15MHz	20MHz	25MHz	30MHz
RBW	30kHz	30kHz	100kHz	100kHz	300kHz	300kHz
VBW	100kHz	100kHz	300kHz	300kHz	1000kHz	1000kHz
Detector	RMS	RMS	RMS	RMS	RMS	RMS
Trace	Max	Max	Max	Max	Max	Max
Sweep Count	Auto	Auto	Auto	Auto	Auto	Auto

6.1.4 MEASUREMENT RESULT
Note: Test chart See Appendix B

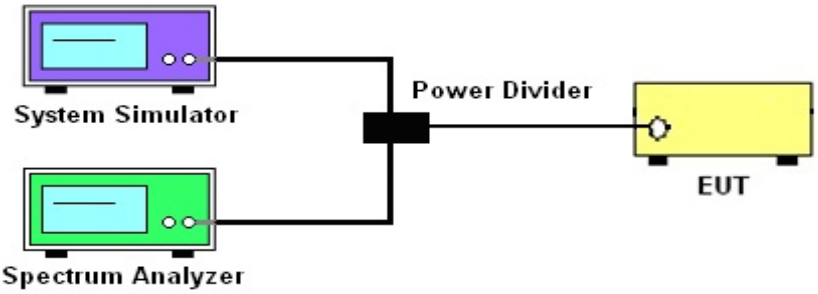
7. CONDUCTED SPURIOUS EMISSION

7.1 DESCRIPTION OF CONDUCTED SPURIOUS EMISSION MEASUREMENT

7.1.1 MEASUREMENT METHOD

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.
For Band 7:
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.
It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

7.1.2 TEST SETUP



7.1.3 TEST PROCEDURES

1. The testing FCC KDB 971168 D01 v03r01 Section 6.0 and ANSI C63.26 2015 Section 5.7.

2. The EUT was connected to spectrum analyzer and system simulator via a power divider.

3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement
4. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
5. The RF fundamental frequency should be excluded against the limit line in the operating frquency band.
6.The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
= P(W)- [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.
For Band 7: P(W)- [43 + 10log(P)] (dB) =-25dBm

	LTE					
LTE BW	1.4M	3M	5M	10M	15M	20M
Span	Auto	Auto	Auto	Auto	Auto	Auto
RBW	1000kHz	1000kHz	1000kHz	1000kHz	1000kHz	1000kHz
VBW	3000kHz	3000kHz	3000kHz	3000kHz	3000kHz	3000kHz
Detector	PK	PK	PK	PK	PK	PK
Trace	Max	Max	Max	Max	Max	Max

7.1.4 TEST RESULTS

Note: Test chart See Appendix C

8. RADIATED SPURIOUS EMISSION

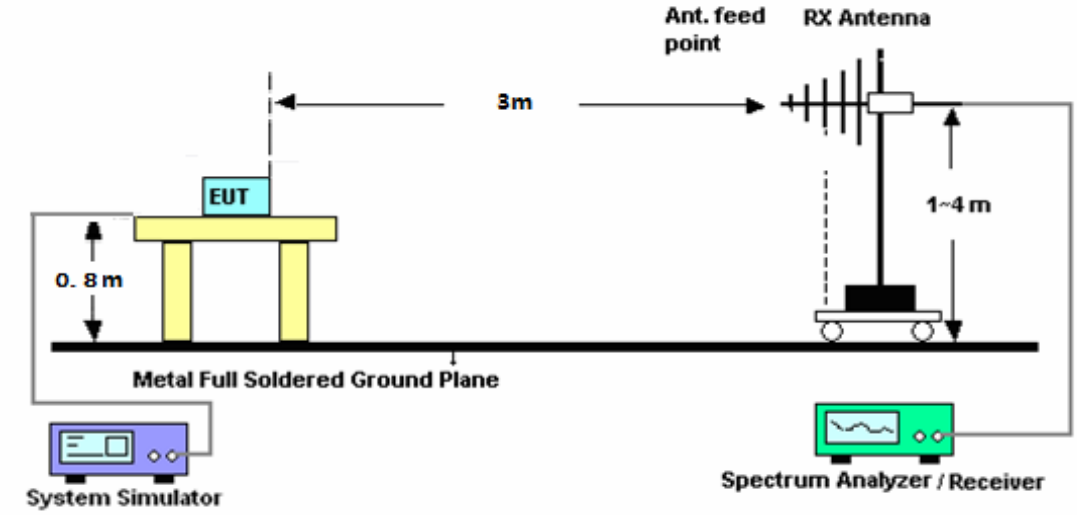
8.1 DESCRIPTION OF RADIATED SPURIOUS EMISSION

8.1.1 MEASUREMENT METHOD

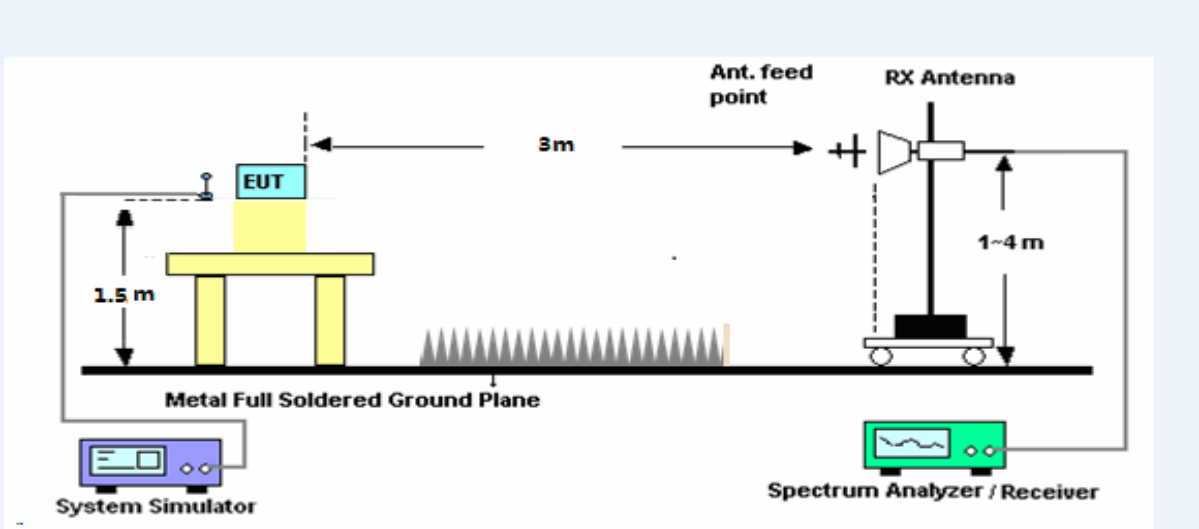
The radiated spurious emission was measured by substitution method according to ANSI C63.26 2015. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.
For Band 7 The power of any emission outside of the authorized operating frequency ranges must attenuated below the transmitter power (P) by a factor of at least 55 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

8.1.2 TEST SETUP

The procedure of radiated spurious emissions is as follows:
a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）The SA is calibrated using following setup.
b) EUT was placed on 1.5 m non-conductive stand at a 3 m test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 m from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic measured with peak detector and 1MHz bandwidth.
Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.
The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the ARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below:
Power=PMea+ARpl
For radiated test from 30MHz to 1GHz



For radiated test from above 1GHz



8.1.3 TEST PROCEDURES

1. The testing FCC KDB 971168 D01 Section 7 and ANSI C63.26 2015 Section 5.5.

2. The EUT was placed on a rotatable wooden table with 1.5 meter above ground.

3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.

4. The table was rotated 360 degrees to determine the position of the highest spurious emission.

5. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations

6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.

7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.

8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

9. Taking the record of output power at antenna port.

10. Repeat step 7 to step 8 for another polarization.

11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
= P(W)- [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm

8.1.4 TEST RESULTS

Note: Test data See Appendix E

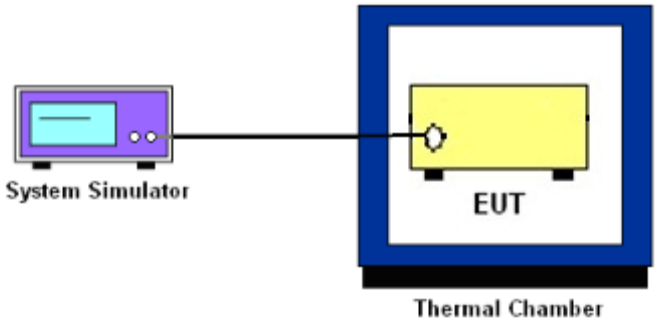
9. FREQUENCY STABILITY

9.1 DESCRIPTION OF FREQUENCY STABILITY MEASUREMENT

9.1.1 MEASUREMENT METHOD

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

9.1.2 TEST SETUP



9.1.3 TEST PROCEDURES FOR TEMPERATURE VARIATION

1. The EUT was set up in the thermal chamber and connected with the system simulator.

2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

9.1.4 TEST PROCEDURES FOR VOLTAGE VARIATION

1. The testing follows FCC KDB 971168 D01v01r03 Section 9.

2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simlator.

3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.

4. The variation in frequency was measured for the worst case.

9.1.5 TEST RESULTS

NB-IoT Band 2 (QPSK) / 1880MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-8.61	-0.005	2.5ppm	PASS
80		5.39	0.003		
70		-29.50	-0.016		
60		-34.44	-0.018		
50		-34.05	-0.018		
40		-29.21	-0.016		
30		-30.00	-0.016		
20		-18.15	-0.010		
10		9.63	0.005		
0		16.89	0.009		
-10		20.00	0.011		
-20		26.11	0.014		
-30		17.67	0.009		
-40		35.36	0.019		
25	Maximum Voltage	-32.84	-0.017		
25	BEP	-14.95	-0.008		

NB-IoT Band 2 (QPSK) / 1880MHz /15KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-22.40	-0.012	2.5ppm	PASS
80		-24.13	-0.013		
70		-36.98	-0.020		
60		-47.55	-0.025		
50		-36.38	-0.019		
40		-40.77	-0.022		
30		-40.70	-0.022		
20		-25.33	-0.013		
10		16.01	0.009		
0		21.94	0.012		
-10		25.99	0.014		
-20		25.69	0.014		
-30		-24.40	-0.013		
-40		-34.42	-0.018		
25	Maximum Voltage	-35.31	-0.019		
25	BEP	-25.33	-0.013		

NB-IoT Band 2 (QPSK) / 1880MHz / 3.75KHz/1@47					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-13.32	-0.007	2.5ppm	PASS
80		6.69	0.004		
70		-27.78	-0.015		
60		-33.56	-0.018		
50		-25.69	-0.014		
40		-30.10	-0.016		
30		-28.92	-0.015		
20		-13.63	-0.007		
10		15.01	0.008		
0		24.18	0.013		
-10		24.53	0.013		
-20		23.89	0.013		
-30		-13.56	-0.007		
-40		20.26	0.011		
25	Maximum Voltage	-27.54	-0.015		
25	BEP	-19.23	-0.010		

NB-IoT Band 2 (QPSK) / 1880MHz /15KHz/1@11					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-24.82	-0.013	2.5ppm	PASS
80		-25.16	-0.013		
70		-34.33	-0.018		
60		-46.01	-0.024		
50		-41.61	-0.022		
40		-31.46	-0.017		
30		-43.93	-0.023		
20		-26.52	-0.014		
10		17.01	0.009		
0		25.63	0.014		
-10		25.71	0.014		
-20		24.81	0.013		
-30		-20.77	-0.011		
-40		-36.79	-0.020		
25	Maximum Voltage	-35.95	-0.019		
25	BEP	-27.32	-0.015		

NB-IoT Band 4 (QPSK) / 1732.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-7.72	-0.004	2.5ppm	PASS
80		-7.12	-0.004		
70		-34.28	-0.018		
60		-38.65	-0.021		
50		-35.79	-0.019		
40		-30.93	-0.016		
30		-29.13	-0.015		
20		-6.54	-0.003		
10		-14.20	-0.008		
0		16.35	0.009		
-10		18.04	0.010		
-20		19.08	0.010		
-30		8.94	0.005		
-40		8.75	0.005		
25	Maximum Voltage	-23.92	-0.013		
25	BEP	-19.33	-0.010		

NB-IoT Band 4 (QPSK) / 1732.5MHz /15KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-28.74	-0.015	2.5ppm	PASS
80		-36.59	-0.019		
70		-47.18	-0.025		
60		-52.19	-0.028		
50		-45.73	-0.024		
40		-44.82	-0.024		
30		-47.05	-0.025		
20		-42.10	-0.022		
10		-32.20	-0.017		
0		19.08	0.010		
-10		20.51	0.011		
-20		19.94	0.011		
-30		-27.95	-0.015		
-40		-36.95	-0.020		
25	Maximum Voltage	-34.17	-0.018		
25	BEP	-50.95	-0.027		

NB-IoT Band 4 (QPSK) / 1732.5MHz / 3.75KHz/1@47					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-9.20	-0.005	2.5ppm	PASS
80		-8.37	-0.004		
70		-31.51	-0.017		
60		-34.13	-0.018		
50		-34.92	-0.019		
40		-34.13	-0.018		
30		-25.11	-0.013		
20		-9.97	-0.005		
10		-13.73	-0.007		
0		7.93	0.004		
-10		12.95	0.007		
-20		17.85	0.009		
-30		9.78	0.005		
-40		-24.30	-0.013		
25	Maximum Voltage	-22.70	-0.012		
25	BEP	-17.94	-0.010		

NB-IoT Band 4 (QPSK) / 1732.5MHz /15KHz/1@11					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-30.03	-0.016	2.5ppm	PASS
80		-34.36	-0.018		
70		-44.06	-0.023		
60		-53.54	-0.028		
50		-40.70	-0.022		
40		-46.68	-0.025		
30		-31.07	-0.017		
20		-38.71	-0.021		
10		-28.98	-0.015		
0		19.98	0.011		
-10		18.94	0.010		
-20		20.96	0.011		
-30		-24.42	-0.013		
-40		-43.30	-0.023		
25	Maximum Voltage	-33.70	-0.018		
25	BEP	-55.16	-0.029		

NB-IoT Band 26(Part 22) (QPSK) / 836.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	8.85	0.005	2.5ppm	PASS
80		6.19	0.003		
70		-13.18	-0.007		
60		-16.15	-0.009		
50		-16.42	-0.009		
40		-12.25	-0.007		
30		-8.38	-0.004		
20		-8.37	-0.004		
10		7.47	0.004		
0		7.55	0.004		
-10		10.57	0.006		
-20		10.04	0.005		
-30		10.57	0.006		
-40	N/A	-14.42	-0.008		
25	Maximum Voltage	-7.00	-0.004		
25	BEP	-9.17	-0.005		

NB-IoT Band 26(Part 22) (QPSK) / 836.5MHz /15KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-10.76	-0.006	2.5ppm	PASS
80		-15.06	-0.008		
70		-17.64	-0.009		
60		-20.13	-0.011		
50		-22.26	-0.012		
40		-22.04	-0.012		
30		-13.95	-0.007		
20		-15.25	-0.008		
10		11.79	0.006		
0		14.55	0.008		
-10		-18.94	-0.010		
-20		14.65	0.008		
-30		-14.91	-0.008		
-40		-24.86	-0.013		
25	Maximum Voltage	-16.14	-0.009		
25	BEP	-21.27	-0.011		

NB-IoT Band 26 (QPSK) / 836.5MHz / 3.75KHz/1@47					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	7.91	0.004	2.5ppm	PASS
80		7.93	0.004		
70		-17.98	-0.010		
60		-15.88	-0.008		
50		-17.75	-0.009		
40		-15.02	-0.008		
30		-13.28	-0.007		
20		-5.06	-0.003		
10		-4.85	-0.003		
0		10.44	0.006		
-10		11.07	0.006		
-20		12.10	0.006		
-30		13.25	0.007		
-40		5.69	0.003		
25	Maximum Voltage	-10.59	-0.006		
25	BEP	-11.47	-0.006		

NB-IoT Band 26(Part 22) (QPSK) / 836.5MHz /15KHz/1@11					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-9.70	-0.005	2.5ppm	PASS
80		-11.13	-0.006		
70		-17.90	-0.010		
60		-21.74	-0.012		
50		-21.17	-0.011		
40		-19.13	-0.010		
30		-14.68	-0.008		
20		-14.98	-0.008		
10		10.60	0.006		
0		12.66	0.007		
-10		17.75	0.009		
-20		15.61	0.008		
-30		-11.79	-0.006		
-40		-16.87	-0.009		
25	Maximum Voltage	-16.47	-0.009		
25	BEP	-20.61	-0.011		

NB-IoT Band 26(Part 90) (QPSK) / 819MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	7.16	0.004	2.5ppm	PASS
80		4.08	0.002		
70		-16.59	-0.009		
60		-20.89	-0.011		
50		-11.76	-0.006		
40		-8.85	-0.005		
30		-12.09	-0.006		
20		-2.58	-0.001		
10		12.82	0.007		
0		6.65	0.004		
-10		11.61	0.006		
-20		10.18	0.005		
-30		16.16	0.009		
-40		-13.45	-0.007		
25	Maximum Voltage	-6.63	-0.004		
25	BEP	-9.87	-0.005		

NB-IoT Band 26(Part 90) (QPSK) / 819MHz /15KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-7.17	-0.004	2.5ppm	PASS
80		-15.36	-0.008		
70		-17.69	-0.009		
60		-23.11	-0.012		
50		-15.31	-0.008		
40		-22.37	-0.012		
30		-18.39	-0.010		
20		-19.03	-0.010		
10		13.46	0.007		
0		9.93	0.005		
-10		-19.13	-0.010		
-20		17.85	0.009		
-30		-12.12	-0.006		
-40		-18.47	-0.010		
25	Maximum Voltage	-12.83	-0.007		
25	BEP	-23.17	-0.012		

NB-IoT Band 26(Part 90) (QPSK) / 819MHz / 3.75KHz/1@47					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	12.69	0.007	2.5ppm	PASS
80		8.77	0.005		
70		-19.37	-0.010		
60		-12.46	-0.007		
50		-12.97	-0.007		
40		-14.67	-0.008		
30		-12.53	-0.007		
20		-11.31	-0.006		
10		-2.64	-0.001		
0		12.63	0.007		
-10		11.53	0.006		
-20		12.24	0.007		
-30		9.17	0.005		
-40		-2.15	-0.001		
25	Maximum Voltage	-5.04	-0.003		
25	BEP	-13.81	-0.007		

NB-IoT Band 26(Part 90) (QPSK) / 819MHz /15KHz/1@11					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-10.56	-0.006	2.5ppm	PASS
80		-10.28	-0.005		
70		-18.05	-0.010		
60		-23.89	-0.013		
50		-23.65	-0.013		
40		-22.90	-0.012		
30		-14.17	-0.008		
20		-15.86	-0.008		
10		12.62	0.007		
0		16.33	0.009		
-10		17.16	0.009		
-20		9.45	0.005		
-30		-12.32	-0.007		
-40		-13.02	-0.007		
25	Maximum Voltage	-11.91	-0.006		
25	BEP	-15.17	-0.008		

NB-IoT Band 66 (QPSK) / 1745MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	12.36	0.007	2.5ppm	PASS
80		13.19	0.007		
70		-20.83	-0.011		
60		-28.90	-0.015		
50		-23.43	-0.012		
40		-25.12	-0.013		
30		-15.36	-0.008		
20		23.67	0.013		
10		14.10	0.008		
0		30.37	0.016		
-10		25.94	0.014		
-20		25.66	0.014		
-30		26.24	0.014		
-40		10.54	0.006		
25	Maximum Voltage	-17.97	-0.010		
25	BEP	-18.78	-0.010		

NB-IoT Band 66 (QPSK) / 1745MHz /15KHz/1@0					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-20.07	-0.011	2.5ppm	PASS
80		-24.81	-0.013		
70		-29.17	-0.016		
60		-31.49	-0.017		
50		-42.49	-0.023		
40		-18.10	-0.010		
30		-35.28	-0.019		
20		-18.77	-0.010		
10		21.76	0.012		
0		27.68	0.015		
-10		28.24	0.015		
-20		29.38	0.016		
-30		17.02	0.009		
-40		-25.96	-0.014		
25	Maximum Voltage	-36.16	-0.019		
25	BEP	-29.38	-0.016		

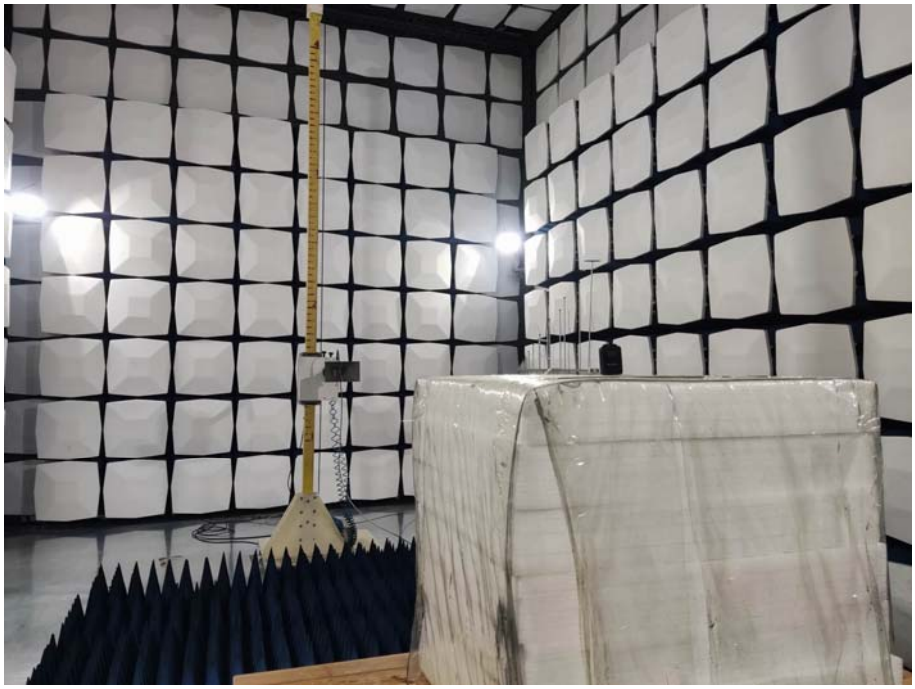
NB-IoT Band 66 (QPSK) / 1745MHz / 3.75KHz/1@47					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	14.36	0.008	2.5ppm	PASS
80		12.32	0.007		
70		-21.74	-0.012		
60		-30.78	-0.016		
50		-30.61	-0.016		
40		-21.17	-0.011		
30		-16.26	-0.009		
20		-12.02	-0.006		
10		26.89	0.014		
0		20.60	0.011		
-10		26.48	0.014		
-20		22.46	0.012		
-30		-20.53	-0.011		
-40		-27.82	-0.015		
25	Maximum Voltage	-12.95	-0.007		
25	BEP	-18.55	-0.010		

NB-IoT Band 66 (QPSK) / 1745MHz /15KHz/1@11					
Temperature (°C)	Voltage (Volt)	Freq. Dev. (Hz)	Freq. Dev. (ppm)	Limit	Result
85	Normal Voltage	-17.92	-0.010	2.5ppm	PASS
80		-25.36	-0.013		
70		-38.92	-0.021		
60		-31.37	-0.017		
50		-37.06	-0.020		
40		-17.55	-0.009		
30		-39.40	-0.021		
20		-15.99	-0.009		
10		26.39	0.014		
0		30.73	0.016		
-10		33.50	0.018		
-20		30.00	0.016		
-30		20.59	0.011		
-40		-30.94	-0.016		
25	Maximum Voltage	-35.78	-0.019		
25	BEP	-21.37	-0.011		

APPENDIX ——PHOTOS OF TEST SETUP

SPURIOUS EMISSION TEST SETUP (BELOW 1GHZ)

SPURIOUS EMISSION TEST SETUP (ABOVE 1GHZ)



End of report