TEST REPORT

Application No.:	ZR/2021/A0023
Applicant:	Fibocom Wireless Inc.
Address of Applicant	1101,Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen,China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer	1101,Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen,China
EUT Description:	LTE CatM1&NB-IoT&EGPRS Module
Model No.:	MA510-GL
Trade Mark:	Fibocom
FCC ID:	ZMOMA510GL
Standards:	47 CFR Part 2 47 CFR Part 22 subpart H 47 CFR Part 24 subpart E 47 CFR Part 27 subpart H 47 CFR Part 27 subpart L 47 CFR Part 27 subpart E 47 CFR Part 90 subpart R 47 CFR Part 90 subpart S
Date of Receipt:	2021/10/29
Date of Test:	2021/11/10 to 2021/11/12
Date of Issue:	2021/12/13
Test Result :	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

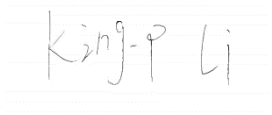
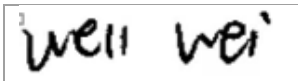
Authorized Signature:

Panta Sun

Panta Sun
Wireless Laboratory Manager

1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2021/11/22		Original
02		2021/12/13		1. Add 15MHz for LTE CatM1 Band 26(824-849) 2. Update test procedure for Page 36 3. Update equipment list

Authorized for issue by:		
Prepared By		 **(King-p Li) / Engineer**
Checked By		 **(Well Wei) /Reviewer**

Remark:This report supersedes our previous report SUZR/2021/A002301, Rev.:01, issued on 2021-11-22, which is hereby deemed null and void.

Contents

2 Test Summary

2.1 GSM850/ LTE CatM1 Band 5/ LTE NB1 Band 5/ LTE CatM1 Band 26(824~849 MHz)/ LTE NB1 Band 26(824~849 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913(a)(5)	ERP ≤ 7 W	Appendix B	Pass
Peak-Average Ratio	§22.913(d)	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051, §22.917(a)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917(a)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917(a)	FCC: ≤ -13 dBm/100 kHz.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §22.355	≤ ±2.5ppm.	Refer to ZR/2019/8003201	Pass

2.2 GSM 1900/ LTE CatM1 Band 2/ LTE NB1 Band 2 / LTE CatM1 Band 25/ LTE NB1 Band 25

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232(c)	EIRP ≤ 2 W	Appendix B	Pass
Peak-Average Ratio	§24.232(d)	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051, §24.238(a)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238(a)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	≤ -13 dBm/1 MHz.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §24.235	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

2.3 LTE CatM1 Band 4/ LTE NB1 Band 4/ LTE CatM1 Band 66/ LTE NB1 Band 66

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)(4)	EIRP ≤ 1 W	Refer to ZR/2019/8003201	Pass
Peak-Average Ratio	§27.50(d)(5)	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051, §27.53(h)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

2.4 LTE CatM1 Band 12/ LTE NB1 Band 12/ LTE CatM1 Band 85/ LTE NB1 Band 85

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046 §27.50(c)(10)	ERP ≤ 3 W.	Refer to ZR/2019/8003201	Pass
Peak-Average Ratio	---	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051, §27.53(g)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	FCC: ≤ -13 dBm/100 kHz.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

2.5 LTE CatM1 Band 13/ LTE NB1 Band 13

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(b)(10)	ERP ≤ 3 W.	Refer to ZR/2019/8003201	Pass
Peak-Average Ratio	---	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049,	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051, §27.53(c)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(c) §27.53(f)	≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations. For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(c) §27.53(f)	FCC: ≤ -13 dBm/100 kHz. For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(2) §27.54	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

2.6 LTE CatM1 Band 14

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046 §90.542(d)	ERP ≤ 3 W.	Refer to ZR/2019/8003201	Pass
Peak-Average Ratio	---	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Emission Mask	§2.1051 §90.210(n)	Transmitters designed for operation under this part on frequencies other than listed in this section must meet the emission mask requirements of Emission Mask B. Equipment operating under this part on frequencies allocated to but shared with the Federal Government, must meet the applicable Federal Government technical standards (b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows: (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB..(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051 §90.543(e)(2)(3)	(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10	Refer to	Pass

		log (P) dB in a 6.25 kHz band segment, for base and fixed stations.(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.	ZR/2019/8003201	
Spurious Emission at Antenna Terminals	§2.1051, §90.543(c) §90.543(f)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §90.543(c) §90.543(f)	FCC: ≤ -13 dBm/100 kHz. For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §90.213	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

2.7 LTE CatM1 Band 26(814~824 MHz)/ LTE NB1 Band 26(814~824 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Transmitter Conducted Power Output	§2.1046, §90.635(b)	< 100 W.	Refer to ZR/2019/8003201	Pass
Peak-Average Ratio	---	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Emission Mask	§2.1051 § 90.691(a)	For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50+10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §90.213	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

2.8 LTE NB1 Band71

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046 §27.50(c)(10)	EIRP ≤ 3 W	Refer to ZR/2019/8003201	Pass
Peak-Average Ratio	---	Limit≤13 dB	Refer to ZR/2019/8003201	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2019/8003201	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2019/8003201	Pass
Band Edges Compliance	§2.1051, §27.53(g)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Refer to ZR/2019/8003201	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Refer to ZR/2019/8003201	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	≤ -13 dBm/1 MHz.	Appendix B	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Refer to ZR/2019/8003201	Pass

Remark:
This test report (Report No.: SUZR/2021/A002301-01) is base on the original test report (Report No.: ZR/2019/8003201 issued on 2019-10-30).
Review this report and original report, this report just changing the parts according to the declaration letter from client.
Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.
Therefore in this report radiated spurious emissions of GSM was retested, the power of GSM and radiated spurious emissions of LTE(LTE CatM1/NB1 Band 13) were performed based on the worst case of the original report with report number ZR/2019/8003201 and other test data in this report are base on the previous report with report number ZR/2019/8003201.

3 General Information

3.1 Details of Client

Applicant:	Fibocom Wireless Inc.
Address of Applicant:	1101,Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen,China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer:	1101,Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan,Shenzhen,China

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Weller Liu, King-p Li, Nature Shen, Tizzy Song

3.3 Test Facility

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

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number:0031225543

3.4 General Description of EUT

EUT Description:	LTE CatM1&NB-IoT&EGPRS Module			
Model No.:	MA510-GL			
Trade Mark:	Fibocom			
Hardware Version:	V1.0.3			
Software Version:	69400.1000.00.00.00.01			
Sample Type:	☐ Portable Device, ☒Module			
Antenna Type:	☒ External, ☐ Integrated			
Antenna Gain*:	☒Provided by applicant			
	GSM850:	-1.0dBi	GSM1900:	0.9dBi
	LTE CatM1 Band 2:	0.9dBi	LTE CatM1 Band 4:	1.6dBi
	LTE CatM1 Band 5:	-1.0dBi	LTE CatM1 Band 12:	-1.4dBi
	LTE CatM1 Band 13:	-0.7dBi	LTE CatM1 Band 14:	-0.7dBi
	LTE CatM1 Band 25:	0.9dBi	LTE CatM1 Band 26:	-1.0dBi
	LTE CatM1 Band 66:	1.6dBi	LTE CatM1 Band 85:	-0.7dBi
	LTE NB1 Band 2:	0.9dBi	LTE NB1 Band 4:	1.6dBi
	LTE NB1 Band 5:	-1.0dBi	LTE NB1 Band 12:	-1.4dBi
	LTE NB1 Band 13:	-0.7dBi	LTE NB1 Band 25:	0.9dBi
	LTE NB1 Band 26:	-1.0dBi	LTE NB1 Band 66:	1.6dBi
	LTE NB1 Band 71:	-1.5dBi	LTE NB1 Band 85:	-0.7dBi
RF Cable*:	☒Provided by applicant			
	0.5dB(0.6~1GHz)	0.8dB(1.4~2GHz)	1.0dB(2.1~2.7GHz)	
	1.5dB(3~4GHz)	1.8dB(4.4~6GHz)		
Remark: *Since the above data and/or information is provided by the applicant relevant results or conclusions of this report are only made for these data and/or information , SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.				

3.5 Test Mode

Test Mode	Test Modes Description
GSM/TM1	GSM system, GSM/GPRS, GMSK modulation
GSM/TM2	GSM system, EGPRS, 8PSK modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation
Remark: The test mode(s) are selected according to relevant radio technology specifications.	

3.6 Test Environment

Environment Parameter	101.0~101.40 KPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(℃)	Voltage(V)
NTNV	25	3.8
LTNV	-30	3.8
HTNV	75	3.8

Remark:
NV: Normal Voltage
NT: Normal Temperature
LT: Low Extreme Test Temperature
HT: High Extreme Test Temperature

3.7 Technical Specification

Characteristics	Description		
Radio System Type	☒ GSM ☒ NB1 ☒ CatM1		
Supported Frequency Range	Band	TX	RX
	GSM 850	824 to 849 MHz	869 to 894 MHz
	GSM 1900	1850 to 1910 MHz	1930 to 1990 MHz
	LTE NB1 Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE NB1 Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE NB1 Band 5	824 to 849 MHz	869 to 894 MHz
	LTE NB1 Band 12	699 to 716 MHz	729 to 746 MHz
	LTE NB1 Band 13	777 to 787 MHz	746 to 756 MHz
	LTE NB1 Band 25	1850 to 1915MHz	1930 to 1995 MHz
	LTE NB1 Band 26(814-824)	814 to 824MHz	859 to 869 MHz
	LTE NB1 Band 26(824-849)	824 to 849 MHz	869 to 894 MHz
	LTE NB1 Band 66	1710 to 1780 MHz	2110 to 2200 MHz
	LTE NB1 Band 71	663 to 698 MHz	617 to 652 MHz
	LTE NB1 Band 85	698 to 716 MHz	728 to 746 MHz
	LTE CatM1 Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE CatM1 Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE CatM1 Band 5	824 to 849 MHz	869 to 894 MHz
	LTE CatM1 Band 12	699 to 716 MHz	729 to 746 MHz
	LTE CatM1 Band 13	777 to 787 MHz	746 to 756 MHz
	LTE CatM1 Band 14	788 to 798 MHz	758 to 768 MHz
	LTE CatM1 Band 25	1850 to 1915MHz	1930 to 1995 MHz
	LTE CatM1 Band 26(814-824)	814 to 824MHz	859 to 869 MHz
	LTE CatM1 Band 26(824-849)	824 to 849 MHz	869 to 894 MHz
	LTE CatM1 Band 66	1710 to 1780 MHz	2110 to 2200 MHz
	LTE CatM1 Band 85	698 to 716 MHz	728 to 746 MHz
Supported Channel Bandwidth	GSM Band	☒200KHz;	
	LTE NB1 Band 2	☒180KHz;	
	LTE NB1 Band 4	☒180KHz;	
	LTE NB1 Band 5	☒180KHz;	
	LTE NB1 Band 12	☒180KHz;	
	LTE NB1 Band 13	☒180KHz;	
	LTE NB1 Band 25	☒180KHz;	
	LTE NB1 Band 26 (814-824)	☒180KHz;	
	LTE NB1 Band 26 (824-849)	☒180KHz;	
	LTE NB1 Band 66	☒180KHz;	
	LTE NB1 Band 71	☒180KHz;	
	LTE NB1 Band 85	☒180KHz;	
	LTE CatM1 Band 2	☒1.4 MHz; ☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE CatM1 Band 4	☒1.4 MHz; ☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz	
	LTE CatM1 Band 5	☒1.4 MHz; ☒3 MHz; ☒5 MHz; ☒10 MHz	
	LTE CatM1 Band 12	☒1.4 MHz; ☒3 MHz; ☒5 MHz; ☒10 MHz	

	LTE CatM1 Band 13	☒5 MHz; ☒10 MHz
	LTE CatM1 Band 14	☒5 MHz; ☒10 MHz
	LTE CatM1 Band 25	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz
	LTE CatM1 Band 26 (814-824)	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz
	LTE CatM1 Band 26 (824-849)	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz ☒15 MHz
	LTE CatM1 Band 66	☒1.4 MHz;☒3 MHz; ☒5 MHz; ☒10 MHz; ☒15 MHz, ☒20 MHz
	LTE CatM1 Band 85	☒5 MHz; ☒10 MHz

3.8 Test Frequencies

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM850	TX	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6 MHz	848.8 MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2 MHz	881.6 MHz	893.8 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM1900	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0 MHz	1909.8 MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE NB1 Band 2	180KHz	TX	Channel 18601	Channel 18900	Channel 19199
			1850.1 MHz	1880 MHz	1909.9 MHz
		RX	Channel 601	Channel 900	Channel 1199
			1930.1 MHz	1960 MHz	1989.9 MHz
LTE NB1 Band 4	180KHz	TX	Channel 19951	Channel 20175	Channel 20399
			1710.1 MHz	1732.5 MHz	1754.9 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2110.1 MHz	2132.5MHz	2154.9 MHz
LTE NB1 Band 5	180KHz	TX	Channel 20401	Channel 20525	Channel 20649
			824.1 MHz	836.5 MHz	848.9 MHz
		RX	Channel 2401	Channel 2525	Channel 2649
			869.1 MHz	881.5 MHz	893.9 MHz
LTE NB1 Band 12	180KHz	TX	Channel 23011	Channel 23095	Channel 23179
			699.1 MHz	707.5 MHz	715.9 MHz
		RX	Channel 5011	Channel 5095	Channel 5179
			729.1 MHz	737.5 MHz	745.9 MHz
LTE NB1 Band 13	180KHz	TX	Channel 23181	Channel 23230	Channel 23279
			777.1 MHz	782 MHz	786.9 MHz
		RX	Channel 5181	Channel 5230	Channel 5279
			746.1 MHz	752 MHz	755.9 MHz
LTE NB1 Band 25	180KHz	TX	Channel 26041	Channel 26365	Channel 26689
			1850.1 MHz	1882.5 MHz	1914.9 MHz
		RX	Channel 8041	Channel 8365	Channel 8689
			1930.1 MHz	1962.5 MHz	1994.9 MHz
LTE NB1 Band 26(814-824)	180KHz	TX	Channel 26692	Channel 26740	Channel 26788
			814.2 MHz	819 MHz	823.8 MHz
		RX	Channel 8692	Channel 8740	Channel 8788
			859.2MHz	864MHz	868.8MHz
LTE NB1 Band 26(824-849)	180KHz	TX	Channel 26791	Channel 26915	Channel 27039
			824.1 MHz	836.5 MHz	848.9 MHz
		RX	Channel 8791	Channel 8915	Channel 9039
			869.1 MHz	881.5 MHz	893.9 MHz
LTE NB1 Band 66	180KHz	TX	Channel 131973	Channel 132322	Channel 132671
			1710.1 MHz	1745 MHz	1779.9 MHz
		RX	Channel 66437	Channel 66786	Channel 67135
			2110.1 MHz	2145 MHz	2179.9 MHz
LTE NB1 Band 71	180KHz	TX	Channel 133123	Channel 133297	Channel 133471
			663.1 MHz	680.5 MHz	697.9 MHz
		RX	Channel 68587	Channel 68761	Channel 68935
			617.1 MHz	634.5 MHz	651.9 MHz
LTE NB1 Band 85	180KHz	TX	Channel 134003	Channel 134092	Channel 134181
			698.1 MHz	707 MHz	715.9 MHz
		RX	Channel 70367	Channel 0456	Channel 70545
			728.1 MHz	737 MHz	745.9 MHz

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Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 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
	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
	5MHz	TX	Channel 18625	Channel 18900	Channel 19175
			1852.5 MHz	1880 MHz	1907.5 MHz
		RX	Channel 625	Channel 900	Channel1175
			1932.5 MHz	1960 MHz	1987.5 MHz
	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
	15MHz	TX	Channel 18675	Channel 18900	Channel 19125
			1857.5 MHz	1880 MHz	1902.5 MHz
		RX	Channel 675	Channel 900	Channel 1125
			1937.5 MHz	1960 MHz	1982.5 MHz
	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	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 4	1.4MHz	TX	Channel 19957	Channel 20175	Channel 20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	3MHz	TX	Channel 19965	Channel 20175	Channel 20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	5MHz	TX	Channel 19975	Channel 20175	Channel 20375
			1712.5 MHz	1732.5 MHz	1752.5 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	10MHz	TX	Channel 20000	Channel 20175	Channel 20350
			1715 MHz	1732.5 MHz	1750 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	15MHz	TX	Channel 20025	Channel 20175	Channel 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz
		RX	Channel 2025	Channel 2175	Channel 2325
			2117.5 MHz	2132.5MHz	2147.5 MHz
	20MHz	TX	Channel 20050	Channel 20175	Channel 20300
			1720 MHz	1732.5 MHz	1745 MHz
		RX	Channel 2050	Channel 2175	Channel 2300
			2120 MHz	2132.5MHz	2145 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 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
	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
	5MHz	TX	Channel 20425	Channel 20525	Channel 20625
			826.5 MHz	836.5 MHz	846.5 MHz
		RX	Channel 2425	Channel 2525	Channel 2625
			871.5 MHz	881.5 MHz	891.5 MHz
	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

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Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 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
	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
	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
	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

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 13	5MHz	TX	Channel 23025	Channel 23230	Channel 23255
			779.5 MHz	782 MHz	784.5 MHz
		RX	Channel 5205	Channel 5230	Channel 5255
			748.5 MHz	751 MHz	753.5 MHz
	10MHz	TX	Channel 23230	Channel 23230	Channel 23230
			782 MHz	782 MHz	782 MHz
		RX	Channel 5230	Channel 5230	Channel 5230
			751 MHz	751 MHz	751 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 14	5MHz	TX	Channel 23305	Channel 23330	Channel 23355
			790.5 MHz	793 MHz	795.5 MHz
		RX	Channel 5305	Channel 5330	Channel 5355
			760.5 MHz	763 MHz	765.5 MHz
	10MHz	TX	Channel 23330	Channel 23330	Channel 23330
			793MHz	793 MHz	793 MHz
		RX	Channel 5330	Channel 5330	Channel 5330
			763MHz	763 MHz	763 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 25	1.4MHz	TX	Channel 26047	Channel 26365	Channel 26683
			1850.7 MHz	1882.5 MHz	1914.3 MHz
		RX	Channel 8047	Channel 8365	Channel 8683
			1930.7 MHz	1962.5 MHz	1994.3 MHz
	3MHz	TX	Channel 26055	Channel 26365	Channel 26675
			1851.5 MHz	1882.5 MHz	1913.5 MHz
		RX	Channel 8055	Channel 8365	Channel 8675
			1931.5 MHz	1962.5 MHz	1993.5 MHz
	5MHz	TX	Channel 26065	Channel 26365	Channel 26665
			1852.5 MHz	1882.5 MHz	1912.5 MHz
		RX	Channel 8065	Channel 8365	Channel 8665
			1932.5 MHz	1962.5 MHz	1992.5 MHz
	10MHz	TX	Channel 26090	Channel 26365	Channel 26640
			1855 MHz	1882.5 MHz	1910 MHz
		RX	Channel 8090	Channel 8365	Channel 8640
			1935 MHz	1962.5 MHz	1990 MHz
	15MHz	TX	Channel 26115	Channel 26365	Channel 26615
			1857.5 MHz	1882.5 MHz	1907.5 MHz
		RX	Channel 8115	Channel 8365	Channel 8615
			1937.5 MHz	1962.5 MHz	1987.5 MHz
	20MHz	TX	Channel 26140	Channel 26365	Channel 26590
			1860 MHz	1882.5 MHz	1905 MHz
		RX	Channel 8140	Channel 8365	Channel 8590
			1940 MHz	1962.5 MHz	1985 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 26 (814-824)	1.4MHz	TX	Channel 26697	Channel 26740	Channel 26783
			814.7 MHz	819 MHz	823.3 MHz
		RX	Channel 8697	Channel 8740	Channel 8783
			859.7 MHz	864MHz	868.3 MHz
	3MHz	TX	Channel 26705	Channel 26740	Channel 26775
			815.5 MHz	819 MHz	822.5 MHz
		RX	Channel 8705	Channel 8740	Channel 8775
			860.5 MHz	864MHz	867.5 MHz
	5MHz	TX	Channel 26715	Channel 26740	Channel 26765
			816.5 MHz	819 MHz	821.5 MHz
		RX	Channel 8715	Channel 8740	Channel 8755
			861.5 MHz	864MHz	866.5 MHz
	10MHz	TX	Channel 26740	Channel 26740	Channel 26740
			819 MHz	819 MHz	819 MHz
		RX	Channel 8740	Channel 8740	Channel 8740
			864MHz	864MHz	864MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band26 (824-849)	1.4MHz	TX	Channel 26797	Channel 26915	Channel 27033
			824.7 MHz	836.5 MHz	848.3 MHz
		RX	Channel 8697	Channel 8915	Channel 9033
			859.7 MHz	881.5 MHz	893.3 MHz
	3MHz	TX	Channel 26805	Channel 26915	Channel 27025
			825.5 MHz	836.5 MHz	847.5 MHz
		RX	Channel 8805	Channel 8915	Channel 9025
			860.5 MHz	881.5 MHz	892.5 MHz
	5MHz	TX	Channel 26815	Channel 26915	Channel 27015
			826.5 MHz	836.5 MHz	846.5 MHz
		RX	Channel 8815	Channel 8915	Channel 9015
			871.5 MHz	881.5 MHz	891.5 MHz
	10MHz	TX	Channel 26840	Channel 26915	Channel 26990
			829 MHz	836.5 MHz	844 MHz
		RX	Channel 8840	Channel 8915	Channel 8990
			874 MHz	881.5 MHz	889 MHz
	15MHz	TX	Channel 26865	Channel 26915	Channel 26965
			831.5 MHz	836.5 MHz	841.5 MHz
		RX	Channel 8865	Channel 8915	Channel 8965
			876.5 MHz	881.5 MHz	886.5 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 66	1.4MHz	TX	Channel 131979	Channel 132322	Channel 132665
			1710.7 MHz	1745 MHz	1779.3 MHz
		RX	Channel 66443	Channel 66786	Channel 67329
			2110.7 MHz	2145MHz	2199.3 MHz
	3MHz	TX	Channel 131987	Channel 132322	Channel 132657
			1711.5 MHz	1745 MHz	1778.5MHz
		RX	Channel 66451	Channel 66786	Channel 67321
			2111.5 MHz	2145MHz	2198.5MHz
	5MHz	TX	Channel 131997	Channel 132322	Channel 132647
			1712.5 MHz	1745 MHz	1777.5 MHz
		RX	Channel 66461	Channel 66786	Channel 67311
			2112.5 MHz	2145MHz	2197.5 MHz
	10MHz	TX	Channel 132022	Channel 132322	Channel 132622
			1715 MHz	1745 MHz	1775 MHz
		RX	Channel 66486	Channel 66786	Channel 67286
			2115 MHz	2145MHz	2195 MHz
	15MHz	TX	Channel 132047	Channel 132322	Channel 132597
			1717.5 MHz	1745 MHz	1772.5 MHz
		RX	Channel 66511	Channel 66786	Channel 67261
			2117.5 MHz	2145MHz	2192.5 MHz
	20MHz	TX	Channel 132072	Channel 132322	Channel 132572
			1720 MHz	1745 MHz	1770 MHz
		RX	Channel 66536	Channel 66786	Channel 67236
			2120 MHz	2145MHz	2190 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 85	1.4MHz	TX	Channel 23007	Channel 23090	Channel 23173
			698.7 MHz	707 MHz	715.3 MHz
		RX	Channel 5007	Channel 5090	Channel 5173
			728.7 MHz	737 MHz	745.3 MHz
	3MHz	TX	Channel 23015	Channel 23090	Channel 23165
			699.5 MHz	707 MHz	714.5 MHz
		RX	Channel 5015	Channel 5090	Channel 5165
			729.5 MHz	737 MHz	744.5 MHz
	5MHz	TX	Channel 23025	Channel 23090	Channel 23155
			700.5 MHz	707 MHz	713.5 MHz
		RX	Channel 5025	Channel 5090	Channel 5155
			730.5 MHz	737 MHz	743.5 MHz
	10MHz	TX	Channel 23050	Channel 23090	Channel 23130
			703 MHz	707 MHz	711 MHz
		RX	Channel 5050	Channel 5090	Channel 5130
			733 MHz	737 MHz	741 MHz

4 Description of Tests

4.1 Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 V03r01

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.

Remark: Reference test setup 1

4.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure: FCC KDB 971168 D01 V03r01 ; ANSI/C63.26 (2015)

Calculate power in dBm by the following formula:

ERP (dBm) = Conducted Power (dBm) + antenna gain (dBd)

EIRP(dBm) = Conducted Power (dBm) + antenna gain (dBi)

EIRP=ERP+2.15dB

Measurement Procedure: FCC KDB 971168 D01 V03r01 ; ANSI/C63.26 (2015)

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

5). 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.

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

E (dB μ V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

ERP = EIRP – 2.15 (dB); where ERP and EIRP are expressed in consistent units.

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:

E (dB μ V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

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

Remark: Reference test setup 2

4.3 Occupied Bandwidth

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 4.2

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.

Remark: Reference test setup 1

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

4.4 Band Edge at Antenna Terminals

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

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 two 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 rms.

Remark: Reference test setup 1

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

4.5 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure: FCC KDB 971168 D01 V03r01

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.

Remark: Reference test setup 1

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

4.6 Peak-Average Ratio

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.7.1

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.

Remark: Reference test setup 1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

4.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01

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

5). 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.

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

E (dB μV/m) = Measured amplitude level (μV/m) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

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:

E (dB μV/m) = Measured amplitude level (μV/m) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

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

Remark1: Reference test setup 2

Remark2: The emission below 18G were measured at a 3m test distance, while emissions above 18GHz were measured at a 1m test distance.

Remark: Reference test setup 2

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Factor(Antenna Factor + Cable Factor – Preamplifier Factor)
2) Scan from 9kHz to 40GHz,The disturbance between 9KHz to 30MHz and 18GHz to 40GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .
3) All modes have been tested, but only the worst case data displayed in this report.

4.8 Frequency Stability / Temperature Variation

Measurement Procedure:

Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 V03r01; ANSI/C63.26 (2015)

. 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.

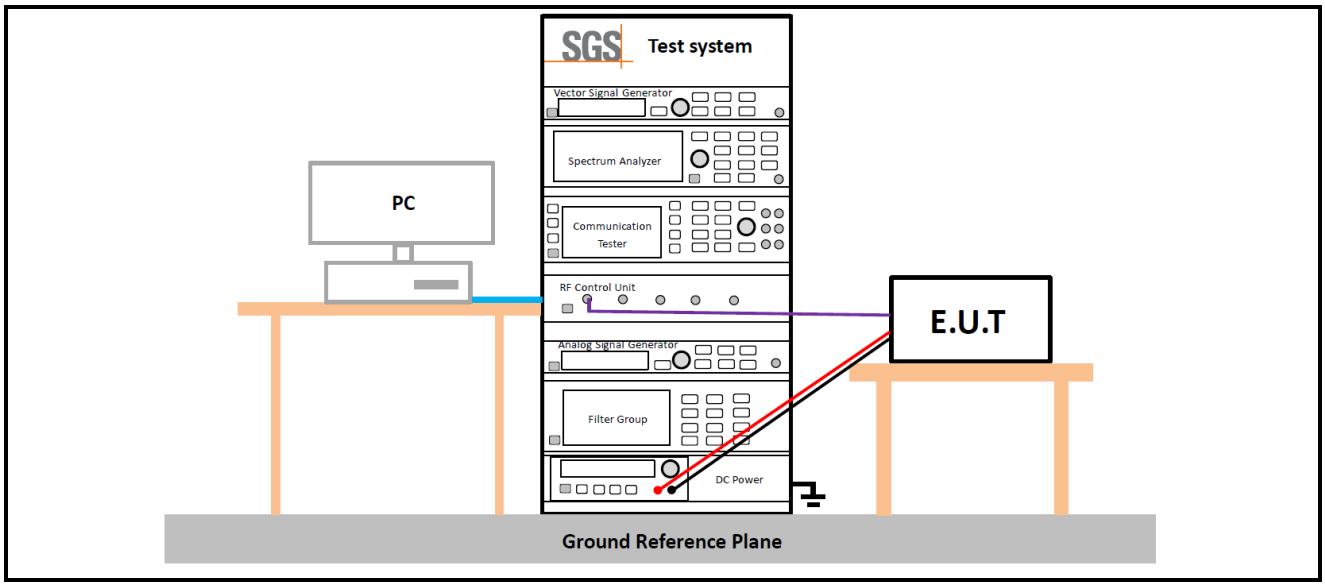
Time Period and Procedure:

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.

Remark: Reference test setup 3

4.9 Test Setups

4.9.1 Test Setup 1



4.9.2 Test Setup 2

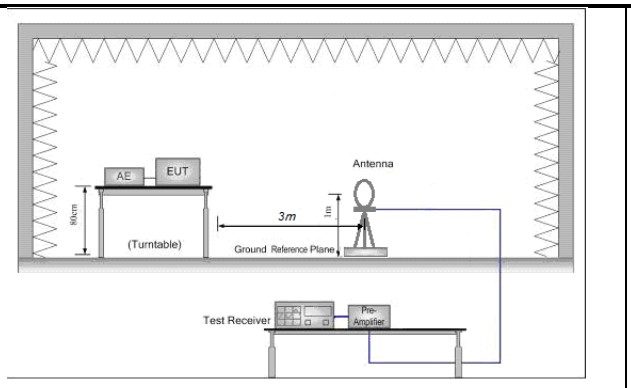


Figure 1. Below 30MHz

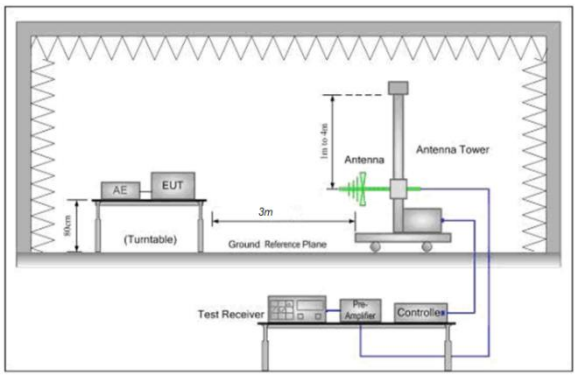


Figure 2. 30MHz to 1GHz

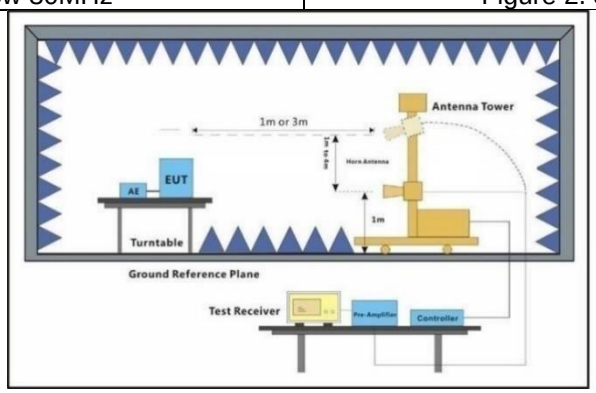
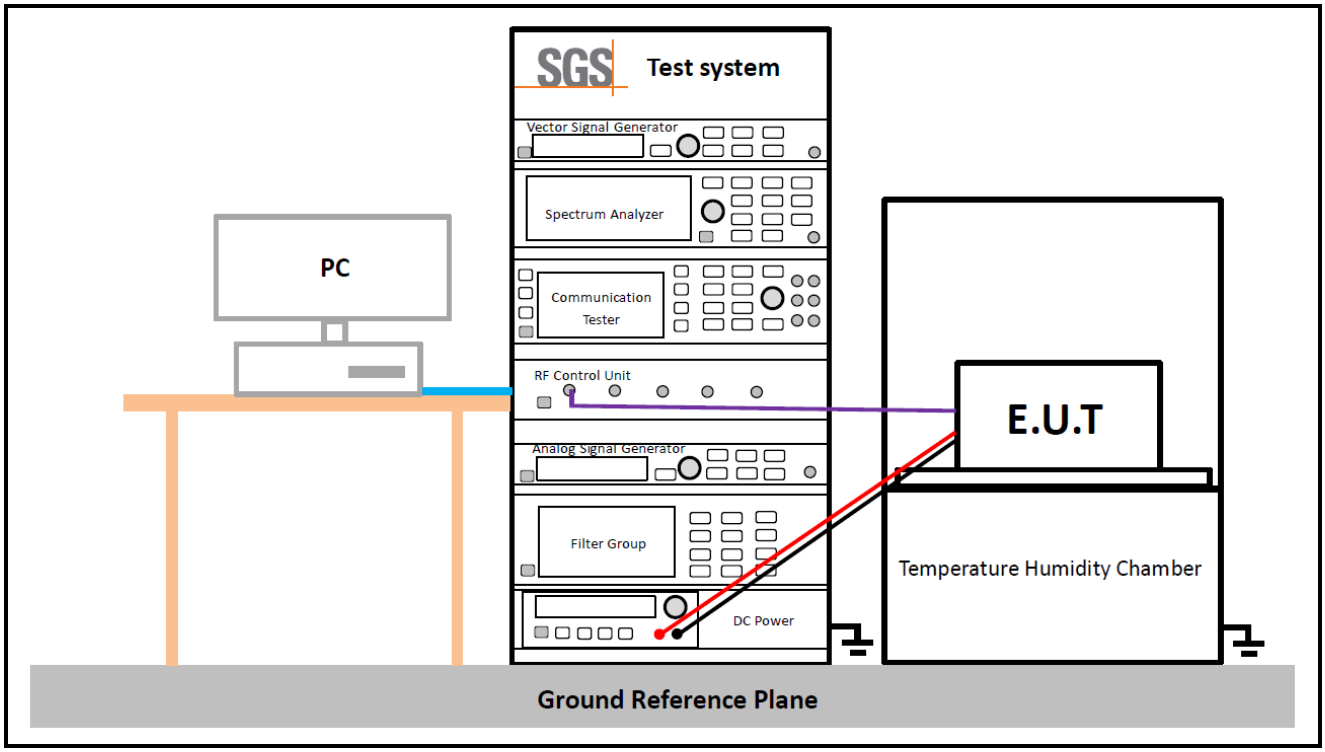


Figure 3. above 1GHz

4.9.3 Test Setup 3



4.10Test 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; 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; 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; LTE/TM1;LTE/TM2;
Modulation Characteristics		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (M= middle channel)
		Test Mode	GSM/TM1;GSM/TM2; LTE/TM1;LTE/TM2;
Bandwid	Occupie	Test	Ambient Climate & Rated Voltage

th	d Bandwidth	Environment	
		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; 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; 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; LTE/TM1;LTE/TM2;
Spurious Emission at Antenna Terminals		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; LTE/TM1;
Field Strength of Spurious Radiation		Test Environment	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 2

	Test Mode	GSM/TM1;GSM/TM2; LTE/TM1;LTE/TM2; Remark: 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 Environment	(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 3
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	GSM/TM1;GSM/TM2; LTE/TM1;LTE/TM2;

5 Main Test Instruments

RF Test Equipment					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021-05-08	2024-05-07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2021-02-20	2022-02-19
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2021-02-20	2022-02-19
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2021-02-20	2022-02-19
Measurement Software	Tonscend	JS1120-3 Test System V 2.6.88.0336	SUWI-02-09-09	NCR	NCR
Radio Communication Analyzer	ROHDE&SCHWARZ	CMW500	SUWI-01-27-01	2021-09-28	2022-09-27
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2021-02-20	2022-02-19

RSE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date (yyyy-mm-dd)**	**Cal Due Date (yyyy-mm-dd)**
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021-05-08	2024-05-07
Active Loop Antenna	Schwarzbeck	FMZB 1519B	SUWI-01-21-01	2021-06-10	2022-06-09
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	SUWI-01-11-01	2021-05-16	2022-05-15
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	SUWI-01-11-02	2021-05-16	2022-05-15
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	SUWI-01-11-03	2021-05-14	2022-05-13
Filter bank	Tonscend	JS0806-F	SUWI-03-02-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	SUWI-03-02-02	NCR	NCR
Filter bank	Tonscend	JS0806-F	SUWI-03-02-03	NCR	NCR
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2021-02-20	2022-02-19
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2021-02-20	2022-02-19
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2021-02-20	2022-02-19
Radio communication analyzer	Anritsu	MT8820C	SUWI-01-16-08	2021-02-20	2022-02-19
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2021-02-20	2022-02-19
signal analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2021-05-28	2022-05-27
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2021-02-20	2022-02-19
Measurement Software	Tonscend	JS32-RE V3.0.0.2	SUWI-02-09-06	NCR	NCR
Radio Communication Analyzer	ROHDE&SCHWARZ	CMW500	SUWI-01-27-01	2021-09-28	2022-09-27

6 Measurement Uncertainty

For a 95% confidence level (k = 2), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.54dB
2	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.8dB (30M -1GHz)
		± 4.8dB (1GHz to 18GHz)
		± 4.80dB (Above 18GHz)

7 Appendixes

Appendix A	Setup Photos

South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone 215000 t (86–512) 62992980 www.sgsgroup.com.cn
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Appendix B

Effective (Isotropic) Radiated Power Output Data

Test Result

Test on the worst case:

Band	Channel	Power(dBm)	ERP	Limit(dBm)	Verdict
GSM850	128	32.12	28.97	38.5	PASS
GSM850	190	32.11	28.96	38.5	PASS
GSM850	251	32.15	29.00	38.5	PASS

Band	Channel	Power(dBm)	EIRP	Limit(dBm)	Verdict
GSM1900	512	29.51	30.41	33	PASS
GSM1900	661	29.53	30.43	33	PASS
GSM1900	810	29.14	30.04	33	PASS

Field Strength of Spurious Radiation

Test Band = GSM850

Test Channel = Low Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1648.0000	-35.68	-13.00	22.68	369	360	Horizontal
2	2472.0000	-40.30	-13.00	27.30	258	69	Horizontal
3	3296.0000	-44.91	-13.00	31.91	365	320	Horizontal
4	4121.0000	-55.92	-13.00	42.92	245	329	Horizontal
5	4945.2000	-51.21	-13.00	38.21	125	300	Horizontal
6	7392.0000	-49.47	-13.00	36.47	150	286	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1648.0000	-40.73	-13.00	27.73	256	165	Vertical
2	2472.0000	-47.82	-13.00	34.82	354	137	Vertical
3	3296.0000	-48.30	-13.00	35.30	258	123	Vertical
4	4121.0000	-57.47	-13.00	44.47	269	142	Vertical
5	4945.2000	-53.62	-13.00	40.62	158	65	Vertical
6	7282.0000	-49.69	-13.00	36.69	150	295	Vertical

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Test Band = GSM850
Test Channel = Mid Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1672.0000	-34.23	-13.00	21.23	152	360	Horizontal
2	2509.2000	-46.01	-13.00	33.01	364	8	Horizontal
3	3345.6000	-43.95	-13.00	30.95	108	319	Horizontal
4	4182.0000	-55.21	-13.00	42.21	241	285	Horizontal
5	5018.4000	-53.09	-13.00	40.09	346	46	Horizontal
6	7766.0000	-49.06	-13.00	36.06	185	194	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1672.0000	-45.52	-13.00	32.52	163	5	Vertical
2	2509.2000	-52.18	-13.00	39.18	185	85	Vertical
3	3345.6000	-46.53	-13.00	33.53	341	147	Vertical
4	4182.0000	-54.03	-13.00	41.03	206	295	Vertical
5	5018.0000	-53.51	-13.00	40.51	128	147	Vertical
6	8202.0000	-47.94	-13.00	34.94	108	41	Vertical

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Test Band = GSM850
Test Channel = High Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1697.6000	-33.17	-13.00	20.17	320	360	Horizontal
2	2546.0000	-48.57	-13.00	35.57	152	271	Horizontal
3	3395.2000	-47.65	-13.00	34.65	264	271	Horizontal
4	4244.0000	-52.35	-13.00	39.35	105	332	Horizontal
5	5092.8000	-46.44	-13.00	33.44	205	304	Horizontal
6	8146.0000	-47.68	-13.00	34.68	186	46	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1697.6000	-40.68	-13.00	27.68	125	2	Vertical
2	2546.0000	-48.16	-13.00	35.16	164	309	Vertical
3	3394.0000	-45.92	-13.00	32.92	263	56	Vertical
4	4244.0000	-51.90	-13.00	38.90	185	324	Vertical
5	5092.8000	-47.88	-13.00	34.88	346	247	Vertical
6	7890.0000	-47.16	-13.00	34.16	284	271	Vertical

Test Band = EDGE 850
Test Channel = Mid Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1672.0000	-65.68	-13.00	52.68	236	60	Horizontal
2	2508.0000	-61.47	-13.00	48.47	369	214	Horizontal
3	3345.6000	-64.08	-13.00	51.08	356	65	Horizontal
4	4182.0000	-70.18	-13.00	57.18	248	56	Horizontal
5	5018.4000	-68.55	-13.00	55.55	223	271	Horizontal
6	7998.0000	-54.84	-13.00	41.84	119	266	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1672.0000	-66.24	-13.00	53.24	115	45	Vertical
2	2509.2000	-63.81	-13.00	50.81	226	226	Vertical
3	3345.6000	-63.92	-13.00	50.92	333	69	Vertical
4	4182.0000	-70.05	-13.00	57.05	265	237	Vertical
5	5018.4000	-69.74	-13.00	56.74	364	324	Vertical
6	7956.0000	-53.76	-13.00	40.76	185	338	Vertical

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Test Band = EDGE 850
Test Channel = Low Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1648.0000	-69.22	-13.00	56.22	226	156	Horizontal
2	2472.0000	-69.19	-13.00	56.19	365	185	Horizontal
3	3296.0000	-67.33	-13.00	54.33	221	99	Horizontal
4	4121.0000	-71.39	-13.00	58.39	203	194	Horizontal
5	4945.2000	-67.45	-13.00	54.45	108	329	Horizontal
6	7942.0000	-55.29	-13.00	42.29	158	95	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1648.0000	-65.29	-13.00	52.29	236	280	Vertical
2	2472.0000	-64.76	-13.00	51.76	325	108	Vertical
3	3296.0000	-64.41	-13.00	51.41	152	37	Vertical
4	4121.0000	-70.74	-13.00	57.74	136	289	Vertical
5	4945.2000	-65.83	-13.00	52.83	149	122	Vertical
6	7984.0000	-53.98	-13.00	40.98	228	160	Vertical

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Test Band =EDGE 850
Test Channel = High Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1696.0000	-64.63	-13.00	51.63	255	256	Horizontal
2	2546.0000	-54.87	-13.00	41.87	226	357	Horizontal
3	3395.2000	-67.88	-13.00	54.88	334	69	Horizontal
4	4244.0000	-69.25	-13.00	56.25	110	118	Horizontal
5	5092.8000	-65.32	-13.00	52.32	238	84	Horizontal
6	7956.0000	-54.48	-13.00	41.48	366	123	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1696.0000	-64.60	-13.00	51.60	150	22	Vertical
2	2546.0000	-51.64	-13.00	38.64	365	118	Vertical
3	3395.2000	-68.46	-13.00	55.46	235	359	Vertical
4	4244.0000	-68.39	-13.00	55.39	258	36	Vertical
5	5092.8000	-62.58	-13.00	49.58	144	272	Vertical
6	7996.0000	-55.52	-13.00	42.52	150	301	Vertical

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Test Band = PCS 1900
Test Channel = Low Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2417.0000	-50.60	-13.00	37.60	215	256	Horizontal
2	3700.4000	-66.10	-13.00	53.10	325	225	Horizontal
3	5550.6000	-45.36	-13.00	32.36	109	174	Horizontal
4	7400.8000	-58.73	-13.00	45.73	229	66	Horizontal
5	9251.0000	-54.85	-13.00	41.85	104	360	Horizontal
6	11101.2000	-51.13	-13.00	38.13	167	174	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1304.0000	-56.39	-13.00	43.39	163	156	Vertical
2	3700.4000	-63.71	-13.00	50.71	185	344	Vertical
3	5550.6000	-43.21	-13.00	30.21	166	67	Vertical
4	7400.8000	-59.90	-13.00	46.90	215	312	Vertical
5	9251.0000	-54.94	-13.00	41.94	349	92	Vertical
6	11101.2000	-50.55	-13.00	37.55	109	141	Vertical

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Test Band = PCS 1900
Test Channel = Mid Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2312.5000	-51.15	-13.00	38.15	168	333	Horizontal
2	3759.7500	-64.33	-13.00	51.33	196	54	Horizontal
3	5640.0000	-43.02	-13.00	30.02	214	104	Horizontal
4	7520.0000	-56.99	-13.00	43.99	194	123	Horizontal
5	9400.0000	-54.42	-13.00	41.42	152	360	Horizontal
6	11280.0000	-51.68	-13.00	38.68	345	123	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1454.0000	-56.07	-13.00	43.07	163	195	Vertical
2	3759.7500	-60.12	-13.00	47.12	185	360	Vertical
3	5640.0000	-40.43	-13.00	27.43	149	60	Vertical
4	7520.0000	-59.76	-13.00	46.76	245	3	Vertical
5	9400.0000	-55.20	-13.00	42.20	375	97	Vertical
6	11280.0000	-51.61	-13.00	38.61	108	3	Vertical

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Test Band = PCS 1900
Test Channel = High Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1298.5000	-56.16	-13.00	43.16	185	275	Horizontal
2	3819.6000	-65.31	-13.00	52.31	254	302	Horizontal
3	5729.4000	-49.53	-13.00	36.53	166	29	Horizontal
4	7639.2000	-59.55	-13.00	46.55	185	321	Horizontal
5	9549.0000	-54.59	-13.00	41.59	194	34	Horizontal
6	11458.8000	-51.82	-13.00	38.82	258	118	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1537.0000	-55.30	-13.00	42.30	182	195	Vertical
2	3819.6000	-59.54	-13.00	46.54	156	319	Vertical
3	5729.4000	-39.99	-13.00	26.99	286	54	Vertical
4	7639.2000	-60.14	-13.00	47.14	295	359	Vertical
5	9549.0000	-52.45	-13.00	39.45	256	22	Vertical
6	11458.8000	-51.32	-13.00	38.32	192	300	Vertical

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Test on the worst case:

Test Band = CAT M1 Band 13 10M
Test Channel = Mid Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1556.0000	-72.84	-13.00	59.84	255	323	Horizontal
2	2334.0000	-26.93	-13.00	13.93	335	131	Horizontal
3	3110.3600	-74.22	-13.00	61.22	158	179	Horizontal
4	3887.9500	-71.42	-13.00	58.42	269	35	Horizontal
5	4665.5400	-68.28	-13.00	55.28	357	56	Horizontal
6	7988.0000	-54.38	-13.00	41.38	118	54	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1556.0000	-71.22	-13.00	58.22	150	128	Vertical
2	2332.0000	-27.00	-13.00	14.00	150	89	Vertical
3	3110.3600	-74.39	-13.00	61.39	150	132	Vertical
4	3887.9500	-70.81	-13.00	57.81	150	99	Vertical
5	4665.5400	-68.88	-13.00	55.88	150	320	Vertical
6	7972.0000	-54.81	-13.00	41.81	150	75	Vertical

Test Band = CAT M1 Band13 5M
Test Channel = Low Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-71.29	-13.00	58.29	150	147	Horizontal
2	2332.0000	-27.43	-13.00	14.43	158	147	Horizontal
3	3109.3600	-73.53	-13.00	60.53	111	17	Horizontal
4	3886.7000	-70.82	-13.00	57.82	254	295	Horizontal
5	4664.0400	-68.54	-13.00	55.54	147	180	Horizontal
6	7994.0000	-54.88	-13.00	41.88	226	348	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-65.80	-13.00	52.80	158	146	Vertical
2	2332.0000	-28.26	-13.00	15.26	265	98	Vertical
3	3109.3600	-70.28	-13.00	57.28	224	291	Vertical
4	3886.7000	-71.48	-13.00	58.48	366	281	Vertical
5	4664.0400	-69.13	-13.00	56.13	249	214	Vertical
6	7950.0000	-54.88	-13.00	41.88	150	136	Vertical

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Test Band =CAT M1 Band13 5M
Test Channel = Mid Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1560.0000	-70.00	-40.00	30.00	266	318	Horizontal
2	2340.0000	-26.96	-13.00	13.96	236	223	Horizontal
3	3119.3600	-74.37	-13.00	61.37	254	213	Horizontal
4	3899.2000	-71.35	-13.00	58.35	365	98	Horizontal
5	4679.0400	-69.11	-13.00	56.11	158	26	Horizontal
6	7986.0000	-55.00	-13.00	42.00	269	204	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1560.0000	-69.75	-40.00	29.75	256	117	Vertical
2	2340.0000	-26.90	-13.00	13.90	277	94	Vertical
3	3119.3600	-69.90	-13.00	56.90	236	360	Vertical
4	3899.2000	-71.61	-13.00	58.61	269	276	Vertical
5	4679.0400	-68.16	-13.00	55.16	356	290	Vertical
6	7956.0000	-55.09	-13.00	42.09	244	132	Vertical

Test Band =CAT M1 Band13 5M
Test Channel = High Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1564.0000	-75.12	-40.00	35.12	155	169	Horizontal
2	2340.0000	-28.24	-13.00	15.24	236	352	Horizontal
3	3119.3600	-74.67	-13.00	61.67	366	83	Horizontal
4	3899.2000	-70.89	-13.00	57.89	254	323	Horizontal
5	4679.0400	-69.85	-13.00	56.85	247	107	Horizontal
6	7944.0000	-54.73	-13.00	41.73	390	246	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1560.0000	-70.82	-40.00	30.82	235	233	Vertical
2	2340.0000	-27.43	-13.00	14.43	158	360	Vertical
3	3119.3600	-73.72	-13.00	60.72	266	356	Vertical
4	3899.2000	-70.87	-13.00	57.87	344	113	Vertical
5	4679.0400	-69.17	-13.00	56.17	227	252	Vertical
6	7988.0000	-54.53	-13.00	41.53	111	132	Vertical

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Test Band = NB IOT Band13
Test Channel = Low Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-68.61	-13.00	55.61	226	74	Horizontal
2	2332.0200	-76.64	-13.00	63.64	365	50	Horizontal
3	3109.3600	-73.72	-13.00	60.72	258	50	Horizontal
4	3886.7000	-71.21	-13.00	58.21	115	2	Horizontal
5	4664.0400	-68.77	-13.00	55.77	225	36	Horizontal
6	7980.0000	-55.00	-13.00	42.00	155	198	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-60.25	-13.00	47.25	158	358	Vertical
2	2332.0200	-76.61	-13.00	63.61	265	88	Vertical
3	3109.3600	-74.51	-13.00	61.51	365	359	Vertical
4	3886.7000	-70.88	-13.00	57.88	245	189	Vertical
5	4664.0400	-68.53	-13.00	55.53	267	232	Vertical
6	7958.0000	-55.46	-13.00	42.46	278	69	Vertical

Test Band = NB IOT Band13
Test Channel = Mid Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-61.85	-13.00	48.85	154	84	Horizontal
2	2339.5200	-76.30	-13.00	63.30	265	333	Horizontal
3	3119.3600	-74.39	-13.00	61.39	233	175	Horizontal
4	3899.2000	-71.68	-13.00	58.68	221	266	Horizontal
5	4679.0400	-68.82	-13.00	55.82	258	208	Horizontal
6	7992.0000	-55.25	-13.00	42.25	260	155	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-60.41	-13.00	47.41	154	360	Vertical
2	2339.5200	-75.09	-13.00	62.09	236	147	Vertical
3	3119.3600	-74.53	-13.00	61.53	258	8	Vertical
4	3899.2000	-71.21	-13.00	58.21	246	185	Vertical
5	4679.0400	-69.34	-13.00	56.34	277	13	Vertical
6	7902.0000	-55.18	-13.00	42.18	298	18	Vertical

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Test Band = NB IOT Band13
Test Channel = High Channel

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1556.0000	-60.23	-13.00	47.23	158	99	Horizontal
2	2347.0200	-76.88	-13.00	63.88	236	89	Horizontal
3	3129.3600	-72.46	-13.00	59.46	270	32	Horizontal
4	3911.7000	-71.49	-13.00	58.49	203	342	Horizontal
5	4694.0400	-68.69	-13.00	55.69	119	295	Horizontal
6	7976.0000	-55.80	-13.00	42.80	228	352	Horizontal

Suspected Data List							
NO.	Freq. [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1554.0000	-60.53	-13.00	47.53	206	185	Vertical
2	2347.0200	-76.71	-13.00	63.71	118	71	Vertical
3	3129.3600	-74.87	-13.00	61.87	302	360	Vertical
4	3911.7000	-70.65	-13.00	57.65	229	224	Vertical
5	4694.0400	-68.77	-13.00	55.77	245	3	Vertical
6	7954.0000	-55.21	-13.00	42.21	203	358	Vertical

The End