






LTE TEST REPORT

Report Number: C21T00135-RF02-V00

Applicant	SIMCom
Product Name	4G Wireless Smart Module
Model Name	SIM8905A-R2
Brand Name	SIMCom
FCC ID	2AJYU-8PSA302

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in FCC Part 2/24/27/90, ANSI/TIA-603-E, ANSI C63.26, KDB 971168 D01.

Prepared by		Reviewed by	
Approved by		Issue Date	2022-01-10

Industrial Internet Innovation Center (Shanghai) Co., Ltd.



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Test Laboratory:

Industrial Internet Innovation Center (Shanghai) Co., Ltd.
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Revision Version

Report Number	Revision	Date	Memo
C21T00135-RF02-V00	00	2021-01-10	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name	Industrial Internet Innovation Center (Shanghai) Co., Ltd.
Address	Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China
FCC Registration No.	958356
FCC Degistration No.	CN1177

1.2. Testing Environment

Normal Temperature	15°C~35°C
Relative Humidity	30%RH~60%RH
Supply Voltage	120V/60Hz

1.3. Project Information

Project Leader	XU Yuting
Testing Start Date	2021-12-08
Testing End Date	2021-12-17



2. Client Information

2.1. Applicant Information

Company Name	SIMCom
Address	8F, Bldg3 No.289 Linhong Rd, ChangNing District Shanghai, PRC China
Telephone	15102196457

2.2. Manufacturer Information

Company Name	SIMCom
Address	8F, Bldg3 No.289 Linhong Rd, ChangNing District Shanghai, PRC China
Telephone	15102196457

3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Product Name	4G Wireless Smart Module
Model name	SIM8905A-R2
Supported Radio Technology and Bands	LTE Band 2/4/5/7/12/13/17/25/26/41
Hardware Version	V1.03
Software Version	R2148.01
FCC ID	2AJYU-8PSA302
Extreme Temperature	-35°C~75°C
Nominal Voltage	3.9 V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.4V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
N02	861384050078712	V1.03	R2148.01	2021-12-06
	861384050080759			
N11	861384050078290	V1.03	R2148.01	2021-12-06
	861384050080338			

*EUT ID: is internally used to identify the test sample in the lab.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN/Remark
AE1	RF cable	N/A	N/A

*AE ID: is internally used to identify the test sample in the lab.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	2020-10-01
FCC Part 22	PUBLIC MOBILE SERVICES	2020-10-01
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2020-10-01
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	2020-10-01
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio	2015
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v03r01

4.2. Reference Information from client

Antenna gain Information of the test sample provided by Mobiwire Mobiles (Ningbo) Co.,Ltd

Maximum of Antenna Gain:

LTE BAND2: 11 dBi

LTE BAND4: 6 dBi

LTE BAND5: 7.5 dBi

LTE BAND7: 11 dBi

LTE BAND12: 7.5 dBi

LTE BAND17: 7.5 dBi

LTE BAND25: 6 dBi

LTE BAND26: 7.5 dBi

LTE BAND41: 11 dBi

5. Test Summary

5.1. Summary of Test Results

LTE Band 2

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	24.232(c)	Pass
2	Emission Limit	24.238(a), 2.1051	Pass
3	Frequency Stability	24.235, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	24.238(a)	Pass
6	Band Edge Compliance	24.238(a)	Pass
7	Conducted Spurious Emission	24.238, 2.1057	Pass
8	Peak to Average Power Ratio	24.232 (d)	Pass

LTE Band 4

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(h), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(h)	Pass
6	Band Edge Compliance	27.53(h)	Pass
7	Conducted Spurious Emission	27.53(h), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

LTE Band 5

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	2.1046(a), 22.913(a)	Pass
2	Emission Limit	22.917, 2.1051	Pass
3	Frequency Stability	22.235, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	22.917(b)	Pass
6	Band Edge Compliance	22.917(b)	Pass
7	Conducted Spurious Emission	22.917, 2.1057	Pass



LTE Band 7

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(m), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(m)	Pass
6	Band Edge Compliance	27.53(m)	Pass
7	Conducted Spurious Emission	27.53(m), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

LTE Band 12

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(h), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(h)	Pass
6	Band Edge Compliance	27.53(h)	Pass
7	Conducted Spurious Emission	27.53(h), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

LTE Band 13

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(c)(10)	Pass
2	Emission Limit	27.53(g),2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(g)	Pass
6	Band Edge Compliance	27.53(g)	Pass
7	Conducted Spurious Emission	27.53(g),2.1057	Pass
8	Peak to AveragePower Ratio	27.50(a)	Pass

LTE Band 17

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(h), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(h)	Pass
6	Band Edge Compliance	27.53(h)	Pass
7	Conducted Spurious Emission	27.53(h), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

LTE Band 25

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	2.1046,24.232	Pass
2	Emission Limit	2.1053,24.238	Pass
3	Frequency Stability	2.1055,24.235	Pass
4	Occupied Bandwidth	2.1049,24.238	Pass
5	Emission Bandwidth	2.1049,24.238	Pass
6	Band Edge Compliance	2.1049,24.238	Pass
7	Conducted Spurious Emission	2.1049,24.238	Pass
8	Peak to Average Power Ratio	2.1049,24.238	Pass

LTE Band 26(Part 90)

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	90.635(b)	Pass
2	Emission Limit	90.669	Pass
3	Frequency Stability	90.213(a)	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	90.209 (b)	Pass
6	Band Edge Compliance	90.669	Pass
7	Conducted Spurious Emission	90.669	Pass



LTE Band 41

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(h), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(h)	Pass
6	Band Edge Compliance	27.53(h)	Pass
7	Conducted Spurious Emission	27.53(h), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

Test Conditions

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	25°C
Voltage	Vnom	3.7V
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

5.2. Statements

The SIM8905A-R2, manufactured by SIMCom is a new product for testing.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Measurement Results

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω
Temperature	Min. = 15 °C, Max. = 35 °C

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

6.1. Output Power

6.1.1. Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

In all cases, output power is within the specified limits.

CMW500 setting:

1: CMW500 is connected to the DUT

2: Set RX Expected PEP to 30 dBm

6.1.2. Conducted

6.1.2.1. Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

6.1.2.2 Measurement result

LTE Band 2

Band	Frequency(MHz)	BandWidth	RB size/offset	QPSK(dBm)	Q16(dBm)
FDD02	1850.7	1.4	One Rb High	21.37	20.72
FDD02	1850.7	1.4	One Rb Low	21.48	20.68
FDD02	1850.7	1.4	One Rb Middle	21.26	20.83
FDD02	1850.7	1.4	Half Rb Low	21.37	20.60
FDD02	1850.7	1.4	Half Rb High	21.26	20.62
FDD02	1850.7	1.4	Fullrb	20.32	19.72
FDD02	1851.5	3	One Rb High	21.23	20.34
FDD02	1851.5	3	One Rb Low	21.34	21.01
FDD02	1851.5	3	One Rb Middle	21.30	20.49
FDD02	1851.5	3	Half Rb Low	20.44	19.52
FDD02	1851.5	3	Half Rb High	20.44	19.40
FDD02	1851.5	3	Fullrb	20.34	19.40
FDD02	1852.5	5	One Rb High	21.62	20.53
FDD02	1852.5	5	One Rb Low	21.23	20.41
FDD02	1852.5	5	One Rb Middle	21.02	20.43
FDD02	1852.5	5	Half Rb Low	20.30	19.44
FDD02	1852.5	5	Half Rb High	20.29	19.36

FDD02	1852.5	5	Fullrb	20.24	19.25
FDD02	1855	10	One Rb High	21.47	20.44
FDD02	1855	10	One Rb Low	21.37	20.54
FDD02	1855	10	One Rb Middle	21.49	20.75
FDD02	1855	10	Half Rb Low	20.32	19.26
FDD02	1855	10	Half Rb High	20.36	19.39
FDD02	1855	10	Fullrb	20.37	19.36
FDD02	1857.5	15	One Rb High	21.47	20.79
FDD02	1857.5	15	One Rb Low	21.27	20.69
FDD02	1857.5	15	One Rb Middle	21.31	20.45
FDD02	1857.5	15	Half Rb Low	20.62	20.58
FDD02	1857.5	15	Half Rb High	20.71	20.65
FDD02	1857.5	15	Fullrb	20.32	19.42
FDD02	1860	20	One Rb High	21.51	20.09
FDD02	1860	20	One Rb Low	21.49	20.51
FDD02	1860	20	One Rb Middle	21.55	20.50
FDD02	1860	20	Half Rb Low	20.29	19.43
FDD02	1860	20	Half Rb High	20.34	19.53
FDD02	1860	20	Fullrb	20.41	19.46
FDD02	1880	1.4	One Rb High	21.14	20.48
FDD02	1880	1.4	One Rb Low	21.33	20.55
FDD02	1880	1.4	One Rb Middle	21.25	20.63
FDD02	1880	1.4	Half Rb Low	21.19	20.43
FDD02	1880	1.4	Half Rb High	21.16	20.45
FDD02	1880	1.4	Fullrb	20.10	19.21
FDD02	1880	3	One Rb High	20.85	20.00
FDD02	1880	3	One Rb Low	21.05	20.34
FDD02	1880	3	One Rb	20.91	20.34

			Middle		
FDD02	1880	3	Half Rb Low	20.19	19.55
FDD02	1880	3	Half Rb High	20.30	19.62
FDD02	1880	3	Fullrb	20.31	19.54
FDD02	1880	5	One Rb High	20.64	19.68
FDD02	1880	5	One Rb Low	21.06	19.28
FDD02	1880	5	One Rb Middle	20.98	19.54
FDD02	1880	5	Half Rb Low	20.26	19.35
FDD02	1880	5	Half Rb High	20.29	19.29
FDD02	1880	5	Fullrb	20.31	19.42
FDD02	1880	10	One Rb High	20.96	20.19
FDD02	1880	10	One Rb Low	21.19	20.70
FDD02	1880	10	One Rb Middle	21.43	20.50
FDD02	1880	10	Half Rb Low	20.21	19.27
FDD02	1880	10	Half Rb High	20.27	19.22
FDD02	1880	10	Fullrb	20.25	19.38
FDD02	1880	15	One Rb High	21.00	20.31
FDD02	1880	15	One Rb Low	21.35	20.59
FDD02	1880	15	One Rb Middle	21.05	20.20
FDD02	1880	15	Half Rb Low	20.48	20.50
FDD02	1880	15	Half Rb High	20.19	20.25
FDD02	1880	15	Fullrb	20.25	19.32
FDD02	1880	20	One Rb High	21.09	20.02
FDD02	1880	20	One Rb Low	21.44	20.81
FDD02	1880	20	One Rb Middle	21.08	20.55
FDD02	1880	20	Half Rb Low	20.39	19.50
FDD02	1880	20	Half Rb High	20.16	19.35
FDD02	1880	20	Fullrb	20.28	19.33

FDD02	1909.3	1.4	One Rb High	20.88	20.05
FDD02	1909.3	1.4	One Rb Low	20.69	19.73
FDD02	1909.3	1.4	One Rb Middle	20.98	20.21
FDD02	1909.3	1.4	Half Rb Low	20.92	20.11
FDD02	1909.3	1.4	Half Rb High	21.05	20.09
FDD02	1909.3	1.4	Fullrb	20.14	19.31
FDD02	1908.5	3	One Rb High	20.92	20.30
FDD02	1908.5	3	One Rb Low	20.73	20.01
FDD02	1908.5	3	One Rb Middle	20.65	19.98
FDD02	1908.5	3	Half Rb Low	19.93	18.66
FDD02	1908.5	3	Half Rb High	20.05	18.96
FDD02	1908.5	3	Fullrb	19.93	18.95
FDD02	1907.5	5	One Rb High	21.08	20.16
FDD02	1907.5	5	One Rb Low	20.71	19.98
FDD02	1907.5	5	One Rb Middle	20.39	19.50
FDD02	1907.5	5	Half Rb Low	19.96	19.06
FDD02	1907.5	5	Half Rb High	20.05	19.12
FDD02	1907.5	5	Fullrb	19.88	18.91
FDD02	1905	10	One Rb High	20.96	20.15
FDD02	1905	10	One Rb Low	20.79	20.02
FDD02	1905	10	One Rb Middle	21.04	20.12
FDD02	1905	10	Half Rb Low	19.86	18.98
FDD02	1905	10	Half Rb High	20.01	18.99
FDD02	1905	10	Fullrb	19.90	19.06
FDD02	1902.5	15	One Rb High	20.94	20.20
FDD02	1902.5	15	One Rb Low	20.81	19.96
FDD02	1902.5	15	One Rb Middle	20.64	19.70

FDD02	1902.5	15	Half Rb Low	20.49	20.67
FDD02	1902.5	15	Half Rb High	20.74	20.73
FDD02	1902.5	15	Fullrb	19.90	19.11
FDD02	1900	20	One Rb High	21.04	20.30
FDD02	1900	20	One Rb Low	21.15	20.29
FDD02	1900	20	One Rb Middle	21.05	20.40
FDD02	1900	20	Half Rb Low	20.03	19.22
FDD02	1900	20	Half Rb High	19.85	18.94
FDD02	1900	20	Fullrb	20.01	19.07

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FDD04	1710.7	1.4	One Rb High	22.15	21.27
FDD04	1710.7	1.4	One Rb Low	22.17	21.52
FDD04	1710.7	1.4	One Rb Middle	22.31	21.53
FDD04	1710.7	1.4	Half Rb Low	22.16	20.91
FDD04	1710.7	1.4	Half Rb High	22.10	21.04
FDD04	1710.7	1.4	Fullrb	21.18	20.22
FDD04	1711.5	3	One Rb High	22.16	21.31
FDD04	1711.5	3	One Rb Low	22.33	21.40
FDD04	1711.5	3	One Rb Middle	22.08	21.42
FDD04	1711.5	3	Half Rb Low	21.24	20.04
FDD04	1711.5	3	Half Rb High	21.10	20.24
FDD04	1711.5	3	Fullrb	21.25	20.09
FDD04	1712.5	5	One Rb High	22.03	21.28
FDD04	1712.5	5	One Rb Low	21.97	21.22
FDD04	1712.5	5	One Rb Middle	22.06	21.57
FDD04	1712.5	5	Half Rb Low	21.21	20.13
FDD04	1712.5	5	Half Rb High	21.23	20.07
FDD04	1712.5	5	Fullrb	21.20	20.10
FDD04	1715	10	One Rb High	22.16	21.46

FDD04	1715	10	One Rb Low	22.33	21.51
FDD04	1715	10	One Rb Middle	22.38	21.36
FDD04	1715	10	Half Rb Low	21.22	20.29
FDD04	1715	10	Half Rb High	21.24	20.28
FDD04	1715	10	Fullrb	21.18	20.30
FDD04	1717.5	15	One Rb High	22.29	21.40
FDD04	1717.5	15	One Rb Low	22.34	21.53
FDD04	1717.5	15	One Rb Middle	22.09	21.42
FDD04	1717.5	15	Half Rb Low	21.50	21.49
FDD04	1717.5	15	Half Rb High	21.41	21.48
FDD04	1717.5	15	Fullrb	21.22	20.38
FDD04	1720	20	One Rb High	22.33	21.40
FDD04	1720	20	One Rb Low	22.33	21.33
FDD04	1720	20	One Rb Middle	22.42	21.67
FDD04	1720	20	Half Rb Low	21.27	20.28
FDD04	1720	20	Half Rb High	21.37	20.32
FDD04	1720	20	Fullrb	21.30	20.22
FDD04	1732.5	1.4	One Rb High	22.33	21.69
FDD04	1732.5	1.4	One Rb Low	22.43	21.37
FDD04	1732.5	1.4	One Rb Middle	22.38	21.59
FDD04	1732.5	1.4	Half Rb Low	22.30	20.98
FDD04	1732.5	1.4	Half Rb High	22.24	21.06
FDD04	1732.5	1.4	Fullrb	21.29	20.36
FDD04	1732.5	3	One Rb High	22.27	22.14
FDD04	1732.5	3	One Rb Low	22.41	21.80
FDD04	1732.5	3	One Rb Middle	22.20	21.33
FDD04	1732.5	3	Half Rb Low	21.33	20.68
FDD04	1732.5	3	Half Rb High	21.29	20.64
FDD04	1732.5	3	Fullrb	21.39	20.50

FDD04	1732.5	5	One Rb High	21.84	20.84
FDD04	1732.5	5	One Rb Low	22.19	20.56
FDD04	1732.5	5	One Rb Middle	22.21	20.51
FDD04	1732.5	5	Half Rb Low	21.32	20.47
FDD04	1732.5	5	Half Rb High	21.32	20.38
FDD04	1732.5	5	Fullrb	21.31	20.37
FDD04	1732.5	10	One Rb High	22.13	21.60
FDD04	1732.5	10	One Rb Low	22.35	21.66
FDD04	1732.5	10	One Rb Middle	22.47	22.17
FDD04	1732.5	10	Half Rb Low	21.37	20.48
FDD04	1732.5	10	Half Rb High	21.38	20.49
FDD04	1732.5	10	Fullrb	21.36	20.42
FDD04	1732.5	15	One Rb High	22.31	21.81
FDD04	1732.5	15	One Rb Low	22.34	21.46
FDD04	1732.5	15	One Rb Middle	22.26	21.46
FDD04	1732.5	15	Half Rb Low	21.44	21.46
FDD04	1732.5	15	Half Rb High	21.44	21.31
FDD04	1732.5	15	Fullrb	21.37	20.36
FDD04	1732.5	20	One Rb High	22.41	21.84
FDD04	1732.5	20	One Rb Low	22.39	21.65
FDD04	1732.5	20	One Rb Middle	22.22	21.40
FDD04	1732.5	20	Half Rb Low	21.49	20.44
FDD04	1732.5	20	Half Rb High	21.36	20.38
FDD04	1732.5	20	Fullrb	21.46	20.42
FDD04	1754.3	1.4	One Rb High	22.22	21.33
FDD04	1754.3	1.4	One Rb Low	22.05	21.24
FDD04	1754.3	1.4	One Rb Middle	22.17	21.60
FDD04	1754.3	1.4	Half Rb Low	22.27	21.30
FDD04	1754.3	1.4	Half Rb High	22.16	21.22

FDD04	1754.3	1.4	Fullrb	21.30	20.46
FDD04	1753.5	3	One Rb High	22.09	21.37
FDD04	1753.5	3	One Rb Low	22.14	21.15
FDD04	1753.5	3	One Rb Middle	22.19	21.22
FDD04	1753.5	3	Half Rb Low	21.26	20.16
FDD04	1753.5	3	Half Rb High	21.19	20.00
FDD04	1753.5	3	Fullrb	21.09	19.99
FDD04	1752.5	5	One Rb High	22.09	21.35
FDD04	1752.5	5	One Rb Low	22.01	21.25
FDD04	1752.5	5	One Rb Middle	22.08	21.20
FDD04	1752.5	5	Half Rb Low	21.07	20.07
FDD04	1752.5	5	Half Rb High	21.21	20.28
FDD04	1752.5	5	Fullrb	21.04	20.05
FDD04	1750	10	One Rb High	22.18	21.40
FDD04	1750	10	One Rb Low	22.24	21.63
FDD04	1750	10	One Rb Middle	22.33	21.46
FDD04	1750	10	Half Rb Low	21.34	20.32
FDD04	1750	10	Half Rb High	21.19	20.24
FDD04	1750	10	Fullrb	21.20	20.25
FDD04	1747.5	15	One Rb High	22.07	21.40
FDD04	1747.5	15	One Rb Low	22.20	21.56
FDD04	1747.5	15	One Rb Middle	22.13	21.22
FDD04	1747.5	15	Half Rb Low	21.84	22.16
FDD04	1747.5	15	Half Rb High	22.14	22.15
FDD04	1747.5	15	Fullrb	21.27	20.33
FDD04	1745	20	One Rb High	22.37	21.52
FDD04	1745	20	One Rb Low	22.59	22.03
FDD04	1745	20	One Rb Middle	22.58	21.63
FDD04	1745	20	Half Rb Low	21.44	20.53

FDD04	1745	20	Half Rb High	21.39	20.34
FDD04	1745	20	Fullrb	21.41	20.37

LTE Band 5

FDD05	824.7	1.4	One Rb High	23.02	22.42
FDD05	824.7	1.4	One Rb Low	23.22	22.67
FDD05	824.7	1.4	One Rb Middle	23.14	22.96
FDD05	824.7	1.4	Half Rb Low	23.42	22.48
FDD05	824.7	1.4	Half Rb High	23.25	22.59
FDD05	824.7	1.4	Fullrb	22.26	21.34
FDD05	825.5	3	One Rb High	23.12	22.83
FDD05	825.5	3	One Rb Low	23.22	22.49
FDD05	825.5	3	One Rb Middle	23.04	22.37
FDD05	825.5	3	Half Rb Low	22.19	21.47
FDD05	825.5	3	Half Rb High	22.26	21.40
FDD05	825.5	3	Fullrb	22.21	21.18
FDD05	826.5	5	One Rb High	23.16	22.15
FDD05	826.5	5	One Rb Low	22.98	22.33
FDD05	826.5	5	One Rb Middle	22.96	22.23
FDD05	826.5	5	Half Rb Low	22.12	21.15
FDD05	826.5	5	Half Rb High	22.17	21.25
FDD05	826.5	5	Fullrb	22.13	21.17
FDD05	829	10	One Rb High	23.24	22.39
FDD05	829	10	One Rb Low	23.19	22.48
FDD05	829	10	One Rb Middle	23.27	22.49
FDD05	829	10	Half Rb Low	22.18	21.30
FDD05	829	10	Half Rb High	22.25	21.09
FDD05	829	10	Fullrb	22.34	21.24
FDD05	836.5	1.4	One Rb High	23.18	22.36
FDD05	836.5	1.4	One Rb Low	23.31	22.18

FDD05	836.5	1.4	One Rb Middle	23.08	22.40
FDD05	836.5	1.4	Half Rb Low	23.23	22.47
FDD05	836.5	1.4	Half Rb High	23.15	22.45
FDD05	836.5	1.4	Fullrb	22.18	21.54
FDD05	836.5	3	One Rb High	23.07	22.58
FDD05	836.5	3	One Rb Low	23.37	22.39
FDD05	836.5	3	One Rb Middle	23.09	22.24
FDD05	836.5	3	Half Rb Low	22.24	21.51
FDD05	836.5	3	Half Rb High	22.13	21.49
FDD05	836.5	3	Fullrb	22.25	21.42
FDD05	836.5	5	One Rb High	22.93	21.10
FDD05	836.5	5	One Rb Low	23.18	21.51
FDD05	836.5	5	One Rb Middle	23.00	21.50
FDD05	836.5	5	Half Rb Low	22.18	21.09
FDD05	836.5	5	Half Rb High	22.17	21.25
FDD05	836.5	5	Fullrb	22.20	21.25
FDD05	836.5	10	One Rb High	23.25	22.45
FDD05	836.5	10	One Rb Low	23.09	22.53
FDD05	836.5	10	One Rb Middle	23.09	22.59
FDD05	836.5	10	Half Rb Low	22.33	21.19
FDD05	836.5	10	Half Rb High	22.17	21.21
FDD05	836.5	10	Fullrb	22.25	21.28
FDD05	848.3	1.4	One Rb High	22.90	22.63
FDD05	848.3	1.4	One Rb Low	22.97	22.71
FDD05	848.3	1.4	One Rb Middle	22.87	22.28
FDD05	848.3	1.4	Half Rb Low	23.11	21.93
FDD05	848.3	1.4	Half Rb High	22.78	21.93
FDD05	848.3	1.4	Fullrb	22.00	21.18
FDD05	847.5	3	One Rb High	22.87	22.32

FDD05	847.5	3	One Rb Low	23.10	22.33
FDD05	847.5	3	One Rb Middle	22.84	21.82
FDD05	847.5	3	Half Rb Low	22.09	21.40
FDD05	847.5	3	Half Rb High	22.13	21.00
FDD05	847.5	3	Fullrb	22.16	21.33
FDD05	846.5	5	One Rb High	22.96	21.91
FDD05	846.5	5	One Rb Low	23.38	22.43
FDD05	846.5	5	One Rb Middle	22.91	22.29
FDD05	846.5	5	Half Rb Low	22.11	21.23
FDD05	846.5	5	Half Rb High	22.03	21.29
FDD05	846.5	5	Fullrb	22.11	20.93
FDD05	844	10	One Rb High	22.91	22.75
FDD05	844	10	One Rb Low	23.34	22.14
FDD05	844	10	One Rb Middle	23.46	22.67
FDD05	844	10	Half Rb Low	22.16	21.31
FDD05	844	10	Half Rb High	22.29	21.26
FDD05	844	10	Fullrb	22.17	21.25

LTE Band 7

FDD07	2502.5	5	One Rb High	20.77	18.92
FDD07	2502.5	5	One Rb Low	20.63	19.67
FDD07	2502.5	5	One Rb Middle	20.70	19.75
FDD07	2502.5	5	Half Rb Low	19.77	18.55
FDD07	2502.5	5	Half Rb High	19.83	18.80
FDD07	2502.5	5	Fullrb	19.75	18.99
FDD07	2505	10	One Rb High	20.79	20.23
FDD07	2505	10	One Rb Low	20.74	19.82
FDD07	2505	10	One Rb Middle	20.94	20.06
FDD07	2505	10	Half Rb Low	19.79	18.97
FDD07	2505	10	Half Rb High	19.98	19.08

FDD07	2505	10	Fullrb	19.96	19.14
FDD07	2507.5	15	One Rb High	20.96	20.24
FDD07	2507.5	15	One Rb Low	20.98	20.19
FDD07	2507.5	15	One Rb Middle	20.85	20.12
FDD07	2507.5	15	Half Rb Low	20.01	19.99
FDD07	2507.5	15	Half Rb High	20.13	20.18
FDD07	2507.5	15	Fullrb	19.93	19.03
FDD07	2510	20	One Rb High	21.00	19.93
FDD07	2510	20	One Rb Low	21.00	20.47
FDD07	2510	20	One Rb Middle	21.21	20.51
FDD07	2510	20	Half Rb Low	19.95	19.02
FDD07	2510	20	Half Rb High	19.94	19.06
FDD07	2510	20	Fullrb	19.98	18.90
FDD07	2535	5	One Rb High	20.78	20.09
FDD07	2535	5	One Rb Low	20.96	19.36
FDD07	2535	5	One Rb Middle	20.94	19.83
FDD07	2535	5	Half Rb Low	20.13	19.11
FDD07	2535	5	Half Rb High	20.10	19.10
FDD07	2535	5	Fullrb	20.11	19.13
FDD07	2535	10	One Rb High	21.08	20.25
FDD07	2535	10	One Rb Low	21.01	20.23
FDD07	2535	10	One Rb Middle	21.04	20.57
FDD07	2535	10	Half Rb Low	20.15	19.19
FDD07	2535	10	Half Rb High	20.18	19.17
FDD07	2535	10	Fullrb	20.15	19.22
FDD07	2535	15	One Rb High	21.01	20.32
FDD07	2535	15	One Rb Low	21.02	20.40
FDD07	2535	15	One Rb Middle	20.88	20.13
FDD07	2535	15	Half Rb Low	20.50	20.50

FDD07	2535	15	Half Rb High	20.41	20.40
FDD07	2535	15	Fullrb	20.14	19.21
FDD07	2535	20	One Rb High	21.04	20.46
FDD07	2535	20	One Rb Low	20.95	20.37
FDD07	2535	20	One Rb Middle	20.97	20.49
FDD07	2535	20	Half Rb Low	20.19	19.42
FDD07	2535	20	Half Rb High	20.21	19.37
FDD07	2535	20	Fullrb	20.26	19.25
FDD07	2567.5	5	One Rb High	20.85	20.04
FDD07	2567.5	5	One Rb Low	21.06	20.13
FDD07	2567.5	5	One Rb Middle	20.87	20.21
FDD07	2567.5	5	Half Rb Low	20.03	19.09
FDD07	2567.5	5	Half Rb High	19.97	19.09
FDD07	2567.5	5	Fullrb	19.96	19.03
FDD07	2565	10	One Rb High	20.92	20.15
FDD07	2565	10	One Rb Low	21.22	20.26
FDD07	2565	10	One Rb Middle	20.85	19.93
FDD07	2565	10	Half Rb Low	20.17	19.21
FDD07	2565	10	Half Rb High	20.02	19.11
FDD07	2565	10	Fullrb	20.10	19.21
FDD07	2562.5	15	One Rb High	20.84	20.08
FDD07	2562.5	15	One Rb Low	21.24	20.46
FDD07	2562.5	15	One Rb Middle	20.81	19.99
FDD07	2562.5	15	Half Rb Low	20.67	20.55
FDD07	2562.5	15	Half Rb High	20.18	20.26
FDD07	2562.5	15	Fullrb	20.21	19.22
FDD07	2560	20	One Rb High	20.82	20.00
FDD07	2560	20	One Rb Low	21.42	20.74
FDD07	2560	20	One Rb Middle	21.28	20.62

FDD07	2560	20	Half Rb Low	20.42	19.55
FDD07	2560	20	Half Rb High	20.10	19.18
FDD07	2560	20	Fullrb	20.19	19.21

LTE Band 12

FDD12	699.7	1.4	One Rb High	22.16	21.35
FDD12	699.7	1.4	One Rb Low	22.20	21.31
FDD12	699.7	1.4	One Rb Middle	22.03	21.53
FDD12	699.7	1.4	Half Rb Low	22.09	21.12
FDD12	699.7	1.4	Half Rb High	21.96	21.31
FDD12	699.7	1.4	Fullrb	21.02	20.11
FDD12	700.5	3	One Rb High	21.99	20.75
FDD12	700.5	3	One Rb Low	22.30	21.78
FDD12	700.5	3	One Rb Middle	21.89	21.26
FDD12	700.5	3	Half Rb Low	21.24	20.13
FDD12	700.5	3	Half Rb High	21.07	20.12
FDD12	700.5	3	Fullrb	21.09	20.28
FDD12	701.5	5	One Rb High	22.37	21.27
FDD12	701.5	5	One Rb Low	22.10	21.41
FDD12	701.5	5	One Rb Middle	21.92	21.26
FDD12	701.5	5	Half Rb Low	21.07	20.20
FDD12	701.5	5	Half Rb High	21.25	20.08
FDD12	701.5	5	Fullrb	21.16	19.96
FDD12	704	10	One Rb High	22.30	21.47
FDD12	704	10	One Rb Low	21.95	21.21
FDD12	704	10	One Rb Middle	22.32	21.39
FDD12	704	10	Half Rb Low	21.03	20.15
FDD12	704	10	Half Rb High	21.37	20.36
FDD12	704	10	Fullrb	21.21	20.14
FDD12	707.5	1.4	One Rb High	22.19	21.57

FDD12	707.5	1.4	One Rb Low	22.38	21.55
FDD12	707.5	1.4	One Rb Middle	22.45	21.93
FDD12	707.5	1.4	Half Rb Low	22.24	21.48
FDD12	707.5	1.4	Half Rb High	22.22	21.43
FDD12	707.5	1.4	Fullrb	21.32	20.33
FDD12	707.5	3	One Rb High	21.97	21.16
FDD12	707.5	3	One Rb Low	22.37	21.29
FDD12	707.5	3	One Rb Middle	22.18	21.48
FDD12	707.5	3	Half Rb Low	21.35	20.70
FDD12	707.5	3	Half Rb High	21.26	20.51
FDD12	707.5	3	Fullrb	21.33	20.47
FDD12	707.5	5	One Rb High	21.97	20.32
FDD12	707.5	5	One Rb Low	22.31	20.58
FDD12	707.5	5	One Rb Middle	22.04	20.47
FDD12	707.5	5	Half Rb Low	21.24	20.42
FDD12	707.5	5	Half Rb High	21.22	20.31
FDD12	707.5	5	Fullrb	21.33	20.24
FDD12	707.5	10	One Rb High	21.81	21.32
FDD12	707.5	10	One Rb Low	22.19	21.87
FDD12	707.5	10	One Rb Middle	22.49	21.64
FDD12	707.5	10	Half Rb Low	21.31	20.25
FDD12	707.5	10	Half Rb High	21.00	20.14
FDD12	707.5	10	Fullrb	21.29	20.31
FDD12	715.3	1.4	One Rb High	22.12	21.30
FDD12	715.3	1.4	One Rb Low	21.89	21.26
FDD12	715.3	1.4	One Rb Middle	22.23	21.57
FDD12	715.3	1.4	Half Rb Low	22.27	21.52
FDD12	715.3	1.4	Half Rb High	22.30	21.48
FDD12	715.3	1.4	Fullrb	21.26	20.24

FDD12	714.5	3	One Rb High	22.18	21.76
FDD12	714.5	3	One Rb Low	21.94	21.35
FDD12	714.5	3	One Rb Middle	22.21	21.47
FDD12	714.5	3	Half Rb Low	21.16	19.93
FDD12	714.5	3	Half Rb High	21.30	20.26
FDD12	714.5	3	Fullrb	21.19	20.09
FDD12	713.5	5	One Rb High	22.25	21.33
FDD12	713.5	5	One Rb Low	21.89	21.19
FDD12	713.5	5	One Rb Middle	22.21	21.31
FDD12	713.5	5	Half Rb Low	20.93	20.06
FDD12	713.5	5	Half Rb High	21.28	20.23
FDD12	713.5	5	Fullrb	20.98	20.04
FDD12	711	10	One Rb High	22.23	21.47
FDD12	711	10	One Rb Low	22.52	21.74
FDD12	711	10	One Rb Middle	21.98	21.04
FDD12	711	10	Half Rb Low	21.32	20.44
FDD12	711	10	Half Rb High	20.98	19.98
FDD12	711	10	Fullrb	21.17	20.26

LTE Band 13

FDD13	779.5	5	One Rb High	22.35	20.84
FDD13	779.5	5	One Rb Low	22.63	20.74
FDD13	779.5	5	One Rb Middle	22.32	21.25
FDD13	779.5	5	Half Rb Low	21.79	20.70
FDD13	779.5	5	Half Rb High	21.68	20.56
FDD13	779.5	5	Fullrb	21.78	20.84
FDD13	782	10	One Rb High	22.64	21.68
FDD13	782	10	One Rb Low	22.88	22.45
FDD13	782	10	One Rb Middle	22.63	22.08
FDD13	782	10	Half Rb Low	21.94	20.73

FDD13	782	10	Half Rb High	21.87	20.84
FDD13	782	10	Fullrb	21.72	20.79
FDD13	782	5	One Rb High	22.66	21.08
FDD13	782	5	One Rb Low	22.58	21.08
FDD13	782	5	One Rb Middle	22.58	20.93
FDD13	782	5	Half Rb Low	21.66	20.74
FDD13	782	5	Half Rb High	21.69	20.78
FDD13	782	5	Fullrb	21.62	20.70
FDD13	782	10	One Rb High	22.59	21.64
FDD13	782	10	One Rb Low	22.83	22.10
FDD13	782	10	One Rb Middle	22.70	21.98
FDD13	782	10	Half Rb Low	21.86	20.54
FDD13	782	10	Half Rb High	21.83	20.80
FDD13	782	10	Fullrb	21.79	20.69
FDD13	784.5	5	One Rb High	22.85	21.91
FDD13	784.5	5	One Rb Low	22.74	21.70
FDD13	784.5	5	One Rb Middle	22.74	22.02
FDD13	784.5	5	Half Rb Low	21.67	20.60
FDD13	784.5	5	Half Rb High	21.83	20.89
FDD13	784.5	5	Fullrb	21.73	20.61
FDD13	782	10	One Rb High	22.62	22.14
FDD13	782	10	One Rb Low	22.76	22.02
FDD13	782	10	One Rb Middle	22.64	22.10
FDD13	782	10	Half Rb Low	21.72	20.75
FDD13	782	10	Half Rb High	21.80	20.81
FDD13	782	10	Fullrb	21.76	20.82

LTE Band 17

FDD17	706.5	5	One Rb High	22.20	20.31
FDD17	706.5	5	One Rb Low	22.35	20.67

FDD17	706.5	5	One Rb Middle	22.14	20.66
FDD17	706.5	5	Half Rb Low	21.39	20.40
FDD17	706.5	5	Half Rb High	21.29	20.21
FDD17	706.5	5	Fullrb	21.43	20.53
FDD17	709	10	One Rb High	22.01	21.08
FDD17	709	10	One Rb Low	22.76	21.93
FDD17	709	10	One Rb Middle	22.54	21.72
FDD17	709	10	Half Rb Low	21.48	20.51
FDD17	709	10	Half Rb High	21.34	20.43
FDD17	709	10	Fullrb	21.45	20.34
FDD17	710	5	One Rb High	21.83	20.98
FDD17	710	5	One Rb Low	22.28	21.23
FDD17	710	5	One Rb Middle	22.08	20.35
FDD17	710	5	Half Rb Low	21.25	20.42
FDD17	710	5	Half Rb High	21.29	20.38
FDD17	710	5	Fullrb	21.44	20.26
FDD17	710	10	One Rb High	22.21	21.49
FDD17	710	10	One Rb Low	22.71	21.79
FDD17	710	10	One Rb Middle	22.29	21.67
FDD17	710	10	Half Rb Low	21.43	20.38
FDD17	710	10	Half Rb High	21.20	20.27
FDD17	710	10	Fullrb	21.44	20.33
FDD17	713.5	5	One Rb High	22.41	21.35
FDD17	713.5	5	One Rb Low	22.08	21.40
FDD17	713.5	5	One Rb Middle	22.27	21.32
FDD17	713.5	5	Half Rb Low	21.24	20.36
FDD17	713.5	5	Half Rb High	21.32	20.39
FDD17	713.5	5	Fullrb	21.29	20.15
FDD17	711	10	One Rb High	22.24	21.38

FDD17	711	10	One Rb Low	22.64	21.85
FDD17	711	10	One Rb Middle	22.06	21.16
FDD17	711	10	Half Rb Low	21.43	20.54
FDD17	711	10	Half Rb High	21.25	20.21
FDD17	711	10	Fullrb	21.36	20.44

LTE Band 25

FDD25	1850.7	1.4	One Rb High	21.53	20.62
FDD25	1850.7	1.4	One Rb Low	21.55	20.66
FDD25	1850.7	1.4	One Rb Middle	21.54	20.88
FDD25	1850.7	1.4	Half Rb Low	21.53	20.64
FDD25	1850.7	1.4	Half Rb High	21.54	20.64
FDD25	1850.7	1.4	Fullrb	20.60	19.53
FDD25	1851.5	3	One Rb High	21.51	20.84
FDD25	1851.5	3	One Rb Low	21.46	20.87
FDD25	1851.5	3	One Rb Middle	21.63	21.30
FDD25	1851.5	3	Half Rb Low	20.57	19.58
FDD25	1851.5	3	Half Rb High	20.61	19.56
FDD25	1851.5	3	Fullrb	20.51	19.48
FDD25	1852.5	5	One Rb High	21.70	20.63
FDD25	1852.5	5	One Rb Low	21.59	20.79
FDD25	1852.5	5	One Rb Middle	21.53	20.87
FDD25	1852.5	5	Half Rb Low	20.47	19.49
FDD25	1852.5	5	Half Rb High	20.55	19.39
FDD25	1852.5	5	Fullrb	20.53	19.41
FDD25	1855	10	One Rb High	21.66	20.81
FDD25	1855	10	One Rb Low	21.62	20.93
FDD25	1855	10	One Rb Middle	21.76	20.75
FDD25	1855	10	Half Rb Low	20.50	19.64
FDD25	1855	10	Half Rb High	20.65	19.57

FDD25	1855	10	Fullrb	20.55	19.53
FDD25	1857.5	15	One Rb High	21.63	20.81
FDD25	1857.5	15	One Rb Low	21.50	20.86
FDD25	1857.5	15	One Rb Middle	21.65	20.75
FDD25	1857.5	15	Half Rb Low	20.80	20.86
FDD25	1857.5	15	Half Rb High	21.53	21.42
FDD25	1857.5	15	Fullrb	20.52	19.54
FDD25	1860	20	One Rb High	21.65	20.87
FDD25	1860	20	One Rb Low	21.66	21.24
FDD25	1860	20	One Rb Middle	21.95	21.05
FDD25	1860	20	Half Rb Low	20.58	19.64
FDD25	1860	20	Half Rb High	20.58	19.39
FDD25	1860	20	Fullrb	20.62	19.55
FDD25	1882.5	1.4	One Rb High	21.01	19.75
FDD25	1882.5	1.4	One Rb Low	21.17	19.71
FDD25	1882.5	1.4	One Rb Middle	21.23	20.29
FDD25	1882.5	1.4	Half Rb Low	21.13	20.02
FDD25	1882.5	1.4	Half Rb High	21.20	20.15
FDD25	1882.5	1.4	Fullrb	20.31	19.26
FDD25	1882.5	3	One Rb High	20.97	20.43
FDD25	1882.5	3	One Rb Low	21.10	20.37
FDD25	1882.5	3	One Rb Middle	21.23	20.47
FDD25	1882.5	3	Half Rb Low	20.28	19.53
FDD25	1882.5	3	Half Rb High	20.34	19.48
FDD25	1882.5	3	Fullrb	20.25	19.28
FDD25	1882.5	5	One Rb High	21.03	20.02
FDD25	1882.5	5	One Rb Low	20.89	19.83
FDD25	1882.5	5	One Rb Middle	21.10	19.48
FDD25	1882.5	5	Half Rb Low	20.15	19.38

FDD25	1882.5	5	Half Rb High	20.21	19.20
FDD25	1882.5	5	Fullrb	20.21	19.12
FDD25	1882.5	10	One Rb High	21.19	20.33
FDD25	1882.5	10	One Rb Low	21.18	20.76
FDD25	1882.5	10	One Rb Middle	21.28	20.64
FDD25	1882.5	10	Half Rb Low	20.25	19.11
FDD25	1882.5	10	Half Rb High	20.24	19.28
FDD25	1882.5	10	Fullrb	20.19	19.26
FDD25	1882.5	15	One Rb High	21.14	20.41
FDD25	1882.5	15	One Rb Low	21.32	20.83
FDD25	1882.5	15	One Rb Middle	21.18	20.92
FDD25	1882.5	15	Half Rb Low	20.34	20.34
FDD25	1882.5	15	Half Rb High	20.41	20.16
FDD25	1882.5	15	Fullrb	20.18	19.25
FDD25	1882.5	20	One Rb High	21.26	19.84
FDD25	1882.5	20	One Rb Low	21.48	20.33
FDD25	1882.5	20	One Rb Middle	21.49	20.07
FDD25	1882.5	20	Half Rb Low	20.34	19.36
FDD25	1882.5	20	Half Rb High	20.21	19.18
FDD25	1882.5	20	Fullrb	20.26	19.22
FDD25	1914.3	1.4	One Rb High	20.65	20.18
FDD25	1914.3	1.4	One Rb Low	20.91	20.26
FDD25	1914.3	1.4	One Rb Middle	20.74	20.33
FDD25	1914.3	1.4	Half Rb Low	20.93	20.19
FDD25	1914.3	1.4	Half Rb High	20.81	19.65
FDD25	1914.3	1.4	Fullrb	19.87	18.89
FDD25	1913.5	3	One Rb High	20.79	20.39
FDD25	1913.5	3	One Rb Low	21.01	19.91
FDD25	1913.5	3	One Rb Middle	20.68	19.63

FDD25	1913.5	3	Half Rb Low	20.00	18.79
FDD25	1913.5	3	Half Rb High	19.71	18.98
FDD25	1913.5	3	Fullrb	20.00	19.06
FDD25	1912.5	5	One Rb High	20.56	19.87
FDD25	1912.5	5	One Rb Low	21.02	19.96
FDD25	1912.5	5	One Rb Middle	21.07	20.09
FDD25	1912.5	5	Half Rb Low	19.97	19.04
FDD25	1912.5	5	Half Rb High	19.79	18.74
FDD25	1912.5	5	Fullrb	19.95	18.72
FDD25	1910	10	One Rb High	20.83	20.10
FDD25	1910	10	One Rb Low	20.96	20.25
FDD25	1910	10	One Rb Middle	21.08	20.21
FDD25	1910	10	Half Rb Low	19.93	18.89
FDD25	1910	10	Half Rb High	20.00	19.00
FDD25	1910	10	Fullrb	19.93	18.89
FDD25	1907.5	15	One Rb High	20.87	20.17
FDD25	1907.5	15	One Rb Low	20.98	20.01
FDD25	1907.5	15	One Rb Middle	20.99	20.31
FDD25	1907.5	15	Half Rb Low	20.09	20.36
FDD25	1907.5	15	Half Rb High	20.74	20.74
FDD25	1907.5	15	Fullrb	20.03	19.00
FDD25	1905	20	One Rb High	20.86	20.40
FDD25	1905	20	One Rb Low	21.43	20.81
FDD25	1905	20	One Rb Middle	21.26	20.51
FDD25	1905	20	Half Rb Low	20.22	19.22
FDD25	1905	20	Half Rb High	20.06	19.03
FDD25	1905	20	Fullrb	20.06	18.99

LTE Band 26(part 90)

FDD26A	814.7	1.4	One Rb High	23.00	22.16
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FDD26A	814.7	1.4	One Rb Low	22.96	21.88
FDD26A	814.7	1.4	One Rb Middle	23.08	22.00
FDD26A	814.7	1.4	Half Rb Low	22.91	21.94
FDD26A	814.7	1.4	Half Rb High	22.98	22.06
FDD26A	814.7	1.4	Fullrb	22.00	21.10
FDD26A	815.5	3	One Rb High	22.73	22.05
FDD26A	815.5	3	One Rb Low	23.13	22.20
FDD26A	815.5	3	One Rb Middle	22.96	21.89
FDD26A	815.5	3	Half Rb Low	22.05	21.10
FDD26A	815.5	3	Half Rb High	21.92	20.98
FDD26A	815.5	3	Fullrb	22.04	20.99
FDD26A	816.5	5	One Rb High	22.83	22.05
FDD26A	816.5	5	One Rb Low	23.15	22.13
FDD26A	816.5	5	One Rb Middle	22.71	22.05
FDD26A	816.5	5	Half Rb Low	22.09	20.80
FDD26A	816.5	5	Half Rb High	21.96	21.06
FDD26A	816.5	5	Fullrb	21.92	21.01
FDD26A	819	1.4	One Rb High	23.04	22.36
FDD26A	819	1.4	One Rb Low	23.16	22.25
FDD26A	819	1.4	One Rb Middle	22.89	22.34
FDD26A	819	1.4	Half Rb Low	23.05	21.76
FDD26A	819	1.4	Half Rb High	22.93	22.33
FDD26A	819	1.4	Fullrb	22.04	21.35
FDD26A	819	3	One Rb High	23.01	22.10
FDD26A	819	3	One Rb Low	23.01	22.06
FDD26A	819	3	One Rb Middle	22.86	22.36
FDD26A	819	3	Half Rb Low	22.10	21.19
FDD26A	819	3	Half Rb High	22.00	21.68
FDD26A	819	3	Fullrb	22.25	21.28

FDD26A	819	5	One Rb High	22.63	21.67
FDD26A	819	5	One Rb Low	23.01	21.18
FDD26A	819	5	One Rb Middle	22.59	21.33
FDD26A	819	5	Half Rb Low	21.96	21.09
FDD26A	819	5	Half Rb High	22.05	21.18
FDD26A	819	5	Fullrb	22.14	21.15
FDD26A	819	10	One Rb High	22.97	22.14
FDD26A	819	10	One Rb Low	22.95	22.33
FDD26A	819	10	One Rb Middle	22.90	22.33
FDD26A	819	10	Half Rb Low	22.02	20.97
FDD26A	819	10	Half Rb High	22.05	21.14
FDD26A	819	10	Fullrb	22.22	21.13
FDD26A	823.3	1.4	One Rb High	23.23	22.48
FDD26A	823.3	1.4	One Rb Low	23.19	22.21
FDD26A	823.3	1.4	One Rb Middle	22.88	22.57
FDD26A	823.3	1.4	Half Rb Low	23.00	22.22
FDD26A	823.3	1.4	Half Rb High	22.97	22.45
FDD26A	823.3	1.4	Fullrb	22.04	21.12
FDD26A	822.5	3	One Rb High	23.24	22.51
FDD26A	822.5	3	One Rb Low	23.14	22.65
FDD26A	822.5	3	One Rb Middle	22.89	22.25
FDD26A	822.5	3	Half Rb Low	22.09	21.35
FDD26A	822.5	3	Half Rb High	22.06	21.32
FDD26A	822.5	3	Fullrb	22.10	21.25
FDD26A	821.5	5	One Rb High	22.90	22.26
FDD26A	821.5	5	One Rb Low	23.30	22.28
FDD26A	821.5	5	One Rb Middle	22.89	22.21
FDD26A	821.5	5	Half Rb Low	22.19	21.32
FDD26A	821.5	5	Half Rb High	22.09	21.04



FDD26A	821.5	5	Fullrb	22.10	21.27
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TDD41	2537.5	5	One Rb High	20.95	20.08
TDD41	2537.5	5	One Rb Low	20.75	20.45
TDD41	2537.5	5	One Rb Middle	20.88	20.08
TDD41	2537.5	5	Half Rb Low	20.05	18.79
TDD41	2537.5	5	Half Rb High	19.99	18.87
TDD41	2537.5	5	Fullrb	19.98	18.87
TDD41	2540	10	One Rb High	21.33	20.16
TDD41	2540	10	One Rb Low	21.21	20.39
TDD41	2540	10	One Rb Middle	21.27	20.38
TDD41	2540	10	Half Rb Low	20.05	19.09
TDD41	2540	10	Half Rb High	20.01	19.03
TDD41	2540	10	Fullrb	19.98	19.06
TDD41	2542.5	15	One Rb High	21.27	20.16
TDD41	2542.5	15	One Rb Low	21.27	20.38
TDD41	2542.5	15	One Rb Middle	21.13	20.02
TDD41	2542.5	15	Half Rb Low	20.05	19.88
TDD41	2542.5	15	Half Rb High	20.22	20.08
TDD41	2542.5	15	Fullrb	20.05	19.32
TDD41	2545	20	One Rb High	21.10	20.10
TDD41	2545	20	One Rb Low	21.40	20.25
TDD41	2545	20	One Rb Middle	21.25	20.05
TDD41	2545	20	Half Rb Low	20.07	19.22
TDD41	2545	20	Half Rb High	20.10	19.14
TDD41	2545	20	Fullrb	19.96	19.05
TDD41	2593	5	One Rb High	20.78	19.71
TDD41	2593	5	One Rb Low	20.98	19.51
TDD41	2593	5	One Rb Middle	20.86	19.51

TDD41	2593	5	Half Rb Low	19.95	19.03
TDD41	2593	5	Half Rb High	19.93	18.81
TDD41	2593	5	Fullrb	19.98	18.91
TDD41	2593	10	One Rb High	20.83	19.65
TDD41	2593	10	One Rb Low	21.05	19.90
TDD41	2593	10	One Rb Middle	20.71	19.89
TDD41	2593	10	Half Rb Low	19.95	18.93
TDD41	2593	10	Half Rb High	19.82	18.81
TDD41	2593	10	Fullrb	19.85	18.92
TDD41	2593	15	One Rb High	20.77	20.02
TDD41	2593	15	One Rb Low	21.29	20.20
TDD41	2593	15	One Rb Middle	20.75	20.01
TDD41	2593	15	Half Rb Low	20.25	20.19
TDD41	2593	15	Half Rb High	19.83	19.91
TDD41	2593	15	Fullrb	19.98	19.04
TDD41	2593	20	One Rb High	20.62	20.03
TDD41	2593	20	One Rb Low	21.26	20.52
TDD41	2593	20	One Rb Middle	20.81	20.18
TDD41	2593	20	Half Rb Low	20.12	19.22
TDD41	2593	20	Half Rb High	19.86	19.03
TDD41	2593	20	Fullrb	19.94	19.06
TDD41	2652.5	5	One Rb High	20.75	20.12
TDD41	2652.5	5	One Rb Low	20.54	19.90
TDD41	2652.5	5	One Rb Middle	20.63	20.05
TDD41	2652.5	5	Half Rb Low	19.92	18.84
TDD41	2652.5	5	Half Rb High	19.72	18.67
TDD41	2652.5	5	Fullrb	19.78	18.80
TDD41	2650	10	One Rb High	20.94	19.93
TDD41	2650	10	One Rb Low	21.30	20.31

TDD41	2650	10	One Rb Middle	21.10	20.28
TDD41	2650	10	Half Rb Low	19.84	18.84
TDD41	2650	10	Half Rb High	19.77	19.06
TDD41	2650	10	Fullrb	19.87	18.90
TDD41	2647.5	15	One Rb High	21.00	19.88
TDD41	2647.5	15	One Rb Low	21.22	20.39
TDD41	2647.5	15	One Rb Middle	20.81	19.89
TDD41	2647.5	15	Half Rb Low	20.30	20.21
TDD41	2647.5	15	Half Rb High	19.53	19.52
TDD41	2647.5	15	Fullrb	19.85	18.86
TDD41	2645	20	One Rb High	20.99	19.84
TDD41	2645	20	One Rb Low	21.32	20.19
TDD41	2645	20	One Rb Middle	20.99	19.87
TDD41	2645	20	Half Rb Low	19.98	19.03
TDD41	2645	20	Half Rb High	19.81	18.97
TDD41	2645	20	Fullrb	19.92	18.94

6.1.3 Radiated

6.1.3.1 Description

This is the test for the maximum radiated power from the EUT.

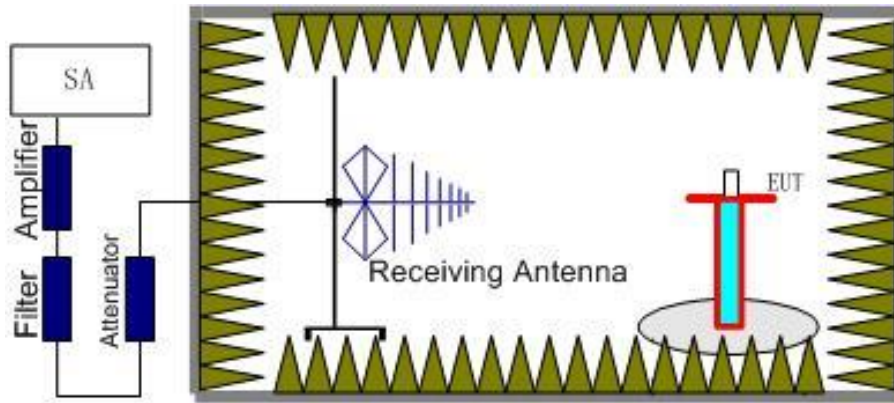
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 27.50(d) specifies "Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP".

Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP".

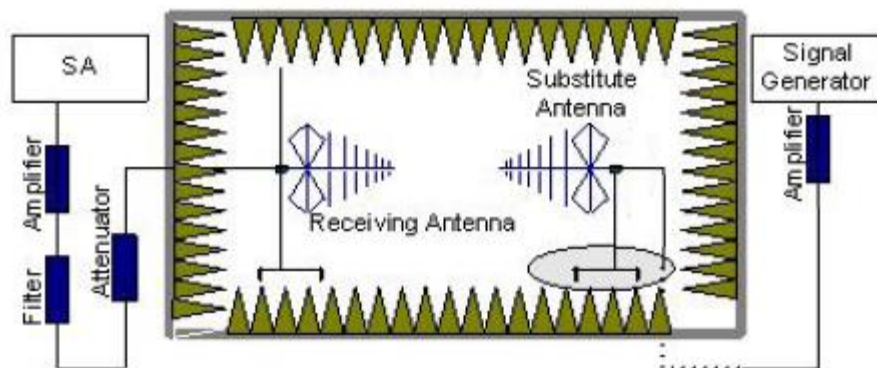
Rule Part 27.50(c) specifies "Portable stations (hand-held de-vices) are limited to 3 watts ERP".

6.1.3.2 Method of Measurement



The measurements procedures in TIA-603E-2016 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna. The cable loss (P_{cl}), the substitution antenna Gain (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:



$$\text{Power (EIRP)} = P_{\text{Mea}} + P_{\text{Ag}} - P_{\text{cl}} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$.

6.1.3.3 Measurement result

LTE Band 2- EIRP 24. 232(b)

Limits: $\leq 33\text{dBm}$ (2W)

LTE Band 2_1.4MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1850.7	32.48	33.00	H
1880	32.33	33.00	H
1909.3	32.05	33.00	H

LTE Band 2_3MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1851.5	32.34	33.00	H
1880	32.05	33.00	H
1908.5	31.92	33.00	H

LTE Band 2_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1852.5	32.62	33.00	H
1880	32.06	33.00	H
1907.5	32.08	33.00	H

LTE Band 2_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1855	32.49	33.00	H
1880	32.43	33.00	H
1905	32.04	33.00	H

LTE Band 2_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1857.5	32.47	33.00	H
1880	32.35	33.00	H
1902.5	31.94	33.00	H

LTE Band 2_20 MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1860	32.55	33.00	H
1880	32.44	33.00	H
1900	32.15	33.00	H

LTE Band 2_1.4MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1850.7	31.83	33.00	H



1880	31.63	33.00	H
1909.3	31.21	33.00	H

LTE Band 2_3MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1851.5	32.01	33.00	H
1880	31.34	33.00	H
1908.5	31.30	33.00	H

LTE Band 2_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1852.5	31.53	33.00	H
1880	30.68	33.00	H
1907.5	31.16	33.00	H

LTE Band 2_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1855	31.75	33.00	H
1880	31.70	33.00	H
1905	31.15	33.00	H

LTE Band 2_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1857.5	31.79	33.00	H
1880	31.59	33.00	H
1902.5	31.73	33.00	H

LTE Band 2_20 MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1860	31.51	33.00	H
1880	31.81	33.00	H
1900	31.40	33.00	H

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1710.7	28.31	30.00	H
1732.5	28.43	30.00	H
1754.3	28.27	30.00	H

LTE Band 4_3MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1711.5	28.33	30.00	H
1732.5	28.41	30.00	H
1753.5	28.19	30.00	H

LTE Band 4_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
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1712.5	28.06	30.00	H
1732.5	28.21	30.00	H
1752.5	28.09	30.00	H

LTE Band 4_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1715	28.38	30.00	H
1732.5	28.47	30.00	H
1750	28.33	30.00	H

LTE Band 4_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1717.5	28.34	30.00	H
1732.5	28.34	30.00	H
1747.5	28.20	30.00	H

LTE Band 4_20MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1720	28.42	30.00	H
1732.5	28.41	30.00	H
1745	28.59	30.00	H

LTE Band 4_1.4MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1710.7	27.53	30.00	H
1732.5	27.69	30.00	H
1754.3	27.60	30.00	H

LTE Band 4_3MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1711.5	27.42	30.00	H
1732.5	28.14	30.00	H
1753.5	27.37	30.00	H

LTE Band 4_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1712.5	27.57	30.00	H
1732.5	26.84	30.00	H
1752.5	27.35	30.00	H

LTE Band 4_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1715	27.51	30.00	H
1732.5	28.17	30.00	H
1750.5	27.63	30.00	H

LTE Band 4_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1717.5	27.53	30.00	H



1732.5	27.81	30.00	H
1747.5	28.16	30.00	H

LTE Band 4_20MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1720	27.67	30.00	H
1732.5	27.84	30.00	H
1745	28.03	30.00	H

LTE Band 5- ERP/EIRP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
824.70	30.92	28.77	38.45	H
836.50	30.81	28.66	38.45	H
848.30	30.61	28.46	38.45	H

LTE Band 5_3MHz_QPSK

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
825.50	30.72	28.57	38.45	H
836.50	30.87	28.72	38.45	H
847.50	30.60	28.45	38.45	H

LTE Band 5_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
826.50	30.66	28.51	38.45	H
836.50	30.68	28.53	38.45	H
846.50	30.88	28.73	38.45	H

LTE Band 5_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
829.00	30.77	28.62	38.45	H
836.50	30.75	28.60	38.45	H
844.00	30.96	28.81	38.45	H

LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
824.70	30.46	28.31	38.45	H
836.50	29.97	27.82	38.45	H
848.30	30.21	28.06	38.45	H

LTE Band 5_3MHz_16QAM

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
825.50	30.33	28.18	38.45	H
836.50	30.08	27.93	38.45	H
847.50	29.83	27.68	38.45	H

LTE Band 5_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
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826.50	29.83	27.68	38.45	H
836.50	29.01	26.86	38.45	H
846.50	29.93	27.78	38.45	H

LTE Band 5_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	ERP(dBm)	Limit(dBm)	Polarization
829.00	29.99	27.84	38.45	H
836.50	30.09	27.94	38.45	H
844.00	30.25	28.10	38.45	H

LTE Band 7- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2502.5	31.77	33.00	H
2535	31.96	33.00	H
2567.5	32.06	33.00	H

LTE Band 7_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2505	31.94	33.00	H
2535	32.08	33.00	H
2565	32.22	33.00	H

LTE Band 7_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2507.5	31.98	33.00	H
2535	32.02	33.00	H
2562.5	32.24	33.00	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2510	32.21	33.00	H
2535	32.04	33.00	H
2560	32.42	33.00	H

LTE Band 7_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2502.5	30.75	33.00	H
2535	31.09	33.00	H
2567.5	31.21	33.00	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2505	31.23	33.00	H
2535	31.57	33.00	H
2565	31.26	33.00	H

LTE Band 7_15MHz_16QAM



Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2507.5	31.24	33.00	H
2535	31.50	33.00	H
2562.5	31.55	33.00	H

LTE Band 7_20MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2510	31.51	33.00	H
2535	31.49	33.00	H
2560	31.74	33.00	H

LTE Band 12- ERP 27.50(c)

Limits: ≤ 38.45 dBm (7W)

LTE Band 12_1.4MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
699.7	27.55	38.45	H
707.5	27.80	38.45	H
715.3	27.65	38.45	H

LTE Band 12_3MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
700.5	27.65	38.45	H
707.5	27.72	38.45	H
714.5	27.56	38.45	H

LTE Band 12_5MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
701.5	27.72	38.45	H
707.5	27.66	38.45	H
713.5	27.60	38.45	H

LTE Band 12_10MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
704	27.67	38.45	H
707.5	27.84	38.45	H
711	27.87	38.45	H

LTE Band 12_1.4MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
699.7	26.88	38.45	H
707.5	27.28	38.45	H
715.3	26.92	38.45	H

LTE Band 12_3MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
700.5	27.13	38.45	H
707.5	26.83	38.45	H
714.5	27.11	38.45	H

LTE Band 12_5MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
701.5	26.76	38.45	H
707.5	25.93	38.45	H
713.5	26.68	38.45	H

LTE Band 12_10MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
704	26.82	38.45	H
707.5	27.22	38.45	H
711	27.09	38.45	H

LTE Band 13- ERP 27.50(c)

Limits: ≤38.45dBm (7W)

LTE Band 13_5MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
779.5	27.98	38.45	H
782	28.01	38.45	H
784.5	28.20	38.45	H

LTE Band 13_10MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
782	28.23	38.45	H
782	28.18	38.45	H
782	28.11	38.45	H

LTE Band 13_5MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
779.5	26.60	38.45	H
782	26.43	38.45	H
784.5	27.37	38.45	H

LTE Band 13_10MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
782	27.80	38.45	H
782	27.45	38.45	H
782	27.49	38.45	H

LTE Band 17- ERP 27.50(c)(10)

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
706.5	27.70	34.77	H
710	27.63	34.77	H
713.5	27.76	34.77	H

LTE Band 17_10MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
709	28.11	34.77	H
710	28.06	34.77	H
711	27.99	34.77	H

LTE Band 17_5MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
706.5	26.02	34.77	H
710	26.58	34.77	H
713.5	26.75	34.77	H

LTE Band 17_10MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
709	27.28	34.77	H
710	27.14	34.77	H
711	27.20	34.77	H

LTE Band 25- EIRP 24.229(c)

Limits: $\leq 30\text{dBm}$ (1W)

LTE Band 25_1.4MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1850.7	27.55	30.00	H
1882.5	27.23	30.00	H
1914.3	26.93	30.00	H

LTE Band 25_3MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1851.5	27.63	30.00	H
1882.5	27.23	30.00	H
1913.5	27.01	30.00	H

LTE Band 25_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1852.5	27.70	30.00	H
1882.5	27.10	30.00	H
1912.5	27.07	30.00	H

LTE Band 25_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1855	27.76	30.00	H
1882.5	27.28	30.00	H
1910	27.08	30.00	H

LTE Band 25_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization



1857.5	27.65	30.00	H
1882.5	27.32	30.00	H
1907.5	26.99	30.00	H

LTE Band 25_20MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1860	27.95	30.00	H
1882.5	27.49	30.00	H
1905	27.43	30.00	H

LTE Band 25_1.4MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1850.7	26.88	30.00	H
1882.5	26.29	30.00	H
1914.3	26.33	30.00	H

LTE Band 25_3MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1851.5	27.30	30.00	H
1882.5	26.47	30.00	H
1913.5	26.39	30.00	H

LTE Band 25_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1852.5	26.87	30.00	H
1882.5	26.02	30.00	H
1912.5	26.09	30.00	H

LTE Band 25_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1855	26.93	30.00	H
1882.5	26.76	30.00	H
1910	26.25	30.00	H

LTE Band 25_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1857.5	27.42	30.00	H
1882.5	26.92	30.00	H
1907.5	26.74	30.00	H

LTE Band 25_20MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1860	27.24	30.00	H
1882.5	26.33	30.00	H
1905	26.81	30.00	H

LTE Band 26(part90)- ERP 22.913(a)

Limits: ≤30dBm (1W)

LTE Band 26(part90)_1.4MHz_QPSK



Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
814.7	28.43	30.00	H
819.0	28.51	30.00	H
823.3	28.58	30.00	H

LTE Band 26(part90)_3MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
815.5	28.48	30.00	H
819.0	28.36	30.00	H
822.5	28.59	30.00	H

LTE Band 26(part90)_5MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
816.5	28.50	30.00	H
819.0	28.36	30.00	H
821.5	28.65	30.00	H

LTE Band 26(part90)_10MHz_QPSK

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
819.0	28.32	30.00	H

LTE Band 26(part90)_1.4MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
814.7	27.51	30.00	H
819.0	27.71	30.00	H
823.3	27.92	30.00	H

LTE Band 26(part90)_3MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
815.5	27.55	30.00	H
819.0	27.71	30.00	H
822.5	28.00	30.00	H

LTE Band 26(part90)_5MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
816.5	27.48	30.00	H
819.0	27.02	30.00	H
821.5	27.63	30.00	H

LTE Band 26(part90)_10MHz_16QAM

Frequency(MHz)	ERP(dBm)	Limit(dBm)	Polarization
819.0	27.68	30.00	H

LTE Band 41- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 41_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
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2498.5	31.95	33.00	H
2593	31.98	33.00	H
2687.5	31.75	33.00	H

LTE Band 41_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2501	32.33	33.00	H
2593	32.05	33.00	H
2685	32.30	33.00	H

LTE Band 41_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2503.5	32.27	33.00	H
2593	32.29	33.00	H
2682.5	32.22	33.00	H

LTE Band 41_20MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2506	32.40	33.00	H
2593	32.26	33.00	H
2680	32.32	33.00	H

LTE Band 41_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2498.5	31.45	33.00	H
2593	30.71	33.00	H
2687.5	31.12	33.00	H

LTE Band 41_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2501	31.39	33.00	H
2593	30.90	33.00	H
2685	31.31	33.00	H

LTE Band 41_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2503.5	31.38	33.00	H
2593	31.20	33.00	H
2682.5	31.39	33.00	H

LTE Band 41_20MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2506	31.25	33.00	H
2593	31.52	33.00	H
2680	31.19	33.00	H

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwidths equal to or less than 5MHz.

RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.



6.2. Emission Limit

Reference

CFR 2.1051,2.1053, 22.917,24.238,27.53(g), 27.53(h), 27.53(m),90.669.

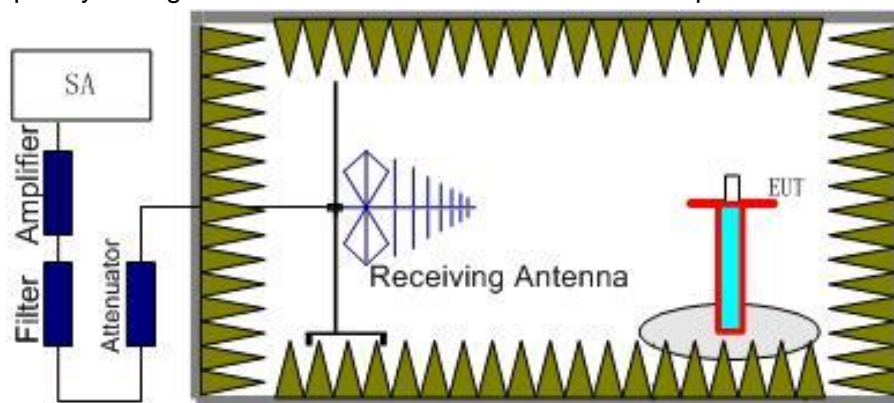
6.2.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

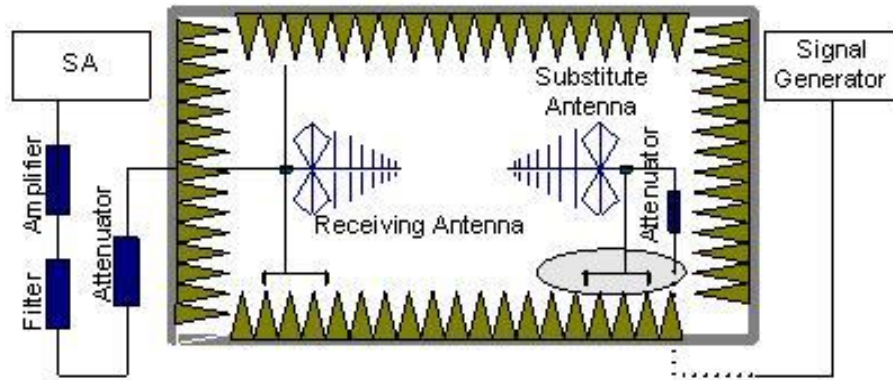
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 27.53(g), Part 27.53(h), Part 27.53(m). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 7.

The procedure of radiated spurious emissions is as follows:

- Below 1 GHz, EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



- The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
- The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} - P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

6.2.2 Measurement Limit

Part 27.53(g), 27.53(h), 27.53(m) state that on any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P , in Watts) by at least $43 + 10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

According to KDB 971168 6, a relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

Part 27.53(m) states that for mobile digital stations, 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 than $43 + 10\log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10\log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating



on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

6.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands. 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 the LTE Bands. Into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The evaluated frequency range is from 30MHz to 26GHz.

BAND	Channel		Result
2	L	18607	Pass
	M	18900	Pass
	H	19193	Pass
4	L	19957	Pass
	M	20175	Pass
	H	20393	Pass
5	L	20407	Pass
	M	20525	Pass
	H	20643	Pass
7	L	20775	Pass
	M	21100	Pass
	H	21425	Pass
12	L	23017	Pass
	M	23095	Pass
	H	23173	Pass
13	L	23205	Pass
	M	23230	Pass
	H	23255	Pass

17	L	23755	Pass
	M	23790	Pass
	H	23825	Pass
25	L	26047	Pass
	M	26365	Pass
	H	26683	Pass
26	L	26697	Pass
	M	26740	Pass
	H	26783	Pass
41	L	40065	Pass
	M	40640	Pass
	H	41215	Pass

RSE-LTE2-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3701.2	-54.75	6.6	7.9	-53.45	-13	H
5552.4	-52.82	8.2	9.8	-51.22	-13	H
7403.6	-52.79	9.7	11.6	-50.89	-13	H
9254.4	-50.8	10.7	12.7	-48.8	-13	V
11100.8	-47.36	12.1	12.3	-47.16	-13	H
12950.2	-44.24	13.2	12.3	-45.14	-13	V

RSE-LTE2-M-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3759.6	-54.05	6.6	7.9	-52.75	-13	V
5641.6	-53.71	8.3	10.2	-51.81	-13	V
7521.2	-52.45	9.7	11.6	-50.55	-13	V
9399.2	-50.64	10.7	12.7	-48.64	-13	V
11273.0	-47.19	12.1	12.3	-46.99	-13	V
13161.6	-46.39	13.0	12.3	-47.09	-13	V

RSE-LTE2-M-V

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3759.2	-54.57	6.6	7.9	-53.27	-13	H
5639.2	-53.85	8.3	10.2	-51.95	-13	H
7520.8	-52.64	9.7	11.6	-50.74	-13	V
9399.2	-51.03	10.7	12.7	-49.03	-13	H
11280.0	-47.38	12.1	12.3	-47.18	-13	V
13163.0	-45.9	13.0	12.3	-46.6	-13	H

RSE-LTE2-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3818.0	-54.68	6.7	7.9	-53.48	-13	V
5728.0	-53.2	8.5	10.2	-51.5	-13	V
7633.6	-53.35	9.7	11.8	-51.25	-13	V
9540.0	-50.85	10.7	12.7	-48.85	-13	V
11455.0	-47.23	12.3	12.3	-47.23	-13	V
13356.2	-43.71	13.7	12.3	-45.11	-13	H

RSE-LTE4-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3421.6	-54.6	6.3	7.8	-53.1	-13	H
5128.8	-51.04	7.9	9.4	-49.54	-13	H
6838.0	-53.12	9.2	10.9	-51.42	-13	V
8550.4	-51.78	10.3	12.6	-49.48	-13	H
10262.8	-48.13	11.5	12.3	-47.33	-13	V
11974.4	-45.92	12.6	12.3	-46.22	-13	H

RSE-LTE4-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3466.0	-54.82	6.4	7.8	-53.42	-13	H
5190.4	-49.71	8.0	9.4	-48.31	-13	H
6929.2	-52.89	9.3	11.1	-51.09	-13	V

8664.4	-52.11	10.3	12.7	-49.71	-13	V
10394.8	-47.99	11.6	12.3	-47.29	-13	V
12122.8	-45.11	12.6	12.3	-45.41	-13	V

RSE-LTE4-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3509.2	-53.98	6.4	7.8	-52.58	-13	H
5249.6	-49.26	8.0	9.4	-47.86	-13	H
7017.6	-51.39	9.3	11.1	-49.59	-13	V
8770.4	-52.13	10.4	12.7	-49.83	-13	V
10523.2	-47.99	11.6	12.3	-47.29	-13	H
12271.2	-45.85	12.7	12.3	-46.25	-13	H

RSE-LTE5-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1649.0	-51.3	4.2	4.7	-50.8	-13	H
2491.2	-44.32	5.4	5.6	-44.12	-13	V
3296.4	-53.06	6.2	6.9	-52.36	-13	H
4126.0	-53.95	7.0	8.9	-52.05	-13	V
4944.8	-53.37	7.7	9.6	-51.47	-13	H
5770.8	-53.26	8.5	10.2	-51.56	-13	H

RSE-LTE5-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1671.2	-51.55	4.5	4.7	-51.35	-13	H
2510.0	-44.9	5.4	5.6	-44.7	-13	H
3348.0	-52.98	6.2	6.9	-52.28	-13	V
4181.2	-54.23	7.0	8.9	-52.33	-13	V
5018.0	-55.18	7.8	9.6	-53.38	-13	H
5855.2	-53.45	8.4	10.2	-51.65	-13	V

**RSE-LTE5-H**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1695.7	-51.03	4.5	4.7	-50.83	-13	H
2542.3	-43.67	5.4	5.6	-43.47	-13	V
3395.2	-55.23	6.3	7.8	-53.73	-13	H
4244.0	-54.15	7.1	8.9	-52.35	-13	V
5091.2	-52.57	7.9	9.6	-50.87	-13	V
5936.8	-53.18	8.5	10.2	-51.48	-13	V

RSE-LTE7-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
5005.2	-47.4	7.8	9.6	-45.6	-25	V
7507.2	-41.27	9.7	11.6	-39.37	-25	V
10010.0	-46.17	11.2	12.5	-44.87	-25	V
12608.2	-40.75	12.8	12.3	-41.25	-25	H
15257.8	-35.63	14.4	12.3	-37.73	-25	H
17847.8	-30.7	16.0	12.3	-34.4	-25	V

RSE-LTE7-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3786.8	-49.85	6.7	7.9	-48.65	-25	H
5216.4	-47.08	8.0	9.4	-45.68	-25	V
7608.8	-44.12	9.7	11.6	-42.22	-25	V
10329.2	-44.53	11.5	12.3	-43.73	-25	V
13082.5	-40.67	13.0	12.3	-41.37	-25	V
15847.5	-32.94	14.9	12.3	-35.54	-25	H

RSE-LTE7-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3656.4	-50.75	6.6	7.9	-49.45	-25	H
5137.6	-43.85	7.9	9.4	-42.35	-25	V
7706.4	-44.68	9.8	11.8	-42.68	-25	V



10284.0	-45.02	11.5	12.3	-44.22	-25	V
13255.8	-38.34	13.6	12.3	-39.64	-25	V
16271.0	-33.17	14.7	12.3	-35.57	-25	H

RSE-LTE12-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1399.4	-55.35	4.0	5.3	-54.05	-13	H
2095.8	-47.88	4.9	4.5	-48.28	-13	H
2794.2	-42.65	5.7	6.1	-42.25	-13	V
3500.0	-54	6.4	7.8	-52.6	-13	H
4195.6	-54.6	7.0	8.9	-52.7	-13	H
4883.6	-53.55	7.7	9.6	-51.65	-13	H

RSE-LTE12-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1416.4	-54.75	4.0	5.3	-53.45	-13	V
2121.5	-47.6	4.9	4.5	-48	-13	H
2830.0	-42.38	5.8	6.1	-42.08	-13	H
3539.2	-52.54	6.4	7.8	-51.14	-13	H
4242.4	-53.89	7.1	8.9	-52.09	-13	H
4951.6	-54	7.7	9.6	-52.1	-13	H

RSE-LTE12-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1431.3	-54.61	4.1	5.3	-53.41	-13	H
2145.0	-47.62	5.0	5.1	-47.52	-13	V
2870.8	-41.57	5.8	6.1	-41.27	-13	H
3570.0	-53.32	6.4	7.8	-51.92	-13	H
4290.8	-53.98	7.1	8.9	-52.18	-13	V
5009.6	-54.52	7.8	9.6	-52.72	-13	H

**RSE-LTE13-L**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1653.2	-51.19	4.5	4.7	-50.99	-13	V
2131.5	-46.77	5.0	5.1	-46.67	-13	H
2870.0	-41.32	5.8	6.1	-41.02	-13	H
3526.4	-53.08	6.4	7.8	-51.68	-13	H
4318.8	-53.65	7.1	8.9	-51.85	-13	H
5208.4	-48.91	8.0	9.4	-47.51	-13	H

RSE-LTE13-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1550.0	-53.17	4.2	5.3	-52.07	-13	H
2166.9	-45.66	5.0	5.1	-45.56	-13	H
2947.3	-41.57	5.8	6.7	-40.67	-13	H
3910.4	-52.74	6.8	8.6	-50.94	-13	V
4832.8	-53.01	7.6	9.0	-51.61	-13	V
5796.8	-52.7	8.4	10.2	-50.9	-13	H

RSE-LTE13-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1564.9	-52.57	4.2	5.3	-51.47	-13	V
2138.8	-47.23	5.0	5.1	-47.13	-13	H
2969.2	-41.28	5.8	6.7	-40.38	-13	H
3762.0	-53.5	6.6	7.9	-52.2	-13	H
4782.0	-50.95	7.6	9.0	-49.55	-13	H
5744.8	-52.21	8.5	10.2	-50.51	-13	V

RSE-LTE17-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1413.3	-46.27	4.0	5.3	-44.97	-13	H
2138.1	-45.46	5.0	5.1	-45.36	-13	H
2848.1	-41.23	5.8	6.1	-40.93	-13	H

3538.4	-24.56	6.4	7.8	-23.16	-13	H
4232.0	-43.64	7.1	8.9	-41.84	-13	V
7066.0	-45.9	9.4	11.1	-44.2	-13	V

RSE-LTE17-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1419.8	-47.16	4.0	5.3	-45.86	-13	H
2048.5	-47.9	4.8	4.5	-48.2	-13	H
2859.2	-41.03	5.8	6.1	-40.73	-13	H
3544.0	-28.81	6.4	7.8	-27.41	-13	H
4259.2	-47.76	7.1	8.9	-45.96	-13	H
4951.6	-53.85	7.7	9.6	-51.95	-13	H

RSE-LTE17-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1429.5	-47.96	4.1	5.3	-46.76	-13	H
2891.9	-41.57	5.8	6.7	-40.67	-13	V
3573.2	-26.65	6.4	7.8	-25.25	-13	H
4288.8	-44.76	7.1	8.9	-42.96	-13	H
6412.4	-48.34	8.9	10.6	-46.64	-13	V
7146.1	-48.74	9.4	11.4	-46.74	-13	V

RSE-LTE25-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3701.2	-34.46	6.6	7.9	-33.16	-13	H
5552.4	-42.26	8.2	9.8	-40.66	-13	V
7402.8	-31.91	9.7	11.6	-30.01	-13	V
9253.6	-35.45	10.7	12.7	-33.45	-13	V
11102.2	-42.17	12.1	12.3	-41.97	-13	V
13219.0	-43.66	13.0	12.3	-44.36	-13	H

RSE-LTE25-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3764.8	-36.92	6.6	7.9	-35.62	-13	V
5647.6	-42.36	8.3	10.2	-40.46	-13	V
7529.6	-35.63	9.7	11.6	-33.73	-13	V
9412.8	-39.67	10.7	12.7	-37.67	-13	V
11294.0	-42.7	12.1	12.3	-42.5	-13	V
13146.2	-44.1	13.0	12.3	-44.8	-13	H

RSE-LTE25-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3828.4	-34.1	6.7	7.9	-32.9	-13	V
5742.8	-41.04	8.5	10.2	-39.34	-13	V
7656.8	-39.82	9.7	11.8	-37.72	-13	V
9571.6	-43.32	10.8	12.7	-41.42	-13	V
11484.4	-41.7	12.3	12.3	-41.7	-13	V
13353.4	-44.04	13.7	12.3	-45.44	-13	V

RSE-LTE26-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1627.9	-52.59	4.2	4.7	-52.09	-13	V
2445.0	-44.07	5.3	5.6	-43.77	-13	H
3258.8	-53.71	6.1	6.9	-52.91	-13	H
4072.8	-54.12	6.9	8.6	-52.42	-13	H
4888.8	-54.57	7.7	9.6	-52.67	-13	H
5705.2	-54.55	8.5	10.2	-52.85	-13	H

RSE-LTE26-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1663.5	-52.67	4.5	4.7	-52.47	-13	H
2493.8	-44.9	5.4	5.6	-44.7	-13	V
3326.0	-53.37	6.2	6.9	-52.67	-13	H

4158.4	-54.6	7.0	8.9	-52.7	-13	V
4992.8	-54.58	7.8	9.6	-52.78	-13	H
5819.6	-52.97	8.4	10.2	-51.17	-13	V

RSE-LTE26-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1682.6	-50.49	4.5	4.7	-50.29	-13	H
2540.4	-43.53	5.4	5.6	-43.33	-13	H
3392.8	-54.52	6.3	7.8	-53.02	-13	H
4244.8	-53.72	7.1	8.9	-51.92	-13	H
5086.8	-52.59	7.9	9.6	-50.89	-13	H
5935.2	-53.21	8.5	10.2	-51.51	-13	H

RSE-LTE41-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3918.8	-52.22	6.8	8.6	-50.42	-25	V
5107.2	-48.39	7.9	9.6	-46.69	-25	H
7231.2	-48.81	9.6	11.4	-47.01	-25	H
10150.4	-45.66	11.3	12.5	-44.46	-25	V
13082.5	-40.87	13.0	12.3	-41.57	-25	H
16652.5	-31.97	15.1	12.3	-34.77	-25	H

RSE-LTE41-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
5183.2	-42.49	8.0	9.4	-41.09	-25	V
7775.6	-41.51	9.9	11.8	-39.61	-25	V
10371.6	-42.5	11.6	12.3	-41.8	-25	V
12114.8	-41.04	12.6	12.3	-41.34	-25	V
15004.0	-37.75	14.4	12.3	-39.85	-25	V
17998.2	-27.59	16.4	12.3	-31.69	-25	V



RSE-LTE41-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3938.8	-52.1	6.8	8.6	-50.3	-25	H
5377.6	-47.9	8.1	9.8	-46.2	-25	V
8062.4	-46.61	9.9	12.2	-44.31	-25	V
10752.0	-44.66	11.7	12.3	-44.06	-25	V
13425.5	-38.76	13.7	12.3	-40.16	-25	V
16127.5	-33.17	15.0	12.3	-35.87	-25	H

6.3. Frquency Stability

Reference

CFR Part 2.1055,22.235,24.235, 27.54,90.213(a).

6.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -10°C .
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 7. Measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -10°C to $+50^{\circ}\text{C}$. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at $+50^{\circ}\text{C}$.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10°C decrements from $+50^{\circ}\text{C}$ to -10°C . Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to $\pm 0.5^{\circ}\text{C}$ during the measurement procedure.

6.3.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.6VDC and 4.35VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. For the purposes of measuring frequency stability these voltage limits are to be used.

6.3.3 Measurement results

LTE Band 2, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-5.608	8.311	0.003	0.004
3.90	-5.522	-6.523	0.003	0.003
4.40	-6.380	-6.394	0.003	0.003

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-4.177	7.625	0.002	0.004
40	-5.808	-6.623	0.003	0.004
30	-4.921	4.849	0.003	0.003
20	-6.309	7.067	0.003	0.004
10	-6.895	7.782	0.004	0.004
0	-5.493	8.154	0.003	0.004
-10	-3.591	7.453	0.002	0.004
-20	-7.467	6.151	0.004	0.003
-30	-3.848	-6.294	0.002	0.003

LTE Band 4, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-2.961	8.812	0.002	0.005
3.90	3.862	8.689	0.002	0.005
4.40	3.834	9.599	0.002	0.006

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-2.832	9.112	0.002	0.005
40	-4.063	4.520	0.002	0.003
30	-5.636	6.895	0.003	0.004
20	-9.971	3.848	0.006	0.002
10	-7.582	5.622	0.004	0.003
0	3.147	7.195	0.002	0.004
-10	3.076	8.869	0.002	0.005
-20	3.562	6.752	0.002	0.004
-30	3.018	8.755	0.002	0.005

LTE Band 5, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-2.546	9.908	0.003	0.011
3.90	-5.250	9.799	0.006	0.012
4.40	-2.561	8.583	0.003	0.010

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-2.890	9.899	0.003	0.012
40	-3.047	9.813	0.004	0.012
30	-2.460	8.497	0.003	0.010
20	-4.034	8.626	0.005	0.010
10	-2.890	10.071	0.003	0.012
0	-3.147	9.327	0.004	0.011
-10	-2.332	9.212	0.003	0.011
-20	-2.031	8.640	0.002	0.010
-30	-1.473	9.484	0.002	0.011

LTE Band 7, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-8.955	14.105	0.004	0.006
3.90	-7.896	8.855	0.003	0.003
4.40	-8.812	9.542	0.003	0.004

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-9.670	-9.956	0.004	0.004
40	-7.610	11.144	0.003	0.004
30	-7.796	-11.287	0.003	0.004
20	-9.155	9.828	0.004	0.004
10	-10.958	8.683	0.004	0.003
0	-6.166	-10.114	0.002	0.004
-10	-8.698	-10.672	0.003	0.004
-20	-3.319	-8.211	0.001	0.003
-30	-8.898	-13.061	0.004	0.005

LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-4.206	6.580	0.006	0.009
3.90	-1.702	8.812	0.002	0.012
4.40	-1.860	7.668	0.003	0.011

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-1.631	10.028	0.002	0.014
40	-2.861	9.313	0.004	0.013
30	-2.918	9.642	0.004	0.014
20	-2.804	8.955	0.004	0.013
10	-3.519	9.255	0.005	0.013
0	-2.246	9.856	0.003	0.014
-10	1.316	9.427	0.002	0.013
-20	-1.774	7.997	0.003	0.011
-30	-2.260	7.939	0.003	0.011

LTE Band 13, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-4.612	7.367	0.006	0.009
3.90	-3.777	6.866	0.005	0.009
4.40	-3.033	8.297	0.004	0.011

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-3.319	11.215	0.004	0.014
40	-4.635	7.625	0.006	0.010
30	-1.488	10.514	0.002	0.013
20	-2.017	11.387	0.003	0.015
10	1.960	11.158	0.003	0.014
0	2.503	11.644	0.003	0.015
-10	2.303	10.943	0.003	0.014
-20	2.217	10.271	0.003	0.013
-30	2.975	10.829	0.004	0.014

LTE Band 17, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-1.259	9.527	0.002	0.013
3.90	-2.131	10.500	0.003	0.015
4.40	-1.688	8.538	0.002	0.012

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-2.689	8.354	0.004	0.012
40	2.146	9.871	0.003	0.014
30	-2.160	10.014	0.003	0.014
20	-2.418	10.929	0.003	0.015
10	-1.788	10.271	0.003	0.014
0	-2.589	10.271	0.004	0.014
-10	1.273	9.813	0.002	0.014
-20	-0.973	9.198	0.001	0.013
-30	-2.217	8.469	0.003	0.012

LTE Band 25, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	5.865	6.523	0.003	0.003
3.90	4.735	11.644	0.003	0.006
4.40	4.377	7.653	0.002	0.004

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	5.293	7.052	0.003	0.004
40	-7.181	8.789	0.004	0.004
30	5.436	8.569	0.003	0.005
20	5.865	8.726	0.003	0.005
10	5.050	9.212	0.003	0.005
0	4.578	11.430	0.002	0.006
-10	3.047	10.400	0.002	0.006
-20	4.091	10.386	0.002	0.006
-30	4.077	10.042	0.002	0.005

LTE Band 26 (Part90) , 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-3.905	7.739	0.005	0.009
3.90	-3.490	9.055	0.004	0.011
4.40	-2.818	8.354	0.003	0.010

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-3.562	9.298	0.004	0.011
40	-2.904	8.540	0.004	0.010
30	-4.478	9.727	0.005	0.012
20	-2.890	9.012	0.004	0.011
10	-2.317	8.841	0.003	0.011
0	-3.819	7.882	0.005	0.010
-10	-3.119	7.954	0.004	0.010
-20	-3.161	8.855	0.004	0.011
-30	-3.219	9.499	0.004	0.012

LTE Band 41, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.40	-8.64	-5.593	0.003	0.002
3.90	-7.381	-8.168	0.003	0.003
4.40	-6.795	8.969	0.003	0.003

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-4.878	6.766	0.002	0.003
40	8.24	5.565	0.003	0.002
30	7.453	10.757	0.003	0.004
20	10.657	7.982	0.004	0.003
10	7.124	5.293	0.003	0.002
0	5.679	-9.313	0.002	0.004
-10	-16.408	-5.307	0.006	0.002
-20	-13.59	-5.851	0.005	0.002
-30	7.911	-7.496	0.003	0.003



6.4. Occupied Bandwidth

Reference

CFR Part 2.1049(h) (i),24.238.

6.4.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

The measurement method is from KDB 971168 4:

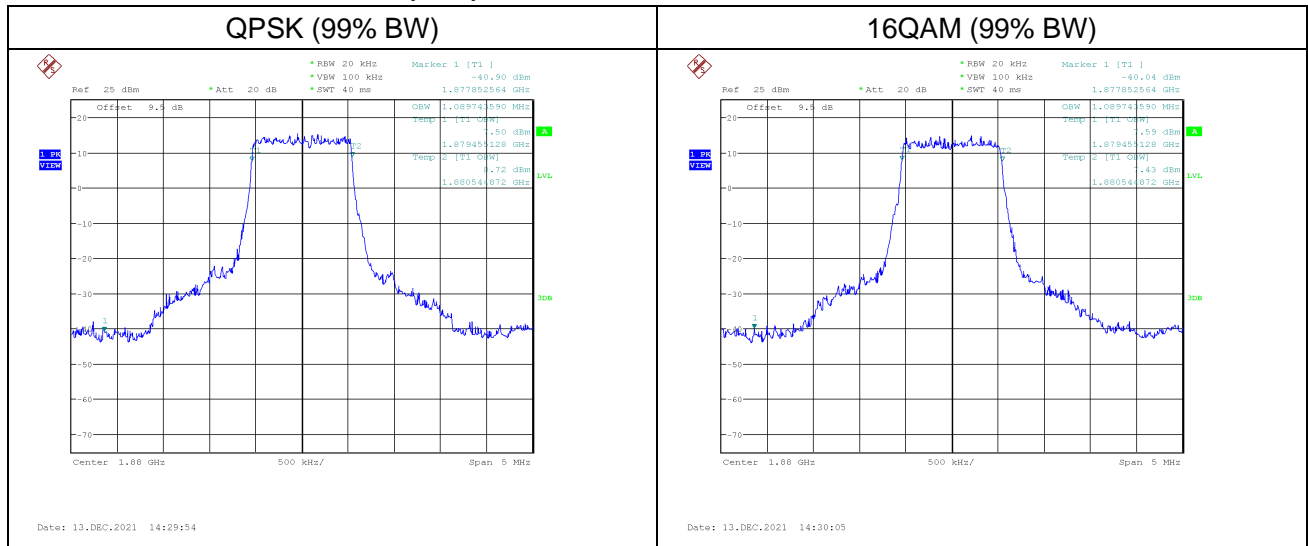
- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- d) Set the detection mode to peak, and the trace mode to max hold.
- e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

Occupied Bandwidth Measurement Results:

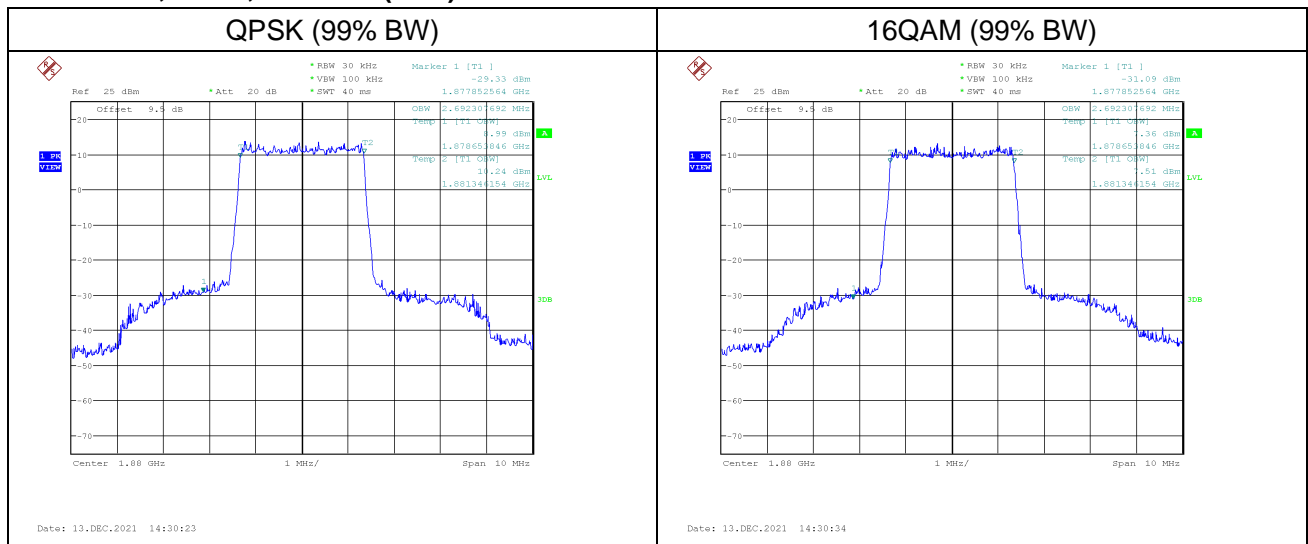
Band	Range	BandWidth	Frequency(MHz)	QPSK(MHz)	Q16(MHz)
FDD02	MidRange	1.4	1880	1.09	1.09
FDD02	MidRange	3	1880	2.69	2.69
FDD02	MidRange	5	1880	4.50	4.47
FDD02	MidRange	10	1880	8.99	8.99
FDD02	MidRange	15	1880	13.49	13.49
FDD02	MidRange	20	1880	17.98	17.98
FDD04	MidRange	1.4	1732.5	1.09	1.09
FDD04	MidRange	3	1732.5	2.71	2.69
FDD04	MidRange	5	1732.5	4.50	4.47
FDD04	MidRange	10	1732.5	8.94	8.94
FDD04	MidRange	15	1732.5	13.56	13.49
FDD04	MidRange	20	1732.5	17.89	17.89
FDD05	MidRange	3	836.5	2.69	2.69
FDD05	MidRange	5	836.5	4.50	4.50

FDD05	MidRange	10	836.5	8.99	8.94
FDD07	MidRange	5	2535	4.50	4.47
FDD07	MidRange	10	2535	8.94	8.94
FDD07	MidRange	15	2535	13.49	13.49
FDD07	MidRange	20	2535	17.98	17.98
FDD12	MidRange	1.4	707.5	1.09	1.10
FDD12	MidRange	3	707.5	2.69	2.69
FDD12	MidRange	5	707.5	4.47	4.50
FDD12	MidRange	10	707.5	8.99	8.99
FDD13	MidRange	5	782	4.50	4.50
FDD13	MidRange	10	782	8.99	8.99
FDD17	MidRange	5	710	4.50	4.47
FDD17	MidRange	10	710	8.94	8.94
FDD25	MidRange	1.4	1882.5	1.09	1.09
FDD25	MidRange	3	1882.5	2.71	2.69
FDD25	MidRange	5	1882.5	4.50	4.50
FDD25	MidRange	10	1882.5	8.99	8.94
FDD25	MidRange	15	1882.5	13.49	13.49
FDD25	MidRange	20	1882.5	17.98	17.98
FDD26(part 90)	MidRange	1.4	819	1.09	1.10
FDD26(part 90)	MidRange	3	819	2.69	2.69
FDD26(part 90)	MidRange	5	819	4.50	4.50
FDD26(part 90)	MidRange	10	819	8.99	8.99
TDD41	MidRange	5	2593	4.47	4.47
TDD41	MidRange	10	2593	8.94	8.94
TDD41	MidRange	15	2593	13.49	13.49
TDD41	MidRange	20	2593	17.98	17.89

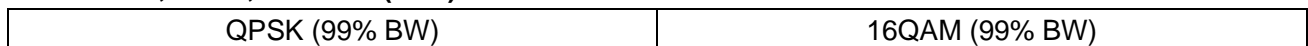
LTE band 2, 1.4MHz, 1880MHz(99%)

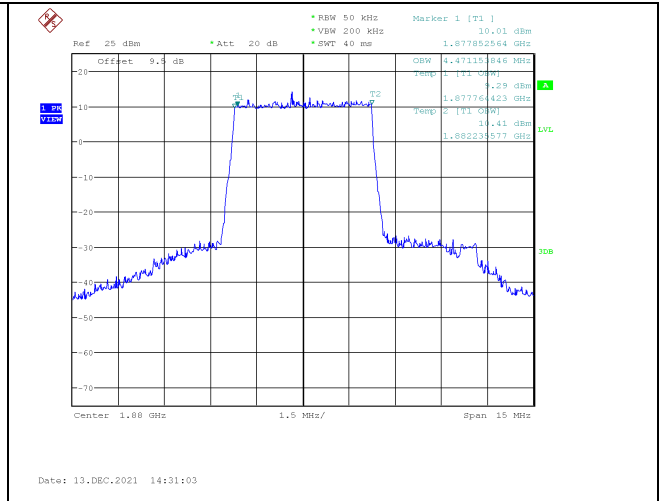
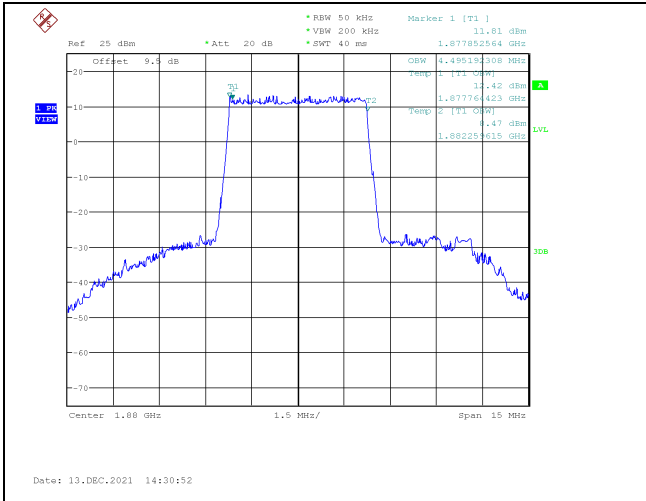


LTE band 2, 3MHz, 1880MHz(99%)

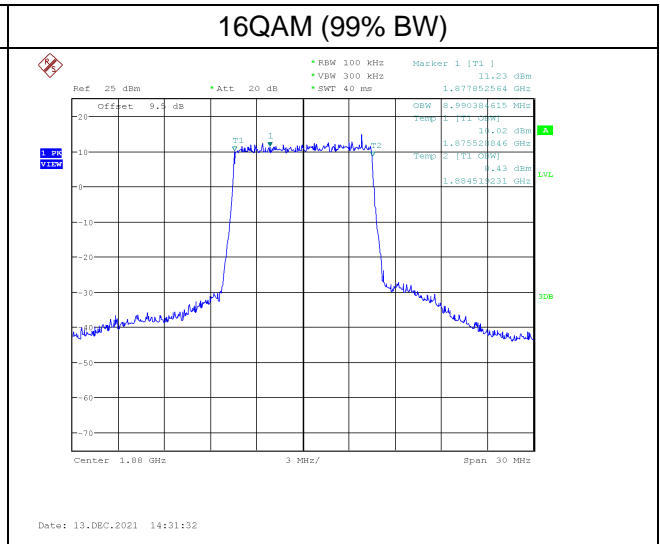
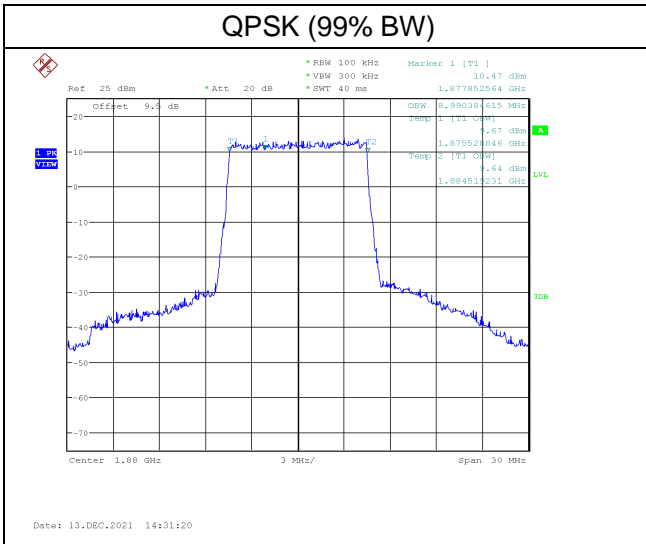


LTE band 2, 5MHz, 1880MHz(99%)

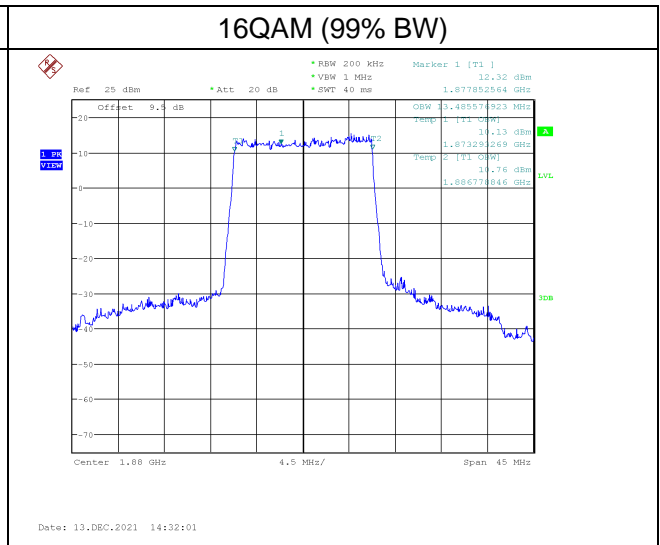
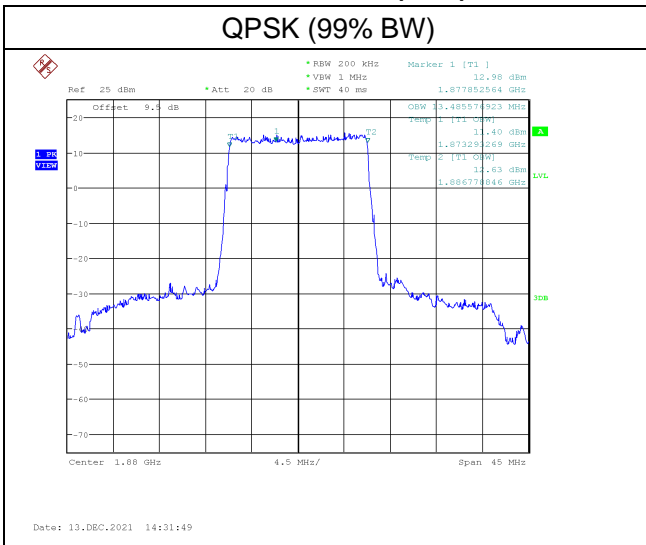




LTE band 2, 10MHz, 1880MHz(99%)



LTE band 2, 15MHz, 1880MHz(99%)



LTE band 2, 20MHz, 1880MHz(99%)