



RF TEST REPORT

Report No.: SET2022-05598

Product Name: 5G NR Multi model smart phone

Model No. : ZTE 7540N

FCC ID: SRQ-ZTE7540N

Applicant: ZTE CORPORATION.

Address: ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China.

Dates of Testing: 2022.04.18-2022.05.10

Issued by: CCIC Southern Testing Co., Ltd.

Lab Location: Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.

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Test Report

Product : 5G NR Multi model smart phone

Brand Name..... : ZTE

Trade Name : ZTE

Applicant : ZTE CORPORATION.

Applicant Address : ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,Nanshan District, Shenzhen, Guangdong, P.R.China.

Manufacturer : ZTE CORPORATION.

Manufacturer Address : ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,Nanshan District, Shenzhen, Guangdong, P.R.China.

Test Standards : 47 CFR Part 27

Test Result..... : PASS

Tested by : Sun 2022.06.07
Sun, Test Engineer

Reviewed by..... : Chris You 2022.06.07
Chris You, Senior Engineer

Approved by..... : Shuangwen Zhang 2022.06.07
Shuangwen Zhang, Manager



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Change History		
Issue	Date	Reason for change
1.0	2022.05.12	First edition
2.0	2022.06.07	Updated battery voltage and Emission Designator



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	5G NR Multi model smart phone
Hardware Version	zs9A
Software Version	MyOS11.0.1_7540N_VFPT
Maximum Output Power to Antenna	CA-7C: 19.37dBm
Bandwidth	CA-7C: 10+20MHz/20+10MHz/15+10MHz/15+15MHz/ 15+20MHz/20+15MHz/20+20MHz
Modulation Type	QPSK/16QAM/64QAM(downlink only)
Antenna Type	Internal Antenna
Antenna Gain(Max)	CA-7C: -1.3dBi
Power supply	Rechargeable Li-Polymer Battery DC3.85V/3900mAh



1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

Band	BW (MHz)	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)
CA-7C	10+20	QPSK	28M1G7D	—	0.057
		16QAM	28M1W7D	—	0.051
	20+10	QPSK	28M0G7D	—	0.057
		16QAM	28M1W7D	—	0.049
	15+10	QPSK	23M5G7D	—	0.061
		16QAM	23M5W7D	—	0.051
	15+15	QPSK	28M6G7D	—	0.055
		16QAM	28M5W7D	—	0.047
	15+20	QPSK	32M8G7D	—	0.056
		16QAM	32M8W7D	—	0.048
	20+15	QPSK	32M9G7D	—	0.054
		16QAM	32M8W7D	—	0.045
	20+20	QPSK	37M7G7D	0.005	0.055
		16QAM	37M6W7D	—	0.045



1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2/27:

1.47 CFR Part 2/27

2. ANSI/TIA/EIA-603-D-2010

3. FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Limit	Result
1	2.1046	Conducted RF Output Power	Reporting Only	PASS
2	27.50 (d)(5)	Peak to Average Ratio	<13dB	PASS
3	27.50 (h)(2)	Equivalent Isotropic Radiated Power	EIRP < 2Watt	PASS
4	2.1049	Occupied Bandwidth	Reporting Only	PASS
5	2.1051 27.53 (m)(4)	Conducted Spurious Emission and Conducted Band Edge Measurement	Refer to 27.53(m)(4)	PASS
6	2.1051 27.53 (m)(4)	Radiated Spurious Emission	<55+10log10(P[watt])	PASS
7	2.1055 27.54	Frequency Stability	<2.5ppm	PASS

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



1.4 Test Configuration of Equipment Under Test

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth(MHz)							Modulation		Test Channel		
		10+20	20+10	15+10	15+15	15+20	20+15	20+20	QPSK	16QAM	L	M	H
Max. Output Power	7C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peak-to-Average Ratio	7C							✓	✓	✓	✓	✓	✓
26dB and 99% Bandwidth	7C	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Conducted Band Edge	7C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Conducted Spurious Emission	7C							✓	✓		✓	✓	✓
Frequency Stability	7C							✓	✓			✓	
ERP/EIRP	7C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Radiated Spurious Emission	7C	Worst case										✓	
Note		<p>1. The mark “ ✓ ” means that this configuration is chosen for testing.</p> <p>2.The mark “ - ” means that this bandwidth is not supported.</p> <p>3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</p> <p>4. For E.R.P/E.I.R.P. measurement, the widest bandwidth and the bandwidth with the highest conducted power of each band is chosen for testing. Besides, the lowest bandwidth of each band is also measured for reporting only.</p>											



1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + Power Splitter + attenuator factor..

Following shows an offset computation example with cable loss 1.5dB; There are two power dividers, 3dB and 4.5dB respectively; 10dB attenuator.

Example:

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss(dB)} + \text{Power Splitter (dB)} + \text{attenuator factor(dB)} \\ &= 1.5 + 7.5 + 10 = 19 \text{ (dB)}\end{aligned}$$

1.6 Facilities and Accreditations

1.6.1 Test Facilities

CNAS-Lab Code: L1659

CCIC-SET is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

FCC-Registration No.: 406086

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until April 19th, 2023.

ISED Registration: 11185A-1

CAB identifier: CN0064

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Jun. 30th, 2023.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.



1.6.2 Test Environment Conditions

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

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR PART 2 REQUIREMENTS

2.1 Conducted RF Output Power

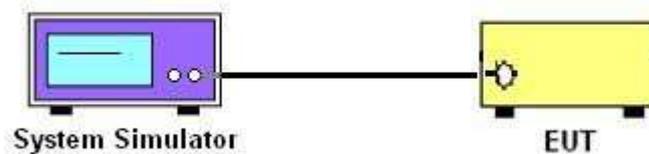
2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Setup



2.1.4 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.



2.1.5 Test Results

CC-Combo 10MHz+20MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	17.69	16.97
			50	0	100	0	15.82	15.02
	2525.6	2540.0	1	49	1	0	18.05	17.32
			50	0	100	0	16.31	15.28
	2545.6	2560.0	1	49	1	0	19.17	18.53
			50	0	100	0	17.35	16.47

CC-Combo 20MHz+10MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	17.64	16.93
			100	0	50	0	15.91	14.95
	2530.1	2544.5	1	99	1	0	18.68	17.82
			100	0	50	0	16.55	15.53
	2550.1	2564.5	1	99	1	0	19.12	18.47
			100	0	50	0	17.26	16.27

CC-Combo 15MHz+10MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 10MHz	2507.5	2519.5	1	74	1	0	17.87	17.11
			75	0	50	0	15.97	14.95
	2530.1	2542.1	1	74	1	0	18.66	18.02
			75	0	50	0	16.45	15.47
	2552.7	2564.7	1	74	1	0	19.37	18.61
			75	0	50	0	17.43	16.42



CC-Combo 15MHz+15MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1	CC1	CC2	CC2	Conducted Average (dBm)	
			RB Size	RB Offset	RB Size	RB Offset	QPSK	16QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	17.69	16.86
			75	0	75	0	15.64	14.91
	2527.5	2542.5	1	74	1	0	18.45	17.71
			75	0	75	0	16.45	15.46
	2547.5	2562.5	1	74	1	0	19.08	18.37
			75	0	75	0	16.92	16.15

CC-Combo 15MHz+20MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1	CC1	CC2	CC2	Conducted Average (dBm)	
			RB Size	RB Offset	RB Size	RB Offset	QPSK	16QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	17.66	16.88
			75	0	100	0	15.67	14.71
	2525.3	2542.4	1	74	1	0	18.32	17.68
			75	0	100	0	16.42	15.41
	2542.9	2560.0	1	74	1	0	19.11	18.42
			75	0	100	0	16.98	16.03

CC-Combo 20MHz+15MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1	CC1	CC2	CC2	Conducted Average (dBm)	
			RB Size	RB Offset	RB Size	RB Offset	QPSK	16QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	17.53	16.72
			100	0	75	0	15.75	14.80
	2527.6	2544.7	1	99	1	0	18.42	17.71
			100	0	75	0	16.47	15.49
	2545.1	2562.2	1	99	1	0	19.13	18.28
			100	0	75	0	17.05	16.12



CC-Combo 20MHz+20MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 20MHz	2510.0	2529.8	1	99	1	0	17.60	16.97
			1	0	1	99	8.78	9.02
			100	0	100	0	15.62	14.64
	2525.1	2544.9	1	99	1	0	18.23	17.61
			1	0	1	99	8.70	9.04
			100	0	100	0	16.42	15.51
	2540.2	2560.0	1	99	1	0	19.06	18.21
			1	0	1	99	8.91	9.07
			100	0	100	0	17.61	16.77

2.2 Peak to Average Ratio

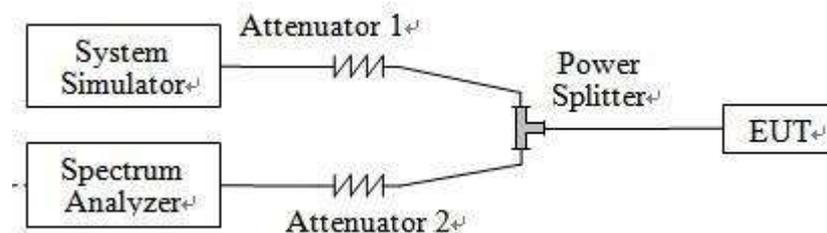
2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.2.3 Test Description



2.2.4 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.



2.2.5 Test Results of Peak-to-Average Ratio

Band	Range	BandWidth (MHz)	RbMode	Modulation	PAPR (dBm)	Limit (dBm)	Result
7C	LowRange	20+20	OneRB_high	QPSK	5.92	13.00	Pass
7C	LowRange	20+20	fullRB	Q16	6.39	13.00	Pass
7C	MidRange	20+20	OneRB_high	QPSK	6.07	13.00	Pass
7C	MidRange	20+20	fullRB	Q16	6.58	13.00	Pass
7C	HighRange	20+20	OneRB_high	QPSK	5.93	13.00	Pass
7C	HighRange	20+20	fullRB	Q16	6.45	13.00	Pass

2.3 99% Occupied Bandwidth and 26dB Bandwidth

2.3.1 Definition

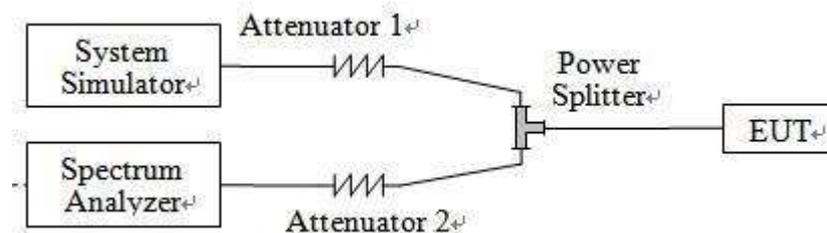
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

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

2.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.3.3 Test Setup



2.3.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

**2.3.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth**

Band	Range	BandWidth (MHz)	Frequency (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26dB bandwidth (MHz)
7C	MidRange	10+20	2535	QPSK	28.041	30.13
7C	MidRange	10+20	2535	Q16	28.055	30.05
7C	MidRange	20+10	2535	QPSK	28.061	30.09
7C	MidRange	20+10	2535	Q16	28.065	30.12
7C	MidRange	15+10	2535	QPSK	23.486	25.45
7C	MidRange	15+10	2535	Q16	23.507	25.49
7C	MidRange	15+15	2535	QPSK	28.682	30.76
7C	MidRange	15+15	2535	Q16	28.646	30.71
7C	MidRange	15+20	2535	QPSK	32.894	35.09
7C	MidRange	15+20	2535	Q16	32.889	35.03
7C	MidRange	20+15	2535	QPSK	30.410	32.49
7C	MidRange	20+15	2535	Q16	30.397	32.53
7C	MidRange	20+20	2535	QPSK	37.724	40.02
7C	MidRange	20+20	2535	Q16	37.746	40.09



7C_MidRange_10MHz+20MHz_2535_QPSK



7C_MidRange_10MHz+20MHz_2535_Q16



7C_MidRange_20MHz+10MHz_2535_QPSK



7C_MidRange_20MHz+10MHz_2535_Q16



7C_MidRange_15MHz+10MHz_2535_QPSK

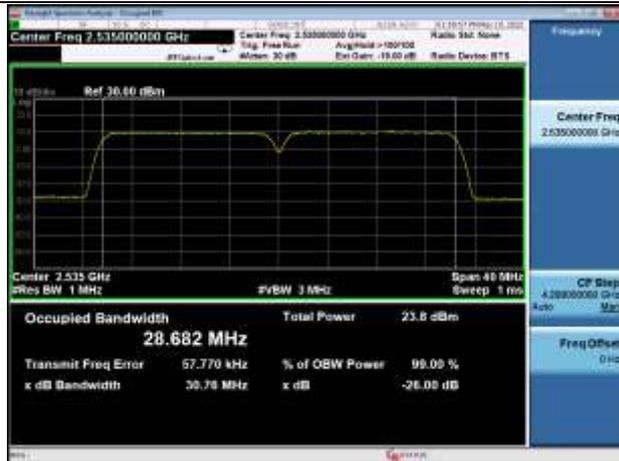


7C_MidRange_15MHz+10MHz_2535_Q16





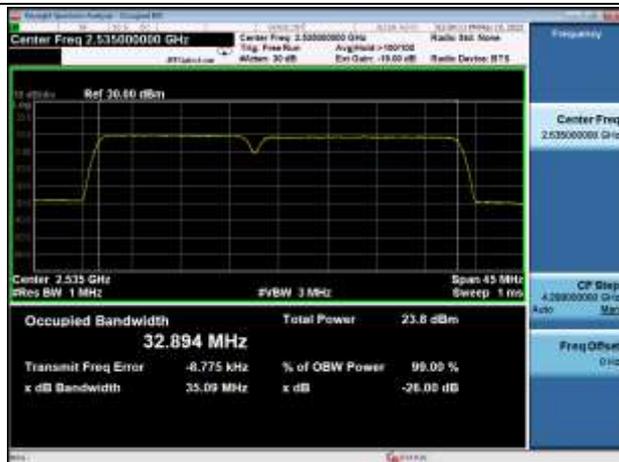
7C_MidRange_15MHz+15MHz_2535_QPSK



7C_MidRange_15MHz+15MHz_2535_Q16



7C_MidRange_15MHz+20MHz_2535_QPSK



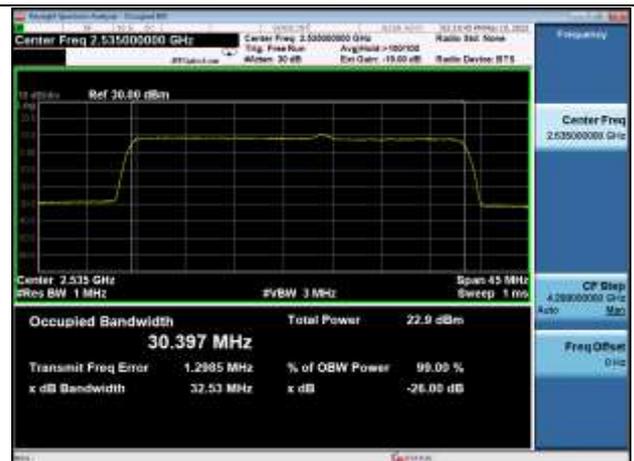
7C_MidRange_15MHz+20MHz_2535_Q16



7C_MidRange_20MHz+15MHz_2535_QPSK



7C_MidRange_20MHz+15MHz_2535_Q16





7C_MidRange_20MHz+20MHz_2535_QPSK



7C_MidRange_20MHz+20MHz_2535_Q16



2.4 Frequency Stability

2.4.1 Requirement

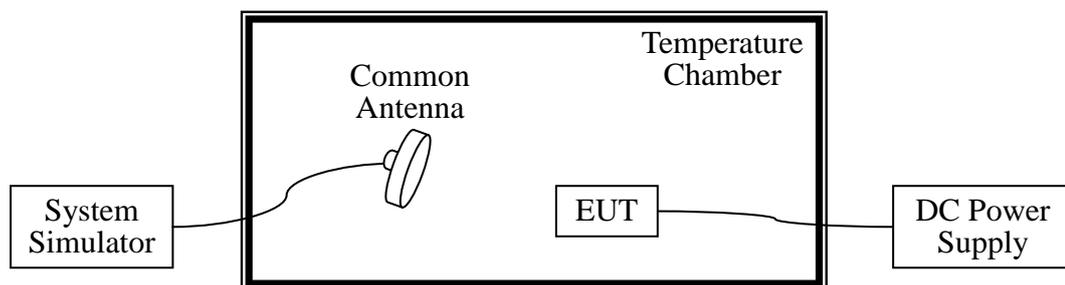
According to FCC requirement, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from $-30\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ at intervals of not more than $10\text{ }^{\circ}\text{C}$.
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3 Test Setup



2.4.4 Test Procedures

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to $-30\text{ }^{\circ}\text{C}$ and the EUT was stabilized before



testing. Power was applied and the maximum change in frequency was recorded within one minute.

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

4. The nominal, highest and lowest extreme voltages were tested, which are specified by the applicant; the normal temperature here used is 25 °C.

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



2.4.5 Test Result of Frequency Stability

Temperature	Voltage	Band	BandWidth (MHz)	RbMode	Modulation	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Result
Normal	Low	7C	20+20	fullRB	QPSK	9.317	0.004	0.10	Pass
Normal	Normal	7C	20+20	fullRB	QPSK	8.631	0.003	0.10	Pass
Normal	High	7C	20+20	fullRB	QPSK	-13.628	0.005	0.10	Pass
50	Normal	7C	20+20	fullRB	QPSK	-11.943	0.005	0.10	Pass
40	Normal	7C	20+20	fullRB	QPSK	-10.863	0.004	0.10	Pass
30	Normal	7C	20+20	fullRB	QPSK	-13.264	0.005	0.10	Pass
20	Normal	7C	20+20	fullRB	QPSK	8.614	0.003	0.10	Pass
10	Normal	7C	20+20	fullRB	QPSK	10.627	0.004	0.10	Pass
0	Normal	7C	20+20	fullRB	QPSK	-11.352	0.005	0.10	Pass
-10	Normal	7C	20+20	fullRB	QPSK	-10.261	0.004	0.10	Pass
-20	Normal	7C	20+20	fullRB	QPSK	-13.840	0.006	0.10	Pass
-30	Normal	7C	20+20	fullRB	QPSK	-9.291	0.004	0.10	Pass

Note: Normal=3.85V, Low=3.50V, High=4.45V

2.5 Conducted Out of Band Emissions

2.5.1 Requirement

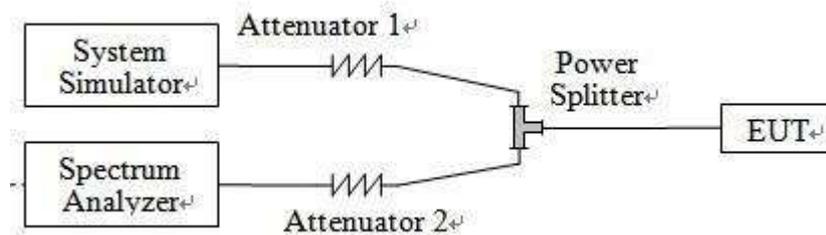
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

2.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.5.3 Test Setup



2.5.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.



7. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(\text{W}) - [43 + 10\log(P)] (\text{dB})$$

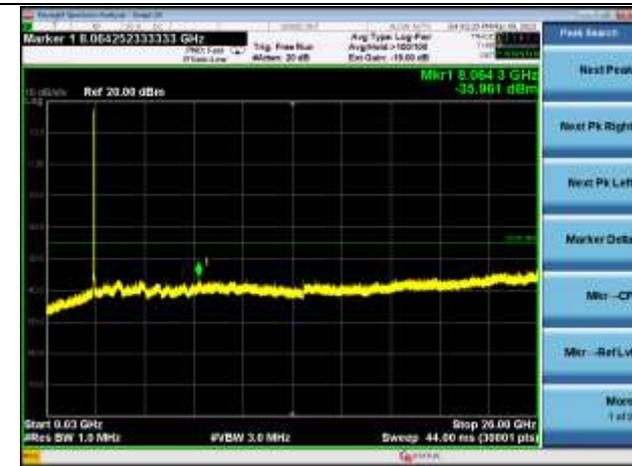
$$= [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB})$$

$$= -13\text{dBm}.$$

8. For 9KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2.5.5 Test Result of Conducted Spurious Emission

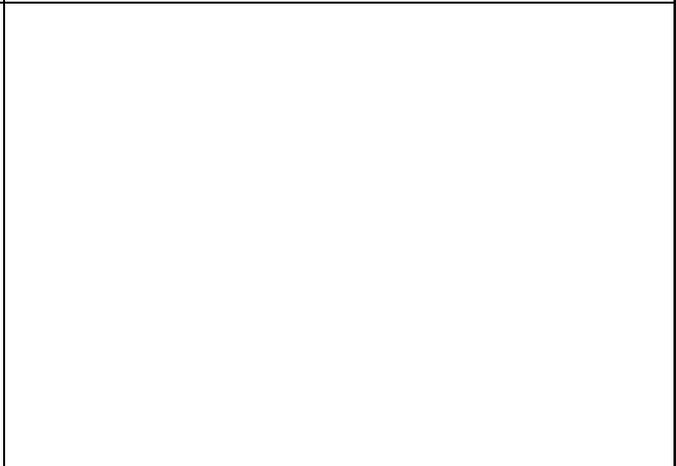
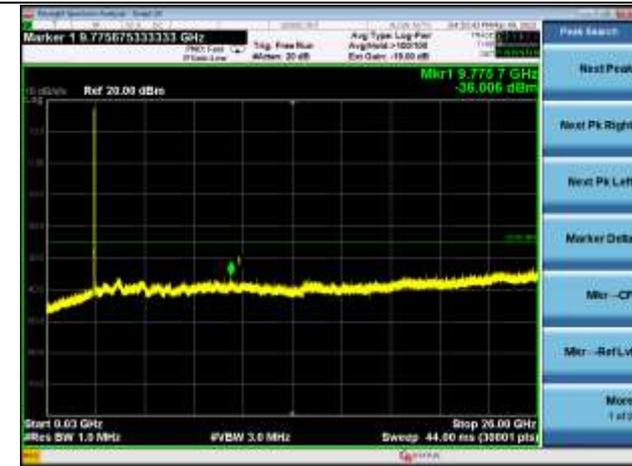
7C_LowRange_20MHz+20MHz_30MHz~26GHz



7C_MidRange_20MHz+20MHz_30MHz~26GHz



7C_HighRange_20MHz+20MHz_30MHz~26GHz



2.6 Conducted Band Edge

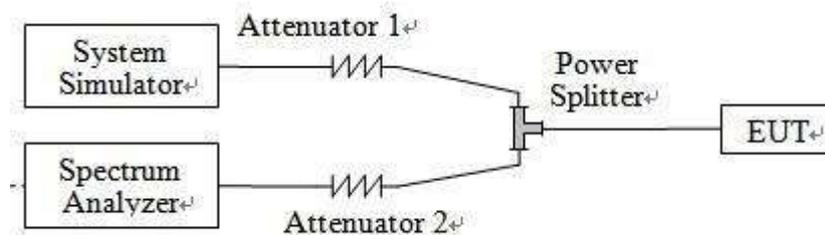
2.6.1 Description of Conducted Band Edge Measurement

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

2.6.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.6.3 Test Setup

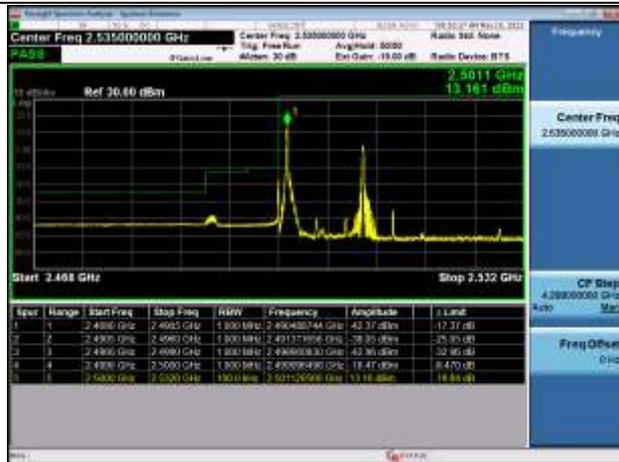


2.6.4 Test Procedures

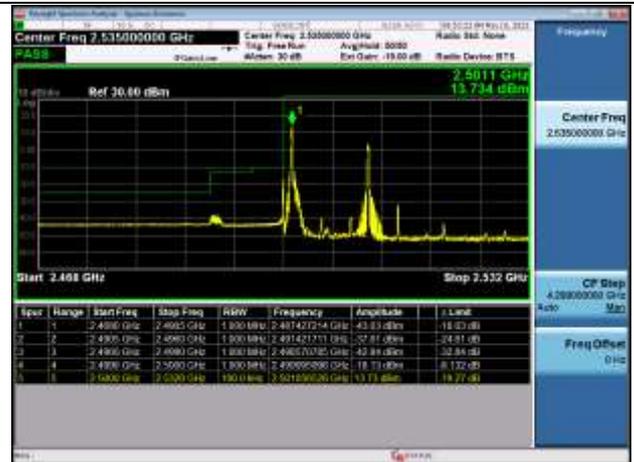
1. The testing follows FCC KDB 971168 v03r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW $\geq 1\%$ EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.
The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
9. For LTE Band 7 the other 40 dB, and 55 dB have additionally applied same calculation above.

2.6.5 Test Result of Conducted Band Edge

LowRange_7C_10MHz+20MHz_OneRB
_low_QPSK



LowRange_7C_10MHz+20MHz_OneRB
_low_Q16



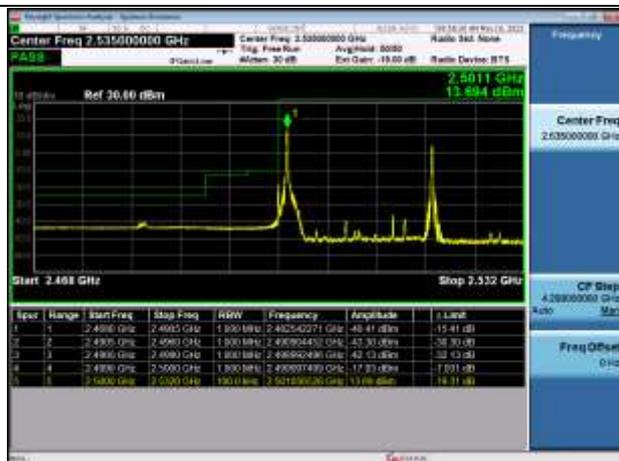
LowRange_7C_10MHz+20MHz_fullRB
_low_QPSK



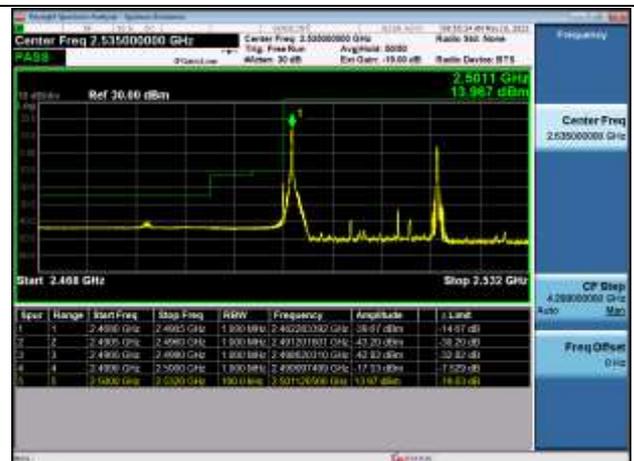
LowRange_7C_10MHz+20MHz_fullRB
_low_Q16



LowRange_7C_20MHz+10MHz_OneRB
_low_QPSK

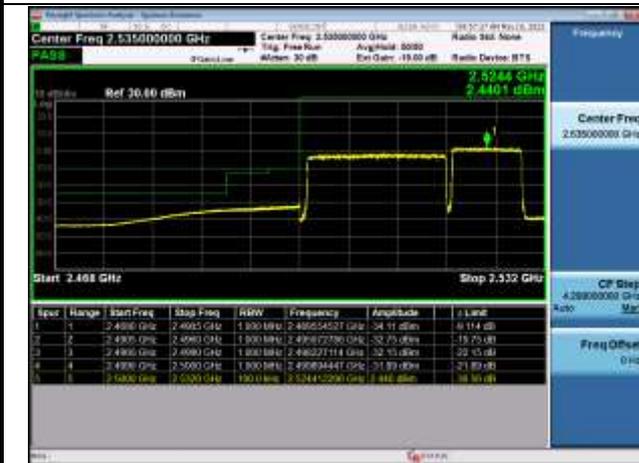


LowRange_7C_20MHz+10MHz_OneRB
_low_Q16





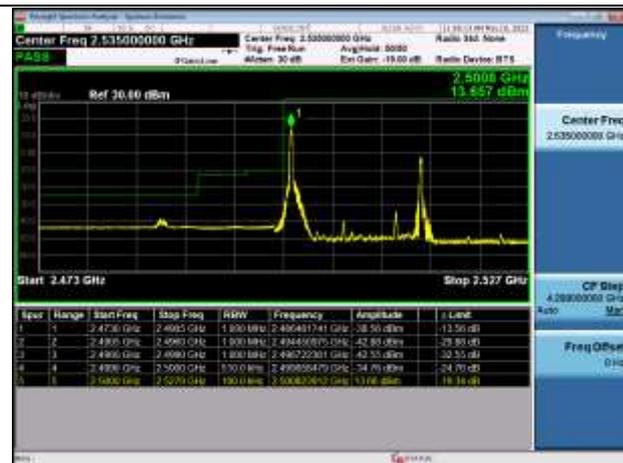
LowRange_7C_20MHz+10MHz_fullRB
_low_QPSK



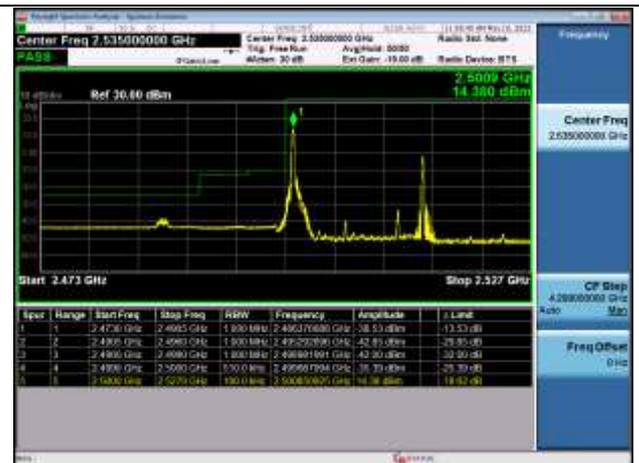
LowRange_7C_20MHz+10MHz_fullRB
_low_Q16



LowRange_7C_15MHz+10MHz_OneRB
_low_QPSK



LowRange_7C_15MHz+10MHz_OneRB
_low_Q16



LowRange_7C_15MHz+10MHz_fullRB
_low_QPSK

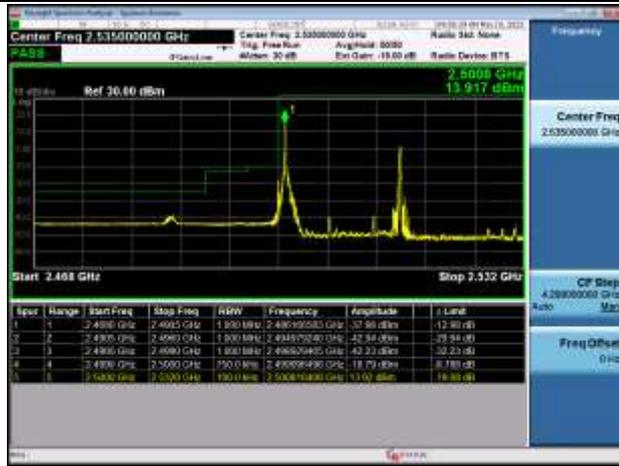


LowRange_7C_15MHz+10MHz_fullRB
_low_Q16

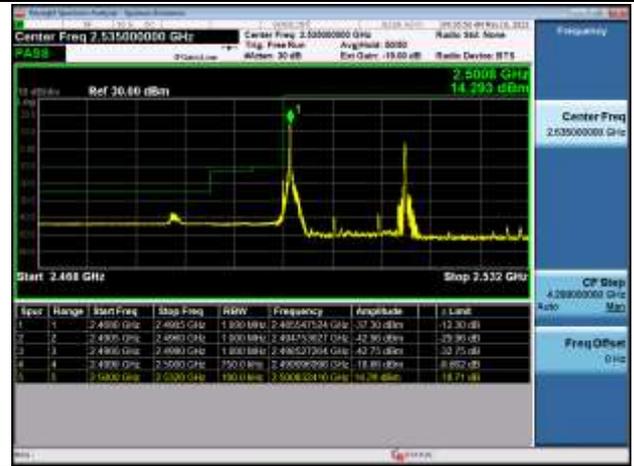




LowRange_7C_15MHz+15MHz_OneRB
_low_QPSK



LowRange_7C_15MHz+15MHz_OneRB
_low_Q16



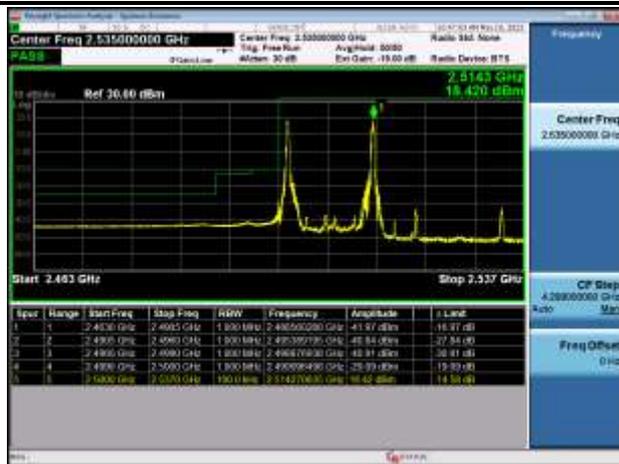
LowRange_7C_15MHz+15MHz_fullRB
_low_QPSK



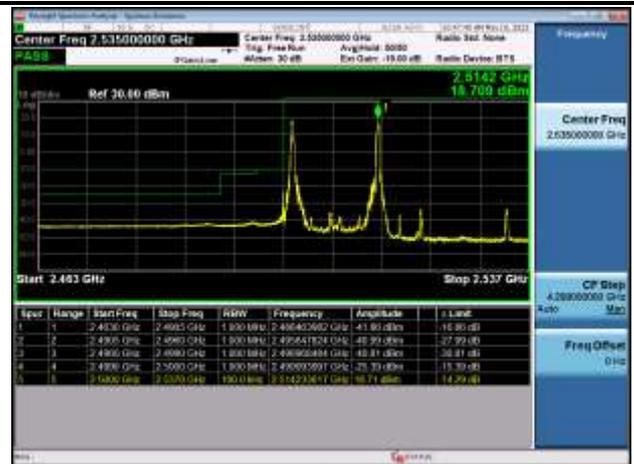
LowRange_7C_15MHz+15MHz_fullRB
_low_Q16



LowRange_7C_15MHz+20MHz_OneRB
_low_QPSK



LowRange_7C_15MHz+20MHz_OneRB
_low_Q16

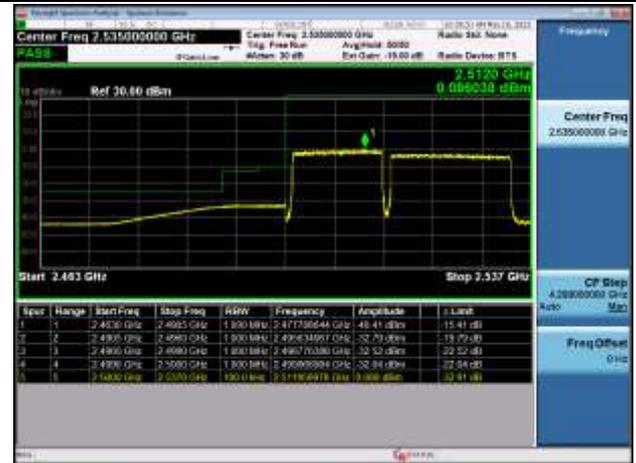




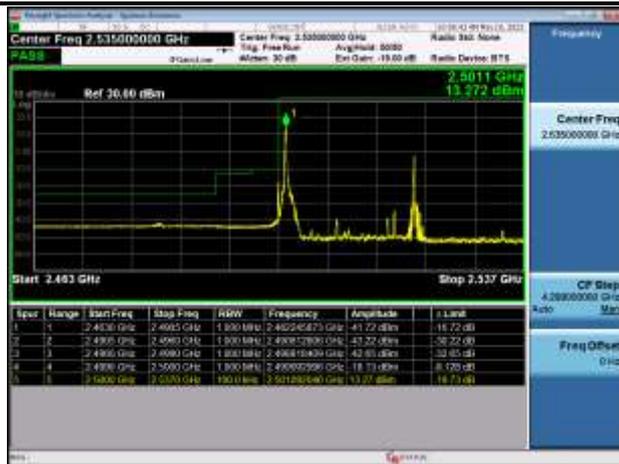
LowRange_7C_15MHz+20MHz_fullRB
_low_QPSK



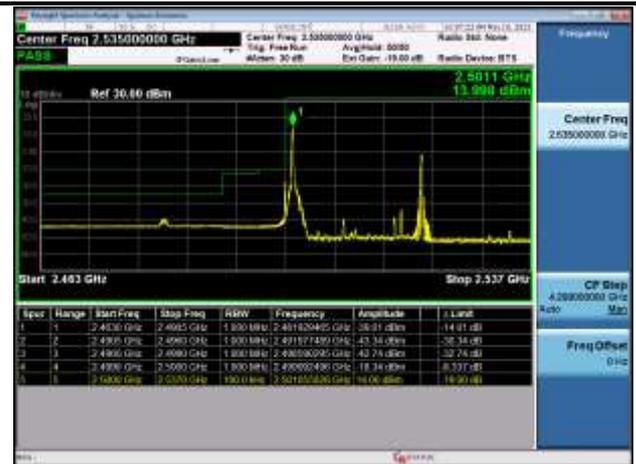
LowRange_7C_15MHz+20MHz_fullRB
_low_Q16



LowRange_7C_20MHz+15MHz_OneRB
_low_QPSK



LowRange_7C_20MHz+15MHz_OneRB
_low_Q16



LowRange_7C_20MHz+15MHz_fullRB
_low_QPSK

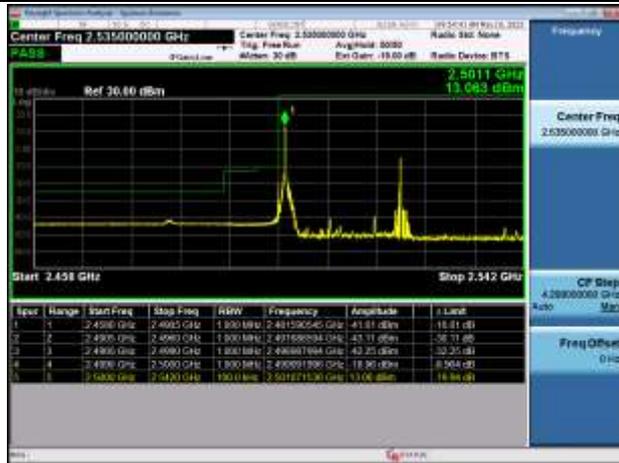


LowRange_7C_20MHz+15MHz_fullRB
_low_Q16

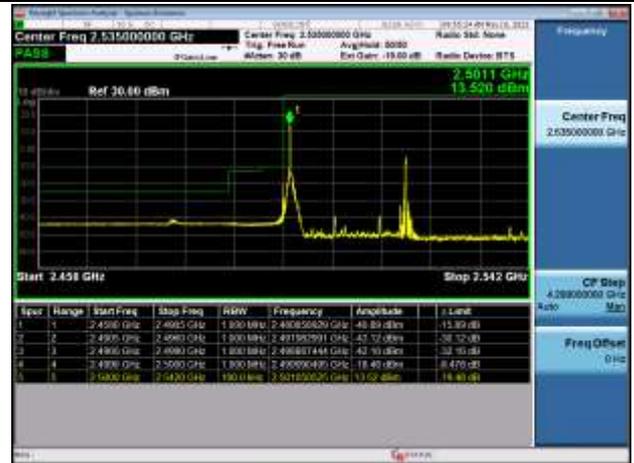




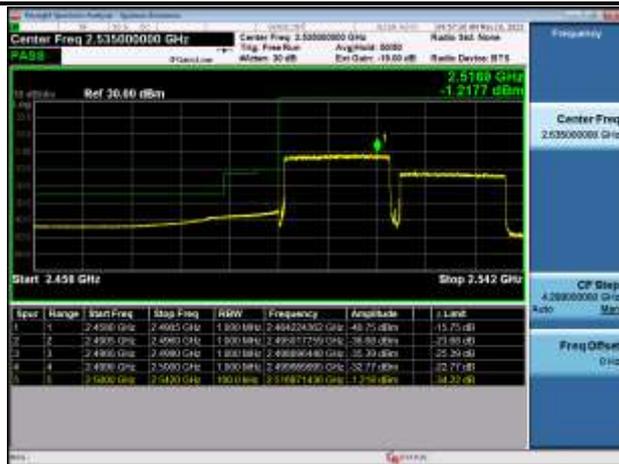
LowRange_7C_20MHz+20MHz_OneRB
_low_QPSK



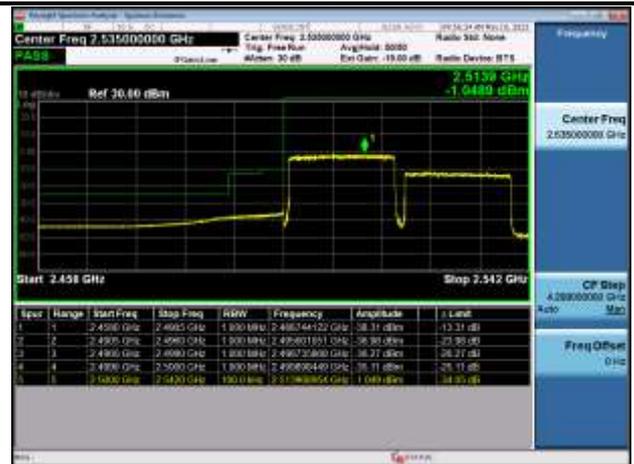
LowRange_7C_20MHz+20MHz_OneRB
_low_Q16



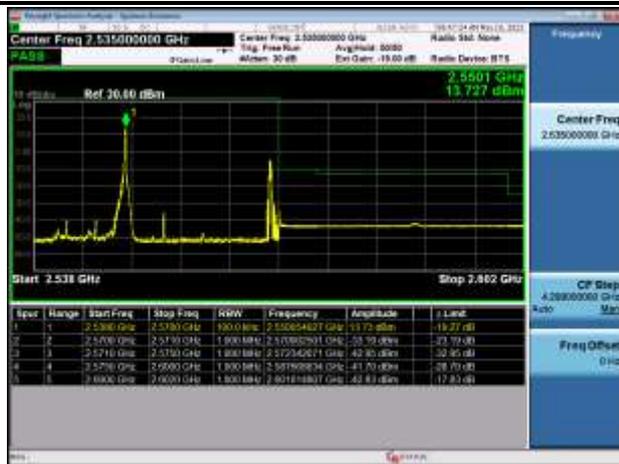
LowRange_7C_20MHz+20MHz_fullRB
_low_QPSK



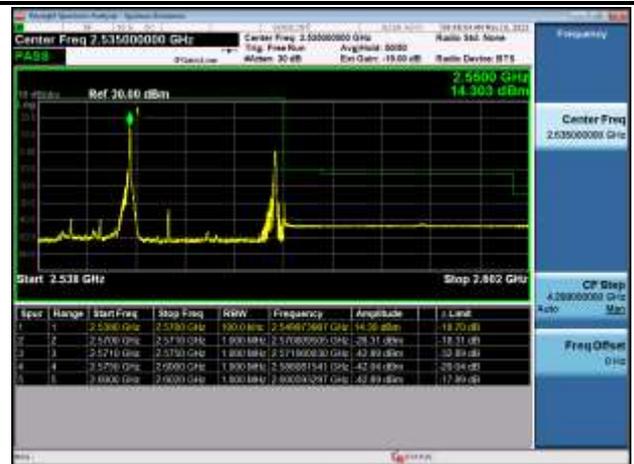
LowRange_7C_20MHz+20MHz_fullRB
_low_Q16



HighRange_7C_10MHz+20MHz_OneRB
_low_QPSK



HighRange_7C_10MHz+20MHz_OneRB
_low_Q16





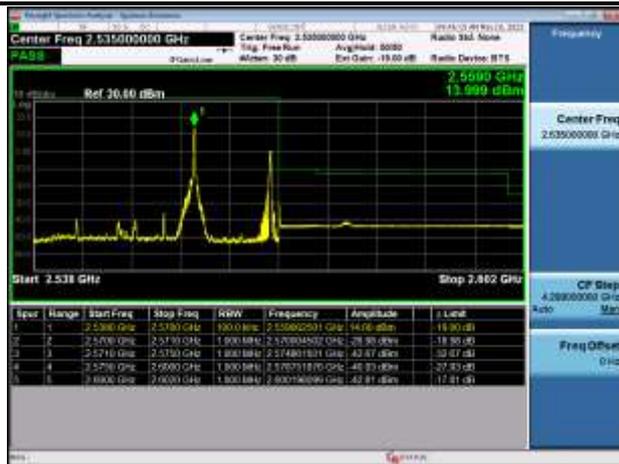
HighRange_7C_10MHz+20MHz_fullIRB
_low_QPSK



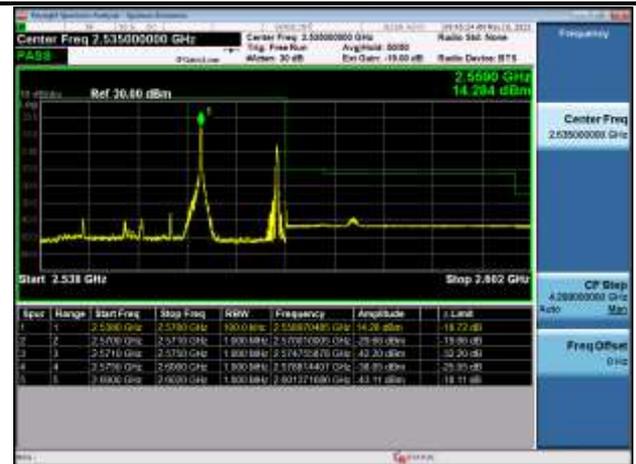
HighRange_7C_10MHz+20MHz_fullIRB
_low_Q16



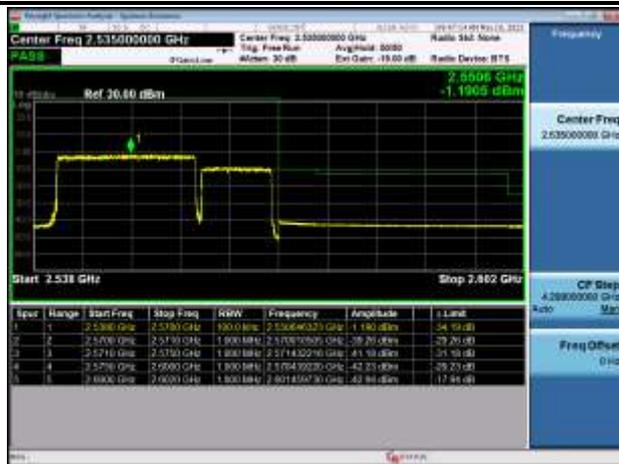
HighRange_7C_20MHz+10MHz_OneRB
_low_QPSK



HighRange_7C_20MHz+10MHz_OneRB
_low_Q16



HighRange_7C_20MHz+10MHz_fullIRB
_low_QPSK

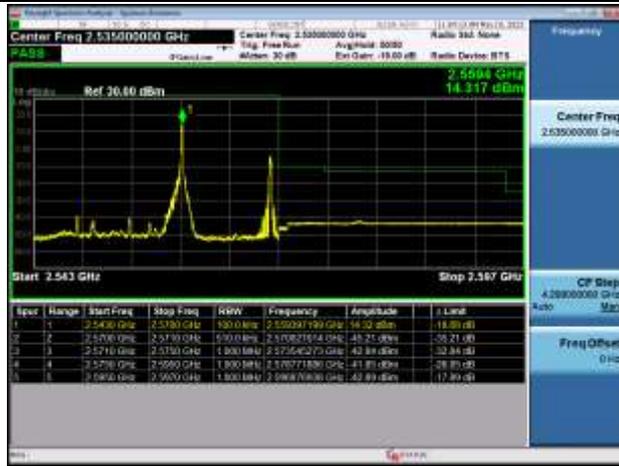


HighRange_7C_20MHz+10MHz_fullIRB
_low_Q16

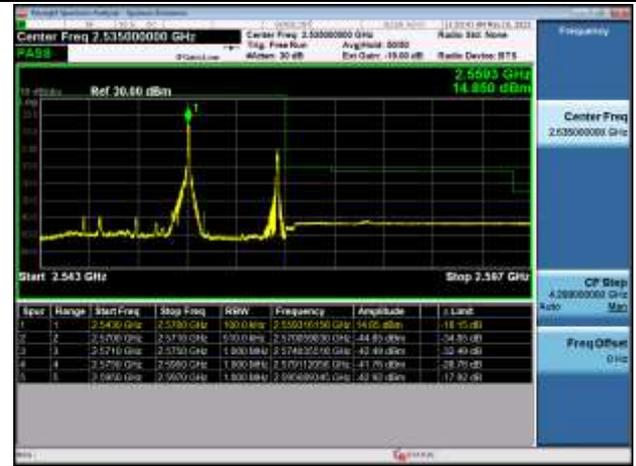




HighRange_7C_15MHz+10MHz_OneRB
_low_QPSK



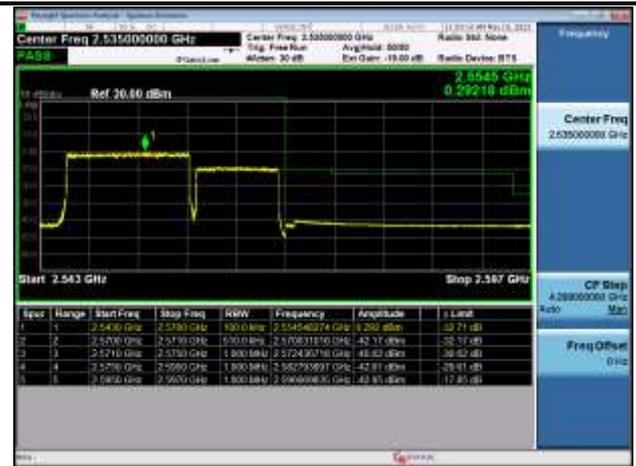
HighRange_7C_15MHz+10MHz_OneRB
_low_Q16



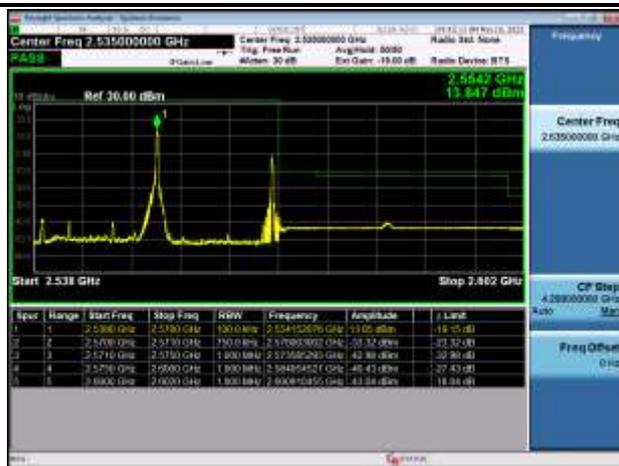
HighRange_7C_15MHz+10MHz_fullRB
_low_QPSK



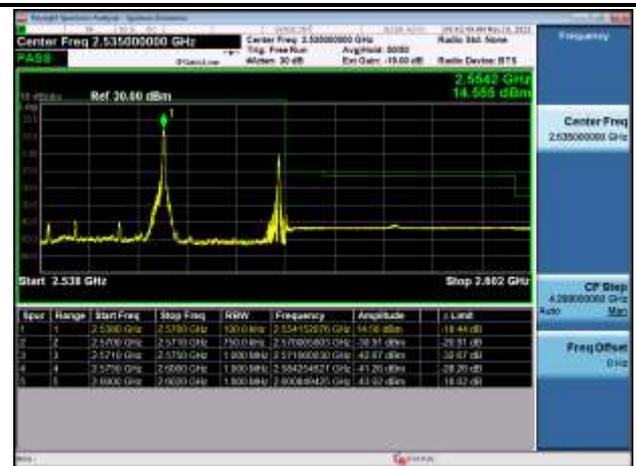
HighRange_7C_15MHz+10MHz_fullRB
_low_Q16



HighRange_7C_15MHz+15MHz_OneRB
_low_QPSK



HighRange_7C_15MHz+15MHz_OneRB
_low_Q16





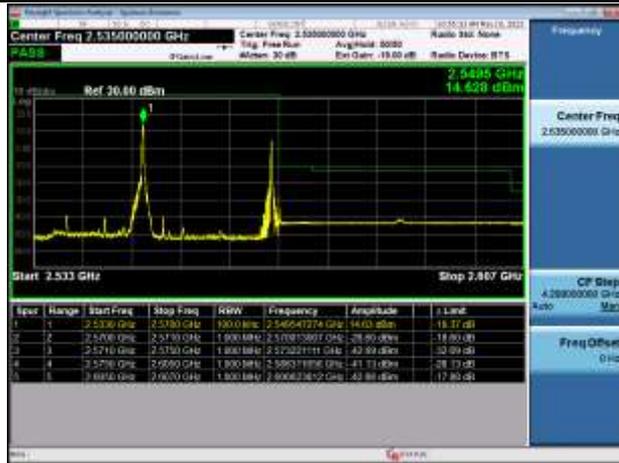
HighRange_7C_15MHz+15MHz_fullIRB_low_QPSK



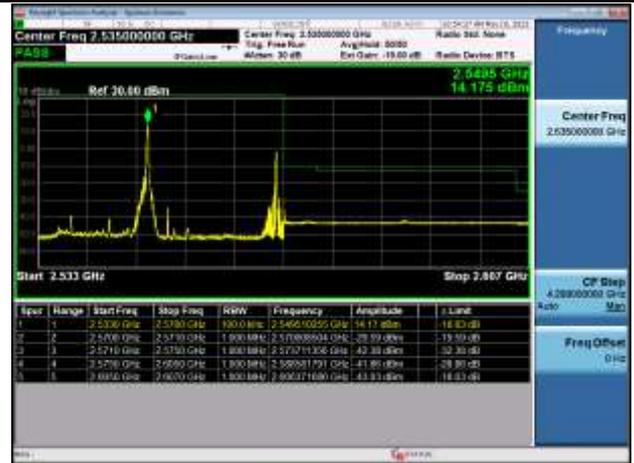
HighRange_7C_15MHz+15MHz_fullIRB_low_Q16



HighRange_7C_15MHz+20MHz_OneRB_low_QPSK



HighRange_7C_15MHz+20MHz_OneRB_low_Q16



HighRange_7C_15MHz+20MHz_fullIRB_low_QPSK

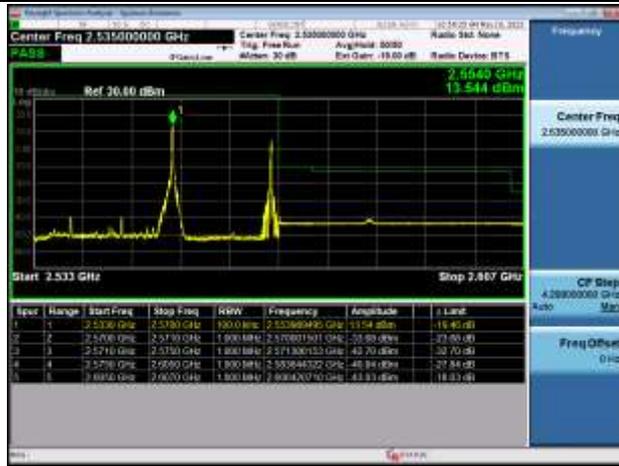


HighRange_7C_15MHz+20MHz_fullIRB_low_Q16

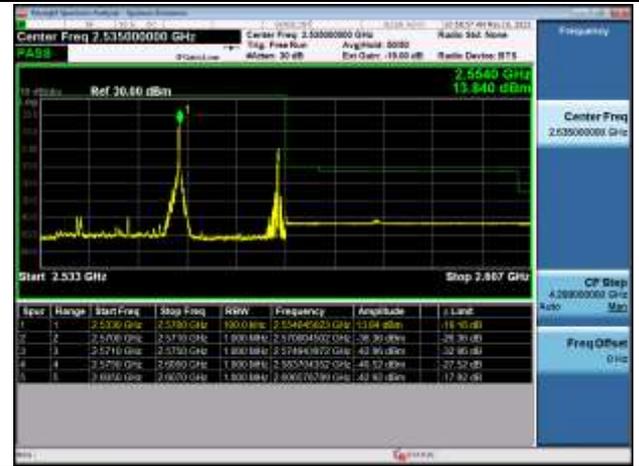




HighRange_7C_20MHz+15MHz_OneRB
_low_QPSK



HighRange_7C_20MHz+15MHz_OneRB
_low_Q16



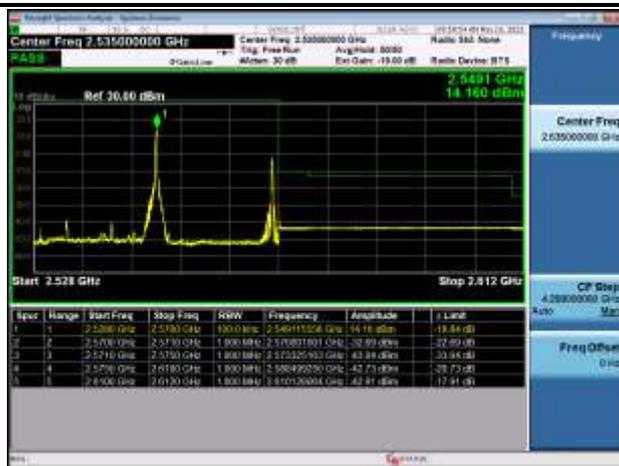
HighRange_7C_20MHz+15MHz_fullRB
_low_QPSK



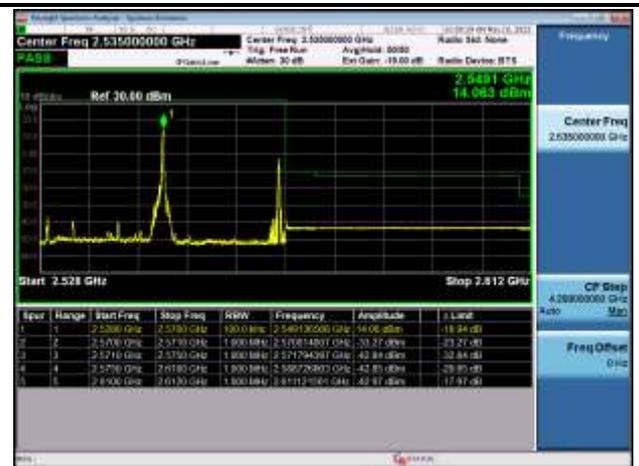
HighRange_7C_20MHz+15MHz_fullRB
_low_Q16



HighRange_7C_20MHz+20MHz_OneRB
_low_QPSK



HighRange_7C_20MHz+20MHz_OneRB
_low_Q16





HighRange_7C_20MHz+20MHz_fullIRB
_low_QPSK

HighRange_7C_20MHz+20MHz_fullIRB
_low_Q16



2.7 Transmitter Radiated Power (EIRP/ERP)

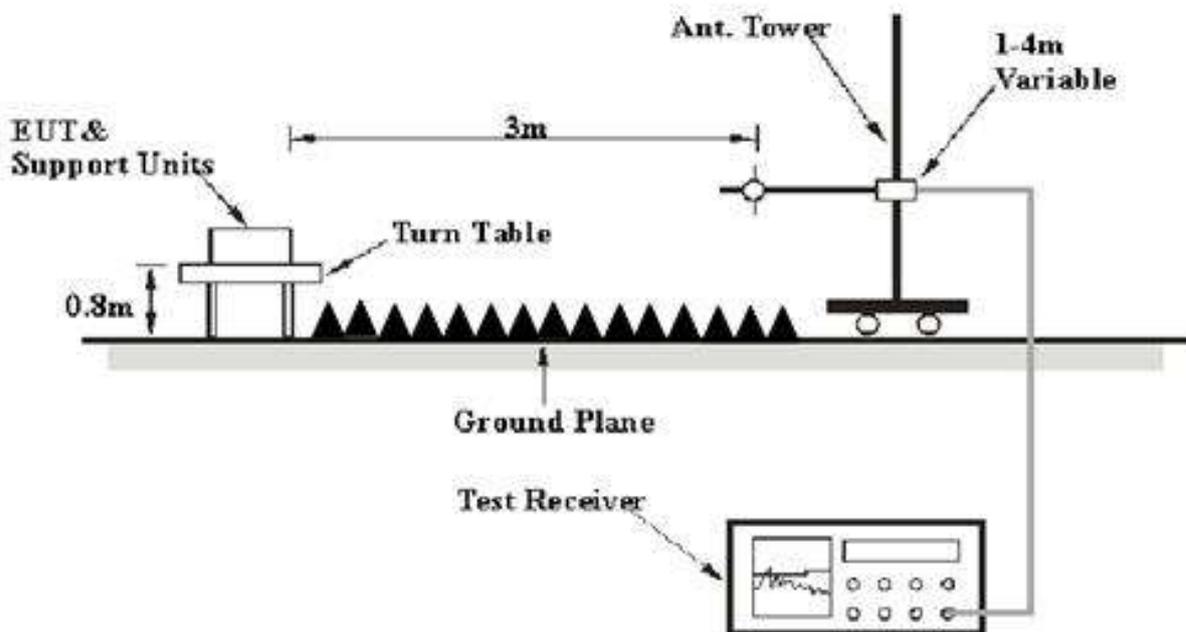
2.7.1 Requirement

Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03r01. Mobile and portable (hand-held) stations operating are limited to average ERP of 7 watts with LTE band 5 Equivalent isotropic radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03r01.

2.7.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3 Test Setup





2.7.4 Test Procedures

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer which used a channel power option across EUT's signal bandwidth per section 4.0 of KDB 971168 D01v03r01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

P_s (dBm): Input power to substitution antenna.

G_s (dBi or dBd): Substitution antenna Gain.

$E_t = R_t + AF$

$E_s = R_s + AF$

AF (dB/m): Receive antenna factor

R_t : The highest received signal in spectrum analyzer for EUT.

R_s : The highest received signal in spectrum analyzer for substitution antenna.



2.7.5 Test Result of ERP/EIRP

CC-Combo 10MHz+20MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	16.15	15.47
			50	0	100	0	14.42	13.61
	2525.6	2540.0	1	49	1	0	16.71	15.78
			50	0	100	0	14.95	13.66
	2545.6	2560.0	1	49	1	0	17.58	17.11
			50	0	100	0	16.02	15.09

CC-Combo 20MHz+10MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	16.15	15.26
			100	0	50	0	14.39	13.41
	2530.1	2544.5	1	99	1	0	17.16	16.28
			100	0	50	0	15.17	14.02
	2550.1	2564.5	1	99	1	0	17.53	16.91
			100	0	50	0	15.68	14.73

CC-Combo 15MHz+10MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 10MHz	2507.5	2519.5	1	74	1	0	16.28	15.46
			75	0	50	0	14.39	13.92
	2530.1	2542.1	1	74	1	0	17.13	16.44
			75	0	50	0	14.87	13.97
	2552.7	2564.7	1	74	1	0	17.82	17.05
			75	0	50	0	16.01	14.85



CC-Combo 15MHz+15MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	16.27	15.14
			75	0	75	0	14.16	13.47
	2527.5	2542.5	1	74	1	0	16.91	16.21
			75	0	75	0	14.97	13.85
	2547.5	2562.5	1	74	1	0	17.38	16.68
			75	0	75	0	15.41	14.52

CC-Combo 15MHz+20MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	16.17	15.22
			75	0	100	0	14.02	13.16
	2525.3	2542.4	1	74	1	0	17.35	16.08
			75	0	100	0	15.03	13.93
	2542.9	2560.0	1	74	1	0	17.46	16.82
			75	0	100	0	15.38	14.36

CC-Combo 20MHz+15MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	16.11	15.16
			100	0	75	0	14.16	13.23
	2527.6	2544.7	1	99	1	0	16.83	16.07
			100	0	75	0	14.91	13.92
	2545.1	2562.2	1	99	1	0	17.35	16.54
			100	0	75	0	15.39	14.38



CC-Combo 20MHz+20MHz:

Bandwidth	CC1 Frequency (MHz)	CC2 Frequency (MHz)	CC1 RB	CC1 RB	CC2 RB	CC2 RB	Conducted Average (dBm)	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 20MHz	2510.0	2529.8	1	99	1	0	16.02	15.27
			1	0	1	99	7.73	8.04
			100	0	100	0	14.13	13.16
	2525.1	2544.9	1	99	1	0	16.68	16.09
			1	0	1	99	7.61	7.98
			100	0	100	0	15.03	14.08
	2540.2	2560.0	1	99	1	0	17.38	16.54
			1	0	1	99	7.86	8.07
			100	0	100	0	16.19	15.08

2.8 Radiated Out of Band Emissions

2.8.1 Requirement

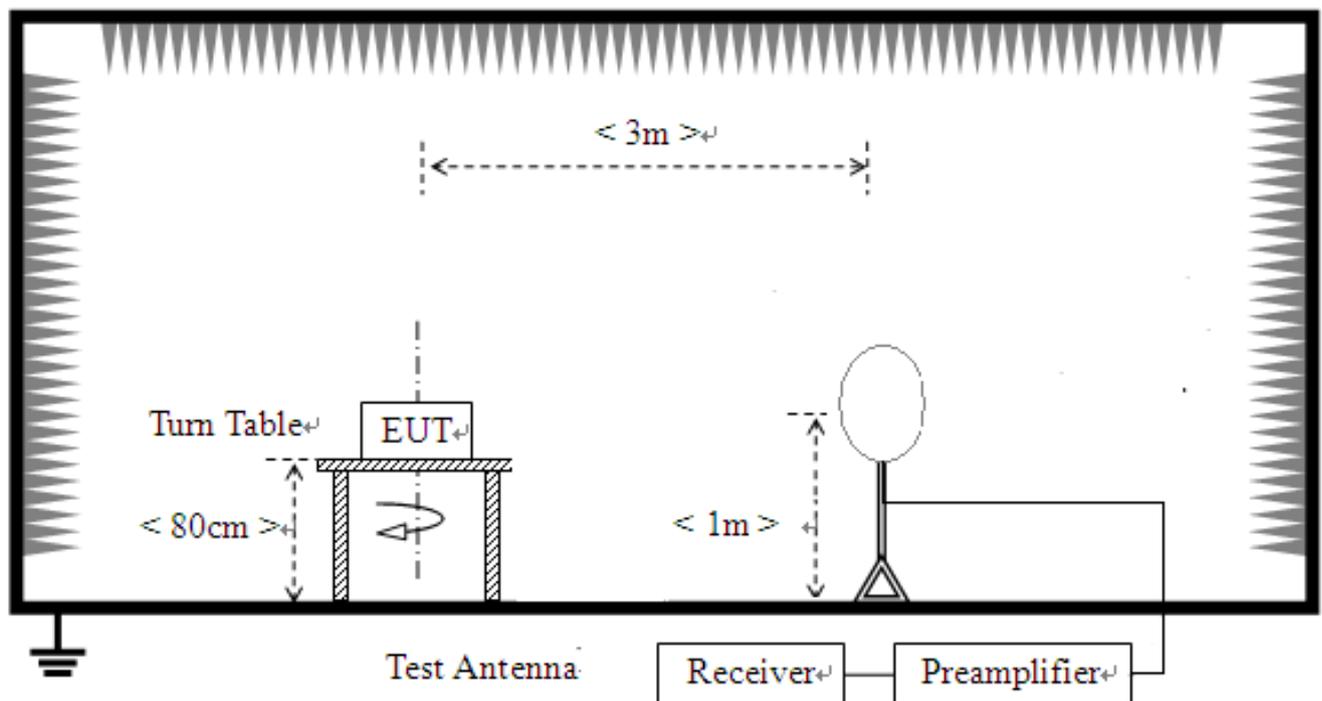
The radiated spurious emission was measured by substitution method according to ANSI / TIA /EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

2.8.2 Measuring Instruments

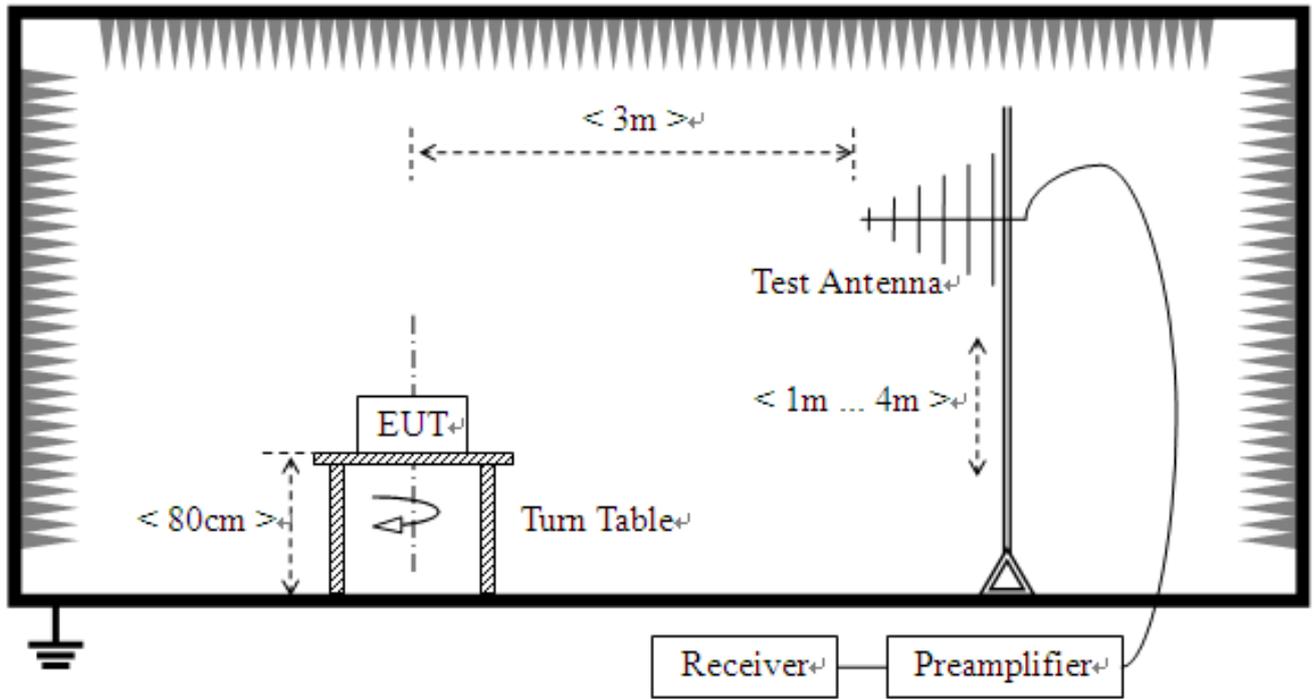
The measuring equipment is listed in the section 3 of this test report.

2.8.3 Test Setup

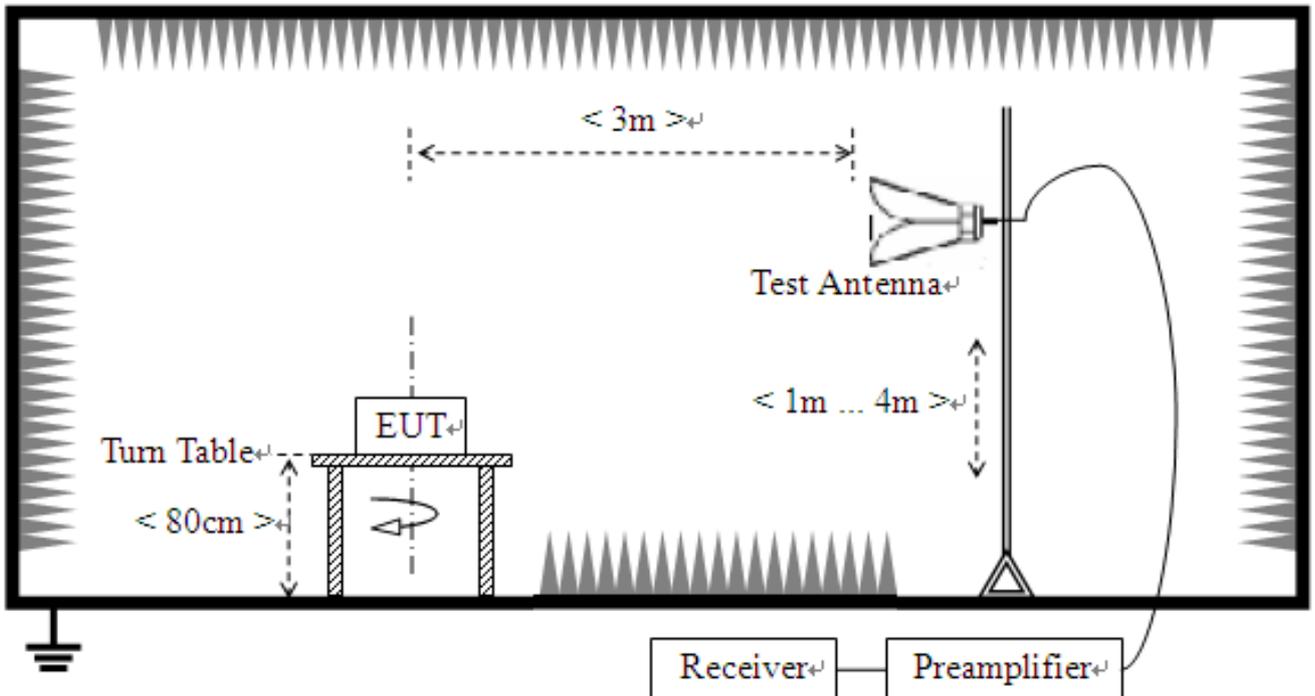
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





2.8.4 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

$$\begin{aligned} & \text{The limit line is derived from } 43 + 10\log(P)\text{dB below the transmitter power } P(\text{Watts}) \\ & = P(\text{W}) - [43 + 10\log(P)] \text{ (dB)} \\ & = [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} \\ & = -13\text{dBm}. \end{aligned}$$

11. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
12. The spectrum is measured from 9 KHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
13. The maximum RB configurations of the Radiated Spurious Emissions as RB Size 1, RB Offset 0.



2.8.5 Test Result (Plots) of Radiated Spurious Emission

Note: 1. within 30MHz-1GHz were found more than 20dB below limit line

Note: 2. Absolute Level=Reading Level + Factor

LTE Band CA-7C QPSK 20MHz BW Middle Channel

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	74.1571	-81.28	-62.02	-25.00	37.02	19.26	Horizontal
2	364.332	-90.81	-62.34	-25.00	37.34	28.47	Horizontal
3	663.241	-90.28	-55.50	-25.00	30.50	34.78	Horizontal
4	2097.54	-56.14	-51.52	-25.00	26.52	4.62	Horizontal
5	5738.86	-52.92	-38.81	-25.00	13.81	14.11	Horizontal
6	8807.90	-59.85	-39.59	-25.00	14.59	20.26	Horizontal

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	79.98	-90.18	-68.09	-25.00	43.09	22.09	Vertical
2	770.480	-90.20	-54.24	-25.00	29.24	35.96	Vertical
3	1679.33	-55.92	-54.32	-25.00	29.32	1.60	Vertical
4	5093.54	-58.16	-43.42	-25.00	18.42	14.74	Vertical
5	7607.30	-59.43	-38.93	-25.00	13.93	20.50	Vertical
6	9828.41	-60.05	-38.15	-25.00	13.15	21.90	Vertical

Note: other spurious emissions are 20dB below limit line and no need to report



3. LIST OF MEASURING EQUIPMENT

NO.	Description	Manufacturer	Model	Serial No.	Cal. Date	Due Date
1	EMI Test Receiver	R&S	ESU8	A0805559	2022.02.21	2023.02.20
2	Passive Loop Antenna	SCHWARZBECK	FMZB 1519B	A180903206	2020.07.22	2023.07.21
3	Broadband antenna (30MHz~1GHz)	Schwarbeck	BBHA 9120 J	A190503537	2020.12.29	2022.12.28
4	Broadband antenna (30MHz~1GHz)	R&S	VULB9160	A0805560	2019.05.24	2022.05.23
5	Horn Antenna (1GHz~18GHz)	R&S	ESIB7	A0501375	2020.06.24	2022.06.22
6	Horn antenna (18GHz~26.5GHz)	AR	AT4003A	A0329293	2021.09.05	2022.09.04
7	Amplifier 30M~1GHz	MILMEGA	80RF1000-1000	A140101634	2021.12.24	2022.12.23
8	Amplifier 1G~18GHz	MILMEGA	AS0104R-800/40 0	A160302517	2021.12.24	2022.12.23
9	Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2022.03.25	2023.03.24
10	Test Receiver	R&S	ESIB26	A0304218	2021.12.27	2022.12.26
11	Temperature chamber	Yamato	DNF810C	A170702700	2022.03.31	2023.03.30
12	Wideband Radio Communication tester	KEYSIGHT	E7515A	A160702555	2022.03.25	2023.03.24
13	Power Supply	R&S	WYJ-60100	A141102031	2021.11.01	2022.10.31

** END OF REPORT **