

FCC Test Report

FCC ID : N7NHL7688
Equipment : Wireless Module
Model No. : HL7688
Brand Name : AirPrime
Applicant : Sierra Wireless Inc.
Address : 13811 Wireless Way Richmond, BC, V6V 3A4
Canada
Standard : 47 CFR FCC Part 22 Subpart H
Received Date : Jul. 12, 2016
Tested Date : Aug. 03 ~ Aug. 08, 2016

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:


Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FG571601-01P22	Rev. 01	Initial issue	Aug. 18, 2016

Summary of Test Results

FCC Rules	Test Items	Measured	Result
2.1046 / 22.913(a)(2)	Effective Radiated Power	Power[dBm] : WCDMA: 23.20 LTE: 22.88	Pass
2.1053 / 22.917(a)	Radiated Emissions	Meet the requirement of limit	Pass
2.1051 / 22.917(a)	Conducted Emissions	Meet the requirement of limit	Pass
2.1051 / 22.917(a)	Band Edge	Meet the requirement of limit	Pass
2.1049 / 22.917(a)	Occupied Bandwidth	Meet the requirement of limit	Pass
-	Peak to average ratio	Meet the requirement of limit	Pass
2.1055 / 22.355	Frequency Stability	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

Operating Frequency	WCDMA Band 5: 826.4 MHz ~ 846.6 MHz LTE Band 5: Channel Bandwidth: 1.4MHz: 824.7 MHz ~ 848.3 MHz Channel Bandwidth: 3MHz: 825.5 MHz ~ 847.5 MHz Channel Bandwidth: 5MHz: 826.5 MHz ~ 846.5 MHz Channel Bandwidth: 10MHz: 829 MHz ~ 844 MHz
Modulation	WCDMA: BPSK (Uplink) LTE: QPSK, 16QAM (Uplink)
Release Version	WCDMA: R5 / R6 / R7 / R8 LTE: 8
Duplex Mode	FDD
UE Category	Cat. 1
H/W Version	1
S/W Version	RHL76xx.A.2.10.1

1.1.2 Maximum ERP and Emission Designator

Mode	Modulation	Maximum ERP(W)	Emission Designator
WCDMA 850	QPSK	0.209	4M10F9W
LTE Band 5, CB: 1.4MHz	QPSK	0.194	1M09G7D
LTE Band 5, CB: 1.4MHz	16QAM	0.164	1M09W7D
LTE Band 5, CB: 3MHz	QPSK	0.189	2M69G7D
LTE Band 5, CB: 3MHz	16QAM	0.165	2M70W7D
LTE Band 5, CB: 5MHz	QPSK	0.186	4M50G7D
LTE Band 5, CB: 5MHz	16QAM	0.147	4M50W7D
LTE Band 5, CB: 10MHz	QPSK	0.194	9M03G7D
LTE Band 5, CB: 10MHz	16QAM	0.160	9M00W7D

1.1.3 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	Dipole	2	R-SMA	---

Note: The antenna is for testing use only.

1.1.4 EUT Operational Condition

Supply Voltage	3.7 Vdc from host		
Operational Voltage	☒ Vnom (3.7 V)	☒ Vmax (4.5 V)	☒ Vmin (3.2 V)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (55°C)	☒ Tmin (-30°C)

1.1.5 Operating Channel List

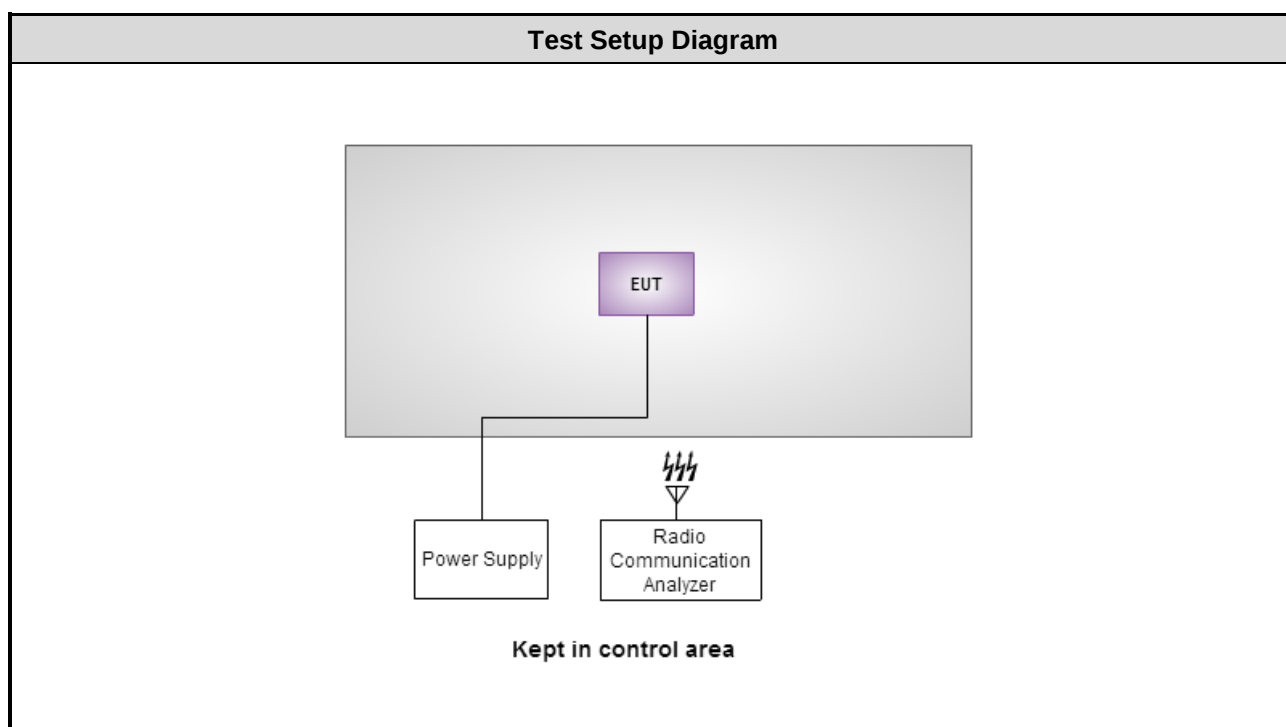
WCDMA Band 5		
Channel Location	Channel	Frequency (MHz)
Low	4132	826.4
Middle	4182	836.4
High	4233	846.6

LTE Band 5		
Channel Bandwidths (MHz)	Channel	Frequency (MHz)
1.4	20407	824.7
1.4	20525	836.5
1.4	20643	848.3
3	20415	825.5
3	20525	836.5
3	20635	847.5
5	20425	826.5
5	20525	836.5
5	20625	846.5
10	20450	829.0
10	20525	836.5
10	20600	844.0

1.2 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Signal cable / Length (m)
1	Power Supply	GWINSTEK	GPC-60300	EM884797	---	---

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
Radio Communication Analyzer	Anritsu	MT8820C	6201240341	Mar. 28, 2016	Mar. 27, 2017
DC POWER SOURCE	GW INSTRON	GPC-3060D	EM884797	Oct. 20, 2015	Oct. 19, 2016
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber 3 / (03CH03-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 14, 2015	Sep. 13, 2016
Receiver	Agilent	N9038A	MY53290044	Oct. 14, 2015	Oct. 13, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 26, 2016	Apr. 25, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 24, 2016	Feb. 23, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016
Preamplifier	EMC	EMC02325	980187	Sep. 21, 2015	Sep. 20, 2016
Preamplifier	Agilent	83017A	MY53270014	Sep. 07, 2015	Sep. 06, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 05, 2016	Feb. 04, 2017
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22600/4	Feb. 05, 2016	Feb. 04, 2017
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 05, 2016	Feb. 04, 2017
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 05, 2016	Feb. 04, 2017
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 05, 2016	Feb. 04, 2017
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 05, 2016	Feb. 04, 2017
Radio Communication Analyzer	Anritsu	MT8820C	6201240341	Mar. 28, 2016	Mar. 27, 2017
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards.

47 CFR FCC Part 22 Subpart H

ANSI / TIA / EIA-603-D -2010

FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.134 Hz
Conducted power	± 0.808 dB
Frequency error	± 34.134 Hz
Temperature	± 0.6 °C
Conducted emission	± 2.670 dB
AC conducted emission	± 2.90 dB
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.37 dB

2 Test Configuration

2.1 Testing Condition and Location Information

Test Item	Test Site	Ambient Condition	Tested By
RF conducted	TH01-WS	23°C / 64%	Felix Sung
Radiated Emissions	03CH03-WS	22°C / 64%	Anderson Hung

➤ FCC site registration No.: 207696

➤ IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

WCDMA Band 5		
Test item	Mode	Test channel
Effective Radiated Power	WCDMA Band 5	4132, 4182, 4233
Radiated Emissions $\leq$ 1GHz	WCDMA Band 5	4182
Radiated Emissions $>$ 1GHz	WCDMA Band 5	4132, 4182, 4233
Conducted Emissions	WCDMA Band 5	4132, 4182, 4233
Band Edge	WCDMA Band 5	4132, 4233
Occupied Bandwidth	WCDMA Band 5	4132, 4182, 4233
Peak to average ratio	WCDMA Band 5	4132, 4182, 4233
Frequency Stability	WCDMA Band 5	4182
Note: 1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Y-plane results were found as the worst case and were shown in this report.		

LTE Band 5			
Test item	Channel Bandwidths	Modulation	Test channel
Effective Radiated Power	1.4 MHz	QPSK / 16QAM	20407 / 20525 / 20643
Conducted Emissions	3 MHz	QPSK / 16QAM	20415 / 20525 / 20635
Occupied Bandwidth	5 MHz	QPSK / 16QAM	20425 / 20525 / 20625
Peak to Average Ratio	10 MHz	QPSK / 16QAM	20450 / 20525 / 20600
Radiated Emission $\leq$ 1GHz	1.4 MHz	QPSK	20407
	3 MHz	QPSK	20415
	5 MHz	QPSK	20425
	10 MHz	QPSK	20450
Radiated Emission $>$ 1GHz	1.4 MHz	QPSK	20407 / 20525 / 20643
	3 MHz	QPSK	20415 / 20525 / 20635
	5 MHz	QPSK	20425 / 20525 / 20625
	10 MHz	QPSK	20450 / 20525 / 20600
Band Edge	1.4 MHz	QPSK / 16QAM	20407 / 20643
	3 MHz	QPSK / 16QAM	20415 / 20635
	5 MHz	QPSK / 16QAM	20425 / 20625
	10 MHz	QPSK / 16QAM	20450 / 20600
Frequency Stability	1.4 MHz	QPSK	20525
	3 MHz	QPSK	20525
	5 MHz	QPSK	20525
	10 MHz	QPSK	20525
Note: 1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Y-plane results were found as the worst case and were shown in this report.			

3 Test Results

3.1 Effective Radiated Power

3.1.1 Limit of Effective Radiated Power

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1.2 Test Procedures

For Conducted power measurement:

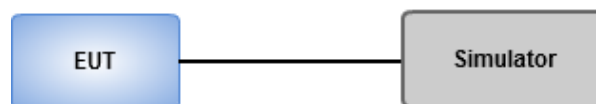
1. The EUT links up with simulator and is set to maximum output power level at low / middel / high channel.
2. Measure the output power of low / middle / high channel of the EUT.

For ERP measurement:

EPR can be calculated by below formula from KDB 412172 D01.

1. $EIRP = P_T + G_T - L_C$
 P_T = transmitter output power, in dBm.
 G_T = gain of the transmitting antenna, in dBi (EIRP).
 L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.
2. $ERP = EIRP - 2.15 \text{ dB}$.

3.1.3 Test Setup



3.1.4 Test Result of Conducted Output Power (dBm)

Band	WCDMA BAND 5		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2K	23.24	23.35	23.27
HSDPA Subtest-1	23.22	23.27	23.24
HSDPA Subtest-2	22.83	22.83	22.81
HSDPA Subtest-3	22.61	22.64	22.62
HSDPA Subtest-4	22.37	22.41	22.37
DC-HSDPA Subtest-1	23.10	23.11	23.09
DC-HSDPA Subtest-2	22.69	22.70	22.67
DC-HSDPA Subtest-3	22.45	22.49	22.47
DC-HSDPA Subtest-4	22.24	22.28	22.25
HSUPA Subtest-1	22.80	22.92	22.81
HSUPA Subtest-2	20.60	20.56	20.56
HSUPA Subtest-3	21.60	21.69	21.55
HSUPA Subtest-4	20.79	20.82	20.76
HSUPA Subtest-5	22.43	22.90	22.80

Band / Channel Bandwidth			LTE Band 5 / CB: 1.4MHz		
Channel			20407	20525	20643
Frequency (MHz)			824.7	836.5	848.3
Mode	RB	RB Offset	Maximum AV Power (dBm)		
QPSK	1	0	23.03	22.93	22.71
	1	2	22.85	22.74	22.62
	1	5	22.87	22.81	22.66
	3	0	22.93	22.79	22.63
	3	1	22.85	22.81	22.61
	3	2	22.85	22.77	22.70
	6	0	21.74	21.77	21.69
16QAM	1	0	22.31	22.05	22.16
	1	2	22.11	22.01	22.10
	1	5	22.24	21.92	21.89
	3	0	22.03	21.89	21.8
	3	1	22.05	21.86	21.78
	3	2	22.00	22.04	21.77
	6	0	20.92	20.93	20.71

Band / Channel Bandwidth			LTE Band 5 / CB: 3MHz		
Channel			20415	20525	20635
Frequency (MHz)			825.5	836.5	847.5
Mode	RB	RB Offset	Maximum AV Power (dBm)		
QPSK	1	0	22.91	22.84	22.65
	1	7	22.88	22.74	22.59
	1	14	22.76	22.76	22.49
	8	0	21.88	21.79	21.60
	8	4	21.84	21.78	21.62
	8	7	21.97	21.69	21.41
	15	0	21.83	21.69	21.63
16QAM	1	0	22.25	22.19	22.10
	1	7	22.33	22.11	21.95
	1	14	22.11	22.01	21.97
	8	0	20.90	20.83	20.55
	8	4	20.94	20.84	20.65
	8	7	20.98	20.82	20.71
	15	0	20.99	20.76	20.55

Band / Channel Bandwidth			LTE Band 5 / CB: 5MHz		
Channel			20425	20525	20625
Frequency (MHz)			826.5	836.5	846.5
Mode	RB	RB Offset	Maximum AV Power (dBm)		
QPSK	1	0	22.85	22.72	22.68
	1	12	22.82	22.63	22.62
	1	24	22.77	22.56	22.47
	12	0	21.82	21.75	21.65
	12	6	21.84	21.80	21.61
	12	11	21.87	21.78	21.56
	25	0	21.78	21.76	21.58
16QAM	1	0	21.83	21.77	21.82
	1	12	21.82	21.72	21.74
	1	24	21.72	21.66	21.63
	12	0	20.92	20.91	20.75
	12	6	20.95	20.84	20.71
	12	11	20.93	20.83	20.52
	25	0	20.90	20.76	20.64

Band / Channel Bandwidth			LTE Band 5 / CB: 10MHz		
Channel			20450	20525	20600
Frequency (MHz)			829	836.5	844
Mode	RB	RB Offset	Maximum AV Power (dBm)		
QPSK	1	0	23.02	22.58	22.65
	1	24	22.71	22.47	22.57
	1	49	22.59	22.39	22.19
	25	0	21.85	21.78	21.74
	25	12	21.84	21.73	21.63
	25	24	21.98	21.66	21.57
	50	0	21.84	21.73	21.64
16QAM	1	0	22.08	21.97	22.13
	1	24	22.05	21.95	22.18
	1	49	22.07	21.78	21.89
	25	0	20.88	20.80	20.72
	25	12	20.81	20.75	20.63
	25	24	20.80	20.69	20.59
	50	0	20.87	20.82	20.66

3.1.5 Test Result of Effective Radiated Power (dBm)

Mode	WCDMA Band 5, RMC 12.2K						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
4132	826.4	23.24	2	25.24	23.09	0.204	7
4182	836.4	23.35	2	25.35	23.20	0.209	7
4233	846.6	23.27	2	25.27	23.12	0.205	7

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB: 1.4MHz, QPSK						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20407	824.7	23.03	2	25.03	22.88	0.194	7
20525	836.5	22.93	2	24.93	22.78	0.190	7
20643	848.3	22.71	2	24.71	22.56	0.180	7

Mode	LTE Band 5, CB: 1.4MHz, 16QAM						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20407	824.7	22.31	2	24.31	22.16	0.164	7
20525	836.5	22.05	2	24.05	21.90	0.155	7
20643	848.3	22.16	2	24.16	22.01	0.159	7

Mode	LTE Band 5, CB: 3MHz, QPSK						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20415	825.5	22.91	2	24.91	22.76	0.189	7
20525	836.5	22.84	2	24.84	22.69	0.186	7
20635	847.5	22.65	2	24.65	22.5	0.178	7

Mode	LTE Band 5, CB: 3MHz, 16QAM						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20415	825.5	22.33	2	24.33	22.18	0.165	7
20525	836.5	22.19	2	24.19	22.04	0.160	7
20635	847.5	22.1	2	24.1	21.95	0.157	7

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB: 5MHz, QPSK						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20425	826.5	22.85	2	24.85	22.7	0.186	7
20525	836.5	22.72	2	24.72	22.57	0.181	7
20625	846.5	22.68	2	24.68	22.53	0.179	7

Mode	LTE Band 5, CB: 5MHz, 16QAM						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20425	826.5	21.83	2	23.83	21.68	0.147	7
20525	836.5	21.77	2	23.77	21.62	0.145	7
20625	846.5	21.82	2	23.82	21.67	0.147	7

Mode	LTE Band 5, CB: 10MHz, QPSK						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20450	829.0	23.02	2	25.02	22.87	0.194	7
20525	836.5	22.58	2	24.58	22.43	0.175	7
20600	844.0	22.65	2	24.65	22.5	0.178	7

Mode	LTE Band 5, CB: 10MHz, 16QAM						
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (W)	Limit (W)
20450	829.0	22.08	2	24.08	21.93	0.156	7
20525	836.5	21.97	2	23.97	21.82	0.152	7
20600	844.0	22.18	2	24.18	22.03	0.160	7

NOTE: ERP = S.G power value + correction factor - 2.15.

3.2 Radiated Emissions

3.2.1 Limit of Radiated Emissions

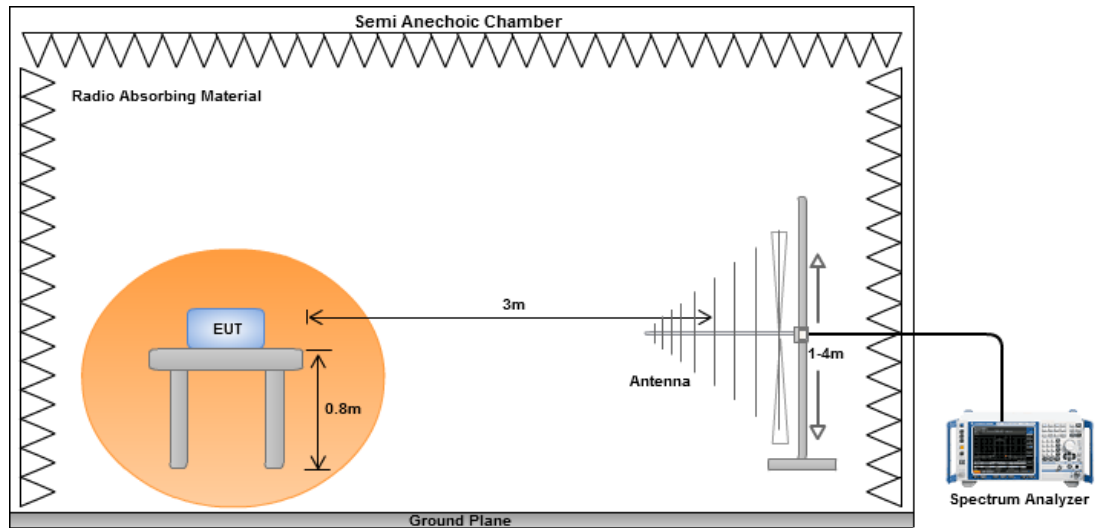
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB equal to -13dBm.

3.2.2 Test Procedures

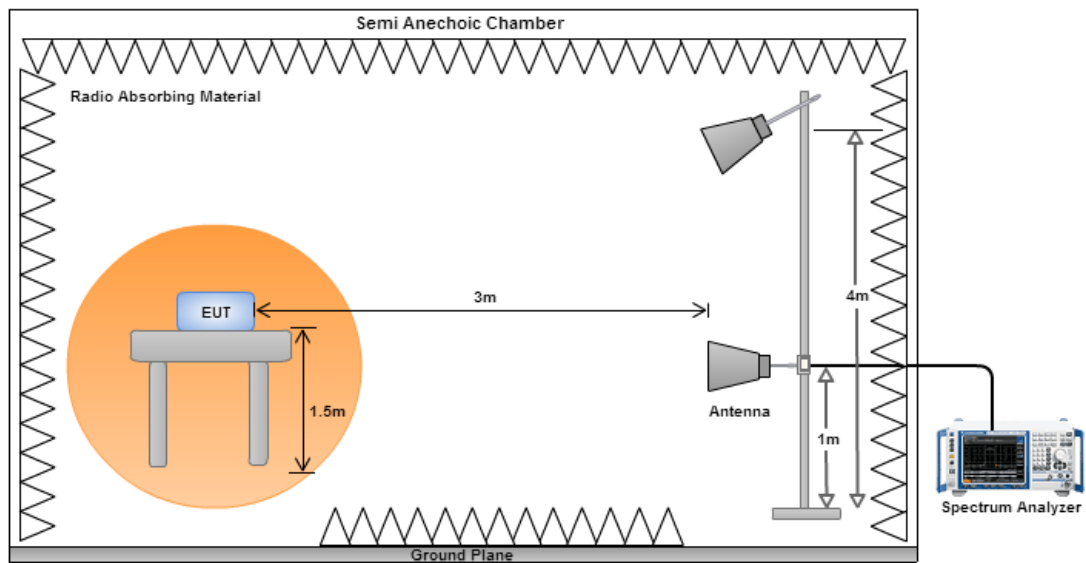
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.
4. After finding the max radiated emission, substitution method will be used for getting effective radiated power. EUT will be removed and substitution antenna will be placed at same position. Signal generator will output CW signal to substitution antenna through a RF cable. Rotate turntable and move antenna to find maximum radiated emission. Adjust output power of signal generator to let the maximum radiated emission is same as step 3. Record the output power level.
5. $E.I.R.P = \text{output power of step 4} + \text{gain of substitution antenna} - \text{cable loss of RF cable}$. ERP can be calculated by below formula:
 $E.R.P = E.I.R.P - 2.15\text{dB}$.

3.2.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.2.4 Test Result of Radiated Emissions below 1GHz

Mode	WCDMA Band 5, Channel: 4182						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
38.25	H	-64.19	-13.00	-51.19	-64.33	-49.33	-12.71
70.25	H	-66.91	-13.00	-53.91	-57.96	-59.70	-5.06
149.25	H	-68.95	-13.00	-55.95	-60.61	-65.70	-1.10
236.11	H	-71.88	-13.00	-58.88	-60.94	-74.17	4.44
356.44	H	-80.41	-13.00	-67.41	-74.49	-82.63	4.37
767.20	H	-72.94	-13.00	-59.94	-74.08	-74.22	3.43
38.88	V	-63.95	-13.00	-50.95	-53.76	-49.19	-12.61
70.14	V	-65.44	-13.00	-52.44	-55.53	-58.20	-5.09
150.25	V	-77.57	-13.00	-64.57	-72.17	-74.38	-1.04
236.25	V	-76.40	-13.00	-63.40	-70.73	-78.69	4.44
355.49	V	-76.03	-13.00	-63.03	-71.02	-78.25	4.37
767.59	V	-69.37	-13.00	-56.37	-71.42	-70.65	3.43

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB:1.4MHz, 1RB, Offset 0, Channel: 20407						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
37.48	H	-64.36	-13.00	-51.36	-64.52	-49.37	-12.84
70.83	H	-71.33	-13.00	-58.33	-62.37	-64.28	-4.90
149.86	H	-78.88	-13.00	-65.88	-70.54	-75.67	-1.06
235.48	H	-79.49	-13.00	-66.49	-68.54	-81.78	4.44
355.07	H	-76.66	-13.00	-63.66	-70.72	-78.89	4.38
769.13	H	-67.86	-13.00	-54.86	-69.03	-69.14	3.43
39.70	V	-63.83	-13.00	-50.83	-53.82	-49.21	-12.47
69.77	V	-64.48	-13.00	-51.48	-54.57	-57.13	-5.20
150.07	V	-76.12	-13.00	-63.12	-70.73	-72.92	-1.05
236.05	V	-75.92	-13.00	-62.92	-70.24	-78.21	4.44
355.47	V	-75.86	-13.00	-62.86	-70.85	-78.08	4.37
767.99	V	-67.60	-13.00	-54.60	-69.65	-68.88	3.43

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB:3MHz, 1RB, Offset 0, Channel: 20415						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
37.48	H	-66.20	-13.00	-53.20	-66.36	-51.21	-12.84
70.71	H	-70.68	-13.00	-57.68	-61.72	-63.60	-4.93
149.86	H	-79.41	-13.00	-66.41	-71.07	-76.20	-1.06
236.01	H	-81.04	-13.00	-68.04	-70.10	-83.33	4.44
356.89	H	-76.33	-13.00	-63.33	-70.42	-78.55	4.37
769.59	H	-68.81	-13.00	-55.81	-69.99	-70.09	3.43
39.70	V	-64.43	-13.00	-51.43	-54.42	-49.81	-12.47
70.74	V	-62.73	-13.00	-49.73	-52.81	-55.66	-4.92
150.75	V	-62.15	-13.00	-49.15	-56.71	-58.99	-1.01
236.84	V	-71.18	-13.00	-58.18	-65.53	-73.47	4.44
356.89	V	-75.77	-13.00	-62.77	-70.77	-77.99	4.37
768.78	V	-66.81	-13.00	-53.81	-68.86	-68.09	3.43

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB:5MHz, 1RB, Offset 0, Channel: 20425						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
38.29	H	-69.53	-13.00	-56.53	-69.67	-54.68	-12.70
70.74	H	-70.59	-13.00	-57.59	-61.63	-63.52	-4.92
151.42	H	-79.27	-13.00	-66.27	-70.93	-76.14	-0.98
238.92	H	-80.96	-13.00	-67.96	-70.07	-83.25	4.44
356.71	H	-76.85	-13.00	-63.85	-70.94	-79.07	4.37
768.17	H	-68.02	-13.00	-55.02	-69.17	-69.30	3.43
38.73	V	-65.02	-13.00	-52.02	-54.80	-50.24	-12.63
70.74	V	-63.98	-13.00	-50.98	-54.06	-56.91	-4.92
149.58	V	-76.39	-13.00	-63.39	-71.05	-73.16	-1.08
237.65	V	-75.85	-13.00	-62.85	-70.23	-78.14	4.44
354.37	V	-76.23	-13.00	-63.23	-71.21	-78.46	4.38
769.26	V	-66.60	-13.00	-53.60	-68.65	-67.88	3.43

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB:10MHz, 1RB, Offset 0, Channel: 20450						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
37.48	H	-64.48	-13.00	-51.48	-64.64	-49.49	-12.84
70.74	H	-69.96	-13.00	-56.96	-61.00	-62.89	-4.92
151.92	H	-78.74	-13.00	-65.74	-70.40	-75.64	-0.95
236.01	H	-80.83	-13.00	-67.83	-69.89	-83.12	4.44
358.83	H	-76.24	-13.00	-63.24	-70.36	-78.45	4.36
767.29	H	-68.29	-13.00	-55.29	-69.43	-69.57	3.43
38.73	V	-64.34	-13.00	-51.34	-54.12	-49.56	-12.63
71.71	V	-63.13	-13.00	-50.13	-53.20	-56.33	-4.65
150.04	V	-76.57	-13.00	-63.57	-71.19	-73.37	-1.05
233.80	V	-74.87	-13.00	-61.87	-69.11	-77.17	4.45
357.74	V	-75.87	-13.00	-62.87	-70.88	-78.09	4.37
768.38	V	-67.68	-13.00	-54.68	-69.73	-68.96	3.43

NOTE: ERP = S.G power value + correction factor - 2.15.

3.2.5 Test Result of Radiated Emissions above 1GHz

Mode	WCDMA Band 5, Channel: 4132						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1652.80	H	-69.39	-13.00	-56.39	-69.85	-72.41	5.17
2479.20	H	-68.29	-13.00	-55.29	-73.33	-72.44	6.30
3305.60	H	-66.44	-13.00	-53.44	-74.38	-71.01	6.72
1652.80	V	-68.73	-13.00	-55.73	-68.72	-71.75	5.17
2479.20	V	-66.20	-13.00	-53.20	-72.04	-70.35	6.30
3305.60	V	-64.25	-13.00	-51.25	-72.29	-68.82	6.72

Mode	WCDMA Band 5, Channel: 4182						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1672.80	H	-70.49	-13.00	-57.49	-70.90	-73.55	5.21
2509.20	H	-68.87	-13.00	-55.87	-74.18	-73.03	6.31
3345.60	H	-66.72	-13.00	-53.72	-74.66	-71.34	6.77
1672.80	V	-67.63	-13.00	-54.63	-67.62	-70.69	5.21
2509.20	V	-66.43	-13.00	-53.43	-72.52	-70.59	6.31
3345.60	V	-63.48	-13.00	-50.48	-71.52	-68.10	6.77

Mode	WCDMA Band 5, Channel: 4233						
Frequency (MHz)	Antenna Polarity.	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1693.20	H	-70.72	-13.00	-57.72	-71.08	-73.83	5.26
2539.80	H	-68.63	-13.00	-55.63	-74.13	-72.81	6.33
3386.40	H	-66.15	-13.00	-53.15	-74.07	-70.81	6.81
1693.20	V	-68.14	-13.00	-55.14	-68.13	-71.25	5.26
2539.80	V	-66.29	-13.00	-53.29	-72.64	-70.47	6.33
3386.40	V	-63.31	-13.00	-50.31	-71.36	-67.97	6.81

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB: 1.4MHz, 1RB, Offset 0, Channel: 20407						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1649.10	H	-64.27	-13.00	-51.27	-66.88	-67.28	5.16
2472.50	H	-58.02	-13.00	-45.02	-65.26	-62.17	6.30
3297.40	H	-52.04	-13.00	-39.04	-62.14	-56.60	6.71
1649.10	V	-60.22	-13.00	-47.22	-62.36	-63.23	5.16
2472.50	V	-54.29	-13.00	-41.29	-62.23	-58.44	6.30
3297.40	V	-50.06	-13.00	-37.06	-60.25	-54.62	6.71

Mode	LTE Band 5, CB: 1.4MHz, 1RB, Offset 0, Channel: 20525						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1672.20	H	-63.99	-13.00	-50.99	-66.55	-67.05	5.21
2508.70	H	-59.43	-13.00	-46.43	-66.89	-63.59	6.31
3343.70	H	-51.17	-13.00	-38.17	-61.25	-55.78	6.76
1672.20	V	-60.15	-13.00	-47.15	-62.29	-63.21	5.21
2508.70	V	-56.05	-13.00	-43.05	-64.29	-60.21	6.31
3343.70	V	-49.50	-13.00	-36.50	-59.69	-54.11	6.76

Mode	LTE Band 5, CB: 1.4MHz, 1RB, Offset 0, Channel: 20643						
Frequency (MHz)	Antenna Polarity.	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1695.40	H	-64.83	-13.00	-51.83	-67.34	-67.95	5.27
2543.40	H	-59.39	-13.00	-46.39	-67.06	-63.57	6.33
3391.50	H	-51.81	-13.00	-38.81	-61.88	-56.48	6.82
1695.40	V	-61.25	-13.00	-48.25	-63.39	-64.37	5.27
2543.40	V	-57.34	-13.00	-44.34	-65.87	-61.52	6.33
3391.50	V	-49.90	-13.00	-36.90	-60.10	-54.57	6.82

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB: 3MHz, 1RB, Offset 0, Channel: 20415						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1652.00	H	-63.78	-13.00	-50.78	-66.39	-66.79	5.16
2476.80	H	-54.09	-13.00	-41.09	-61.36	-58.24	6.30
3301.70	H	-50.88	-13.00	-37.88	-60.97	-55.45	6.72
1652.00	V	-61.85	-13.00	-48.85	-63.99	-64.86	5.16
2476.80	V	-52.00	-13.00	-39.00	-59.97	-56.15	6.30
3301.70	V	-49.79	-13.00	-36.79	-59.98	-54.36	6.72

Mode	LTE Band 5, CB: 3MHz, 1RB, Offset 0, Channel: 20525						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1672.20	H	-61.80	-13.00	-48.80	-64.36	-64.86	5.21
2508.70	H	-57.45	-13.00	-44.45	-64.91	-61.61	6.31
3346.60	H	-49.80	-13.00	-36.80	-59.87	-54.42	6.77
1672.20	V	-60.55	-13.00	-47.55	-62.69	-63.61	5.21
2508.70	V	-56.23	-13.00	-43.23	-64.47	-60.39	6.31
3346.60	V	-48.89	-13.00	-35.89	-59.08	-53.51	6.77

Mode	LTE Band 5, CB: 3MHz, 1RB, Offset 0, Channel: 20635						
Frequency (MHz)	Antenna Polarity.	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1695.40	H	-63.11	-13.00	-50.11	-65.62	-66.23	5.27
2542.00	H	-51.51	-13.00	-38.51	-59.17	-55.69	6.33
3390.00	H	-50.78	-13.00	-37.78	-60.85	-55.45	6.82
1695.40	V	-60.75	-13.00	-47.75	-62.89	-63.87	5.27
2542.00	V	-50.97	-13.00	-37.97	-59.49	-55.15	6.33
3390.00	V	-49.57	-13.00	-36.57	-59.77	-54.24	6.82

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB: 5MHz, 1RB, Offset 0, Channel: 20425						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1645.10	H	-64.31	-13.00	-51.31	-66.97	-67.31	5.15
2467.65	H	-59.41	-13.00	-46.41	-66.62	-63.56	6.30
3290.20	H	-50.62	-13.00	-37.62	-60.71	-55.17	6.70
1645.10	V	-61.48	-13.00	-48.48	-63.62	-64.48	5.15
2467.65	V	-57.24	-13.00	-44.24	-65.14	-61.39	6.30
3290.20	V	-49.42	-13.00	-36.42	-59.60	-53.97	6.70

Mode	LTE Band 5, CB: 5MHz, 1RB, Offset 0, Channel: 20525						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1668.70	H	-65.61	-13.00	-52.61	-68.13	-68.71	5.25
2503.05	H	-59.47	-13.00	-46.47	-66.90	-63.63	6.31
3337.40	H	-50.32	-13.00	-37.32	-60.40	-54.93	6.76
1668.70	V	-64.71	-13.00	-51.71	-66.85	-67.81	5.25
2503.05	V	-57.58	-13.00	-44.58	-65.77	-61.74	6.31
3337.40	V	-51.55	-13.00	-38.55	-61.74	-56.16	6.76

Mode	LTE Band 5, CB: 5MHz, 1RB, Offset 0, Channel: 20625						
Frequency (MHz)	Antenna Polarity.	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1692.30	H	-65.64	-13.00	-52.64	-68.15	-68.75	5.26
2538.45	H	-60.87	-13.00	-47.87	-68.51	-65.05	6.33
3384.60	H	-52.18	-13.00	-39.18	-62.25	-56.84	6.81
1692.30	V	-60.37	-13.00	-47.37	-62.50	-63.48	5.26
2538.45	V	-53.60	-13.00	-40.60	-62.09	-57.78	6.33
3384.60	V	-54.40	-13.00	-41.40	-64.60	-59.06	6.81

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	LTE Band 5, CB: 10MHz, 1RB, Offset 0, Channel: 20450						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1649.20	H	-64.72	-13.00	-51.72	-67.33	-67.73	5.16
2473.80	H	-59.80	-13.00	-46.80	-67.05	-63.95	6.30
3298.40	H	-51.87	-13.00	-38.87	-61.97	-56.43	6.71
1649.20	V	-62.29	-13.00	-49.29	-64.43	-65.30	5.16
2473.80	V	-58.27	-13.00	-45.27	-66.22	-62.42	6.30
3298.40	V	-50.57	-13.00	-37.57	-60.76	-55.13	6.71

Mode	LTE Band 5, CB: 10MHz, 1RB, Offset 0, Channel: 20525						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1664.20	H	-71.69	-13.00	-58.69	-69.54	-74.69	5.15
2496.30	H	-67.71	-13.00	-54.71	-65.56	-71.87	6.31
3328.40	H	-64.67	-13.00	-51.67	-62.52	-69.27	6.75
1664.20	V	-65.14	-13.00	-52.14	-62.99	-68.14	5.15
2496.30	V	-58.73	-13.00	-45.73	-56.58	-62.89	6.31
3328.40	V	-51.87	-13.00	-38.87	-49.72	-56.47	6.75

Mode	LTE Band 5, CB: 10MHz, 1RB, Offset 0, Channel: 20600						
Frequency (MHz)	Antenna Polarity.	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Vaule (dBm)	Correction Factor (dB)
1679.20	H	-64.27	-13.00	-51.27	-66.81	-67.35	5.23
2518.80	H	-60.37	-13.00	-47.37	-67.89	-64.54	6.32
3358.40	H	-55.40	-13.00	-42.40	-65.48	-60.03	6.78
1679.20	V	-61.25	-13.00	-48.25	-63.39	-64.33	5.23
2518.80	V	-54.90	-13.00	-41.90	-63.22	-59.07	6.32
3358.40	V	-51.59	-13.00	-38.59	-61.79	-56.22	6.78

NOTE: ERP = S.G power value + correction factor - 2.15.

3.3 Conducted Emissions

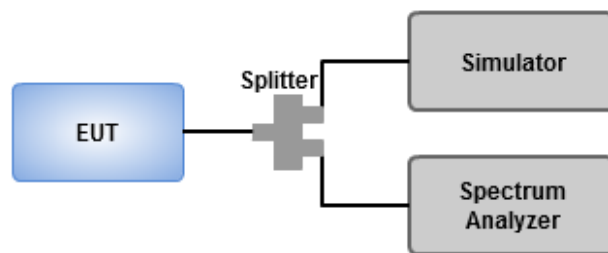
3.3.1 Limit of Conducted Emissions

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 equal to -13dBm.

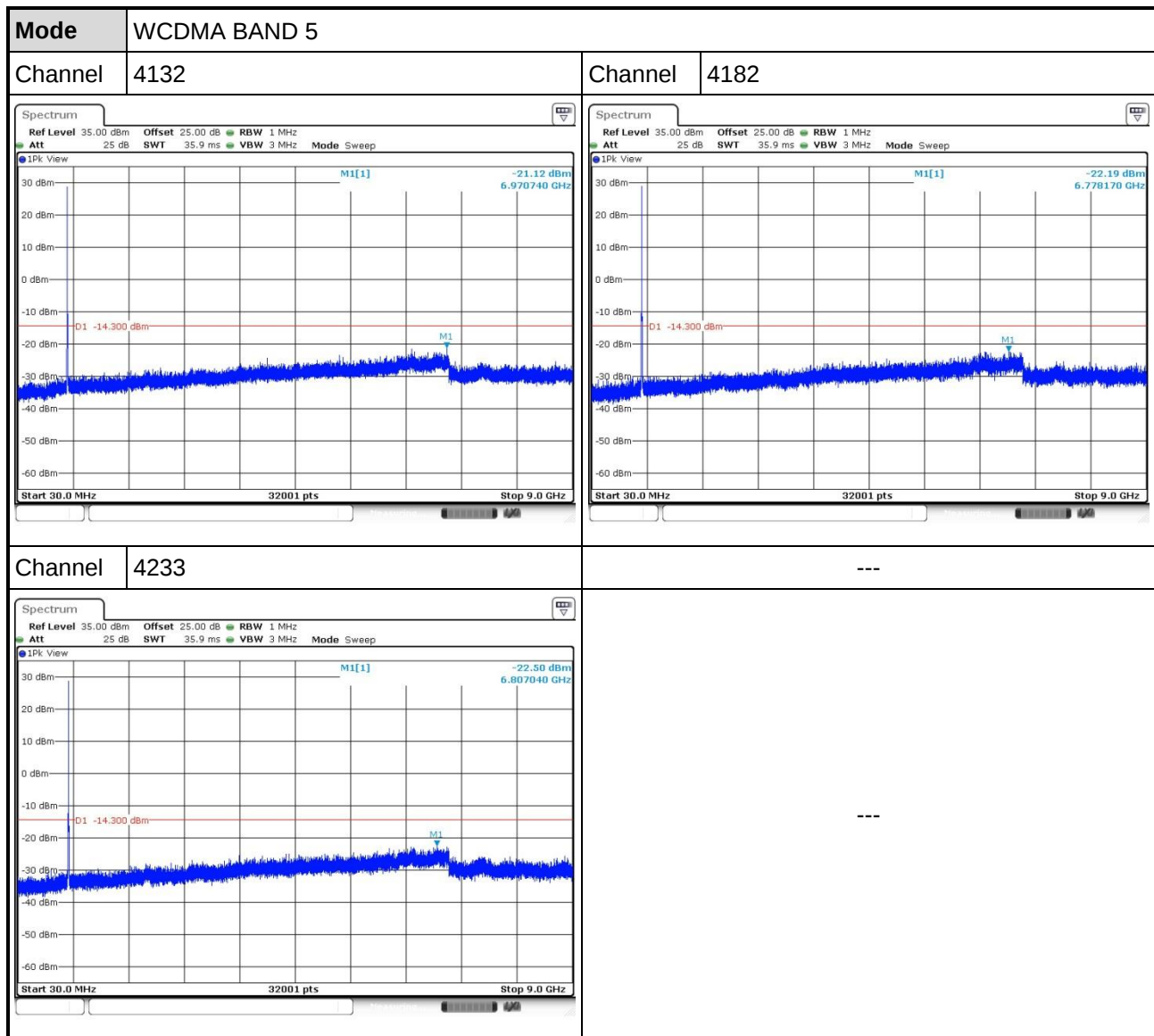
3.3.2 Test Procedures

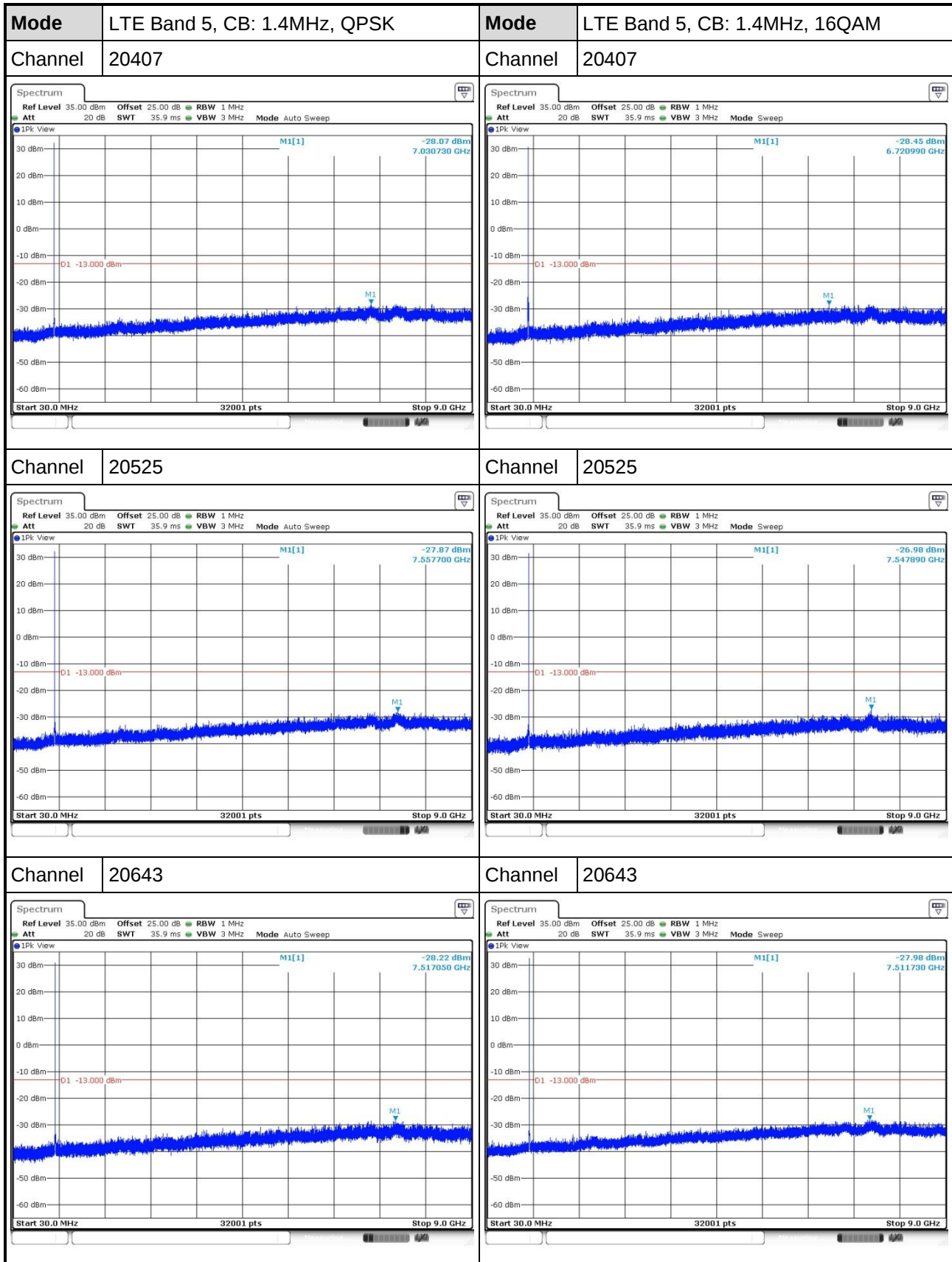
1. Lowest, middle and highest operating channels are tested for this item.
2. Scan frequency range is from 30 MHz ~ 9 GHz.
3. Set RBW = 1MHz, VBW = 3MHz, detector = RMS, sweep time = auto.
4. Record the max trace value and capture the test plot of each sub frequency band.

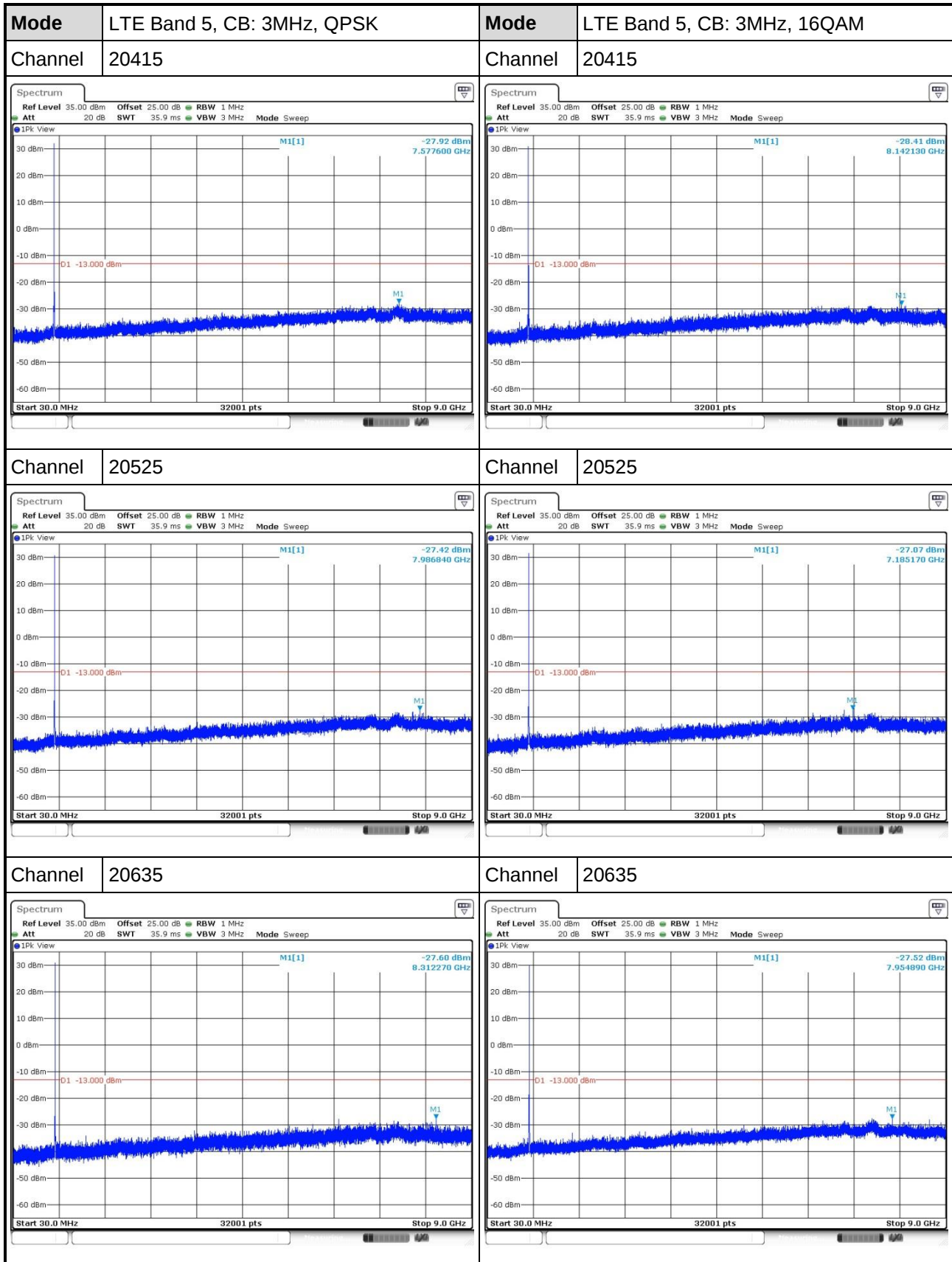
3.3.3 Test Setup

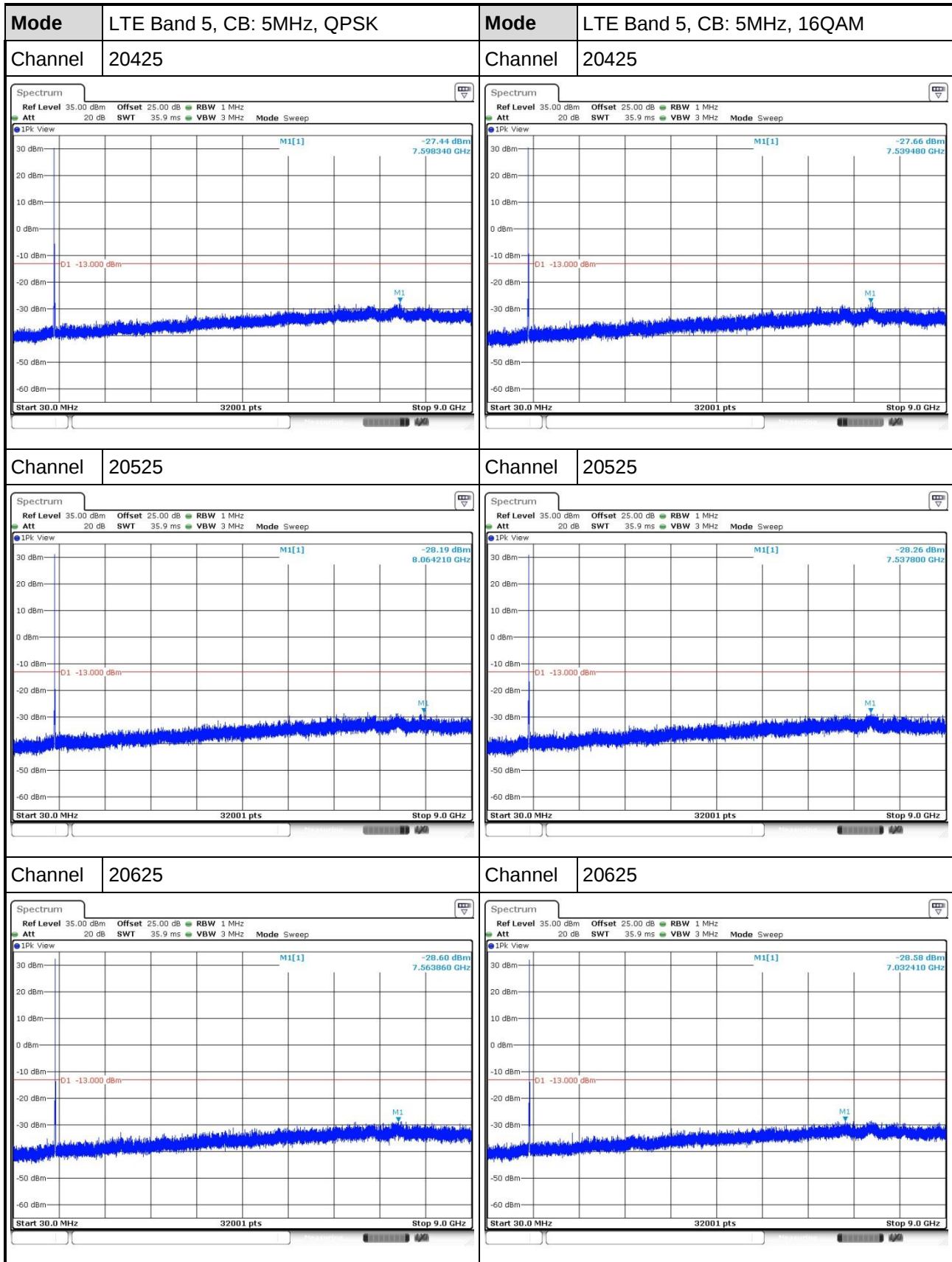


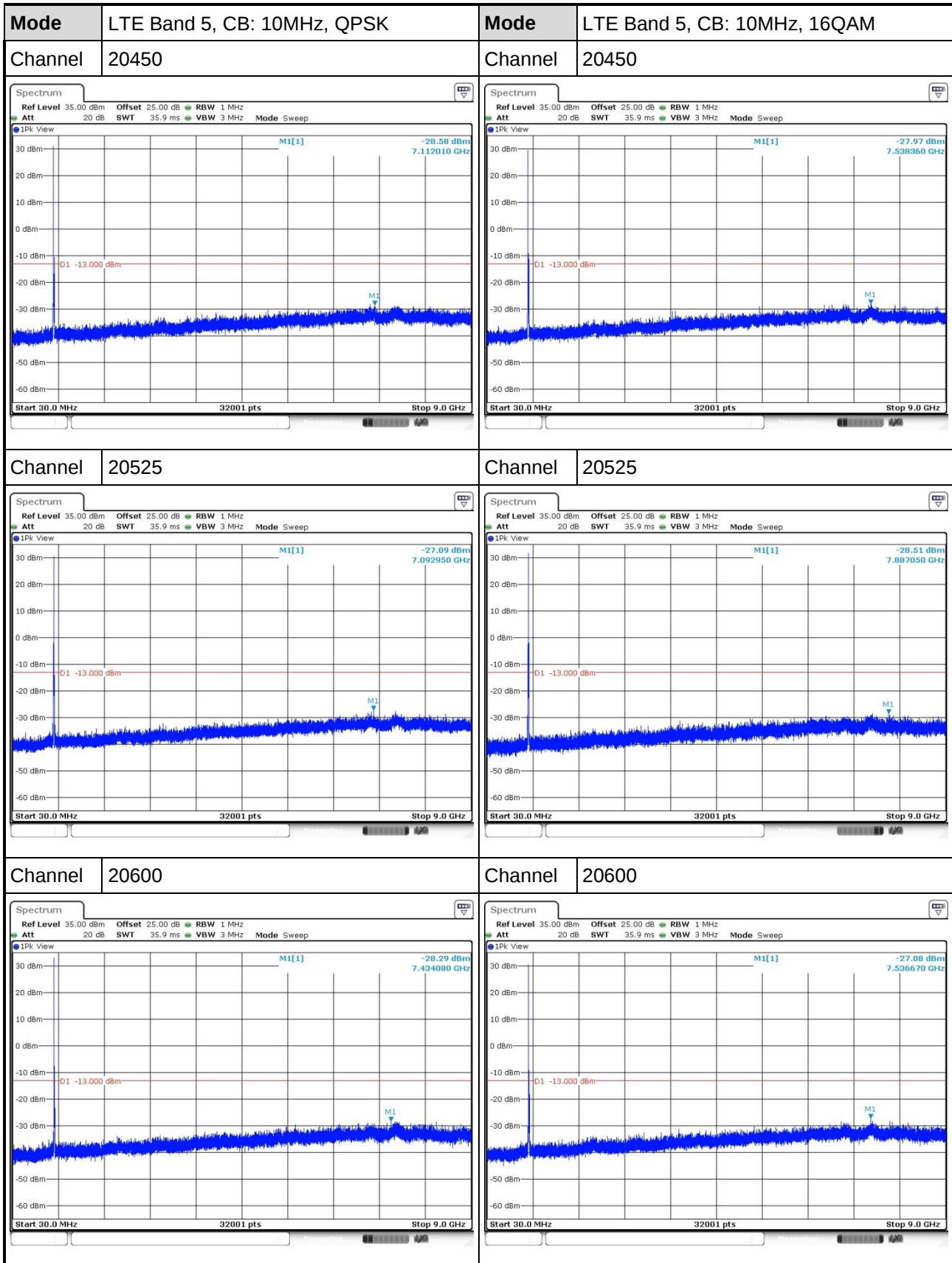
3.3.4 Test Result of Conducted Emissions











3.4 Band Edge

3.4.1 Limit of Band Edge

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 equal to -13dBm.

3.4.2 Test Procedures

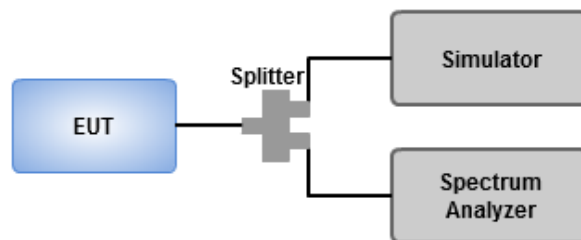
For WCDMA

1. Lowest and highest operating channels are tested for this item.
2. The center frequency of spectrum analyzer will be set to 824 and 849 MHz.
3. Set RBW = 100 kHz, VBW = 300 kHz, span = 5 MHz, detector = RMS, sweep time = auto.
4. Record the max trace value and capture the test plot.

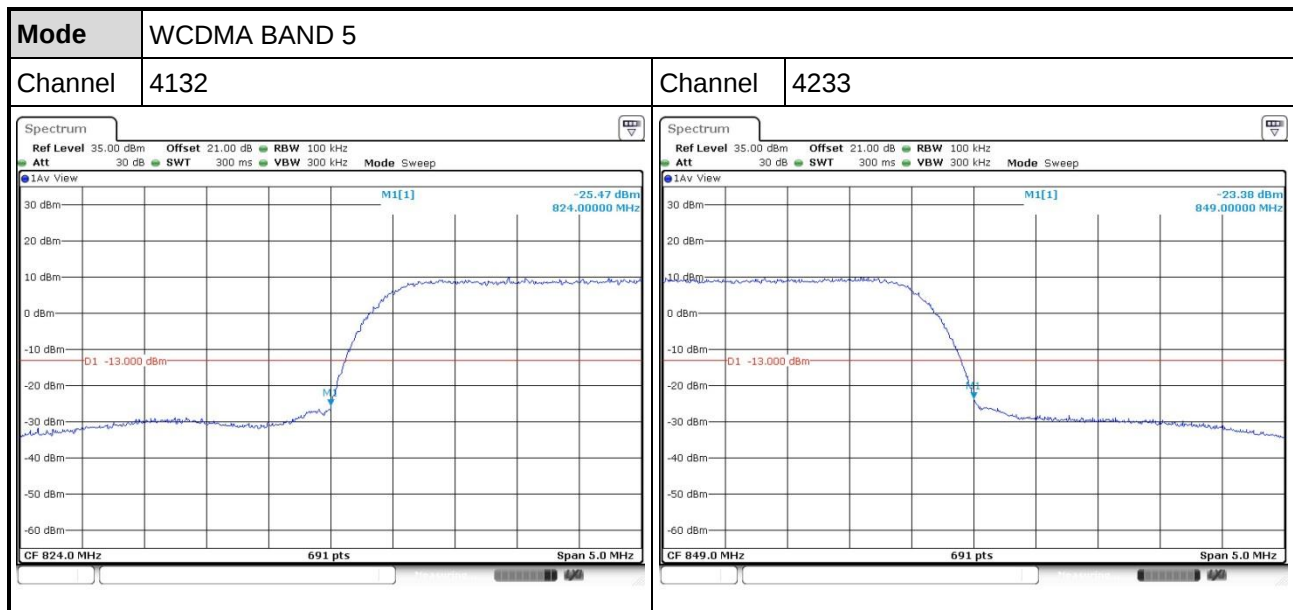
For LTE

1. Lowest and highest operating channels are tested for this item.
2. Set RBW = 15 / 39 / 56 / 110 kHz, VBW = 62 / 120 / 180 / 330 kHz for LTE channel bandwidth 1.4 / 3 / 5 / 10 MHz, detector = RMS, sweep time = auto to measure trace.
3. Set RBW = 20 / 50 / 100 / 200 kHz, VBW = 100 / 200 / 300 / 1000 kHz for LTE channel bandwidth 1.4 / 3 / 5 / 10 MHz, detector = RMS and use channel power measurement function of spectrum analyzer to integrate power over 1MHz.

3.4.3 Test Setup



3.4.4 Test Result of Band Edge

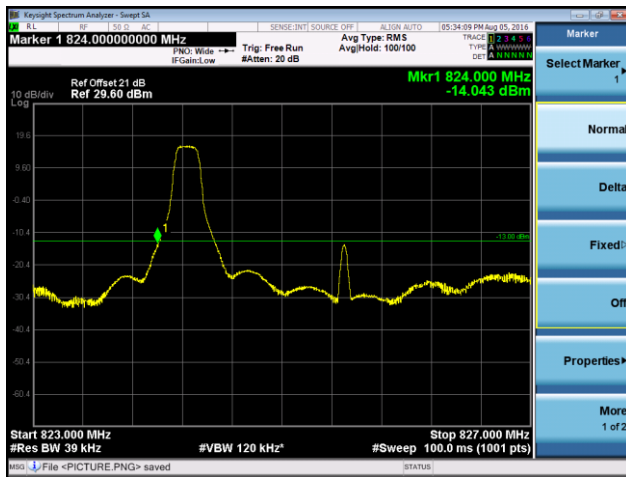
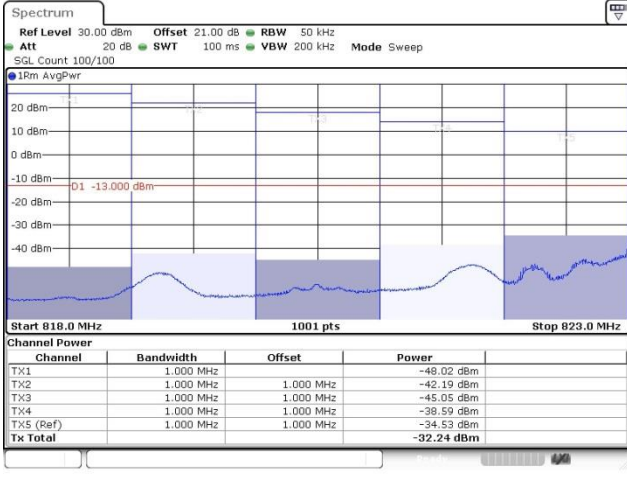










Mode		LTE Band 5, CB: 3MHz, QPSK					
Channel		20415	1 RB lower / Offset 0	Channel		20415	1 RB lower / Offset 0
							
Channel		20415	100% RB / Offset 0	Channel		20415	100% RB / Offset 0
