FCC TEST REPORT

Product Name:	Mobile Phone
Trade Mark:	MI
Model No.:	MDE5
Report Number:	170726002RFM-2
Test Standards:	FCC 47 CFR Part 24 Subpart E FCC 47 CFR Part 2
FCC ID:	2AFZZ-XMSD5
Test Result:	PASS
Date of Issue:	September 4, 2017

Prepared for:

Xiaomi Communications Co., Ltd.
The Rainbow City of China Resources, NO.68,Qinghe Middle Street, Haidian District, Beijing, China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Tested by: Kevin Liang, Senior Engineer

Reviewed by: Jim Long, Senior Supervisor

Approved by: Billy Li, Technical Director

Date: September 4, 2017

Version

Version No.	Date	Description
V1.0	September 4, 2017	Original

CONTENTS

1. GENERAL INFORMATION 4
   1.1 CLIENT INFORMATION 4
   1.2 EUT INFORMATION 4
      1.2.1 GENERAL DESCRIPTION OF EUT 4
      1.2.2 DESCRIPTION OF ACCESSORIES 5
   1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD 6
   1.4 DESCRIPTION OF SUPPORT UNITS 8
   1.5 TEST LOCATION 8
   1.6 TEST FACILITY 8
   1.7 DEVIATION FROM STANDARDS 9
   1.8 ABNORMALITIES FROM STANDARD CONDITIONS 9
   1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER 9
   1.10 MEASUREMENT UNCERTAINTY 9
2. TEST SUMMARY 10
3. EQUIPMENT LIST 11
4. TEST CONFIGURATION 12
   4.1 ENVIRONMENTAL CONDITIONS FOR TESTING 12
      4.1.1 NORMAL OR EXTREME TEST CONDITIONS 12
   4.2 TEST SETUP 12
      4.2.1 FOR RADIATED EMISSIONS TEST SETUP 12
      4.2.2 FOR CONDUCTED RF TEST SETUP 13
   4.3 TEST CHANNELS 14
   4.4 SYSTEM TEST CONFIGURATION 15
   4.5 PRE-SCAN 15
5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION 21
   5.1 REFERENCE DOCUMENTS FOR TESTING 21
   5.2 EQUIVALENT ISOTROPIC RADIATED POWER (EIRP) 21
   5.3 CONDUCTED OUTPUT POWER 24
   5.4 PEAK-TO-AVERAGE RATIO 25
   5.5 99%&26DB BANDWIDTH 34
   5.6 BAND EDGE AT ANTENNA TERMINALS 57
   5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS 96
   5.8 FIELD STRENGTH OF SPURIOUS RADIATION 117
      5.8.1 RADIATED EMISSION TEST DATA (30 MHZ TO 1 GHZ) 118
      5.8.2 RADIATED EMISSION TEST DATA (ABOVE 1GHZ) 133
   5.9 FREQUENCY STABILITY 148

APPENDIX 1 PHOTOS OF TEST SETUP 151
APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS 151

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Xiaomi Communications Co., Ltd.
Address of Applicant:	The Rainbow City of China Resources, NO.68,Qinghe Middle Street, Haidian District, Beijing, China
Manufacturer:	Xiaomi Communications Co., Ltd.
Address of Manufacturer:	The Rainbow City of China Resources, NO.68,Qinghe Middle Street, Haidian District, Beijing, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Mobile Phone		
Model No.:	MDE5		
Add. Model No.:	N/A		
Trade Mark:	MI		
DUT Stage:	Identical Prototype		
EUT Supports Function:	GSM Bands:	GSM 850/ PCS 1900	
	UTRA Bands:	Band II/ Band IV/ Band V	
	CDMA Band:	BC0/ BC1/ BC10	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 7/ Band 12/ Band 13/ Band 17/ Band 25/ Band 26/ Band 30	
		TDD Band 38/ Band 41	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V3.0+EDR/ Bluetooth V4.1 LE/ Bluetooth V5.0 LE	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
	RNSS Bands:	1559 MHz to 1610 MHz	GPS/GLONASS/Galileo
	NFC:	13.553 MHz to 13.567 MHz	
Software Version:	MIUI 8		
Hardware Version:	P2.0		
Sample Received Date:	July 27, 2017		
Sample Tested Date:	July 27, 2017 to September 2, 2017		

1.2.2 Description of Accessories

Adapter	
Trade Mark:	XIAOMI
Model No.:	MDY-08-EY
Input:	100-240V~50/60 Hz 0.5A
Output:	5V ⎓ 3A/9V ⎓ 2A/12V ⎓ 1.5A
AC Cable:	N/A
DC Cable:	N/A

Battery	
Trade Mark:	MI
Model No.:	BM3B
Battery Type:	Lithium-ion Polymer Rechargeable Battery
Rated Voltage:	3.85 Vdc
Limited Charge Voltage:	4.4 Vdc
Rated Capacity:	3300 mAh

Cable(1)	
Trade Mark:	MI
Model No.:	L6BU2018-CS-H
Description:	USB Type-C Plug Cable
Cable Type:	Shielded without ferrite
Length:	1.0 Meter

Cable(2)	
Trade Mark:	MI
Model No.:	KLC-2588-1
Description:	USB Type-C Plug Cable
Cable Type:	Shielded without ferrite
Length:	1.0 Meter

Cable(3)	
Trade Mark:	MI
Model No.:	KLC-2469
Description:	USB Type-C to 3.5 mm Headphone Jack Adapter
Cable Type:	Unshielded without ferrite

Cable(4)	
Trade Mark:	MI
Model No.:	0QT000XI0007
Description:	USB Type-C to 3.5 mm Headphone Jack Adapter
Cable Type:	Unshielded without ferrite

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, DC-HSDPA, CDMA2000, LTE	
Type of Modulation:	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA	BPSK
	HSDPA/DC-HSDPA:	QPSK
	HSUPA:	QPSK
	DC-HSDPA:	16QAM, 64QAM
	CDMA2000 BC1 1xRTT:	QPSK
	CDMA2000 BC1 1xEV-DO:	QPSK, 8PSK
	LTE Band 2:	QPSK, 16QAM, 64QAM
	LTE Band 25:	QPSK, 16QAM, 64QAM
Frequency Range:	GSM/GPRS/EDGE 1900:	1850.2-1909.8 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
	CDMA BC1:	1851.25-1908.75 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz):	1850.7-1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz):	1851.5-1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz):	1852.5-1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz):	1855.0-1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz):	1857.5-1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz):	1860.0-1900.0 MHz
	LTE Band 25 (Channel Bandwidth: 1.4 MHz):	1850.7-1914.3 MHz
	LTE Band 25 (Channel Bandwidth: 3 MHz):	1851.5-1913.5 MHz
	LTE Band 25 (Channel Bandwidth: 5 MHz):	1852.5-1912.5 MHz
	LTE Band 25 (Channel Bandwidth: 10 MHz):	1855.0-1910.0 MHz
	LTE Band 25 (Channel Bandwidth: 15 MHz):	1857.5-1907.5 MHz
	LTE Band 25 (Channel Bandwidth: 20 MHz):	1860.0-1905.0 MHz
Max RF Output Power:	GSM/GPRS 1900:	30.18dBm
	EDGE 1900:	25.76dBm
	WCDMA Band II:	21.91dBm
	CDMA2000 BC1:	22.92dBm
	LTE Band 2 (Channel Bandwidth: 1.4 MHz):	21.90dBm
	LTE Band 2 (Channel Bandwidth: 3 MHz):	21.93dBm
	LTE Band 2 (Channel Bandwidth: 5 MHz):	21.96dBm
	LTE Band 2 (Channel Bandwidth: 10 MHz):	21.98dBm
	LTE Band 2 (Channel Bandwidth: 15 MHz):	22.01dBm
	LTE Band 2 (Channel Bandwidth: 20 MHz):	22.06dBm
	LTE Band 25 (Channel Bandwidth: 1.4 MHz):	21.80dBm
	LTE Band 25 (Channel Bandwidth: 3 MHz):	21.83dBm
	LTE Band 25 (Channel Bandwidth: 5 MHz):	21.85dBm
	LTE Band 25 (Channel Bandwidth: 10 MHz):	21.89dBm
	LTE Band 25 (Channel Bandwidth: 15 MHz):	21.95dBm
	LTE Band 25 (Channel Bandwidth: 20 MHz):	21.98dBm

Type of Emission:	GSM/GPRS 1900:		247KGXW
	EDGE 1900:		249KG7W
	WCDMA Band II:		4M14F9W
	CDMA2000 BC1:		1M28F9W
	LTE Band 2 QPSK	Channel Bandwidth: 1.4 MHz	1M10G7W
		Channel Bandwidth: 3 MHz	2M71G7W
		Channel Bandwidth: 5 MHz	4M52G7W
		Channel Bandwidth: 10 MHz	8M99G7W
		Channel Bandwidth: 15 MHz	13M5G7W
		Channel Bandwidth: 20 MHz	18M0G7W
	LTE Band 2 16QAM	Channel Bandwidth: 1.4 MHz	1M10D7W
		Channel Bandwidth: 3 MHz	2M71D7W
		Channel Bandwidth: 5 MHz	4M53D7W
		Channel Bandwidth: 10 MHz	8M98D7W
		Channel Bandwidth: 15 MHz	13M5D7W
		Channel Bandwidth: 20 MHz	18M0D7W
	LTE Band 2 64QAM	Channel Bandwidth: 1.4 MHz	1M10D7W
		Channel Bandwidth: 3 MHz	2M70D7W
		Channel Bandwidth: 5 MHz	4M53D7W
		Channel Bandwidth: 10 MHz	9M00D7W
		Channel Bandwidth: 15 MHz	13M5D7W
		Channel Bandwidth: 20 MHz	18M0D7W
	LTE Band 25 QPSK	Channel Bandwidth: 1.4 MHz	1M10G7W
		Channel Bandwidth: 3 MHz	2M71G7W
		Channel Bandwidth: 5 MHz	4M52G7W
		Channel Bandwidth: 10 MHz	9M00G7W
		Channel Bandwidth: 15 MHz	13M5G7W
		Channel Bandwidth: 20 MHz	18M0G7W
	LTE Band 25 16QAM	Channel Bandwidth: 1.4 MHz	1M10D7W
		Channel Bandwidth: 3 MHz	2M70D7W
		Channel Bandwidth: 5 MHz	4M52D7W
		Channel Bandwidth: 10 MHz	8M99D7W
		Channel Bandwidth: 15 MHz	13M5D7W
		Channel Bandwidth: 20 MHz	17M9D7W
	LTE Band 25 64QAM	Channel Bandwidth: 1.4 MHz	1M10D7W
		Channel Bandwidth: 3 MHz	2M70D7W
		Channel Bandwidth: 5 MHz	4M53D7W
		Channel Bandwidth: 10 MHz	8M98D7W
		Channel Bandwidth: 15 MHz	13M5D7W
		Channel Bandwidth: 20 MHz	18M0D7W
IEMI:	Conducted: 865736030026044, 865736030026051		
	Radiation: 865736030023801, 865736030023819		
MEID:	Conducted: 99001021001303		
	Radiation: 99001021001191		
Antenna Type:	PIFA Antenna		
Antenna Gain:	-0.25 dBi		

GPRS/EDGE Class:	Class 33
Normal Test Voltage:	3.85 Vdc
Extreme Test Voltage:	3.7 to 4.4Vdc
Extreme Test Temperature:	-30 °C to +50 °C

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
N/A	N/A	N/A	N/A	N/A

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.30 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.6 TEST FACILITY

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

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1
The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 24 Subpart E Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Peak-to-average ratio	FCC 47 CFR Part 24.232(d)	KDB 971168 D01v02r02	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS

Note:

1) N/A: In this whole report not application.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☑	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018
☑	Receiver	R&S	ESIB26	100114	Dec. 22, 2016	Dec. 22, 2017
☐	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	Jun. 24, 2015	Jun. 23, 2018
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Jul. 24, 2015	Jul. 23, 2018
☑	Preamplifier	HP	8447F	2805A02960	Dec. 22, 2016	Dec. 22, 2017
☑	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	Dec. 30, 2016	Dec. 30, 2017
☑	Horn Antenna	ETS-LINDGREN	3117	00164202	Jul. 24, 2015	Jul. 23, 2018
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	Dec. 30, 2016	Dec. 30, 2017
☑	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jul. 28, 2015	Jul. 27, 2018
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jul. 29, 2015	Jul. 28, 2018
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☐	Highpass Filter (1.2GHz~18GHz)	Micro-Tronics	HPM50108	G552	Jan. 19, 2017	Jan. 19, 2018
☐	Highpass Filter (3GHz~18GHz)	Micro-Tronics	HPM50117	G005	Jan. 30, 2017	Jan. 30, 2018
☑	Test Software	Audix	e3	Software Version: 9.160323		

2/3/4G RF Test System Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☐	Spectrum Analyzer	R&S	FSP 13	1164.4391.13	Mar. 22, 2017	Mar. 21, 2018
☐	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Dec. 22, 2016	Dec. 22, 2017
☑	Spectrum Analyzer	R&S	FSV 13	1307.9002K13 -101620-cJ	Aug. 09, 2017	Aug. 08, 2018
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☑	Wideband Radio Communication Tester	R&S	CMW500	116254	Mar. 22, 2017	Mar. 21, 2018
☑	Universal Radio Communication Tester	R&S	CMU200	114713	Dec. 22, 2016	Dec. 22, 2017
☑	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 21, 2016	Sep. 20, 2017
☑	Temp & Humidity chamber	Votisch	VT4002	58566133290 020	Jun. 19, 2017	Jun. 18, 2018
☐	Temp & Humidity chamber	Ispec	GL(U)04KA(W)	1692H201P3	Sep. 21, 2016	Sep. 20, 2017
☑	Test Software	ECIT	AutomationTestSystem		Software Version: 2.170530	

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

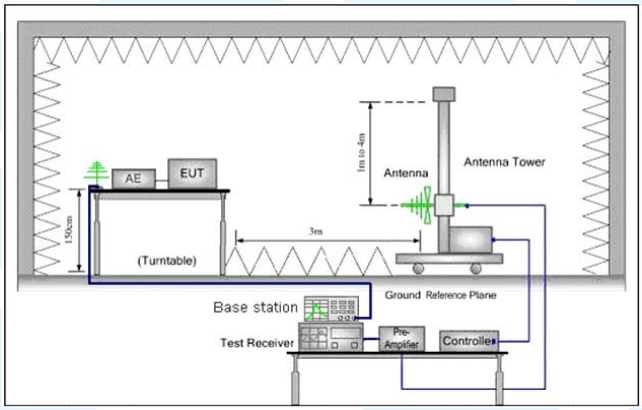
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.85	20 to 75
TL/VL	-30	3.7	20 to 75
TH/VL	+50	3.7	20 to 75
TL/VH	-30	4.4	20 to 75
TH/VH	+50	4.4	20 to 75

Remark:

1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.7 V to 4.4 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.7 V to 4.4 V.
2) VN: Normal Voltage; TN: Normal Temperature;
   TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
   VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup



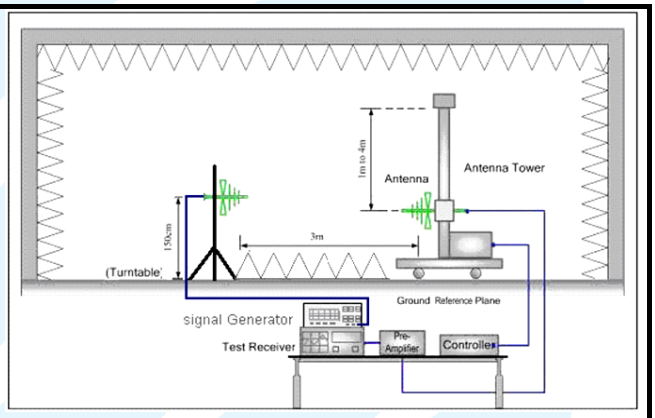
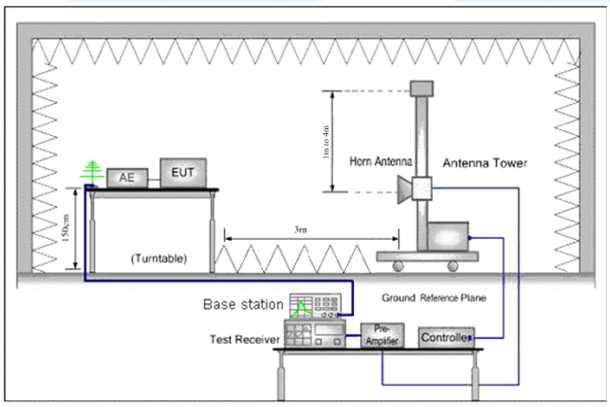


Figure 1. 30MHz to 1GHz



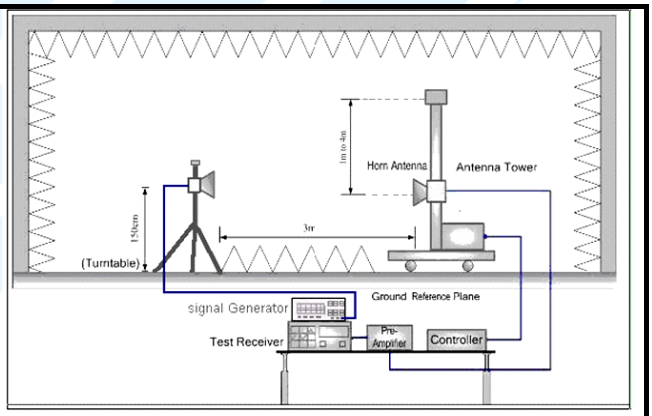
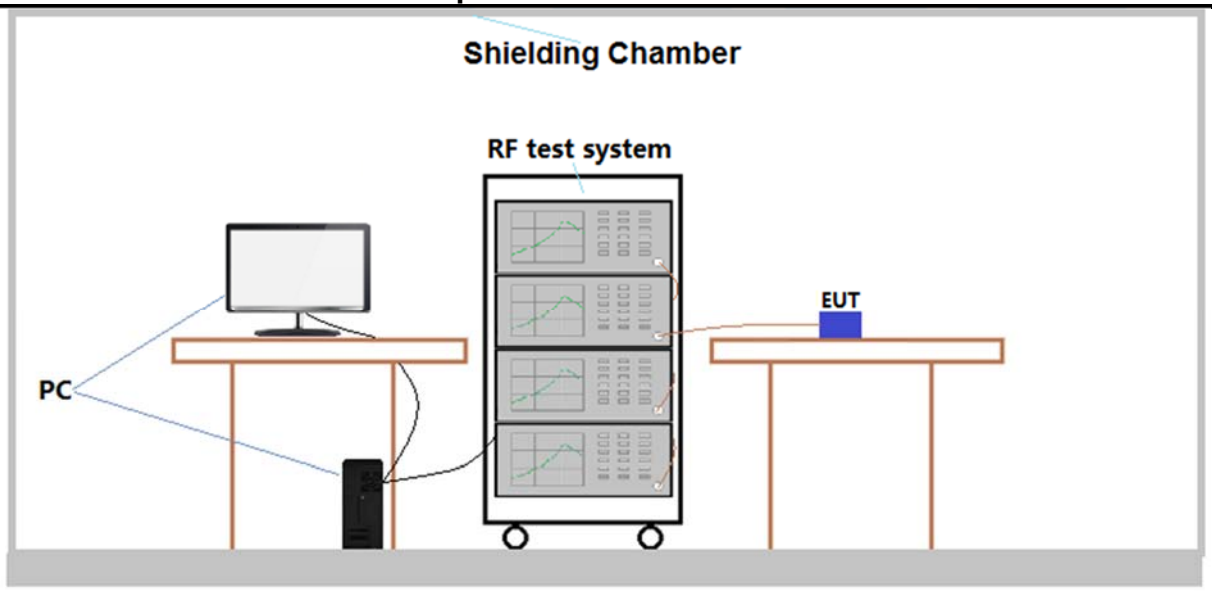
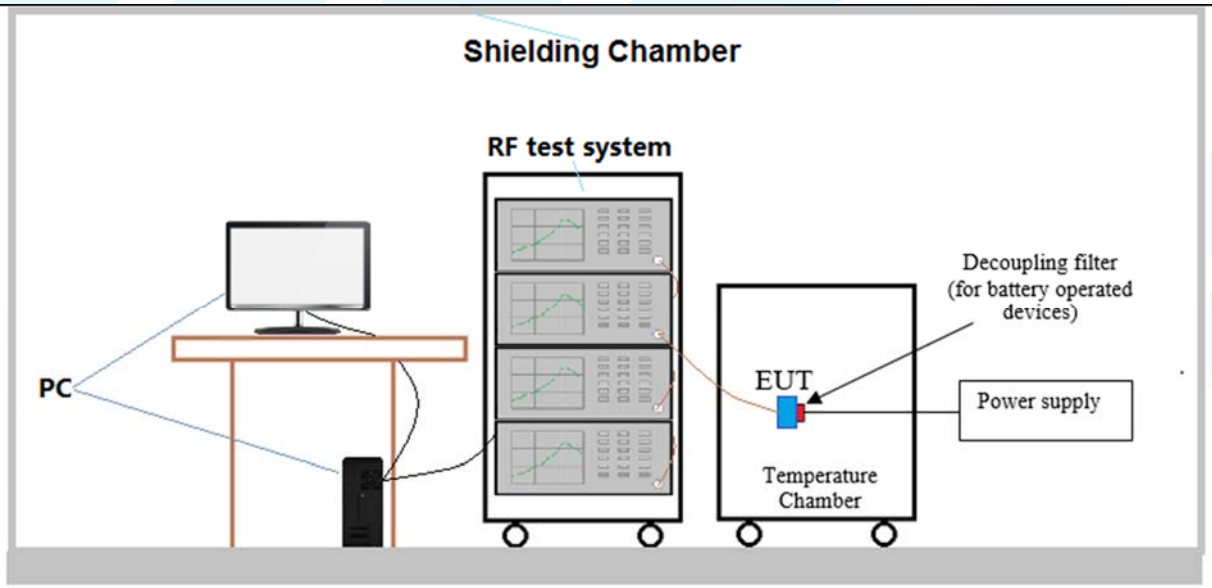


Figure 2. Above 1GHz

4.2.2 For Conducted RF test setup



Normal Environment



Extreme Environment

4.3 TEST CHANNELS

Band	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/ EDGE1900	Tx (1850 MHz-1910 MHz)	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
WCDMA Band II	Tx (1850 MHz-1910 MHz)	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz
CDMA2000 BC1	Tx (1850 MHz-1910 MHz)	Channel 25	Channel 600	Channel 1175
		1851.25MHz	1880.0 MHz	1908.75 MHz

Band	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink (MHz)
LTE Band 2 TX: 1850-1910MHz	Low Range	1.4	18607	1850.7
		3	18615	1851.5
		5	18625	1852.5
		10	18650	1855
		15	18675	1857.5
		20	18700	1860
	Middle Range	1.4/3/5/10/15/20	18900	1880
	High Range	1.4	19193	1909.3
		3	19185	1908.5
		5	19175	1907.5
		10	19150	1905
		15	19125	1902.5
		20	19100	1900
LTE Band 25 TX: 1850-1915MHz	Low Range	1.4	26047	1850.7
		3	26055	1851.5
		5	26065	1852.5
		10	26090	1855
		15	26115	1857.5
		20	26140	1860
	Middle Range	1.4/3/5/10/15/20	26340	1880
	High Range	1.4	26683	1914.3
		3	26675	1913.5
		5	26665	1912.5
		10	26640	1910
		15	26615	1907.5
		20	26590	1905

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.85Vdc rechargeable Li-on battery. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.
The worst case was found when positioned as the table below.

Band	Mode	Antenna Port	Worst-case axis positioning
GSM 1900	1TX	Chain 0	Y axis
EDGE 1900	1TX	Chain 0	Y axis
WCDMA Band II	1TX	Chain 0	Y axis
CDMA2000 BC1 1xRTT	1TX	Chain 0	Y axis
LTE Band 2	1TX	Chain 0	Y axis
LTE Band 25	1TX	Chain 0	Y axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below:

GSM 1900 Maximum Average Power (dBm)			
Channel	**512**	**661**	**810**
Frequency(MHz)	**1850.2 MHz**	**1880.0 MHz**	**1909.8 MHz**
GSM (GMSK, 1Tx-slot)	30.12	**30.18**	30.08
GPRS (GMSK, 1Tx-slot)	30.11	30.17	30.07
GPRS (GMSK, 2Tx-slot)	28.99	29.05	28.95
GPRS (GMSK, 3Tx-slot)	27.86	27.92	27.82
GPRS (GMSK, 4Tx-slot)	26.73	26.79	26.69
EDGE (8PSK, 1Tx-slot)	25.70	25.76	25.66
EDGE (8PSK, 2Tx-slot)	25.59	25.65	25.55
EDGE (8PSK, 3Tx-slot)	25.46	25.52	25.42
EDGE (8PSK, 4Tx-slot)	25.32	25.38	25.28

WCDMA Band II Maximum Average Power (dBm)			
Channel	**9262**	**9400**	**9538**
Frequency(MHz)	**1852.4 MHz**	**1880.0 MHz**	**1907.6 MHz**
RMC 12.2K	**21.91**	21.87	21.84
HSDPA Subtest-1	20.86	20.83	20.76
HSDPA Subtest-2	20.87	20.84	20.79
HSDPA Subtest-3	20.24	20.3	20.32
HSDPA Subtest-4	20.32	20.39	20.36
HSUPA Subtest-1	20.84	20.71	20.69
HSUPA Subtest-2	18.82	18.77	18.67
HSUPA Subtest-3	19.86	19.73	19.71
HSUPA Subtest-4	18.81	18.75	18.68
HSUPA Subtest-5	20.79	20.74	20.74
DC-HSDPA Subtest-1	20.99	20.94	20.92
DC-HSDPA Subtest-2	20.95	20.94	20.90
DC-HSDPA Subtest-3	20.35	20.38	20.44
DC-HSDPA Subtest-4	20.43	20.50	20.35

CDMA2000 BC1 Maximum Average Power (dBm)			
Channel	**25**	**600**	**1175**
Frequency(MHz)	**1851.25MHz**	**1880.0 MHz**	**1908.75 MHz**
1xRTT RC1+SO55	22.70	22.82	22.58
1xRTT RC3+SO55	22.72	22.84	22.60
1xRTT RC3+SO32 (+ F-SCH)	22.80	**22.92**	22.68
1xRTT RC3+SO32(+SCH)	22.73	22.85	22.61
1xEVDO RTAP 153.6 Kbps	22.71	22.83	22.59
1xEVDO RETAP 4096 Bits	22.55	22.67	22.43
1xRTT RC8+SO75 (1X advance)	22.70	22.81	22.58

LTE Band 2 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
Channel Bandwidth: 1.4 MHz						Channel Bandwidth: 3 MHz				
QPSK	1	0	21.83	21.87	**21.90**	1	0	21.86	21.90	**21.93**
	1	2	21.69	21.73	21.76	1	7	21.72	21.76	21.79
	1	5	21.61	21.65	21.68	1	14	21.64	21.68	21.71
	3	0	21.82	21.86	21.89	8	0	20.76	20.80	20.83
	3	1	21.68	21.72	21.75	8	3	20.70	20.74	20.77
	3	3	21.60	21.64	21.67	8	7	20.64	20.68	20.71
	6	0	20.61	20.65	20.68	15	0	20.64	20.68	20.71
16QAM	1	0	21.11	21.15	21.18	1	0	21.14	21.18	21.21
	1	2	21.05	21.09	21.12	1	7	21.08	21.12	21.15
	1	5	21.01	21.05	21.08	1	14	21.04	21.08	21.11
	3	0	21.09	21.13	21.16	8	0	19.76	19.80	19.83
	3	1	21.03	21.07	21.10	8	3	19.70	19.74	19.77
	3	3	20.99	21.03	21.06	8	7	19.64	19.68	19.71
	6	0	19.64	19.68	19.71	15	0	19.67	19.71	19.74
64QAM	1	0	20.12	20.16	20.19	1	0	20.15	20.19	20.22
	1	2	20.10	20.14	20.17	1	7	20.13	20.17	20.20
	1	5	20.06	20.10	20.13	1	14	20.09	20.13	20.16
	3	0	20.10	20.14	20.17	8	0	18.77	18.81	18.84
	3	1	20.08	20.12	20.15	8	3	18.69	18.73	18.76
	3	3	20.04	20.08	20.11	8	7	18.66	18.70	18.73
	6	0	18.64	18.68	18.71	15	0	18.67	18.71	18.74
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	21.89	21.93	**21.96**	1	0	21.91	21.95	**21.98**
	1	12	21.75	21.79	21.82	1	24	21.77	21.81	21.84
	1	24	21.67	21.71	21.74	1	49	21.69	21.73	21.76
	12	0	20.79	20.83	20.86	25	0	20.81	20.85	20.88
	12	6	20.73	20.77	20.80	25	12	20.75	20.79	20.82
	12	13	20.67	20.71	20.74	25	25	20.69	20.73	20.76
	25	0	20.67	20.71	20.74	50	0	20.69	20.73	20.76
16QAM	1	0	21.17	21.21	21.24	1	0	21.19	21.23	21.26
	1	12	21.11	21.15	21.18	1	24	21.13	21.17	21.20
	1	24	21.07	21.11	21.14	1	49	21.09	21.13	21.16
	12	0	19.79	19.83	19.86	25	0	19.81	19.85	19.88
	12	6	19.73	19.77	19.80	25	12	19.75	19.79	19.82
	12	13	19.67	19.71	19.74	25	25	19.69	19.73	19.76
	25	0	19.70	19.74	19.77	50	0	19.72	19.76	19.79
64QAM	1	0	20.18	20.22	20.25	1	0	20.20	20.24	20.27
	1	12	20.16	20.20	20.23	1	24	20.18	20.22	20.25
	1	24	20.12	20.16	20.19	1	49	20.14	20.18	20.21
	12	0	18.80	18.84	18.87	25	0	18.82	18.86	18.89
	12	6	18.72	18.76	18.79	25	12	18.74	18.78	18.81
	12	13	18.69	18.73	18.76	25	25	18.71	18.75	18.78
	25	0	18.70	18.74	18.77	50	0	18.72	18.76	18.79

LTE Band 2 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
	Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
QPSK	1	0	21.94	21.98	**22.01**	1	0	21.99	22.03	**22.06**
	1	37	21.80	21.84	21.87	1	50	21.85	21.89	21.92
	1	74	21.72	21.76	21.79	1	99	21.77	21.81	21.84
	37	0	20.84	20.88	20.91	50	0	20.89	20.93	20.96
	37	19	20.78	20.82	20.85	50	25	20.83	20.87	20.90
	37	39	20.72	20.76	20.79	50	50	20.77	20.81	20.84
	75	0	20.72	20.76	20.79	100	0	20.77	20.81	20.84
16QAM	1	0	21.22	21.26	21.29	1	0	21.27	21.31	21.34
	1	37	21.16	21.20	21.23	1	50	21.21	21.25	21.28
	1	74	21.12	21.16	21.19	1	99	21.17	21.21	21.24
	37	0	19.84	19.88	19.91	50	0	19.89	19.93	19.96
	37	19	19.78	19.82	19.85	50	25	19.83	19.87	19.90
	37	39	19.72	19.76	19.79	50	50	19.77	19.81	19.84
	75	0	19.75	19.79	19.82	100	0	19.80	19.84	19.87
64QAM	1	0	20.23	20.27	20.30	1	0	20.28	20.32	20.35
	1	37	20.21	20.25	20.28	1	50	20.26	20.30	20.33
	1	74	20.17	20.21	20.24	1	99	20.22	20.26	20.29
	37	0	18.85	18.89	18.92	50	0	18.90	18.94	18.97
	37	19	18.77	18.81	18.84	50	25	18.82	18.86	18.89
	37	39	18.74	18.78	18.81	50	50	18.79	18.83	18.86
	75	0	18.75	18.79	18.82	100	0	18.80	18.84	18.87

LTE Band 25 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
	Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
QPSK	1	0	21.49	21.68	**21.80**	1	0	21.52	21.71	**21.83**
	1	2	21.27	21.35	21.67	1	7	21.30	21.38	21.70
	1	5	21.39	21.39	21.05	1	14	21.42	21.42	21.08
	3	0	21.47	21.66	21.78	8	0	20.44	20.52	20.88
	3	1	21.25	21.33	21.65	8	3	20.36	20.43	20.86
	3	3	21.37	21.37	21.03	8	7	20.41	20.45	20.00
	6	0	20.29	20.37	20.37	15	0	20.32	20.40	20.40
16QAM	1	0	21.11	20.97	21.10	1	0	21.14	21.00	21.13
	1	2	20.92	20.62	20.89	1	7	20.95	20.65	20.92
	1	5	20.92	20.73	20.98	1	14	20.95	20.76	21.01
	3	0	21.10	20.96	21.09	8	0	19.45	19.51	19.79
	3	1	20.91	20.61	20.88	8	3	19.39	19.40	19.81
	3	3	20.91	20.72	20.97	8	7	19.43	19.43	19.83
	6	0	19.32	19.41	19.71	15	0	19.35	19.44	19.74
64QAM	1	0	20.03	19.93	20.05	1	0	20.06	19.96	20.08
	1	2	19.89	19.56	19.87	1	7	19.92	19.59	19.90
	1	5	19.91	19.68	19.90	1	14	19.94	19.71	19.93
	3	0	20.02	19.92	20.04	8	0	18.39	18.48	18.75
	3	1	19.88	19.55	19.86	8	3	18.37	18.33	18.76
	3	3	19.90	19.67	19.89	8	7	18.37	18.35	18.81
	6	0	18.31	18.39	18.63	15	0	18.34	18.42	18.66

LTE Band 25 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	21.54	21.73	**21.85**	1	0	21.58	21.77	**21.89**
	1	12	21.32	21.40	21.72	1	24	21.36	21.44	21.76
	1	24	21.44	21.44	21.10	1	49	21.48	21.48	21.14
	12	0	20.46	20.54	20.90	25	0	20.50	20.58	20.94
	12	6	20.38	20.45	20.88	25	12	20.42	20.49	20.92
	12	13	20.43	20.47	20.02	25	25	20.47	20.51	20.06
	25	0	20.34	20.42	20.42	50	0	20.38	20.46	20.46
16QAM	1	0	21.16	21.02	21.15	1	0	21.20	21.06	21.19
	1	12	20.97	20.67	20.94	1	24	21.01	20.71	20.98
	1	24	20.97	20.78	21.03	1	49	21.01	20.82	21.07
	12	0	19.47	19.53	19.81	25	0	19.51	19.57	19.85
	12	6	19.41	19.42	19.83	25	12	19.45	19.46	19.87
	12	13	19.45	19.45	19.85	25	25	19.49	19.49	19.89
	25	0	19.37	19.46	19.76	50	0	19.41	19.50	19.80
64QAM	1	0	20.08	19.98	20.10	1	0	20.12	20.02	20.14
	1	12	19.94	19.61	19.92	1	24	19.98	19.65	19.96
	1	24	19.96	19.73	19.95	1	49	20.00	19.77	19.99
	12	0	18.41	18.50	18.77	25	0	18.45	18.54	18.81
	12	6	18.39	18.35	18.78	25	12	18.43	18.39	18.82
	12	13	18.39	18.37	18.83	25	25	18.43	18.41	18.87
	25	0	18.36	18.44	18.68	50	0	18.40	18.48	18.72
Channel Bandwidth: 15 MHz						Channel Bandwidth: 20 MHz				
QPSK	1	0	21.64	21.83	**21.95**	1	0	21.67	21.86	**21.98**
	1	37	21.42	21.50	21.82	1	50	21.45	21.53	21.85
	1	74	21.54	21.54	21.20	1	99	21.57	21.57	21.23
	37	0	20.56	20.64	21.00	50	0	20.59	20.67	21.03
	37	19	20.48	20.55	20.98	50	25	20.51	20.58	21.01
	37	39	20.53	20.57	20.12	50	50	20.56	20.60	20.15
	75	0	20.44	20.52	20.52	100	0	20.47	20.55	20.55
16QAM	1	0	21.26	21.12	21.25	1	0	21.29	21.15	21.28
	1	37	21.07	20.77	21.04	1	50	21.10	20.80	21.07
	1	74	21.07	20.88	21.13	1	99	21.10	20.91	21.16
	37	0	19.57	19.63	19.91	50	0	19.60	19.66	19.94
	37	19	19.51	19.52	19.93	50	25	19.54	19.55	19.96
	37	39	19.55	19.55	19.95	50	50	19.58	19.58	19.98
	75	0	19.47	19.56	19.86	100	0	19.50	19.59	19.89
64QAM	1	0	20.18	20.08	20.20	1	0	20.21	20.11	20.23
	1	37	20.04	19.71	20.02	1	50	20.07	19.74	20.05
	1	74	20.06	19.83	20.05	1	99	20.09	19.86	20.08
	37	0	18.51	18.60	18.87	50	0	18.54	18.63	18.9
	37	19	18.49	18.45	18.88	50	25	18.52	18.48	18.91
	37	39	18.49	18.47	18.93	50	50	18.52	18.5	18.96
	75	0	18.46	18.54	18.78	100	0	18.49	18.57	18.81

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

Band	Radiated	Conducted
GSM/GPRS/ EDGE 1900	1) GSM (GMSK, 1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link	1) GSM (GMSK,1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link
WCDMA Band II	RMC 12.2Kbps Link	RMC 12.2Kbps Link
CDMA2000 BC1	1xRTT	1xRTT

LTE worse case mode applicability and tested channel detail as below:

Item	Channel Bandwidth(MHz)						Modulation			RB #			Test		
	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
LTE Band 2															
EIRP	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Conducted output power	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
Peak-to-average ratio	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒
99%&26dB Bandwidth	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
Band Edge at antenna terminals	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
Spurious emissions at antenna terminals	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Field strength of spurious radiation	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☐	☐	☐	☒	☐
Frequency stability	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐
LTE Band 25															
EIRP	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Conducted output power	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
Peak-to-average ratio	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒
99%&26dB Bandwidth	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
Band Edge at antenna terminals	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
Spurious emissions at antenna terminals	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Field strength of spurious radiation	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☐	☐	☐	☒	☐
Frequency stability	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐

Remark:
The mark "☒" means is chosen for testing;
The mark "☐" means is not chosen for testing;
The mark "--" means is not supported bandwidth.

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2 Subpart J	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 24 Subpart E	PART 24 – PERSONAL COMMUNICATIONS SERVICES Subpart E – Broadband PCS
3	ANSI/TIA-603-D 2010	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v02r02

5.2 EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

Test Requirement: FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)

Test Method: KDB 971168 D01v02r02 & ANSI/TIA/EIA-603-D 2010

Limit:

Mobile and portable stations are limited to 2 watts EIRP.

Test Procedure:

Test procedure as below:

1) The EUT was powered ON and placed on a 0.8/1.5m high table at a 3 meter semi/fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.
7) The output power into the substitution antenna was then measured.
8) Steps 6) and 7) were repeated with both antennas polarized.
9) Calculate power in dBm by the following formula:

$$ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$
$$EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$
$$EIRP = ERP + 2.15dB$$

where:
Pg is the generator output power into the substitution antenna.

10) Test the EUT in the lowest channel, the middle channel the Highest channel
11) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the Y axis positioning which it is worse case.
12) Repeat above procedures until all frequencies measured was complete.

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Peak	100kHz	300kHz	Peak
Above 1GHz	Peak	1MHz	3MHz	Peak

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Maximum EIRP (dBm)						
Channel	GSM 1Tx-slot	EDGE 1Tx-slot	WCDMA RMC 12.2Kbps	CDMA2000 BC1 1xRTT	Limit (dBm)	Result
Lowest	27.93	23.54	20.62	20.85	33.01	Pass
Middle	27.98	23.45	20.65	20.55	33.01	Pass
Highest	27.69	23.36	20.49	20.52	33.01	Pass

LTE Band 2 Maximum EIRP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 1.4MHz					
Lowest	21.99	21.21	20.02	33.01	Pass
Middle	22.02	21.23	20.18	33.01	Pass
Highest	21.84	21.18	20.03	33.01	Pass
Channel Bandwidth: 3MHz					
Lowest	21.81	21.32	20.31	33.01	Pass
Middle	21.95	21.34	20.14	33.01	Pass
Highest	21.94	21.25	20.09	33.01	Pass
Channel Bandwidth: 5MHz					
Lowest	21.84	21.39	20.33	33.01	Pass
Middle	21.73	21.25	20.35	33.01	Pass
Highest	21.95	21.13	20.31	33.01	Pass
Channel Bandwidth: 10MHz					
Lowest	22.01	21.18	20.22	33.01	Pass
Middle	21.87	21.39	20.00	33.01	Pass
Highest	22.23	21.23	20.22	33.01	Pass
Channel Bandwidth: 15MHz					
Lowest	22.17	21.39	20.24	33.01	Pass
Middle	21.85	21.16	20.18	33.01	Pass
Highest	21.89	21.30	20.32	33.01	Pass
Channel Bandwidth: 20MHz					
Lowest	21.79	21.24	20.18	33.01	Pass
Middle	21.84	21.13	20.18	33.01	Pass
Highest	22.05	21.50	20.44	33.01	Pass

LTE Band 25 Maximum EIRP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 1.4MHz					
Lowest	21.43	21.13	20.27	33.01	Pass
Middle	21.69	21.04	20.03	33.01	Pass
Highest	21.75	21.04	20.16	33.01	Pass
Channel Bandwidth: 3MHz					
Lowest	21.66	21.18	19.81	33.01	Pass
Middle	21.62	20.99	19.80	33.01	Pass
Highest	21.93	21.04	19.93	33.01	Pass
Channel Bandwidth: 5MHz					
Lowest	21.61	20.98	20.21	33.01	Pass
Middle	21.77	21.26	19.86	33.01	Pass
Highest	22.00	21.35	20.24	33.01	Pass
Channel Bandwidth: 10MHz					
Lowest	21.57	21.03	19.96	33.01	Pass
Middle	22.02	21.22	20.11	33.01	Pass
Highest	21.74	21.25	20.22	33.01	Pass
Channel Bandwidth: 15MHz					
Lowest	21.42	21.04	20.14	33.01	Pass
Middle	21.80	21.22	20.32	33.01	Pass
Highest	21.91	21.37	20.26	33.01	Pass
Channel Bandwidth: 20MHz					
Lowest	21.45	21.15	19.98	33.01	Pass
Middle	21.62	21.38	20.01	33.01	Pass
Highest	22.06	21.22	20.23	33.01	Pass

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)

Test Method: ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02

Limit:

Mobile and portable stations are limited to 2 watts EIRP.

Test Procedure:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA2000, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: The full result refer to section 4.5 for details.

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement: FCC 47 CFR Part 24.232(d)

Test Method: KDB 971168 D01v02r02

Limit: 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

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth
b) Set the number of counts to a value that stabilizes the measured CCDF curve
c) Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

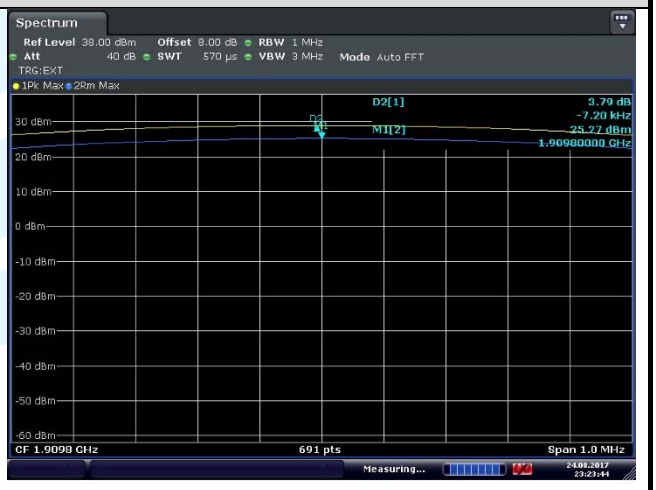
Test Data: See table below

Peak-to-average ratio (dB)						
Channel	GSM 1Tx-slot	EDGE 1Tx-slot	WCDMA RMC 12.2Kbps	CDMA2000 BC1 1xRTT	Limit (dBm)	Result
Lowest	0.34	3.94	3.16	4.14	13	Pass
Middle	0.37	3.95	3.22	4.67	13	Pass
Highest	0.40	3.79	2.90	3.33	13	Pass

LTE Band 2 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	4.06	4.96	5.77	13	Pass
	Full RB	4.93	5.83	5.62	13	Pass
Middle	1 RB	4.46	5.30	4.75	13	Pass
	Full RB	4.96	5.88	6.17	13	Pass
Highest	1 RB	3.80	4.29	4.00	13	Pass
	Full RB	4.72	5.83	5.68	13	Pass

LTE Band 25 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	3.94	4.81	5.88	13	Pass
	Full RB	5.10	5.94	5.83	13	Pass
Middle	1 RB	4.58	5.62	5.36	13	Pass
	Full RB	4.90	5.83	5.88	13	Pass
Highest	1 RB	4.52	5.57	5.25	13	Pass
	Full RB	4.55	5.45	5.86	13	Pass

The test plot as follows:

GSM 1Tx-slot	EDGE 1Tx-slot
Lowest Channel	
Middle Channel	
Highest Channel	
	

WCDMA RMC 12.2Kbps	CDMA2000 BC1 1xRTT
Lowest Channel	
Middle Channel	
Highest Channel	

LTE Band 2 / 20 MHz / QPSK

1 RB	Full RB

Lowest Channel

Middle Channel

Highest Channel

LTE Band 2 / 20 MHz / 16QAM

1 RB	Full RB

Lowest Channel

Middle Channel

Highest Channel

LTE Band 2 / 20 MHz / 64QAM

1 RB	Full RB

Lowest Channel

Middle Channel

Highest Channel

LTE Band 25 / 20 MHz / QPSK

1 RB	Full RB

Lowest Channel

Middle Channel

Highest Channel

LTE Band 25 / 20 MHz / 16QAM

1 RB	Full RB

Lowest Channel

Middle Channel

Highest Channel

LTE Band 25 / 20 MHz / 64QAM

1 RB	Full RB

Lowest Channel

Middle Channel

Highest Channel

5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)

Test Method: ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02

Limit: No Limit

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

99% & 26 dB Bandwidth				
Test Mode	**Channel**	**Frequency (MHz)**	**26 dB BW (kHz)**	**99% BW (kHz)**
GSM 1Tx-slot	512	1850.2	319.3	246.93
	661	1880.0	318.1	246.33
	810	1909.8	313.8	247.20
EDGE 1Tx-slot	512	1850.2	317.9	248.22
	661	1880.0	315.0	241.51
	810	1909.8	314.8	248.99

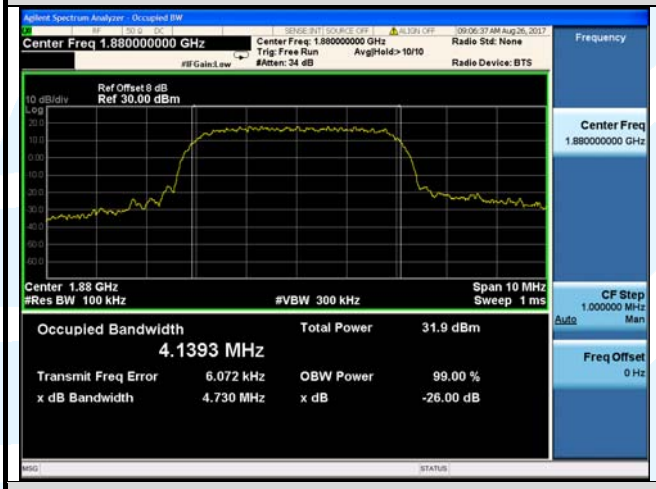
99% & 26 dB Bandwidth				
Test Mode	**Channel**	**Frequency (MHz)**	**26 dB BW (MHz)**	**99% BW (MHz)**
WCDMA RMC 12.2Kbps	9262	1852.4	4.712	4.1360
	9400	1880.0	4.730	4.1393
	9538	1907.6	4.736	4.1295
CDMA2000 BC1 1xRTT	25	1851.25	1.431	1.2807
	600	1880.0	1.420	1.2745
	1175	1908.75	1.446	1.2831

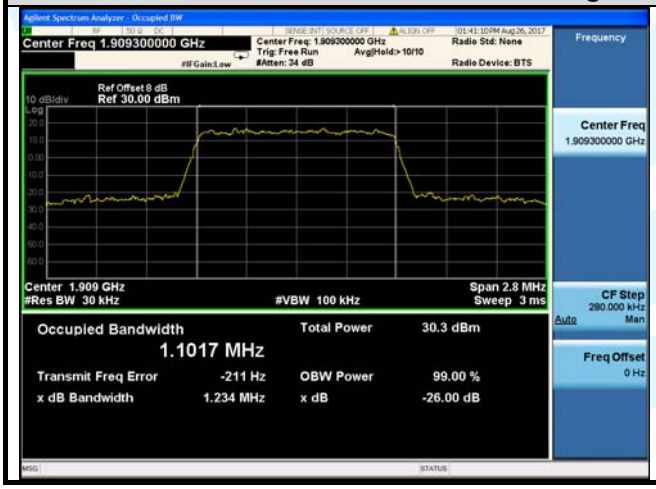
LTE Band 2								
Channel	RB Configuration		26 dB BW (MHz)			99% BW (MHz)		
	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Channel Bandwidth: 1.4 MHz								
Lowest	6	0	1.245	1.225	1.228	1.0898	1.0899	1.0901
Middle	6	0	1.236	1.235	1.249	1.0957	1.0988	1.0977
Highest	6	0	1.234	1.238	1.246	1.1017	1.0964	1.0960
Channel Bandwidth: 3 MHz								
Lowest	15	0	3.012	3.023	3.000	2.7088	2.7047	2.7036
Middle	15	0	2.988	3.009	3.016	2.7027	2.7079	2.7035
Highest	15	0	2.993	3.033	3.037	2.7089	2.7056	2.7023
Channel Bandwidth: 5 MHz								
Lowest	25	0	4.983	4.984	4.952	4.5177	4.5001	4.4978
Middle	25	0	4.943	5.005	4.994	4.5077	4.5301	4.5214
Highest	25	0	4.983	4.971	5.003	4.5067	4.5145	4.5288
Channel Bandwidth: 10 MHz								
Lowest	50	0	9.864	9.813	9.832	8.9859	8.9561	8.9740
Middle	50	0	9.844	9.825	9.788	8.9704	8.9796	8.9821
Highest	50	0	9.909	9.778	9.791	8.9938	8.9818	8.9961
Channel Bandwidth: 15 MHz								
Lowest	75	0	14.59	14.61	14.67	13.476	13.476	13.479
Middle	75	0	14.62	14.60	14.70	13.432	13.487	13.490
Highest	75	0	14.72	14.69	14.64	13.462	13.491	13.467
Channel Bandwidth: 20 MHz								
Lowest	100	0	19.66	19.31	19.47	17.922	17.941	17.951
Middle	100	0	19.40	19.48	19.51	17.924	17.937	17.980
Highest	100	0	19.54	19.46	19.41	17.965	17.994	18.029

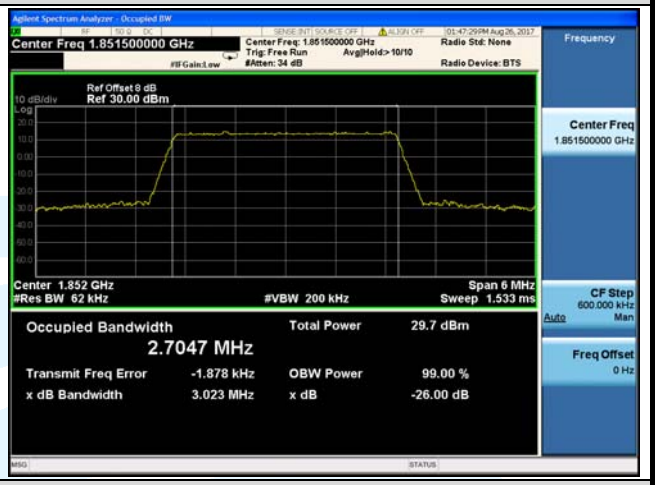
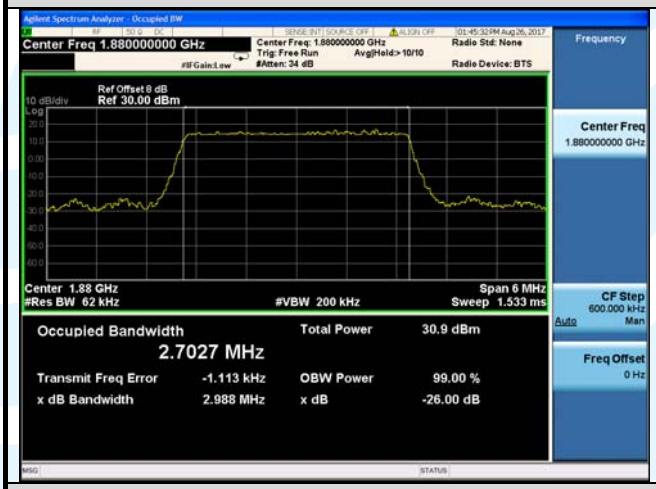
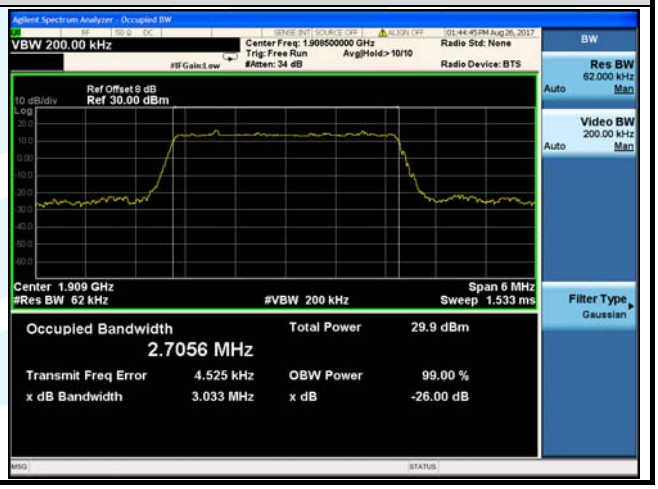
LTE Band 25								
Channel	RB Configuration		26 dB BW (MHz)			99% BW (MHz)		
	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Channel Bandwidth: 1.4 MHz								
Lowest	6	0	1.239	1.239	1.240	1.0945	1.0937	1.0948
Middle	6	0	1.232	1.241	1.243	1.0932	1.0957	1.0929
Highest	6	0	1.252	1.236	1.232	1.0951	1.0914	1.0944
Channel Bandwidth: 3 MHz								
Lowest	15	0	2.998	3.008	3.022	2.7076	2.7043	2.7047
Middle	15	0	3.004	3.021	3.007	2.7093	2.7032	2.7007
Highest	15	0	2.995	2.977	2.988	2.7098	2.6963	2.7036
Channel Bandwidth: 5 MHz								
Lowest	25	0	4.954	4.994	4.988	4.5104	4.5085	4.5118
Middle	25	0	4.973	4.942	4.964	4.5198	4.5118	4.5009
Highest	25	0	4.955	4.988	4.987	4.5021	4.5216	4.5313
Channel Bandwidth: 10 MHz								
Lowest	50	0	9.834	9.740	9.729	8.9952	8.9887	8.9715
Middle	50	0	9.834	9.850	9.758	8.9952	8.9755	8.9656
Highest	50	0	9.793	9.817	9.812	8.9794	8.9891	8.9765
Channel Bandwidth: 15 MHz								
Lowest	75	0	14.59	14.65	14.66	13.447	13.465	13.450
Middle	75	0	14.73	14.63	14.61	13.481	13.486	13.455
Highest	75	0	14.73	14.59	14.71	13.481	13.459	13.490
Channel Bandwidth: 20 MHz								
Lowest	100	0	19.42	19.54	19.30	17.961	17.930	17.994
Middle	100	0	19.45	19.47	19.49	17.959	17.899	17.933
Highest	100	0	19.47	19.45	19.34	17.967	17.937	17.948

The test plot as follows:

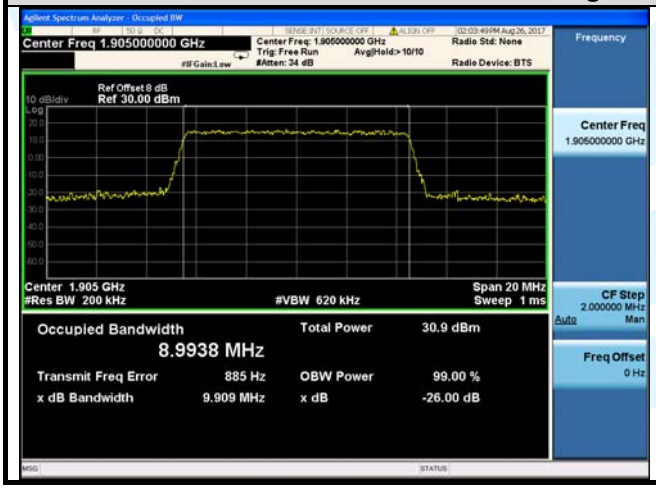
GSM	EDGE
Lowest Channel	
Middle Channel	
Highest Channel	

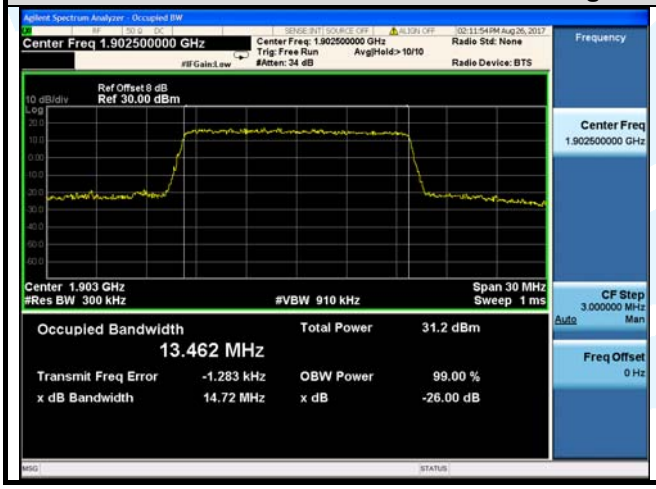
WCDMA	CDMA2000 BC1
Lowest Channel	
Middle Channel	
	
Highest Channel	

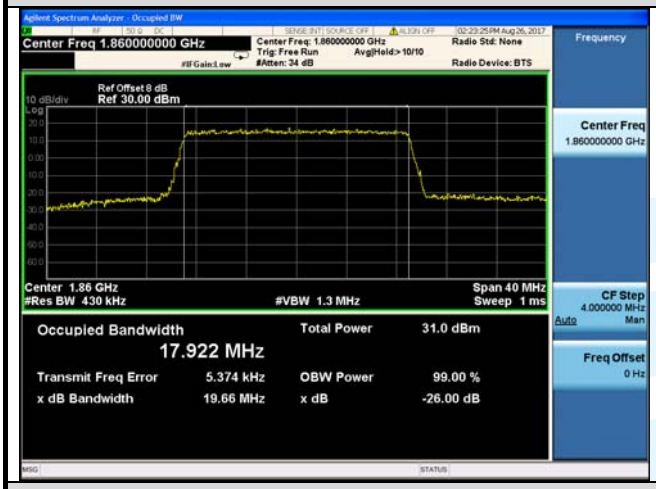
LTE Band 2_ Channel Bandwidth: 1.4 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
Highest Channel	
	

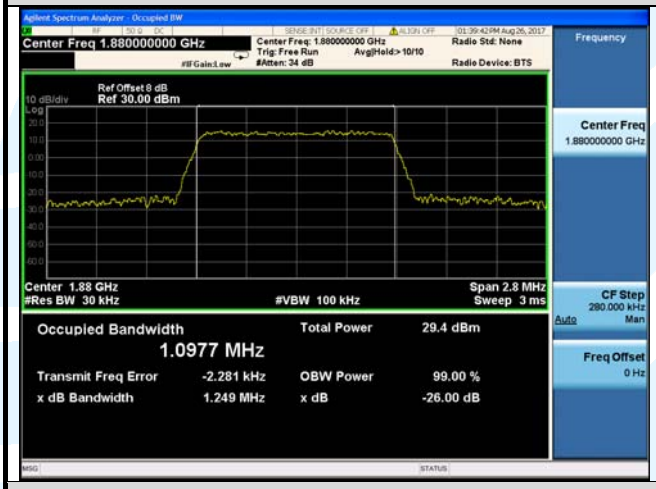
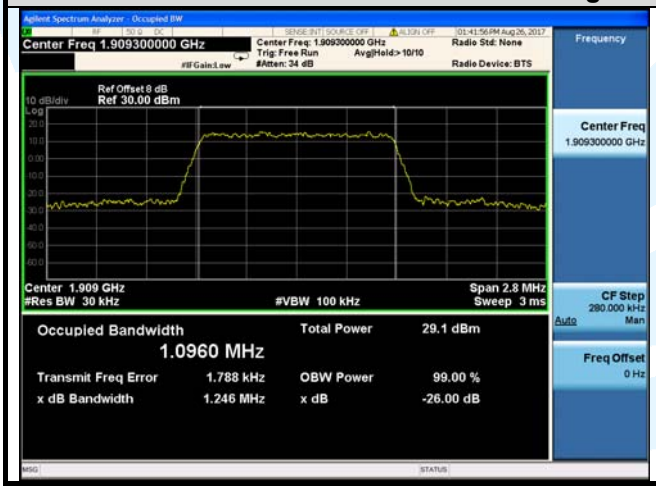
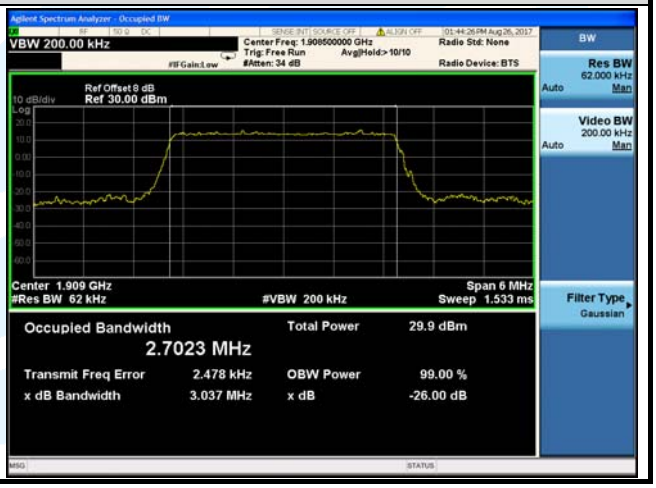
LTE Band 2_ Channel Bandwidth: 3 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

LTE Band 2_ Channel Bandwidth: 5 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
Highest Channel	

LTE Band 2_ Channel Bandwidth: 10 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
Highest Channel	
	

LTE Band 2_ Channel Bandwidth: 15 MHz	
QPSK	16QAM
Lowest Channel	
Middle Channel	
Highest Channel	
	

LTE Band 2_ Channel Bandwidth: 20 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
Highest Channel	

LTE Band 2 / 1.4MHz / 64QAM	LTE Band 2 / 3MHz / 64QAM
Lowest Channel	
Middle Channel	
	
Highest Channel