FCC TEST REPORT

Product Name:	Mobile Phone
Trade Mark:	MI
Model No.:	MCG3B
Report Number:	170803008RFM-2
Test Standards:	FCC 47 CFR Part 24 Subpart E FCC 47 CFR Part 2
FCC ID:	2AFZZ-RMS3B
Test Result:	PASS
Date of Issue:	August 30, 2017

Prepared for:

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

Prepared by:

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Technical Director

Date: August 30, 2017

Version

Version No.	Date	Description
V1.0	August 30, 2017	Original

CONTENTS

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:	N/A
Address of Manufacturer:	N/A

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Mobile Phone		
Model No.:	MCG3B		
Add. Model No.:	N/A		
Trade Mark:	MI		
DUT Stage:	Identical Prototype		
EUT Supports Function:	GSM Bands:	GSM850/1900	
	UTRA Bands:	Band II/ Band V	
	E-UTRA Bands:	FDD Band 4/ Band 5/ Band 7	
		TDD Band 38	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth: V3.0+HS & V4.1 LE	
	RNSS Bands:	1559 MHz to 1610 MHz	GPS/ GLONASS/
	BSR:	VHF Band II	FM
Software Version:	MIUI8		
Hardware Version:	P2.0		
Sample Received Date:	August 4, 2017		
Sample Tested Date:	August 4, 2017 to August 30, 2017		

1.2.2 Description of Accessories

Adapter(1)	
Trade Mark:	XIAOMI
Model No.:	MDY-09-EE
Input:	100-240 V~50/60 Hz 0.2A Max
Output:	5.0 V ⎓ 1.0 A
AC Cable:	N/A
DC Cable:	0.8 Meter, Shielded without ferrite
Manufacturer:	Dongguan Aohai Power Technology Co., Ltd.

Adapter(2)	
Trade Mark:	XIAOMI
Model No.:	MDY-09-EE
Input:	100-240 V~50/60 Hz 0.2A Max
Output:	5.0 V ⎓ 1.0 A
AC Cable:	N/A
DC Cable:	0.8 Meter, Shielded without ferrite
Manufacturer:	Dongguan Aohai Power Technology Co., Ltd.

Battery(1)	
Trade Mark:	MI
Model No.:	BN34
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.85 Vdc
Limited Charge Voltage:	4.4 Vdc
Rated Capacity:	2910mAh
Manufacturer:	SCUD(Fujian)Electronics Co., Ltd.

Battery(2)	
Trade Mark:	MI
Model No.:	BN34
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.85 Vdc
Limited Charge Voltage:	4.4 Vdc
Rated Capacity:	2910mAh
Manufacturer:	Sunwoda Electronic Co., Ltd.

Cable(1)	
Trade Mark:	N/A
Model No.:	KLC-2639
Description:	USB Micro-B Plug Cable
Cable Type:	Shielded without ferrite
Length:	0.8 Meter

Cable(2)	
Trade Mark:	N/A
Model No.:	0US231XI0015
Description:	USB Micro-B Plug Cable
Cable Type:	Shielded without ferrite
Length:	0.8 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, DC-HSDPA,	
Type of Modulation:	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA	BPSK
	HSDPA/DC-HSDPA:	QPSK,16QAM
	HSUPA:	QPSK
Frequency Range:	GSM/GPRS/EDGE 1900:	1850.2-1909.8 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
Max RF Output Power:	GSM/GPRS 1900:	29.64dBm
	EDGE 1900:	26.16dBm
	WCDMA BandII:	23.34dBm
Type of Emission:	GSM/GPRS 1900:	246KGXW
	EDGE 1900:	245KG7W
	WCDMA Band II:	4M12F9W
IEMI:	Radiation: 865183030024549, 865183030024556	
	Conducted: 865183030024846, 865183030024853	
Antenna Type:	PIFA Antenna	
Antenna Gain:	1 dBi	
GPRS/EDGE Class:	Class 33	
Normal Test Voltage:	3.85 Vdc	
Extreme Test Voltage:	3.6 to 4.4Vdc	
Extreme Test Temperature:	-30 °C to +50 °C	

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested independently

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
-	-	-	-	-

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
☑	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	3.6	20 to 75
TH/VL	+50	3.6	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 3.6 V to 4.4 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.6 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

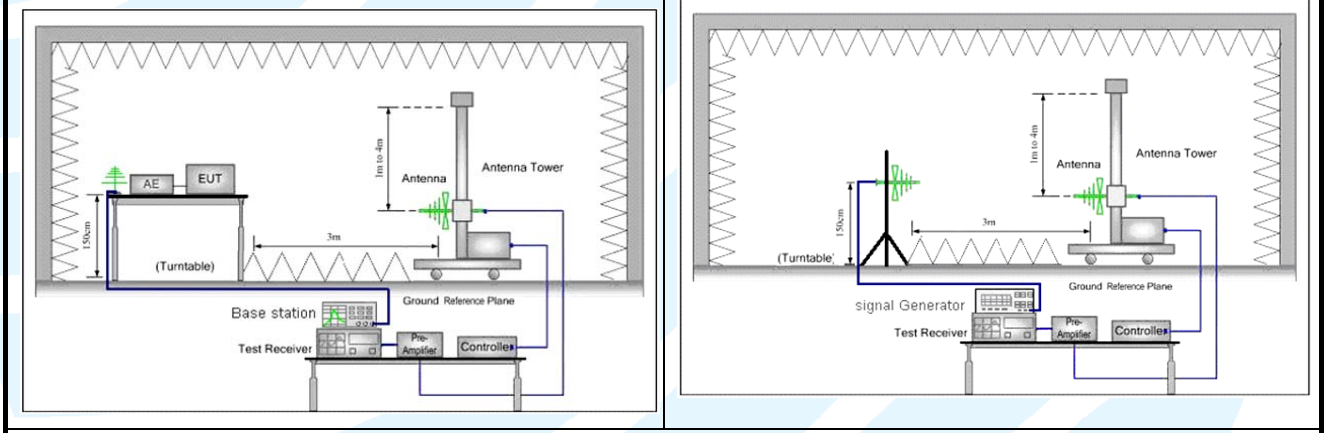


Figure 1. 30MHz to 1GHz

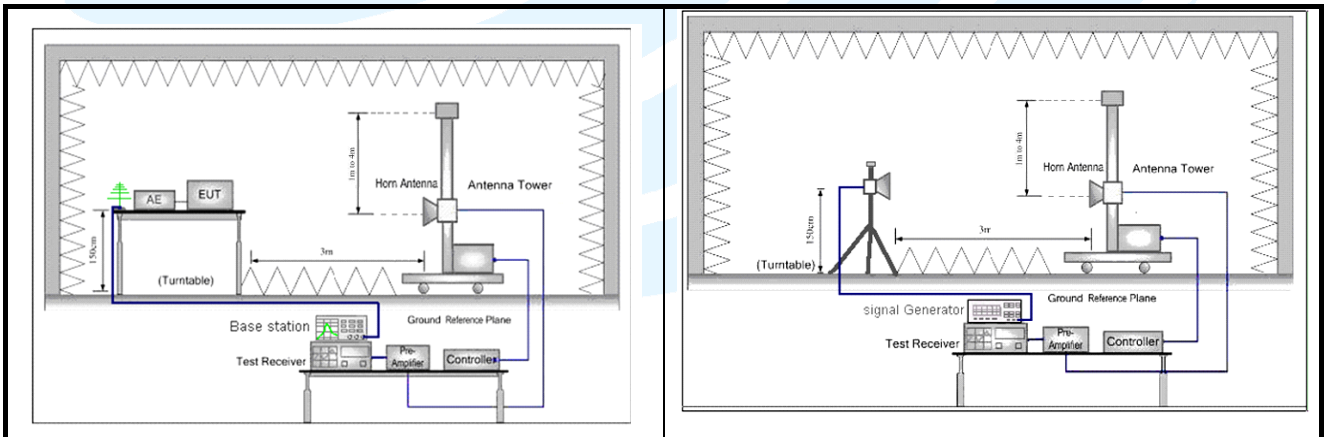
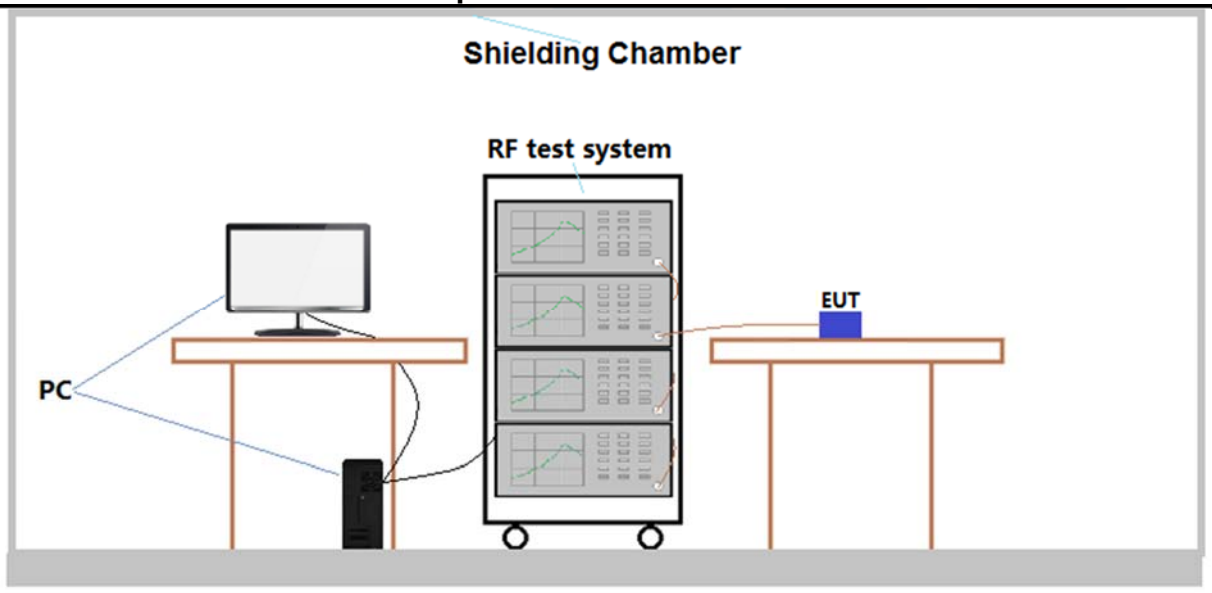
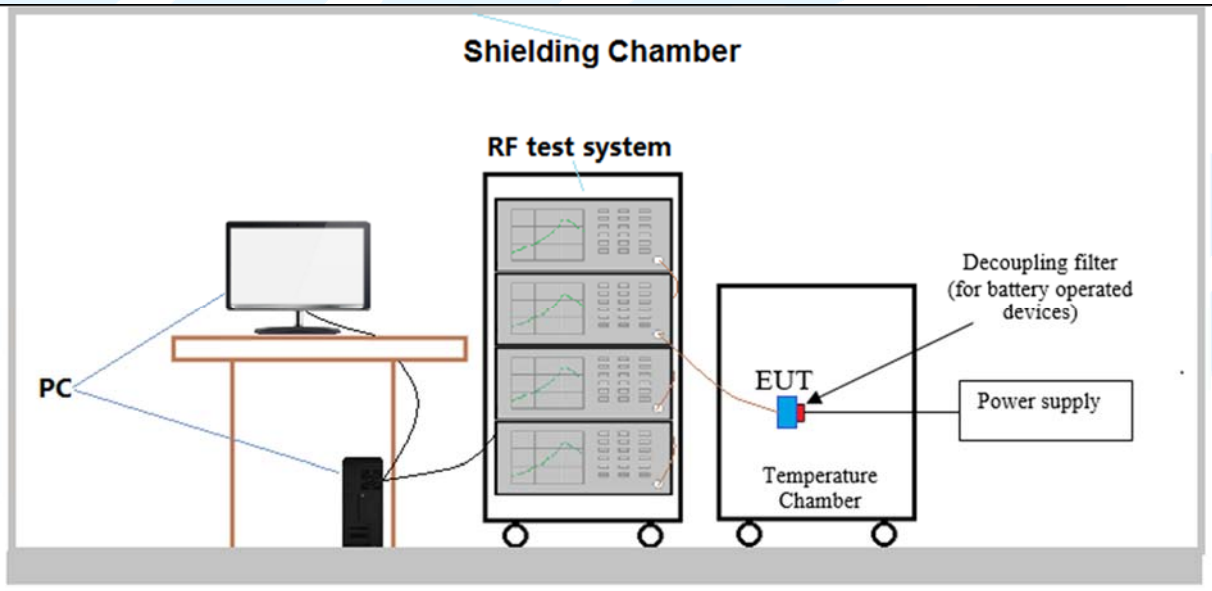


Figure 2. Above 1GHz

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

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

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:
SIM 1 Card Conducted transmitter power measurement result.

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)	29.62	29.59	**29.64**
GPRS (GMSK, 1Tx-slot)	29.63	29.58	29.61
GPRS (GMSK, 2Tx-slot)	28.52	28.44	28.58
GPRS (GMSK, 3Tx-slot)	26.53	26.40	26.76
GPRS (GMSK, 4Tx-slot)	25.40	25.72	25.75
EDGE (8PSK, 1Tx-slot)	26.16	26.03	25.96
EDGE (8PSK, 2Tx-slot)	25.10	25.22	25.21
EDGE (8PSK, 3Tx-slot)	23.79	23.81	23.89
EDGE (8PSK, 4Tx-slot)	22.62	22.59	22.66

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	23.28	23.26	**23.34**
HSDPA Subtest-1	22.37	22.38	22.45
HSDPA Subtest-2	22.30	22.35	22.45
HSDPA Subtest-3	21.78	21.73	21.93
HSDPA Subtest-4	21.84	21.82	21.80
HSUPA Subtest-1	21.78	21.80	21.91
HSUPA Subtest-2	19.76	19.74	19.90
HSUPA Subtest-3	20.74	20.78	20.89
HSUPA Subtest-4	19.74	19.78	19.89
HSUPA Subtest-5	21.74	21.76	21.89
DC-HSDPA Subtest-1	22.36	22.33	22.41
DC-HSDPA Subtest-2	22.35	22.34	22.41
DC-HSDPA Subtest-3	21.79	21.70	21.91
DC-HSDPA Subtest-4	21.83	21.80	21.75

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

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) – cable loss (dB) + antenna gain (dBd)
EIRP(dBm) = Pg(dBm) – cable loss (dB) + 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	Limit (dBm)	Result
Lowest	26.43	22.73	18.83	33.01	Pass
Middle	26.52	22.58	18.72	33.01	Pass
Highest	26.67	22.49	19.02	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 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**	**Limit (dBm)**	**Result**
Lowest	0.90	3.83	3.25	13	Pass
Middle	0.86	3.44	3.25	13	Pass
Highest	0.64	3.77	3.19	13	Pass

The test plot as follows:

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

WCDMA RMC 12.2Kbps	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

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

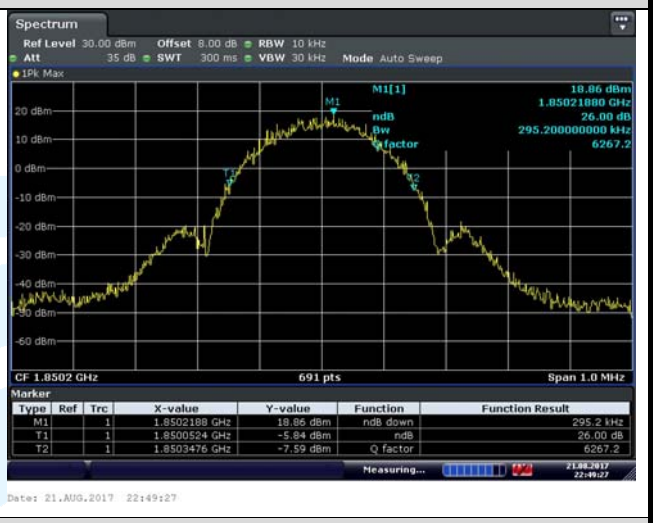
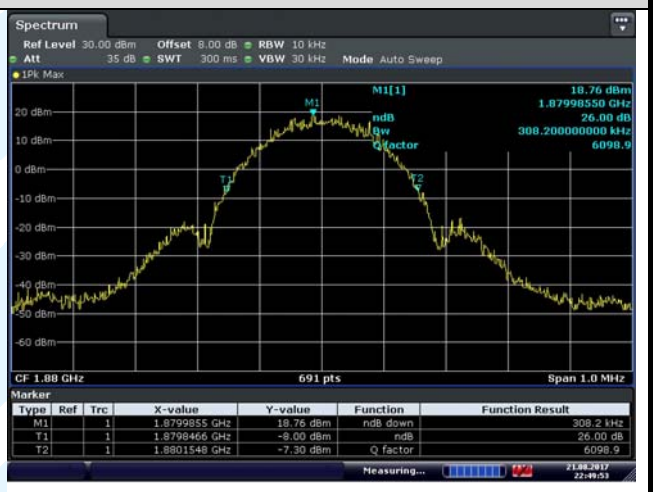
Test Data: See table below

99% & 26 dB Bandwidth				
Test Mode	**Channel**	**Frequency (MHz)**	**26 dB BW (kHz)**	**99% BW (kHz)**
GSM 1Tx-slot	512	1850.2	312.60	246.02
	661	1880.0	309.70	243.13
	810	1909.8	314.00	244.57
EDGE 1Tx-slot	512	1850.2	295.20	243.13
	661	1880.0	308.20	244.57
	810	1909.8	301.00	244.57

99% & 26 dB Bandwidth				
Test Mode	**Channel**	**Frequency (MHz)**	**26 dB BW (MHz)**	**99% BW (MHz)**
WCDMA RMC 12.2Kbps	9262	1852.4	4.703	4.124
	9400	1880.0	4.718	4.124
	9538	1907.6	4.689	4.124

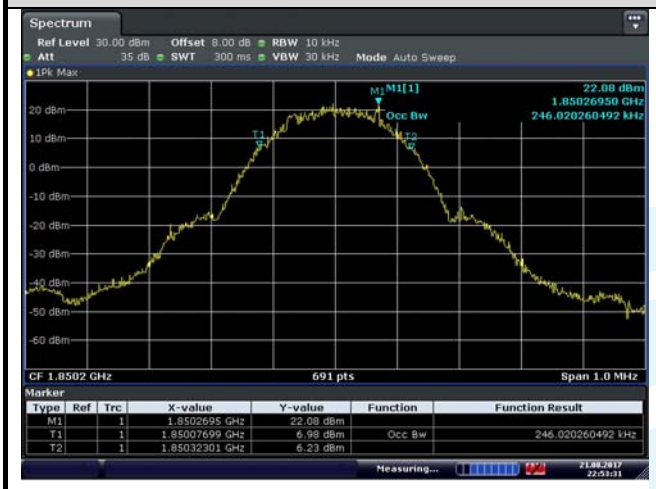
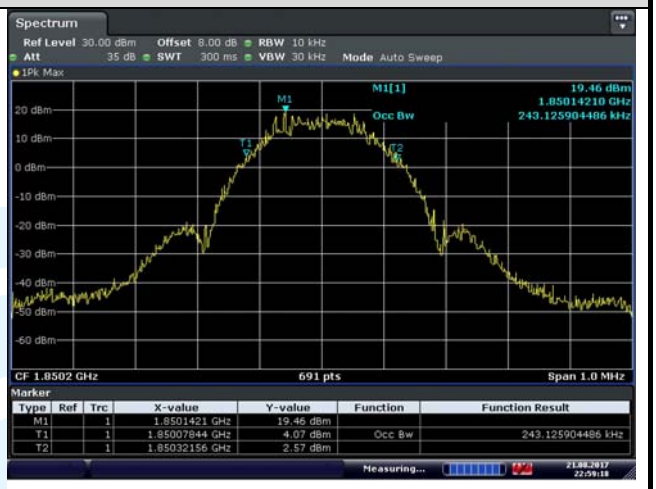
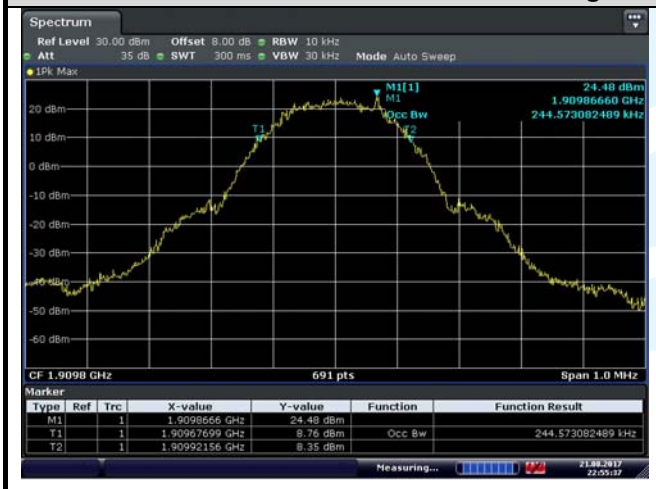
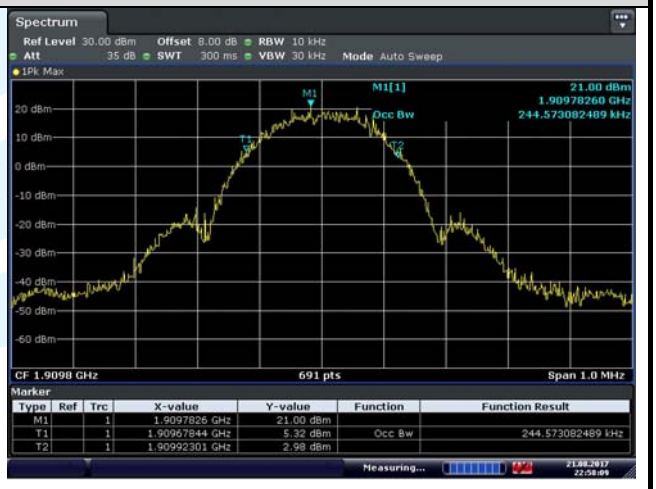
The test plot as follows:

26 dB Bandwidth

GSM	EDGE
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

WCDMA Band II	
Lowest Channel	Middle Channel
	
Highest Channel	
	N/A

99% Bandwidth

GSM	EDGE
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

WCDMA Band II	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

5.6 ABAND EDGE AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)

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

Limit:

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. The emission limit equal to -13 dBm

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.

For each band edge measurement:

1) Set the spectrum analyzer span to include the block edge frequency.
2) Set a marker to point the corresponding band edge frequency in each test case.
3) Set display line at -13 dBm
4) Set resolution bandwidth to at least 1% of emission bandwidth.
5) Set spectrum analyzer with RMS detector.
6) Record the max trace plot into the test report

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

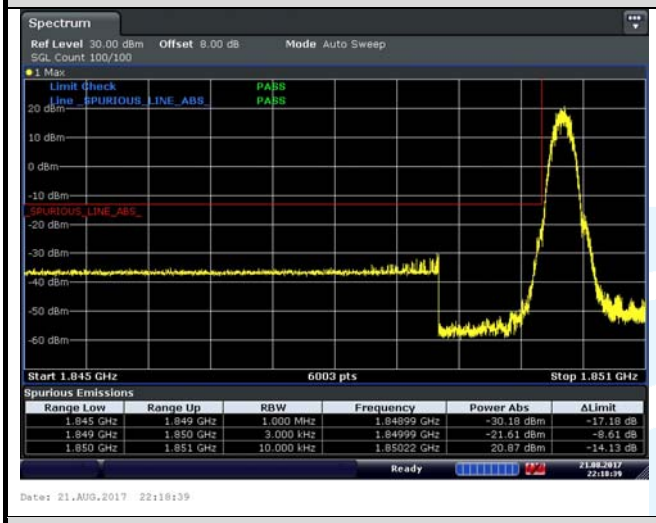
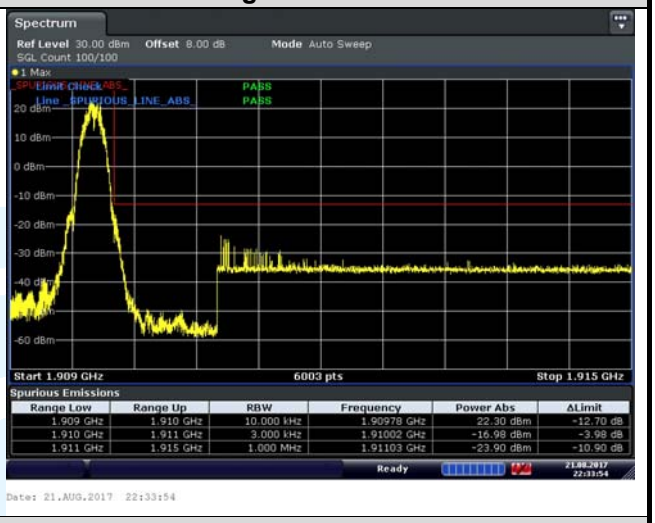
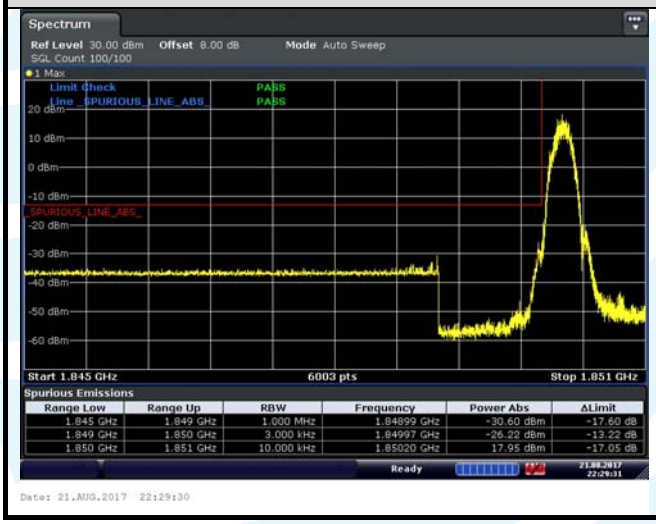
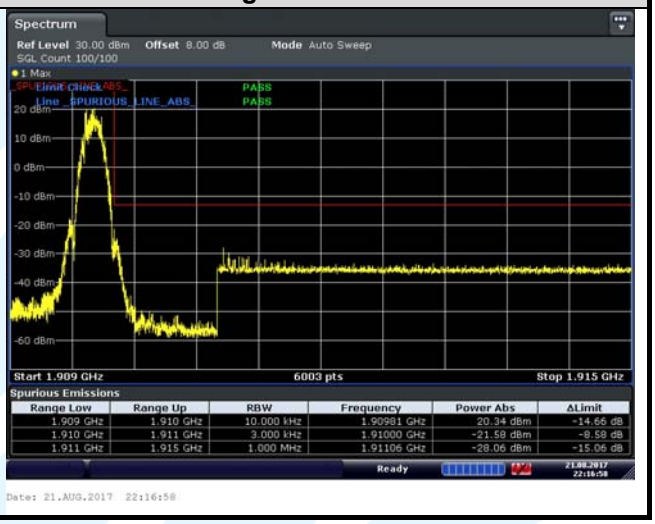
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plot as follows:

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

WCDMA RMC 12.2Kbps	
Lowest Channel	Highest Channel
	

5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)

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

Limit:

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. The emission limit equal to -13 dBm

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

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

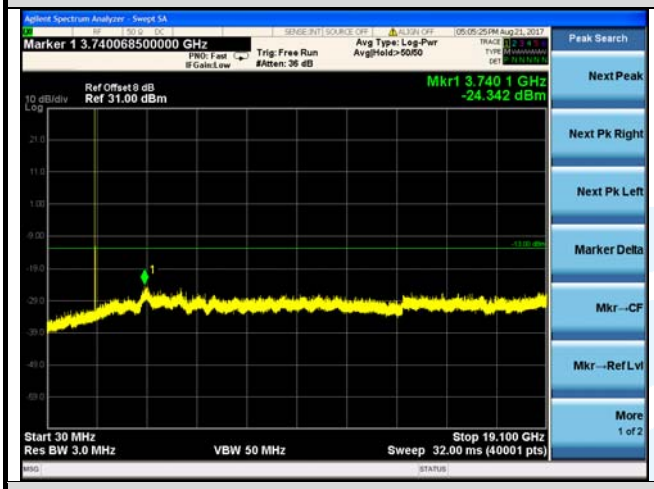
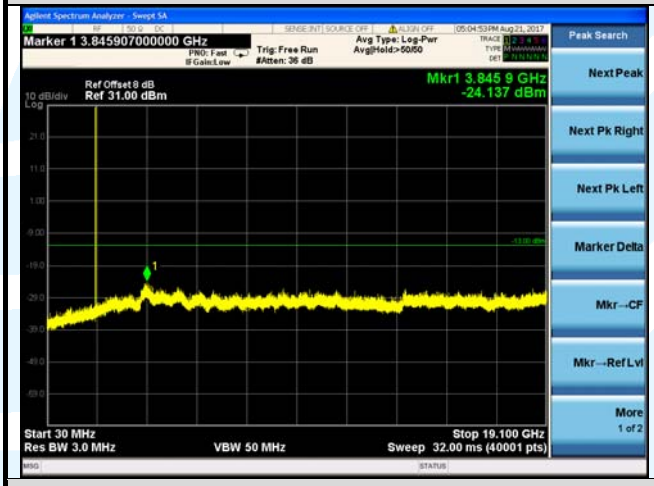
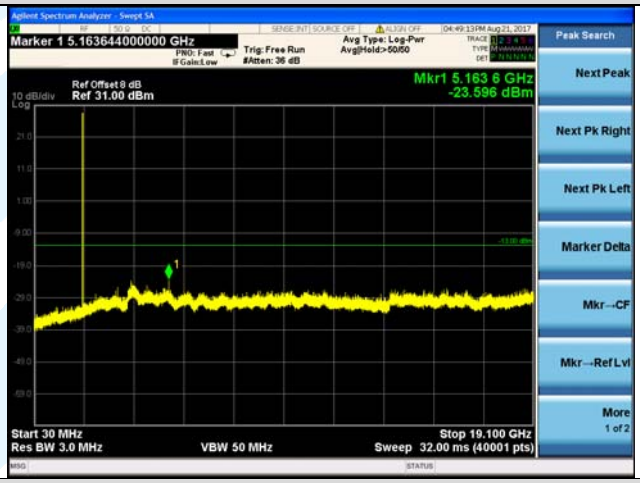
Test Setup: Refer to section 4.2.2 for details.

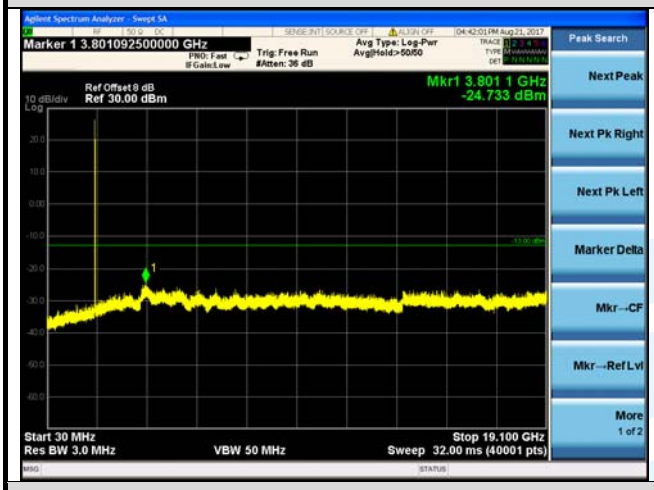
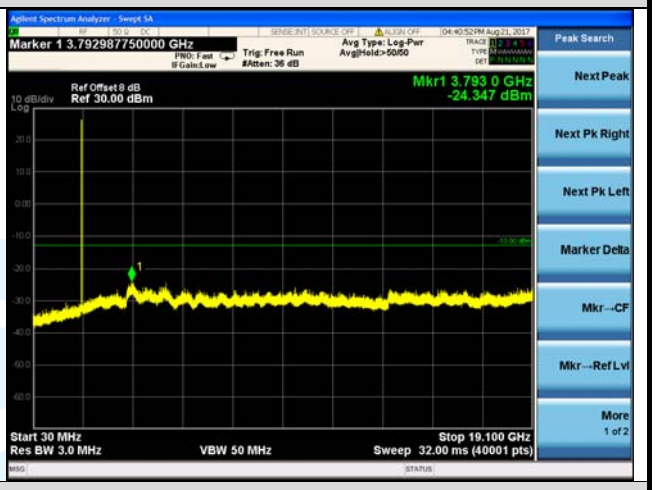
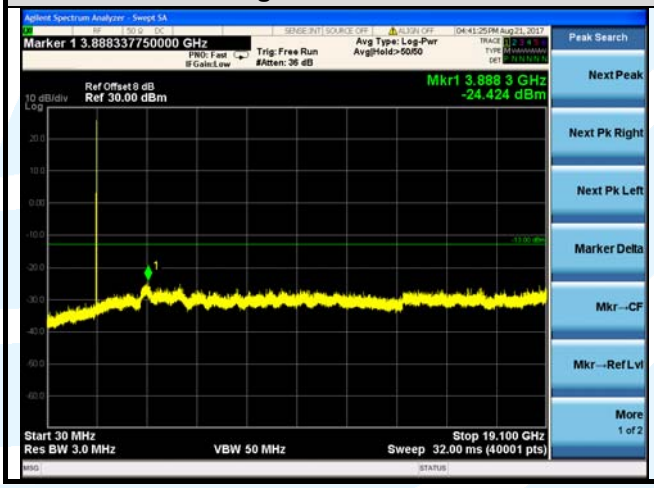
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

The test plot as follows:

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

WCDMA RMC 12.2Kbps	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)

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

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

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. The emission limit equal to -13 dBm

Test Setup: Refer to section 4.2.1 for details.

Test Procedures:

1. Scan up to 10th harmonic, find the maximum radiation frequency to measure.
2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

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) – cable loss (dB) + antenna gain (dBd)

EIRP(dBm) = Pg(dBm) – cable loss (dB) + 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.

Equipment Used: Refer to section 3 for details.

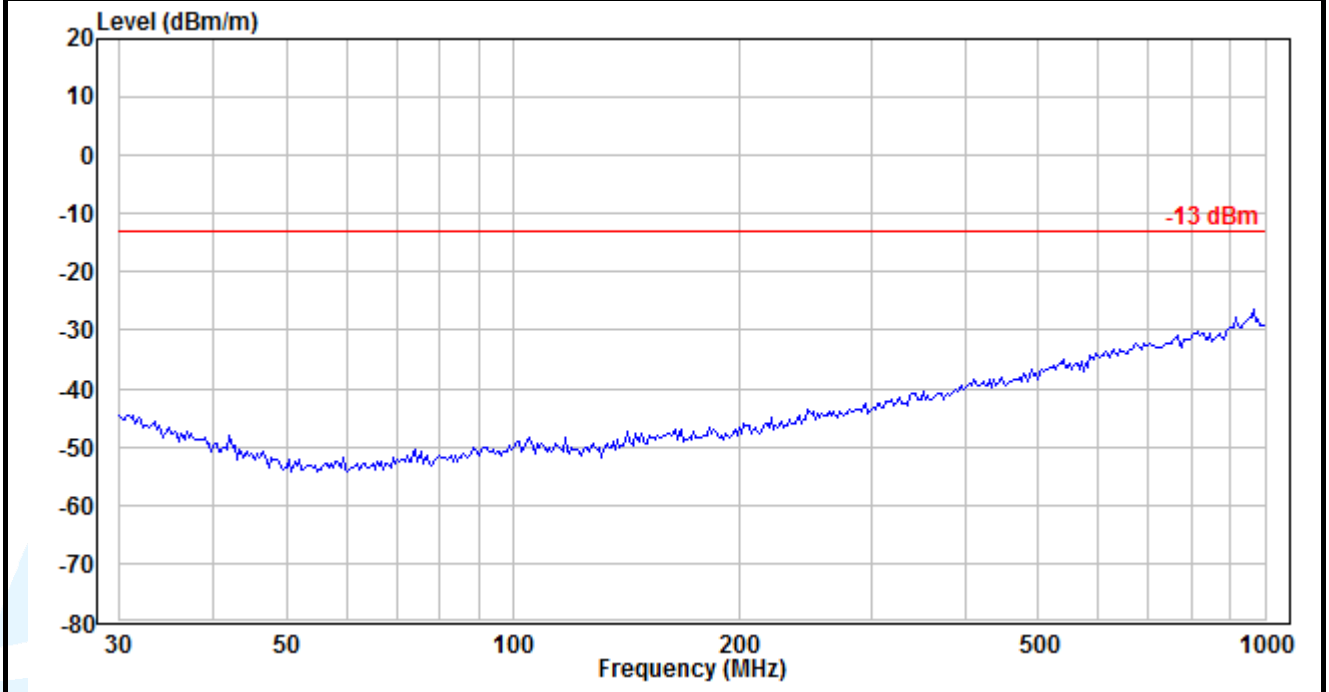
Test Result: Pass

The measurement data as follows:

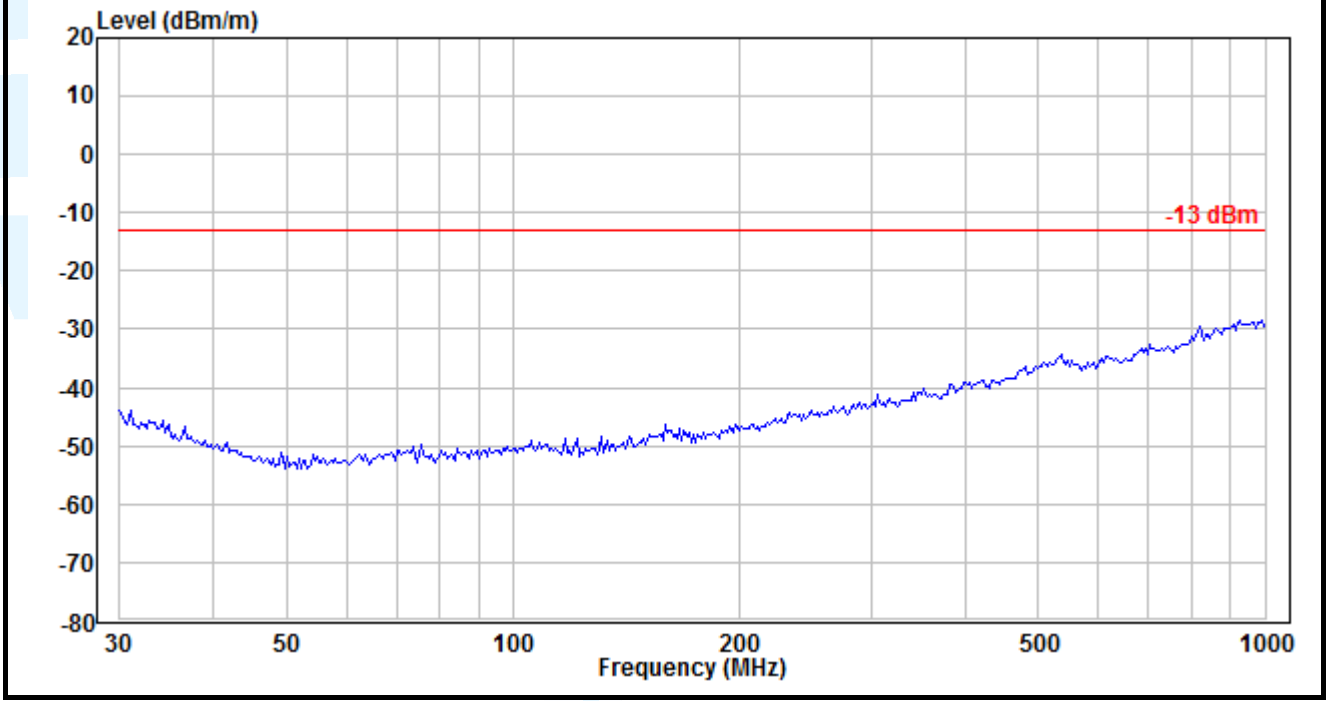
5.8.1 Radiated Emission Test Data (30 MHz to 1 GHz)

GSM 1Tx-slot_Middle Channel

Horizontal

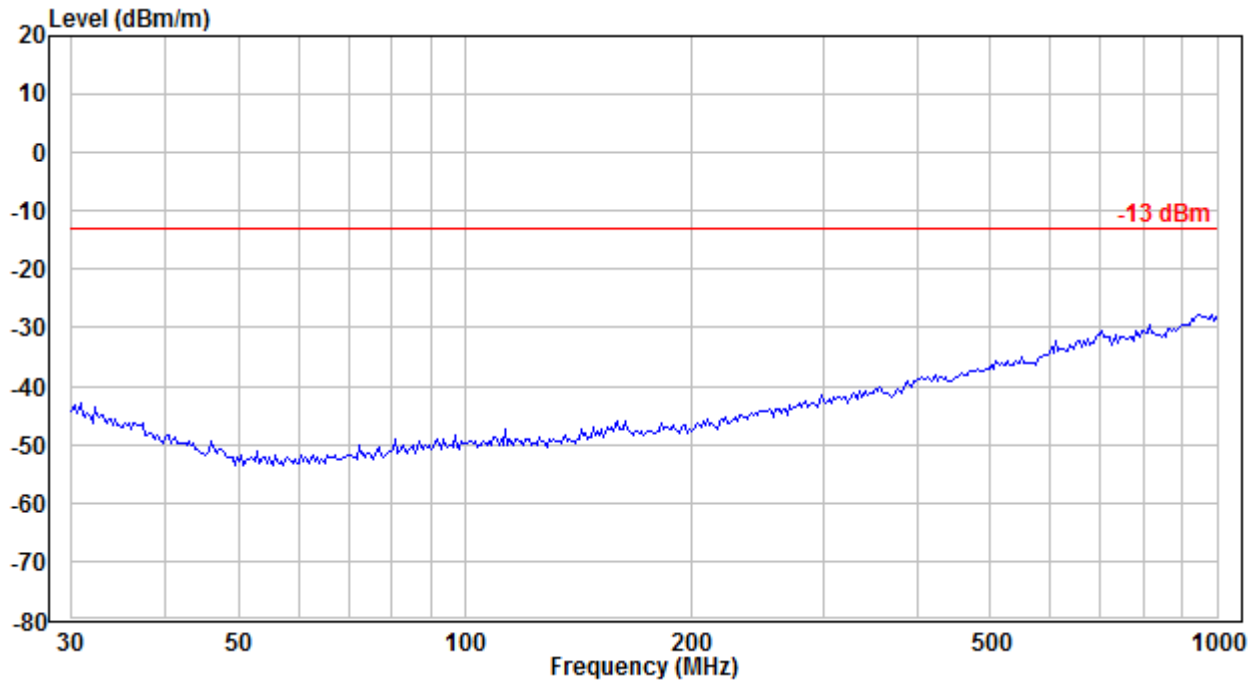


Vertical

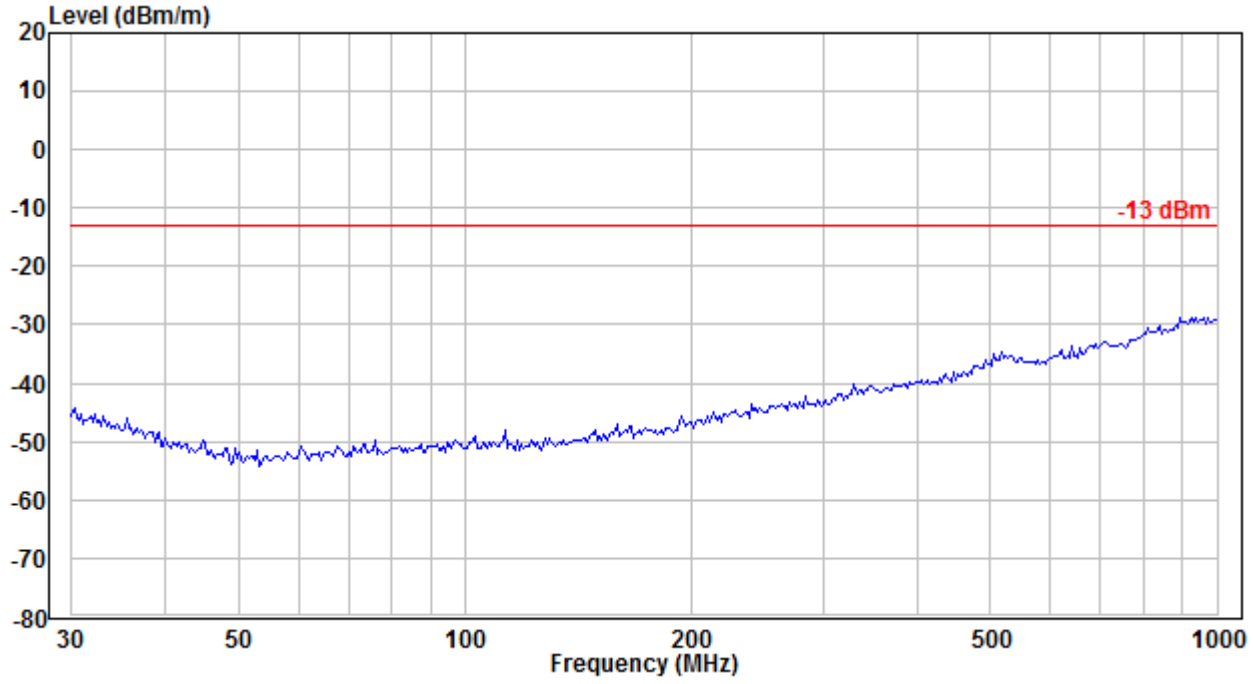


WCDMA RMC 12.2Kbps_Middle Channel

Horizontal



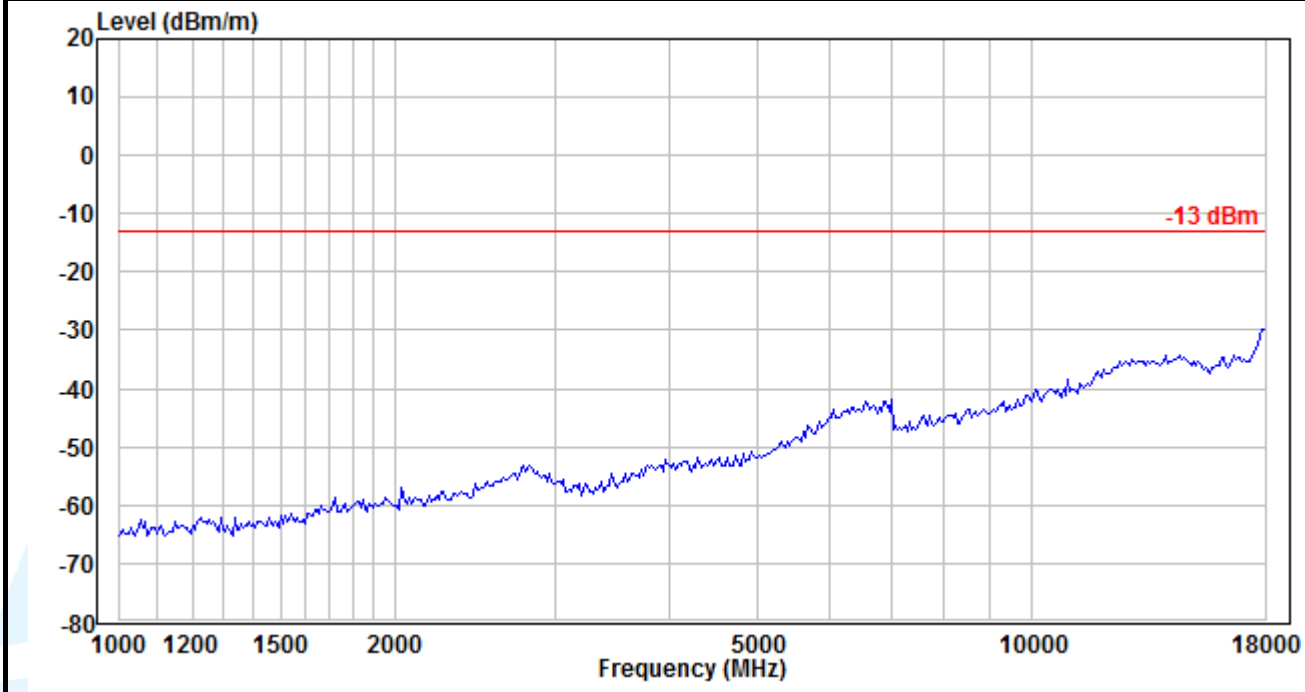
Vertical



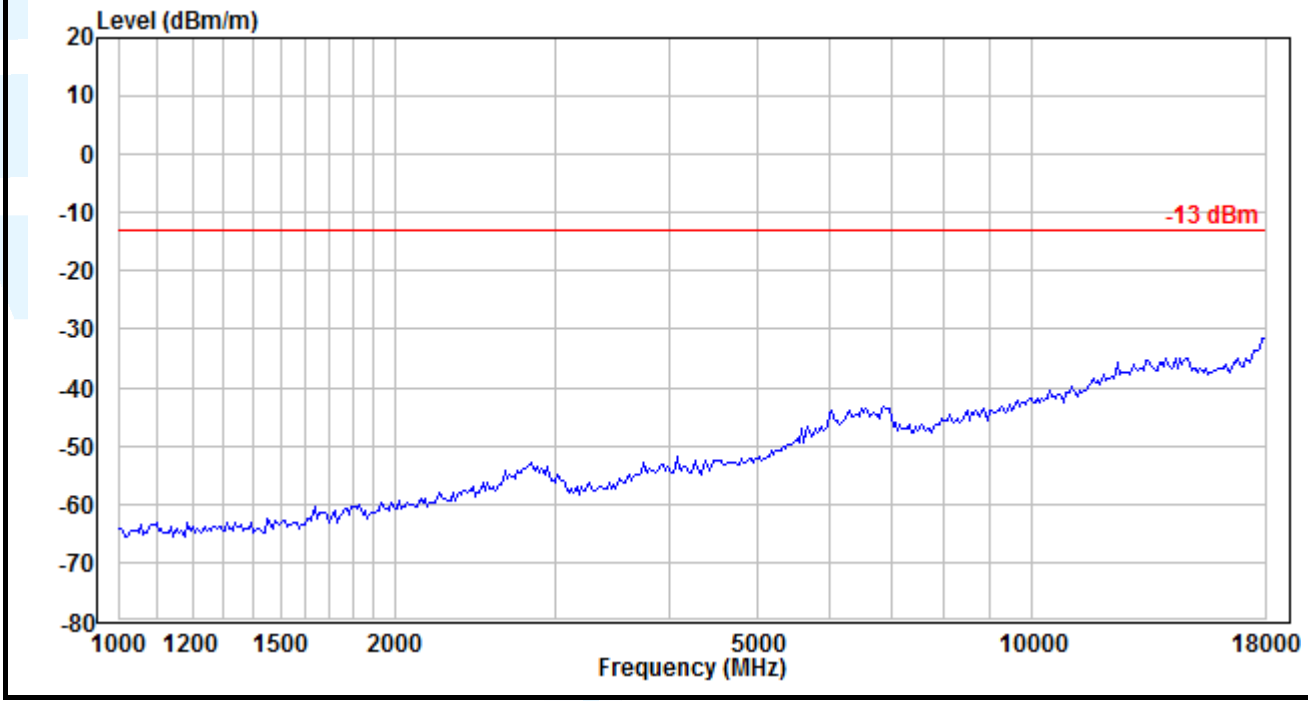
5.8.2 Radiated Emission Test Data (Above 1GHz)

GSM 1Tx-slot_Middle Channel

Horizontal

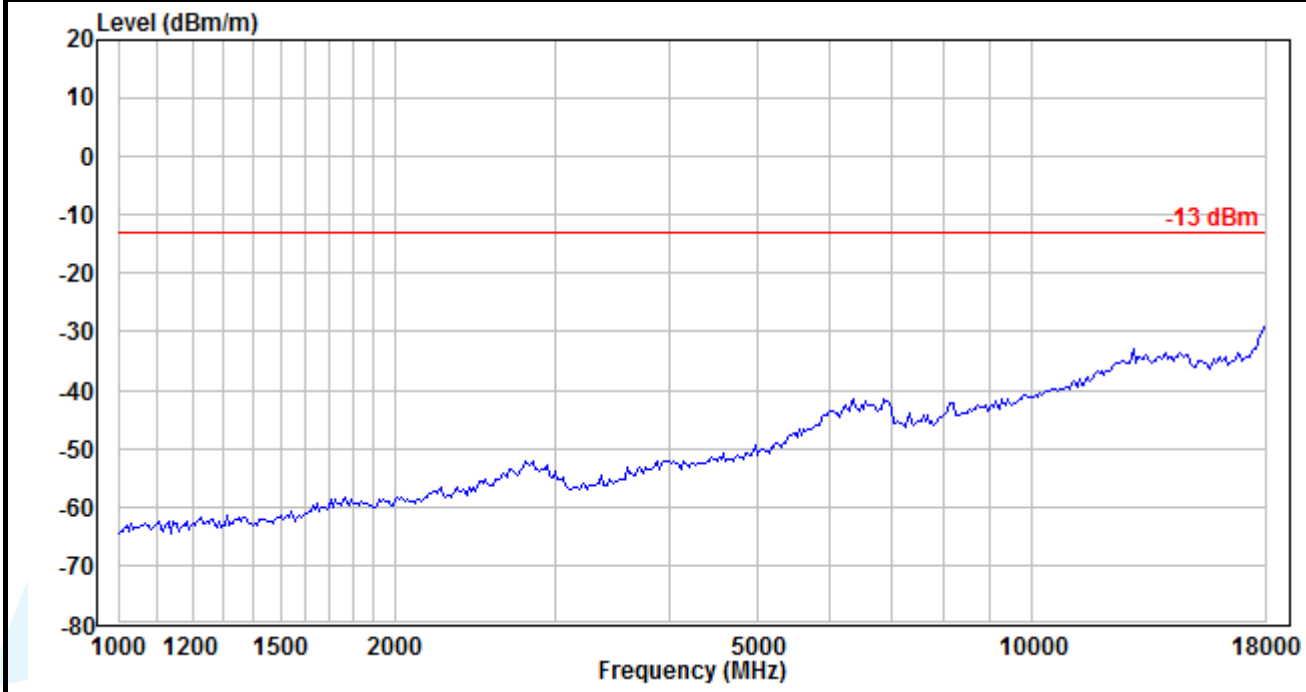


Vertical

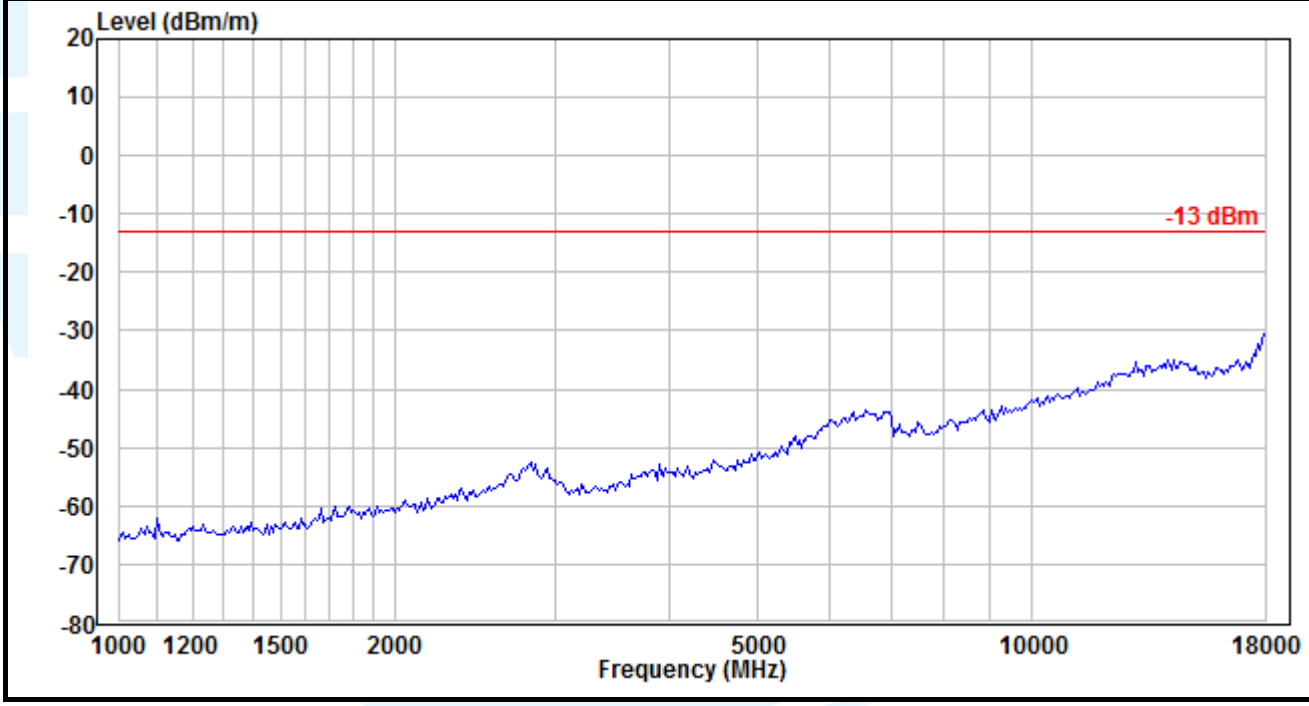


WCDMA RMC 12.2Kbps_Middle Channel

Horizontal



Vertical



5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235

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

Limits: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
   a) Temp. = −30° to + 50°C
   b) Voltage =low voltage, 3.6 Vdc, Normal, 3.85Vdc and High voltage, 4.4 Vdc.
2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
GSM 1Tx-slot							
GMSK	661 / 1880.0	VL	TN	1.23	0.0007	Note 1	Pass
		VN		0.26	0.0001		Pass
		VH		0.52	0.0003		Pass
		VN	50	2.78	0.0015		Pass
			40	-0.97	-0.0005		Pass
			30	-2.58	-0.0014		Pass
			20	-2.52	-0.0013		Pass
			10	-0.13	-0.0001		Pass
			0	-0.32	-0.0002		Pass
			-10	-1.23	-0.0007		Pass
			-20	-0.77	-0.0004		Pass
			-30	-1.68	-0.0009		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(℃)	(Hz)	(ppm)	(ppm)	
EDGE 1Tx-slot							
GMSK	661 / 1880.0	VL	TN	-3.45	-0.0018	Note 1	Pass
		VN		-2.07	-0.0011		Pass
		VH		-4.55	-0.0024		Pass
		VN	50	0.9	0.0005		Pass
			40	0.71	0.0004		Pass
			30	0.43	0.0002		Pass
			20	-2.08	-0.0011		Pass
			10	-1.78	-0.0009		Pass
			0	-1.23	-0.0007		Pass
			-10	-1.49	-0.0008		Pass
			-20	-2.34	-0.0012		Pass
			-30	-5.32	-0.0028		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Pass/ Fail
	(MHz)	(Vdc)	(℃)	(Hz)	(ppm)	(ppm)	
WCDMA RMC 12.2Kbps							
GMSK	9400 / 1880.0	VL	TN	-1.62	-0.0009	Note 1	Pass
		VN		-1.31	-0.0007		Pass
		VH		-1.42	-0.0008		Pass
		VN	50	-4.45	-0.0024		Pass
			40	-3.43	-0.0018		Pass
			30	-1.33	-0.0007		Pass
			20	-1.06	-0.0006		Pass
			10	-0.87	-0.0005		Pass
			0	-0.47	-0.0003		Pass
			-10	0.05	0.0000		Pass
			-20	0.69	0.0004		Pass
			-30	2.32	0.0012		Pass

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***