FCC TEST REPORT

Product Name:	Mobile Phone
Trade Mark:	N/A
Model No.:	CRUSH X565
Report Number:	180709006RFM-1
Test Standards:	FCC 47 CFR Part 22 Subpart H FCC 47 CFR Part 2
FCC ID:	2AIMEX565
Test Result:	PASS
Date of Issue:	July 26, 2018

Prepared for:

SMT TELECOMM HK LIMITED
Unit C 8/F CHARMHILL CTR 50 HILLWOOD RD TST KL, Kowloon, Hong Kong

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: Henry Lu
Project Engineer

Reviewed by: Kevin Liang
Assistant Manager

Approved by: Billy Li
Technical Director

Date: July 26, 2018

UnionTrust Laboratories UnionTrust * Certified *

Version

Version No.	Date	Description
V1.0	July 26, 2018	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	SMT TELECOMM HK LIMITED
Address of Applicant:	Unit C 8/F CHARMHILL CTR 50 HILLWOOD RD TST KL, Kowloon, Hong Kong
Manufacturer:	SMT TELECOMM HK LIMITED
Address of Manufacturer:	Unit C 8/F CHARMHILL CTR 50 HILLWOOD RD TST KL, Kowloon, Hong Kong

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Mobile Phone	
Model No.:	CRUSH X565	
Add. Model No.:	N/A	
Trade Mark:	N/A	
DUT Stage:	Identical Prototype	
EUT Supports Function:	GSM Bands:	GSM850/1900
	UTRA Bands:	Band II/ Band IV/ Band V
	2.4 GHz ISM Band:	IEEE 802.11b/g/n
		Bluetooth V4.0
Software Version:	SMT_SN_X565_V2984_FINAL	
Hardware Version:	W56A_V3	
IMEI Code:	387192451020364, 219254078364031; 321447530691208, 320359601481274	
Sample Received Date:	July 10, 2018	
Sample Tested Date:	July 10, 2018 to July 19, 2018	

1.2.2 Description of Accessories

Adapter	
Model No.:	PCX565
Input:	100-240 V~50/60 Hz 0.15 A
Output:	5.0 V ⎓ 1000 mA
AC Cable:	N/A
DC Cable:	N/A

Battery	
Model No.:	BPX565
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.8 Vdc
Rated Capacity:	2000 mAh

Cable	
Description:	USB Micro-B Plug Cable
Cable Type:	Shielded without ferrite
Length:	1.1 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, WCDMA, HSDPA, HSUPA	
Type of Modulation:	GSM/GPRS:	GMSK
	WCDMA	BPSK
	HSDPA:	QPSK
	HSUPA:	QPSK
Frequency Range:	GSM/GPRS 850:	824.2-848.8 MHz
	WCDMA Band V:	826.4-846.6 MHz
Max RF Output Power:	GSM/GPRS 850:	32.29dBm
	WCDMA Band V:	23.16dBm
Type of Emission:	GSM/GPRS 850:	247KGXW
	WCDMA Band V:	4M16F9W
Antenna Type:	PIFA Antenna	
Antenna Gain:	3.16 dBi	
GPRS Class:	Class 12	
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.5 to 4.3Vdc	
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 22 Subpart H Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Peak-to-average ratio	FCC 47 CFR Part 22.913(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI/TIA-603-E-2016 & KDB 971168 D01v03	PASS

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. 10, 2017	Dec. 10, 2018
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 17, 2017	Dec. 17, 2018
☑	Preamplifier	HP	8447F	2805A02960	Dec. 10, 2017	Dec. 10, 2018
☑	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May 19, 2018	May 19, 2019
☑	Horn Antenna	ETS-LINDGREN	3117	00164202	Dec. 17, 2017	Dec. 17, 2018
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 22, 2019
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☑	Wideband Radio Communication Tester	R&S	CMW500	116254	June 07, 2018	June 07, 2019
☑	Test Software	Audix	e3	Software Version: 9.160323		

2/3/4G RF Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☑	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Dec. 10, 2017	Dec. 10, 2018
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec.10, 2017	Dec. 10, 2018
☑	Wideband Radio Communication Tester	R&S	CMW500	116254	June 07, 2018	June 07, 2019
☑	Universal Radio Communication Tester	R&S	CMU200	114713	Dec. 10, 2017	Dec. 10, 2018
☑	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 14, 2017	Sep. 13, 2018
☑	Temp & Humidity chamber	Votisch	VT4002	58566133290 020	June 05, 2018	June 05, 2019

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	3.8	20 to 75
TL/VL	-30	3.5	20 to 75
TH/VL	+50	3.5	20 to 75
TL/VH	-30	4.3	20 to 75
TH/VH	+50	4.3	20 to 75

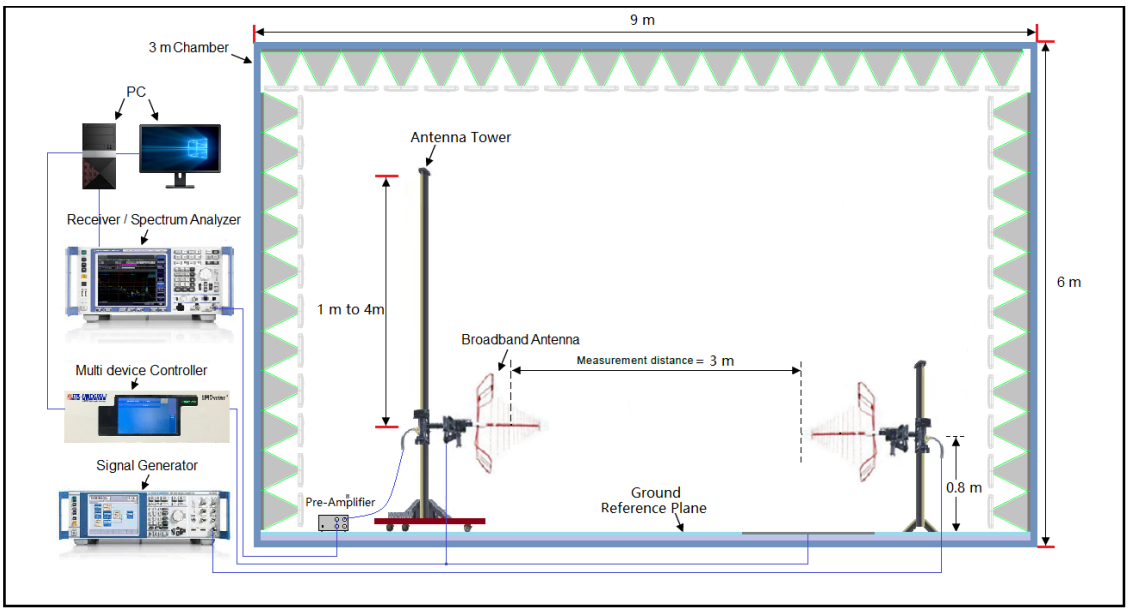
Remark:

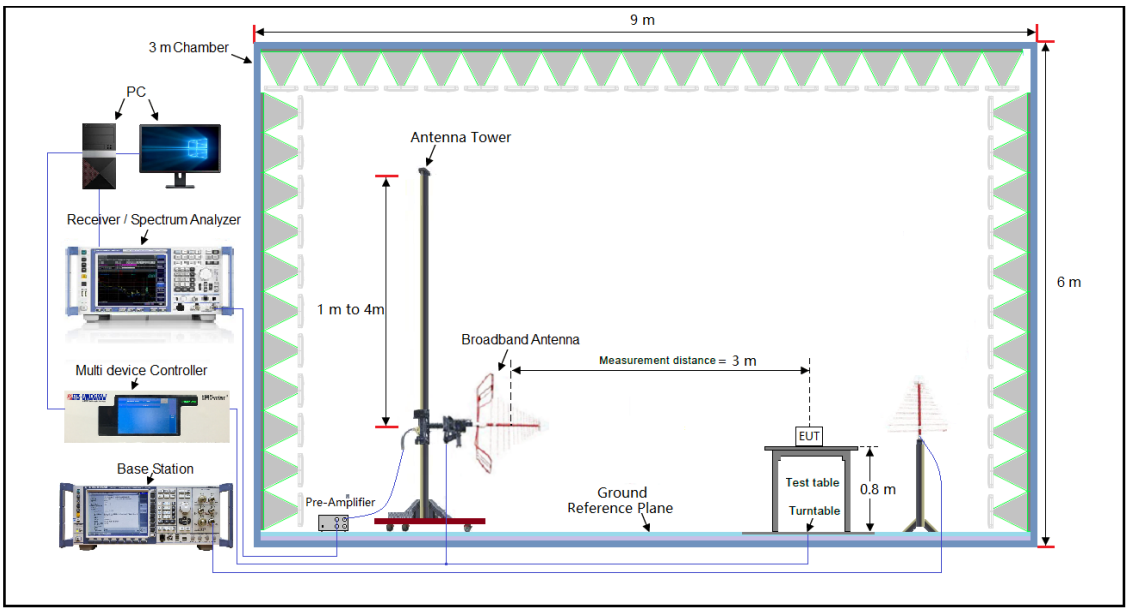
1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.5 V to 4.3 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.5 V to 4.3 V.
2) VN: Normal Voltage; TN: Normal Temperature;
   TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
   VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.2 TEST SETUP

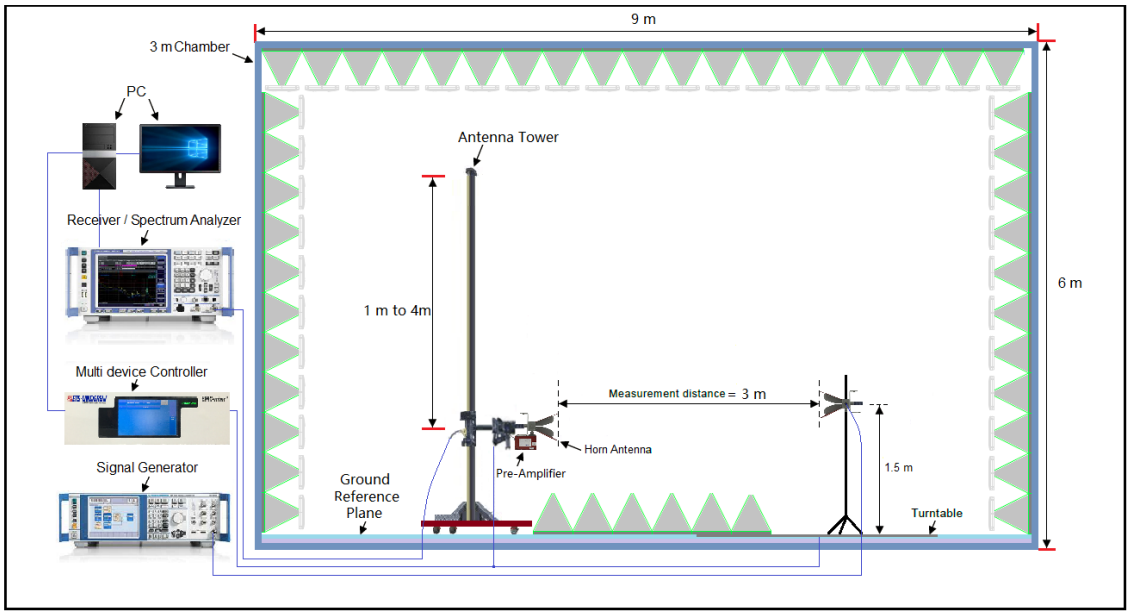
4.2.1 For Radiated Emissions test setup

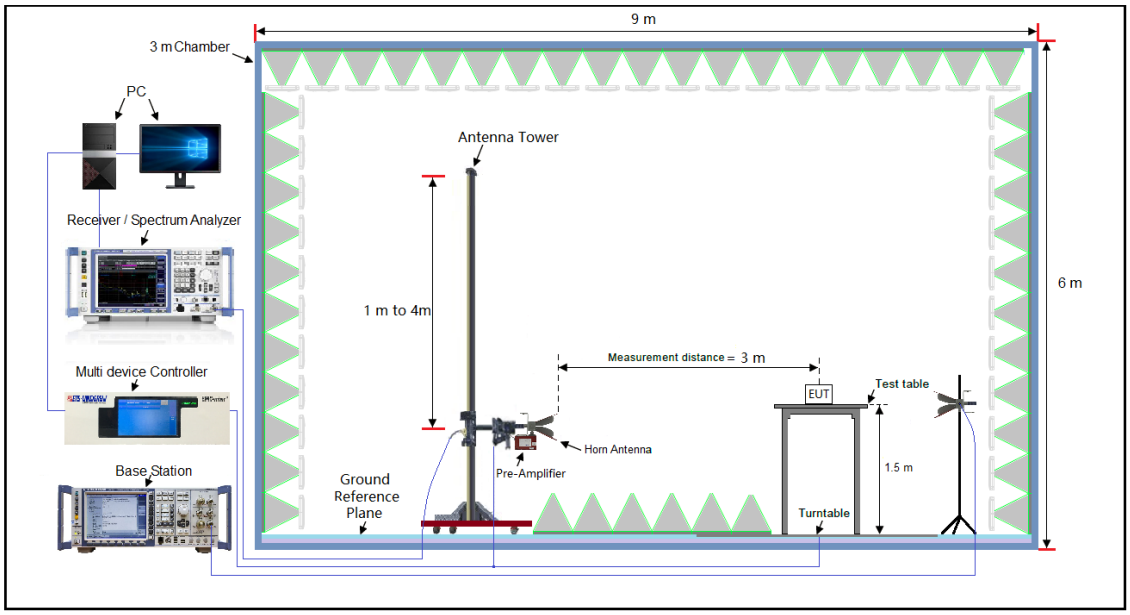
Setup - 1_ERP Test setup



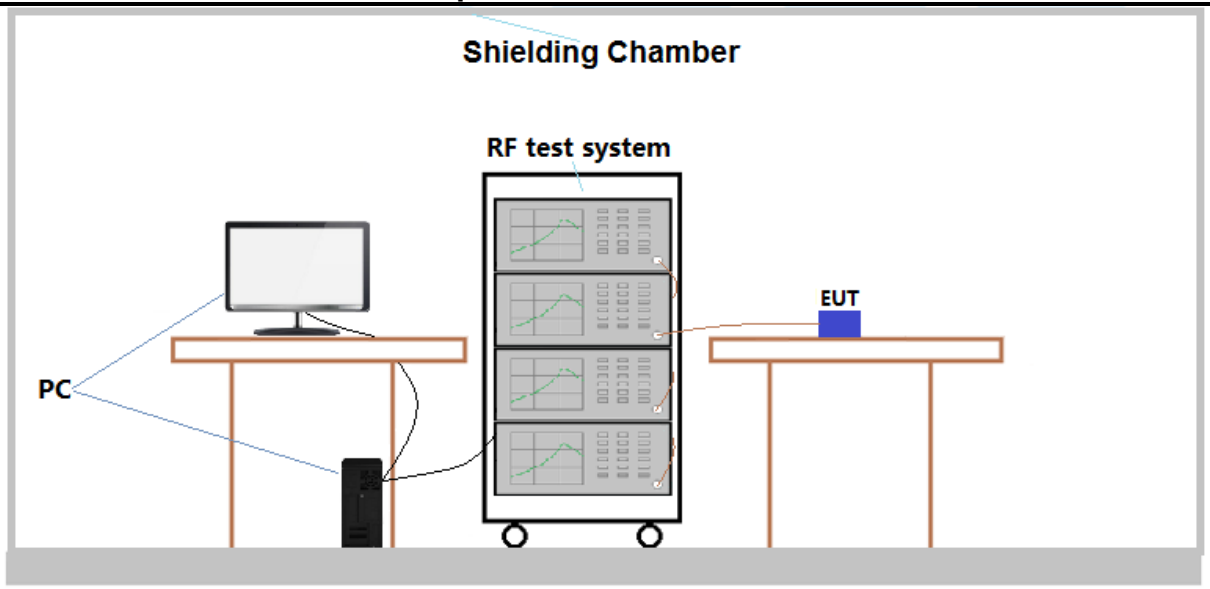


Setup - 2_EIRP Test setup

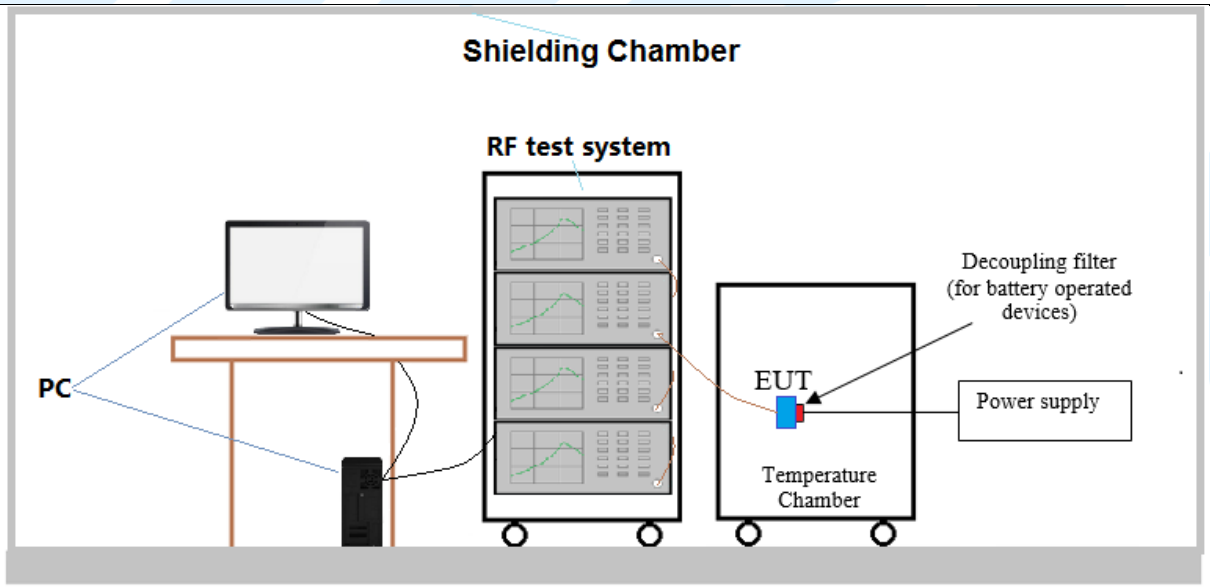




4.2.3 For Conducted RF test setup



Normal Environment



Extreme Environment

4.3 TEST CHANNELS

Band	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS	Tx (824 MHz ~ 849 MHz)	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
WCDMA band V	Tx (824 MHz ~ 849 MHz)	Channel 4132	Channel 4182	Channel 4233
		826.4 MHz	836.4 MHz	846.6 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 3.8Vdc 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.

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 850 Maximum Average Power (dBm)			
Channel	**128**	**190**	**251**
Frequency(MHz)	**824.2 MHz**	**836.6 MHz**	**848.8 MHz**
GSM (GMSK, 1Tx-slot)	**32.29**	32.27	32.28
GPRS (GMSK, 1Tx-slot)	32.18	32.21	32.21
GPRS (GMSK, 2Tx-slot)	31.28	31.46	31.46
GPRS (GMSK, 3Tx-slot)	29.65	29.60	29.38
GPRS (GMSK, 4Tx-slot)	28.47	28.41	28.31

WCDMA Band V Maximum Average Power (dBm)			
Channel	**4132**	**4182**	**4233**
Frequency(MHz)	**826.4 MHz**	**836.4 MHz**	**846.6 MHz**
RMC 12.2K	**23.16**	23.11	23.12
HSDPA Subtest-1	22.11	21.97	21.97
HSDPA Subtest-2	22.13	21.95	21.95
HSDPA Subtest-3	21.60	21.46	21.43
HSDPA Subtest-4	21.54	21.39	21.39
HSUPA Subtest-1	22.12	21.70	21.70
HSUPA Subtest-2	20.09	19.72	19.72
HSUPA Subtest-3	21.13	20.81	20.81
HSUPA Subtest-4	19.59	19.43	19.43
HSUPA Subtest-5	21.58	21.42	21.42

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	1) GSM (GMSK, 1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link	1) GSM (GMSK,1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link
WCDMA Band V	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 22 Subpart H	Cellular Radiotelephone Service
3	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03

5.2 EFFECTIVE RADIATED POWER (ERP)

Test Requirement: FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)

Test Method: KDB 971168 D01v03& ANSI/TIA-603-E-2016

Limit:

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

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 ERP (dBm)				
Channel	**GSM 1Tx-slot**	**WCDMA RMC 12.2Kbps**	**Limit (dBm)**	**Result**
Lowest	28.78	18.06	38.45	Pass
Middle	30.40	18.07	38.45	Pass
Highest	31.53	18.66	38.45	Pass

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

Limit:

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

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 22.913(a)

Test Method: KDB 971168 D01v03

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

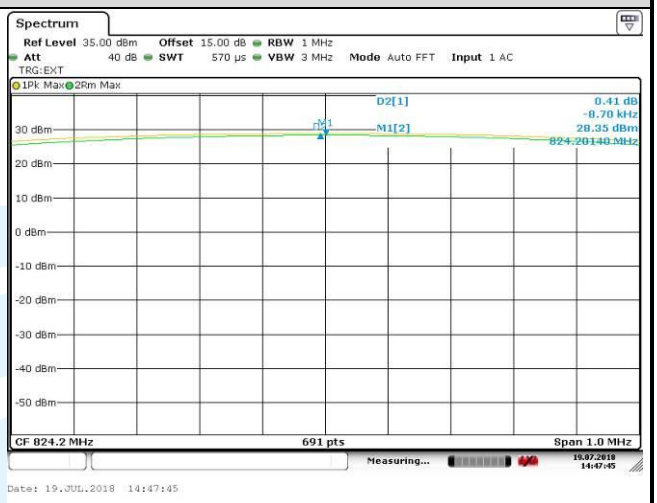
Peak-to-average ratio (dB)					
Channel	**GSM 1Tx-slot**	**GPRS 1Tx-slot**	**EDGE 1Tx-slot**	**Limit (dBm)**	**Result**
Lowest	0.60	0.41	N/A	13	Pass
Middle	0.58	0.56	N/A	13	Pass
Highest	0.42	0.31	N/A	13	Pass

Channel	**WCDMA RMC 12.2Kbps**	**HSDPA**	**HSUPA**	**Limit (dBm)**	**Result**
Lowest	2.99	3.07	3.16	13	Pass
Middle	2.81	3.25	3.13	13	Pass
Highest	2.81	3.36	3.04	13	Pass

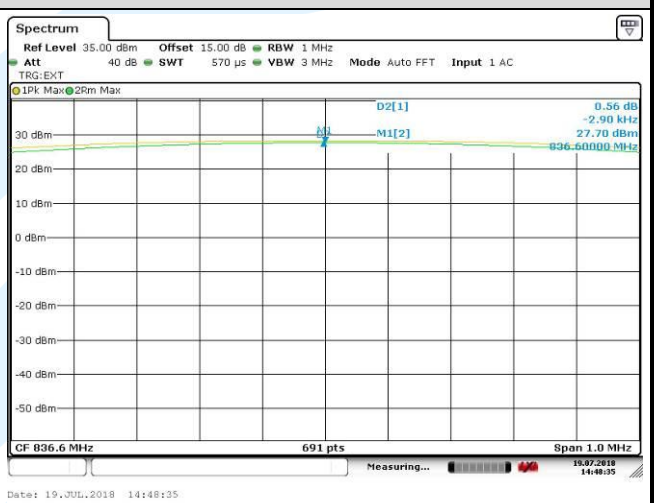
The test plot as follows:

GSM 1Tx-slot

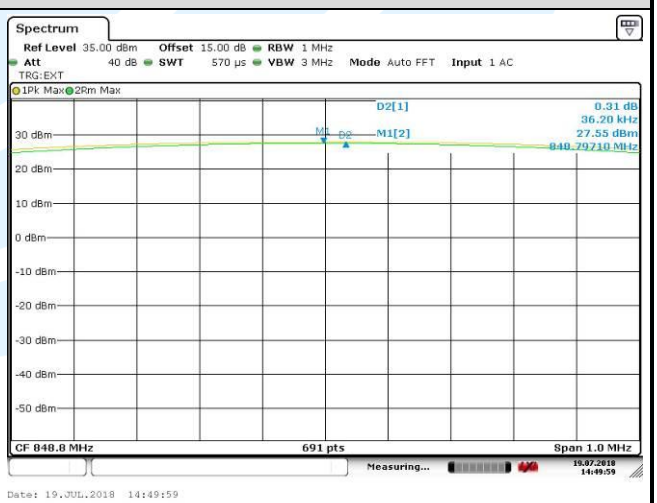
Lowest Channel



Middle Channel



Highest Channel



WCDMA RMC 12.2Kbps	HSDPA
Lowest Channel	
Middle Channel	
Highest Channel	

HSUPA	
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 22.917(b)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

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

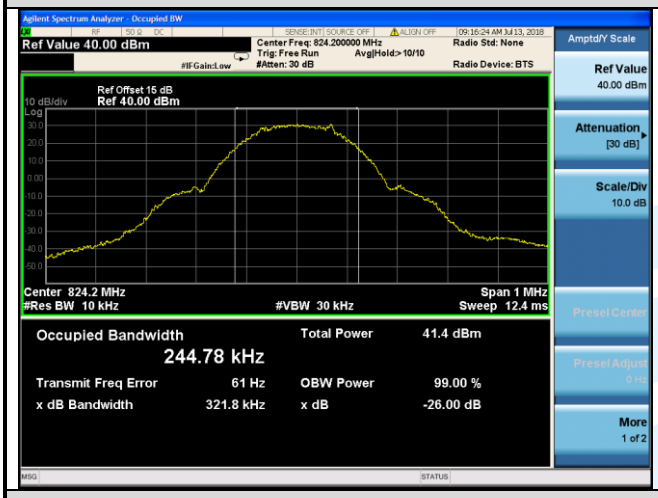
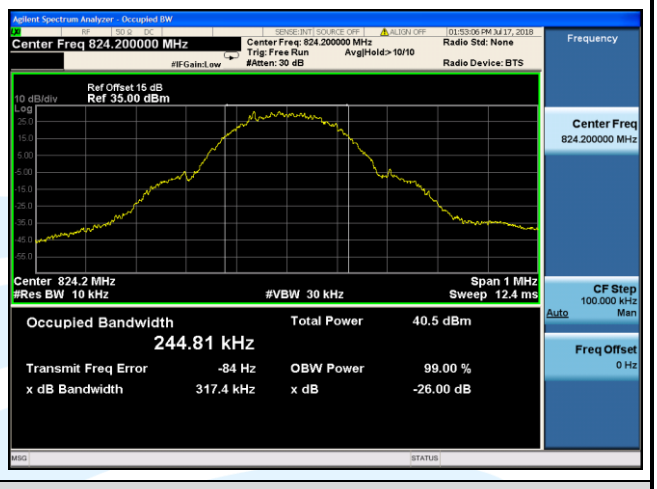
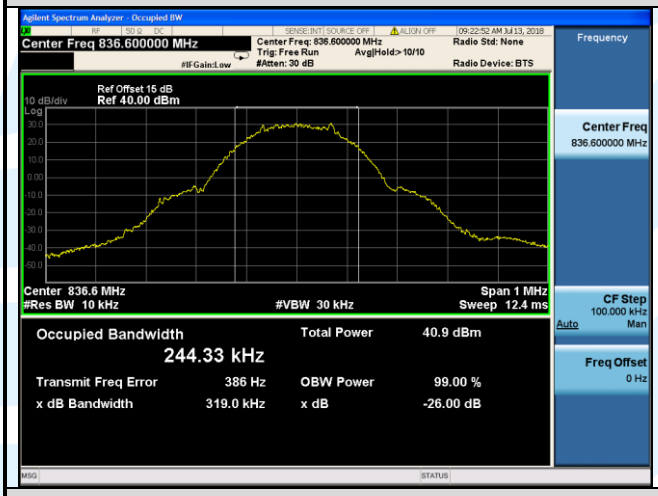
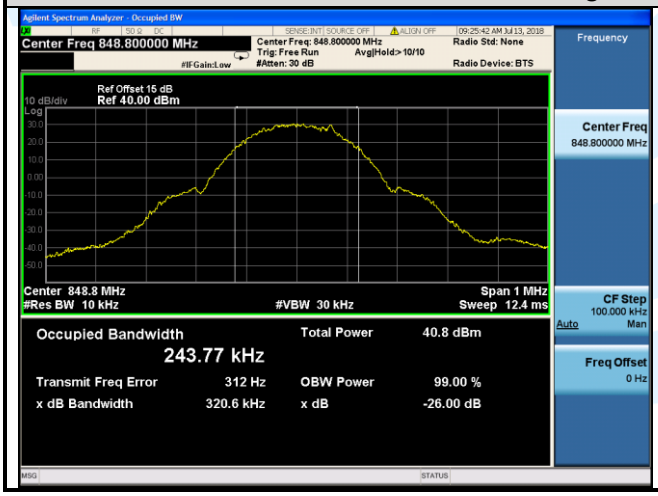
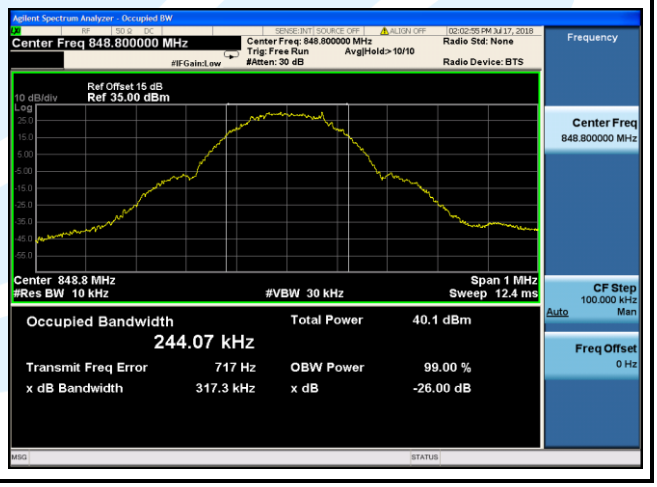
Test Results: Pass

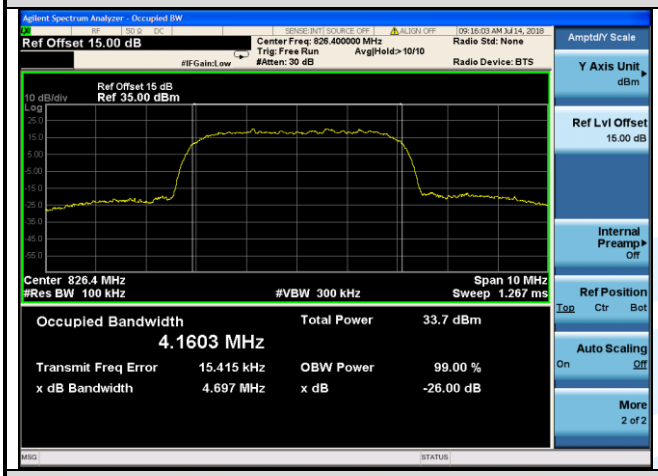
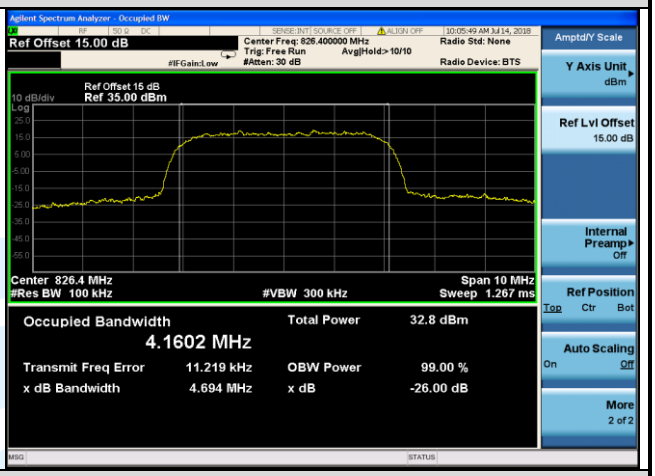
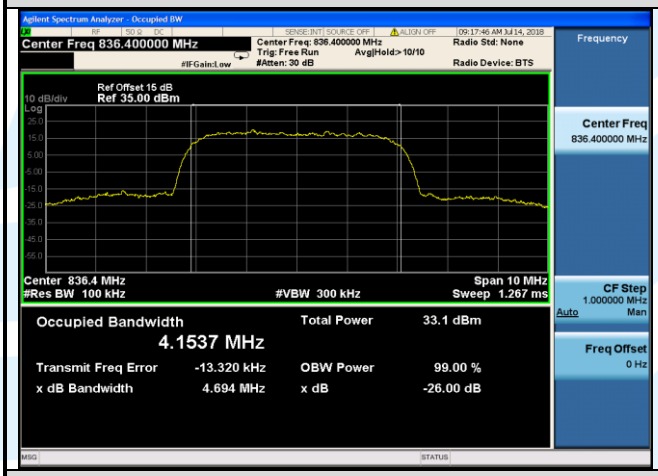
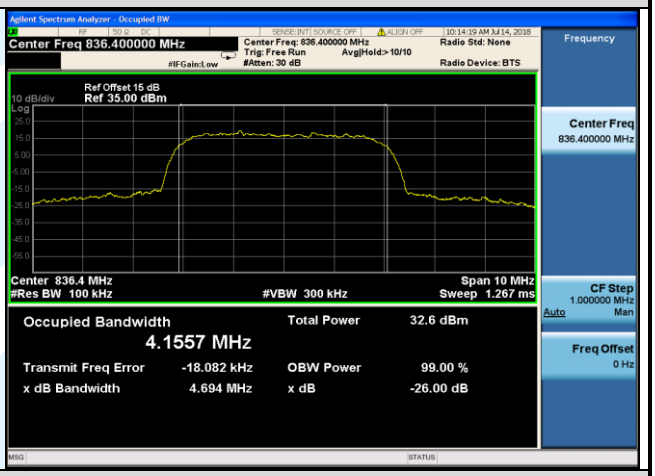
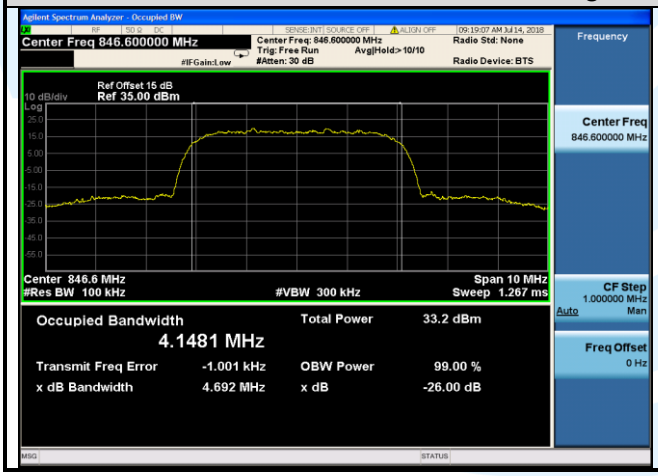
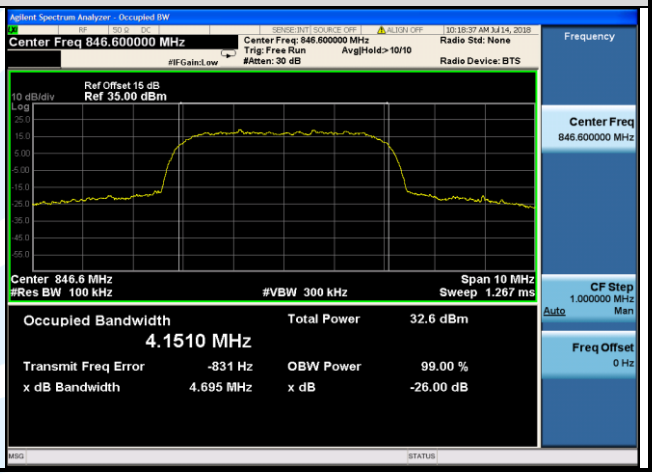
Test Data: See table below

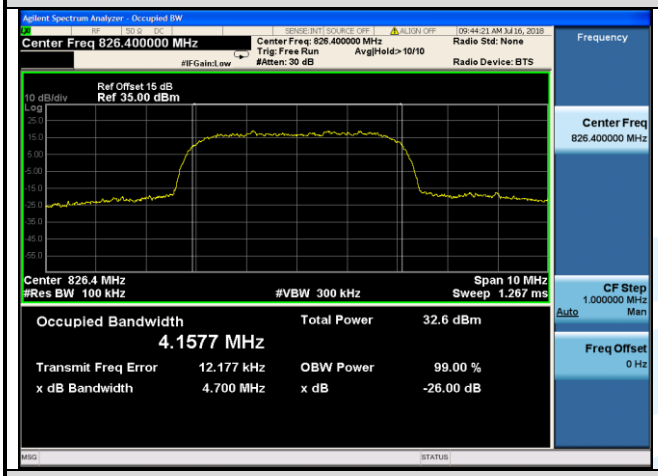
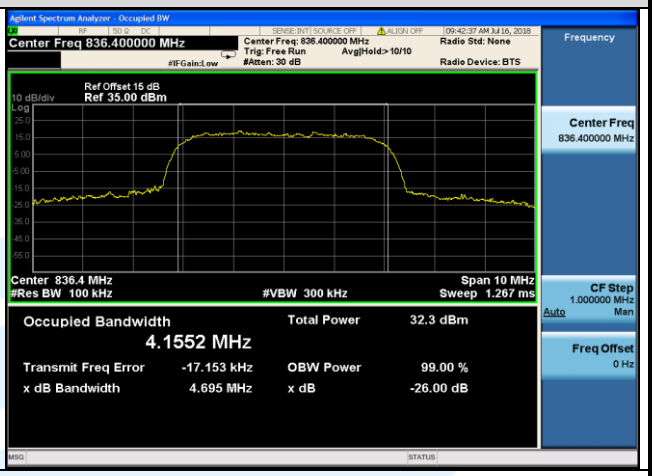
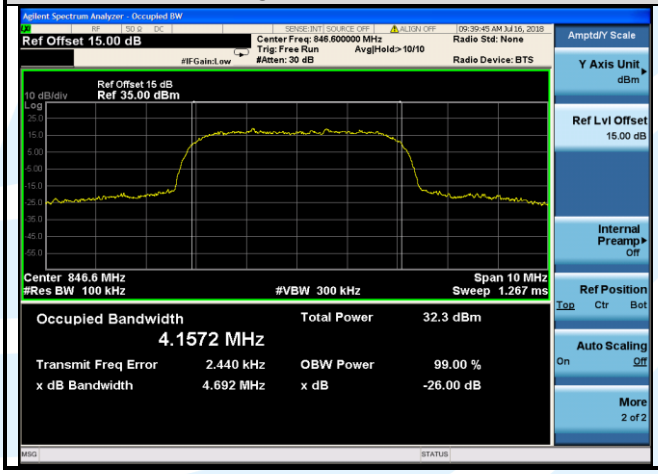
99% & 26 dB Bandwidth				
Test Mode	**Channel**	**Frequency (MHz)**	**26 dB BW (kHz)**	**99% BW (kHz)**
GSM 1Tx-slot	128	824.2	321.8	244.78
	190	836.6	319.0	244.33
	251	848.8	320.6	243.77
GPRS 1Tx-slot	128	824.2	317.4	244.81
	190	836.6	316.4	246.50
	251	848.8	317.3	244.07

99% & 26 dB Bandwidth				
Test Mode	**Channel**	**Frequency (MHz)**	**26 dB BW (MHz)**	**99% BW (MHz)**
WCDMA RMC 12.2Kbps	4132	826.4	4.697	4.1603
	4182	836.4	4.694	4.1537
	4233	846.6	4.692	4.1481
HSDPA	4132	826.4	4.694	4.1602
	4182	836.4	4.694	4.1557
	4233	846.6	4.695	4.1510
HSUPA	4132	826.4	4.700	4.1577
	4182	836.4	4.695	4.1552
	4233	846.6	4.692	4.1572

The test plot as follows:

GSM	GPRS
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

WCDMA	HSDPA
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

HSUPA	
Lowest Channel	**Middle Channel**
	
Highest Channel	
	N/A

5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

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:

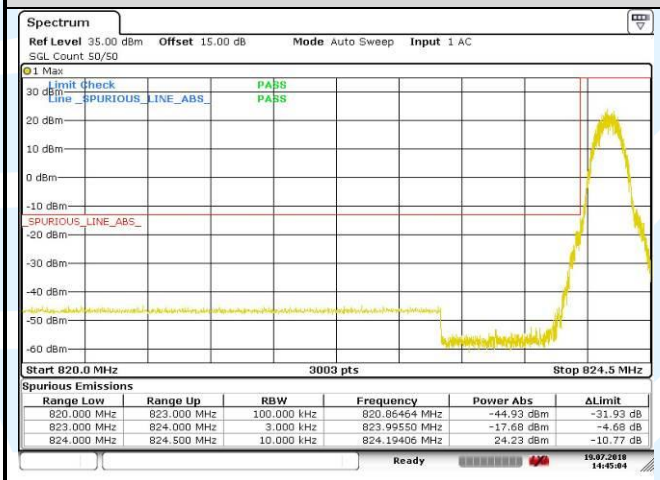
GSM

Lowest Channel

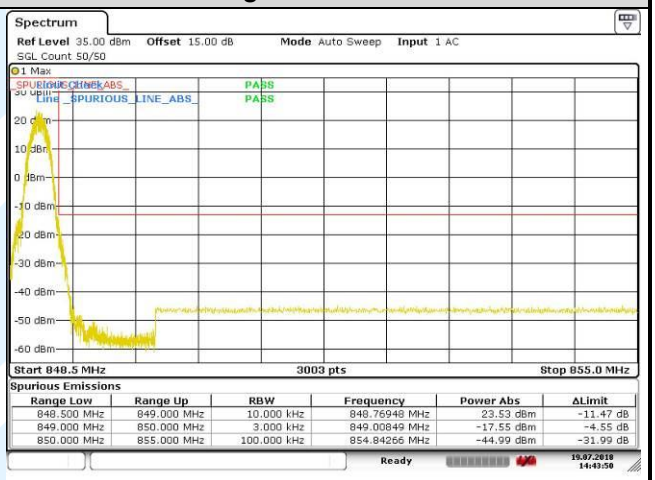
Highest Channel

GPRS 1Tx-slot

Lowest Channel



Highest Channel



WCDMA RMC 12.2Kbps

Lowest Channel

Highest Channel

HSDPA

Lowest Channel

Highest Channel

HSUPA

Lowest Channel

Highest Channel

5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

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.

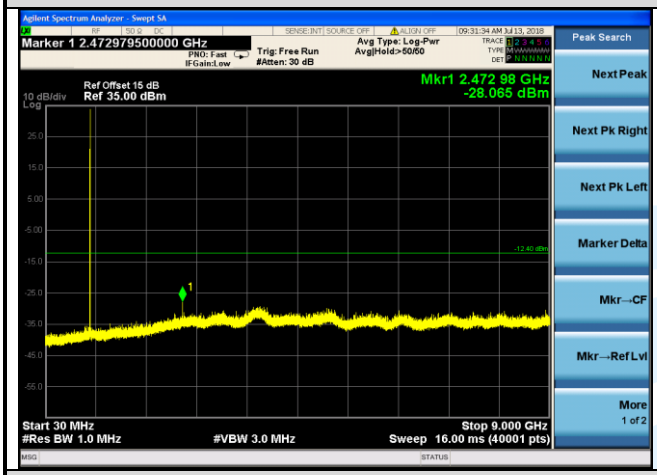
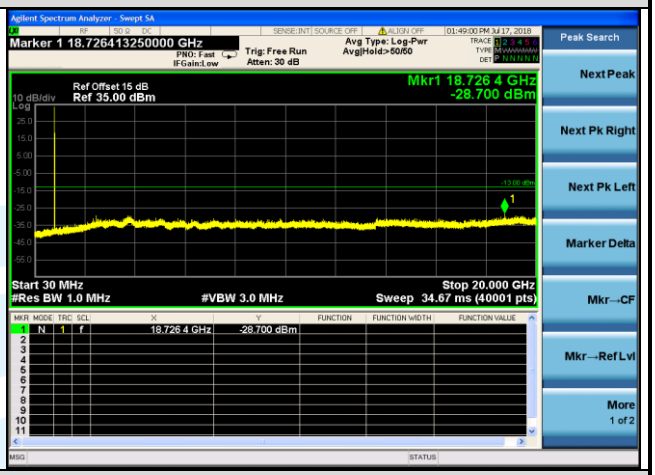
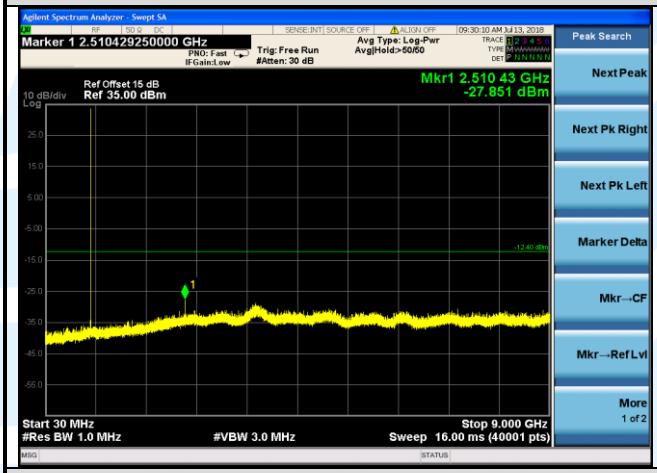
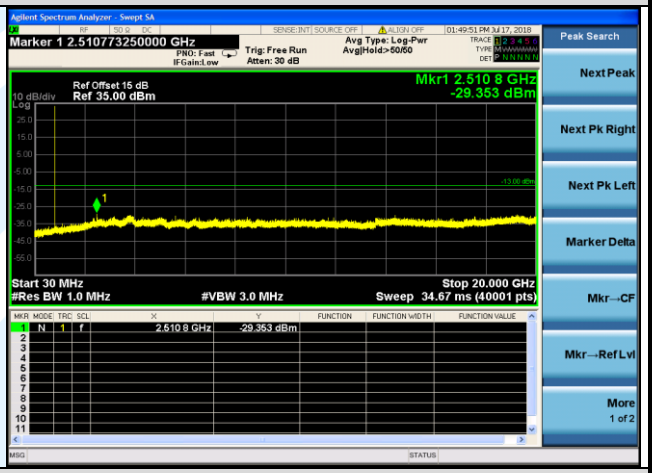
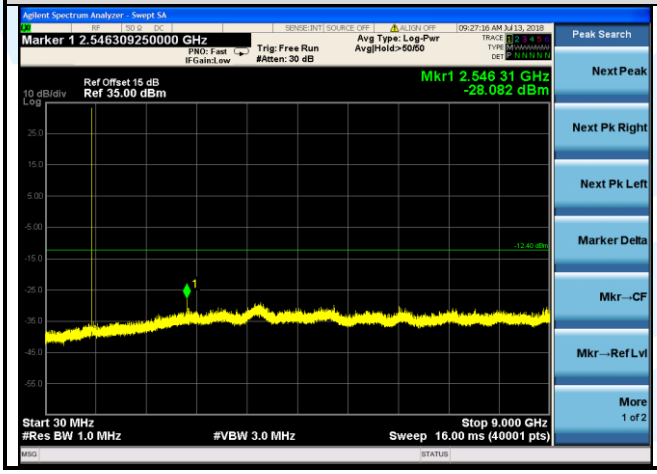
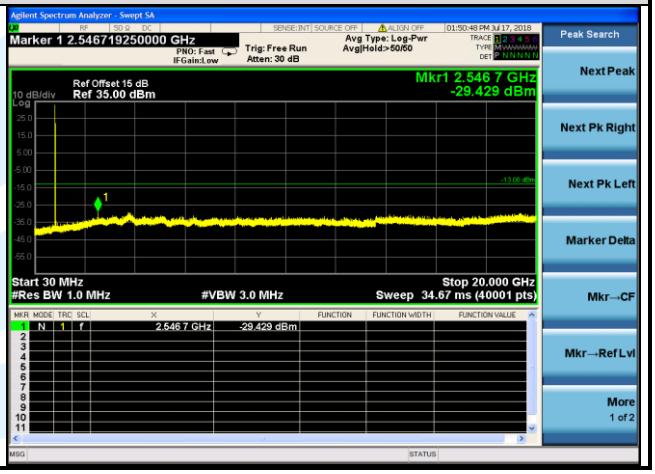
Test Setup: Refer to section 4.2.2 for details.

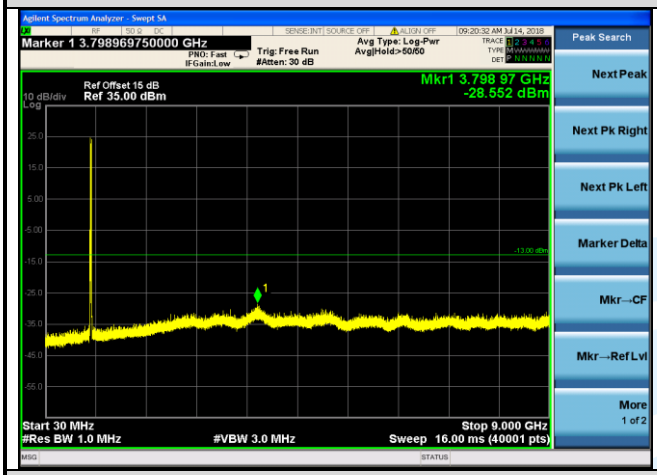
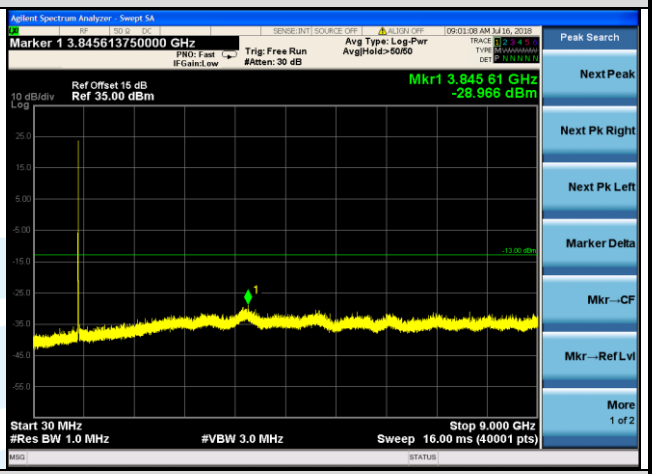
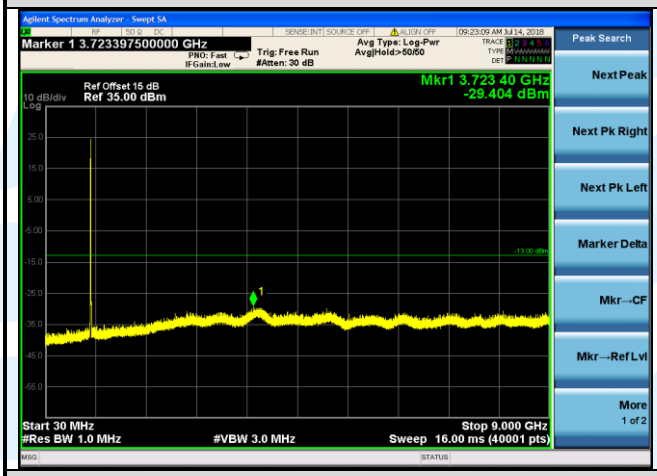
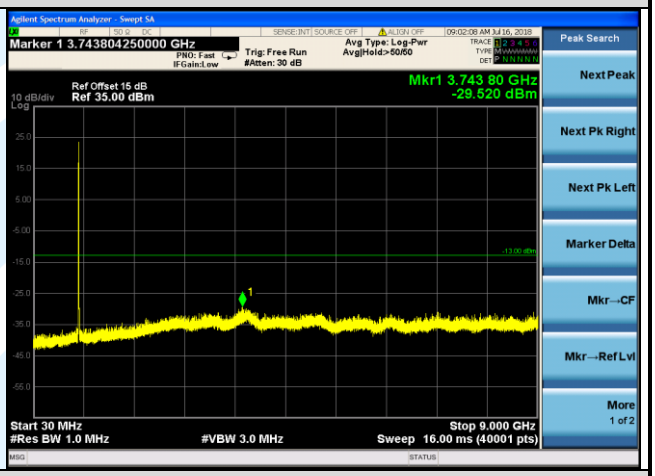
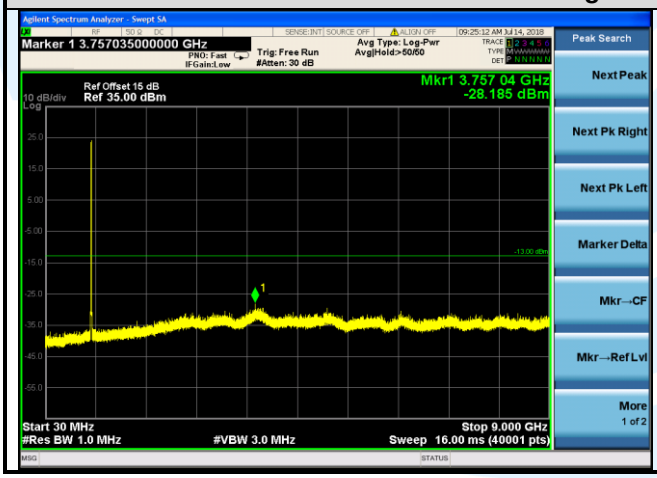
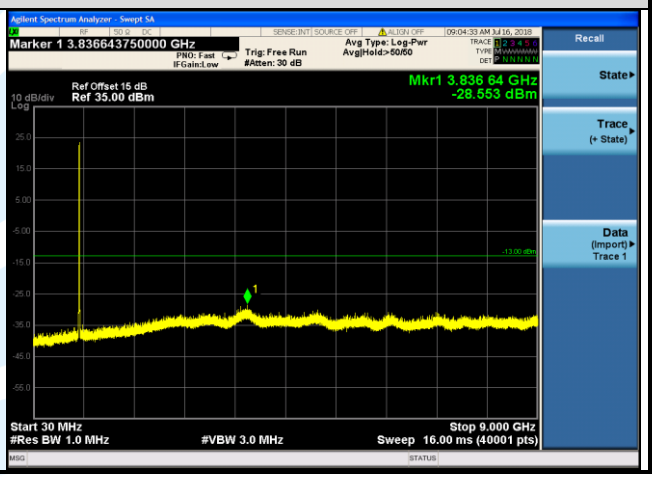
Instruments Used: Refer to section 3 for details

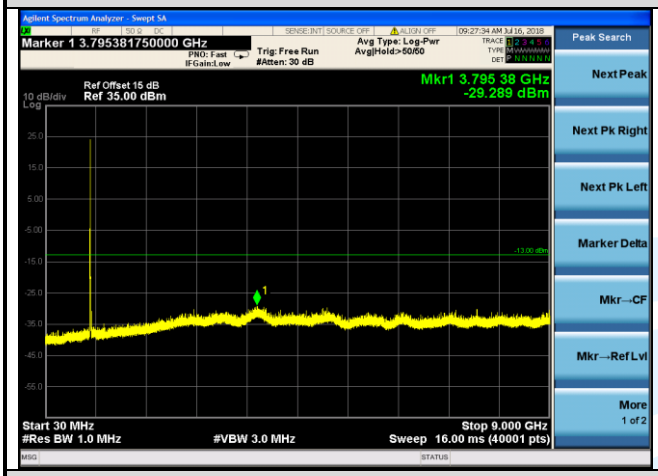
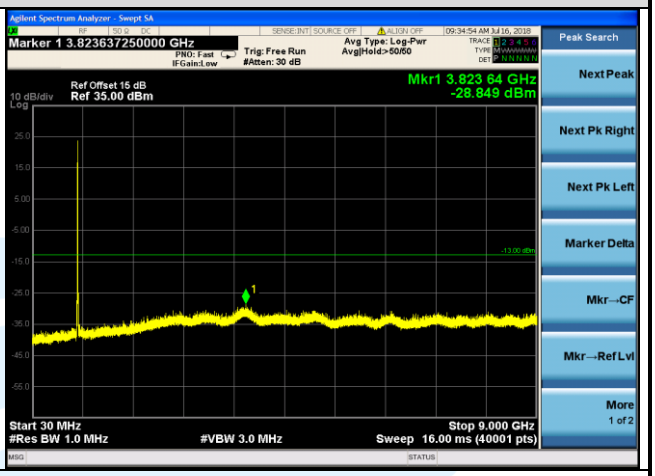
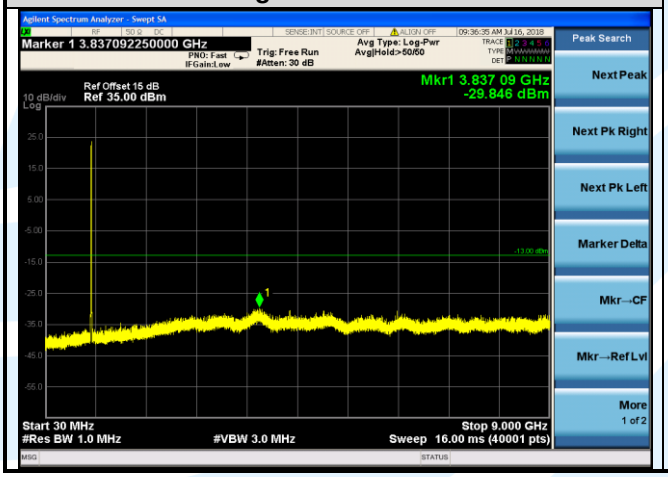
Test Mode: Link mode

Test Results: Pass

The test plot as follows:

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

WCDMA RMC 12.2Kbps	HSDPA
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

HSUPA	
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 22.917(a)(b)

Test Method: ANSI/TIA-603-E-2016 & KDB 971168 D01v03

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 **错误!未找到引用源。** positioning which it is worse case.
12) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

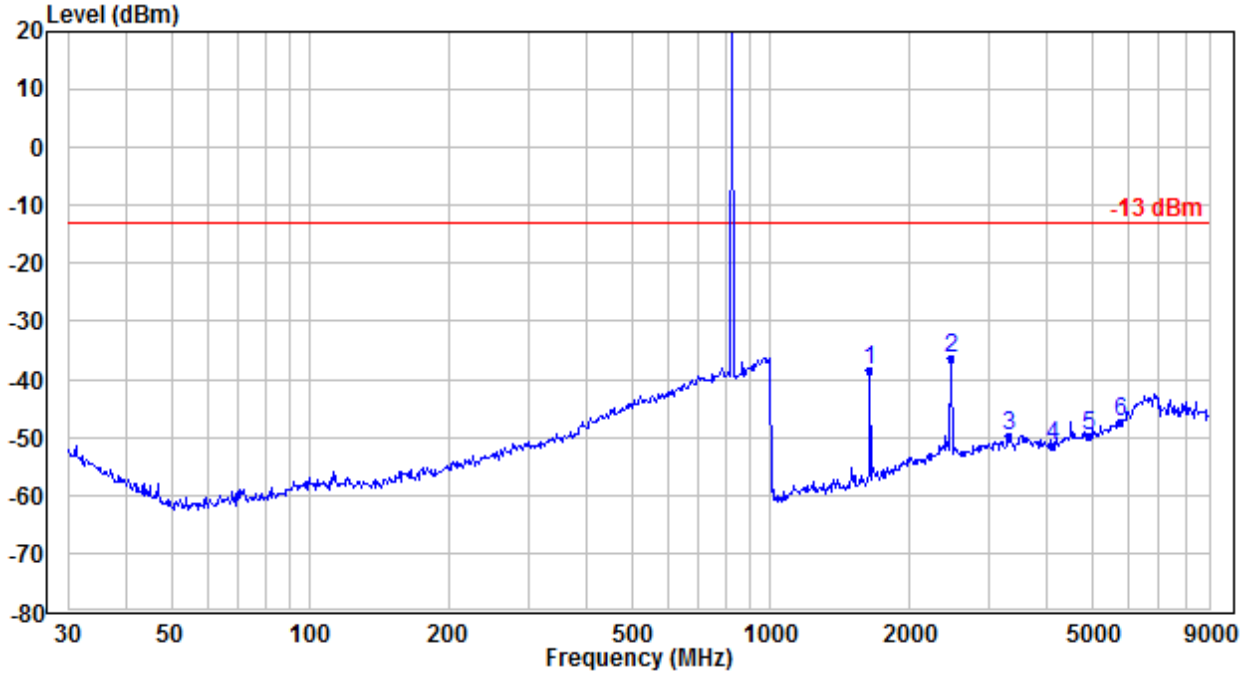
Test Result: Pass

The measurement data as follows:

Radiated Emission Test Data

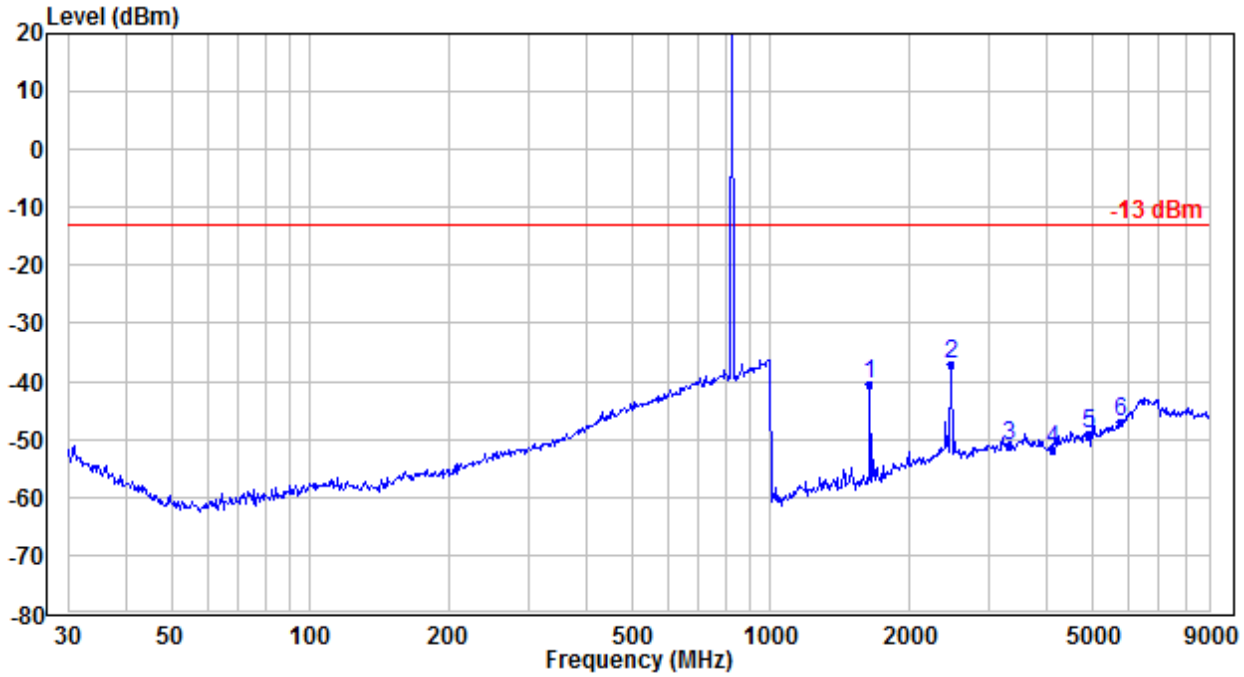
GSM 1Tx-slot_Lowest Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1648.400	-81.26	42.95	-38.31	-13.00	-25.31	Peak
2	2472.600	-84.32	48.05	-36.27	-13.00	-23.27	Peak
3	3296.800	-103.57	53.64	-49.93	-13.00	-36.93	Peak
4	4121.000	-109.06	57.74	-51.32	-13.00	-38.32	Peak
5	4945.200	-109.91	60.28	-49.63	-13.00	-36.63	Peak
6	5769.400	-112.82	65.59	-47.23	-13.00	-34.23	Peak

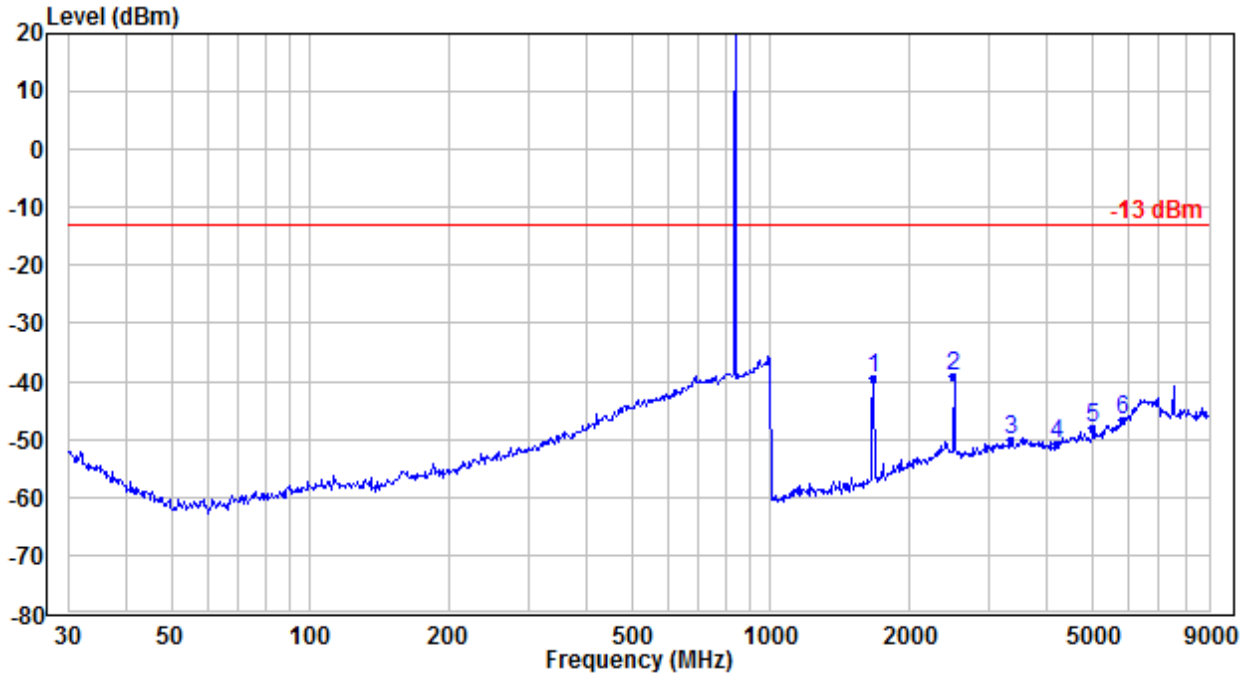
Vertical



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1648.400	-83.49	42.95	-40.54	-13.00	-27.54	Peak
2	2472.600	-85.04	48.05	-36.99	-13.00	-23.99	Peak
3	3296.800	-104.93	53.64	-51.29	-13.00	-38.29	Peak
4	4121.000	-109.59	57.74	-51.85	-13.00	-38.85	Peak
5	4945.200	-109.47	60.28	-49.19	-13.00	-36.19	Peak
6	5769.400	-112.59	65.59	-47.00	-13.00	-34.00	Peak

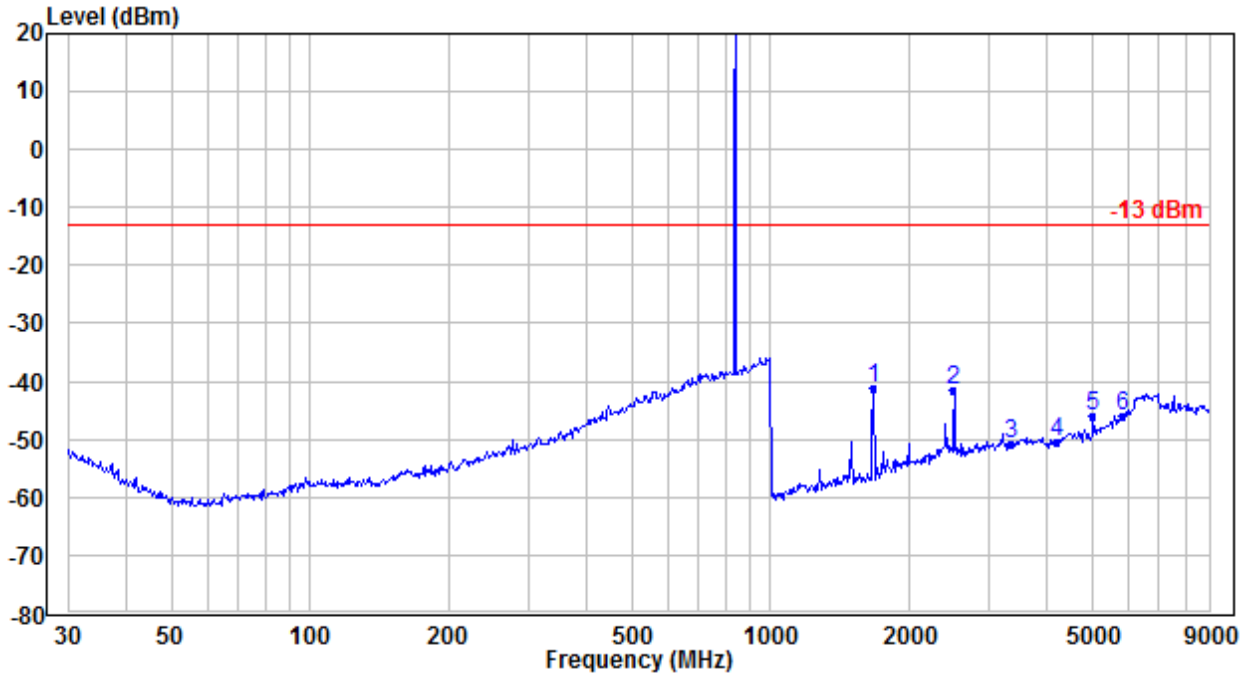
GSM 1Tx-slot_Middle Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1673.200	-82.68	43.13	-39.55	-13.00	-26.55	Peak
2	2509.800	-87.42	48.23	-39.19	-13.00	-26.19	Peak
3	3346.400	-103.90	53.92	-49.98	-13.00	-36.98	Peak
4	4183.000	-108.68	57.75	-50.93	-13.00	-37.93	Peak
5	5019.600	-108.61	60.70	-47.91	-13.00	-34.91	Peak
6	5856.200	-112.99	66.22	-46.77	-13.00	-33.77	Peak

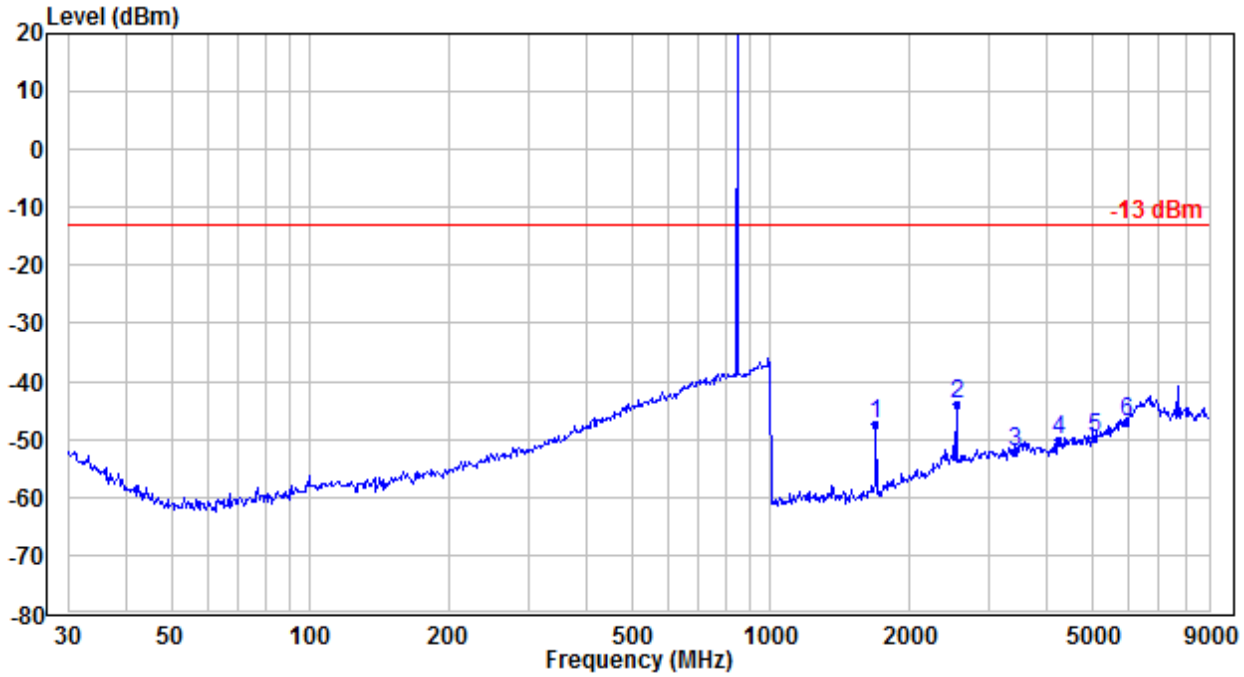
Vertical



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1673.200	-84.32	43.13	-41.19	-13.00	-28.19	Peak
2	2509.800	-89.69	48.23	-41.46	-13.00	-28.46	Peak
3	3346.400	-104.56	53.92	-50.64	-13.00	-37.64	Peak
4	4183.000	-108.04	57.75	-50.29	-13.00	-37.29	Peak
5	5019.600	-106.61	60.70	-45.91	-13.00	-32.91	Peak
6	5856.200	-112.03	66.22	-45.81	-13.00	-32.81	Peak

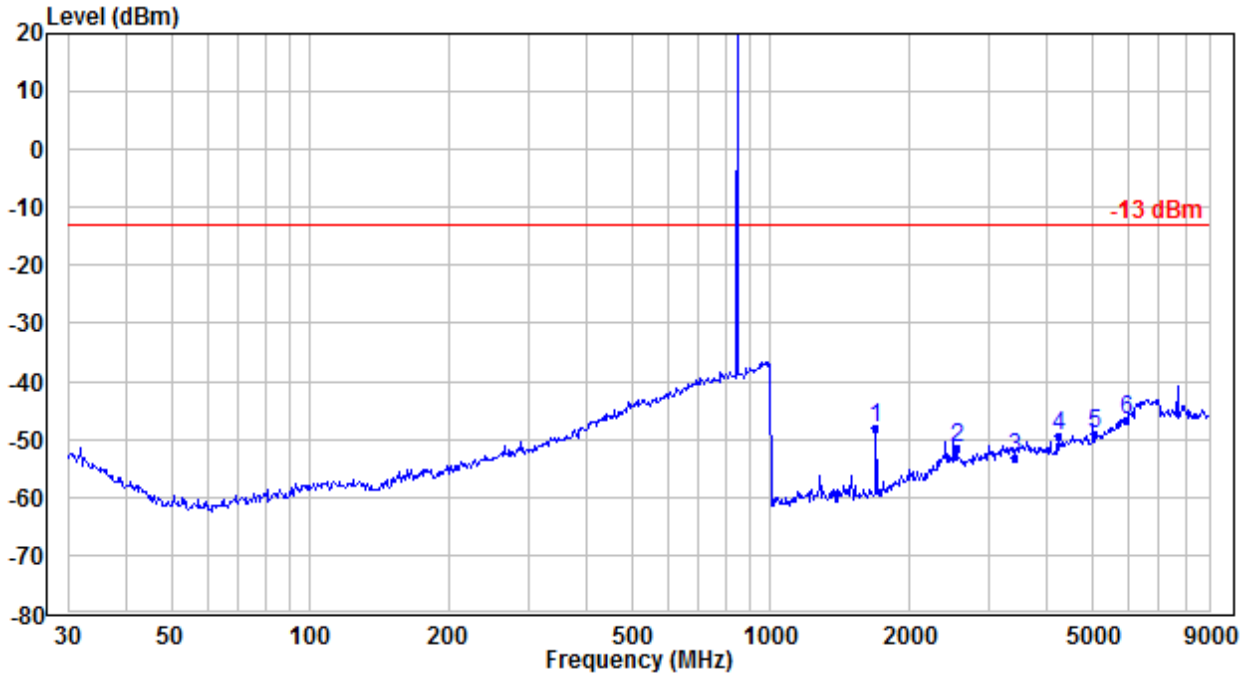
GSM 1Tx-slot_Highest Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1697.600	-90.49	43.30	-47.19	-13.00	-34.19	Peak
2	2546.400	-92.57	48.51	-44.06	-13.00	-31.06	Peak
3	3395.200	-106.51	54.19	-52.32	-13.00	-39.32	Peak
4	4244.000	-107.79	57.77	-50.02	-13.00	-37.02	Peak
5	5092.800	-110.90	61.14	-49.76	-13.00	-36.76	Peak
6	5941.600	-113.83	66.83	-47.00	-13.00	-34.00	Peak

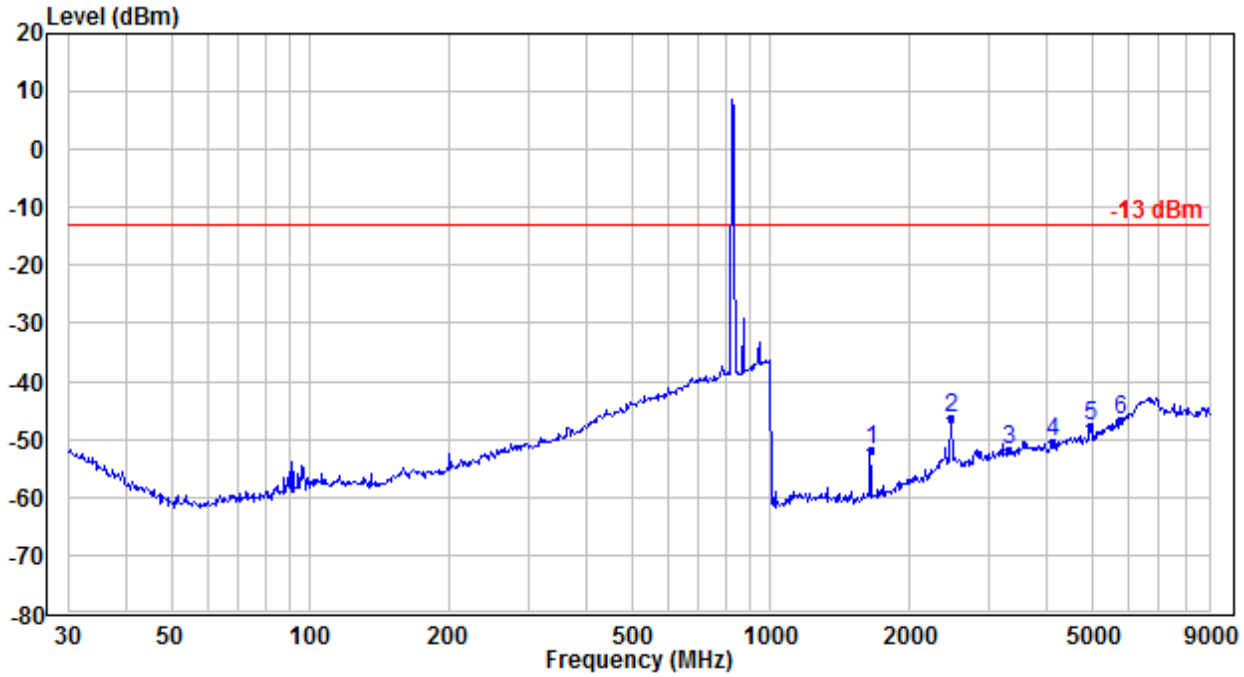
Vertical



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1697.600	-91.49	43.30	-48.19	-13.00	-35.19	Peak
2	2546.400	-99.91	48.51	-51.40	-13.00	-38.40	Peak
3	3395.200	-107.29	54.19	-53.10	-13.00	-40.10	Peak
4	4244.000	-107.29	57.77	-49.52	-13.00	-36.52	Peak
5	5092.800	-110.15	61.14	-49.01	-13.00	-36.01	Peak
6	5941.600	-113.41	66.83	-46.58	-13.00	-33.58	Peak

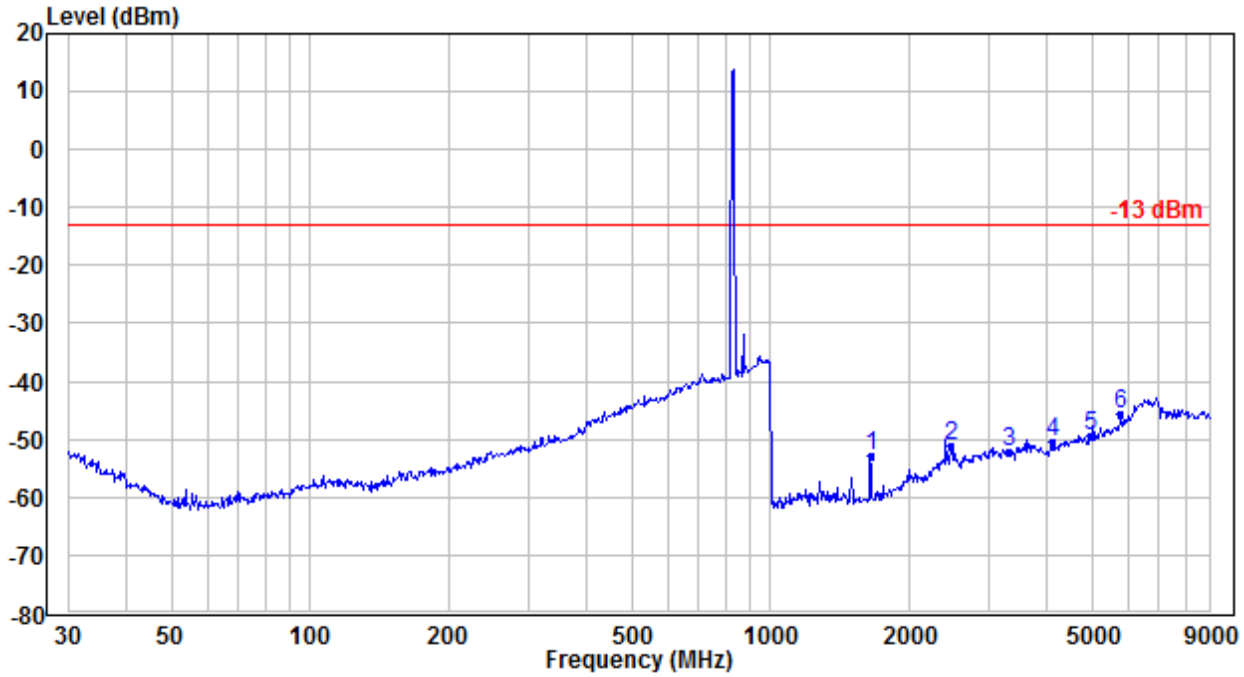
WCDMA RMC 12.2Kbps_Lowest Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1652.800	-94.71	42.99	-51.72	-13.00	-38.72	Peak
2	2479.200	-94.42	48.08	-46.34	-13.00	-33.34	Peak
3	3305.600	-105.50	53.69	-51.81	-13.00	-38.81	Peak
4	4132.000	-108.05	57.74	-50.31	-13.00	-37.31	Peak
5	4958.400	-108.02	60.35	-47.67	-13.00	-34.67	Peak
6	5784.800	-112.35	65.69	-46.66	-13.00	-33.66	Peak

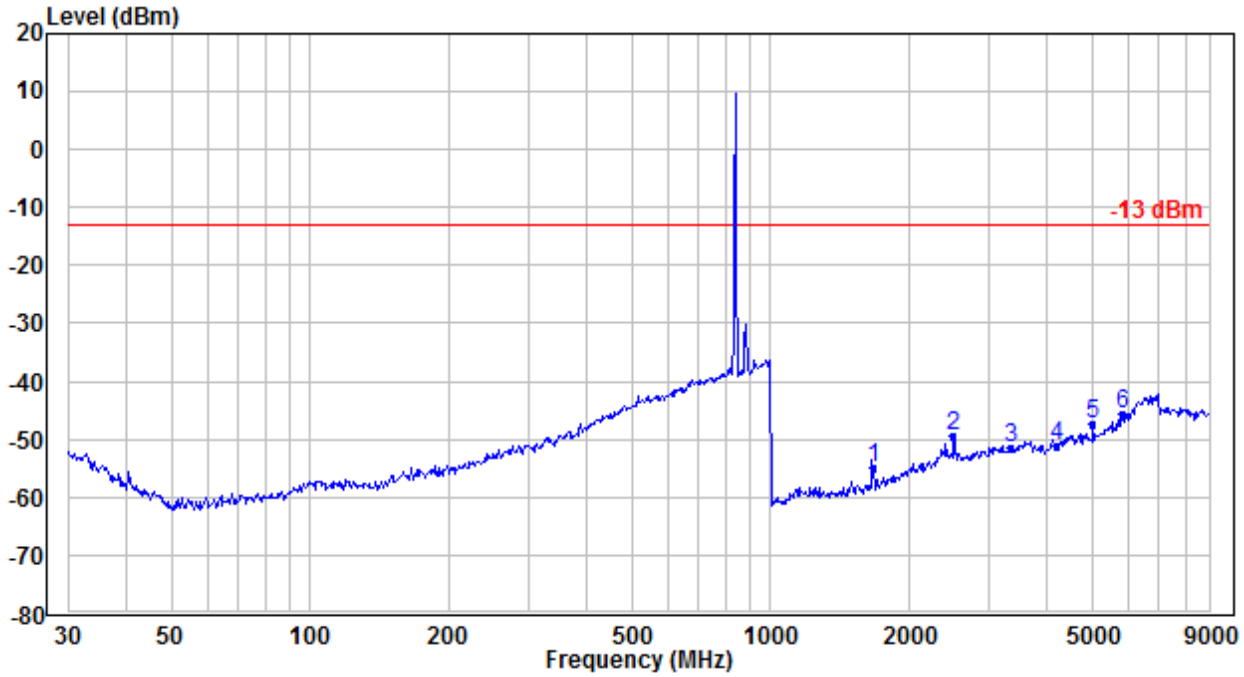
Vertical



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1652.800	-95.95	42.99	-52.96	-13.00	-39.96	Peak
2	2479.200	-99.29	48.08	-51.21	-13.00	-38.21	Peak
3	3305.600	-105.98	53.69	-52.29	-13.00	-39.29	Peak
4	4132.000	-108.27	57.74	-50.53	-13.00	-37.53	Peak
5	4958.400	-109.64	60.35	-49.29	-13.00	-36.29	Peak
6	5784.800	-111.47	65.69	-45.78	-13.00	-32.78	Peak

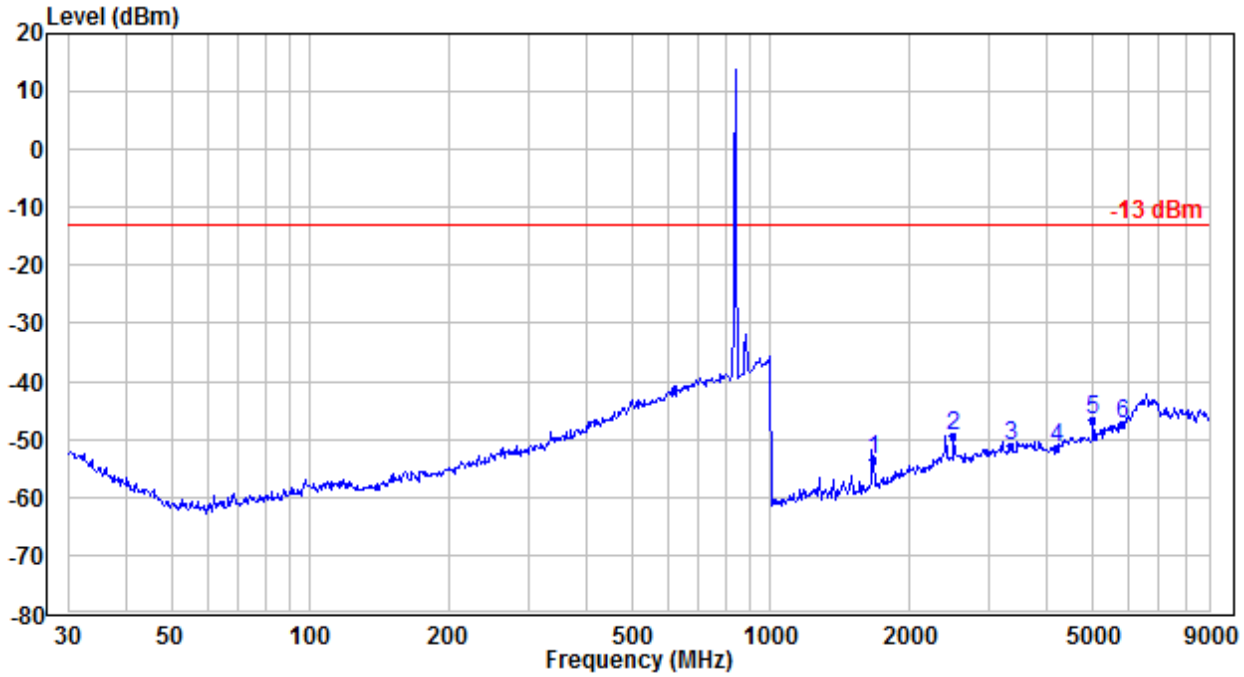
WCDMA RMC 12.2Kbps_Middle Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1672.800	-98.09	43.13	-54.96	-13.00	-41.96	Peak
2	2509.200	-97.75	48.23	-49.52	-13.00	-36.52	Peak
3	3345.600	-105.27	53.92	-51.35	-13.00	-38.35	Peak
4	4182.000	-109.04	57.75	-51.29	-13.00	-38.29	Peak
5	5018.400	-108.15	60.68	-47.47	-13.00	-34.47	Peak
6	5854.800	-111.95	66.20	-45.75	-13.00	-32.75	Peak

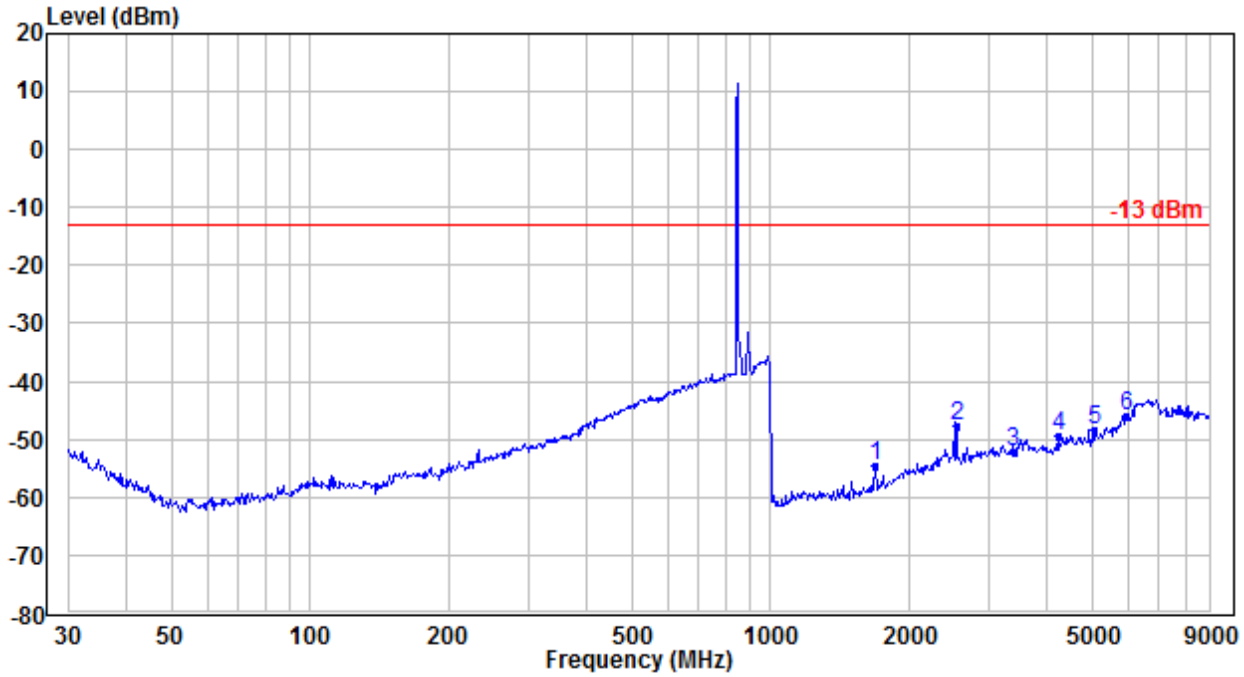
Vertical



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1672.800	-96.77	43.13	-53.64	-13.00	-40.64	Peak
2	2509.200	-97.74	48.23	-49.51	-13.00	-36.51	Peak
3	3345.600	-105.17	53.92	-51.25	-13.00	-38.25	Peak
4	4182.000	-109.29	57.75	-51.54	-13.00	-38.54	Peak
5	5018.400	-107.46	60.68	-46.78	-13.00	-33.78	Peak
6	5854.800	-113.42	66.20	-47.22	-13.00	-34.22	Peak

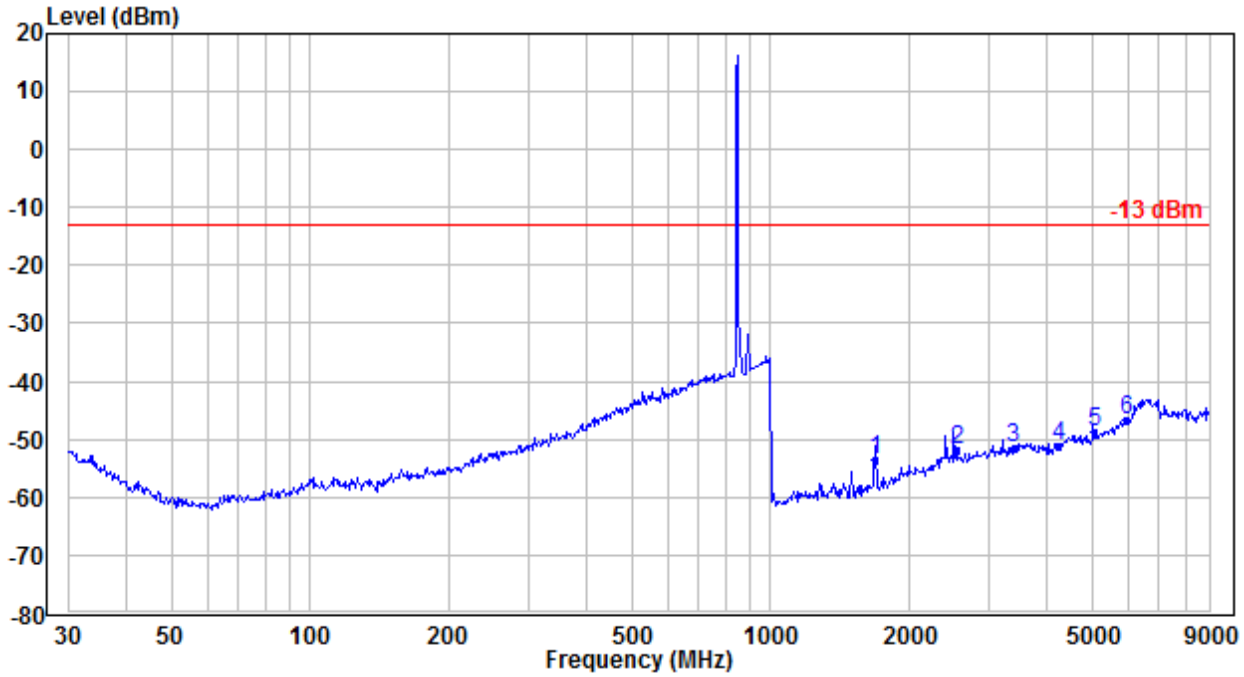
WCDMA RMC 12.2Kbps_Highest Channel

Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1693.200	-97.77	43.27	-54.50	-13.00	-41.50	Peak
2	2539.800	-95.99	48.46	-47.53	-13.00	-34.53	Peak
3	3386.400	-106.25	54.15	-52.10	-13.00	-39.10	Peak
4	4233.000	-107.33	57.77	-49.56	-13.00	-36.56	Peak
5	5079.600	-109.59	61.06	-48.53	-13.00	-35.53	Peak
6	5926.200	-112.85	66.73	-46.12	-13.00	-33.12	Peak

Vertical



No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1693.200	-96.69	43.27	-53.42	-13.00	-40.42	Peak
2	2539.800	-100.22	48.46	-51.76	-13.00	-38.76	Peak
3	3386.400	-105.57	54.15	-51.42	-13.00	-38.42	Peak
4	4233.000	-108.85	57.77	-51.08	-13.00	-38.08	Peak
5	5079.600	-109.83	61.06	-48.77	-13.00	-35.77	Peak
6	5926.200	-113.49	66.73	-46.76	-13.00	-33.76	Peak

Remark:

1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355

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

Limits: The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

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, 3.5 Vdc, Normal, 3.8 Vdc and High voltage, 4.3 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	190 / 836.6	VL	TN	-26	-0.0311	± 2.5	Pass
		VN		-26	-0.0311	± 2.5	Pass
		VH		-26	-0.0311	± 2.5	Pass
		VN	50	-31	-0.0371	± 2.5	Pass
			40	-30	-0.0359	± 2.5	Pass
			30	-29	-0.0347	± 2.5	Pass
			20	-27	-0.0323	± 2.5	Pass
			10	-28	-0.0335	± 2.5	Pass
			0	-24	-0.0287	± 2.5	Pass
			-10	-27	-0.0323	± 2.5	Pass
			-20	-28	-0.0335	± 2.5	Pass
			-30	-32	-0.0383	± 2.5	Pass

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
WCDMA RMC 12.2Kbps							
BPSK	4182 / 836.4	VL	TN	31	0.0371	± 2.5	Pass
		VN		31	0.0371	± 2.5	Pass
		VH		32	0.0383	± 2.5	Pass
		VN	50	28	0.0335	± 2.5	Pass
			40	27	0.0323	± 2.5	Pass
			30	30	0.0359	± 2.5	Pass
			20	30	0.0359	± 2.5	Pass
			10	29	0.0347	± 2.5	Pass
			0	29	0.0347	± 2.5	Pass
			-10	28	0.0335	± 2.5	Pass
			-20	27	0.0323	± 2.5	Pass
			-30	28	0.0335	± 2.5	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 ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.