FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	10870, 10869
FCC ID	:	IHDT56WK4
STANDARD	:	FCC 47 CFR Part 2, 22(H), 24(E), 27(L)
CLASSIFICATION	:	PCS Licensed Transmitter Held to Ear (PCE)

This is a data re-used report which is only valid together with the original test report. The product was received on Jun. 17, 2017 and testing was completed on Jul. 12, 2017. We, Sporton International (KunShan) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-D-2010 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (KunShan) INC., the test report shall not be reproduced except in full.

Prepared by: James Huang / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory 2627

Sporton International (KunShan) INC.

No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG761702-03A	Rev. 01	Initial issue of report	Aug. 07, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049 §22.917(b) §24.238(b) §27.53(g)	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22H	PASS	-
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(h)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 42.05 dB at 7521.000 MHz

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	10870, 10869
FCC ID	IHDT56WK4
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+ (16QAM uplink is not supported)/LTE/NFC WLAN 2.4G 802.11b/g/n HT20/HT40/ WLAN 5G 802.11a/n HT20/HT40/ WLAN 5G 802.11ac VHT20/VHT40/VHT80/ Bluetooth V3.0 + EDR/ Bluetooth V4.0 LE/ Bluetooth v4.1 LE / Bluetooth v4.2 LE / Bluetooth v5.0 LE
IMEI Code	Conducted: 356485080009395/356485080009403 Radiation: 356485080012159/356485080012167
HW Version	DVT2
SW Version	NPW26.75
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1(Model name: 10869) and sample 2(Model name: 10870), the differences between two samples are only for SIM slot, sample 1 is dual SIM slot, sample 2 is single SIM slot. We only choose dual SIM sample to perform full tests.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	**GSM/GPRS/EDGE:** 850: 824.2 MHz ~ 848.8 MHz 1900: 1850.2 MHz ~ 1909.8MHz **WCDMA:** Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz Band IV: 1712.4 MHz ~ 1752.6 MHz
Rx Frequency	**GSM/GPRS/EDGE:** 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz **WCDMA:** Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz Band IV: 2112.4 MHz ~ 2152.6 MHz
Maximum Output Power to Antenna	**WCDMA:** Band V: 23.10 dBm Band II: 23.28 dBm Band IV: 23.13 dBm
Antenna Type	Fixed Internal Antenna
Antenna Gain	Cellular Band: -1.60 dBi PCS Band: -1.60 dBi AWS Band: -0.90 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (uplink is not supported) DC-HSDPA : 64QAM

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter 1 (US)	**Brand Name**	Motorola (Salom)	**Model Name**	SC-22
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5/9/12 Vdc, 3000/1600/1200 mA		
AC Adapter 2 (US)	**Brand Name**	Motorola (Chenyang)	**Model Name**	SC-22
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5/9/12 Vdc, 3000/1600/1200 mA		
AC Adapter 3 (US)	**Brand Name**	Motorola (LiteOn)	**Model Name**	SC-22
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5/9/12 Vdc, 3000/1600/1200 mA		
Battery	**Brand Name**	Motorola (Sunwoda)	**Model Name**	HX40
	Power Rating	3.8Vdc, 2810mAh	**Type**	Li-ion
Earphone	**Brand Name**	Motorola (Cosonic)	**Model Name**	SH38C16618
	Signal Line Type	1.10 meter, non-shielded cable, without ferrite core		
USB Cable 1	**Brand Name**	Motorola (Saibao)	**Model Name**	SKN6473A
	Signal Line Type	1.10 meter, shielded cable, without ferrite core		
USB Cable 2	**Brand Name**	Motorola (Foxlink)	**Model Name**	SKN6473A
	Signal Line Type	1.10 meter, shielded cable, without ferrite core		
USB Cable 3	**Brand Name**	Motorola (Cabletech)	**Model Name**	SKN6473A
	Signal Line Type	1.10 meter, shielded cable, without ferrite core		

1.6 Modification of EUT

No modifications are made to the EUT during all test items.

1.7 Re-use of Measured Data

1.7.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: 10870, 10869, FCC ID: IHDT56WK4) is electrically identical to the reference device (Model: 10647, FCC ID: IHDT56WK1) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 178919 D01.

1.7.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., some difference of population/depopulation to enable support of different cellular bands, please refer to the Operational Description.

The re-used RF data includes the following bands provided in Appendix D (Sporton RF Report No. FG761702-01A for the reference device Model: 10647, FCC ID: IHDT56WK1):

1.7.3 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for radiated spurious emission, the test result were consistent with FCC ID: IHDT56WK1.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

1.7.4 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test/RF Exposure	Report Title/Section
PCE (2G)	IHDT56WK1	Part22H.24E.27L (FG761702-01A)	WWAN 2G all band
PCE (LTE)	IHDT56WK1	Part22H.24E.27L.27M.27H (FG761702-01B)	WWAN LTE band 7/12/17

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

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22H	WCDMA Band V RMC 12.2Kbps	BPSK	0.0861	0.0347 ppm	4M13F9W
Part 24E	WCDMA Band II RMC 12.2Kbps	BPSK	0.1472	0.0176 ppm	4M14F9W
Part 27L	WCDMA Band IV RMC 12.2Kbps	BPSK	0.1671	0.0248 ppm	4M13F9W

1.9 Testing Location

Test Site	Sporton International (KunShan) INC.		
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sporton Site No.		FCC Registration No.
	TH01-KS	03CH03-KS	306251

Note: The test site complies with ANSI C63.4 2014 requirement.

1.10 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 22(H), 24(E), 27(L)
- ANSI / TIA / EIA-603-D-2010
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

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

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

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

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 10th harmonic for WCDMA Band V.
2. 30 MHz to 10th harmonic for WCDMA Band IV.
3. 30 MHz to 10th harmonic for WCDMA Band II.

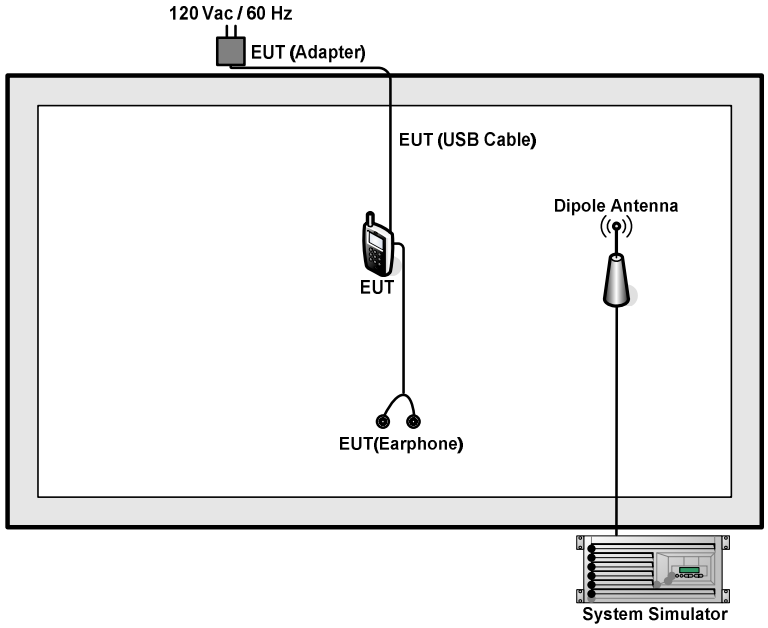
All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

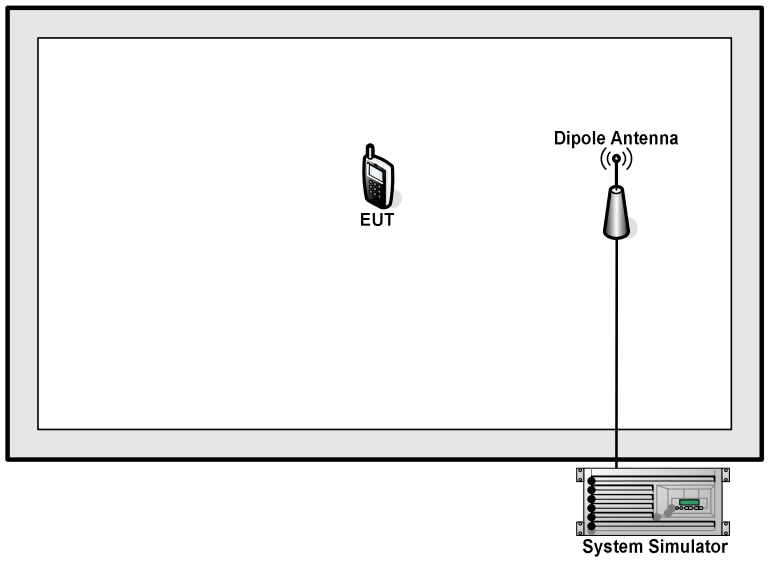
Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band IV	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System

For Part 22H, 24E



For Part 27L



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

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

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

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.4 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.4 + 10 = 14.4 (dB)

3 Conducted Test Result

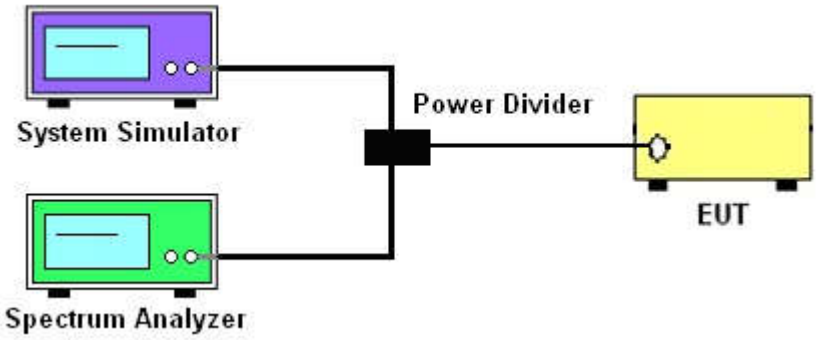
3.1 Measuring Instruments

See list of measuring instruments of this test report.

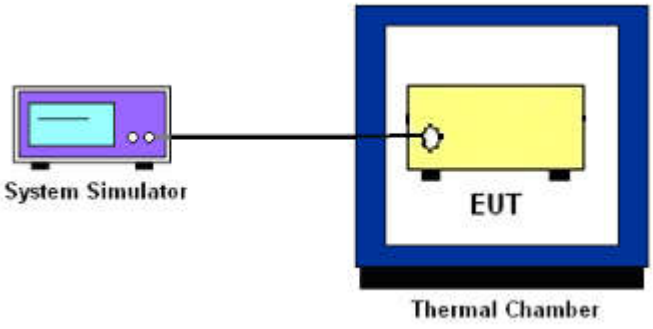
3.2 Test Setup

3.2.1 Conducted Output Power

3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for WCDMA Band II.

The EIRP of mobile transmitters must not exceed 1 Watts for WCDMA Band IV.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

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

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. Set EUT to transmit at maximum output power.
4. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
5. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer.

Record the maximum PAPR level associated with a probability of 0.1%.

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.6.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

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

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

3.6.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 4.2.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

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

3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
   =P(W) - [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

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

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

3.8.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

= P(W) - [43 + 10log(P)] (dB)

= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

= -13dBm.

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 D01 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 D01 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at 20±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

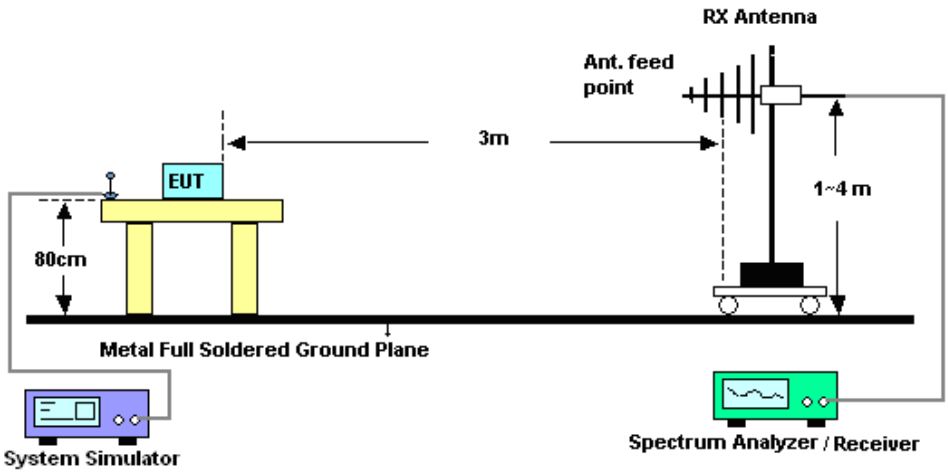
4 Radiated Test Items

4.1 Measuring Instruments

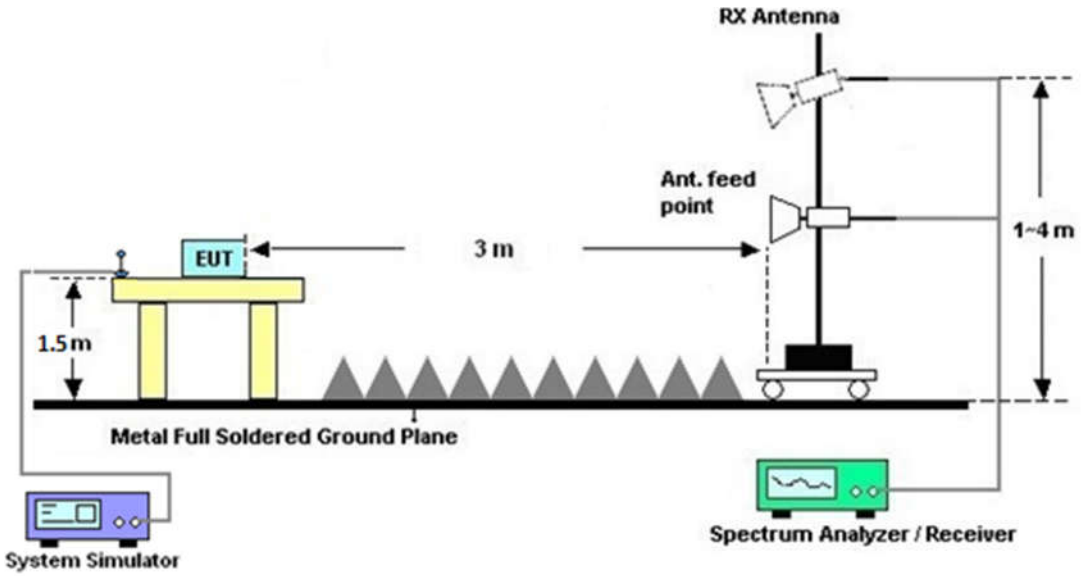
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

    = P(W) - [43 + 10log(P)] (dB)

    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

    = -13dBm.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 09, 2016	Jul. 02, 2017	Aug. 08, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 13, 2016	Jul. 02, 2017	Oct. 12, 2017	Conducted (TH01-KS)
Radio communication analyzer	Anritsu	MT8820C	6201300652	2G/3G/LTE Band	Aug. 08, 2016	Jul. 02, 2017	Aug. 07, 2017	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 18, 2017	Jul. 12, 2017	Apr. 17, 2018	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 22, 2017	Jul. 12, 2017	Apr. 21, 2018	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 22, 2017	Jul. 12, 2017	Apr. 21, 2018	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz ~40GHz	Oct. 19, 2016	Jul. 12, 2017	Oct. 18, 2017	Radiation (03CH03-KS)
Amplifier	SONOMA	310N	187289	9kHz~1GHz	Aug. 09, 2016	Jul. 12, 2017	Aug. 08, 2017	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 13, 2016	Jul. 12, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 12, 2017	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jul. 12, 2017	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jul. 12, 2017	NCR	Radiation (03CH03-KS)

NCR: No Calibration Required

6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.3dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)									
Band	WCDMA Band V			WCDMA Band II			WCDMA Band IV		
Channel	4132	4182	4233	9262	9400	9538	1312	1413	1513
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
AMR 12.2Kbps	23.03	23.08	23.01	23.00	23.26	23.18	22.89	23.02	23.11
RMC 12.2Kbps	23.05	**23.10**	23.02	23.01	**23.28**	23.20	22.90	23.04	**23.13**
HSDPA Subtest-1	21.94	22.05	21.82	21.87	22.14	21.99	20.43	20.50	20.92
HSDPA Subtest-2	21.63	22.03	21.88	21.61	22.16	22.00	20.44	20.53	20.52
HSDPA Subtest-3	21.03	22.07	21.35	21.45	21.70	21.54	19.55	20.05	20.06
HSDPA Subtest-4	21.37	21.99	21.30	21.44	21.70	21.54	19.93	20.04	20.05
DC-HSDPA Subtest-1	20.69	20.77	20.69	20.29	20.59	20.47	20.15	20.29	20.41
DC-HSDPA Subtest-2	20.70	20.75	20.68	20.29	20.57	20.46	20.14	20.31	20.40
DC-HSDPA Subtest-3	20.68	20.74	20.61	20.30	20.55	20.44	20.15	20.29	20.45
DC-HSDPA Subtest-4	20.66	20.73	20.63	20.28	20.55	20.40	20.17	20.28	20.44
HSUPA Subtest-1	22.11	22.05	21.99	21.96	22.23	22.14	21.41	21.51	21.69
HSUPA Subtest-2	20.01	19.77	19.89	20.06	20.29	20.06	19.77	20.37	20.07
HSUPA Subtest-3	21.05	20.90	20.84	21.07	21.22	21.08	20.59	20.74	20.86
HSUPA Subtest-4	20.06	20.00	19.88	19.93	20.25	20.12	19.78	19.88	20.09
HSUPA Subtest-5	22.02	21.93	21.90	22.05	22.35	22.02	21.79	21.94	22.10

ERP/EIRP

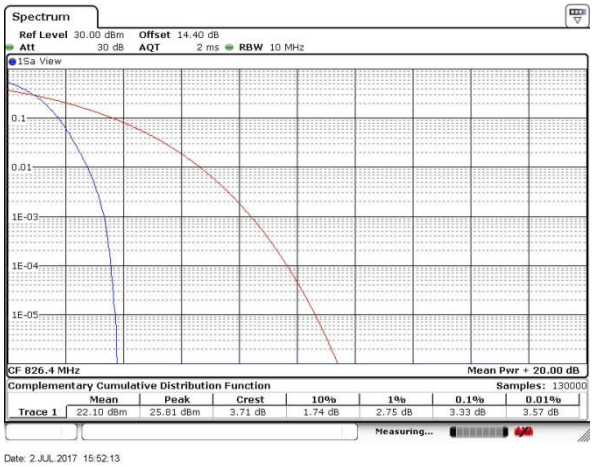
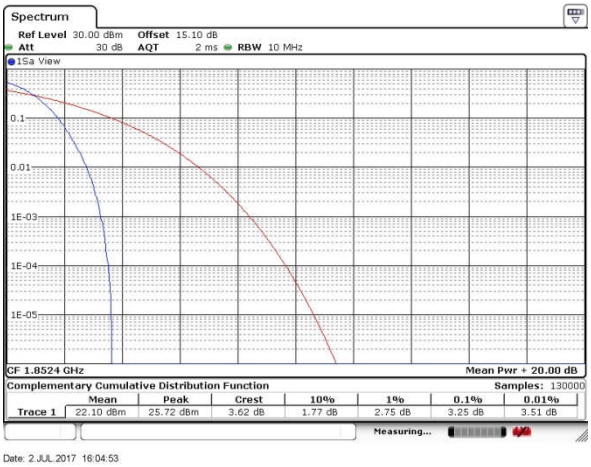
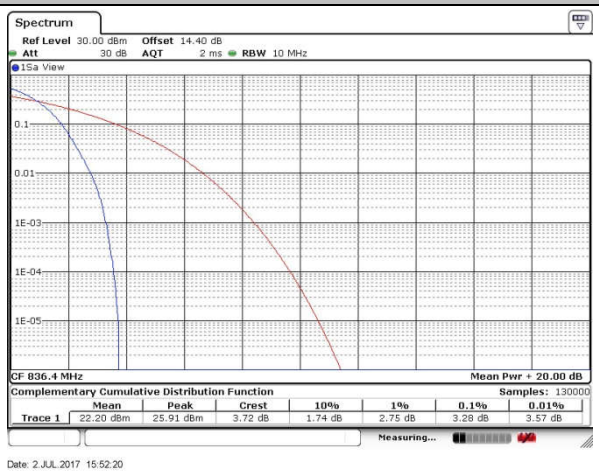
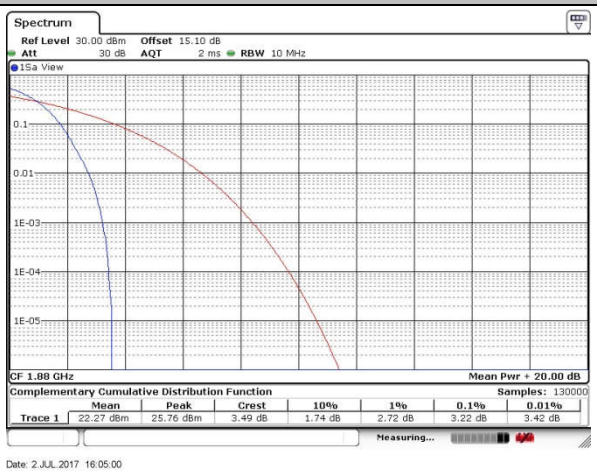
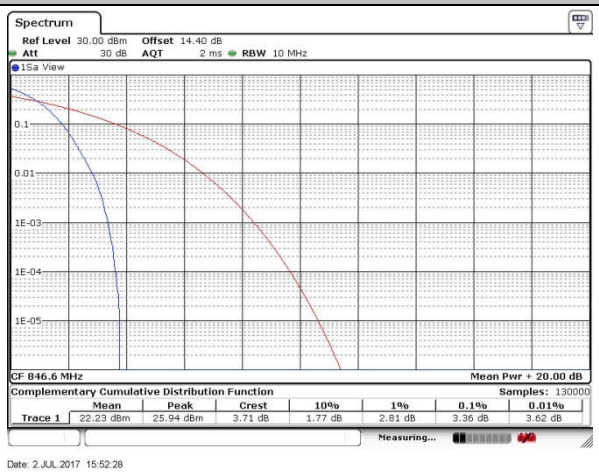
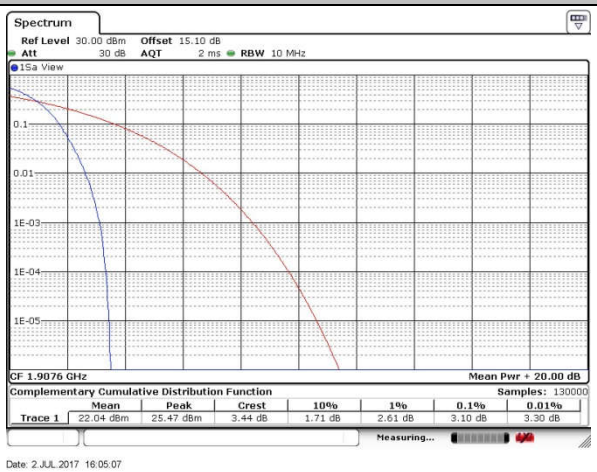
WCDMA Band V (G_T - $L_{C=}$ -1.60dBi)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	23.05	23.10	23.02
Conducted Power (Watts)	0.2018	0.2042	0.2004
ERP(dBm)	19.30	19.35	19.27
ERP(Watts)	0.0851	0.0861	0.0845

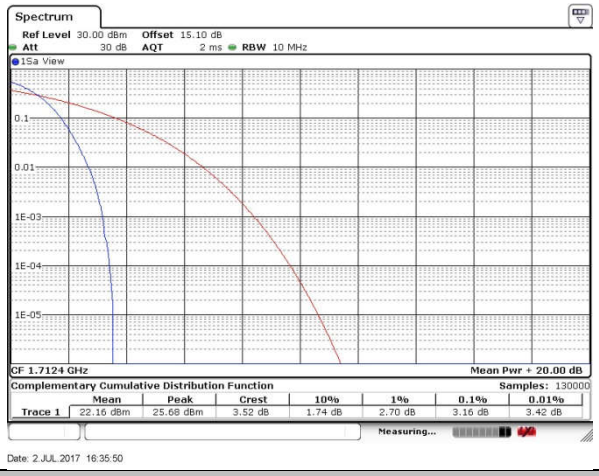
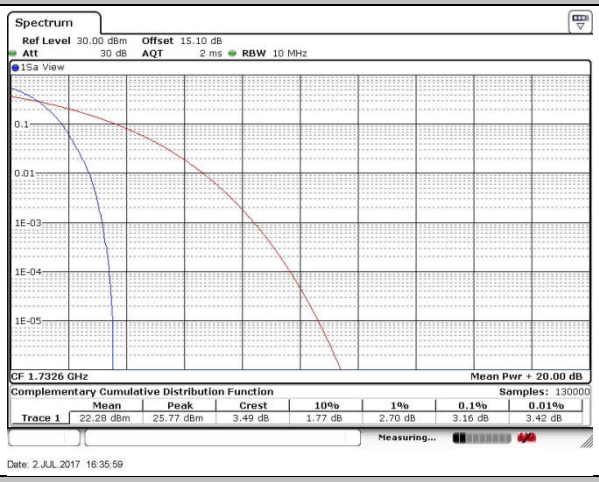
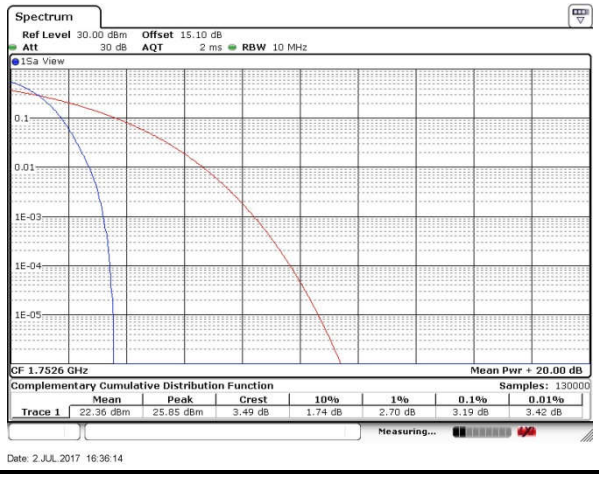
WCDMA Band II (G_T - $L_{C=}$ -1.60dBi)			
Channel	9262	9400	9538
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	23.01	23.28	23.20
Conducted Power (Watts)	0.2000	0.2128	0.2089
EIRP(dBm)	21.41	21.68	21.60
EIRP(Watts)	0.1384	0.1472	0.1445

WCDMA Band IV (G_T - $L_{C=}$ -0.90dBi)			
Channel	1312	1413	1513
	(Low)	(Mid)	(High)
Frequency (MHz)	1712.4	1732.6	1752.6
Conducted Power (dBm)	22.90	23.04	23.13
Conducted Power (Watts)	0.1950	0.2014	0.2056
EIRP(dBm)	22.00	22.14	22.23
EIRP(Watts)	0.1585	0.1637	0.1671

Peak-to-Average Ratio

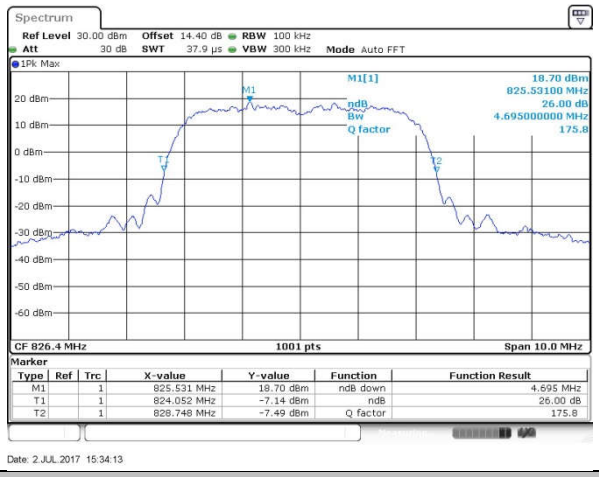
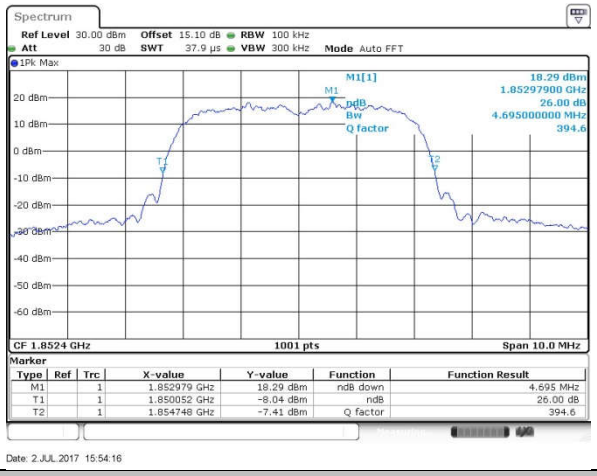
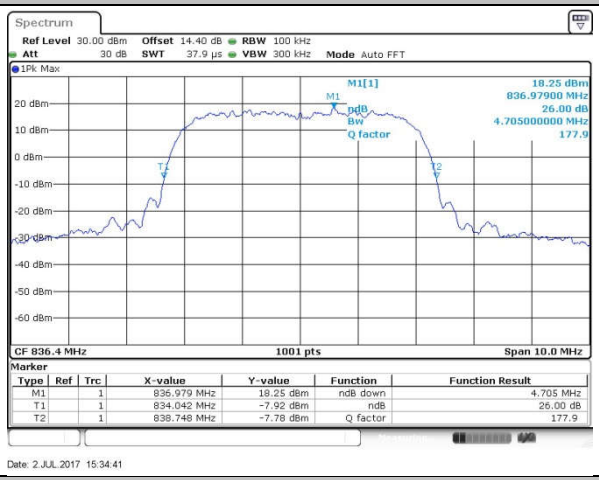
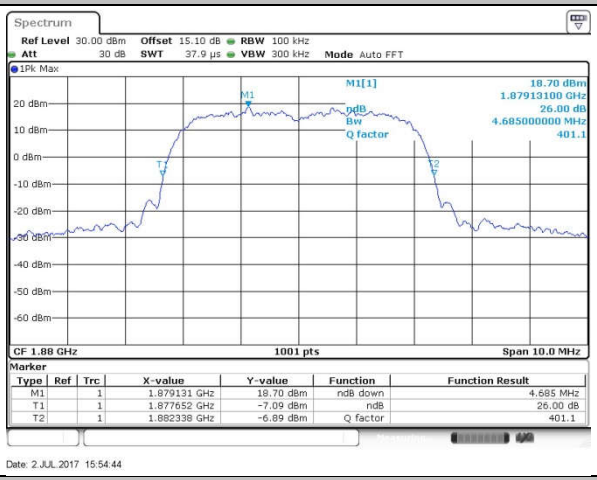
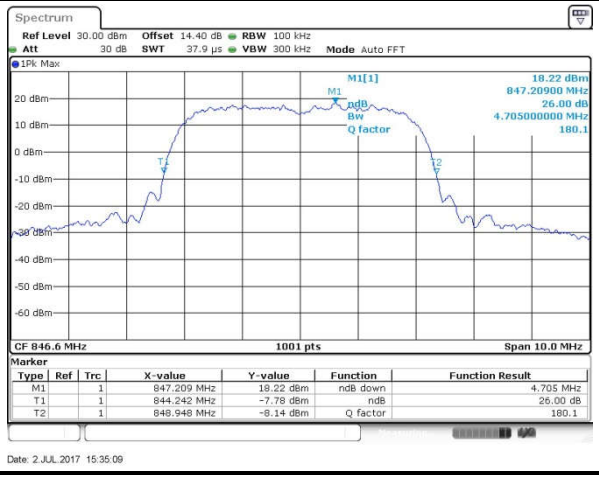
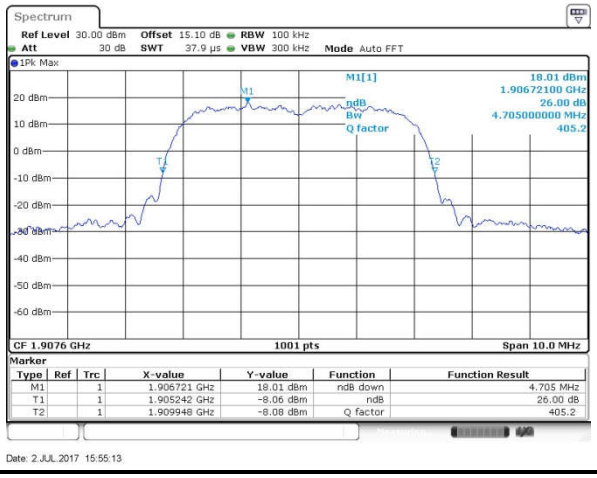
Mode	WCDMA Band V(dB)	WCDMA Band II(dB)	WCDMA Band IV(dB)	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	3.33	3.25	3.16	PASS
Middle CH	3.28	3.22	3.16	
Highest CH	3.36	3.10	3.19	

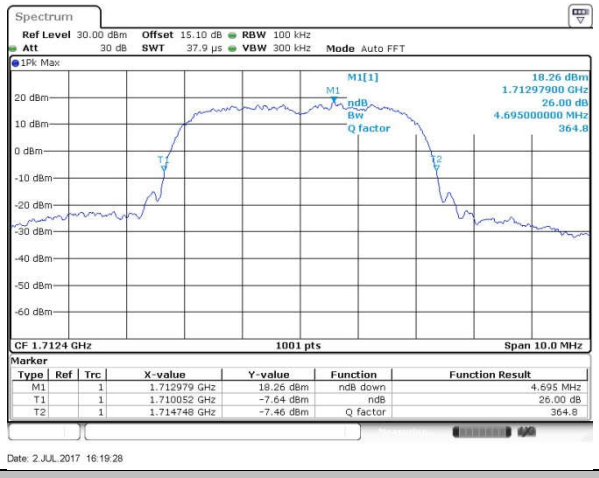
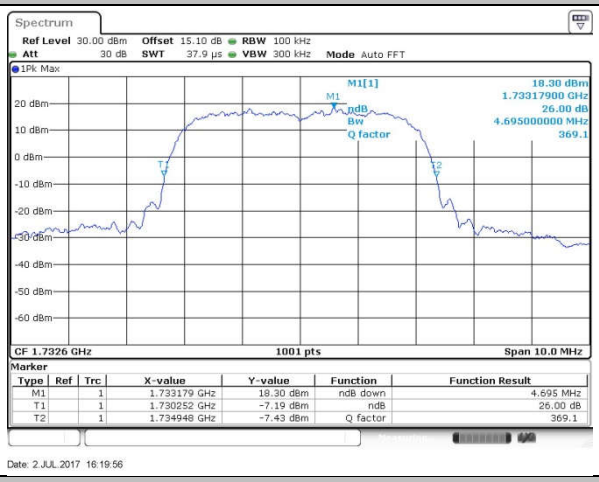
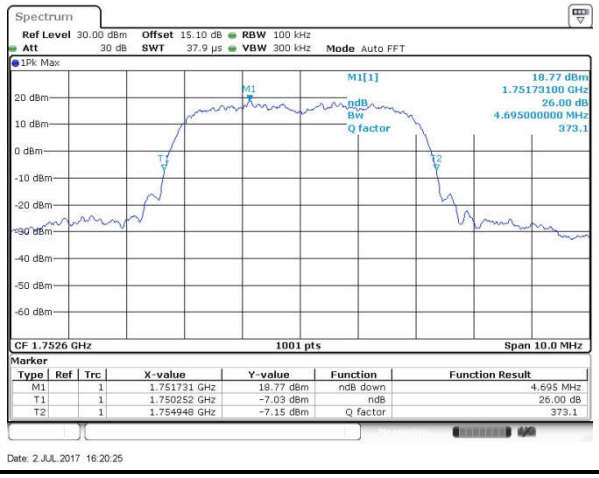
WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)	
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

26dB Bandwidth

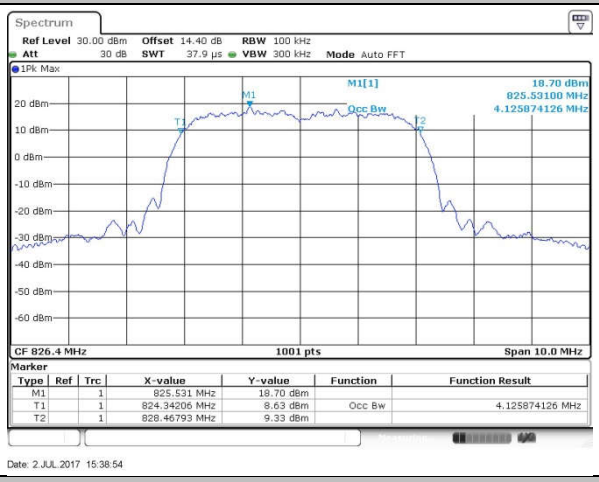
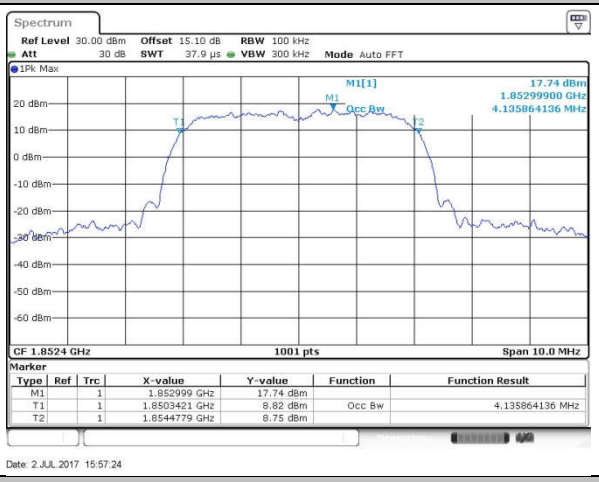
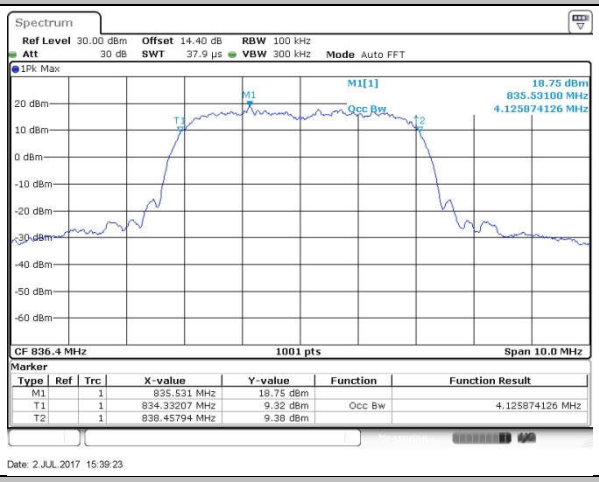
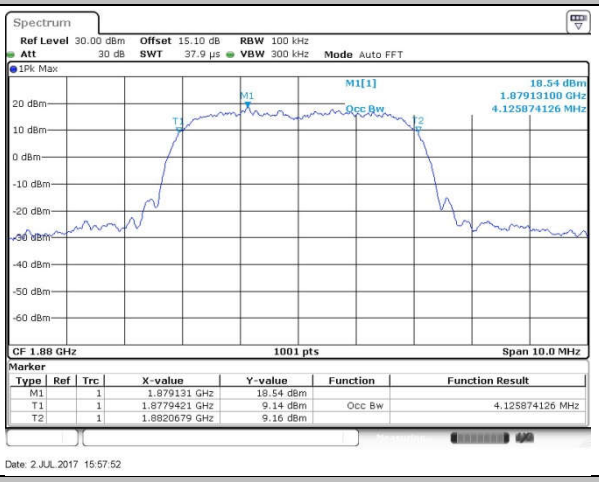
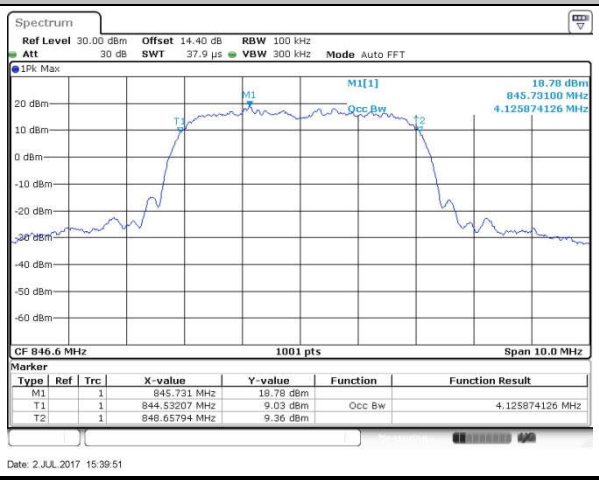
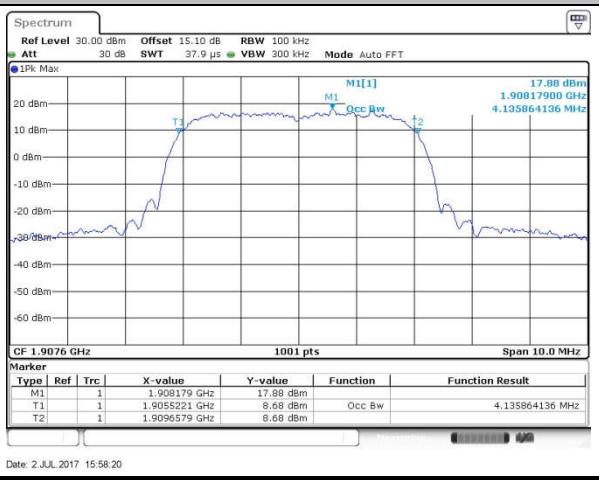
Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)	WCDMA Band IV(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.70	4.70	4.70
Middle CH	4.71	4.69	4.70
Highest CH	4.71	4.71	4.70

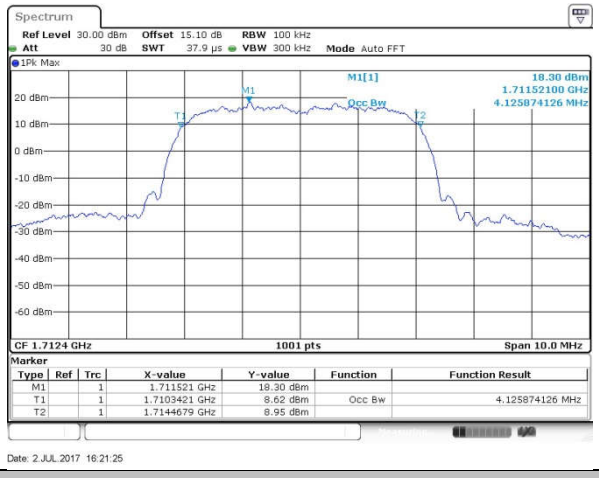
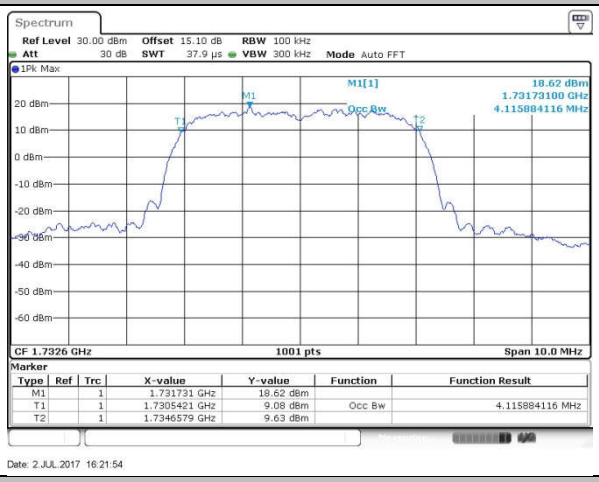
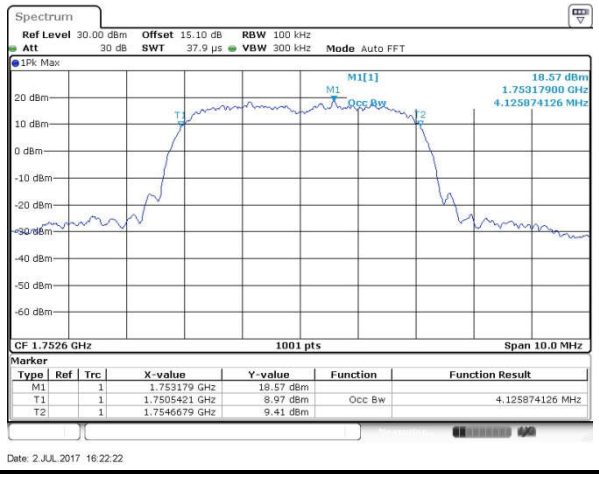
WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)	
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

Occupied Bandwidth

Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)	WCDMA Band IV(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.13	4.14	4.13
Middle CH	4.13	4.13	4.12
Highest CH	4.13	4.14	4.13

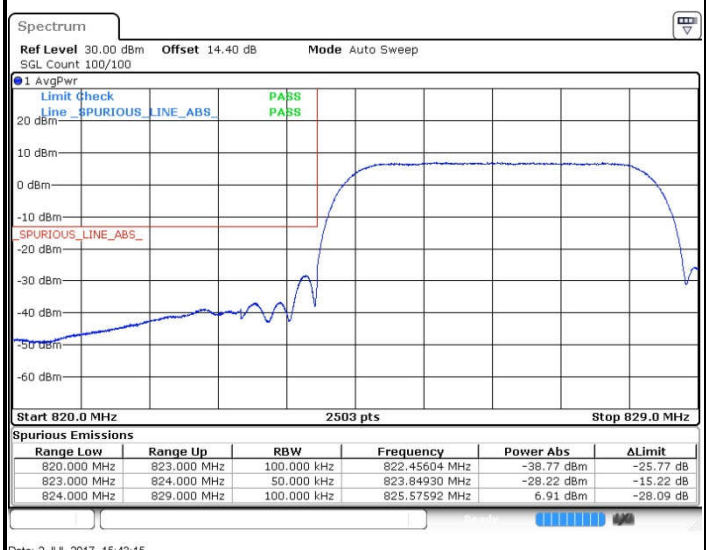
WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)	
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

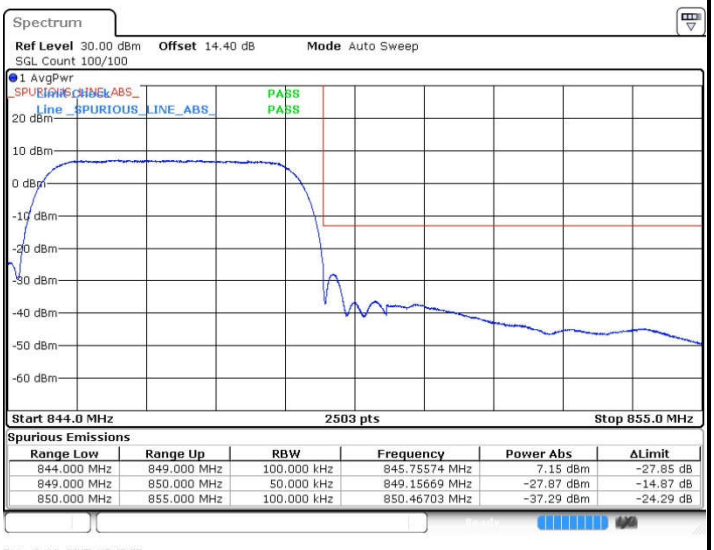
Conducted Band Edge

WCDMA Band V (RMC 12.2Kbps)

Lowest Band Edge

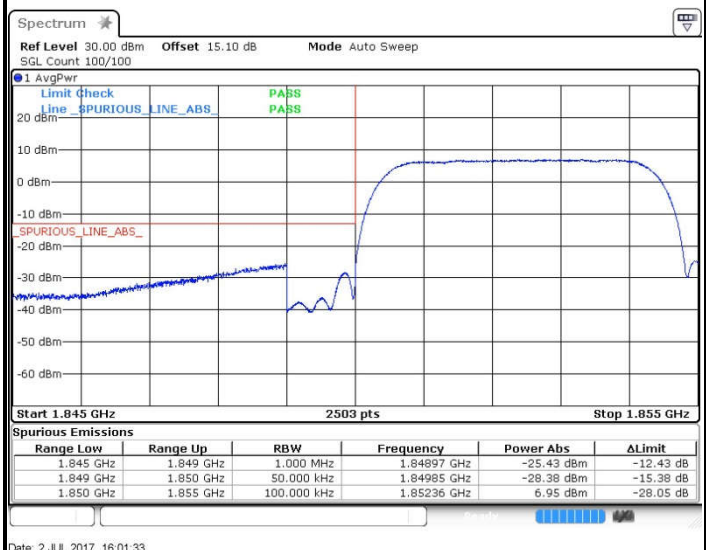


Highest Band Edge

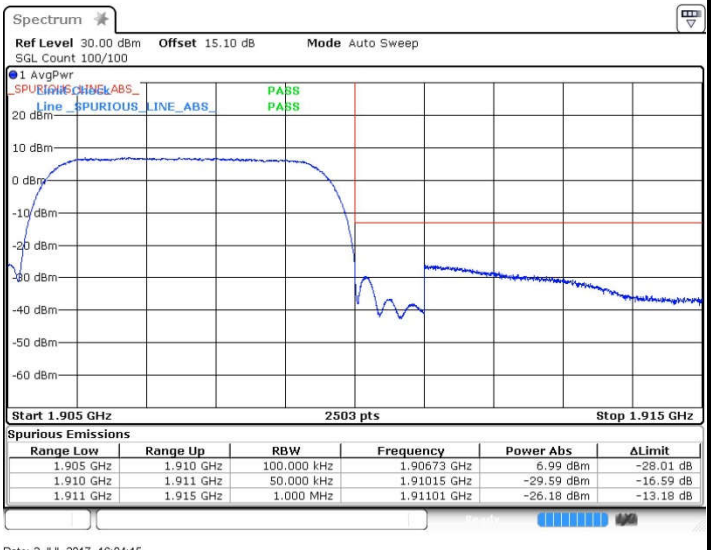


WCDMA Band II (RMC 12.2Kbps)

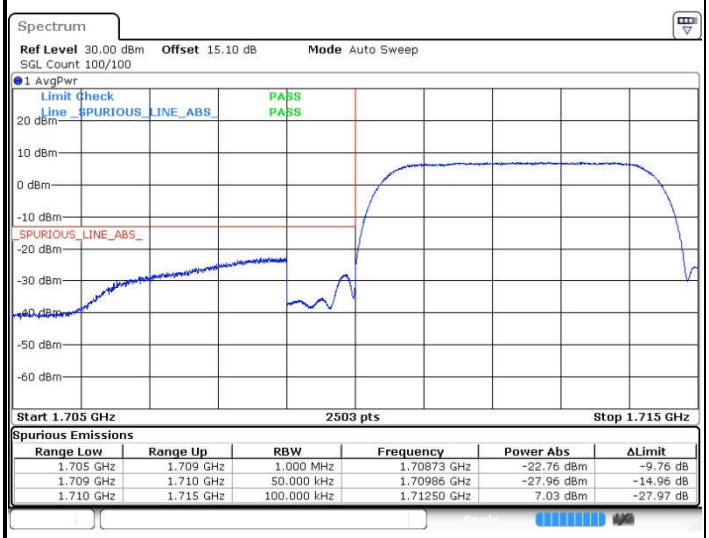
Lowest Band Edge

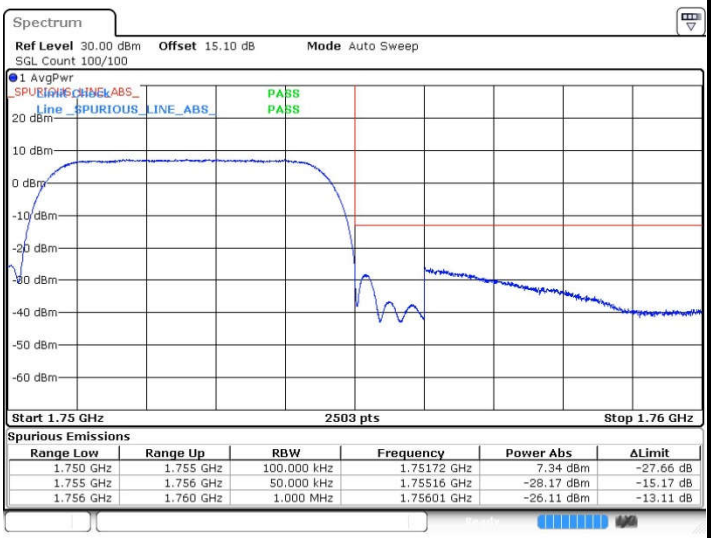


Highest Band Edge



WCDMA Band IV (RMC 12.2Kbps)	
Lowest Band Edge	**Highest Band Edge**

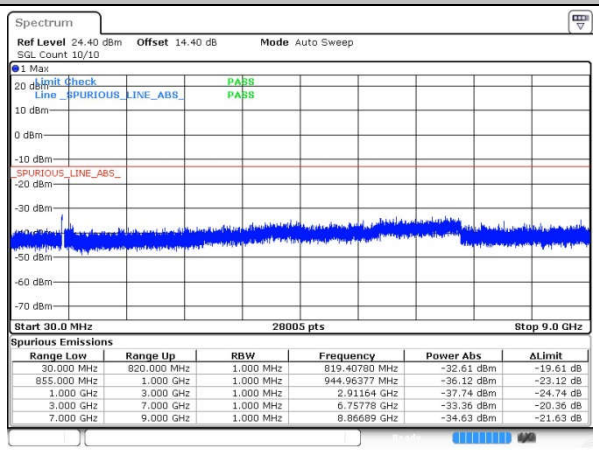




Conducted Spurious Emission

WCDMA Band V (RMC 12.2Kbps)

Lowest Channel

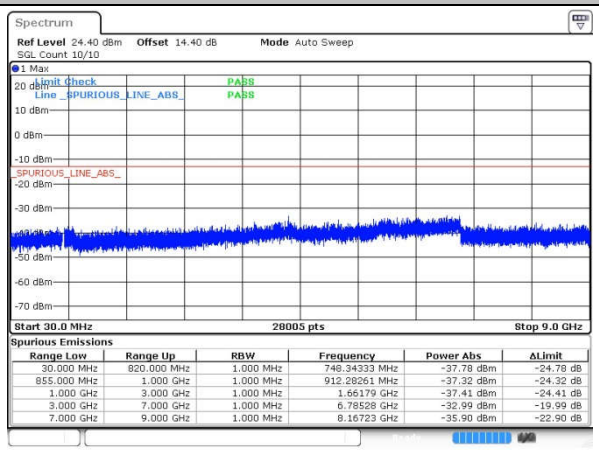


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	819.40780 MHz	-32.61 dBm	-19.61 dB
855.000 MHz	1.000 GHz	1.000 MHz	944.96377 MHz	-36.12 dBm	-23.12 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.91164 GHz	-37.74 dBm	-24.74 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.75778 GHz	-33.36 dBm	-20.36 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.86689 GHz	-34.63 dBm	-21.63 dB

Date: 2.JUL.2017 15:47:21

Middle Channel

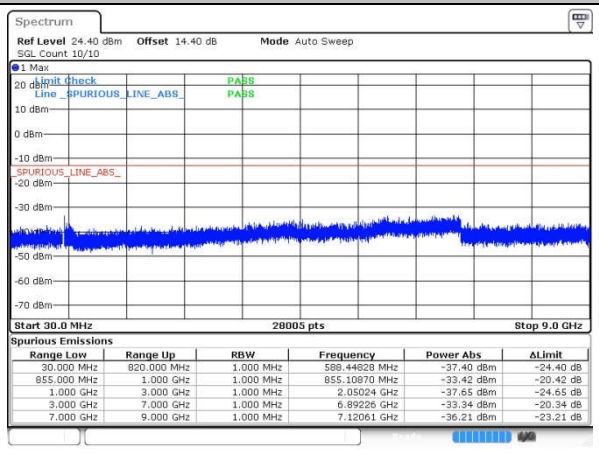


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	748.34333 MHz	-37.78 dBm	-24.78 dB
855.000 MHz	1.000 GHz	1.000 MHz	912.28261 MHz	-37.32 dBm	-24.32 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.66179 GHz	-37.41 dBm	-24.41 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.78528 GHz	-32.99 dBm	-19.99 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.16723 GHz	-35.90 dBm	-22.90 dB

Date: 2.JUL.2017 15:48:36

Highest Channel



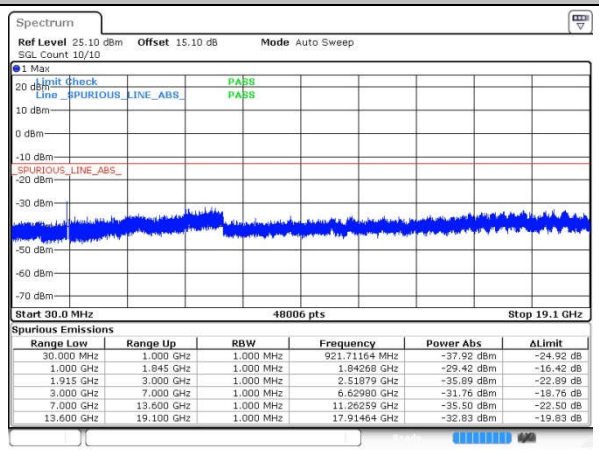
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	588.44828 MHz	-37.40 dBm	-24.40 dB
855.000 MHz	1.000 GHz	1.000 MHz	855.10870 MHz	-33.42 dBm	-20.42 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.05024 GHz	-37.65 dBm	-24.65 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.89226 GHz	-33.34 dBm	-20.34 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.12061 GHz	-36.21 dBm	-23.21 dB

Date: 2.JUL.2017 15:49:52

WCDMA Band II (RMC 12.2Kbps)

Lowest Channel

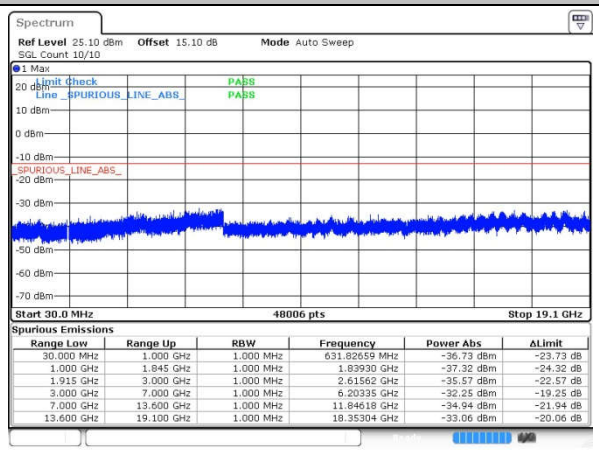


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	921.71164 MHz	-37.92 dBm	-24.92 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.84268 GHz	-29.42 dBm	-16.42 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.51879 GHz	-35.89 dBm	-22.89 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.62980 GHz	-31.76 dBm	-18.76 dB
7.000 GHz	13.600 GHz	1.000 MHz	11.26259 GHz	-35.50 dBm	-22.50 dB
13.600 GHz	19.100 GHz	1.000 MHz	17.91464 GHz	-32.83 dBm	-19.83 dB

Date: 2.JUL.2017 16:06:28

Middle Channel

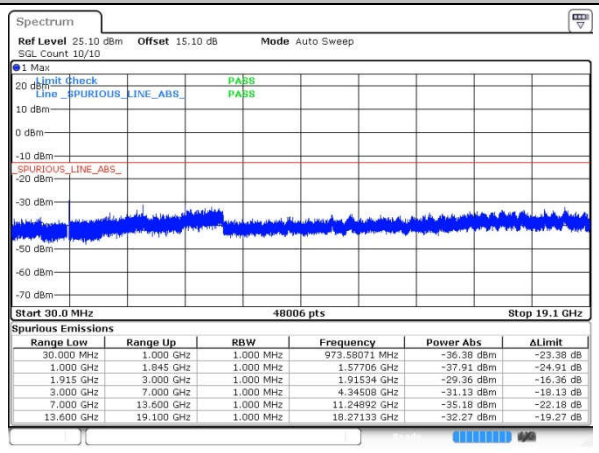


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	631.82659 MHz	-36.73 dBm	-23.73 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.83930 GHz	-37.32 dBm	-24.32 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.61562 GHz	-35.57 dBm	-22.57 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.20335 GHz	-32.25 dBm	-19.25 dB
7.000 GHz	13.600 GHz	1.000 MHz	11.84618 GHz	-34.94 dBm	-21.94 dB
13.600 GHz	19.100 GHz	1.000 MHz	18.35304 GHz	-33.06 dBm	-20.06 dB

Date: 2.JUL.2017 16:07:43

Highest Channel



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	973.58071 MHz	-36.38 dBm	-23.38 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.57706 GHz	-37.91 dBm	-24.91 dB
1.915 GHz	3.000 GHz	1.000 MHz	1.91534 GHz	-29.36 dBm	-16.36 dB
3.000 GHz	7.000 GHz	1.000 MHz	4.34508 GHz	-31.13 dBm	-18.13 dB
7.000 GHz	13.600 GHz	1.000 MHz	11.24892 GHz	-35.18 dBm	-22.18 dB
13.600 GHz	19.100 GHz	1.000 MHz	18.27133 GHz	-32.27 dBm	-19.27 dB

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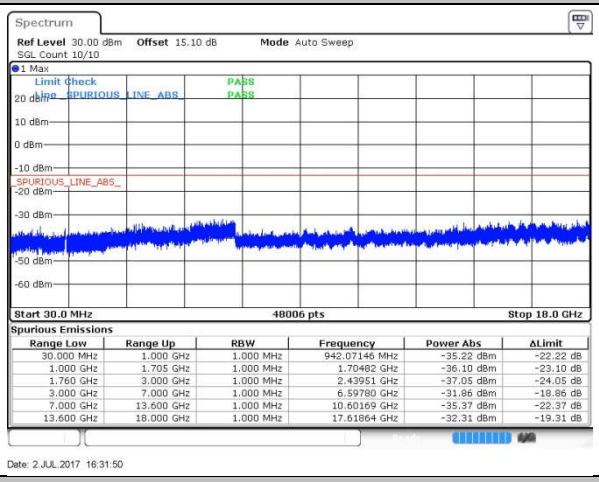
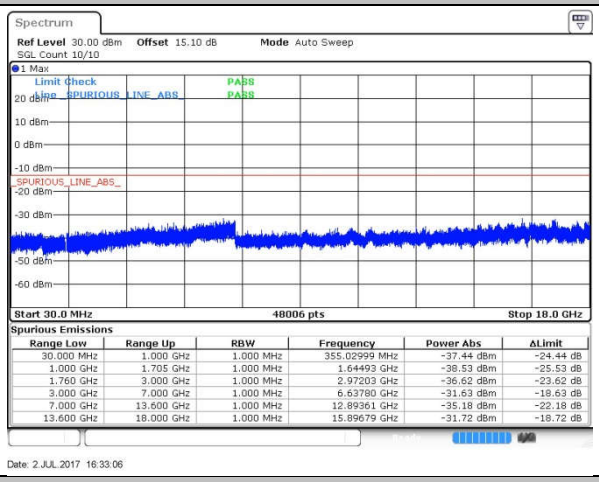
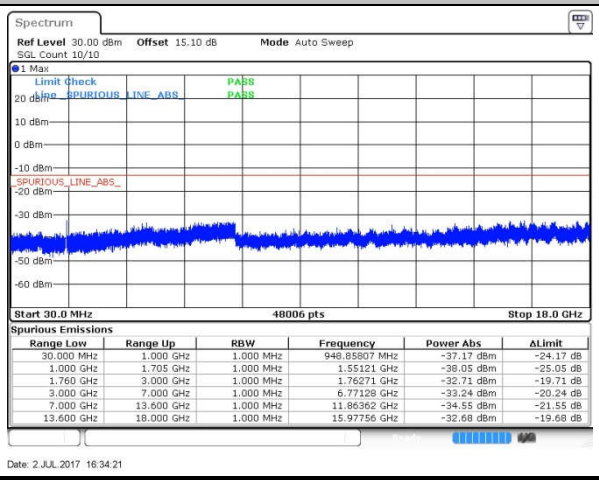
WCDMA Band IV (RMC 12.2Kbps)	
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

Frequency Stability

Test Conditions	Middle Channel	WCDMA Band V (RMC 12.2Kbps)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0108	PASS
40	Normal Voltage	0.0132	
30	Normal Voltage	0.0084	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0120	
0	Normal Voltage	0.0323	
-10	Normal Voltage	0.0012	
-20	Normal Voltage	0.0287	
-30	Normal Voltage	0.0072	
20	Maximum Voltage	0.0347	
20	Normal Voltage	0.0287	
20	Battery End Point	0.0048	

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0016	PASS
40	Normal Voltage	0.0021	
30	Normal Voltage	0.0005	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0021	
0	Normal Voltage	0.0027	
-10	Normal Voltage	0.0133	
-20	Normal Voltage	0.0016	
-30	Normal Voltage	0.0176	
20	Maximum Voltage	0.0005	
20	Normal Voltage	0.0122	
20	Battery End Point	0.0011	

Note:

1. Normal Voltage = 3.82V. ；Battery End Point (BEP) =3.65V.；Maximum Voltage =4.4V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Test Conditions	Middle Channel	WCDMA Band IV (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0023	PASS
40	Normal Voltage	0.0058	
30	Normal Voltage	0.0087	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0017	
0	Normal Voltage	0.0052	
-10	Normal Voltage	0.0190	
-20	Normal Voltage	0.0202	
-30	Normal Voltage	0.0248	
20	Maximum Voltage	0.0000	
20	Normal Voltage	0.0029	
20	Battery End Point	0.0075	

Note:

1. Normal Voltage = 3.82V. ；Battery End Point (BEP) =3.65V.；Maximum Voltage =4.4V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1674	-57.31	-13	-44.31	-60.58	-59.63	1.33	5.80	H
	2510	-61.81	-13	-48.81	-71.16	-64.98	1.58	6.90	H
	3345	-65.75	-13	-52.75	-74.96	-69.25	1.85	7.50	H
	1674	-58.94	-13	-45.94	-61.28	-61.26	1.33	5.80	V
	2510	-63.26	-13	-50.26	-71.23	-66.43	1.58	6.90	V
	3345	-67.01	-13	-54.01	-76.03	-70.51	1.85	7.50	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band II(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3759	-57.60	-13	-44.60	-71.84	-59.31	5.08	6.80	H
	5640	-57.79	-13	-44.79	-74.59	-59.46	8.03	9.70	H
	7521	-55.05	-13	-42.05	-76.35	-57.43	9.43	11.81	H
	3759	-61.20	-13	-48.20	-73.63	-62.91	5.08	6.80	V
	5640	-58.67	-13	-45.67	-75.76	-60.34	8.03	9.70	V
	7521	-55.12	-13	-42.12	-76.26	-57.50	9.43	11.81	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band IV(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3465	-67.09	-13	-54.09	-75.99	-71.06	4.87	8.84	H
	5199	-65.21	-13	-52.21	-76.14	-66.65	7.70	9.14	H
	6930	-58.31	-13	-45.31	-76.78	-59.99	8.98	10.66	H
	3465	-62.67	-13	-49.67	-74.29	-66.64	4.87	8.84	V
	5199	-61.89	-13	-48.89	-75.94	-63.33	7.70	9.14	V
	6930	-58.92	-13	-45.92	-76.94	-60.60	8.98	10.66	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Appendix D. Original Report

Please refer to Sporton report number FG761702-01A which is issued separately.