FCC RF Test Report

APPLICANT	:	SAFRAN Identity&Security
EQUIPMENT	:	MorphoTablet 2
BRAND NAME	:	SAFRAN MORPHO
MODEL NAME	:	MPH-MB001A
FCC ID	:	ZBW-MPHMB001A
STANDARD	:	FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)

The product was received on Apr. 06, 2016 and testing was completed on May 03, 2016. 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.

James Huang

Prepared by: James Huang / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG640601A	Rev. 01	Initial issue of report	Jun. 28, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049 §22.917(b) §24.238(b)	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-
	§2.1055 §24.235		Within Authorized Band		
4.4	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
4.5	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 11.90 dB at 1674.000 MHz

1 General Description

1.1 Applicant

SAFRAN Identity&Security
11, boulevard Galliéni 92130 - Issy-les-Moulineaux France

1.2 Manufacturer

SAFRAN Identity&Security
11, boulevard Galliéni 92130 - Issy-les-Moulineaux France

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	MorphoTablet 2
Brand Name	SAFRAN MORPHO
Model Name	MPH-MB001A
FCC ID	ZBW-MPHMB001A
EUT supports Radios application	GSM/GPRS/EGPRS(Downlink Only)/WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/DC-HSDPA/LTE/NFC/ WLAN2.4GHz 802.11b/g/n HT20/ Bluetooth v3.0+ EDR/Bluetooth v4.0 LE
IMEI Code	Conducted: 357079070006740 Radiation: 357079070000008/16 ERP/EIRP: 357079070006682
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	**GSM/GPRS/EDGE(Downlink Only):** 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
Rx Frequency	**GSM/GPRS/EDGE(Downlink Only):** 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
Maximum Output Power to Antenna	**GSM/GPRS/EDGE(Downlink Only):** 850: 31.71 dBm 1900: 29.36 dBm **WCDMA:** Band V: 23.59 dBm Band II: 23.86 dBm
Antenna Type	Dipole Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK(Downlink Only) WCDMA: QPSK (Uplink) HSDPA/DC-HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink) HSPA+: 16QAM (Uplink is not supported) DC-HSDPA : 64QAM

1.5 Modification of EUT

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

1.6 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 22	GSM850 GSM	GMSK	0.8790	0.0155 ppm	244KGXW
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.1510	0.0167 ppm	4M15F9W
Part 24	GSM1900 GSM	GMSK	0.7727	0.0186 ppm	244KGXW
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.2239	0.0064 ppm	4M17F9W

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sporton Site No.		FCC Registration No.
	TH01-KS	03CH02-KS	418269

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

1.8 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)
- ANSI / TIA / EIA-603-D-2010
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

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.

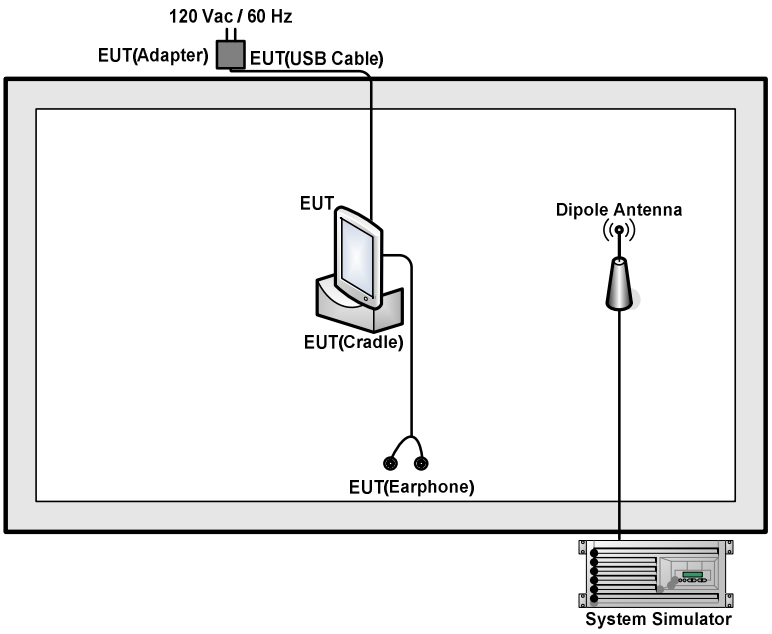
Radiated emissions were investigated from 30 MHz to 10th harmonic.

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**
GSM 850	■ GSM Link	■ GSM Link
GSM 1900	■ GSM Link	■ GSM Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



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	GPD-2303S	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 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 4.5 dB and a 10dB attenuator.

Example :

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

= 4.5 + 10 = 14.5 (dB)

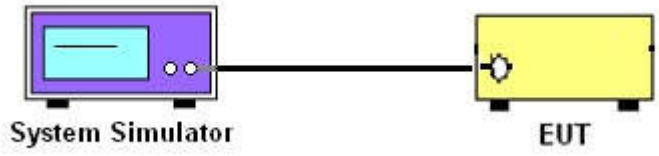
3 Conducted Test Result

3.1 Measuring Instruments

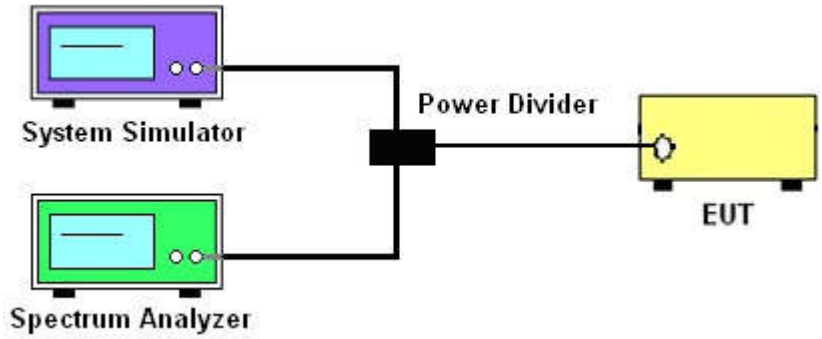
See list of measuring instruments of this test report.

3.2 Test Setup

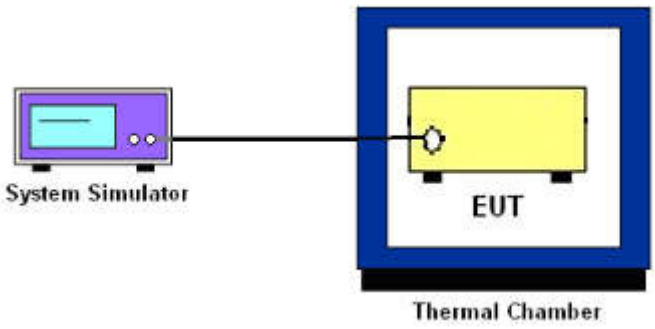
3.2.1 Conducted Output Power



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

3.4.1 Description of the Conducted Output Power

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.

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 10th 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 25±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.

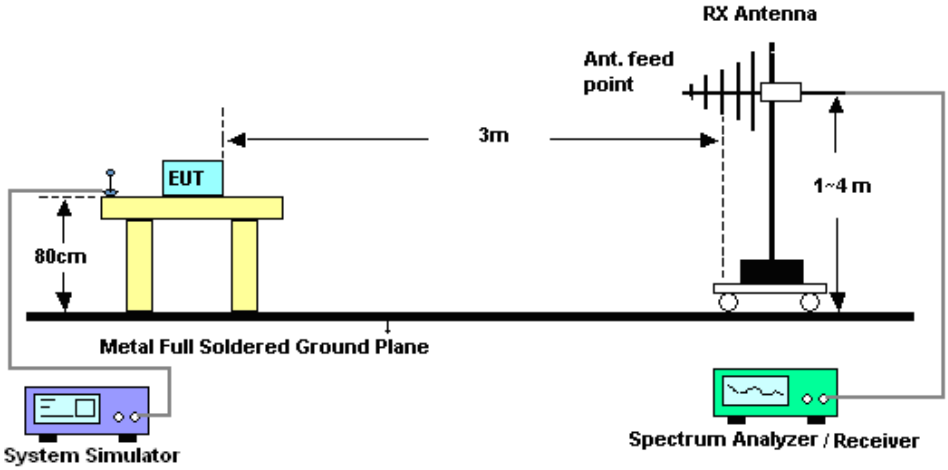
4 Radiated Test Items

4.1 Measuring Instruments

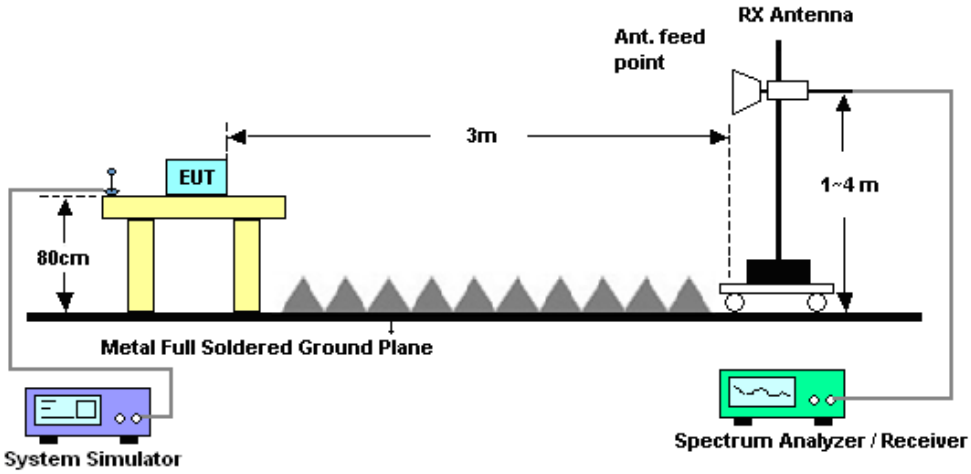
See list of measuring instruments of this test report.

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 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

4.4.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-D-2010, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band).

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-D-2010 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by the substitution antenna at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, EIRP = LVL + Correction factor and ERP = EIRP - 2.15. Take the record of the output power at substitution antenna.

	GSM/GPRS/EDGE	WCDMA/HSPA
SPAN	500kHz	10MHz
RBW	10kHz	100kHz
VBW	30kHz	300kHz
Detector	RMS	RMS
Trace	Average	Average
Average Type	Power	Power
Sweep Count	100	100

4.5 Field Strength of Spurious Radiation Measurement

4.5.1 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.

4.5.2 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 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	Sep. 10, 2015	Apr. 19, 2016~ May 03, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Apr. 19, 2016~ May 03, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Sep. 10, 2015	May 02, 2016	Sep. 09, 2016	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Apr. 22, 2016	May 02, 2016	Apr. 21, 2017	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz-2GHz	Sep. 12, 2015	May 02, 2016	Sep. 11, 2016	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 07, 2015	May 02, 2016	Nov. 06, 2016	Radiation (03CH02-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz~40GHz	Oct. 10, 2015	May 02, 2016	Oct. 09, 2016	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz ~1000MHz / 32 dB	Apr. 22, 2016	May 02, 2016	Apr. 21, 2017	Radiation (03CH02-KS)
High Gain Amplifier	MITEQ	AMF-7D-00 101800-30-1	1865802	1GHz~18GHz	Jan. 20, 2016	May 02, 2016	Jan. 19, 2017	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1-26.5GHz Gain 30dB	Oct. 24, 2015	May 02, 2016	Oct. 23, 2016	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35 -HG	1887435	18GHz~40GHz	Jan. 20, 2016	May 02, 2016	Jan. 19, 2017	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	May 02, 2016	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 02, 2016	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 02, 2016	NCR	Radiation (03CH02-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))	**5.1 dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power (Average power)

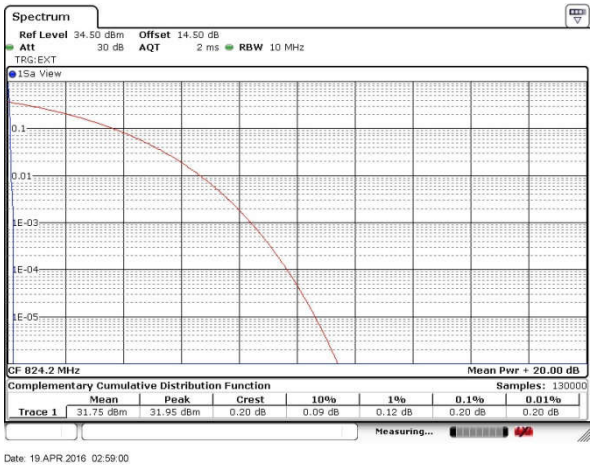
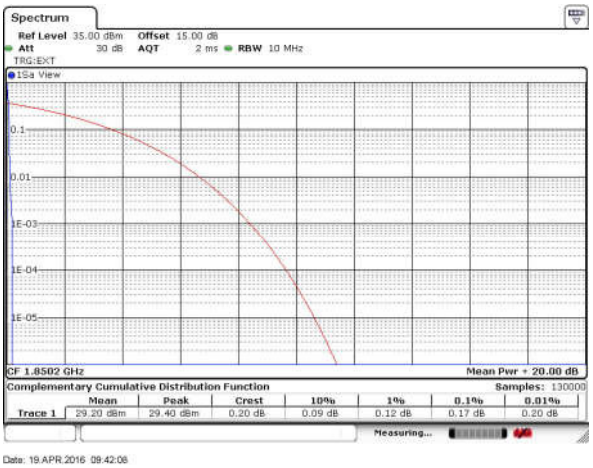
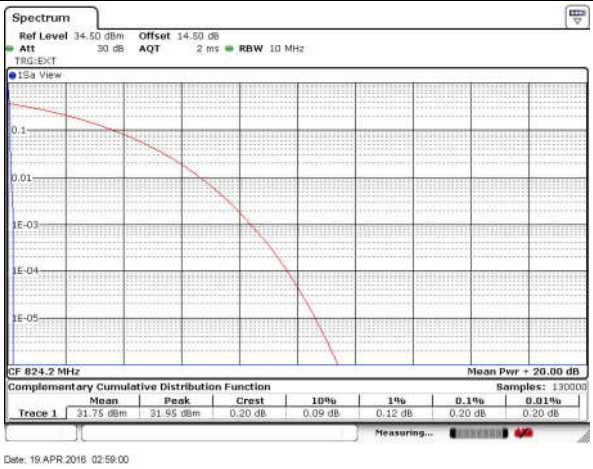
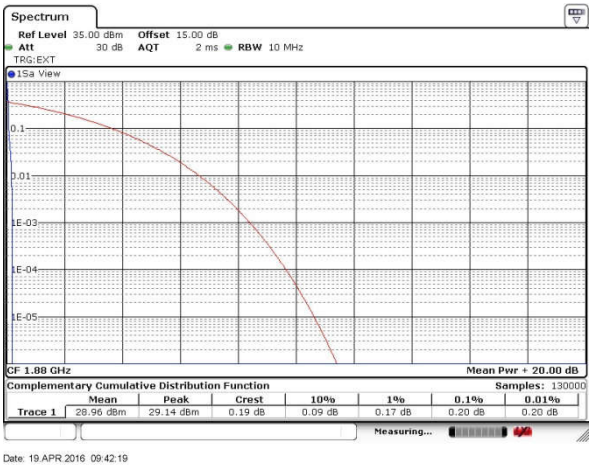
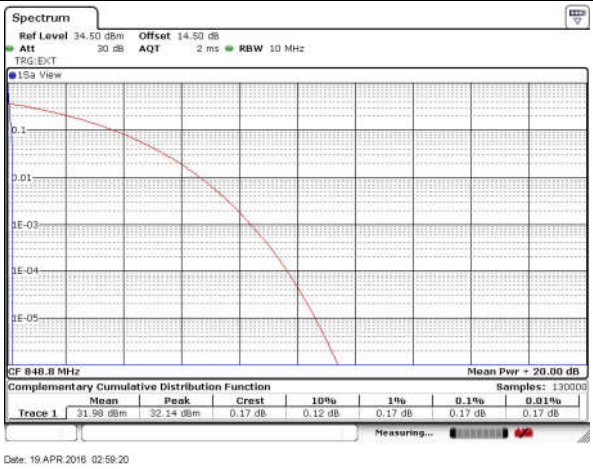
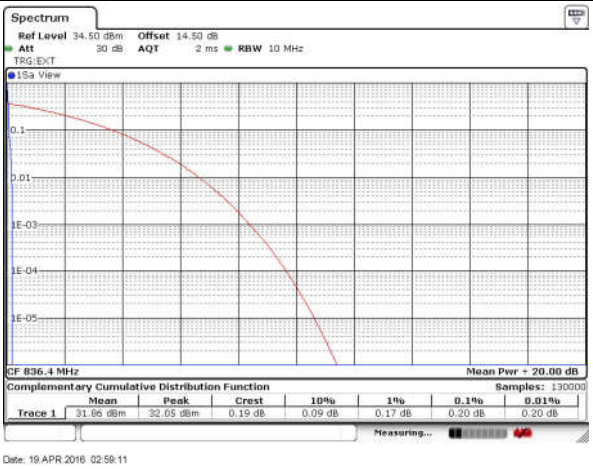
Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	31.71	31.62	31.69	29.24	29.30	29.36
GPRS class 8	31.68	31.58	31.62	29.23	29.24	29.32
GPRS class 10	29.82	29.64	29.73	27.56	27.62	27.58
GPRS class 11	27.85	27.61	27.64	25.52	25.45	25.22
GPRS class 12	25.98	26.01	26.07	23.94	23.99	23.79

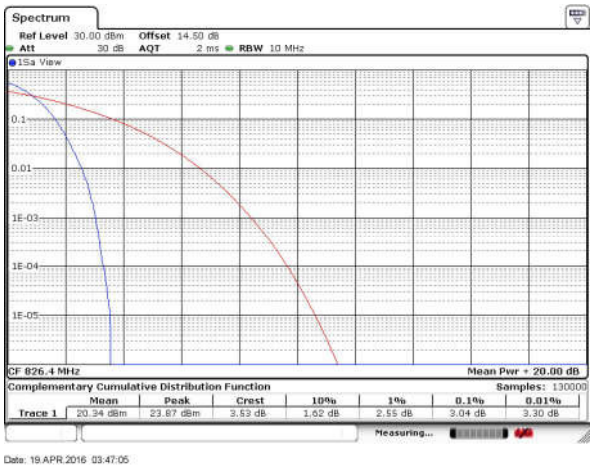
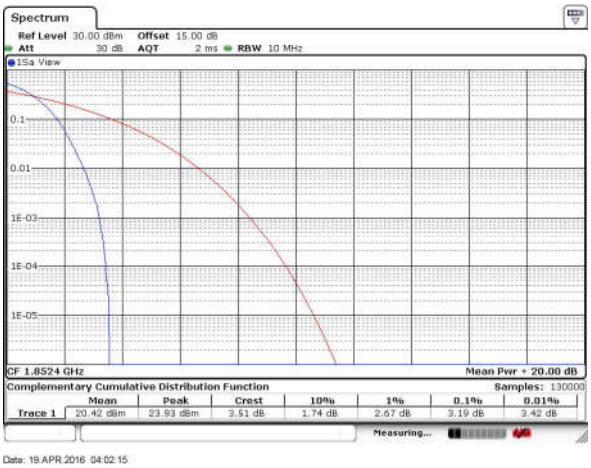
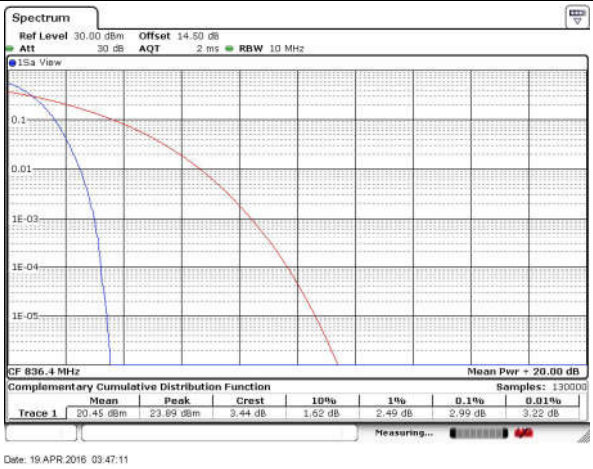
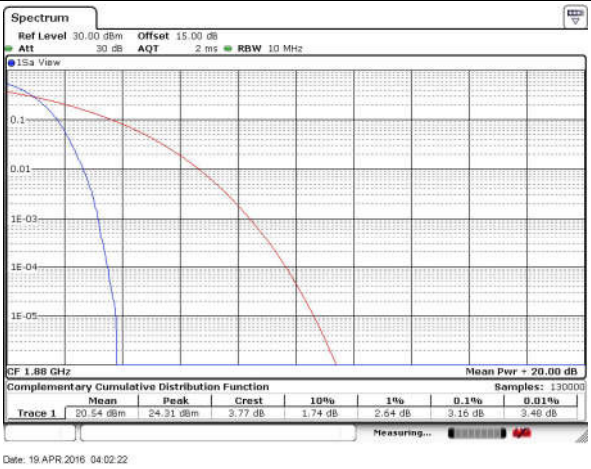
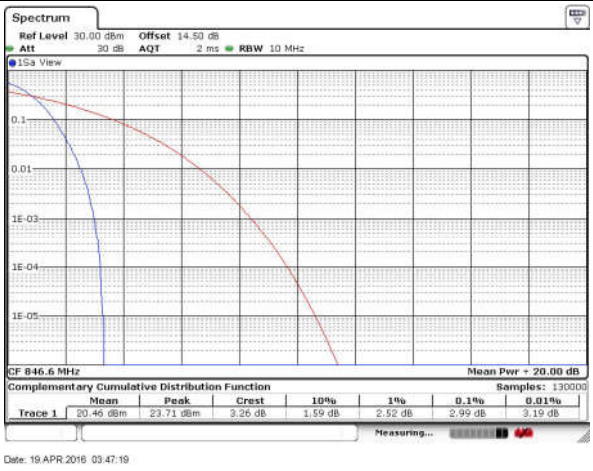
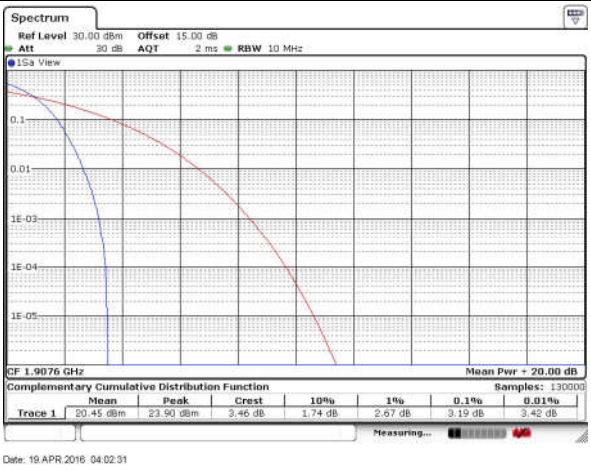
Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
AMR 12.2Kbps	23.54	23.57	23.57	23.71	23.84	23.81
RMC 12.2Kbps	23.56	23.58	23.59	23.73	23.86	23.82
HSDPA Subtest-1	22.31	22.45	22.52	22.59	22.71	22.72
HSDPA Subtest-2	22.52	22.53	22.51	22.62	22.71	22.74
HSDPA Subtest-3	22.06	22.07	22.07	22.16	22.25	22.28
HSDPA Subtest-4	22.03	22.04	22.05	22.15	22.24	22.26
DC-HSDPA Subtest-1	22.16	22.05	22.06	22.26	22.36	22.32
DC-HSDPA Subtest-2	22.16	22.12	22.06	22.20	22.33	22.45
DC-HSDPA Subtest-3	22.13	22.19	22.17	22.21	22.36	22.39
DC-HSDPA Subtest-4	22.16	22.15	22.17	22.24	22.34	22.36
HSUPA Subtest-1	21.93	21.48	22.16	22.36	22.44	22.44
HSUPA Subtest-2	20.65	20.81	20.97	21.05	21.02	22.03
HSUPA Subtest-3	20.34	21.15	21.15	21.55	20.72	21.68
HSUPA Subtest-4	21.69	21.10	21.34	22.14	22.17	22.25
HSUPA Subtest-5	21.56	21.64	21.82	22.08	22.14	22.46

Peak-to-Average Ratio

Mode	GSM850 (dB)	GSM1900 (dB)	Limit: 13 (dB)
Mod.	GSM	GSM	Result
Lowest CH	0.20	0.17	PASS
Middle CH	0.20	0.20	
Highest CH	0.17	0.20	

Mode	WCDMA Band V (dB)	WCDMA Band II (dB)	Limit: 13 (dB)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	3.04	3.19	PASS
Middle CH	2.99	3.16	
Highest CH	2.99	3.19	

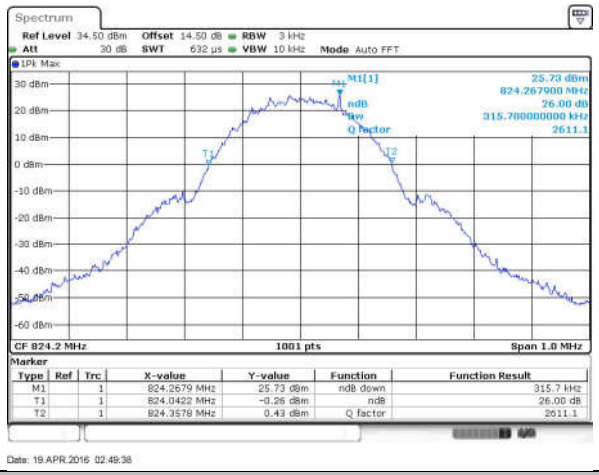
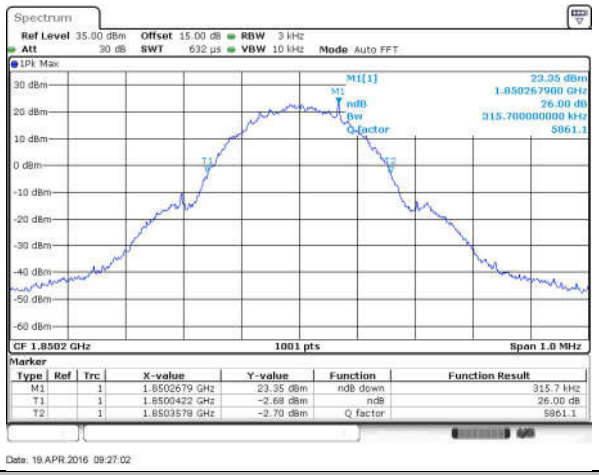
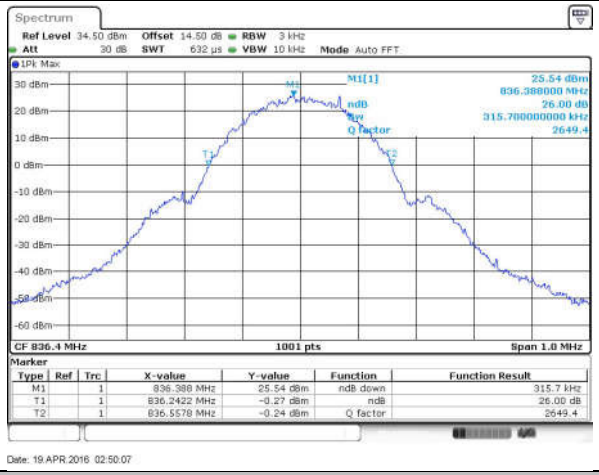
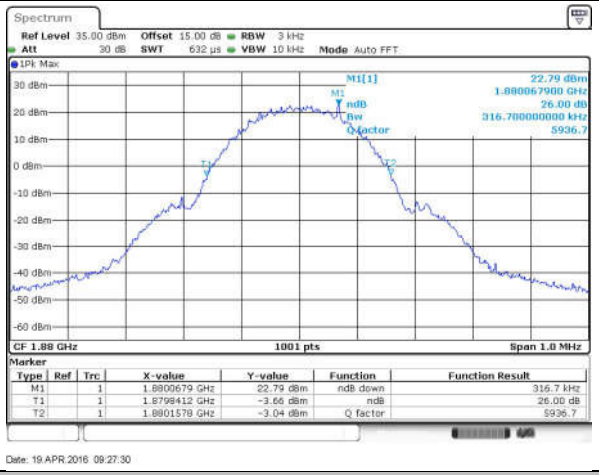
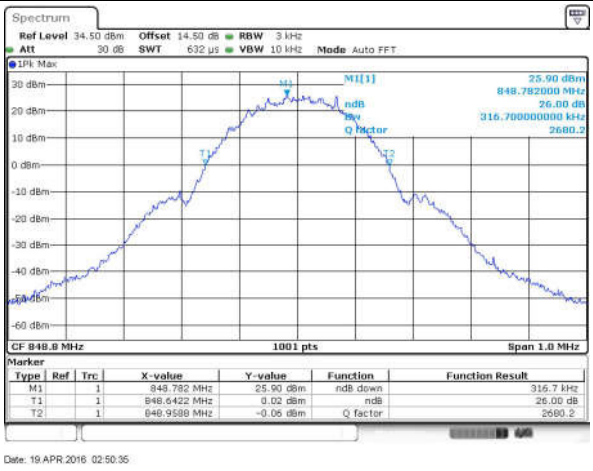
GSM850 (GSM)	GSM1900 (GSM)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

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

26dB Bandwidth

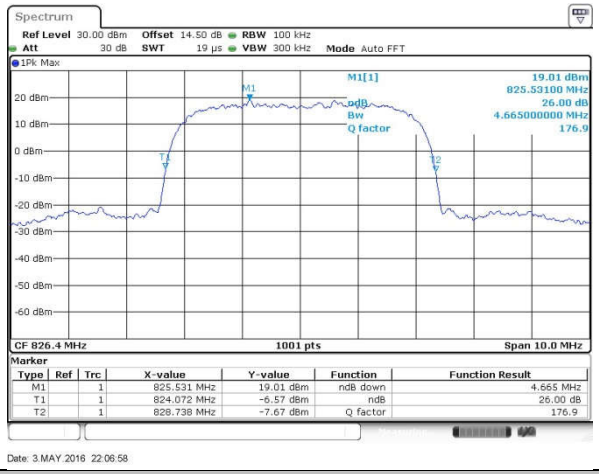
Mode	GSM850 (MHz)	GSM1900 (MHz)
Mod.	GSM	GSM
Lowest CH	0.316	0.316
Middle CH	0.316	0.317
Highest CH	0.317	0.316

Mode	WCDMA Band V (MHz)	WCDMA Band II (MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.67	4.67
Middle CH	4.68	4.68
Highest CH	4.68	4.67

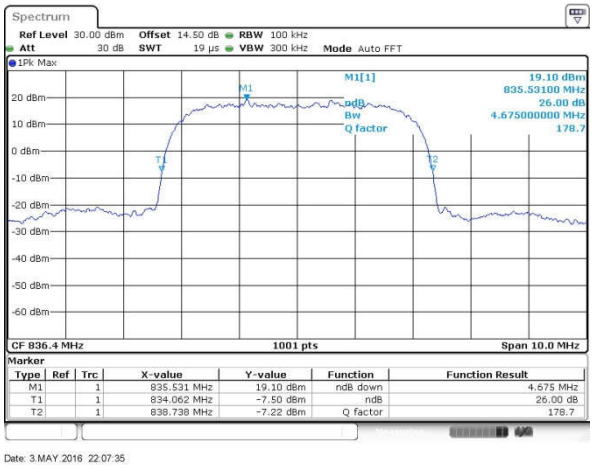
GSM850 (GSM)	GSM1900 (GSM)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band V (RMC 12.2Kbps)

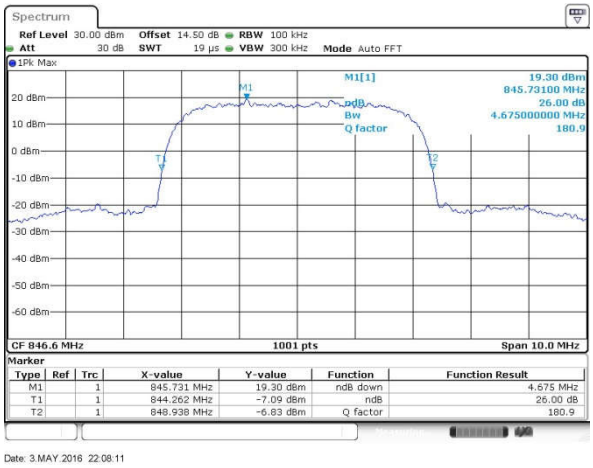
Lowest Channel



Middle Channel

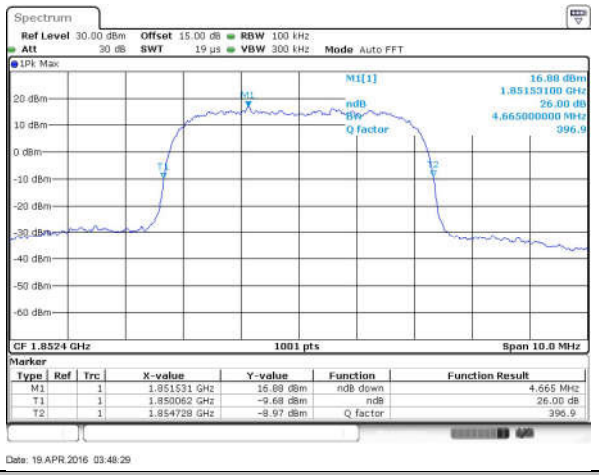


Highest Channel

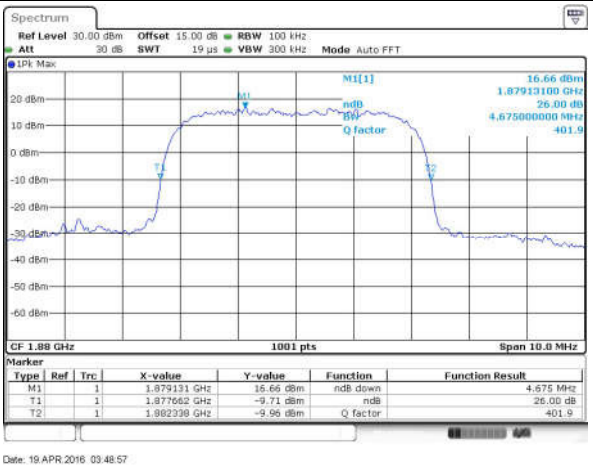


WCDMA Band II (RMC 12.2Kbps)

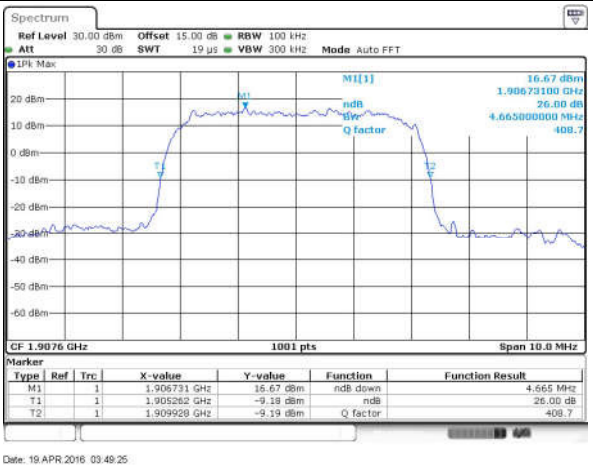
Lowest Channel



Middle Channel



Highest Channel



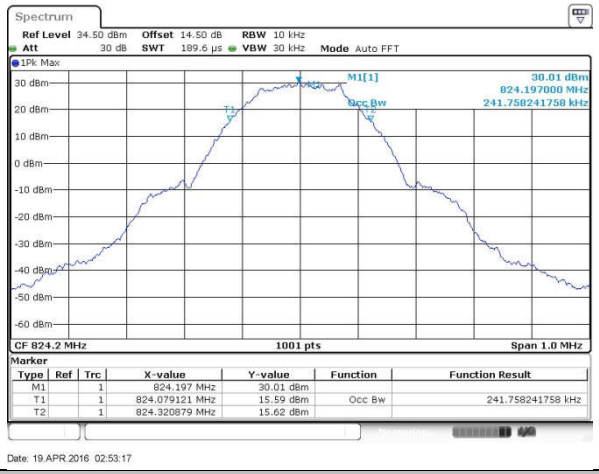
Occupied Bandwidth

Mode	GSM850 (MHz)	GSM1900 (MHz)
Mod.	GSM	GSM
Lowest CH	0.242	0.244
Middle CH	0.244	0.242
Highest CH	0.243	0.243

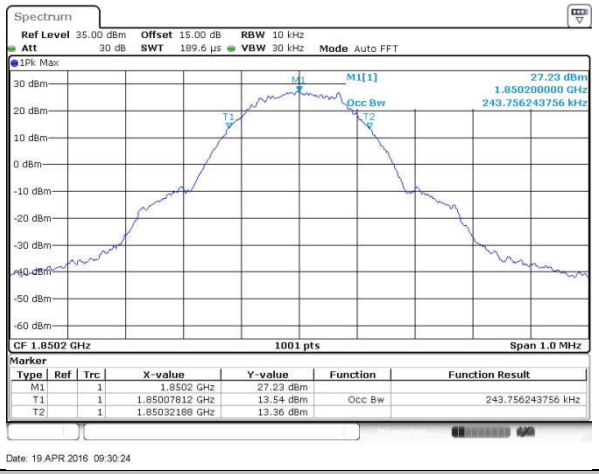
Mode	WCDMA Band V (MHz)	WCDMA Band II (MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.15	4.17
Middle CH	4.15	4.16
Highest CH	4.15	4.15

GSM850 (GSM)

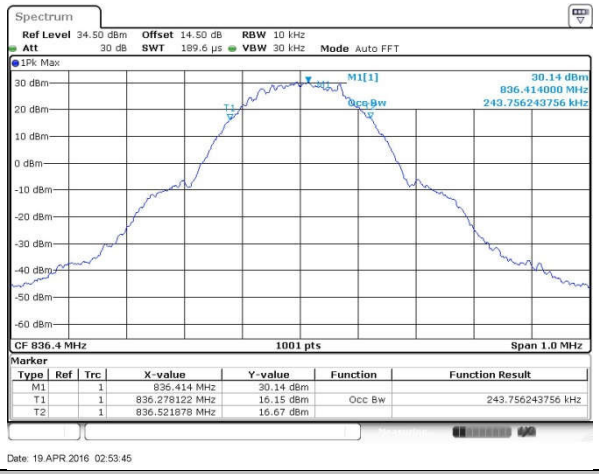
Lowest Channel



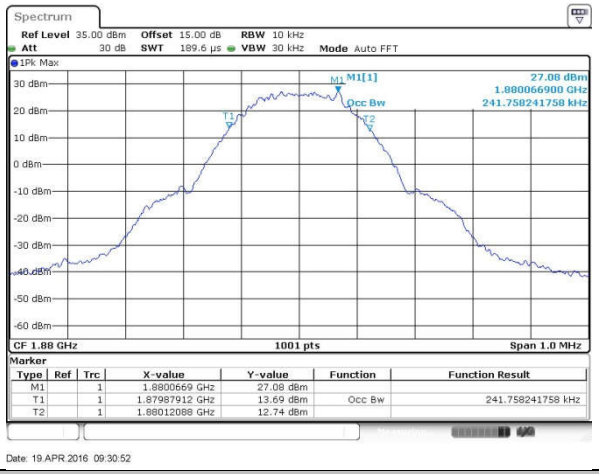
Lowest Channel



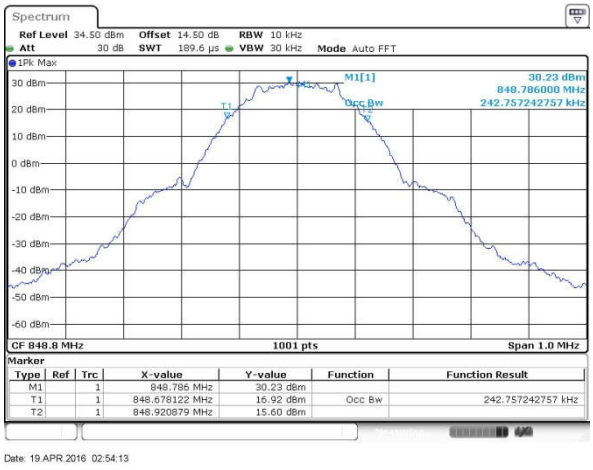
Middle Channel



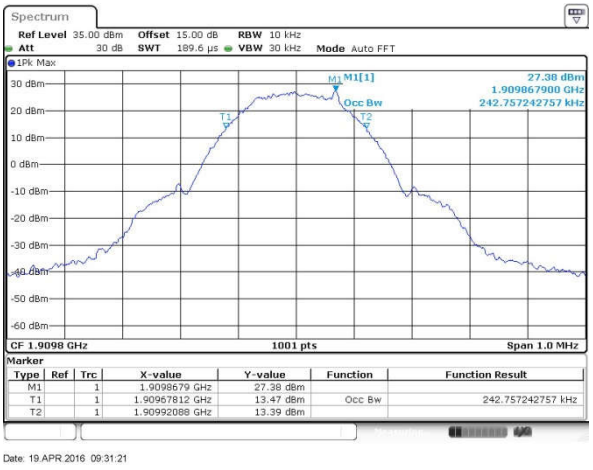
Middle Channel

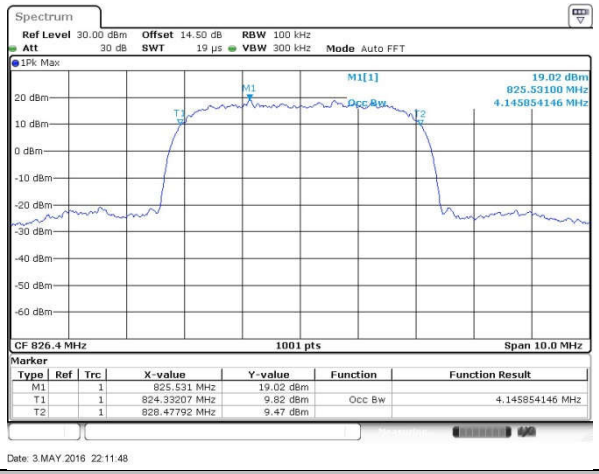
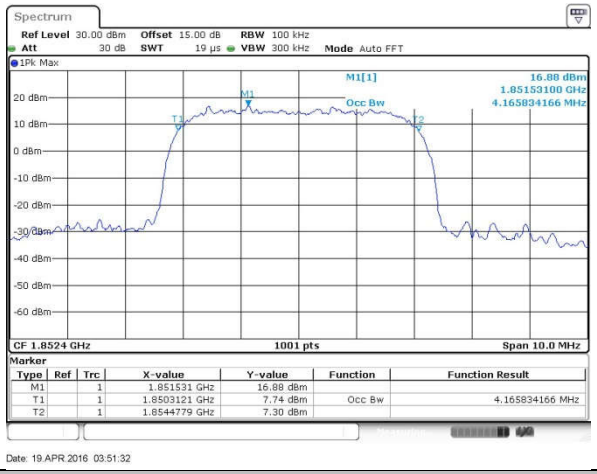
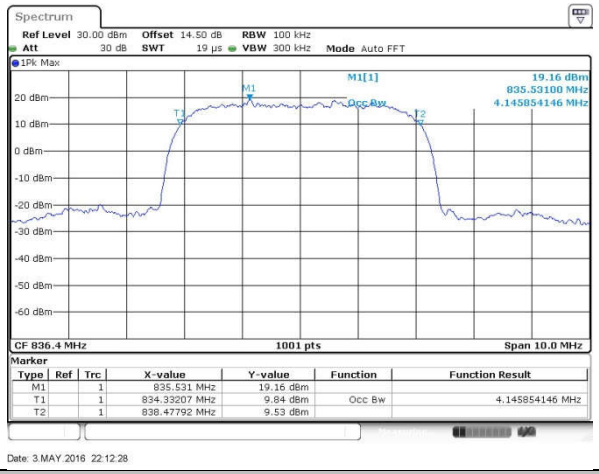
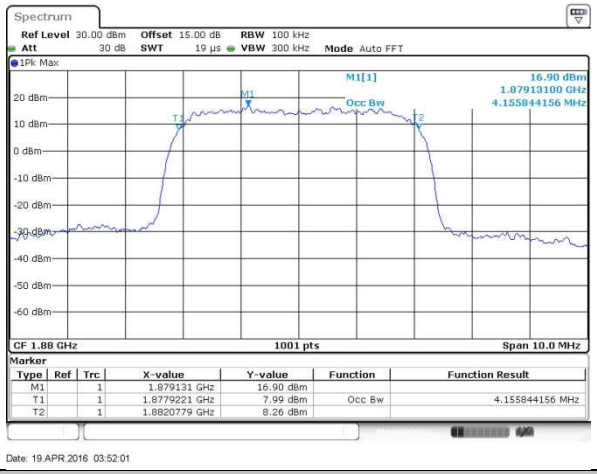
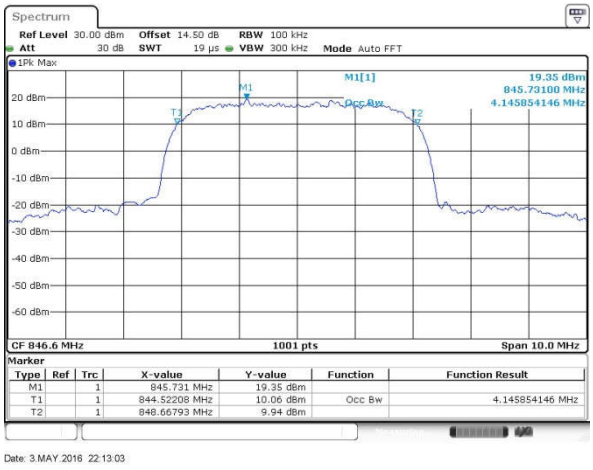
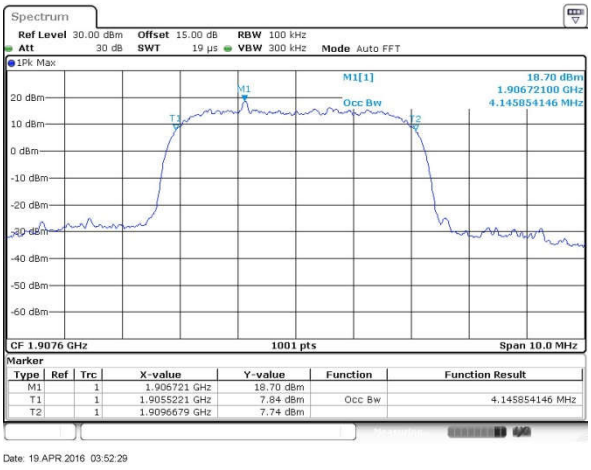


Highest Channel



Highest Channel

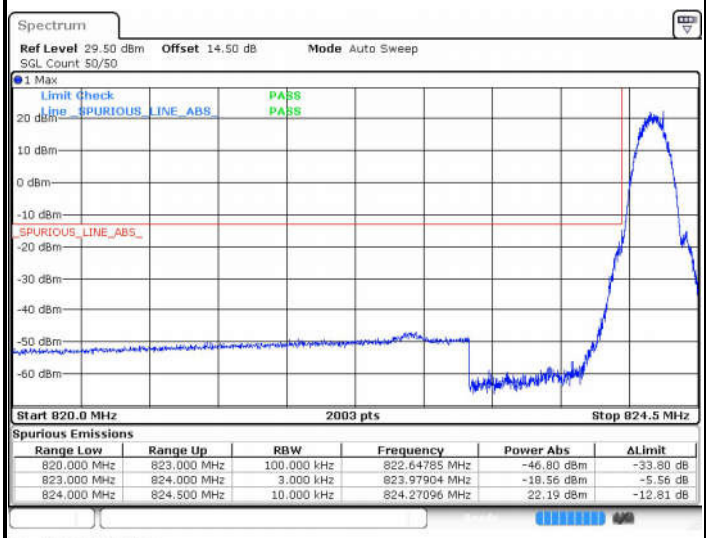


WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

Conducted Band Edge

GSM850 (GSM)

Lowest Band Edge

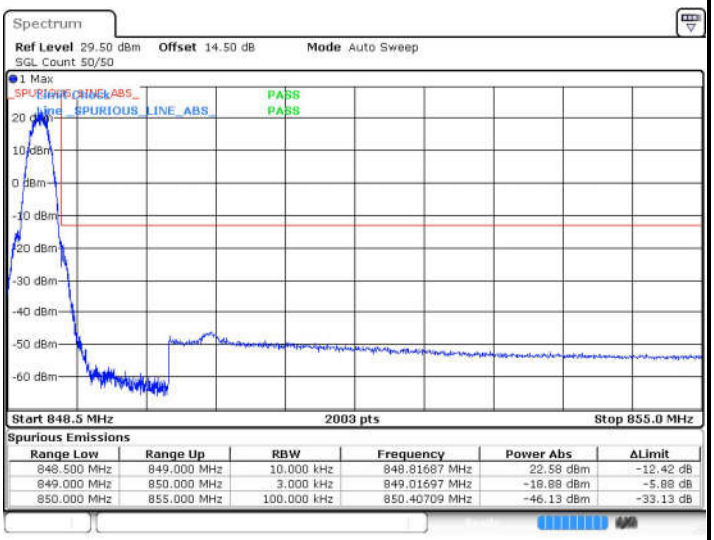


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
820.000 MHz	823.000 MHz	100.000 kHz	822.64785 MHz	-46.80 dBm	-33.80 dB
823.000 MHz	824.000 MHz	3.000 kHz	823.97904 MHz	-18.56 dBm	-5.56 dB
824.000 MHz	824.500 MHz	10.000 kHz	824.27096 MHz	22.19 dBm	-12.81 dB

Date: 19.APR.2016 02:47:25

Highest Band Edge



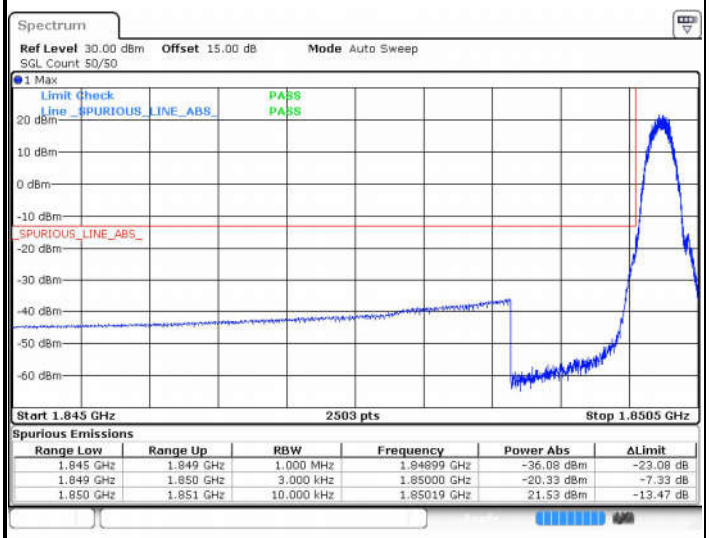
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
848.500 MHz	849.000 MHz	10.000 kHz	848.81687 MHz	22.58 dBm	-12.42 dB
849.000 MHz	850.000 MHz	3.000 kHz	849.01697 MHz	-18.88 dBm	-5.88 dB
850.000 MHz	855.000 MHz	100.000 kHz	850.40709 MHz	-46.13 dBm	-33.13 dB

Date: 19.APR.2016 02:48:51

GSM1900 (GSM)

Lowest Band Edge

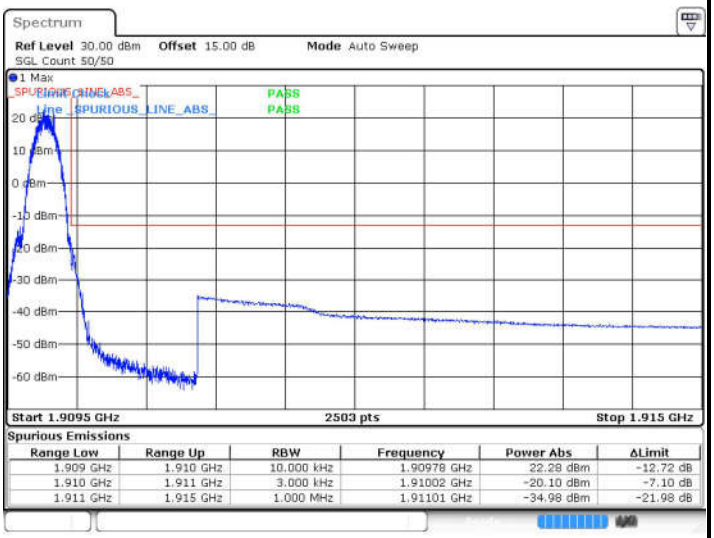


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.845 GHz	1.849 GHz	1.000 MHz	1.84899 GHz	-36.08 dBm	-23.08 dB
1.849 GHz	1.850 GHz	3.000 kHz	1.85000 GHz	-20.33 dBm	-7.33 dB
1.850 GHz	1.851 GHz	10.000 kHz	1.85019 GHz	21.53 dBm	-13.47 dB

Date: 19.APR.2016 09:35:43

Highest Band Edge



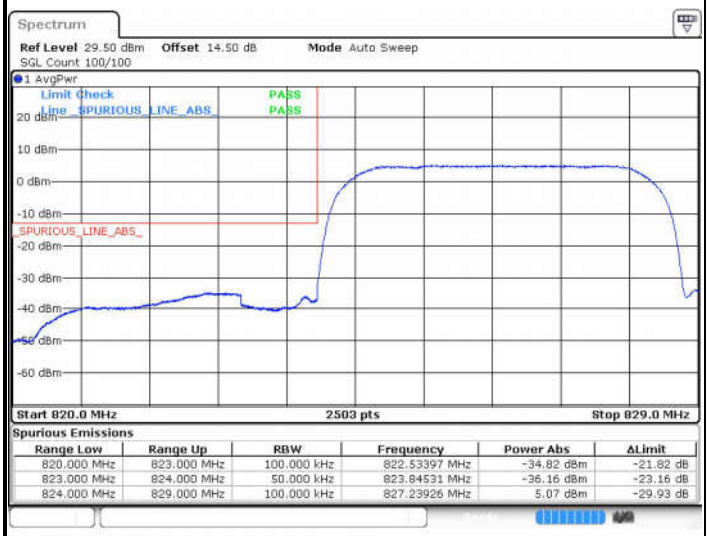
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.909 GHz	1.910 GHz	10.000 kHz	1.90978 GHz	22.28 dBm	-12.72 dB
1.910 GHz	1.911 GHz	3.000 kHz	1.91002 GHz	-20.10 dBm	-7.10 dB
1.911 GHz	1.915 GHz	1.000 MHz	1.91101 GHz	-34.98 dBm	-21.98 dB

Date: 19.APR.2016 09:37:09

WCDMA Band V (RMC 12.2Kbps)

Lowest Band Edge

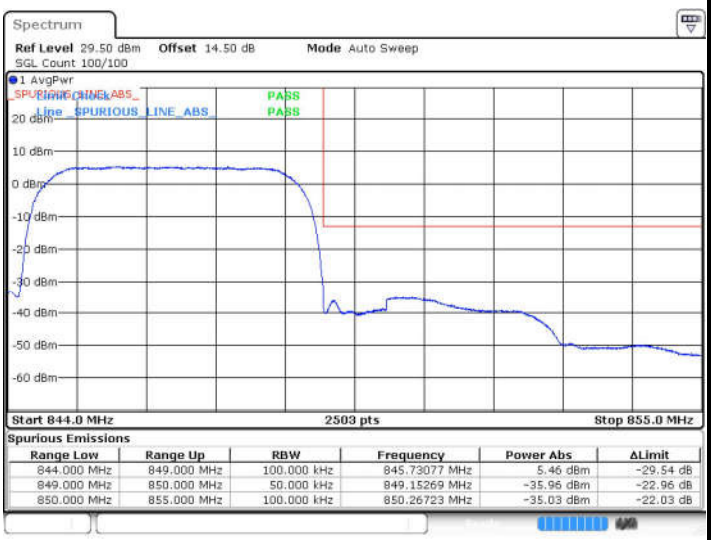


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
820.000 MHz	823.000 MHz	100.000 kHz	822.53397 MHz	-34.82 dBm	-21.82 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.84531 MHz	-36.16 dBm	-23.16 dB
824.000 MHz	829.000 MHz	100.000 kHz	827.23926 MHz	5.07 dBm	-29.93 dB

Date: 19.APR.2016 03:39:20

Highest Band Edge



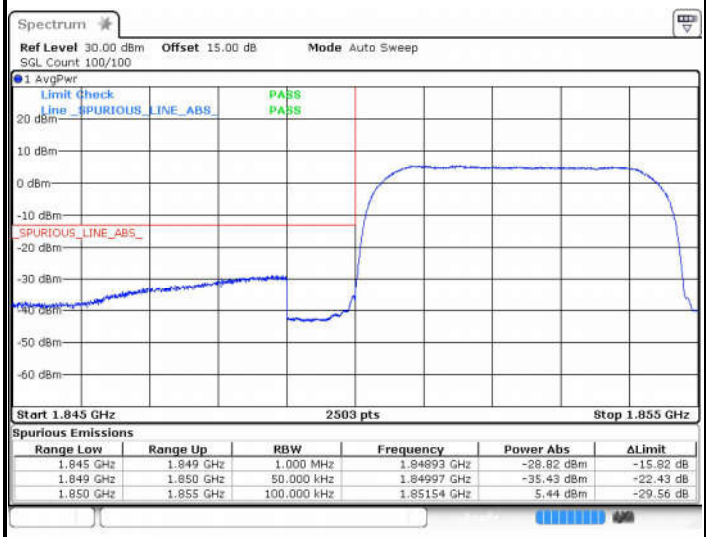
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	845.73077 MHz	5.46 dBm	-29.54 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.15269 MHz	-35.96 dBm	-22.96 dB
850.000 MHz	855.000 MHz	100.000 kHz	850.26723 MHz	-35.03 dBm	-22.03 dB

Date: 19.APR.2016 03:42:01

WCDMA Band II (RMC 12.2Kbps)

Lowest Band Edge

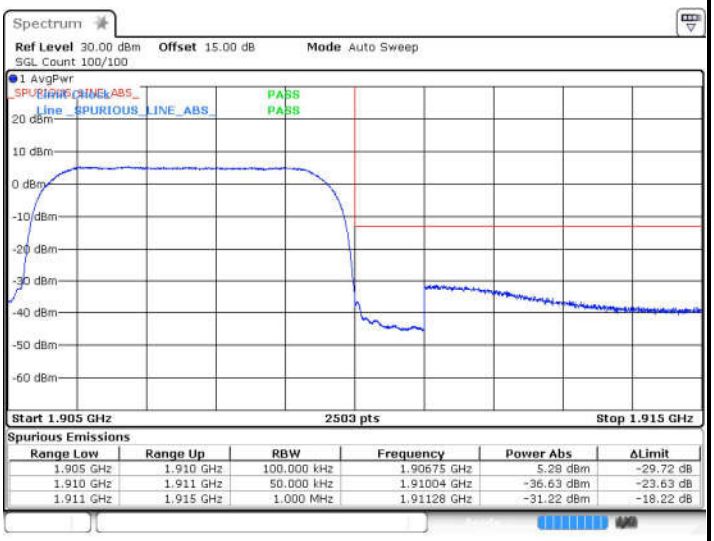


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.845 GHz	1.849 GHz	1.000 MHz	1.84893 GHz	-28.82 dBm	-15.82 dB
1.849 GHz	1.850 GHz	50.000 kHz	1.84997 GHz	-35.43 dBm	-22.43 dB
1.850 GHz	1.855 GHz	100.000 kHz	1.85154 GHz	5.44 dBm	-29.56 dB

Date: 19.APR.2016 03:55:22

Highest Band Edge



Spurious Emissions

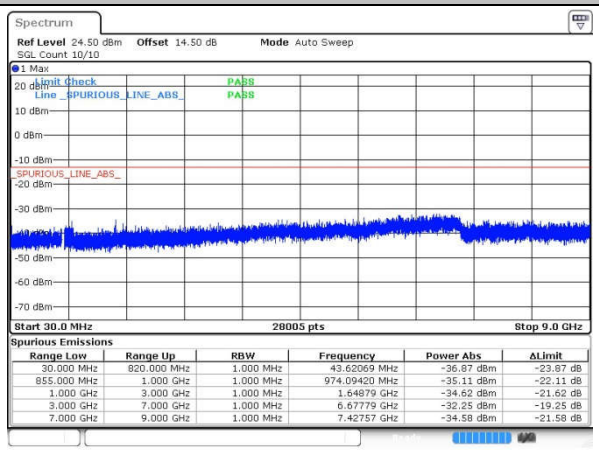
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.905 GHz	1.910 GHz	100.000 kHz	1.90675 GHz	5.28 dBm	-29.72 dB
1.910 GHz	1.911 GHz	50.000 kHz	1.91004 GHz	-36.63 dBm	-23.63 dB
1.911 GHz	1.915 GHz	1.000 MHz	1.91128 GHz	-31.22 dBm	-18.22 dB

Date: 19.APR.2016 03:58:03

Conducted Spurious Emission

GSM850 (GSM)

Lowest Channel



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	43.62069 MHz	-36.87 dBm	-23.87 dB
855.000 MHz	1.000 GHz	1.000 MHz	974.09420 MHz	-35.11 dBm	-22.11 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.54879 GHz	-34.62 dBm	-21.62 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.67779 GHz	-32.25 dBm	-19.25 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.42757 GHz	-34.58 dBm	-21.58 dB

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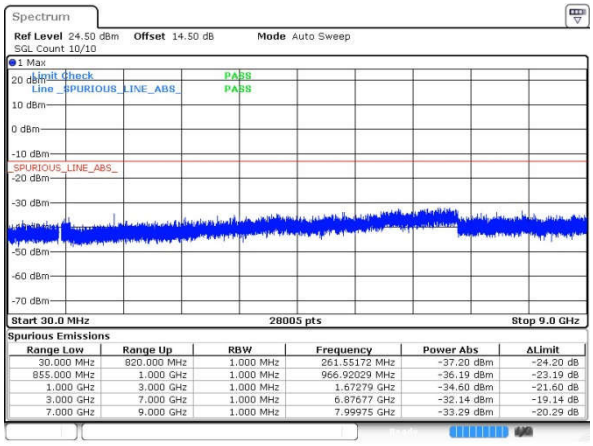
Middle Channel

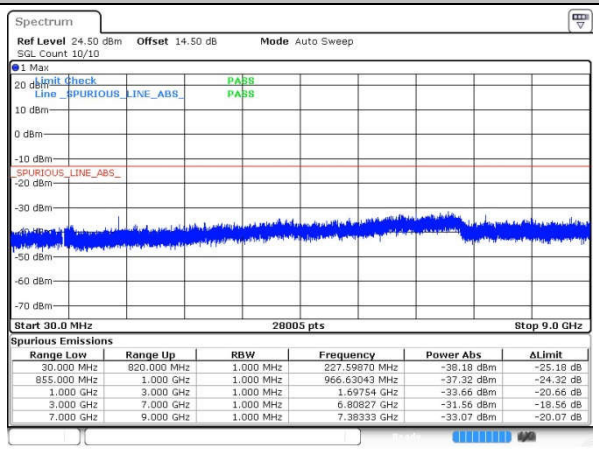


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	261.55172 MHz	-37.20 dBm	-24.20 dB
855.000 MHz	1.000 GHz	1.000 MHz	966.92029 MHz	-36.19 dBm	-23.19 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.67279 GHz	-34.60 dBm	-21.60 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.87677 GHz	-32.14 dBm	-19.14 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.99975 GHz	-33.29 dBm	-20.29 dB

Date: 19.APR.2016 02:57:21

Highest Channel



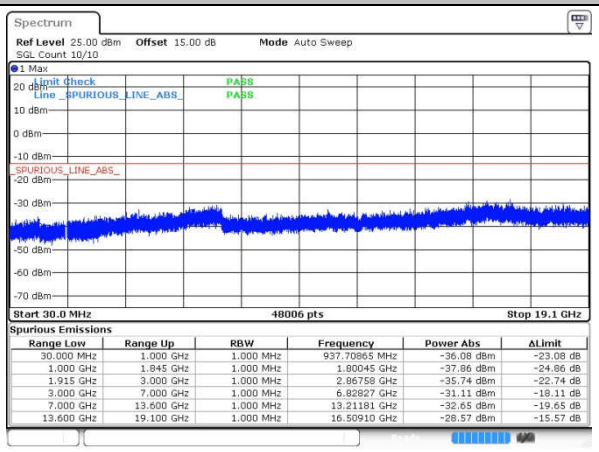
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	227.59870 MHz	-38.18 dBm	-25.18 dB
855.000 MHz	1.000 GHz	1.000 MHz	966.63043 MHz	-37.32 dBm	-24.32 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.69754 GHz	-33.66 dBm	-20.66 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.80827 GHz	-31.56 dBm	-18.56 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.38333 GHz	-33.07 dBm	-20.07 dB

Date: 19.APR.2016 02:58:36

GSM1900 (GSM)

Lowest Channel

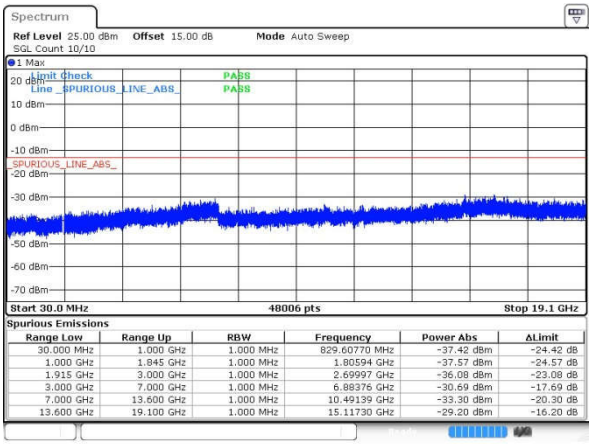


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	937.70865 MHz	-36.08 dBm	-23.08 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.80045 GHz	-37.86 dBm	-24.86 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.86758 GHz	-35.74 dBm	-22.74 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.82827 GHz	-31.11 dBm	-18.11 dB
7.000 GHz	13.600 GHz	1.000 MHz	13.21181 GHz	-32.65 dBm	-19.65 dB
13.600 GHz	19.100 GHz	1.000 MHz	16.50910 GHz	-28.57 dBm	-15.57 dB

Date: 19.APR.2016 09:39:00

Middle Channel

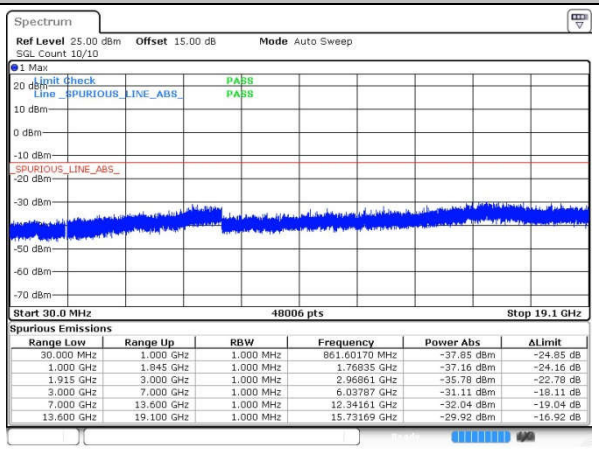


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	829.60770 MHz	-37.42 dBm	-24.42 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.80594 GHz	-37.57 dBm	-24.57 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.69997 GHz	-36.08 dBm	-23.08 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.88376 GHz	-30.69 dBm	-17.69 dB
7.000 GHz	13.600 GHz	1.000 MHz	10.49139 GHz	-33.30 dBm	-20.30 dB
13.600 GHz	19.100 GHz	1.000 MHz	15.11730 GHz	-29.20 dBm	-16.20 dB

Date: 19.APR.2016 09:40:16

Highest Channel



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	861.60170 MHz	-37.85 dBm	-24.85 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.76835 GHz	-37.16 dBm	-24.16 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.96861 GHz	-35.78 dBm	-22.78 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.03787 GHz	-31.11 dBm	-18.11 dB
7.000 GHz	13.600 GHz	1.000 MHz	12.34161 GHz	-32.04 dBm	-19.04 dB
13.600 GHz	19.100 GHz	1.000 MHz	15.73169 GHz	-29.92 dBm	-16.92 dB

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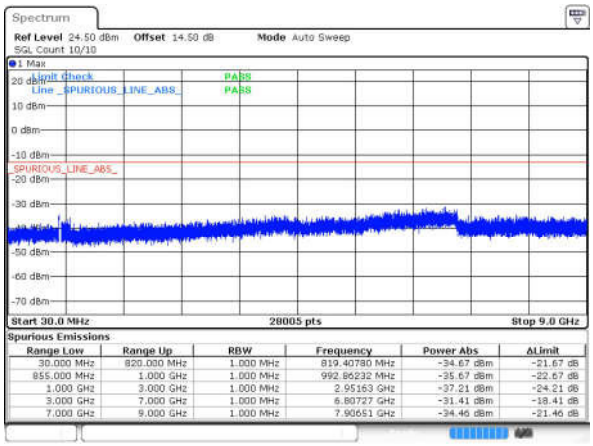
WCDMA Band V (RMC 12.2Kbps)

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	-34.67 dBm	-21.67 dB
855.000 MHz	1.000 GHz	1.000 MHz	992.86232 MHz	-35.67 dBm	-22.67 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.95163 GHz	-37.21 dBm	-24.21 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.80727 GHz	-31.41 dBm	-18.41 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.90651 GHz	-34.46 dBm	-21.46 dB

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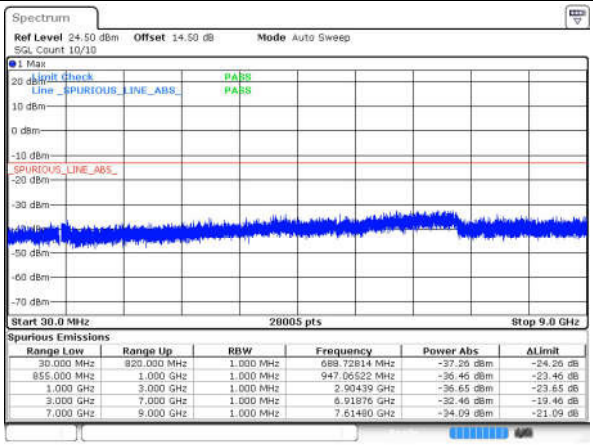
Middle Channel



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	688.72814 MHz	-37.26 dBm	-24.26 dB
855.000 MHz	1.000 GHz	1.000 MHz	947.06522 MHz	-36.46 dBm	-23.46 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.90439 GHz	-36.65 dBm	-23.65 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.91876 GHz	-32.46 dBm	-19.46 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.61480 GHz	-34.09 dBm	-21.09 dB

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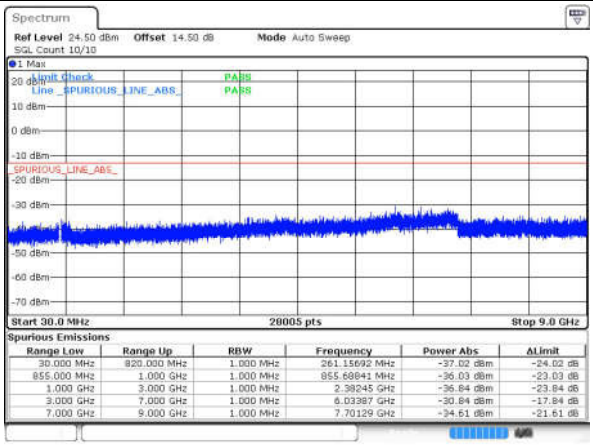
Highest Channel



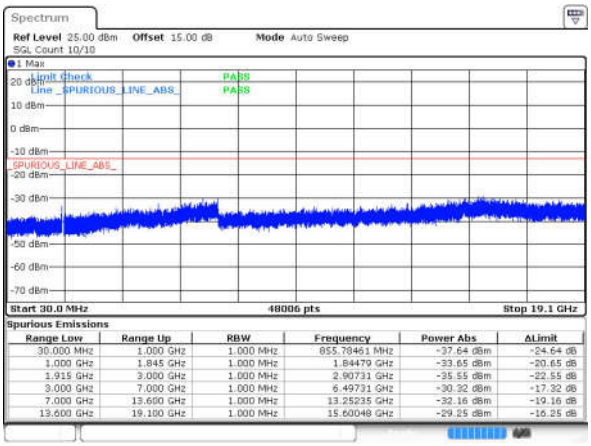
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	261.15692 MHz	-37.02 dBm	-24.02 dB
855.000 MHz	1.000 GHz	1.000 MHz	855.68841 MHz	-36.03 dBm	-23.03 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.38245 GHz	-36.84 dBm	-23.84 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.03387 GHz	-30.84 dBm	-17.84 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.70129 GHz	-34.61 dBm	-21.61 dB

Date: 19.APR.2016 03:45:53

WCDMA Band II (RMC 12.2Kbps)

Lowest Channel

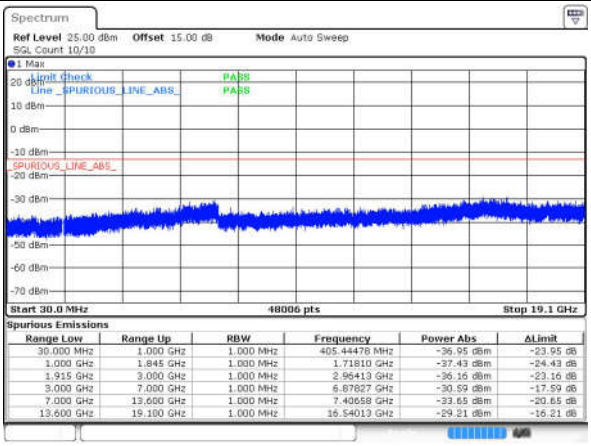


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	855.78461 MHz	-37.64 dBm	-24.64 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.84479 GHz	-33.65 dBm	-20.65 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.90731 GHz	-35.55 dBm	-22.55 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.49731 GHz	-30.32 dBm	-17.32 dB
7.000 GHz	13.600 GHz	1.000 MHz	13.25235 GHz	-32.16 dBm	-19.16 dB
13.600 GHz	19.100 GHz	1.000 MHz	15.60048 GHz	-29.25 dBm	-16.25 dB

Date: 19.APR.2016 03:58:25

Middle Channel

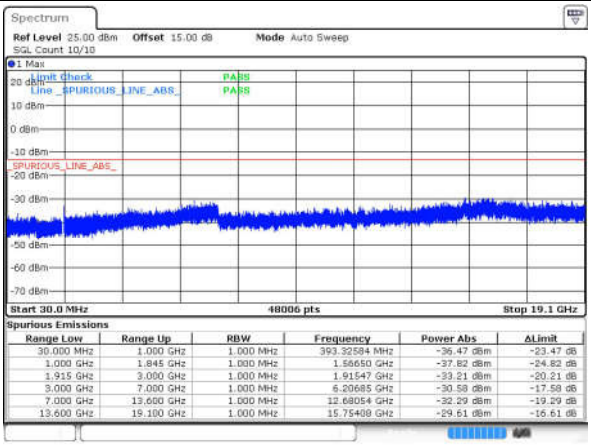


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	405.44478 MHz	-36.95 dBm	-23.95 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.71810 GHz	-37.43 dBm	-24.43 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.96413 GHz	-36.16 dBm	-23.16 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.87827 GHz	-30.59 dBm	-17.59 dB
7.000 GHz	13.600 GHz	1.000 MHz	7.40658 GHz	-33.65 dBm	-20.65 dB
13.600 GHz	19.100 GHz	1.000 MHz	16.54013 GHz	-29.21 dBm	-16.21 dB

Date: 19.APR.2016 04:00:42

Highest Channel



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	393.32584 MHz	-36.47 dBm	-23.47 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.56650 GHz	-37.82 dBm	-24.82 dB
1.915 GHz	3.000 GHz	1.000 MHz	1.91547 GHz	-33.21 dBm	-20.21 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.20685 GHz	-30.58 dBm	-17.58 dB
7.000 GHz	13.600 GHz	1.000 MHz	12.68054 GHz	-32.29 dBm	-19.29 dB
13.600 GHz	19.100 GHz	1.000 MHz	15.75408 GHz	-29.61 dBm	-16.61 dB

Date: 19.APR.2016 04:01:57

Frequency Stability

Test Conditions	Middle Channel	GSM850 (GSM)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0036	PASS
40	Normal Voltage	0.0072	
30	Normal Voltage	0.0132	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0143	
0	Normal Voltage	0.0108	
-10	Normal Voltage	0.0084	
-20	Normal Voltage	0.0155	
-30	Normal Voltage	0.0096	
20	Maximum Voltage	0.0036	
20	Normal Voltage	0.0120	
20	Battery End Point	0.0155	

Test Conditions	Middle Channel	GSM1900 (GSM)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0037	PASS
40	Normal Voltage	0.0016	
30	Normal Voltage	0.0016	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0027	
0	Normal Voltage	0.0165	
-10	Normal Voltage	0.0186	
-20	Normal Voltage	0.0176	
-30	Normal Voltage	0.0117	
20	Maximum Voltage	0.0021	
20	Normal Voltage	0.0037	
20	Battery End Point	0.0005	

Note:

1. Normal Voltage = 3.8V. ；Battery End Point (BEP) = 3.5 V.；Maximum Voltage =4.35V
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 V (RMC 12.2Kbps)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0024	PASS
40	Normal Voltage	0.0084	
30	Normal Voltage	0.0036	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0048	
0	Normal Voltage	0.0096	
-10	Normal Voltage	0.0143	
-20	Normal Voltage	0.0120	
-30	Normal Voltage	0.0012	
20	Maximum Voltage	0.0167	
20	Normal Voltage	0.0096	
20	Battery End Point	0.0108	

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0053	PASS
40	Normal Voltage	0.0016	
30	Normal Voltage	0.0021	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0059	
0	Normal Voltage	0.0064	
-10	Normal Voltage	0.0037	
-20	Normal Voltage	0.0027	
-30	Normal Voltage	0.0053	
20	Maximum Voltage	0.0043	
20	Normal Voltage	0.0005	
20	Battery End Point	0.0048	

Note:

1. Normal Voltage = 3.8V. ；Battery End Point (BEP) = 3.5 V.；Maximum Voltage =4.35 V
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

ERP/EIRP

Channel	Mode	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	GSM850 GSM	28.27	0.6714	28.78	0.7551
Middle		28.72	0.7447	28.66	0.7345
Highest		29.44	0.8790	28.81	0.7603
Lowest	WCDMA Band V RMC 12.2Kbps	20.73	0.1183	20.92	0.1236
Middle		21.32	0.1355	20.81	0.1205
Highest		21.79	0.1510	21.04	0.1271
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GSM	27.32	0.5395	28.44	0.6982
Middle		27.88	0.6138	28.72	0.7447
Highest		27.07	0.5093	28.88	0.7727
Lowest	WCDMA Band II RMC 12.2Kbps	22.33	0.1710	23.50	0.2239
Middle		22.45	0.1758	23.42	0.2198
Highest		21.41	0.1384	23.35	0.2163
Limit	EIRP < 2W	Result		PASS	

Radiated Spurious Emission

GSM850 (GSM)									
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	-25.86	-13	-12.86	-33.50	-27.75	1.86	5.90	H
	2510	-34.57	-13	-21.57	-49.38	-36.91	2.31	6.80	H
	3345	-41.26	-13	-28.26	-56.82	-43.66	2.85	7.40	H
	4182	-42.70	-13	-29.70	-57.79	-45.38	3.07	7.90	H
	1674	-24.90	-13	-11.90	-32.16	-26.79	1.86	5.90	V
	2510	-30.09	-13	-17.09	-47.01	-32.43	2.31	6.80	V
	3345	-34.14	-13	-21.14	-53.02	-36.54	2.85	7.40	V
	4182	-48.35	-13	-35.35	-61.94	-51.03	3.07	7.90	V

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

GSM1900 (GSM)									
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	-51.85	-13	-38.85	-66.05	-56.45	3	7.60	H
	5640	-48.91	-13	-35.91	-62.70	-55.17	3.84	10.10	H
	7521	-42.49	-13	-29.49	-62.27	-49.99	4.43	11.93	H
	3759	-54.59	-13	-41.59	-67.08	-59.19	3	7.60	V
	5640	-48.57	-13	-35.57	-60.98	-54.83	3.84	10.10	V
	7521	-46.51	-13	-33.51	-64.3	-54.01	4.43	11.93	V

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

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	1676	-36.69	-13	-23.69	-43.41	-38.58	1.86	5.90	H
	2512	-40.32	-13	-27.32	-53.59	-42.66	2.31	6.80	H
	3345	-49.65	-13	-36.65	-62.28	-52.05	2.85	7.40	H
	1672	-38.82	-13	-25.82	-45.01	-40.71	1.86	5.90	V
	2506	-45.21	-13	-32.21	-57.96	-47.55	2.31	6.80	V
	3342	-47.06	-13	-34.06	-61.04	-49.46	2.85	7.40	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	-52.32	-13	-39.32	-66.52	-56.92	3	7.60	H
	5640	-49.34	-13	-36.34	-63.13	-55.60	3.84	10.10	H
	7521	-43.88	-13	-30.88	-63.66	-51.38	4.43	11.93	H
	3759	-53.53	-13	-40.53	-66.02	-58.13	3	7.60	V
	5640	-48.16	-13	-35.16	-60.57	-54.42	3.84	10.10	V
	7521	-46.17	-13	-33.17	-63.96	-53.67	4.43	11.93	V

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