

FCC RF Test Report

APPLICANT : Brightstar Corporation
EQUIPMENT : Mobile Phone
BRAND NAME : Avvio, MEU
MODEL NAME : Avvio Q501, MEU AN502
FCC ID : WVBAQ501X
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Nov. 24, 2016 and testing was completed on Dec. 01, 2016. We, SPORTON INTERNATIONAL (SHENZHEN) 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG6N2401	Rev. 01	Initial issue of report	Dec. 19, 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 for Part 22H	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 20.85 dB at 3760.000 MHz



1 General Description

1.1 Applicant

Brightstar Corporation

9725 NW 117th Ave., Miami, Florida, FL 33178, United States

1.2 Manufacturer

Shenzhen Crave Communication Co., Ltd.

Floor 3, Bldg8, Dongfangming Industrial City, No.83 Dabao Rd., 33 District, Shenzhen, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Avvio, MEU
Model Name	Avvio Q501, MEU AN502
FCC ID	WVBAQ501X
EUT supports Radios application	GSM/GPRS/EGPRS (Downlink Only) WCDMA/HSPA/HSPA+(16QAM uplink is not supported)/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE
IMEI Code	Conducted: 352155079998320 Radiated: 352155079998643 ERP/EIRP: 352155079998593
EUT Stage	Production Unit

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 for this project. The different model with different brand is for market purpose. The differences between them are as below:
 - 1) Avvio Q501: PCBA with single SIM card slot, MEU AN502: PCBA with dual SIM card slot.
 - 2) Avvio Q501 has GSM quad-band and WCDMA B2/B5, but MEU AN502 disable WCDMA B2 and add WCDMA B1 by SW.

According to the difference, we choose single SIM card mobile sample 1 to perform RF test.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification		
Tx Frequency	Sample 1:	GSM/GPRS: 824.2 MHz ~ 848.8 MHz 1850.2 MHz ~ 1909.8MHz WCDMA: Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz
	Sample 2:	GSM/GPRS: 824.2 MHz ~ 848.8 MHz 1850.2 MHz ~ 1909.8MHz WCDMA: Band V: 826.4 MHz ~ 846.6 MHz
Rx Frequency	Sample 1:	GSM/GPRS: 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
	Sample 2:	GSM/GPRS: 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz WCDMA: Band V: 871.4 MHz ~ 891.6 MHz
Maximum Output Power to Antenna	GSM/GPRS: 850: 32.84 dBm 1900: 29.82 dBm WCDMA: Band V: 24.00 dBm Band II: 22.83 dBm	
Antenna Type	PIFA Antenna	
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK(Downlink Only) WCDMA : BPSK (Uplink) HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM(uplink is not supported)	

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 22H	GSM850 GSM	GMSK	0.138	0.0717 ppm	243KGXW
Part 22H	WCDMA Band V RMC 12.2Kbps	BPSK	0.018	0.0203 ppm	4M16F9W
Part 24E	GSM1900 GSM	GMSK	0.652	0.0330 ppm	244KGXW
Part 24E	WCDMA Band II RMC 12.2Kbps	BPSK	0.167	0.0074 ppm	4M16F9W

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595
Test Site No.	Sporton Site No. TH01-SZ

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-3320-2398	
Test Site No.	Sporton Site No. 03CH02-SZ	FCC Registration No. 566869

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 as following frequency range:

1. 30 MHz to 10th harmonic for GSM850 and WCDMA Band V.
2. 30 MHz to 10th harmonic for GSM1900 and WCDMA Band II.

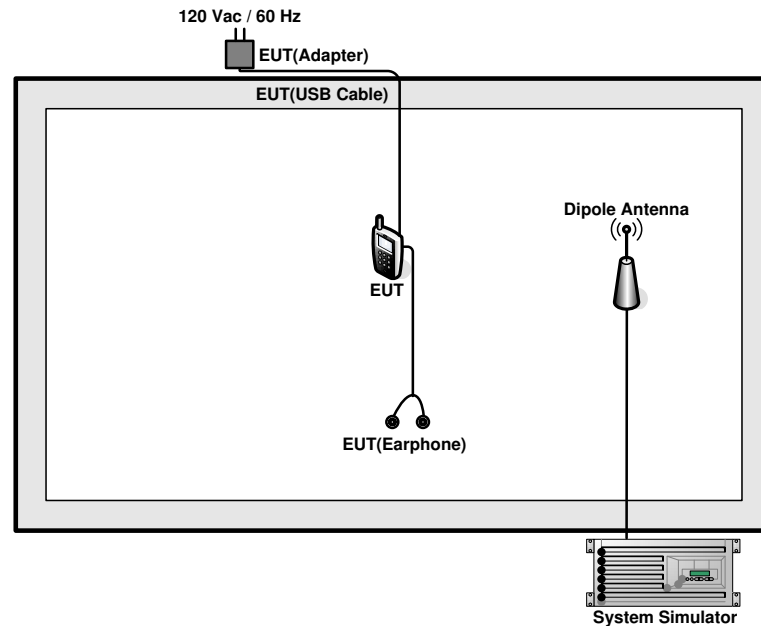
All modes and data rates and positions were investigated.

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

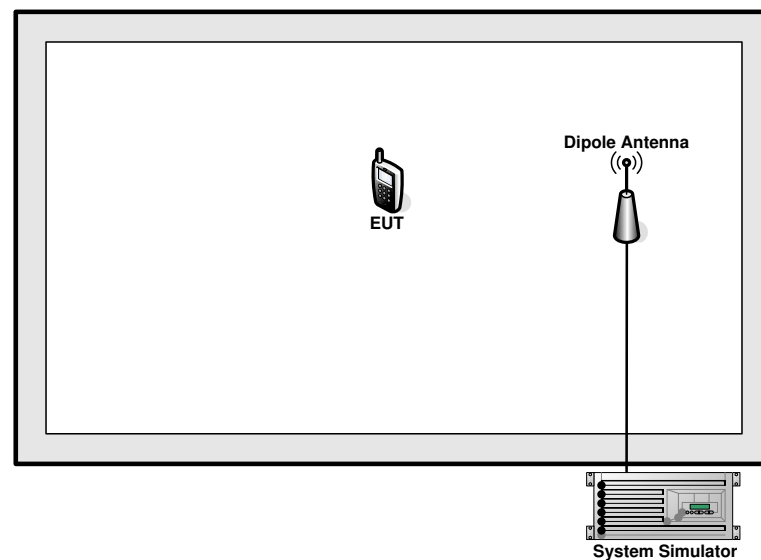
Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GSM Link	■ GSM Link
GSM 1900	■ GSM Link	■ GSM Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System

For 22(H)



For 24(E)



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 dB and a 10dB attenuator.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4 + 10 = 14 \text{ (dB)}\end{aligned}$$

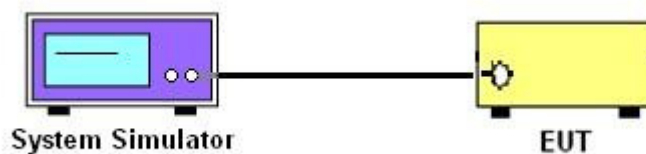
3 Conducted Test Result

3.1 Measuring Instruments

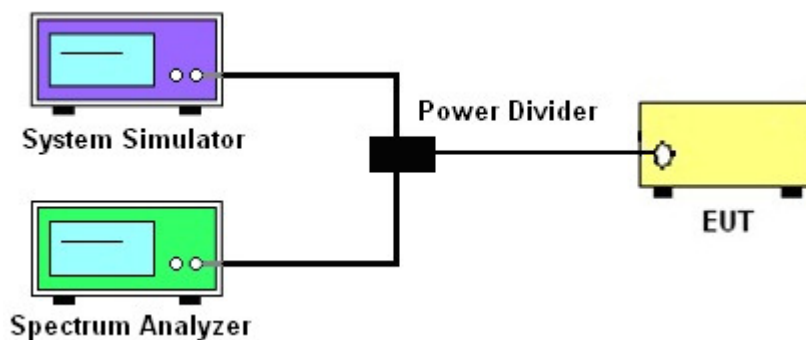
See list of measuring instruments of this test report.

3.2 Test Setup

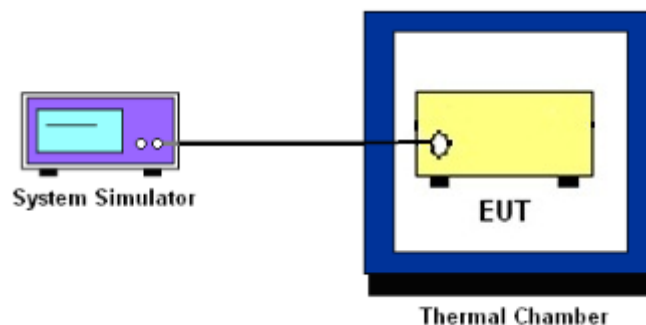
3.2.1 Conducted Output Power



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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13\text{dBm}$.

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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)
= $P(W) - [43 + 10\log(P)]$ (dB)
= $[30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (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 $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) 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 $20\pm 5^{\circ}\text{C}$ 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

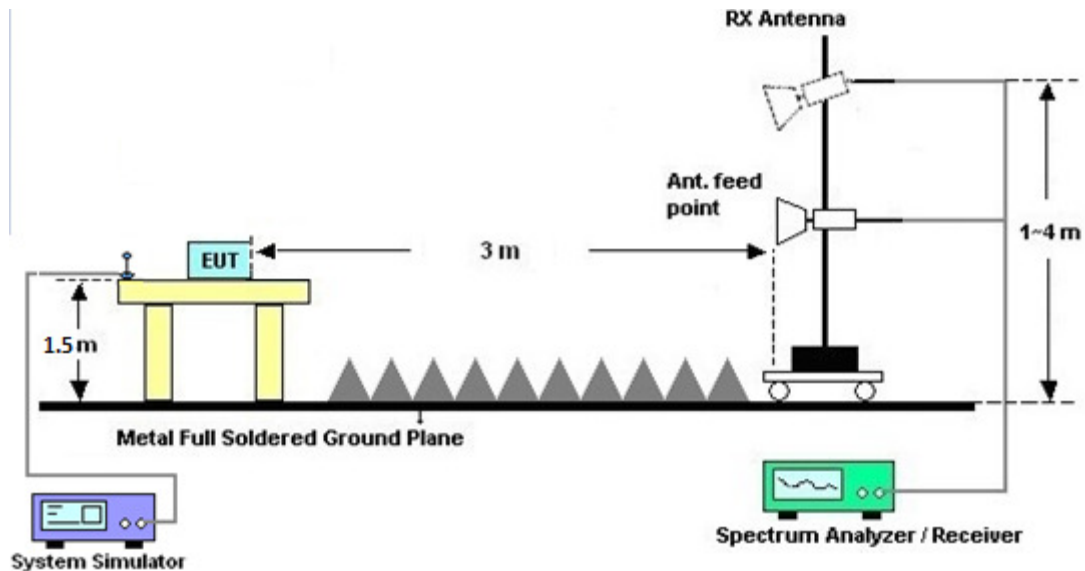
See list of measuring instruments of this test report.

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 for frequency below 1GHz and 1.5 meter for frequency above 1GHz) 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, $EIRP = LVL + \text{Correction factor}$ 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 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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	May 07, 2016	Dec. 01, 2016	May 06, 2017	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 16, 2016	Dec. 01, 2016	Jul. 15, 2017	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz; Max 30dBm	Oct. 11, 2016	Nov. 25, 2016	Oct. 10, 2017	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	May 21, 2016	Nov. 25, 2016	May 20, 2017	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Jan. 11, 2016	Nov. 25, 2016	Jan. 10, 2017	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Aug. 10, 2016	Nov. 25, 2016	Aug. 09, 2017	Radiation (03CH02-SZ)
Amplifier	HP	8447F	3113A04622	9kHz ~1300MHz / 30 dB	Jul. 16, 2016	Nov. 25, 2016	Jul. 15, 2017	Radiation (03CH02-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 12, 2016	Nov. 25, 2016	Jan. 11, 2017	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	61601000247 0	N/A	NCR	Nov. 25, 2016	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Nov. 25, 2016	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Nov. 25, 2016	NCR	Radiation (03CH02-SZ)

NCR: No Calibration Required

6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.5dB
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Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.3dB
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Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.7dB
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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	32.71	32.84	32.82	29.82	29.67	29.57
GPRS class 8	32.70	32.83	32.80	29.80	29.66	29.56
GPRS class 10	31.82	32.00	31.98	28.95	28.74	28.76
GPRS class 11	30.16	30.32	30.35	27.30	27.10	27.15
GPRS class 12	29.35	29.51	29.50	26.50	26.30	26.35

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	23.98	23.58	23.69	22.80	22.14	22.00
RMC 12.2Kbps	24.00	23.60	23.70	22.83	22.16	22.02
HSDPA Subtest-1	22.95	22.69	22.68	22.12	21.45	21.29
HSDPA Subtest-2	22.97	22.68	22.67	22.09	21.43	21.25
HSDPA Subtest-3	22.49	22.25	22.18	21.61	20.98	20.80
HSDPA Subtest-4	22.49	22.20	22.21	21.58	20.93	20.77
HSUPA Subtest-1	20.97	20.81	20.77	20.09	19.49	19.38
HSUPA Subtest-2	20.94	20.79	20.80	20.02	19.48	19.35
HSUPA Subtest-3	21.95	21.80	21.79	21.08	20.42	20.35
HSUPA Subtest-4	20.43	20.33	20.20	19.52	19.01	18.84
HSUPA Subtest-5	23.00	22.80	22.80	22.10	21.60	21.40

**Peak-to-Average Ratio**

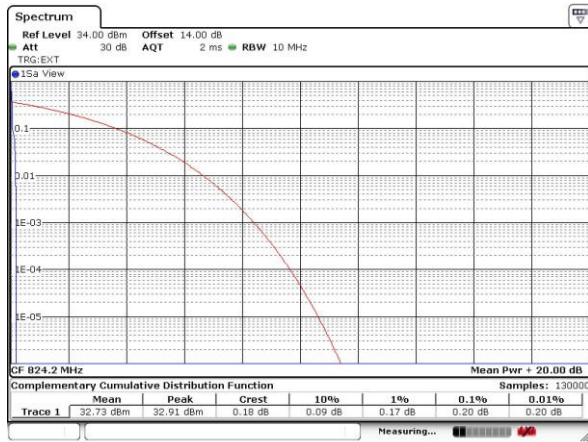
Mode	GSM850(dB)	GSM1900(dB)	Limit: 13dB
Mod.	GSM	GSM	Result
Lowest CH	0.20	0.12	PASS
Middle CH	0.12	0.14	
Highest CH	0.17	0.17	

Mode	WCDMA Band V(dB)	WCDMA Band II(dB)	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	2.26	2.75	PASS
Middle CH	2.72	2.93	
Highest CH	2.43	2.78	



GSM850 (GSM)

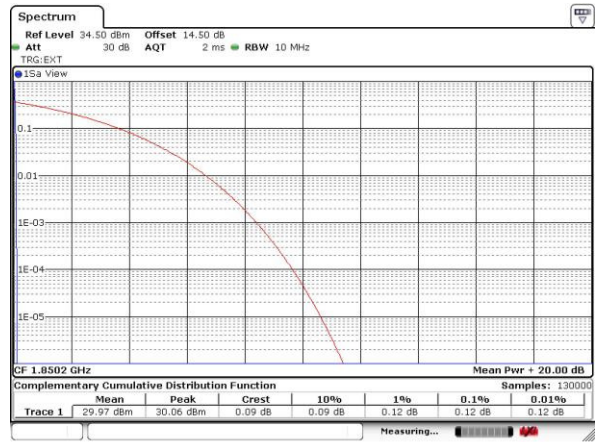
Lowest Channel



Date: 1.DEC.2016 15:50:07

GSM1900 (GSM)

Lowest Channel



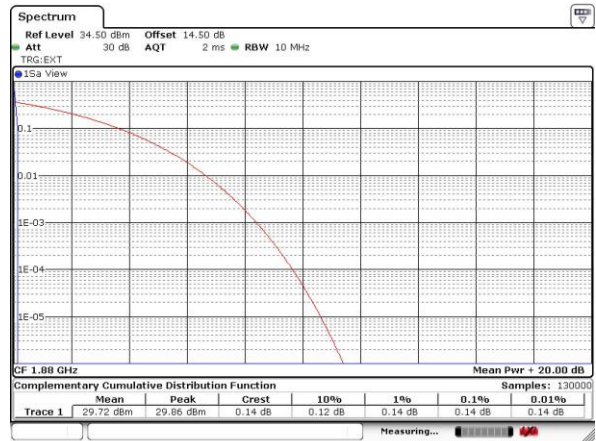
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Middle Channel



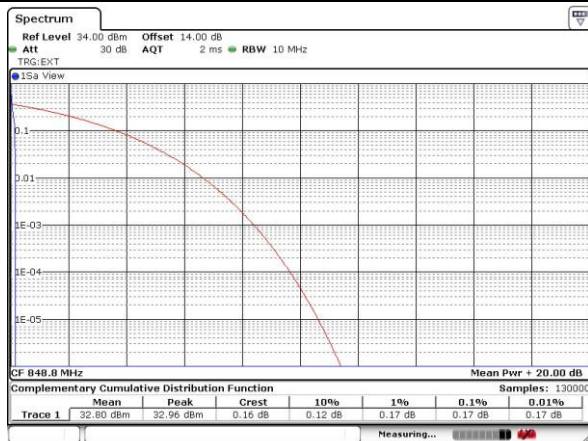
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Middle Channel



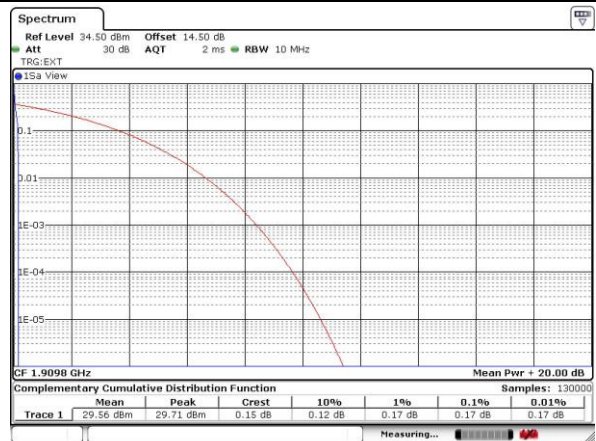
Date: 1.DEC.2016 15:58:59

Highest Channel



Date: 1.DEC.2016 15:50:26

Highest Channel

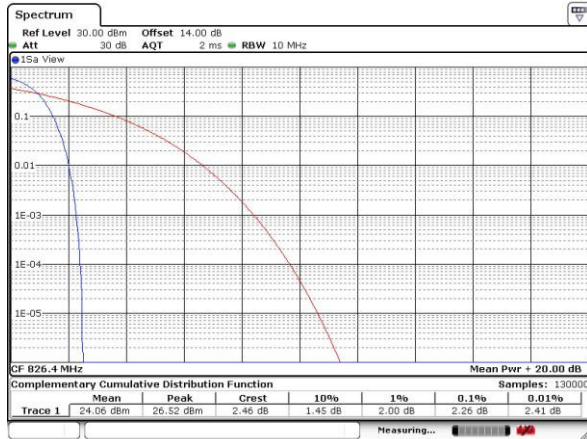


Date: 1.DEC.2016 15:59:07



WCDMA Band V (RMC 12.2Kbps)

Lowest Channel



Date: 1.DEC.2016 16:27:00

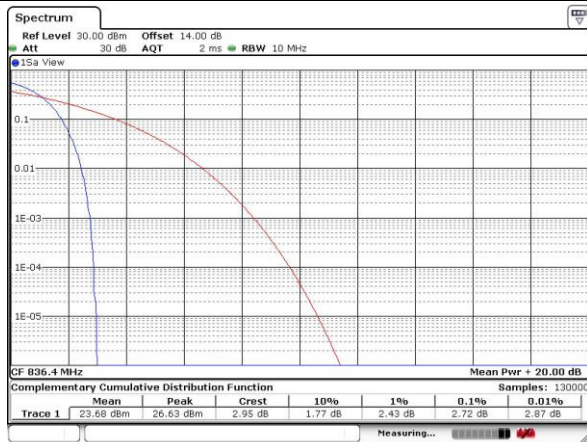
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



Date: 1.DEC.2016 16:37:56

Middle Channel



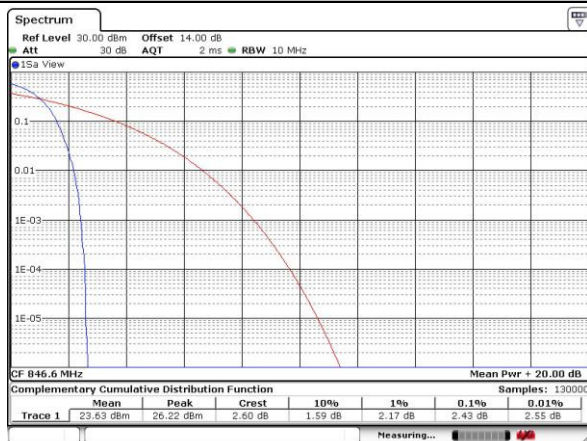
Date: 1.DEC.2016 16:27:13

Middle Channel



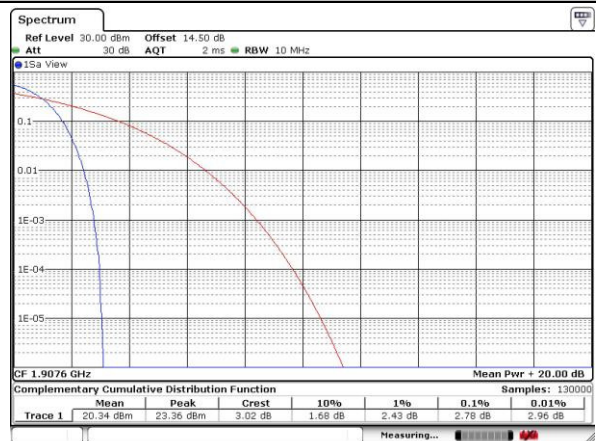
Date: 1.DEC.2016 16:38:15

Highest Channel



Date: 1.DEC.2016 16:27:31

Highest Channel



Date: 1.DEC.2016 16:38:30

**26dB Bandwidth**

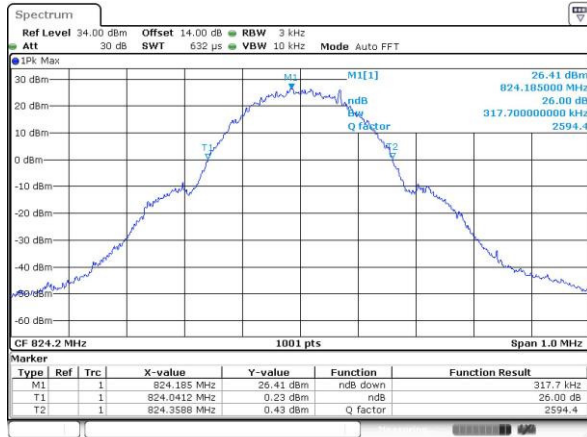
Mode	GSM850(MHz)	GSM1900(MHz)
Mod.	GSM	GSM
Lowest CH	0.318	0.318
Middle CH	0.318	0.316
Highest CH	0.317	0.314

Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.73	4.68
Middle CH	4.68	4.68
Highest CH	4.70	4.69



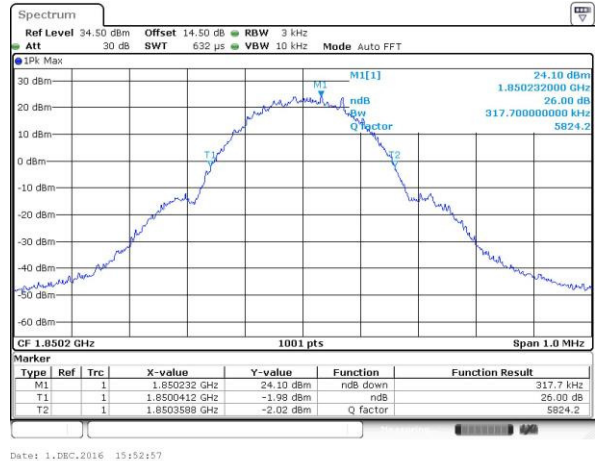
GSM850 (GSM)

Lowest Channel

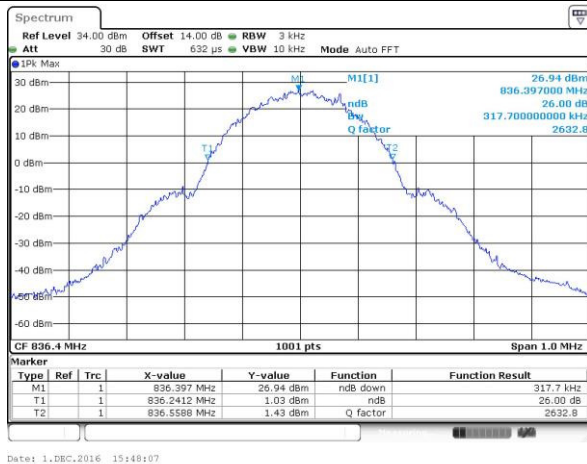


GSM1900 (GSM)

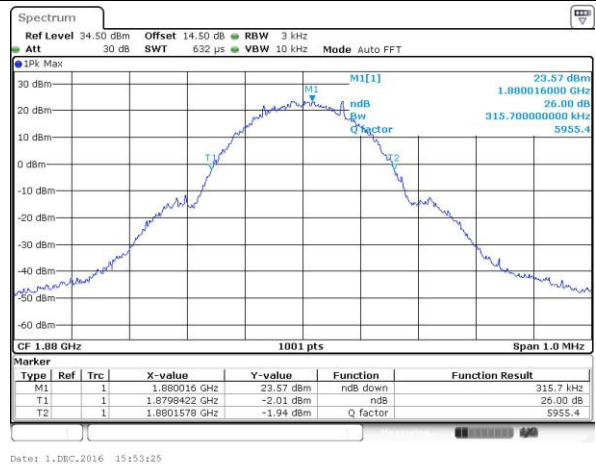
Lowest Channel



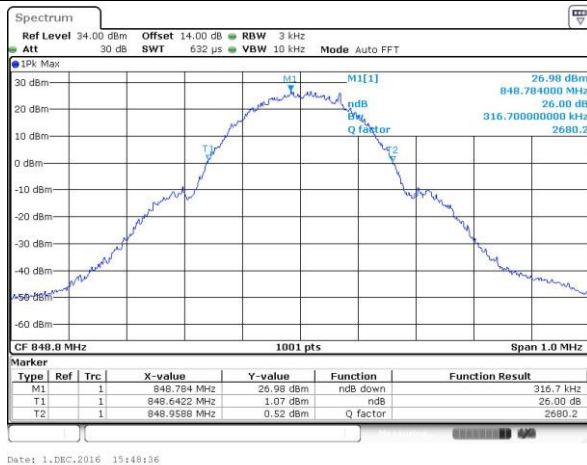
Middle Channel



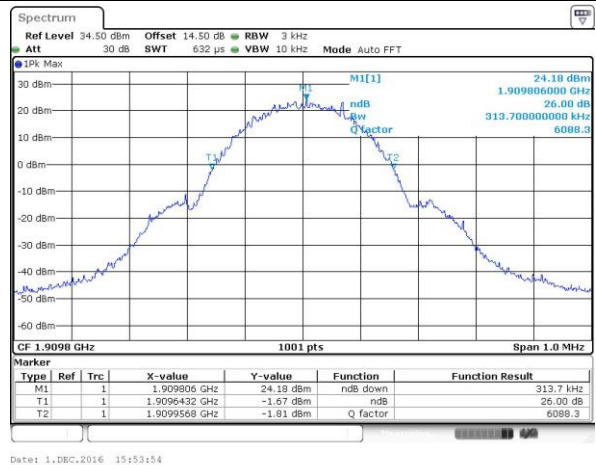
Middle Channel



Highest Channel



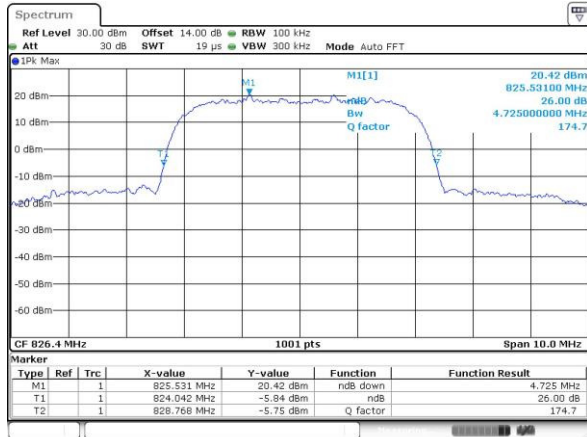
Highest Channel





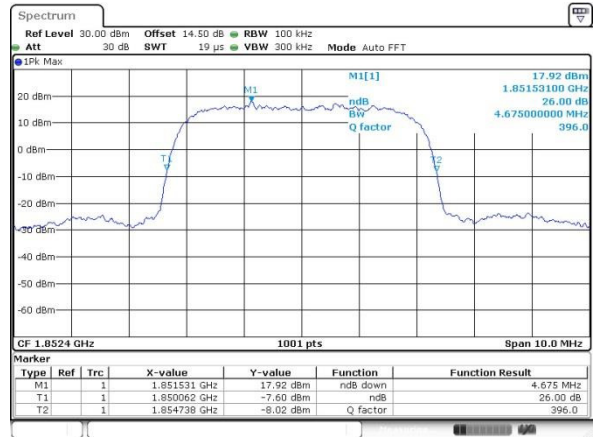
WCDMA Band V (RMC 12.2Kbps)

Lowest Channel

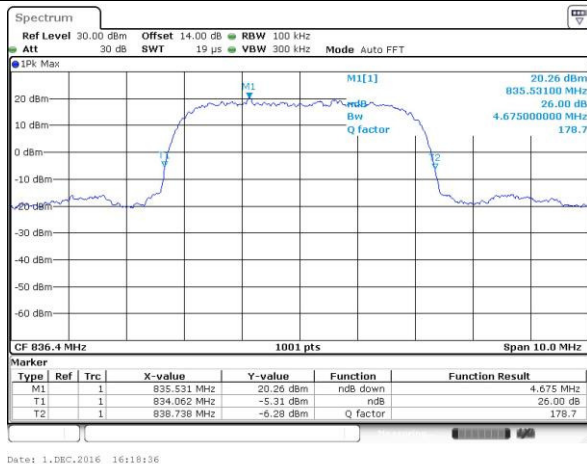


WCDMA Band II (RMC 12.2Kbps)

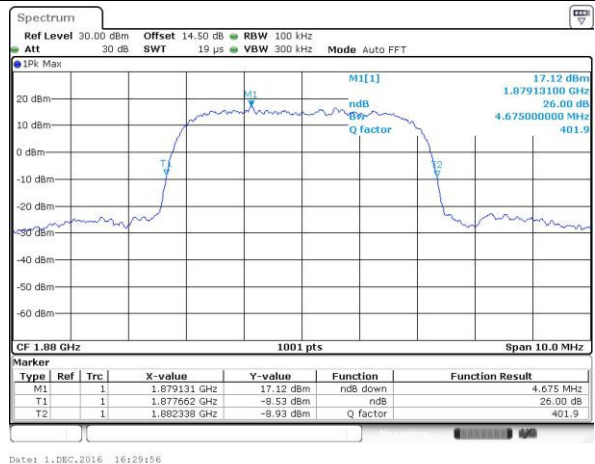
Lowest Channel



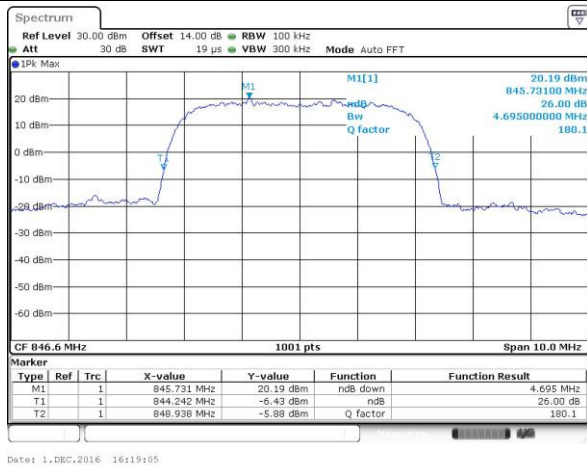
Middle Channel



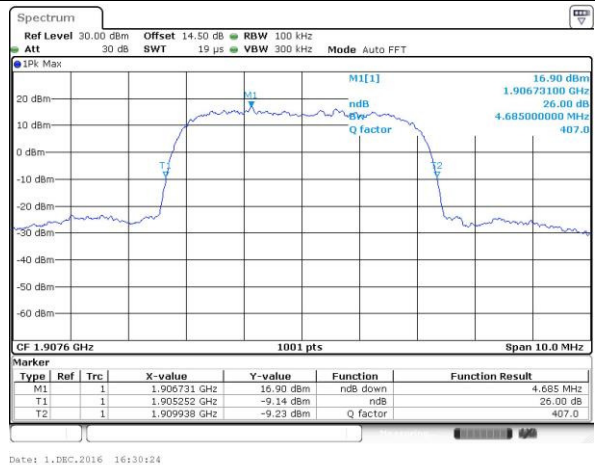
Middle Channel



Highest Channel



Highest Channel



**Occupied Bandwidth**

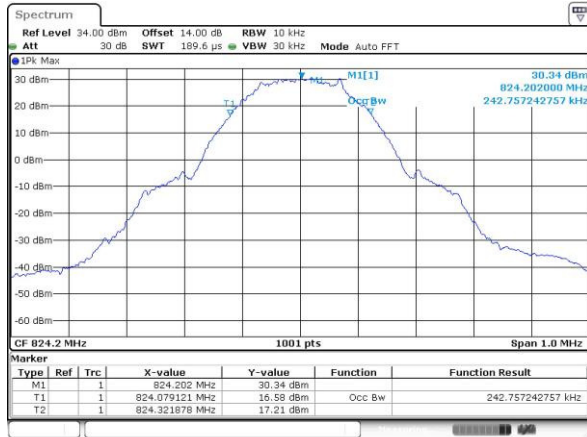
Mode	GSM850(MHz)	GSM1900(MHz)
Mod.	GSM	GSM
Lowest CH	0.243	0.243
Middle CH	0.243	0.243
Highest CH	0.243	0.244

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



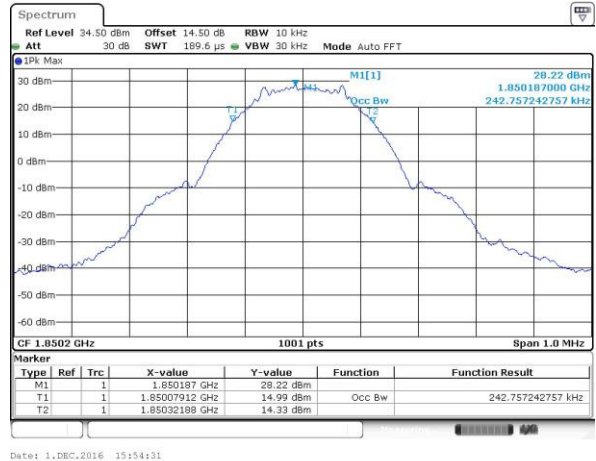
GSM850 (GSM)

Lowest Channel

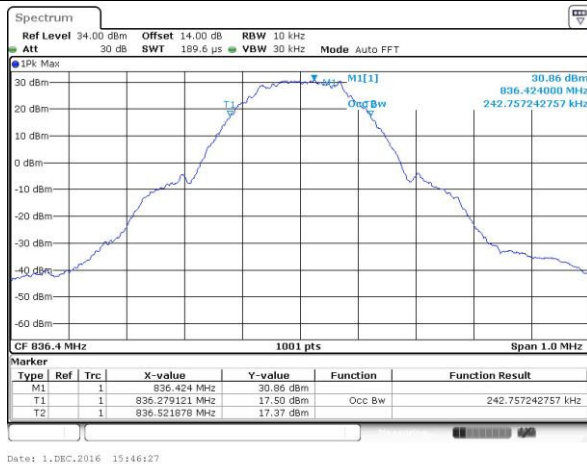


GSM1900 (GSM)

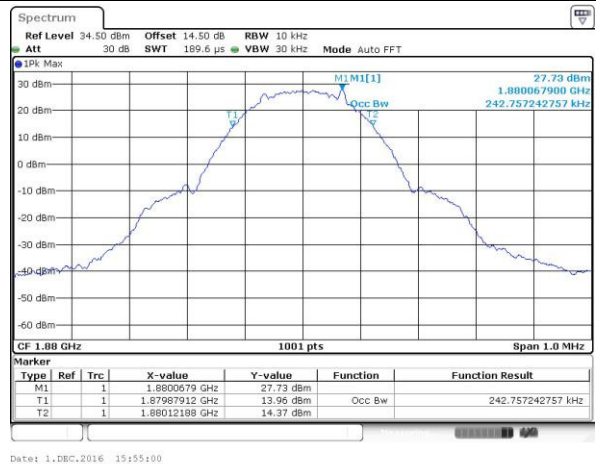
Lowest Channel



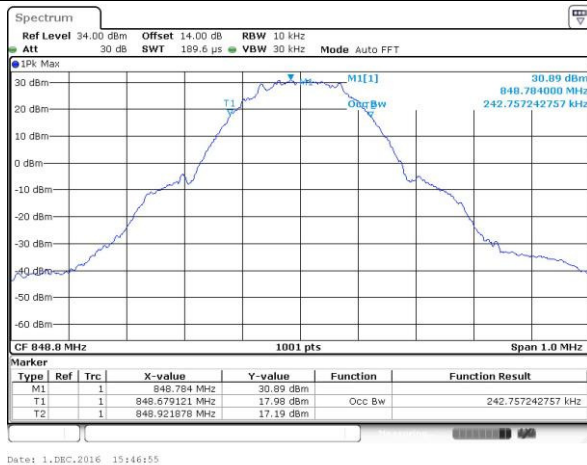
Middle Channel



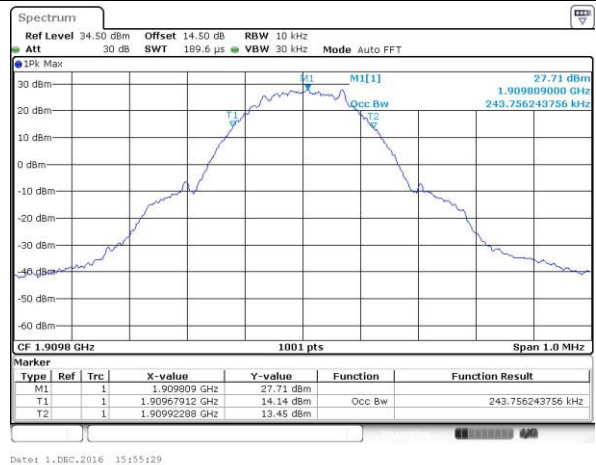
Middle Channel



Highest Channel



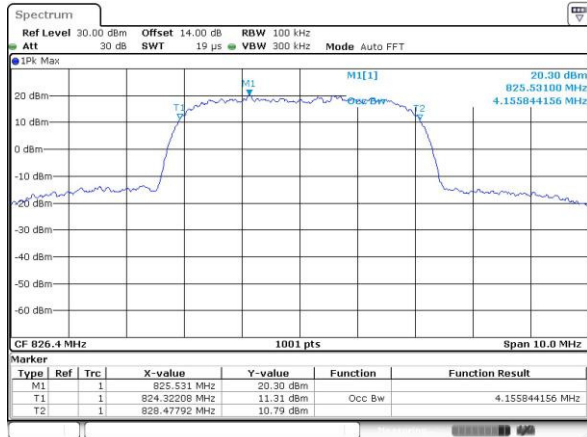
Highest Channel





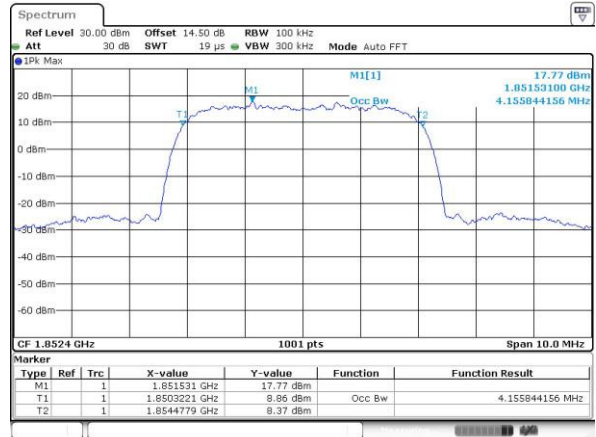
WCDMA Band V (RMC 12.2Kbps)

Lowest Channel

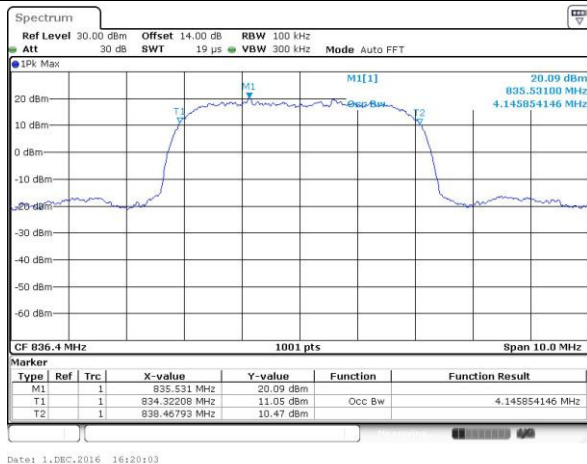


WCDMA Band II (RMC 12.2Kbps)

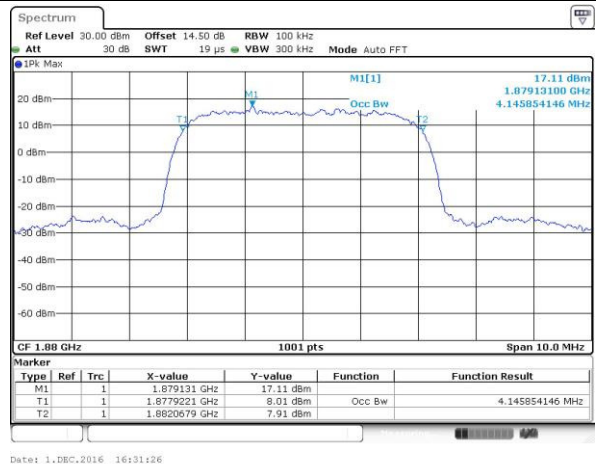
Lowest Channel



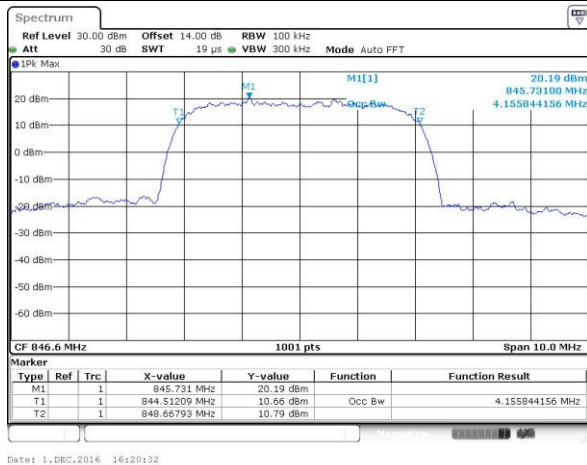
Middle Channel



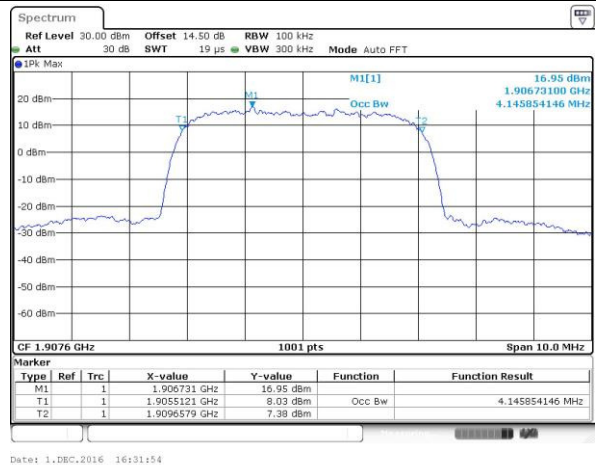
Middle Channel

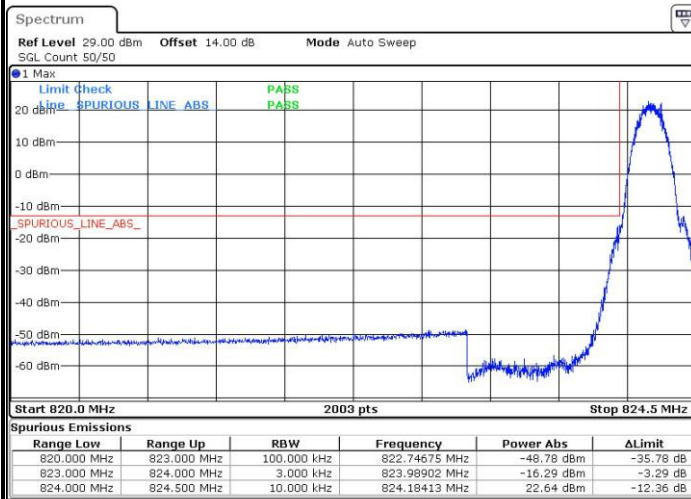
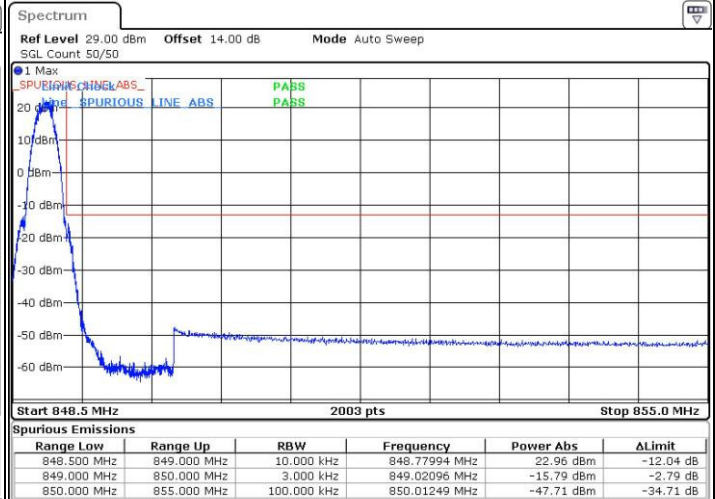
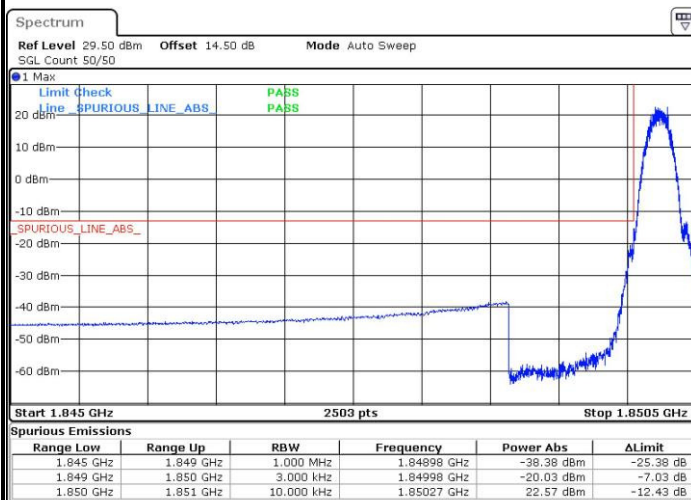
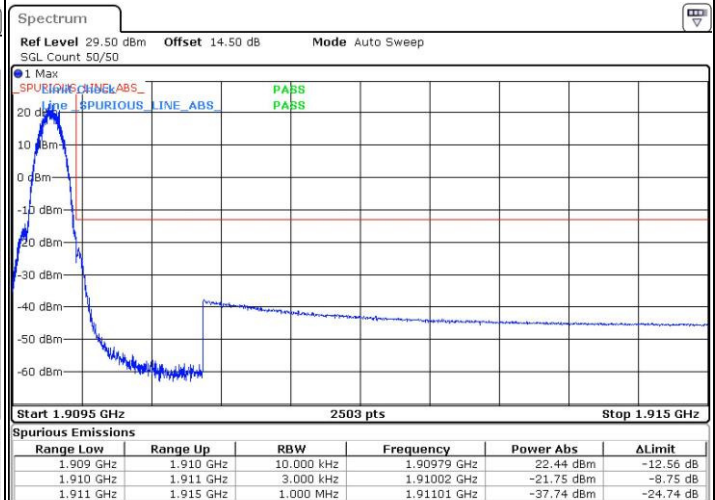


Highest Channel



Highest Channel

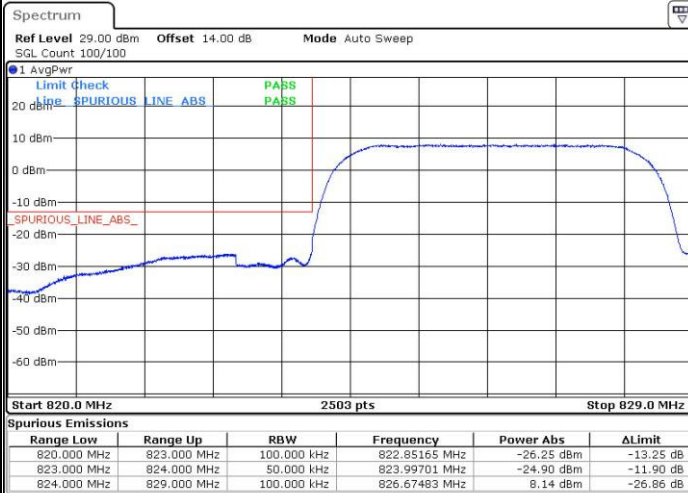


**Conducted Band Edge****GSM850 (GSM)****Lowest Band Edge****Highest Band Edge****GSM1900 (GSM)****Lowest Band Edge****Highest Band Edge**



WCDMA Band V (RMC 12.2Kbps)

Lowest Band Edge



Highest Band Edge



WCDMA Band II (RMC 12.2Kbps)

Lowest Band Edge



Highest Band Edge

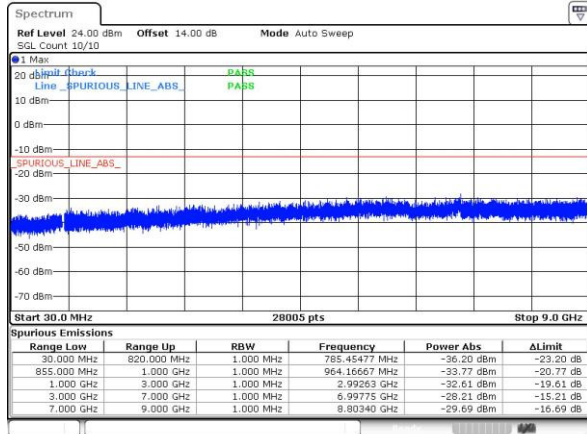




Conducted Spurious Emission

GSM850 (GSM)

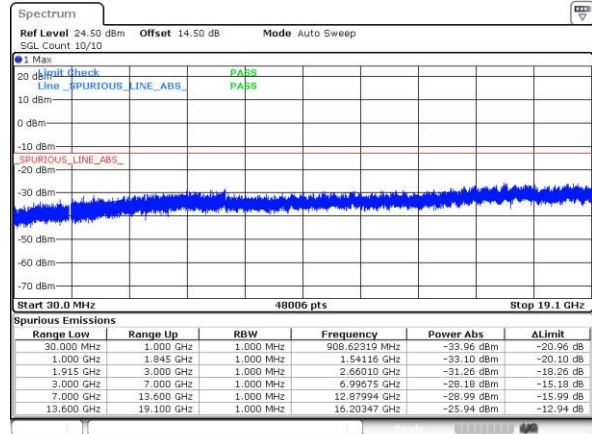
Lowest Channel



Date: 1.DEC.2016 16:07:23

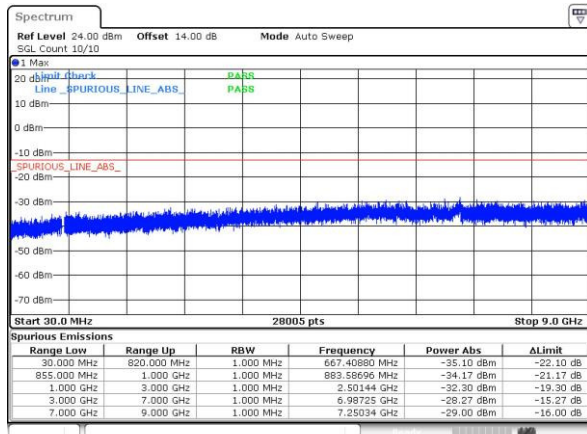
GSM1900 (GSM)

Lowest Channel



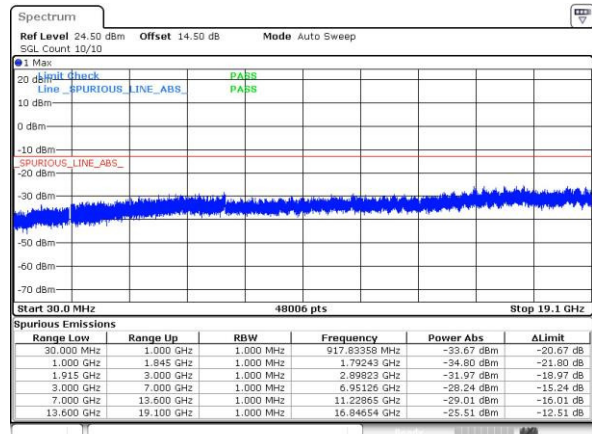
Date: 1.DEC.2016 16:01:14

Middle Channel



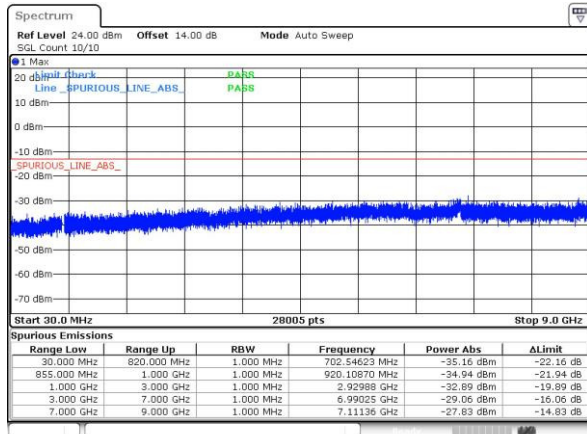
Date: 1.DEC.2016 16:08:41

Middle Channel



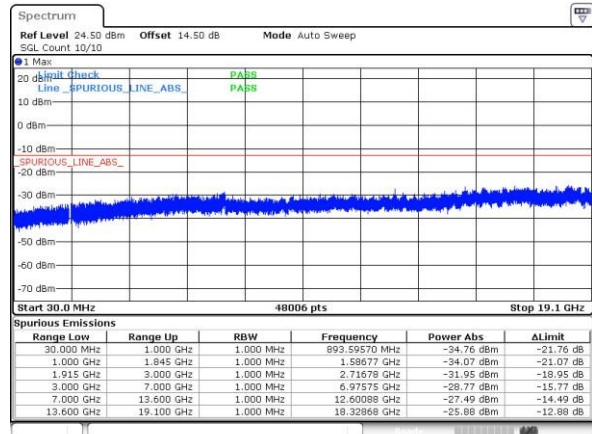
Date: 1.DEC.2016 16:02:31

Highest Channel



Date: 1.DEC.2016 16:09:59

Highest Channel

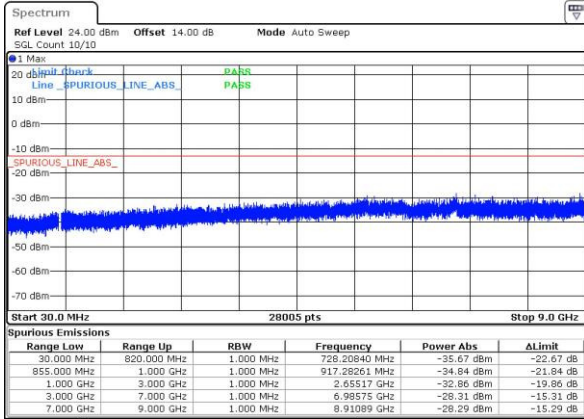


Date: 1.DEC.2016 16:03:49



WCDMA Band V (RMC 12.2Kbps)

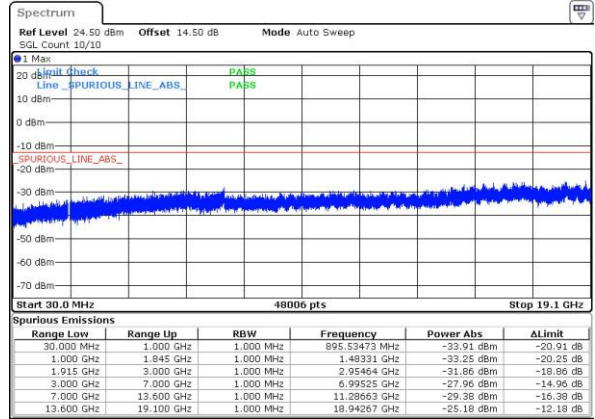
Lowest Channel



Date: 1.DEC.2016 16:14:30

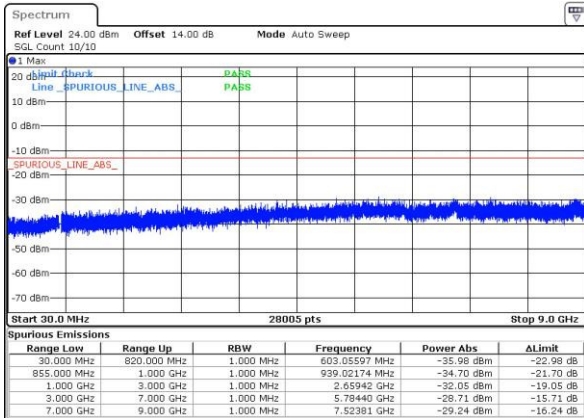
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



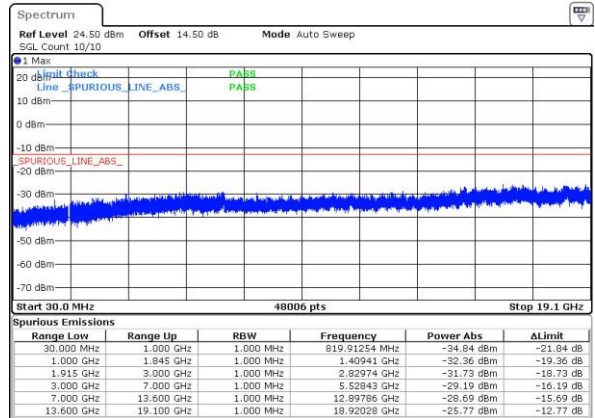
Date: 1.DEC.2016 16:42:03

Middle Channel



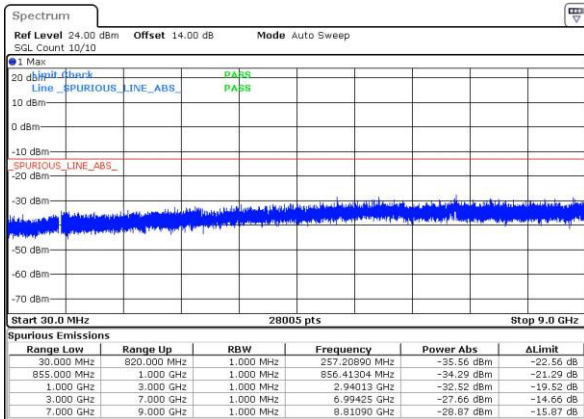
Date: 1.DEC.2016 16:15:47

Middle Channel



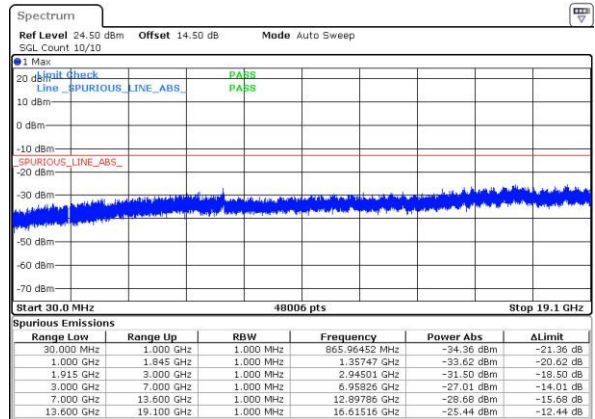
Date: 1.DEC.2016 16:43:21

Highest Channel



Date: 1.DEC.2016 16:17:05

Highest Channel



Date: 1.DEC.2016 16:44:39

**Frequency Stability**

Test Conditions	Middle Channel	GSM850 (GSM)	Limit
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	2.5ppm Result
50	Normal Voltage	0.0395	PASS
40	Normal Voltage	0.0323	
30	Normal Voltage	0.0371	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0299	
0	Normal Voltage	0.0347	
-10	Normal Voltage	0.0717	
-20	Normal Voltage	0.0060	
-30	Normal Voltage	0.0454	
20	Maximum Voltage	0.0335	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0024	

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

Test Conditions	Middle Channel	GSM1900 (GSM)	Limit
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Note 2. Result
50	Normal Voltage	0.0330	PASS
40	Normal Voltage	0.0064	
30	Normal Voltage	0.0059	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0048	
0	Normal Voltage	0.0005	
-10	Normal Voltage	0.0266	
-20	Normal Voltage	0.0245	
-30	Normal Voltage	0.0277	
20	Maximum Voltage	0.0032	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0245	

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.



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	0.0203	
30	Normal Voltage	0.0012	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0048	
0	Normal Voltage	0.0155	
-10	Normal Voltage	0.0036	
-20	Normal Voltage	0.0155	
-30	Normal Voltage	0.0179	
20	Maximum Voltage	0.0024	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0012	

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

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0005	PASS
40	Normal Voltage	0.0016	
30	Normal Voltage	0.0059	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0064	
0	Normal Voltage	0.0016	
-10	Normal Voltage	0.0069	
-20	Normal Voltage	0.0011	
-30	Normal Voltage	0.0016	
20	Maximum Voltage	0.0074	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0064	

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	20.48	0.112	15.76	0.038
Middle		20.90	0.123	16.31	0.043
Highest		21.40	0.138	17.03	0.051
Lowest	WCDMA Band V RMC 12.2Kbps	12.42	0.018	7.32	0.005
Middle		11.58	0.014	6.58	0.005
Highest		12.64	0.018	8.00	0.006
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GSM	26.50	0.447	26.88	0.488
Middle		27.12	0.515	27.25	0.531
Highest		28.14	0.652	27.90	0.617
Lowest	WCDMA Band II RMC 12.2Kbps	21.87	0.154	22.23	0.167
Middle		20.65	0.116	20.59	0.115
Highest		21.89	0.155	21.39	0.138
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	1672.8	-43.01	-13	-30.01	-48.69	-49.70	0.56	9.40	H
	2509.2	-39.76	-13	-26.76	-49.06	-47.47	0.74	10.60	H
	3345.6	-43.94	-13	-30.94	-54.03	-53.54	0.85	12.60	H
	4182	-45.31	-13	-32.31	-56.83	-54.87	0.89	12.60	H
	5018.4	-46.78	-13	-33.78	-60.97	-56.39	0.94	12.70	H
	5854.8	-45.03	-13	-32.03	-59.31	-54.77	1.11	13.00	H
	6691.2	-40.27	-13	-27.27	-56.55	-48.60	1.22	11.70	H
	7527.6	-44.33	-13	-31.33	-62.54	-51.79	1.69	11.30	H
	8364	-46.66	-13	-33.66	-65.74	-54.18	1.63	11.30	H
	1672.8	-40.91	-13	-27.91	-46.21	-47.60	0.56	9.40	V
	2509.2	-37.62	-13	-24.62	-46.68	-45.33	0.74	10.60	V
	3345.6	-48.48	-13	-35.48	-57.26	-58.08	0.85	12.60	V
	4182	-46.96	-13	-33.96	-58.08	-56.52	0.89	12.60	V
	5018.4	-48.93	-13	-35.93	-62.50	-58.54	0.94	12.70	V
	5854.8	-39.99	-13	-26.99	-55.57	-49.73	1.11	13.00	V
	6691.2	-41.96	-13	-28.96	-58.79	-50.29	1.22	11.70	V
	7527.6	-42.79	-13	-29.79	-61.11	-50.25	1.69	11.30	V
	8364	-41.24	-13	-28.24	-60.52	-48.76	1.63	11.30	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	3760	-33.85	-13	-20.85	-49.22	-39.89	6.56	12.60	H
	5640	-48.82	-13	-35.82	-64.76	-53.92	8	13.10	H
	7520	-43.62	-13	-30.62	-62.36	-45.35	9.57	11.30	H
	9400	-40.46	-13	-27.46	-64.85	-41.91	10.45	11.90	H
	11280	-42.76	-13	-29.76	-66.41	-43.97	11.99	13.20	H
	13160	-42.84	-13	-29.84	-66.87	-33.24	11.5	1.90	H
	3760	-36.40	-13	-23.40	-51.59	-42.44	6.56	12.6	V
	5640	-45.47	-13	-32.47	-62.82	-50.57	8	13.1	V
	7520	-44.32	-13	-31.32	-62.72	-46.05	9.57	11.3	V
	9400	-40.61	-13	-27.61	-64.38	-42.06	10.45	11.9	V
	11280	-42.60	-13	-29.60	-66.54	-43.81	11.99	13.2	V
	13160	-40.98	-13	-27.98	-65.71	-31.38	11.5	1.9	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	1672.8	-36.50	-13	-23.50	-42.81	-43.19	0.56	9.40	H
	2509.2	-34.61	-13	-21.61	-44.58	-42.32	0.74	10.60	H
	3345.6	-58.53	-13	-45.53	-67.34	-68.13	0.85	12.60	H
	1672.8	-34.56	-13	-21.56	-40.37	-41.25	0.56	9.40	V
	2509.2	-43.13	-13	-30.13	-51.27	-50.84	0.74	10.60	V
	3345.6	-59.80	-13	-46.80	-67.94	-69.40	0.85	12.60	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	3760	-44.21	-13	-31.21	-57.76	-50.25	6.56	12.60	H
	5640	-52.84	-13	-39.84	-68.78	-57.94	8	13.10	H
	7520	-50.40	-13	-37.40	-69.14	-52.13	9.57	11.30	H
	3760	-44.77	-13	-31.77	-58.12	-50.81	6.56	12.6	V
	5640	-51.90	-13	-38.90	-69.25	-57.00	8	13.1	V
	7520	-50.71	-13	-37.71	-69.11	-52.44	9.57	11.3	V

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