

FCC 47 CFR PART 24 SUBPART E

CERTIFICATION TEST REPORT

For

Wcdma Modem

Model Name: N703

Trademark: neoway

REPORT NO: ES151130020E2

ISSUE DATE: January 11, 2016

Prepared for

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TEST RESULT CERTIFICATION

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EUT Description:	Wcdma Modem
Model Number:	N703
File Number:	ES151130020E2
Date of Test:	November 30, 2015 to January 11, 2016

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J, June 11, 2015 FCC 47 CFR Part 24, Subpart H, May 9, 2015 ANSI/TIA-603-D-2010;FCC CFR Title 47 Part 2	PASS

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 24

The test results of this report relate only to the tested sample identified in this report.

Date of Test : November 30, 2015 to January 11, 2016



Prepared by : Andy Wei/Editor



Reviewer : Joe Xia/Supervisor



Approve & Authorized Signer : Lisa Wang/Manager

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1 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product Name:	Wcdma Modem
Model Number:	N703
Operating Frequency Range(s):	PCS1900: TX1850.2MHz~1909.8MHz /RX1930.2MHz~1989.8MHz; WCDMA1900: TX1852.4MHz~1907.6MHz /RX1932.4MHz~1987.6MHz;
Number of Channels:	299 Channels for PCS1900 277 Channels for WCDMA1900
Modulation:	GMSK for PCS1900; QPSK for WCDMA1900;
Antenna Type:	Fixed External
Antenna Gain:	0dBi
RF Output Power:	PCS1900 30.32 dBm max; WCDMA1900 21.62 dBm max;
Power supply	Model: KSAFD50015W1EU Input: 100-240~50/60Hz 0.5A Output: DC 5V 3A
Temperature Range:	-20°C ~ +50°C

Note: for more details, please refer to the User's manual of the EUT.

2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
§2.1046(a)	RF Power Output	PASS	
§2.1047	Modulation Characteristics	PASS	
§2.1049	Occupied Bandwidth	PASS	
§24.232(a)(2) §2.1046	Effective Radiated Power	PASS	
§2.1051 §24.238(a) §90.210(g)	Spurious Emission at Antenna Terminal Band Edge Emission	PASS	
§24.232(a)(2)	Peak To Average Ratio	PASS	
§2.1055 §24.235	Frequency Stability	PASS	
§2.107	Power Line Conducted Emission	PASS	
§15.209	Receiver Radiation Emission	PASS	
§24.238(a)	Receiver Spurious Emission	PASS	
NOTE1: N/A (Not Applicable)			

Related Submittal(s) /Grant(s)

This submittal(s) (test report) is intended for **FCC ID:PJ7-1721** filing to comply with FCC Part 22 and Part 24 Rules.

3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 24, Subpart H

FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

3.2 MEASUREMENT EQUIPMENT USED

3.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Period of validity
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/15/2016
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/15/2016
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/15/2016
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/15/2016
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/15/2016

3.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Period of validity
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/15/2016
Pre-Amplifier	HP	8447D	2944A07999	05/15/2016
Bilog Antenna	Schwarzbeck	VULB9163	142	05/15/2016
Loop Antenna	ARA	PLA-1030/B	1029	05/15/2016
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/15/2016
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/15/2016
Cable	Schwarzbeck	AK9513	ACRX1	05/15/2016
Cable	Rosenberger	N/A	FP2RX2	05/15/2016
Cable	Schwarzbeck	AK9513	CRPX1	05/15/2016
Cable	Schwarzbeck	AK9513	CRRX2	05/15/2016

3.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Period of validity
Spectrum Analyzer	Agilent	E4407B	88156318	05/15/2016
Power meter	Anritsu	ML2495A	0824006	05/15/2016
Power sensor	Anritsu	MA2411B	0738172	05/15/2016
Radio Communication Tester	R&S	CMU200	1100.0008.02	05/15/2016
Radio Communication Tester	R&S	CMW500	12010002K50-1 40822-2K	05/15/2016

Remark: Each piece of equipment is scheduled for calibration once a year.

3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

During all testing, EUT is in link mode with base station emulator at maximum power level.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

■ Test Mode and system config

● PCS1900 GSM/ GPRS mobile config

A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test

Call parms: BCH set :Cell Band : PCS1900

TCH set: Traffic Band: PCS1900

Traffic channel: CH512/CH661/CH810

MS transmitter level:0

Coding scheme: CS-4

Multislot config: 1up,1down

Active cell: PCS1900

● PCS1900 GSM/ EGPRS mobile config

A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test

Call parms: BCH set :Cell Band : PCS1900

TCH set: Traffic Band: PCS1900

Traffic channel: CH512/CH661/CH810

MS transmitter level:0

Coding scheme: CS-5

Multislot config: 1up,1down

Active cell: PCS1900

● WCDMA 1900 REL99 mobile config

Transmitting performance test of the EUT is implemented during communicating with the SS via air interface. The procedure is using normal call protocol until the UE is communicating on traffic channel basically. On the traffic channel, the UE provides special function for testing that is called Logical Test Interface and the UE is tested using this function. (Refer to T TS 134.109 and TS 134.121).

Transmitting or receiving bit/symbol rate for test channel is shown in the following table .

Bit / Symbol rate for Test Channel

Type of User Information	User Bit Rate	DL DPCH Symbol Rate	UL DPCH Bit Rate	Remarks
12.2 kbps reference measurement channel	12.2 kbps	30 kbps	60 kbps	Standard Test

Transmitter Physical channel configuration

Mode	Rel99
Loopback mode	Test model
Rel99 RMC	12.2 kbps RMC
HSDPA FRC	Not applicable
HSUPA Test	Not applicable
Power control algorithm	Algorithm2
β_c	Not applicable
β_d	Not applicable
β_{ec}	Not applicable
B_c/β_d	8/15
β_{hs}	Not applicable
β_{ed}	Not applicable

● WCDMA 1900 HSDPA Rel5 mobile config

Transmitting performance test of the EUT is implemented during communicating with the SS via air interface. The procedure is using normal call protocol until the UE is communicating on traffic channel basically. On the traffic channel, the UE provides special function for testing that is called Logical Test Interface and the UE is tested using this function. (Refer to TS 134.109 and TS 134.121).

Transmitting or receiving bit/symbol rate for test channel is shown in the following table .

Bit / Symbol rate for Test Channel

Type of User Information	User Bit Rate	DL DPCH Symbol Rate	UL DPCH Bit Rate	Remarks
12.2 kbps reference measurement channel	12.2 kbps	30 kbps	60 kbps	Standard Test

Transmitter Physical channel configuration

Mode	HSDPA Rel5			
subtest	1	2	3	4
Loopback mode	Test model1			
Rel99 RMC	12.2 kbps RMC			
HSDPA FRC	H-Set1			
HSUPA Test	Not applicable			
Power control algorithm	Algorithm2			
β_c	2/15	12/15	15/15	15/15
β_d	15/15	15/15	8/15	4/15
Bd(SF)	64			
Bc/ β_d	2/15	12/15	15/8	15/4
β_{hs}	4/15	24/15	30/15	30/15
MPR(s/dB)	0	0	0.5	0.5
D_{ACK}	8			
D_{NAK}	8			
DCQI	8			
Ack-Nack Repetition Factor	3			
CQI feedback	4ms			
CQI repetition factor	2			
$A_{hs}=\beta_{hs}/\beta_c$	30/15			

● WCDMA 1900 HSUPA Rel6 mobile config

Transmitting performance test of the EUT is implemented during communicating with the SS via air interface. The procedure is using normal call protocol until the UE is communicating on traffic channel basically. On the traffic channel, the UE provides special function for testing that is called Logical Test Interface and the UE is tested using this function. (Refer to TS 134.109 and TS 134.121).

Transmitting or receiving bit/symbol rate for test channel is shown in the following table .

Bit / Symbol rate for Test Channel

Type of User Information	User Bit Rate	DL DPCH Symbol Rate	UL DPCH Bit Rate	Remarks
12.2 kbps reference measurement channel	12.2 kbps	30 kbps	60 kbps	Standard Test

Transmitter Physical channel configuration

Mode	HSUPA Rel6				
subtest	1	2	3	4	5
Loopback mode	Test model1				
Rel99 RMC	12.2 kbps RMC				
HSDPA FRC	H-Set1				
HSUPA Test	HSUPA loopback				
Power control algorithm	Algorithm2				
β_c	11/15	6/15	15/15	2/15	15/15
β_d	15/15	15/15	9/15	15/15	0
β_{ec}	209/225	12/15	30/15	2/15	5/15
β_{ed}	1309/225	94/75	47/15	56/75	47/15
β_c/β_d	11/15	6/15	15/9	2/15	-
β_{hs}	22/15	12/15	30/15	4/15	5/15
D E-DPCCH	6	8	8	5	7
DHARQ	0	0	0	0	0
AG index	20	12	15	17	12
ETFCI	75	67	92	71	67
Associated Max UL data rate kbps	242.1	174.9	482.8	205.8	308.9
Reference E_TFCIs	E_TFCI 11 E_TFCI PO4 E_TFCI 67 E_TFCI PO18 E_TFCI 71 E_TFCI PO23 E_TFCI 75 E_TFCI PO 26 E_TFCI 81 E_TFCI PO 27		E_TFCI 11 E_TFCI PO4 E_TFCI 92 E_TFCI PO18		E_TFCI 11 E_TFCI PO4 E_TFCI 67 E_TFCI PO18 E_TFCI 71 E_TFCI PO23 E_TFCI 75 E_TFCI PO 26 E_TFCI 81 E_TFCI PO 27

Test Frequency and Channels

Test Frequency and Channel				
Frequency Band	☐ PCS1900		☐ WCDMA 1900	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH_H	810	1909.8	9538	1907.6
CH_M	661	1880.0	9400	1880.0
CH_L	512	1850.2	9262	1852.4

4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Description

EMC Lab

edited by CNAS, 2013.10.28
certificate is valid until 2016.10.29
Laboratory has been assessed and proved to be in compliance with
CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
Certificate Registration Number is L229

edited by TUV Rheinland Shenzhen, 2010.5.25
Laboratory has been assessed according to the requirements ISO/IEC
17025.

edited by FCC, October 28, 2010
Certificate Registration Number is 406365.
Accredited by FCC, February 28, 2013
Certificate Registration Number is 709623.
edited by Industry Canada, May 24, 2008
Certificate Registration Number is 46405-4480

5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

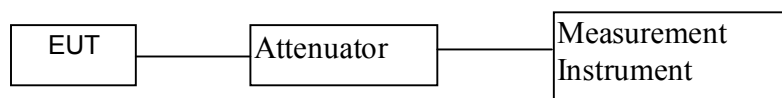
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%

6 SETUP OF EQUIPMENT UNDER TEST

6.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by software to emit the specified signals for the purpose of measurements.

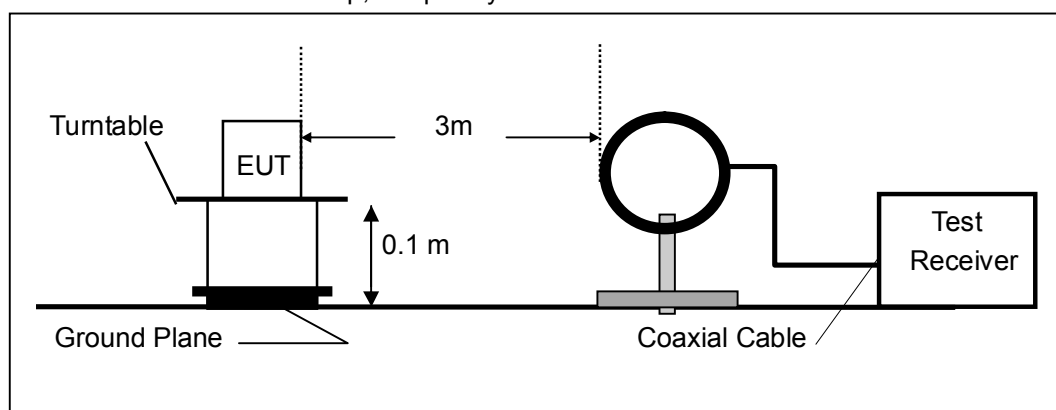


6.2 RADIO FREQUENCY TEST SETUP 2

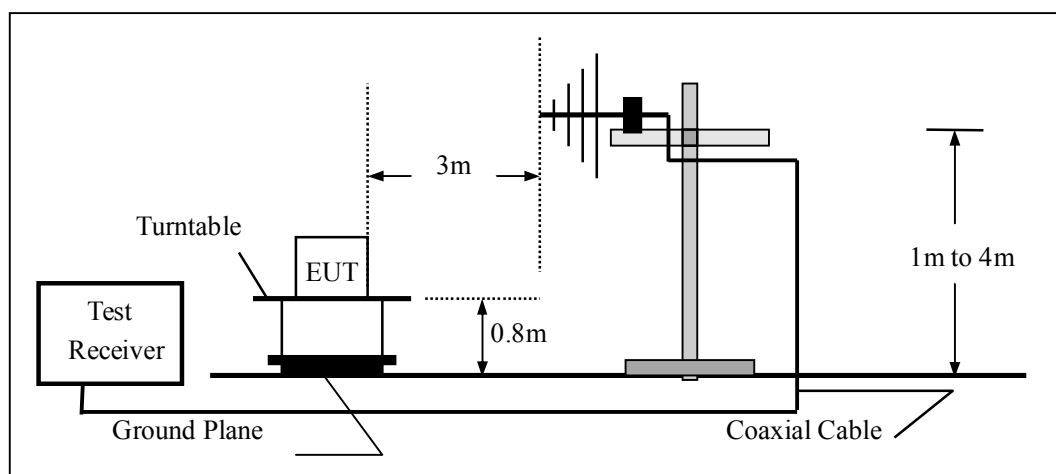
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

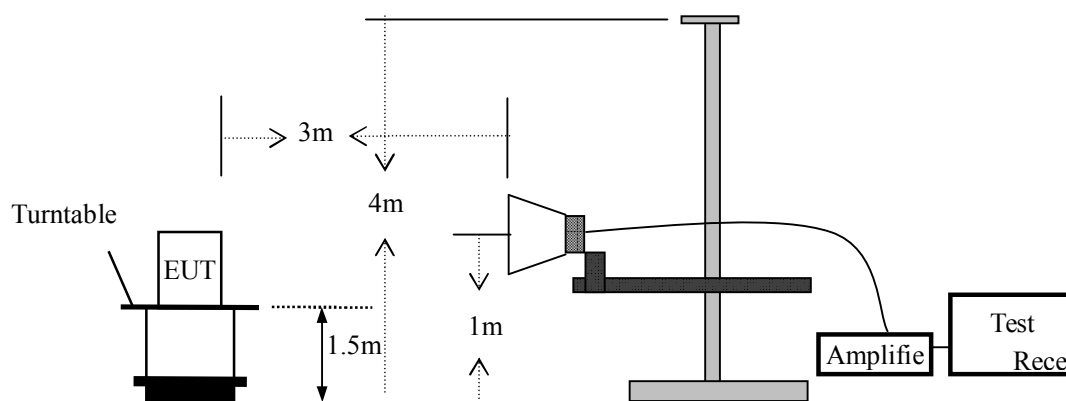
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

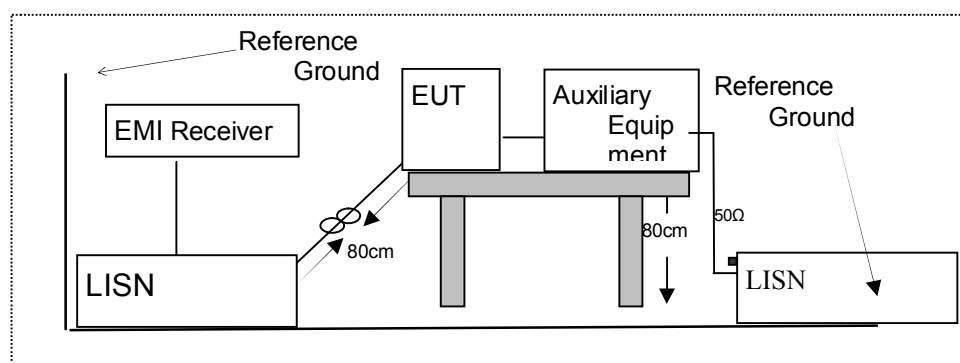


6.3 CONDUCTED EMISSION TEST SETUP

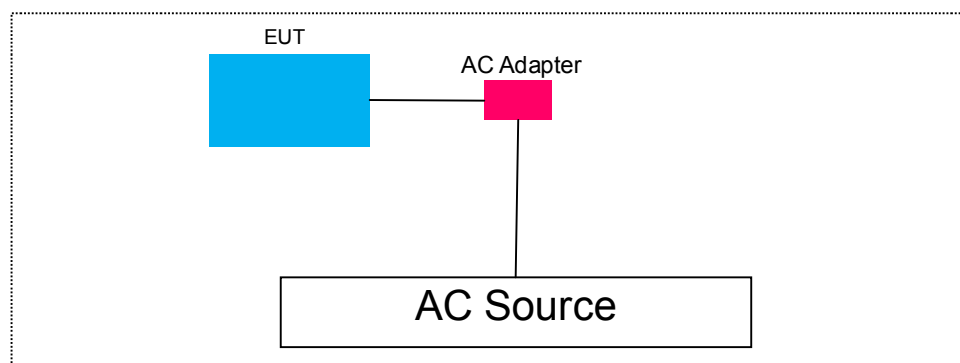
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



6.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1.	Notebook	ASUS	P45V	N/A	
	Tablet	dreamtab	DMTAB-NV08B	N/A	

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7 TEST REQUIREMENTS

7.1 RF OUTPUT POWER

7.1.1 Applicable Standard

According to FCC Part 2.1046 and FCC Part 24.232(c) and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.1.2 Conformance Limit

Mobile and portable stations are limited to 2 watts (33dBm)EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.1.4 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the ARFCN range, power control level set to Max power. The frequency band is set as selected frequency,

The RF output of the transmitter was connected to base station simulator.

Set EUT at maximum average power by base station simulator.

Set RBW = 1-5% of the OBW, not to exceed 1 MHz.

Set VBW $\geq 3 \times$ RBW.

Number of points in sweep $\geq 2 \times$ span / RBW. (This gives bin-to-bin spacing $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)

Sweep time = auto.

Detector = RMS (power averaging).

Set sweep trigger to "free run".

Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add $10 \log (1/0.25) = 6$ dB if the duty cycle is a constant 25%.

Measure lowest, middle, and highest channels for each bandwidth and different modulation.

Measure and record the results in the test report.

7.1.5 Test Results

All the modulation modes were tested, the data of the worst mode are described in the following table.

Temperature : 28 °C Test Date : January 10, 2016
Humidity : 65 % Test By: Andy

Operation Mode	Channel Number	Channel Frequency (MHz)	Average Result (dBm)	Verdict
PCS1900	512	1850.2	30.32	PASS
	661	1880.0	30.11	PASS
	810	1909.8	30.21	PASS
GPRS1900	512	1850.2	30.28	PASS
	661	1880.0	30.05	PASS
	810	1909.8	30.17	PASS
WCDMA1900	9262	1852.4	21.52	PASS
	9400	1880.0	21.62	PASS
	9538	1907.6	21.45	PASS

NOTE1: N/A (Not Applicable)

7.2 MODULATION CHARACTERISTICS

7.2.1 Applicable Standard

According to FCC Part 2.1047 and FCC Part 24E and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.2.2 Conformance Limit

No specific modulation characteristics requirement limits.

7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

7.2.4 Test Configuration

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test, The frequency band is set as selected frequency, test method was according to 3GPP TS 51.010 and 3GPP TS 34.121. and 3GPP2 C.S0011/TIA-98-E for 1XRTT.and 3GPP2 C.S0033-0/tia-866 for Rel.0 and 3GPP2 C.S0033-A for Rev.A The waveform quality and constellation of the was tested.

7.2.5 Test Results

PASS

7.3 OCCUPIED BANDWIDTH

7.3.1 Applicable Standard

According to FCC Part 2.1049 and FCC Part 24E and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.3.2 Conformance Limit

No specific modulation characteristics requirement limits.

7.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

7.3.4 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test,

■ 99% Occupied bandwidth

The following procedure shall be used for measuring (99 %) power bandwidth

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
- b) The nominal IF filter bandwidth (3 dB 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.
- c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- e) Set the detection mode to peak, and the trace mode to max hold..
- f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.
- h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

■ 26 dB Occupied bandwidth

The reference value is the highest level of the spectral envelope of the modulated signal.

- a) 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.
- b) 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.
- c) Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- e) The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target “-X dB down” requirement (i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference value).
- f) Set the detection mode to peak, and the trace mode to max hold.
- g) 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).

- h) Determine the “-X dB down amplitude” as equal to (Reference Value – X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.
- i) 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 g). 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.
- j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s)

7.3.5 Test Results

Temperature : 28 °C Test Date : January 10, 2016
Humidity : 65 % Test By: Andy

Operation Mode	Channel Number	Channel Frequency (MHz)	-26dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Verdict
PCS1900	512	1850.2	321.3	243.1	PASS
	661	1880.0	319.8	240.2	PASS
	810	1909.8	319.8	241.7	PASS
GPRS1900	512	1850.2	324.2	241.7	PASS
	661	1880.0	318.4	241.7	PASS
	810	1909.8	321.3	241.7	PASS
WCDMA1900	9262	1852.4	4660	4150	PASS
	9400	1880.0	4680	4160	PASS
	9538	1907.6	4680	4160	PASS
NOTE1: N/A (Not Applicable)					

Test Model

-26dB Occupied Bandwidth
PCS1900/GSM
Test Channel

☐ CH512



Date: 8 JAN 2016 09:38:37

Test Model

-26dB Occupied Bandwidth
PCS1900/GSM
Test Channel

☐ CH661

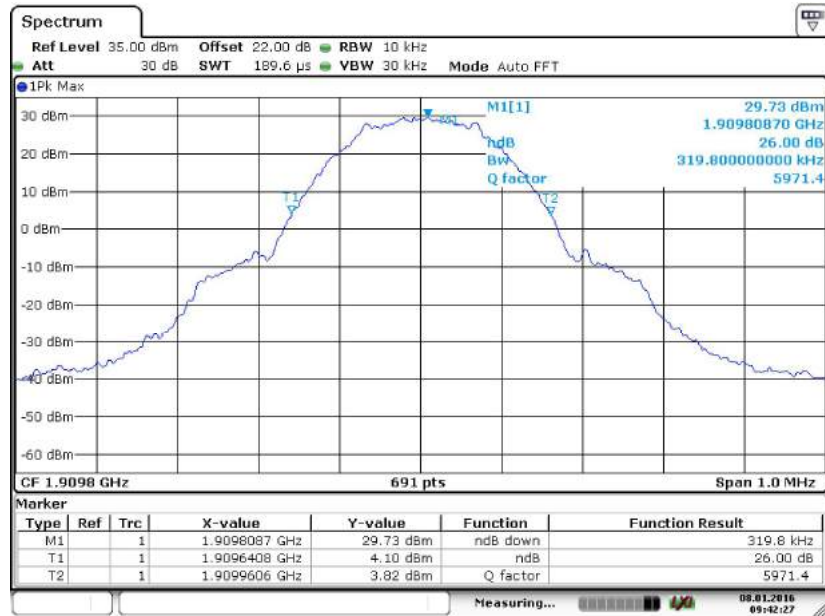


Date: 8 JAN 2016 09:39:37

Test Model

-26dB Occupied Bandwidth
PCS1900/GSM
Test Channel

☐ CH810



Date: 8 JAN 2016 09:42:27

Test Model

-26dB Occupied Bandwidth
GPRS1900
Test Channel

☐ CH512

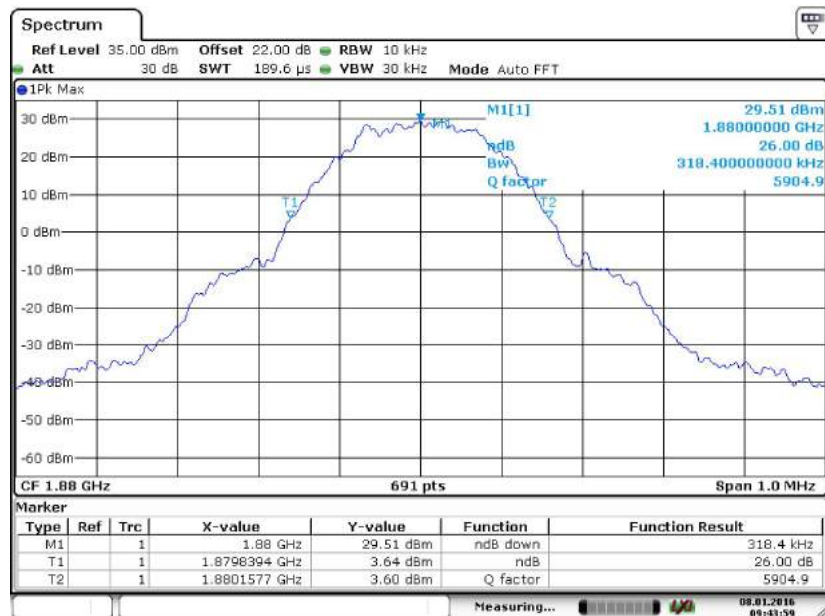


Date: 8 JAN 2016 09:43:36

Test Model

-26dB Occupied Bandwidth
GPRS1900
Test Channel

☐ CH661



Date: 8 JAN 2016 09:43:59

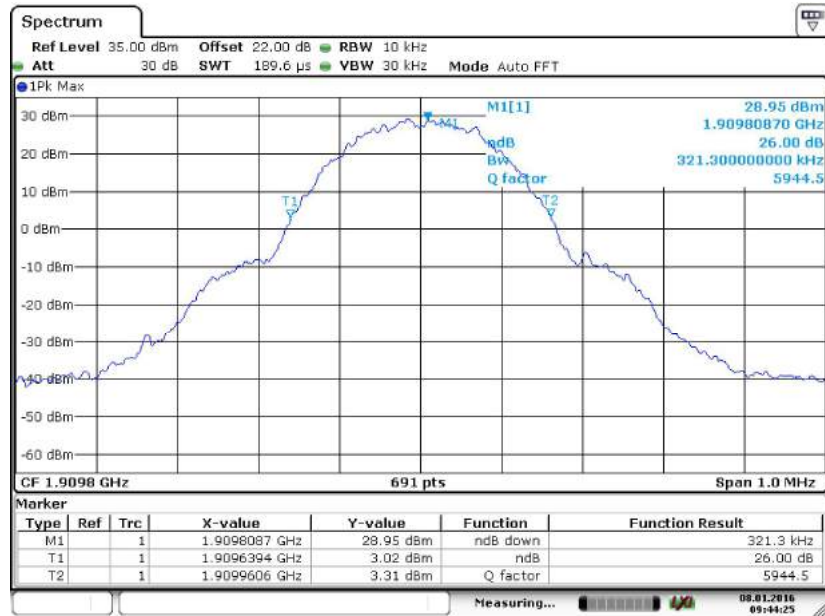
Test Model

-26dB Occupied Bandwidth

GPRS1900

Test Channel

☐ CH810

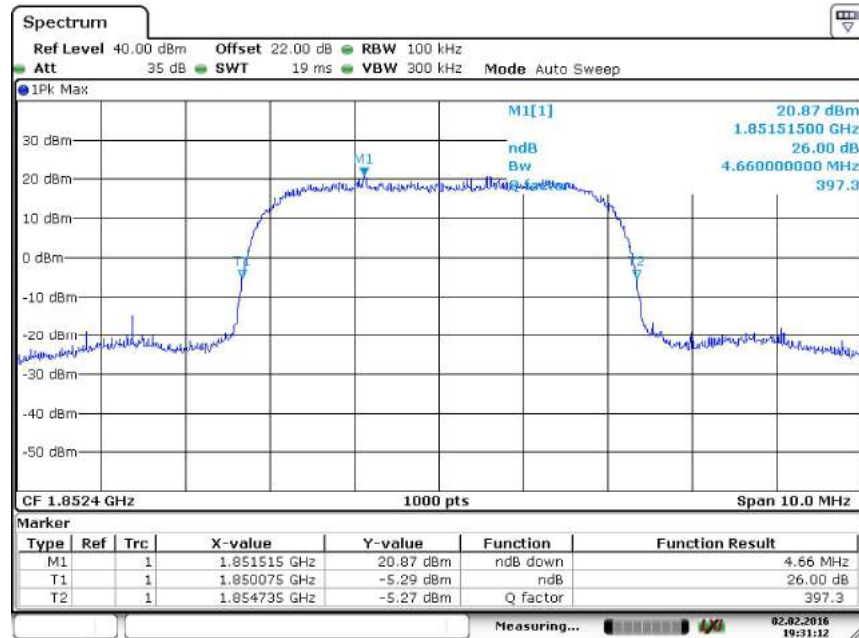


Date: 8 JAN 2016 09:44:25

Test Model

-26dB Occupied Bandwidth
WCDMA1900
Test Channel

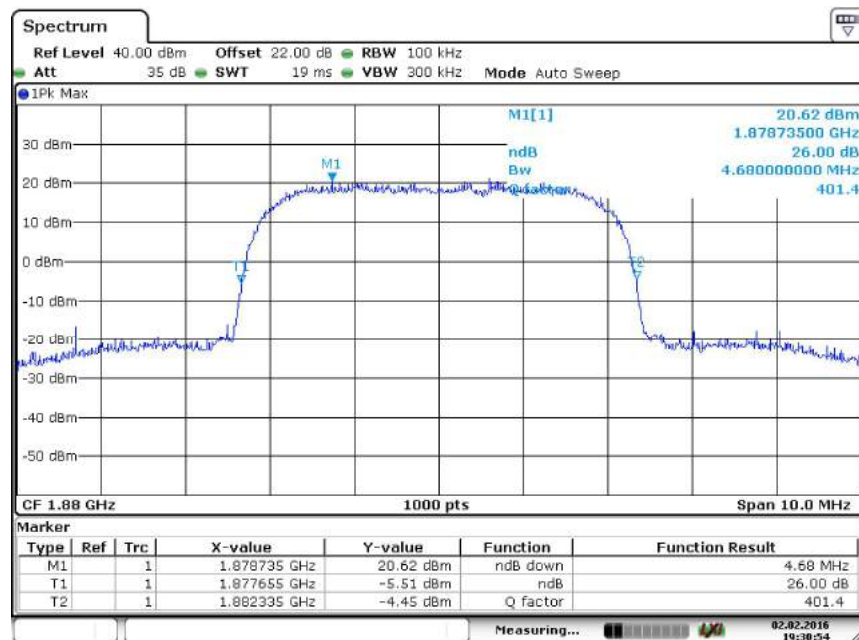
☐ CH9262



Test Model

-26dB Occupied Bandwidth
WCDMA1900
Test Channel

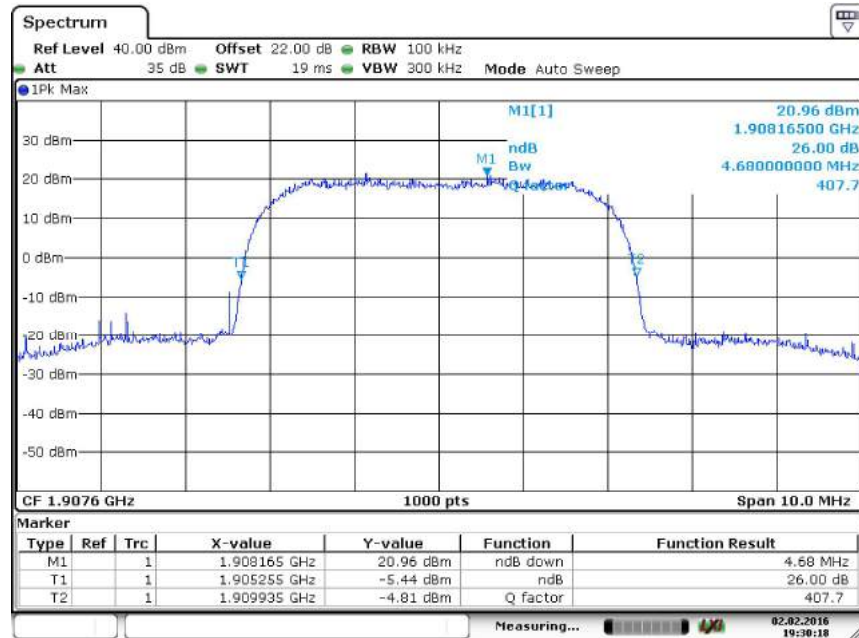
☐ CH9400

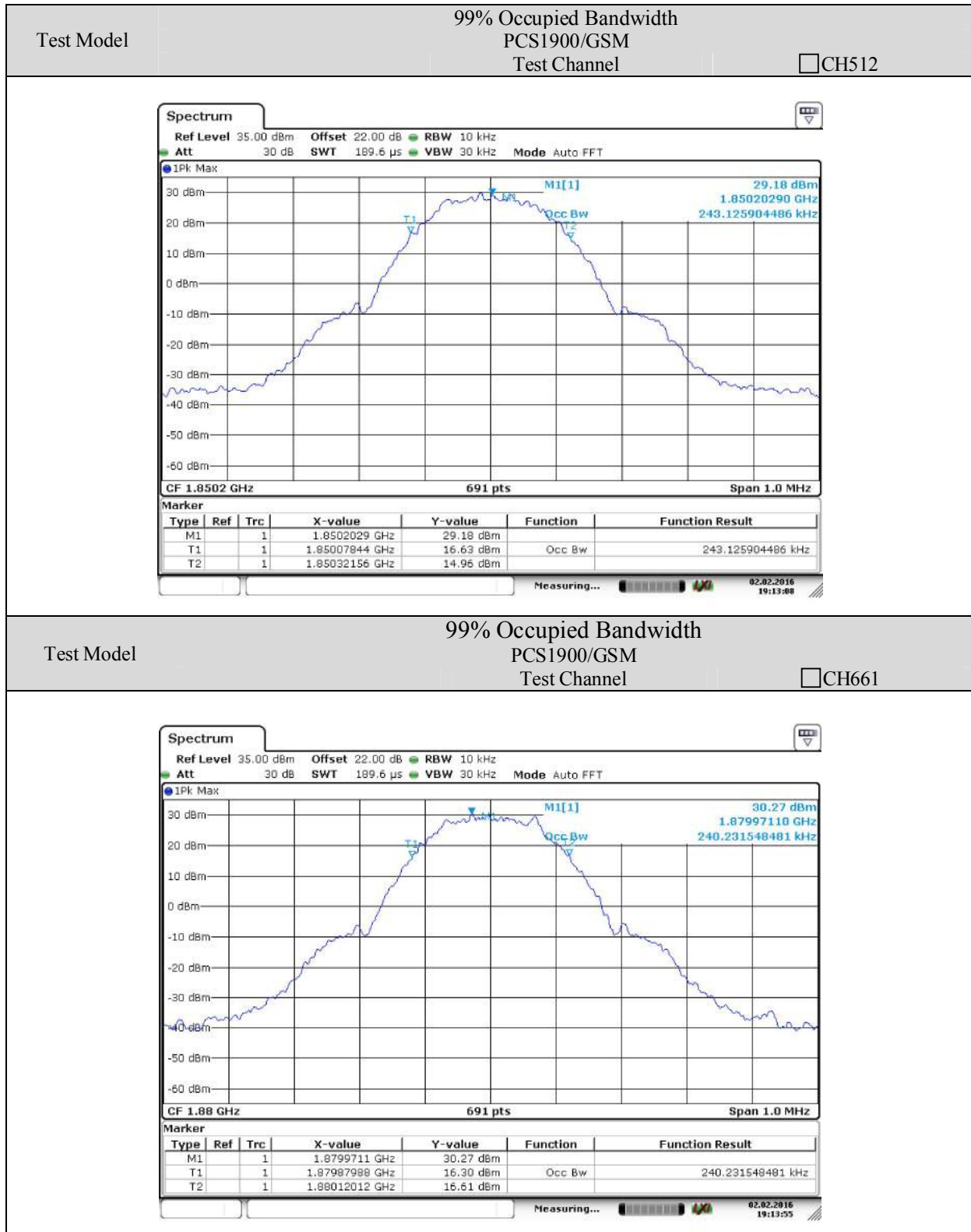


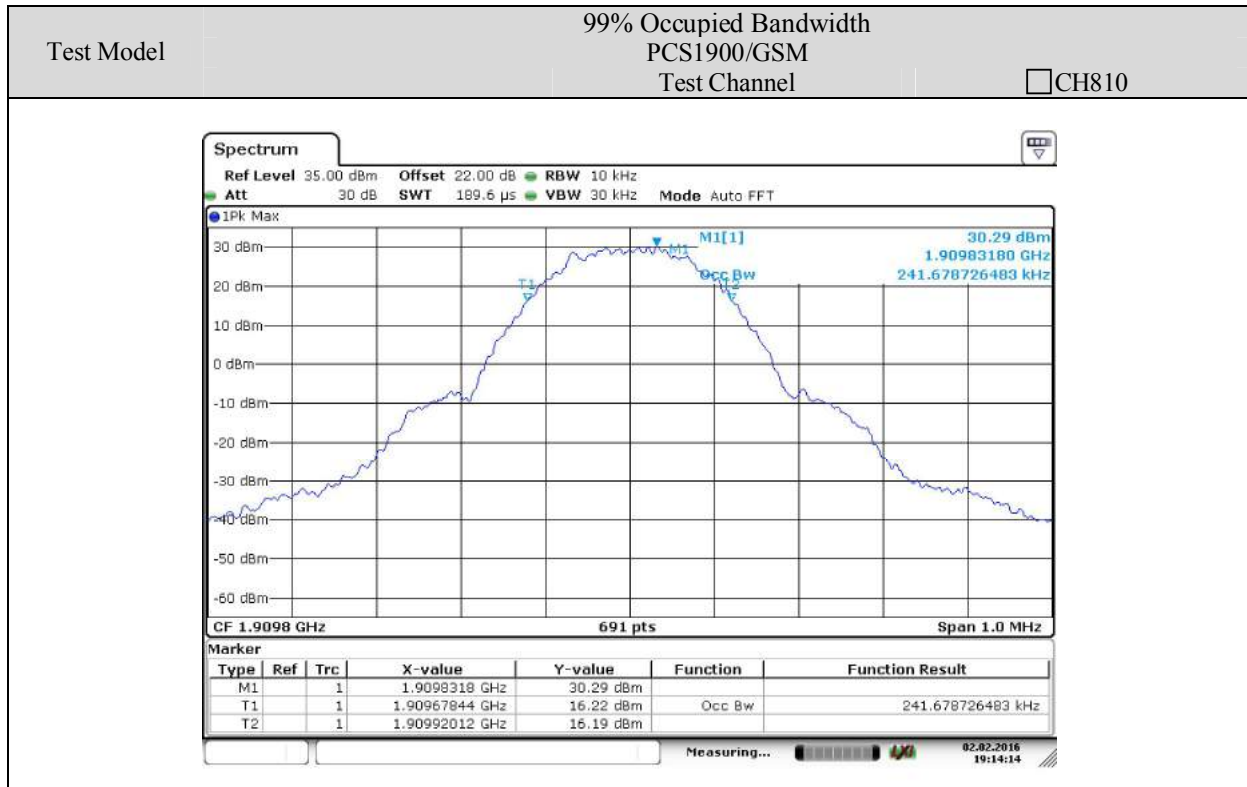
Test Model

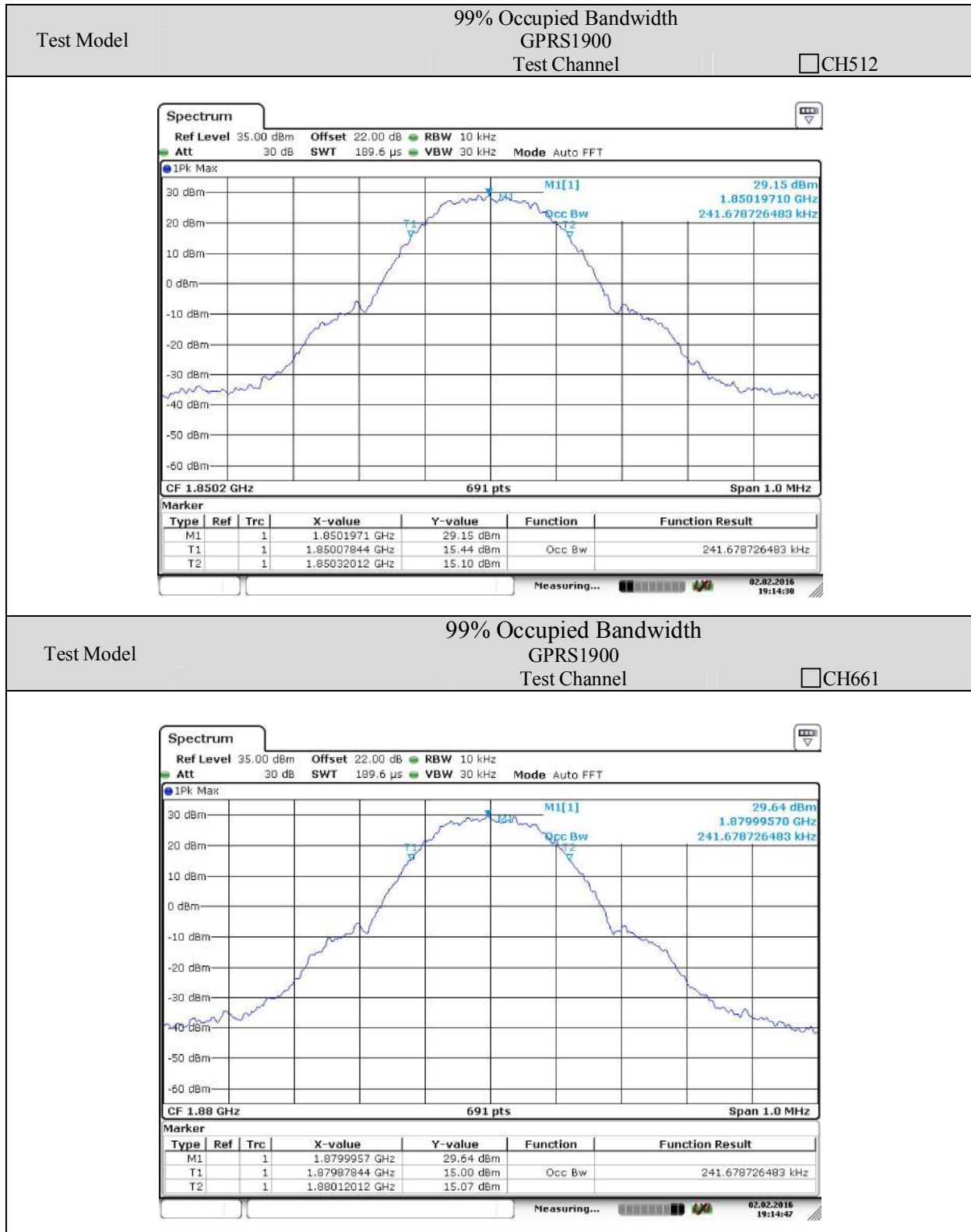
-26dB Occupied Bandwidth
WCDMA1900
Test Channel

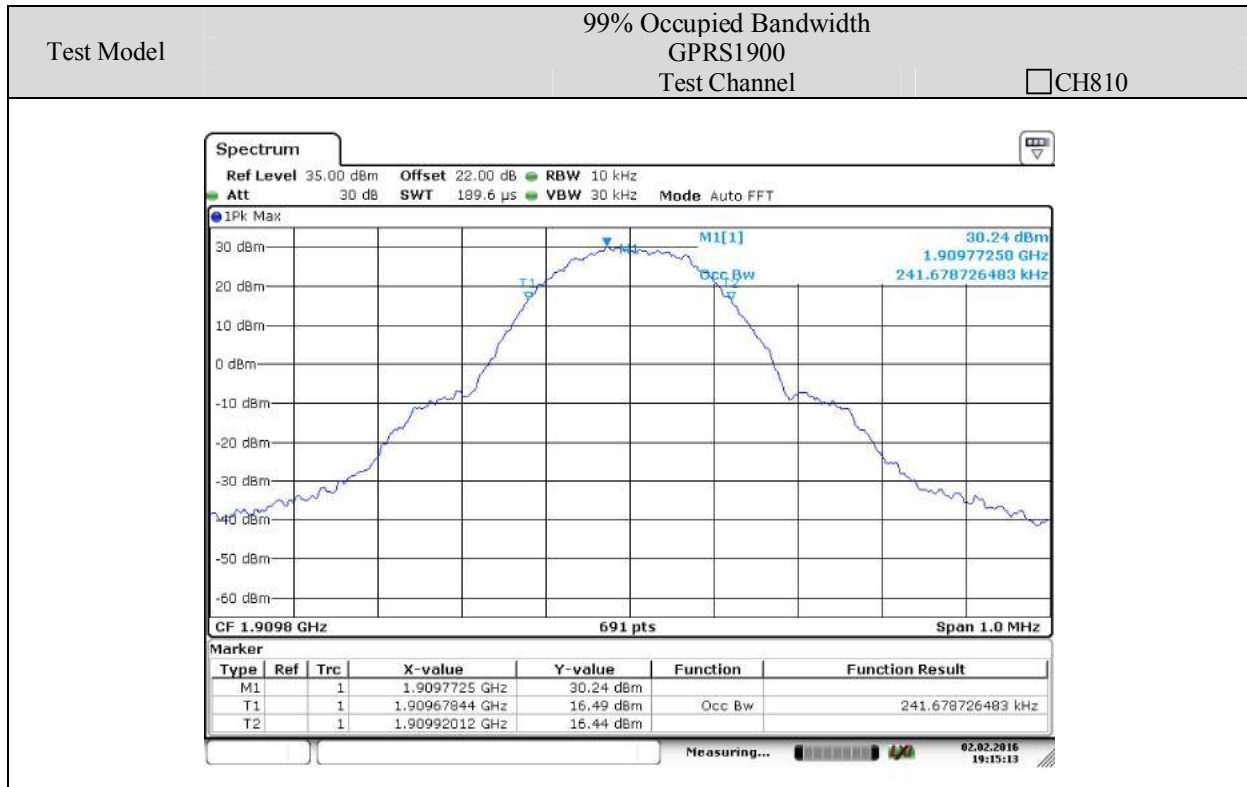
☐ CH9538











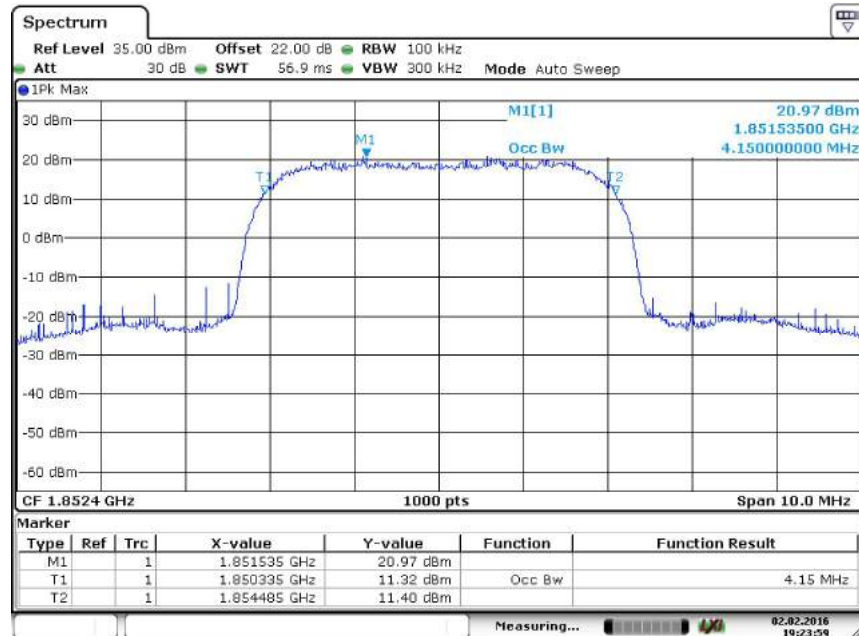
Test Model

99% Occupied Bandwidth

WCDMA1900

Test Channel

☐ CH9262



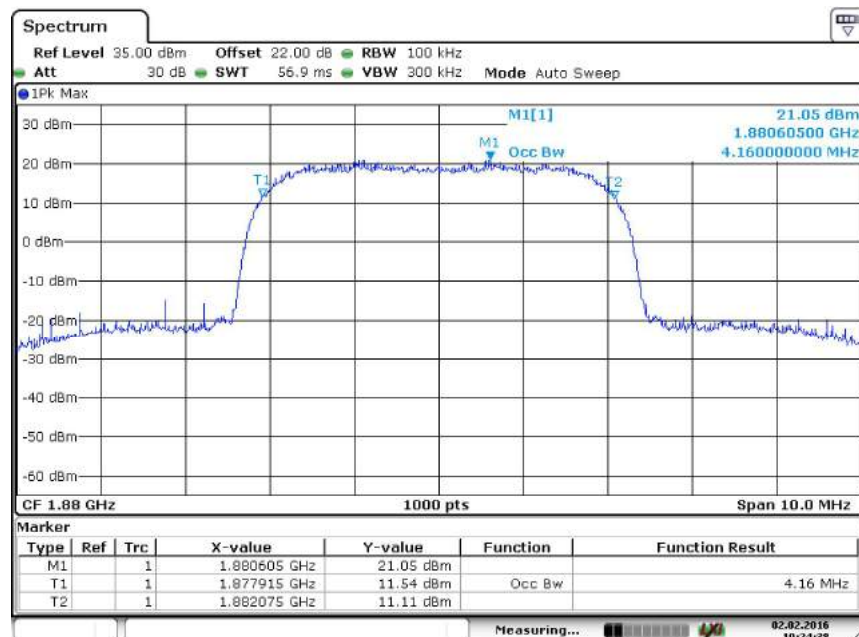
Test Model

99% Occupied Bandwidth

WCDMA1900

Test Channel

☐ CH9400



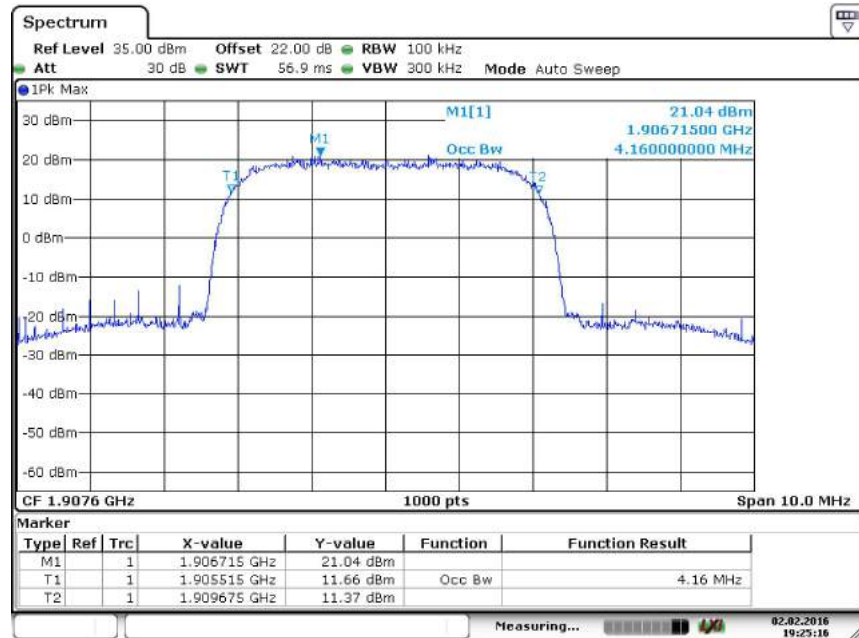
Test Model

99% Occupied Bandwidth

WCDMA1900

Test Channel

☐ CH9538



7.4 EFFECTIVE RADIATED POWER

7.4.1 Applicable Standard

According to FCC Part 2.1046 and FCC Part 24.232(c) and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.4.2 Conformance Limit

Mobile and portable stations are limited to 2 watts (33dBm)EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

7.4.3 Test Configuration

Test according to clause 6.2 radio frequency test setup

7.4.4 Test Procedure

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test

The instrument must have an available measurement/resolution bandwidth that is equal to or exceeds the OBW. If this capability is available, then the following procedure can be used to determine the total peak output power.

- a) Set the RBW $\geq$ OBW.
- b) Set VBW $\geq 3 \times$ RBW.
- c) Set span $\geq 2 \times$ RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Ensure that the number of measurement points $\geq$ span/RBW.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the peak amplitude level.

The EUT was placed on a turn table which is 1.5m above ground plane. Maximum procedure was performed on the six highest emissions to ensure EUT compliance. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. Repeat above procedures until all frequency measured was complete.

EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.

The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).

The EUT shall be replaced by a substitution antenna. The test setup refers to figure below. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.

The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.

The measurement results are obtained as described below:

Power(EIRP)=PMea- PAg - Pcl - Ga

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and

known input power.

ERP can be calculated from EIRP by subtracting the gain of the dipole,

ERP = EIRP -2.15dBi.

7.4.5 Test Results

Temperature : 28°C Test Date : January 10, 2016
Humidity : 65 % Test By: Andy

Operation Mode	Channel Number	Channel Frequency (MHz)	ERP Measurement Result (dBm)	Limit (dBm)	Verdict
PCS1900	512	1850.2	27.48	33	PASS
	661	1880.0	27.40	33	PASS
	810	1909.8	27.32	33	PASS
GPRS1900	512	1850.2	27.40	33	PASS
	661	1880.0	27.40	33	PASS
	810	1909.8	27.24	33	PASS
WCDMA1900	9262	1852.4	20.35	33	PASS
	9400	1880.0	20.14	33	PASS
	9538	1907.6	20.18	33	PASS
NOTE1: N/A (Not Applicable)					

Note:

We performed test at both Polarization H and V and compared which is greater value.
The greater result will be submitted into the report.

Peak ERP(dBm)= $P_{Mea} - P_{cl} - P_{Ag} - G_a$.

7.5 SPURIOUS EMISSION AT ANTENNA TERMINAL

7.5.1 Applicable Standard

According to FCC Part 2.1051 and FCC Part 24.238(a) and part 90.210(g) and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.5.2 Conformance Limit

■ Radiated Spurious Emission out of Band

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

■ 100KHz Band Edg Emissions:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

■ Emission Mask

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least $83 \log(f_d/5)$ dB;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least $29 \log(f_d/11)$ dB or 50 dB, whichever is the lesser attenuation;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log(P)$ dB

7.5.3 Test Configuration

Test according to clause 6.2 radio frequency test setup

7.5.4 Test Configuration

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

then the following procedure can be used to determine spurious emission

- a) RBW = 1 MHz for $f \geq 1$ GHz (1GHz to 25GHz), 100 kHz for $f < 1$ GHz (30MHz to 1GHz), 200Hz for $f < 150$ KHz (9KHz to 150KHz), 9KHz for $f < 30$ MHz (150KHz to 30KHz)
- b) Set VBW $\geq 3 \times$ RBW.
- c) Set span wide enough to fully capture the emission being measured
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Ensure that the number of measurement points $\geq$ span/RBW.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the peak amplitude level.

Step1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.

Step2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.

Step3. The table was rotated 360 degrees to determine the position of the highest spurious emission.

Step4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.

Step5. Make the measurement with the spectrum analyzer's RBW , VBW , taking the record of maximum spurious emission.

Step6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.

Step7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

Step8. Taking the record of output power at antenna port.

Step9. Repeat step 7 to step 8 for another polarization.

Step10. Emission level (dBm) = output power + substitution Gain. Test Results

7.5.5 Test Results

■ Spurious Emission below 30MHz (9KHz to 30MHz)

Temperature: 24°C Test Date: January 10, 2016
Humidity: 53 % Test By: King Kong
Test mode: TX Mode

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance} / \text{test distance})$ (dB);

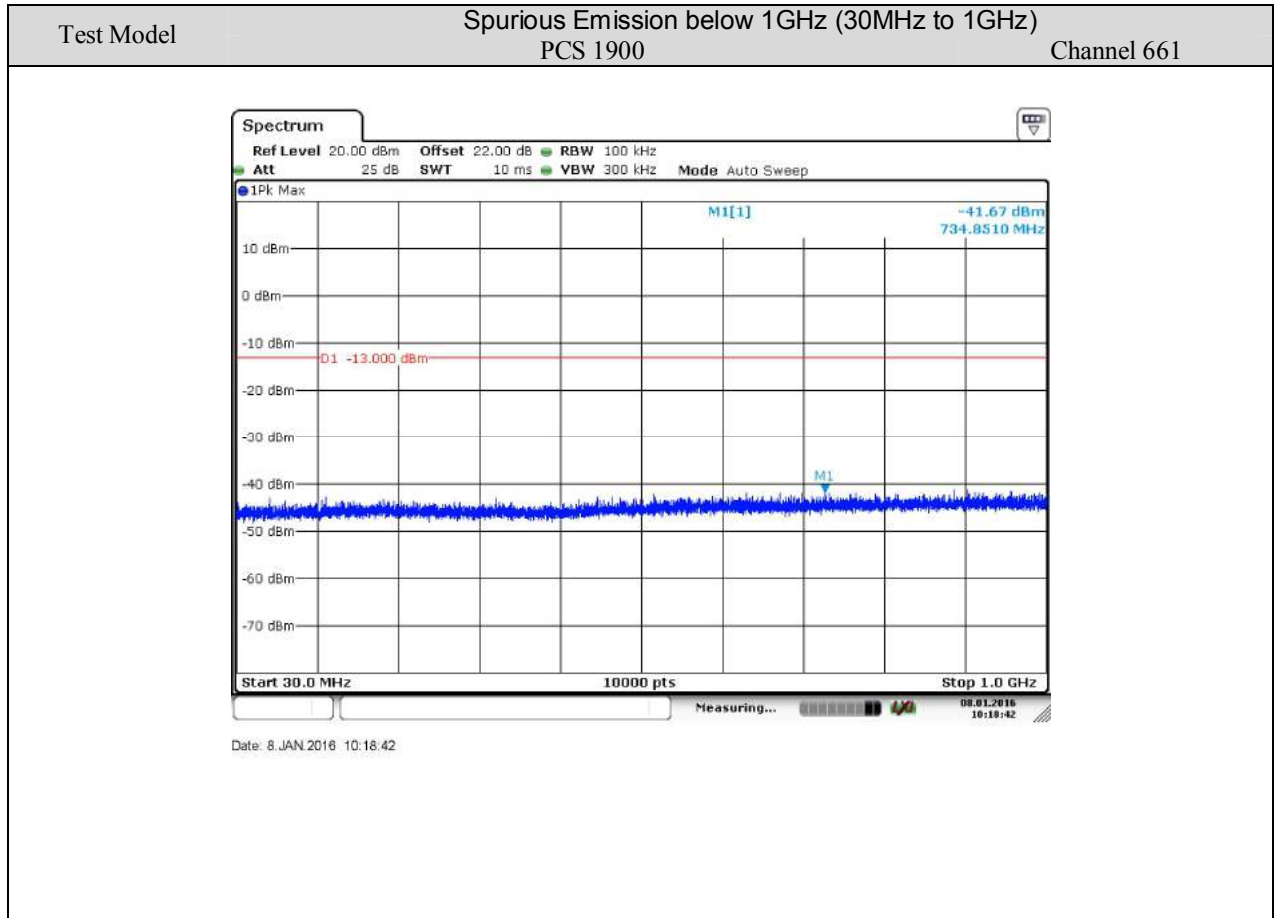
Limit line = Specific limits(dBuV) + distance extrapolation factor

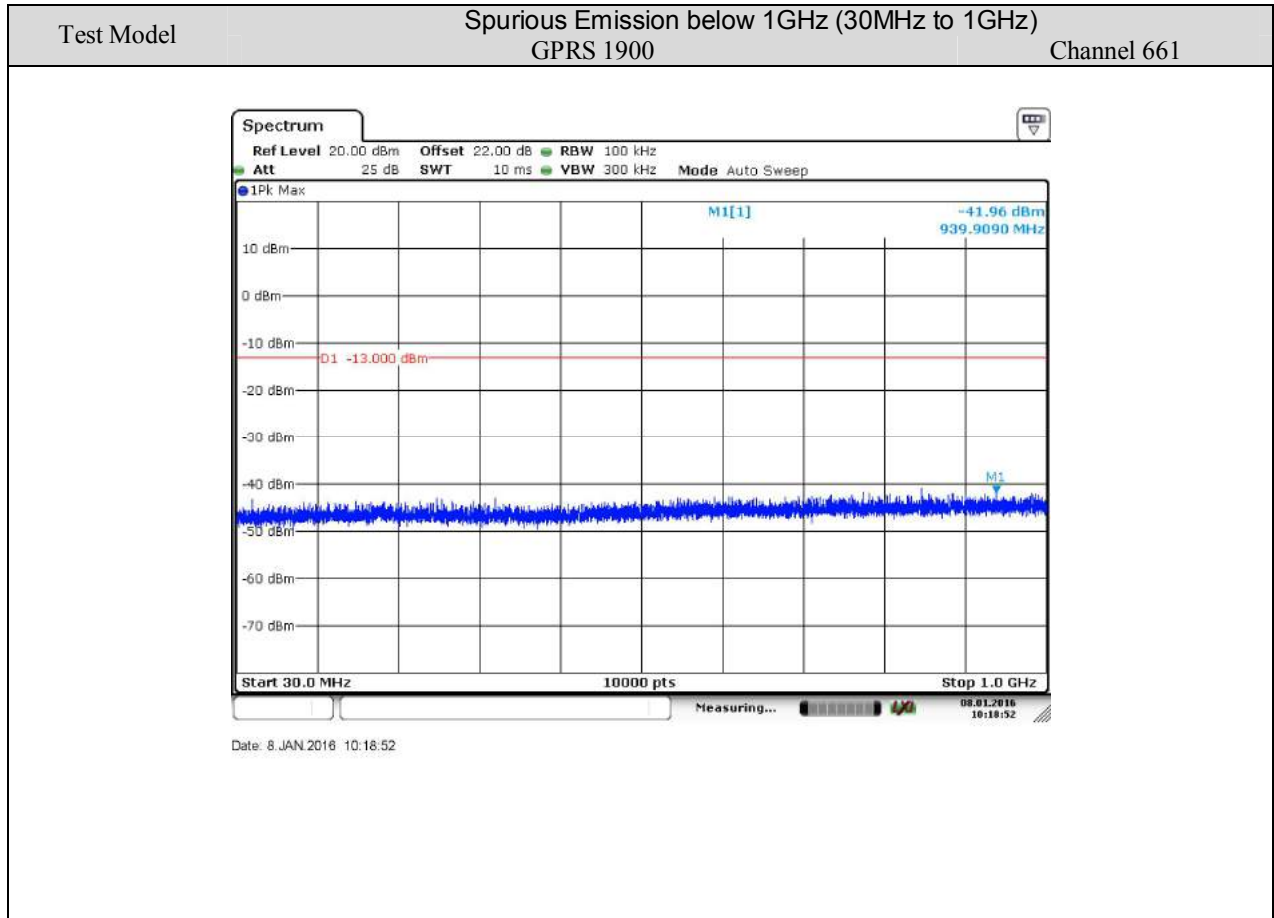
■ Spurious Emission below 1GHz (30MHz to 1GHz)

Temperature : 28°C Test Date : January 10, 2016
Humidity : 65 % Test By: Andy

Test Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
PCS1900	512	1850.2	☐ GSM	PASS
	661	1880.0		PASS
	810	1909.8		PASS
GPRS1900	512	1850.2	☐ GPRS	PASS
	661	1880.0		PASS
	810	1909.8		PASS
WCDMA1900	9262	1852.4	☐ WCDMA	PASS
	9400	1880.0		PASS
	9538	1907.6		PASS
NOTE1: N/A (Not Applicable)				

All modes have been tested, and the worst result recorded was report as below:

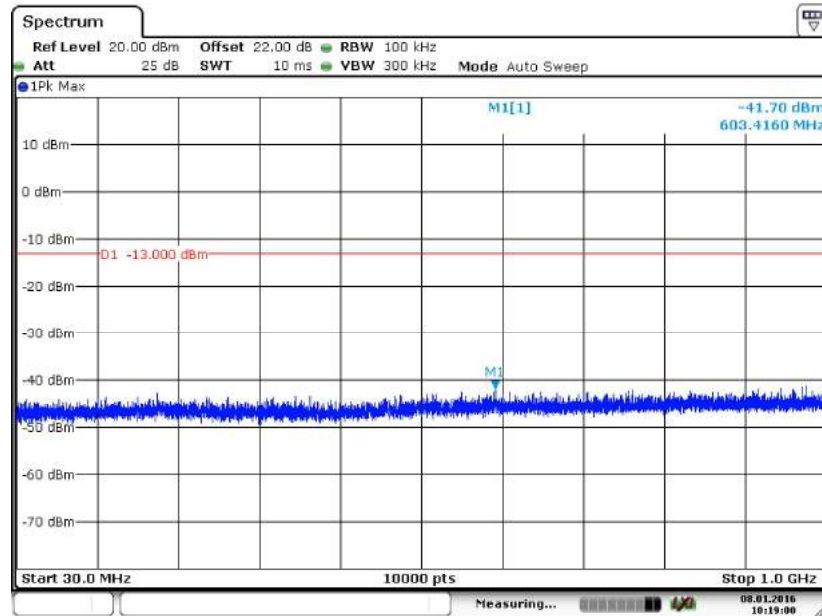




Test Model

Spurious Emission below 1GHz (30MHz to 1GHz)
WCDMA 1900

Channel 9400



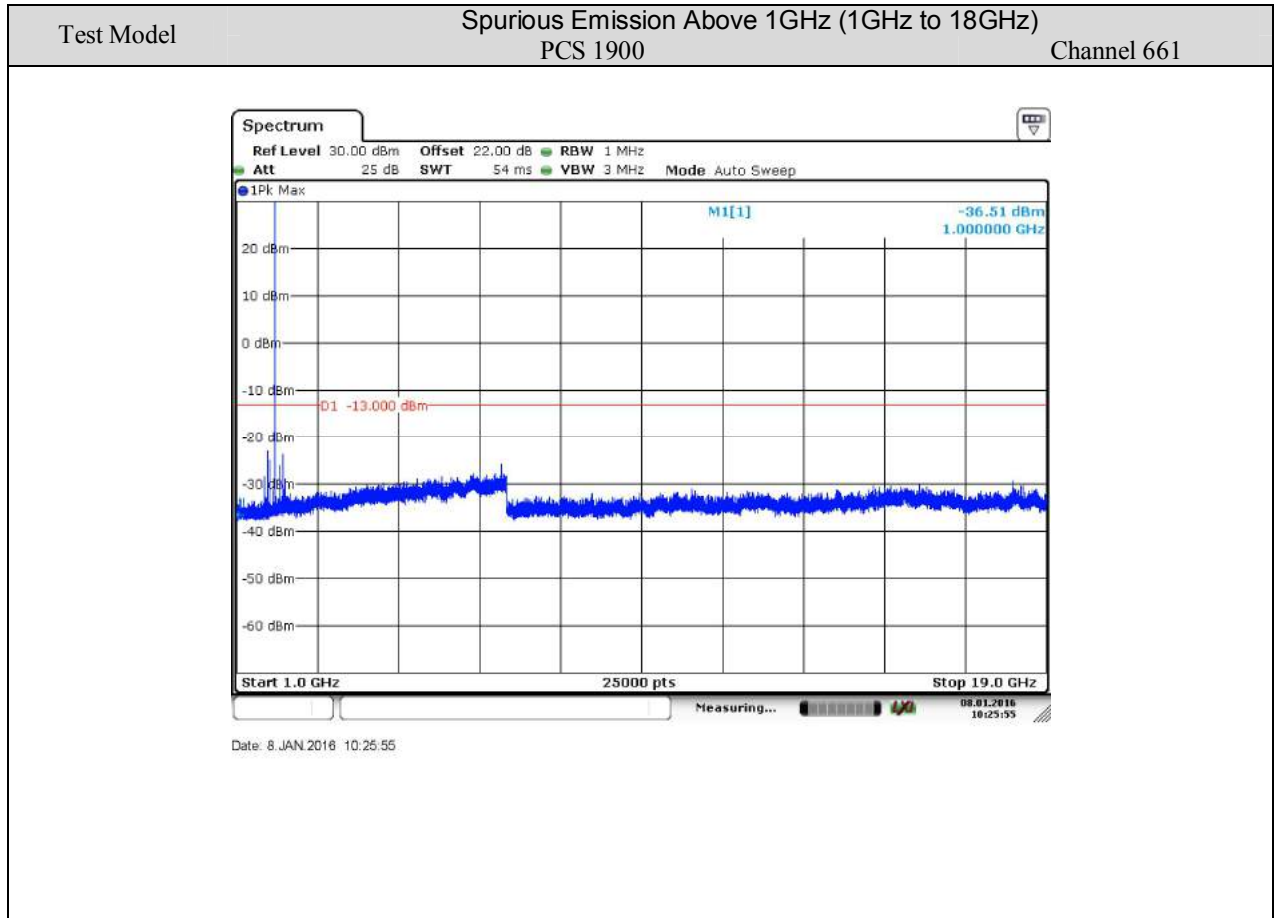
Date: 8.JAN.2016 10:19:01

■ Spurious Emission Above 1GHz (1GHz to 18GHz)

Temperature : 28°C Test Date : January 10, 2016
Humidity : 65 % Test By: Andy

Test Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
PCS1900	512	1850.2	☐ GSM	PASS
	661	1880.0		PASS
	810	1909.8		PASS
GPRS1900	512	1850.2	☐ GPRS	PASS
	661	1880.0		PASS
	810	1909.8		PASS
WCDMA1900	9262	1852.4	☐ WCDMA	PASS
	9400	1880.0		PASS
	9538	1907.6		PASS
NOTE1: N/A (Not Applicable)				

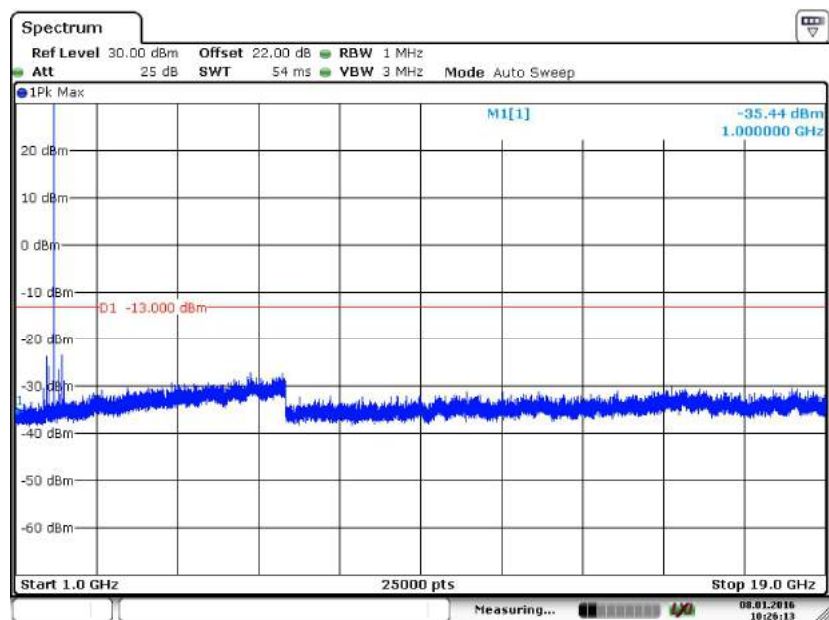
All modes have been tested, and the worst result recorded was report as below:



Test Model

Spurious Emission Above 1GHz (1GHz to 18GHz)
GPRS 1900

Channel 661

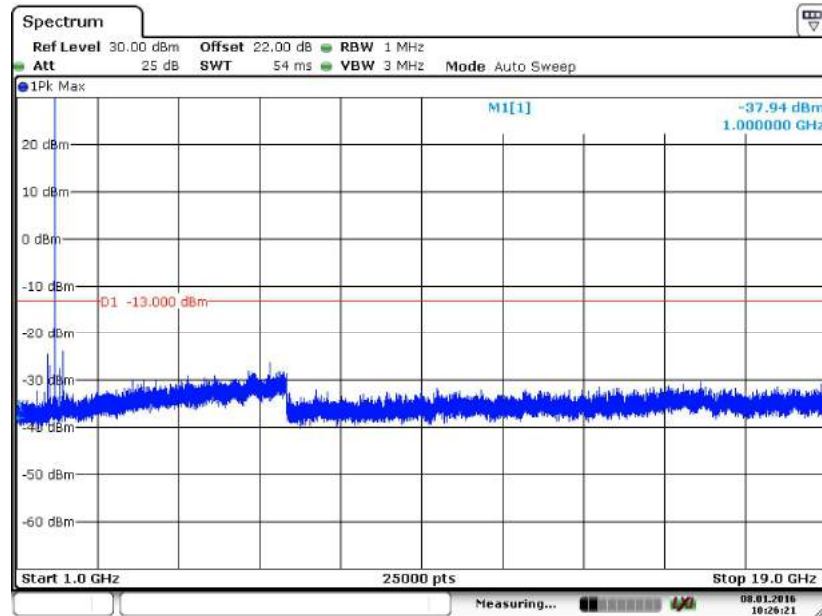


Date: 8.JAN.2016 10:26:13

Test Model

Spurious Emission Above 1GHz (1GHz to 18GHz)
WCDMA 1900

Channel 9400



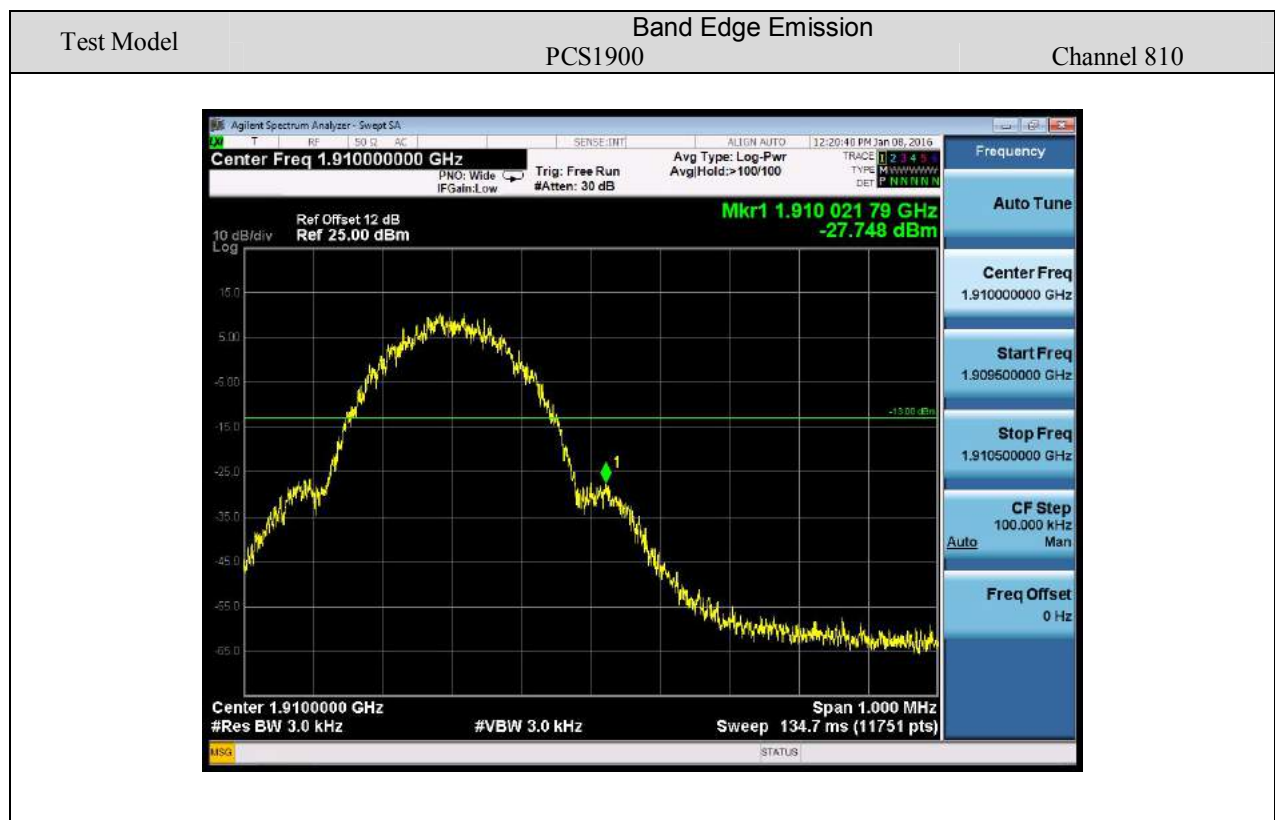
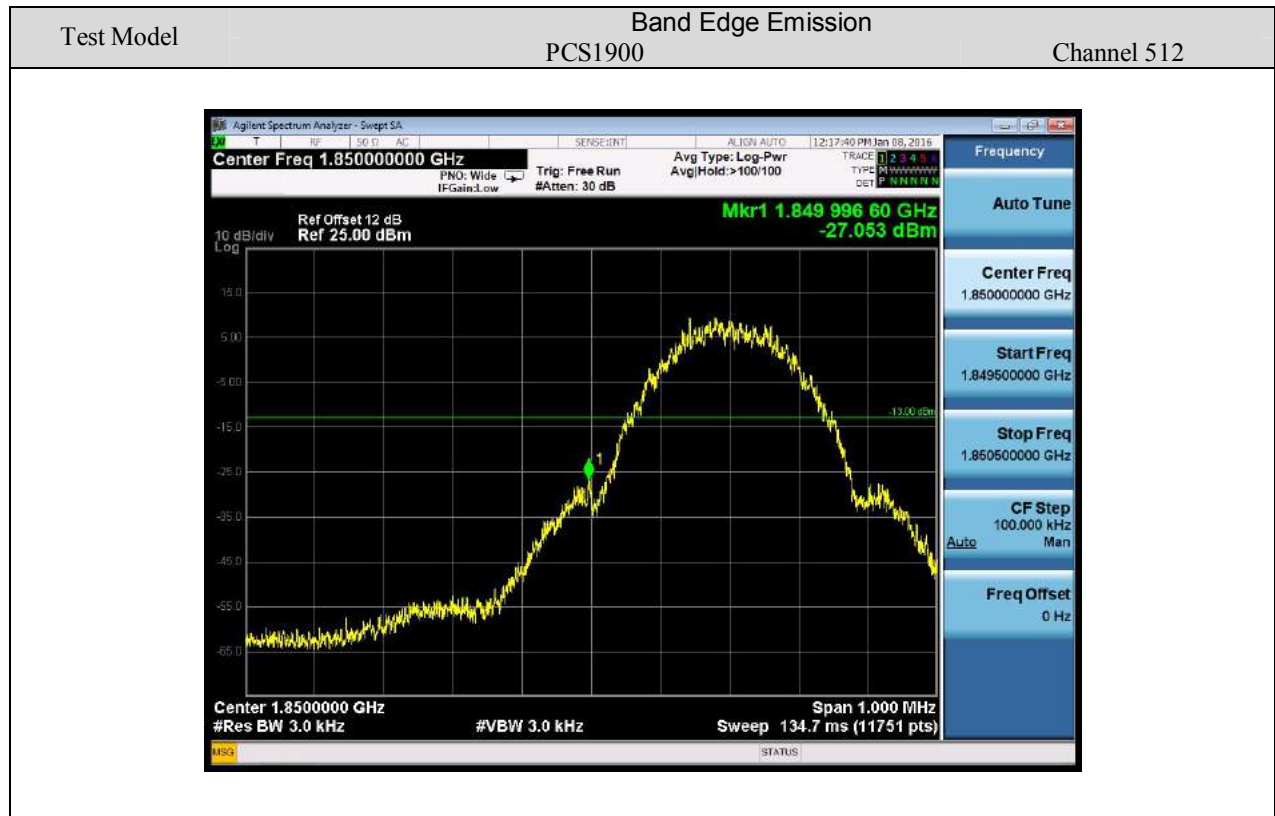
Date: 8.JAN.2016 10:26:21

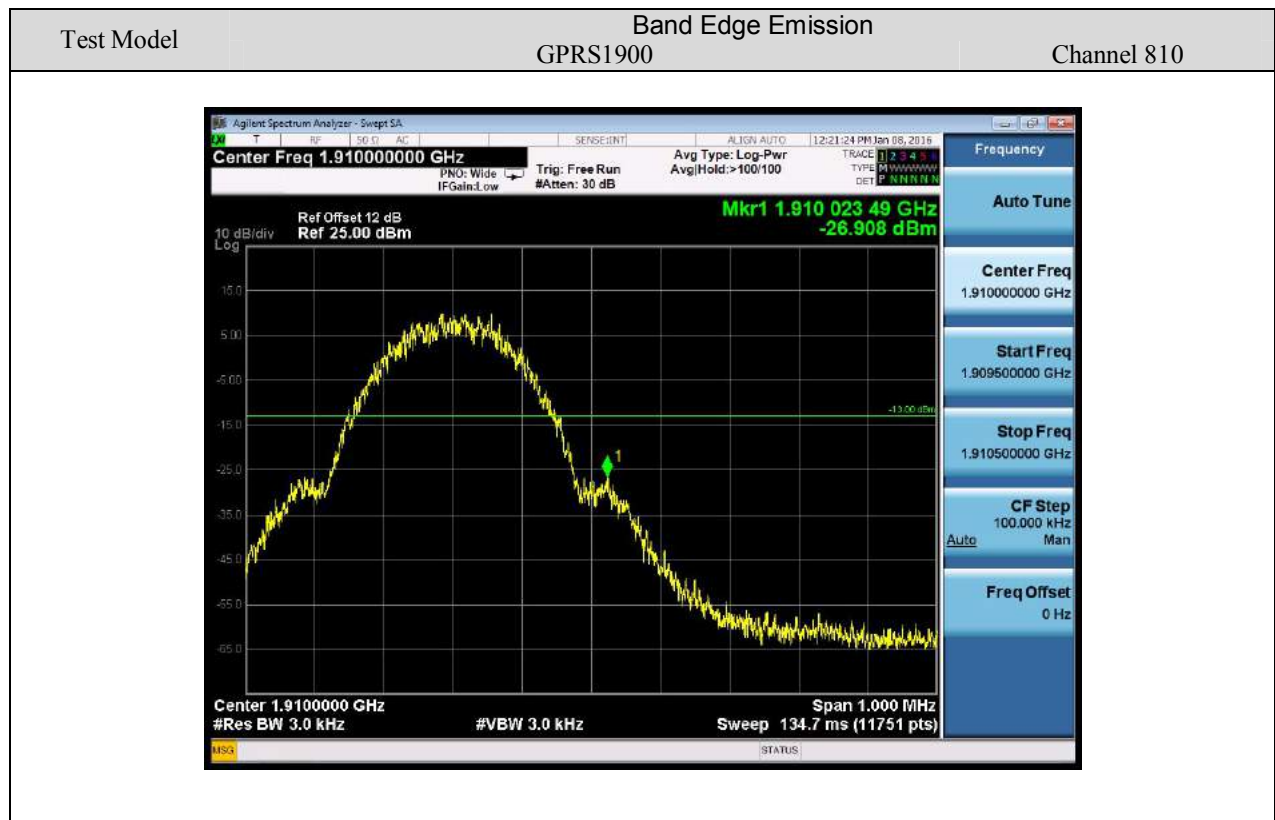
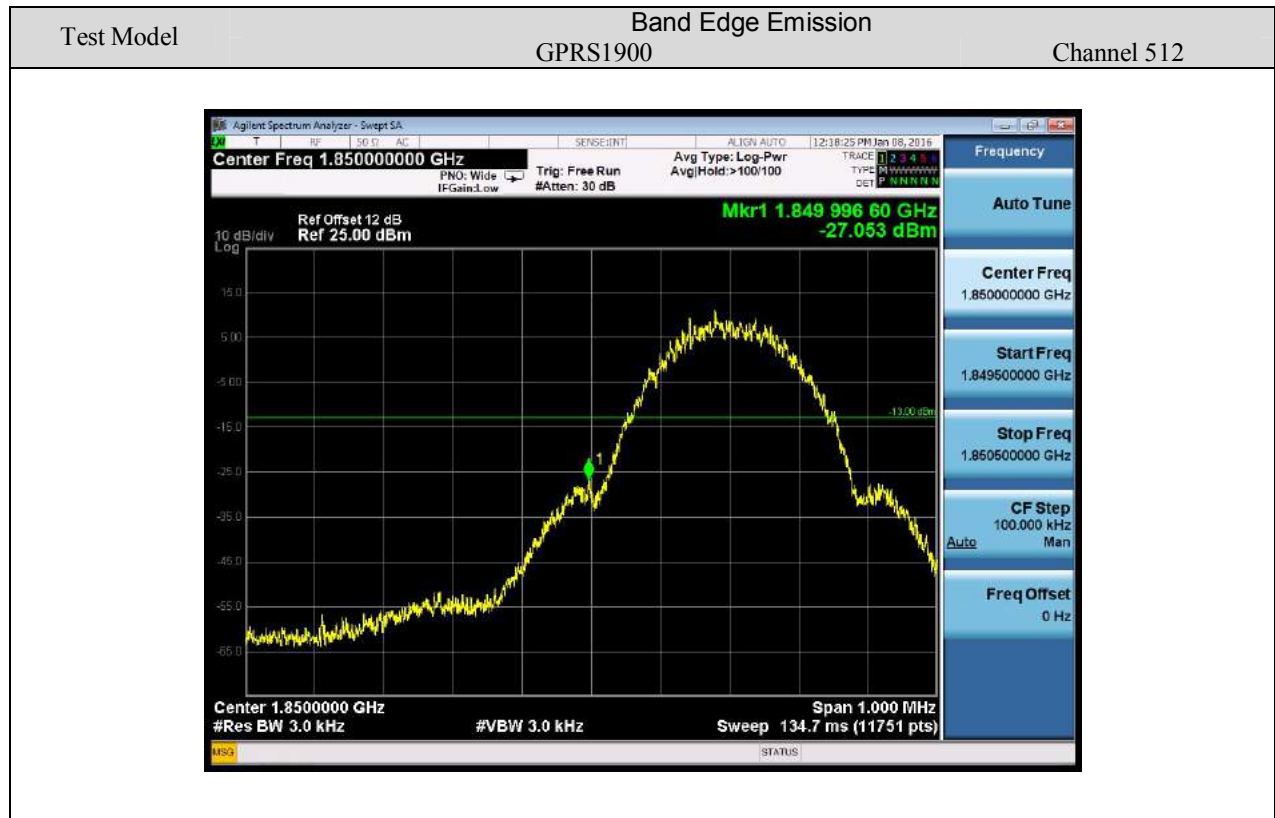
■ Band Edge Emission

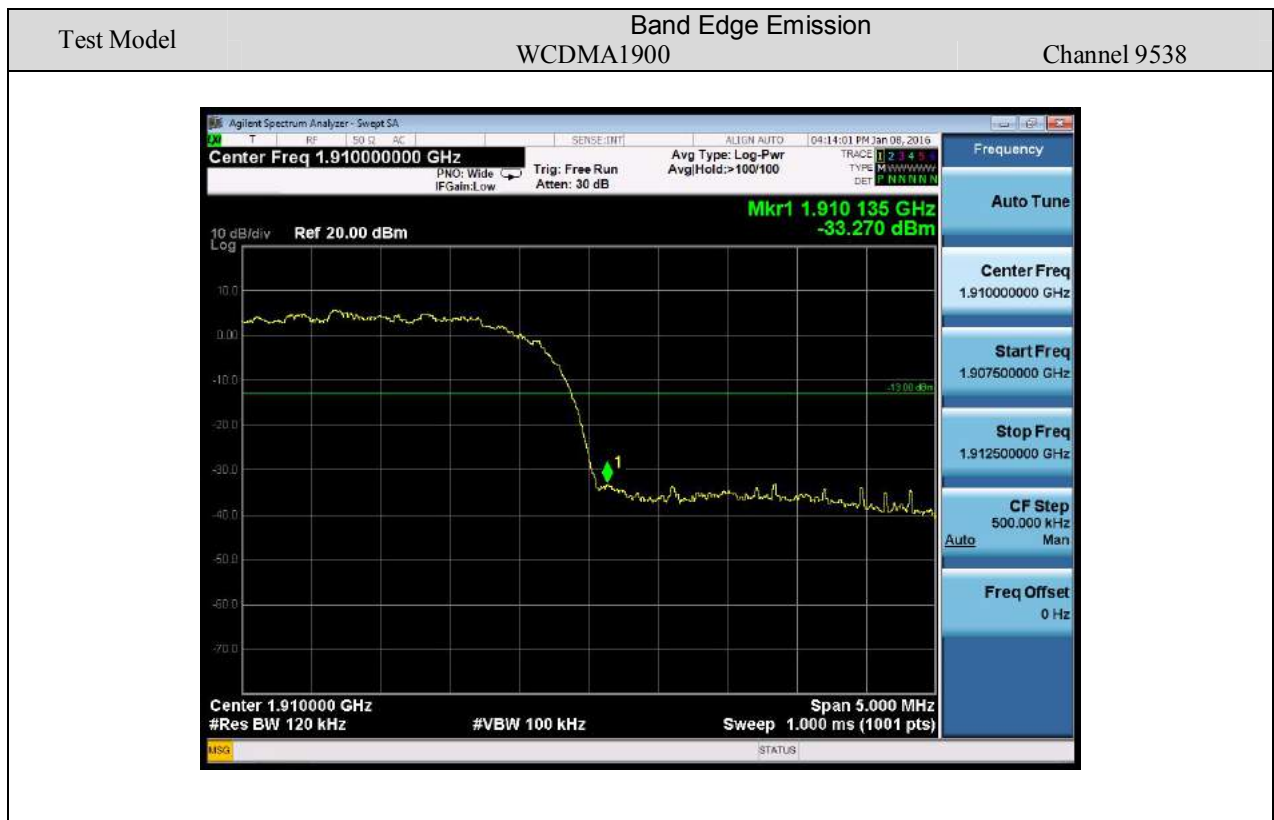
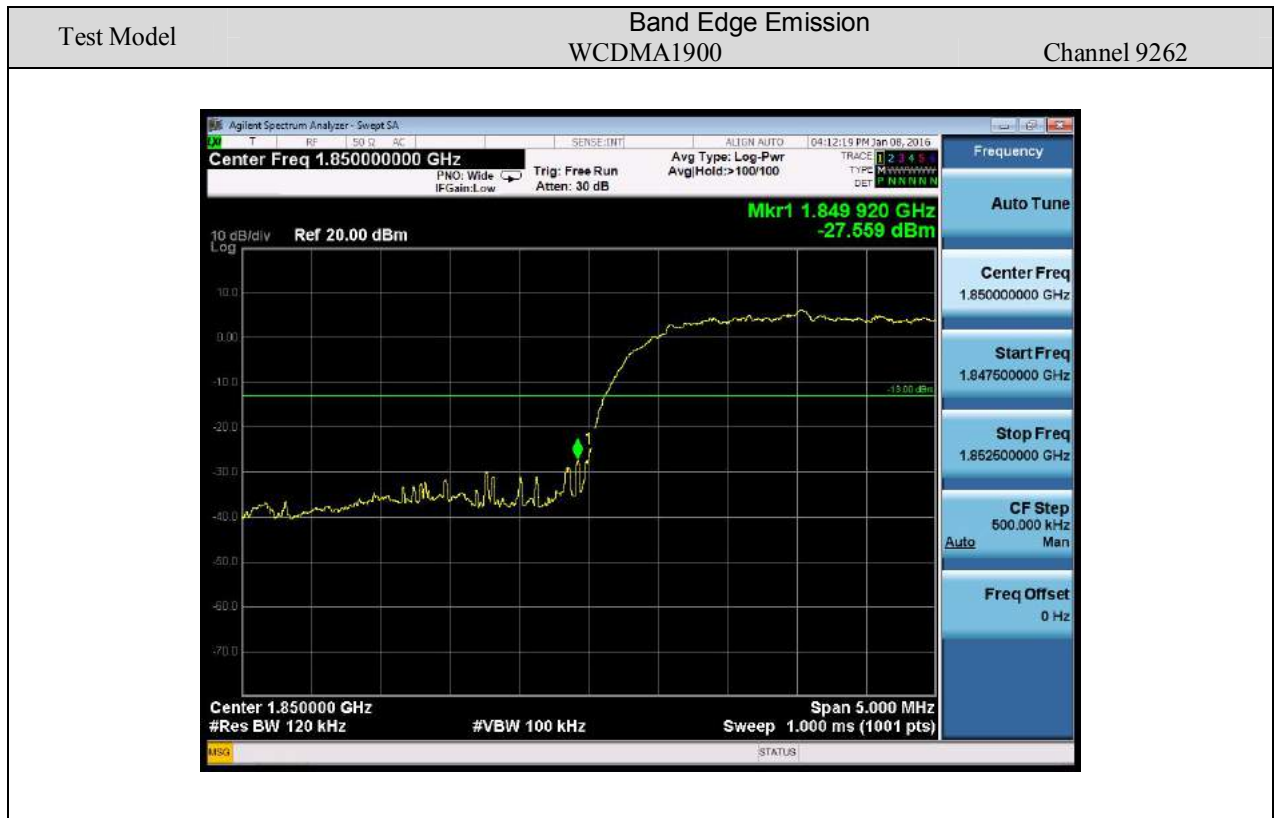
Temperature : 28°C Test Date : January 10, 2016
Humidity : 65 % Test By: Andy

Test Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
PCS1900	512	1850.2	☐ GSM	PASS
	661	1880.0		PASS
	810	1909.8		PASS
GPRS1900	512	1850.2	☐ GPRS	PASS
	661	1880.0		PASS
	810	1909.8		PASS
WCDMA1900	9262	1852.4	☐ WCDMA	PASS
	9400	1880.0		PASS
	9538	1907.6		PASS
NOTE1: N/A (Not Applicable)				

All modes have been tested, and the worst result recorded was report as below







7.6 PEAK TO AVERAGE RATIO

7.6.1 Applicable Standard

According to FCC 24.232(d) and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.6.2 Conformance Limit

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure.

7.6.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.6.4 Test Procedure

The EUT was connected to Spectrum Analyzer and Base Station via power divider.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set the number of counts to a value that stabilizes the measured CCDF curve.

Set the measurement interval to 1 ms.

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

a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval as follows:

1) for continuous transmissions, set to 1 ms,

2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

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

7.6.5 Test Results

Temperature: 24°C
Humidity: 53 %

Test Date: January 10, 2016
Test By: KING KONG

Operation Mode	Channel Number	Channel Frequency (MHz)	P. A .R (dB)	Limit (dB)	Verdict
PCS1900	512	1850.2	3.54	13	PASS
	661	1880.0	3.23	13	PASS
	810	1909.8	3.67	13	PASS
GPRS1900	512	1850.2	3.62	13	PASS
	661	1880.0	3.75	13	PASS
	810	1909.8	3.64	13	PASS
WCDMA1900	9262	1852.4	3.85	13	PASS
	9400	1880.0	3.77	13	PASS
	9538	1907.6	3.88	13	PASS
NOTE1: N/A (Not Applicable)					

7.7 FREQUENCY STABILITY

7.7.1 Applicable Standard

According to FCC Part 2.1055 and FCC Part 24.235 and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.7.2 Conformance Limit

According to part 24.235, from 821MHz to 896MHz, for mobile device, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm.

7.7.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

7.7.4 Test Configuration

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector. A call is set up by the SS according to the generic call set up procedure on a channel with ARFCN in the Mid ARFCN range, power control level set to Max power. MS TXPWR_MAX_CCH is set to the maximum value supported by the Power Class of the Mobile under test.

EUT was placed at temperature chamber and connected to an external power supply.

Temperature and voltage condition shall be tested to confirm frequency stability.

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 95 to 105 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.

7.7.5 Test Results

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (°C)				
PCS1900	CH 512	Vnom	-20	1850.2	6	0.0032	2.5
			-10	1850.2	8	0.0043	2.5
			0	1850.2	10	0.0054	2.5
			10	1850.2	9	0.0049	2.5
			20	1850.2	6	0.0032	2.5
			30	1850.2	7	0.0038	2.5
			40	1850.2	9	0.0049	2.5
			50	1850.2	12	0.0065	2.5
		85% Vnom	20	1850.2	10	0.0054	2.5
		115% Vnom	20	1850.2	8	0.0043	2.5
	CH 661	Vnom	-20	1880.0	8	0.0043	2.5
			-10	1880.0	13	0.0069	2.5
			0	1880.0	13	0.0069	2.5
			10	1880.0	12	0.0064	2.5
			20	1880.0	11	0.0059	2.5
			30	1880.0	10	0.0053	2.5
			40	1880.0	8	0.0043	2.5
			50	1880.0	8	0.0043	2.5
		85% Vnom	20	1880.0	9	0.0048	2.5
		115% Vnom	20	1880.0	7	0.0037	2.5
	CH	Vnom	-20	1909.8	8	0.0042	2.5
			-10	1909.8	10	0.0052	2.5
			0	1909.8	13	0.0068	2.5
			10	1909.8	11	0.0058	2.5
			20	1909.8	12	0.0063	2.5
			30	1909.8	9	0.0047	2.5
			40	1909.8	8	0.0042	2.5
			50	1909.8	10	0.0052	2.5
		85% Vnom	20	1909.8	7	0.0037	2.5
		115% Vnom	20	1909.8	7	0.0037	2.5
VERDICT				PASS			

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (°C)				
GPRS1900	CH 512	Vnom	-20	1850.2	7	0.0038	2.5
			-10	1850.2	9	0.0049	2.5
			0	1850.2	8	0.0043	2.5
			10	1850.2	10	0.0054	2.5
			20	1850.2	11	0.0059	2.5
			30	1850.2	6	0.0032	2.5
			40	1850.2	5	0.0027	2.5
		50	1850.2	8	0.0043	2.5	
		85% Vnom	20	1850.2	8	0.0043	2.5
		115% Vnom	20	1850.2	9	0.0049	2.5
	CH 661	Vnom	-20	1880.0	9	0.0048	2.5
			-10	1880.0	12	0.0064	2.5
			0	1880.0	10	0.0053	2.5
			10	1880.0	8	0.0043	2.5
			20	1880.0	8	0.0043	2.5
			30	1880.0	11	0.0059	2.5
			40	1880.0	9	0.0048	2.5
		50	1880.0	8	0.0043	2.5	
		85% Vnom	20	1880.0	9	0.0048	2.5
		115% Vnom	20	1880.0	8	0.0043	2.5
	CH 810	Vnom	-20	1909.8	10	0.0052	2.5
			-10	1909.8	8	0.0042	2.5
			0	1909.8	11	0.0058	2.5
			10	1909.8	11	0.0058	2.5
			20	1909.8	8	0.0042	2.5
			30	1909.8	7	0.0037	2.5
			40	1909.8	8	0.0042	2.5
		50	1909.8	9	0.0047	2.5	
		85% Vnom	20	1909.8	7	0.0037	2.5
		115% Vnom	20	1909.8	8	0.0042	2.5
VERDICT				PASS			

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (°C)				
WCDMA1900	CH 9262	Vnom	-20	1852.4	10	0.0054	2.5
			-10	1852.4	8	0.0043	2.5
			0	1852.4	8	0.0043	2.5
			10	1852.4	7	0.0038	2.5
			20	1852.4	9	0.0049	2.5
			30	1852.4	10	0.0054	2.5
			40	1852.4	11	0.0059	2.5
			50	1852.4	8	0.0043	2.5
		85% Vnom	20	1852.4	7	0.0038	2.5
		115% Vnom	20	1852.4	9	0.0049	2.5
	CH 9400	Vnom	-20	1880.0	7	0.0037	2.5
			-10	1880.0	10	0.0053	2.5
			0	1880.0	8	0.0043	2.5
			10	1880.0	8	0.0043	2.5
			20	1880.0	7	0.0037	2.5
			30	1880.0	7	0.0037	2.5
			40	1880.0	11	0.0059	2.5
			50	1880.0	13	0.0069	2.5
		85% Vnom	20	1880.0	10	0.0053	2.5
		115% Vnom	20	1880.0	12	0.0064	2.5
	CH 9538	Vnom	-20	1907.6	11	0.0058	2.5
			-10	1907.6	8	0.0042	2.5
			0	1907.6	7	0.0037	2.5
			10	1907.6	8	0.0042	2.5
			20	1907.6	8	0.0042	2.5
			30	1907.6	12	0.0063	2.5
			40	1907.6	13	0.0068	2.5
			50	1907.6	11	0.0058	2.5
		85% Vnom	20	1907.6	7	0.0037	2.5
		115% Vnom	20	1907.6	9	0.0047	2.5
VERDICT				PASS			

7.8 POWER LINE CONDUCTED EMISSIONS

7.8.1 Applicable Standard

According to FCC Part 15.207(a)

7.8.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

7.8.3 Test Configuration

Test according to clause 6.3 conducted emission test setup

7.8.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

7.8.5 Test Results

Test Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
PCS1900	512	1850.2	☐ GSM	PASS
	661	1880.0		PASS
	810	1909.8		PASS
GPRS1900	512	1850.2	☐ GPRS	PASS
	661	1880.0		PASS
	810	1909.8		PASS
WCDMA1900	9262	1852.4	☐ WCDMA1900	PASS
	9400	1880.0		PASS
	9538	1907.6		PASS

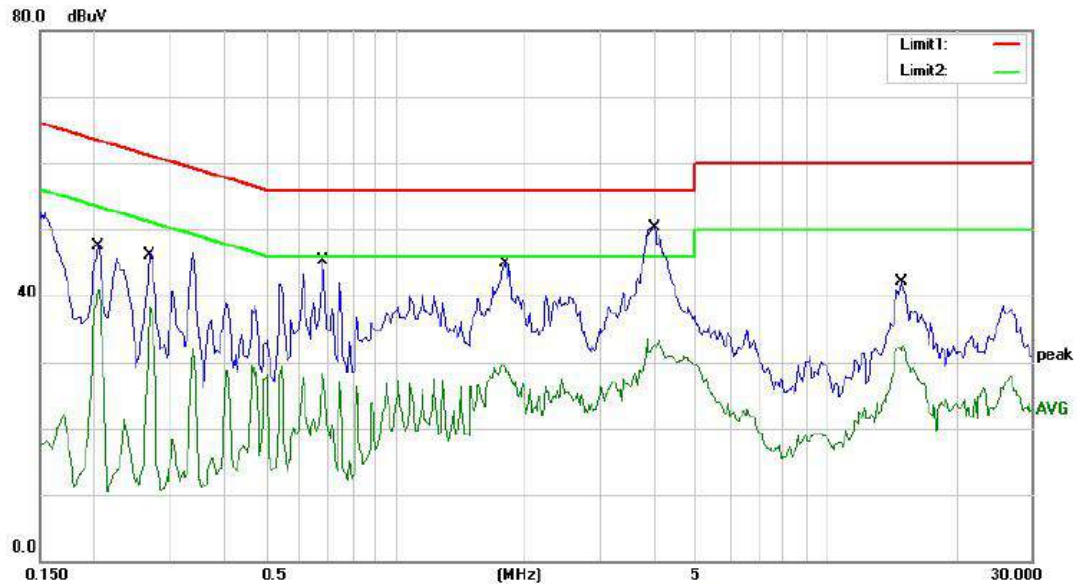
NOTE1: N/A (Not Applicable)

All modes have been tested, and the worst result recorded was report as below

Test Model

Spurious Emission below 30MHz (0.15MHz to 30MHz)
PCS 1900

Channel 661



Site Conduction #1

Phase: L1

Temperature: 26

Note:

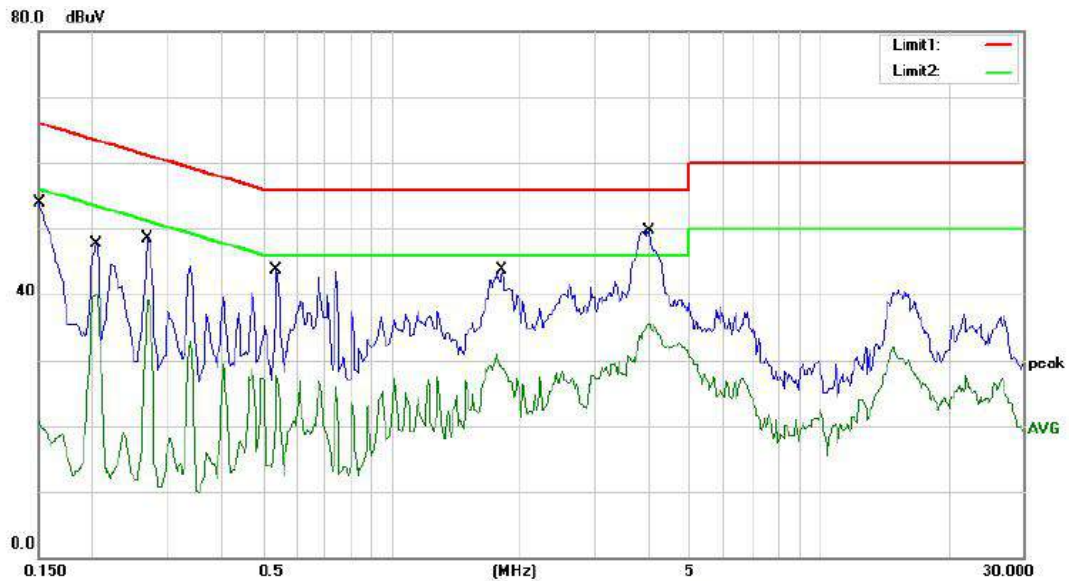
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.2050	47.47	0.00	47.47	63.41	-15.94	QP	
2		0.2050	40.96	0.00	40.96	53.41	-12.45	AVG	
3		0.2700	46.14	0.00	46.14	61.12	-14.98	QP	
4		0.2700	38.22	0.00	38.22	51.12	-12.90	AVG	
5		0.6800	45.34	0.00	45.34	56.00	-10.66	QP	
6		0.6800	28.37	0.00	28.37	46.00	-17.63	AVG	
7		1.8000	44.82	0.00	44.82	56.00	-11.18	QP	
8		1.8000	29.64	0.00	29.64	46.00	-16.36	AVG	
9	*	3.9900	50.35	0.00	50.35	56.00	-5.65	QP	
10		3.9900	33.48	0.00	33.48	46.00	-12.52	AVG	
11		14.9250	42.15	0.00	42.15	60.00	-17.85	QP	
12		14.9250	32.50	0.00	32.50	50.00	-17.50	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:

Test Model

Spurious Emission below 30MHz (0.15MHz to30MHz)
PCS 1900

Channel 661



Site Conduction #1

Phase: **N**

Temperature: 26

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	53.96	0.00	53.96	66.00	-12.04	QP	
2		0.1500	20.66	0.00	20.66	56.00	-35.34	AVG	
3		0.2050	47.76	0.00	47.76	63.41	-15.65	QP	
4		0.2050	40.02	0.00	40.02	53.41	-13.39	AVG	
5		0.2700	48.47	0.00	48.47	61.12	-12.65	QP	
6		0.2700	39.18	0.00	39.18	51.12	-11.94	AVG	
7		0.5400	43.80	0.00	43.80	56.00	-12.20	QP	
8		0.5400	27.64	0.00	27.64	46.00	-18.36	AVG	
9		1.8150	43.64	0.00	43.64	56.00	-12.36	QP	
10		1.8150	28.92	0.00	28.92	46.00	-17.08	AVG	
11	*	3.9850	49.64	0.00	49.64	56.00	-6.36	QP	
12		3.9850	35.55	0.00	35.55	46.00	-10.45	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:

7.9 RECEIVER SPURIOUS EMISSION

7.9.1 Applicable Standard

According to FCC Part 2.1051 and FCC Part 24.238 and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

7.9.2 Conformance Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

7.9.3 Test Configuration

Test according to clause 6.2 radio frequency test setup

7.9.4 Test Configuration

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector.

The EUT was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

then the following procedure can be used to determine spurious emission

- a) RBW = 1 MHz for $f \geq 1$ GHz(1GHz to 25GHz), 100 kHz for $f < 1$ GHz(30MHz to 1GHz), 200Hz for $f < 150$ KHz(9KHz to 150KHz), 9KHz for $f < 30$ MHz(150KHz to 30KHz)
- b) Set VBW $\geq 3 \times$ RBW.
- c) Set span wide enough to fully capture the emission being measured
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Ensure that the number of measurement points $\geq$ span/RBW.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the peak amplitude level.

Step1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.

Step2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.

Step3. The table was rotated 360 degrees to determine the position of the highest spurious emission.

Step4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.

Step5. Make the measurement with the spectrum analyzer's RBW , VBW , taking the record of maximum spurious emission.

Step6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.

Step7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

Step8. Taking the record of output power at antenna port.

Step9. Repeat step 7 to step 8 for another polarization.

Step10. Emission level (dBm) = output power + substitution Gain.

7.9.5 Test Results

■ Spurious Emission below 30MHz (9KHz to 30MHz)

Temperature:	24℃	Test Date:	January 10, 2016
Humidity:	53 %	Test By:	King Kong
Test mode:	RX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance} / \text{test distance})$ (dB);

Limit line = Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission below 1GHz (30MHz to 1GHz)

Temperature :	28℃	Test Date :	January 10, 2016
Humidity :	65 %	Test By:	Andy

Test Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
PCS1900	512	1850.2	☐ GSM	PASS
	661	1880.0		PASS
	810	1909.8		PASS
GPRS1900	512	1850.2	☐ GPRS	PASS
	661	1880.0		PASS
	810	1909.8		PASS
WCDMA1900	9262	1852.4	☐ WCDMA1900	PASS
	9400	1880.0		PASS
	9538	1907.6		PASS
NOTE1: N/A (Not Applicable)				

All modes have been tested, and the worst result recorded was report as below:

GSM1900 (GSM Link), 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

GSM 1900 (GSM Link), 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
350.58	H	-44.18	3.24	-2.12	-49.54	-13	-36.54
350.58	V	-45.32	3.24	-2.12	-50.68	-13	-37.68

GSM 1900 (GSM Link), Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
4102.35	H	-48.17	8.12	8.65	-47.64	-13	-34.64
4102.35	V	-47.59	8.12	8.65	-47.06	-13	-34.06

GSM1900 (GPRS 12 Link), 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

GSM1900 (GPRS 12 Link), 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
582.30	H	-49.35	4.65	-3.21	-57.21	-13	-44.21
582.30	V	-48.33	4.65	-3.21	-56.19	-13	-43.19

GSM1900 (GPRS 12 Link), Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
4102.53	H	-51.30	9.60	10.80	-50.10	-13	-37.10
4102.53	V	-50.25	9.6	10.8	-49.05	-13	-36.05

WCDMA Band II 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

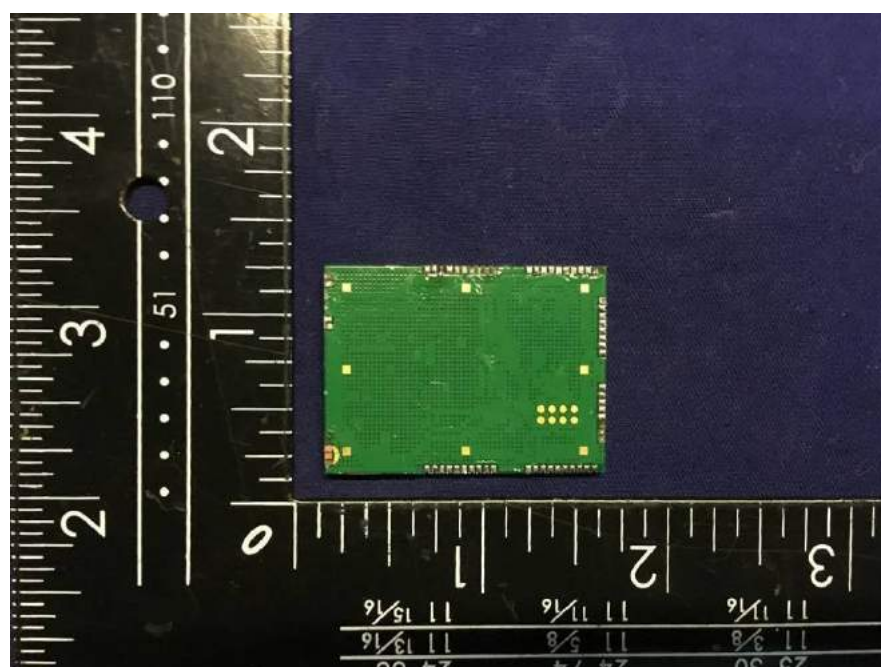
WCDMA Band II 30MHz to 1GHz

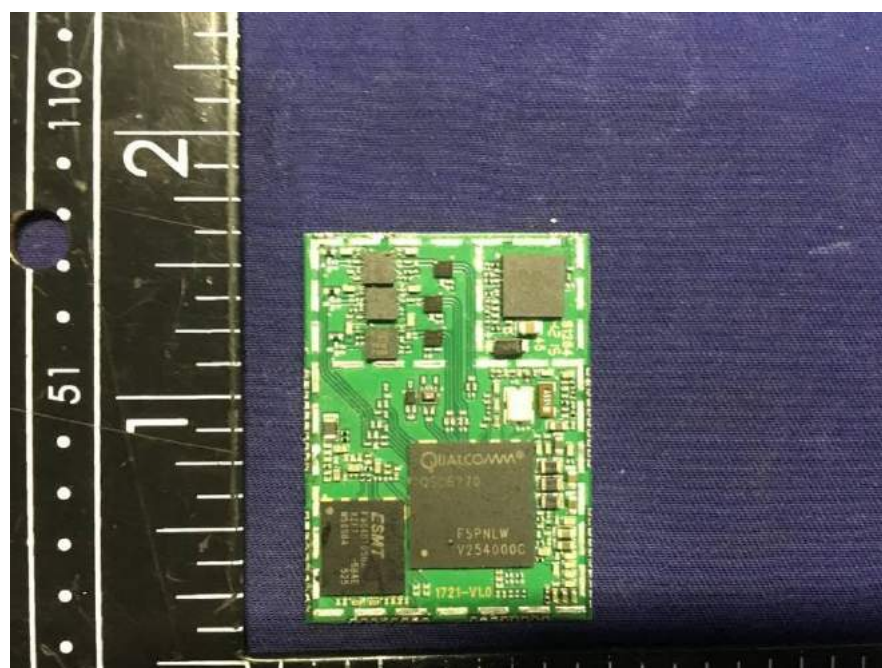
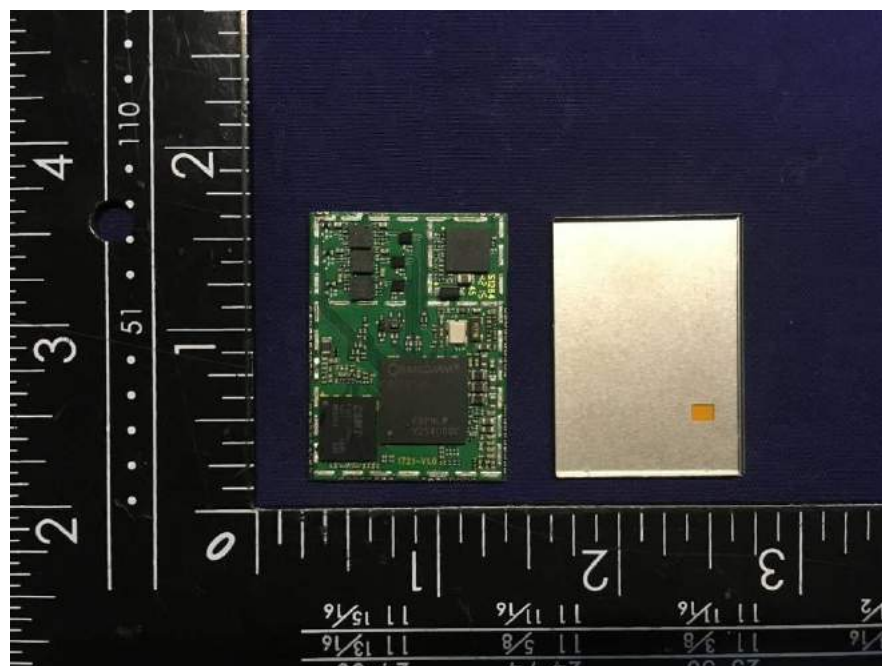
Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 9400 (1880MHz)							
845.20	H	-46.32	6.52	2.12	-50.72	-13	-37.72
845.20	V	-47.11	6.52	2.12	-51.51	-13	-38.51

WCDMA Band II Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 9400 (1880MHz)							
2408.45	H	-50.12	7.24	8.05	-49.31	-13	-36.31
2408.45	V	-51.22	7.24	8.05	-50.41	-13	-37.41
4816.33	H	-50.85	10.12	10.33	-50.64	-13	-37.64
4816.33	V	-50.82	10.12	10.33	-50.61	-13	-37.61

EUT PHOTO





***END OF REPORT ***