TEST REPORT

OF

UHF RFID Reader

Model Name: XC2903

FCC ID: TQ4XC2903

Trademark: 远望谷

REPORT NO.: ES140124192E3

ISSUE DATE: May 19, 2014

Prepared for

INVENGO INFORMATION TECHNOLOGY CO., LTD.

3/F，No.T2-B, High-tech industrial Park South, Shenzhen 518057, China.

Prepared by

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VERIFICATION OF COMPLIANCE

Applicant:	INVENGO INFORMATION TECHNOLOGY CO., LTD. 3/F, No.T2-B,High-tech industrial Park South, Shenzhen 518057,china.
Manufacturer:	INVENGO INFORMATION TECHNOLOGY CO., LTD. 3/F, No.T2-B,High-tech industrial Park South, Shenzhen 518057,china.
Product Description:	UHF RFID Reader
Model Number:	XC2903
File Number:	ES140124192E3
Date of Test:	February 27, 2014 to May 19, 2014

We hereby certify that:

The above equipment was tested by SHENZHEN EMTEK 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 C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 22, FCC Rules Part 24.

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

Date of Test : February 27, 2014 to May 19, 2014

Prepared by : Jack.Li/Editor

Reviewer : June xie/Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

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Modified Information

Version	Report No.	Revision Data	Summary
Ver.1.0	ES140124192E3	/	Original Version

1 General Information

1.1 Product Description

Device Type:	Portable Device
Exposure Category:	Uncontrolled Environment/General Population
Product Name:	UHF RFID Reader
Model Number:	XC2903
Power supply:	3.7V internal rechargeable lithium battery or DC 5V from AC adapter
Adapter:	Model: FSP020-DGAA1 Input: 100-240V~, 50/60Hz, 1.0A Output: DC 5.0V, 4.0A MAX
MEID:	N/A
Hardware Version:	N/A
Software Version:	Windows CE 6.0
Operating Mode(s) &Operating Frequency Range(s):	802.11b/g/n(HT20): 2412 MHz ~ 2462 MHz; RFID: 902.75 MHz ~ 927.25 MHz; GPRS850:TX824.2 MHz ~ 848.8 MHz /RX869.2 MHz ~ 893.8 MHz; GPRS1900:TX1850.2 MHz~1909.8MHz/RX1930.2 MHz ~ 1989.8 MHz;
Modulation:	OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n; DSSS with DBPSK/DQPSK/CCK for 802.11b; GMSK for GPRS; ASK for RFID;
Number of Channels:	11 Channels for 802.11b/g/n; 50 Channels for RFID; 124 Channels for GPRS850; 299 Channels for GPRS1900;
Type of Antenna:	External Antenna
Antenna Gain:	1.6dBi for GPRS, 2dBi for Wifi, 1dBi for RFID;
RF Output Power:	GPRS850:32.83dBm MAX; GPRS1900:29.62dBm MAX; 802.11b: 21.27dBm MAX; RFID:26.52dBm MAX

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for FCC ID: TQ4XC2903 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules, FCC Part 22, Subpart H Rules and FCC Part 24, Subpart E Rules. The composite system is compliance with Subpart B is authorized under a DOC procedure.

1.3 Test Methodology

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

1.3.1 Preliminary Guidance for Receiving Applications for Certification of 3G Device. May 9, 2006.
1.3.2 47 CFR Part 2, 22(H), 24(E)
1.3.3 ANSI / TIA / EIA-603-C-2004
1.3.4 FCC KDB 971168 D01 Power Meas. License Digital Systems v01

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.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2013.10.29
The certificate is valid until 2016.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen 2010.5.25
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, October 28, 2010
The Certificate Registration Number is 406365.

Accredited by Industry Canada, March 5, 2010
The Certificate Registration Number is 4480A-2.

Name of Firm : SHENZHEN EMTEK CO., LTD

Site Location : Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

2 System Test Configuration

2.1 EUT Configuration

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.

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 **Conducted Emissions**

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2009 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.

2.3.2 **Radiated Emissions**

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. Emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

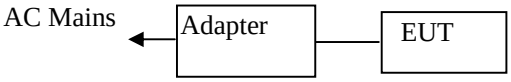


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	UHF RFID Reader	远望谷	XC2903	TQ4XC2903	N/A	EUT
2.	Adapter	N/A	FSP020-DGAA1	N/A	N/A	

Note:

(1) Unless otherwise denoted as EUT in『Remark』column, device(s) used in tested system is a support equipment.

3 Description of Test Modes

The EUT (UHF RFID Reader) has been tested under normal operating condition.
EUT is a composite System, this Report Records GPRS function test data.
The Transmitter of EUT is an UHF RFID Reader and powered by host equipment;
these is GPRS and have modulation GMSK. According exploratory test,
EUT will have maximum output power, so those data rate were used for all test.

For GPRS 850 :
1. For lowest channel : 824.2MHz (Channel 128)
2. For middle channel : 836.4MHz (Channel 189)
3. For highest channel: 848.8MHz (Channel 251)

For GPRS 1900 :
4. For lowest channel : 1850.2MHz (Channel 512)
5. For middle channel : 1880 MHz (Channel 661)
6. For highest channel: 1909.8MHz (Channel 810)

GPRS Class 8 and Class 10 have been tested, the worst result Class 10 was recorded in report.

4 Summary of Test Results

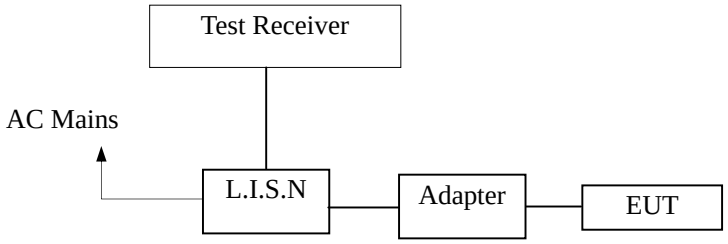
FCC Rules	Description Of Test	Limit	Result
§2.1046	Conducted Output Power	N/A	Pass
§24.232(d)	Peak-to-Average Ratio	< 13 dB	Pass
§22.913(a)(2)	Effective Radiated Power	< 7 Watts	Pass
§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	Pass
§2.1049 §22.917(a) §24.238(a)	Occupied Bandwidth	N/A	Pass
§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	<43+10log10(P[Watts])	Pass
§2.1051 §22.917(a) §24.238(a)	Conducted Emission	< 43+10log10(P[Watts])	Pass
§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	Pass
§2.1055 §22.355 §24.235	Frequency Stability for Temperature & Voltage	< 2.5 ppm	Pass

5 Conducted Emissions Test

5.1 Measurement Procedure

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

5.2 Test Set-up (Block Diagram of Configuration)



5.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2013	05/28/2014
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/29/2013	05/28/2014
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/29/2013	05/28/2014
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/29/2013	05/28/2014
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/29/2013	05/28/2014

5.4 Conducted Emission Limit

Conducted Emission 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.

5.5 Measurement Result

All the modes were tested the data of the worst mode are recorded in the following pages.

Date of Test:	February, 28, 2014	Temperature:	24°C
Frequency Detector:	0.15~30MHz	Humidity:	53%
Test Result:	PASS	Test Mode:	Worst Mode

Test Line	Frequency MHz	Emission Level QP dB(μV)	Emission Level AV dB(μV)	Limits QP dB(μV)	Limits AV dB(μV)	Margin QP dB(μV)	Margin AV dB(μV)
Line	0.16	57.64	31.57	65.73	55.61	-8.09	-24.04
	0.17	56.49	38.04	65.21	55.21	-8.72	-17.17
	0.20	51.53	30.93	63.61	53.21	-12.08	-22.28
	0.47	36.26	20.92	56.60	46.69	-20.34	-25.77
	1.26	20.78	8.23	56.00	46.00	-35.22	-37.77
	2.90	27.39	8.24	56.00	46.00	-28.61	-37.76
Neutral	0.15	60.50	46.51	66.00	56.00	-5.50	-9.49
	0.17	57.00	34.71	65.21	55.21	-8.21	-20.50
	0.18	56.00	36.62	64.72	54.72	-8.72	-18.10
	0.20	57.44	33.25	63.82	53.82	-6.38	-20.57
	0.45	40.41	22.50	56.88	46.78	-16.47	-24.28
	2.38	31.48	10.18	56.00	46.00	-24.52	-35.82

6 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

6.1 Measurement Procedure

6.1.1 The EUT was placed on a turn table which is 1.5m above ground plane.

6.1.2 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

6.1.3 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6.1.4 Repeat above procedures until all frequency measured was complete.

6.1.5 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 EUTthrough 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) weremeasured with peak detector.

6.1.6 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).

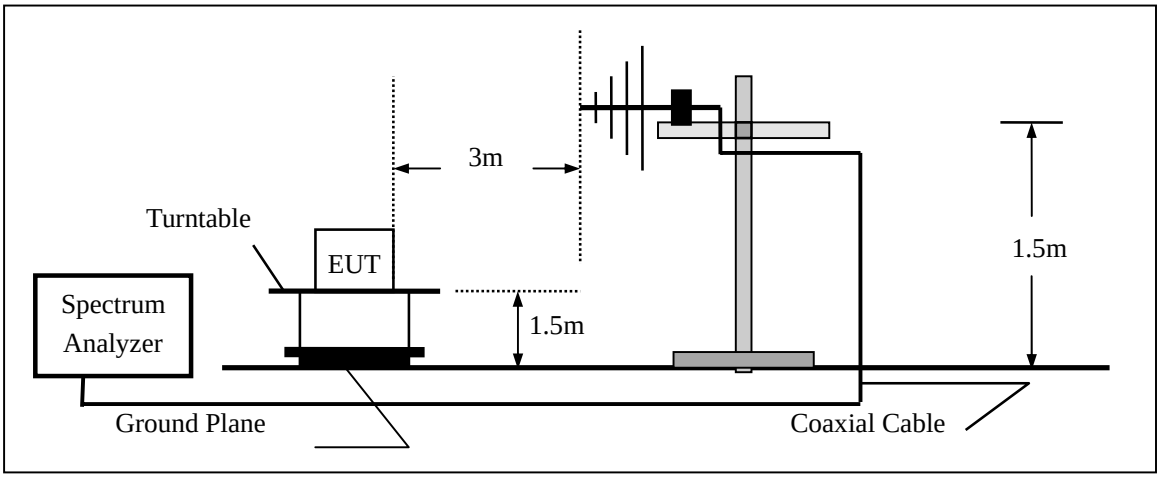
6.1.7 The EUT shall be replaced by a substitution antenna. The test setup refers to figure below. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution 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 antennapolarization.

6.1.8 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

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

6.1.10 ERP can be calculated from EIRP by subtracting the gain of the dipole,
ERP = EIRP -2.15dBi.

6.2 Test Set-up (Block Diagram of Configuration)



6.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/29/2013	05/28/2014
Spectrum Analyzer	Rohde & Schwarz	FSV40	132.1-3008K39-100967-AP	05/29/2013	05/28/2014
Pre-Amplifier	HP	8447D	2944A07999	05/29/2013	05/28/2014
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2013	05/28/2014
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2013	05/28/2014
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/29/2013	05/28/2014
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/29/2013	05/28/2014
Cable	Schwarzbeck	AK9513	ACRX1	05/29/2013	05/28/2014
Cable	Rosenberger	N/A	FP2RX2	05/29/2013	05/28/2014
Cable	Schwarzbeck	AK9513	CRPX1	05/29/2013	05/28/2014
Cable	Schwarzbeck	AK9513	CRRX2	05/29/2013	05/28/2014

6.4 Description of ERP &EIRP Measurement

6.4.1 This is the test for the maximum radiated power from the EUT.

6.4.2 Rule Part 22.913(a) specifies ” The ERP of mobile transmitters and auxiliary test transmitters mustnot exceed 7 Watts.”

6.4.3 Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

6.5 Radiated Emission Limit

GSM 850-ERP 22.913(a) (Limits)

	Power Step	Burst Peak ERP (dBm)
GPRS	3	≤38.45dBm (7W)

PCS1900-EIRP 24.232(c) (Limits)

	Power Step	Burst Peak ERP (dBm)
GPRS	3	≤33dBm (2W)

6.6 Measurement Result

Band:	GPRS850	Test Date :	May 12, 2014
Test Mode:	GPRS Class 10	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK

Horizontal Polarization							
Frequency (MHz)	PMea (dBm)	Pcl (dB)	PAg (dB)	Ga Antenna Gain (dB)	Correction (dB)	ERP (dBm)	ERP (W)
824.20	-17.17	2.11	-51.00	0.87	2.15	**30.43**	**1.1041**
836.60	-17.79	2.13	-51.00	0.93	2.15	29.73	0.9397
848.80	-18.42	2.13	-51.00	0.97	2.15	29.06	0.8054
Vertical Polarization							
Frequency (MHz)	PMea (dBm)	Pcl (dB)	PAg (dB)	Ga Antenna Gain (dB)	Correction (dB)	ERP (dBm)	ERP (W)
824.20	-22.57	2.11	-51.00	0.87	2.15	25.03	0.3184
836.60	-23.13	2.13	-51.00	0.93	2.15	24.39	0.2748
848.80	-23.22	2.13	-51.00	0.97	2.15	24.26	0.2667

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.

Band:	GPRS1900	Test Date :	May 12, 2014
Test Mode:	GPRS Class 10	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK

Horizontal Polarization						
Frequency (MHz)	PMea (dBm)	Pcl (dB)	PAg (dB)	Ga Antenna Gain (dB)	EIRP (dBm)	EIRP (W)
1850.20	-23.81	3.22	-50.51	-4.49	27.97	0.6266
1880.00	-24.23	3.28	-51.51	-4.36	**28.36**	**0.6855**
1909.80	-26.25	3.30	-51.51	-4.27	26.23	0.4198
Vertical Polarization						
Frequency (MHz)	PMea (dBm)	Pcl (dB)	PAg (dB)	Ga Antenna Gain (dB)	EIRP (dBm)	EIRP (W)
1850.20	-24.76	3.22	-50.51	-4.49	27.02	0.5035
1880.00	-24.93	3.28	-51.51	-4.36	27.66	0.5834
1909.80	-26.04	3.30	-51.51	-4.27	26.44	0.4406

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 Field Strength of Spurious Radiation Measurement

7.1 Measurement Procedure

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

7.1.2 The EUT was set 3 meters from the receiving antenna, which was mounted on the antennatower.

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

7.1.4 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.

7.1.5 Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.

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

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

7.1.8 Taking the record of output power at antenna port.

7.1.9 Repeat step 7 to step 8 for another polarization.

7.1.10 The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

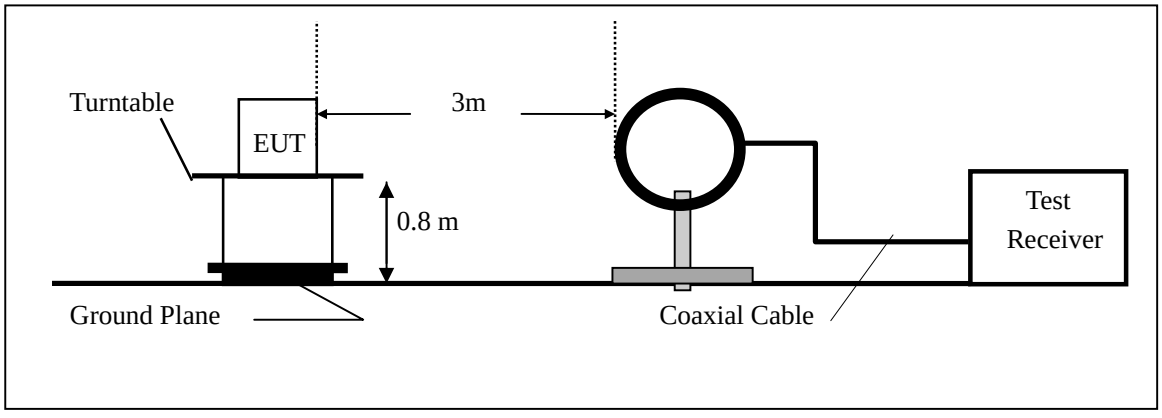
7.1.11 The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)= P(W) - [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.

7.1.12 EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain

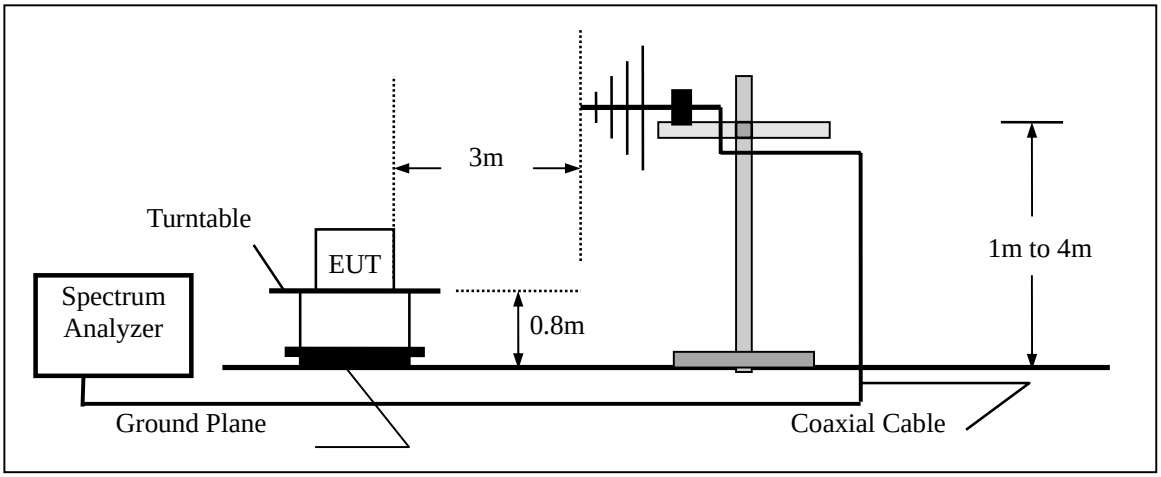
7.1.13 ERP (dBm) = EIRP - 2.15

7.2 Test Set-up (Block Diagram of Configuration)

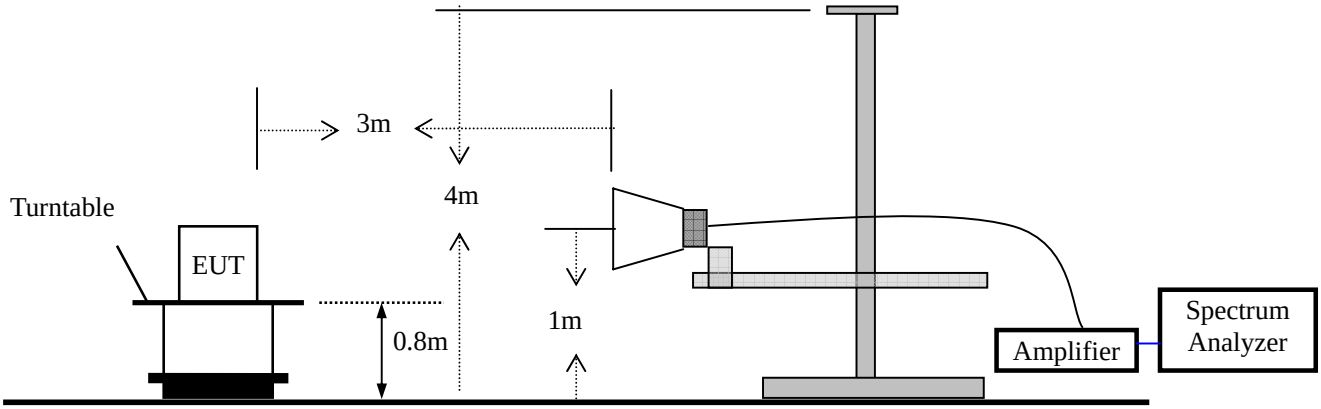
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



7.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	05/29/2013	05/28/2014
Spectrum Analyzer	HP	E4407B	839840481	05/29/2013	05/28/2014
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2013	05/28/2014
Pre-Amplifier	HP	8447D	2944A07999	05/29/2013	05/28/2014
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2013	05/28/2014
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2013	05/28/2014
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/29/2013	05/28/2014
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/29/2013	05/28/2014

7.4 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.

7.5 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

7.6 Measurement Result

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) and GSM850 band (824.2MHz, 836.6MHz, 848.8MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 ,GSM850 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

Band:	GPRS850	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK
Channel:	CH128/824.2 MHz		

Freq. (MHz)	Ant.Pol. H/V	Correct Factor (dB)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)
1648.4	V	-50.86	2.15	-53.01	-13.00
2472.6	V	-33.97	2.15	-36.12	-13.00
3296.8	V	-56.03	2.15	-58.18	-13.00
1648.4	H	-51.49	2.15	-53.64	-13.00
2472.6	H	-36.24	2.15	-38.39	-13.00
3296.8	H	-56.76	2.15	-58.91	-13.00

Note:

P_{Mea}= The power of signal source
P_{pl} = Path loss
G_a = Antenna Gain
Correct Factor(EIRP)=PMea –Ppl -Ga
Peak ERP=Correct Factor –Correction(ERP=EIRP-2.15)

Band:	GPRS850	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK
Channel:	CH189/836.4 MHz		

Freq. (MHz)	Ant.Pol. H/V	Correct Factor (dB)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)
1672.8	V	-49.20	2.15	-51.35	-13.00
2509.2	V	-32.80	2.15	**-34.95**	-13.00
3345.6	V	-54.05	2.15	-56.20	-13.00
1672.8	H	-51.17	2.15	-53.32	-13.00
2509.2	H	-38.60	2.15	-40.75	-13.00
3345.6	H	-58.37	2.15	-60.52	-13.00

Note:

P_{Mea}= The power of signal source
P_{pl} = Path loss
G_a = Antenna Gain
Correct Factor(EIRP)=PMea –Ppl -Ga
Peak ERP=Correct Factor –Correction(ERP=EIRP-2.15)

Band:	GPRS850	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK
Channel:	CH251/848.8 MHz		

Freq. (MHz)	Ant.Pol. H/V	Correct Factor (dB)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)
1697.6	V	-51.01	2.15	-53.16	-13.00
2546.4	V	-34.61	2.15	-36.76	-13.00
3395.2	V	-55.86	2.15	-58.01	-13.00
1697.6	H	-52.98	2.15	-55.13	-13.00
2546.4	H	-40.41	2.15	-42.56	-13.00
3395.2	H	-60.18	2.15	-62.33	-13.00

Note:

P_{Mea}= The power of signal source
P_{pl} = Path loss
G_a = Antenna Gain
Correct Factor(EIRP)=PMea –Ppl -Ga
Peak ERP=Correct Factor –Correction(ERP=EIRP-2.15)

Band:	GPRS1900	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK
Channel:	CH512/1850.2 MHz		

Freq. (MHz)	Ant.Pol. H/V	P_{Mea} (dB)	Path Loss (dB)	Antenna Gain (dBm)	Peak EIRP (dBm)	Limit (dBm)
3700.4	V	-52.75	4.35	-8.05	-49.05	-13.00
5550.6	V	-37.84	5.57	-9.79	-33.62	-13.00
7400.8	V	-58.27	6.54	-11.37	-53.44	-13.00
3700.4	H	-55.06	4.35	-8.05	-51.36	-13.00
5550.6	H	-41.21	5.57	-9.79	-36.99	-13.00
7400.8	H	-60.63	6.54	-11.37	-55.80	-13.00

Note:

P_{Mea}= The power of signal source
P_{pl} = Path loss
G_a = Antenna Gain
Correct Factor(EIRP)=PMea –Ppl -Ga
Peak ERP=Correct Factor –Correction(ERP=EIRP-2.15)

Band:	GPRS1900	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK
Channel:	CH 661/1880 MHz		

Freq. (MHz)	Ant.Pol. H/V	P_{Mea} (dB)	Path Loss (dB)	Antenna Gain (dBm)	Peak EIRP (dBm)	Limit (dBm)
3760.0	V	-52.27	4.37	-8.01	-48.63	-13.00
5640.0	V	-37.36	5.59	-9.75	**-33.20**	-13.00
7520.0	V	-57.79	6.56	-11.33	-53.02	-13.00
3760.0	H	-54.58	4.37	-8.01	-50.94	-13.00
5640.0	H	-40.73	5.59	-9.75	-36.57	-13.00
7520.0	H	-60.15	6.56	-11.33	-55.38	-13.00

Note:

P_{Mea}= The power of signal source
P_{pl} = Path loss
G_a = Antenna Gain
Correct Factor(EIRP)=PMea –Ppl -Ga
Peak ERP=Correct Factor –Correction(ERP=EIRP-2.15)

Band:	GPRS1900	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK
Channel:	CH 810/1909.8 MHz		

Freq. (MHz)	Ant.Pol. H/V	P_{Mea} (dB)	Path Loss (dB)	Antenna Gain (dBm)	Peak EIRP (dBm)	Limit (dBm)
3819.6	V	-53.29	4.41	-7.99	-49.71	-13.00
5729.4	V	-38.38	5.63	-9.73	-34.28	-13.00
7639.2	V	-58.81	6.60	-11.31	-54.10	-13.00
3819.6	H	-55.6	4.41	-7.99	-52.02	-13.00
5729.4	H	-41.75	5.63	-9.73	-37.65	-13.00
7639.2	H	-61.17	6.60	-11.31	-56.46	-13.00

Note:

P_{Mea}= The power of signal source
P_{pl} = Path loss
G_a = Antenna Gain
Correct Factor(EIRP)=PMea –Ppl -Ga
Peak ERP=Correct Factor –Correction(ERP=EIRP-2.15)

8 Conducted Output Power Measurement

8.1 Measurement Procedure

8.1.1 The transmitter output port was connected to base station.

8.1.2 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.

8.1.3 Set EUT at maximum power through base station.

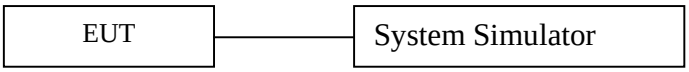
8.1.4 Select lowest, middle, and highest channels for each band and different modulation.

8.1.5 Compare each band and different modulation combination to show the worst data rate.

8.2 Description of Conducted Output Power Measurement

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

8.3 Test SET-UP (Block Diagram of Configuration)



8.4 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014

8.5 Conducted Output Power Limit

GSRS 850	Power Step	Nominal Peak output power (dBm)	Power &Multislot class
GPRS	3	33dBm(2W)	8

GSRS 1800	Power Step	Nominal Peak output power (dBm)	Power &Multislot class
GPRS	3	30dBm(1W)	8

8.6 Measurement Results

Spectrum Detector: PK Test Date : May 14, 2014
Test By: KK Temperature : 24°C
Test Result: PASS Humidity : 53 %
Operation Mode: GPRS850 (GPRS Class 10)

Cellular Band			
Modes	GPRS（GMSK, 2Slot）		
Channel	128(Low)	189(Mid)	251(High)
Frequency (MHz)	824.2	836.4	848.8
Power Step	3	3	3
Conducted Power (dBm)	32.83	32.34	32.14
Conducted Power (Watts)	1.92	1.71	1.64

Spectrum Detector: PK Test Date : May 14, 2014
Test By: KK Temperature : 24°C
Test Result: PASS Humidity : 53 %
Operation Mode: GPRS1900 (GPRS Class 10)

PCS Band			
Modes	GPRS（GMSK, 2Slot）		
Channel	512(Low)	661(Mid)	810(High)
Frequency (MHz)	1850.2	1880	1909.8
Power Step	3	3	3
Conducted Power (dBm)	29.62	29.40	29.12
Conducted Power (Watts)	0.92	0.87	0.82

Note: maximum burst average power for GPRS.

9 Peak-to-Average Ratio

9.1 Measurement Procedure

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

9.1.2 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.

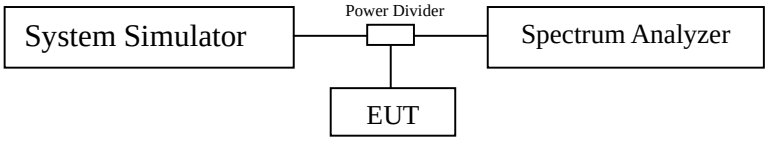
9.1.3 For GSM/EGPRS operating modes:

a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.

b. Set EUT in maximum power output, and triggered the burst signal.

c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.

9.2 Test Set-up (Block Diagram of Configuration)



9.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014
Spectrum Analyzer	Rohde & Schwarz	FSV40	132.1-3008K 39-100967-AP	05/29/2013	05/28/2014

9.4 Description of the Peak-to-Average Ratio Measurement

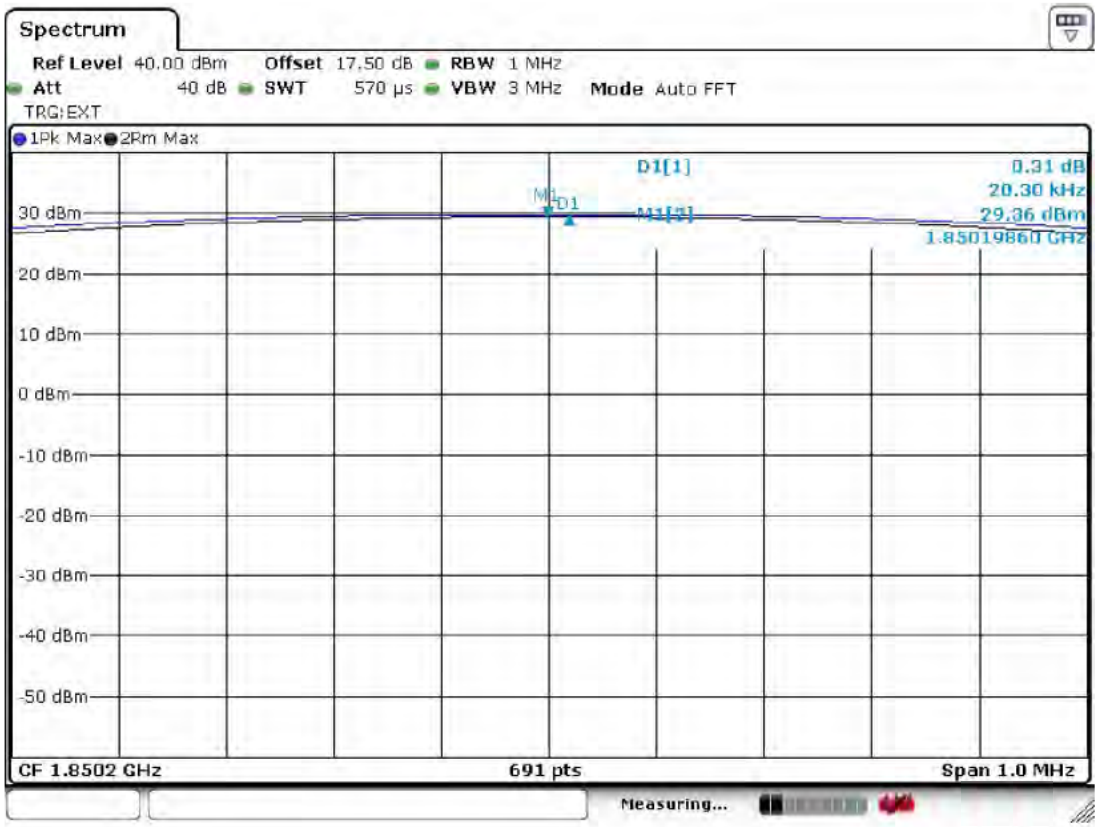
The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

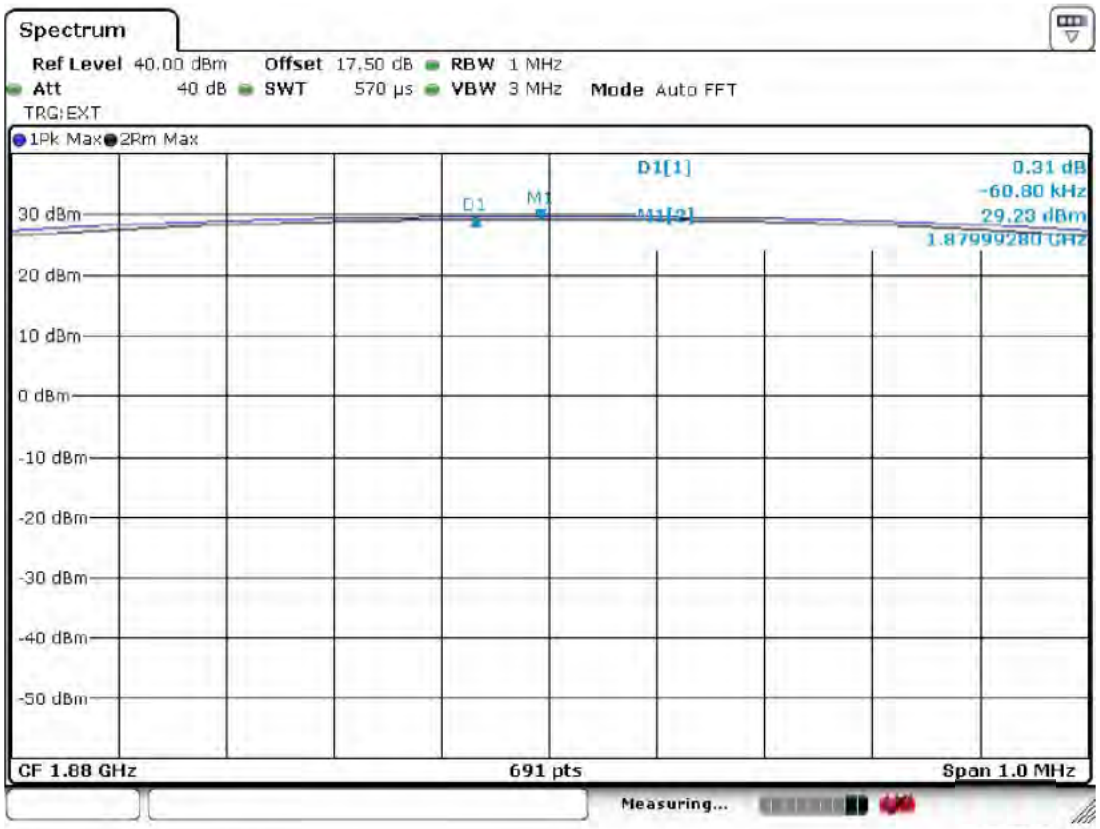
9.5 Measurement Results

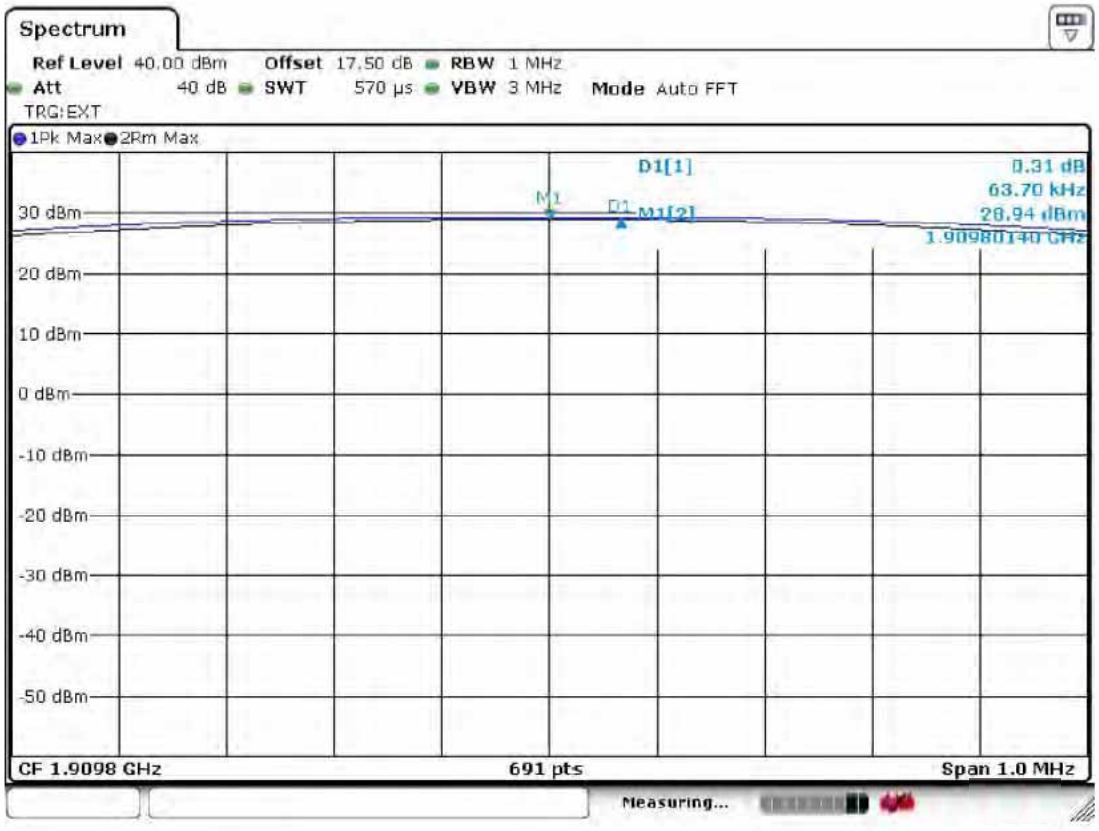
Mode:	GPRS1900	Test Date:	May 14, 2014
Test By:	DK	Temperature:	24°C
Test Result:	PASS	Humidity:	53 %

Operation Mode: GPRS1900 Class 10

Cellular Band			
Modes	GPRS1900(GPRS Class 10)		
Channel	512(Low)	661(Mid)	810(High)
Frequency (MHz)	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	0.31	0.31	0.31




Spectrum
Ref Level 40.00 dBm Offset 17.50 dB RBW 1 MHz
Att 40 dB SWT 570 µs VBW 3 MHz Mode Auto FFT
TRG:EXT
1Pk Max 2Rm Max
D1[1] 0.31 dB
-60.80 kHz
M1[2] 29.23 dBm
1.87999280 GHz
30 dBm
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
CF 1.88 GHz
691 pts
Span 1.0 MHz
Measuring...


Spectrum
Ref Level 40.00 dBm Offset 17.50 dB RBW 1 MHz
Att 40 dB SWT 570 µs VBW 3 MHz Mode Auto FFT
TRG:EXT
1Pk Max 2Rm Max
D1[1] 0.31 dB
63.70 kHz
M1[2] 28.94 dBm
1.90980140 GHz
30 dBm
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
CF 1.9098 GHz
691 pts
Span 1.0 MHz
Measuring...

10 99% Occupied Bandwidth and 26dB Bandwidth Test

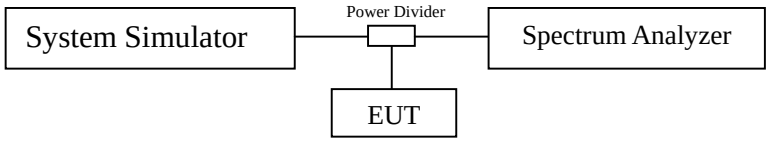
10.1 Measurement Procedure

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

10.1.2 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.

10.1.3 The 99% occupied bandwidth and 26 dB bandwidth of the middle channel for the highest RF powers were measured.

10.2 Test Set-up (Block Diagram of Configuration)



10.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014
Spectrum Analyzer	Agilent	E4407B	88156318	05/29/2013	05/28/2014

10.4 Description of Measurement

The 99% 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 emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

10.5 Measurement Results

Mode:	GPRS850	Test Date :	May 14, 2014
Test By:	DK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: GPRS850 (Class 10)

Cellular Band			
Modes	GPRS850(GPRS Class 10)		
Channel	128(Low)	189(Mid)	251(High)
Frequency (MHz)	824.2	836.4	848.8
99% OBW (KHz)	246.278	246.786	243.797
26dB BW (KHz)	**315.994**	315.935	313.332

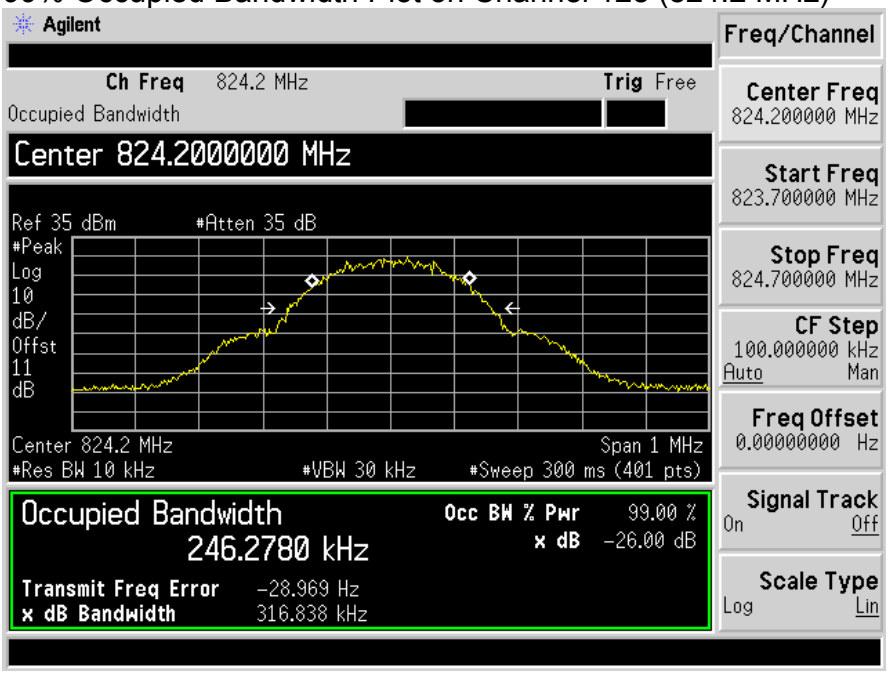
Mode:	GPRS1900	Test Date :	May 14, 2014
Test By:	DK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: GPRS1900 (Class 10)

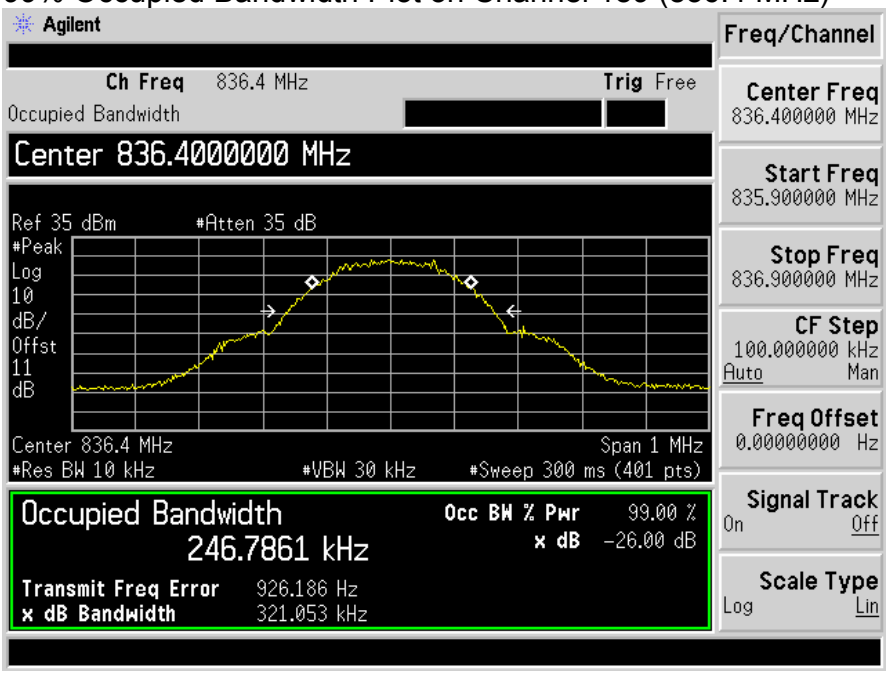
PCS Band			
Modes	GPRS1900(GPRS Class 10)		
Channel	512(Low)	661(Mid)	810(High)
Frequency (MHz)	1850.2	1880	1909.8
99% OBW (KHz)	242.969	244.783	245.958
26dB BW (KHz)	314.334	**316.037**	310.708

10.6 Measurement Results

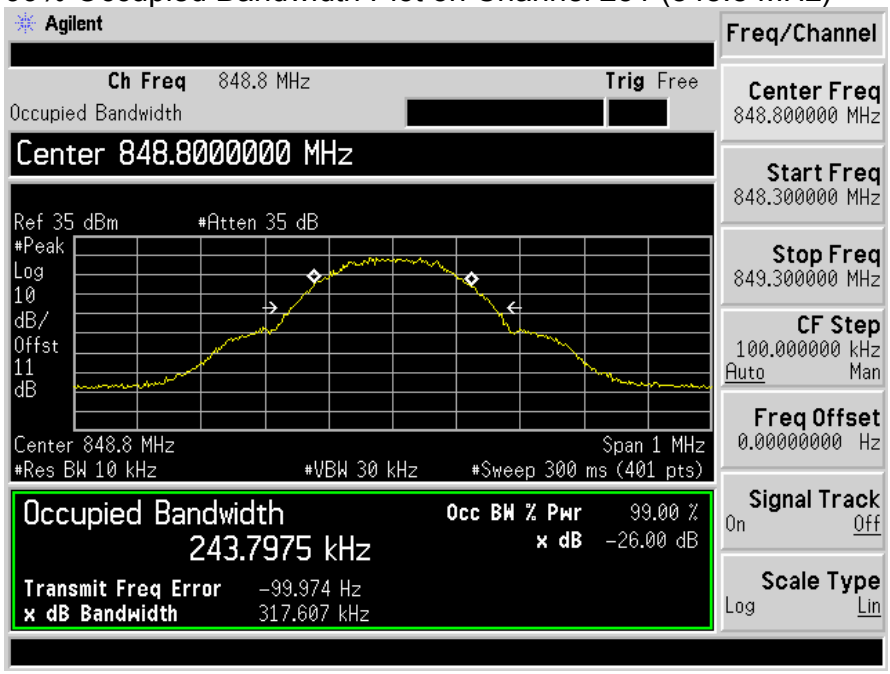
99% Occupied Bandwidth Plot on Channel 128 (824.2 MHz)



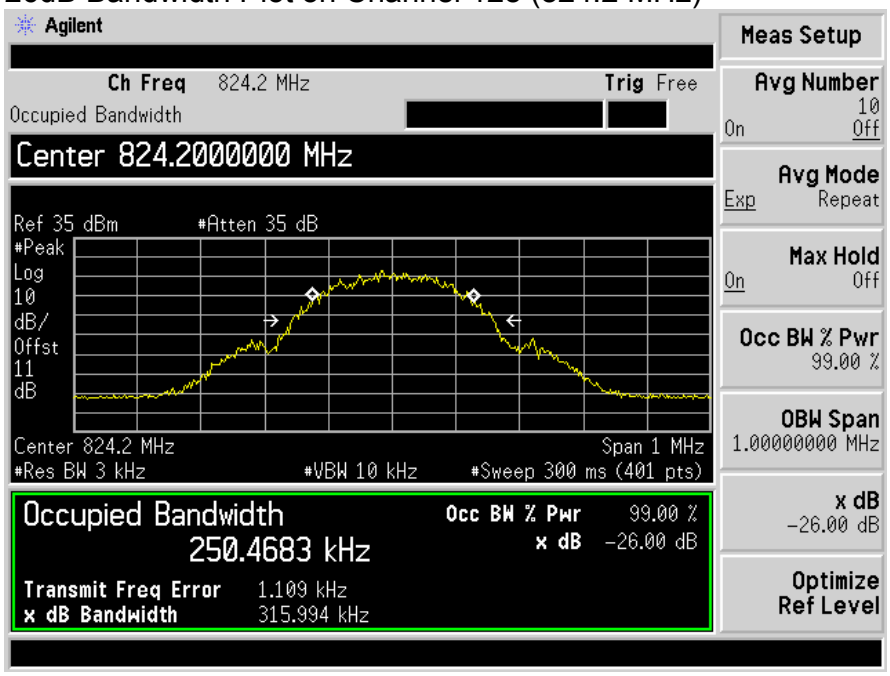
99% Occupied Bandwidth Plot on Channel 189 (836.4 MHz)



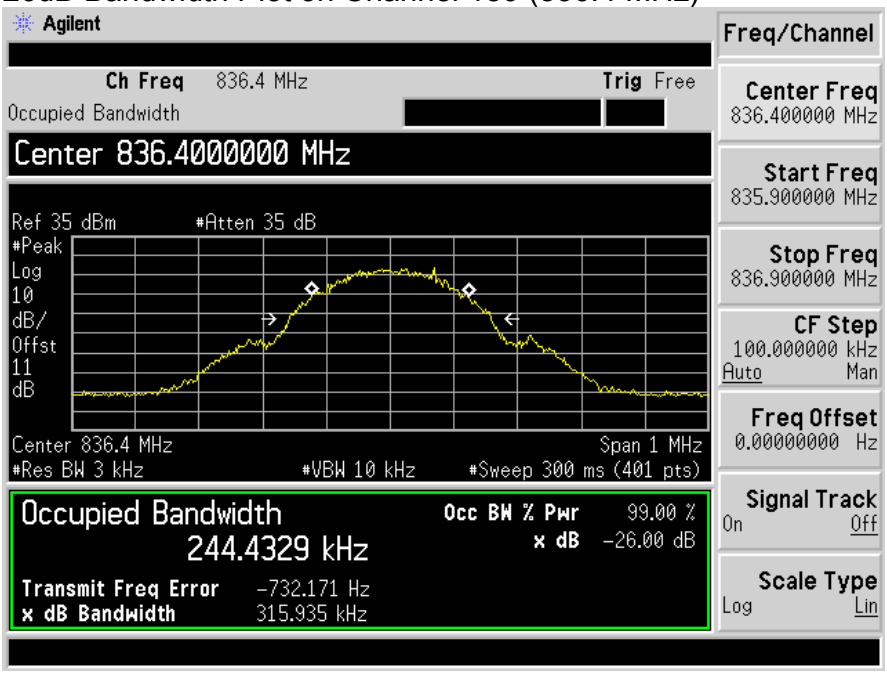
99% Occupied Bandwidth Plot on Channel 251 (848.8 MHz)



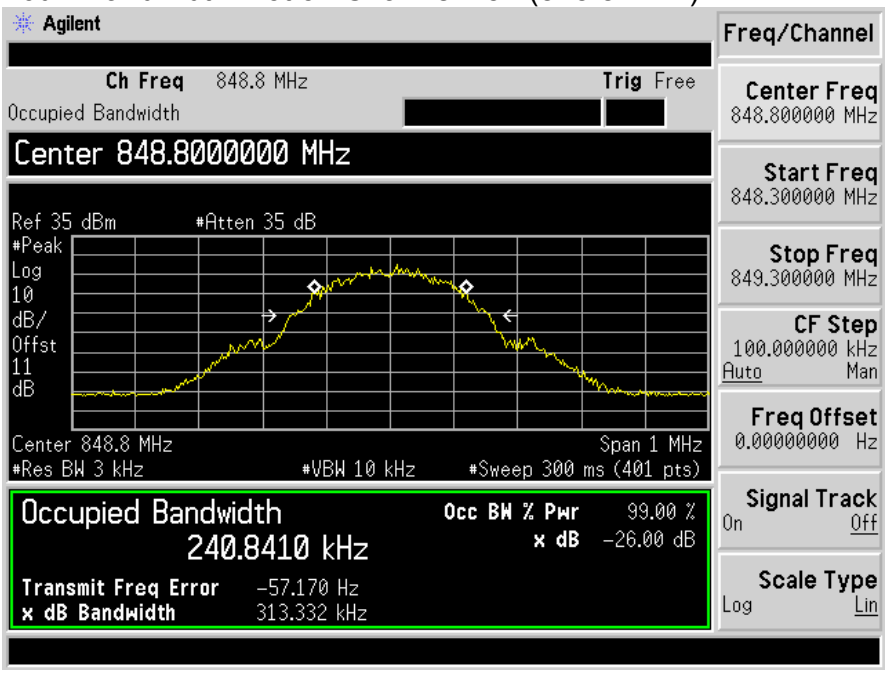
26dB Bandwidth Plot on Channel 128 (824.2 MHz)



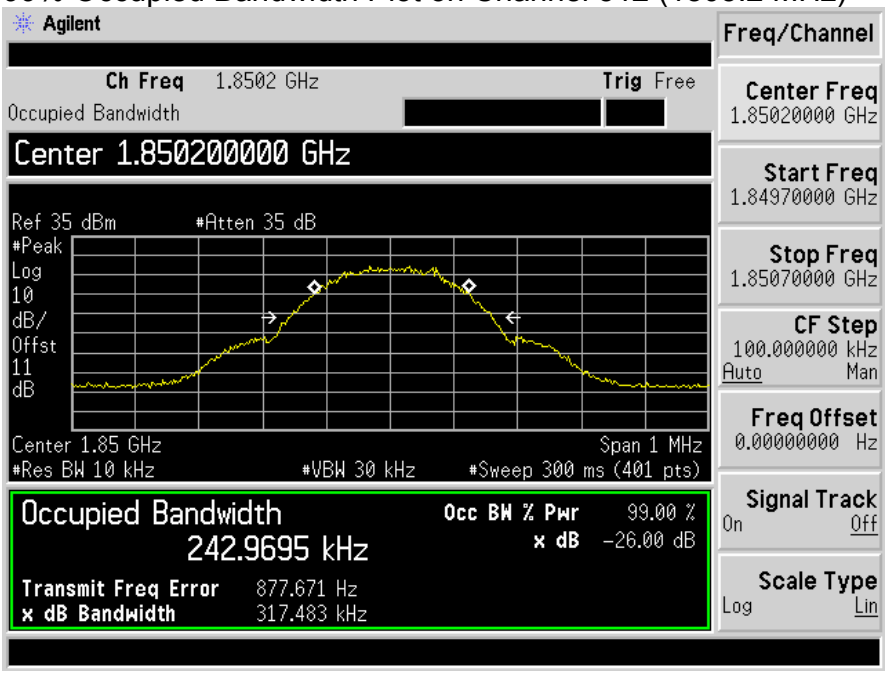
26dB Bandwidth Plot on Channel 189 (836.4 MHz)



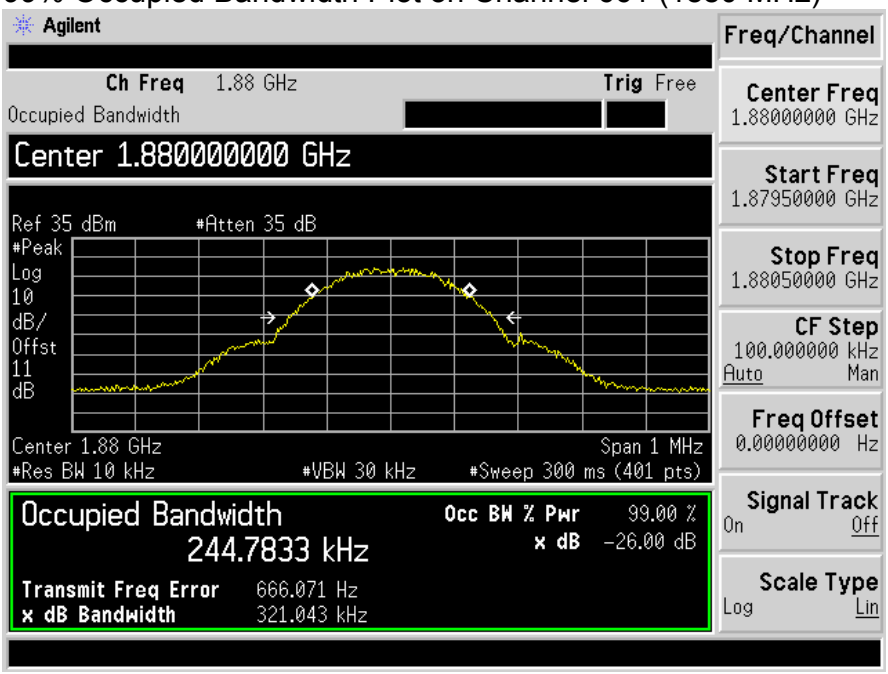
26dB Bandwidth Plot on Channel 251 (848.8 MHz)



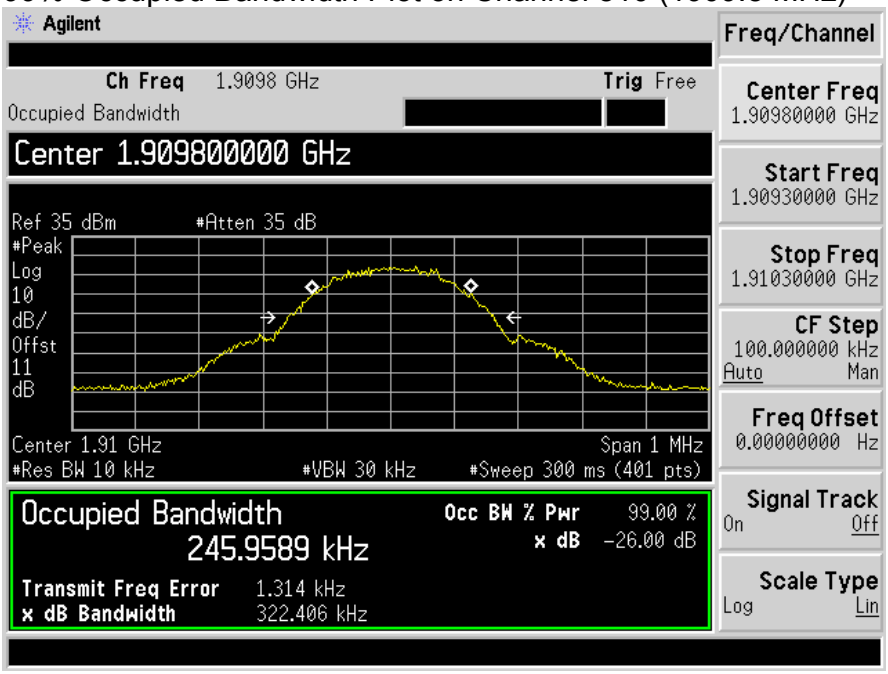
99% Occupied Bandwidth Plot on Channel 512 (1805.2 MHz)



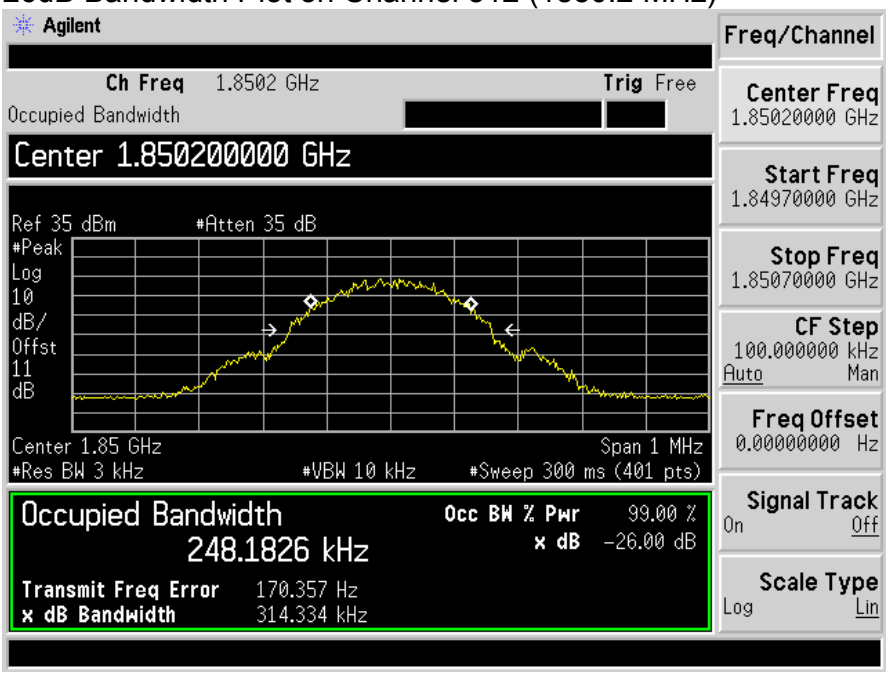
99% Occupied Bandwidth Plot on Channel 661 (1880 MHz)



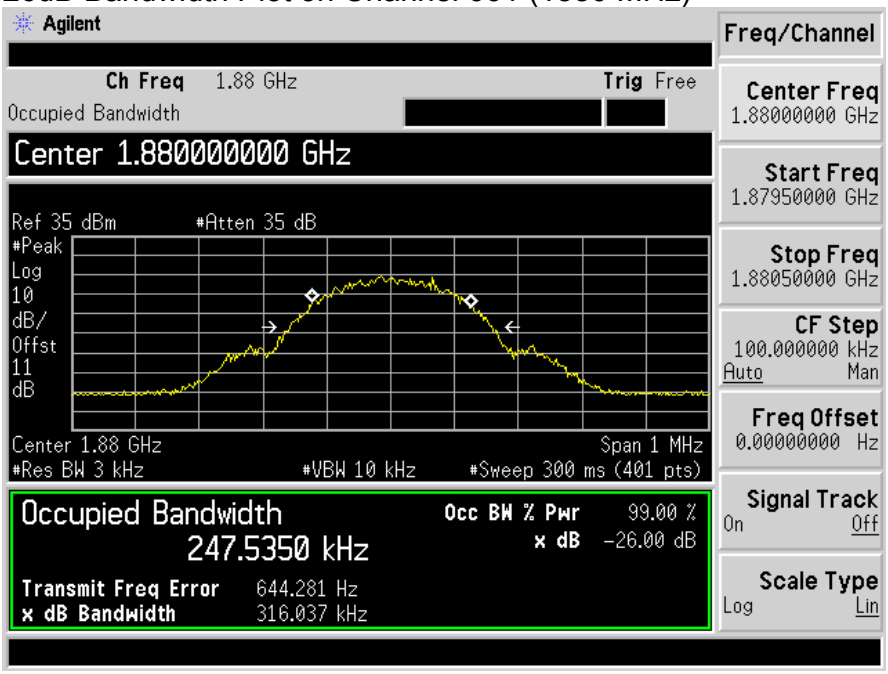
99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



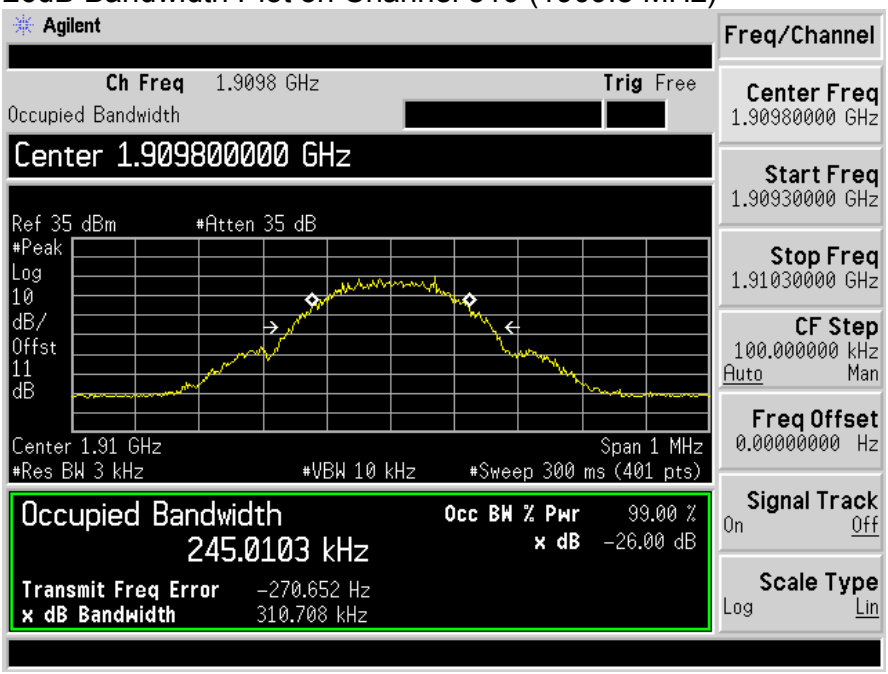
26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



26dB Bandwidth Plot on Channel 661 (1880 MHz)



26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



11 Band Edge Measurement

11.1 Test Procedures

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

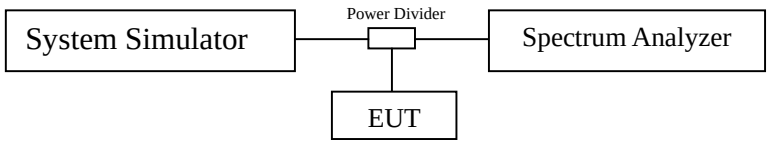
11.1.2 The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

11.1.3 The band edges of low and high channels for the highest RF powers were measured.

11.1.4 The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

11.1.5 The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts) = P(W) - [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.

11.2 Test Set-up (Block Diagram of Configuration)



11.3 Test Equipment

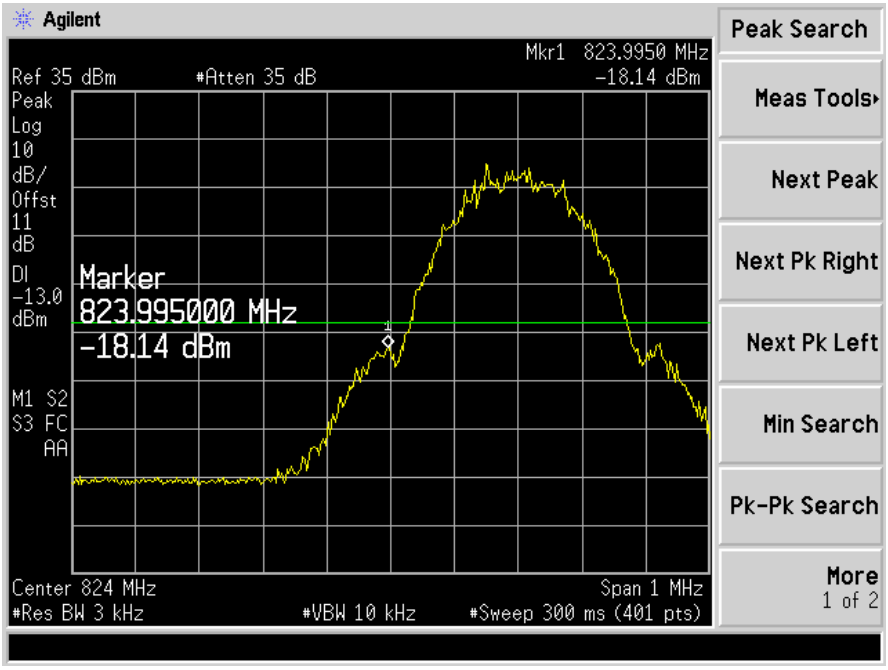
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014
Spectrum Analyzer	Agilent	E4407B	88156318	05/29/2013	05/28/2014

11.4 Description of 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.

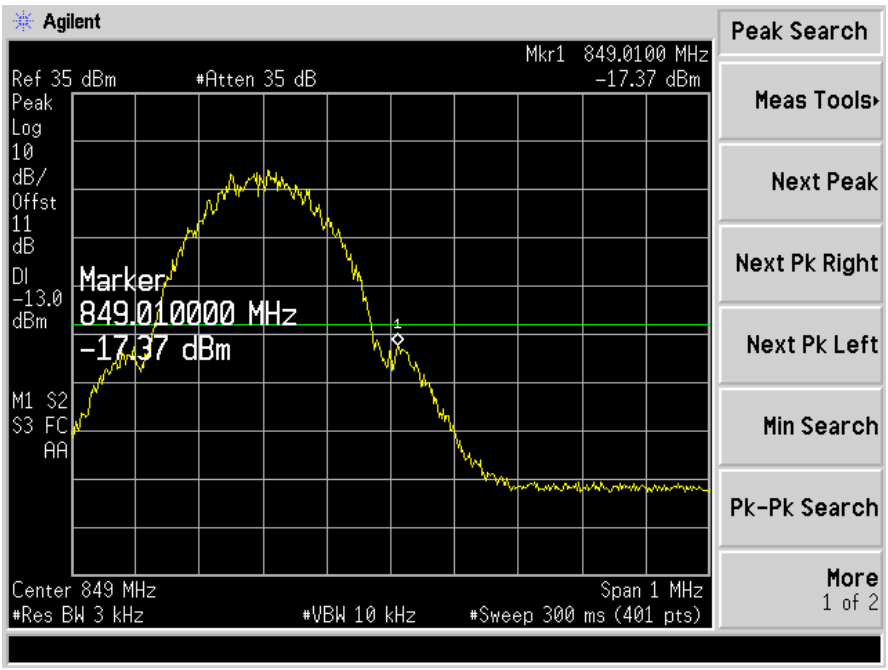
11.5 Measurement Results

Band:	GPRS850	Test Mode:	GPRS Class 10
Correction Factor:	0.22dB	Maximum 26dB Bandwidth:	315.94KHz
Band Edge:	-17.92dBm	Measurement Value:	-18.14dBm
Test By:	DK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %
Test Date:	May 14, 2014		



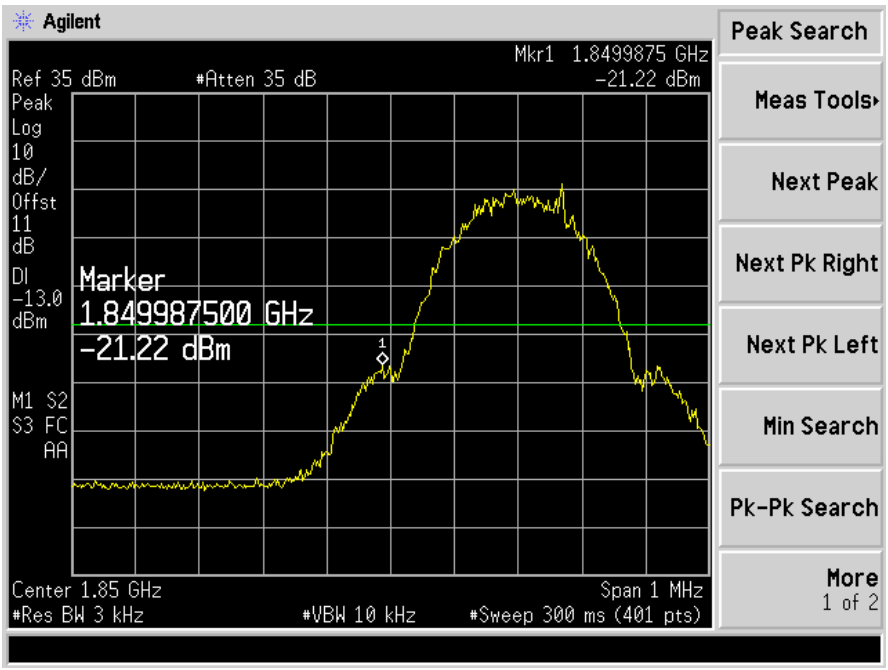
1. Correction Factor(dB)= 10log(1% Emission BW/RBW)
2. Band Edge= Measurement Value + Correction Factor(dB)

Band:	GPRS850	Test Mode:	GPRS Class 10
Correction Factor :	0.22dB	Maximum 26dB Bandwidth:	315.94KHz
Band Edge :	-17.15dBm	Measurement Value:	-17.37dBm
Test By:	DK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %
Test Date :	May 14, 2014		



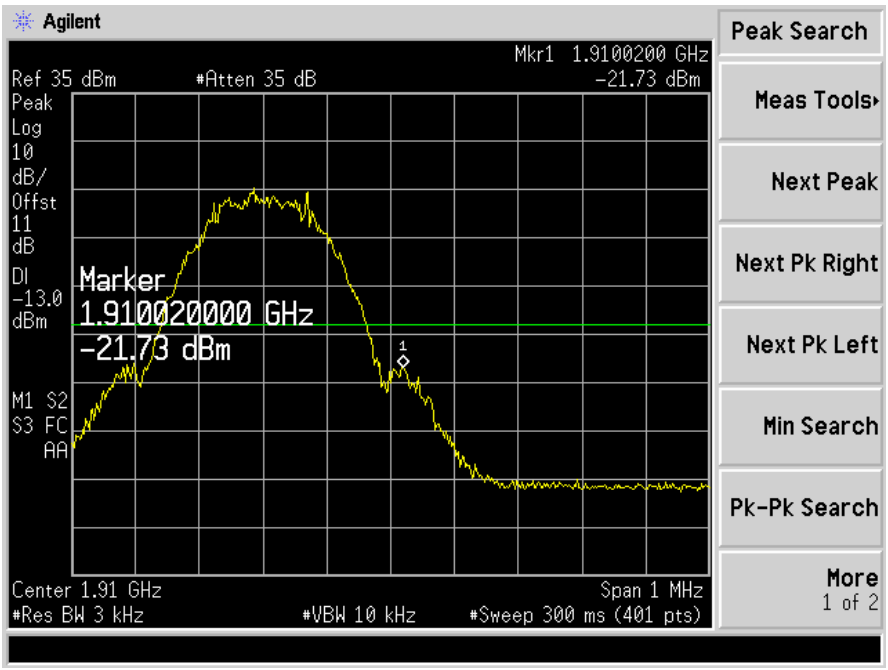
1. Correction Factor(dB)= 10log(1% Emission BW/RBW)
2. Band Edge= Measurement Value + Correction Factor(dB)

Band:	GPRS1900	Test Mode:	GPRS Class 10
Correction Factor :	0.22dB	Maximum 26dB Bandwidth:	316.037KHz
Band Edge :	-21.00dBm	Measurement Value:	-21.22dBm
Test By:	DK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %
Test Date :	May 14, 2014		



1. Correction Factor(dB)= 10log(1% Emission BW/RBW)
2. Band Edge= Measurement Value + Correction Factor(dB)

Band:	GPRS1900	Test Mode:	GPRS Class 10
Correction Factor :	0.22dB	Maximum 26dB Bandwidth:	316.037KHz
Band Edge :	-21.51dBm	Measurement Value:	-21.73dBm
Test By:	DK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %
Test Date :	May 14, 2014		



1. Correction Factor(dB)= 10log(1% Emission BW/RBW)
2. Band Edge= Measurement Value + Correction Factor(dB)

12 Conducted Spurious Emission Measurement

12.1 Test Procedures

12.1.1 The EUT was connected to spectrum analyzer and base station via power divider.

12.1.2 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.

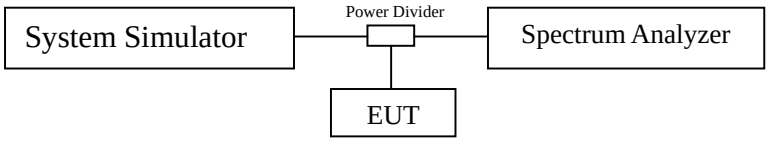
12.1.3 The middle channel for the highest RF power within the transmitting frequency was measured.

12.1.4 The conducted spurious emission for the whole frequency range was taken.

12.1.5 The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

12.1.6 The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)= P(W) - [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.

12.2 Block Diagram of Test setup



12.3 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014
Spectrum Analyzer	Agilent	E4407B	88156318	05/29/2013	05/28/2014

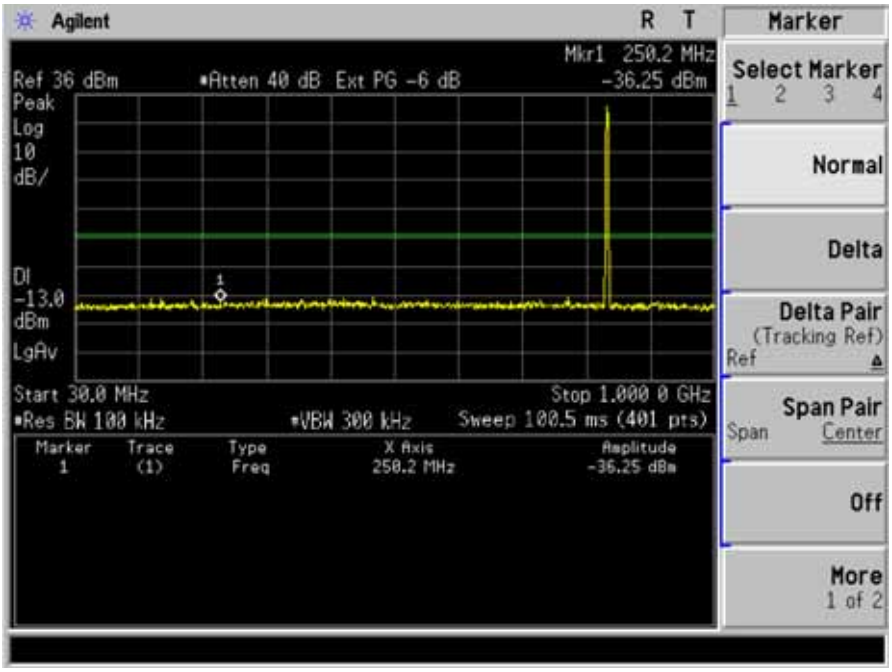
12.4 Description of Conducted Spurious Emission Measurement

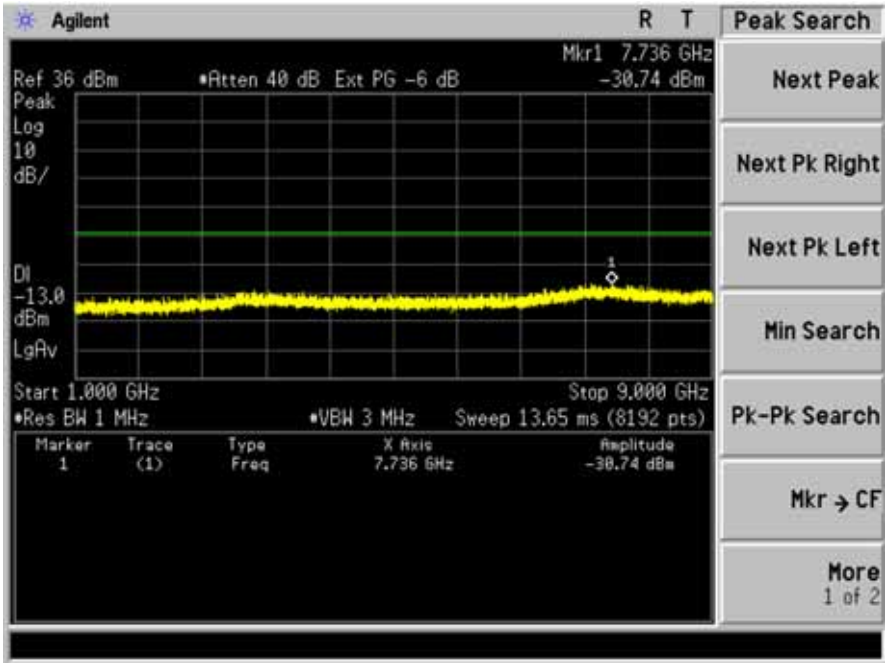
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.
It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to afrequency including its 10th harmonic.

12.5 Measurement Results

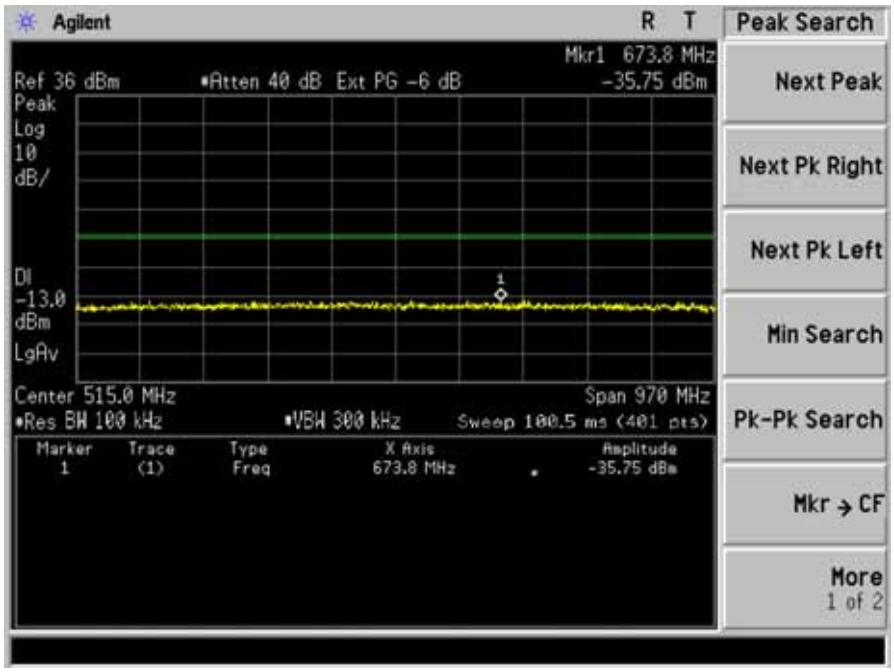
All the channels were tested the data of the worst mode (Middle channel) are recorded in the following pages and the others channel methods do not exceed the limits.

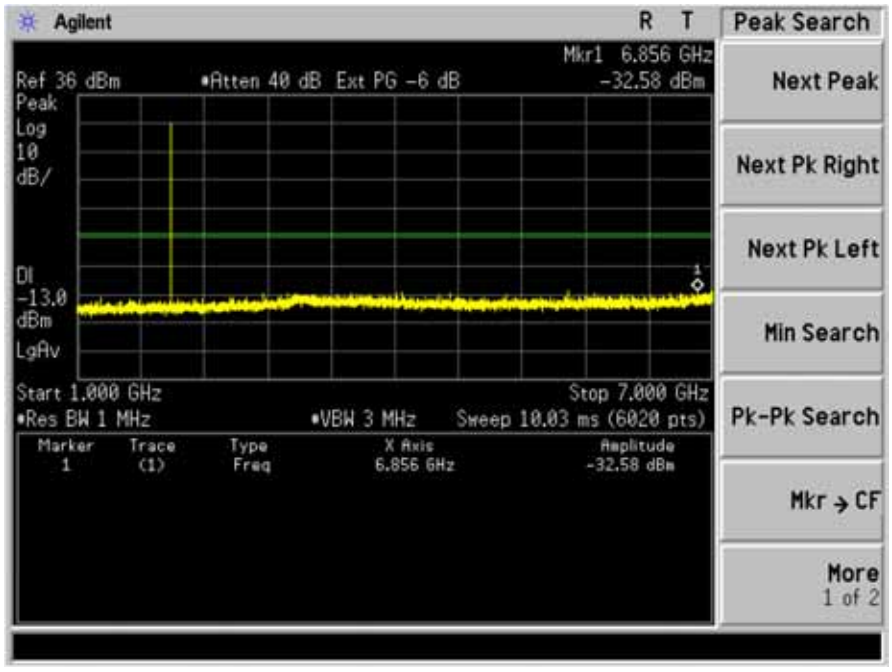
Band:	GPRS 850	Test Mode :	GPRS Class 10
Channel :	CH189	Frequency :	836.4 MHz

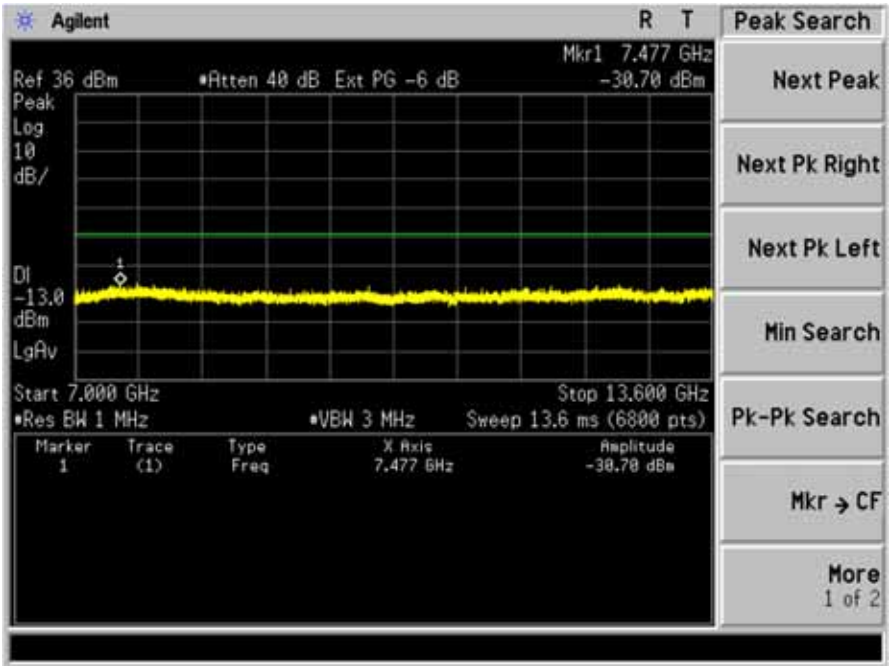


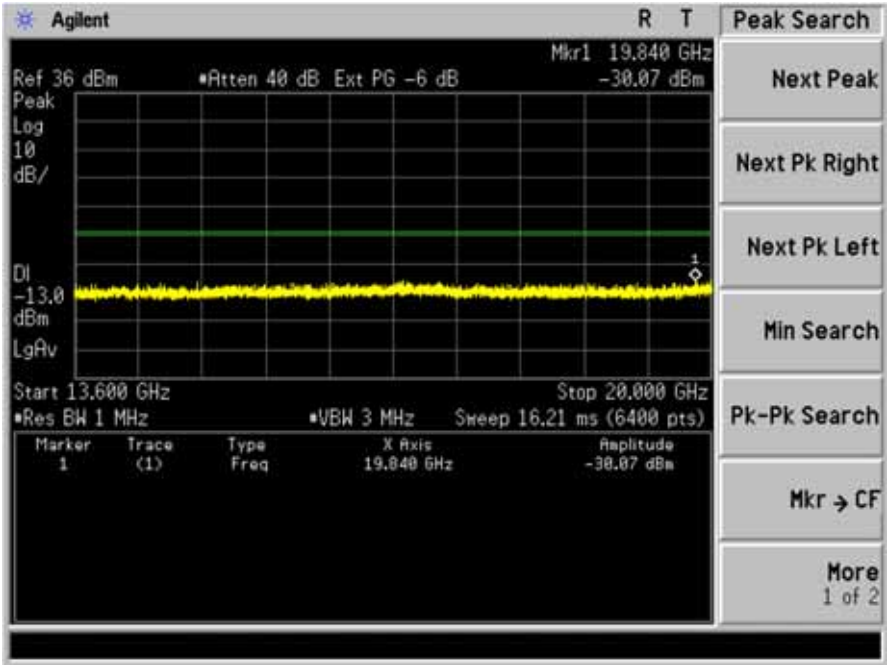


Band:	GPRS 1900	Test Mode :	GPRS Class 10
Channel :	CH661	Frequency :	1880.0 MHz






Agilent
R T
Peak Search
Mkr1 7.477 GHz
Ref 36 dBm
•Atten 40 dB Ext PG -6 dB
-30.70 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
Start 7.000 GHz
Stop 13.600 GHz
•Res BW 1 MHz
•VBW 3 MHz
Sweep 13.6 ms (6800 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 7.477 GHz -30.70 dBm


Agilent
R T
Peak Search
Mkr1 19.840 GHz
Ref 36 dBm
•Atten 40 dB Ext PG -6 dB
-30.07 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
Start 13.600 GHz
Stop 20.000 GHz
•Res BW 1 MHz
•VBW 3 MHz
Sweep 16.21 ms (6400 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 19.840 GHz -30.07 dBm

13 Frequency Stability Measurement

13.1 Test Procedures

For Voltage Variation:

13.1.1 The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.

13.1.2 The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.

13.1.3 The variation in frequency was measured for the worst case.

For Temperature Variation:

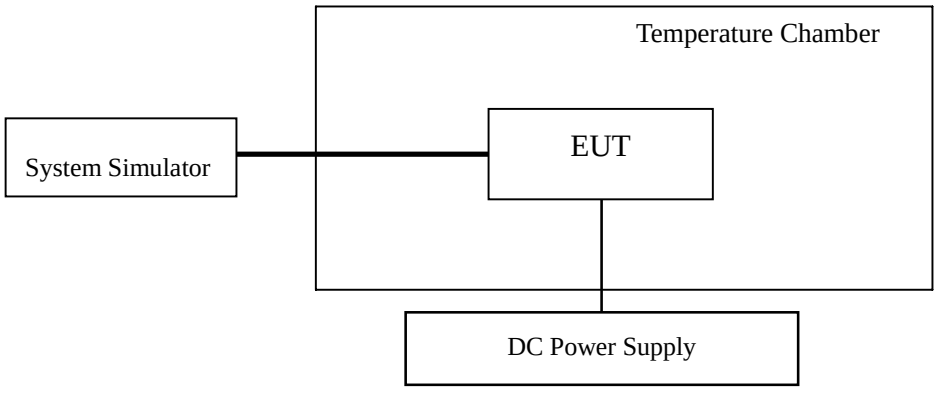
13.1.4 The EUT was set up in the thermal chamber and connected with the base station.

13.1.5 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.

13.1.6 With power OFF, the temperature was raised in 10°C step 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.

13.1.7 If the EUT cannot be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

13.2 Block Diagram of Test setup



13.3 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
System Simulator	Rohde & Schwarz	CMU200	111226	05/29/2013	05/28/2014
thermal-humidity test chamber	ESPEC	EL-02KA	12107166	N/A	N/A
DC Power Supply	DAZHENG	PS-6050	N/A	N/A	N/A

13.4 Description of Frequency Stability Measurement

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

13.5 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GPRS850 CH189	GPRS Class10	3.7	-14	-0.02	2.5	PASS
		BER	-7	-0.01		
		4.2	-16	-0.02		
GPRS1900 CH661	Class10	3.7	-35	-0.02		
		BER	-52	-0.03		
		4.2	-44	-0.02		

Note:

1. Normal Voltage = 3.7V.
2. Battery End Point (BEP) = 3.5 V.

13.6 Test Result of Temperature Variation

All the channels were tested the data of the worst mode (Middle channel) are recorded in the following pages and the others channel methods do not exceed the limits.

Band:	GPRS850	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %
Limit (ppm) :	2.5	Test By:	KK
Channel:	CH189/836.4 MHz		

temperature (°C)	Frequency error (Hz)	Frequency error(ppm) (dB)
-30	12	0.01
-20	10	0.01
-10	8	0.01
0	-5	-0.01
10	-5	-0.01
20	-12	-0.01
30	-15	-0.02
40	-16	-0.02
50	-21	-0.03
55	-24	-0.03

Note:

The manufacturer declared that the EUT could work properly at temperature 55 ° C.

Band:	GPRS1900	Test Date :	May 14, 2014
Test Mode:	GPRS Class 10	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %
Limit (ppm) :	2.5	Test By:	KK
Channel:	CH 661/880 MHz		

temperature (°C)	Frequency error (Hz)	Frequency error(ppm) (dB)
-30	-25	-0.01
-20	-20	-0.01
-10	-18	-0.01
0	-33	-0.02
10	-30	-0.02
20	-35	-0.02
30	-38	-0.02
40	-44	-0.02
50	-48	-0.03
55	-51	-0.03

Note:

The manufacturer declared that the EUT could work properly at temperature 55 ° C.

********** END OF REPORT**********