FCC Test Report

(Part 22 Subpart H & Part 24 Subpart E)

FCC ID	:	**2ACDNTMC-HERO**
Applicant	:	**CHINA TRADE GROUP S.A.S** CALLE 13 NO 14-42-CENTRO CUNDINAMARQUES OFICINA 805-806-OCTAVO PISO, BOGOTA, COLOMBIA
Sample Description		
Product Name	:	**MOBILE PHONE**
Model No.	:	TMC-HERO
Serial No.	:	N/A
Trademark	:	TMC
Receipt Date	:	2014-04-25
Test Date	:	2014-04-25 to 2014-05-14
Issue Date	:	2014-05-14
Test Standard(s)	:	**FCC CFR Title 47 Part 2** **FCC CFR Title 47 Part 22 Subpart H** **FCC CFR Title 47 Part 24 Subpart E**
Conclusions	:	**PASSED***

*In the configuration tested, the EUT complied with the standards specified above.

Test/Witness Engineer : Jason Deng

Approved & Authorized : Winkey Wang

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information

1.1. Client Information

Applicant	:	CHINA TRADE GROUP S.A.S
Address	:	CALLE 13 NO 14-42-CENTRO CUNDINAMARQUES OFICINA 805-806-OCTAVO PISO, BOGOTA, COLOMBIA
Manufacturer	:	SHENZHEN YILIWANDA ELECTRONIC TECHNOLOGY Co., LTD.
Address	:	5 FL, TOWER 5A, XINFU INDUSTRIAL ZONE, CHONGQING ROAD, SHENZHEN, CHINA

1.2. General Description of EUT (Equipment Under Test)

Product Name	:	MOBILE PHONE
Model No.	:	TMC-HERO
Serial No.	:	N/A
Trademark	:	TMC
Power Supply	:	Travel charger: Input 100-240V~ 50/60Hz, 0.15A, Output DC 5V, 500mA Rechargeable Li-ion Battery DC 3.7V
Operation Frequency range:	:	GSM 850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz WCDMA Band V:826.4MHz-846.6MHz
Modulation type	:	GSM/GPRS:GMSK, UMTS:QPSK, EGPRS: 8PSK
Antenna type	:	Integral Antenna
Antenna gain	:	GSM 850: -2.0 dBi PCS 1900: -1.0 dBi WCDMA 850 : -2.0 dBi

Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

(2) Operation Frequency List:

GSM 850		PCS1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
129	824.40	513	1850.40
….	….	….	….
189	836.40	660	1879.80
190	836.60	661	1880.00
191	836.80	662	1880.20
…	…	…	…
250	848.60	809	1909.60
251	848.80	810	1909.80

WCDMA Band V	
Channel	Frequency (MHz)
4132	826.40
4133	826.60
….	….
4182	836.40
4183	836.60
4184	836.80
…	…
4232	846.40
4233	846.60

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

GSM850			PCS1900		
	Channel	Frequency(MHz)		Channel	Frequency(MHz)
Lowest channel	128	824.20	Lowest channel	512	1850.20
Middle channel	190	836.60	Middle channel	661	1880.00
Highest channel	251	848.80	Highest channel	810	1909.80
WCDMA Band V					
	Channel	Frequency(MHz)			
Lowest channel	4132	826.40			
Middle channel	4183	836.60			
Highest channel	4233	846.60			

1.3. Description of Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Description
Communicate mode (GSM850)	Keep the EUT in communicating mode on GSM850 band.
Data mode (GPRS850)	Keep the EUT in data communicating mode on GPRS850 band.

Data mode (EGPRS850)	Keep the EUT in data communicating mode on EGPRS850 band.
Communicate mode (PCS1900)	Keep the EUT in communicating mode on PCS1900 band.
Data mode (GPRS1900)	Keep the EUT in data communicating mode on GPRS1900 band.
Data mode (EGPRS1900)	Keep the EUT in data communicating mode on EGPRS1900 band.
Communicate mode (UMTS 850)	Keep the EUT in communicating mode on UMTS 850 band.
Data mode (RMC UMTS850)	Keep the EUT in data communicating mode on RMC in UMTS850 (12.2 kbps)
Data mode (HSDPA UMTS850)	Keep the EUT in data communicating mode on HSDPA in UMTS 850 (Sub-test 1~Sub-test 4).
Data mode(HSUPA UMTS850)	Keep the EUT in data communicating mode on HSUPA in UMTS 850(Sub-test 1~Sub-test 5).
Remark :	Pre-test output power of all modes, and found GSM850, PCS1900 and UMTS 850 12.2 kbps RMC were the worst case.

1.4. Laboratory Location:

Shenzhen Certification Technology Service Co., Ltd.

Address: 2F, Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China

At the time of testing, the Laboratory is accredited. It is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 197647.

Tel:86-755-86375552 Fax: 86-755-26736857

2. Test Results Summary

FCC Part15, Subpart B		
Section	**Test Item**	**Judgment**
Part 1.1307 Part 2.1093	RF Exposure (SAR)	PASSED (refer to SAR report)
Part 2.1046 Part 22.913(a)(2) Part 24.232 (c)	RF Output Power	PASSED
Part 2.1047	Modulation Characteristics	PASSED
Part 2.1049 Part 22.917 Part 24.238	99% & -26 dB Occupied Bandwidth	PASSED
Part 2.1051 Part 22.917 (a) Part 24.238 (a)	Spurious Emissions at Antenna Terminal	PASSED
Part 2.1053 Part 22.917 (a) Part 24.238 (a)	Field Strength of Spurious Radiation	PASSED
Part 22.917 (a) Part 24.238 (a)	Out of band emission Band Edge	PASSED
Part 2.1055(a)(1)(b)	Frequency stability vs. temperature	PASSED
Part 2.1055(d)(1)(2)	Frequency stability vs. voltage	PASSED
Note: "PASSED" - The EUT complies with the essential requirements in the standard.		

3. Test Instruments List

Item	Test Equipment	Manufacturer	Model No.	Cal. Date	Cal. Due date
1	Bilog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	Mar. 28, 2014	Mar. 27, 2015
2	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	Mar. 28, 2014	Mar. 27, 2015
3	Coaxial Cable	N/A	N/A	Mar. 28, 2014	Mar. 27, 2015
4	Coaxial Cable	N/A	N/A	Mar. 28, 2014	Mar. 27, 2015
5	Coaxial cable	N/A	N/A	Mar. 28, 2014	Mar. 27, 2015
6	Coaxial Cable	N/A	N/A	Mar. 28, 2014	Mar. 27, 2015
7	Coaxial Cable	N/A	N/A	Mar. 28, 2014	Mar. 27, 2015
8	Amplifier (10kHz-1.3GHz)	HP	8447D	Mar. 28, 2014	Mar. 27, 2015
9	Amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	Mar. 28, 2014	Mar. 27, 2015
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	Mar. 28, 2014	Mar. 27, 2015
11	Horn Antenna	ETS-LINDGREN	3160	Mar. 28, 2014	Mar. 27, 2015
12	Positioning Controller	UC	UC3000	N/A	N/A
13	Spectrum analyzer 9kHz-30GHz	Rohde & Schwarz	FSP	Mar. 28, 2014	Mar. 27, 2015
14	EMI Test Receiver	Rohde & Schwarz	ESPI	Mar. 28, 2014	Mar. 27, 2015
15	Loop antenna	Laplace instrument	RF300	Mar. 28, 2014	Mar. 27, 2015
16	Universal radio communication tester	Rhode & Schwarz	CMU200	Mar. 28, 2014	Mar. 27, 2015
17	Signal Analyzer	Rohde & Schwarz	FSIQ3	Mar. 28, 2014	Mar. 27, 2015
18	EMI Test Receiver	Rohde & Schwarz ESCI	ESCI	Mar. 28, 2014	Mar. 27, 2015
19	LISN	CHASE	MN2050D	Mar. 28, 2014	Mar. 27, 2015

4. Conducted Output Power

4.1. Test Standard and Limit

4.1.1. Test Standard

FCC part 22.913(a) and FCC part 24.232(b)

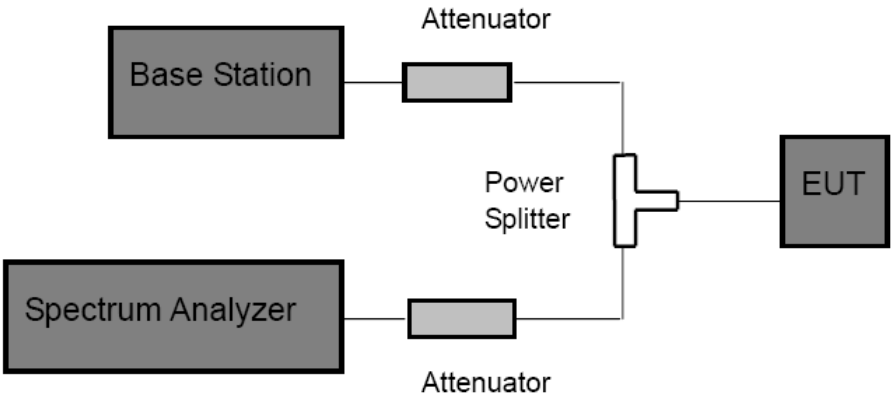
4.1.2. Test Method

FCC part 2.1046

4.1.3. Test Limit

Frequency Band	Limit
GSM 850MHz	38.5 dBm (ERP)
PCS 1900 MHz	33 dBm (EIRP)
WCDMA Band V	38.5 dBm (ERP)

4.2. Test Setup



4.3. Test Procedure

(1) The EUT is coupled to the Spectrum Analyzer and the Base Station with the suitable Attenuators through the Power Splitter, the path loss is calibrated to correct the reading.
(2) A call is set up by the Base Station to the generic call set up procedure.
(3) Set EUT at maximum power level through base station by power level command.
(4) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak and mark it; finally record the peak and the plot.

4.4. Test Data

Mode	Channel	Frequency (MHz)	Burst Average power (dBm)	Limit (dBm)	Result
GSM 850	128	824.20	32.58	38.45	PASSED
	190	836.60	32.79		PASSED
	251	848.80	**32.85**		PASSED
GPRS 850 (1 Uplink slot)	128	824.20	32.57		PASSED
	190	836.60	32.78		PASSED
	251	848.80	**32.84**		PASSED
GPRS 850 (2 Uplink slots)	128	824.20	31.82		PASSED
	190	836.60	32.05		PASSED
	251	848.80	32.12		PASSED
GPRS 850 (3 Uplink slots)	128	824.20	30.05		PASSED
	190	836.60	30.25		PASSED
	251	848.80	30.44		PASSED
GPRS 850 (4 Uplink slots)	128	824.20	28.97		PASSED
	190	836.60	29.20		PASSED
	251	848.80	29.40		PASSED
EGPRS 850 (1 Uplink slot)	128	824.20	26.51		PASSED
	190	836.60	26.73		PASSED
	251	848.80	**26.81**		PASSED
EGPRS 850 (2 Uplink slots)	128	824.20	25.27		PASSED
	190	836.60	25.41		PASSED
	251	848.80	25.56		PASSED
EGPRS 850 (3 Uplink slots)	128	824.20	23.67		PASSED
	190	836.60	23.84		PASSED
	251	848.80	23.95		PASSED
EGPRS 850 (4 Uplink slots)	128	824.20	22.52		PASSED
	190	836.60	22.61		PASSED
	251	848.80	22.88		PASSED

Mode	Channel	Frequency (MHz)	Burst Average power (dBm)	Limit (dBm)	Result
PCS 1900	512	1850.20	29.81	33.00	PASSED
	661	1880.00	29.97		PASSED
	810	1909.80	**30.16**		PASSED
GPRS 1900 (1 Uplink slot)	512	1850.20	29.79		PASSED
	661	1880.00	29.95		PASSED
	810	1909.80	**30.15**		PASSED
GPRS 1900 (2 Uplink slots)	512	1850.20	29.02		PASSED
	661	1880.00	29.23		PASSED
	810	1909.80	29.46		PASSED
GPRS 1900 (3 Uplink slots)	512	1850.20	27.12		PASSED
	661	1880.00	27.34		PASSED
	810	1909.80	27.61		PASSED
GPRS 1900 (4 Uplink slots)	512	1850.20	26.03		PASSED
	661	1880.00	26.25		PASSED
	810	1909.80	26.57		PASSED
EGPRS 1900 (1 Uplink slot)	512	1850.20	25.75		PASSED
	661	1880.00	25.97		PASSED
	810	1909.80	**26.14**		PASSED
EGPRS 1900 (2 Uplink slots)	512	1850.20	24.77		PASSED
	661	1880.00	24.92		PASSED
	810	1909.80	25.01		PASSED
EGPRS 1900 (3 Uplink slots)	512	1850.20	22.89		PASSED
	661	1880.00	22.96		PASSED
	810	1909.80	23.11		PASSED
EGPRS 1900 (4 Uplink slots)	512	1850.20	21.93		PASSED
	661	1880.00	22.06		PASSED
	810	1909.80	22.27		PASSED

Mode		Channel	Frequency (MHz)	Burst Average power (dBm)	Limit (dBm)	Result
UMTS 850 HSDPA	Subtest 1	4132	826.40	21.64	38.45	PASSED
		4183	836.00	**21.84**		PASSED
		4233	846.60	21.46		PASSED
	Subtest 2	4132	826.40	21.31		PASSED
		4183	836.00	21.48		PASSED
		4233	846.60.	21.29		PASSED
	Subtest 3	4132	826.40	21.38		PASSED
		4183	836.00	21.46		PASSED
		4233	846.60	21.32		PASSED
	Subtest 4	4132	826.40	21.36		PASSED
		4183	836.00	21.41		PASSED
		4233	846.60	21.32		PASSED
UMTS 850 RMC	12.2kbps	4132	826.40	22.66		PASSED
		4183	836.00	**22.89**		PASSED
		4233	846.60	22.50		PASSED
UMTS 850 AMR	12.2kbps	4132	826.40	22.65		PASSED
		4183	836.00	22.87		PASSED
		4233	846.60	22.50		PASSED
UMTS 850 HSUPA	Subtest 1	4132	826.40	**21.87**		PASSED
		4183	836.00	21.87		PASSED
		4233	846.60	21.43		PASSED
	Subtest 2	4132	826.40	20.16		PASSED
		4183	836.00	20.13		PASSED
		4233	846.60	19.89		PASSED
	Subtest 3	4132	826.40	20.21		PASSED
		4183	836.00	20.19		PASSED
		4233	846.60	20.16		PASSED
	Subtest 4	4132	826.40	20.15		PASSED
		4183	836.00	20.19		PASSED
		4233	846.60	20.03		PASSED
	Subtest 5	4132	826.40	21.12		PASSED
		4183	836.00	21.15		PASSED
		4233	846.60	21.01		PASSED

5. Modulation Characteristics

According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

6. Occupied Bandwidth Test

6.1. Test Standard and Limit

6.1.1. Test Standard

FCC part 22.913(a) and FCC part 24.232(b)

6.1.2. Test Method

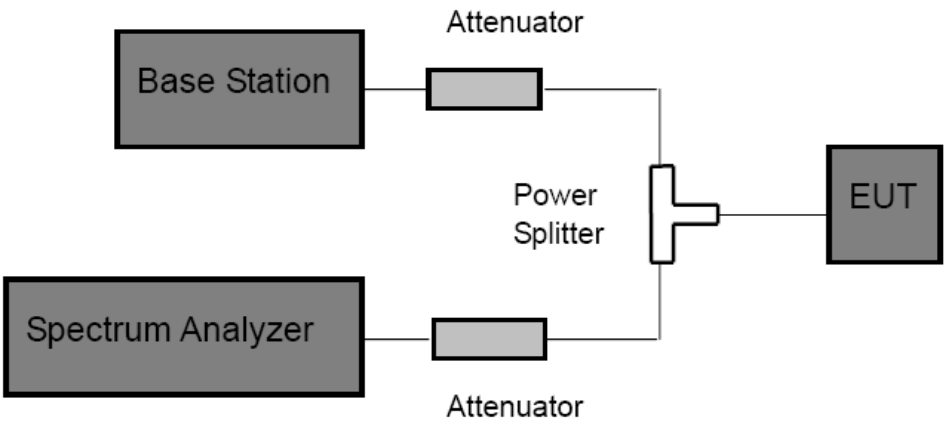
FCC part 2.1049

6.1.3. Test Limit

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as 99% power and -26dBc occupied bandwidths.

6.2. Test Setup



6.3. Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.

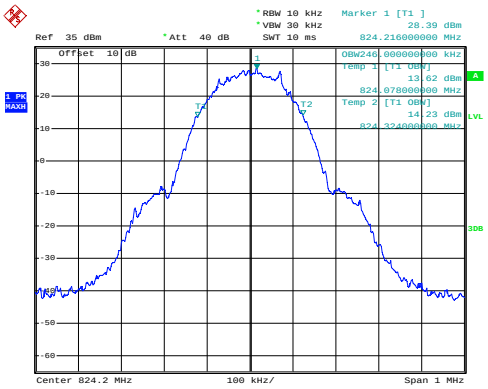
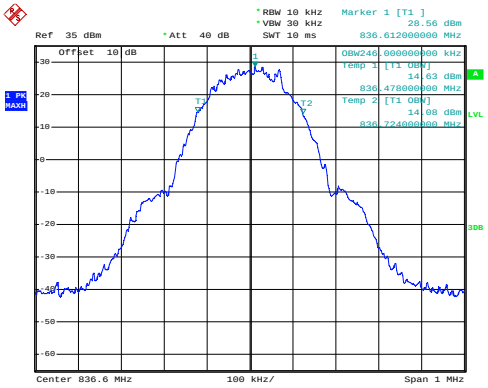
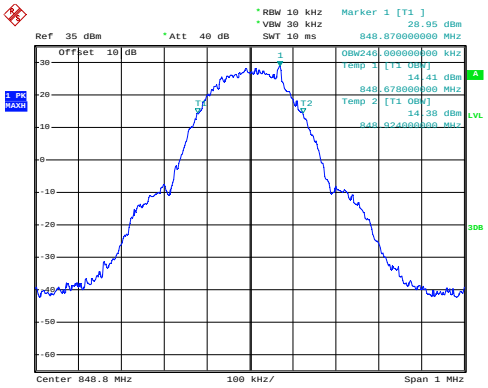
(2) RBW was set to about 1% of emission BW, VBW= 3 times RBW.

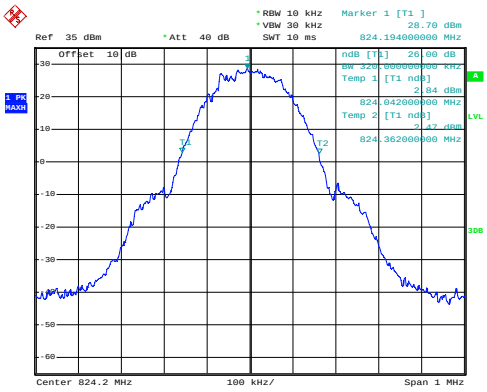
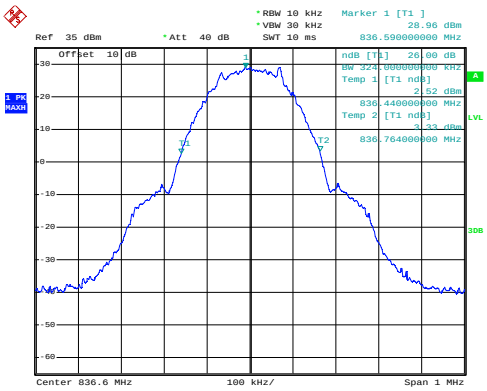
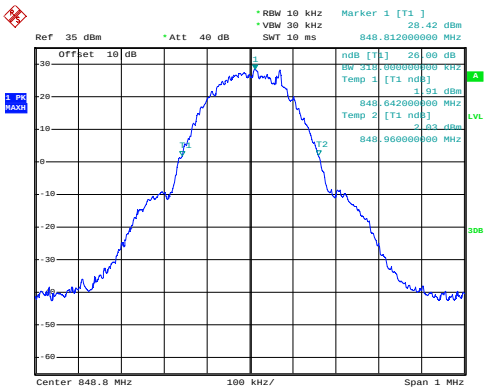
(3) -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

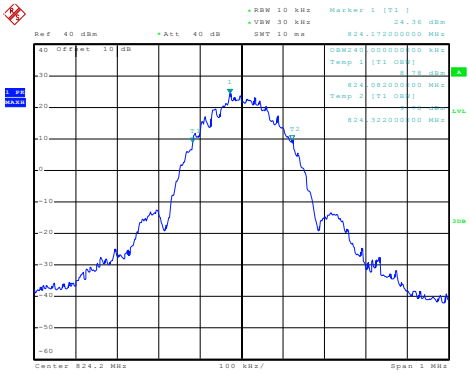
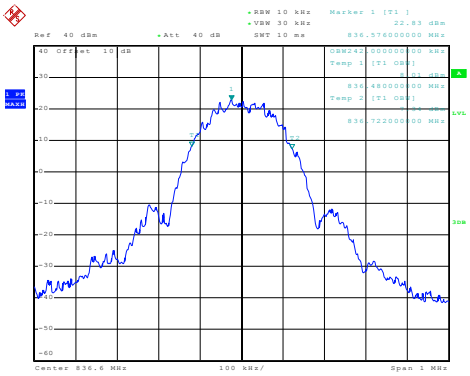
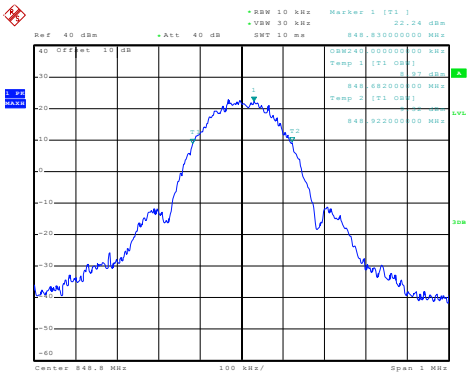
6.4. Test Data

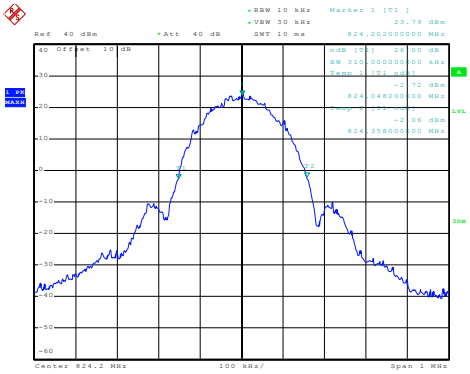
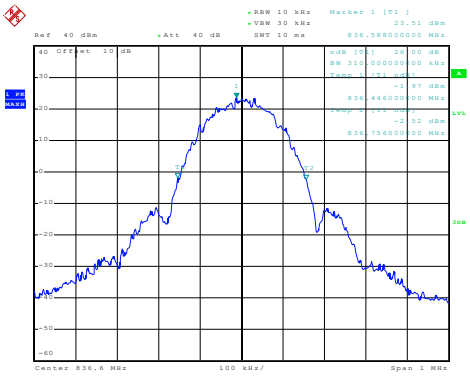
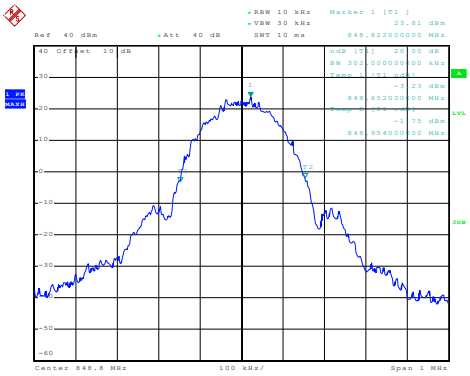
Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850	128	824.2	246	320
	190	836.6	246	324
	251	848.8	246	318
EGPRS 850	128	824.2	240	310
	190	836.6	242	310
	251	848.8	240	302
PCS 1900	512	1850.2	246	320
	661	1880.0	244	318
	810	1909.8	244	322
EGPRS 1900	512	1850.2	242	310
	661	1880.0	242	308
	810	1909.8	244	316
UMTS850 12.2k RMC	4132	824.40	4160	4700
	4183	836.00	4180	4720
	4233	846.60	4160	4720
UMTS850 HSDPA	4132	824.40	4160	4720
	4183	836.00	4180	4720
	4233	846.60	4180	4720
UMTS850 HSUPA	4132	824.40	4160	4720
	4183	836.00	4180	4680
	4233	846.60	4160	4700
Note: GSM & GPRS use the same modulation technical (GMSK), and with the same channels, so the 99% OBW and the -26dB of GPRS not performed.				

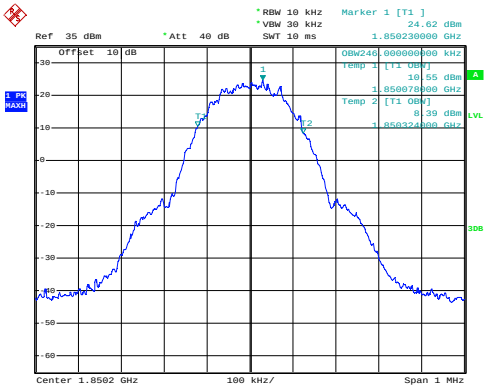
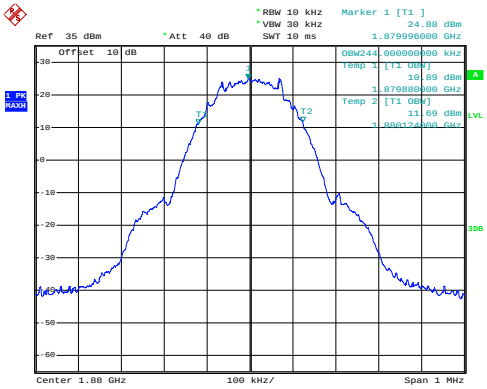
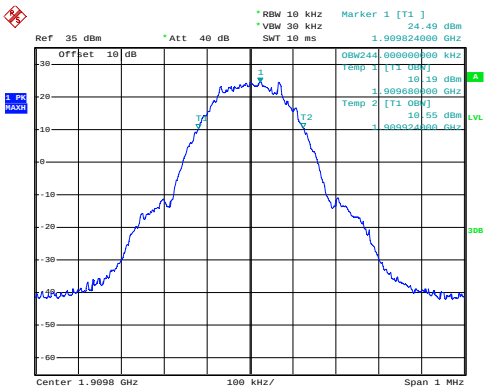
Test plot as follows:

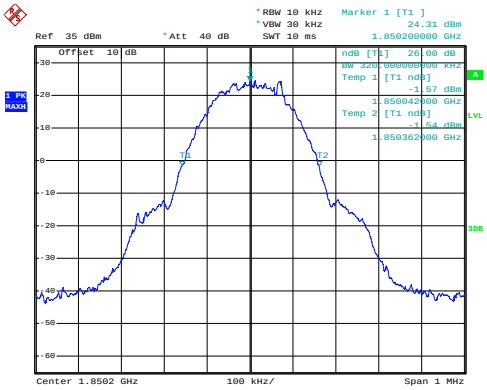
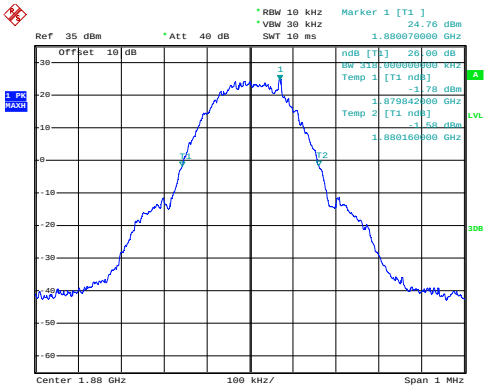
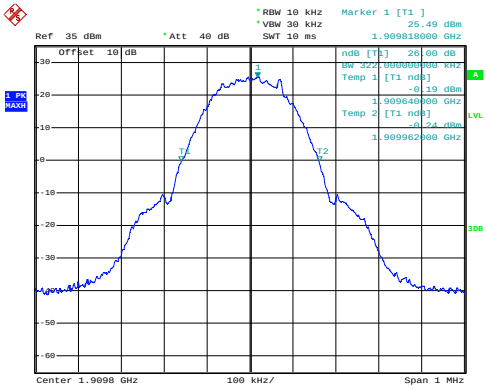
Test Item	99% Occupy bandwidth	**Test Mode**	GSM850
Lowest	 REMOTE HIGH Date: 13.MAY.2014 19:30:44		
Middle	 REMOTE HIGH Date: 13.MAY.2014 19:35:52		
Highest	 REMOTE HIGH Date: 13.MAY.2014 19:40:22		

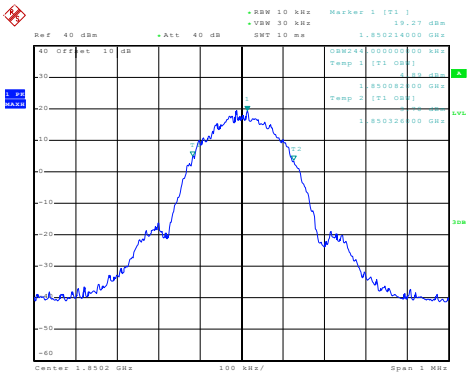
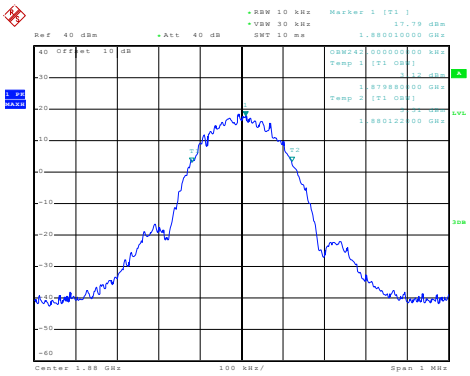
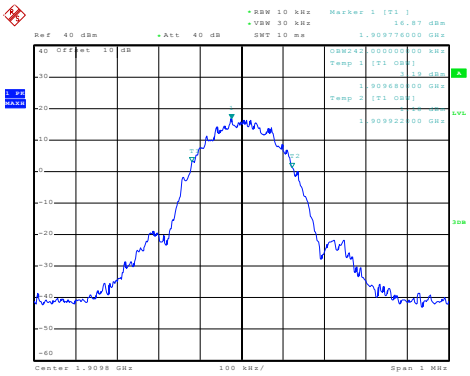
Test Item	-26dB bandwidth	Test Mode	GSM850
Lowest	 REMOTE HIGH Date: 13.MAY.2014 19:57:25		
Middle	 REMOTE HIGH Date: 13.MAY.2014 19:55:52		
Highest	 REMOTE HIGH Date: 13.MAY.2014 19:41:41		

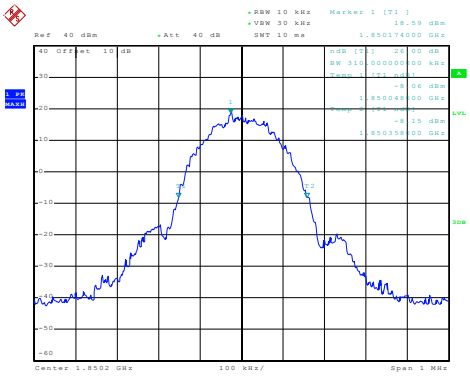
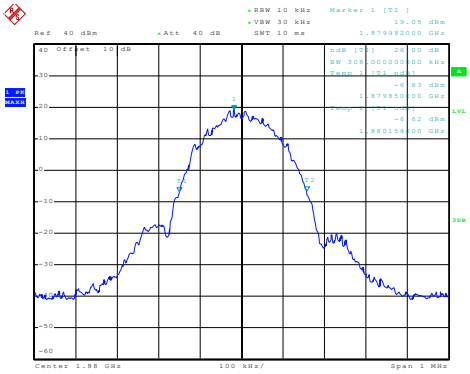
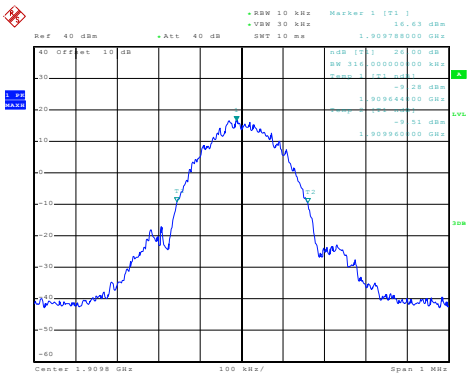
Test Item	99% Occupy bandwidth	Test Mode	EGPRS 850
Lowest	 REMOTE HIGH Date: 13.MAY.2014 21:31:18		
Middle	 REMOTE HIGH Date: 13.MAY.2014 21:34:25		
Highest	 REMOTE HIGH Date: 13.MAY.2014 21:37:05		

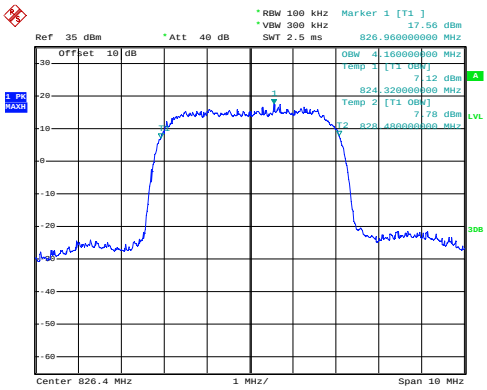
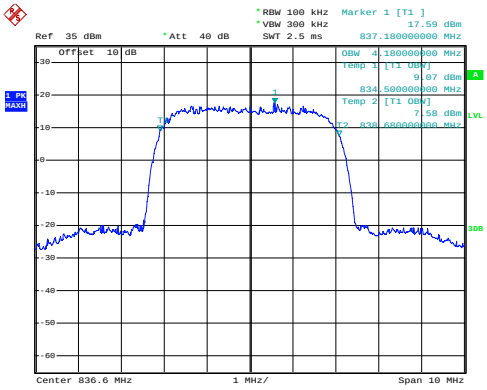
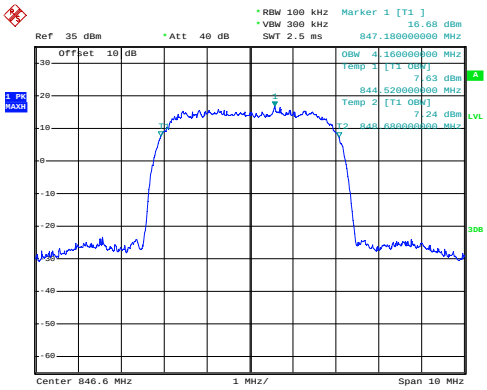
Test Item	-26dB bandwidth	Test Mode	EGPRS 850
Lowest	 REMOTE HIGH Date: 13.MAY.2014 21:41:29		
Middle	 REMOTE HIGH Date: 13.MAY.2014 21:46:23		
Highest	 REMOTE HIGH Date: 13.MAY.2014 21:50:17		

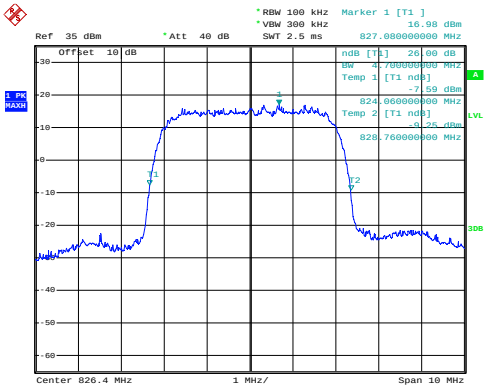
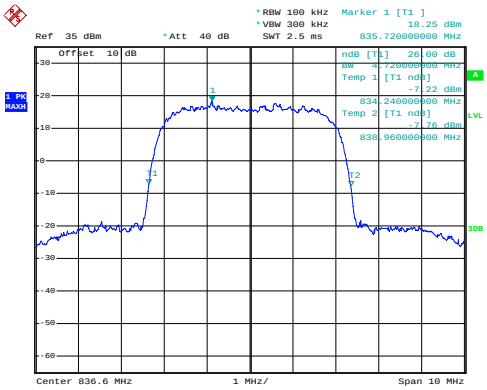
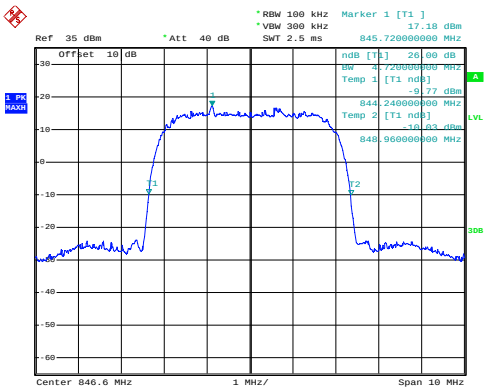
Test Item	99% Occupy bandwidth	Test Mode	PCS1900
Lowest	 REMOTE HIGH Date: 13.MAY.2014 20:21:15		
Middle	 REMOTE HIGH Date: 13.MAY.2014 20:26:18		
Highest	 REMOTE HIGH Date: 13.MAY.2014 20:29:08		

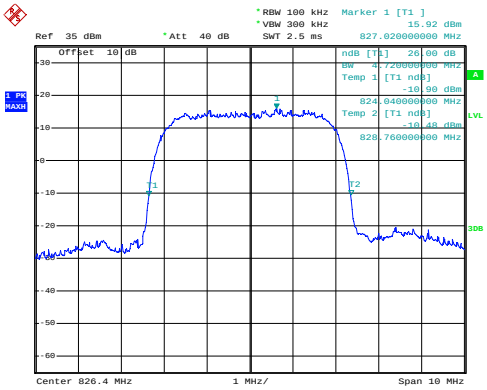
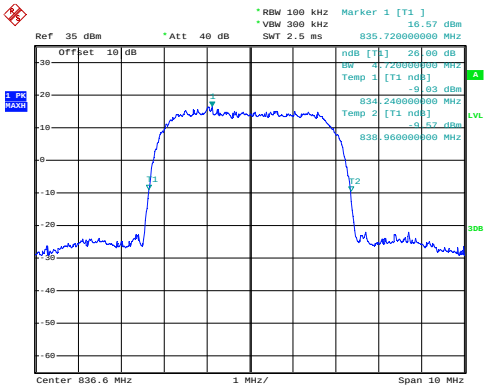
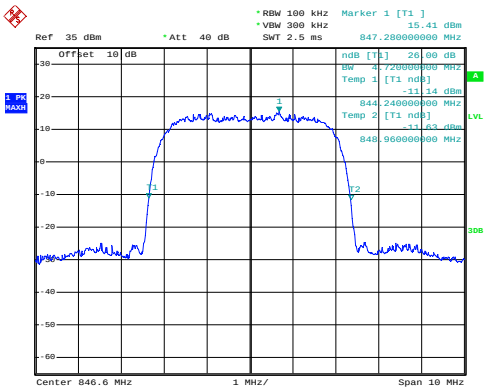
Test Item	-26dB bandwidth	Test Mode	PCS 1900
Lowest	 REMOTE HIGH Date: 13.MAY.2014 20:48:45		
Middle	 REMOTE HIGH Date: 13.MAY.2014 20:45:53		
Highest	 REMOTE HIGH Date: 13.MAY.2014 20:43:41		

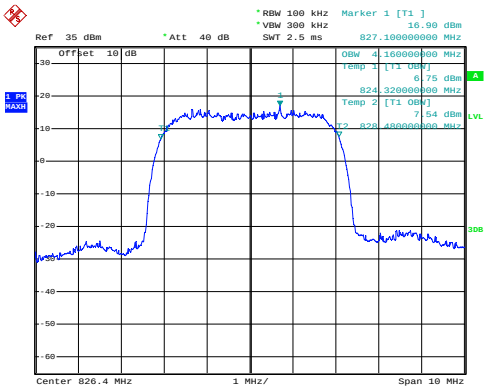
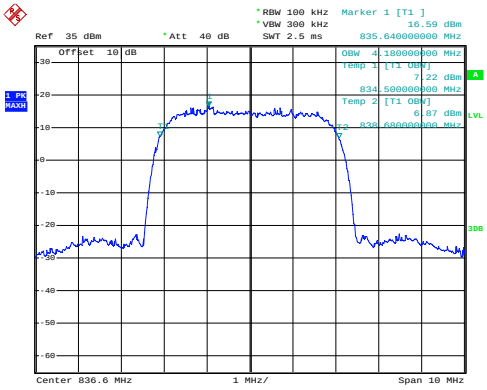
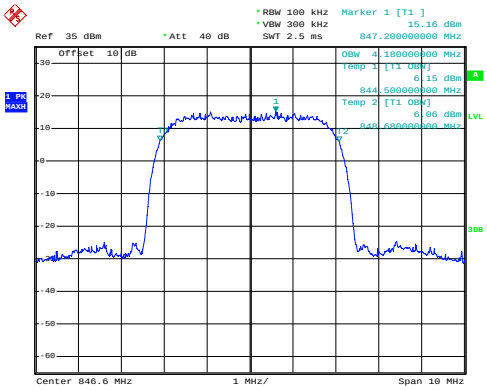
Test Item	99% Occupy bandwidth	Test Mode	EGPRS 1900
Lowest	 REMOTE HIGH Date: 13.MAY.2014 21:55:06		
Middle	 REMOTE HIGH Date: 13.MAY.2014 21:58:47		
Highest	 REMOTE HIGH Date: 13.MAY.2014 22:03:21		

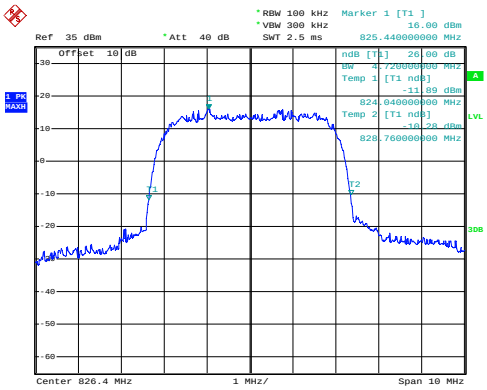
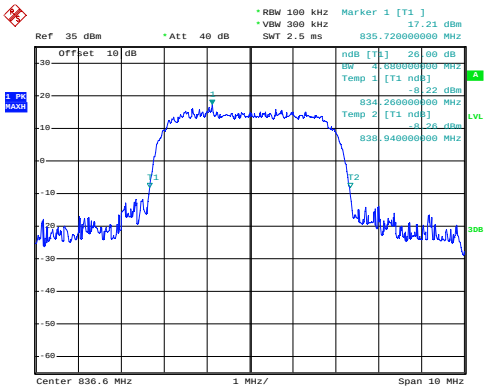
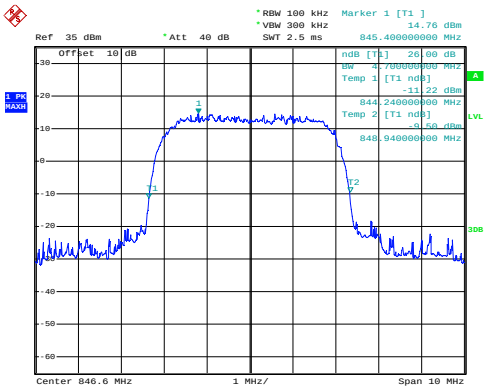
Test Item	-26dB bandwidth	Test Mode	EGPRS 1900
Lowest	 REMOTE HIGH Date: 13.MAY.2014 22:07:32		
Middle	 REMOTE HIGH Date: 13.MAY.2014 22:10:52		
Highest	 REMOTE HIGH Date: 13.MAY.2014 22:13:48		

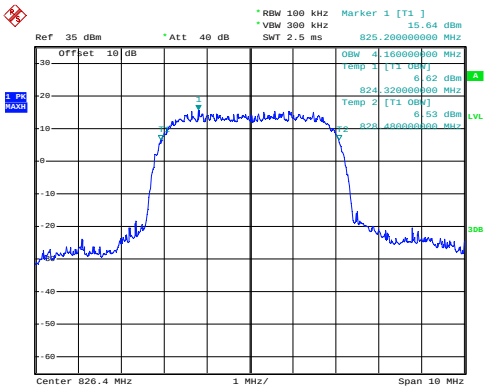
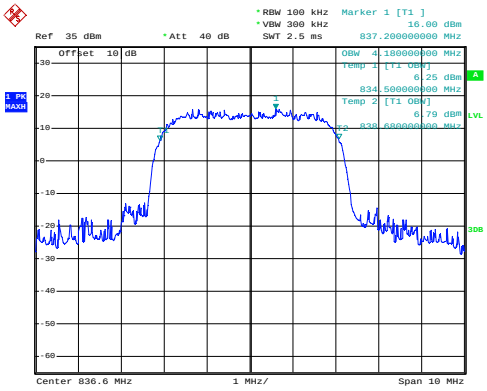
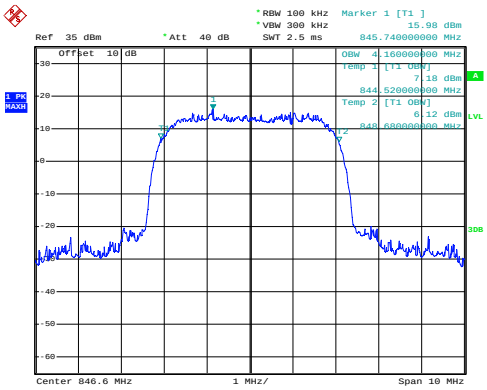
Test Item	99% Occupy bandwidth	Test Mode	UMTS850 12.2k RMC
Lowest	 REMOTE HIGH Date: 13.MAY.2014 22:55:40		
Middle	 REMOTE HIGH Date: 13.MAY.2014 22:58:12		
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:00:29		

Test Item	-26dB bandwidth	Test Mode	UMTS850 12.2k RMC
Lowest	 REMOTE HIGH Date: 13.MAY.2014 23:06:49		
Middle	 REMOTE HIGH Date: 13.MAY.2014 23:05:50		
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:02:09		

Test Item	-26dB bandwidth	Test Mode	UMTS850 HSDPA
Lowest	 REMOTE HIGH Date: 13.MAY.2014 23:36:04		
Middle	 REMOTE HIGH Date: 13.MAY.2014 23:37:24		
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:38:27		

Test Item	99% Occupy bandwidth	**Test Mode**	UMTS850 HSDPA
Lowest	 REMOTE HIGH Date: 14.MAY.2014 00:02:08		
Middle	 REMOTE HIGH Date: 13.MAY.2014 23:23:49		
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:22:26		

Test Item	-26dB bandwidth	Test Mode	UMTS 850 HSUPA
Lowest	 REMOTE HIGH Date: 13.MAY.2014 23:51:59		
Middle	 REMOTE HIGH Date: 13.MAY.2014 23:53:23		
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:54:17		

Test Item	99% Occupy bandwidth	Test Mode	UMTS 850 HSUPA
Lowest	 REMOTE HIGH Date: 13.MAY.2014 23:50:12		
Middle	 REMOTE HIGH Date: 13.MAY.2014 23:49:18		
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:48:10		

7. Out of Band Emission at Antenna Terminals

7.1. Test Standard and Limit

7.1.1. Test Standard

FCC part 22.917(a) and FCC part 24.238(a)

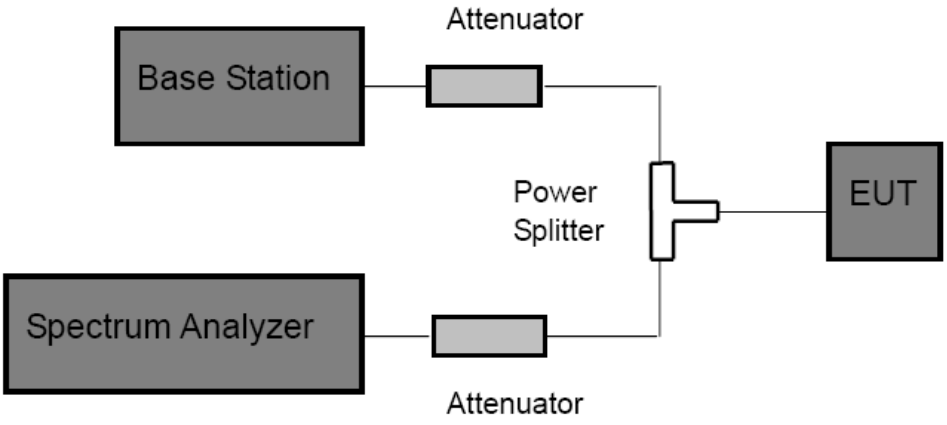
7.1.2. Test Method

FCC part 2.1051

7.1.3. Test 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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

7.2. Test Setup



7.3. Test Procedure

(1) The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

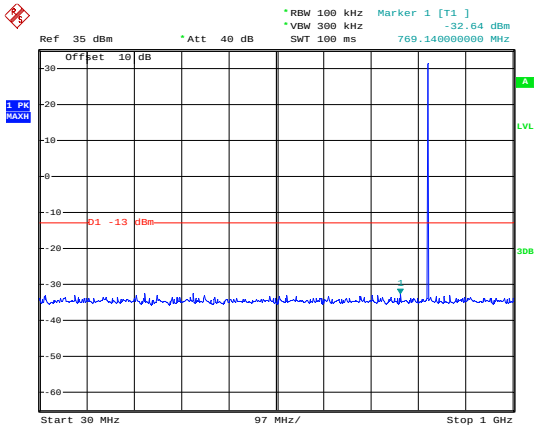
(2) The resolution bandwidth of the spectrum analyzer was set at 100 kHz when below 1GHz, 1MHz when above 1 GHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

(3) For the out of band: Set the RBW=100 kHz, VBW=300 kHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic.

(4) Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

7.4. Test Data

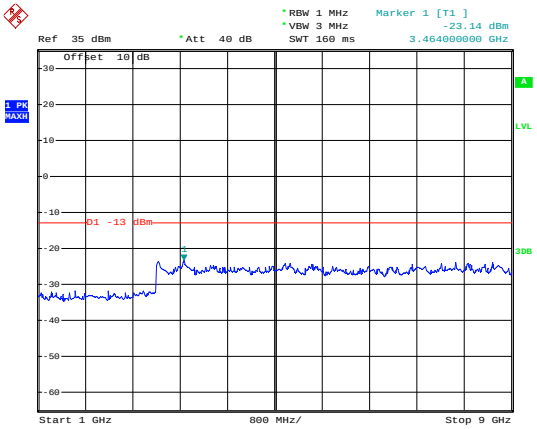
Test Mode	GSM850	Test Channel	Lowest channel



REMOTE HIGH

Date: 13.MAY.2014 20:00:16

30MHz~1GHz

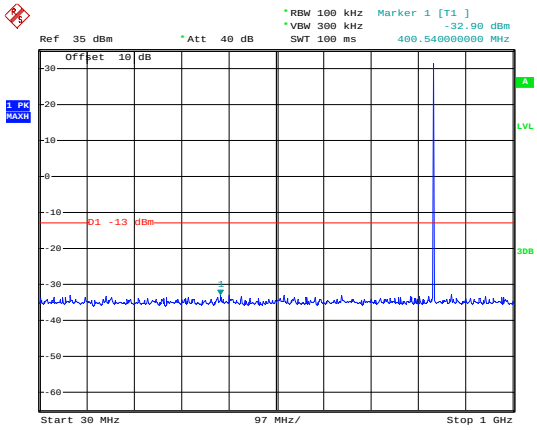


REMOTE HIGH

Date: 13.MAY.2014 20:05:35

1GHz~9GHz

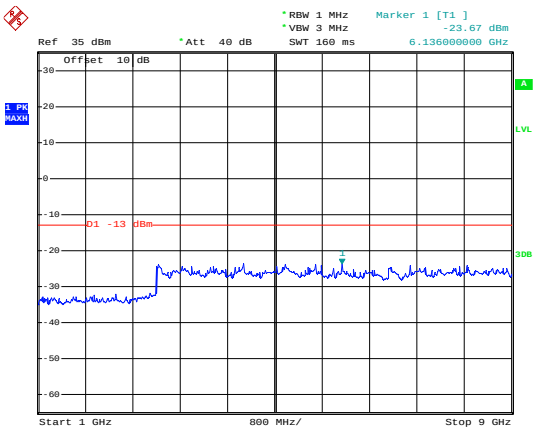
Test Mode	GSM850	Test Channel	Middle channel



REMOTE HIGH

Date: 13.MAY.2014 20:01:32

30MHz~1GHz

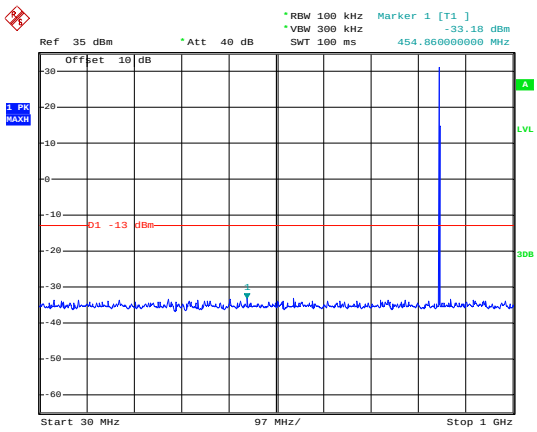


REMOTE HIGH

Date: 13.MAY.2014 20:04:27

1GHz~9GHz

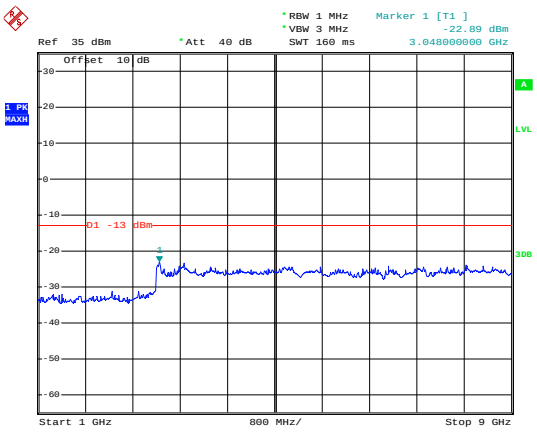
Test Mode	GSM850	Test Channel	Highest channel



REMOTE HIGH

Date: 13.MAY.2014 20:02:23

30MHz~1GHz

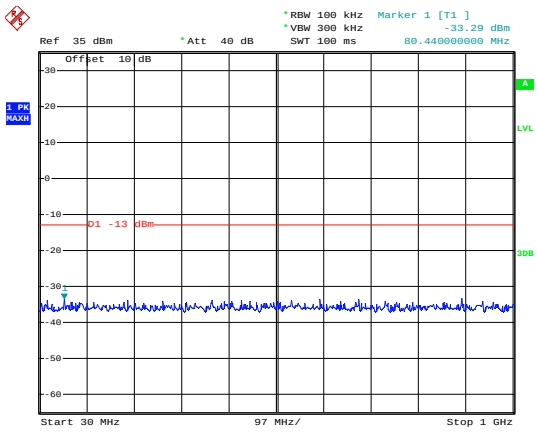


REMOTE HIGH

Date: 13.MAY.2014 20:03:54

1GHz~9GHz

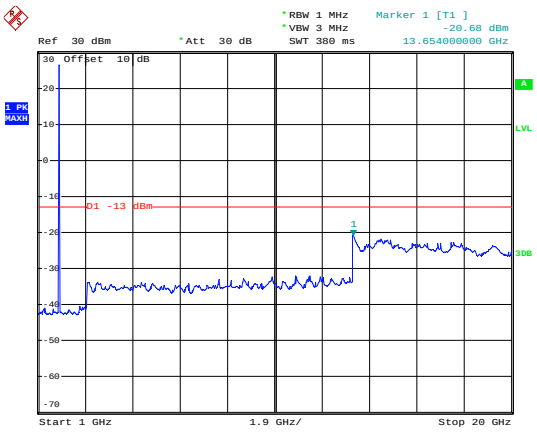
Test Mode	PCS1900	Test Channel	Lowest channel



REMOTE HIGH

Date: 13.MAY.2014 20:49:52

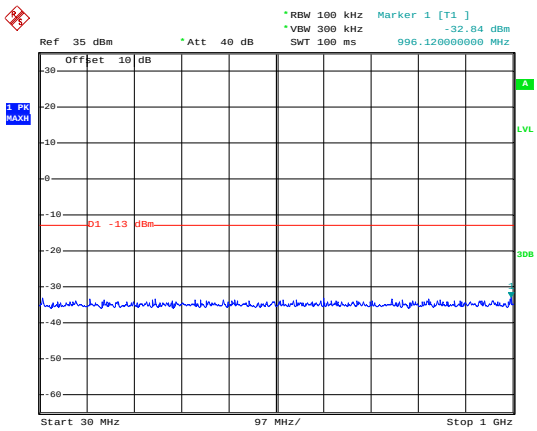
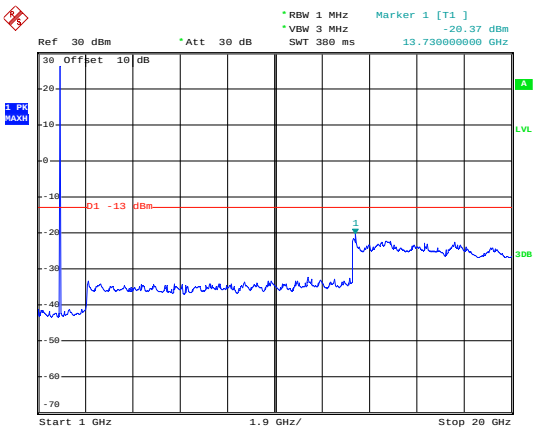
30MHz~1GHz

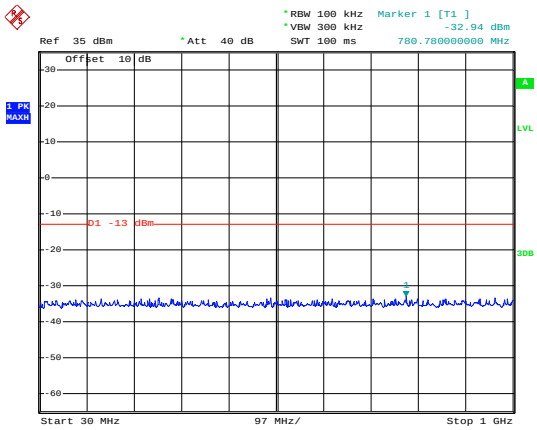
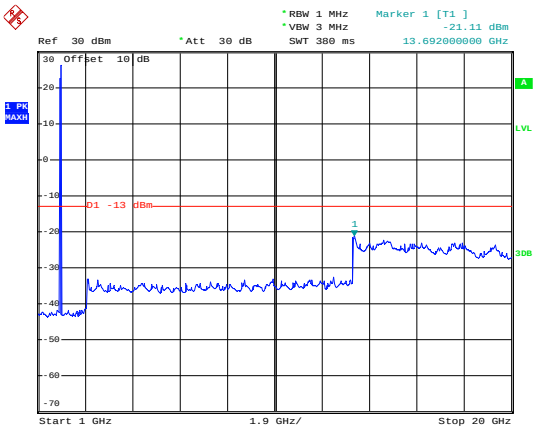


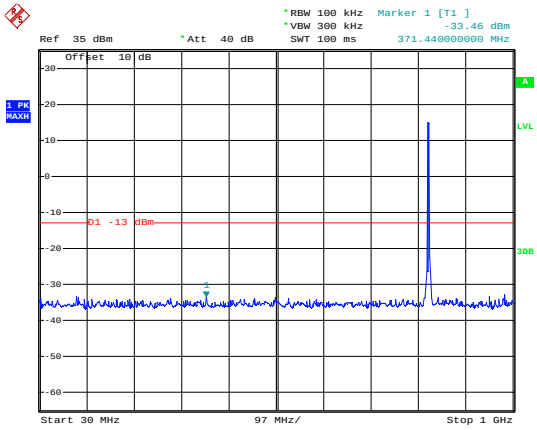
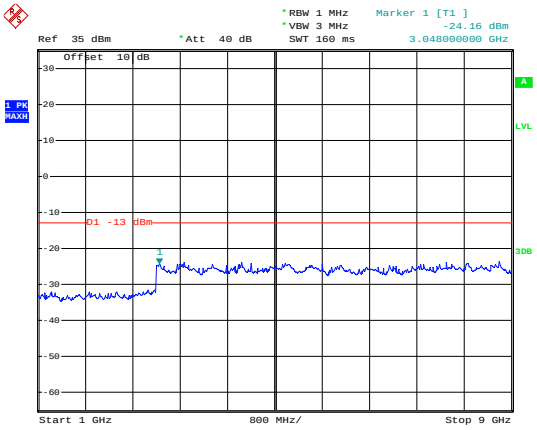
REMOTE HIGH

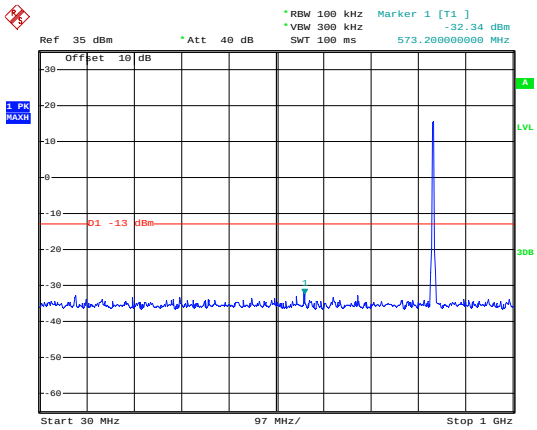
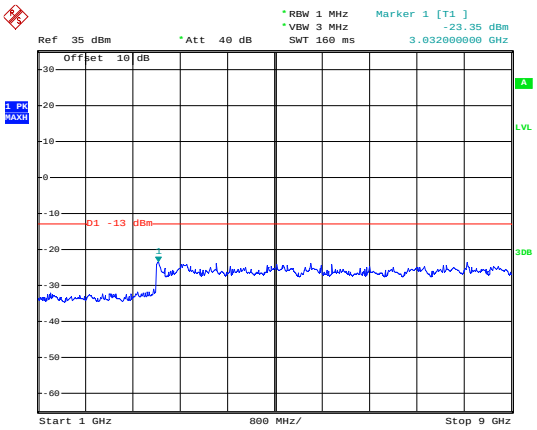
Date: 13.MAY.2014 20:55:35

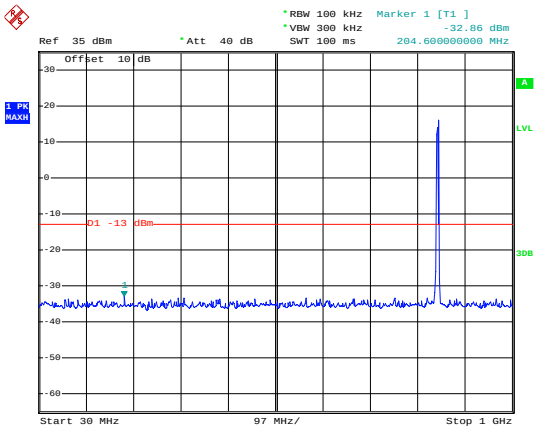
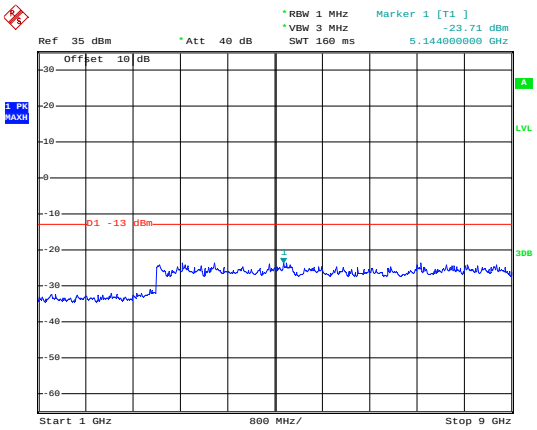
1GHz~20GHz

Test Mode	PCS1900	Test Channel	Middle channel
 REMOTE HIGH Date: 13.MAY.2014 20:50:52		 REMOTE HIGH Date: 13.MAY.2014 20:53:58	
30MHz~1GHz		1GHz~20GHz	

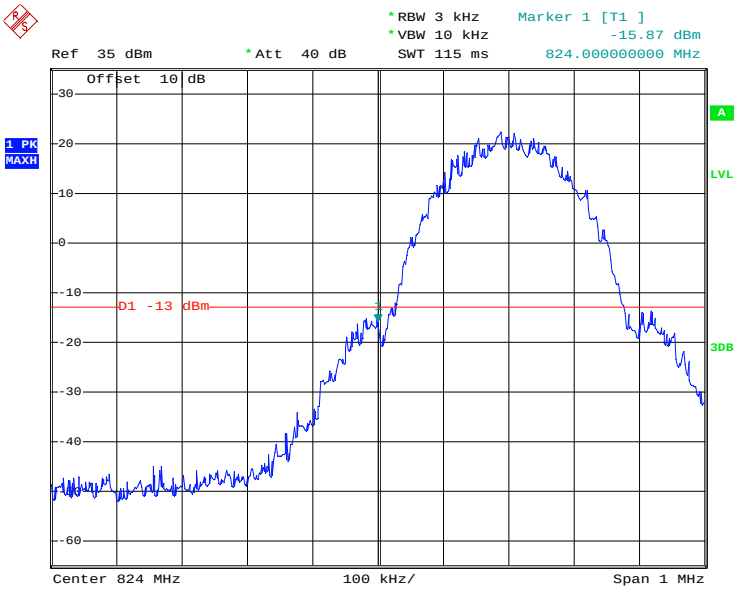
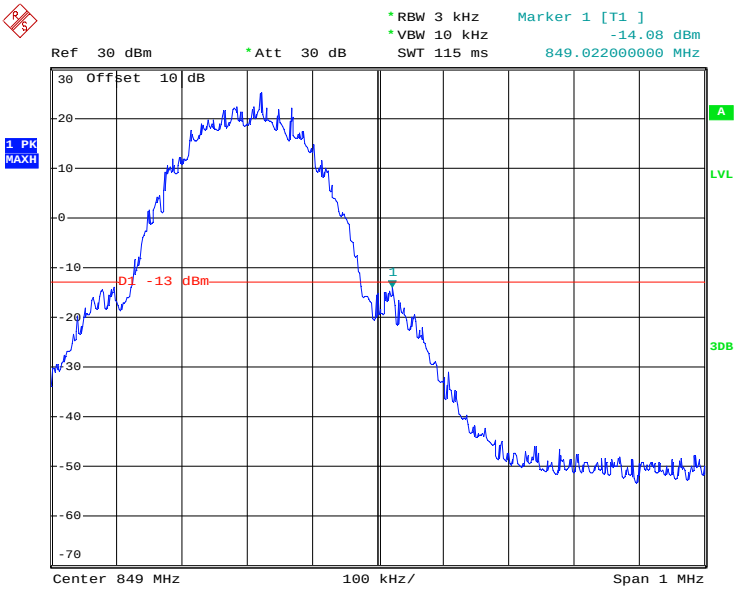
Test Mode	PCS1900	Test Channel	Highest channel
 REMOTE HIGH Date: 13.MAY.2014 20:51:41		 REMOTE HIGH Date: 13.MAY.2014 20:52:52	
30MHz~1GHz		1GHz~20GHz	

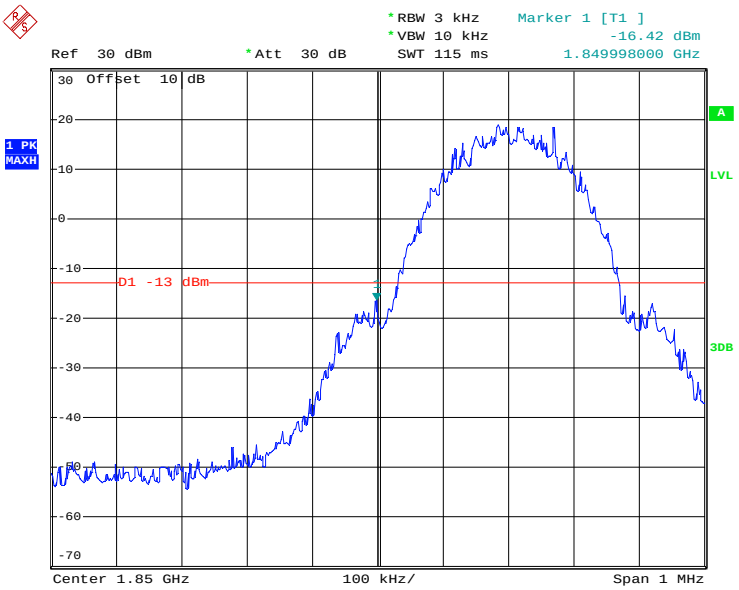
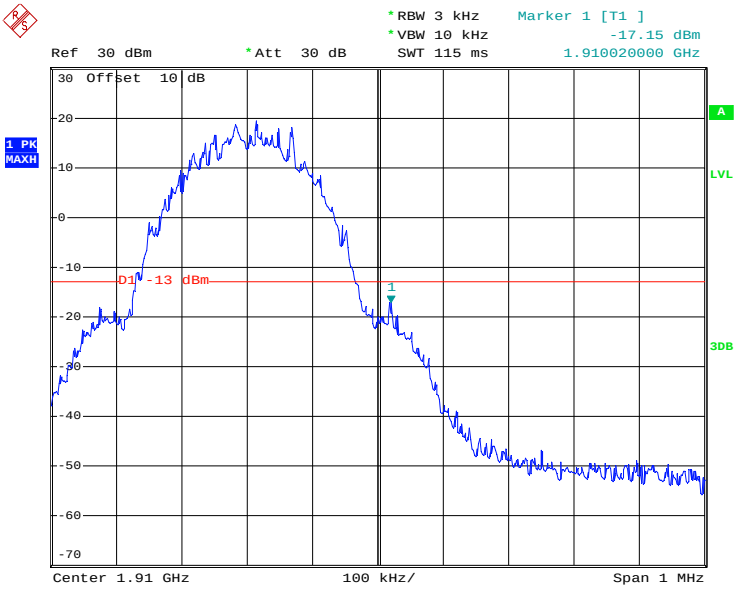
Test Mode	UMTS 850 12.2k RMC	Test Channel	Lowest channel
 REMOTE HIGH Date: 13.MAY.2014 23:08:56		 REMOTE HIGH Date: 13.MAY.2014 23:13:52	
30MHz~1GHz		1GHz~9GHz	

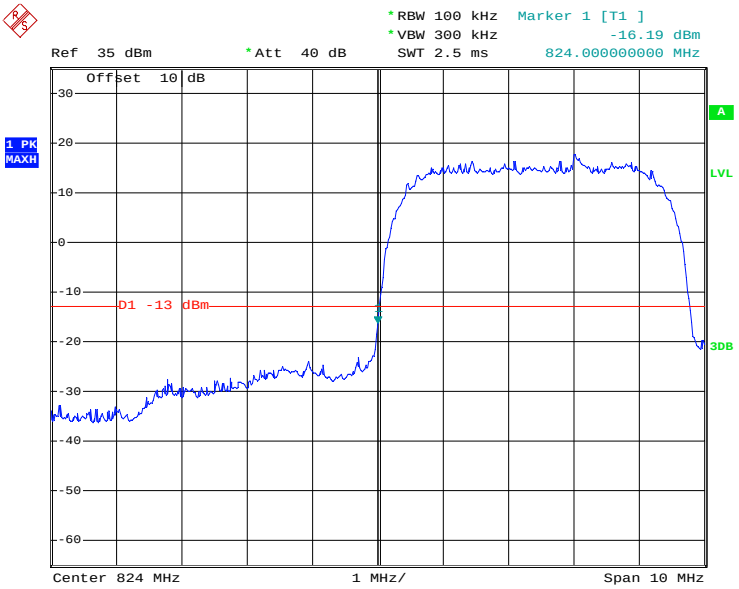
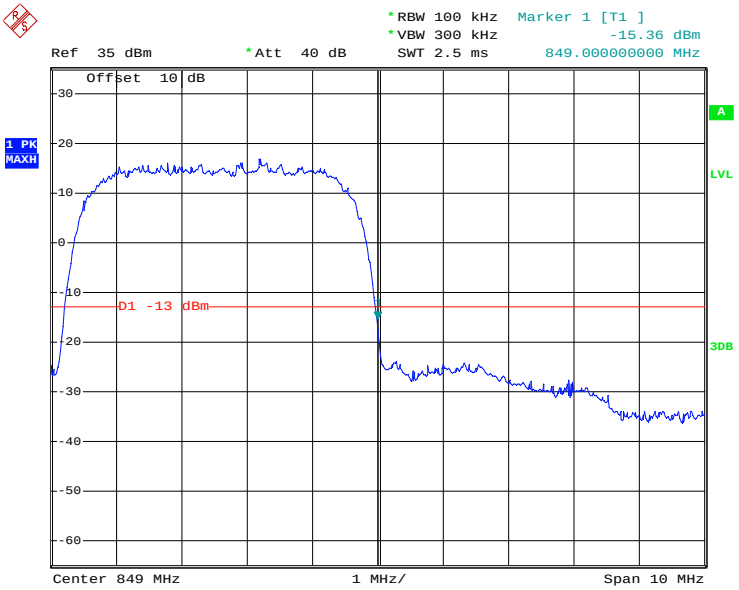
Test Mode	UMTS 850 12.2k RMC	Test Channel	Middle channel
 REMOTE HIGH Date: 13.MAY.2014 23:09:47		 REMOTE HIGH Date: 13.MAY.2014 23:13:04	
30MHz~1GHz		1GHz~9GHz	

Test Mode	UMTS 850 12.2k RMC	Test Channel	Highest channel
 REMOTE HIGH Date: 13.MAY.2014 23:10:58		 REMOTE HIGH Date: 13.MAY.2014 23:14:29	
30MHz~1GHz		1GHz~9GHz	

Band Edge Emission

Test Mode	GSM850
Lowest	 REMOTE HIGH Date: 13.MAY.2014 20:07:29
Highest	 REMOTE HIGH Date: 13.MAY.2014 21:03:02

Test Mode	PCS1900
Lowest	 REMOTE HIGH Date: 13.MAY.2014 20:58:00
Highest	 REMOTE HIGH Date: 13.MAY.2014 20:59:13

Test Mode	UMTS850 12.2k RMC
Lowest	 REMOTE HIGH Date: 13.MAY.2014 23:17:20
Highest	 REMOTE HIGH Date: 13.MAY.2014 23:16:06

8. ERP, EIRP Measurement

8.1. Test Standard and Limit

8.1.1. Test Standard

FCC part 22.913(a) and FCC part 24.232(b)

8.1.2. Test Method

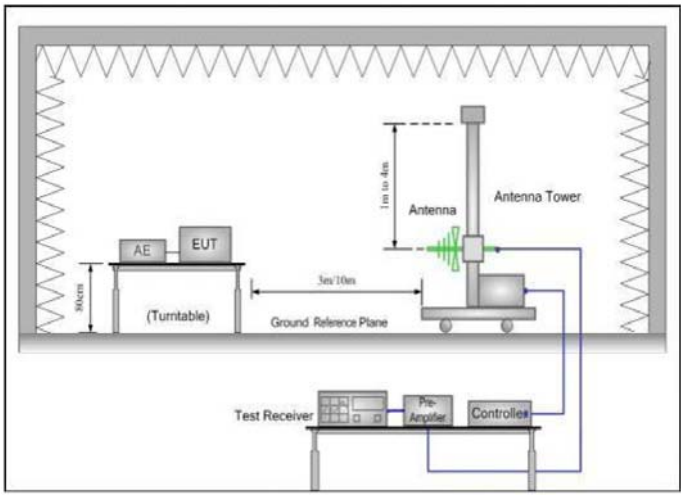
FCC part 2.1046

8.1.3. Test Limit

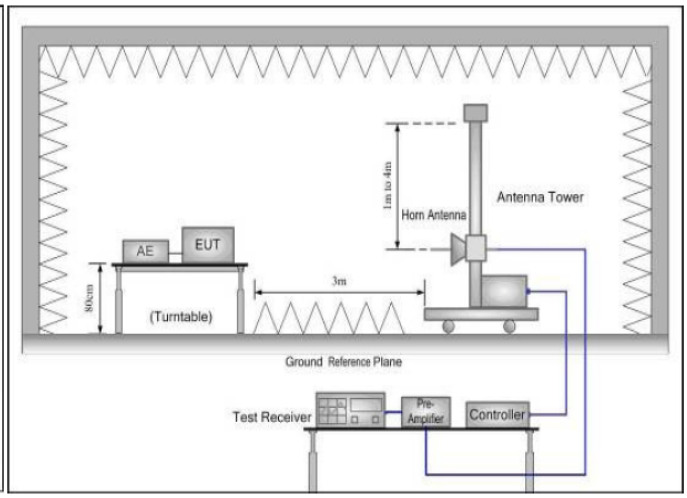
Frequency Band	Limit
GSM 850MHz	38.5 dBm (ERP)
PCS 1900 MHz	33 dBm (EIRP)
WCDMA Band V	38.5 dBm (ERP)

8.2. Test Setup

Below 1GHz



Above 1GHz



8.3. Test Procedure

(1) The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

(2) During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

(3) ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)

(4) EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:
EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB) Test Data

(5) The worse case was relating to the conducted output power.

8.4. Test Data

Measurement Data (worst case)

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
GSM850	251	H	V	31.21	38.45	PASSED
			H	25.12		PASSED
		E1	V	30.94		PASSED
			H	25.04		PASSED
		E2	V	31.09		PASSED
			H	25.07		PASSED

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
PCS1900	810	H	V	27.83	33.00	PASSED
			H	19.92		PASSED
		E1	V	27.16		PASSED
			H	19.72		PASSED
		E2	V	26.54		PASSED
			H	19.36		PASSED

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
UMTS 850 12.2k RMC	4183	H	V	20.26	38.45	PASSED
			H	13.91		PASSED
		E1	V	20.15		PASSED
			H	13.58		PASSED
		E2	V	20.12		PASSED
			H	13.63		PASSED

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
GPRS 850	251	H	V	29.65	38.45	PASSED
			H	23.07		PASSED
		E1	V	29.41		PASSED
			H	23.03		PASSED
		E2	V	29.38		PASSED
			H	22.85		PASSED

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
GPRS 1900	810	H	V	27.04	33.00	PASSED
			H	16.78		PASSED
		E1	V	26.21		PASSED
			H	16.63		PASSED
		E2	V	26.15		PASSED
			H	16.32		PASSED

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
EGPRS 850	251	H	V	25.32	38.45	PASSED
			H	21.46		PASSED
		E1	V	25.16		PASSED
			H	21.33		PASSED
		E2	V	25.14		PASSED
			H	21.31		PASSED

Mode	Channel	EUT Pol.	Antenna Pol.	ERP (dBm)	Limit (dBm)	Result
EGPRS 1900	810	H	V	24.11	33.00	PASSED
			H	15.73		PASSED
		E1	V	23.52		PASSED
			H	15.61		PASSED
		E2	V	23.45		PASSED
			H	15.36		PASSED

9. Field Strength of Spurious Radiation Measurement

9.1. Test Standard and Limit

9.1.1. Test Standard

FCC part 22.917(a) and FCC part 24.238(a)

9.1.2. Test Method

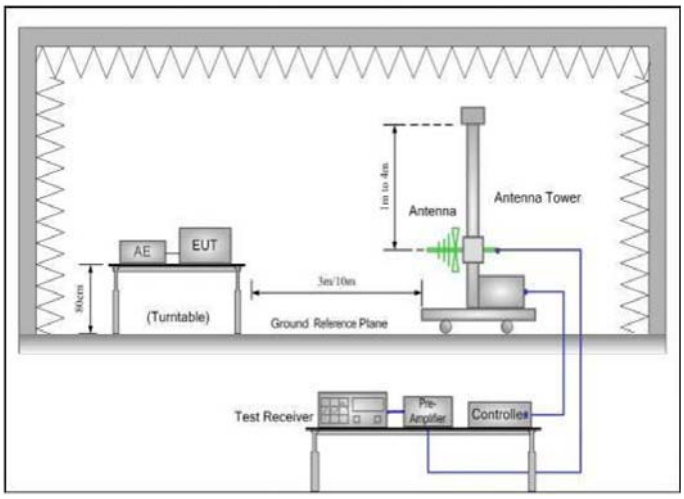
FCC part 2.1053

9.1.3. Test Limit

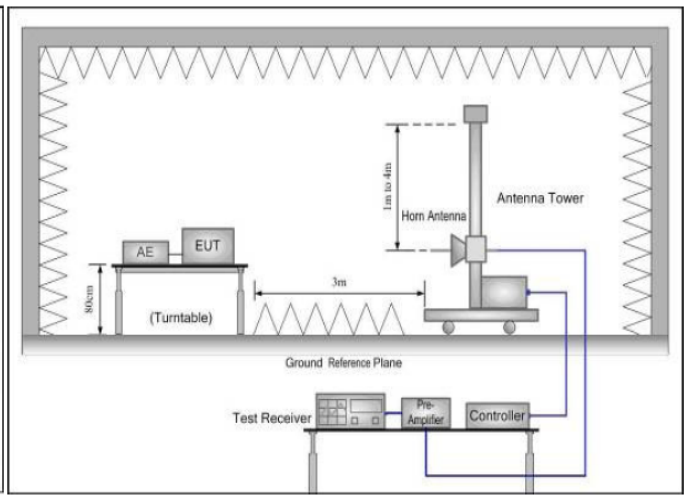
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power(P) by a factor of at least 43+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

9.2. Test Setup

Below 1GHz



Above 1GHz



9.3. Test Procedure

(1) The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

(2) During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

(3) The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

(4) The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.
ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) –Cable Loss (dB)

9.4. Test Data

Measurement Data (worst case)

Test mode	GSM850		Test channel	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-46.52	-13.00	Passed
2472.60	V	-45.60		Passed
3296.80	V	-49.65		Passed
4121.00	V	-42.98		Passed
4945.20	V	---		Passed
5769.40	V	---		Passed
1648.40	Horizontal	-45.38	-13.00	Passed
2472.60	H	-49.30		Passed
3296.80	H	-50.50		Passed
4121.00	H	-42.63		Passed
4945.20	H	---		Passed
5769.40	H	---		Passed

Test mode	GSM850		Test channel	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-45.49	-13.00	Passed
2509.80	V	-51.14		Passed
3346.40	V	-50.36		Passed
4183.00	V	-42.73		Passed
5019.60	V	---		Passed
5856.20	V	---		Passed
1673.20	Horizontal	-52.14	-13.00	Passed
2509.80	H	-49.88		Passed
3346.40	H	-49.72		Passed
4183.00	H	-37.72		Passed
5019.60	H	---		Passed
5856.20	H	---		Passed

Test mode	GSM850		Test channel	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-44.29	-13.00	Passed
2546.40	V	-51.74		Passed
3395.20	V	-48.00		Passed
4244.00	V	-43.63		Passed
5092.80	V	---		Passed
5941.60	V	---		Passed
1697.60	Horizontal	-53.78	-13.00	Passed
2546.40	H	-44.58		Passed
3395.20	H	-49.54		Passed
4244.00	H	-44.05		Passed
5092.80	H	---		Passed
5941.60	H	---		Passed

Remark：
1. The emission behavior belongs to narrowband spurious emission.
2. Remark”---“ means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode	PCS1900		Test channel	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-39.86	-13.00	Passed
5550.60	V	-42.63		Passed
7400.80	V	-40.58		Passed
9251.00	V	-35.27		Passed
11101.20	V	---		Passed
12951.40	V	---		Passed
3700.40	Horizontal	-43.65	-13.00	Passed
5550.60	H	-42.36		Passed
7400.80	H	-36.92		Passed
9251.00	H	-35.44		Passed
11101.20	H	---		Passed
12951.40	H	---		Passed

Test mode	PCS1900		Test channel	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-48.55	-13.00	Passed
5640.00	V	-42.82		Passed
7520.00	V	-38.19		Passed
9400.00	V	-37.24		Passed
11280.00	V	---		Passed
13160.00	V	---		Passed
3760.00	Horizontal	-46.13	-13.00	Passed
5640.00	H	-45.49		Passed
7520.00	H	-35.68		Passed
9400.00	H	-34.69		Passed
11280.00	H	---		Passed
13160.00	H	---		Passed

Test mode	PCS1900		Test channel	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-35.69	-13.00	Passed
5729.40	V	-41.28		Passed
7639.20	V	-41.63		Passed
9549.00	V	-38.98		Passed
11458.80	V	---		Passed
13368.60	V	---		Passed
3819.60	Horizontal	-47.08	-13.00	Passed
5729.40	H	-40.11		Passed
7639.20	H	-38.65		Passed
9549.00	H	-37.54		Passed
11458.80	H	---		Passed
13368.60	H	---		Passed

Remark：
1. The emission behavior belongs to narrowband spurious emission.
2. Remark”---“ means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode	UMTS850 12.2k RMC		Test channel	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-56.71	-13.00	Passed
2479.20	V	-41.85		Passed
3305.60	V	-50.88		Passed
4132.00	V	-45.89		Passed
4958.40	V	---		Passed
5784.80	V	---		Passed
1652.80	Horizontal	-58.70	-13.00	Passed
2479.20	H	-51.38		Passed
3305.60	H	-48.53		Passed
4132.00	H	-46.54		Passed
4958.40	H	---		Passed
5784.80	H	---		Passed

Test mode	UMTS850 12.2k RMC		Test channel	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1672.00	Vertical	-55.95	-13.00	Passed
2508.00	V	-43.20		Passed
3344.00	V	-50.77		Passed
4180.00	V	-46.04		Passed
5016.00	V	---		Passed
5852.00	V	---		Passed
1672.00	Horizontal	-56.85	-13.00	Passed
2508.00	H	-45.63		Passed
3344.00	H	-52.34		Passed
4180.00	H	-49.63		Passed
5016.00	H	---		Passed
5852.00	H	---		Passed

Test mode	UMTS850 12.2k RMC		Test channel	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-56.45	-13.00	Passed
2539.80	V	-42.96		Passed
3386.40	V	-50.22		Passed
4233.00	V	-48.63		Passed
5079.60	V	---		Passed
5926.20	V	---		Passed
1693.20	Horizontal	-58.77	-13.00	Passed
2539.80	H	-50.12		Passed
3386.40	H	-50.33		Passed
4233.00	H	-47.14		Passed
5079.60	H	---		Passed
5926.20	H	---		Passed

Remark：
1. The emission behavior belongs to narrowband spurious emission.
2. Remark”---“ means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

10. Frequency stability V.S. Temperature Measurement

10.1. Test Standard and Limit

10.1.1. Test Standard

FCC part 2.1055(a)(1)(b)

10.1.2. Test Method

FCC part 2.1055(a)(1)(b)

10.1.3. Test Limit

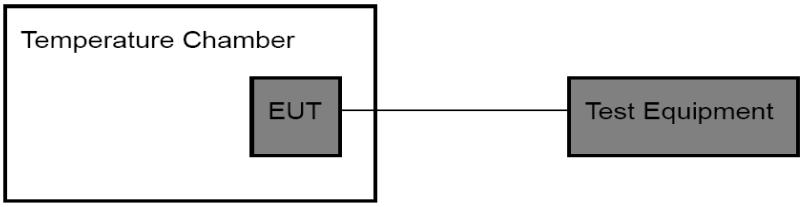
According to FCC section 22.355 the carrier frequency of each transmitter in the Public Mobile Services must be maintained within tolerances given in the table below:

Frequency Range (MHz)	Base, fixed (ppm)	Mobile≤3 watts (ppm)	Mobile≤3 watts (ppm)
25 ~ 50	20.0	20.0	50.0
50 ~ 450	5.0	5.0	50.0
450~ 512	2.5	5.0	5.0
812 ~896	1.5	2.5	2.5
928 ~929	5.0	N/A	N/A
929~ 960	1.5	N/A	N/A
2110 ~ 2220	10.0	N/A	N/A

According to FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

10.2. Test Setup

For Temperature Test:



10.3. Test Procedure

(1) The equipment under test was connected to an external DC power supply and input rated voltage.
(2) RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
(3) The EUT was placed inside the temperature chamber.
(4) Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
(5) Turn EUT off and set the chamber temperature to －30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
(6) Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached

10.4. Test Data

Measurement Data:

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	48	0.057375	2.5	Passed
	-20	56	0.066938		
	-10	35	0.041836		
	0	45	0.053789		
	10	36	0.043031		
	20	39	0.046617		
	30	37	0.044227		
	40	45	0.053789		
	50	46	0.054984		

Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	48	0.025532	2.5	Passed
	-20	55	0.029255		
	-10	46	0.024468		
	0	37	0.019681		
	10	35	0.018617		
	20	39	0.020745		
	30	45	0.023936		
	40	30	0.015957		
	50	39	0.020745		

Reference Frequency: GPRS 850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	44	0.052594	2.5	Passed
	-20	52	0.062156		
	-10	36	0.043031		
	0	41	0.049008		
	10	38	0.045422		
	20	36	0.043031		
	30	33	0.039445		
	40	42	0.050203		
	50	43	0.051399		

Reference Frequency: GPRS 1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	46	0.024468	2.5	Passed
	-20	53	0.028191		
	-10	41	0.021809		
	0	39	0.020745		
	10	36	0.019149		
	20	38	0.020213		
	30	43	0.022872		
	40	32	0.017021		
	50	37	0.019681		

Reference Frequency: EGPRS 850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	41	0.049008	2.5	Passed
	-20	45	0.053789		
	-10	38	0.045422		
	0	42	0.050203		
	10	32	0.038250		
	20	35	0.041836		
	30	41	0.049008		
	40	42	0.050203		
	50	47	0.056180		

Reference Frequency: EGPRS 1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	38	0.020213	2.5	Passed
	-20	42	0.022340		
	-10	35	0.018617		
	0	37	0.019681		
	10	31	0.016489		
	20	38	0.020213		
	30	41	0.021809		
	40	25	0.013298		
	50	43	0.022872		

Reference Frequency: UMTS850 12.2k RMC Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	43	0.051399	2.5	Passed
	-20	40	0.047813		
	-10	37	0.044227		
	0	39	0.046617		
	10	45	0.053789		
	20	43	0.051399		
	30	38	0.045422		
	40	49	0.058570		
	50	37	0.044227		

Reference Frequency: UMTS850 HSDPA Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	38	0.045422	2.5	Passed
	-20	32	0.038250		
	-10	46	0.054984		
	0	45	0.053789		
	10	47	0.056180		
	20	39	0.046617		
	30	46	0.054984		
	40	30	0.035859		
	50	33	0.039445		

Reference Frequency: UMTS850 HSUPA Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	**Temperature (℃)**	**Frequency error**		**Limit (ppm)**	**Result**
		Hz	**ppm**		
3.70	-30	49	0.058570	2.5	Passed
	-20	45	0.053789		
	-10	53	0.063352		
	0	47	0.056180		
	10	40	0.047813		
	20	52	0.062156		
	30	46	0.054984		
	40	42	0.050203		
	50	51	0.060961		

11. Frequency stability V.S. Voltage Measurement

11.1. Test Standard and Limit

11.1.1. Test Standard

FCC part 2.1055(d)(1)(2)

11.1.2. Test Method

FCC part 2.1055(d)(1)(2)

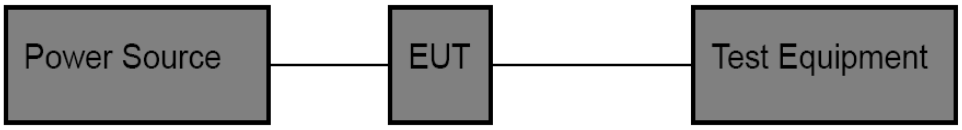
11.1.3. Test Limit

According to FCC section 22.355 the carrier frequency of each transmitter in the Public Mobile Services must be maintained within tolerances given in the table below:

Frequency Range (MHz)	Base, fixed (ppm)	Mobile≤3 watts (ppm)	Mobile≤3 watts (ppm)
25 ~ 50	20.0	20.0	50.0
50 ~ 450	5.0	5.0	50.0
450~ 512	2.5	5.0	5.0
812 ~896	1.5	2.5	2.5
928 ~929	5.0	N/A	N/A
929~ 960	1.5	N/A	N/A
2110 ~ 2220	10.0	N/A	N/A

According to FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

11.2. Test Setup



11.3. Test Procedure

(1) Set chamber temperature to 25℃. Use a variable DC power source to power the EUT and set the voltage to rated voltage.

(2) Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

(3) Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

11.4. Test Data

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	40	0.047813	2.5	Passed
	3.70	50	0.059766		
	3.40	43	0.051399		

Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	46	0.024468	2.5	Passed
	3.70	55	0.029255		
	3.40	34	0.018085		

Reference Frequency: GPRS 850 Middle channel=190 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	43	0.051399	2.5	Passed
	3.70	39	0.046617		
	3.40	45	0.053789		

Reference Frequency: GPRS 1900 Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	39	0.020745	2.5	Passed
	3.70	46	0.024468		
	3.40	37	0.019681		

Reference Frequency: EGPRS 850 Middle channel=190 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	38	0.045422	2.5	Passed
	3.70	47	0.056180		
	3.40	41	0.049008		

Reference Frequency: EGPRS 1900 Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	45	0.023936	2.5	Passed
	3.70	53	0.028191		
	3.40	34	0.018085		

Reference Frequency: UMTS 850 12.2k RMC Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	43	0.051399	2.5	Passed
	3.70	45	0.053789		
	3.40	42	0.050203		

Reference Frequency: UMTS 850 HSDPA Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	47	0.056180	2.5	Passed
	3.70	40	0.047813		
	3.40	45	0.053789		

Reference Frequency: UMTS 850 HSUPA Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	43	0.051399	2.5	Passed
	3.70	36	0.043031		
	3.40	45	0.053789		