

FCC 47 CFR PART 22H and 24E

Product Type : Tracker

Applicant : GlobalSat Technology Corporation

Address : 16F., No. 186, Jian Yi Road, Chung Ho City, Taipei hsien,
Taiwan

Trade Name : GlobalSat

Model Number : TR151-SP

Test Specification : FCC 47 CFR PART 22H: Oct, 2009
FCC 47 CFR PART 24E: Oct, 2009
ANSI/TIA-603-C 2004

Issue Date : Aug. 27, 2010

Issue by

A Test Lab Techno Corp.
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Taoyuan County 334, Taiwan R.O.C.
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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Aug. 27, 2010	Initial Issue	

Verification of Compliance

Issued Date: 2010/08/27

Product Type : Tracker

Applicant : GlobalSat Technology Corporation

Address : 16F., No. 186, Jian Yi Road, Chung Ho City, Taipei hsien,
Taiwan

Trade Name : GlobalSat

Model Number : TR151-SP

FCC ID : RID-TR151-SP

EUT Rated Voltage : DC 5.0V, 2.0A

Test Voltage : 120 Vac / 60 Hz

Applicable : FCC 47 CFR PART 22H: Oct, 2009

Standard : FCC 47 CFR PART 24E: Oct, 2009
ANSI/TIA-603-C 2004

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
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1330
<http://www.atl-lab.com.tw/e-index.htm>



The above equipment was tested by A Test Lab Techno Corp. 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: 2003 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 22H, Part 24E.
The test results of this report relate only to the tested sample identified in this report.

Approved By : Miller Lee Reviewed By : Gary Wu
(Manager) (Miller Lee) (Testing Engineer) (Gary Wu)

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1 General Information

1.1. EUT Description

Applicant		GlobalSat Technology Corporation			
Applicant Address		16F., No. 186, Jian Yi Road, Chung Ho City, Taipei hsien, Taiwan			
Manufacturer		GlobalSat Technology Corporation			
Manufacturer Address		16F., No. 186, Jian Yi Road, Chung Ho City, Taipei hsien, Taiwan			
Product Type		Tracker			
Trade Name		GlobalSat			
Model Number		TR151-SP			
FCC ID		RID-TR151-SP			
Mode	GSM/GPRS	Band	UL Frequency (MHz)	DL Frequency (MHz)	Modulation
		850	824.2 ~ 848.8	869.2 ~ 893.8	GMSK/8PSK
		1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8	GMSK/8PSK
Channel Control		Auto			
Type of Antenna		Monopole Antenna			
Antenna Gain (dBi)		GSM/GPRS 850: 3.9 dBi GSM/GPRS 1900: 1.5 dBi			
Max. RF Output power		GSM/GPRS 850: 32.60 dBm / 1.820 W GSM/GPRS 1900: 28.80 dBm / 0.759 W			
Max. ERP/EIRP		GSM/GPRS 850: 35.23 dBm / 3.334 W GSM/GPRS 1900: 30.26 dBm / 1.062 W			
Emission Designator		GSM/GPRS 850: 248KGXW GSM/GPRS 1900: 245KGXW			
Component					
Battery		TEKOCELL, TE-HC0A0A0 DC 3.7V, 15000mAh			
Power Adapter		Touch Electronic co., Ltd., SA08-10US05R-A Input:100-240Vac, 50-60Hz, 0.5A Output: 5.0 Vdc, 2.0A Cable out: Non-Shielded, 1.76 m			

1.2. Mode of Operation

ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: GSM 850 Link
Mode 2: GSM 1900 Link

Note: Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

Tested System Details

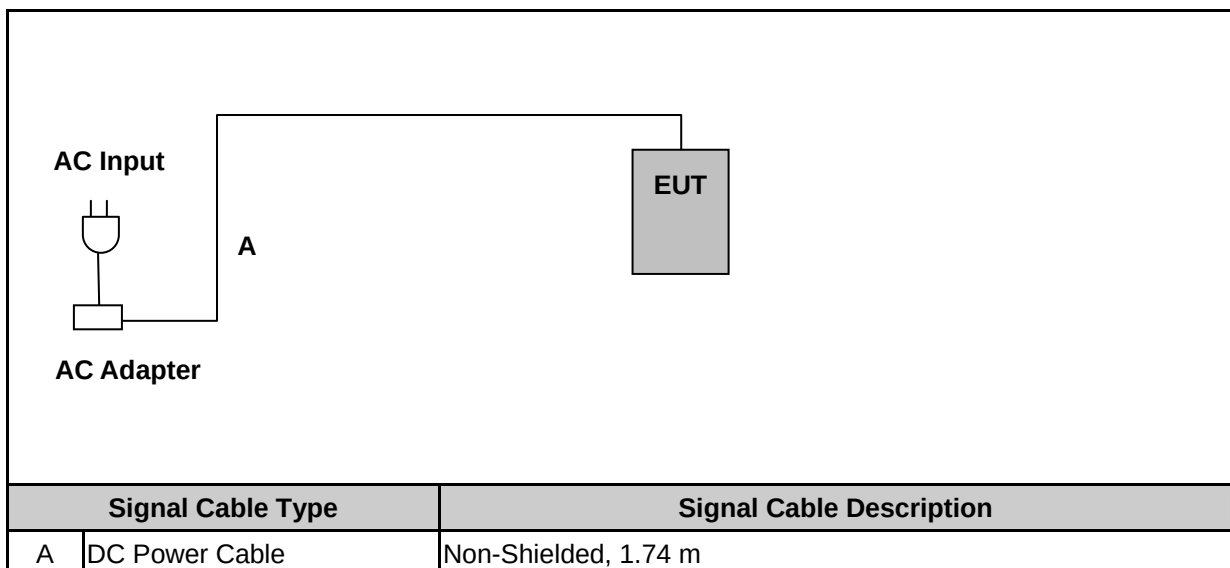
The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model Number	Serial Number	Power Cord
1.	Universal Radio Communication Tester	R&S	CMU200	109369	N/A

1.3. EUT Exercise Software

1.	Setup the EUT and Base Station (CMU200) as shown on 1.4.
2.	Turn on the power of all equipment.

1.4. Configuration of Test System Details



1.5. Test Site Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	25
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950

1.6. Summary of Test Result

Description	FCC Rule	IC Rule	Limit	Result
Conducted Output Power	§2.1046	N/A	N/A	Pass
Effective Radiated Power	§22.913(a)(2)	RSS-132(4.4) SRSP-503(5.1.3)	< 7 Watts for FCC (<6.3 Watts for IC)	Pass
Equivalent Isotropic Radiated Power	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	< 2 Watts	Pass
Occupied Bandwidth	§2.1049 §22.917(a) §24.238(a)	N/A	N/A	Pass
Band Edge Measurement	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1)RSS-133 (6.5.1)	< 43+10log ₁₀ (P[Watts])	Pass
Conducted Emission	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	< 43+10log ₁₀ (P[Watts])	Pass
Field Strength of Spurious Radiation	§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	< 43+10log ₁₀ (P[Watts])	Pass
Frequency Stability for Temperature & Voltage	§2.1055 §22.355 §24.235	RSS-132(4.3) RSS-133(6.3)	< 2.5 ppm	Pass

2 RF Output Power Test

2.1. Limit

N/A

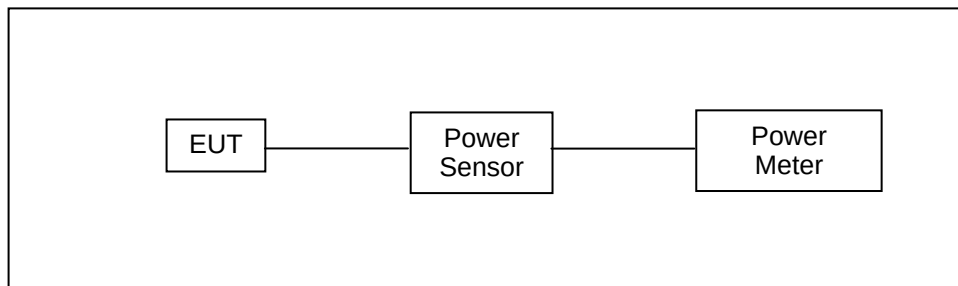
2.2. Test Instruments

Describe	Manufacturer	Model No.	Serial No.	Cal. Date	Remark
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	109369	07/29/2009	(2)
Single Channel PK Power Sensor	Agilent	N1911A	MY45101619	07/19/2010	(1)
Wideband Power Meter	Agilent	N1921A	MY45241957	07/19/2010	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

2.3. Test Setup



2.4. Test Procedure

The measurement is made according to ANSI/TIA-603-C-2004 as follows:

1. The transmitter output was connected to power meter and base station through power divider.
2. Set base station for EUT at GSM 850: PCL=5 and PCS 1900: PCL=0.
3. Set base station for EUT at WCDMA Band V and WCDMA Band II, power level was set to maximum.
4. Select lowest, middle, and highest channels for each band.

2.5. Uncertainty

The measurement uncertainty is defined as for RF output power measurement is 1.2 dB.

2.6. Test Result

Model Number	TR151-SP					
Test Item	RF Output Power					
Date of Test	07/21/2010			Test Site	TE02	
Bands	Data Rate	Frequency (MHz)	Time-Average Power		Peak Power	
			(dBm)	(W)	(dBm)	(W)
GSM 850	-----	824.2	23.06	0.202	32.35	1.718
		836.4	23.21	0.209	32.50	1.778
		848.8	23.31	0.214	32.60	1.820
GRRS 850	4Down1Up	824.2	22.54	0.179	31.83	1.524
		836.4	22.69	0.186	31.98	1.578
		848.8	22.79	0.190	32.08	1.614
	3Down2Up	824.2	25.49	0.354	31.82	1.521
		836.4	25.64	0.366	31.97	1.574
		848.8	25.74	0.375	32.07	1.611
GSM 1900	-----	1850.20	19.51	0.089	28.80	0.759
		1880.00	19.15	0.082	28.44	0.698
		1909.80	19.19	0.083	28.48	0.705
GRRS 1900	4Down1Up	1850.20	19.45	0.088	28.74	0.748
		1880.00	19.10	0.081	28.39	0.690
		1909.80	19.15	0.082	28.44	0.698
	3Down2Up	1850.20	22.44	0.175	28.77	0.753
		1880.00	22.07	0.161	28.40	0.692
		1909.80	22.11	0.162	28.44	0.698

Note: The peak power testing result was used peak detector.

3 Effective Radiated Power / Equivalent Isotropic Radiated Power Test

3.1. Limit

For FCC Part 22.913(a)(2): The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC Part 24.232(b): The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 2 Watts.

3.2. Test Instruments

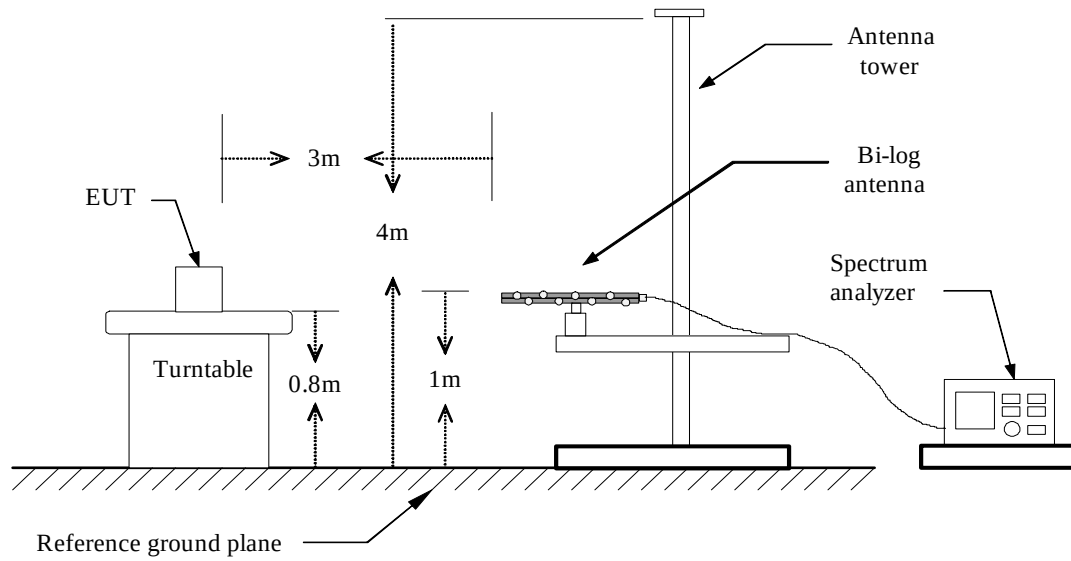
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/07/2009	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	02/24/2010	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2010	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2010	(1)
Bi-log Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	08/02/2010	(1)
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/29/2010	(1)
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/29/2010	(1)
Test Site	ATL	TE01	888001	07/30/2010	(1)

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

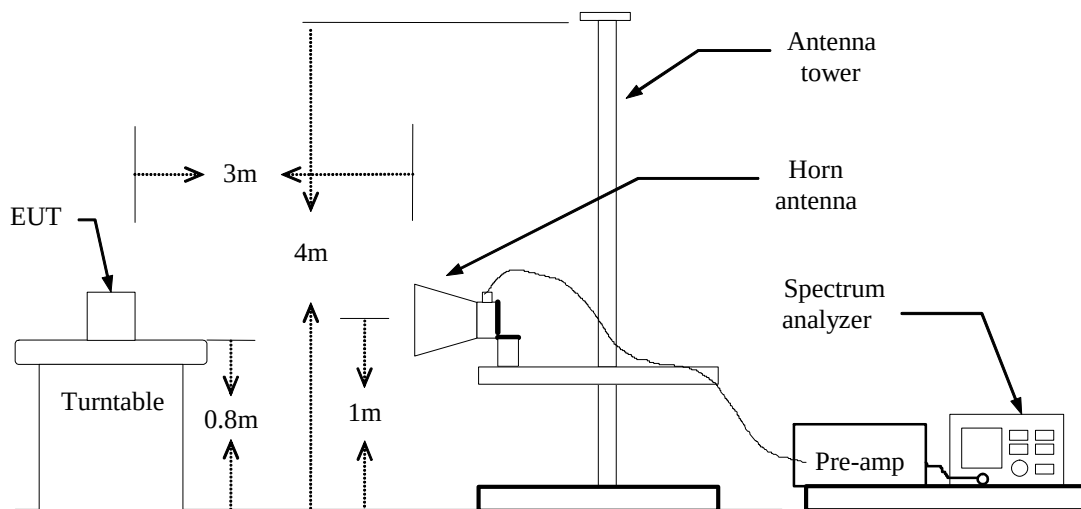
NOTE: N.C.R. = No Calibration Request.

3.3. Test Setup

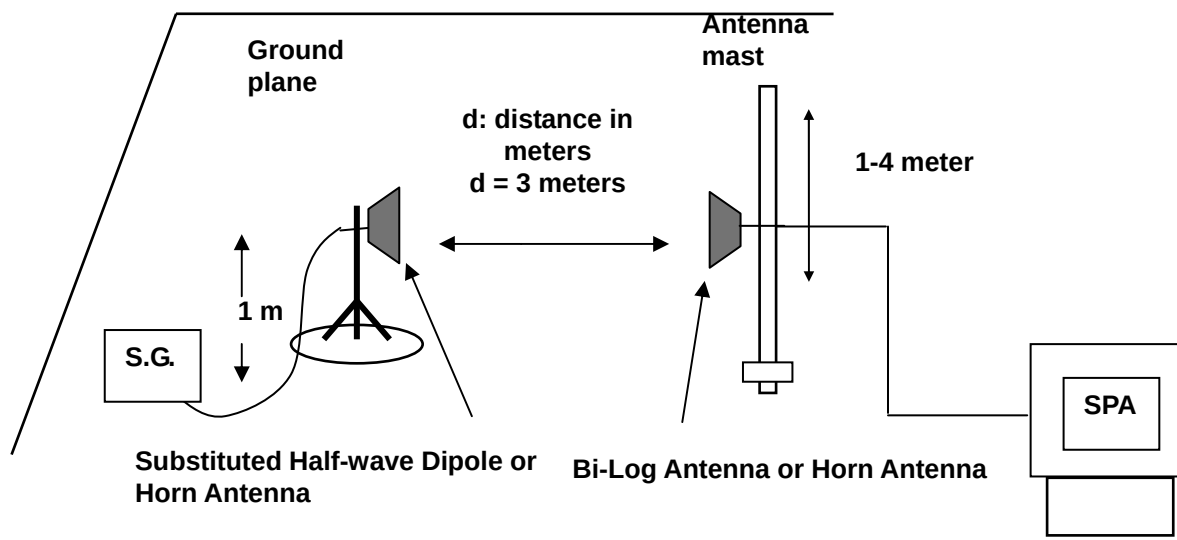
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



3.4. Test Procedure

The measurement is made according to ANSI/TIA-603-C-2004 as follows:

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.

During the measurement of the EUT, the resolution bandwidth was set to 3MHz and the average bandwidth was set to 3MHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824-849MHz, and EIRP in frequency band 1851.25 –1910MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849MHz) or horn antenna (1851.25-1910MHz) connected to a signal generator. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

3.5. Uncertainty

The measurement uncertainty is defined as for Field Strength of Spurious Radiation measurement is ± 3.072 dB.

3.6. Test Result

Model Number	TR151-SP						
Test Item	ERP/EIRP						
Test Mode	Mode 1: GSM 850 Link						
Date of Test	07/27/2010				Test Site	TE01	
Bands	Frequency (MHz)	Ant. Polar.	Read Level (dBm)	Correction factor (dB)	ERP		Limit
					(dBm)	(W)	
GSM 850	824.2	H	15.79	8.66	24.45	0.279	< 7W
		V	21.12	7.85	28.97	0.789	< 7W
	836.4	H	17.21	10.26	27.47	0.558	< 7W
		V	23.63	7.97	31.60	1.445	< 7W
	848.8	H	19.56	11.62	31.18	1.312	< 7W
		V	27.37	7.86	35.23	3.334	< 7W

Model Number	TR151-SP						
Test Item	ERP/EIRP						
Test Mode	Mode 2: GSM 1900 Link						
Date of Test	07/27/2010				Test Site	TE01	
Bands	Frequency (MHz)	Ant. Polar.	Read Level (dBm)	Correction factor (dB)	EIRP		Limit
					(dBm)	(W)	
GSM 1900	1850.20	H	13.45	10.42	23.87	0.244	< 2W
		V	22.00	8.26	30.26	1.062	< 2W
	1880.00	H	11.98	10.44	22.42	0.175	< 2W
		V	20.42	8.50	28.92	0.780	< 2W
	1909.80	H	13.27	10.44	23.71	0.235	< 2W
		V	20.41	8.73	29.14	0.820	< 2W

Note: 1. ERP/EIRP = Read Level + Correction factor.

2. For WCDMA signals, a peak detector is used with RBW = VBW = 5MHz.

3. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW= 1 MHz.

4 Occupied Bandwidth Test

4.1. Limit

The Occupied Bandwidth Limit:

N/A.

The Band Edge Limit:

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

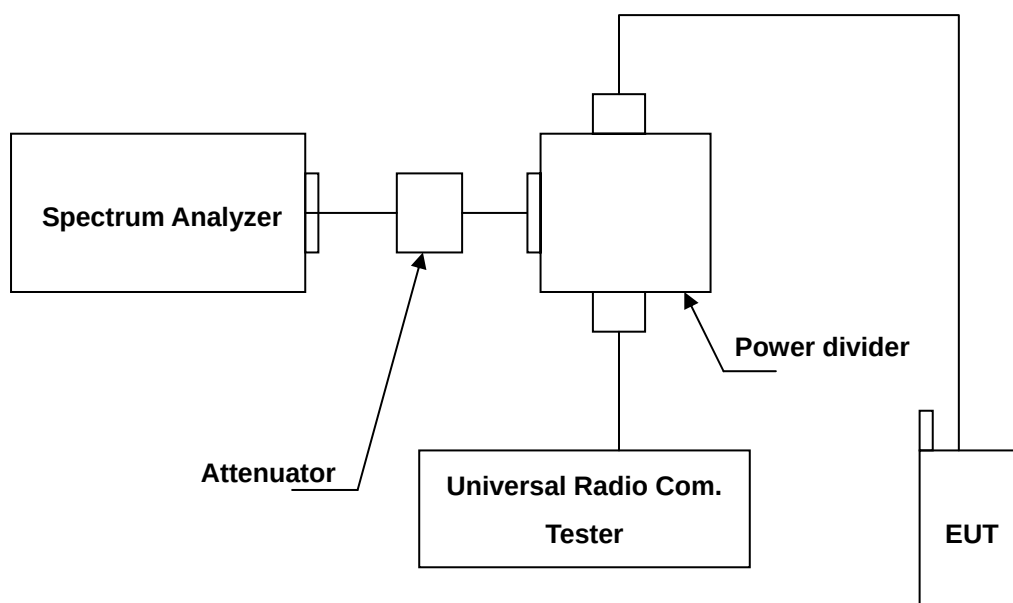
4.2. Test Instruments

Describe	Manufacturer	Model No.	Serial No.	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/14/2009	(2)
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	109369	07/29/2009	(2)
Attenuator	RADIALL	R41572000	0603033073	N.C.R.	-----
Power divider	Agilent	87302C	3239A00760	N.C.R.	-----
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

4.3. Setup



4.4. Test Procedure

The measurement is made according to FCC rules part 22 and 24:

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The occupied bandwidth of middle channel for the highest and lowest RF powers was measured.
3. The band edge of low and high channels for the highest RF powers within the transmitting frequency band were measured. Setting RBW as roughly BW/100.
4. The band edge setting:
 - a. RB=3 kHz; VB=3 kHz for GSM 850 and PCS 1900.
 - b. RB=51 kHz; VB=160 kHz for WCDMA Band V and WCDMA Band II.

4.5. Uncertainty

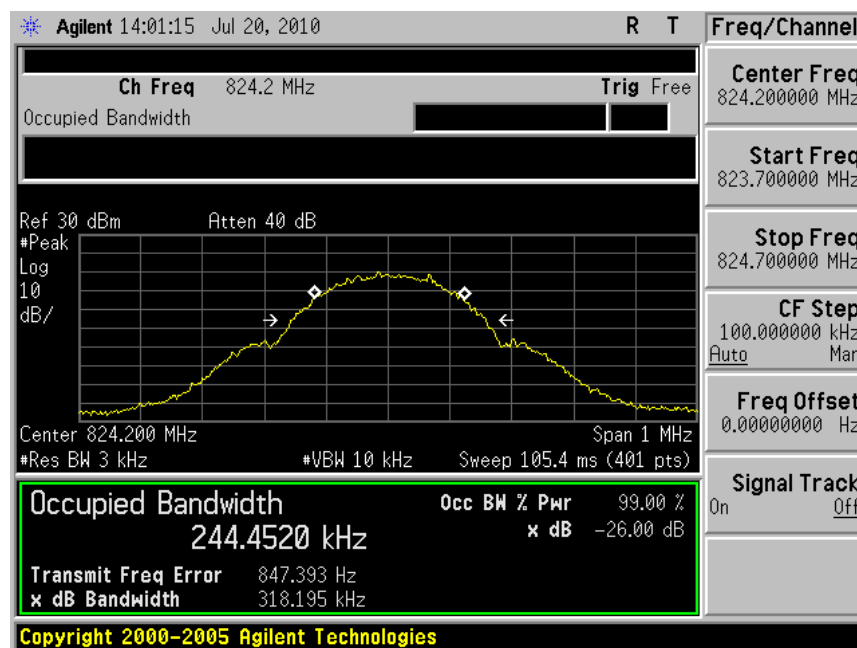
The measurement uncertainty is defined as $\pm 10\text{Hz}$

4.6. Test Result

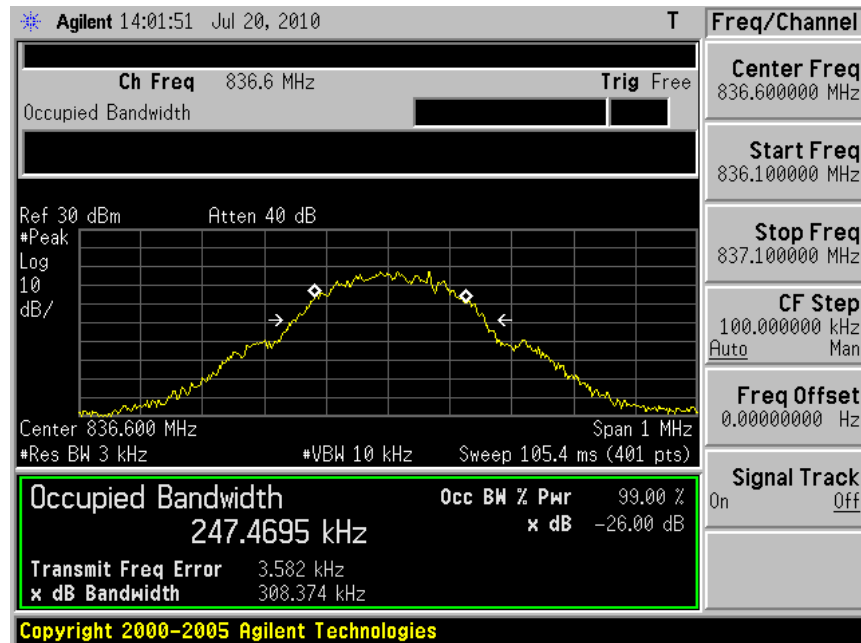
99% Occupied Bandwidth

Model Number	TR151-SP		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	07/20/2010	Test Site	TE02
Channel No.	Frequency (MHz)	99% Bandwidth (kHz)	Note
128	824.2	244.4520	RBW:3KHz , VBW:10KHz
190	836.4	247.4695	RBW:3KHz , VBW:10KHz
251	848.8	243.9960	RBW:3KHz , VBW:10KHz

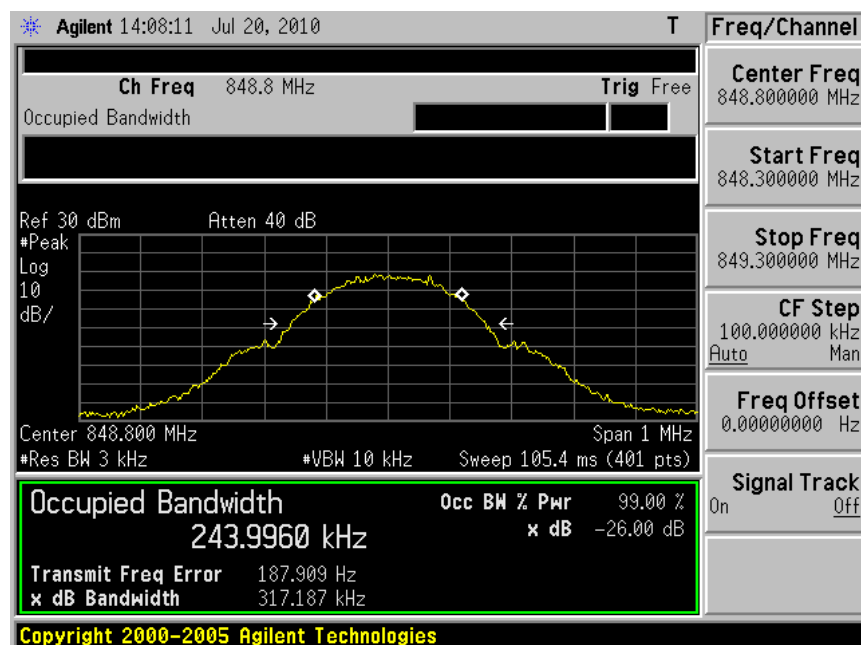
Channel 128



Channel 190

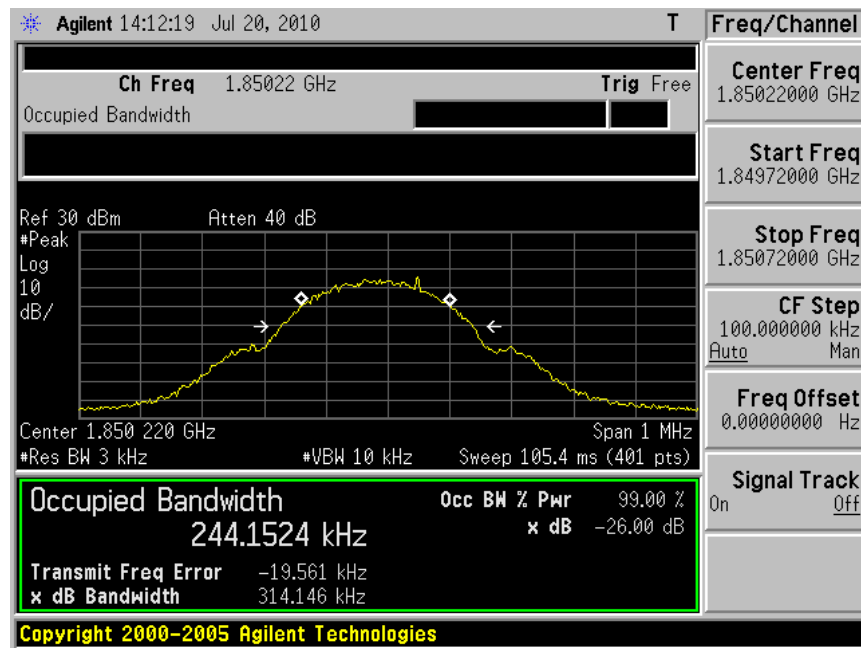


Channel 251

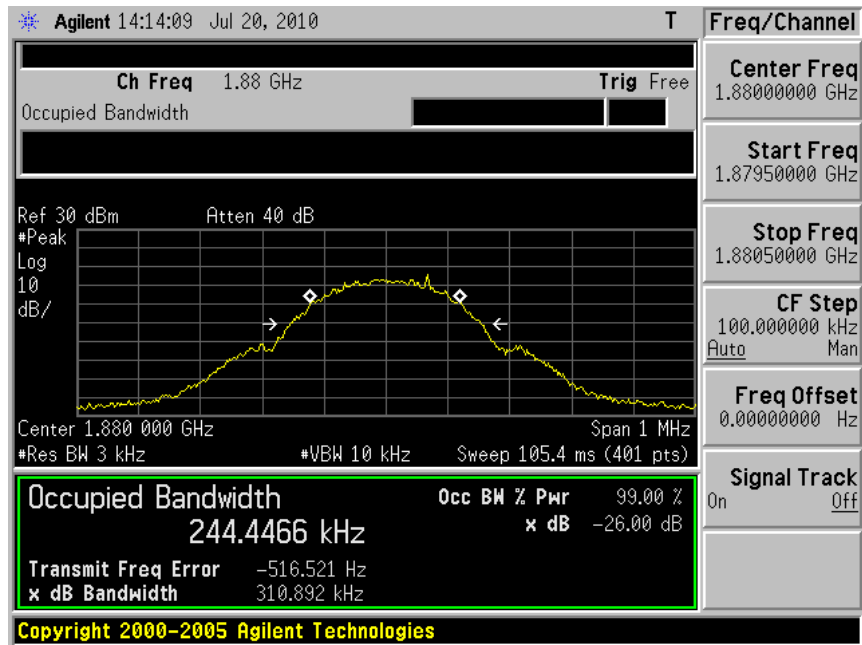


Model Number	TR151-SP		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: GSM 1900 Link		
Date of Test	07/20/2010	Test Site	TE02
Channel No.	Frequency (MHz)	99% Bandwidth (kHz)	Note
512	1850.20	244.1524	RBW:3KHz , VBW:10KHz
661	1880.00	244.4466	RBW:3KHz , VBW:10KHz
810	1909.80	242.9293	RBW:3KHz , VBW:10KHz

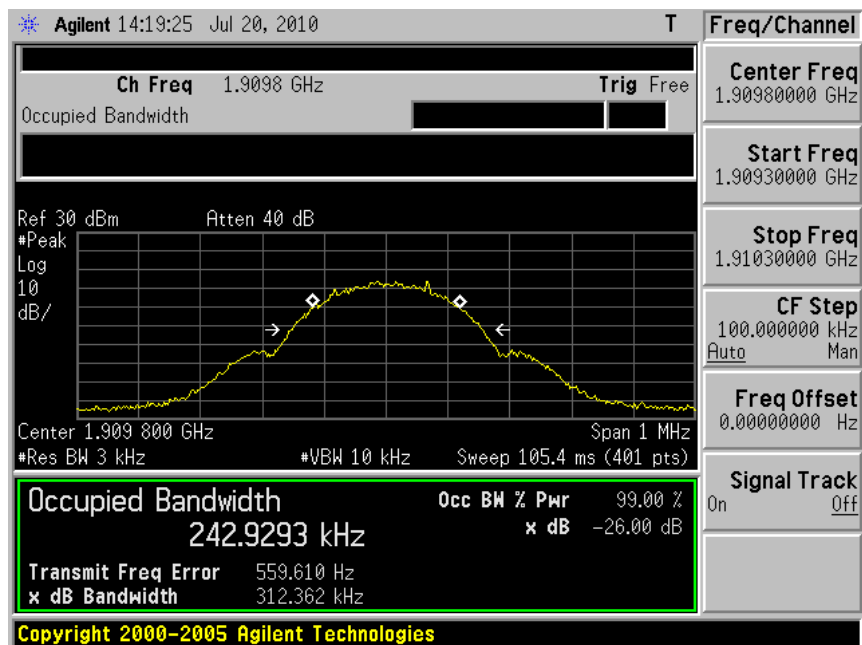
Channel 512



Channel 661



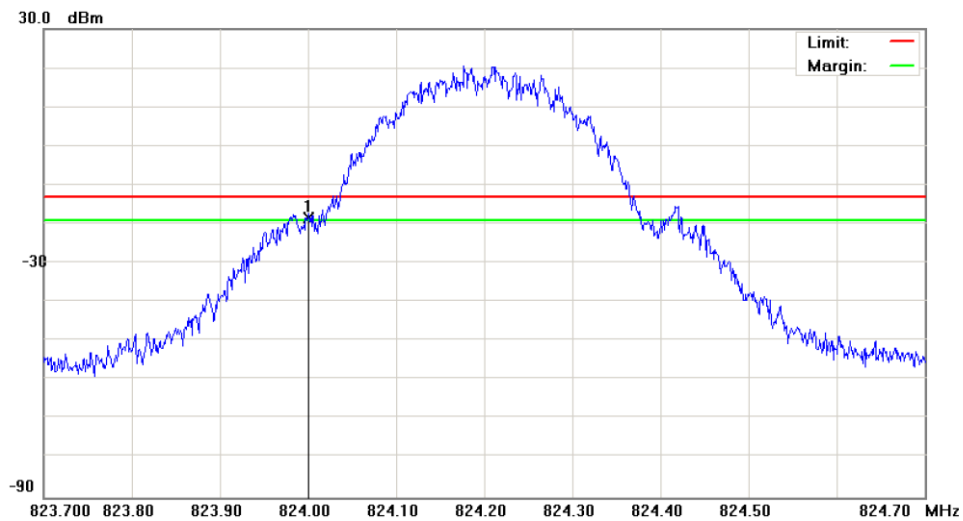
Channel 810



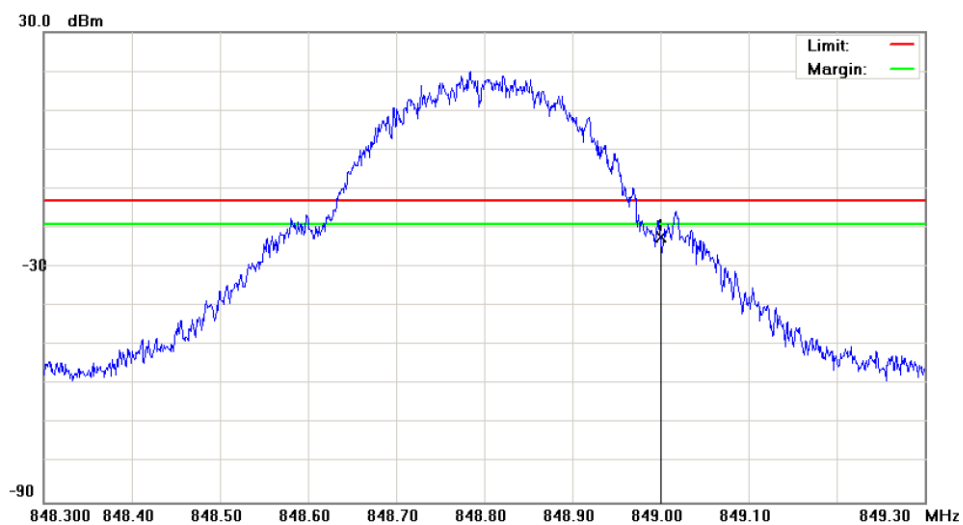
Band Edge

Model Number	TR151-SP				
Test Item	Band Edge				
Test Mode	Mode 1: GSM 850 Link				
Date of Test	07/21/2010		Test Site	TE02	
Band	Channel	Frequency (MHz)	Bandwidth (dBm)	Limit (dBm)	Result
Lower	128	824.0000	-18.57	-13	Pass
Higher	251	849.0000	-22.47	-13	Pass

Lower Band

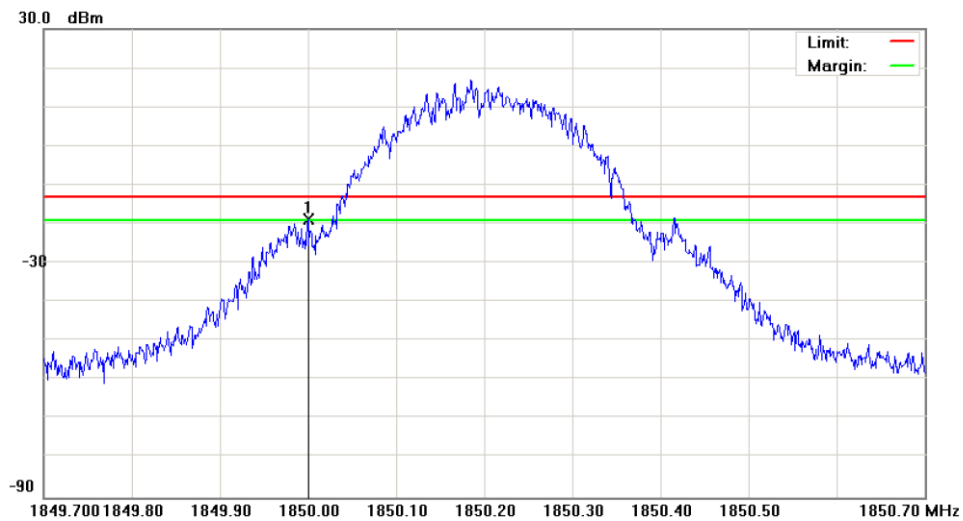


Higher Band

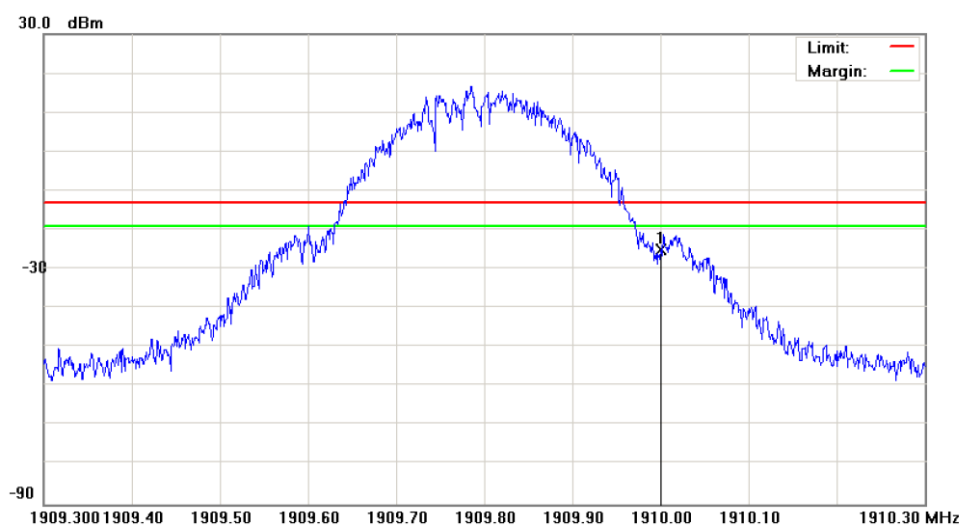


Model Number	TR151-SP				
Test Item	Band Edge				
Test Mode	Mode 2: GSM 1900 Link				
Date of Test	07/21/2010		Test Site	TE02	
Band	Channel	Frequency (MHz)	Bandwidth (dBm)	Limit (dBm)	Result
Lower	512	1850.000	-18.86	-13	Pass
Higher	810	1910.000	-25.01	-13	Pass

Lower Band



Higher Band



5 Conducted Emission Test

5.1. Limit

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

5.2. Test Instruments

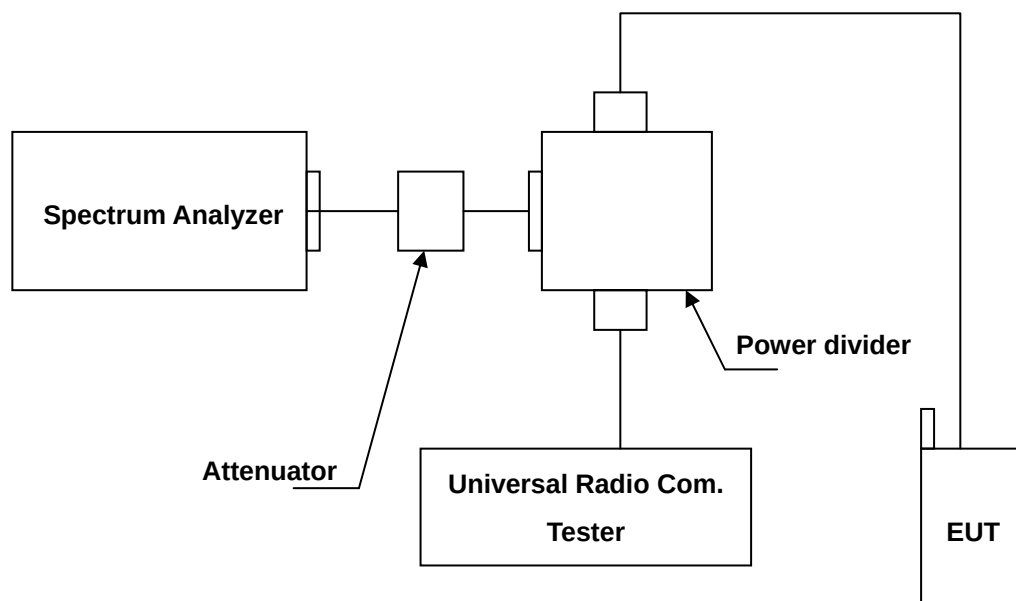
Describe	Manufacturer	Model No.	Serial No.	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/14/2009	(2)
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	109369	07/29/2009	(2)
Attenuator	RADIALL	R41572000	0603033073	N.C.R.	-----
Power divider	Agilent	87302C	3239A00760	N.C.R.	-----
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

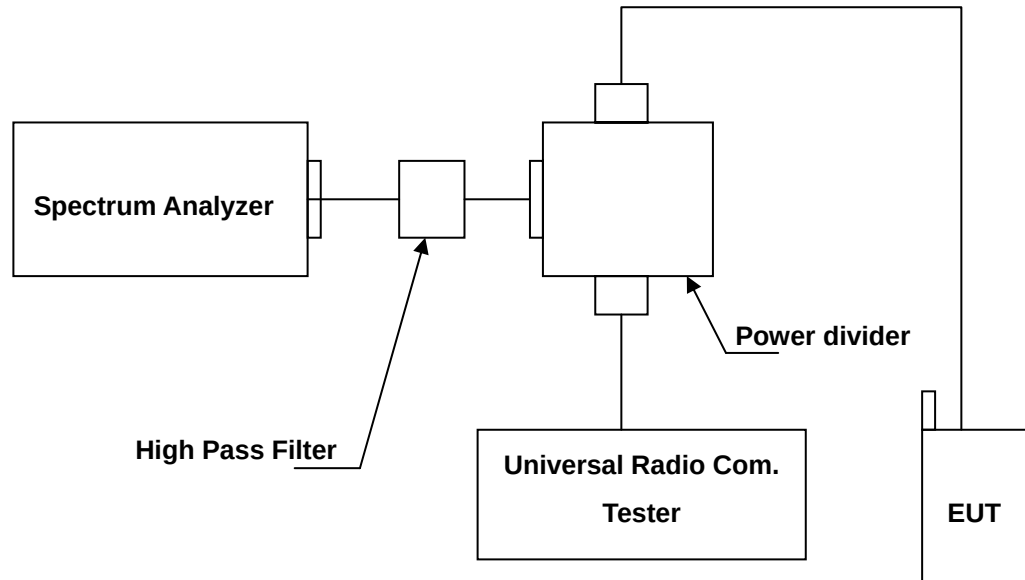
NOTE: N.C.R. = No Calibration Request.

5.3. Setup

Below 2.8GHz



Above 2.8GHz



5.4. Test Procedure

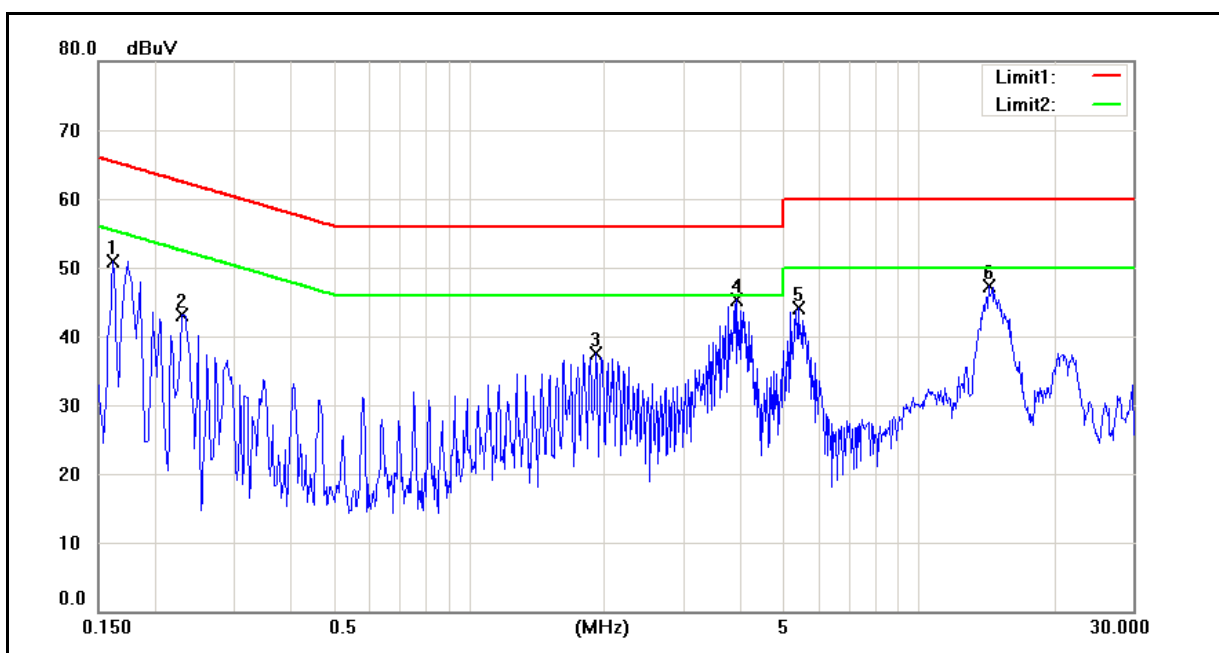
1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.
4. Test setting at GSM 850 RB>100 kHz, VB>100 kHz; PCS 1900 RB>1MHz, VB>1MHz.

5.5. Uncertainty

The measurement uncertainty is evaluated as ± 2.24 dB.

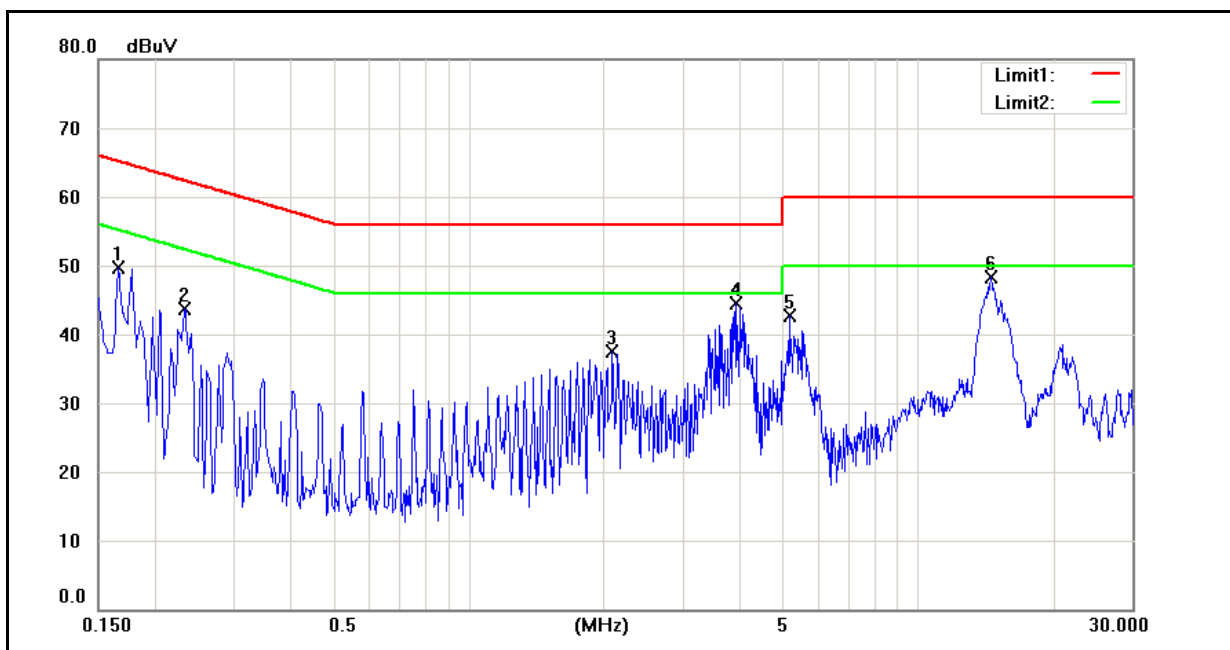
5.6. Test Result

Standard:	FCC Part 15B Class B(QP)	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	2010/08/17
		Test By:	Gary Wu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1620	32.72	8.43	9.60	42.32	18.03	65.36	55.36	-23.04	-37.33	Pass
2	0.2300	30.19	20.41	9.59	39.78	30.00	62.45	52.45	-22.67	-22.45	Pass
3	1.9220	26.07	22.38	9.61	35.68	31.99	56.00	46.00	-20.32	-14.01	Pass
4	3.9580	32.45	22.03	9.63	42.08	31.66	56.00	46.00	-13.92	-14.34	Pass
5	5.4140	32.91	20.60	9.65	42.56	30.25	60.00	50.00	-17.44	-19.75	Pass
6	14.3340	30.98	24.48	9.76	40.74	34.24	60.00	50.00	-19.26	-15.76	Pass

Standard:	FCC Part 15B Class B (QP)	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	2010/08/17
		Test By:	Gary Wu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1660	31.03	12.73	9.59	40.62	22.32	65.16	55.16	-24.54	-32.84	Pass
2	0.2340	32.19	22.10	9.58	41.77	31.68	62.31	52.31	-20.54	-20.63	Pass
3	2.0940	25.95	22.02	9.60	35.55	31.62	56.00	46.00	-20.45	-14.38	Pass
4	3.9580	32.79	22.59	9.62	42.41	32.21	56.00	46.00	-13.59	-13.79	Pass
5	5.1820	28.84	17.51	9.64	38.48	27.15	60.00	50.00	-21.52	-22.85	Pass
6	14.5820	31.38	24.14	9.80	41.18	33.94	60.00	50.00	-18.82	-16.06	Pass

6 Field Strength of Spurious Radiation Test

6.1. Limit

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

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

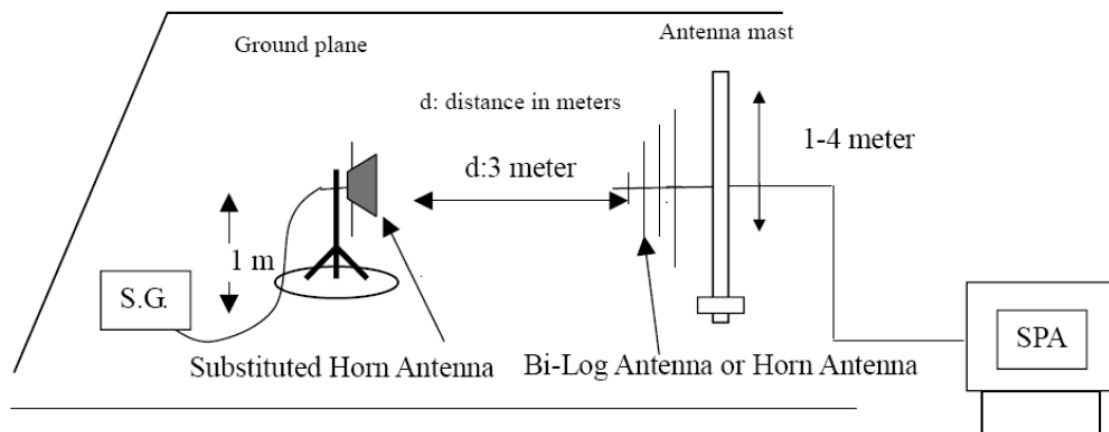
6.2. Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/27/2009	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/20/2009	(2)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2010	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2010	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	06/23/2009	(2)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	07/01/2009	(2)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/30/2009	(2)
Test Site	ATL	TE01	TE01	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

6.3. Setup



6.4. Test Procedure

The measurement is made according to ANSI/TIA-603-C-2004 as follows:

The equipment under test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer. This is repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. With the signal generator tuned to a particular spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters to obtain a maximum reading at the spectrum analyzer. The output of the signal generator is then adjusted until a reading identical to that obtained with the actual transmitter is achieved.

The power in dBm of each spurious emission is calculated by correcting the signal generator level for cable loss and gain of the substitution antenna referenced to a dipole. A fully charged battery was used for the supply voltage.

The settings of the receiver were as follows:

Units	dBm
Resolution Bandwidth	1 MHz
Video Bandwidth	Auto
Sweep Time	Auto

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in **lie-down position (X axis)** and the worst case was recorded.

6.5. Uncertainty

The measurement uncertainty is defined as for Field Strength of Spurious Radiation measurement is ± 3.072 dB.

6.6. Test Result

Standard:	FCC Part 22	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	2010/07/20
Frequency:	824.2 MHz	Test By:	Gary Wu

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Ant.Polar. H / V
1	41.6400	-44.15	-6.79	-50.94	-13.00	-37.94	peak	H
2	399.5700	-50.47	-0.10	-50.57	-13.00	-37.57	peak	H
3	497.5400	-53.33	0.72	-52.61	-13.00	-39.61	peak	H
4	873.9000	-54.26	8.03	-46.23	-13.00	-33.23	peak	H
5	928.2200	-62.97	9.28	-53.69	-13.00	-40.69	peak	H
6	995.1500	-69.39	11.15	-58.24	-13.00	-45.24	peak	H
7	1651.000	-48.30	6.72	-41.58	-13.00	-28.58	peak	H
8	2470.000	-54.06	11.97	-42.09	-13.00	-29.09	peak	H
1	55.2200	-69.75	7.43	-62.32	-13.00	-49.32	peak	V
2	398.6000	-55.35	2.63	-52.72	-13.00	-39.72	peak	V
3	477.1700	-72.01	11.24	-60.77	-13.00	-47.77	peak	V
4	811.8200	-69.60	7.41	-62.19	-13.00	-49.19	peak	V
5	873.9000	-52.02	14.08	-37.94	-13.00	-24.94	peak	V
6	991.2700	-67.94	12.59	-55.35	-13.00	-42.35	peak	V
7	1651.000	-56.46	10.39	-46.07	-13.00	-33.07	peak	V
8	2470.000	-56.98	11.90	-45.08	-13.00	-32.08	peak	V

Standard:	FCC Part 22	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	2010/07/27
Frequency:	836.4 MHz	Test By:	Gary Wu

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Ant.Polar. H / V
1	55.2200	-61.43	0.00	-61.43	-13.00	-48.43	peak	H
2	191.9900	-67.59	0.00	-67.59	-13.00	-54.59	peak	H
3	398.6000	-51.77	0.00	-51.77	-13.00	-38.77	peak	H
4	873.9000	-38.64	0.00	-38.64	-13.00	-25.64	peak	H
5	940.8300	-57.27	0.00	-57.27	-13.00	-44.27	peak	H
6	992.2400	-47.50	0.00	-47.50	-13.00	-34.50	peak	H
7	1672.000	-49.35	0.00	-49.35	-13.00	-36.35	peak	H
8	2512.000	-47.73	0.00	-47.73	-13.00	-34.73	peak	H
1	41.6400	-51.13	0.00	-51.13	-13.00	-38.13	peak	V
2	399.5700	-45.72	0.00	-45.72	-13.00	-32.72	peak	V
3	477.1700	-53.26	0.00	-53.26	-13.00	-40.26	peak	V
4	497.5400	-51.15	0.00	-51.15	-13.00	-38.15	peak	V
5	873.9000	-47.48	0.00	-47.48	-13.00	-34.48	peak	V
6	993.2100	-55.51	0.00	-55.51	-13.00	-42.51	peak	V
7	1672.000	-45.36	0.00	-45.36	-13.00	-32.36	peak	V
8	2512.000	-42.91	0.00	-42.91	-13.00	-29.91	peak	V
9	2510.000	-47.34	12.22	-35.12	-13.00	-22.12	peak	V

Standard:	FCC Part 22	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	2010/07/27
Frequency:	848.8 MHz	Test By:	Gary Wu

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Ant.Polar. H / V
1	398.6000	-52.74	0.00	-52.74	-13.00	-39.74	peak	H
2	477.1700	-60.93	0.00	-60.93	-13.00	-47.93	peak	H
3	602.3000	-66.66	0.00	-66.66	-13.00	-53.66	peak	H
4	873.9000	-37.64	0.00	-37.64	-13.00	-24.64	peak	H
5	893.3000	-49.73	0.00	-49.73	-13.00	-36.73	peak	H
6	995.1500	-56.15	0.00	-56.15	-13.00	-43.15	peak	H
7	1700.000	-45.00	0.00	-45.00	-13.00	-32.00	peak	H
8	2547.000	-51.79	0.00	-51.79	-13.00	-38.79	peak	H
1	41.6400	-50.93	0.00	-50.93	-13.00	-37.93	peak	V
2	398.6000	-51.55	0.00	-51.55	-13.00	-38.55	peak	V
3	498.5100	-54.38	0.00	-54.38	-13.00	-41.38	peak	V
4	873.9000	-45.83	0.00	-45.83	-13.00	-32.83	peak	V
5	907.8500	-44.03	0.00	-44.03	-13.00	-31.03	peak	V
6	994.1800	-52.54	0.00	-52.54	-13.00	-39.54	peak	V
7	1700.000	-45.13	0.00	-45.13	-13.00	-32.13	peak	V
8	2547.000	-49.69	0.00	-49.69	-13.00	-36.69	peak	V

Standard:	FCC Part 24	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	2010/07/27
Frequency:	1850.2 MHz	Test By:	Gary Wu

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Ant.Polar. H / V
1	263.7700	-69.65	0.00	-69.65	-13.00	-56.65	peak	H
2	398.6000	-65.34	0.00	-65.34	-13.00	-52.34	peak	H
3	604.2400	-68.88	0.00	-68.88	-13.00	-55.88	peak	H
4	796.3000	-62.61	0.00	-62.61	-13.00	-49.61	peak	H
5	959.2600	-63.94	0.00	-63.94	-13.00	-50.94	peak	H
6	996.1200	-61.44	0.00	-61.44	-13.00	-48.44	peak	H
7	3702.000	-43.75	0.00	-43.75	-13.00	-30.75	peak	H
8	5550.000	-39.72	0.00	-39.72	-13.00	-26.72	peak	H
1	398.6000	-62.57	0.00	-62.57	-13.00	-49.57	peak	V
2	497.5400	-68.20	0.00	-68.20	-13.00	-55.20	peak	V
3	604.2400	-65.51	0.00	-65.51	-13.00	-52.51	peak	V
4	725.4900	-62.42	0.00	-62.42	-13.00	-49.42	peak	V
5	898.1500	-61.77	0.00	-61.77	-13.00	-48.77	peak	V
6	994.1800	-55.30	0.00	-55.30	-13.00	-42.30	peak	V
7	3702.000	-37.24	0.00	-37.24	-13.00	-24.24	peak	V
8	5550.000	-36.30	0.00	-36.30	-13.00	-23.30	peak	V

Standard:	FCC Part 24	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	2010/07/27
Frequency:	1880.0 MHz	Test By:	Gary Wu

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Ant.Polar. H / V
1	263.7700	-68.70	0.00	-68.70	-13.00	-55.70	peak	H
2	399.5700	-64.43	0.00	-64.43	-13.00	-51.43	peak	H
3	748.7700	-63.70	0.00	-63.70	-13.00	-50.70	peak	H
4	799.2100	-63.39	0.00	-63.39	-13.00	-50.39	peak	H
5	956.3500	-61.87	0.00	-61.87	-13.00	-48.87	peak	H
6	991.2700	-52.77	0.00	-52.77	-13.00	-39.77	peak	H
7	3758.000	-39.06	0.00	-39.06	-13.00	-26.06	peak	H
8	5641.000	-40.48	0.00	-40.48	-13.00	-27.48	peak	H
1	398.6000	-63.61	0.00	-63.61	-13.00	-50.61	peak	V
2	497.5400	-68.13	0.00	-68.13	-13.00	-55.13	peak	V
3	549.9200	-65.69	0.00	-65.69	-13.00	-52.69	peak	V
4	673.1100	-62.45	0.00	-62.45	-13.00	-49.45	peak	V
5	726.4600	-60.28	0.00	-60.28	-13.00	-47.28	peak	V
6	898.1500	-59.49	0.00	-59.49	-13.00	-46.49	peak	V
7	3758.000	-28.80	0.00	-28.80	-13.00	-15.80	peak	V
8	5641.000	-39.42	0.00	-39.42	-13.00	-26.42	peak	V

Standard:	FCC Part 24	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	TR151-SP	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	2010/07/27
Frequency:	1909.8 MHz	Test By:	Gary Wu

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Ant.Polar. H / V
1	399.5700	-61.91	-0.10	-62.01	-13.00	-49.01	peak	H
2	544.1000	-69.70	2.09	-67.61	-13.00	-54.61	peak	H
3	675.0500	-71.84	8.93	-62.91	-13.00	-49.91	peak	H
4	799.2100	-68.43	7.71	-60.72	-13.00	-47.72	peak	H
5	898.1500	-70.70	8.57	-62.13	-13.00	-49.13	peak	H
6	993.2100	-67.28	11.09	-56.19	-13.00	-43.19	peak	H
7	3303.000	-60.54	14.67	-45.87	-13.00	-32.87	peak	H
8	6684.000	-66.67	26.59	-40.08	-13.00	-27.08	peak	H
1	398.6000	-56.94	0.00	-56.94	-13.00	-43.94	peak	V
2	675.0500	-56.84	0.00	-56.84	-13.00	-43.84	peak	V
3	726.4600	-55.18	0.00	-55.18	-13.00	-42.18	peak	V
4	796.3000	-58.85	0.00	-58.85	-13.00	-45.85	peak	V
5	898.1500	-58.45	0.00	-58.45	-13.00	-45.45	peak	V
6	992.2400	-52.46	0.00	-52.46	-13.00	-39.46	peak	V
7	3821.000	-37.16	0.00	-37.16	-13.00	-24.16	peak	V

7 Frequency Stability (Temperature Variation) Test

7.1. Limit

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block.

The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

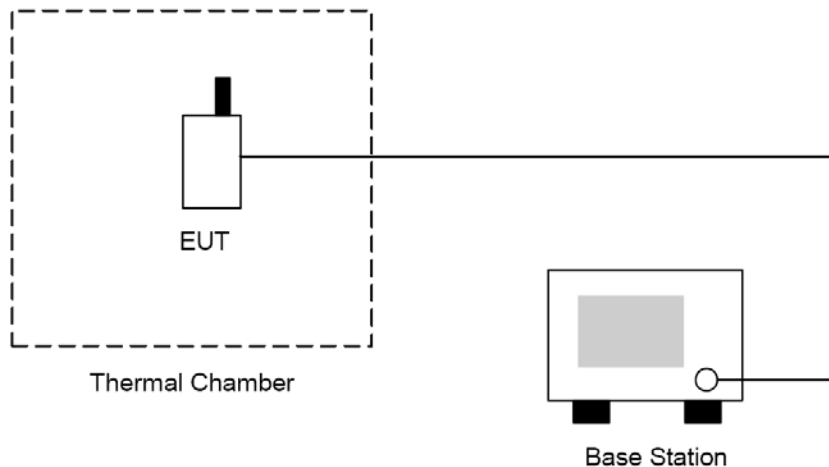
7.2. Test Instruments

Describe	Manufacturer	Model No.	Serial No.	Cal. Date	Remark
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	109369	07/29/2009	(2)
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	08/26/2009	(2)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

7.3. Setup



7.4. Test Procedure

The measurement is made according to FCC rules part 22 and 24:

1. The EUT and test equipment were set up as shown on the following section.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was note within one minute.
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
4. The temperature tests were performed for the worst case.
5. Test data was recorded.

7.5. Uncertainty

The measurement uncertainty is defined as for Frequency Stability (Temperature Variation) measurement is $\pm 10\text{Hz}$.

7.6. Test Result

Model Number	TR151-SP			
Test Item	Frequency Stability (Temperature Variation)			
Test Mode	Mode 1: GSM 850 Link			
Date of Test	07/29/2010		Test Site	TE02
Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
-30	24.32	0.029	±2.5	Pass
-20	20.39	0.024	±2.5	Pass
-10	28.17	0.034	±2.5	Pass
0	19.72	0.024	±2.5	Pass
10	19.39	0.023	±2.5	Pass
20	25.14	0.030	±2.5	Pass
30	23.69	0.028	±2.5	Pass
40	22.01	0.026	±2.5	Pass
50	20.58	0.025	±2.5	Pass

Model Number	TR151-SP			
Test Item	Frequency Stability (Temperature Variation)			
Test Mode	Mode 2: GSM 1900 Link			
Date of Test	07/29/2010		Test Site	TE02
Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
-30	19.38	0.010	±2.5	Pass
-20	20.35	0.011	±2.5	Pass
-10	25.36	0.013	±2.5	Pass
0	20.43	0.011	±2.5	Pass
10	26.87	0.014	±2.5	Pass
20	18.35	0.010	±2.5	Pass
30	17.53	0.009	±2.5	Pass
40	26.34	0.014	±2.5	Pass
50	30.14	0.016	±2.5	Pass

8 Frequency Stability (Voltage Variation) Test

8.1. Limit

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block.

The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

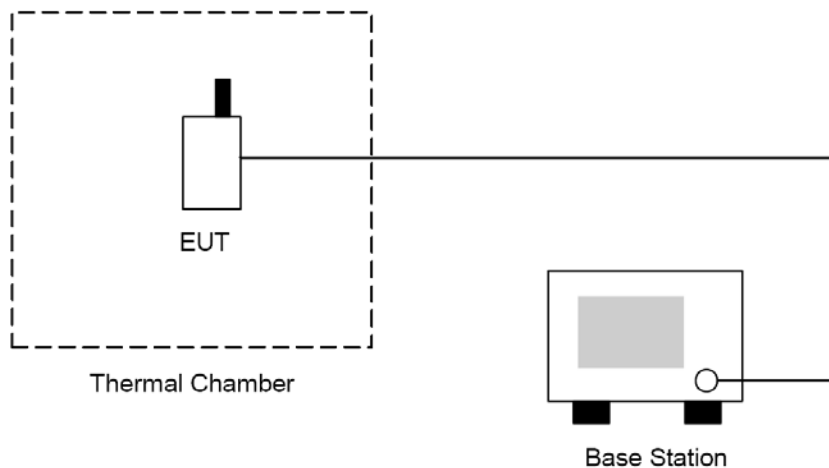
8.2. Test Instruments

Describe	Manufacturer	Model No.	Serial No.	Cal. Date	Remark
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	109369	07/29/2009	(2)
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	08/26/2009	(2)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

8.3. Setup



8.4. Test Procedure

1. The EUT was placed in a temperature chamber at $25 \pm 5^\circ\text{C}$ and connected as the following section.
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.
3. The variation in frequency was measured for the worst case.

8.5. Uncertainty

The measurement uncertainty is defined as for Frequency Stability (Voltage Variation) measurement is $\pm 10\text{Hz}$.

8.6. Test Result

Model Number	TR151-SP				
Test Item	Frequency Stability (Voltage Variation)				
Test Mode	Mode 1: GSM 850 Link				
Date of Test	07/29/2010		Test Site	TE02	
Level	Voltage [Vdc]	Deviation [Hz]	Deviation [ppm]	Limit [ppm]	Result
Battery full point	4.20	21.79	0.026	± 2.5	Pass
Normal	3.70	24.38	0.029	± 2.5	Pass
Battery cut-off point	3.40	23.77	0.028	± 2.5	Pass

Model Number	TR151-SP				
Test Item	Frequency Stability (Voltage Variation)				
Test Mode	Mode 2: GSM 1900 Link				
Date of Test	07/29/2010		Test Site	TE02	
Level	Voltage [Vdc]	Deviation [Hz]	Deviation [ppm]	Limit [ppm]	Result
Battery full point	4.20	21.45	0.011	± 2.5	Pass
Normal	3.70	24.72	0.013	± 2.5	Pass
Battery cut-off point	3.40	23.58	0.013	± 2.5	Pass