FCC TEST REPORT

for

Shandong Kaer Electric Co., Ltd

CDMA Fixed Wireless phone

Model Number: KT2000

FCC ID: ZMXKT2000

Prepared for	:	Shandong Kaer Electric Co., Ltd
Address	:	No. 58, Dalian Road, Weihai, Shandong, China
Prepared by	:	Keyway Testing Technology Co., Ltd.
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Report No.	:	15KWE012365F
Date of Test	:	Jan. 19~23, 2015
Date of Report	:	Jan. 23, 2015

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Keyway Testing Technology Co., Ltd.

Applicant: **Address:**	Shandong Kaer Electric Co., Ltd No. 58, Dalian Road, Weihai, Shandong, China		
Manufacturer: **Address:**	Shandong Kaer Electric Co., Ltd No. 58, Dalian Road, Weihai, Shandong, China		
E.U.T:	CDMA Fixed Wireless phone		
Model Number:	KT2000		
Trade Name:	卡尔®	**Serial No.:**	------
Date of Receipt:	Jan. 19, 2015	**Date of Test:**	Jan. 19~23, 2015
Test Specification:	FCC CFR Title 47 Part 2: 2013 FCC CFR Title 47 Part22 Subpart H: 2013		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied. **Issue Date: Jan. 23, 2015**		

Tested by:	Reviewed by:	Approved by:
Jack	Andy	Jade Yang
Jack Bu / Engineer	Andy Gao / Supervisor	Jade Yang/ Supervisor

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted RF Output Power	2.1046, 22.913	PASS
Occupied Bandwidth	2.1049, 22.917	PASS
Spurious Radiated Emissions	2.1053, 22.917	PASS
Spurious Emissions at Antenna Terminals	2.1051, 22.917	PASS
Band Edge	2.1051,2.1057 22.917, 24.238	PASS
Transmitter Radiated Power (EIPR/ERP)	22.913	PASS
Frequency Stability	2.1055	PASS

Measurement method according to TIA/EIA 603.D-2010

2. GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	CDMA Fixed Wireless phone
Model No.:	KT2000
Operation Frequency:	CDMA 800MHz: 824 - 849MH
Modulation technology:	QPSK
Antenna Type:	External Antenna
Antenna gain:	5dBi
Power supply:	DC 4.6V from adapter Rechargeable lithium-ion battery 3.7V
Adapter	Manufacturer: Shandong Kaer Electric Co., Ltd Model:NLA100046W1U1 I/P:AC 100~240V 50/60Hz 0.2A O/P:DC 4.6V 1A

2.3. Difference between Model Numbers

None.

2.4. Test Supporting System

None.

2.5. Independent Operation Modes

Test modes	
CDMA 800	824.70
	836.52
	848.31

2.6. Test Facilities

Lab Qualifications : Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

2.7. List of Test and Measurement Instruments

2.7.1. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,14	Apr. 27,15
System Simulator	Agilent	E5515C	GB43130245	Apr. 30,14	Apr. 30,15
Power Splitter	Weinschel	1506A	NW425	Apr. 30,14	Apr. 30,15
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 27,14	Apr. 27,15
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 27,14	Apr. 27,15
Spectrum Analyzer	Agilent	E4440A	MY44303352	Apr. 27,14	Apr. 27,15
Signal Generator	Agilent	E4438C	MY45091309	Apr. 27,14	Apr. 27,15
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 27,14	Apr. 27,15
Signal Amplifier	SONOMA	310	187016	Apr. 27,14	Apr. 27,15
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 27,14	Apr. 27,15
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	DAZE	ZN30701	11003	Apr. 27,14	Apr. 27,15
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 27,14	Apr. 27,15
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 27,14	Apr. 27,15
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 30,14	Apr. 30,15
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 27,14	Apr. 27,15
High Pass filter	Micro	HPM50111	324216	Apr. 30,14	Apr. 30,15
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 30,14	Apr. 30,15
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 30,14	Apr. 30,15
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 30,14	Apr. 30,15
DC Power Supply	LongWei	PS-305D	010964729	Apr. 27,14	Apr. 27,15
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 27,14	Apr. 27,15
Universal radio communication tester	Rohde&Schwarz	CMU200	3215420	Apr. 27,14	Apr. 27,15
Splitter	Agilent	11636B	0025164	Apr. 27,14	Apr. 27,15

3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

See item 6.

3.3. Test Operation Mode and Test Software

None.

3.4. Special Accessories and Auxiliary Equipment

None.

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted RF Output Power

4.1.1. Test Setup

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power.

4.1.2. Test Result

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

Measurement data

Mode	channel	Frequency (MHz)	Output Power (dBm)
CDMA	Low	824.70	22.13
	Middle	836.52	22.32
	High	848.31	22.08

Note: Measurement Uncertainty: ±2.6 dB.

4.2. Occupied Bandwidth

4.2.1. Limit

According to FCC section 2.1049 and FCC part22.913(a) and FCC part24.232(b), 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 the 99% emission bandwidth,

4.2.2. Test Setup

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power.

4.2.3. Test Result

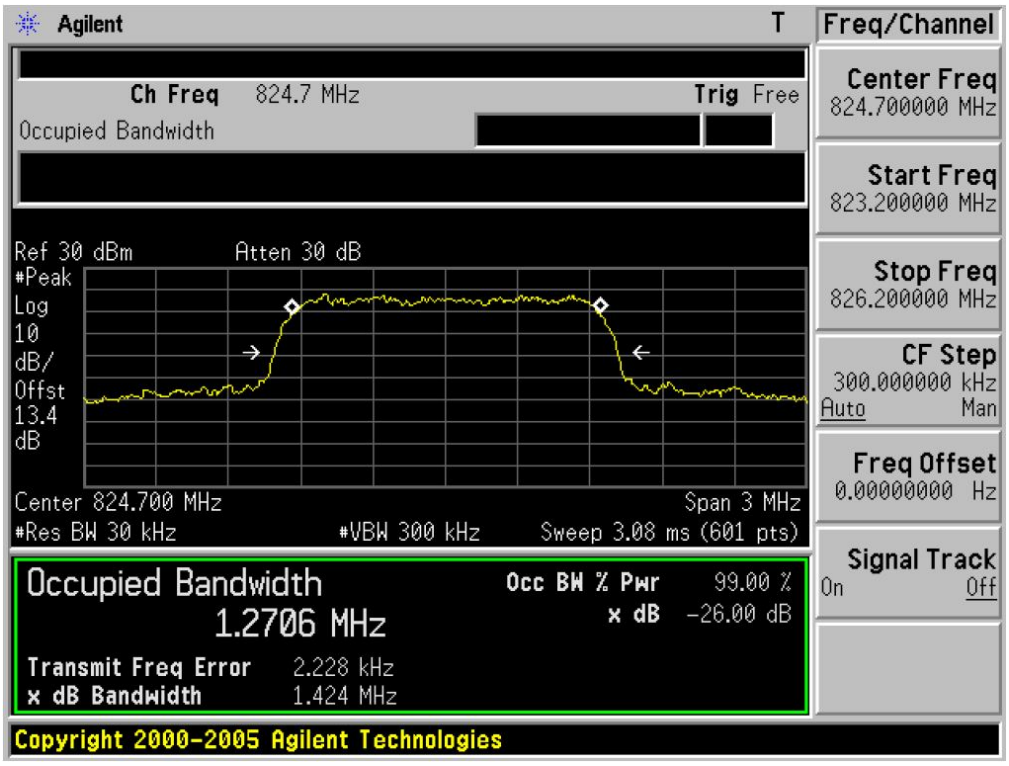
Measurement Data

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (MHz)
CDMA	Low	824.70	1.2706
	Middle	836.52	1.2697
	High	848.31	1.2722

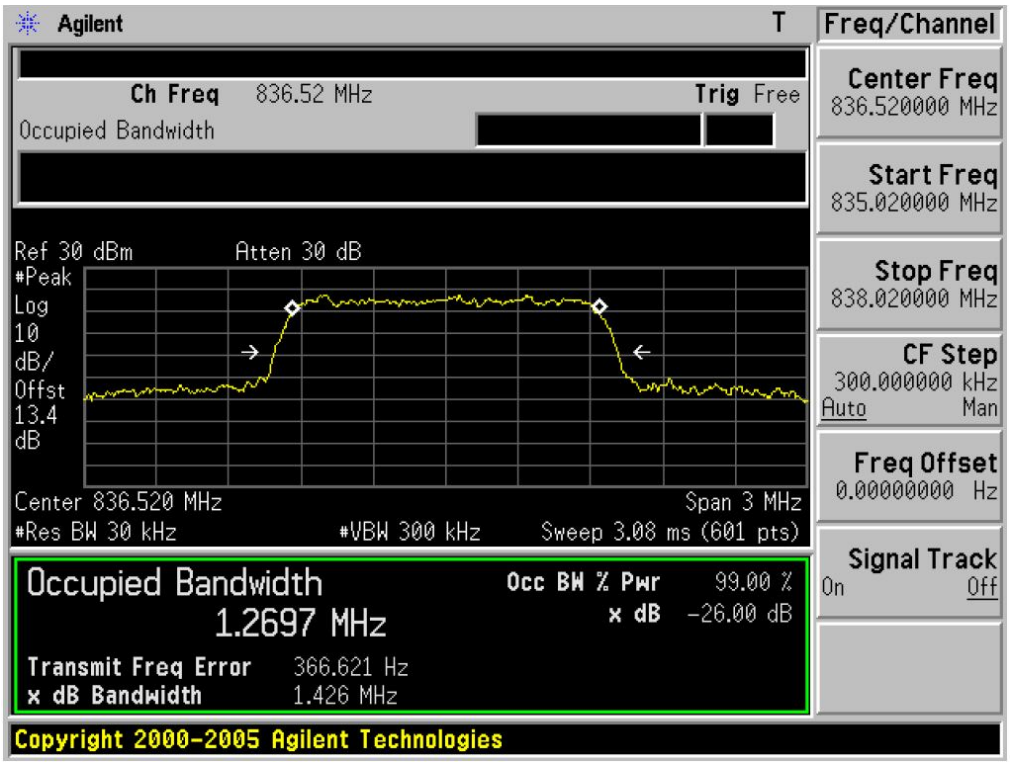
Note: Measurement Uncertainty: ±20Hz.

Test plot as follows:

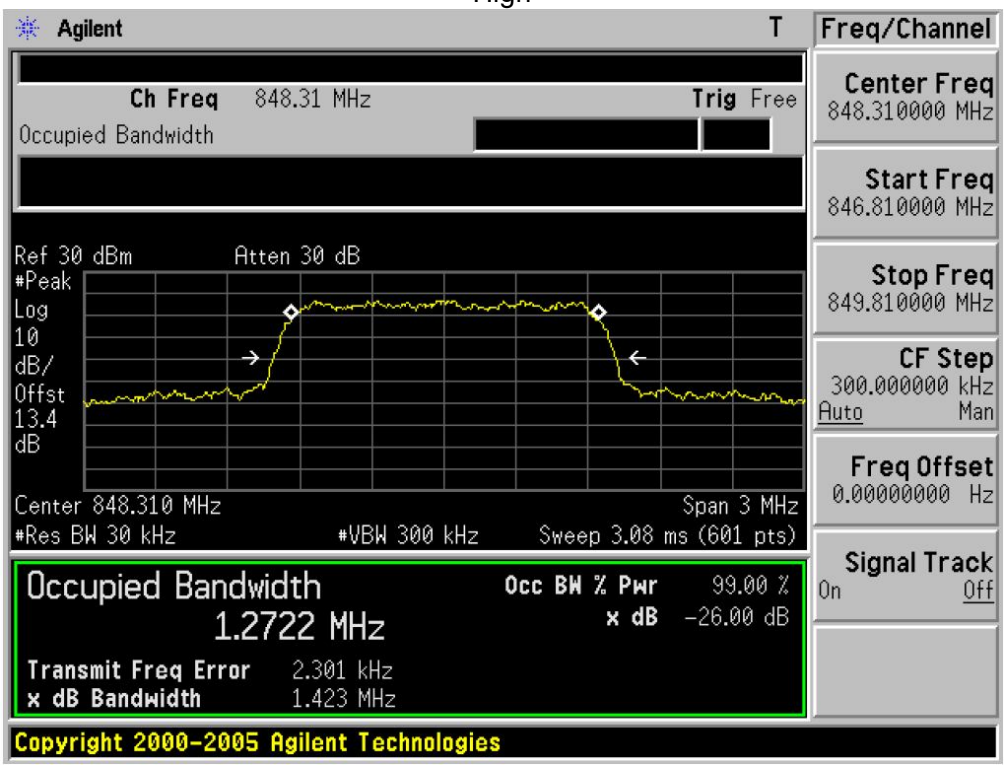
Low



Middle


Agilent
T
Freq/Channel
Ch Freq 836.52 MHz
Trig Free
Occupied Bandwidth
Center Freq
836.520000 MHz
Start Freq
835.020000 MHz
Ref 30 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
13.4
dB
Stop Freq
838.020000 MHz
CF Step
300.000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Center 836.520 MHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 3.08 ms (601 pts)
Signal Track
On
Off
Occupied Bandwidth
1.2697 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 366.621 Hz
x dB Bandwidth 1.426 MHz
Copyright 2000-2005 Agilent Technologies

High


Agilent
T
Freq/Channel
Ch Freq 848.31 MHz
Trig Free
Occupied Bandwidth
Center Freq
848.310000 MHz
Start Freq
846.810000 MHz
Ref 30 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
13.4
dB
Stop Freq
849.810000 MHz
CF Step
300.000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Center 848.310 MHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 3.08 ms (601 pts)
Signal Track
On
Off
Occupied Bandwidth
1.2722 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 2.301 kHz
x dB Bandwidth 1.423 MHz
Copyright 2000-2005 Agilent Technologies

4.3. Frequency Stability

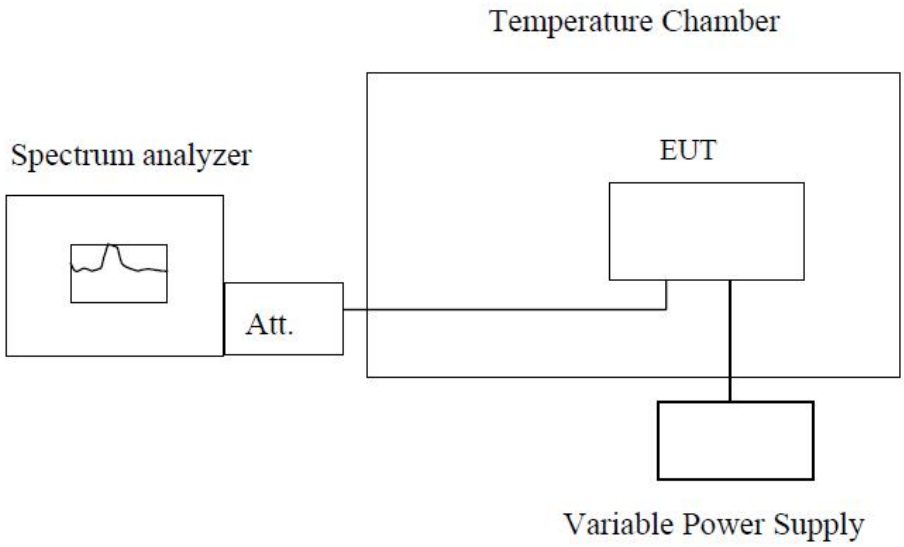
4.3.1. Limit

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -30℃ to +50℃ at intervals of not more than 10℃.

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

4.3.2. Test Setup



Note : Measurement setup for testing on Antenna connector

The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber.

The EUT is commanded by the System Simulator (SS) to operate at the maximum output power

4.3.3. Test Result

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.2VDC and 3.6VDC which are specified by the applicant; the normal temperature here used is 25℃. The frequency deviation limit of 800MHz band is ±2.5ppm.

Test Conditions			Frequency Deviation			Result
Band	Power(Vdc)	Temperature(℃)	Frequency Error(Hz)	ppm	Limit	
Low Channel Channel 824.70MHz	3.7	-30	27	0.0327	±2.5	PASS
	3.7	-20	51	0.0618		
	3.7	-10	36	0.0437		
	3.7	0	44	0.0534		
	3.7	10	29	0.0352		
	3.7	20	34	0.0412		
	3.7	30	54	0.0655		
	3.7	40	39	0.0473		
	3.7	50	28	0.0340		
	4.25	25	47	0.0570		
	3.70	25	41	0.0497		
	3.40	25	48	0.0582		
Middle channel Channel 836.52MHz	3.7	-30	46	0.0550	±2.5	PASS
	3.7	-20	33	0.0394		
	3.7	-10	16	0.0191		
	3.7	0	36	0.0430		
	3.7	10	28	0.0335		
	3.7	20	38	0.0454		
	3.7	30	28	0.0335		
	3.7	40	49	0.0586		
	3.7	50	36	0.0430		
	4.25	25	41	0.0490		
	3.70	25	27	0.0323		
	3.40	25	45	0.0538		
High channel Channel 848.31MHz	3.7	-30	42	0.0495	±2.5	PASS
	3.7	-20	55	0.0648		
	3.7	-10	**63**	**0.0743**		
	3.7	0	37	0.0436		
	3.7	10	27	0.0318		
	3.7	20	45	0.0530		
	3.7	30	38	0.0448		
	3.7	40	43	0.0507		
	3.7	50	42	0.0495		
	4.25	25	39	0.0460		
	3.70	25	37	0.0436		
	3.40	25	25	0.0295		

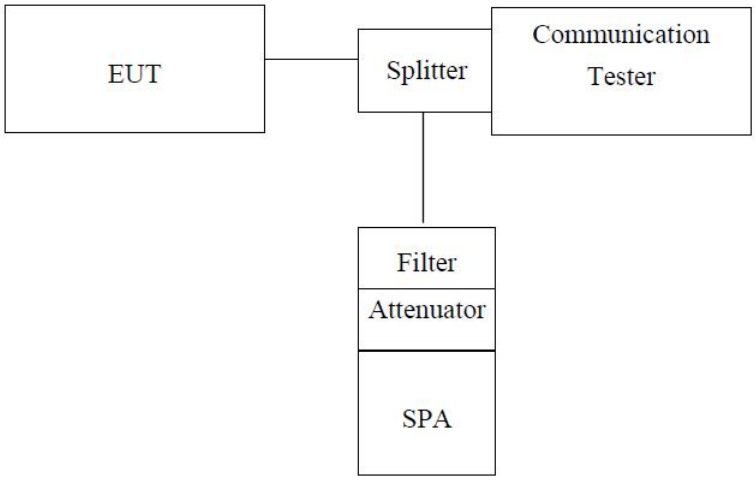
Note: Measurement Uncertainty: ±20Hz.

4.4. Band Edge

4.4.1. Limit

According to FCC §22.917, §24.238, the power of any emissions 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.

4.4.2. Test Setup



Note: *Measurement setup for testing on Antenna connector*

4.4.3. Measurement Procedure

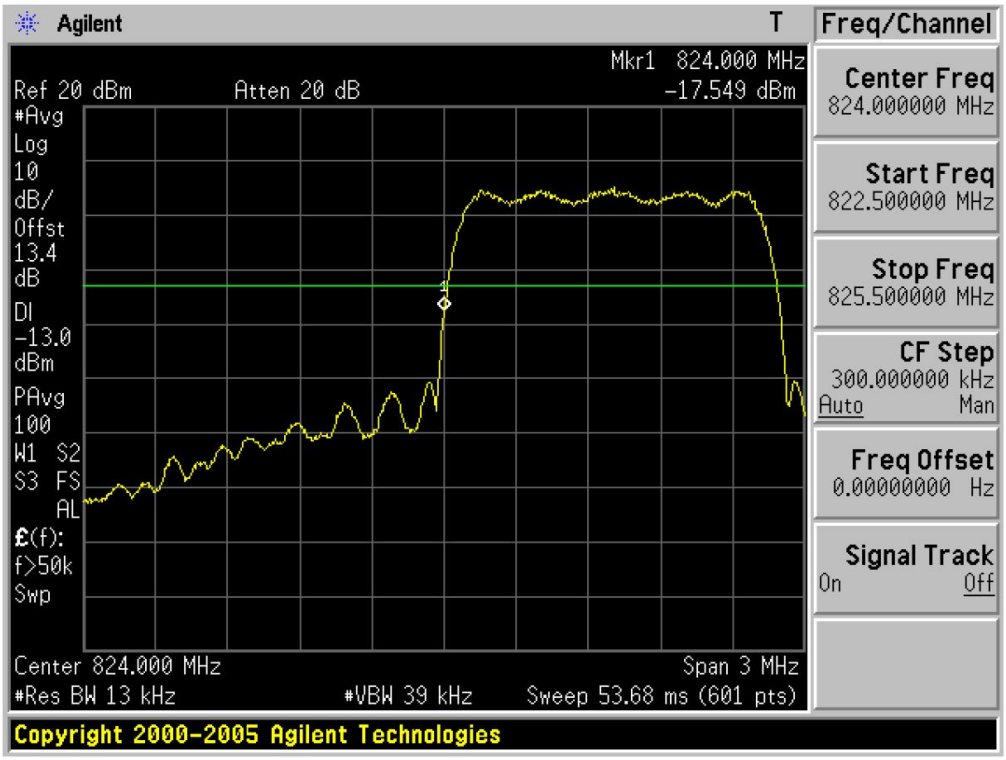
The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer and the System Simulator with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the System Simulator to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the System Simulator.

4.4.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

Test plot as follows:

CDMA Lowest channel



CDMA Highest channel

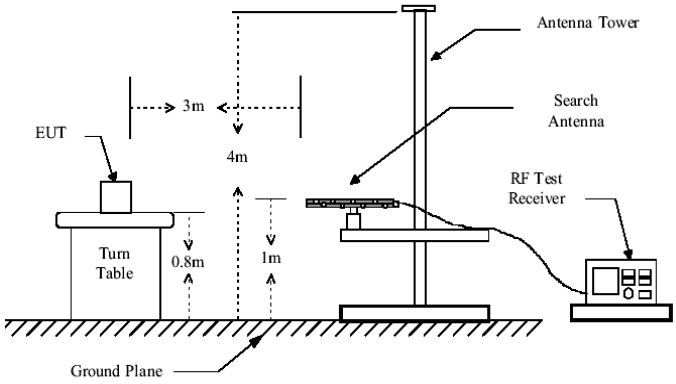
4.5. Transmitter Radiated Power (EIRP/ERP)

4.5.1. Limit

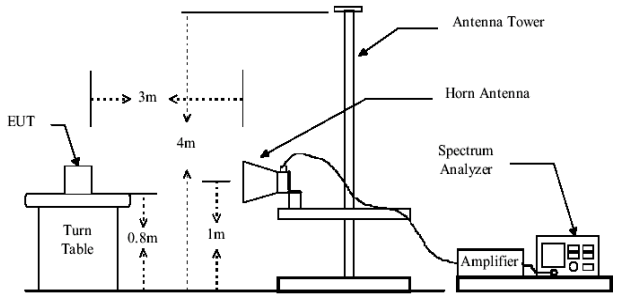
According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

4.5.2. Test Setup

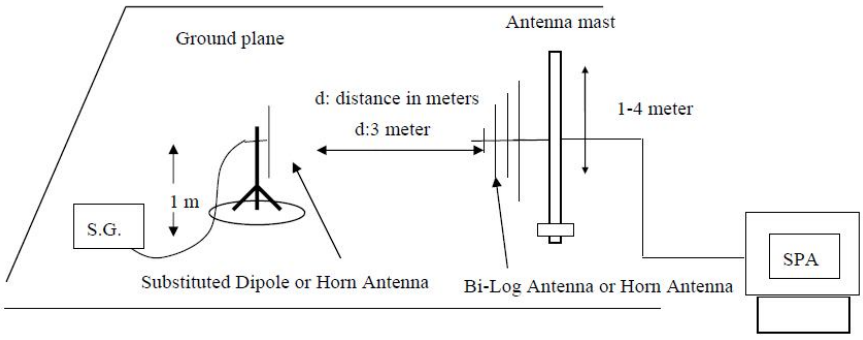
Below 1GHz



Above 1GHz



Substituted method:



4.5.3. Measurement Procedure

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. all test in Full-Anechoic Chamber.

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.

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)

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)

4.5.4. Test Result

EUT mode	Channel	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
CDMA	Lowest	V	21.98	33.01	Pass
		H	20.34		
	Middle	V	**22.41**		
		H	20.18		
	Highes	V	21.29		
		H	20.08		

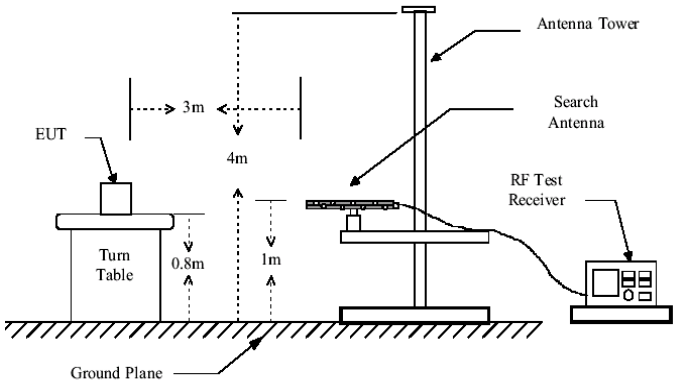
4.6. Spurious Radiated Emissions

4.6.1. Limit

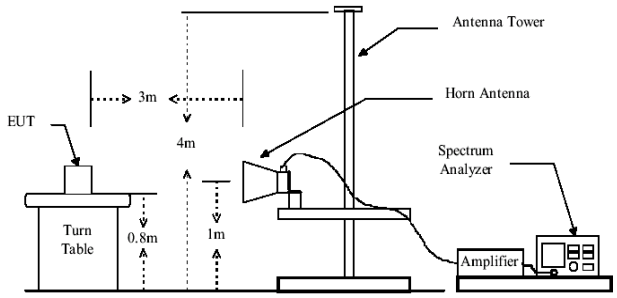
According to FCC §22.917, §24.238, the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

4.6.2. Test Setup

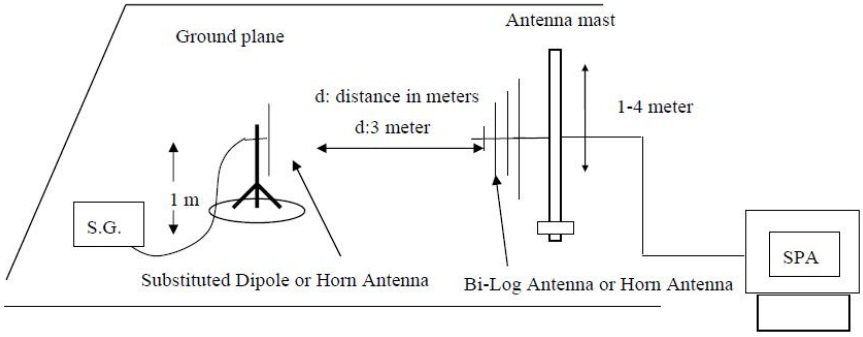
Below 1GHz



Above 1GHz



Substituted method:



4.6.3. Measurement Procedure

The transmitter was placed on the turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 log (TX Power in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts)

Note: Measurement Uncertainty: ±3.6 dB.

Band	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level(dBm)		
Lowest 824.70MHz	278.25	Vertical	-70.26	-13	PASS
	1649.40	Vertical	-28.87		
	2474.10	Vertical	-34.21		
	3298.80	Vertical	-35.47		
	4123.50	Vertical	-41.28		
	4948.20	Vertical	-40.09		
	358.18	Horizontal	-70.75		
	1649.40	Horizontal	-32.43		
	2474.10	Horizontal	-36.24		
	3298.80	Horizontal	-42.43		
	4123.50	Horizontal	-42.30		
	4948.20	Horizontal	-41.17		

Band	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level(dBm)		
Middle 836.52 MHz	268.59	Vertical	-70.29	-13	PASS
	1673.04	Vertical	-32.20		
	2509.56	Vertical	-32.27		
	3346.08	Vertical	-36.69		
	4182.60	Vertical	-43.16		
	5019.12	Vertical	-42.29		
	187.75	Horizontal	-70.16		
	1673.04	Horizontal	-28.92		
	2509.56	Horizontal	-31.33		
	3346.08	Horizontal	-42.30		
	4182.60	Horizontal	-46.44		
	5019.12	Horizontal	-42.16		

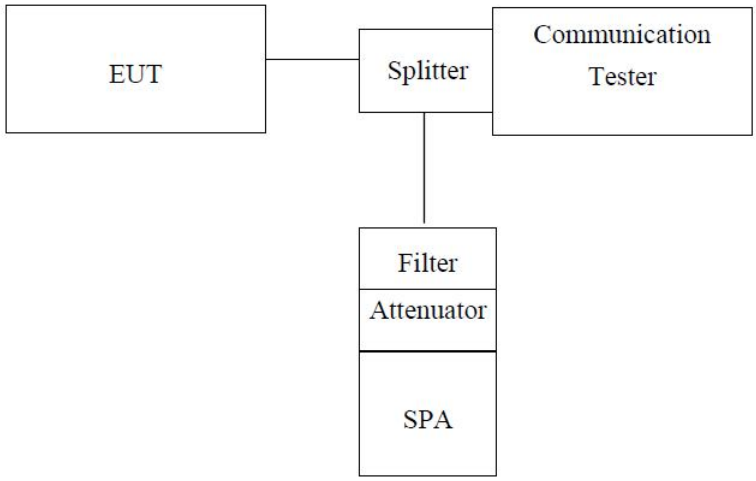
Band	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level(dBm)		
Highest 848.31MHz	397.79	Vertical	-70.46	-13	PASS
	1696.62	Vertical	-27.09		
	2544.93	Vertical	-27.05		
	3393.24	Vertical	-34.97		
	4241.55	Vertical	-42.99		
	5089.86	Vertical	-42.30		
	375.68	Horizontal	-73.28		
	1696.62	Horizontal	-27.39		
	2544.93	Horizontal	-29.23		
	3393.24	Horizontal	-36.35		
	4241.55	Horizontal	-43.44		
	5089.86	Horizontal	-41.29		

4.7. Spurious Emissions at Antenna Terminals

4.7.1. Limit

According to FCC §22.917, §24.238 the power of any emissions 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..

4.7.2. Test Setup



Note: *Measurement setup for testing on Antenna connector*

4.7.3. Measurement Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

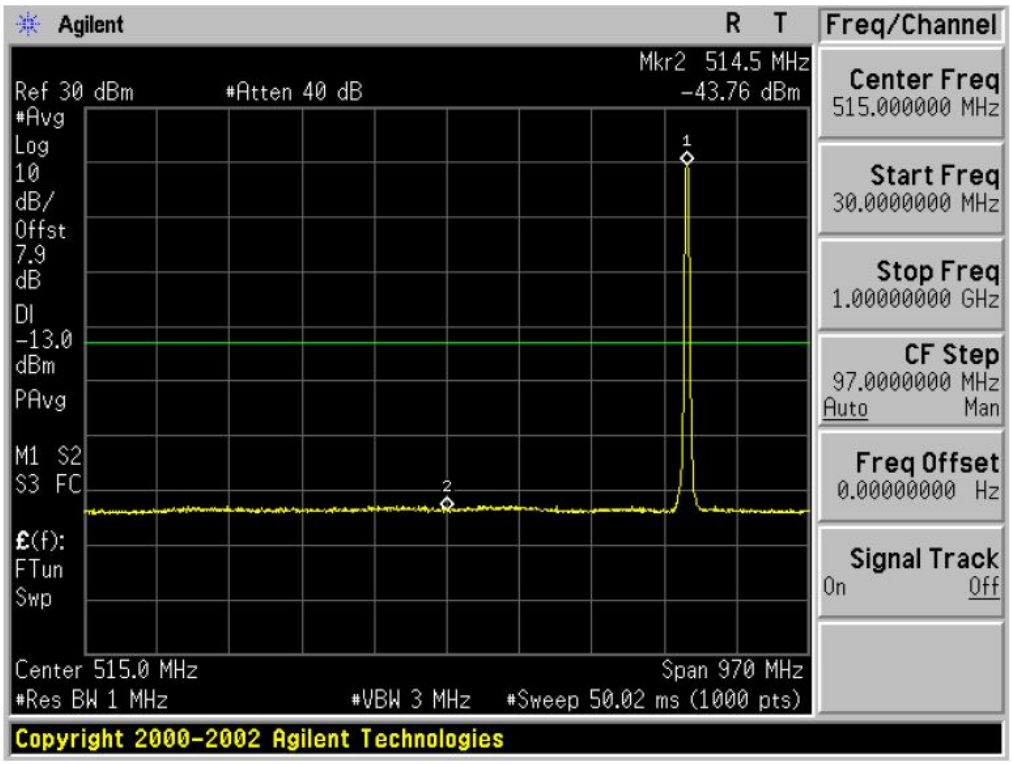
For the out of band: Set the RBW, VBW = 1MHz, 3MHz, Start=30MHz, Stop= 10th harmonic.

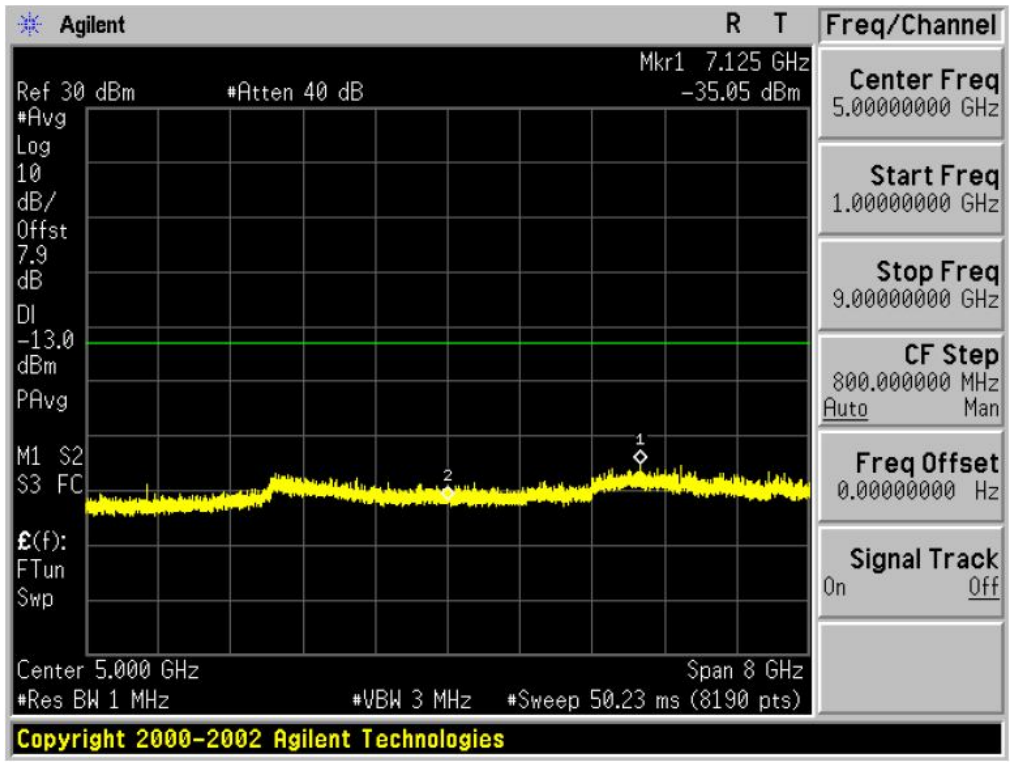
Limit = -13dBm

4.7.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

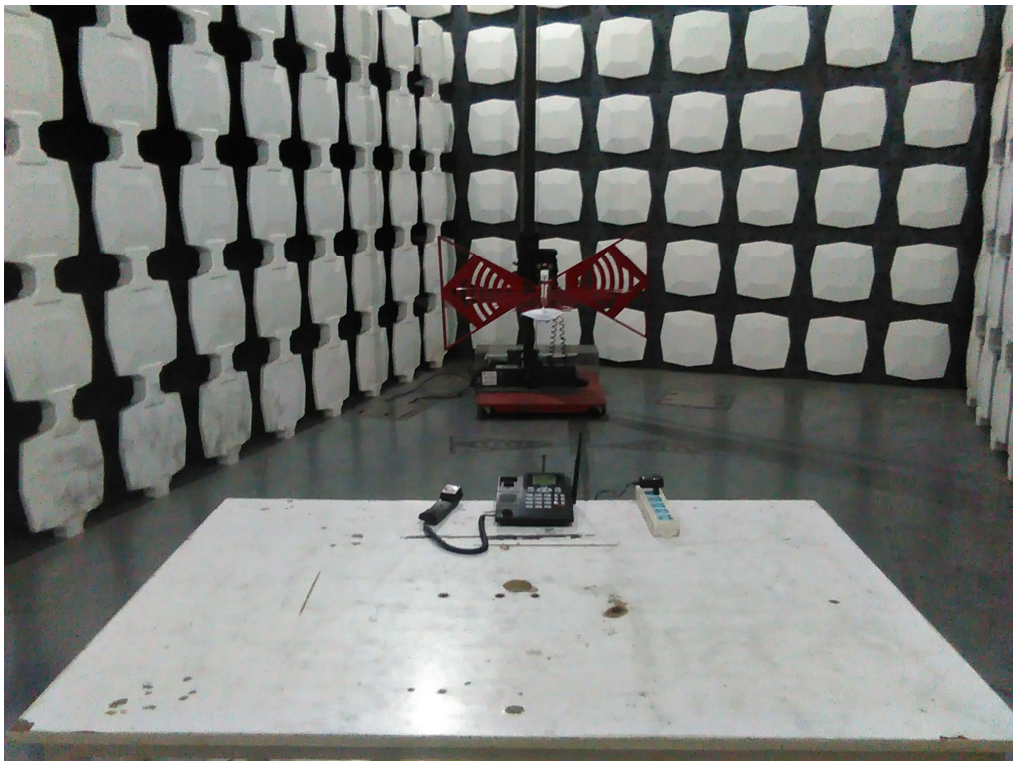
Worst Case: Middle Channel, 836.52MHz





5. PHOTOGRAPHS OF TEST SET-UP

Radiated Emission



6. PHOTOGRAPHS OF THE EUT

END.