

# TEST REPORT

**Reference No.**..... : WTS17S0169025-5E V1  
**FCC ID** ..... : 2AC88-G1611  
**Applicant**..... : HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED  
**Address**..... : Unit D.16F.chenknang plaza 250 Hennessy Road, Wanchai  
Hongkong  
**Manufacturer** ..... : Shenzhen uCloudlink Network Technology, Co., Ltd  
**Address**..... : 3rd Floor, A Part of Building 1, Shenzhen Software Industry Base,  
nanshan district xuefu Road, Post Code 518057, Shenzhen City,  
Guangdong Province, P.R.China  
**Product Name**..... : 4G Wireless Data Terminal  
**Model No**..... : G1611  
**Brand**..... : GlocalMe  
**Standards**..... : FCC CFR47 Part 22 Subpart H:2016  
FCC CFR47 Part 24 Subpart E:2016  
**Date of Receipt sample** .... : Jan. 05, 2017  
**Date of Test** ..... : Jan. 06 ~ Mar. 12, 2017  
**Date of Issue**..... : Apr. 05, 2017  
**Test Result**..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

**Waltek Services (Shenzhen) Co., Ltd.**

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen,  
Guangdong, China

Tel :+86-755-83551033

Fax:+86-755-83552400

Compiled by:



Zero Zhou / Test Engineer

Approved by:



Philo Zhong / Manager

## 2 Test Summary

Test Items	Test Requirement	Result
RF Output Power	2.1046 22.913 (a) 24.232 (c)	PASS
Peak-to-Average Ratio	24.232 (d)	PASS
Bandwidth	2.1049 22.905 22.917 24.238	PASS
Spurious Emissions at Antenna Terminal	2.1051 22.917 (a) 24.238 (a)	PASS
Field Strength of Spurious Radiation	2.1053 22.917 (a) 24.238 (a)	PASS
Out of band emission, Band Edge	22.917 (a) 24.238 (a)	PASS
Frequency Stability	2.1055 22.355 24.235	PASS
Maximum Permissible Exposure (SAR)	1.1307 2.1093	PASS

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#### 4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S0169025-5E	Jan.05, 2017	Jan.06 ~ Mar.12, 2017	Mar.13, 2017	original	-	Replaced
WTS17S0169025-5E V1	Jan.05, 2017	Jan.06 ~ Mar.12, 2017	Apr. 05, 2017	Version 1	Updated	Valid

## 5 General Information

### 5.1 General Description of E.U.T.

Product Name:	4G Wireless Data Terminal
Model No.:	G1611
Model Description:	N/A
GSM Band(s):	GSM 850/900/1800/1900MHz
GPRS/EGPRS Class:	12
CDMA2000 Band(s):	BC0/ BC1
WCDMA Band(s):	FDD Band I/II/IV/V/VIII
LTE Band(s):	FDD Band 2/4/5/17/41
Wi-Fi Specification:	2.4G-802.11b/g/n HT20
Bluetooth Version:	Bluetooth v4.0 with BLE
GPS:	Support
NFC:	N/A
Hardware Version:	G3 VER.B
Software Version:	G3_HTSV1.1.001.003.170112
storage location:	Internal Storage
Test Exercise:	The EUT was operated in a normal mode.

Note:

Main board(Modem1):  
The EUT Main board support GSM850/900/DCS1800/PCS1900, WCDMA Band 1/2/4/5/8, CDMA2000 BC0/BC1, LTE Band 2/4/5/17/41 function. It is intended for speech, Multimedia Message Service (MMS) transmission and 4G free roaming hotspot. It is equipped with GPRS/EDGE class 12 for GSM850/900/DCS1800/PCS1900, GPS,Bluetooth and Wi-Fi functions. For more information see the following datasheet.

Vice board(Modem2):  
The EUT Vice board support GSM850/900/DCS1800/PCS1900, WCDMA Band 1/2/4/5/8, CDMA2000 BC0/BC1,. It is intended for system localization. It is equipped with GPRS/EDGE class 12 for GSM850/900/DCS1800/PCS1900

### 5.2 Details of E.U.T.

Operation Frequency:	GPRS/EDGE 850: 824~849MHz
	GPRS/EDGE 1900: 1850~1910MHz
	CDMA2000 BC0: 824.70~848.31MHz
	CDMA2000 BC1: 1851.25~1908.75MHz
	WCDMA Band II: 1850~1910MHz
	WCDMA Band IV: 1710~1755MHz
	WCDMA Band V: 824~849MHz
	LTE Band 2: 1850~1910MHz
	LTE Band 4: 1710~1755MHz

	LTE Band 5: 823~850MHz
	LTE Band 17: 704~716MHz
	LTE Band 41: 2498~2688MHz
	WiFi:
	802.11b/g/n HT20: 2412~2462MHz
	Bluetooth: 2402~2480MHz
Max. RF output power:	Main Board:
	GSM 850: 32.83dBm
	PCS1900:30.09dBm
	WCDMA Band II: 22.29dBm
	WCDMA Band IV: 22.54dBm
	WCDMA Band V: 22.21dBm
	CDMA2000 BC 0: 24.82dBm
	CDMA2000 BC 1: 24.59dBm
	LTE Band 2: 22.99dBm
	LTE Band 4: 23.52dBm
	LTE Band 5: 22.66dBm
	LTE Band 17: 22.68dBm
	LTE Band 41: 23.80dBm
	Vice Board:
	GSM 850: 32.89dBm
	PCS1900:30.05dBm
	WCDMA Band II: 22.78dBm
	WCDMA Band V: 22.46dBm
	WCDMA Band IV: 22.56dBm
	CDMA2000 BC 0: 24.65dBm
	CDMA2000 BC 1: 24.44dBm
	WiFi(2.4G): 9.41dBm
	Bluetooth: 7.73dBm
Type of Modulation:	GPRS: GMSK
	EDGE: GMSK, 8PSK
	CDMA2000:QPSK, 8PSK
	WCDMA: BPSK, 16QAM
	LTE: QPSK, 16QAM
	WiFi: CCK, OFDM
	Bluetooth: GFSK, Pi/4 DQPSK, 8DPSK
Antenna installation:	GSM/WCDMA/CDMA2000/LTE: internal permanent antenna
	WiFi/Bluetooth: internal permanent antenna
Antenna Gain	GSM 850: 3.47dBi
(Main board same as	PCS1900: 1.77dBi
vice board):	CDMA2000 BC0: -0.3dBi

	CDMA2000 BC1: -1.9dBi
	WCDMA Band II: 1.77dBi
	WCDMA Band V: 3.47dBi
	WCDMA Band IV: 2.2dBi
	LTE Band 2: 1.77dBi
	LTE Band 4: 2.2dBi
	LTE Band 5: 3.47dBi
	LTE Band 17: 5.20dBi
	LTE Band 41: 0.75dBi
	WiFi(2.4G): 1.4dBi
	Bluetooth: 1.4dBi
Technical Data:	Input: DC 3.8V, 5350mWh by battery, or DC 5V, 1.0A by USB port
	Output: 5V 1.0A by USB port
Type of Emission:	Main Board: CDMA2000 BC0: 1M28F9W, CDMA2000 BC1: 1M30F9W, Vice Board: CDMA2000 BC0: 1M28F9W, CDMA2000 BC1: 1M30F9W,



### 5.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Support Band	Test Mode	Channel Frequency	Channel Number
CDMA2000 BC0	Rev. A	824.70 MHz	1013
		836.52 MHz	384
		848.31 MHz	777
CDMA2000 BC1	Rev. A	1851.25 MHz	25
		1880.00 MHz	600
		1908.75 MHz	1175
Remark: This device only supports data communication without Voice.			

### 5.4 Test Facility

The test facility has a test site registered with the following organizations:

- IC – Registration No.: 7760A**  
 Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2015.
- FCC Test Site 1#– Registration No.: 880581**  
 Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.
- FCC Test Site 2#– Registration No.: 328995**  
 Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

## 6 Equipment Used during Test

### 6.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.12,2016	Sep.11,2017
2.	LISN	R&S	ENV216	101215	Sep.12,2016	Sep.11,2017
3.	Cable	Top	TYPE16(3.5M)	-	Sep.12,2016	Sep.11,2017
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.12,2016	Sep.11,2017
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.12,2016	Sep.11,2017
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.12,2016	Sep.11,2017
4.	Cable	LARGE	RF300	-	Sep.12,2016	Sep.11,2017
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	Apr.29, 2016	Apr.28, 2017
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Apr.09,2016	Apr.08,2017
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.09,2016	Apr.08,2017
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.12,2016	Sep.11,2017
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.09,2016	Apr.08,2017
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.09,2016	Apr.08,2017
7	Broadband Pre-amplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.13,2016	Apr.12,2017
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.13,2016	Apr.12,2017
9	Universal Radio Communication Tester	R&S	CMU 200	112461	Apr.13,2016	Apr.12,2017
10	Signal Generator	R&S	SMR20	100046	Sep.12,2016	Sep.11,2017
11	Smart Antenna	SCHWARZBECK	HA08	-	Apr.09,2016	Apr.08,2017
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date

1	Test Receiver	R&S	ESCI	101296	Apr.13,2016	Apr.12,2017
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Apr.09,2016	Apr.08,2017
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Apr.13,2016	Apr.12,2017
4	Cable	HUBER+SUHNER	CBL2	525178	Apr.13,2016	Apr.12,2017
<b>RF Conducted Testing</b>						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.12,2016	Sep.11,2017
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.12,2016	Sep.11,2017
3.	Universal Radio Communication Tester	R&S	CMU 200	112461	Apr.13,2016	Apr.12,2017
4	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.12,2016	Sep.11,2017

## 6.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	$\pm 1.0$ dB
RF Power Density	$\pm 2.2$ dB
Radiated Spurious Emissions test	$\pm 5.03$ dB (Bilog antenna 30M~1000MHz)
	$\pm 5.47$ dB (Horn antenna 1000M~25000MHz)
Conducted Spurious Emissions test	$\pm 3.64$ dB (AC mains 150KHz~30MHz)
Confidence interval: 95%. Confidence factor:k=2	

## 6.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

## 7 RF OUTPUT POWER

Test Requirement:	FCC Part 2.1046, 22.913 (a),24.232 (c)
Test Method:	TIA/EIA-603-D:2010 KDB971168 D01 v02r02
Test Mode:	Transmitting

### 7.1 EUT Operation

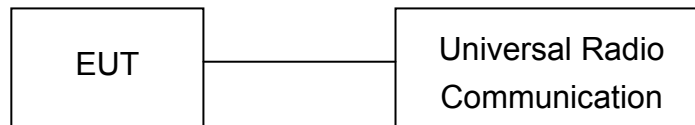
Operating Environment :

Temperature:	22.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

### 7.2 Test Procedure

Conducted method:

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.



Radiated method:

1. The setup of EUT is according with per TIA/EIA Standard 603D measurement procedure.
2. 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.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. 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.

### 7.3 Test Result

Main board

Conducted Power(dBm)						
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.70	836.52	848.31	1851.25	1880.00	1908.75
Rev.A RTAP 153.6kpbs	24.82	24.25	24.21	24.29	24.23	24.59
Rev.A RETAP 4096Bits	24.52	24.08	24.16	24.21	24.15	24.33

Vice board

Conducted Power(dBm)						
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.70	836.52	848.31	1851.25	1880.00	1908.75
Rev.A RTAP 153.6kpbs	24.60	24.12	24.20	24.24	23.74	24.44
Rev.A RETAP 4096Bits	24.35	24.01	24.13	24.10	23.18	24.21

**Radiated Power**

Main board

Max. ERP and EIRP

Cellular Band (Part 22H)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Part 22H	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC0 Channel 1013										
824.20	92.33	46	2.1	H	25.30	0.20	0.00	25.10	38.45	-13.35
824.20	97.87	180	1.0	V	30.77	0.20	0.00	<b>30.57</b>	38.45	-7.88
CDMA2000 BC0 Channel 384										
836.60	93.30	269	1.5	H	26.27	0.20	0.00	26.07	38.45	-12.38
836.60	97.78	47	1.5	V	30.68	0.20	0.00	30.48	38.45	-7.97
CDMA2000 BC0 Channel 777										
848.80	91.76	231	1.7	H	24.73	0.20	0.00	24.53	38.45	-13.92
848.80	97.41	201	1.3	V	30.31	0.20	0.00	30.11	38.45	-8.34

Cellular Band (Part 24E)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Part 24E	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC1 Channel 25										
1851.50	76.17	224	2.4	H	2.20	0.31	10.40	12.29	33	-20.71
1851.50	84.56	340	1.3	V	11.28	0.31	10.40	21.37	33	-11.63
CDMA2000 BC1 Channel 600										
1880.00	79.51	165	2.0	H	5.66	0.31	10.40	15.75	33	-17.25
1880.00	84.90	54	2.3	V	11.78	0.31	10.40	<b>21.87</b>	33	-11.13
CDMA2000 BC1 Channel 1175										
1908.50	78.97	12	2.3	H	5.24	0.32	10.40	15.32	33	-17.68
1908.50	84.09	341	1.1	V	11.13	0.32	10.40	21.21	33	-11.79

Vice board  
ERP and EIRP  
Cellular Band (Part 22H)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Part 22H	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC0 Channel 1013										
824.20	93.41	317	1.1	H	26.38	0.20	0.00	26.18	38.45	-12.27
824.20	97.35	101	1.7	V	30.25	0.20	0.00	<b>30.05</b>	38.45	-8.40
CDMA2000 BC0 Channel 384										
836.60	91.25	276	1.8	H	24.22	0.20	0.00	24.02	38.45	-14.43
836.60	97.19	47	2.3	V	30.09	0.20	0.00	29.89	38.45	-8.56
CDMA2000 BC0 Channel 777										
848.80	91.71	111	2.3	H	24.68	0.20	0.00	24.48	38.45	-13.97
848.80	97.16	309	2.4	V	30.06	0.20	0.00	29.86	38.45	-8.59

Cellular Band (Part 24E)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Part 24E	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC1 Channel 25										
1850.20	87.11	136	2.0	H	13.14	0.31	10.40	23.23	33	-9.77
1850.20	92.63	175	1.5	V	19.35	0.31	10.40	<b>29.44</b>	33	-3.56
CDMA2000 BC1 Channel 600										
1880.00	85.60	270	2.4	H	11.75	0.31	10.40	21.84	33	-11.16
1880.00	92.02	42	1.2	V	18.90	0.31	10.40	28.99	33	-4.01
CDMA2000 BC1 Channel 1175										
1909.80	85.00	77	2.1	H	11.27	0.32	10.40	21.35	33	-11.65
1909.80	92.11	263	1.7	V	19.15	0.32	10.40	29.23	33	-3.77



## 8 Peak-to-Average Ratio

Test Requirement:	24.232 (d)
Test Method:	N/A
Test Mode:	Transmitting

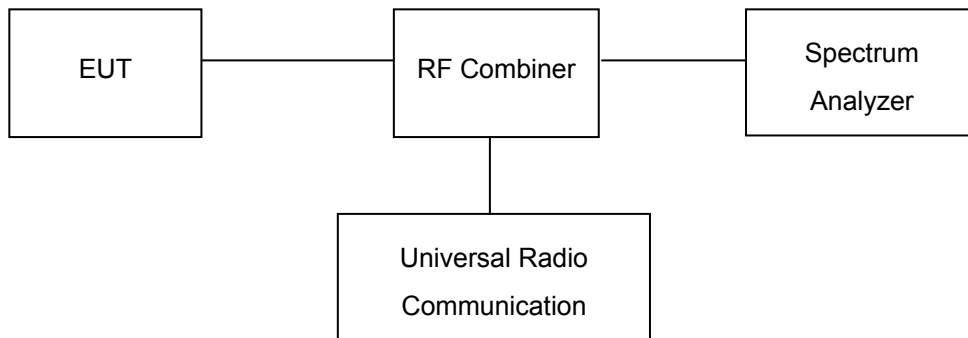
### 8.1 EUT Operation

Operating Environment :

Temperature:	22.5 °C
Humidity:	52.3% RH
Atmospheric Pressure:	101.2kPa

### 8.2 Test Procedure

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer. Record the maximum PAPR level associated with a probability of 0.1%.



### 8.3 Test Result

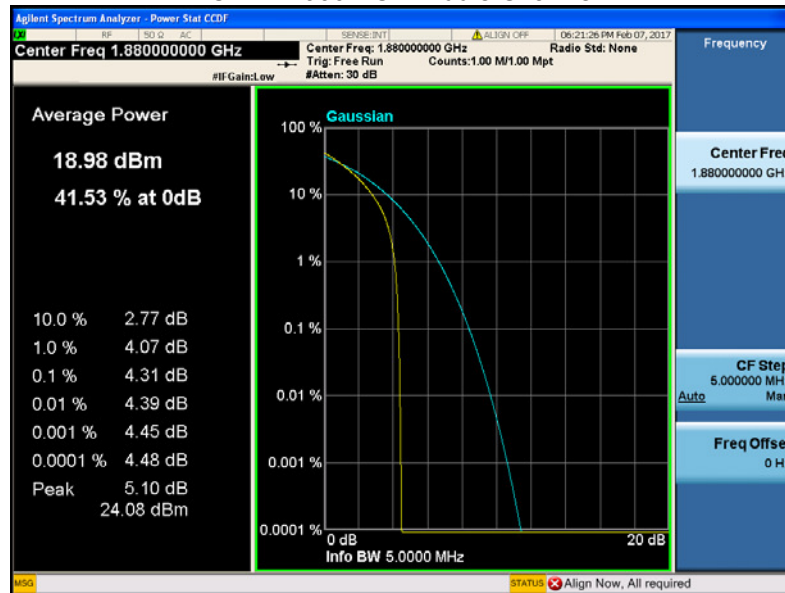
#### Cellular Band (Part 24E)

##### Main board

Mode	CDMA2000 BC1			Limit (dB)
Channel	25	600	1175	
Frequency (MHz)	1851.25	1880.00	1908.75	
Peak-to-Average Ratio (dB)	4.26	4.31	4.37	13

#### Test Plots (Part 24E)

##### CDMA2000 BC1 Middle Channel

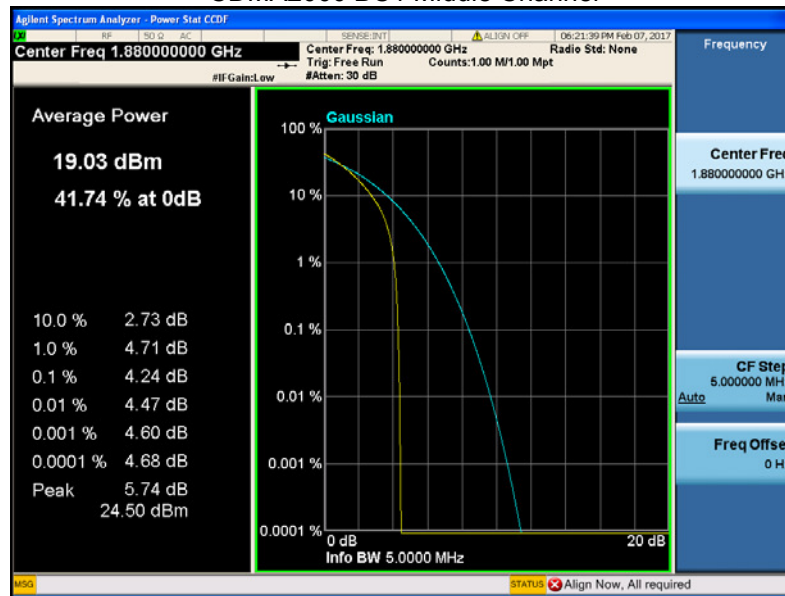


Vice board

Mode	CDMA2000 BC1			Limit (dB)
Channel	25	600	1175	
Frequency (MHz)	1851.25	1880.00	1908.75	
Peak-to-Average Ratio (dB)	4.19	4.24	4.30	13

Test Plots (Part 24E)

CDMA2000 BC1 Middle Channel



## 9 BANDWIDTH

Test Requirement: FCC Part 2.1049,22.917,22.905,24.238

Test Method: TIA/EIA-603-D:2010  
KDB971168 D01 v02r02

Test Mode: Transmitting

### 9.1 EUT Operation

Operating Environment :

Temperature: 22.5 °C

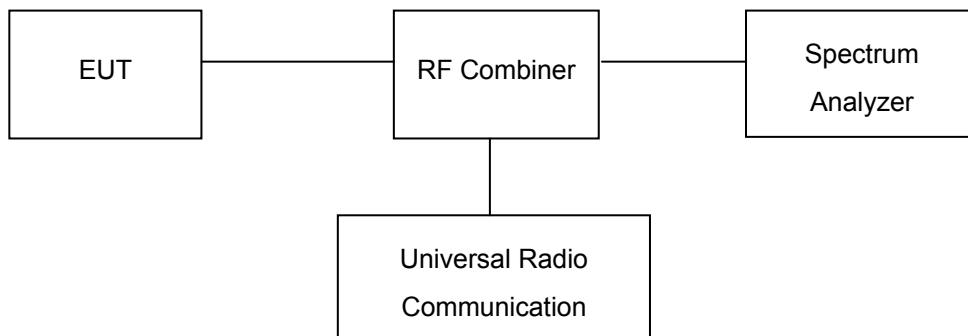
Humidity: 52.3% RH

Atmospheric Pressure: 101.2kPa

### 9.2 Test Procedure

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 kHz (Cellular /PCS) and the 26 dB & 99%bandwidth was recorded.



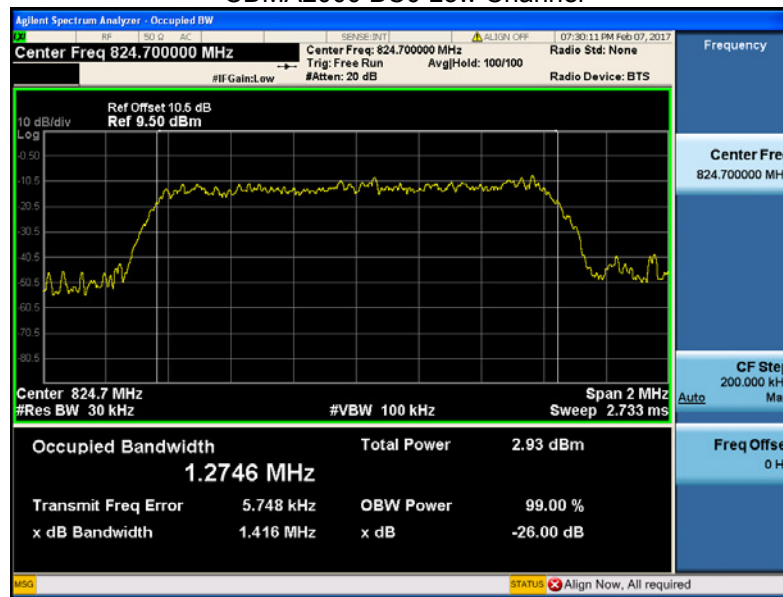
### 9.3 Test Result

#### Main board

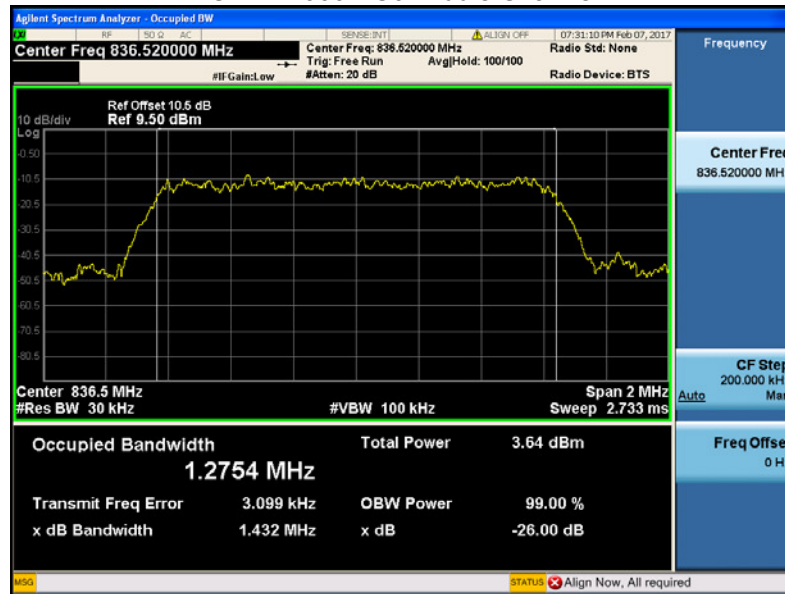
Test Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth(mHz)	26 dB Emission Bandwidth(mHz)
CDMA2000 BC0	1013	824.70	1.27	1.42
	384	836.52	1.28	1.43
	777	848.31	1.28	1.44
CDMA2000 BC1	25	1851.25	1.28	1.44
	600	1880.00	1.28	1.45
	1175	1908.75	1.30	1.86

#### Test Plots

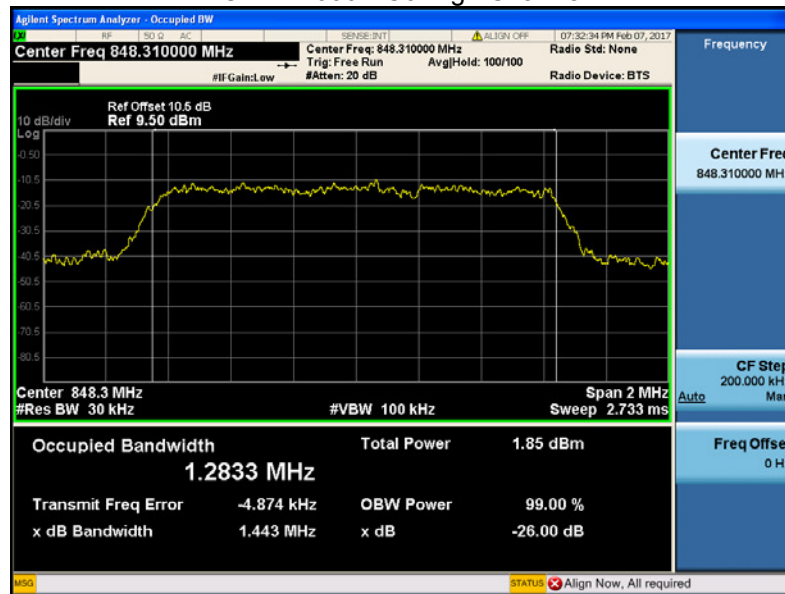
##### CDMA2000 BC0 Low Channel



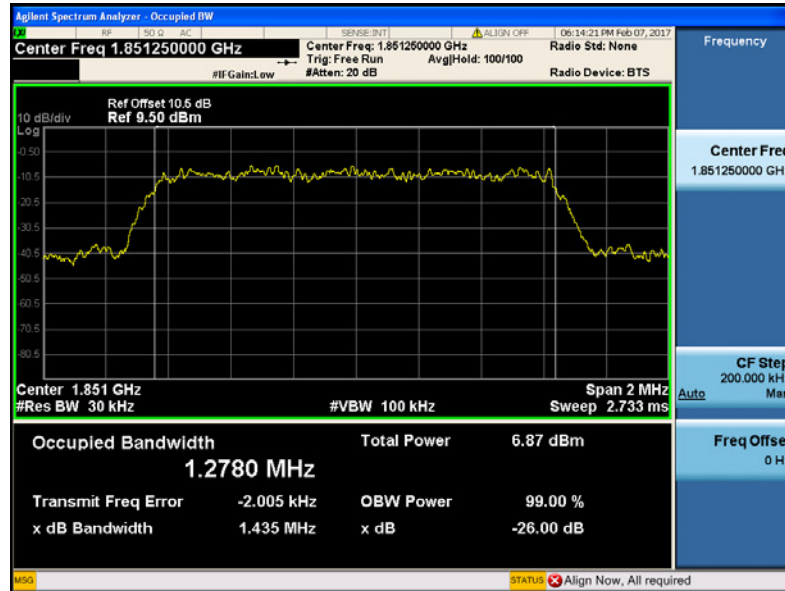
CDMA2000 BC0 Middle Channel



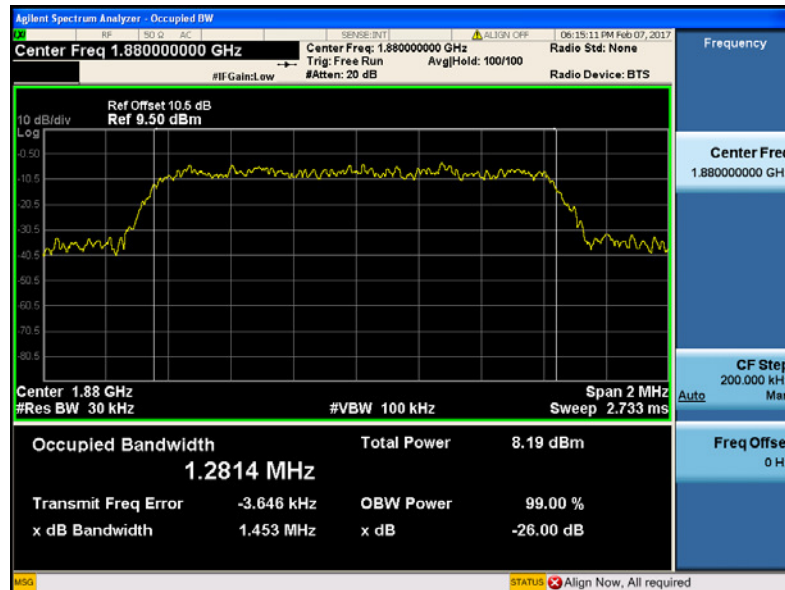
CDMA2000 BC0 High Channel



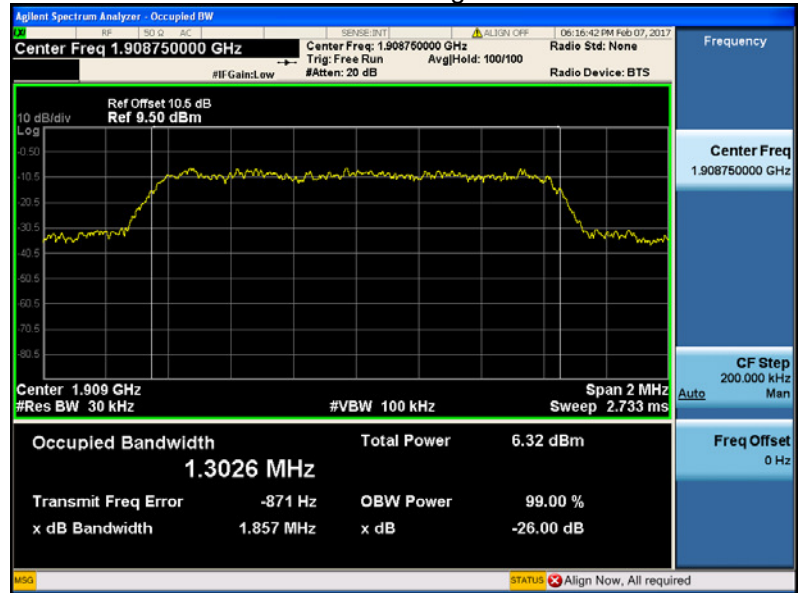
CDMA2000 BC1 Low Channel



CDMA2000 BC1 Middle Channel



CDMA2000 BC1 High Channel



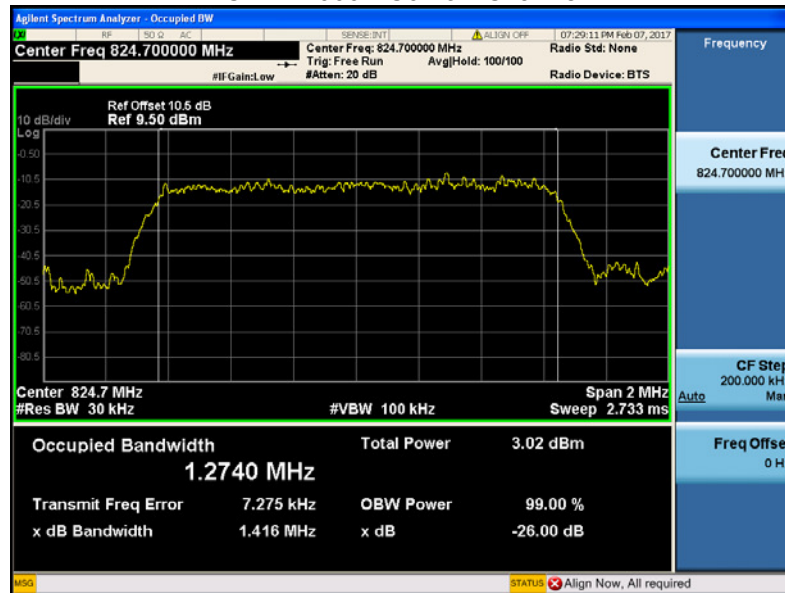


Vice board

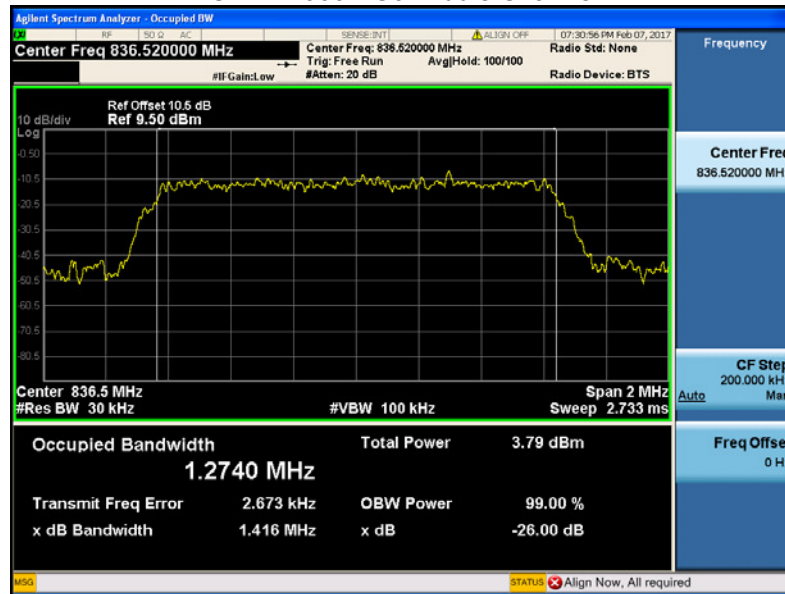
Test Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth(kHz)	26 dB Emission Bandwidth(kHz)
CDMA2000 BC0	1013	824.70	1.27	1.42
	384	836.52	1.27	1.42
	777	848.31	1.28	1.45
CDMA2000 BC1	25	1851.25	1.27	1.44
	600	1880.00	1.28	1.43
	1175	1908.75	1.30	1.78

Test Plots

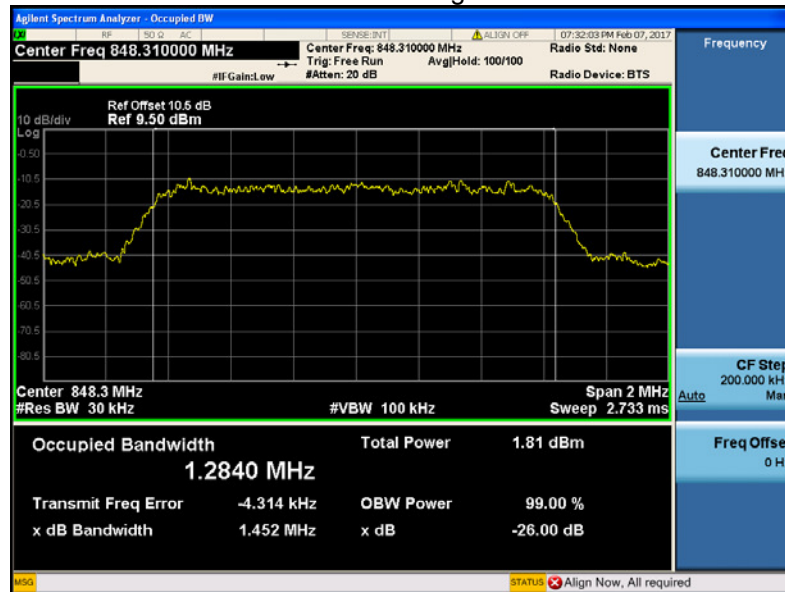
CDMA2000 BC0 Low Channel



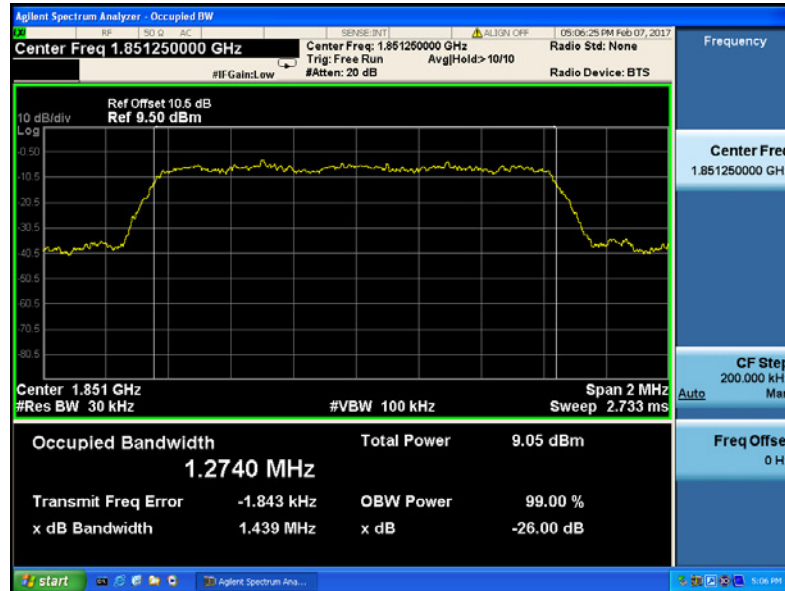
CDMA2000 BC0 Middle Channel



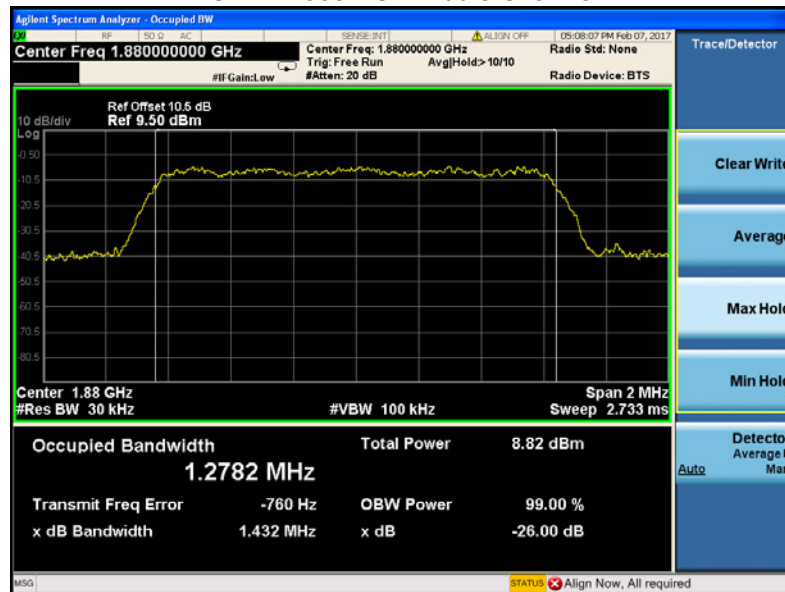
CDMA2000 BC0 High Channel



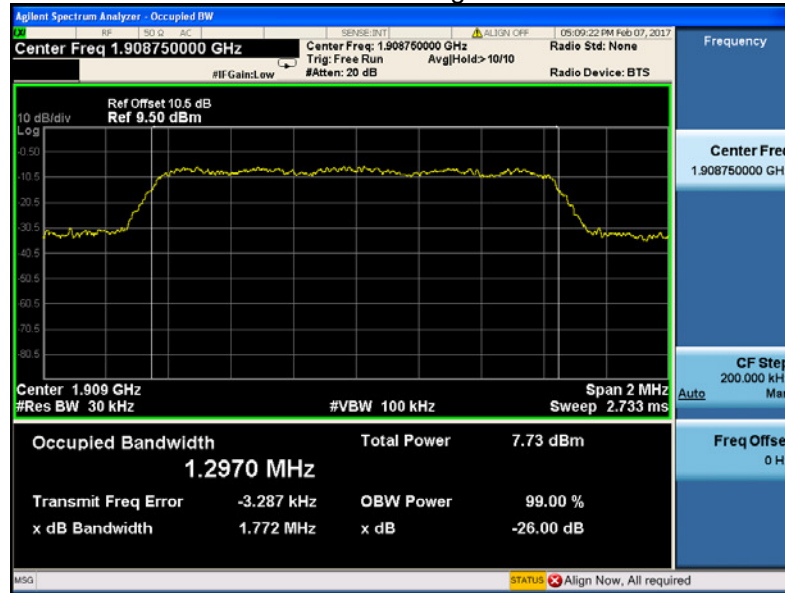
CDMA2000 BC1 Low Channel



CDMA2000 BC1 Middle Channel



CDMA2000 BC1 High Channel



## 10 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement:	FCC Part 2.1051,22.917(a),24.238(a)
Test Method:	TIA/EIA-603-D:2010 KDB971168 D01 v02r02
Test Mode:	Transmitting

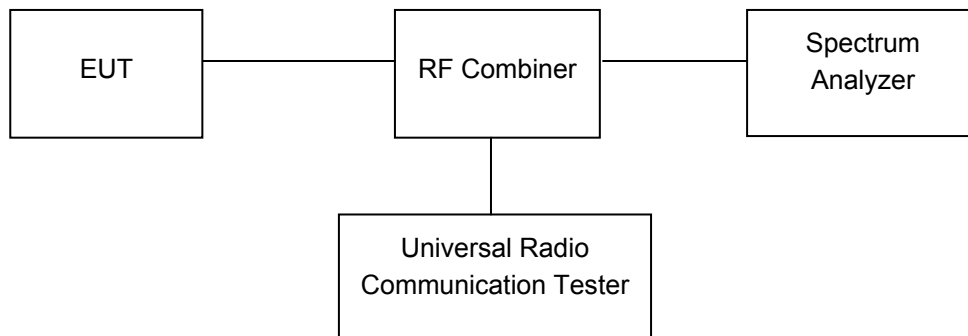
### 10.1 EUT Operation

Operating Environment :

Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.3kPa

### 10.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.



### 10.3 Test Result

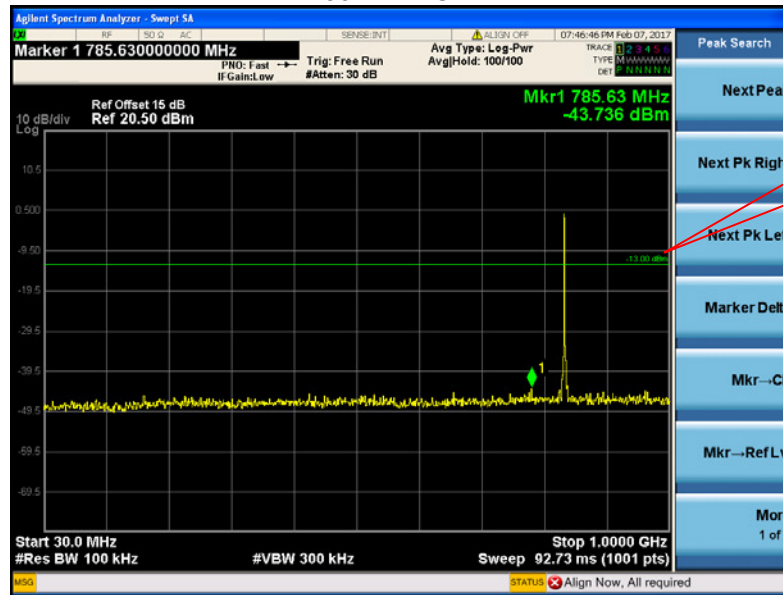
Remark: only the worst data were recorded.

Cellular Band (Part 22H)

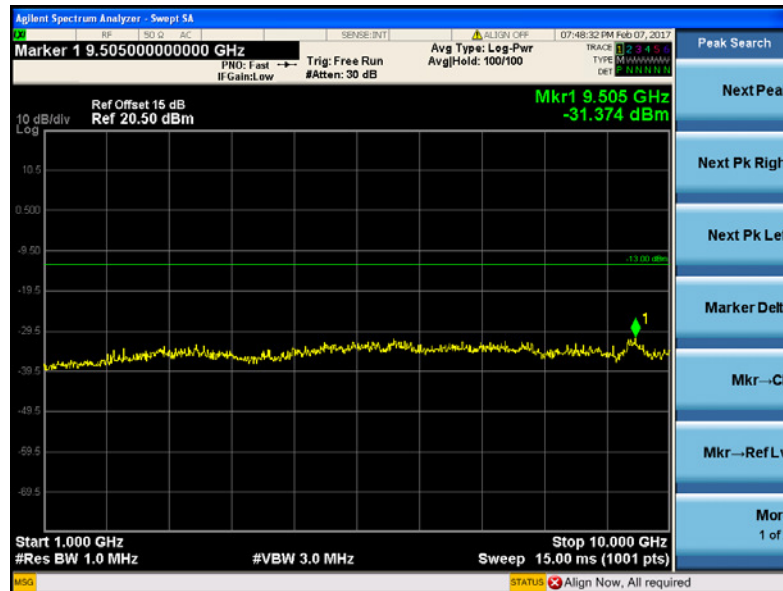
Main board

CDMA2000 BC0 - channel 384

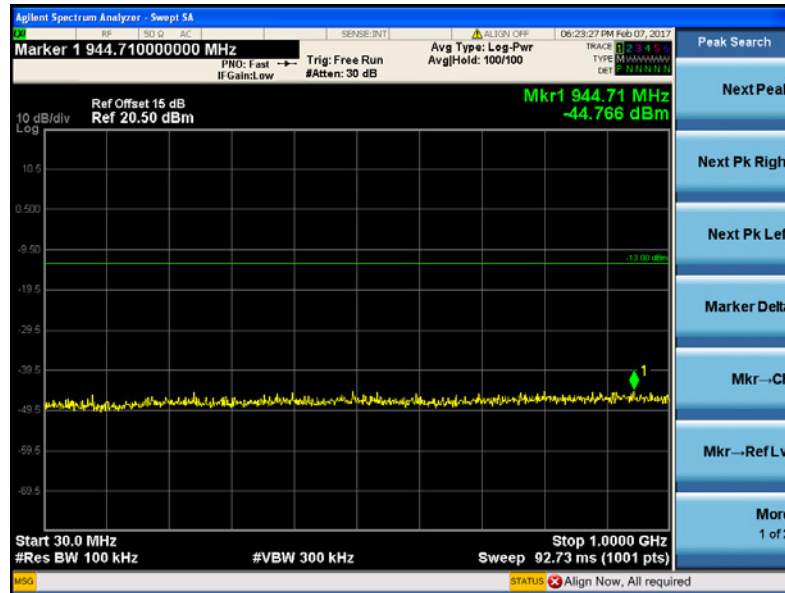
30MHz-1GHz



Above 1GHz

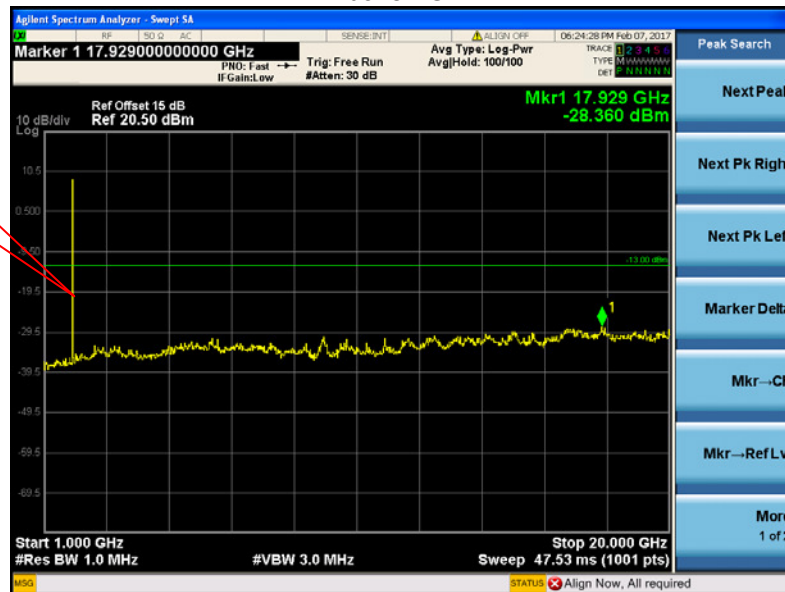


Cellular Band (Part 24E)  
CDMA2000 BC1 - channel 600  
30MHz-1GHz

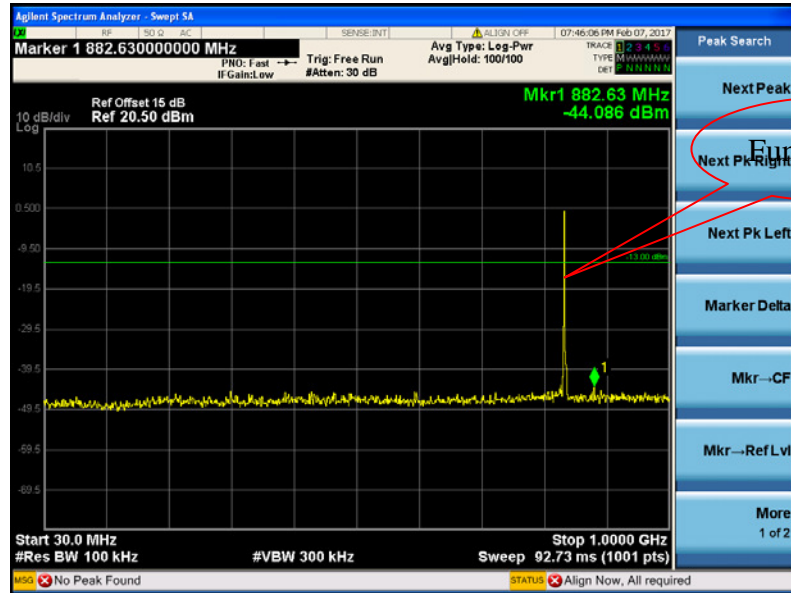


Above 1GHz

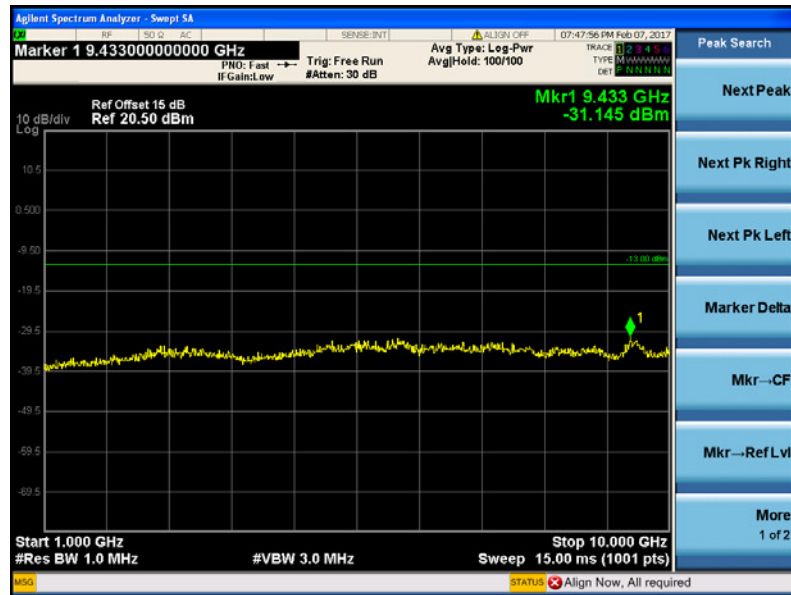
Fundamental



Vice board  
CDMA2000 BC0 - channel 384  
30MHz-1GHz

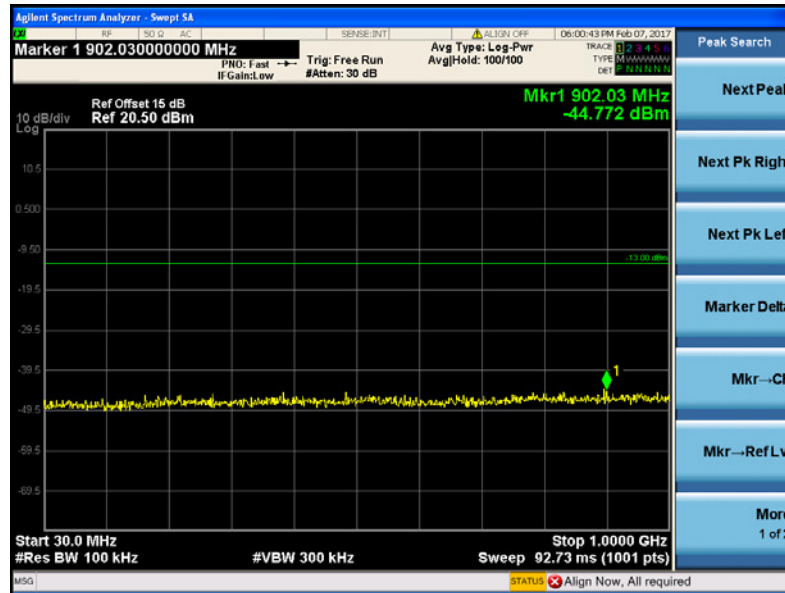


Above 1GHz



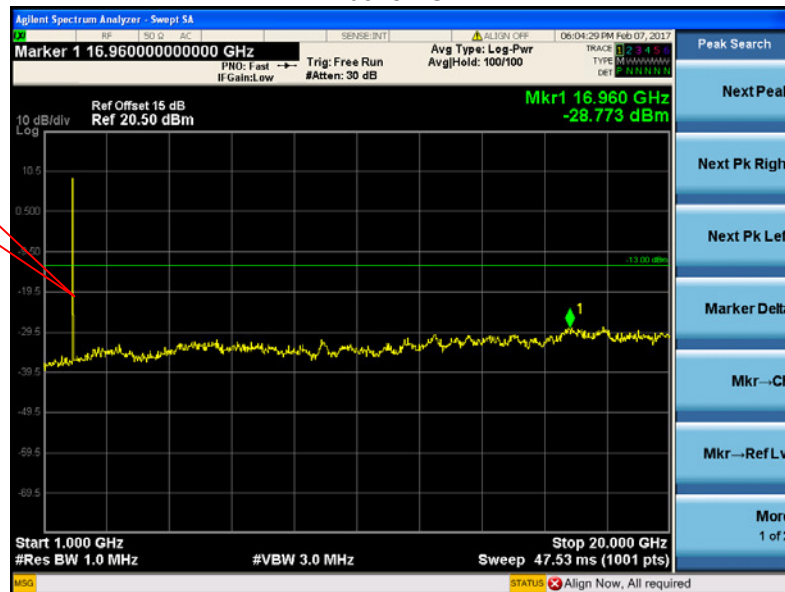


Cellular Band (Part 24E)  
CDMA2000 BC1 - channel 600  
30MHz-1GHz



Above 1GHz

Fundamental



## 11 SPURIOUS RADIATED EMISSIONS

Test Requirement: FCC Part 2.1053,22.917,24.238

Test Method: TIA/EIA-603-D:2010  
KDB971168 D01 v02r02

Test Mode: Transmitting

### 11.1 EUT Operation

Operating Environment :

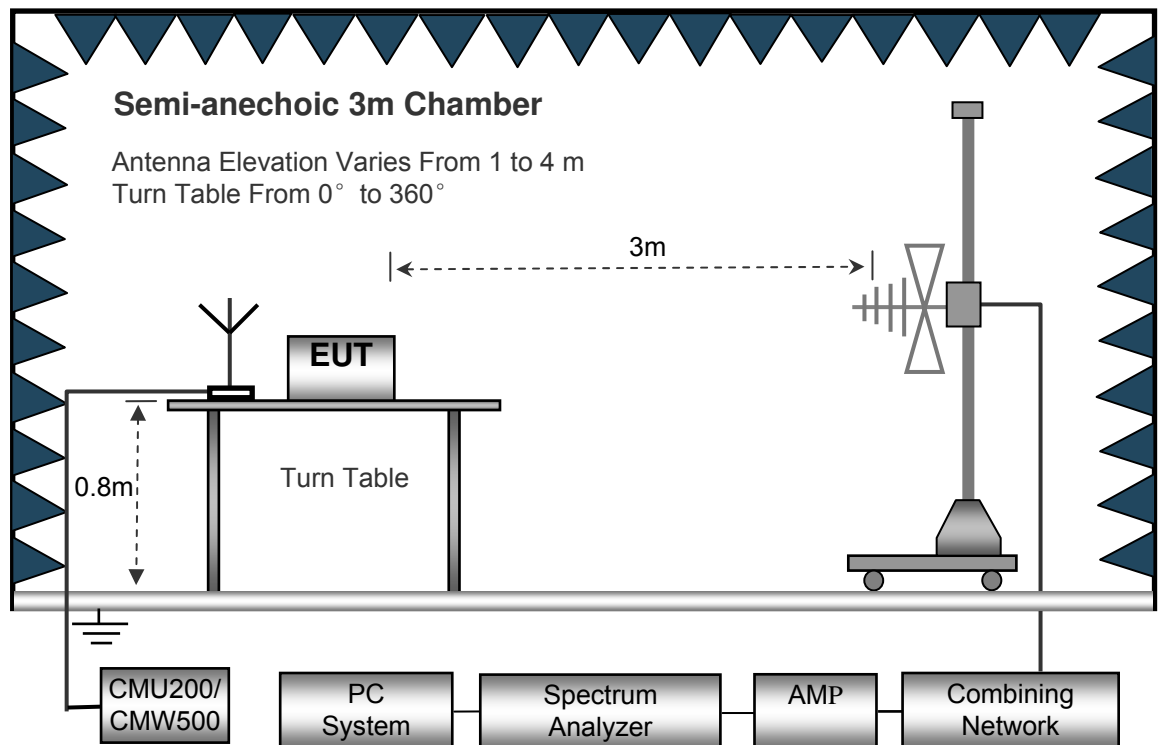
Temperature: 23.5 °C

Humidity: 52.1 % RH

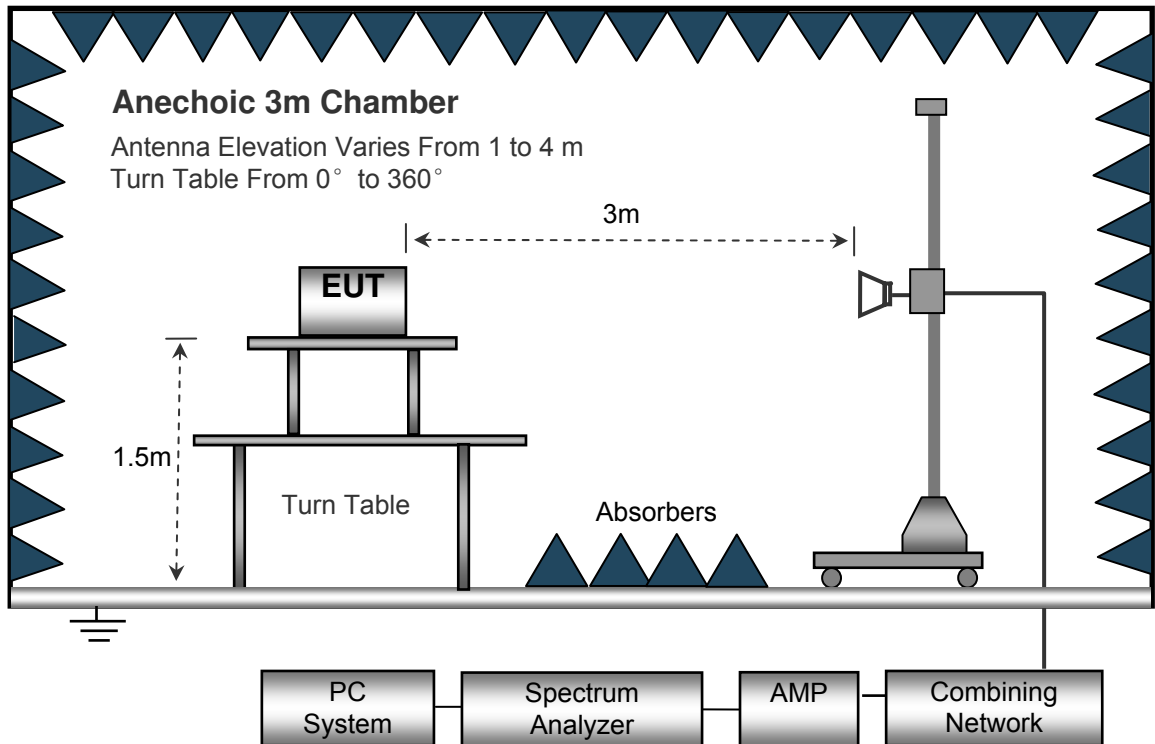
Atmospheric Pressure: 101.2kPa

### 11.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 11.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 100kHz  
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 3MHz  
 Detector ..... Ave.  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 10Hz

## 11.4 Test Procedure

1. The EUT is placed on a turntable, which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from 30MHz up to the tenth harmonic of the highest fundamental frequency.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
7. 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 =  $10 \lg(\text{TXpwr in Watts}/0.001)$  – the absolute level  
Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10}(\text{power out in Watts})$
8. Repeat above procedures until the measurements for all frequencies are completed.

## 11.5 Summary of Test Results

For 19.2MHz,

The measurements were more than 20 dB below the limit and not reported.

Remark: Test performed from 30MHz to 10<sup>th</sup> harmonics with low/middle/high channels, only the worst data were recorded.

Main board

### Cellular Band (Part 22H)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC0 Channel 1013										
201.33	41.43	262	1.4	H	-69.08	0.15	0.00	-69.23	-13.00	-56.23
201.33	45.65	318	1.2	V	-61.94	0.15	0.00	-62.09	-13.00	-49.09
1649.40	65.47	293	1.8	H	-48.50	0.30	9.40	-39.40	-13.00	-26.40
1649.40	58.32	298	1.9	V	-55.21	0.30	9.40	-46.11	-13.00	-33.11
2474.10	55.36	337	1.2	H	-58.64	0.43	10.60	-48.47	-13.00	-35.47
2474.10	49.35	110	2.0	V	-60.93	0.43	10.60	-50.76	-13.00	-37.76

### Cellular Band (Part 24E)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC1 Channel 1175										
201.33	46.67	44	1.2	H	-63.84	0.15	0.00	-63.99	-13.00	-50.99
201.33	39.03	335	2.1	V	-68.56	0.15	0.00	-68.71	-13.00	-55.71
3817.50	65.95	268	1.2	H	-45.59	2.37	12.50	-35.46	-13.00	-22.46
3817.50	59.98	358	1.2	V	-49.83	2.37	12.50	-39.70	-13.00	-26.70
5726.25	53.58	200	1.7	H	-56.03	2.86	12.90	-45.99	-13.00	-32.99
5726.25	44.73	324	1.7	V	-64.15	2.86	12.90	-54.11	-13.00	-41.11

Vice board  
Cellular Band (Part 22H)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC0 Channel 384										
201.33	40.34	53	1.4	H	-70.17	0.15	0.00	-70.32	-13.00	-57.32
201.33	46.75	329	1.8	V	-60.84	0.15	0.00	-60.99	-13.00	-47.99
1649.40	68.43	105	1.7	H	-45.54	0.30	9.40	-36.44	-13.00	-23.44
1649.40	57.22	217	1.9	V	-56.31	0.30	9.40	-47.21	-13.00	-34.21
2474.10	54.97	273	1.1	H	-59.03	0.43	10.60	-48.86	-13.00	-35.86
2474.10	50.56	8	1.6	V	-59.72	0.43	10.60	-49.55	-13.00	-36.55

Cellular Band (Part 24E)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dB $\mu$ V)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
CDMA2000 BC1 Channel 1175										
201.33	44.20	329	1.2	H	-66.31	0.15	0.00	-66.46	-13.00	-53.46
201.33	40.30	47	1.8	V	-67.29	0.15	0.00	-67.44	-13.00	-54.44
3760.00	65.95	320	1.7	H	-45.59	2.37	12.50	-35.46	-13.00	-22.46
3760.00	59.98	247	1.2	V	-49.83	2.37	12.50	-39.70	-13.00	-26.70
5640.00	53.58	186	2.0	H	-56.03	2.86	12.90	-45.99	-13.00	-32.99
5640.00	44.73	63	1.6	V	-64.15	2.86	12.90	-54.11	-13.00	-41.11

Note: 1) Absolute Level = SG Level - Cable loss + Antenna Gain

2) Margin = Limit- Absolute Level

## 12 Band Edge Measurement

Test Requirement:	FCC Part 2.1051,22.917(a),24.238(a)
Test Method:	TIA/EIA-603-D:2010 KDB971168 D01 v02r02
Test Mode:	Transmitting

### 12.1 EUT Operation

Operating Environment :

Temperature:	23.5 °C
Humidity:	52.3 % RH
Atmospheric Pressure:	101.3kPa

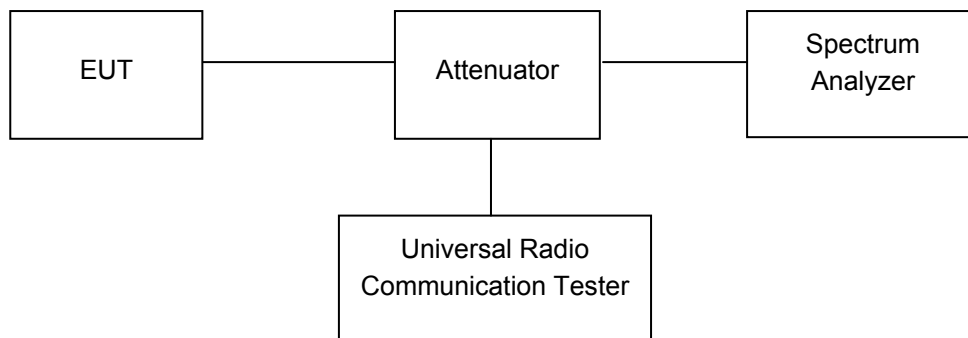
### 12.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

According to FCC Part 22.917(a), 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.

According to FCC Part 24.238(a), 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.

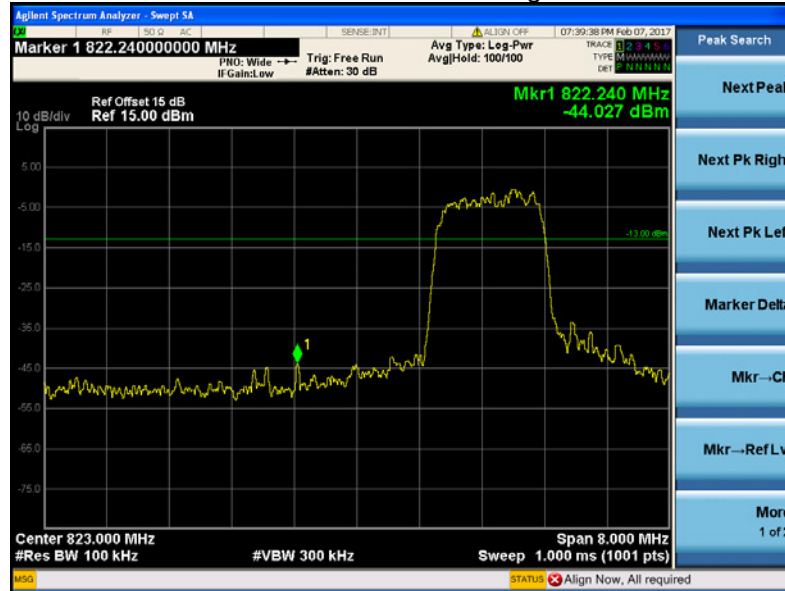
The center of the spectrum analyzer was set to block edge frequency



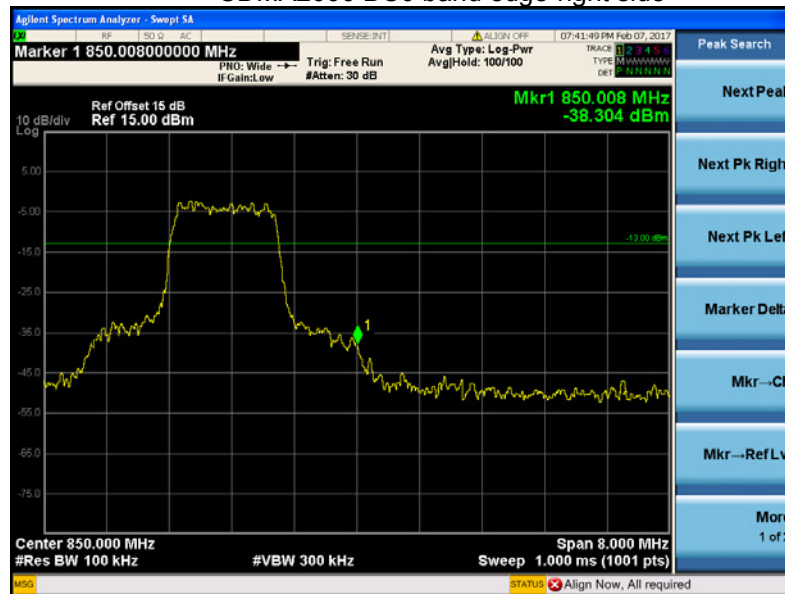
### 12.3 Test Result

Test plots  
Cellular Band (Part 22H)  
Main board

CDMA2000 BC0 band edge-left side



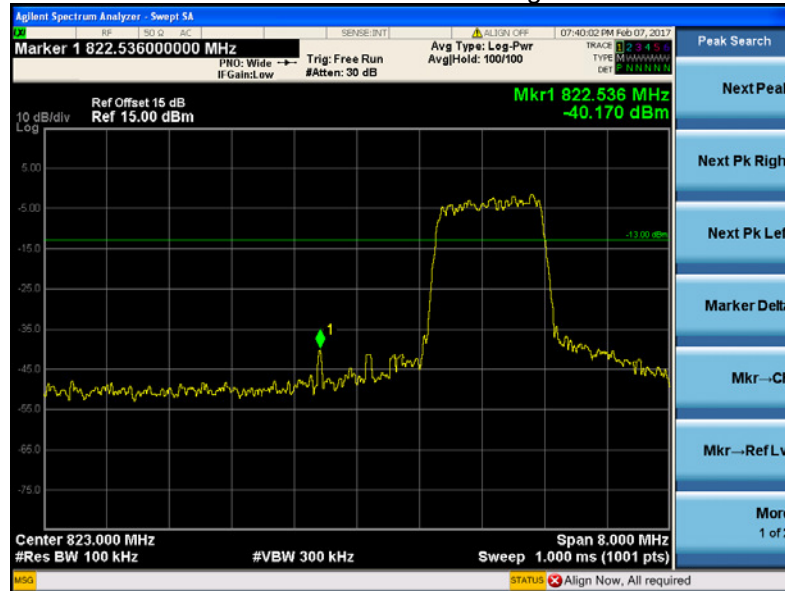
CDMA2000 BC0 band edge-right side



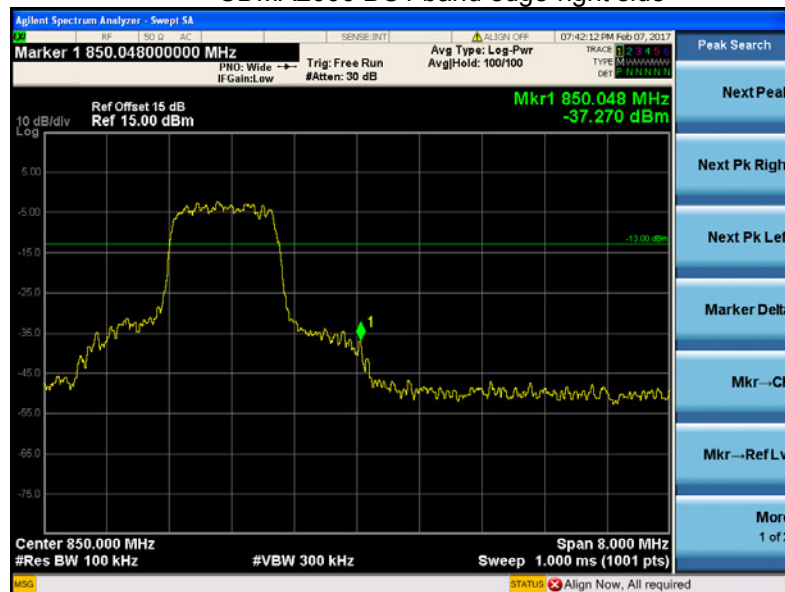


Cellular Band (Part 24E)

CDMA2000 BC1 band edge-left side

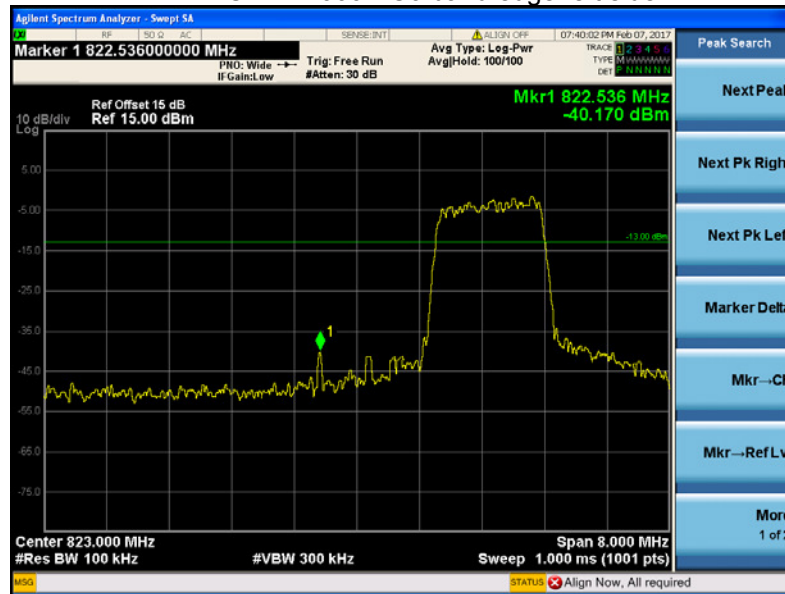


CDMA2000 BC1 band edge-right side

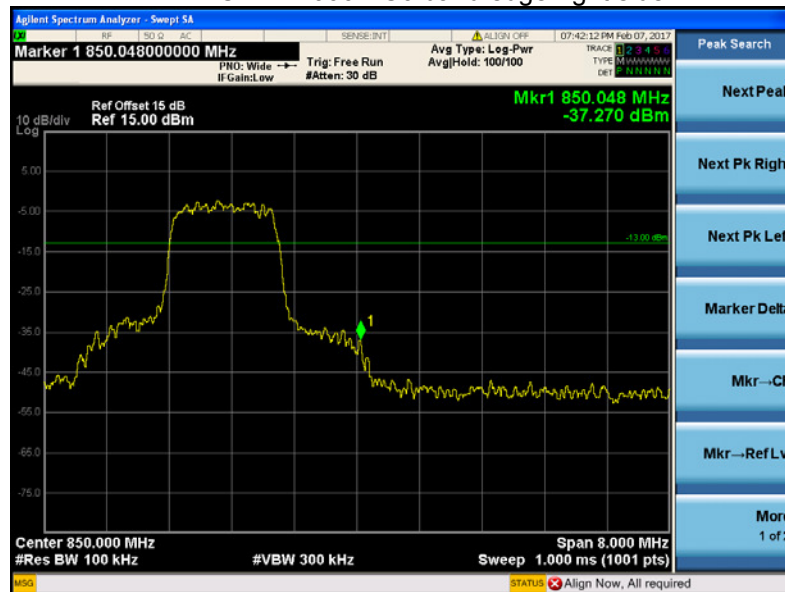


Vice board

CDMA2000 BC0 band edge-left side

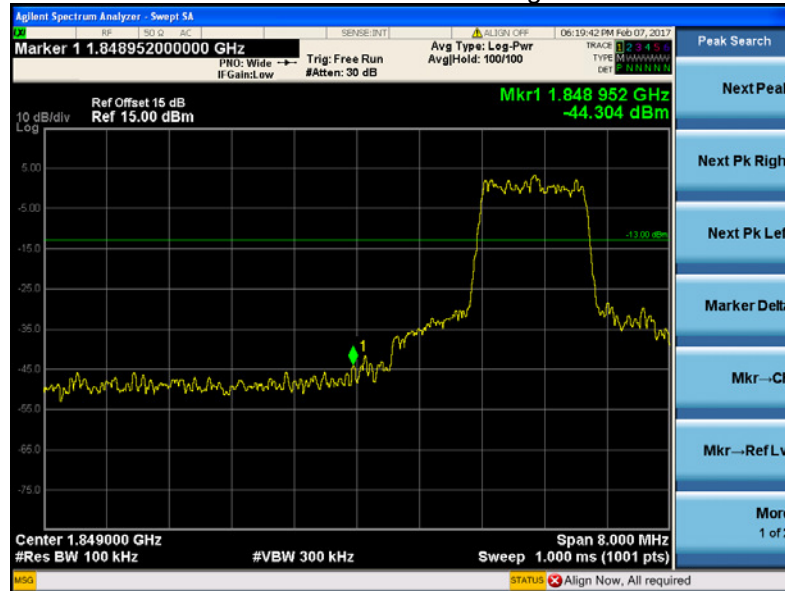


CDMA2000 BC0 band edge-right side

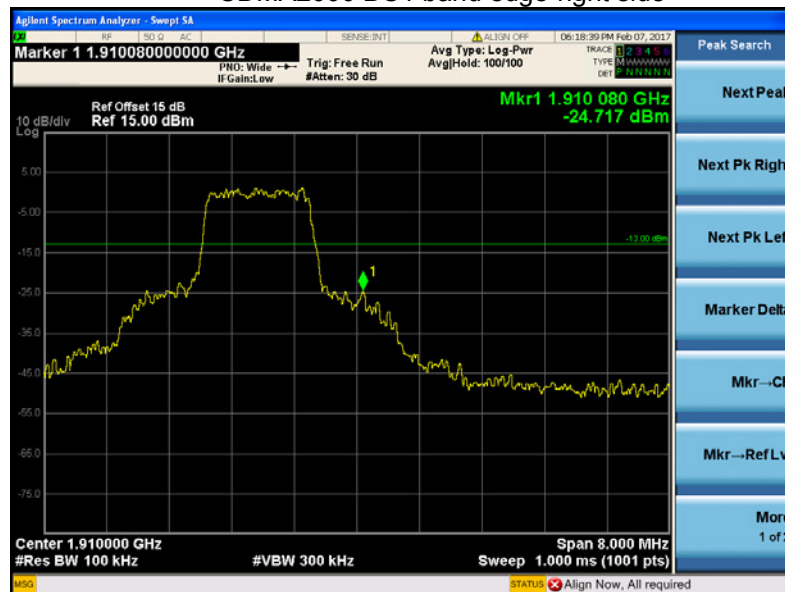


Cellular Band (Part 24E)

CDMA2000 BC1 band edge-left side



CDMA2000 BC1 band edge-right side



## 13 FREQUENCY STABILITY

Test Requirement:	FCC Part 2.1055,22.355,24.235
Test Method:	TIA/EIA-603-D:2010 KDB971168 D01 v02r02
Test Mode:	Transmitting

### 13.1 EUT Operation

Operating Environment :

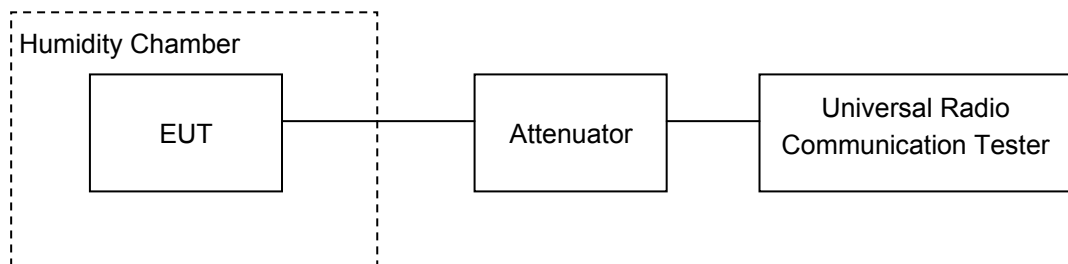
Temperature:	22.9 °C
Humidity:	52.0 % RH
Atmospheric Pressure:	101.3kPa

### 13.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



### 13.3 Test Result

Main board

Cellular Band (Part 22H)

CDMA2000 BC0 Test Frequency:836.52MHz				
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.8	-5	-0.0060	2.5
40		2	0.0024	2.5
30		-7	-0.0084	2.5
20		2	0.0020	2.5
10		8	0.0096	2.5
0		2	0.0024	2.5
-10		0	0.0000	2.5
-20		-1	-0.0012	2.5
-30		-5	-0.0060	2.5
20		3.3	-4	-0.0048
20	4.2	2	0.0024	2.5

## PCS Band (Part 24E)

CDMA2000 BC1 Test Frequency:1880.00MHz				
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.8	-9	-0.0048	2.5
40		-2	-0.0011	2.5
30		-1	-0.0005	2.5
20		0	-0.0002	2.5
10		-7	-0.0037	2.5
0		-9	-0.0048	2.5
-10		-1	-0.0005	2.5
-20		-3	-0.0016	2.5
-30		-1	-0.0005	2.5
20		3.3	5	0.0027
20	4.2	6	0.0032	2.5

## Vice board

## Cellular Band (Part 22H)

CDMA2000 BC0 Test Frequency:836.52MHz				
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.8	-5	-0.0060	2.5
40		9	0.0108	2.5
30		0	0.0000	2.5
20		0	-0.0003	2.5
10		6	0.0072	2.5
0		1	0.0012	2.5
-10		0	0.0000	2.5
-20		-5	-0.0060	2.5
-30		2	0.0024	2.5
20		3.3	3	0.0036
20	4.2	8	0.0096	2.5

## PCS Band (Part 24E)

CDMA2000 BC1 Test Frequency:1880.00MHz				
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.8	9	0.0048	2.5
40		-7	-0.0037	2.5
30		1	0.0005	2.5
20		0	-0.0002	2.5
10		3	0.0016	2.5
0		4	0.0021	2.5
-10		8	0.0043	2.5
-20		-3	-0.0016	2.5
-30		5	0.0027	2.5
20		3.3	-4	-0.0021
20	4.2	-9	-0.0048	2.5



## **14 RF Exposure**

Remark: refer to SAR test report: WTS17S0169022E

