

**FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E AND  
PART 90  
&  
INDUSTRY CANADA RSS-132 & RSS-133**

**TEST REPORT**

**For**

**Computer**

**FCC Model: AIM8Q, AIM8Qxxxxxxxxxxxxxxxxx,  
AIM-x5BTxxxxxxxxxxx(where "x" may be any alphanumeric character,  
"-" or blank for marketing purpose and no impact safety related critical  
components and constructions)**

**IC Model: AIM8Q, AIM-25BT, AIM-35BT, AIM-55BT, AIM-65BT, AIM-75BT**

**Trade Name: ADVANTECH**

*Issued to*

**Advantech Co.Ltd.**

**No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114,  
Taiwan, R.O.C.**

*Issued by*

**Compliance Certification Services Inc.**

**No.11, Wugong 6th Rd., Wugu Dist.,  
New Taipei City 24891, Taiwan. (R.O.C.)**

**<http://www.ccsrf.com>**

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**Issued Date: June 9, 2017**



Testing Laboratory  
1309

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**Revision History**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 9, 2017	Initial Issue	ALL	Angel Cheng

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# 1. TEST RESULT CERTIFICATION

**Applicant:** Advantech Co.Ltd.  
 No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,  
 Taipei 114, Taiwan, R.O.C.

**Manufacturer:** Advantech Co.Ltd.  
 No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,  
 Taipei 114, Taiwan, R.O.C.

**Equipment Under Test:** Computer  
**Trade Name:** ADVANTECH  
**FCC Model:** AIM8Q, AIM8Qxxxxxxxxxxxxxxxxx,  
 AIM-x5BTxxxxxxxxxxxxx(where "x" may be any alphanumeric  
 character, "-" or blank for marketing purpose and no impact  
 safety related critical components and constructions)

**IC Model:** AIM8Q, AIM-25BT, AIM-35BT, AIM-55BT, AIM-65BT,  
 AIM-75BT

**Date of Test:** May 18 ~ 19, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E & IC RSS-132 Issue 3: January, 2013 and IC RSS-133 Issue 6: January, 2013	No non-compliance noted

**We hereby certify that:**

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C: 2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 Subpart H and PART 24 Subpart E.

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

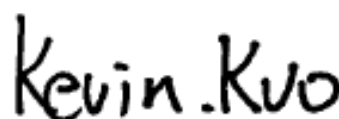
Approved by:




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Sam Chuang  
 Manager  
 Compliance Certification Services Inc.

Tested by




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Kevin Kuo  
 Engineer  
 Compliance Certification Services Inc.

## 2. EUT DESCRIPTION

<b>Product</b>	Computer
<b>FCC Model No.</b>	AIM8Q, AIM8Qxxxxxxxxxxxxxxxxx, AIM-x5BTxxxxxxxxxxxxx(where "x" may be any alphanumeric character, "-" or blank for marketing purpose and no impact safety related critical components and constructions)
<b>IC Model No.</b>	AIM8Q, AIM-25BT, AIM-35BT, AIM-55BT, AIM-65BT, AIM-75BT
<b>Model Discrepancy</b>	All models are electrically identical, different model names are for marketing purpose
<b>Trade Name</b>	ADVANTECH
<b>Received Date</b>	April 6, 2017
<b>Power Supply</b>	1. VDC from Power Adapter Chicony / A16-018N1A I/P: 100-240Vac, 1A, 50-60Hz O/P: 5.15Vdc, 3A, 9.1Vdc, 2A, 18W 2. Battery ADVANTECH / AIM-BAT-8 Rating: 3.8V, 4900mAh, 18.62Wh
<b>Frequency Range</b>	Band Class 0 US Cellular TX: 824 MHz - 849 MHz RX: 860 MHz - 894 MHz Band Class 1 North American PCS TX: 1850 MHz - 1910 MHz RX: 1930 MHz - 1990 MHz Band Class 10 Secondary 800 MHz TX: 817MHz - 824 MHz RX: 861 MHz - 869 MHz
<b>Transmit Power (ERP &amp; EIRP Power)</b>	CDMA Band Class 0 US Cellular: 23.15 dBm Band Class 1 North American PCS: 23.71 dBm Band Class 10 Secondary 800 MHz: 22.03 dBm
<b>Cellular Phone Protocol</b>	CDMA, 1xRTT, 1xEVDO Rev.0, 1xEVDO Rev.A
<b>Antenna Specification</b>	PIFA Antenna Band Class 0 US Cellular: Gain: -1.91dBi Band Class 1 North American PCS: Gain: -1.98dBi Band Class 10 Secondary 800 MHz: Gain: -1.98dBi

**Remark:**

1. The EUT send are pre-pilot unit from factory.
2. We measure worst in CDMA, because the output powers less with 1XRTT /EVDO.
3. .For Canada the EUT CDMA BC10 will be disabled.

### **3. TEST METHODOLOGY**

Both conducted and radiated testing were performed according to the procedures document in ANSI C63.10: 2013, TIA/EIA-603-C: 2004 and FCC CFR 47, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

The tests documented in this report were performed in accordance with IC RSS-132, RSS-133, SPSR503, SPSR510 and ANSI C63.10: 2013 and TIA/EIA-603-C.

This submittal(s) (test report) is intended for IC Certification with Industry Canada RSS-132 & RSS-133.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

According to the requirements in ANSI C63.10: 2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10: 2013.

### 3.4 DESCRIPTION OF TEST MODES

The EUT (model: AIM8Q) had been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

EUT staying in continuous transmitting mode was programmed.

#### 3.4.1 The worst mode of measurement

For CDMA\_BC0

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Voltage/Hz	120V/60Hz
Test Mode	Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Voltage/Hz	120V/60Hz
Test Mode	Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Voltage/Hz	120V/60Hz
Test Mode	Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z for radiated measurement. The worst cases (X-Plane) were recorded in this report.
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

**For CDMA\_BC1**

<b>AC Power Line Conducted Emission</b>	
<b>Test Condition</b>	<b>AC Power line conducted emission for line and neutral</b>
<b>Voltage/Hz</b>	<b>120V/60Hz</b>
<b>Test Mode</b>	<b>Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.</b>
<b>Worst Mode</b>	<input checked="" type="checkbox"/> <b>Mode 1</b> <input type="checkbox"/> <b>Mode 2</b> <input type="checkbox"/> <b>Mode 3</b> <input type="checkbox"/> <b>Mode 4</b>

<b>Radiated Emission Measurement</b>	
<b>Test Condition</b>	<b>Band edge, Emission for Unwanted and Fundamental</b>
<b>Voltage/Hz</b>	<b>120V/60Hz</b>
<b>Test Mode</b>	<b>Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.</b>
<b>Worst Mode</b>	<input checked="" type="checkbox"/> <b>Mode 1</b> <input type="checkbox"/> <b>Mode 2</b> <input type="checkbox"/> <b>Mode 3</b> <input type="checkbox"/> <b>Mode 4</b>
<b>Position</b>	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

<b>Radiated Emission Measurement Below 1G</b>	
<b>Test Condition</b>	<b>Radiated Emission Below 1G</b>
<b>Voltage/Hz</b>	<b>120V/60Hz</b>
<b>Test Mode</b>	<b>Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.</b>
<b>Worst Mode</b>	<input checked="" type="checkbox"/> <b>Mode 1</b> <input type="checkbox"/> <b>Mode 2</b> <input type="checkbox"/> <b>Mode 3</b> <input type="checkbox"/> <b>Mode 4</b>

*Remark:*

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z for radiated measurement. The worst cases (Z-Plane) were recorded in this report.
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.



**For CDMA\_BC10**

<b>AC Power Line Conducted Emission</b>	
<b>Test Condition</b>	<b>AC Power line conducted emission for line and neutral</b>
<b>Voltage/Hz</b>	<b>120V/60Hz</b>
<b>Test Mode</b>	<b>Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.</b>
<b>Worst Mode</b>	<input checked="" type="checkbox"/> <b>Mode 1</b> <input type="checkbox"/> <b>Mode 2</b> <input type="checkbox"/> <b>Mode 3</b> <input type="checkbox"/> <b>Mode 4</b>

<b>Radiated Emission Measurement</b>	
<b>Test Condition</b>	<b>Band edge, Emission for Unwanted and Fundamental</b>
<b>Voltage/Hz</b>	<b>120V/60Hz</b>
<b>Test Mode</b>	<b>Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.</b>
<b>Worst Mode</b>	<input checked="" type="checkbox"/> <b>Mode 1</b> <input type="checkbox"/> <b>Mode 2</b> <input type="checkbox"/> <b>Mode 3</b> <input type="checkbox"/> <b>Mode 4</b>
<b>Position</b>	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

<b>Radiated Emission Measurement Below 1G</b>	
<b>Test Condition</b>	<b>Radiated Emission Below 1G</b>
<b>Voltage/Hz</b>	<b>120V/60Hz</b>
<b>Test Mode</b>	<b>Mode 1:EUT power by AC adapter via power cable. Mode 2:EUT power by Battery.</b>
<b>Worst Mode</b>	<input checked="" type="checkbox"/> <b>Mode 1</b> <input type="checkbox"/> <b>Mode 2</b> <input type="checkbox"/> <b>Mode 3</b> <input type="checkbox"/> <b>Mode 4</b>

*Remark:*

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z for radiated measurement. The worst cases (Y-Plane) were recorded in this report.
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.*

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Meter	Anritsu	ML2495A	1012009	07/04/2016	07/03/2017
Power Sensor	Anritsu	MA2411B	917072	07/04/2016	07/03/2017
Base Station	R&S	CMU 200	101245	07/29/2016	07/28/2017
Base Station	Anritsu	MT-8820C	6200938900	07/26/2016	07/25/2017
Spectrum Analyzer	R&S	FSV 40	101073	10/05/2016	10/04/2017

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Analyzer	Agilent	E4407B	MY44212686	04/07/2017	04/06/2018
Pre-Amplifier	HP	8449B	3008A00965	07/02/2016	07/01/2017
Bilog Antenna	Sunol Sciences	JB1	A052609	03/17/2017	03/16/2018
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/08/2017	03/07/2018
Pre-Amplifier	Anritsu	MH648A	M89145	05/02/2017	05/01/2018
Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/02/2016	09/01/2017
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Base Station	R&S	CMU 200	101245	07/29/2016	07/28/2017
Base Station	Anritsu	MT-8820C	6200938900	07/26/2016	07/25/2017
Software	EZ-EMC (CCS-3A1RE)				

### 4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.2159
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

**Remark:** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.  
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)  
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN,  
R.O.C.  
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

### 5.2 EQUIPMENT




Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

*\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

**Remark:**

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

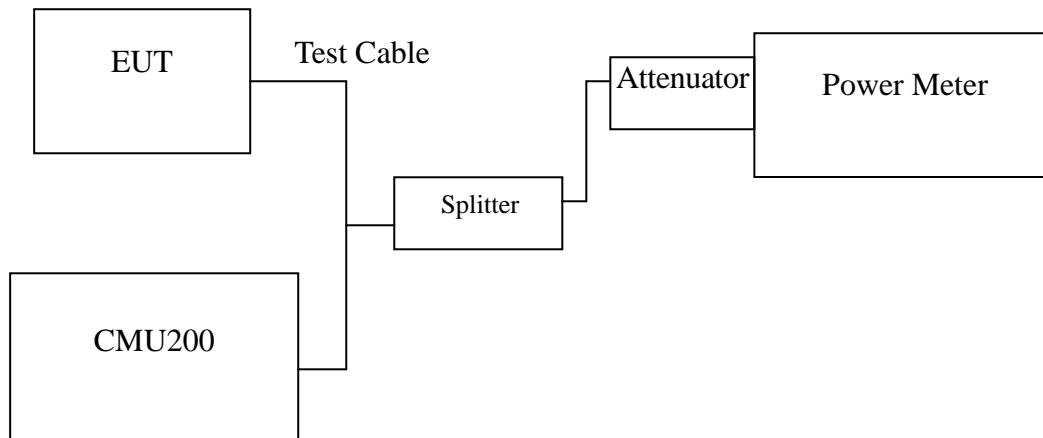
## 7. FCC PART 22 & 24 & 90 REQUIREMENTS AND INDUSTRY CANADA RSS-132 & RSS-133

### 7.1 PEAK POWER

#### LIMIT

According to FCC §2.1046.

#### Test Configuration



*Remark: Measurement setup for testing on Antenna connector*

#### TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

#### TEST RESULTS

*No non-compliance noted.*

**Test Data**

**CDMA**

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
BC0	1013	824.70	24.33	0.2710
	384	836.52	24.91	0.3097
	777	848.31	24.17	0.2612
BC1	25	1851.25	24.62	0.2897
	600	1880.00	24.35	0.2722
	1175	1908.75	24.15	0.2600
BC10	476	817.90	24.33	0.2710
	580	820.50	24.91	0.3097
	684	823.10	23.87	0.2437

**1xRTT**

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
BC0	1013	824.70	24.31	0.2698
	384	836.52	24.66	0.2924
	777	848.31	24.53	0.2838
BC1	25	1851.25	24.93	0.3112
	600	1880.00	24.74	0.2979
	1175	1908.75	24.68	0.2938
BC10	476	817.90	24.51	0.2825
	580	820.50	24.26	0.2667
	684	823.10	24.05	0.2541

**Remark:** The value of factor includes both the loss of cable and external attenuator



**1xEVDO Rev.0**

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
BC0	1013	824.70	24.61	0.2891
	384	836.52	24.79	0.3013
	777	848.31	24.48	0.2805
BC1	25	1851.25	24.33	0.2710
	600	1880.00	24.51	0.2825
	1175	1908.75	23.83	0.2415
BC10	476	817.90	24.11	0.2576
	580	820.50	24.36	0.2729
	684	823.10	24.03	0.2529

**1xEVDO Rev.A**

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
BC0	1013	824.70	24.67	0.2931
	384	836.52	24.53	0.2838
	777	848.31	24.75	0.2985
BC1	25	1851.25	24.91	0.3097
	600	1880.00	24.85	0.3055
	1175	1908.75	24.73	0.2972
BC10	476	817.90	24.35	0.2723
	580	820.50	24.56	0.2858
	684	823.10	24.13	0.2588

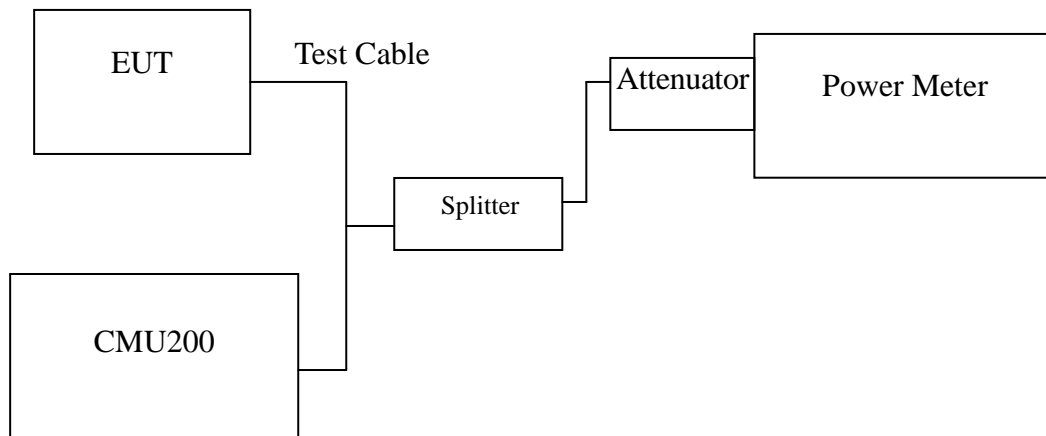
**Remark:** The value of factor includes both the loss of cable and external attenuator

## 7.2 AVERAGE POWER

### LIMIT

For reporting purposes only.

### Test Configuration



*Remark: Measurement setup for testing on Antenna connector*

### TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

### TEST RESULTS

*No non-compliance noted.*

**Test Data**

**CDMA**

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power (W)
BC0	1013	824.7	24.8	0.3020
	384	836.52	24.7	0.2951
	777	848.31	24.7	0.2951
BC1	25	1851.25	24.4	0.2754
	600	1880	24.6	0.2884
	1175	1908.75	24.4	0.2754
BC10	476	817.9	24.0	0.2512
	580	820.5	24.0	0.2512
	684	823.1	24.1	0.2570

**1xRTT**

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power (W)
BC0	1013	824.7	24.5	0.2818
	384	836.52	24.5	0.2818
	777	848.31	24.6	0.2884
BC1	25	1851.25	24.1	0.2570
	600	1880	24.2	0.2630
	1175	1908.75	24.2	0.2630
BC10	476	817.9	23.6	0.2291
	580	820.5	23.7	0.2344
	684	823.1	23.9	0.2455

**Remark:** The value of factor includes both the loss of cable and external attenuator

**1xEVDO Rev.0**

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power (W)
BC0	1013	824.7	24.5	0.2818
	384	836.52	24.6	0.2884
	777	848.31	24.4	0.2754
BC1	25	1851.25	24.2	0.2630
	600	1880	24.4	0.2754
	1175	1908.75	24.1	0.2570
BC10	476	817.9	23.7	0.2344
	580	820.5	23.9	0.2455
	684	823.1	24.0	0.2512

**1xEVDO Rev.A**

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power (W)
BC0	1013	824.7	24.3	0.2692
	384	836.52	24.4	0.2754
	777	848.31	24.3	0.2692
BC1	25	1851.25	23.6	0.2291
	600	1880	23.5	0.2239
	1175	1908.75	23.7	0.2344
BC10	476	817.9	24.1	0.2570
	580	820.5	24.5	0.2818
	684	823.1	24.2	0.2630

**Remark:** The value of factor includes both the loss of cable and external attenuator

### 7.3 ERP & EIRP MEASUREMENT

#### LIMIT

According to FCC §2.1046

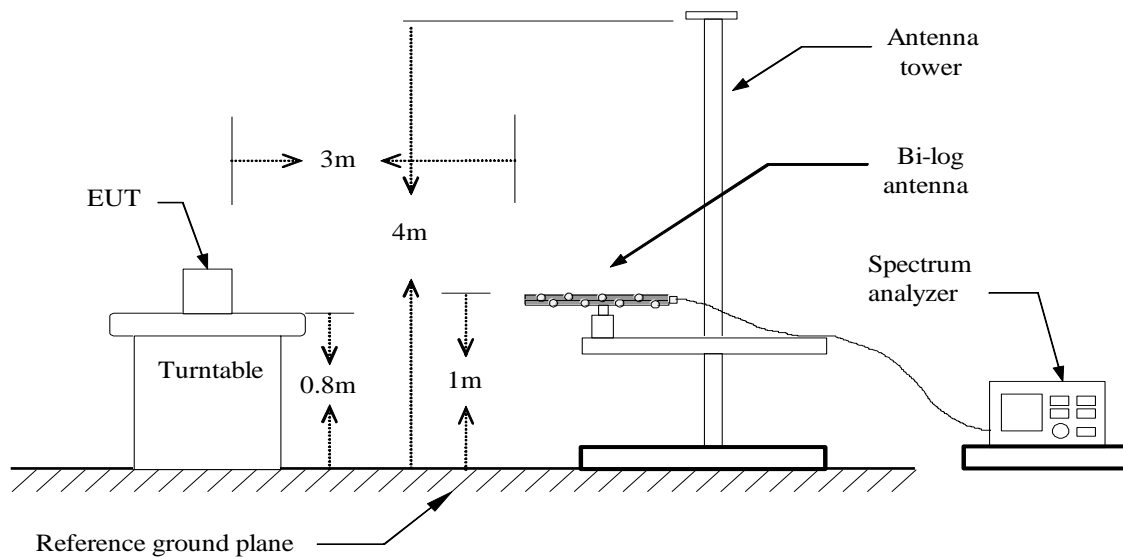
FCC 22.913(b): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

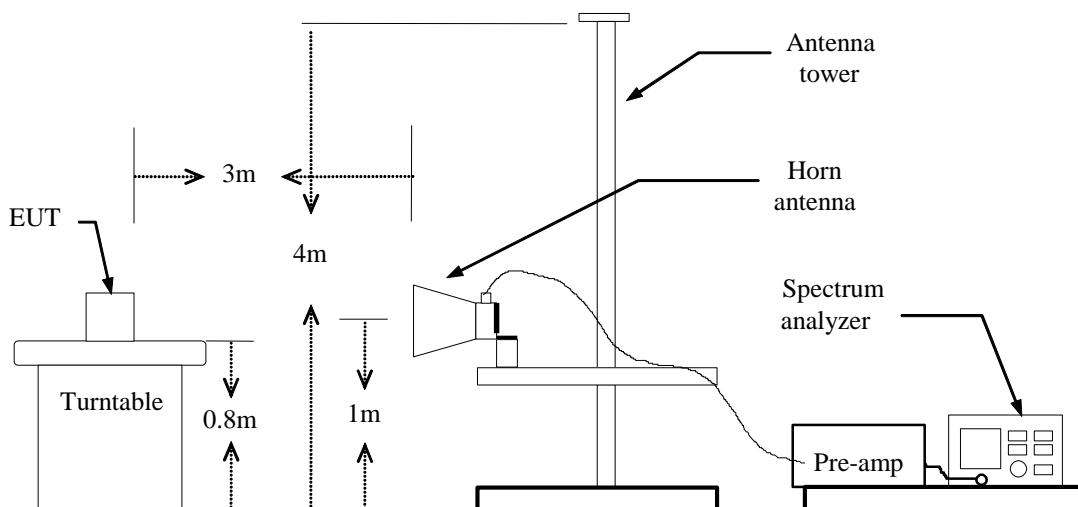
FCC 90.635(b): The effective radiated power (ERP) of the transmitter for mobile stations is 100 watts.

#### TEST CONFIGURATION

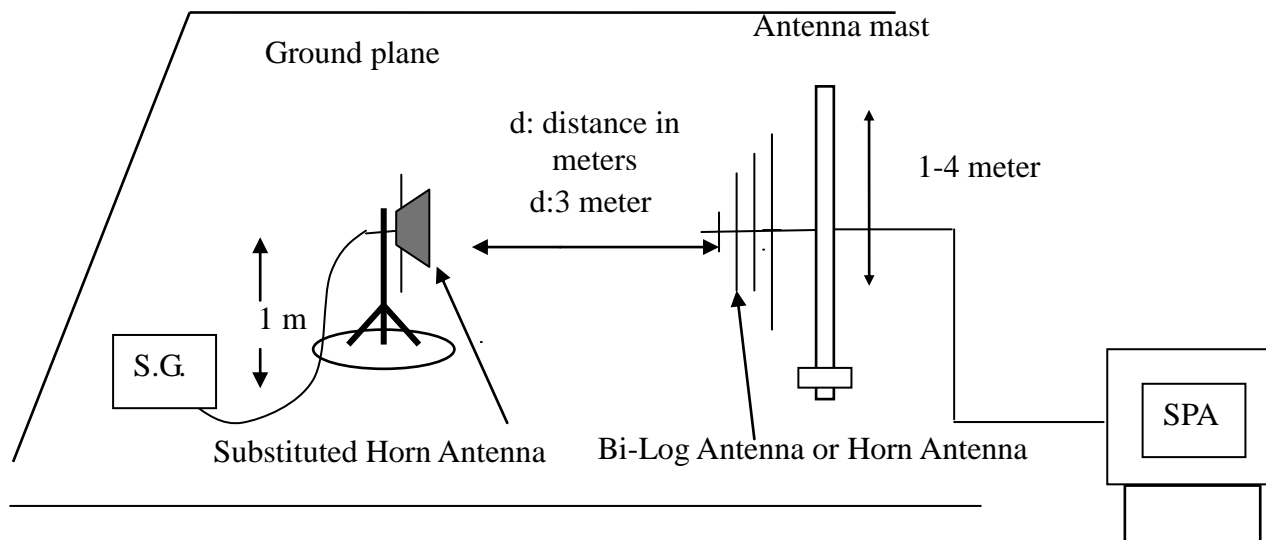
##### Below 1 GHz



##### Above 1 GHz



**For Substituted Method Test Set-UP**



**TEST PROCEDURE**

The EUT was placed on a 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 5MHz and the average bandwidth was set to 50MHz. 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:

$$ERP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

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

**TEST RESULTS**

*No non-compliance noted.*

**CDMA BC0 Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1013	824.5400	V	17.53	1.23	18.76	38.45	-19.69
	824.8400	H	12.73	1.23	13.96	38.45	-24.49
384	836.8400	V	16.52	1.2	17.72	38.45	-20.73
	836.3600	H	17.89	1.2	19.09	38.45	-19.36
777	848.4200	V	19.33	1.17	20.50	38.45	-17.95
	848.2400	H	21.98	1.17	<b>23.15</b>	38.45	-15.30

**CDMA BC1 Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
25	1851.360	V	13.54	1.5	15.04	33.00	-17.96
	1851.360	H	20.86	1.5	22.36	33.00	-10.64
600	1879.680	V	14.11	1.5	15.61	33.00	-17.39
	1879.800	H	21.98	1.5	23.48	33.00	-9.52
1175	1908.840	V	14.04	1.5	15.54	33.00	-17.46
	1908.960	H	22.21	1.5	23.71	33.00	-9.29

**CDMA BC10 Test Data**

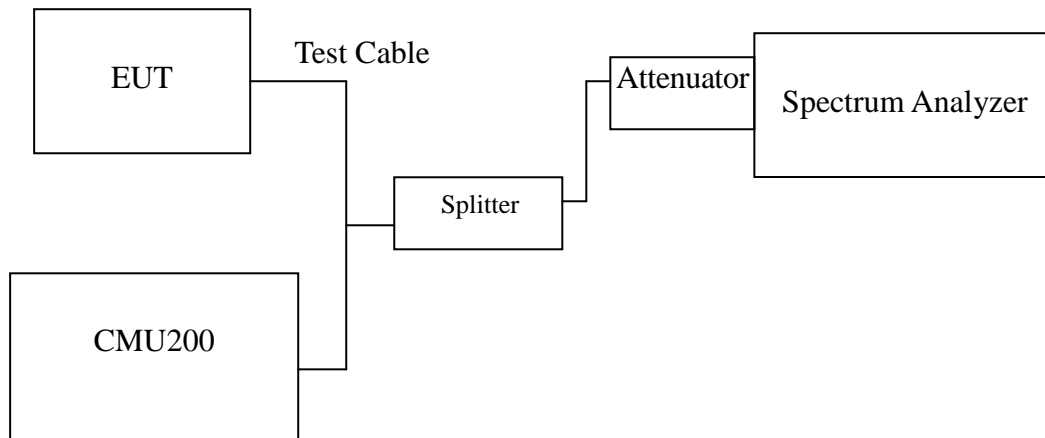
Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
476	817.9400	V	17.17	1.25	18.42	50.00	-31.58
	817.6400	H	20.78	1.25	22.03	50.00	-27.97
580	820.5200	V	17.38	1.24	18.62	50.00	-31.38
	820.3400	H	20.79	1.24	22.03	50.00	-27.97
684	823.0400	V	16.78	1.23	18.01	50.00	-31.99
	823.1000	H	20.68	1.23	21.91	50.00	-28.09

## 7.4 OCCUPIED BANDWIDTH MEASUREMENT

### LIMIT

According to §FCC 2.1049.

### Test Configuration



*Remark: Measurement setup for testing on Antenna connector*

### TEST PROCEDURE

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW is set to 3 times the RBW, -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.

### TEST RESULTS

*No non-compliance noted*



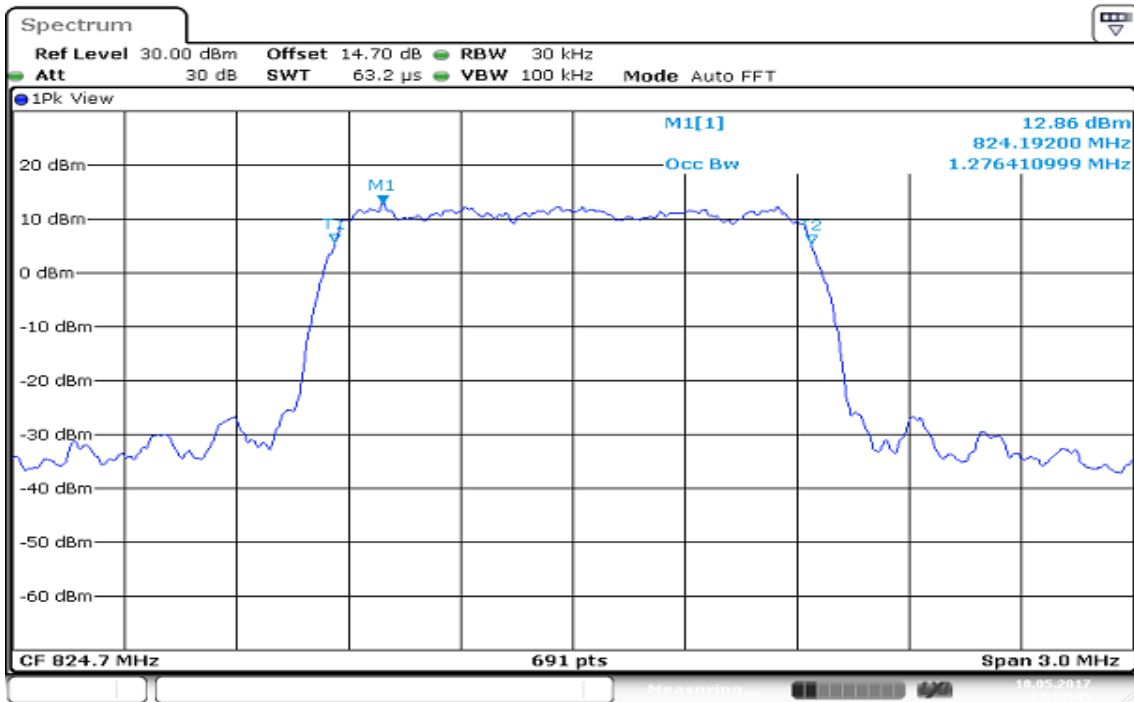
**CDMA**

Test Mode	CH	Frequency (MHz)	99% Bandwidth (MHz)
BC0	1013	824.70	1.2764
	384	836.52	1.2764
	777	848.31	1.2764
BC1	25	1851.25	1.2720
	600	1880.00	1.2764
	1175	1908.75	1.2764
BC10	476	817.90	1.2720
	580	820.50	1.2807
	684	823.10	1.2764

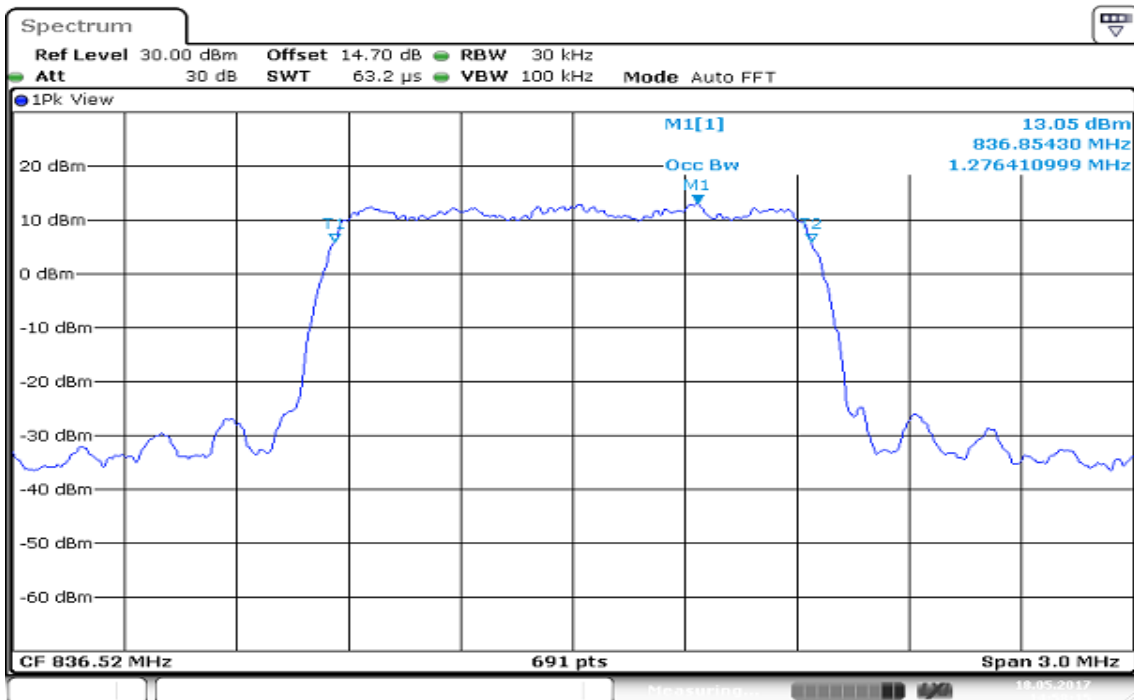
**Remark:** The value of factor includes both the loss of cable and external attenuator

**Test Plot**

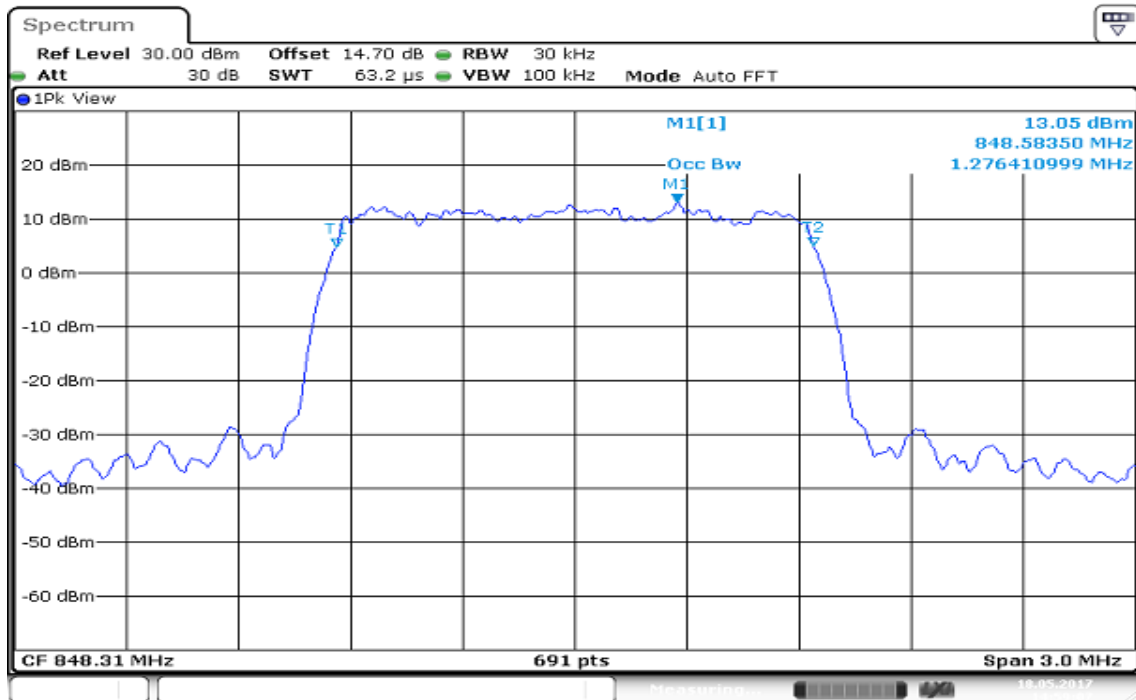
**CDMA / BC0 (CH 1013)**



**CDMA / BC0 (CH 384)**

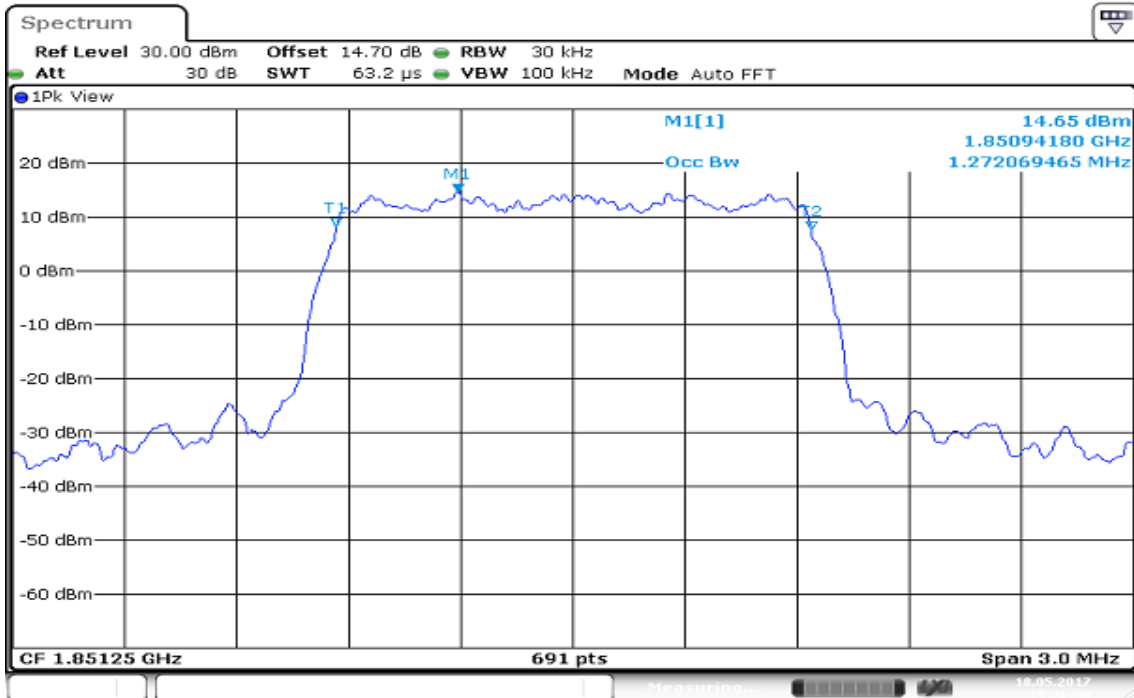


### CDMA / BC0 (CH 777)



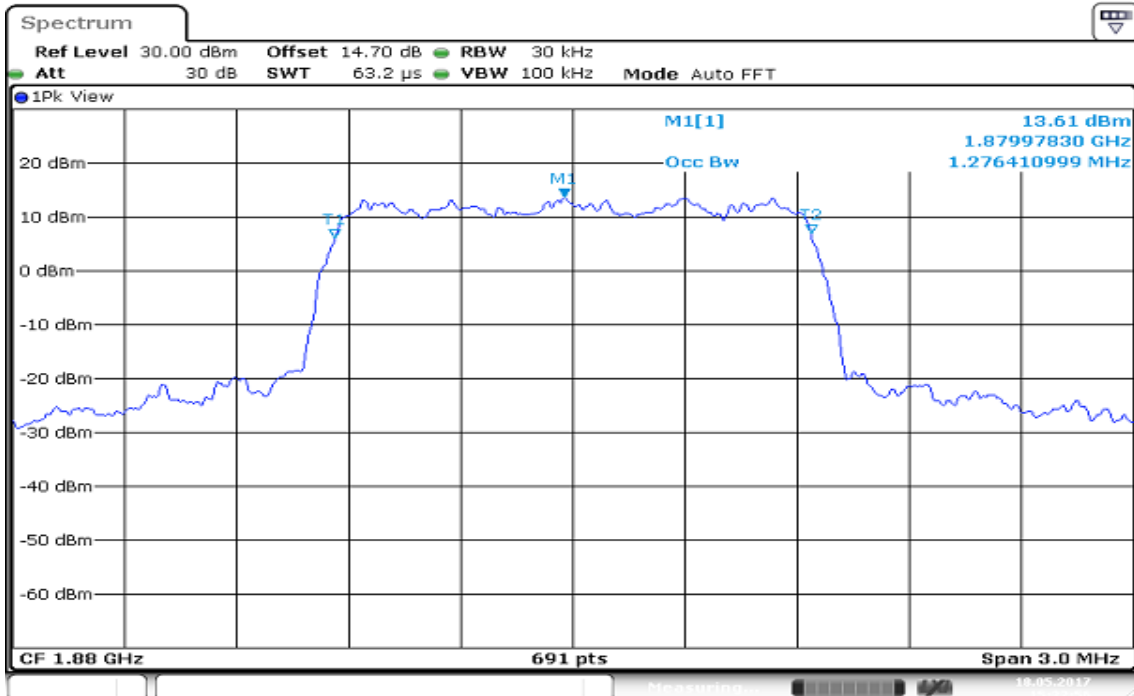
Date: 18 MAY 2017 14:59:07

### CDMA / BC1 (CH 25)



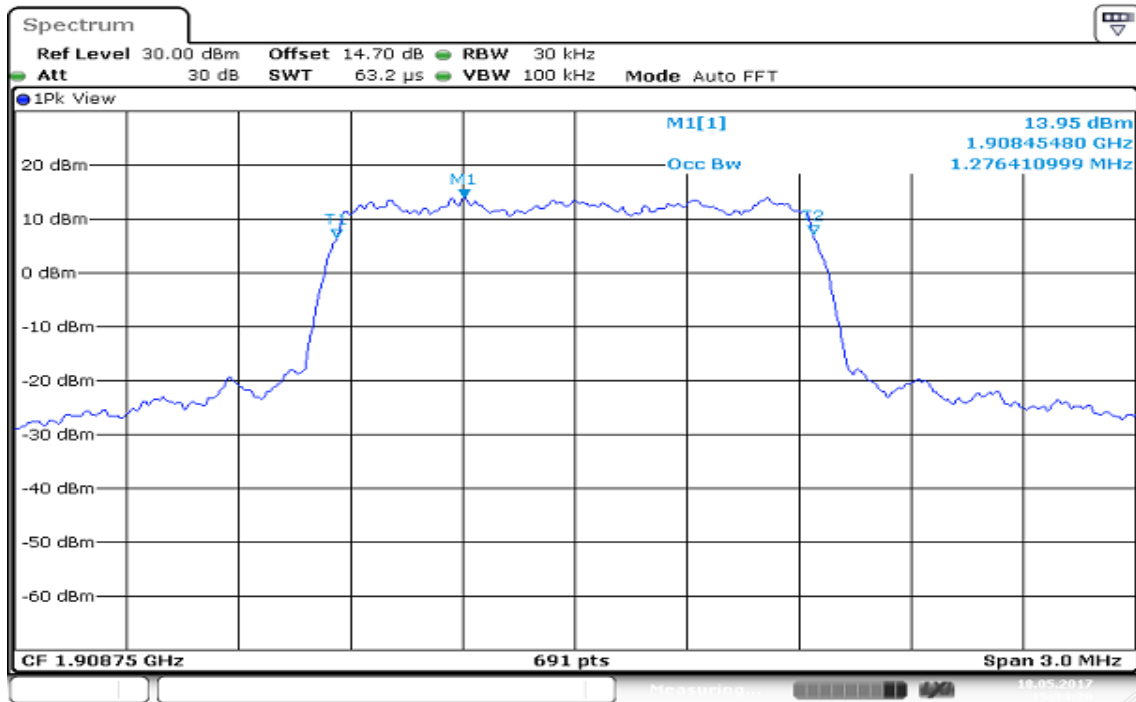
Date: 18 MAY 2017 15:26:50

### CDMA / BC1 (CH 600)



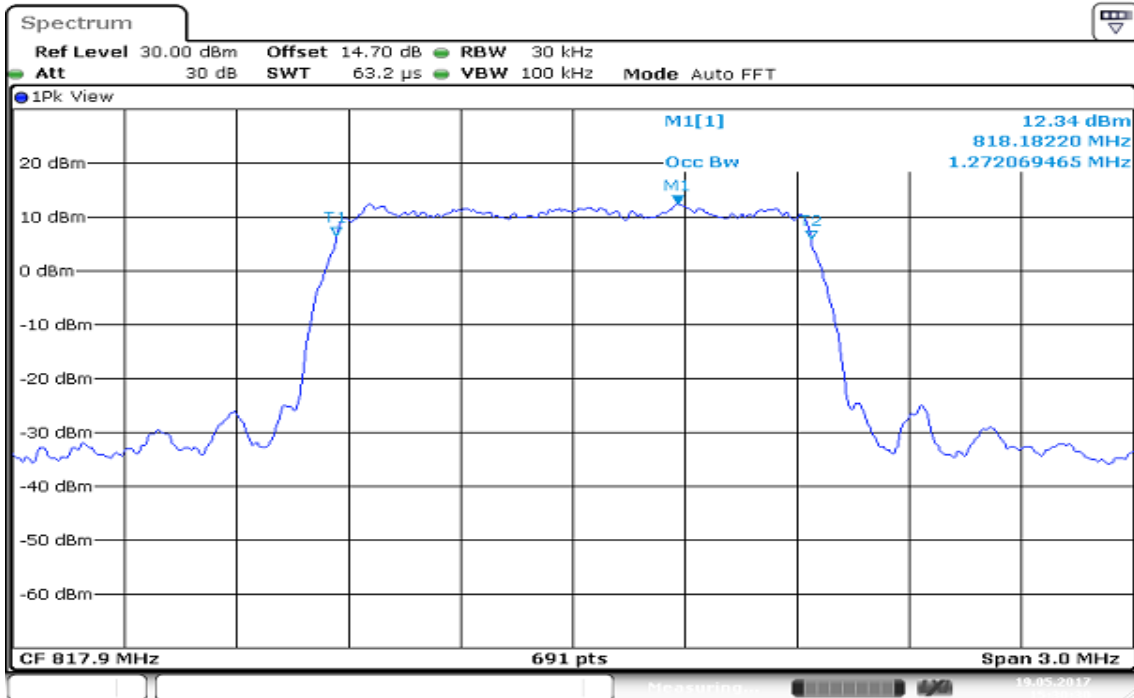
Date: 18 MAY 2017 15:32:56

### CDMA / BC1 (CH 1175)

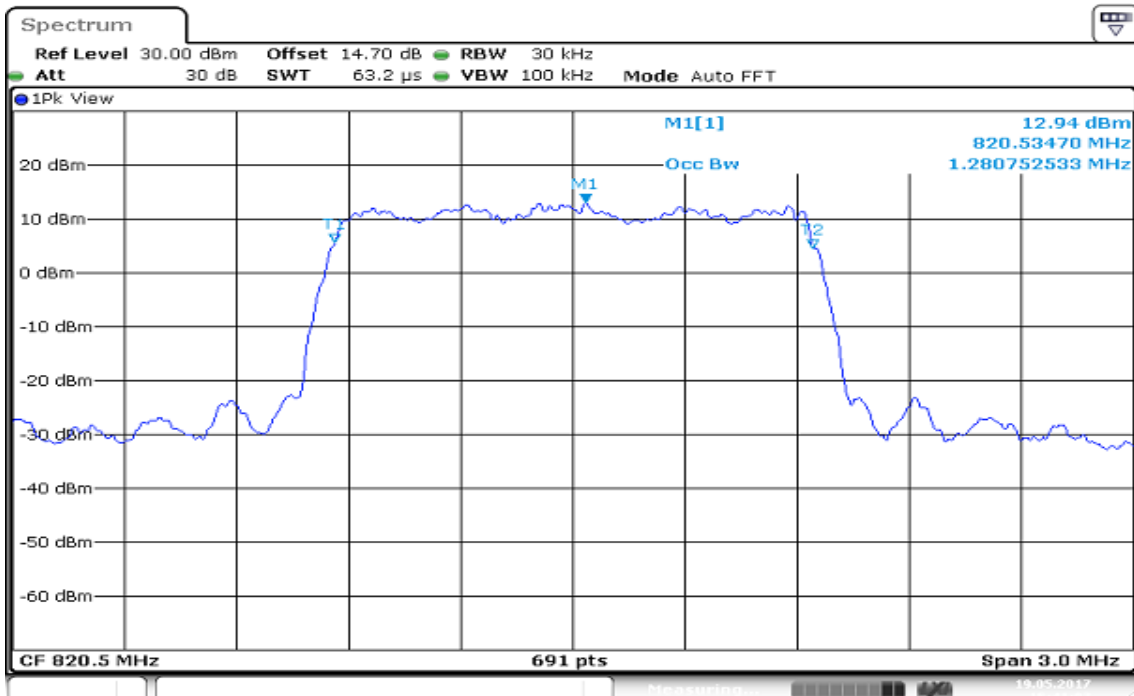


Date: 18 MAY 2017 15:24:20

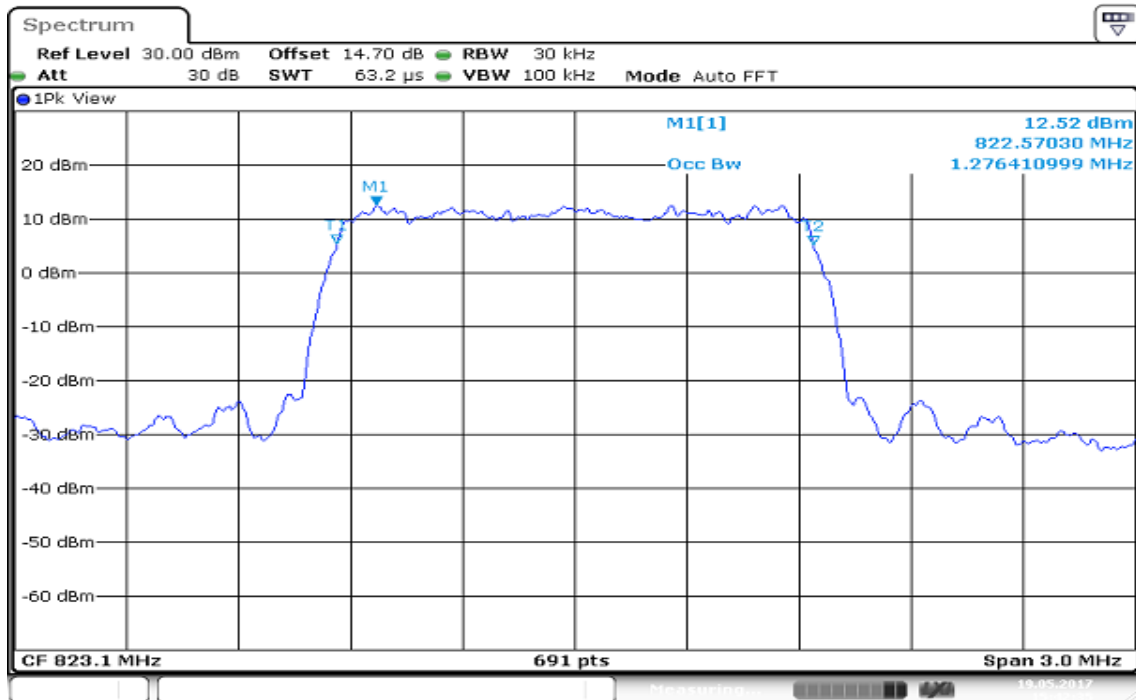
**CDMA / BC10 (CH 476)**



**CDMA / BC10 (CH 580)**



### CDMA / BC10 (CH 684)



Date: 19 MAY 2017 15:42:35

## 7.5 PEAK TO AVERAGE RATIO

### Limit

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

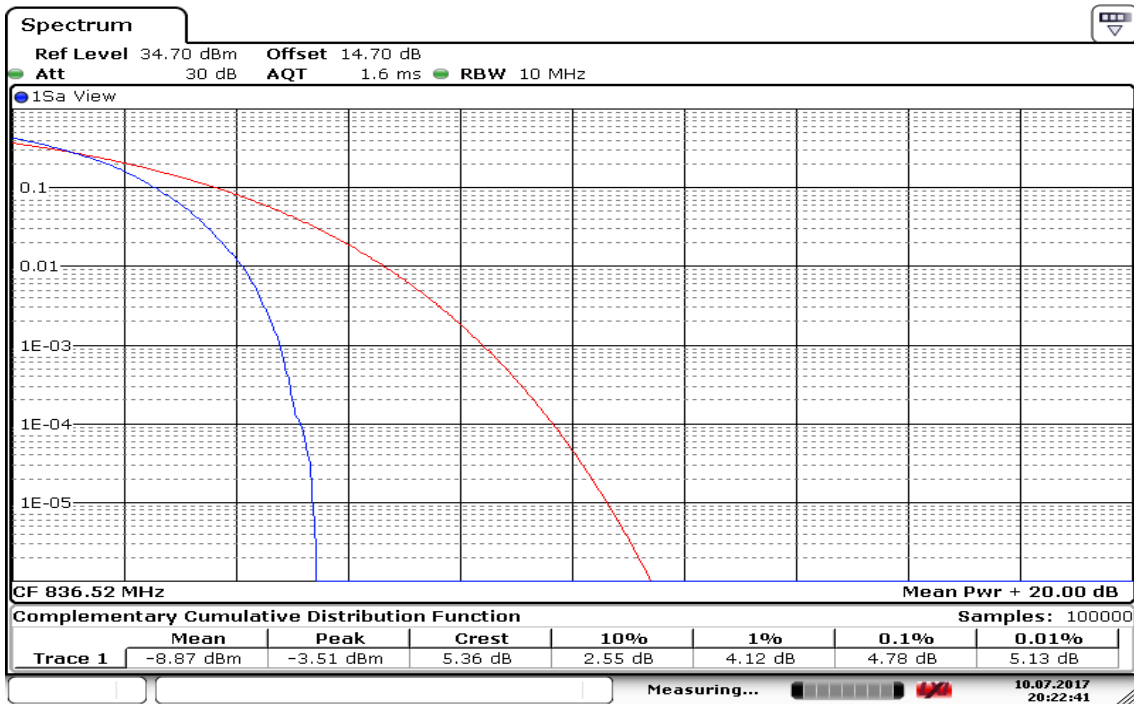
### Test Procedures

1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.



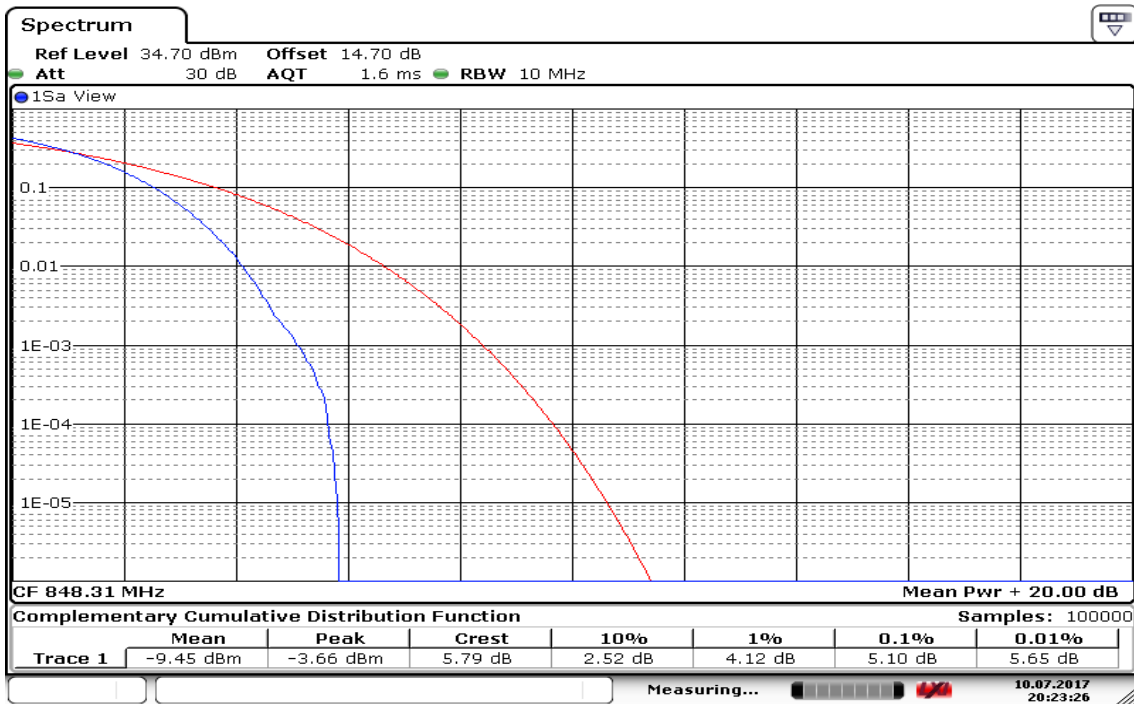
**Test Plot**

**CDMA / BC0 (CH 1013)**



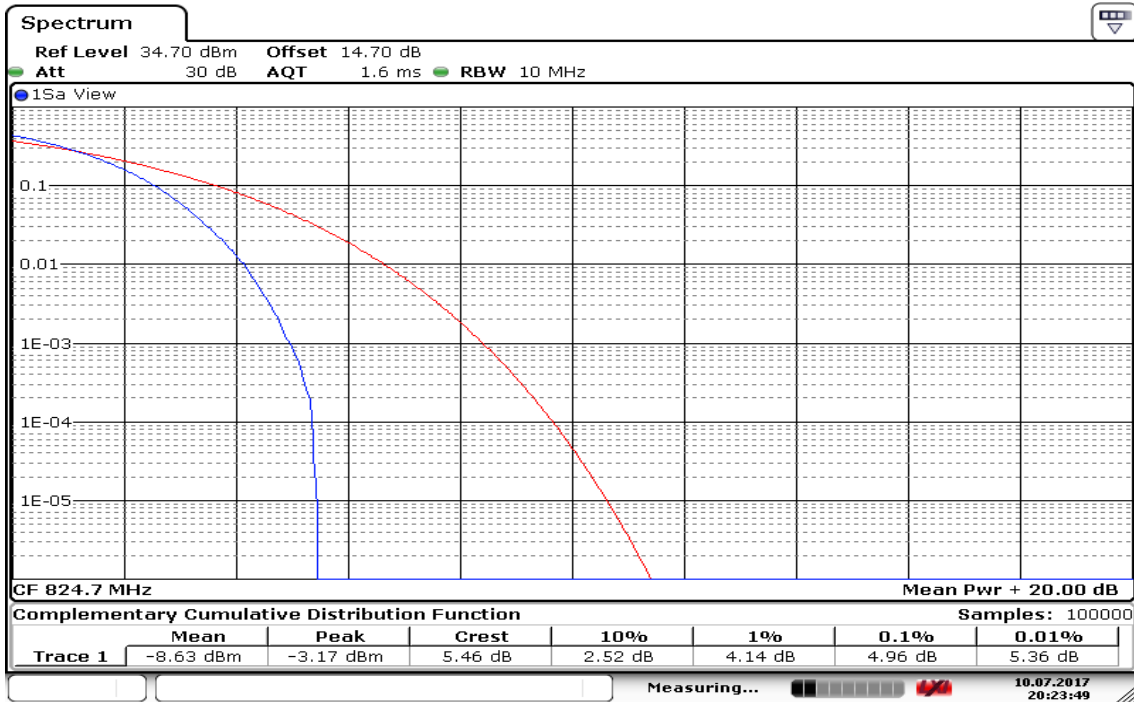
Date: 10.JUL.2017 20:22:41

**CDMA / BC0 (CH 384)**



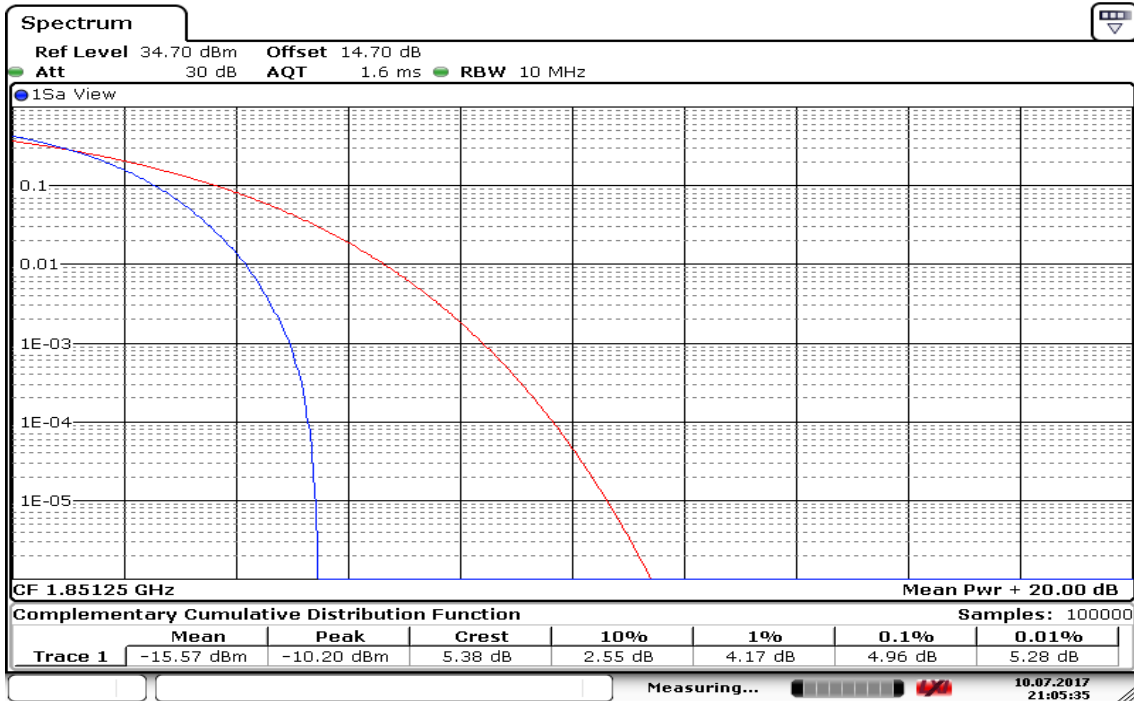
Date: 10.JUL.2017 20:23:26

### CDMA / BC0 (CH 777)



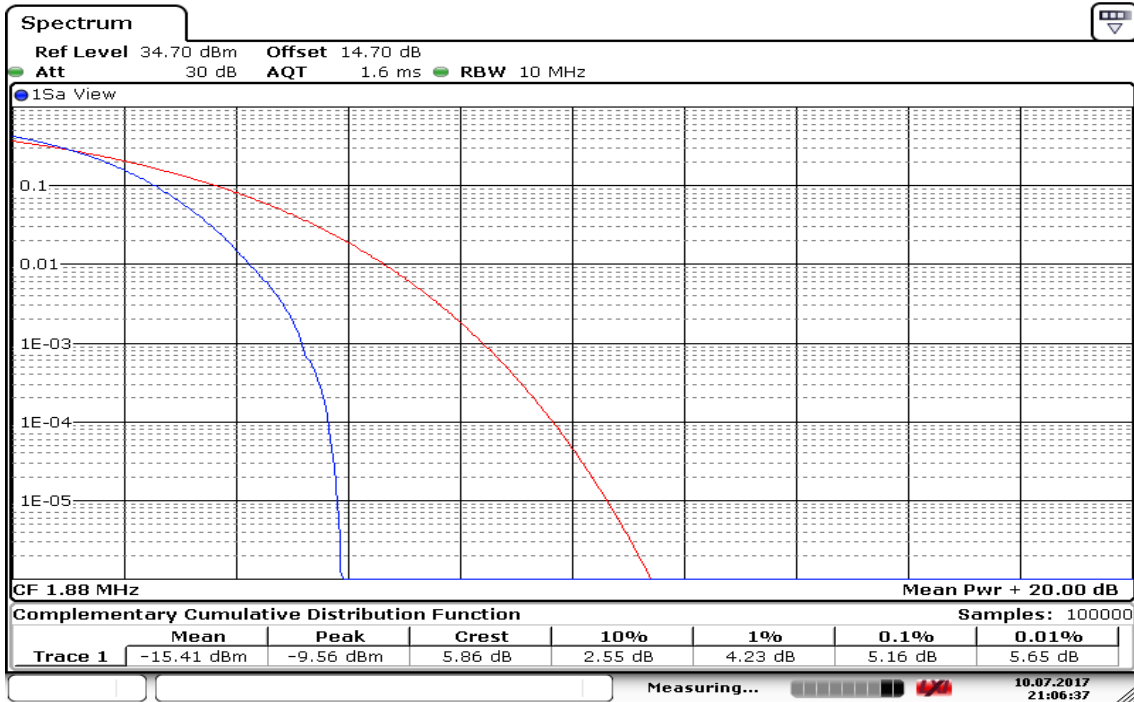
Date: 10.JUL.2017 20:23:49

### CDMA / BC1 (CH 25)



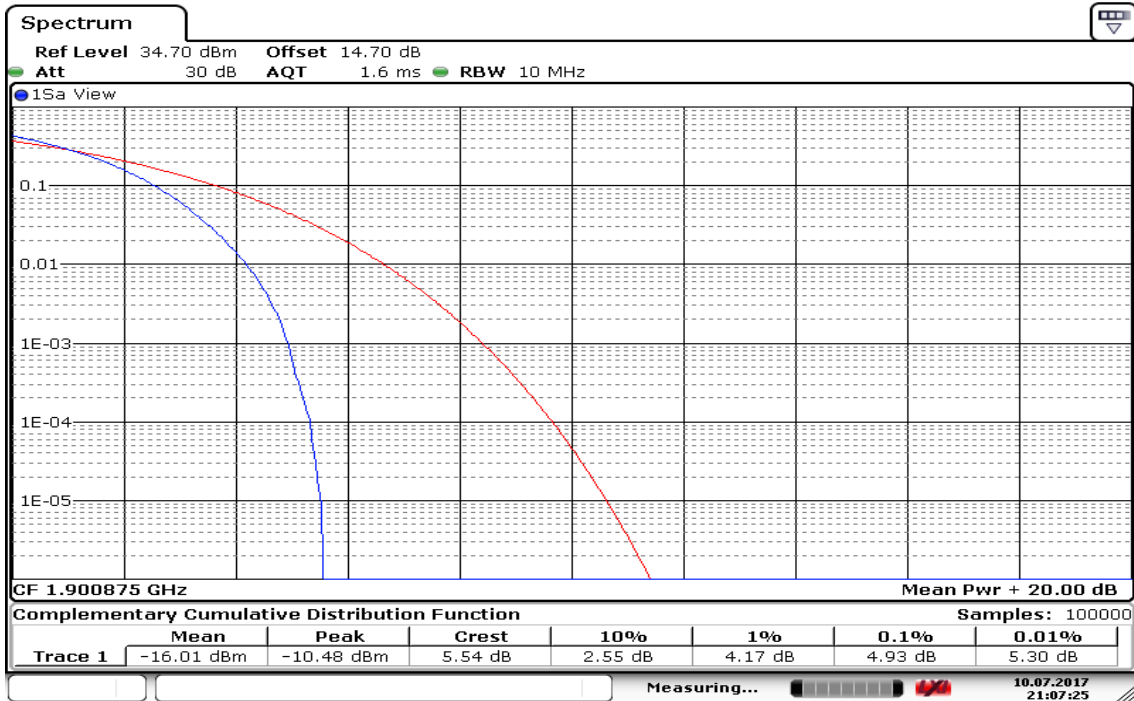
Date: 10.JUL.2017 21:05:35

### CDMA / BC1 (CH 600)



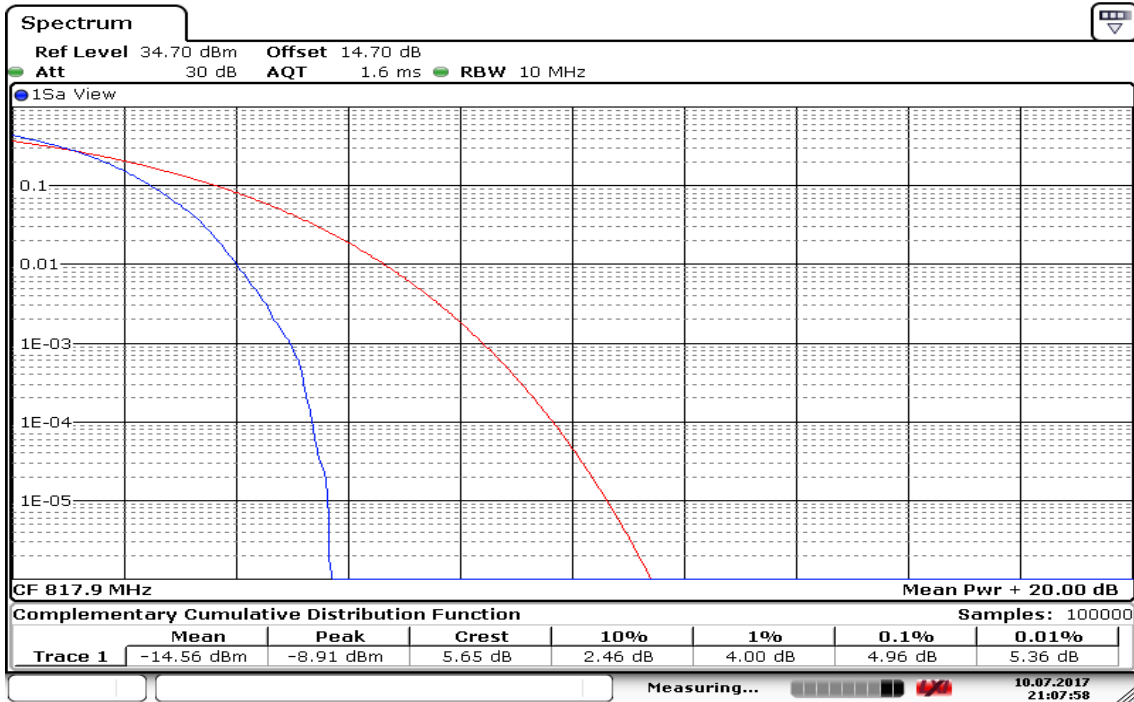
Date: 10.JUL.2017 21:06:37

### CDMA / BC1 (CH 1175)



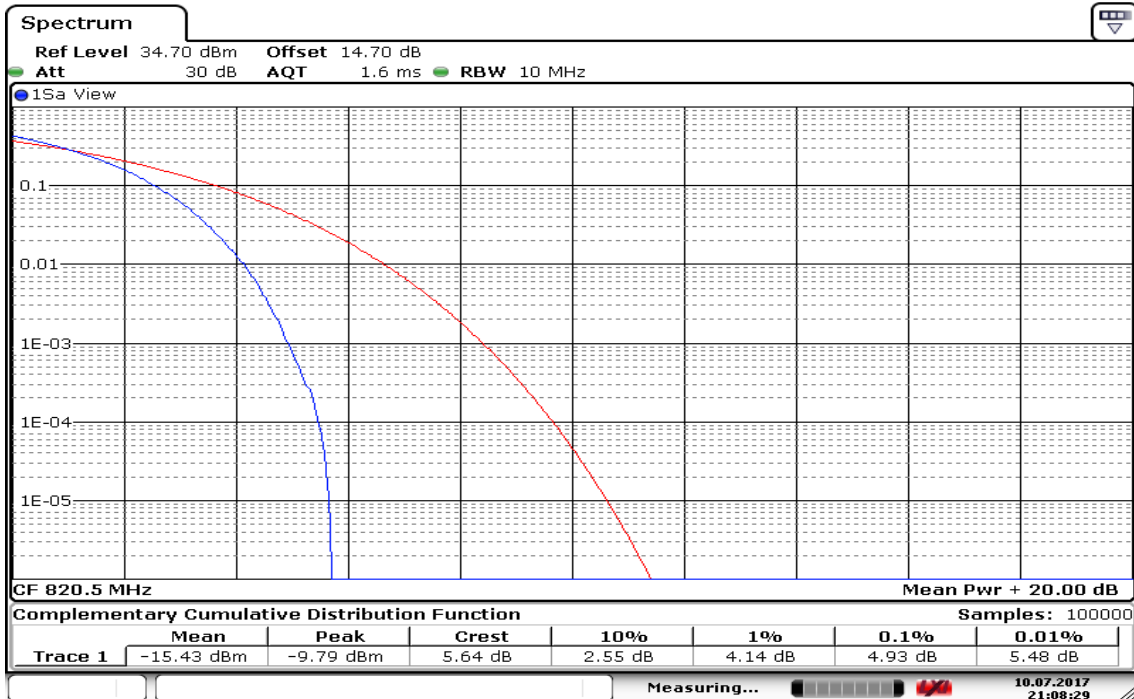
Date: 10.JUL.2017 21:07:25

### CDMA / BC10 (CH 476)



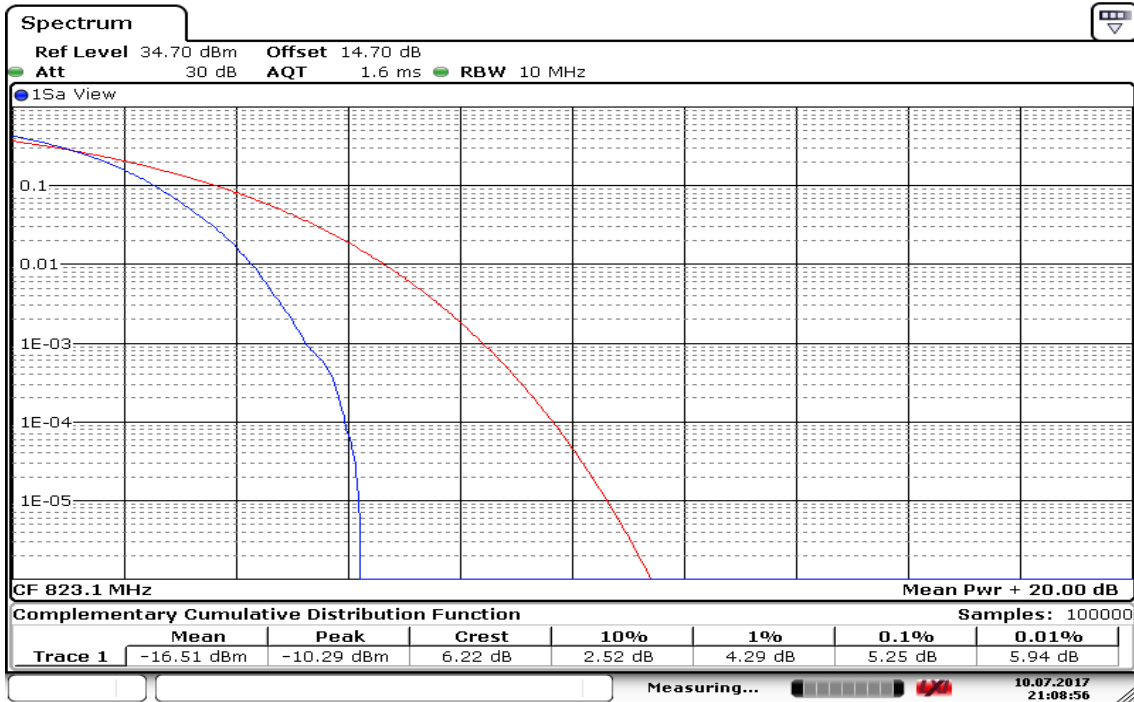
Date: 10.JUL.2017 21:07:58

### CDMA / BC10 (CH 580)



Date: 10.JUL.2017 21:08:29

**CDMA / BC10 (CH 684)**



Date: 10.JUL.2017 21:08:56

## 7.6 OUT OF BAND EMISSION AT ANTENNA TERMINALS

### LIMIT

According to FCC §2.1051, FCC §22.917, FCC §24.238(a) , FCC §90.691,

According to RSS-132, 4.5; RSS-133, 6.5.

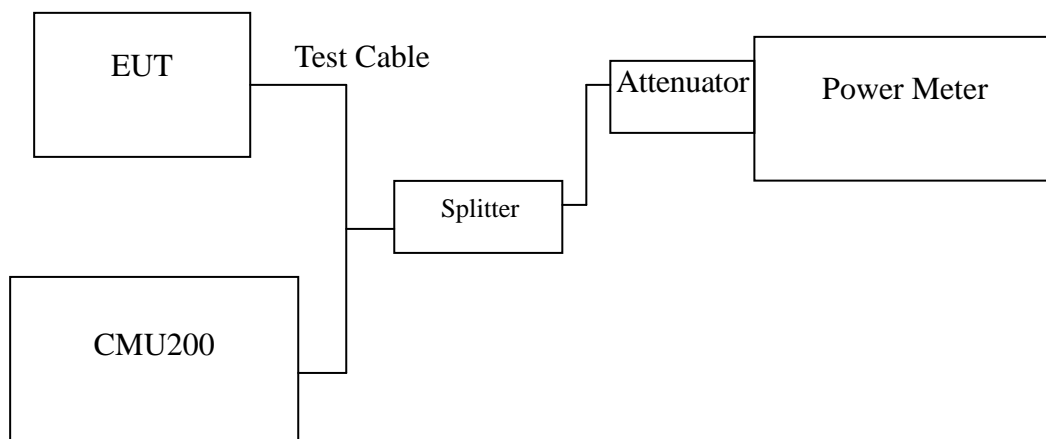
**Out of Band Emissions:** The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least  $43 + 10 \log P$  dB.

**Mobile Emissions in Base Frequency Range:** The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed  $-80$  dBm at the transmit antenna connector.

**Band Edge Requirements:** In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

### TEST CONFIGURATION

Out of band emission at antenna terminals:



### TEST 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, Start=30MHz, Stop= 10 th harmonic. Limit = -13dBm

Band Edge Requirements (824 MHz and 849 MHz /1850MHz and 1910MHz): 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. Limit, -13dBm.

**TEST RESULTS**

*No non-compliance noted.*

**Test Data**

Mode	CH	Location	Description
CDMA / BC0	1013	Figure 7-1	Conducted spurious emissions, 30MHz - 20GHz
	384	Figure 7-2	Conducted spurious emissions, 30MHz - 20GHz
	777	Figure 7-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
CDMA / BC1	25	Figure 8-1	Conducted spurious emissions, 30MHz - 20GHz
	600	Figure 8-2	Conducted spurious emissions, 30MHz - 20GHz
	1175	Figure 8-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
CDMA / BC10	476	Figure 9-1	Conducted spurious emissions, 30MHz - 20GHz
	580	Figure 9-2	Conducted spurious emissions, 30MHz - 20GHz
	684	Figure 9-3.	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
CDMA / BC0	1013	Figure 10-1	Band Edge emissions
	777	Figure 10-2	Band Edge emissions

Mode	CH	Location	Description
CDMA / BC1	25	Figure 11-1	Band Edge emissions
	1175	Figure 11-2	Band Edge emissions

Mode	CH	Location	Description
CDMA / BC10	476	Figure 12-1	Band Edge emissions
	684	Figure 12-2	Band Edge emissions

**Test Plot**

Figure 7-1: Out of Band emission at antenna terminals –CDMA / BC0 / CH 1013

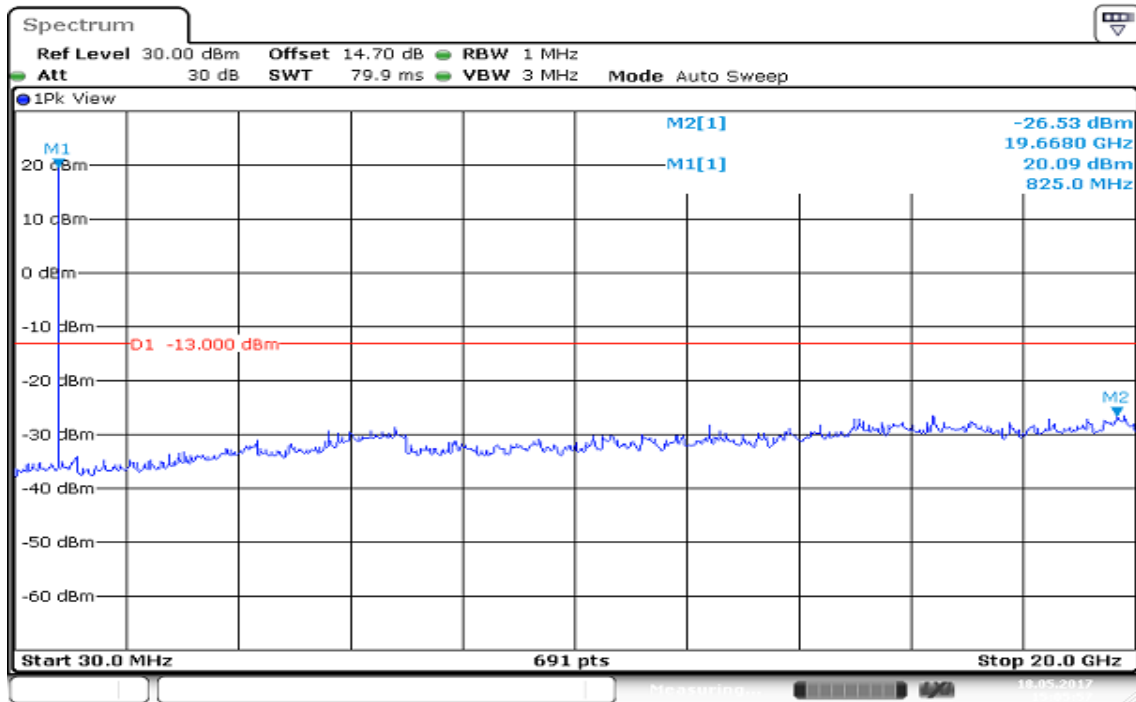


Figure 7-2: Out of Band emission at antenna terminals –CDMA / BC0 / CH 384

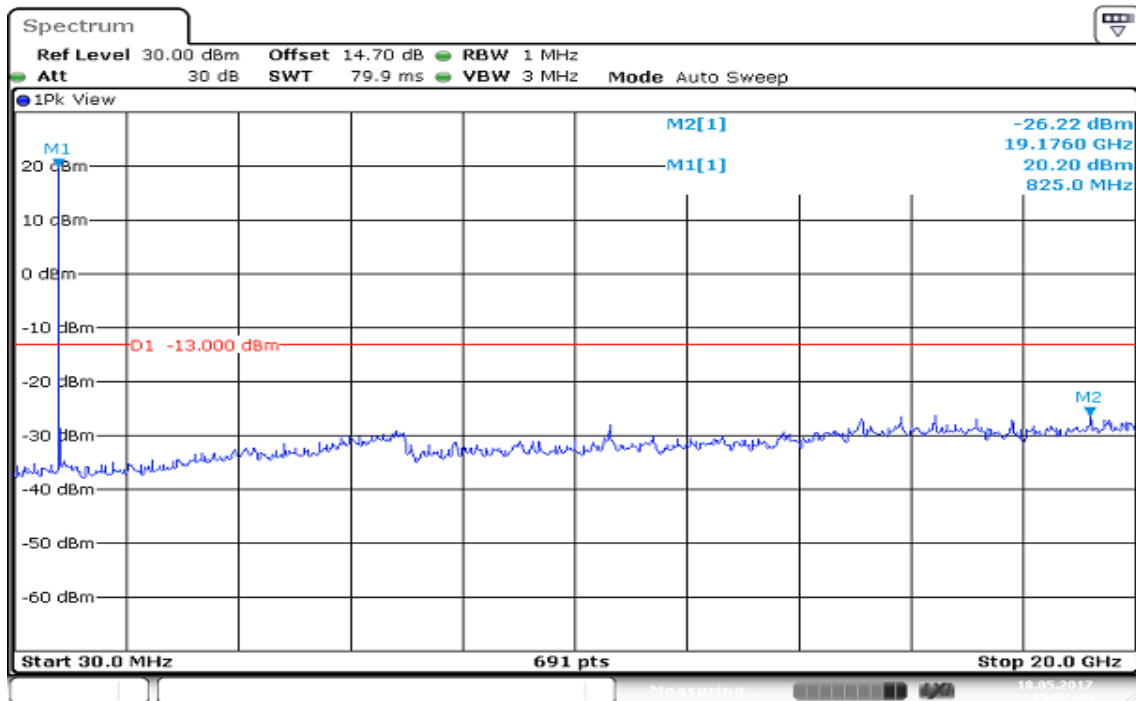
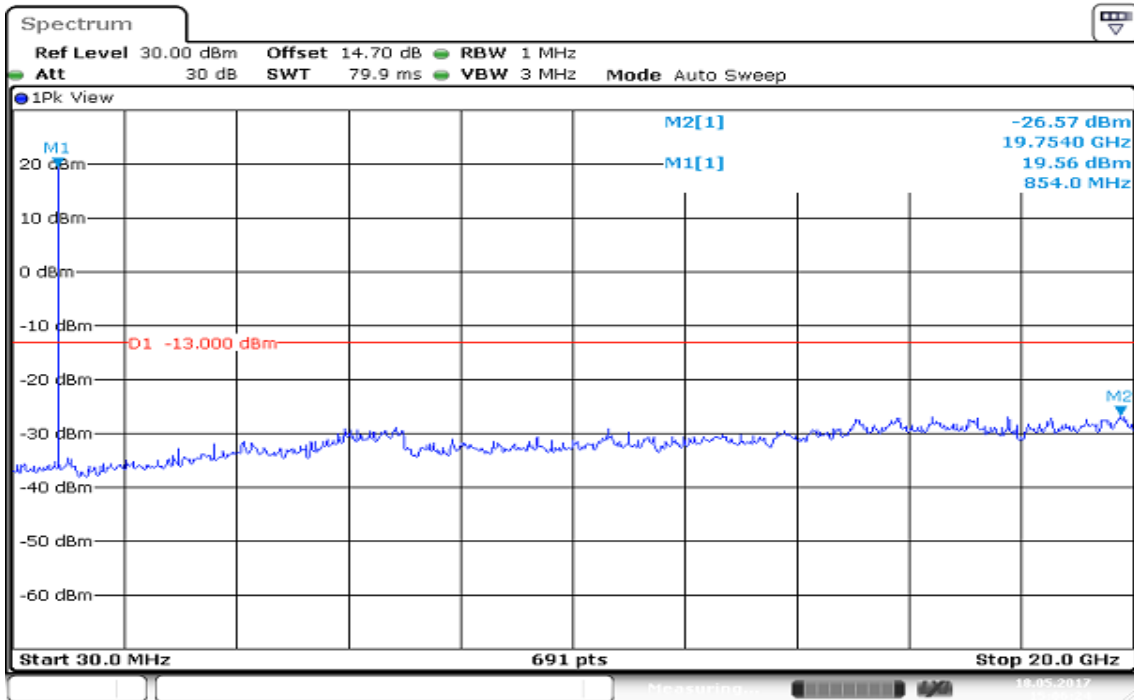




Figure 7-3: Out of Band emission at antenna terminals –CDMA / BC0 / CH 777



Date: 18 MAY 2017 15:06:25

Figure 8-1: Out of Band emission at antenna terminals –CDMA / BC1 / CH 25

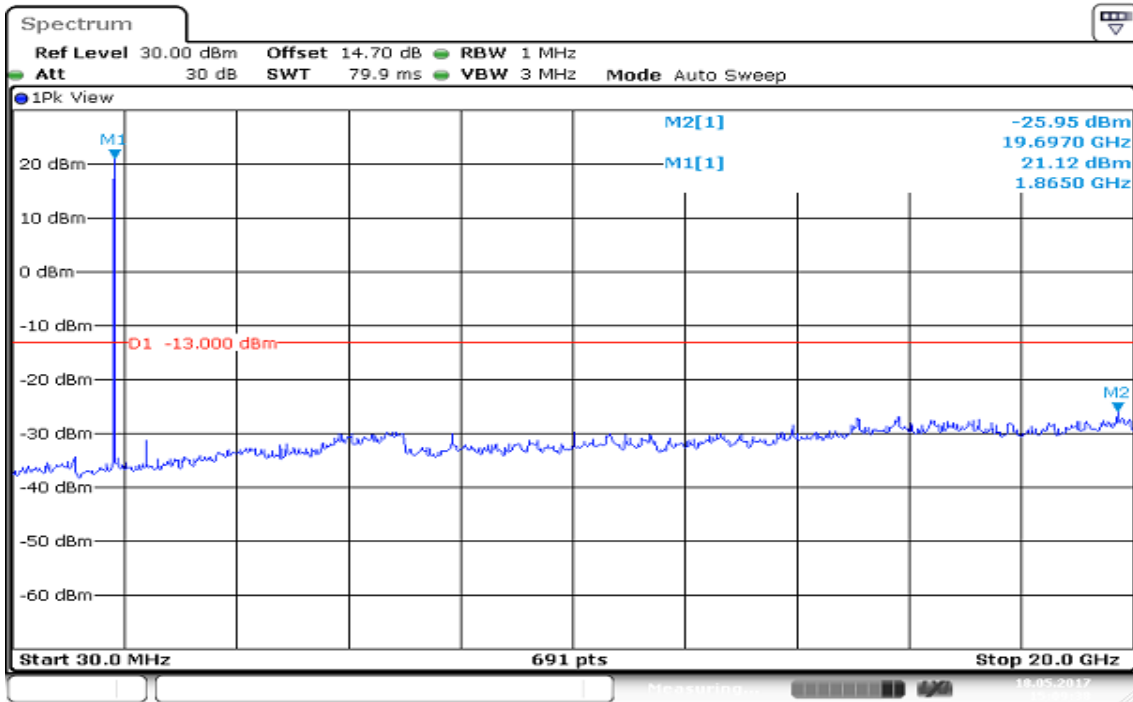


Figure 8-2: Out of Band emission at antenna terminals –CDMA / BC1 / CH 600

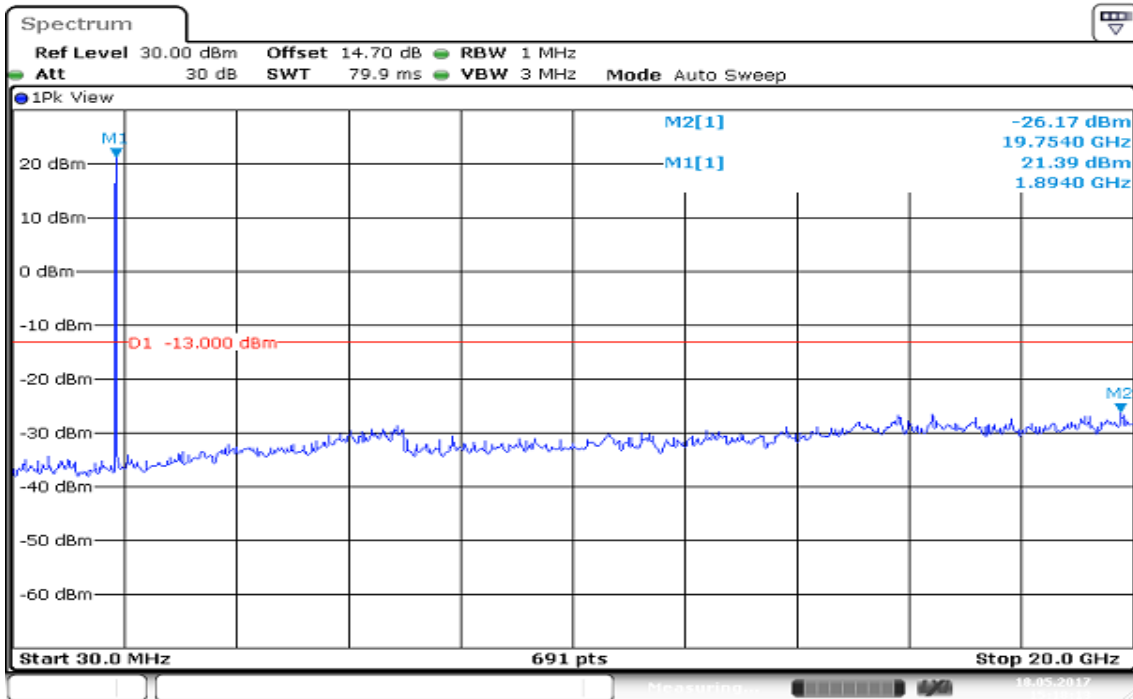


Figure 8-3: Out of Band emission at antenna terminals –CDMA / BC1 / CH 1175

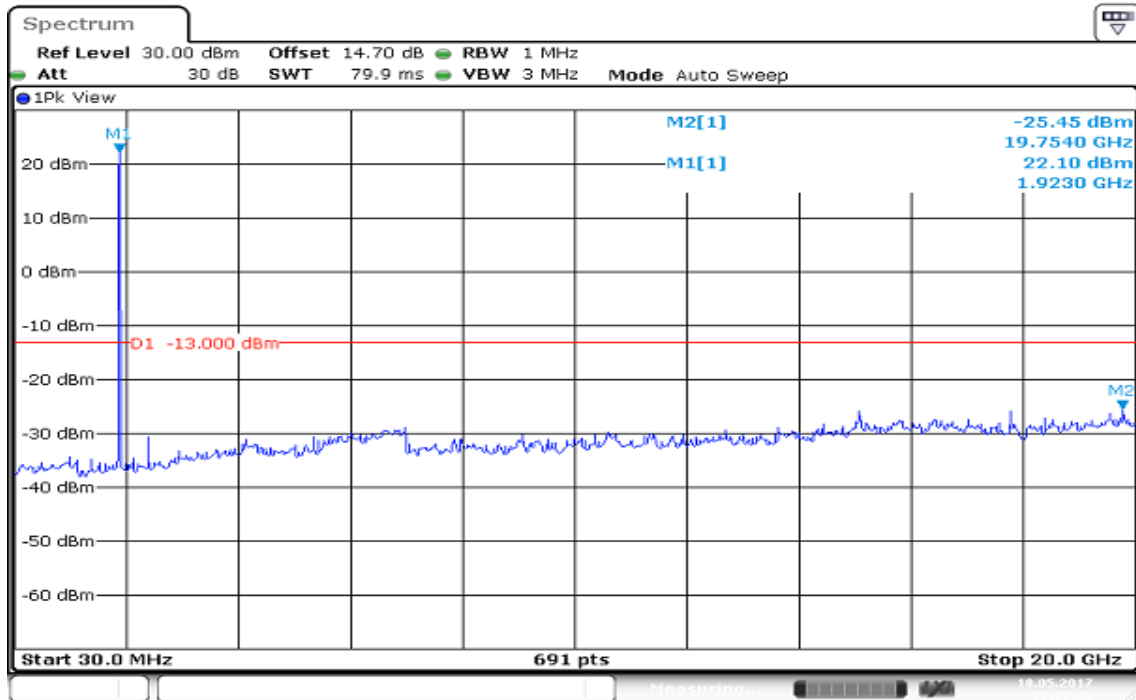


Figure 9-1: Out of Band emission at antenna terminals –CDMA / BC10 / CH 476

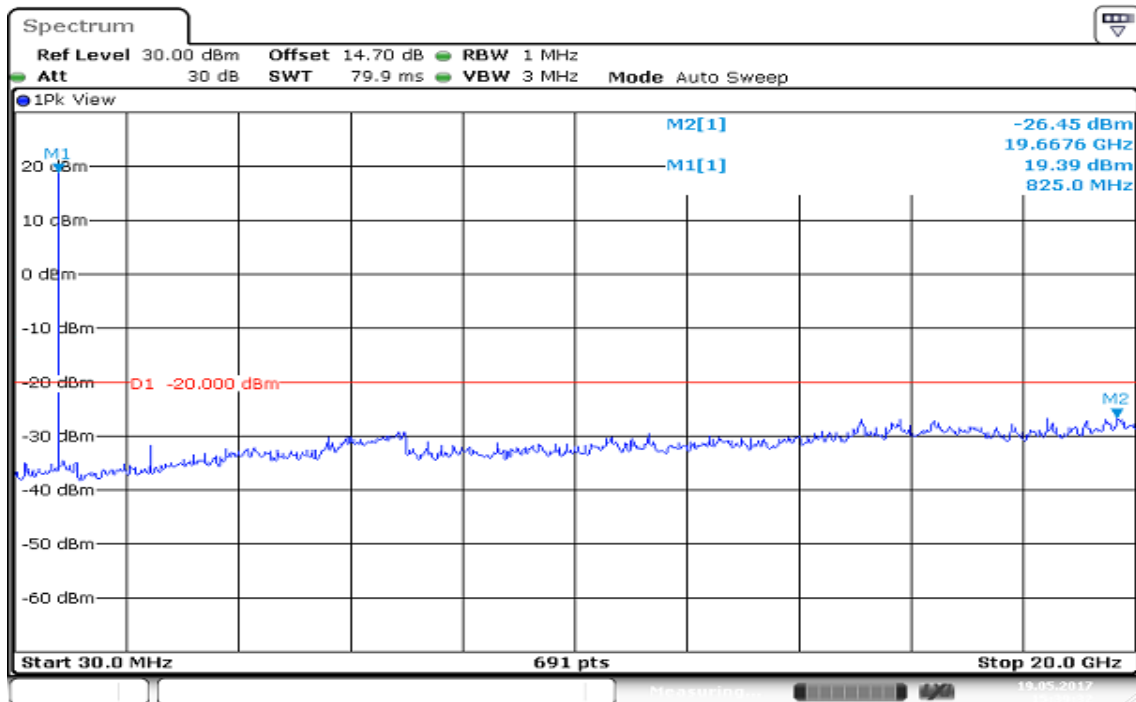


Figure 9-2: Out of Band emission at antenna terminals –CDMA / BC10 / CH 580

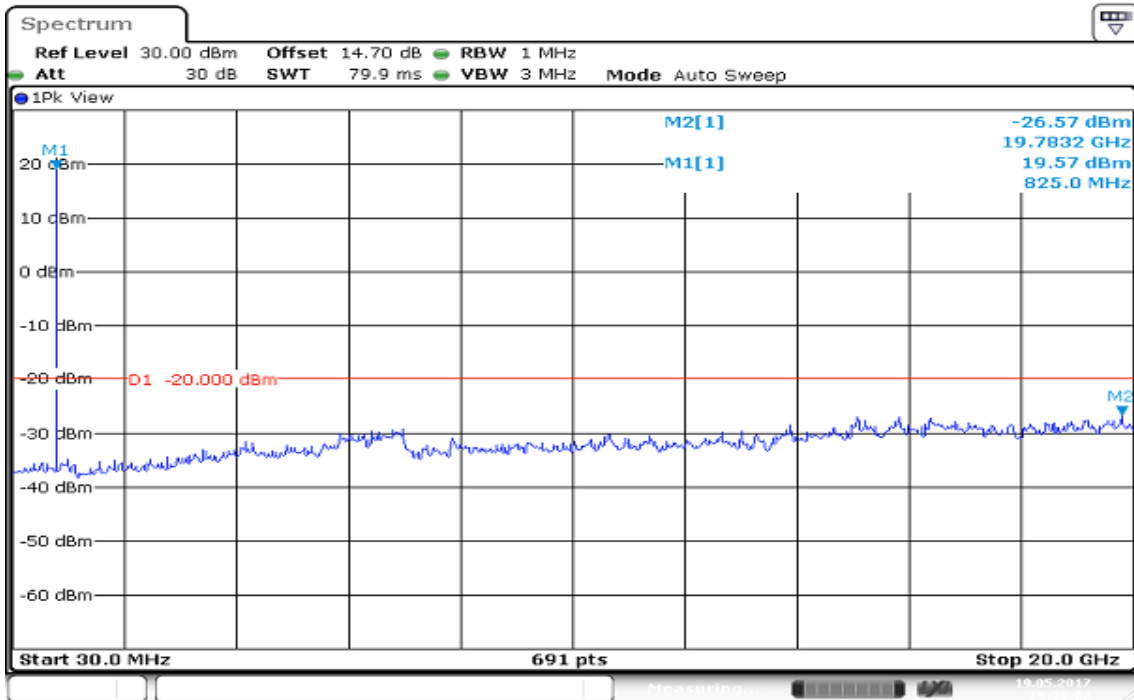


Figure 9-3: Out of Band emission at antenna terminals –CDMA / BC10 / CH 684

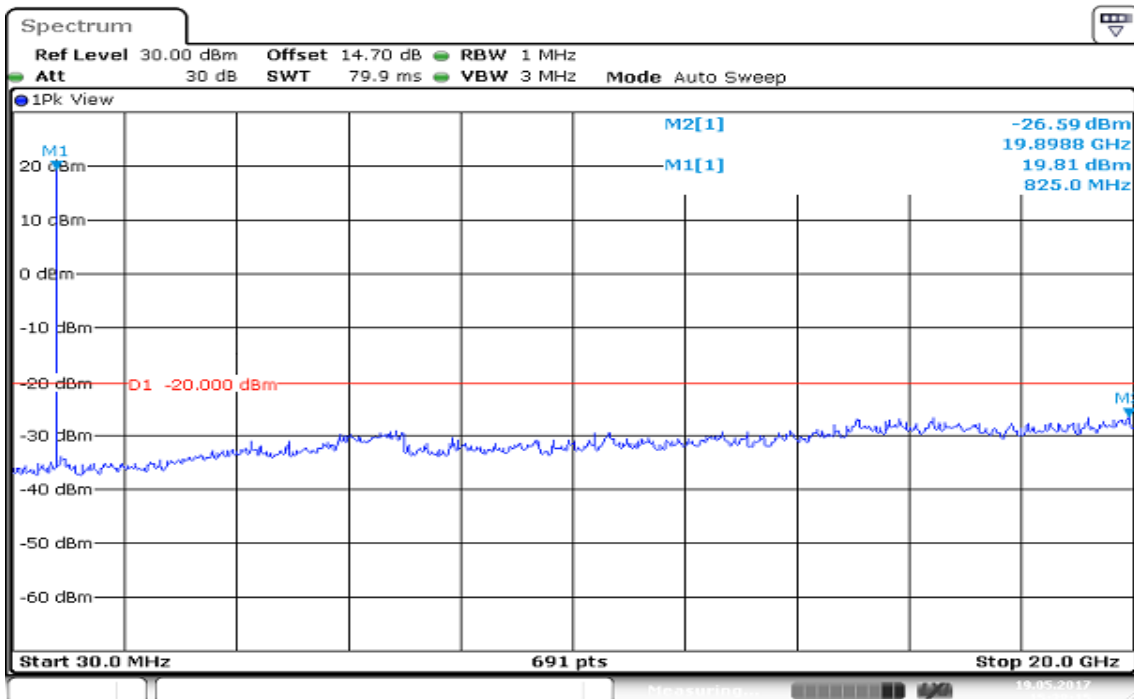


Figure 10-1: Band Edge emissions –CDMA / BC0 / CH 1013

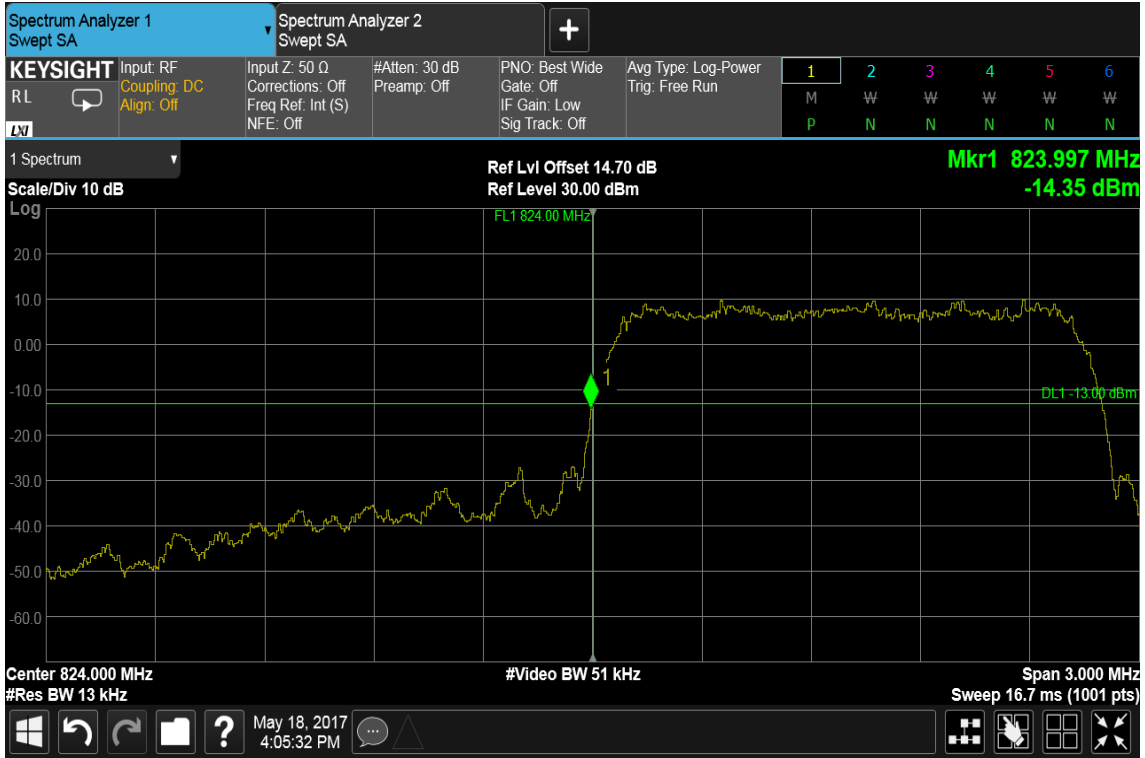


Figure 10-2: Band Edge emissions –CDMA / BC0 / CH 777



Figure 11-1: Band Edge emissions –CDMA / BC1 / CH 25



Figure 11-2: Band Edge emissions –CDMA / BC1 / CH 1175



Figure 12-1: Band Edge emissions –CDMA / BC10 / CH 476

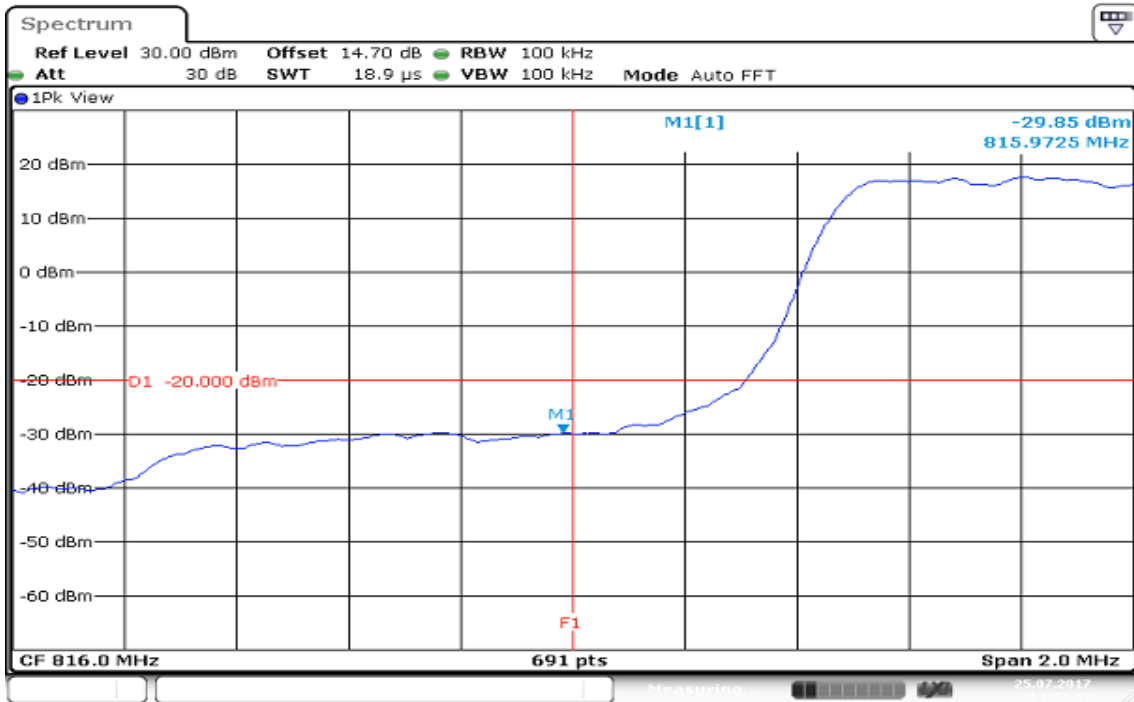
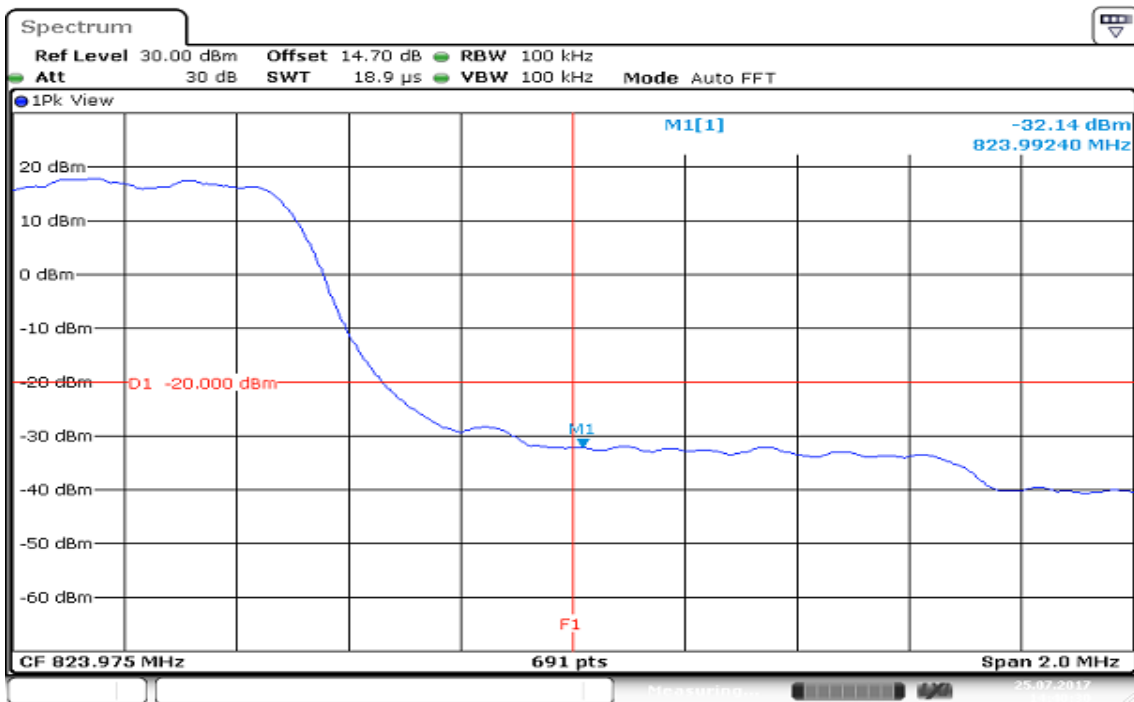


Figure 12-2: Band Edge emissions –CDMA / BC10 / CH 684



## 7.7 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

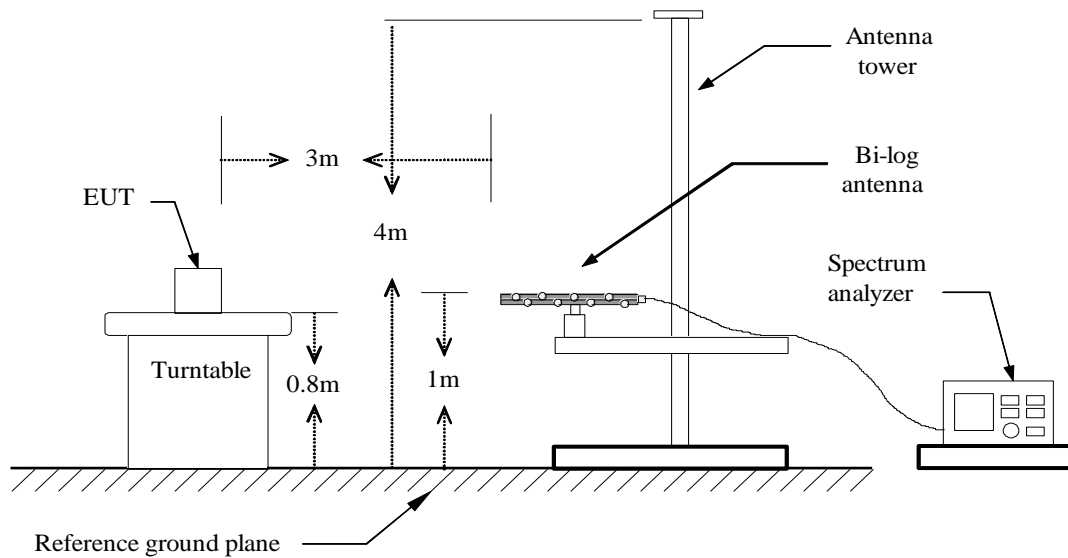
### LIMIT

According to FCC §2.1053 & FCC §90.691

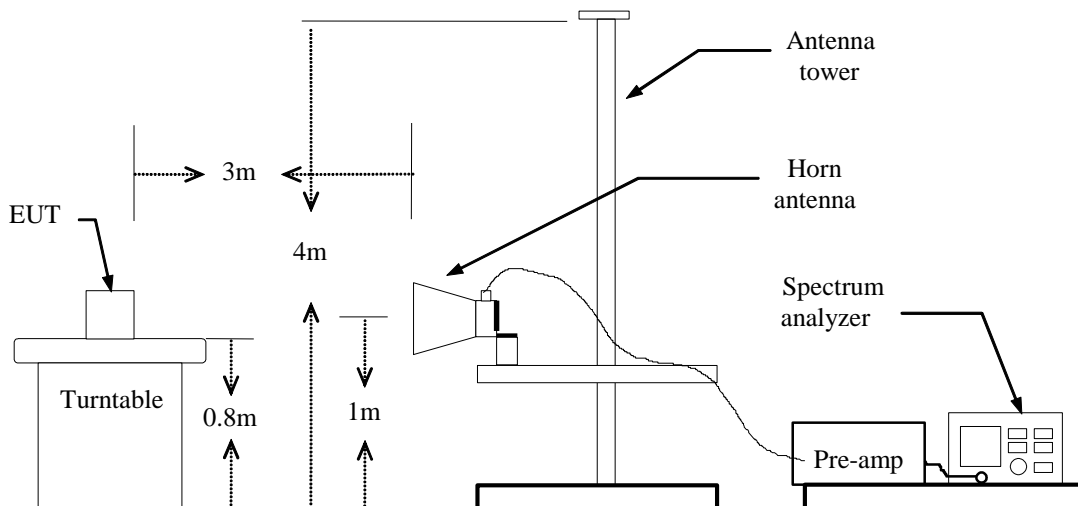
According to RSS-132 (4.5) & RSS-133 (6.5).

### Test Configuration

#### Below 1 GHz

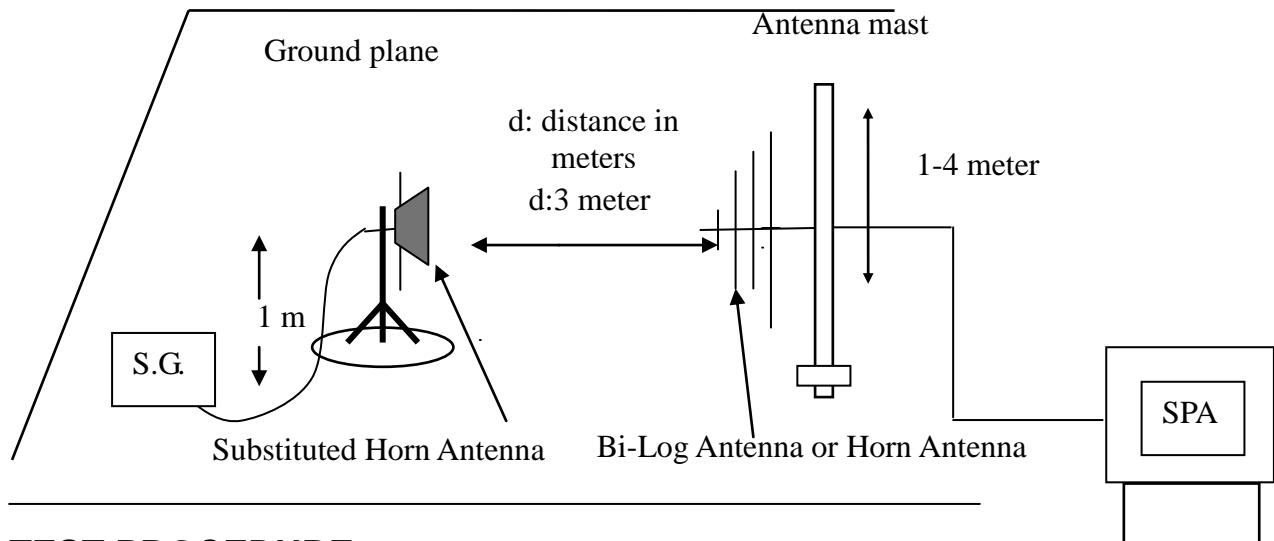


#### Above 1 GHz





**Substituted Method Test Set-up**



**TEST PROCEDURE**

The EUT was placed on a non-conductive, the measurement antenna was placed at a distance of 3 meters from the EUT. 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.

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

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

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

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

**TEST RESULTS**

*Refer to the attached tabular data sheets.*

**Radiated Spurious Emission Measurement Result**

**Below 1GHz**

**Operation Mode:** CDMA / BC0 / TX / CH 384

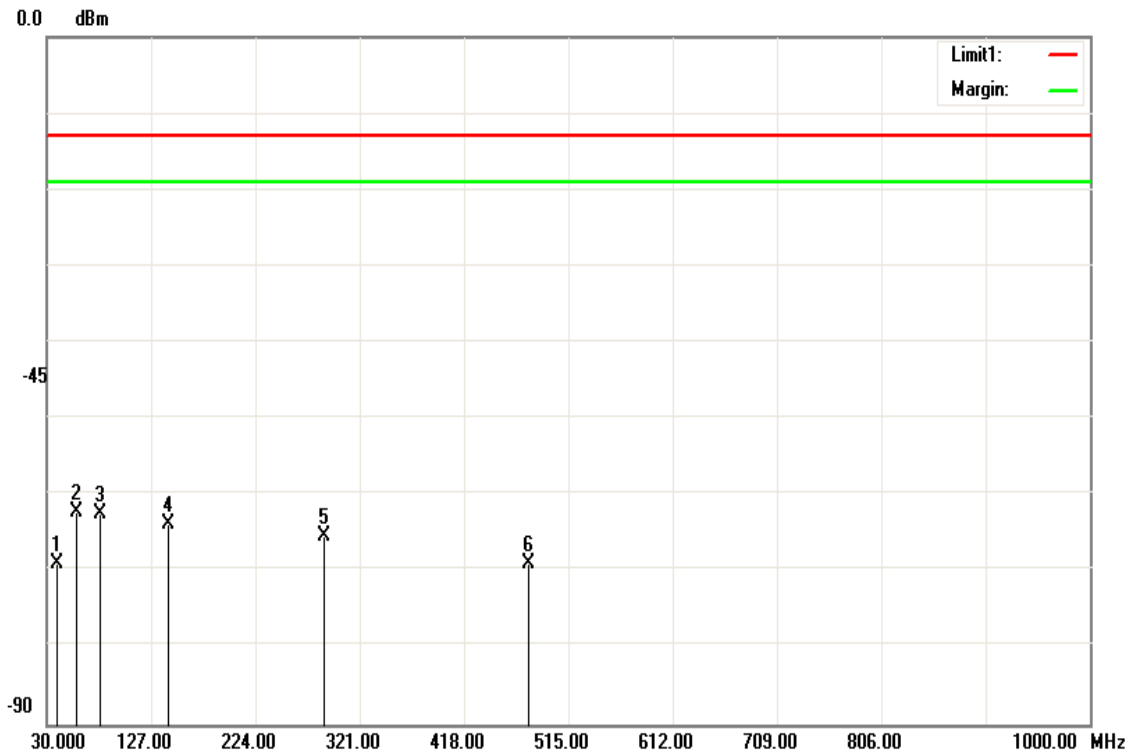
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
39.5200	-63.02	-5.91	-68.93	-13.00	-55.93	V
57.1600	-60.7	-1.58	-62.28	-13.00	-49.28	V
79.4700	-63.04	0.51	-62.53	-13.00	-49.53	V
143.4900	-64.68	0.89	-63.79	-13.00	-50.79	V
288.0200	-72.39	7.02	-65.37	-13.00	-52.37	V
478.1400	-75.85	6.91	-68.94	-13.00	-55.94	V

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC0 / TX / CH 384

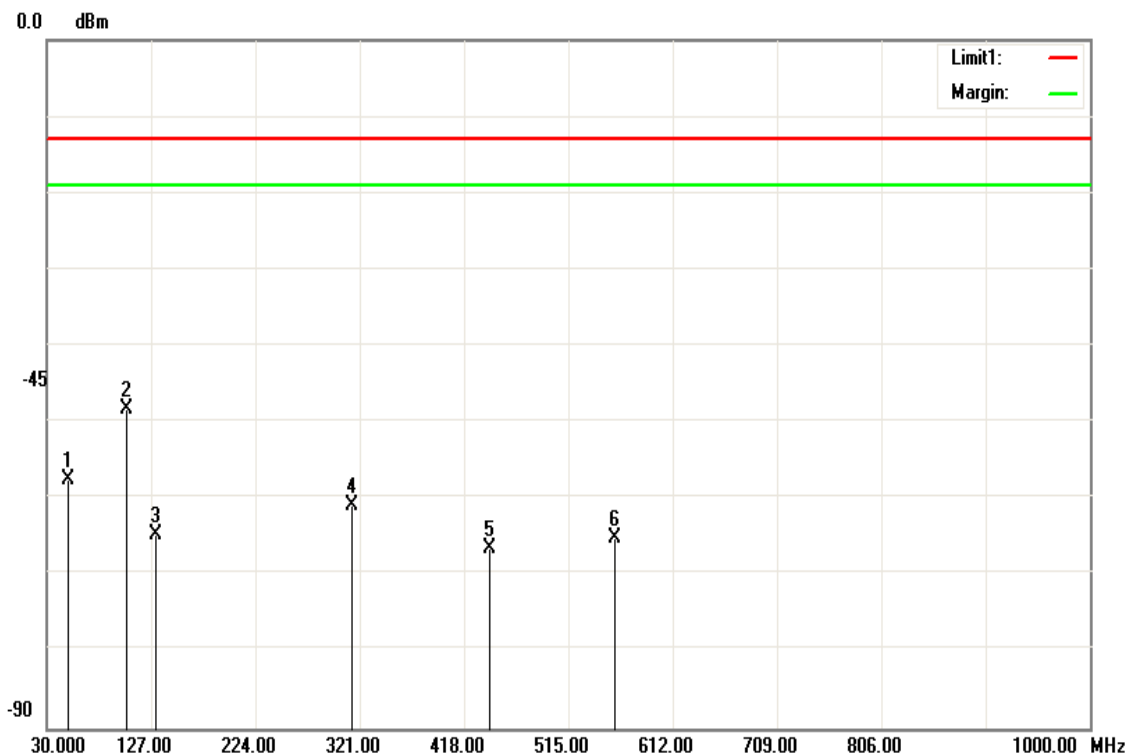
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
49.4000	-54.84	-2.56	-57.40	-13.00	-44.40	H
104.6900	-48.59	0.29	-48.30	-13.00	-35.30	H
131.8500	-65.86	1.08	-64.78	-13.00	-51.78	H
313.2400	-67.8	6.95	-60.85	-13.00	-47.85	H
442.2500	-73.52	7.09	-66.43	-13.00	-53.43	H
558.6500	-70.56	5.39	-65.17	-13.00	-52.17	H

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 25

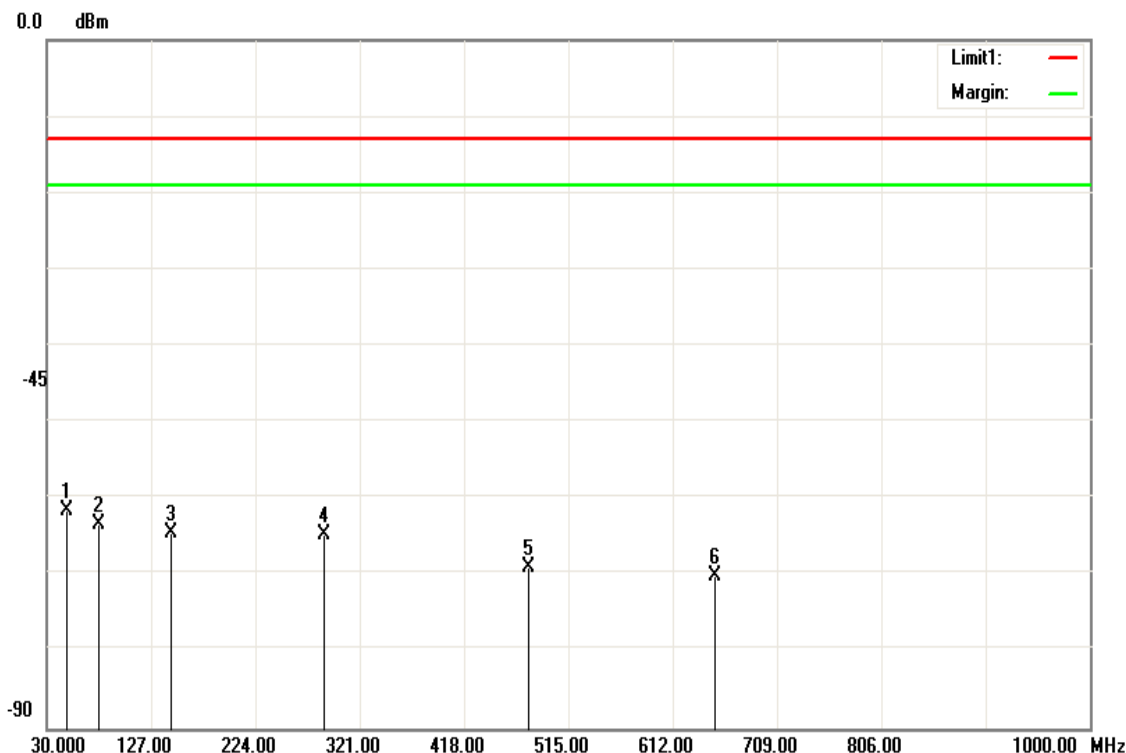
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
48.4300	-58.6	-2.98	-61.58	-13.00	-48.58	V
78.5000	-63.86	0.53	-63.33	-13.00	-50.33	V
145.4300	-65.24	0.71	-64.53	-13.00	-51.53	V
288.0200	-71.81	7.02	-64.79	-13.00	-51.79	V
478.1400	-75.88	6.91	-68.97	-13.00	-55.97	V
651.7700	-71.46	1.32	-70.14	-13.00	-57.14	V

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 25

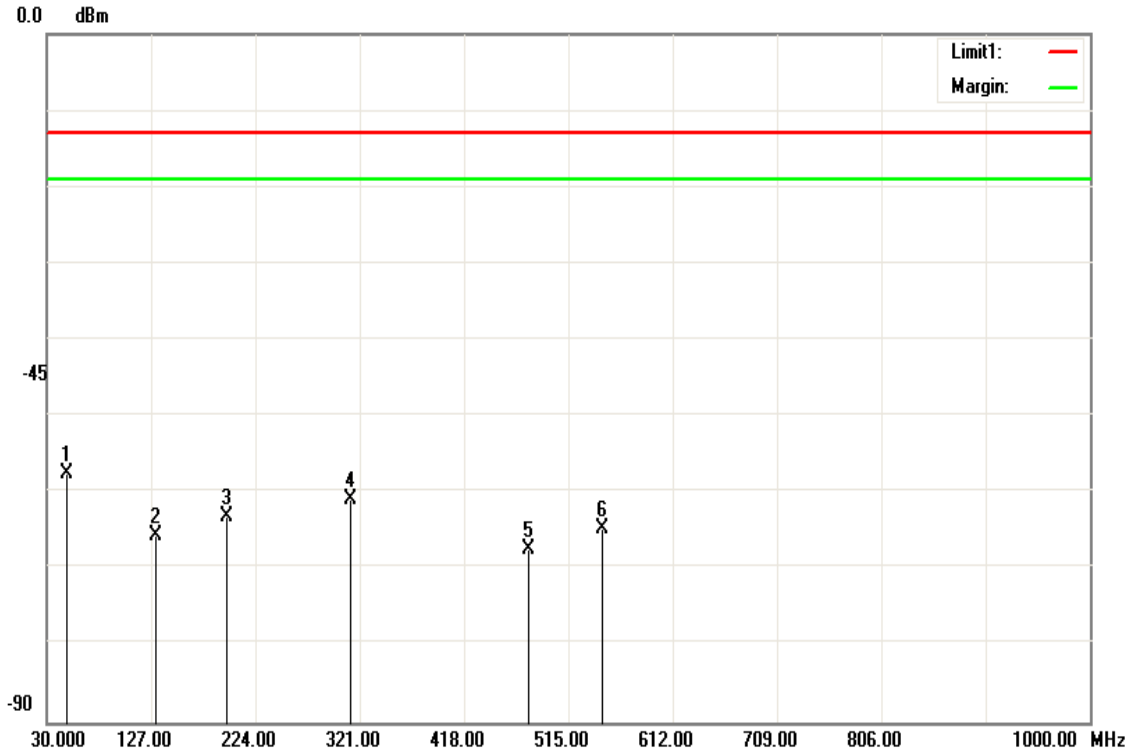
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
48.4300	-54.53	-2.98	-57.51	-13.00	-44.51	H
130.8800	-66.68	1.06	-65.62	-13.00	-52.62	H
196.8400	-67.32	4.1	-63.22	-13.00	-50.22	H
312.2700	-67.85	6.95	-60.90	-13.00	-47.90	H
478.1400	-74.36	6.91	-67.45	-13.00	-54.45	H
547.0100	-71.54	6.85	-64.69	-13.00	-51.69	H

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 580

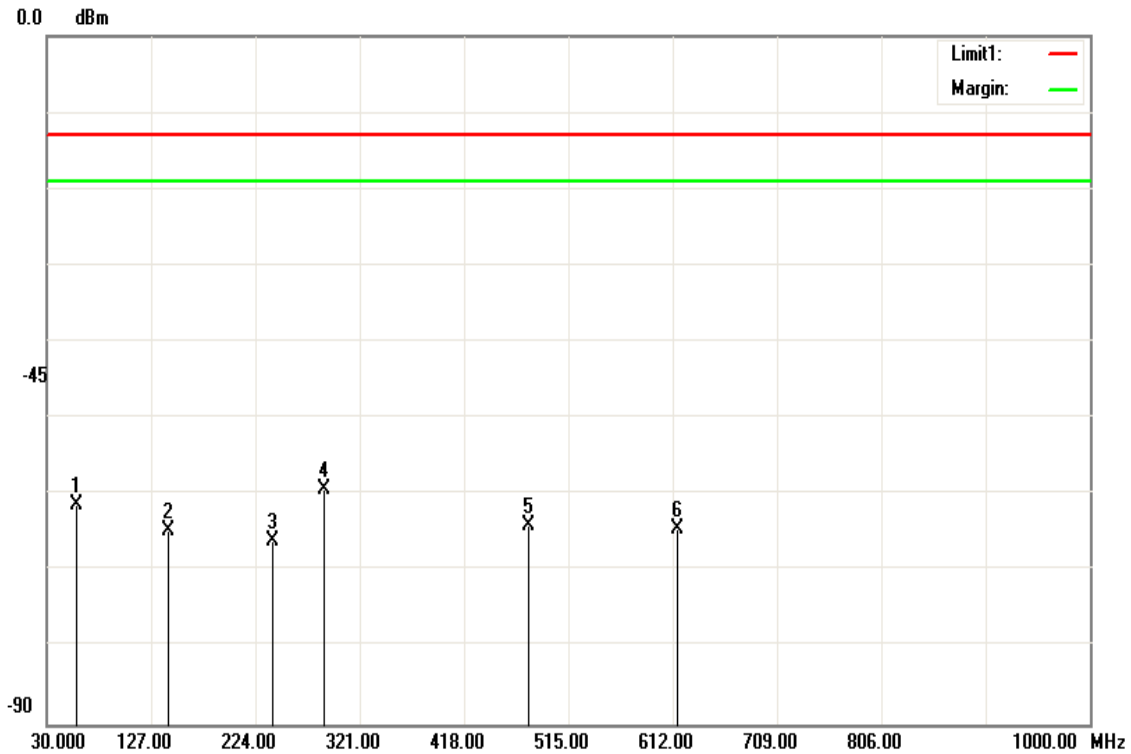
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
57.1600	-59.79	-1.58	-61.37	-13.00	-48.37	V
143.4900	-65.55	0.89	-64.66	-13.00	-51.66	V
239.5200	-72.65	6.71	-65.94	-13.00	-52.94	V
288.0200	-66.37	7.02	-59.35	-13.00	-46.35	V
478.1400	-70.84	6.91	-63.93	-13.00	-50.93	V
616.8500	-63.75	-0.61	-64.36	-13.00	-51.36	V

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 580

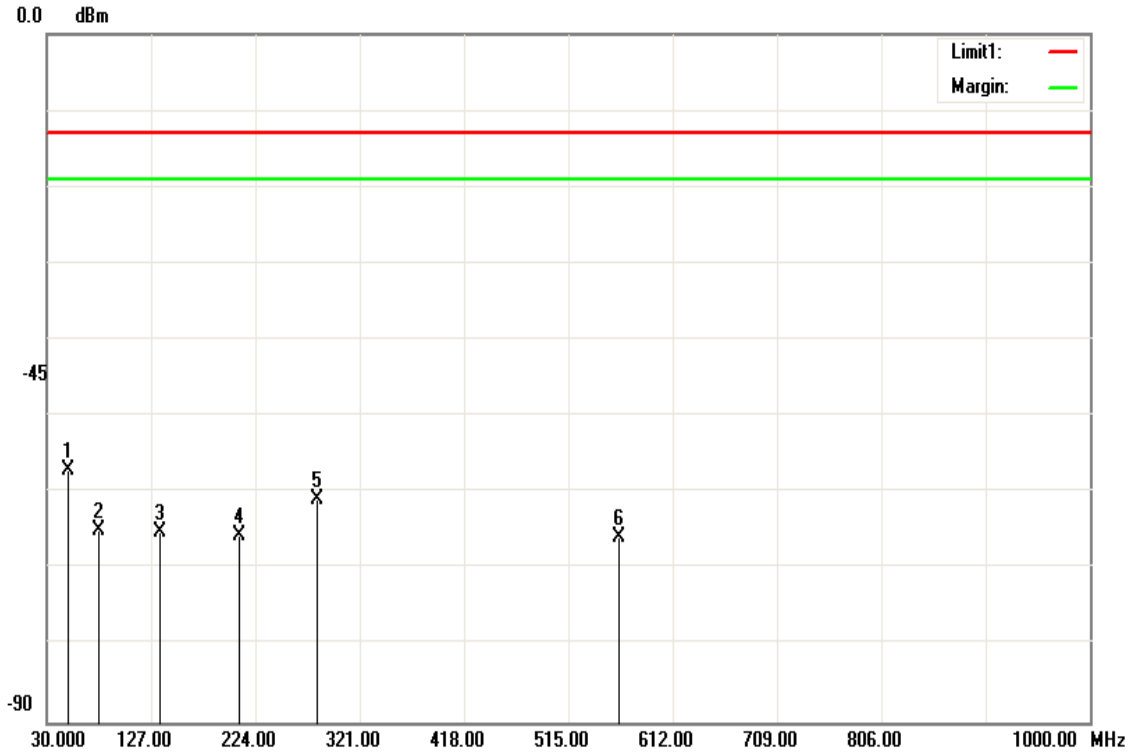
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
49.4000	-54.46	-2.56	-57.02	-13.00	-44.02	H
78.5000	-65.38	0.53	-64.85	-13.00	-51.85	H
135.7300	-66.36	1.14	-65.22	-13.00	-52.22	H
208.4800	-70.17	4.66	-65.51	-13.00	-52.51	H
281.2300	-67.99	7.09	-60.90	-13.00	-47.90	H
562.5300	-70.62	4.74	-65.88	-13.00	-52.88	H

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Above 1GHz**

**Operation Mode:** CDMA / BC0 / TX / CH 384

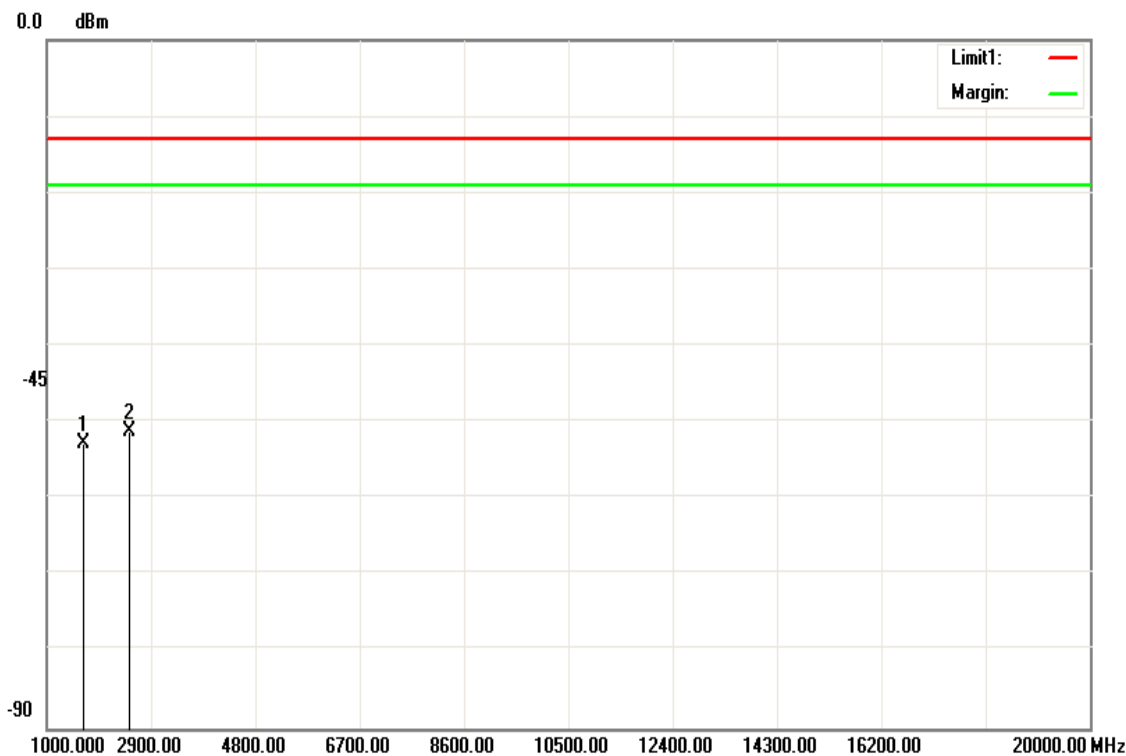
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1673.000	-54.17	1.52	-52.65	-13.00	-39.65	V
2509.000	-53.26	2.02	-51.24	-13.00	-38.24	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



**Operation Mode:** CDMA / BC0 / TX / CH 384

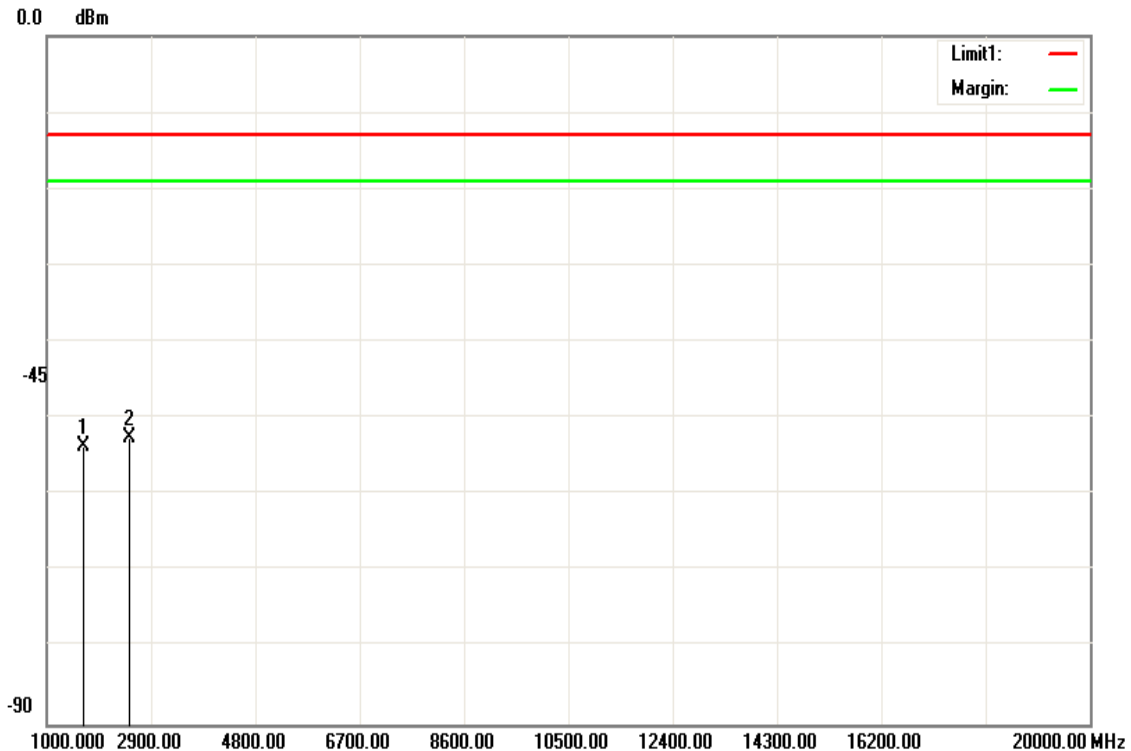
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1673.000	-55.29	1.52	-53.77	-13.00	-40.77	H
2509.000	-54.62	2.02	-52.60	-13.00	-39.60	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC0 / TX / CH 777

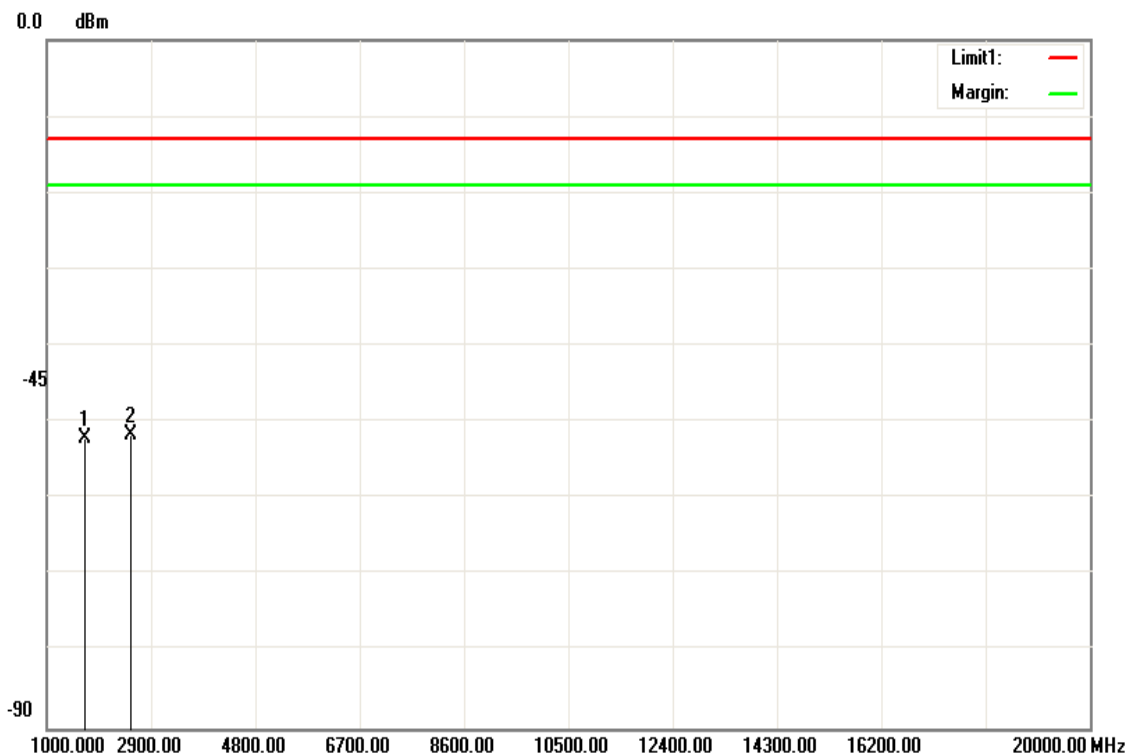
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1696.000	-53.53	1.51	-52.02	-13.00	-39.02	V
2544.000	-54.28	2.67	-51.61	-13.00	-38.61	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC0 / TX / CH 777

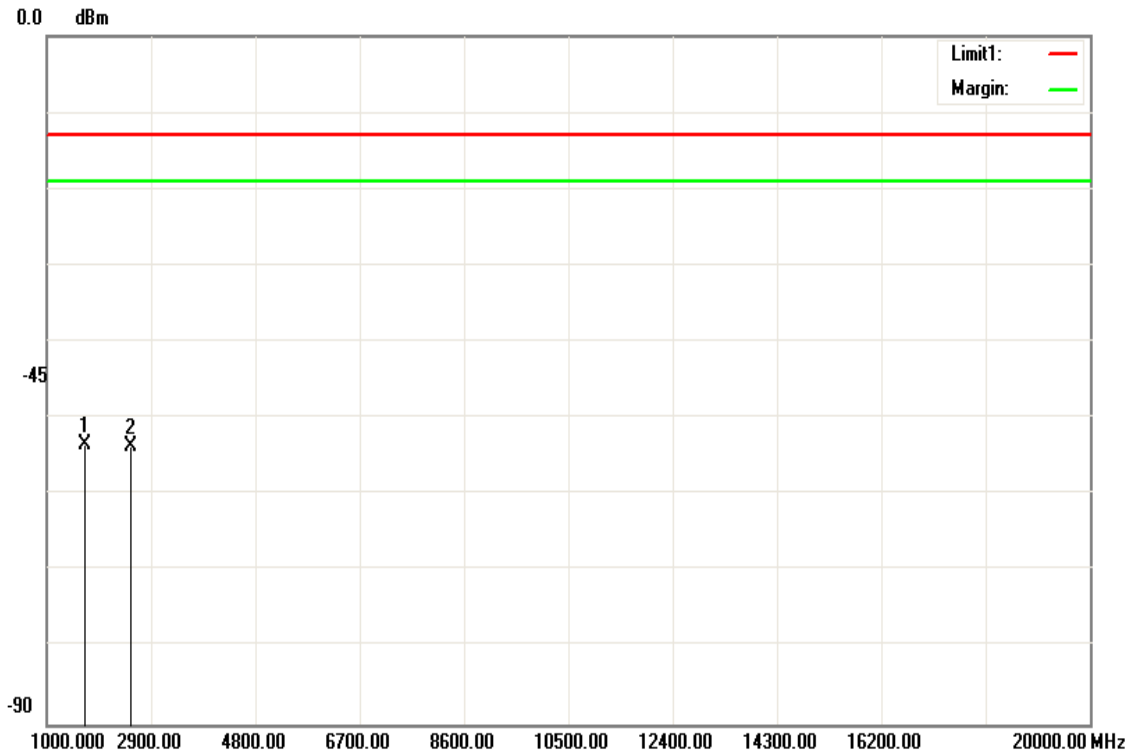
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1696.000	-55.03	1.51	-53.52	-13.00	-40.52	H
2544.000	-56.27	2.67	-53.60	-13.00	-40.60	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC0 / TX / CH 1013

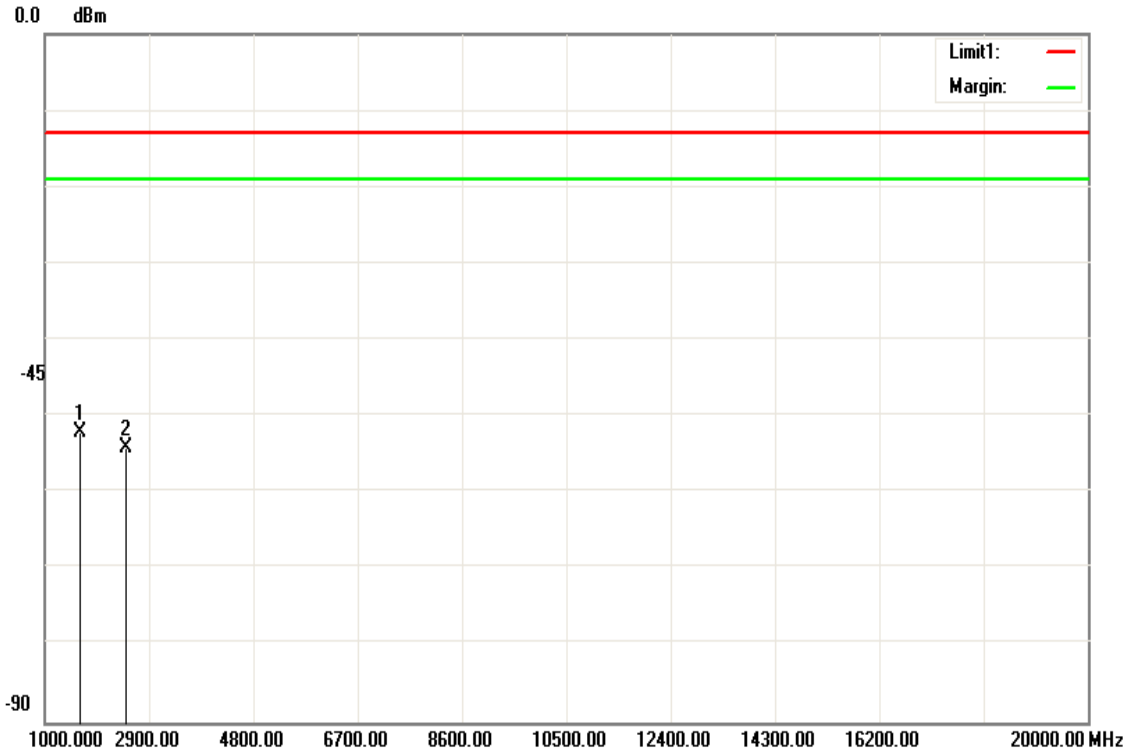
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1649.000	-53.56	1.52	-52.04	-13.00	-39.04	V
2474.000	-55.95	1.83	-54.12	-13.00	-41.12	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC0 / TX / CH 1013

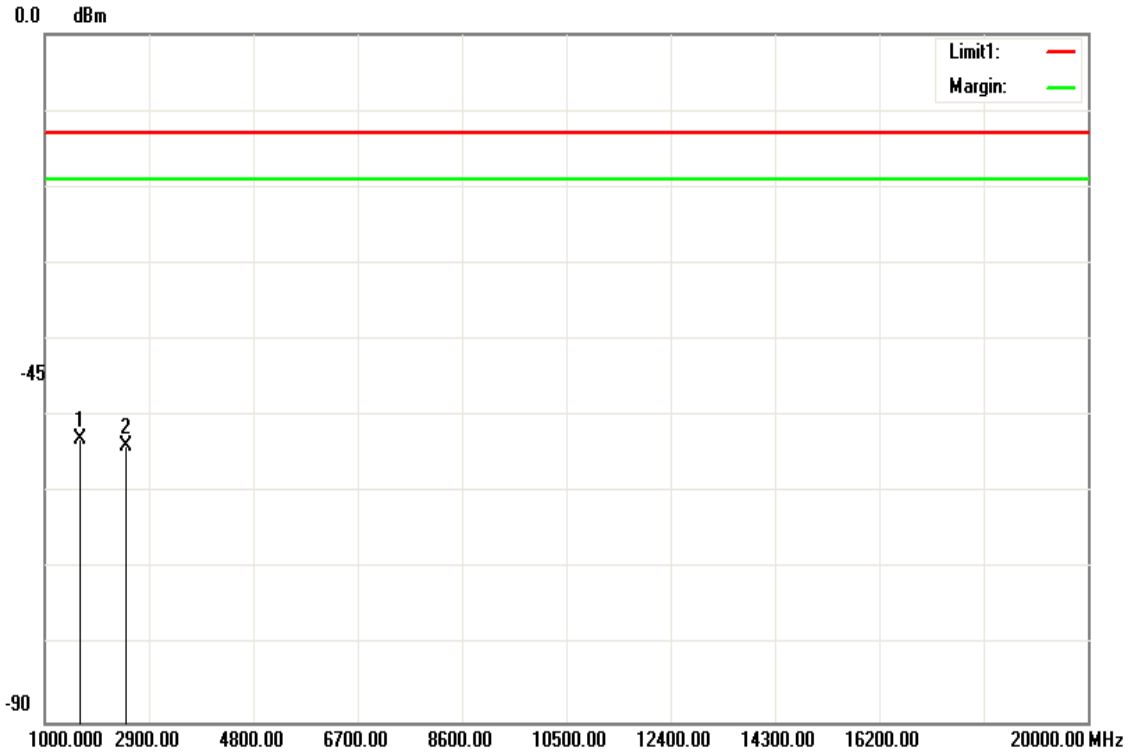
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1649.000	-54.57	1.52	-53.05	-13.00	-40.05	H
2474.000	-55.62	1.83	-53.79	-13.00	-40.79	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 25

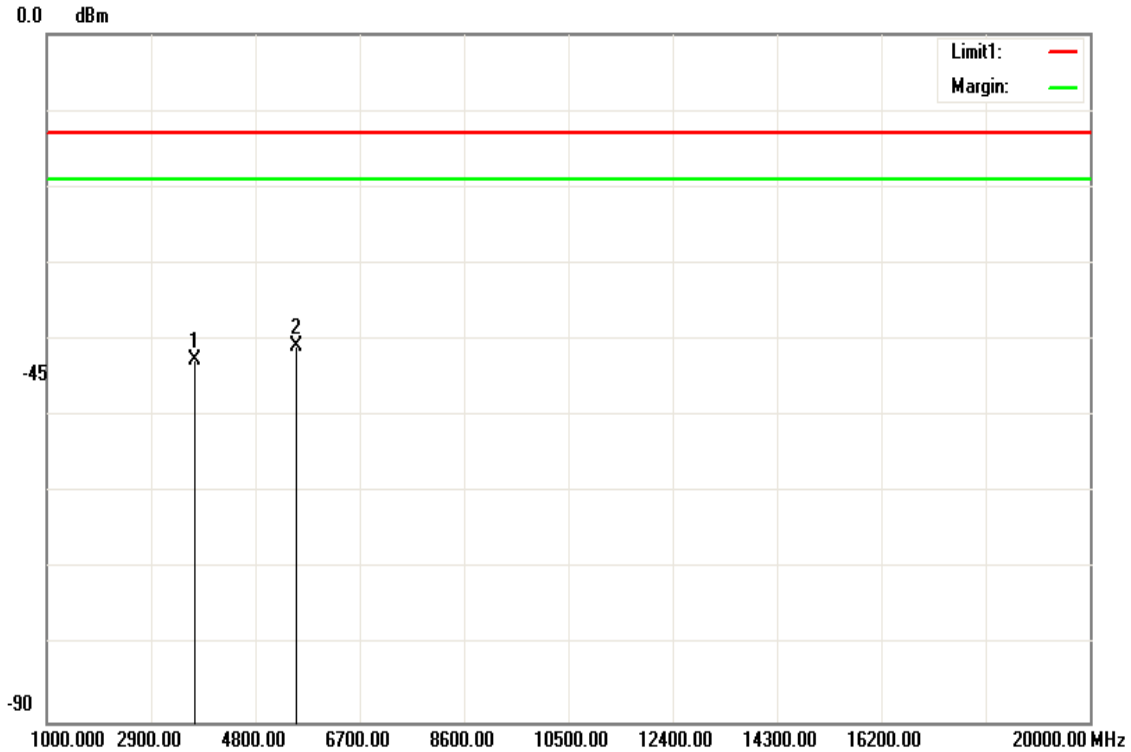
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3702.000	-55.12	12.54	-42.58	-13.00	-29.58	V
5557.000	-53.74	12.88	-40.86	-13.00	-27.86	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 25

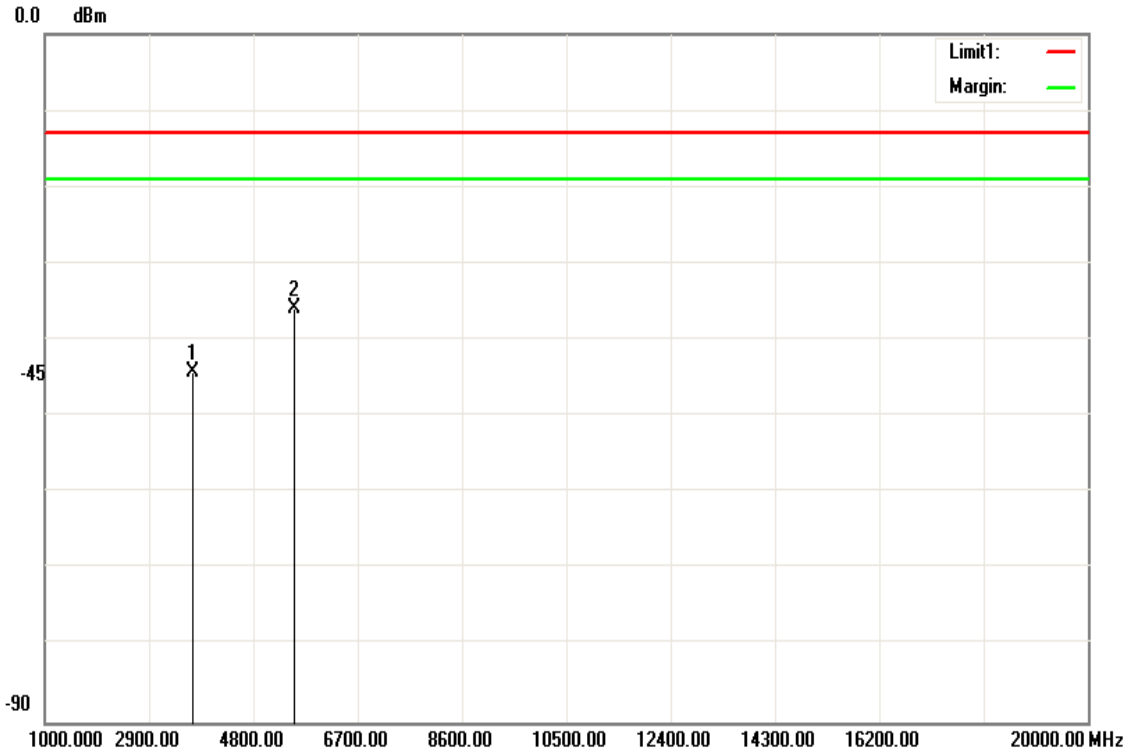
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3702.000	-56.83	12.54	-44.29	-13.00	-31.29	H
5557.000	-48.66	12.88	-35.78	-13.00	-22.78	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 600

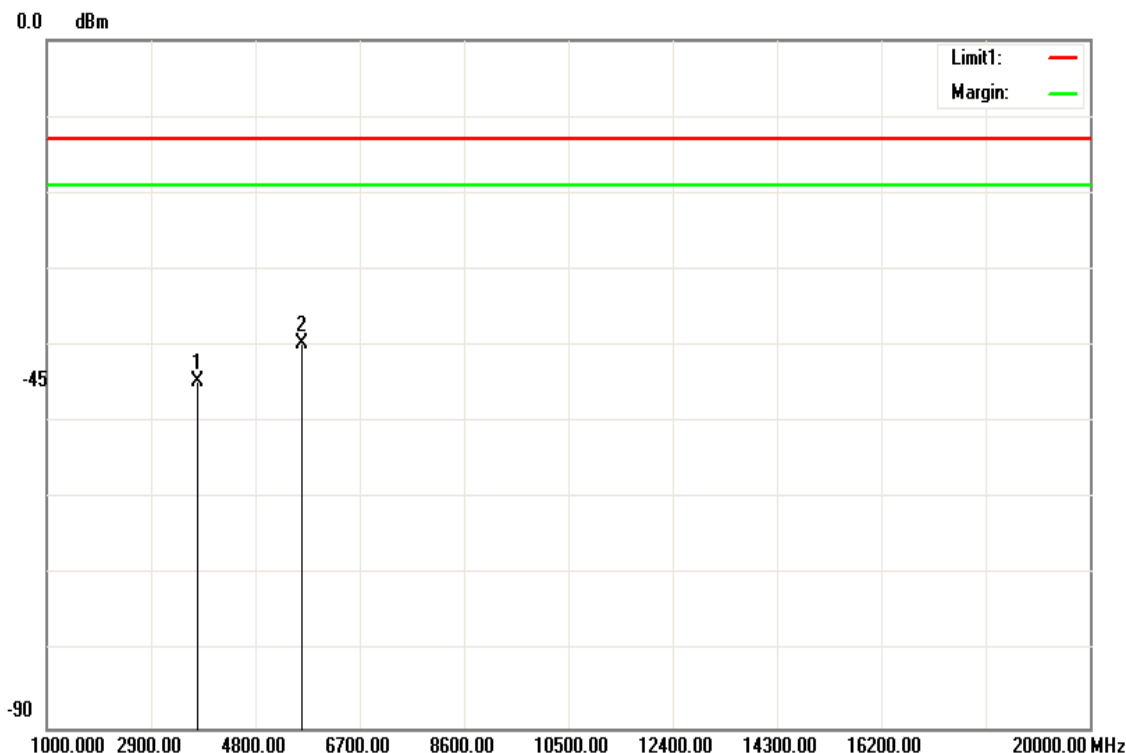
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3758.000	-57.16	12.55	-44.61	-13.00	-31.61	V
5641.000	-52.54	12.84	-39.70	-13.00	-26.70	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



**Operation Mode:** CDMA / BC1 / TX / CH 600

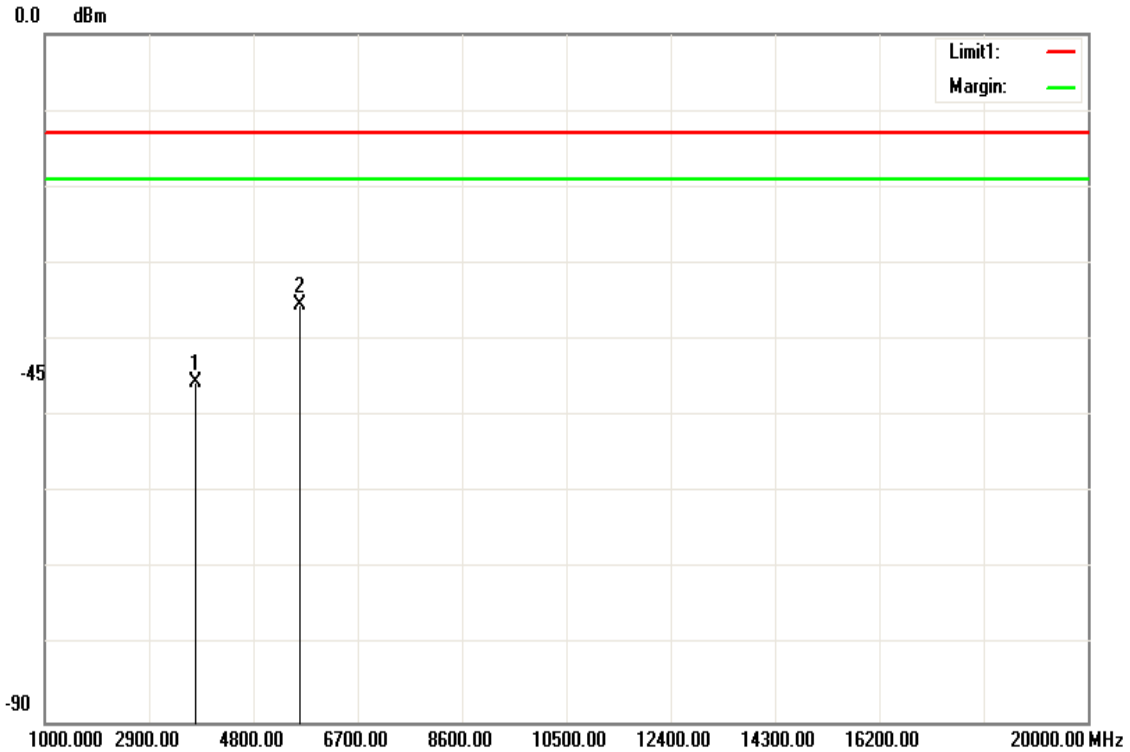
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3758.000	-58.11	12.55	-45.56	-13.00	-32.56	H
5641.000	-48.17	12.84	-35.33	-13.00	-22.33	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 1175

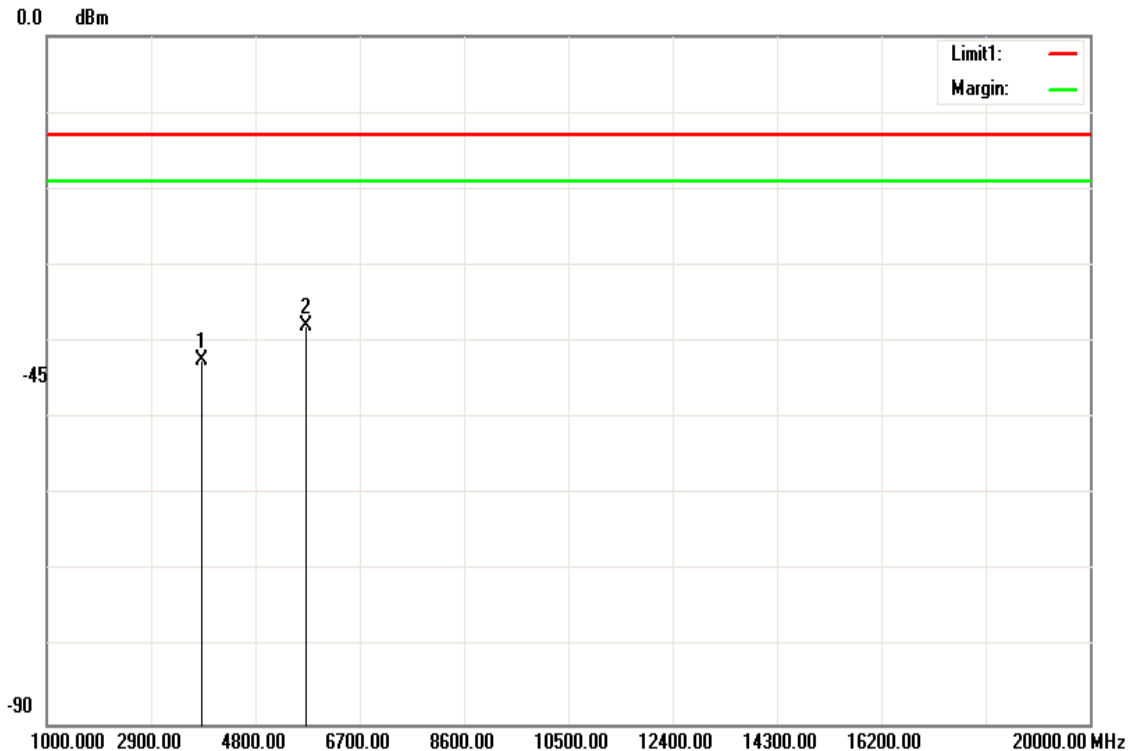
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-54.97	12.56	-42.41	-13.00	-29.41	V
5725.000	-50.65	12.81	-37.84	-13.00	-24.84	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC1 / TX / CH 1175

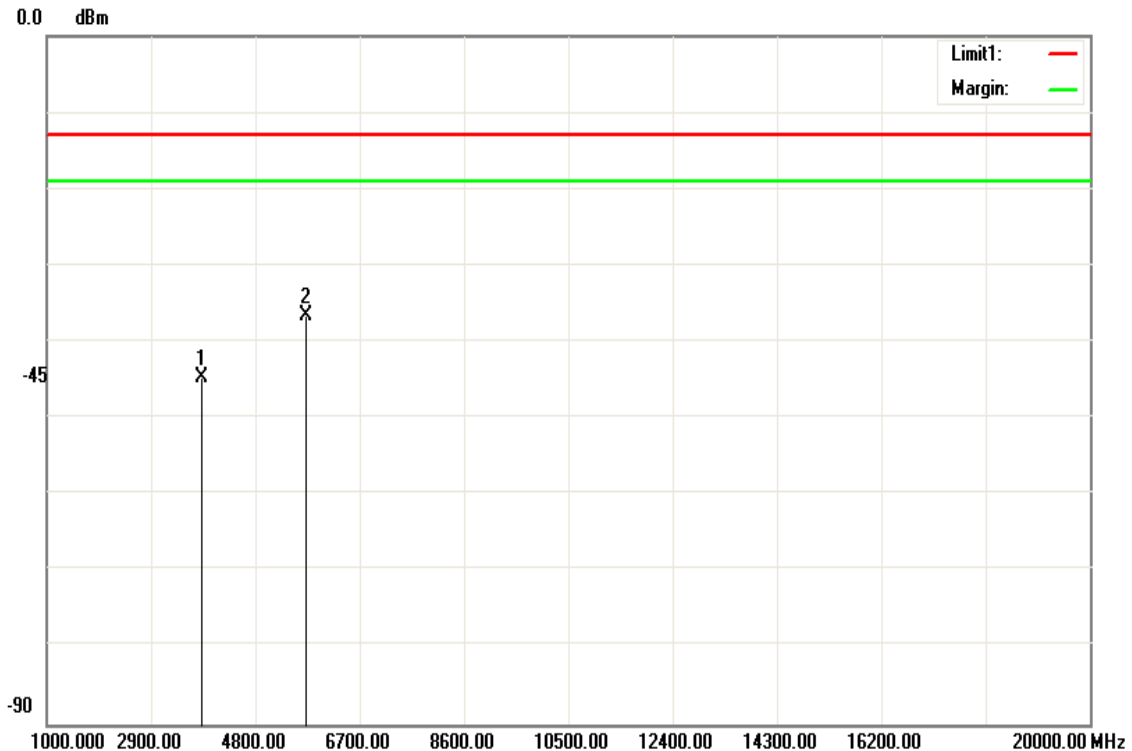
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-57.29	12.56	-44.73	-13.00	-31.73	H
5725.000	-49.29	12.81	-36.48	-13.00	-23.48	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 476

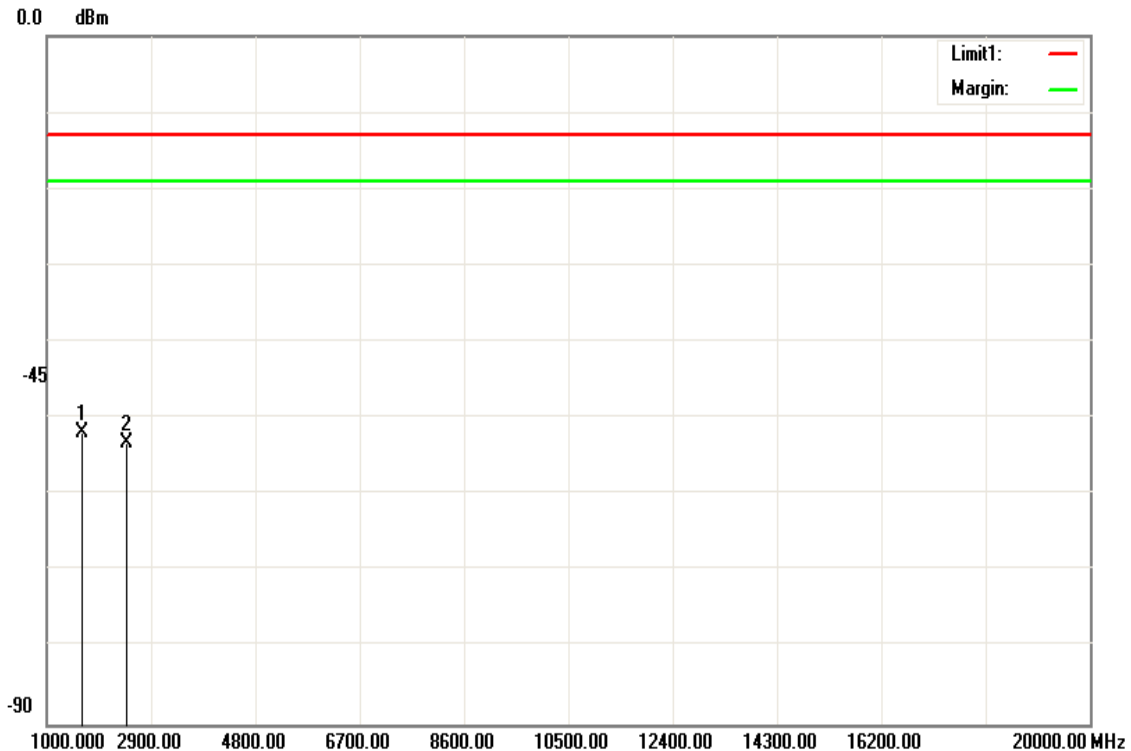
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1634.000	-53.46	1.52	-51.94	-13.00	-38.94	V
2451.000	-55.01	1.81	-53.20	-13.00	-40.20	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 476

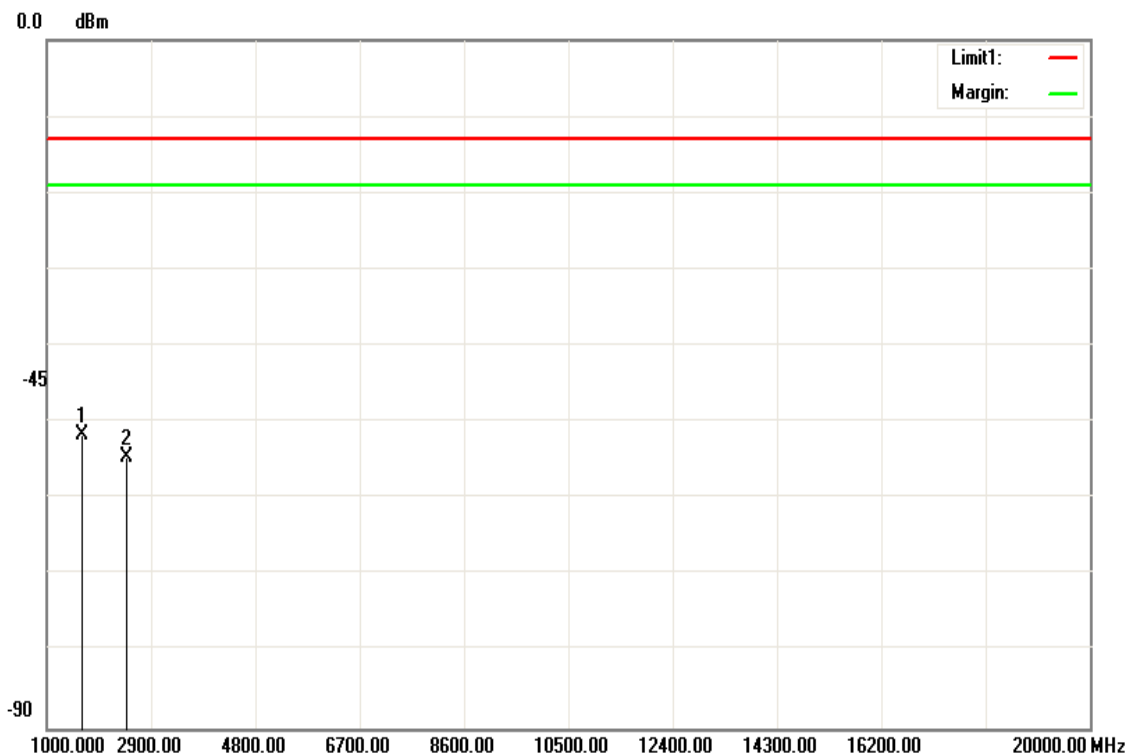
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1634.000	-53.13	1.52	-51.61	-13.00	-38.61	H
2451.000	-56.33	1.81	-54.52	-13.00	-41.52	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 580

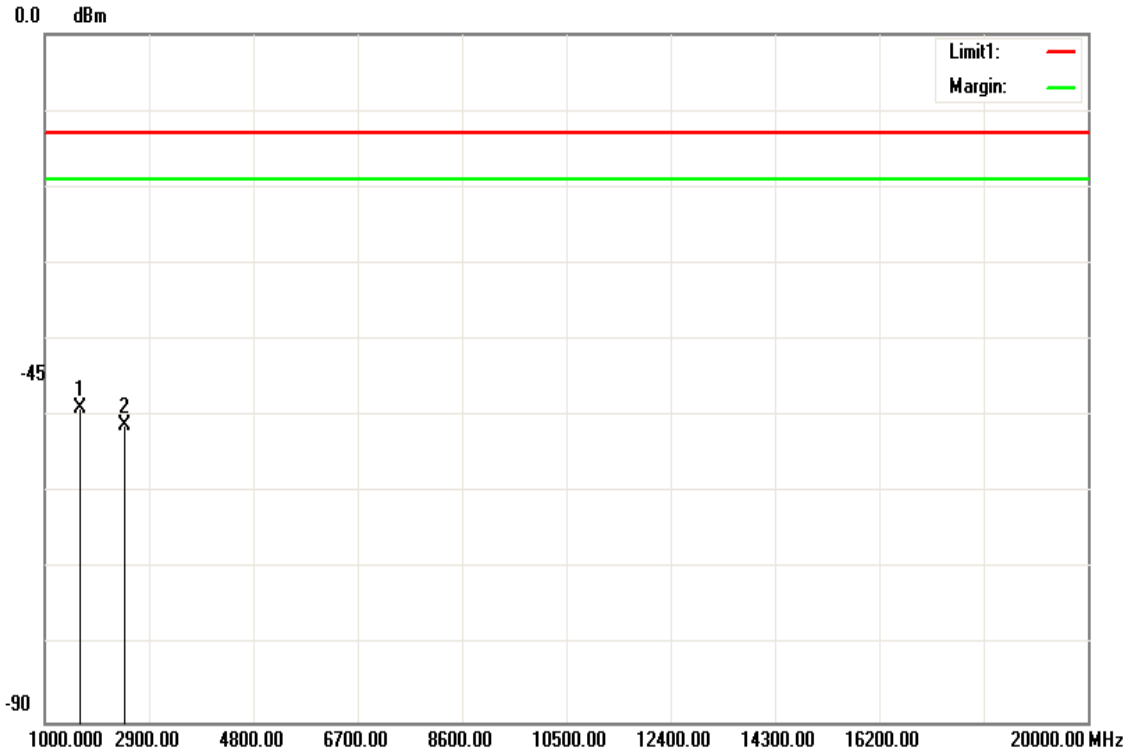
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1641.000	-50.46	1.52	-48.94	-13.00	-35.94	V
2461.000	-53.05	1.82	-51.23	-13.00	-38.23	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 580

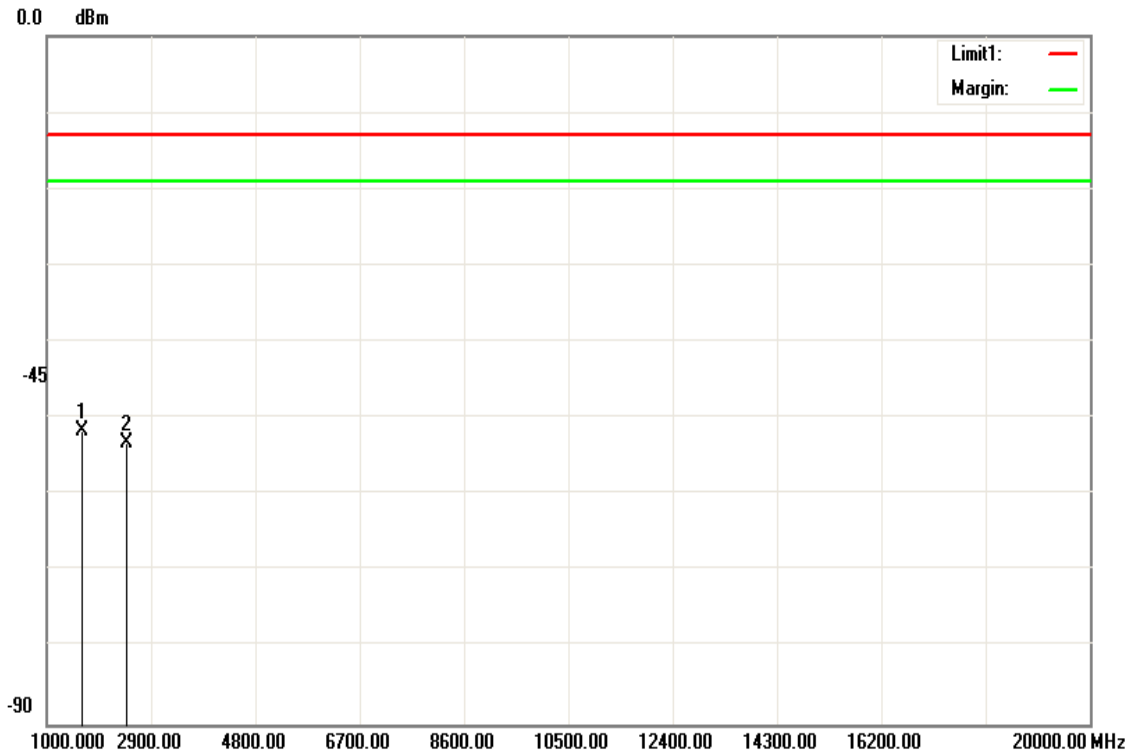
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1641.000	-53.15	1.52	-51.63	-13.00	-38.63	H
2461.000	-55.12	1.82	-53.30	-13.00	-40.30	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Operation Mode:** CDMA / BC10 / TX / CH 684

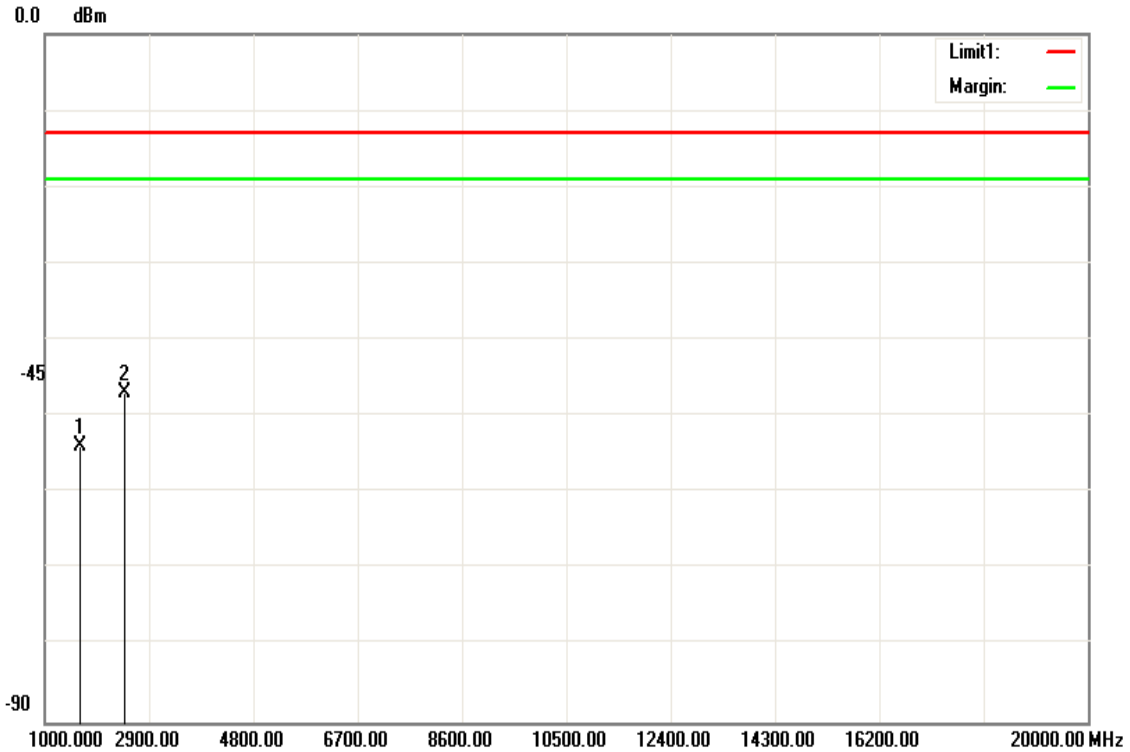
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1646.000	-55.31	1.52	-53.79	-13.00	-40.79	V
2469.000	-48.81	1.83	-46.98	-13.00	-33.98	V
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



**Operation Mode:** CDMA / BC10 / TX / CH 684

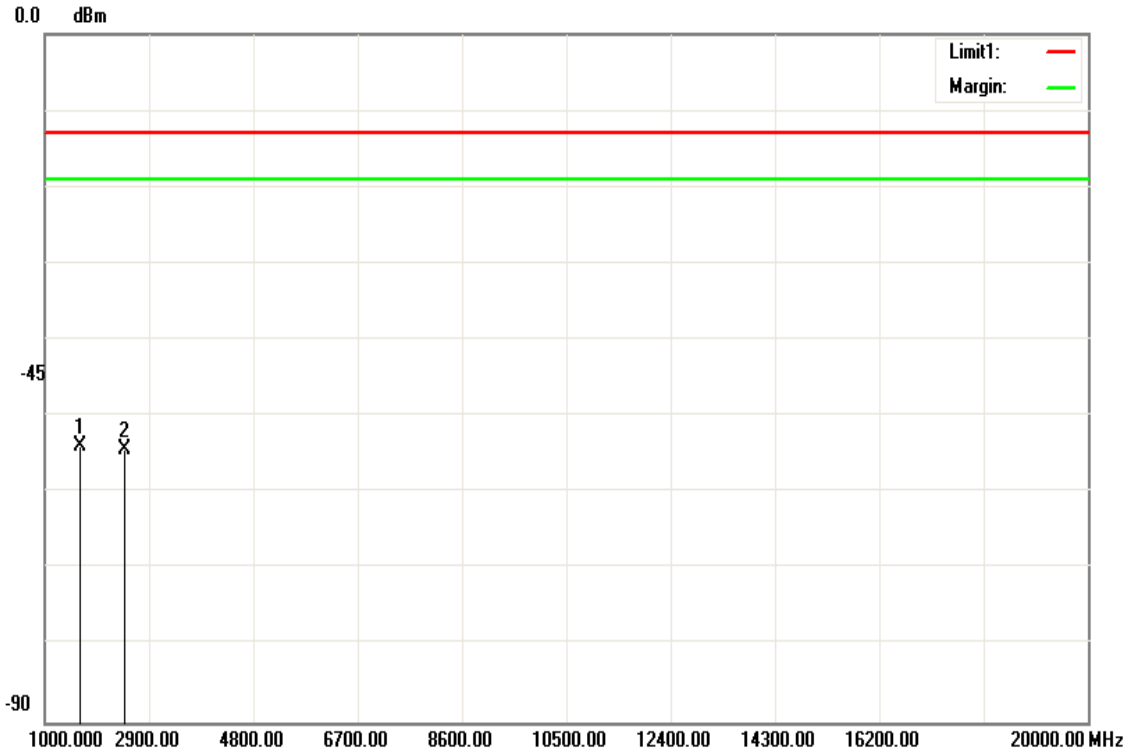
**Test Date:** May 19, 2017

**Temperature:** 22.6°C

**Tested by:** Kevin Kuo

**Humidity:** 57.2 % RH

**Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1646.000	-55.34	1.52	-53.82	-13.00	-40.82	H
2469.000	-56.2	1.83	-54.37	-13.00	-41.37	H
N/A						

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

## 7.8 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

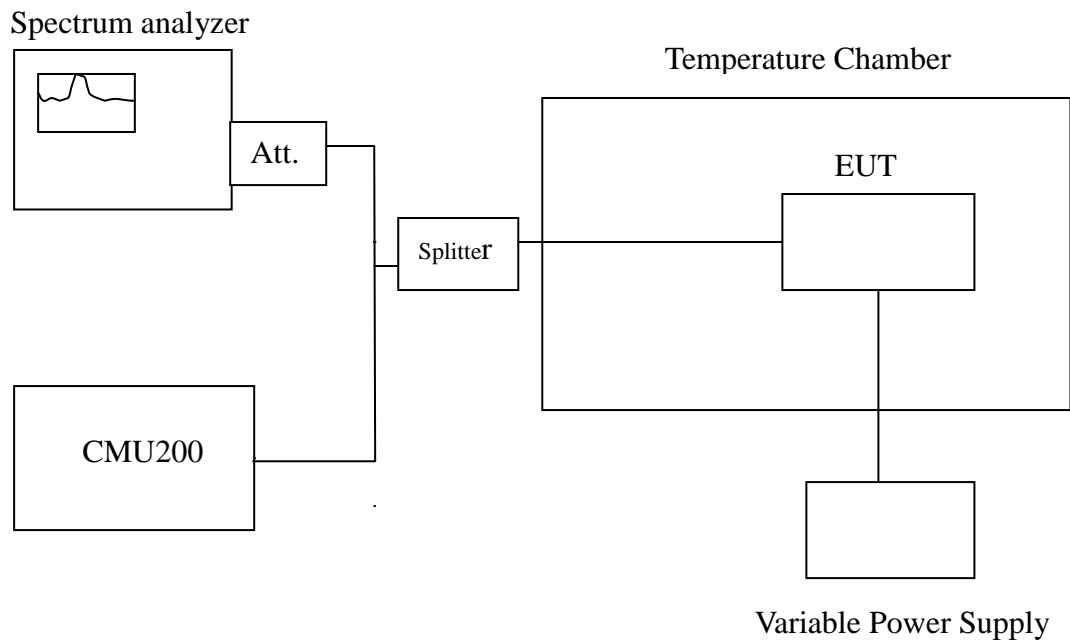
### LIMIT

According to FCC §2.1055, FCC §24.235, FCC §90.231.

According to RSS-132 (4.3) & RSS-133 (6.3).

Frequency Tolerance: +/- 2.5 ppm

### Test Configuration



**Remark:** Measurement setup for testing on Antenna connector

**TEST PROCEDURE**

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

**TEST RESULTS**

*No non-compliance noted.*

**CDMA**

Power Supply	Environment	BC 0	Frequency Error (ppm)	BC 1	Frequency Error (ppm)	BC10	Frequency Error (ppm)
Vdc	Temperature (°C)	Frequency Error(Hz)		Frequency Error(Hz)		Frequency Error(Hz)	
240	50	-12.38	-0.0146	-13.51	-0.0072	-14.28	-0.0174
240	40	-13.22	-0.0156	-12.23	-0.0065	-12.36	-0.0151
240	30	-12.36	-0.0146	-7.62	-0.0041	-8.91	-0.0109
240	20	-10.65	-0.0126	-9.58	-0.0051	-10.33	-0.0126
240	10	-9.58	-0.0113	-8.59	-0.0046	-9.14	-0.0111
240	0	-9.25	-0.0109	-7.65	-0.0041	-7.82	-0.0095
240	-10	-8.65	-0.0102	-5.12	-0.0027	-6.62	-0.0081
240	-20	-8.96	-0.0106	-3.25	-0.0017	-5.13	-0.0063
240	-30	-9.63	-0.0114	-6.65	-0.0035	-3.24	-0.0039

## 7.9 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

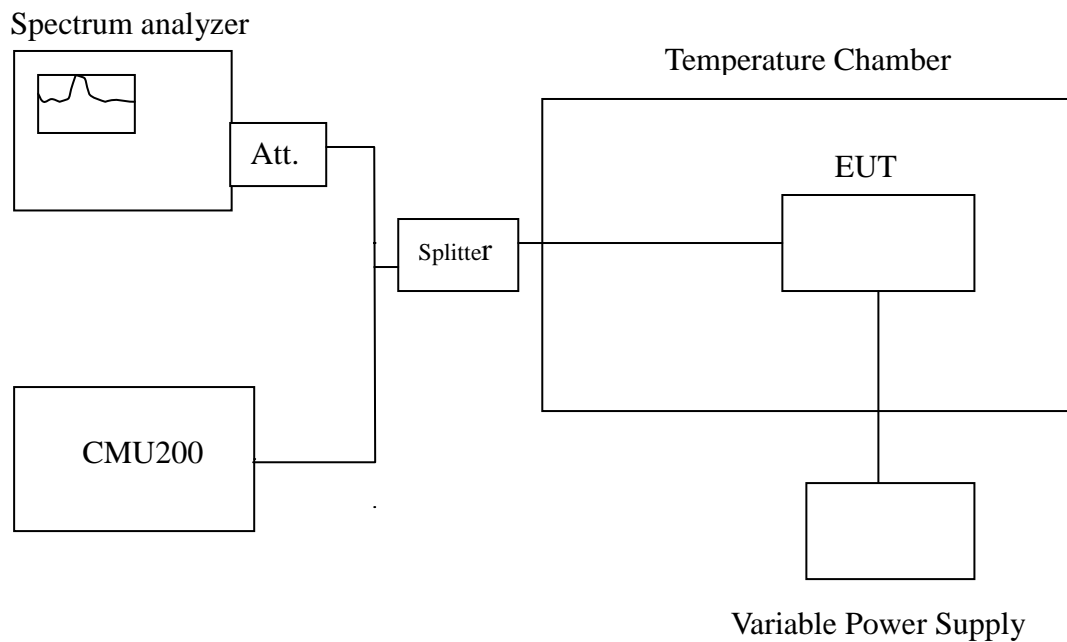
### LIMIT

According to FCC §2.1055, FCC §24.235 , FCC §90.231

According to RSS-132 (4.3) & RSS-133 (6.3).

Frequency Tolerance: +/-2.5 ppm.

### Test Configuration



**Remark:** Measurement setup for testing on Antenna connector.

## **TEST PROCEDURE**

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

## **TEST RESULTS**

*No non-compliance noted.*

### **CDMA**

Power Supply	Environment	BC 0	Frequency Error (ppm)	BC 1	Frequency Error (ppm)	BC10	Frequency Error (ppm)
Vdc	Temperature (°C)	Frequency Error(Hz)		Frequency Error(Hz)		Frequency Error(Hz)	
262	20	-11.23	-0.0132	-8.59	-0.0046	-9.76	-0.0119
240	20	-10.65	-0.0126	-9.58	-0.0051	-10.33	-0.0126
216	20	-10.72	-0.0126	-8.32	-0.0044	-11.21	-0.0137