



# Electromagnetic Compatibility Test Report

**Test Report No: MOT 270611**

Issued on: June 27, 2011

**Product Name**

**VML700**

**Model: F4080A**

**Tested According to**

**FCC 47 CFR, Part 24**

**Industry Canada & RSS-133**

**Tests Performed for**

**Motorola Solutions Inc.**

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ELECTRICAL TESTING  
CERT #1633.01

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## **Test Report details:**

Test commencement date: 01.06.2011  
Test completion date: 24.06.2011  
Customer's representative: Kfir Kamil  
Issued on: 27.06.2011

## **Assessment information:**

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was set up and exercised using the configuration, modes of operation and arrangements defined in this report only.

## **Modifications:**

### **Modifications made to the EUT**

None

### **Modifications made to the Test Standard**

None

## Summary of Compliance Status

Test Spec. Clause	Test Case	Remarks
47 CFR §24.232 (c) & §2.1046 & RSS 133,6.4	RF Power Output	Pass
47 CFR §2.1049 & RSS Gen 4.6	Occupied Bandwidth	Pass
47 CFR §24.238 (a)(b) & RSS 133,6.5	Band Edge	Pass
47 CFR §24.238 (a)(b) & §2.1051 & RSS 133,6.5	Out of Band Emissions	Pass
47 CFR §24.232 (c) & RSS 133,6.4	Radiated Peak Power Output	Pass
47 CFR §24.238 (a) & RSS 133,6.5	Field Strength of Spurious Radiation	Pass
47 CFR §24.235 & §2.1055 & RSS 133,6.3	Frequency Stability	Pass

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## 1. General Description

**Description of the EUT System/Test Item:** LTE User Equipment (Modem)

**Product Name:** VML700

**Model:** F4080A

**FCC ID:** AZ492FT7045

**IC:** 109U-92FT7045

**Description:** Its basic purpose is used for communication the VML700 consists of LTE band 13, LTE band 14, EVDO Rev A (CDMA), WiFi 802.11b/g  
In case of no coverage in LTE band the device will switch automatically to CDMA/EVDO cellular band (BC0 /BC1)

**Maximum Peak Output Power:** 24.5dBm

**Nominal Output Power:** 23.5dBm

**Frequency Range:** EVDO TX: 1850MHz-1910MHz, Rx 1930MHz-1990MHz

### Transmit Data Rate:

Protocol	Rate [Mbps]
1xRTT	Up 153Kbps peak
EVDO Rev -0	Up 153Kbps peak
EVDO Rev -A	Up 1.8Mbps peak

### Type of Modulation:

Protocol	Modulation
1x	QPSK
EVDO Rev -0	QPSK
EVDO Rev -A	QPSK 16QAM

### Antenna Specification:

**Type:** Folded Monopole

**Gain (including 12ft coaxial cable):** 2.6dBi

## 2. Method of Measurements

### 2.1. Conducted RF Measurements:

During RF Power Output verification test, the transmitter's output was connected to the power meter and the base station simulator through a directional coupler. The external attenuations were taken into account to correct the reading. Worst-case results of the various operation & modulation modes were reported.

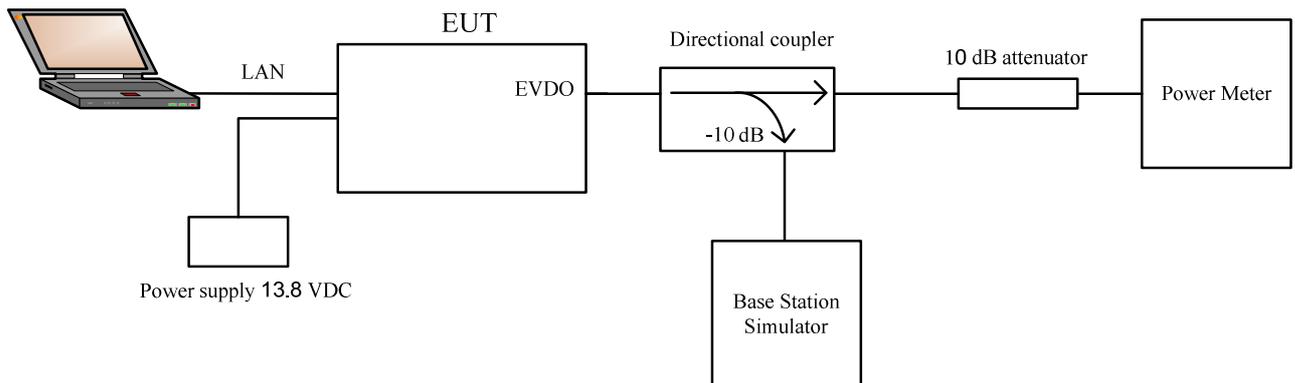
For Occupied Bandwidth measurement, the Spectrum Analyzer with appropriate integrated feature was employed.

For Out of Band emissions measurement, the spectrum was investigated from 9 kHz up to at least the tenth harmonic of the highest fundamental frequency. Multiple sweeps were recorded in max hold mode using a peak detector to ensure that the worst-case emissions were caught.

### Test Setups:

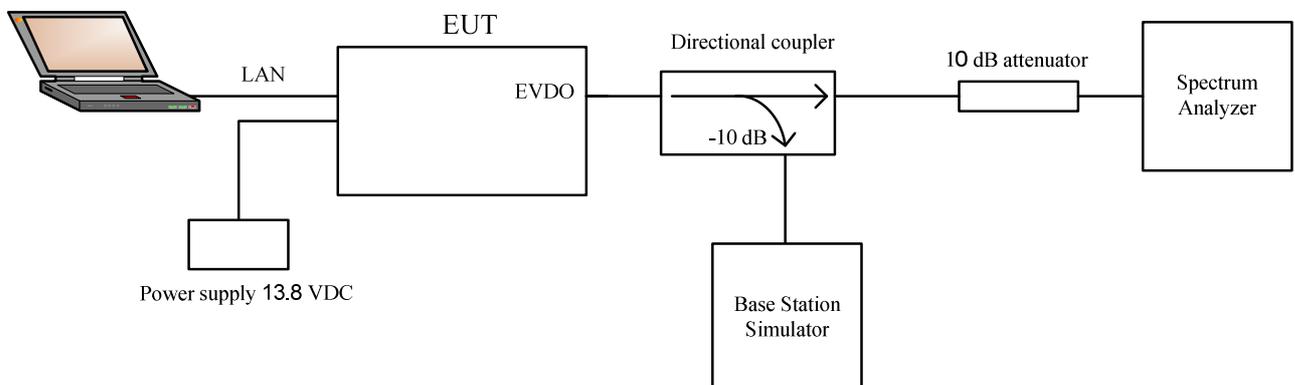
#### RF Power Output verification

Laptop with test application



#### Out of Band Emissions

Laptop with test application



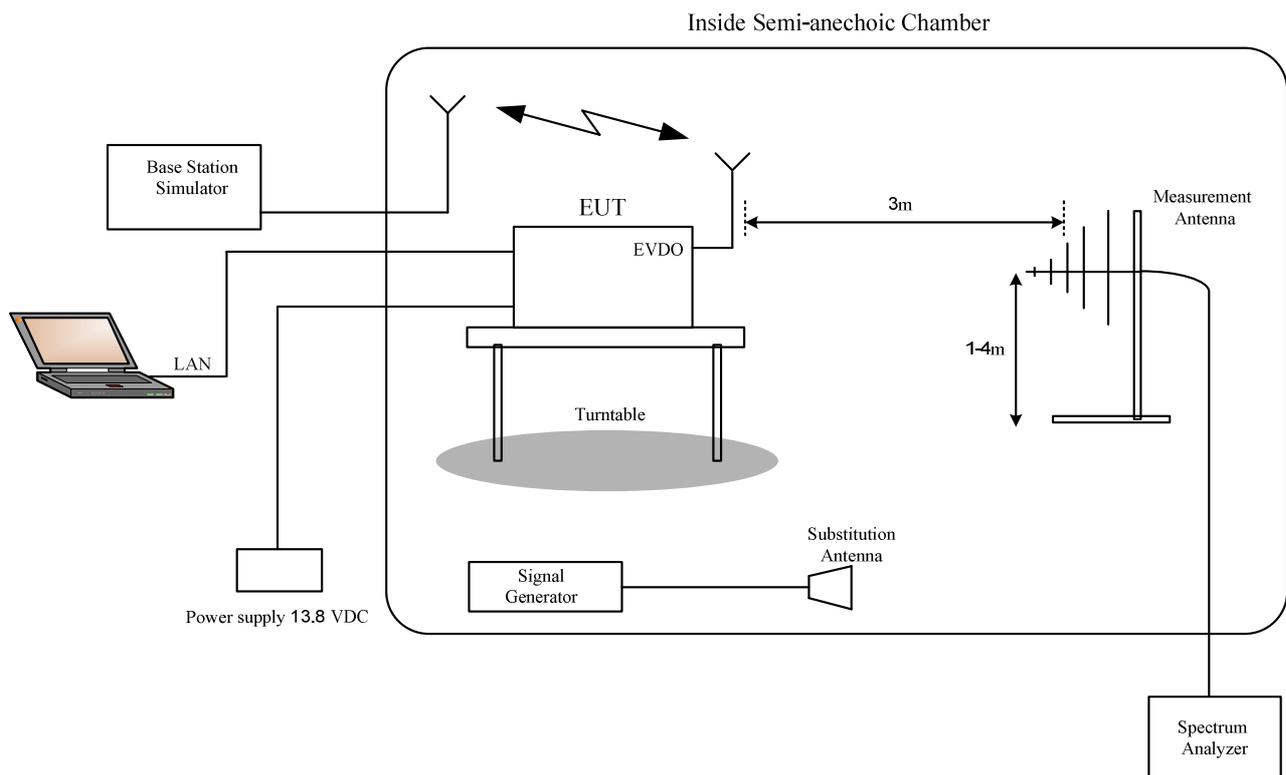
## 2.2. Field Strength of Spurious Radiation Measurements:

Measurements were performed in a semi-anechoic chamber at a 3-meter measurement distance in order to evaluate the radiated electromagnetic interference characteristics of the EUT. The EUT was placed on a non-metallic table, 0.8 m above the turntable, was configured, arranged and operated in a manner consistent with typical application and load conditions. The test program of exercising equipment ensured that various parts of the EUT were exercised to permit detection of all EUT disturbances.

While the turntable was being rotated around 360 degrees, the height of the antenna was varied from 1 to 4 m for the frequency range from 30 MHz up to at least the tenth harmonic of the highest fundamental frequency. Measurements were performed for vertical and horizontal polarization.

Using the Substitution Method in accordance to ANSI/TIA-603, an antenna with a known gain substituted the EUT, and an RF signal source was connected to the antenna input. The signal source level was adjusted until the previously recorded maximum reading was obtained. The power source reading was corrected for the cable loss and the antenna gain was added to obtain the calculated ERP/EIRP peak power. Measurements were made at the low, middle and high channels.

### Test Setup:

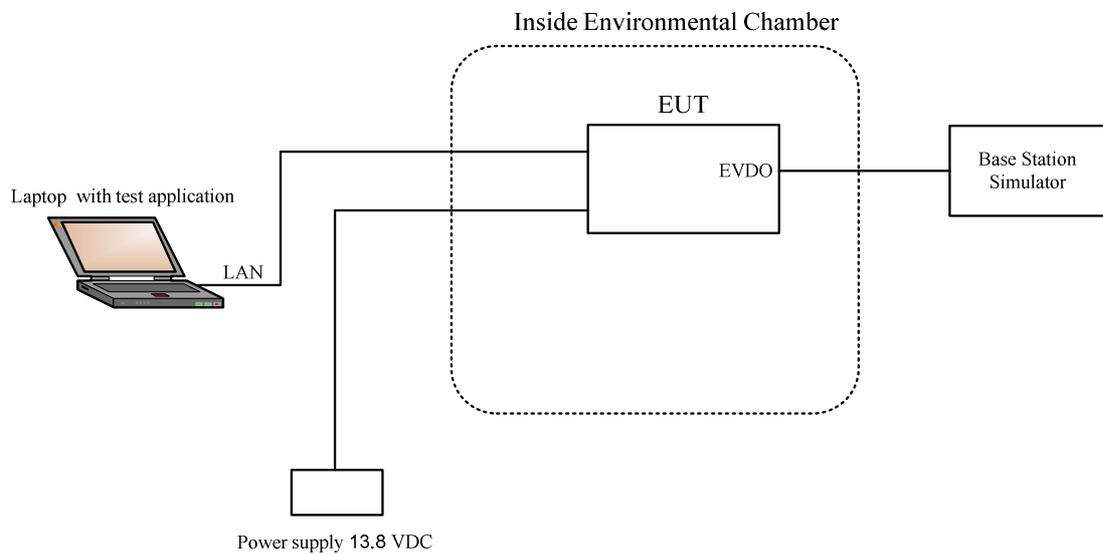


### 2.3. Frequency stability measurements:

The EUT was placed inside an environmental chamber and the frequency stability was measured with variations of ambient temperatures from -30°C to +60°C. Frequency measurements were made at the extremes of the specified temperature range and at intervals of 10°C through the range.

The frequency stability was measured also with variations of primary supply voltage from 85 to 115 percent of the nominal value.

#### Test Setup:



### 2.4. Worst Case Results:

Worst case result is determined for applicable modulation types and data rates. Pre-scan has been conducted to determine the worst-case.

### 3. Test Facility & Uncertainty of Measurement

#### 3.1. Accreditation/ Registration reference:

- A2LA Certificate Number: 1633.01

#### 3.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom Group

**Address:** 30, Hasivim St., Petah Tikva, Israel.  
Tel: 972-3-926-8443

#### 3m Anechoic Chamber:

The 3m-screened chamber is used in two configurations: the semi-anechoic configuration for Radiated Emission measurements and the full-anechoic configuration for Radiated Immunity tests.

#### Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field $\geq 80$ dB at 15 kHz $\geq 90$ dB at 100 kHz Electric field $> 120$ dB from 1MHz to 1GHz $> 110$ dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	$\pm 3.49$ dB, 30MHz to 1GHz
Transmission Loss measured at 5 positions, at 1.5m height	$\pm 3$ dB, 1GHz to 18GHz

#### Full-Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	7m x 4m x 3m
Antenna height	1.55m at Horizontal & Vertical polarizations
Shielding Effectiveness	Magnetic field $\geq 80$ dB at 15 kHz $\geq 90$ dB at 100 kHz Electric field $> 120$ dB from 1MHz to 1GHz $> 110$ dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls and floor
Field Uniformity to EN61000-4-3	$\pm 3$ dB 80MHz to 18GHz

#### 4. FCC 47 CFR, Part 24: Report of Measurements and examinations

##### 4.1. RF Power Output verification

Reference document:	47 CFR §24.232 (c) & §2.1046		
Test Requirements:	Mobile/portable stations are limited to 2 watts EIRP peak power.		
Test setup:	See sec 2.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
Power meter settings:	AVG		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	---	

##### Test results for lowest frequency 1851.25 MHz:

Mode	Test case			BC1 (1900 MHz)					
	#	FWD RC/TAP	REV RC/TAP	Channel 25, Frequency 1851.25 MHz					
				Output power* [dBm]	Antenna gain** [dBi]	EIRP calculated [dBm]	Limit [dBm]	Margin [dB]	Result
1xRTT	1	RC1	RC1 (SO2)	23,95	2,6	26,55	33,00	-6,45	Pass
	2	RC1	RC1 (SO55)	24,02	2,6	26,62	33,00	-6,38	Pass
	3	RC2	RC2 (SO9)	23,89	2,6	26,49	33,00	-6,51	Pass
	4	RC2	RC2 (SO55)	23,95	2,6	26,55	33,00	-6,45	Pass
	5	RC3	RC3 (SO55)	23,79	2,6	26,39	33,00	-6,61	Pass
	6	RC3	RC3 (SO32)	22,91	2,6	25,51	33,00	-7,49	Pass
1xEVDO Rel0	1	FTAP Rate = 307 kbps (2 slot, QPSK)	RTAP rate = 9.6 kbps	23,96	2,6	26,56	33,00	-6,44	Pass
	2		RTAP rate = 19.2 kbps	23,99	2,6	26,59	33,00	-6,41	Pass
	3		RTAP rate = 38.4 kbps	23,97	2,6	26,57	33,00	-6,43	Pass
	4		RTAP rate = 76.8 kbps	23,96	2,6	26,56	33,00	-6,44	Pass
	5		RTAP rate = 153.6 kbps	23,98	2,6	26,58	33,00	-6,42	Pass
1xEVDO RevA	1	FETAP rate = 307 kbps (2 slot, ACK channel is transmitted at all the slots)	RETAP – payload size = 128	23,98	2,6	26,58	33,00	-6,42	Pass
	2		RETAP – payload size = 256	23,99	2,6	26,59	33,00	-6,41	Pass
	3		RETAP – payload size = 512	23,97	2,6	26,57	33,00	-6,43	Pass
	4		RETAP – payload size = 768	23,95	2,6	26,55	33,00	-6,45	Pass
	5		RETAP – payload size = 1024	24,02	2,6	26,62	33,00	-6,38	Pass
	6		RETAP – payload size = 1536	23,99	2,6	26,59	33,00	-6,41	Pass
	7		RETAP – payload size = 2048	24,03	2,6	26,63	33,00	-6,37	Pass
	8		RETAP – payload size = 3072	24,01	2,6	26,61	33,00	-6,39	Pass
	9		RETAP – payload size = 4096	23,94	2,6	26,54	33,00	-6,46	Pass
	10		RETAP – payload size = 6144	24,05	2,6	26,65	33,00	-6,35	Pass
	11		RETAP – payload size = 8192	24,01	2,6	26,61	33,00	-6,39	Pass
	12		RETAP – payload size = 12288	23,95	2,6	26,55	33,00	-6,45	Pass

\* Corrected for external attenuations.

\*\* As provided by the manufacturer (maximum antenna gain including cable loss).

**Test results for middle frequency 1880 MHz:**

Mode	Test case			BC1 (1900 MHz)					
	#	FWD RC/TAP	REV RC/TAP	Channel 600, Frequency 1880 MHz					
				Output power* [dBm]	Antenna gain** [dBi]	EIRP calculated [dBm]	Limit [dBm]	Margin [dB]	Result
1xRTT	1	RC1	RC1 (SO2)	24,06	2,6	26,66	33,00	-6,34	Pass
	2	RC1	RC1 (SO55)	24,06	2,6	26,66	33,00	-6,34	Pass
	3	RC2	RC2 (SO9)	24,06	2,6	26,66	33,00	-6,34	Pass
	4	RC2	RC2 (SO55)	24,04	2,6	26,64	33,00	-6,36	Pass
	5	RC3	RC3 (SO55)	24,05	2,6	26,65	33,00	-6,35	Pass
	6	RC3	RC3 (SO32)	22,75	2,6	25,35	33,00	-7,65	Pass
1xEVDO Rel0	1	FTAP Rate = 307 kbps (2 slot, QPSK)	RTAP rate = 9.6 kbps	24,02	2,6	26,62	33,00	-6,38	Pass
	2		RTAP rate = 19.2 kbps	23,98	2,6	26,58	33,00	-6,42	Pass
	3		RTAP rate = 38.4 kbps	24,08	2,6	26,68	33,00	-6,32	Pass
	4		RTAP rate = 76.8 kbps	24,05	2,6	26,65	33,00	-6,35	Pass
	5		RTAP rate = 153.6 kbps	24,06	2,6	26,66	33,00	-6,34	Pass
1xEVDO RevA	1	FETAP rate = 307 kbps (2 slot, ACK channel is transmitted at all the slots)	RETAP – payload size = 128	24,05	2,6	26,65	33,00	-6,35	Pass
	2		RETAP – payload size = 256	24,04	2,6	26,64	33,00	-6,36	Pass
	3		RETAP – payload size = 512	24,03	2,6	26,63	33,00	-6,37	Pass
	4		RETAP – payload size = 768	23,98	2,6	26,58	33,00	-6,42	Pass
	5		RETAP – payload size = 1024	24,01	2,6	26,61	33,00	-6,39	Pass
	6		RETAP – payload size = 1536	23,97	2,6	26,57	33,00	-6,43	Pass
	7		RETAP – payload size = 2048	24,05	2,6	26,65	33,00	-6,35	Pass
	8		RETAP – payload size = 3072	24,03	2,6	26,63	33,00	-6,37	Pass
	9		RETAP – payload size = 4096	24,08	2,6	26,68	33,00	-6,32	Pass
	10		RETAP – payload size = 6144	23,95	2,6	26,55	33,00	-6,45	Pass
	11		RETAP – payload size = 8192	23,97	2,6	26,57	33,00	-6,43	Pass
	12		RETAP – payload size = 12288	23,96	2,6	26,56	33,00	-6,44	Pass

\* Corrected for external attenuations.

\*\* As provided by the manufacturer (maximum antenna gain including cable loss).

**Test results for highest frequency 1908.75 MHz:**

Mode	Test case			BC1 (1900 MHz)					
				Channel 1175, Frequency 1908.75 MHz					
	#	FWD RC/TAP	REV RC/TAP	Output power*[dBm]	Antenna gain**[dBi]	EIRP calculated [dBm]	Limit [dBm]	Margin [dB]	Result
1xRTT	1	RC1	RC1 (SO2)	23,92	2,6	26,52	33,00	-6,48	Pass
	2	RC1	RC1 (SO55)	23,91	2,6	26,51	33,00	-6,49	Pass
	3	RC2	RC2 (SO9)	23,92	2,6	26,52	33,00	-6,48	Pass
	4	RC2	RC2 (SO55)	23,91	2,6	26,51	33,00	-6,49	Pass
	5	RC3	RC3 (SO55)	23,89	2,6	26,49	33,00	-6,51	Pass
	6	RC3	RC3 (SO32)	22,65	2,6	25,25	33,00	-7,75	Pass
1xEVDO Rel0	1	FTAP Rate = 307 kbps (2 slot, QPSK)	RTAP rate = 9.6 kbps	23,72	2,6	26,32	33,00	-6,68	Pass
	2		RTAP rate = 19.2 kbps	23,62	2,6	26,22	33,00	-6,78	Pass
	3		RTAP rate = 38.4 kbps	23,71	2,6	26,31	33,00	-6,69	Pass
	4		RTAP rate = 76.8 kbps	23,72	2,6	26,32	33,00	-6,68	Pass
	5		RTAP rate = 153.6 kbps	23,68	2,6	26,28	33,00	-6,72	Pass
1xEVDO RevA	1	FETAP rate = 307 kbps (2 slot, ACK channel is transmitted at all the slots)	RETAP – payload size = 128	23,75	2,6	26,35	33,00	-6,65	Pass
	2		RETAP – payload size = 256	23,73	2,6	26,33	33,00	-6,67	Pass
	3		RETAP – payload size = 512	23,75	2,6	26,35	33,00	-6,65	Pass
	4		RETAP – payload size = 768	23,57	2,6	26,17	33,00	-6,83	Pass
	5		RETAP – payload size = 1024	23,77	2,6	26,37	33,00	-6,63	Pass
	6		RETAP – payload size = 1536	23,74	2,6	26,34	33,00	-6,66	Pass
	7		RETAP – payload size = 2048	23,72	2,6	26,32	33,00	-6,68	Pass
	8		RETAP – payload size = 3072	23,76	2,6	26,36	33,00	-6,64	Pass
	9		RETAP – payload size = 4096	23,78	2,6	26,38	33,00	-6,62	Pass
	10		RETAP – payload size = 6144	23,75	2,6	26,35	33,00	-6,65	Pass
	11		RETAP – payload size = 8192	23,71	2,6	26,31	33,00	-6,69	Pass
	12		RETAP – payload size = 12288	23,57	2,6	26,17	33,00	-6,83	Pass

\* Corrected for external attenuations.

\*\* As provided by the manufacturer (maximum antenna gain including cable loss).

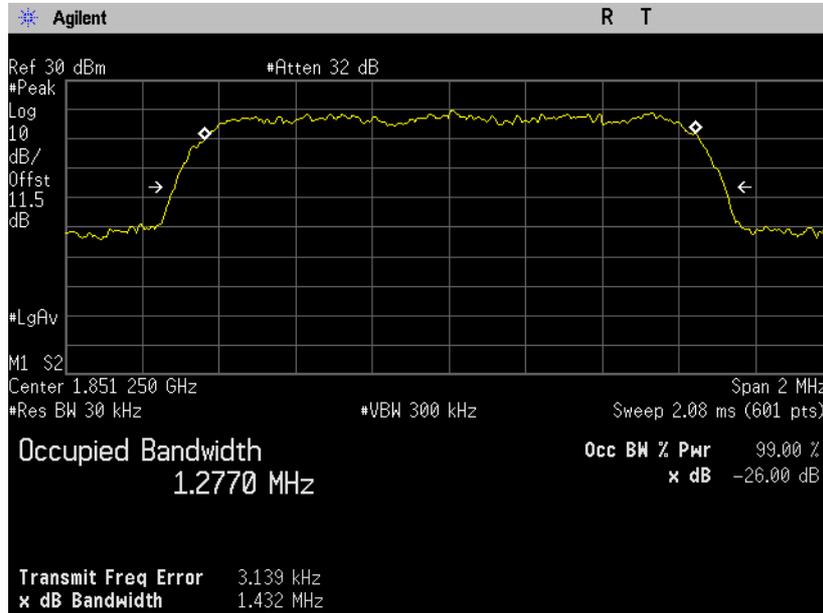
#### 4.2. Occupied Bandwidth

Reference document:	47 CFR §2.1049		
Test Requirements:	The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.		
Test setup:	See sec 2.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 30 kHz, VBW: 300 kHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.2.1 - Plot 4.2.9	

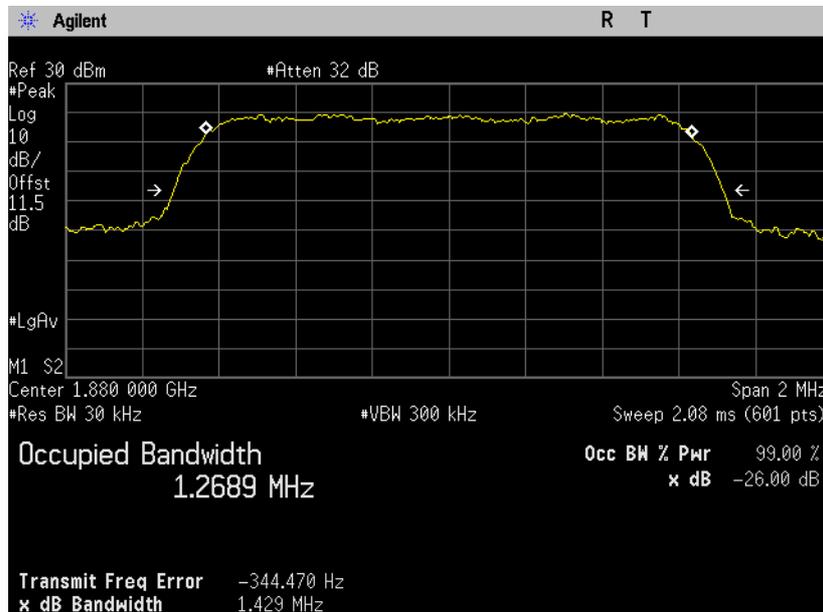
#### Test results:

Channel	Frequency [MHz]	Occupied BW 99% Power [MHz]	26 dB Bandwidth [MHz]	Reference Plots
<b>CDMA 1xRTT, RC3 (SO55)</b>				
25 (low)	1851.25	1.2770	1.432	4.2.1
600 (mid)	1880	1.2689	1.429	4.2.2
1175 (high)	1908.75	1.2722	1.427	4.2.3
<b>CDMA 1xEVDO Rel0, RTAP rate = 153.6 kbps</b>				
25 (low)	1851.25	1.2709	1.435	4.2.4
600 (mid)	1880	1.2685	1.434	4.2.5
1175 (high)	1908.75	1.2743	1.441	4.2.6
<b>CDMA 1xEVDO RevA, RETAP – payload size = 4096</b>				
25 (low)	1851.25	1.2746	1.439	4.2.7
600 (mid)	1880	1.2784	1.439	4.2.8
1175 (high)	1908.75	1.2788	1.440	4.2.9

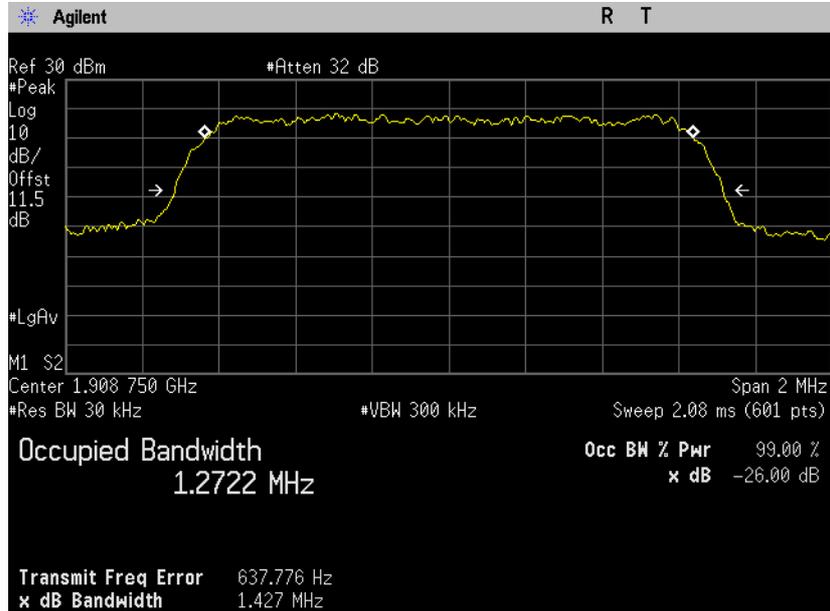
**CDMA 1xRTT, RC3 (SO55)**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.2.1**



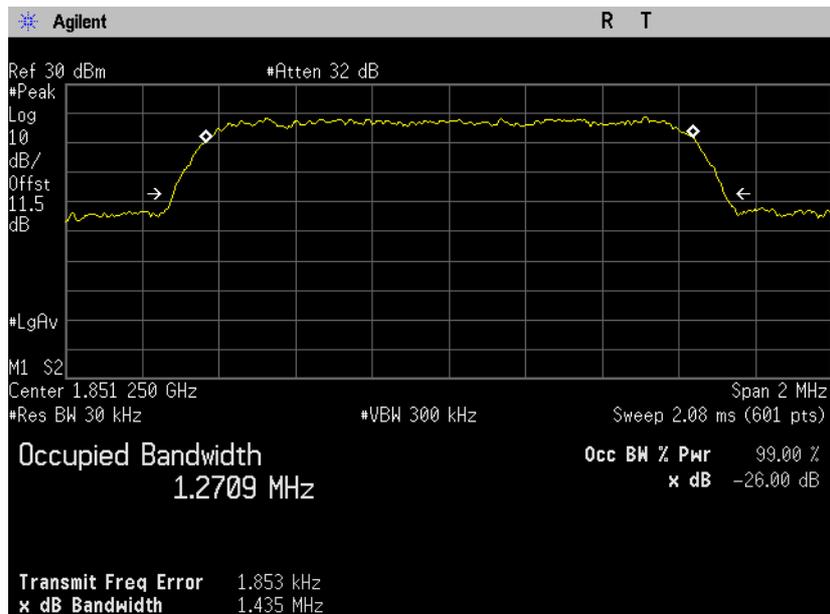
**Middle Frequency 1880 MHz**  
**Plot 4.2.2**



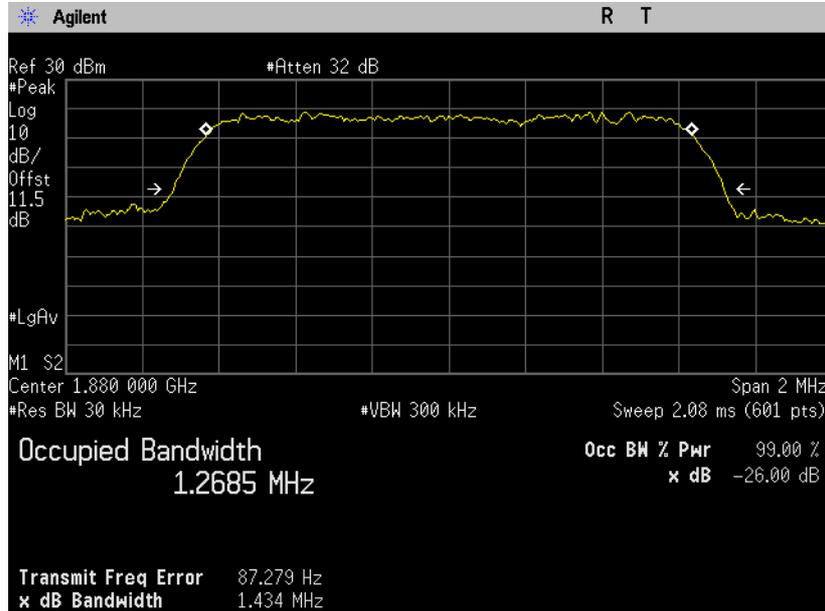
**Highest Frequency 1908.75 MHz**  
**Plot 4.2.3**



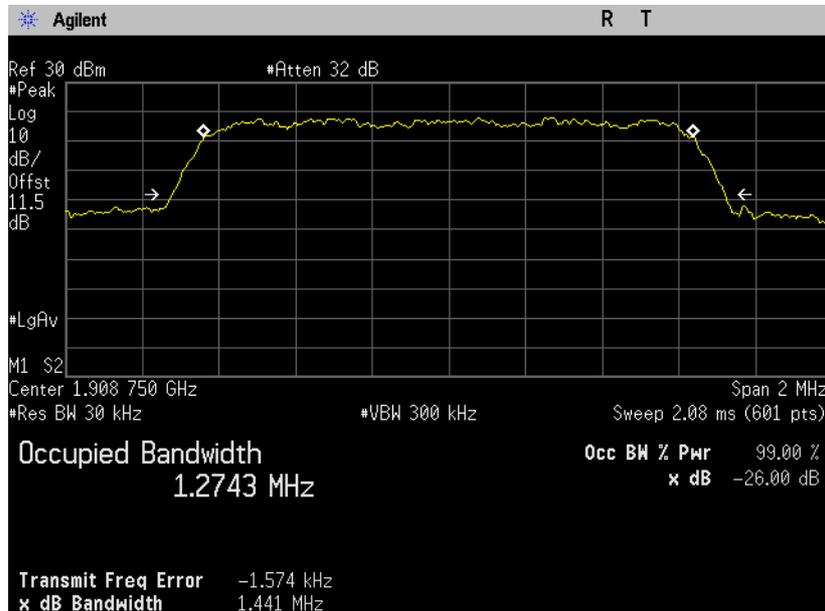
**CDMA 1xEVDO Rel0, RTAP rate = 153.6 kbps**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.2.4**



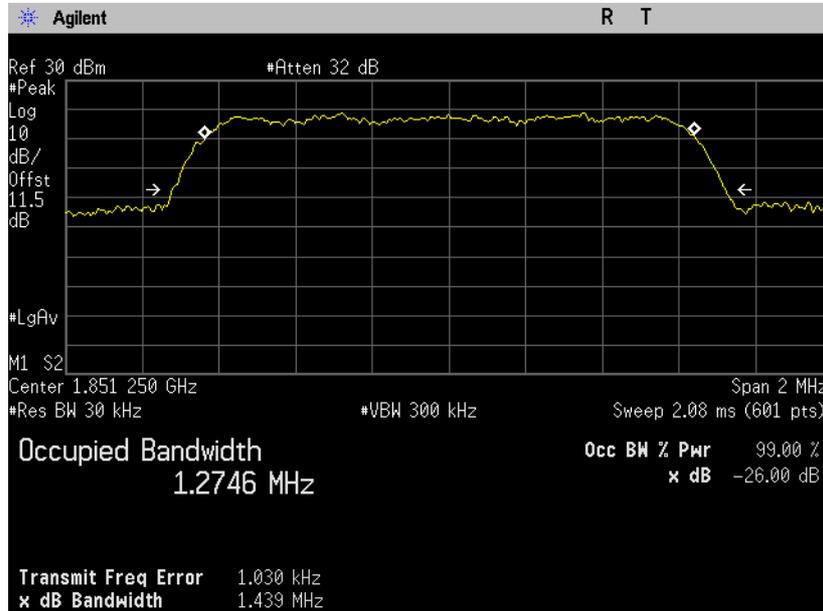
**Middle Frequency 1880 MHz**  
**Plot 4.2.5**



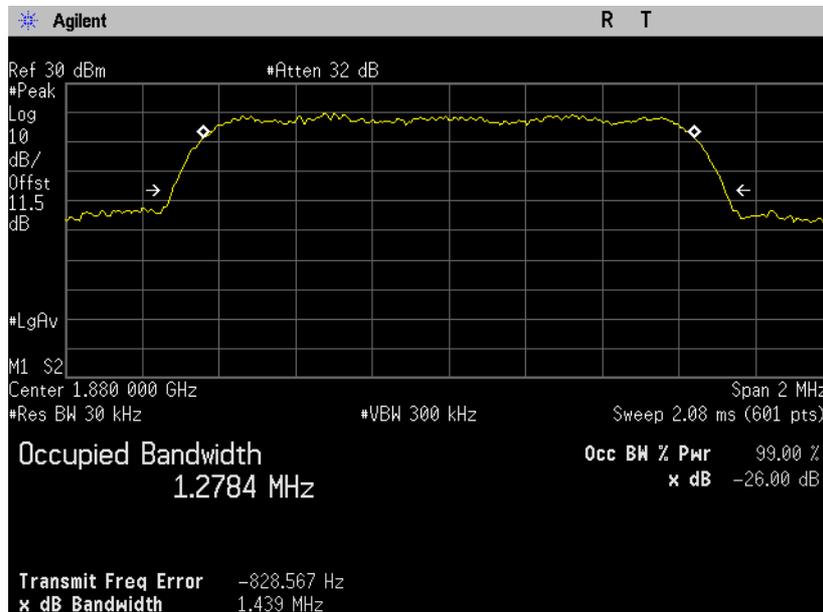
**Highest Frequency 1908.75 MHz**  
**Plot 4.2.6**



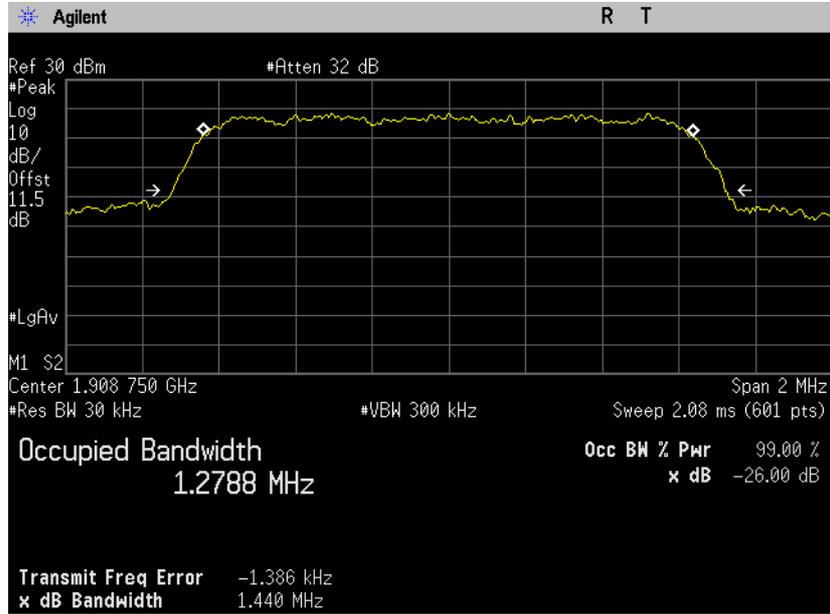
**CDMA 1xEVDO RevA, RETAP – payload size = 4096**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.2.7**



**Middle Frequency 1880 MHz**  
**Plot 4.2.8**



**Highest Frequency 1908.75 MHz**  
**Plot 4.2.9**



### 4.3. Band Edge

Reference document:	47 CFR §24.238 (a)(b)		
Test Requirements:	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10\log(P)$ dB*. In the 1 MHz 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.		
Test setup:	See sec 2.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 13 kHz, VBW: 13 kHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.3.1 -Plot 4.3.6	

\*It translates to a limit of -13 dBm

### Test results:

Channel	Frequency [MHz]	Band Edge Frequency [MHz]	Emission Level [dBm]	Limit [dBm]	Margin [dB]	Reference Plots	Result
<b>CDMA 1xRTT, RC3 (SO55)</b>							
25 (low)	1851.25	1850	-34.501	-13	-21.501	4.3.1	Pass
1175 (high)	1908.75	1910	-36.040	-13	-23.040	4.3.2	Pass
<b>CDMA 1xEVDO Rel0, RTAP rate = 153.6 kbps</b>							
25 (low)	1851.25	1850	-29.926	-13	-16.926	4.3.3	Pass
1175 (high)	1908.75	1910	-31.683	-13	-18.683	4.3.4	Pass
<b>CDMA 1xEVDO RevA, RETAP – payload size = 4096</b>							
25 (low)	1851.25	1850	-29.823	-13	-16.823	4.3.5	Pass
1175 (high)	1908.75	1910	-32.669	-13	-19.669	4.3.6	Pass

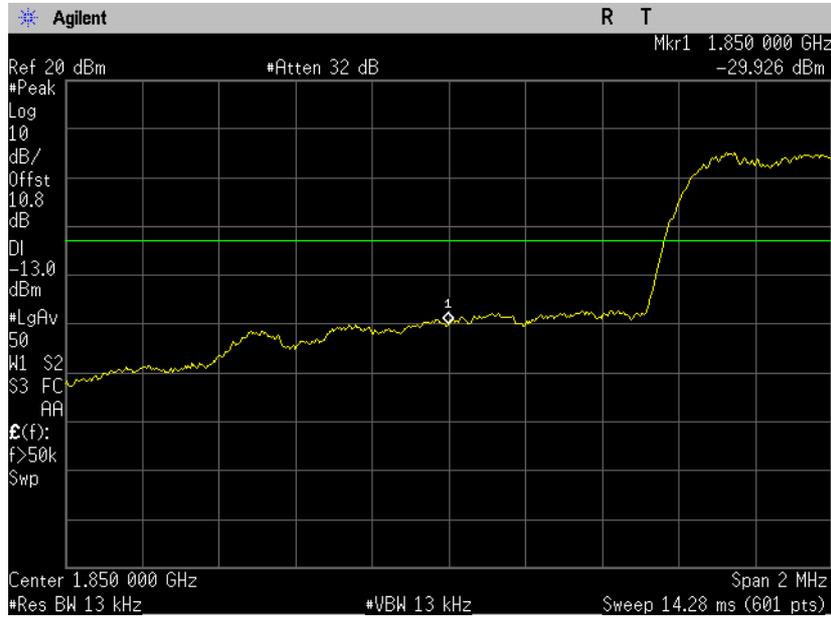
**CDMA 1xRTT, RC3 (SO55)**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.3.1**



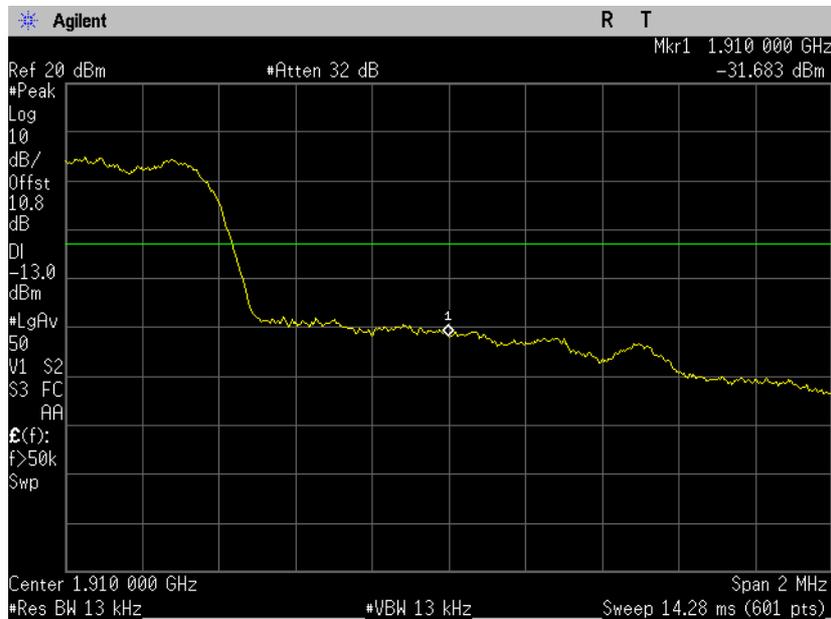
**Highest Frequency 1908.75 MHz**  
**Plot 4.3.2**



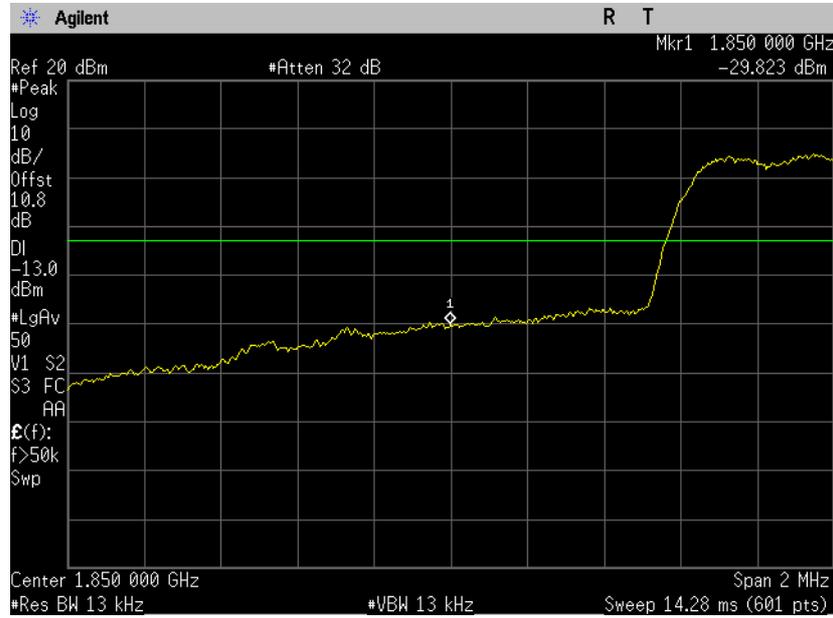
**CDMA 1xEVDO Rel0, RTAP rate = 153.6 kbps**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.3.3**



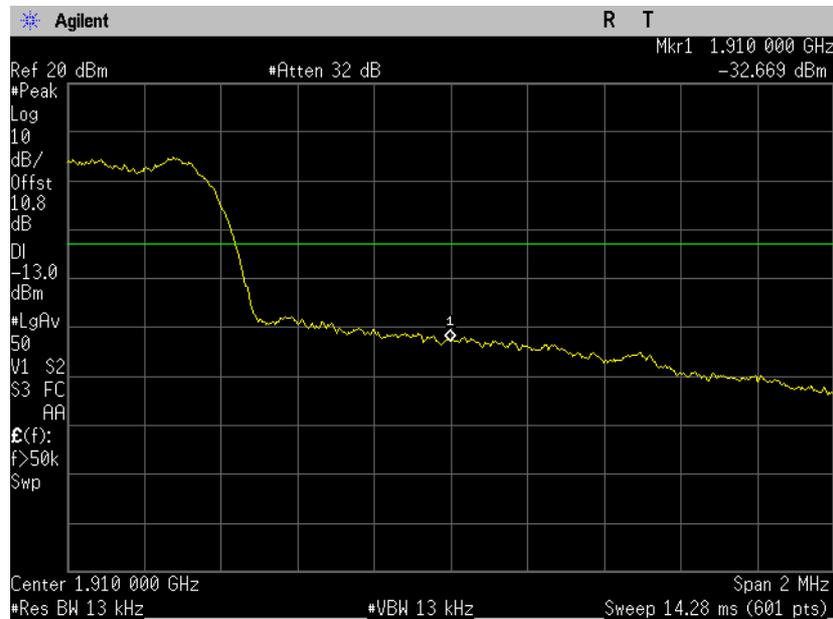
**Highest Frequency 1908.75 MHz**  
**Plot 4.3.4**



**CDMA 1xEVDO RevA, RETAP – payload size = 4096**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.3.5**



**Highest Frequency 1908.75 MHz**  
**Plot 4.3.6**



#### 4.4. Out of Band Emissions

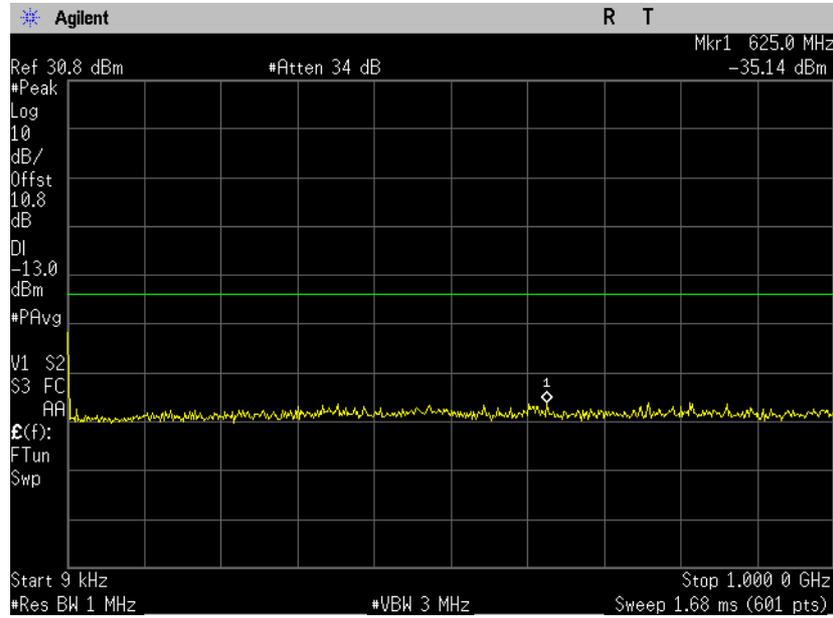
Reference document:	47 CFR §24.238 (a)(b) & §2.1051		
Test Requirements:	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10\log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed.		
Test setup:	See sec 2.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 1 MHz, VBW: 3 MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.4.1- Plot 4.4.9	

\*It translates to a limit of -13 dBm

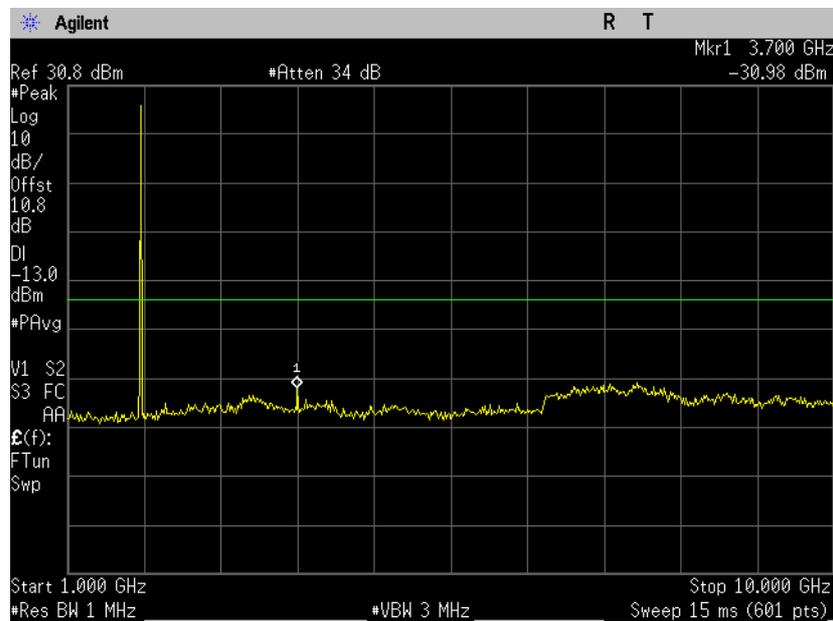
#### Test results:

Channel	Frequency [MHz]	Spurious Emission Frequency [MHz]	Spurious Emission Level* [dBm]	Limit [dBm]	Margin [dB]	Reference Plots	Results
<b>CDMA 1xEVDO Rel0, RTAP rate = 153.6 kbps</b>							
25 (low)	1851.25	3703.080	-29.16	-13	-16.16	4.4.1 – 4.4.3	Pass
600 (mid)	1880	3760.170	-29.80	-13	-16.80	4.4.4 – 4.4.6	Pass
1175 (high)	1908.75	3816.500	-25.24	-13	-12.24	4.4.7 – 4.4.9	Pass

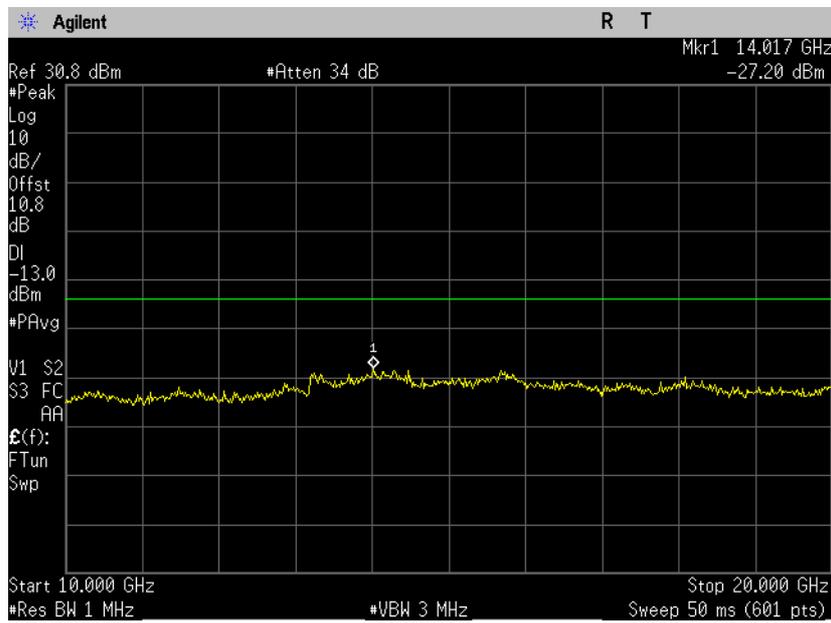
**CDMA 1xEVDO Rel0, RTAP rate = 153.6 kbps**  
**Lowest Frequency 1851.25 MHz**  
**Plot 4.4.1**



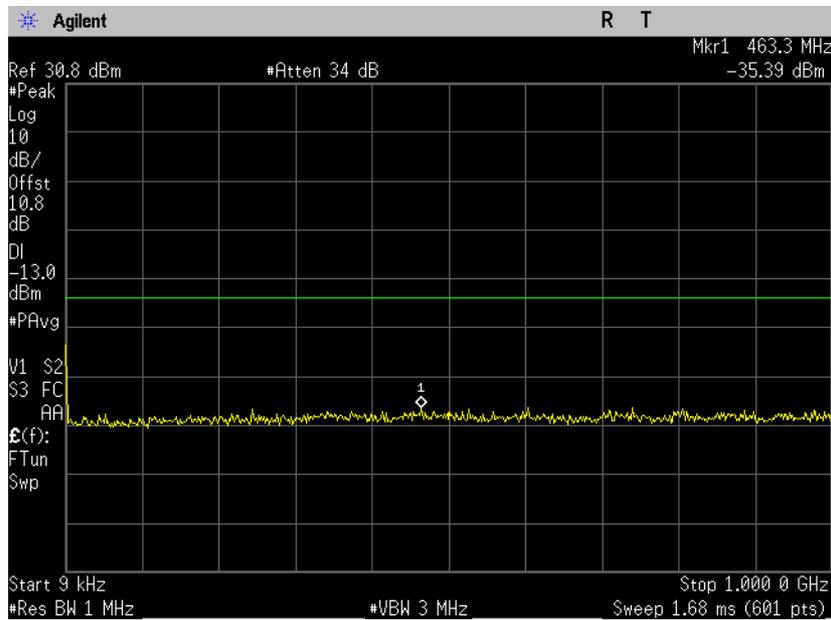
**Plot 4.4.2**



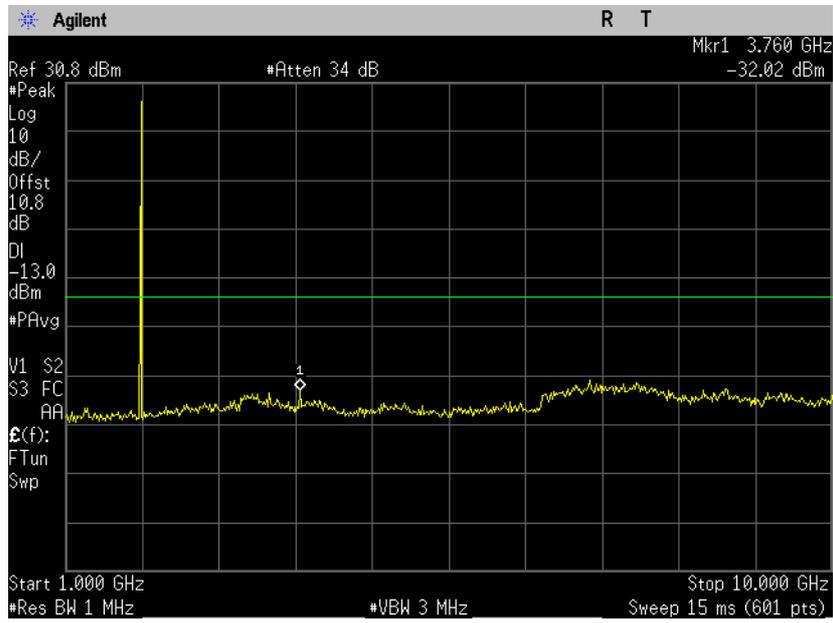
**Plot 4.4.3**



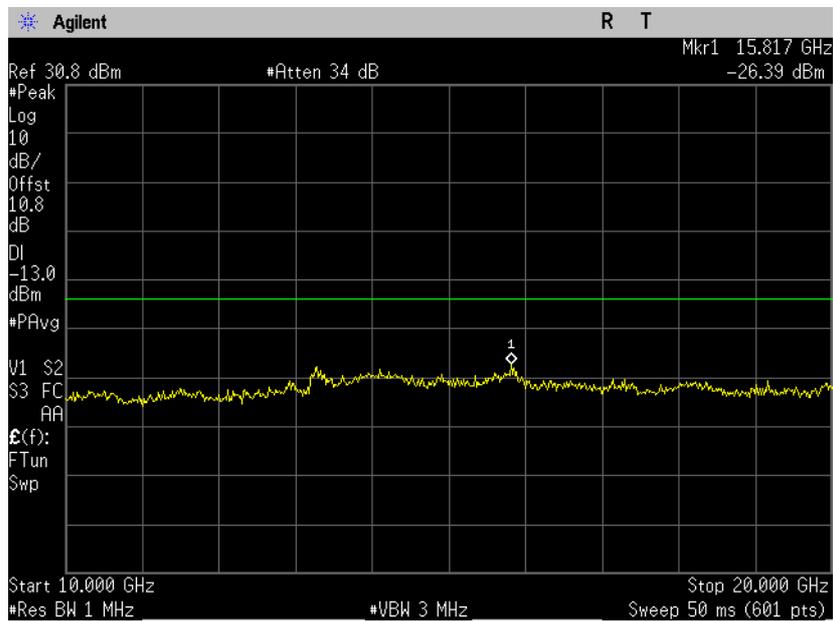
**Middle Frequency 1880 MHz**  
**Plot 4.4.4**



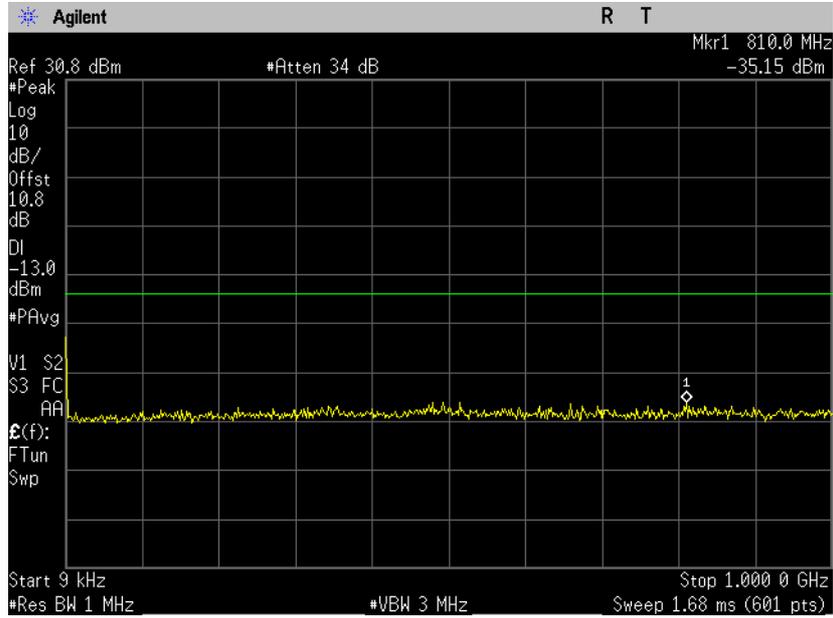
**Plot 4.4.5**



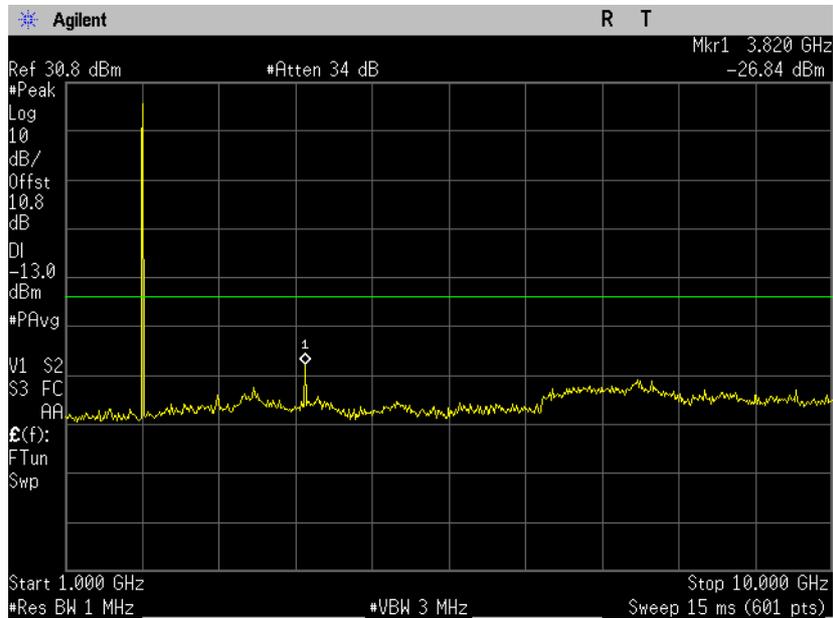
**Plot 4.4.6**



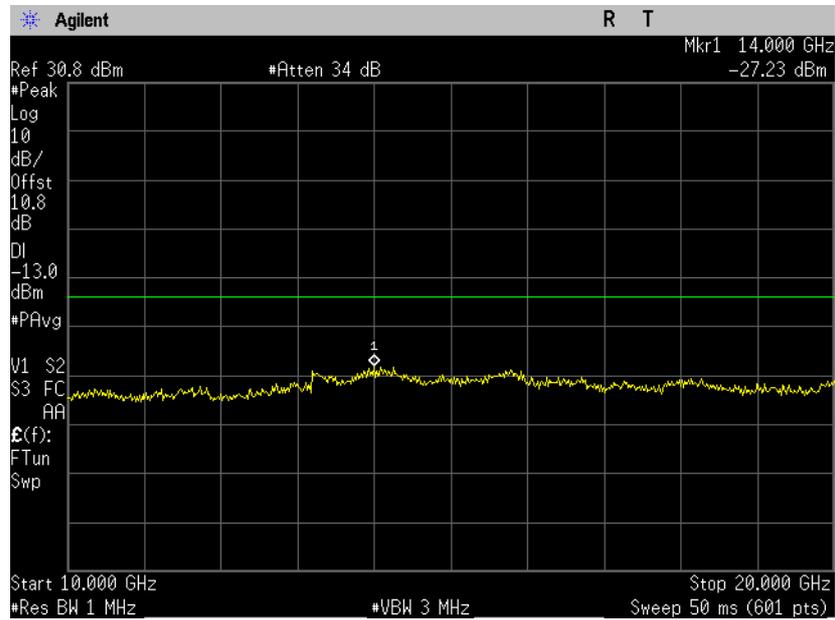
**Highest Frequency 1908.75 MHz**  
**Plot 4.4.7**



**Plot 4.4.8**



**Plot 4.4.9**



#### 4.5. Radiated Peak Power Output

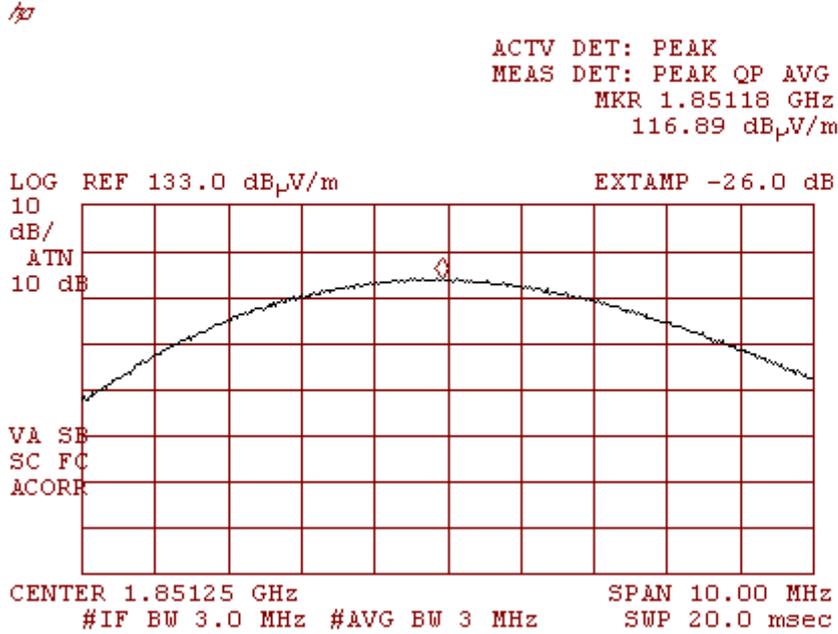
Reference document:	47 CFR §24.232 (c)		
Test Requirements:	Mobile/portable stations are limited to 2 watts EIRP peak power.		
Test setup:	See Sec. 2.2	<b>Pass</b>	
Method of testing:	Radiated		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 3 MHz, VBW: 3 MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	Plot 4.5.1 - Plot 4.5.6	

#### Test results:

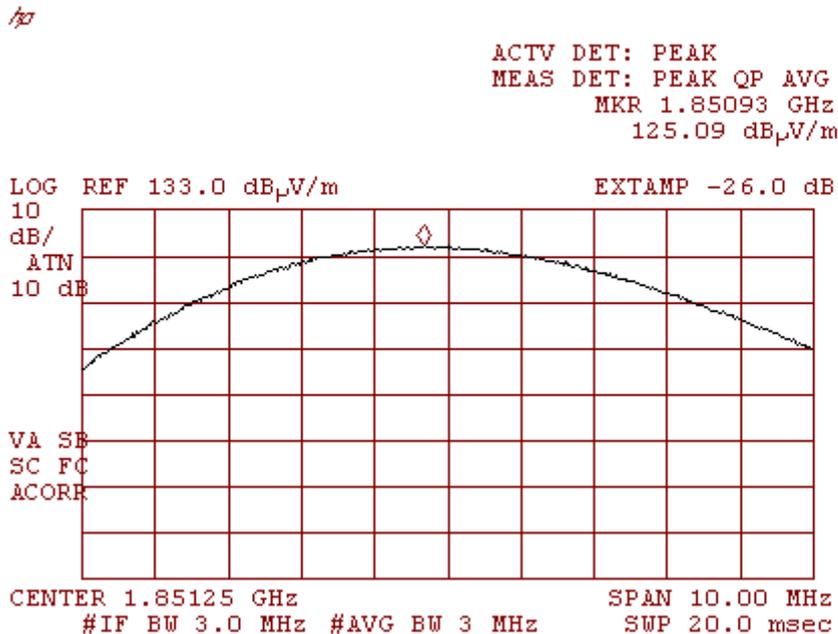
Channel / Frequency	Max Reading [dB $\mu$ V/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBi]	EIRP calculated [dBm]	Limit [dBm]	Margin [dB]	Reference Plots	Results
<b>CDMA 1xRTT, RC3 (SO55)</b>									
25 (low) 1851.25 MHz	125.09	V	17.24	7.26	24.50	33	-8.50	4.5.1 – 4.5.2	Pass
600 (mid) 1880 MHz	126.31	V	18.73	7.25	25.98	33	-7.02	4.5.3 – 4.5.4	Pass
1175 (high) 1908.75 MHz	124.07	V	17.14	7.24	24.38	33	-8.62	4.5.5 – 4.5.6	Pass

\*Corrected for cable loss

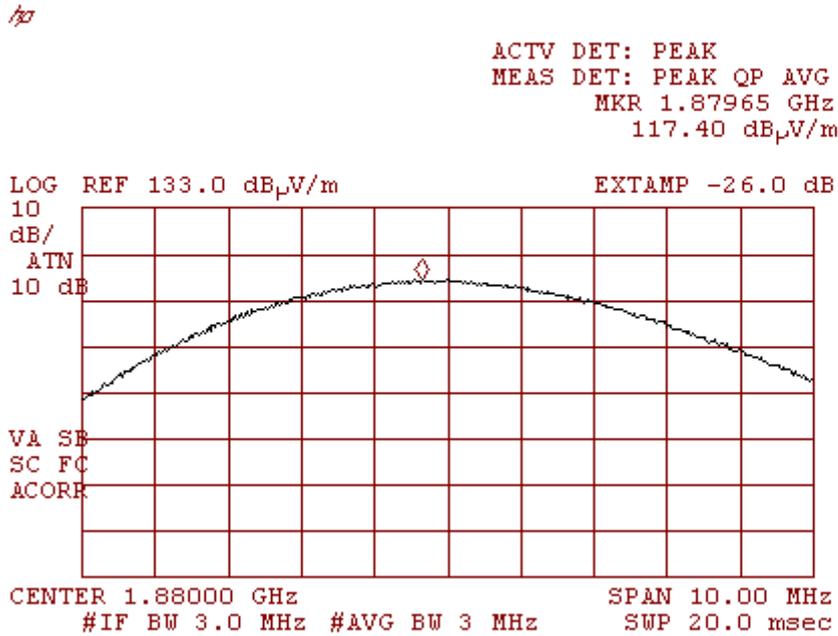
**CDMA 1xRTT, RC3 (SO55)**  
**Lowest Frequency 1851.25 MHz**  
**Horizontal Polarization**  
**Plot 4.5.1**



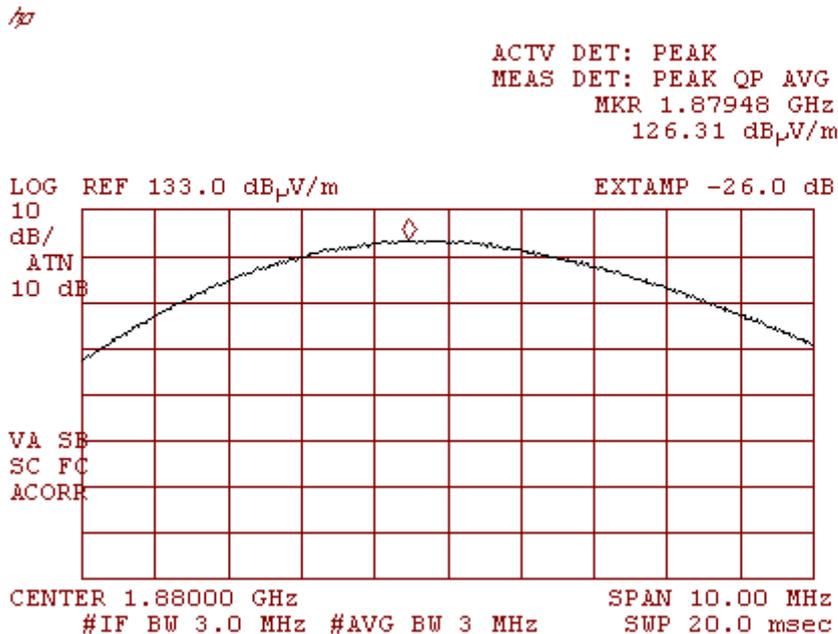
**Vertical Polarization**  
**Plot 4.5.2**



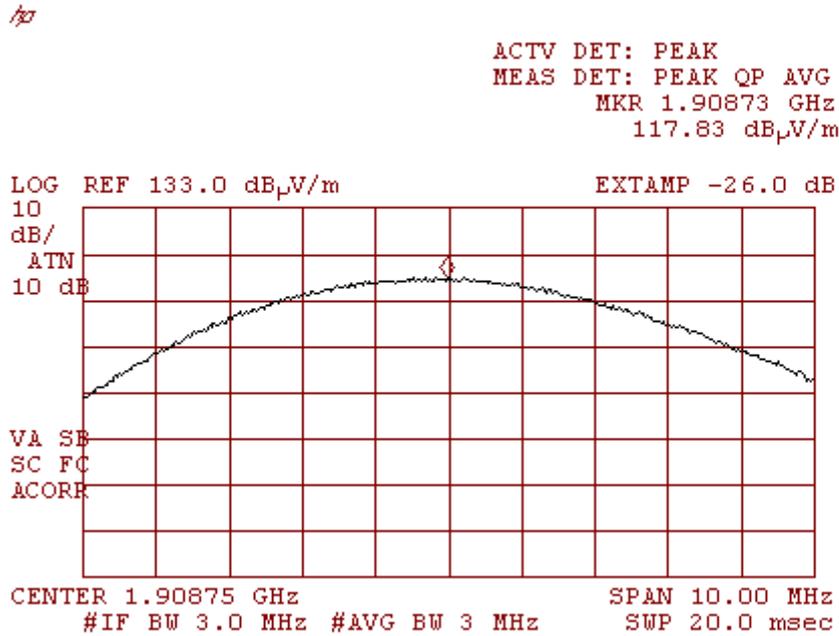
**Middle Frequency 1880 MHz  
Horizontal Polarization  
Plot 4.5.3**



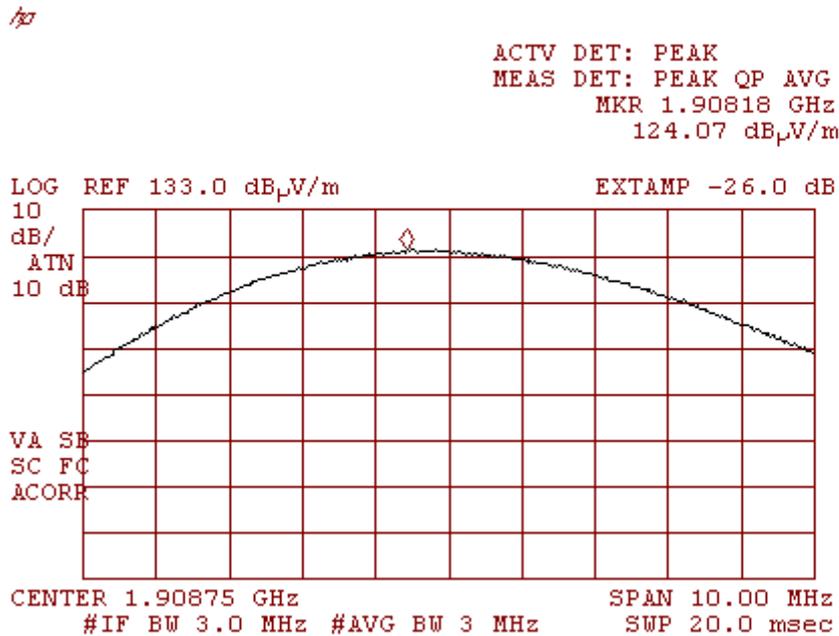
**Vertical Polarization  
Plot 4.5.4**



**Highest Frequency 1908.75 MHz  
Horizontal Polarization  
Plot 4.5.5**



**Vertical Polarization  
Plot 4.5.6**



#### 4.6. Field Strength of Spurious Radiation

Reference document:	47 CFR §24.238 (a)		
Test Requirements:	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10\log(P)$ dB *.		
Test setup:	See Sec. 2.2	<b>Pass</b>	
Method of testing:	Radiated		
Operating conditions:	Under normal test conditions		
S.A. Settings:	f < 1GHz: RBW: 120 kHz , VBW: 300 kHz f > 1GHz: RBW: 1 MHz , VBW: 3 MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	Plots 4.6.1 – 4.6.17	

\*It translates to a limit of -13 dBm

#### Test results:

Channel / Frequency	Spurious Emission Frequency [MHz]	Max Reading [dBμV/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBd]	Emission power calculated [dBm]	Limit [dBm]	Margin [dB]	Results
<b>CDMA 1xRTT, RC3 (SO55)</b>									
25 (low) 1851.25 MHz	3703	59.43	V	-47.40	6.61	-40.79	-13	-27.79	Pass
	9258	57.54	V	-60.79	8.20	-52.59	-13	-39.59	Pass
600 (mid) 1880 MHz	3760	58.39	V	-48.18	6.60	-41.58	-13	-28.58	Pass
1175 (high) 1908.75 MHz	3817	67.57	V	-38.70	6.59	-32.11	-13	-19.11	Pass

\*Corrected for cable loss

**Note:** Measurements were taken using a band reject & high pass filters (where appropriate) at the spectrum analyzer input.

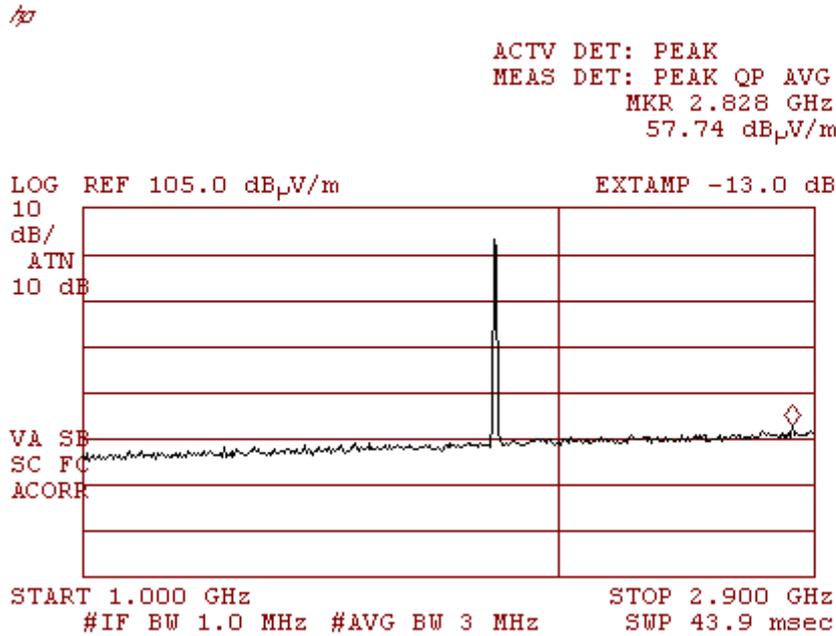
#### Test results below 1GHz:

All measurements were done in horizontal and vertical polarizations; the results show the worst case for all frequencies.

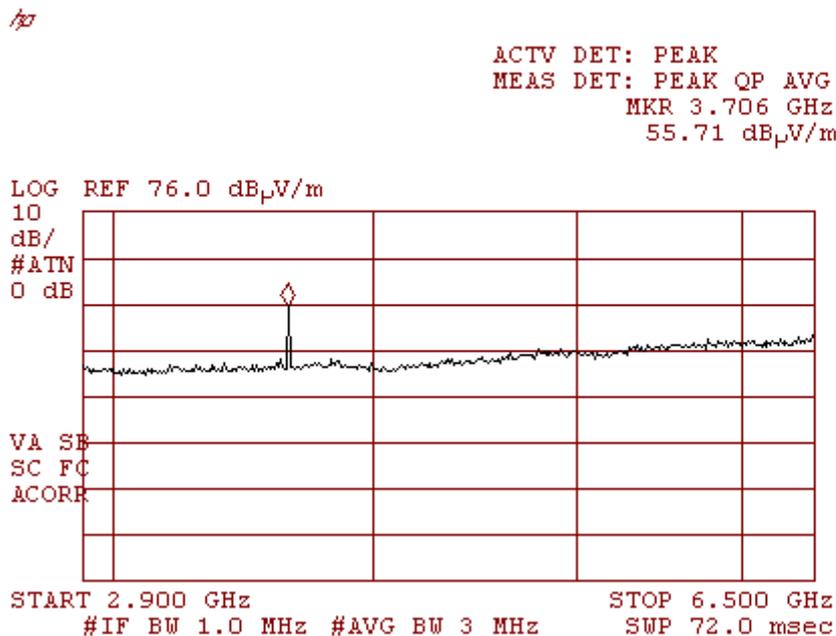
Spurious Emission Frequency [MHz]	Max Reading [dBμV/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBd]	Emission power calculated [dBm]	Limit [dBm]	Margin [dB]	Result
528	38.93	V	-68.94	5.05	-63.89	-13	-50.89	Pass

\* Corrected for cable loss

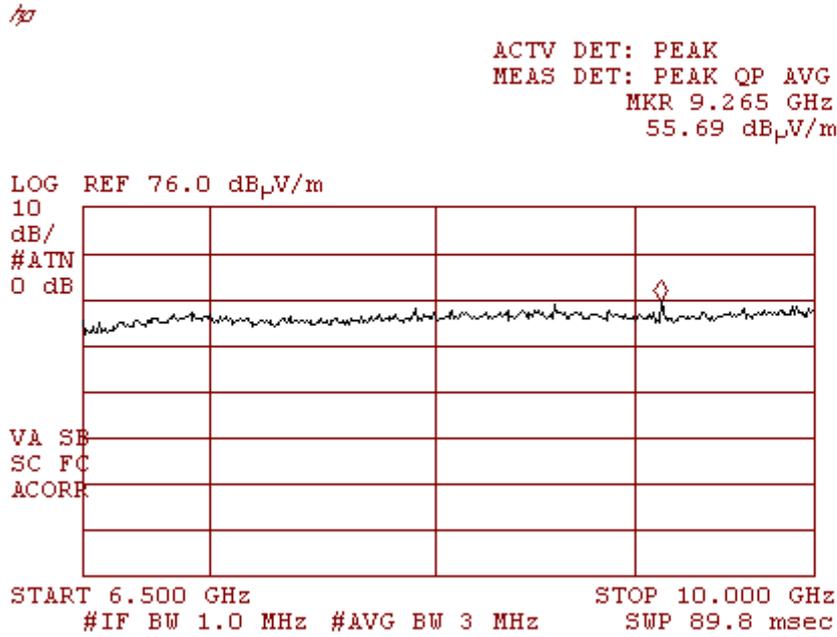
**CDMA 1xRTT, RC3 (SO55)**  
**Lowest Frequency 1851.25 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.6.1**



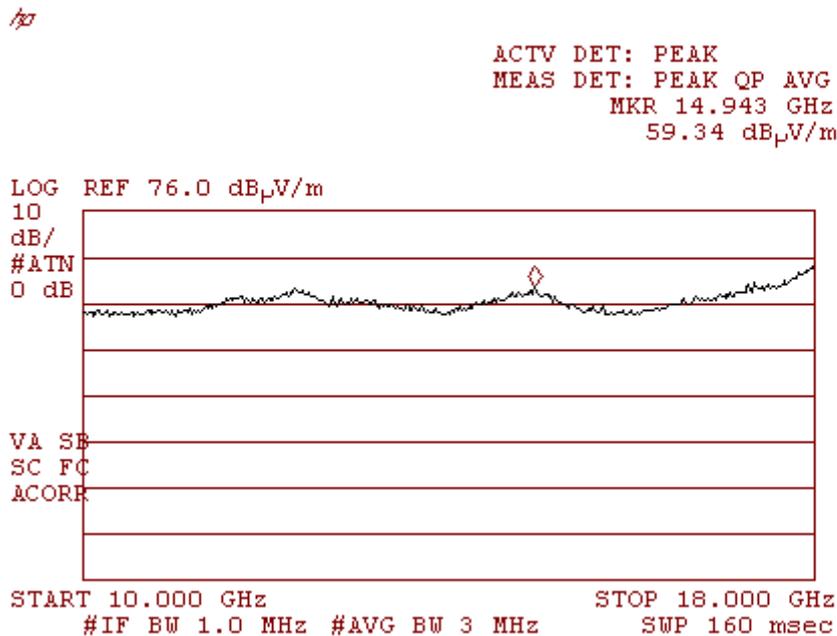
**Horizontal & Vertical Polarization**  
**Plot 4.6.2**



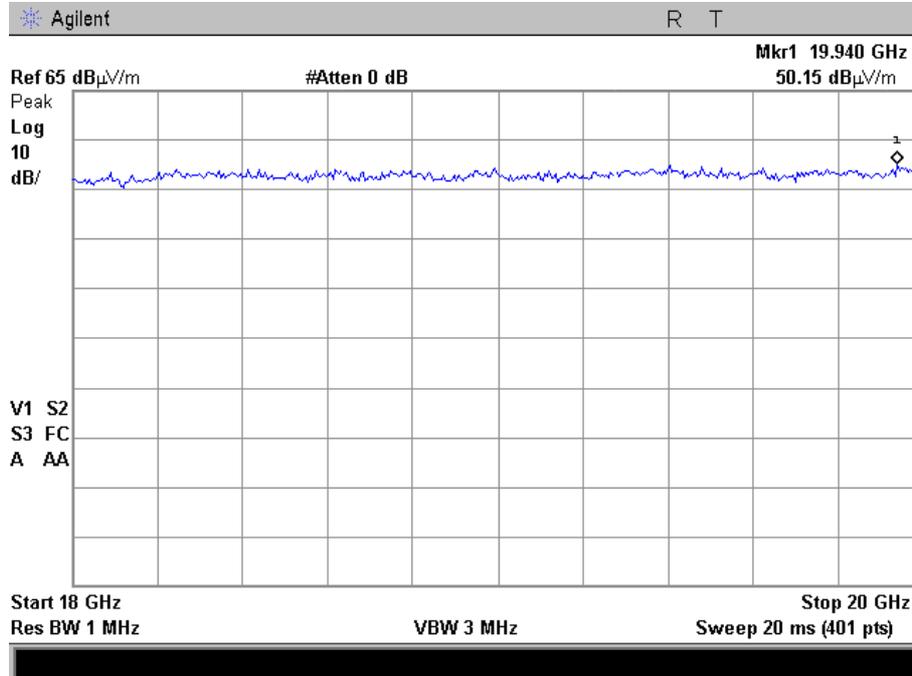
**Horizontal & Vertical Polarization**  
**Plot 4.6.3**



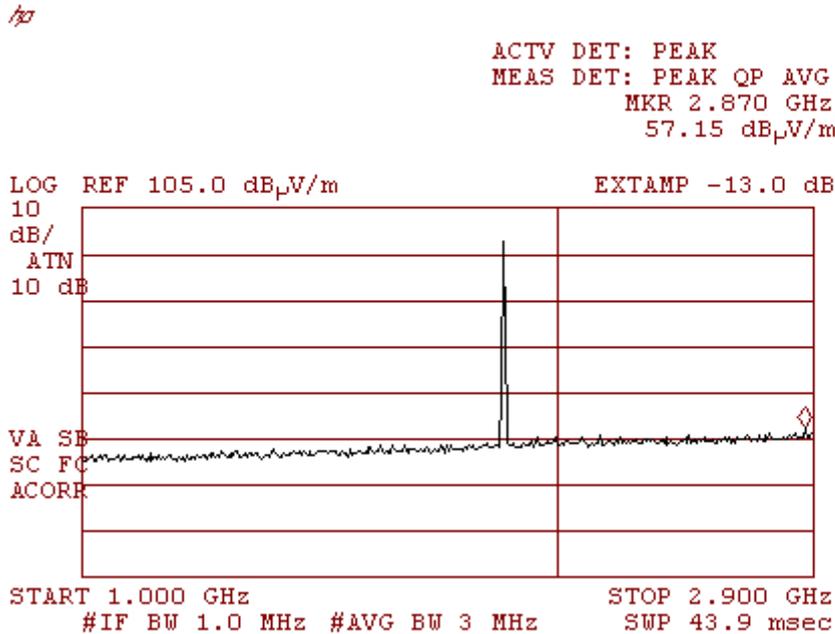
**Horizontal & Vertical Polarization**  
**Plot 4.6.4**



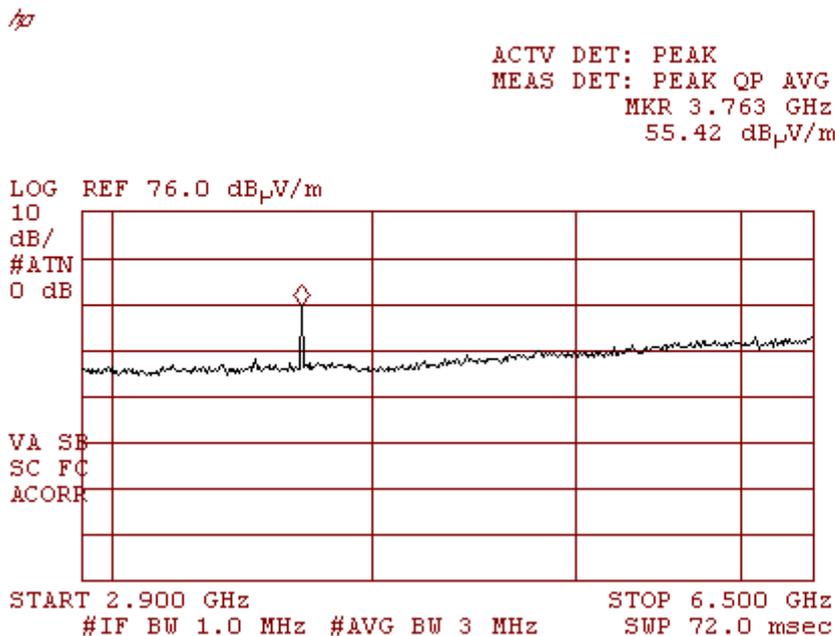
**Horizontal & Vertical Polarization**  
**Plot 4.6.5**



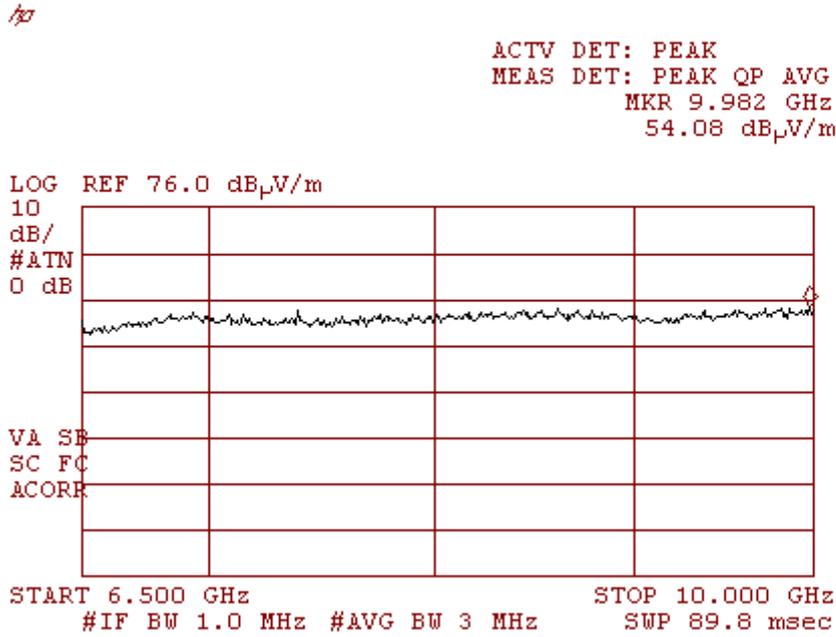
**Middle Frequency 1880 MHz  
Horizontal & Vertical Polarization  
Plot 4.6.6**



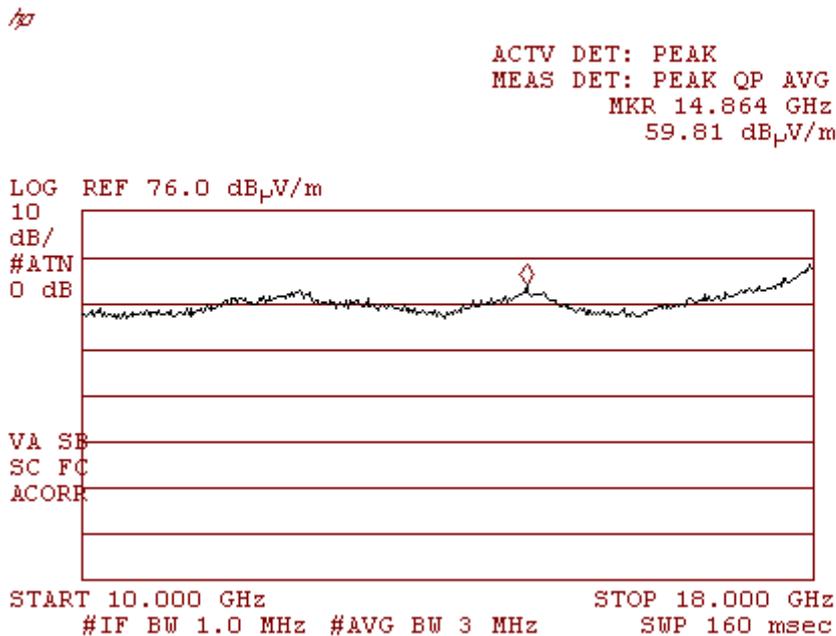
**Horizontal & Vertical Polarization  
Plot 4.6.7**



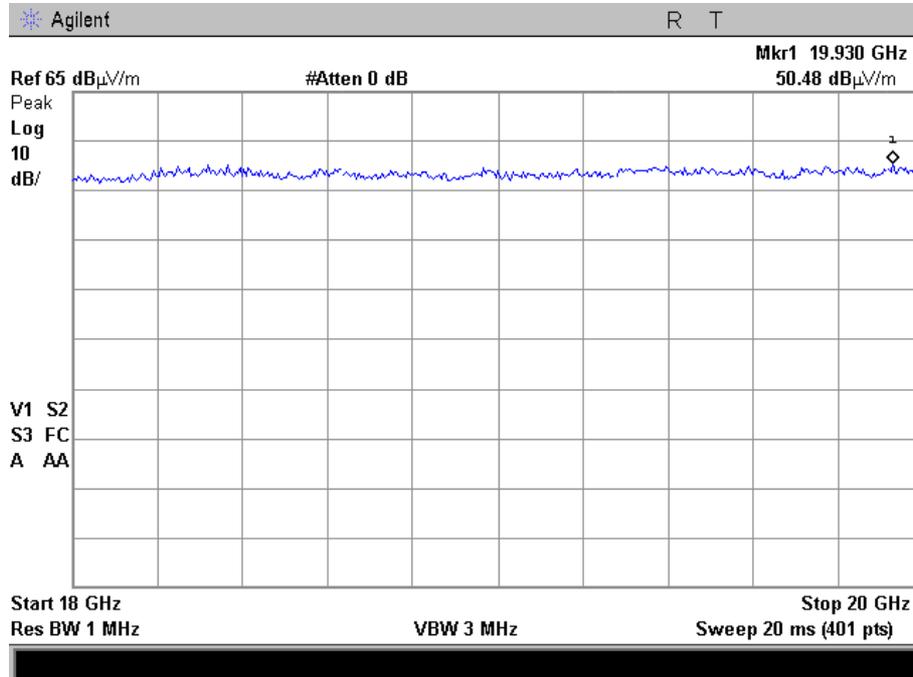
**Horizontal & Vertical Polarization**  
**Plot 4.6.8**



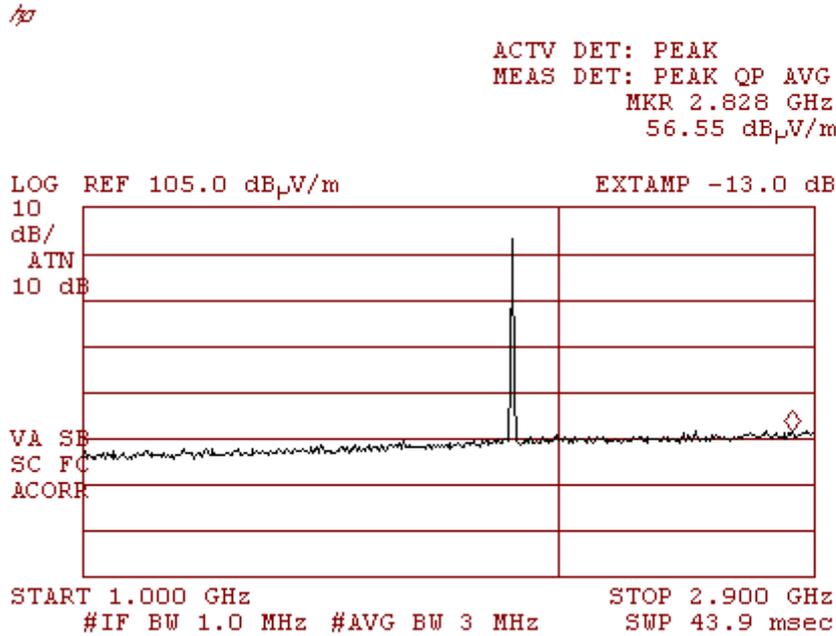
**Horizontal & Vertical Polarization**  
**Plot 4.6.9**



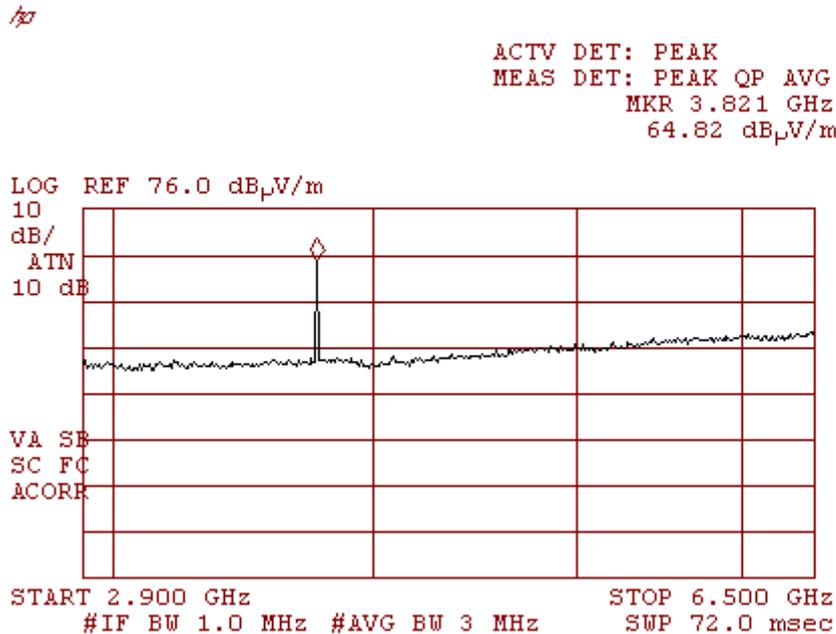
**Horizontal & Vertical Polarization**  
**Plot 4.6.10**



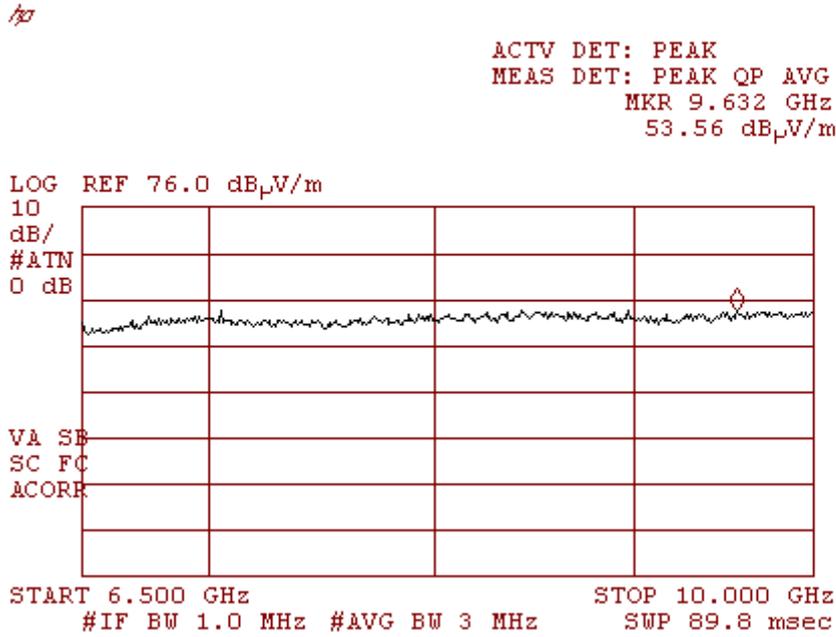
**Highest Frequency 1908.75 MHz  
Horizontal & Vertical Polarization  
Plot 4.6.11**



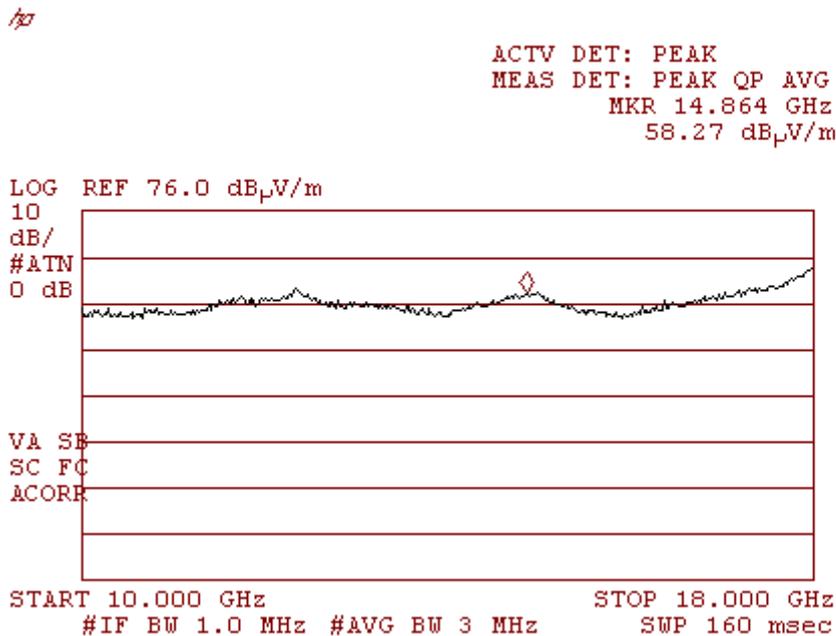
**Horizontal & Vertical Polarization  
Plot 4.6.12**



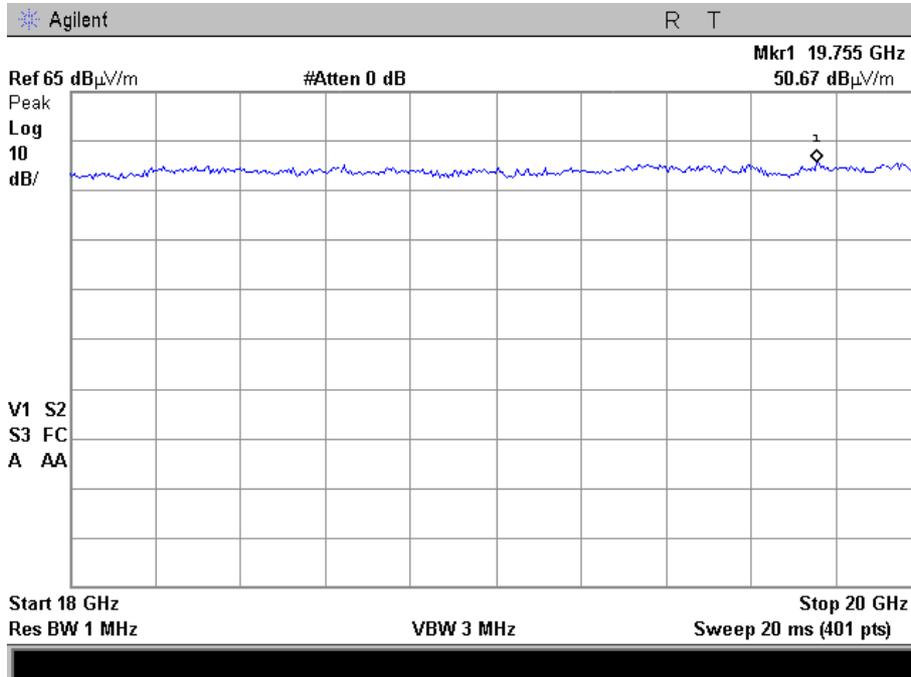
**Horizontal & Vertical Polarization**  
**Plot 4.6.13**



**Horizontal & Vertical Polarization**  
**Plot 4.6.14**



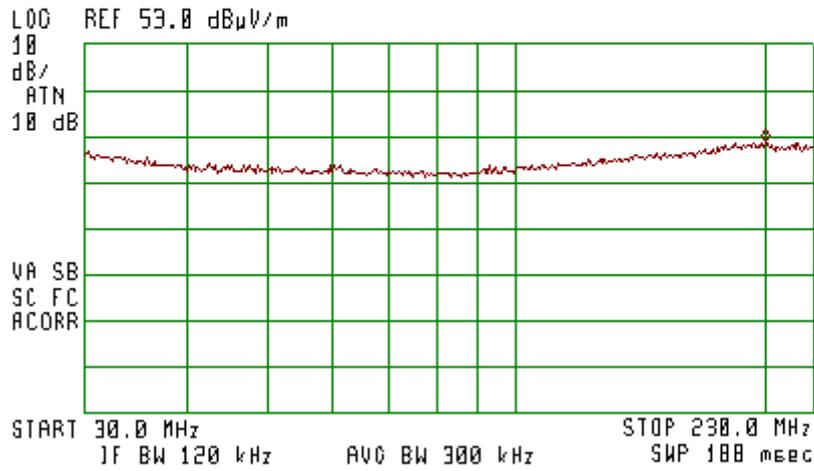
**Horizontal & Vertical Polarization**  
**Plot 4.6.15**



**Below 1 GHz**  
**Worst case for all frequencies**  
**Horizontal & Vertical Polarization**  
**Plot 4.6.16**



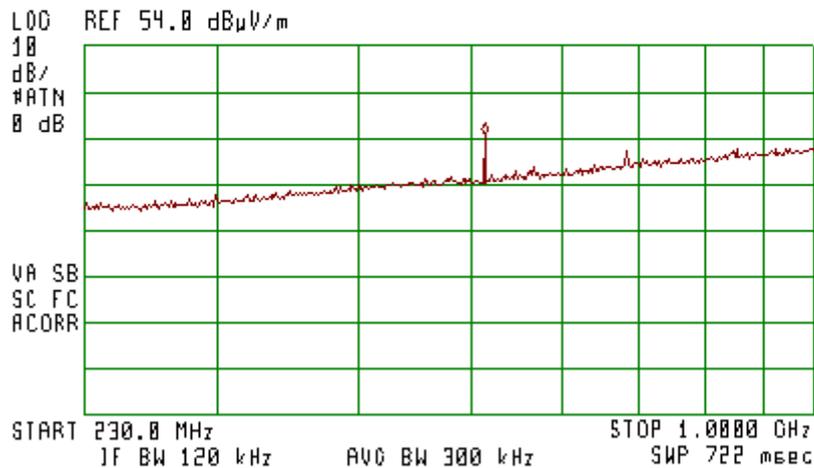
ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 207.0 MHz  
31.88 dB $\mu$ V/m



**Horizontal & Vertical Polarization**  
**Plot 4.6.17**



ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 528.2 MHz  
34.65 dB $\mu$ V/m



#### 4.7. Frequency Stability

Reference document:	47 CFR §24.235 & §2.1055		
Test Requirements:	The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.		
Test setup:	See Sec. 2.3	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	Maximum frequency deviation ~ 16 Hz, while the distance from the -26 dB point of the lowest/highest channel to the band edge was about 530 kHz.		

#### Test results:

##### Frequency error vs. Voltage

Voltage [Vdc]	Frequency Error* [Hz]	Frequency Error [%]	Frequency Error [ppm]
<b>CDMA 1xRTT, RC3 (SO55): 1851.25 MHz</b>			
11.7	14,8	0,00000179	0,017945920
13.8	13,7	0,00000166	0,016612101
15.9	15,2	0,00000184	0,018430945

##### Frequency error vs. Temperature

Temperature [°C]	Frequency Error* [Hz]	Frequency Error [%]	Frequency Error [ppm]
<b>CDMA 1xRTT, RC3 (SO55): 1851.25 MHz</b>			
-30	5,9	0,00000072	0,007154117
-20	4,7	0,00000057	0,005699042
-10	4,6	0,00000056	0,005577786
0	3,9	0,00000047	0,004728992
10	8,3	0,00000101	0,010064266
20	6,8	0,00000082	0,008245423
30	12,2	0,00000148	0,014793258
40	13,5	0,00000164	0,016369589
50	15,7	0,00000190	0,019037226
60	14,3	0,00000173	0,017339639

\***Note:** Frequency error measurements were made by using the build-in capability of the base station simulator.

## 5. Appendix

### Appendix A: List of Measuring Equipment used:

Equipment	Manufacturer/ Model	Serial Number	Due date
CISPR 16 EMI Receiver, 9 kHz - 6.5 GHz	HP 8546A	3710A00392	30-06-2012
Spectrum Analyzer, 9 kHz - 22 GHz	HP 8593EM	3536A00131	30-06-2012
Spectrum Analyzer, 100 Hz - 26.5 GHz	Agilent E7405A	US41160436	30-06-2012
Spectrum Analyzer, 3 Hz - 44 GHz	Agilent E4446A	MY46180602	30-06-2012
Power Meter	Agilent N1911A	MY45100784	30-06-2012
Wideband power sensor	Agilent N1921A	MY45241242	30-06-2012
Low-Noise Amplifier, 0.1 - 18 GHz	MITEQ, AMF-7D-00101800-30-10P	1544443	30-06-2012
Low-Noise Amplifier, 18 - 26.5 GHz	MITEQ, AMF-5F-18002650-30-10P	945372	16-05-2012
Biconical Antenna, 20 - 200 MHz	Schwarzbeck VHBB 9124	9124/0255	16-05-2012
Log-Periodic Antenna, 200 - 1000 MHz	Schwarzbeck VUSLP 9111	VUSLP 9111184	16-05-2012
Double Ridged Guide Antenna, 1 - 18 GHz	A.R.A., DRG-118/A	17188	30-06-2012
SHF-EHF Horn, 15 - 40 GHz	Schwarzbeck BBHA 9170	BBHA9170214	30-06-2012
Turn table	HD 100	100/693	-
Antenna Mast	HD 100	100/693	-
LISN	Fischer 50/250-25-2	9705	30-06-2012
Transient Limiter, 9 kHz ÷ 200 MHz	HP 11947A	3107A04119	30-06-2012
Notch Filter	Micro-Tronics, BRM50702-05	0001	16-05-2012
Tunable Bandreject Filter	K&L, 3TNF-800/1000-0.2-N/N	336	16-05-2012
Tunable Bandreject Filter	K&L, 5TNF-1700/2000-0.1-N/N	212	16-05-2012
Highpass Filter, 1.2 ÷ 15 GHz	WAINWRIGHT, WHK1.2/15G-10EF	SN 3	16-05-2012
Highpass Filter, 2.4 ÷ 18 GHz	WAINWRIGHT, WHK2.4/18G-10EF	SN 1	16-05-2012
Highpass Filter, 7 ÷ 18 GHz	WAINWRIGHT, WHKX7.0/18G-8SS	SN 12	16-05-2012

**Appendix B: Accreditation Certificate**



The American Association for Laboratory Accreditation  
World Class Accreditation

**Accredited Laboratory**  
A2LA has accredited  
**QUALITECH (ECI TELECOM)**  
*Petach-Tikva, ISRAEL*  
for technical competence in the field of  
**Electrical Testing**

This laboratory is accredited in accordance with the recognized international Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Presented this 22<sup>nd</sup> day of March 2011.



*Peter Almy*  
President & CEO  
For the Accreditation Council  
Certificate Number 1633.01  
Valid to September 30, 2012

*For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

*End of the Test Report*