



**MOTOROLA**

**PERSONAL COMMUNICATIONS SECTOR  
PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY  
EMC TEST REPORT - Addendum**

Test Report Number –14836 -1BT  
Report Date: September 21, 2004

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

A handwritten signature in purple ink that reads "Michael E. Hill".

Signature:

Name: Michael E. Hill

Title: Senior Electrical Engineer

Date: September 21, 2004

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THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY A2LA OR  
ANY AGENCY OF THE U.S. GOVERNMENT.  
A2LA Certificate Number: 1846-01



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**Test Report Details**

Tests Performed By: Motorola Personal Communications Sector  
Product Safety and Compliance Group  
600 North US Hwy 45  
Libertyville, IL 60048  
PH (847) 523-6167 Fax (847) 523-4538  
Motorola PCS FRN: 0004321311  
FCC Registration Number: 316588  
Industry Canada Number: IC3908

Radiated Emissions Performed By: Underwriters Laboratories  
International EMC Services  
333 Pfingsten RD  
Northbrook, IL 60062  
Contact: Lubomir Madjarov  
(Tel) 847/664-3957  
(Fax) 847/313-3957

Tests Requested By: Motorola Inc.  
Personal Communications Sector  
600 North US Hwy 45  
Libertyville, IL 60048

Product Type: Cellular Phone

Signaling Capability: GSM 850, 1900, Bluetooth

Model Number: V551

Serial Numbers: 004400007590431, 004400007590282,  
004400005533896, 004400005533847,  
0044000005533813

Testing Complete Date: September 17, 2004

## **Applicable Standards**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

- Part 15 Subpart C – Intentional Radiators
- Part 22 Subpart H - Public Mobile Services
- Part 24 - Personal Communications Services
- Part 90 - Private Land Mobile Radio Service

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4 2001, RSS-118 (AMPS), RSS-128 (TDMA), RSS-129 (CDMA), RSS-133 (PCS)  
DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" published by the Federal Communications Commission was also used in the testing of this product.

**Summary of Testing**

Test	Test Name	Pass/Fail
1	Carrier Frequency Separation	Pass
2	Number of Hopping Frequencies	Pass
3	Time of Occupancy (Dwell Time)	Pass
4	20 dB Bandwidth	Pass
5	Spurious RF Conducted Emissions	Pass
6	Field Strength of Spurious Emissions	Pass
7	Max Power	N/A
8	Band Edges	See plots
9	Conducted Spurious Emissions	Pass

Test	Test Name	Results
1	Carrier Frequency Separation	1.000MHz
2	Number of Hopping	79
3	Time of Occupancy (Dwell Time)	2.92ms
4	20 dB Bandwidth	953 kHz
5	Spurious RF Conducted Emissions	See plots
6	Field Strength of Spurious Emissions	See plots
7	Max Power	-1.09 dB
8	Band Edges	See plots
9	Conducted Spurious Emissions	See plots

The margin with respect to the limit is the minimum margin for all modes and bands. ( ) indicates the margin at which the product exceeds the limit.

**General and Special Conditions**

The EUT was tested using a fully charged battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized. All testing was done in an indoor controlled environment with an average temperature of 22° C and relative humidity of 50%.

**Equipment and Cable Configurations**

The EUT was tested in a stand-alone configuration that is representative of typical use.

**Measuring Equipment and Calibration Information**

<b>Manufacturer</b>	<b>Equipment Type</b>	<b>Model No.</b>	<b>Serial Number</b>	<b>Cal. Due Date</b>
Rohde & Schwarz	Receiver	ESI26	838786/010	5/17/2005
Hewlett-Packard	EMC Analyzer	8593EM	3536A00118	10/2/2004
Hewlett-Packard	EMC Analyzer	7405	US39440191	11/13/2004
Miteq	Preamplifier 0.1-26.5GHz	NSP2650-NF-S	966350	1/8/2005
ETS	DRG Horn Antenna	3115	6222	<b>9/29/2004</b>
A.H. Systems Inc.	DRG Horn Antenna	SAS-2--/571	365	12/17/2004
ETS	Log-Periodic Antenna	3148	1188	3/5/2005
ETS	Biconical Antenna	3110B	3370	11/14/2004
Attenuator	Weinschel	AS-6	6675	10/14/2004
Attenuator	Weinschel	AS-6	6677	11/4/2004
Rohde & Schwarz	Mobile Test Set	CMD 80	DE29008	N/A
Hewlett-Packard	Signal Generator	83623B	3844A01195	6/20/2005
Thermotron	Environmental Chamber	S-4	31580	1/5/2005
Hewlett-Packard	Pre-Amplifier	8347A	3307A02001	11/4/2004
Agilent	Power Meter	EE4418B	GB40206388	12/5/2004
Agilent	Power Sensor	E4412B	US38486321	11/23/2004
Hewlett-Packard	Pre-Amplifier	8447F	2805A03419	5/19/2005

**U.L. Equipment**

Hewlett Packard	QP Adapter	85650A	2811A01069	1/8/2005
Hewlett Packard	S/A Display	8566B	2542A12974	1/8/2005
Hewlett Packard	S/A	8566B	2637A03376	1/8/2005
Hewlett Packard	RF Preselector	85685A	2810A00692	1/8/2005
Rohde & Schwarz	S/A	FSEK20	DE2525315	1/9/2005
EMCO	Horn Antenna 1-18GHz	3115	2638	7/10/2005
EMCO	Horn Antenna 18-26.5GHz	3160-09	9904-1165	N/A*
Chase	Bi-Con Antenna 30-300MHz	VBA6106A	1246	6/23/2005
Chase	Log-Periodic Antenna	UPA6108	1120	6/23/2005

**All equipment is on a one-year calibration cycle.**

## **Description of Bluetooth Transmitter**

The Bluetooth spread-spectrum, frequency hopping transceiver is designed to operate between 2400 and 2483 MHz. The Bluetooth antenna is mounted on the PCB inside of the EUT. The antenna installation is permanent. For a more thorough description of the functionality please refer to Exhibit 12 of this package.

As a Bluetooth transmitter, it is designed operate with other Bluetooth devices as defined by industrial standard. In this application, the device is battery-operated. Therefore conducted AC line emissions testing as described in CFR47, Part 15.207 was not necessary.

## **Measurement Procedures and Data**

### **CARRIER FREQUENCY SEPARATION**

CFR 47 Part 15.247

#### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

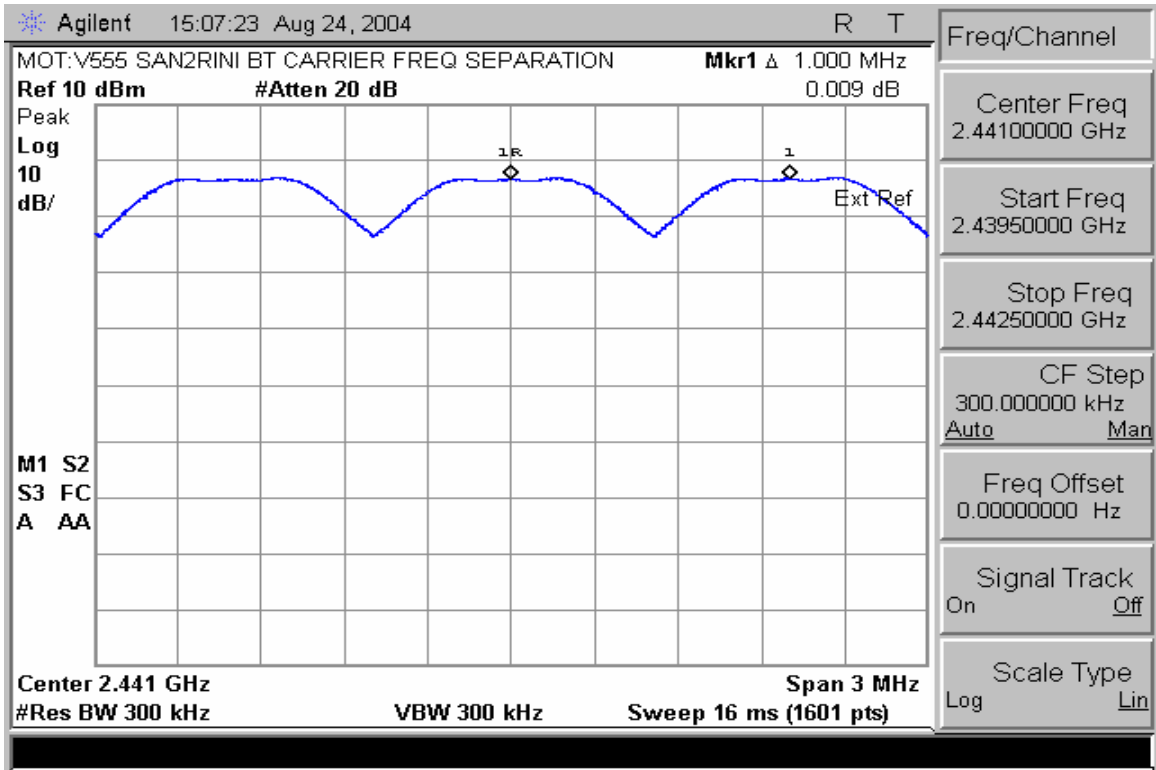
The Bluetooth transmitter had its hopping function enabled. The following spectrum analyzer settings were used:

1. Span = wide enough to capture the peaks of two adjacent channels
2. Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span
3. Video (or Average) Bandwidth (VBW)  $\geq$  RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

#### **Measurement Results**

See attached.



Carrier Frequency Separation

## NUMBER OF HOPPING FREQUENCIES

CFR 47 Part 15.247

### Measurement Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

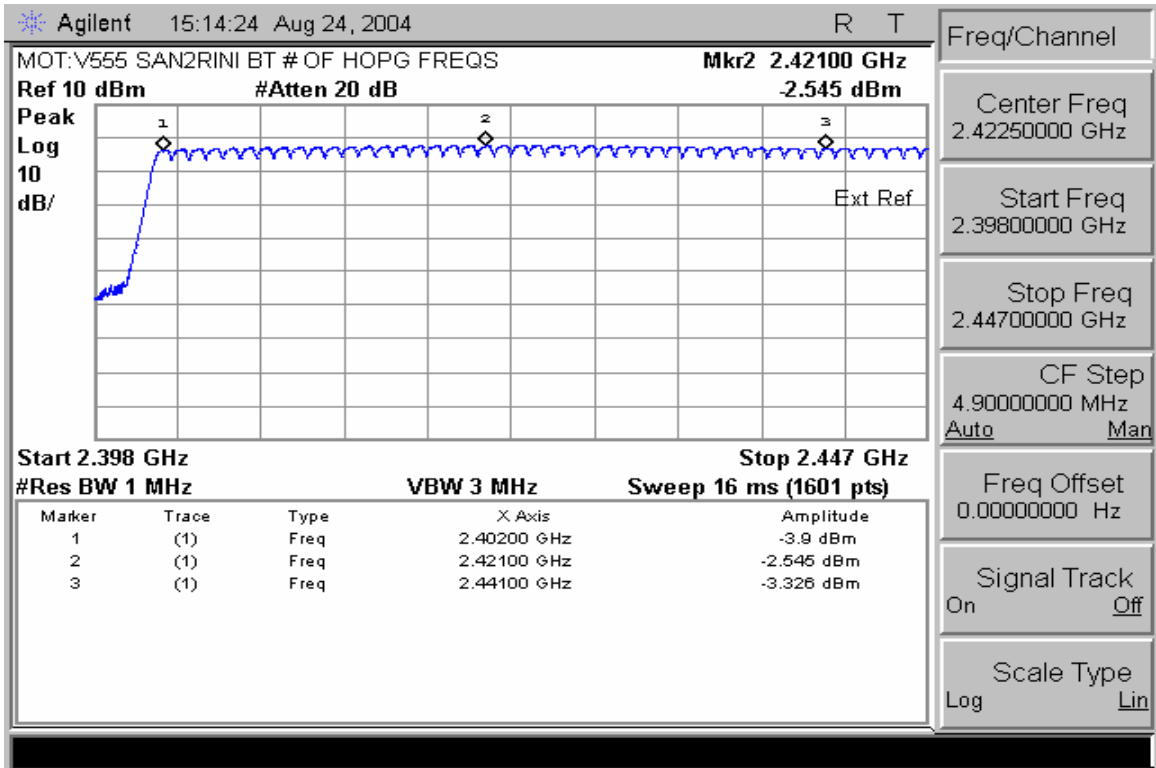
The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer used the following settings:

1. Span = the frequency band of operation
2. RBW  $\geq$  1% of the span
3. VBW  $\geq$  RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

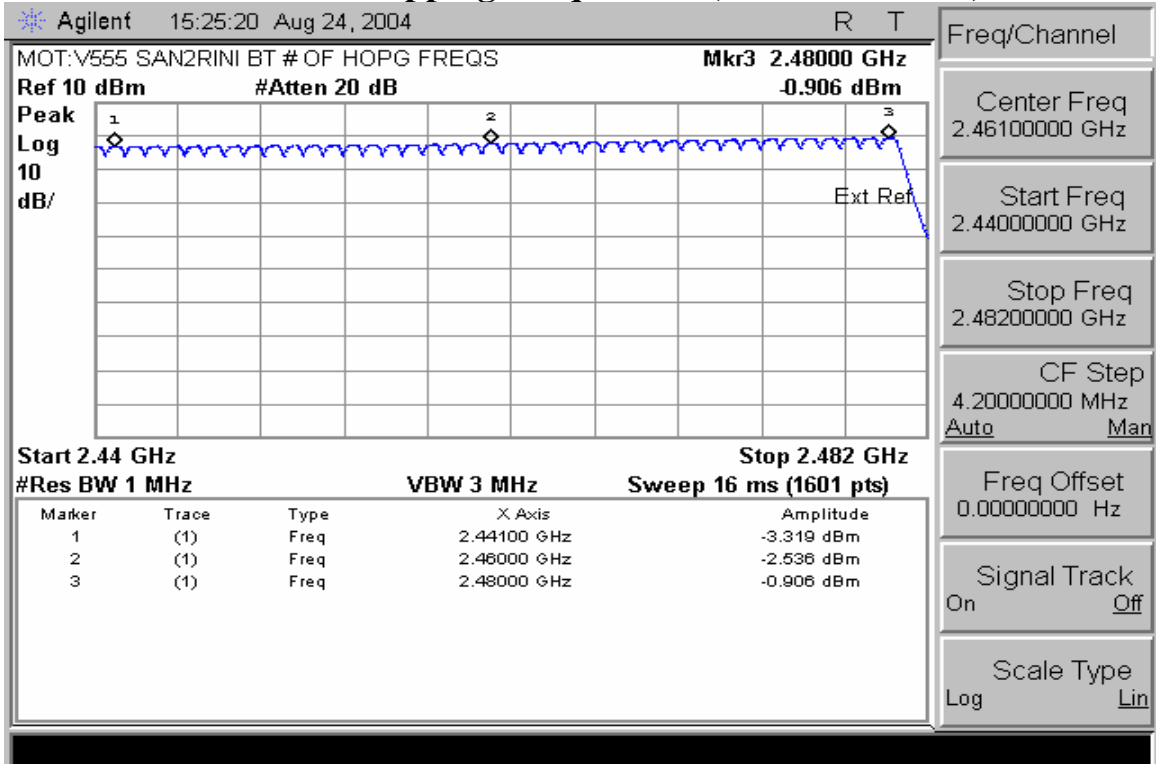
The trace was allowed to stabilize.

### Measurement Results

See attached.



**Number of Hopping Frequencies (Channels 2 – 42)**



**Number of Hopping Frequencies (Channels 42 – 80)**

**TIME OF OCCUPANCY (DWELL TIME)**

CFR47 Part 15.247

**Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

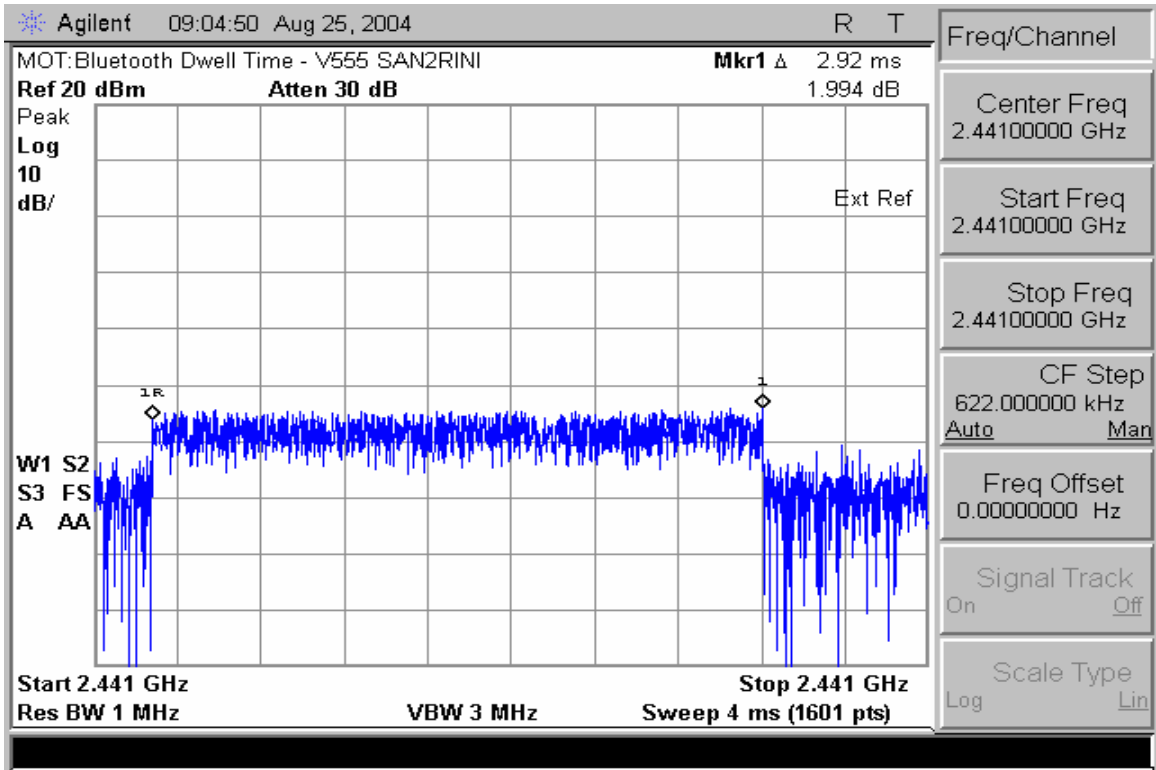
The Bluetooth hopping function of the EUT was enabled. The following spectrum analyzer settings were used:

1. Span = zero span, centered on a hopping channel
2. RBW = 1 MHz
3. VBW  $\geq$  RBW
4. Sweep = as necessary to capture the entire dwell time per hopping channel
5. Detector function = peak
6. Trace = max hold

The marker-delta function was used to determine the dwell time.

**Measurement Results**

(Attached)



Dwell Time

## **20dB Bandwidth**

CFR 47 Part 15.247

### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

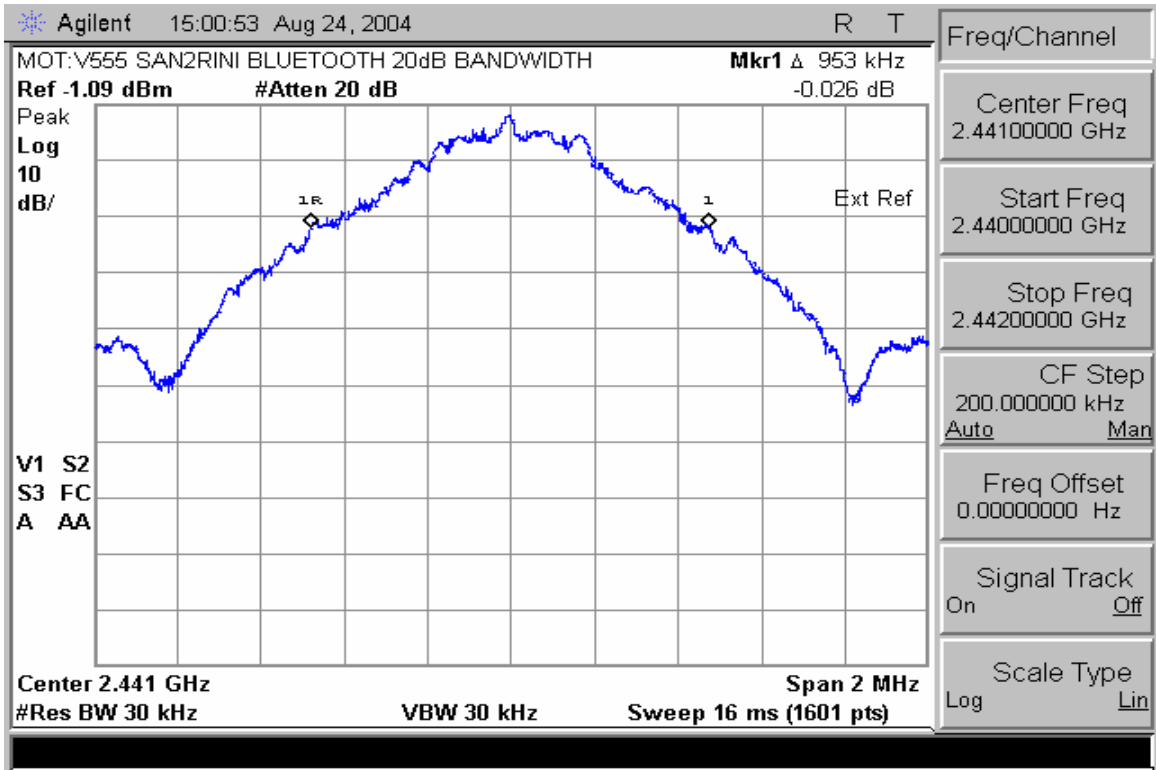
The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer used the following settings:

1. Span = approx. 2 to 3 times the 20dB bandwidth, centered on a hopping frequency
2. RBW  $\geq$  1% of the 20dB span
3. VBW  $\geq$  RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate. The marker-to-peak function was used to set the marker to the peak of the emission. The marker-delta function was used to measure 20dB down one side of the emission. The marker-delta function and marker was moved to the other side of the emission until it was even with the reference marker. The marker-delta reading at this point was the 20dB bandwidth of the emission.

### **Measurement Results**

Attached



## **FIELD STRENGTH OF SPURIOUS EMISSIONS**

CFR47 Part 2.1053, 15.249

### **Measurement Procedure**

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

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

The power in dBm of each spurious emission is calculated by correcting the signal generator level for cable loss and gain of the substitution antenna referenced to a dipole.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

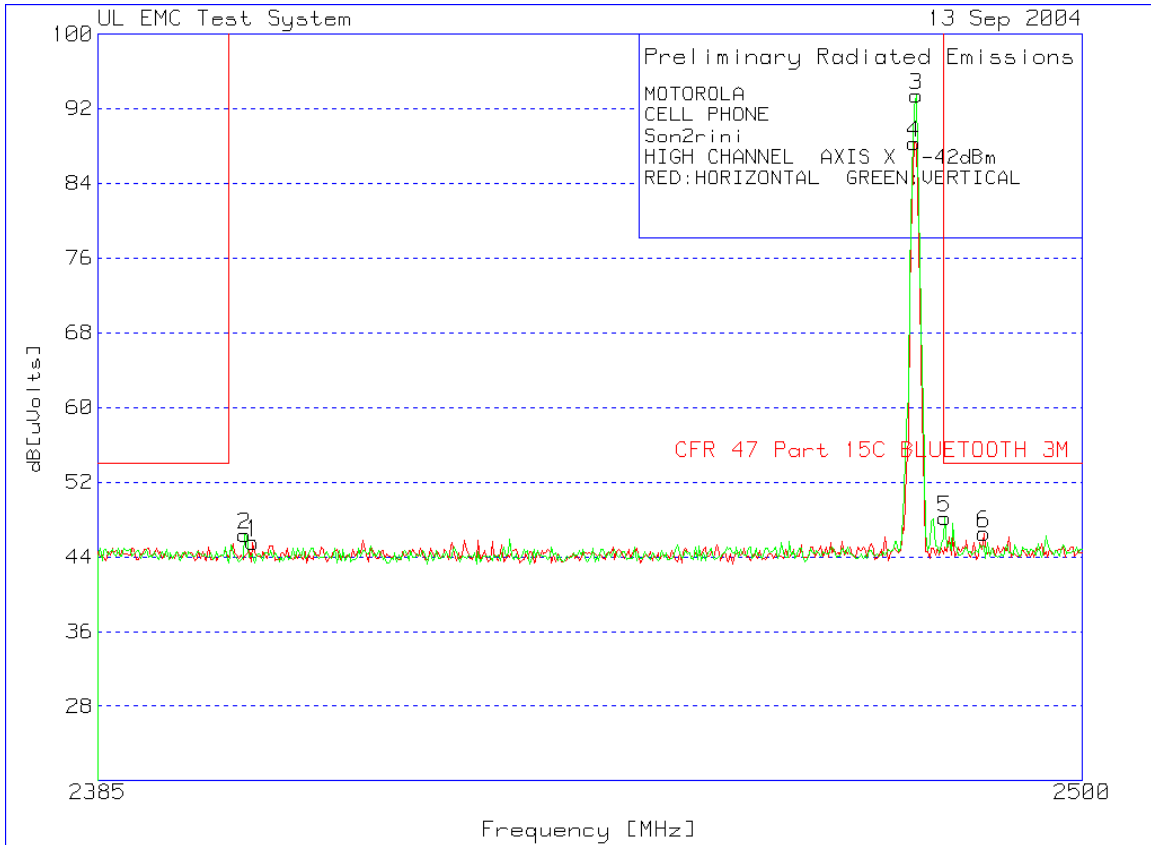
Field Strength (dBuV/m) = EMI Receiver Level (dBuV) + Cable Loss (dB) -  
Amplifier Gain (dB) + Antenna Correction Factor (1/m)

A fully charged battery was used for the supply voltage.

This data was taken at Underwriter's Laboratories.

### **Measurement Results**

Attached

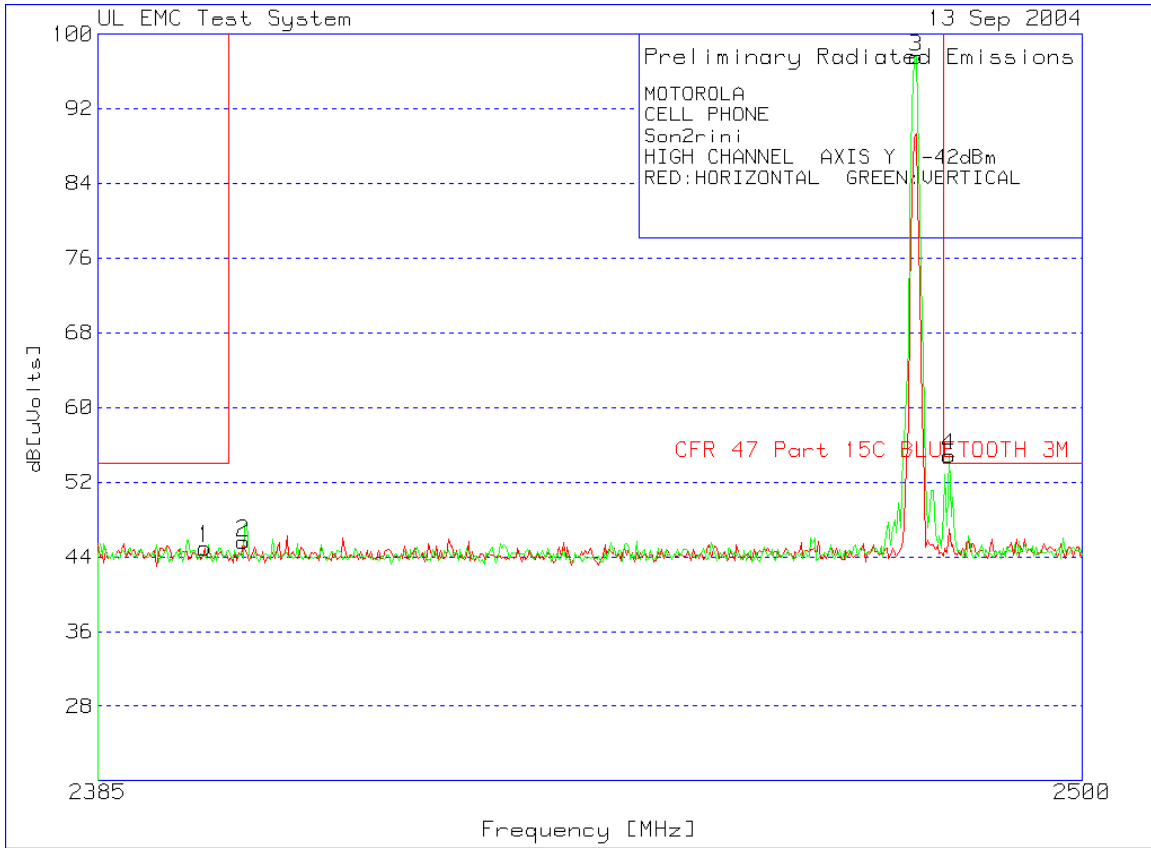


**Inband High Channel X**

MOTOROLA  
 CELL PHONE  
 San2rini  
 HIGH CHANNEL AXIS X -42dBm  
 RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2402.745	20.46 pk		3.3	21.8	45.56	999	-953.44	100	Horz
4	2479.95	63.03 pk		3.3	22	88.33	999	-910.67	100	Horz
6	2488.247	21.13 pk		3.3	22.1	46.53	54	-7.47	100	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
2	2401.824	21.27 pk		3.3	21.8	46.37	999	-952.63	100	Vert
3	2480.18	68.12 pk		3.3	22	93.42	999	-905.58	100	Vert
5	2483.637	22.76 pk		3.3	22.1	48.16	54	-5.84	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE



### Inband High Channel Y

MOTOROLA  
CELL PHONE  
San2rini  
HIGH CHANNEL AXIS Y -42dBm  
RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2397.214	19.86 pk		3.3	21.8	44.96	54	-9.04	150	Horz
2	2401.593	20.49 pk		3.3	21.8	45.59	999	-953.41	150	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
3	2480.18	72.23 pk		3.3	22	97.53	999	-901.47	100	Vert
4	2484.098	29.45 pk		3.3	22.1	54.85	54	0.85	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
LIMIT 2: NONE

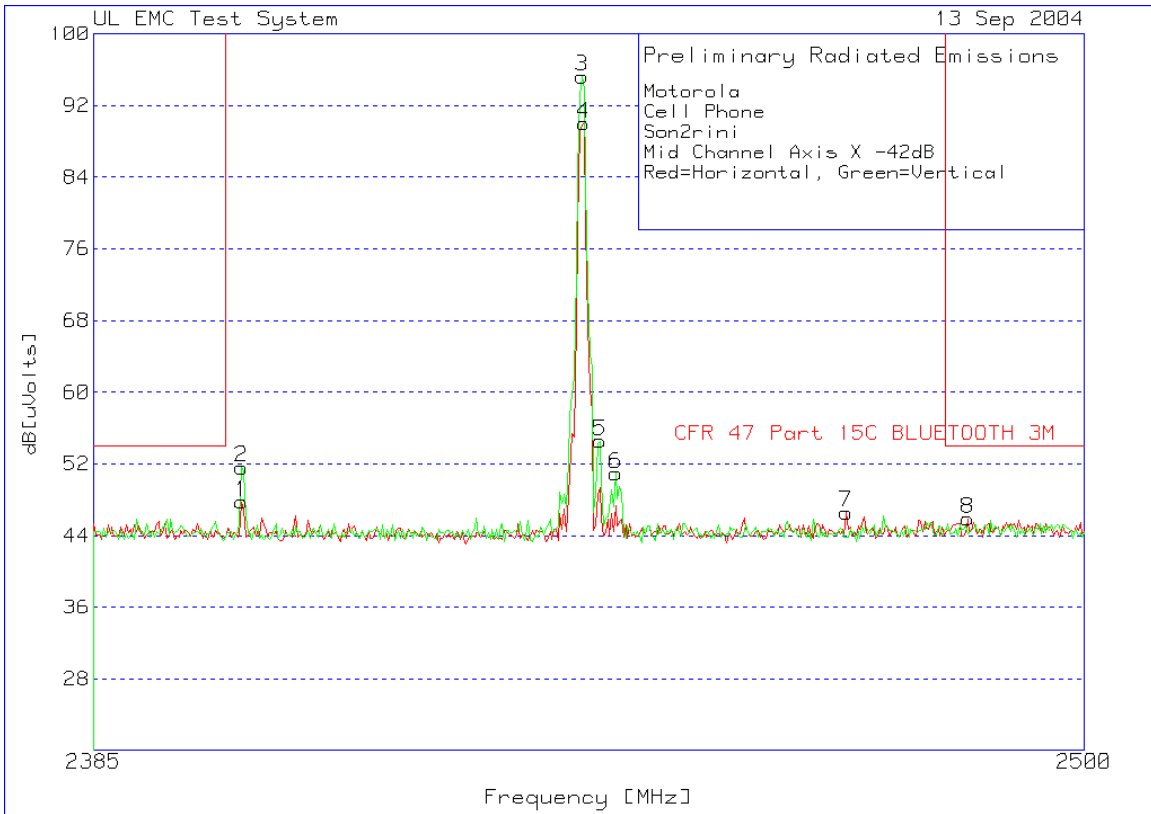


**Inband High Channel Z**

MOTOROLA  
 CELL PHONE  
 Son2rini  
 HIGH CHANNEL AXIS Z -42dBm  
 RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2387.074	21.89 pk		3.3	21.8	46.99	54	-7.01	100	Horz
4	2480.18	64.51 pk		3.3	22	89.81	999	-909.19	100	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
2	2401.824	22.58 pk		3.3	21.8	47.68	999	-951.32	100	Vert
3	2480.18	65.44 pk		3.3	22	90.74	999	-908.26	150	Vert
5	2482.024	23.28 pk		3.3	22	48.58	999	-950.42	150	Vert
6	2483.637	24.39 pk		3.3	22.1	49.79	54	-4.21	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE

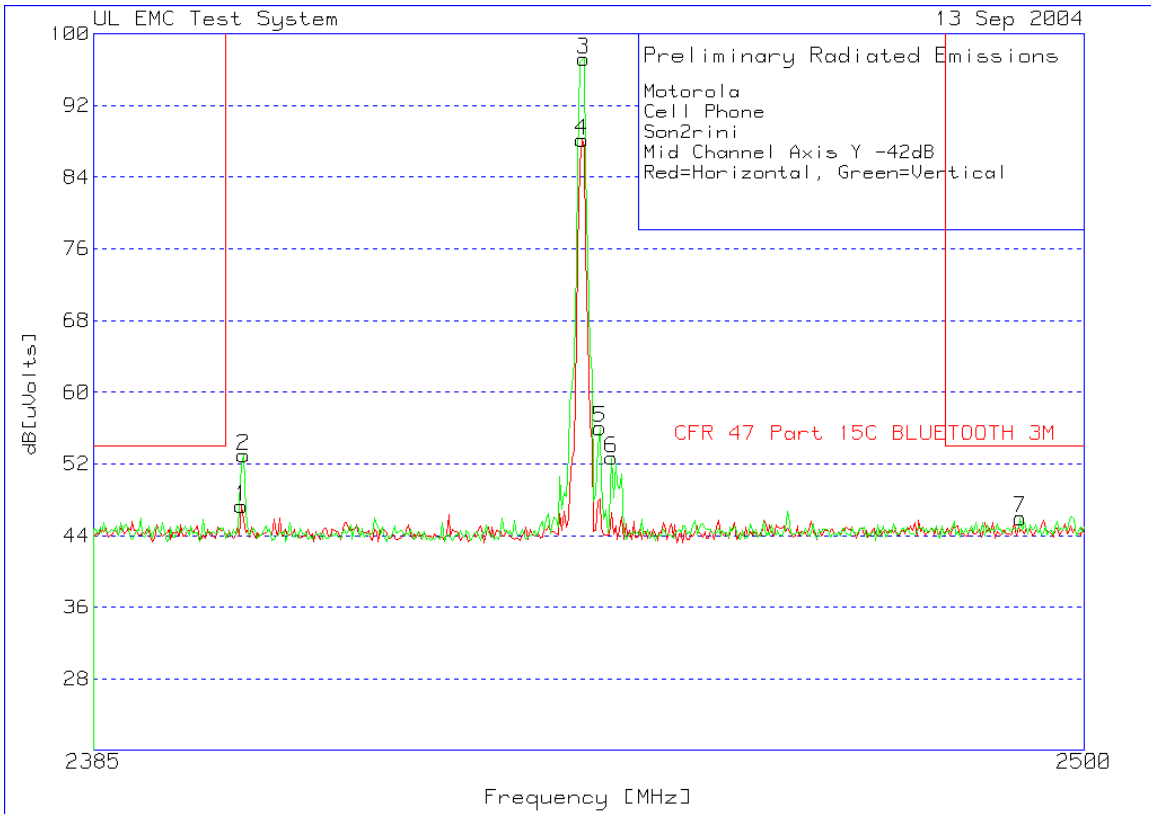


**Inband Mid Channel X**

Motorola  
 Cell Phone  
 San2rini  
 Mid Channel Axis X -42dB  
 Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2401.824	22.66 pk		3.3	21.8	47.76	999	-951.24	150	Horz
4	2441.232	64.8 pk		3.3	21.9	90	999	-909	100	Horz
7	2471.884	21.29 pk		3.3	22	46.59	999	-952.41	150	Horz
8	2486.172	20.48 pk		3.3	22.1	45.88	54	-8.12	150	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
2	2401.824	26.52 pk		3.3	21.8	51.62	999	-947.38	100	Vert
3	2441.002	70.04 pk		3.3	21.9	95.24	999	-903.76	100	Vert
5	2443.076	29.37 pk		3.3	21.9	54.57	999	-944.43	100	Vert
6	2444.92	25.74 pk		3.3	21.9	50.94	999	-948.06	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE

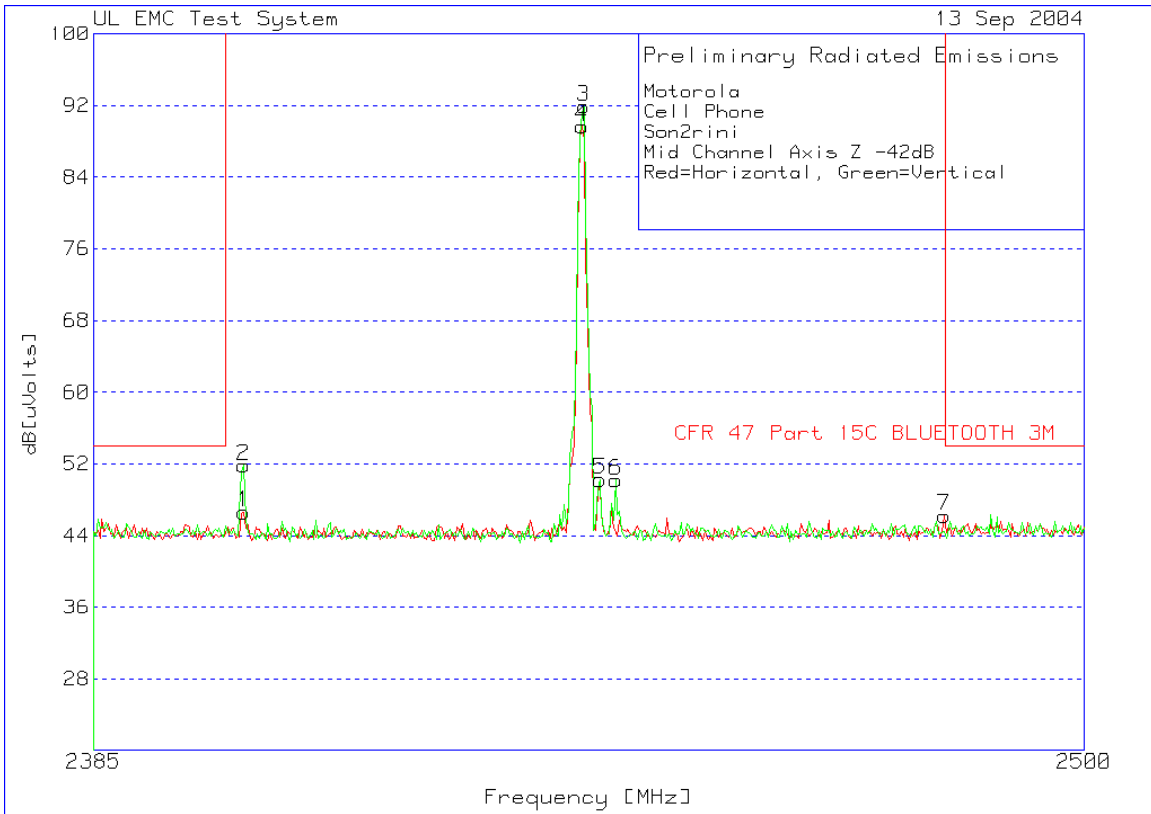


**Inband Mid Channel Y**

Motorola  
 Cell Phone  
 San2rini  
 Mid Channel Axis Y -42dB  
 Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2401.824	22.18 pk		3.3	21.8	47.28	999	-951.72	149	Horz
4	2441.002	62.96 pk		3.3	21.9	88.16	999	-910.84	100	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
2	2402.054	27.85 pk		3.3	21.8	52.95	999	-946.05	100	Vert
3	2441.232	72.01 pk		3.3	21.9	97.21	999	-901.79	100	Vert
5	2443.076	30.83 pk		3.3	21.9	56.03	999	-942.97	100	Vert
6	2444.459	27.47 pk		3.3	21.9	52.67	999	-946.33	100	Vert
7	2492.395	20.57 pk		3.3	22.1	45.97	54	-8.03	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M

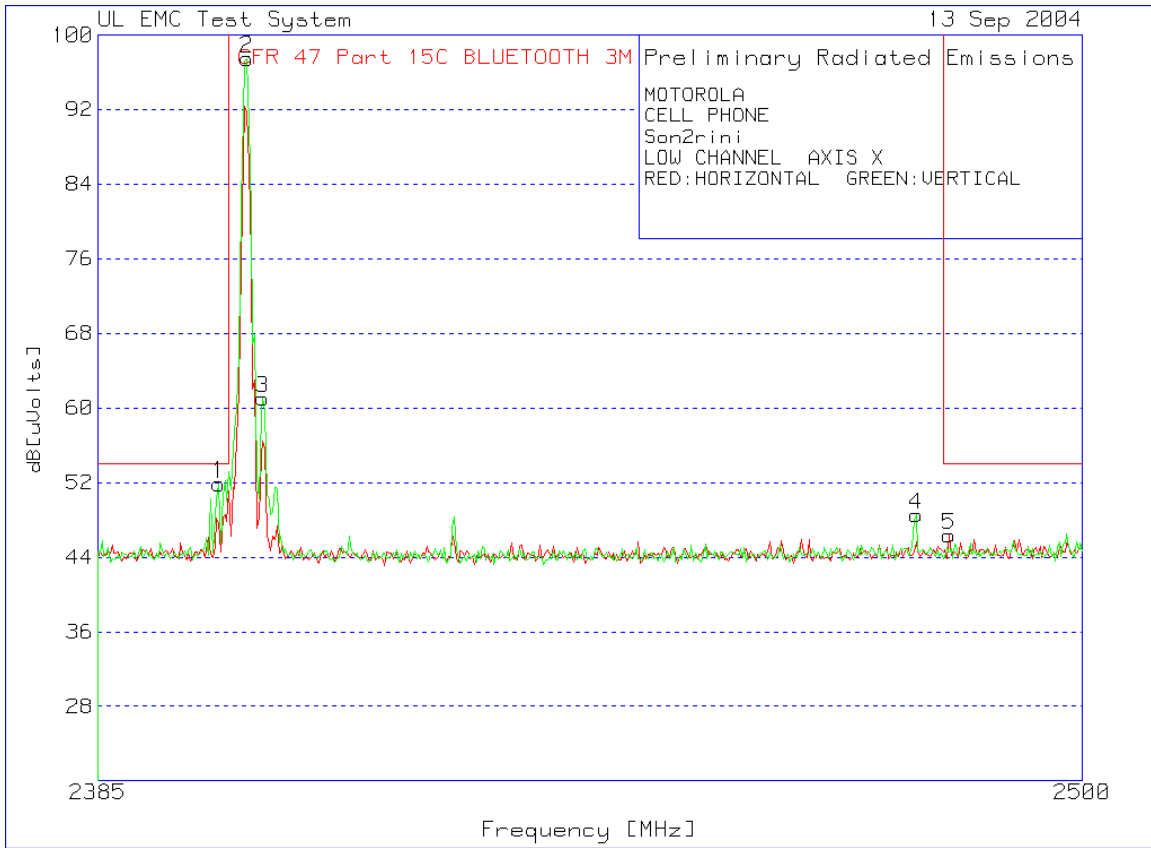


**Inband Mid Channel Z**

Motorola  
 Cell Phone  
 San2rini  
 Mid Channel Axis Z -42dB  
 Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2402.054	21.51 pk		3.3	21.8	46.61	999	-952.39	150	Horz
4	2441.002	64.46 pk		3.3	21.9	89.66	999	-909.34	100	Horz
7	2483.407	20.79 pk		3.3	22.1	46.19	999	-952.81	100	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
2	2402.054	26.73 pk		3.3	21.8	51.83	999	-947.17	100	Vert
3	2441.232	66.71 pk		3.3	21.9	91.91	999	-907.09	150	Vert
5	2443.076	25.06 pk		3.3	21.9	50.26	999	-948.74	150	Vert
6	2444.92	24.98 pk		3.3	21.9	50.18	999	-948.82	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE

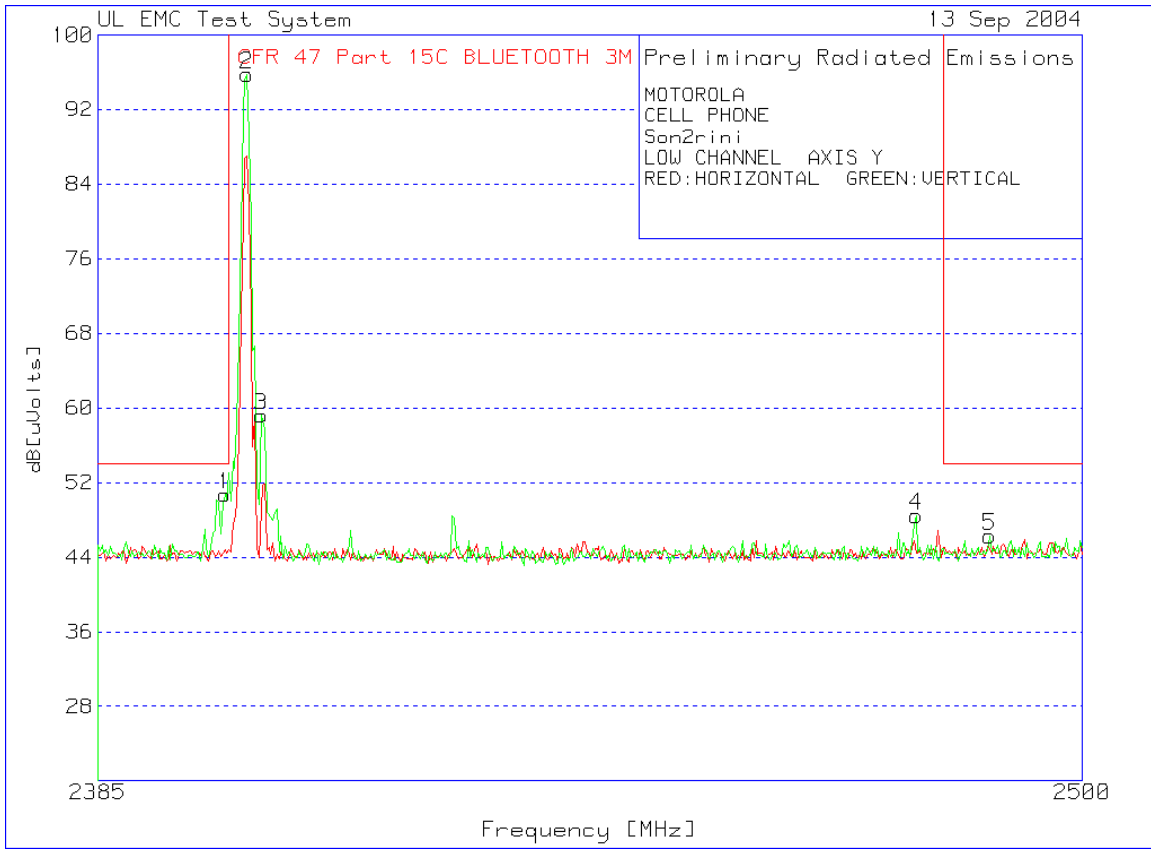


**Inband Low Channel X**

MOTOROLA  
CELL PHONE  
San2rini  
LOW CHANNEL AXIS X  
RED: HORIZONTAL GREEN: VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
5	2484.098	20.97	pk	3.3	22.1	46.37	54	-7.63	150	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2398.828	26.76	pk	3.3	21.8	51.86	54	-2.14	100	Vert
2	2402.054	72.4	pk	3.3	21.8	97.5	999	-901.5	100	Vert
3	2403.898	35.96	pk	3.3	21.8	61.06	999	-937.94	100	Vert
4	2480.18	23.25	pk	3.3	22	48.55	999	-950.45	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
LIMIT 2: NONE

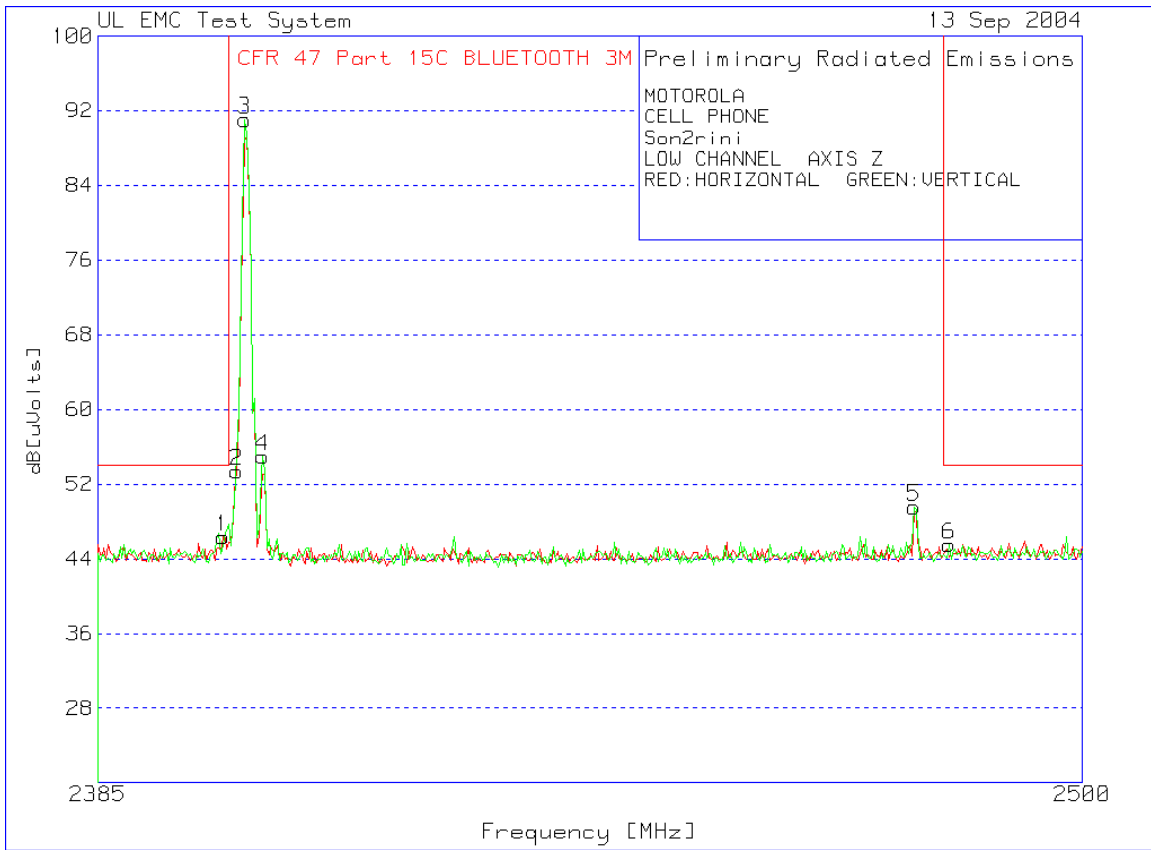


**Inband Low Channel Y**

MOTOROLA  
CELL PHONE  
San2rini  
LOW CHANNEL AXIS Y  
RED: HORIZONTAL GREEN: VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Factor [dB]	Loss/Factor [dB]	Transducer	Level dB[uVolts]	Limit 1	Margin 1 [dB]	Height [cm]	Polarity
2 - 4GHz 2385 - 2500MHz											
1	2399.519	25.63	pk	3.3	21.8		50.73	54	-3.27	100	Vert
2	2402.054	70.71	pk	3.3	21.8		95.81	999	-903.19	100	Vert
3	2403.667	34.09	pk	3.3	21.8		59.19	999	-939.81	100	Vert
4	2480.18	23.16	pk	3.3	22		48.46	999	-950.54	150	Vert
5	2488.938	20.89	pk	3.3	22.1		46.29	54	-7.71	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
LIMIT 2: NONE

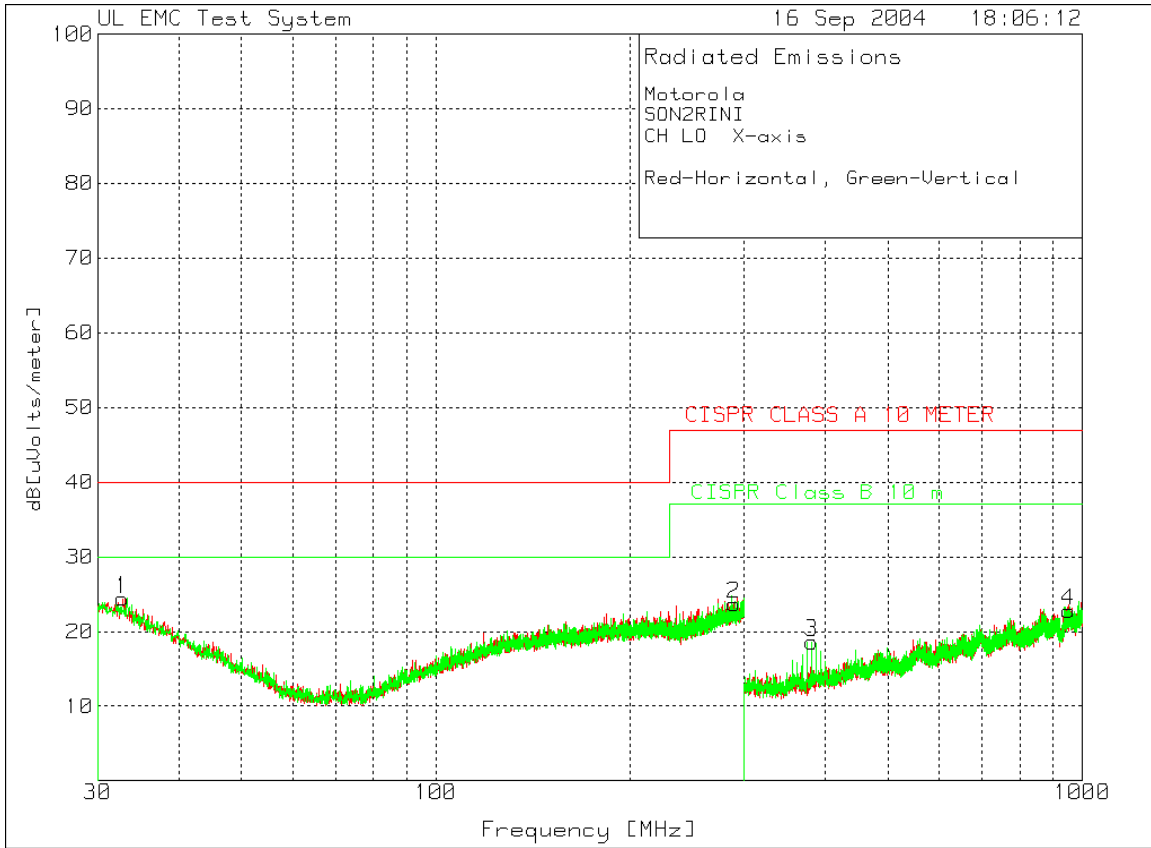


**Inband Low Channel Z**

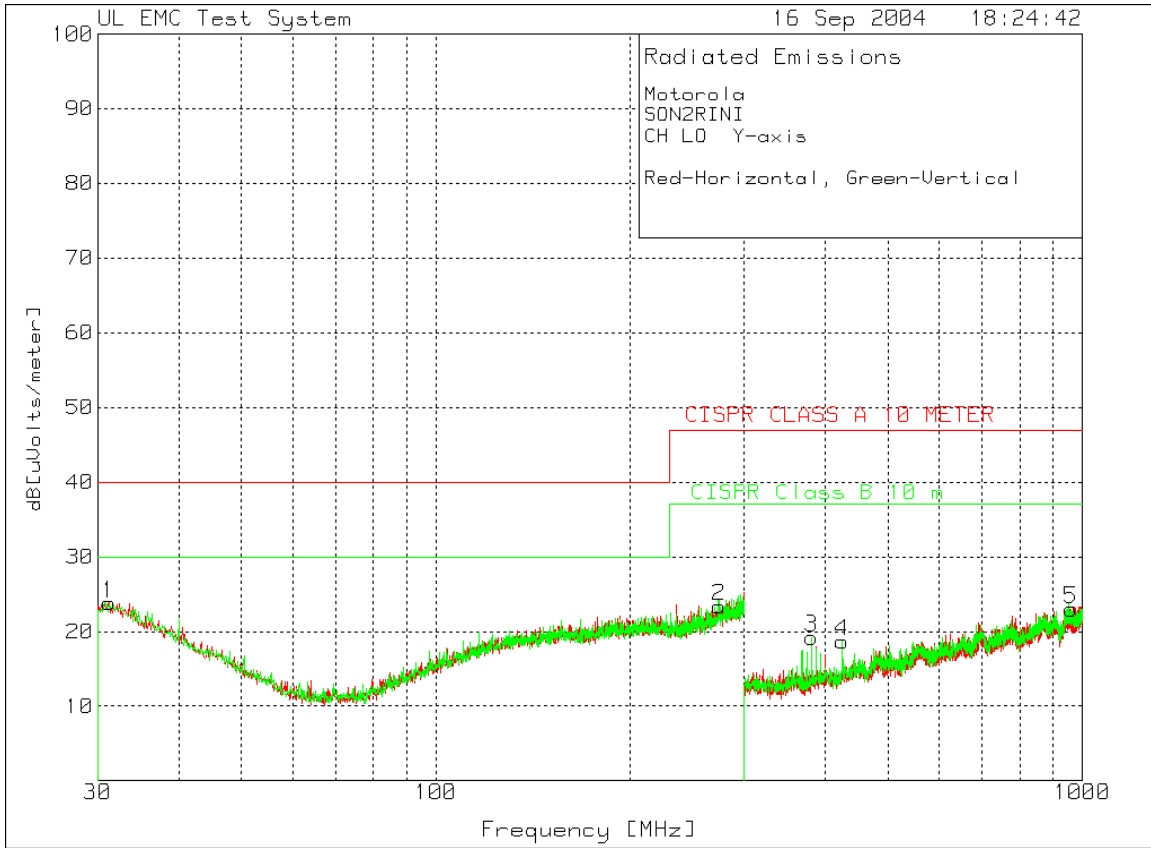
MOTOROLA  
 CELL PHONE  
 San2rini  
 LOW CHANNEL AXIS Z  
 RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2385 - 2500MHz</b>										
1	2399.289	21.26 pk		3.3	21.8	46.36	54	-7.64	99	Horz
2	2400.902	28.28 pk		3.3	21.8	53.38	999	-945.62	99	Horz
<b>2 - 4GHz 2385 - 2500MHz</b>										
3	2401.824	65.95 pk		3.3	21.8	91.05	999	-907.95	150	Vert
4	2403.898	29.86 pk		3.3	21.8	54.96	999	-944.04	150	Vert
5	2479.95	24.28 pk		3.3	22	49.58	999	-949.42	99	Vert
6	2484.098	20.13 pk		3.3	22.1	45.53	54	-8.47	150	Vert

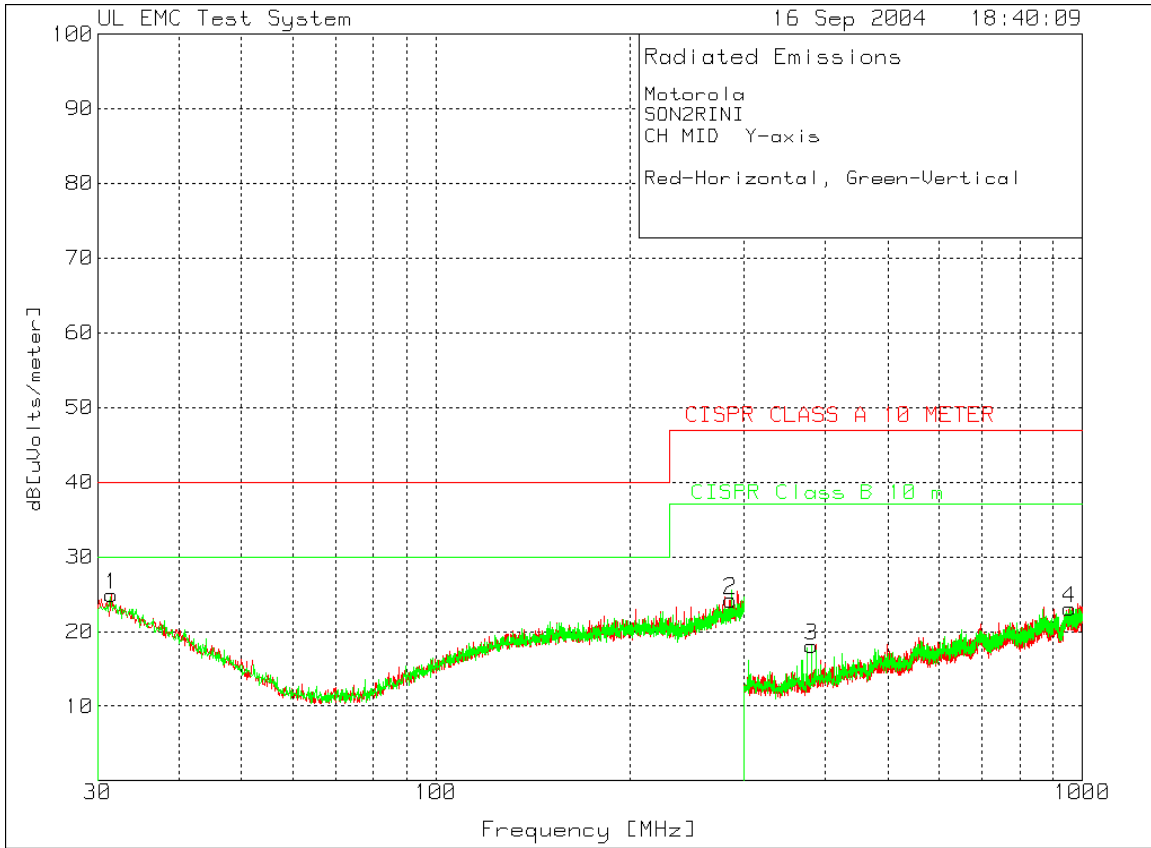
LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE



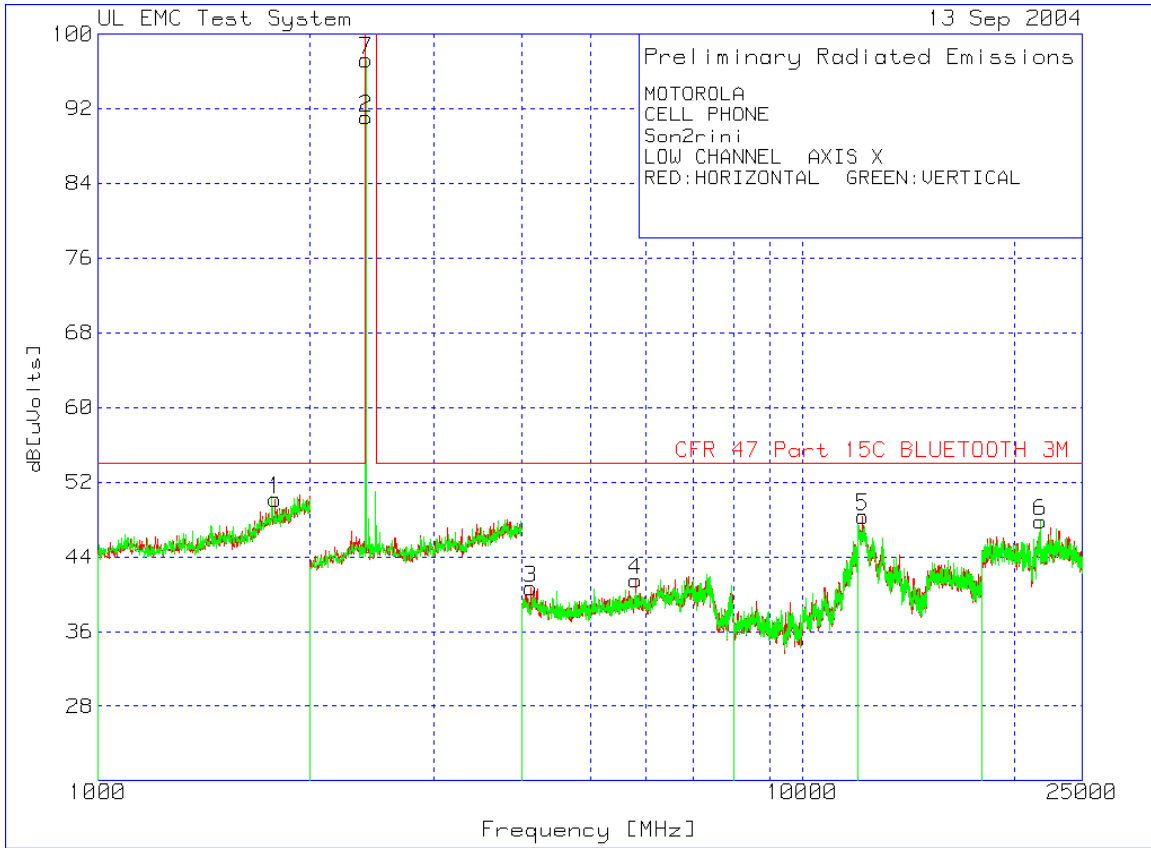
**30 -1000MHz Low Channel Dual Polarization X-Axis**



**30 -1000MHz Low Channel Dual Polarization Y-Axis**



**30-1000MHz Mid Channel Dual Polarization Y-Axis**

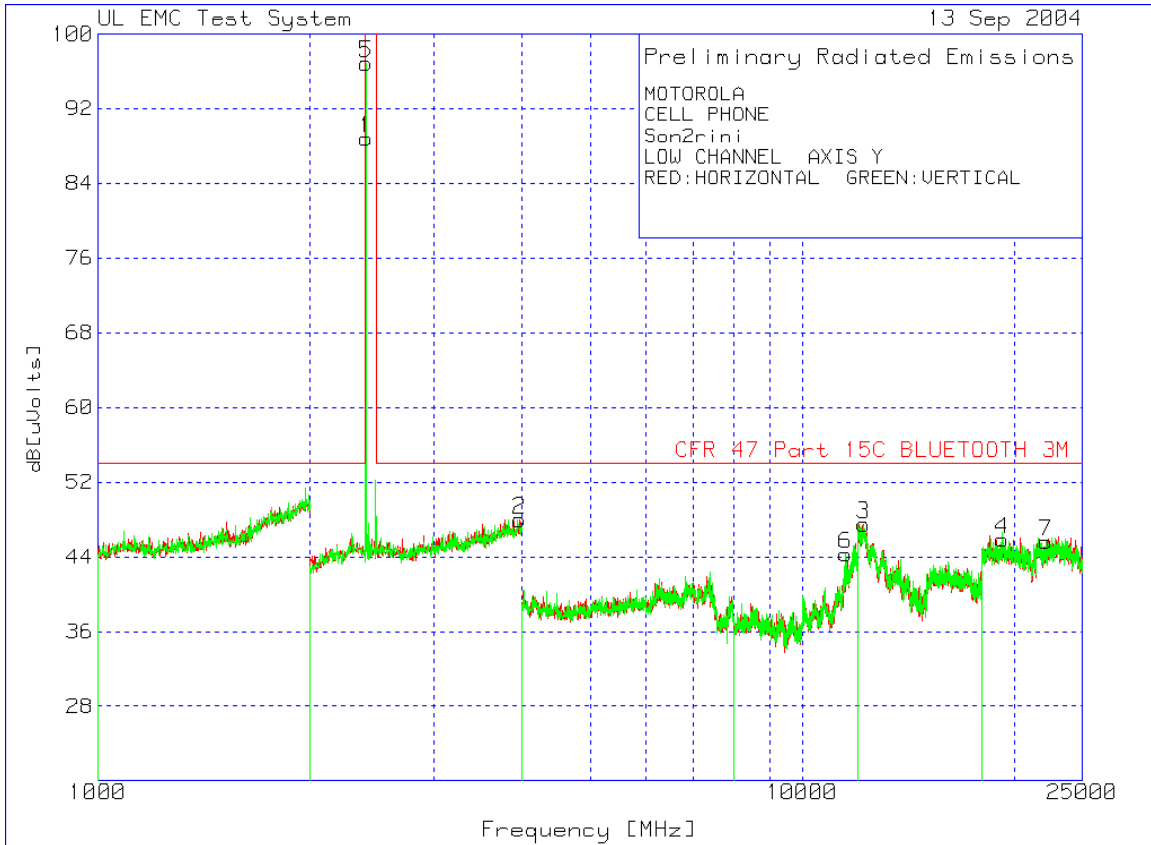


### Low Channel X-Orientation

MOTOROLA  
 CELL PHONE  
 San2rini  
 LOW CHANNEL AXIS X  
 RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB[uV]]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>1 - 2GHz 1000 - 2000MHz</b>										
1	1785.571	20.78	pk	2.9	26.5	50.18	54	-3.82	150	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2400.802	65.99	pk	3.3	21.8	91.09	999	-907.91	100	Horz
<b>4 - 8GHz 4000 - 8000MHz</b>										
3	4116.116	64.28	pk	-52	28.4	40.68	54	-13.32	100	Horz
4	5801.802	62.81	pk	-50	28.7	41.51	54	-12.49	100	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
5	12198.198	50.24	pk	-41.3	39.4	48.34	54	-5.66	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
7	2400.802	72.14	pk	3.3	21.8	97.24	999	-901.76	100	Vert
<b>18-26.5GHz 18000 - 25000MHz</b>										
6	21790.791	68.01	pk	-60.6	40.4	47.81	54	-6.19	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE



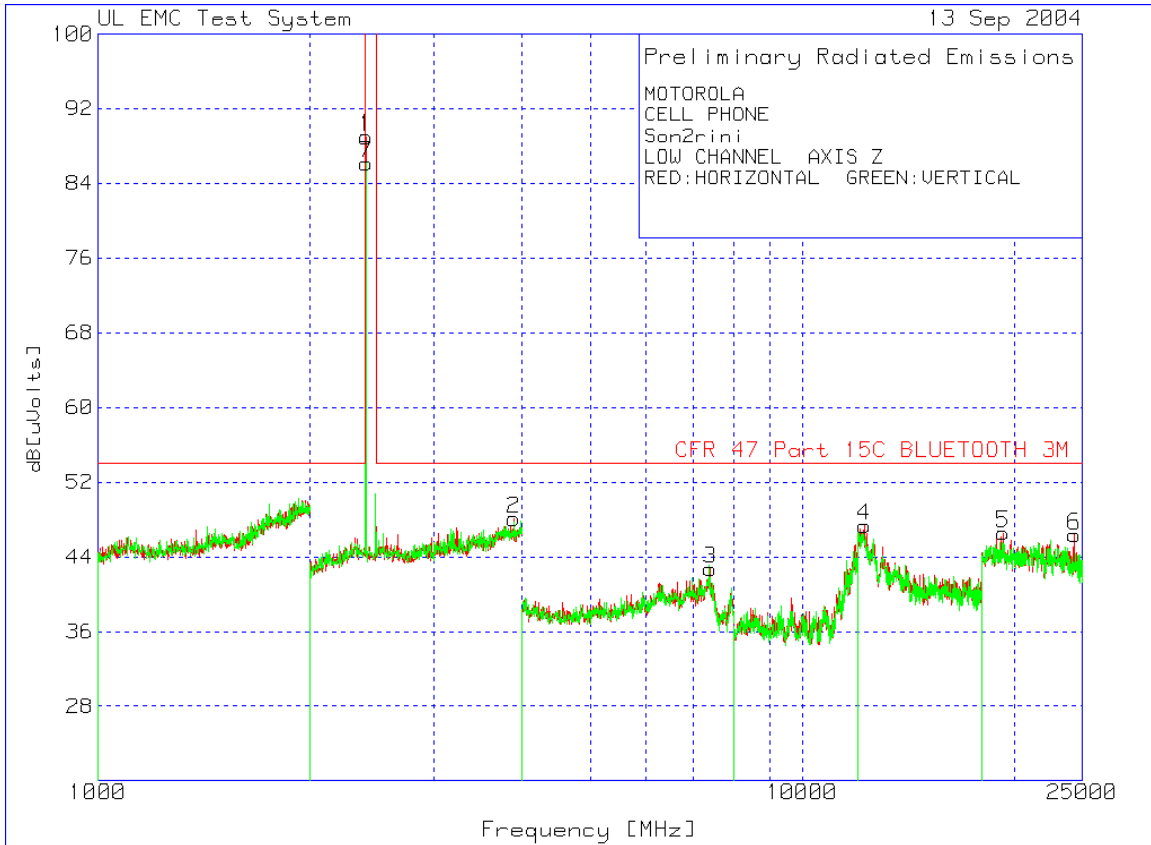
**1-25GHz Low Channel Y-Orientation**

MOTOROLA  
CELL PHONE  
San2rini

LOW CHANNEL AXIS Y  
RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2000 - 4000MHz</b>										
1	2400.802	63.73 pk		3.3	21.8	88.83	999	-910.17	100	Horz
2	3963.928	19.6 pk		4.2	24.2	48	54	-6	150	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
3	12222.222	49.11 pk		-41	39.4	47.51	54	-6.49	99	Horz
<b>18-26.5GHz 18000 - 25000MHz</b>										
4	19247.247	73.55 pk		-68	40.3	45.85	54	-8.15	150	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
5	2400.802	71.81 pk		3.3	21.8	96.91	999	-902.09	100	Vert
<b>8 - 12GHz 8000 - 12000MHz</b>										
6	11527.528	49.31 pk		-42.2	37.2	44.31	54	-9.69	150	Vert
<b>18-26.5GHz 18000 - 25000MHz</b>										
7	22169.169	64.54 pk		-59.4	40.5	45.64	54	-8.36	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
LIMIT 2: NONE

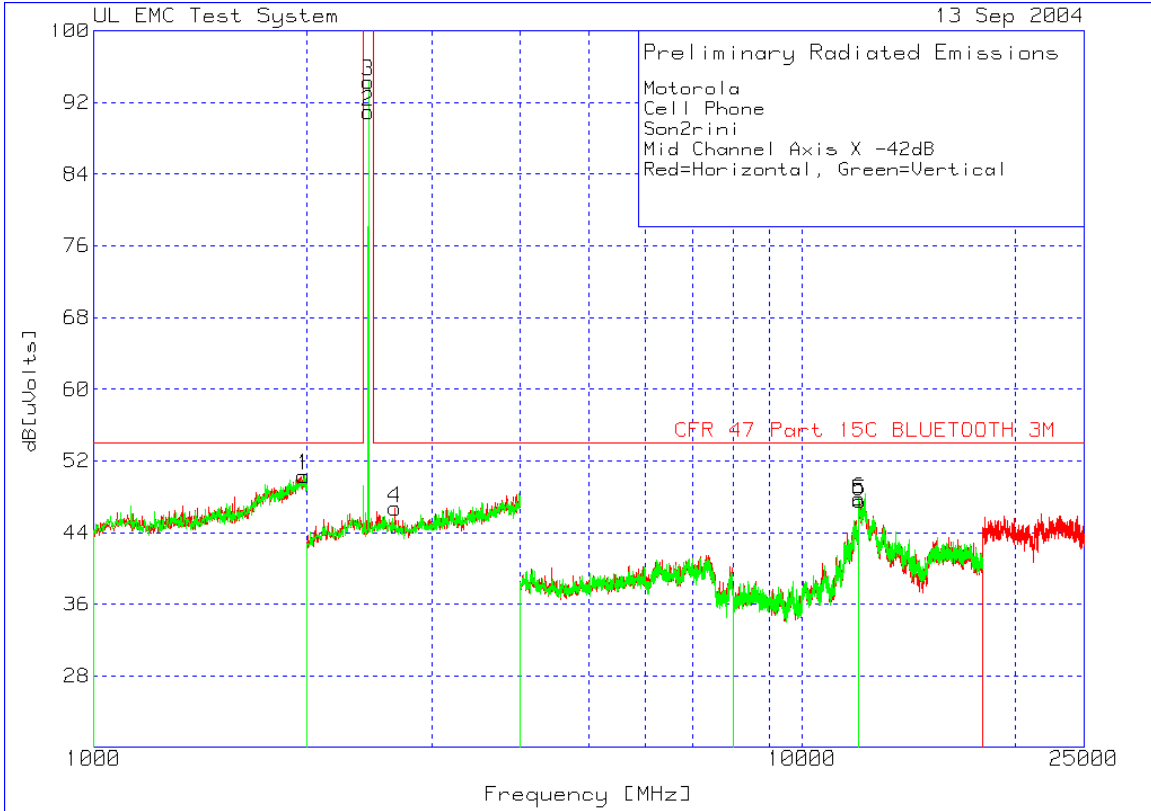


**1-25GHz Low Channel Z-Orientation**

MOTOROLA  
 CELL PHONE  
 San2rini  
 LOW CHANNEL AXIS Z  
 RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2000 - 4000MHz</b>										
1	2400.802	63.89	pk	3.3	21.8	88.99	999	-910.01	100	Horz
2	3895.792	20.09	pk	4.2	23.8	48.09	54	-5.91	100	Horz
<b>4 - 8GHz 4000 - 8000MHz</b>										
3	7414.83	58.7	pk	-47	31	42.7	54	-11.3	100	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
4	12252.505	48.61	pk	-40.7	39.4	47.31	54	-6.69	100	Horz
<b>18-26.5GHz 18000 - 25000MHz</b>										
5	19290.581	74.46	pk	-68.2	40.3	46.56	54	-7.44	100	Horz
6	24354.709	67.12	pk	-61.1	40.3	46.32	54	-7.68	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
7	2400.802	61.03	pk	3.3	21.8	86.13	999	-912.87	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE

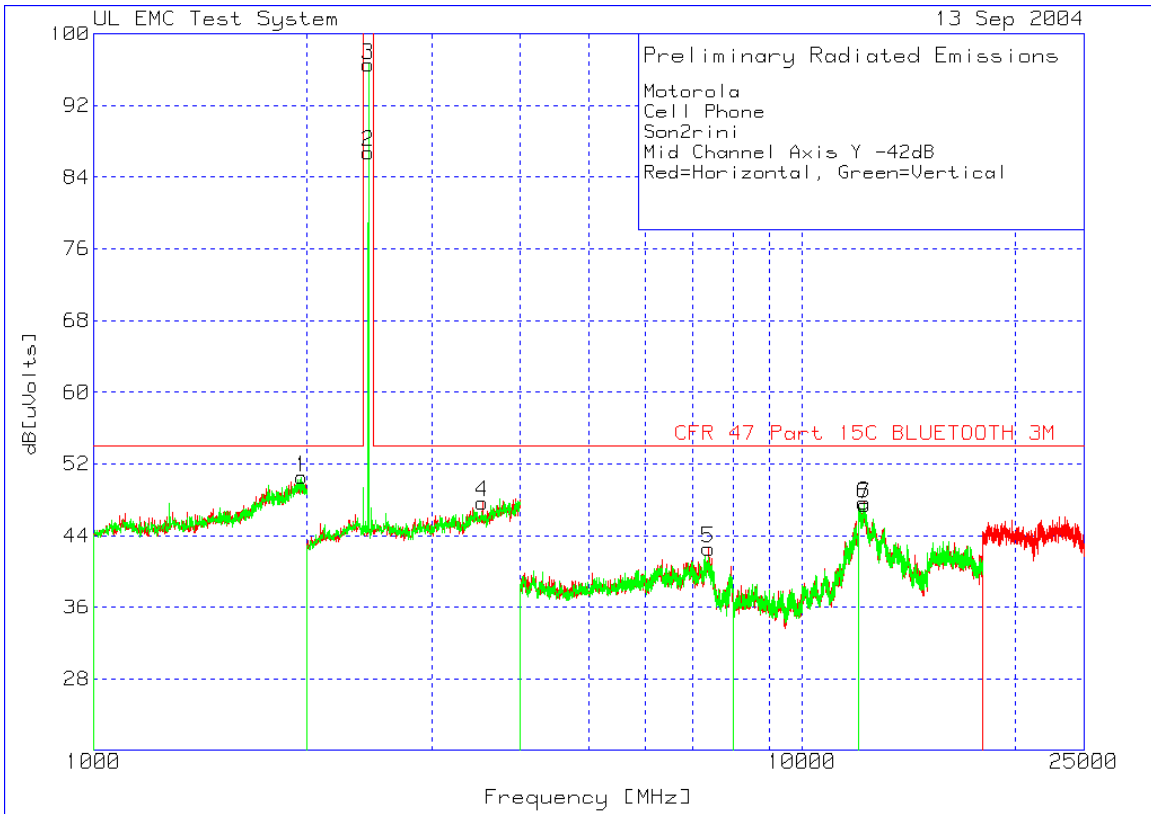


**1-25 GHz Mid-Channel X-Orientation**

Motorola  
 Cell Phone  
 San2rini  
 Mid Channel Axis X -42dB  
 Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>1 - 2GHz 1000 - 2000MHz</b>										
1	1977.956	19.84	pk	3.1	27.4	50.34	54	-3.66	150	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2440.882	65.79	pk	3.3	21.9	90.99	999	-908.01	100	Horz
4	2661.323	21.14	pk	3.4	22.2	46.74	54	-7.26	150	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
5	12048.048	50.21	pk	-42.1	39.4	47.51	54	-6.49	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
3	2440.882	69.14	pk	3.3	21.9	94.34	999	-904.66	99	Vert
<b>12 - 18GHz 12000 - 18000MHz</b>										
6	12024.024	50	pk	-41.6	39.4	47.8	54	-6.2	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE



**1-25GHz Mid-Channel Y-Orientation**

Motorola  
 Cell Phone  
 San2rini  
 Mid Channel Axis Y -42dB  
 Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2440.882	61.61 pk		3.3	21.9	86.81	999	-912.19	100	Horz
4	3535.07	20.22 pk		4.1	23.4	47.72	54	-6.28	149	Horz
<b>4 - 8GHz 4000 - 8000MHz</b>										
5	7375.375	58.85 pk		-47.3	31	42.55	54	-11.45	100	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
6	12210.21	49.46 pk		-41.2	39.4	47.66	54	-6.34	100	Horz
<b>1 - 2GHz 1000 - 2000MHz</b>										
1	1965.932	20.14 pk		3.1	27.3	50.54	54	-3.46	150	Vert
<b>2 - 4GHz 2000 - 4000MHz</b>										
3	2440.882	71.38 pk		3.3	21.9	96.58	999	-902.42	100	Vert
<b>12 - 18GHz 12000 - 18000MHz</b>										
7	12246.246	48.77 pk		-40.7	39.4	47.47	54	-6.53	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE

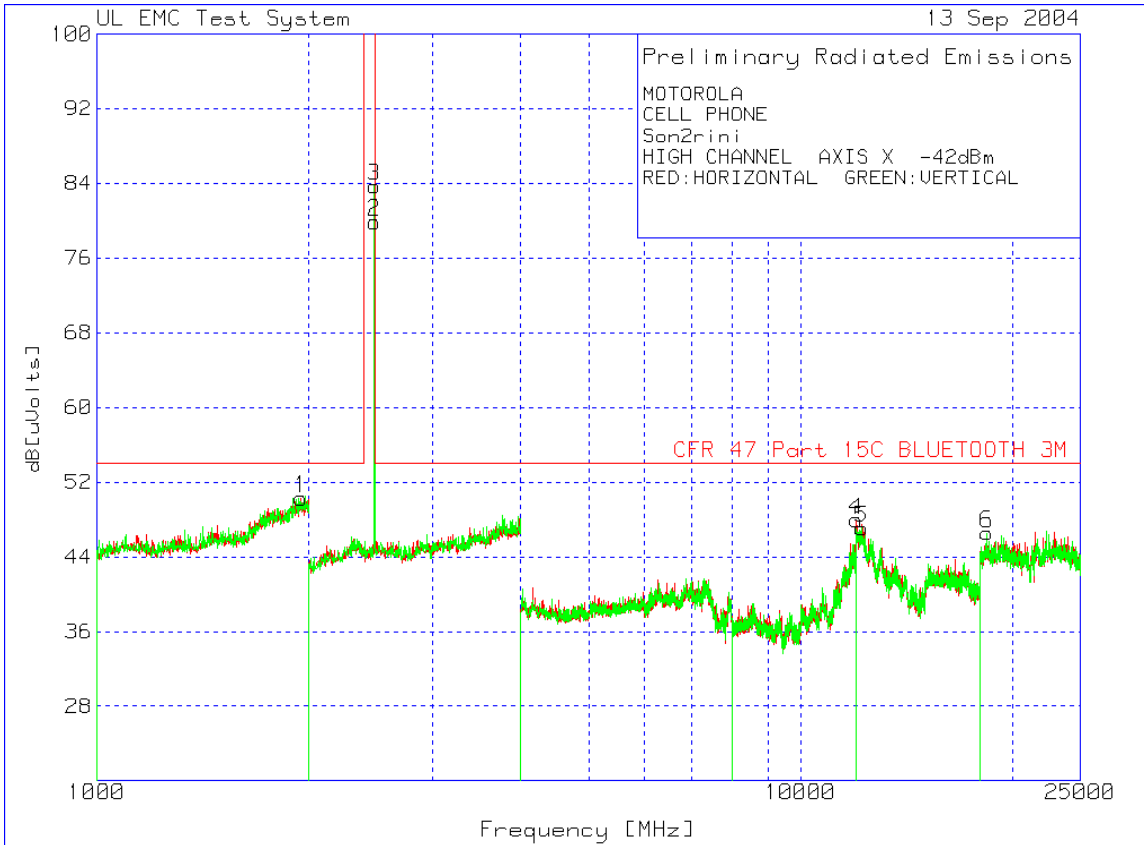


**1-25 GHz Mid-Channel Z-Orientation**

MOTOROLA  
 CELL PHONE  
 San2rini  
 MID CHANNEL AXIS Z  
 RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>2 - 4GHz 2000 - 4000MHz</b>										
1	2440.882	65.05 pk		3.3	21.9	90.25	999	-908.75	100	Horz
3	3767.535	20.34 pk		4.1	23.9	48.34	54	-5.66	100	Horz
<b>4 - 8GHz 4000 - 8000MHz</b>										
4	7286.573	59.96 pk		-47.2	30.3	43.06	54	-10.94	100	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
5	12252.505	48.8 pk		-40.7	39.4	47.5	54	-6.5	100	Horz
<b>18-26.5GHz 18000 - 25000MHz</b>										
6	19290.581	74.7 pk		-68.2	40.3	46.8	54	-7.2	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2440.882	62.09 pk		3.3	21.9	87.29	999	-911.71	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE



**1-25 GHz High-Channel X-Orientation**

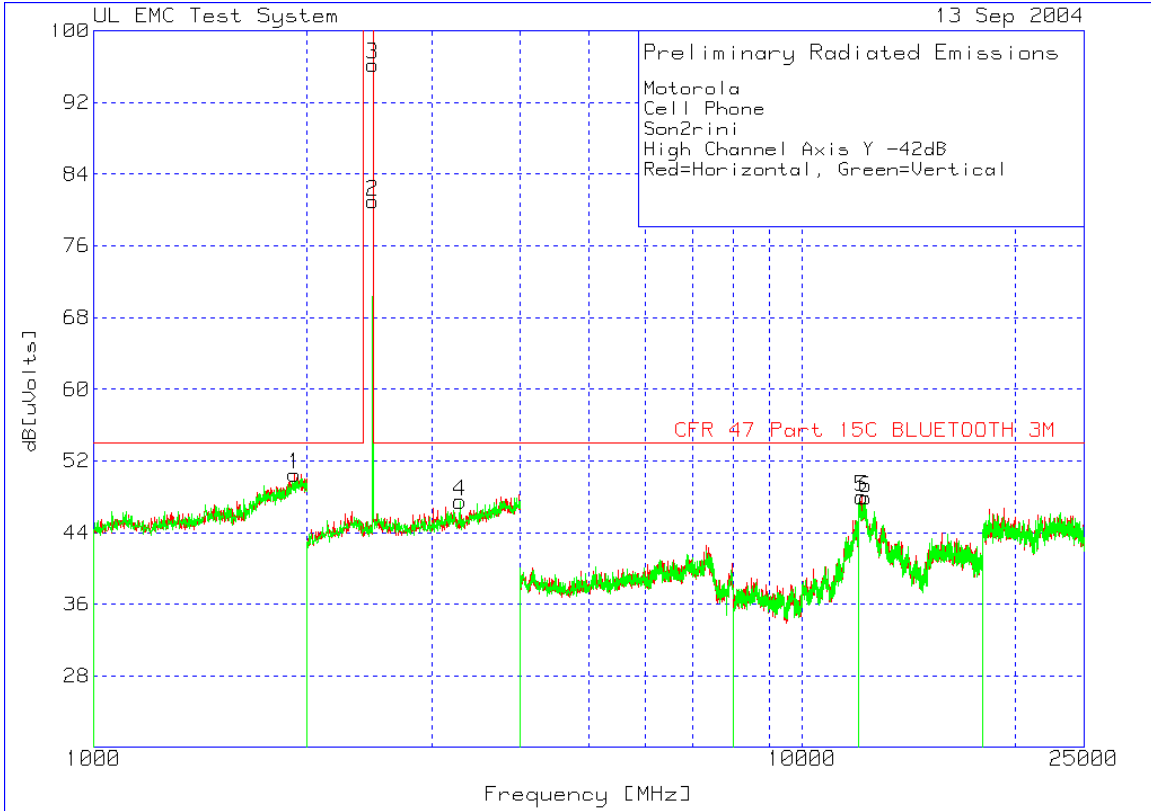
MOTOROLA  
CELL PHONE  
San2rini

HIGH CHANNEL AXIS X -42dBm

RED:HORIZONTAL GREEN:VERTICAL

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>1 - 2GHz 1000 - 2000MHz</b>										
1	1951.904	19.91 pk		3.1	27.3	50.31	54	-3.69	150	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2480.962	54.61 pk		3.3	22	79.91	999	-919.09	100	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
4	12018.018	50.07 pk		-41.5	39.4	47.97	54	-6.03	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
3	2480.962	58.43 pk		3.3	22	83.73	999	-915.27	150	Vert
<b>12 - 18GHz 12000 - 18000MHz</b>										
5	12234.234	48.59 pk		-40.9	39.4	47.09	54	-6.91	150	Vert
<b>18-26.5GHz 18000 - 25000MHz</b>										
6	18413.413	73.26 pk		-66.8	40.1	46.56	54	-7.44	149	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
LIMIT 2: NONE

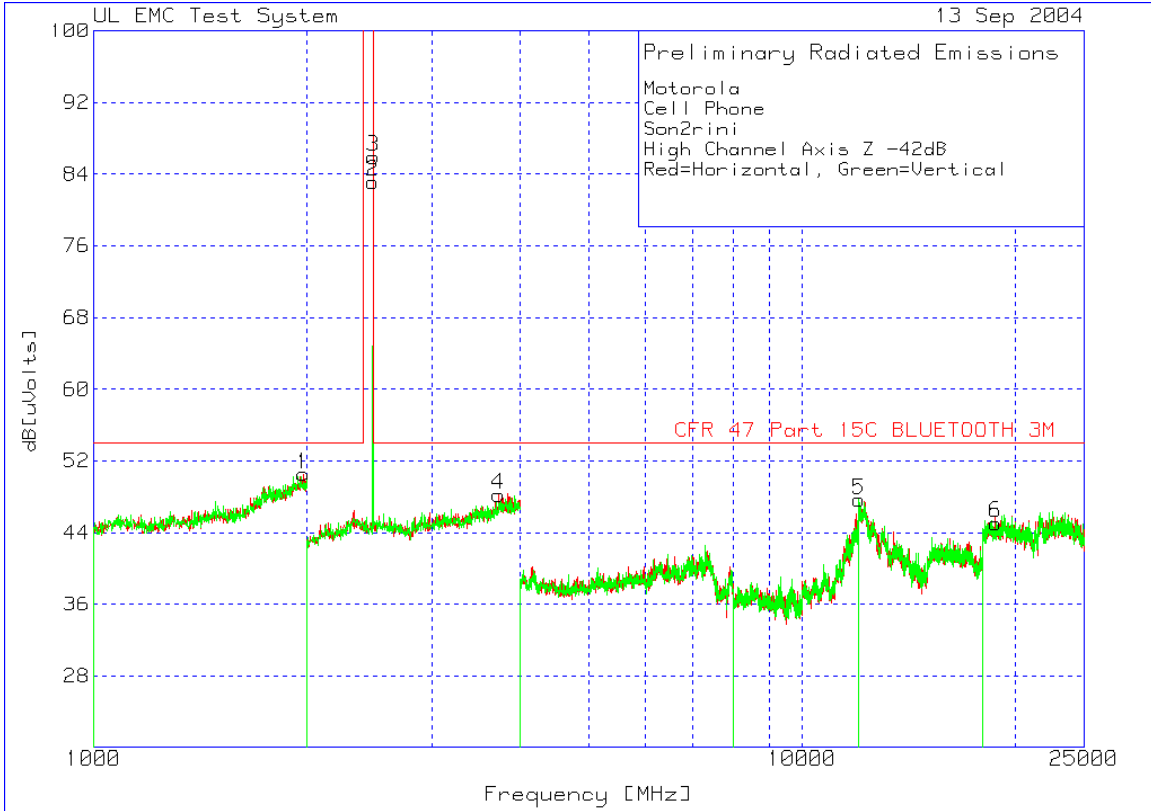


**1-25 GHz High-Channel Y-Orientation**

Motorola  
Cell Phone  
San2rini  
High Channel Axis Y -42dB  
Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>1 - 2GHz 1000 - 2000MHz</b>										
1	1919.84	20.37 pk			3	27.1	54	-3.53	150	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2476.954	55.7 pk		3.3	22	81	999	-918	100	Horz
<b>12 - 18GHz 12000 - 18000MHz</b>										
5	12126.126	50.78 pk		-42.2	39.4	47.98	54	-6.02	99	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
3	2476.954	70.93 pk		3.3	22	96.23	999	-902.77	100	Vert
4	3286.573	20.88 pk		3.8	22.8	47.48	54	-6.52	100	Vert
<b>12 - 18GHz 12000 - 18000MHz</b>										
6	12294.294	49.7 pk		-41.2	39.4	47.9	54	-6.1	150	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
LIMIT 2: NONE



**1-25 GHz High-Channel Z-Orientation**

Motorola  
 Cell Phone  
 San2rini  
 High Channel Axis Z -42dB  
 Red=Horizontal, Green=Vertical

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts]	Limit 1	Margin 1[dB]	Height [cm]	Polarity
<b>1 - 2GHz 1000 - 2000MHz</b>										
1	1975.952	20.03 pk		3.1	27.4	50.53	54	-3.47	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
2	2476.954	57.88 pk		3.3	22	83.18	999	-915.82	149	Horz
4	3727.455	20.43 pk		4.1	23.7	48.23	54	-5.77	100	Horz
<b>18-26.5GHz 18000 - 25000MHz</b>										
6	18749.75	72.07 pk		-67.1	40.1	45.07	54	-8.93	100	Horz
<b>2 - 4GHz 2000 - 4000MHz</b>										
3	2480.962	60.62 pk		3.3	22	85.92	999	-913.08	99	Vert
<b>12 - 18GHz 12000 - 18000MHz</b>										
5	12024.024	49.86 pk		-41.6	39.4	47.66	54	-6.34	100	Vert

LIMIT 1: CFR 47 Part 15C BLUETOOTH 3M  
 LIMIT 2: NONE

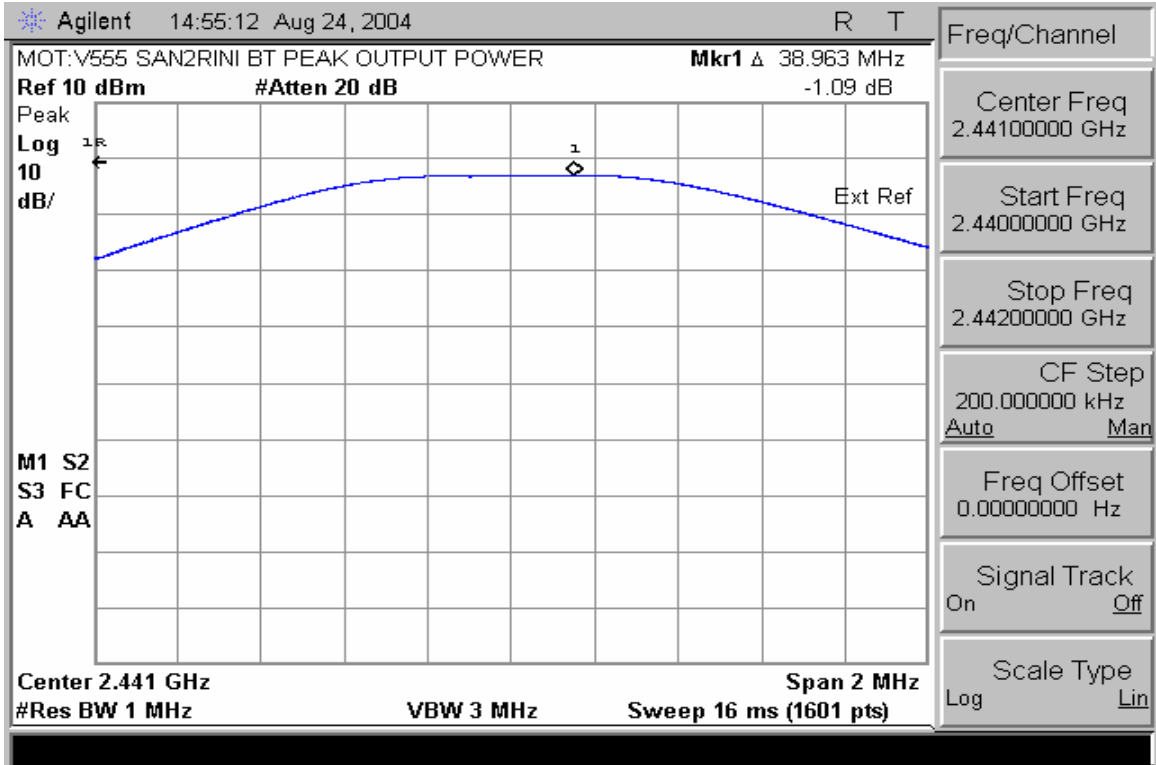
## PEAK OUTPUT POWER

CFR 47 Part 15.247

### Measurement Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

### Measurement Results



**Peak Output Power**

## **BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS**

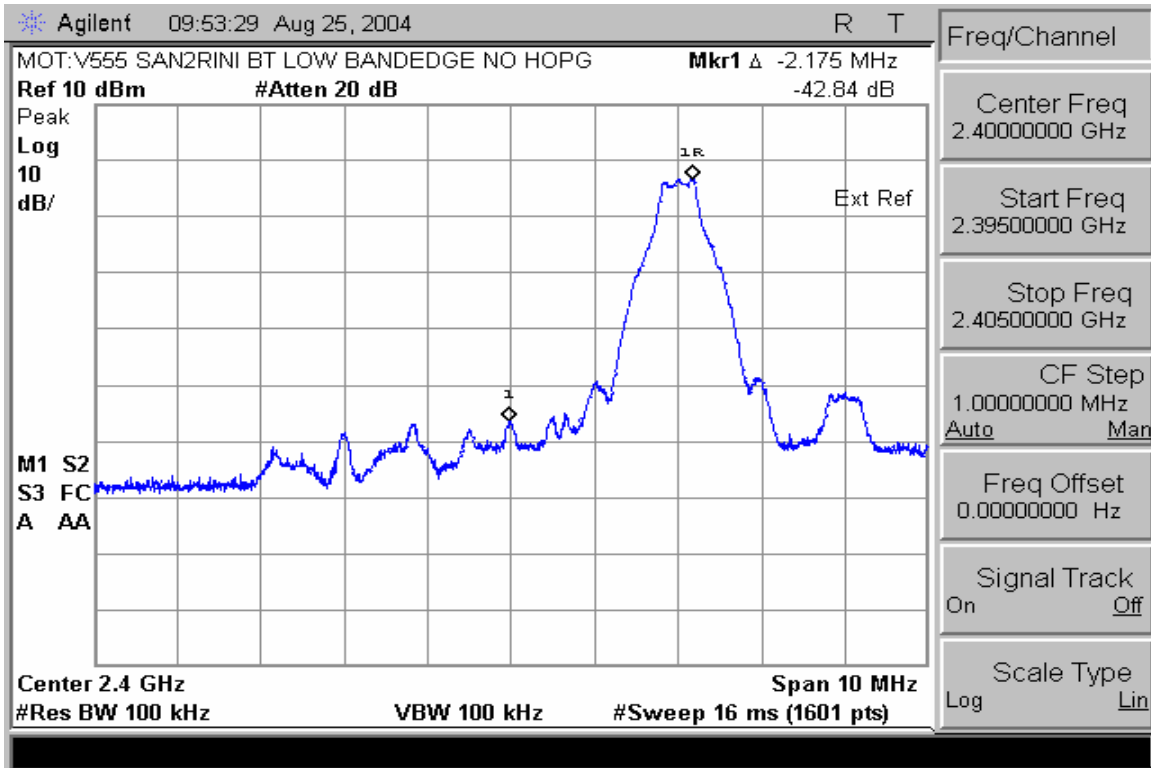
CFR 47 Part 15.247

### **Measurement Procedure**

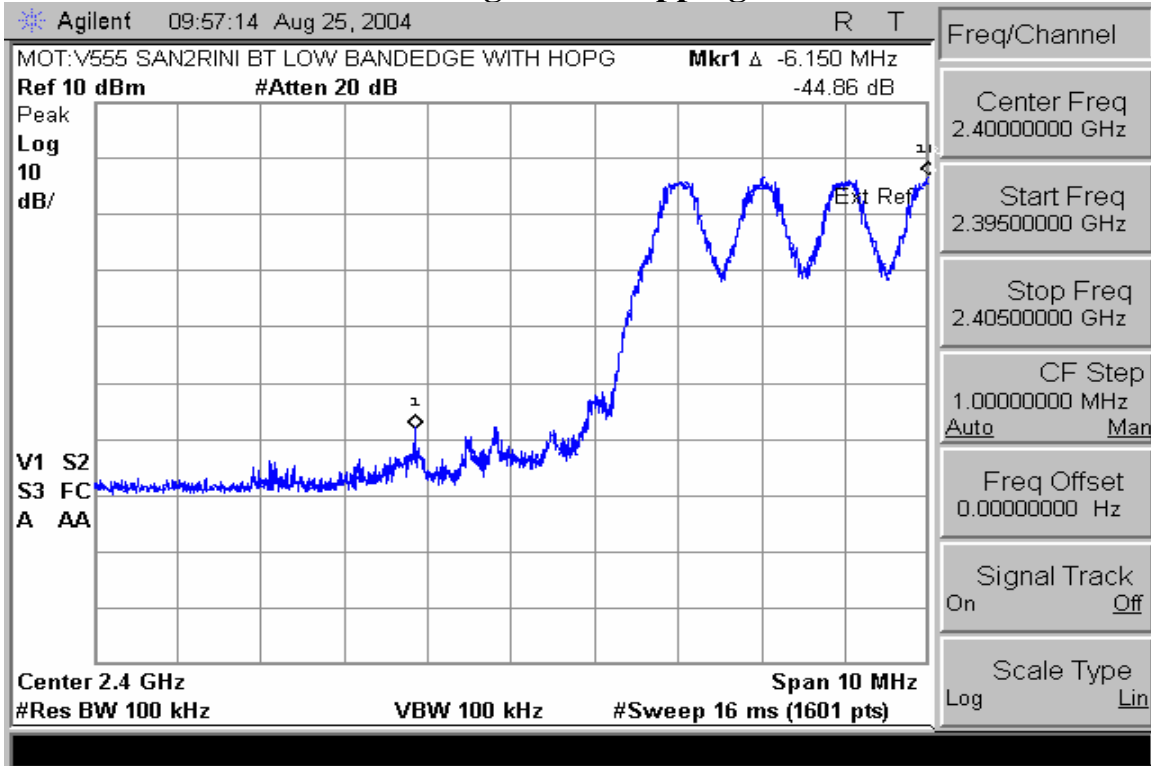
The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

### **Measurement Results**

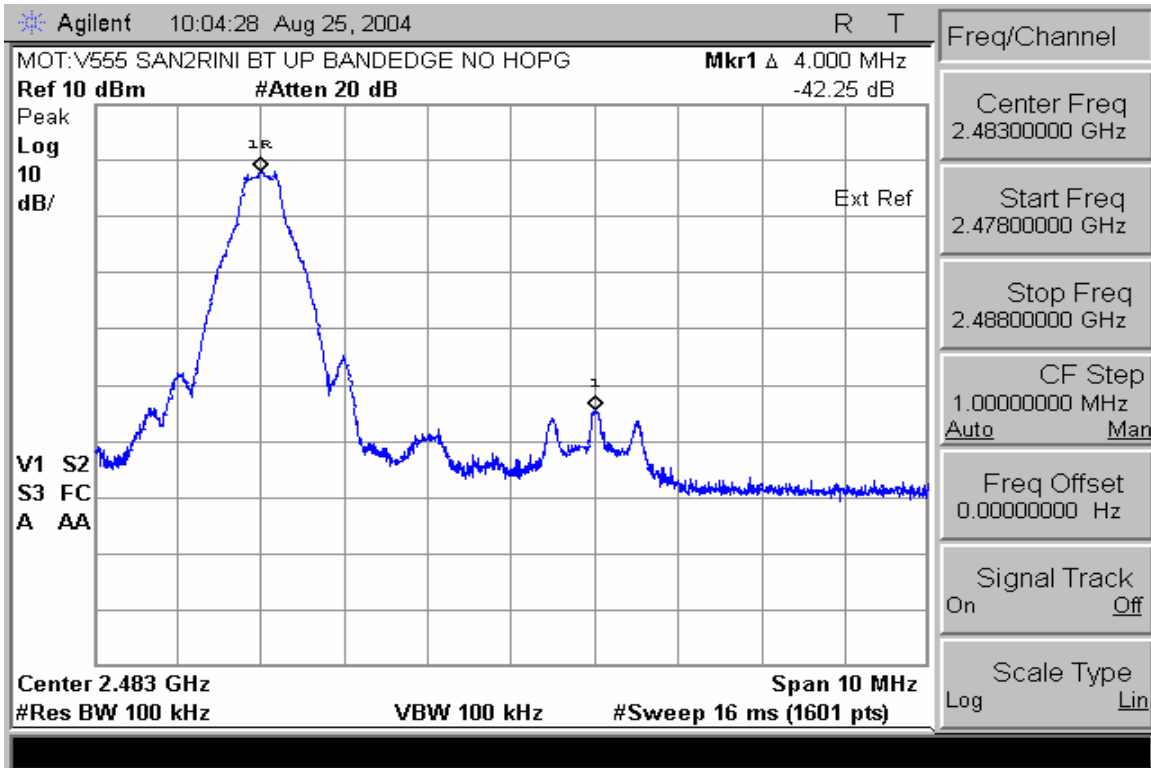
See Attached:



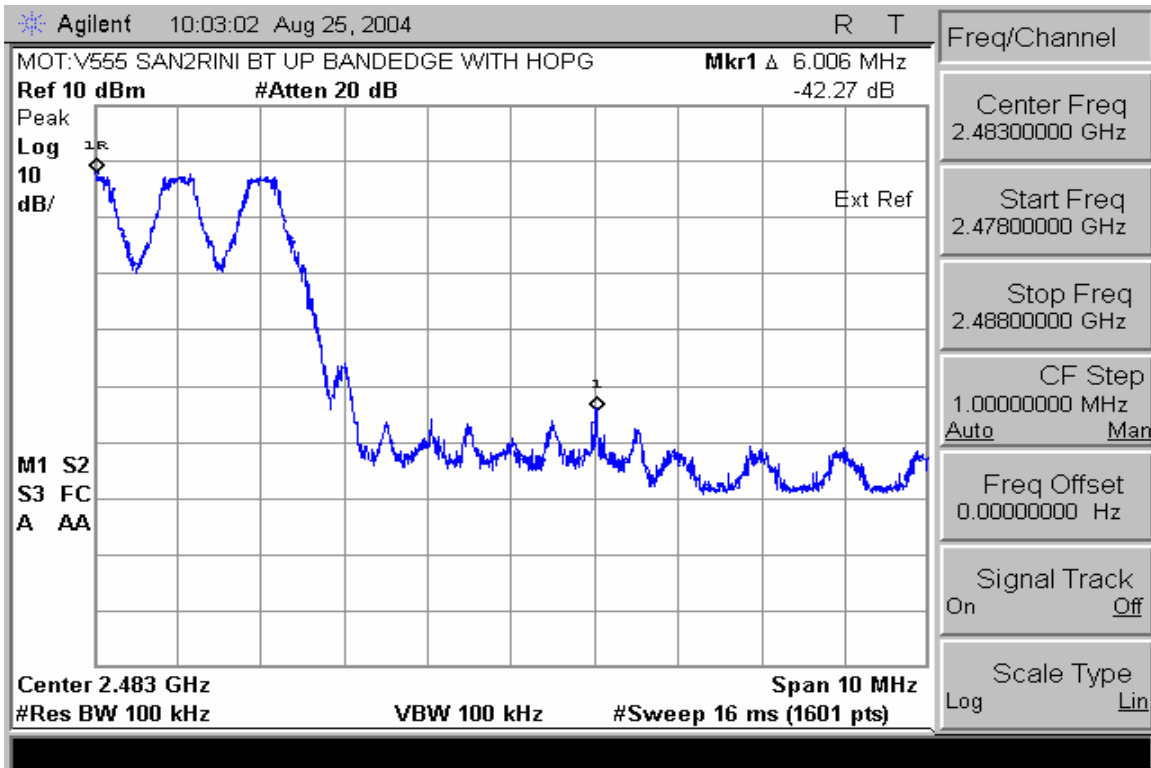
**Low Band Edge with Hopping Disabled**



**Low Band Edge with Hopping Enabled**



**High Band Edge with Hopping Disabled**



**High Band Edge with Hopping Enabled**

## **SPURIOUS RF CONDUCTED EMISSIONS**

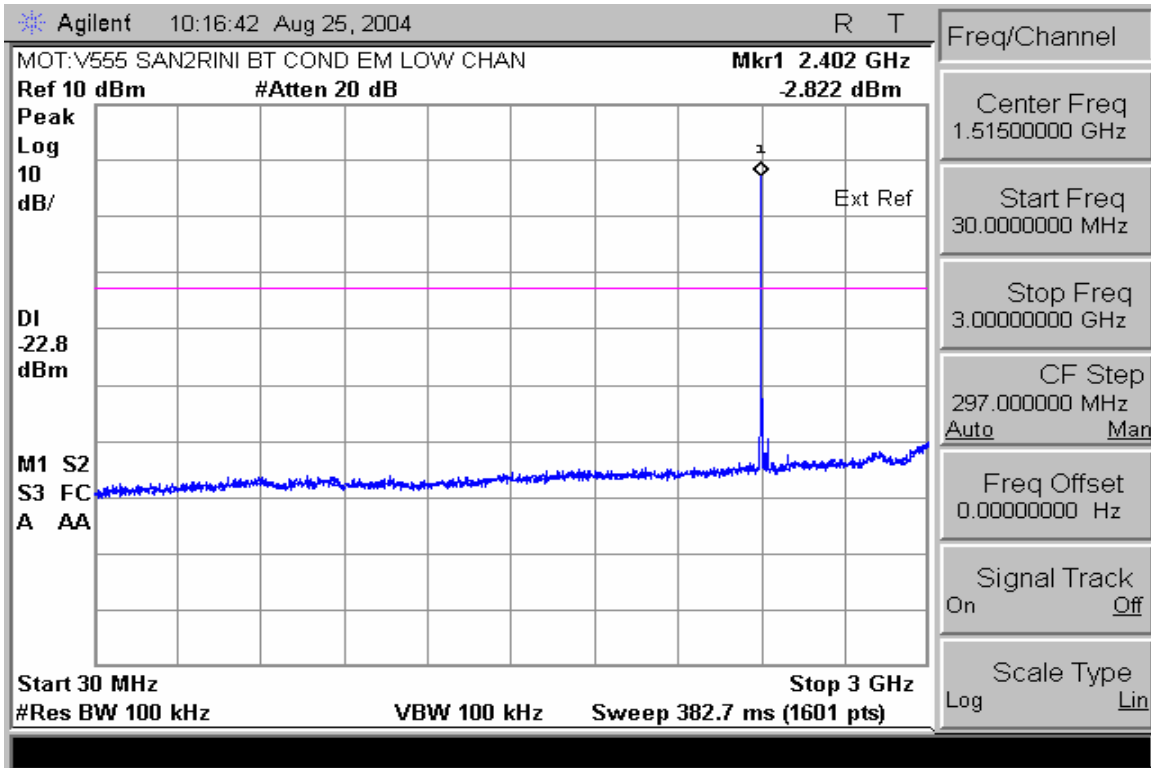
CFR 47 Part 15.247

### **Measurement Procedure**

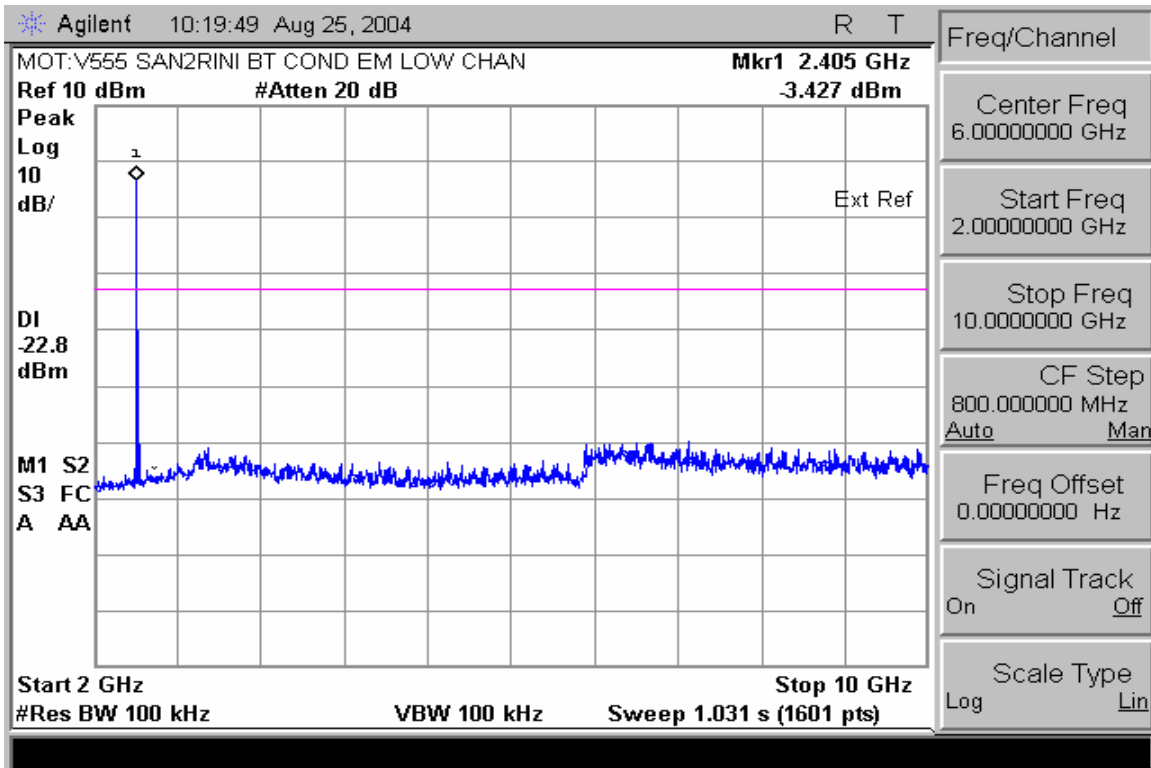
The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

### **Measurement Results**

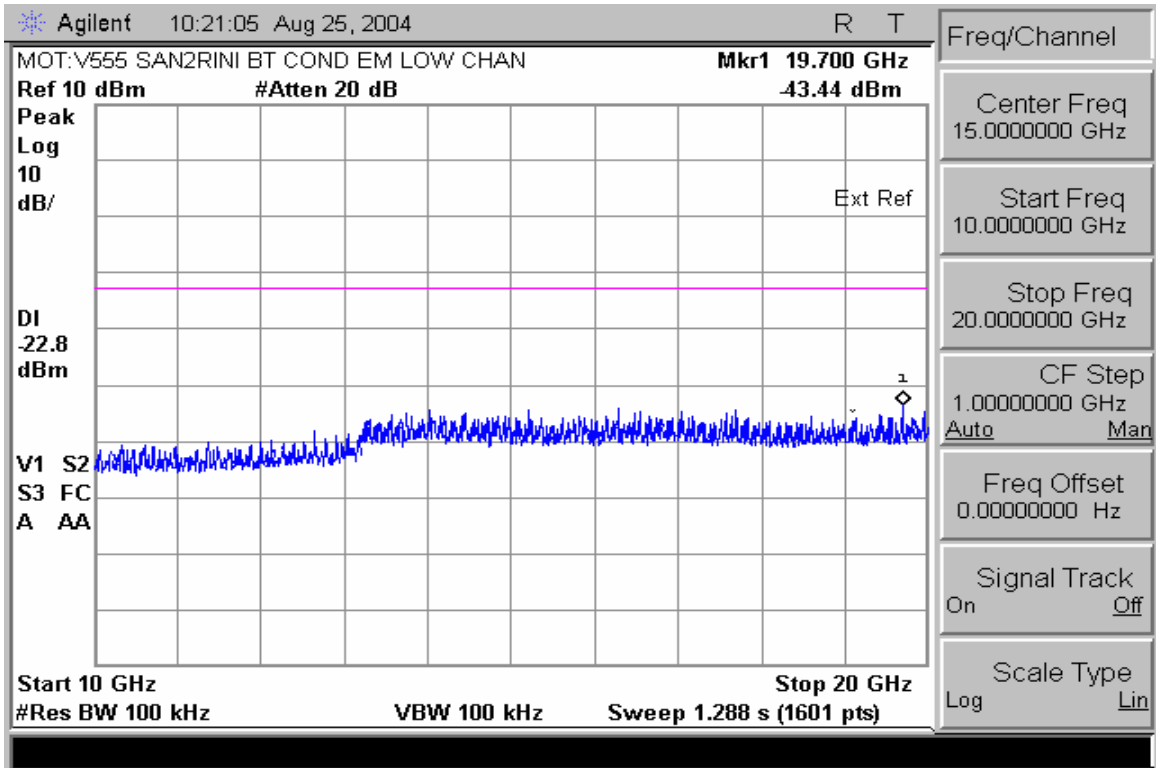
See attached:



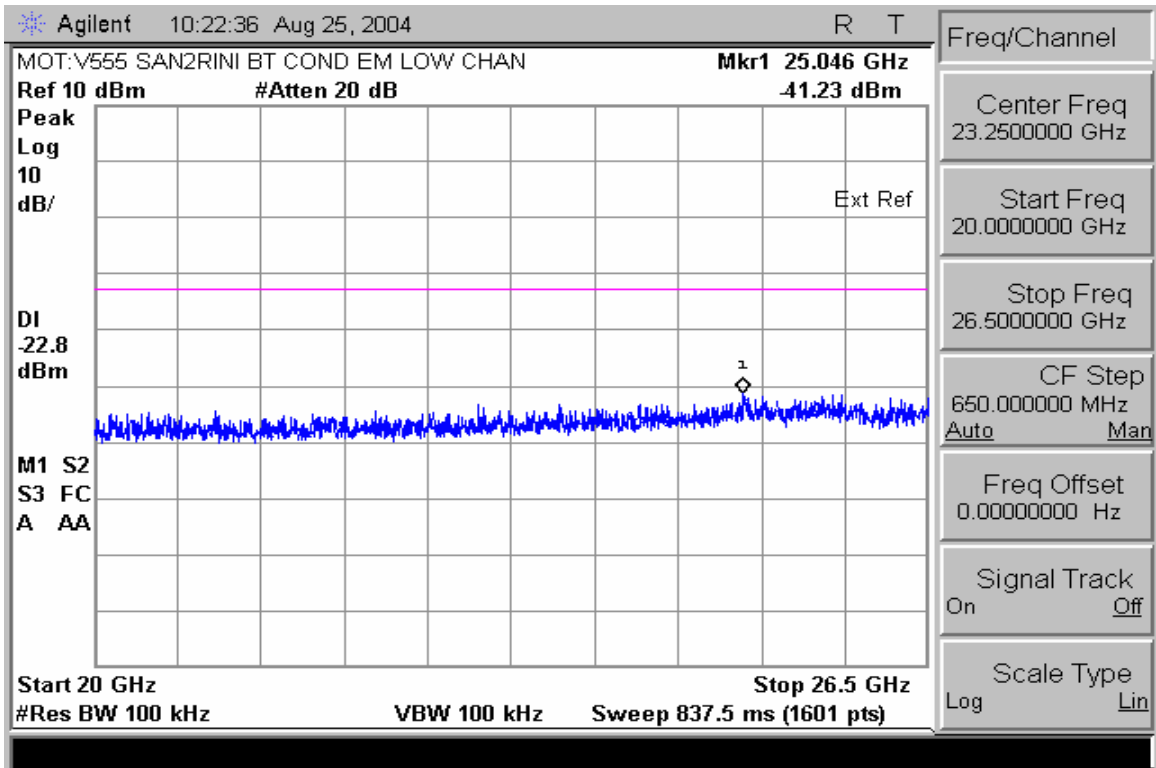
**Conducted Spurious Emissions 30-3000MHz (Low Channel Enabled)**



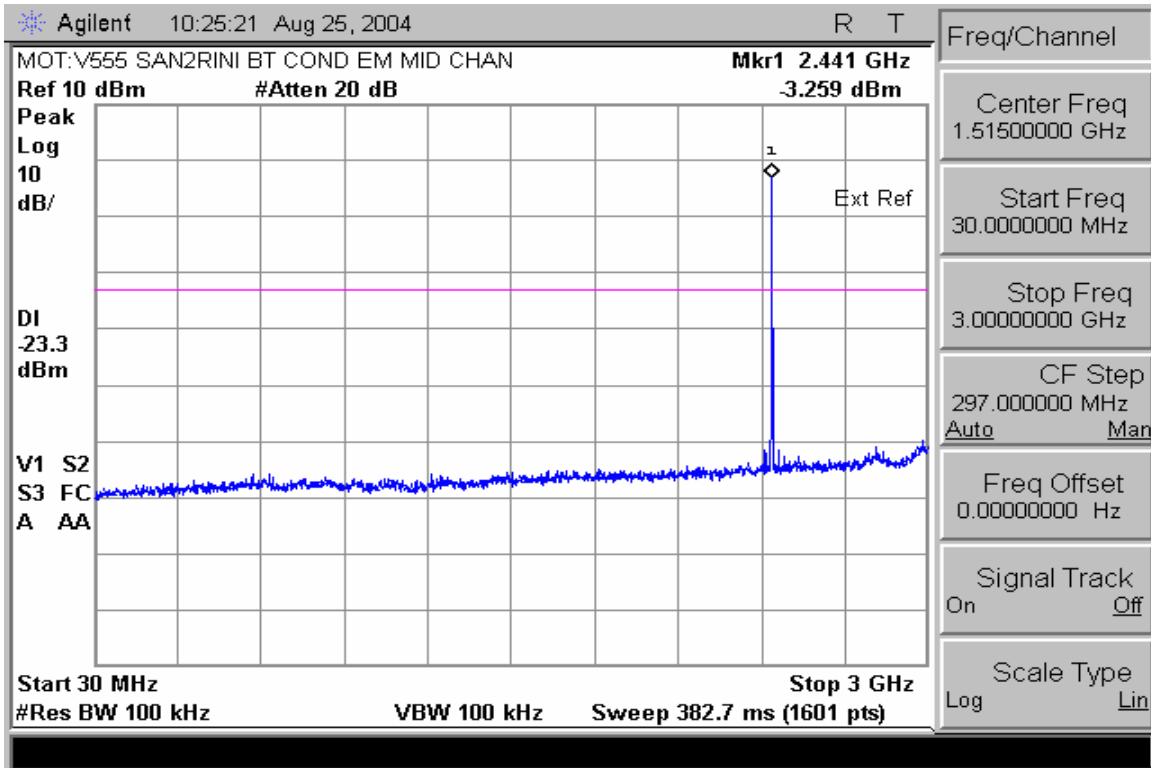
**Conducted Spurious Emissions 2-10GHz (Low Channel Enabled)**



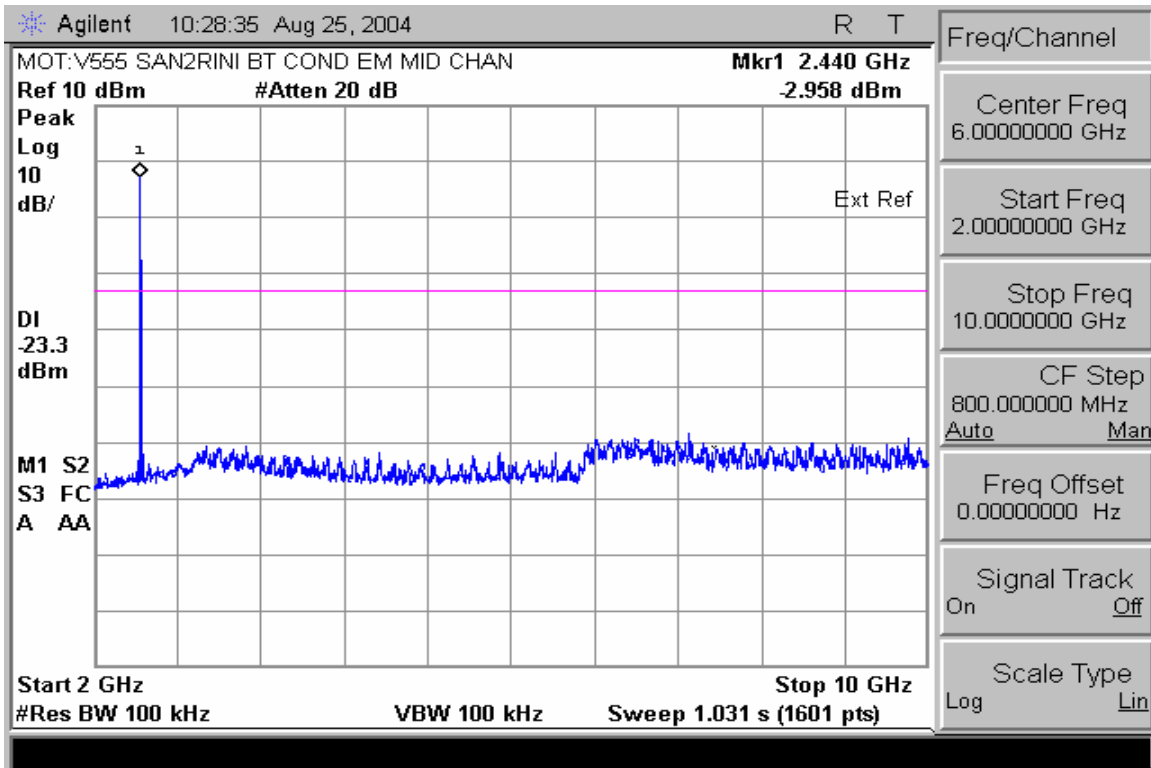
Conducted Spurious Emissions 10-20GHz (Low Channel Enabled)



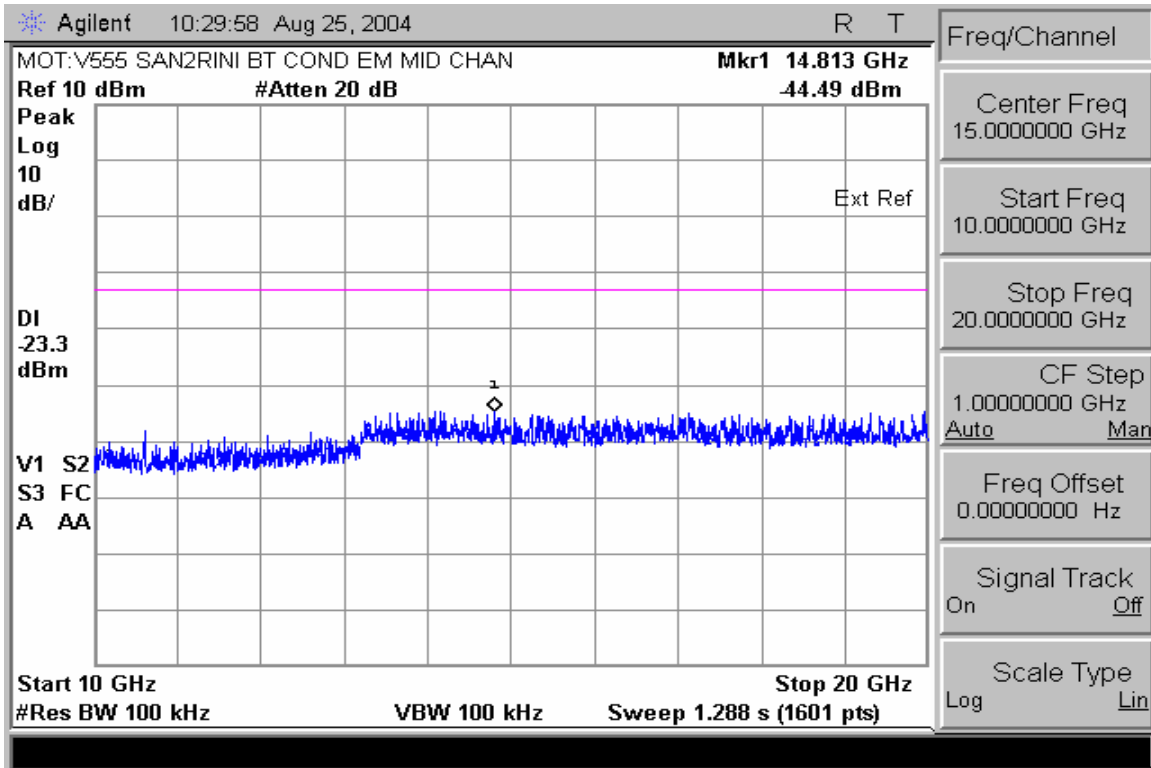
Conducted Spurious Emissions 20-26.5GHz (Low Channel Enabled)



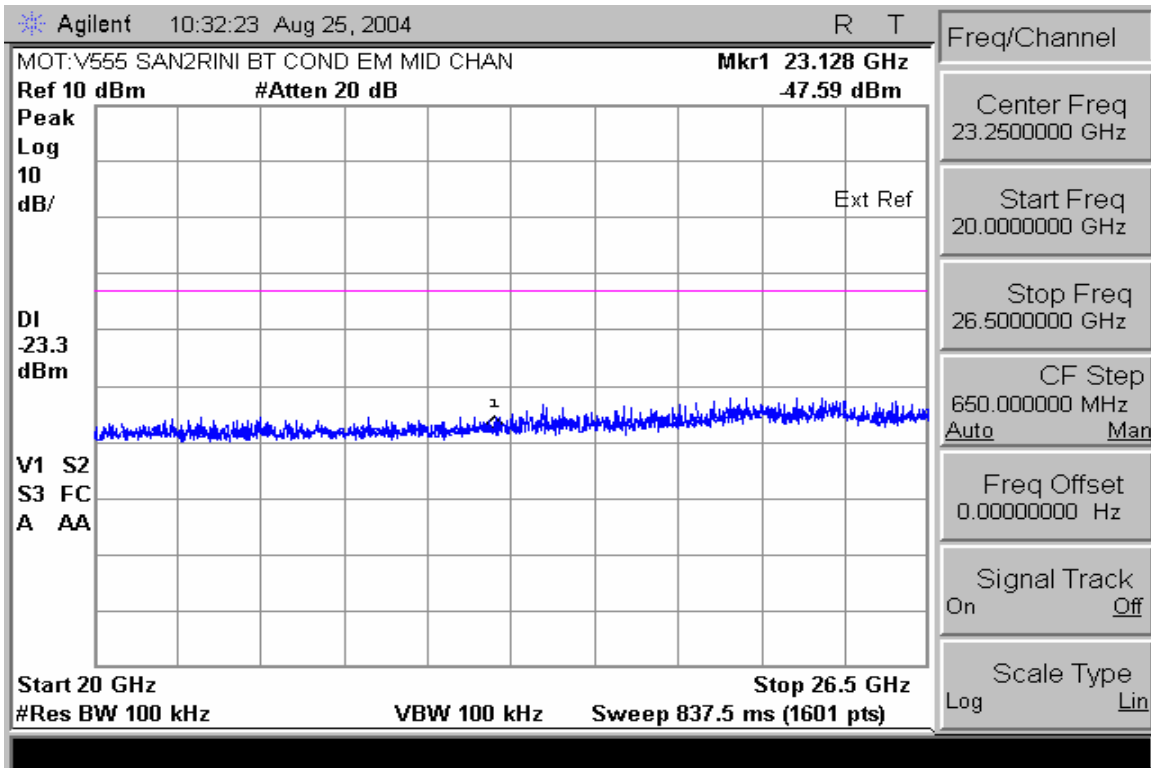
**Conducted Spurious Emissions 30-3000MHz (Mid Channel Enabled)**



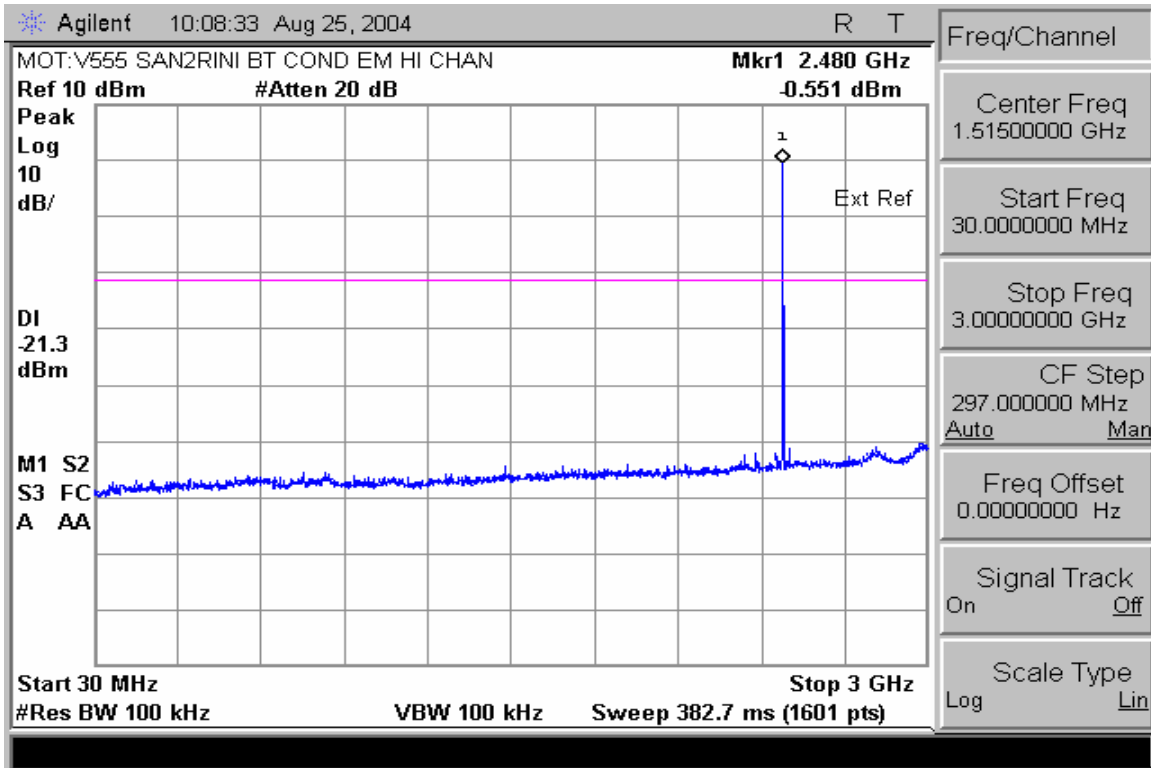
**Conducted Spurious Emissions 2-10GHz (Mid Channel Enabled)**



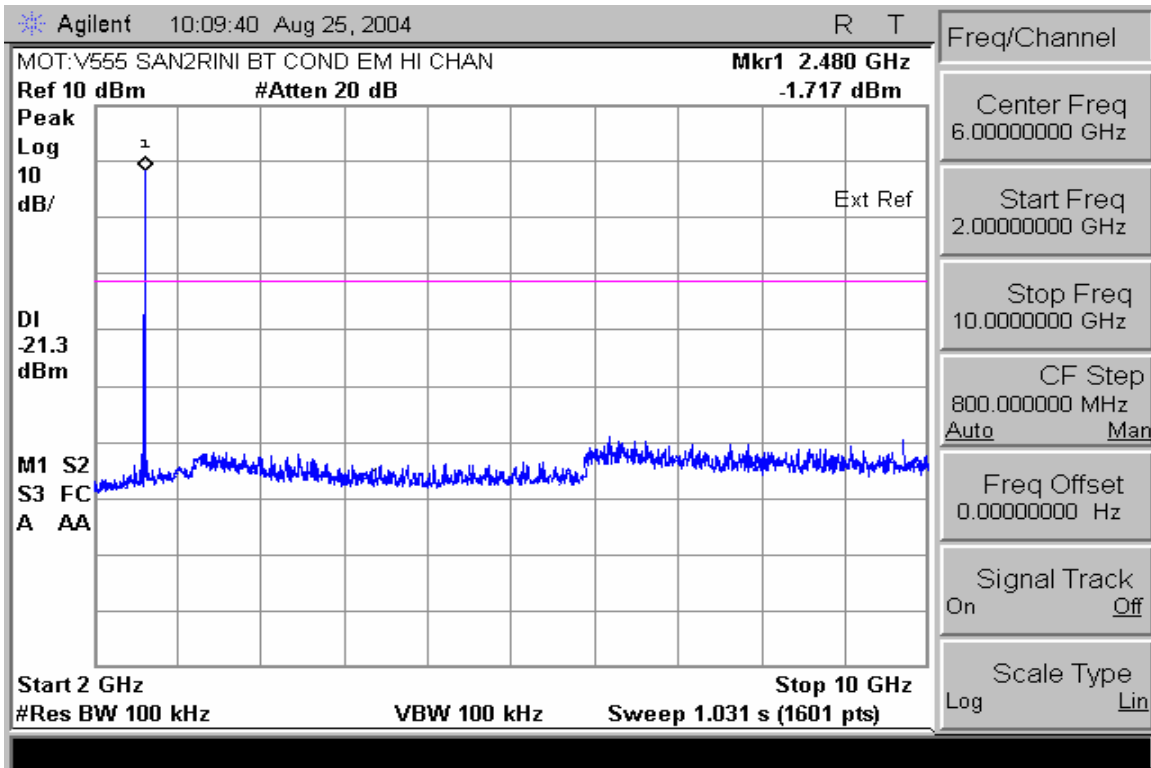
**Conducted Spurious Emissions 10-20GHz (Mid Channel Enabled)**



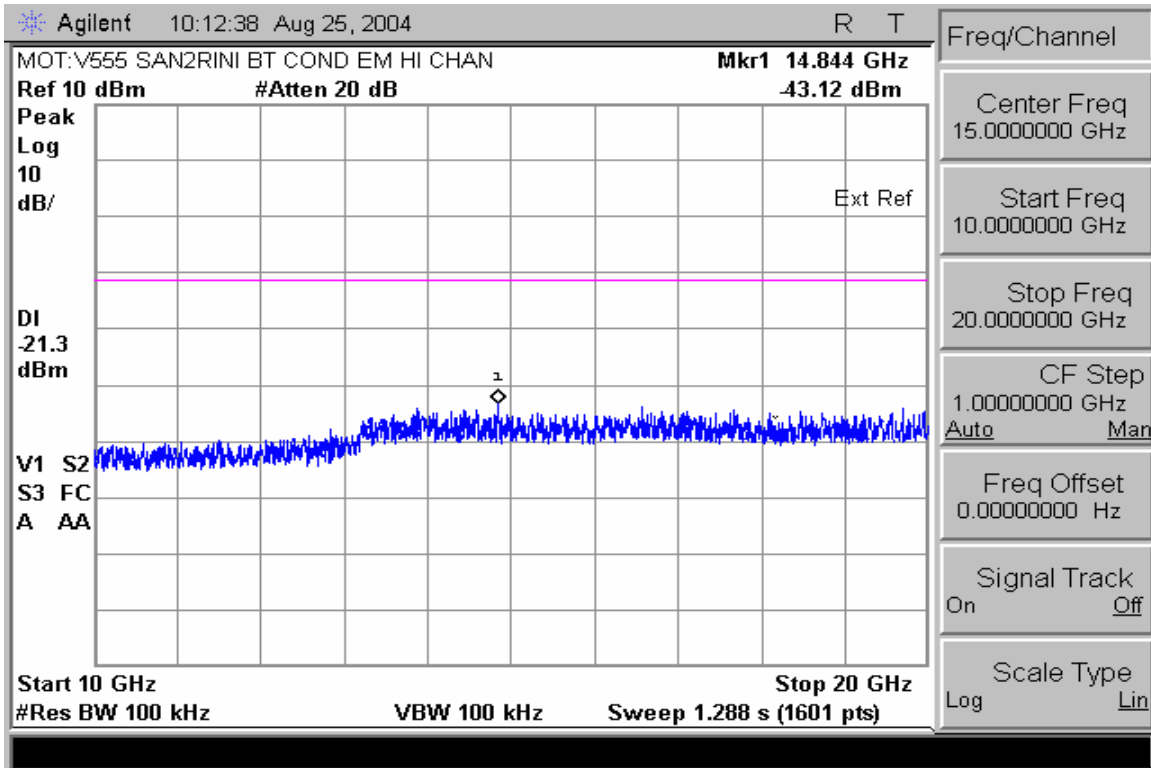
**Conducted Spurious Emissions 20-26.5GHz (Mid Chan Enabled)**



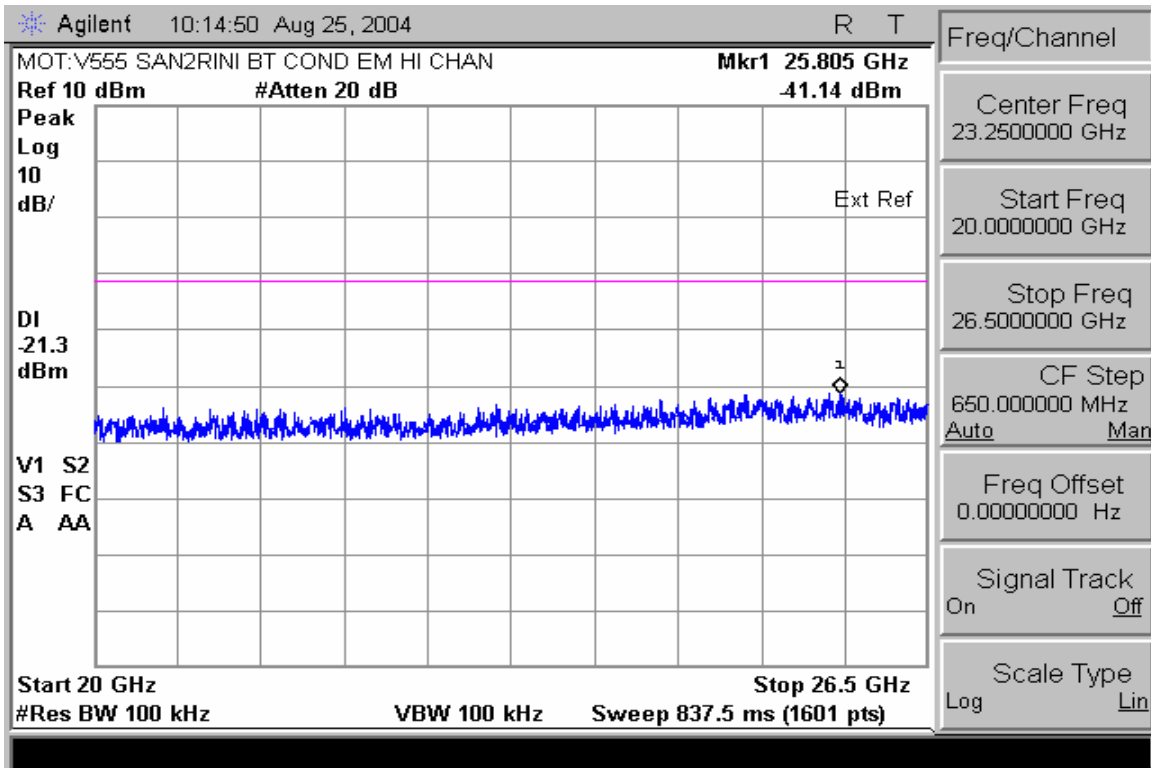
**Conducted Spurious Emissions 30-3000MHz (High Channel Enabled)**



**Conducted Spurious Emissions 2-10GHz (High Channel Enabled)**



**Conducted Spurious Emissions 10-20GHz (High Channel Enabled)**



**Conducted Spurious Emissions 20-26.5GHz (High Chan Enabled)**

**End of Test Report**