Intentional Radiator Test Report

Test Standards:
FCC Part 15 (Subpart C – Intentional Radiators)
Industry Canada RSS-210

Prepared For:

Socket Communications, Inc.
37400 Central Court
Newark, CA 94560

Equipment Under Test:
Bluetooth Headset

Model:
RING SCANNER

Prepared by:

44366 S. Grimmer Blvd.
Fremont, CA 94538
USA

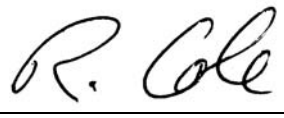
TABLE OF CONTENTS

1.0 CUSTOMER INFORMATION

Test Laboratory: **FCC registration number**	EMCE Engineering 44366 S. Grimmer Blvd. Fremont, CA 94538 USA Tel: 510-490-4307 Fax: 510-490-3441 bob@universalcompliance.com 0007-1981-20
Customer:	Socket Communications, Inc. 37400 Central Court Newark, CA 94560 Tel: 510-744-2700 Fax:510-744-2701
Contact Person:	Bob Miller
Receipt of EUT:	2/17/06
Test plan reference:	FCC Part 2, 15 (15.247) / IC RSS-210
Date of testing:	2/23/06 – 3/28/06
Date of Report:	3/31/06

The tests listed in this report have been completed to demonstrate compliance to the CFR 47 Section 15.247, as well as Industry Canada Radio Standard RSS-210, Issue 5.

Contents approved:


Name: Bob Cole Title: President

2.0 EUT AND ACCESSORY INFORMATION

EUT description

The EUT is a Socket Communications, Inc. **M/N: RING SCANNER.**

EUT and accessories

The table below lists all EUTs and accessories used in the tests. Later in this report, only numbers in the last column are used to refer to the devices in each test.

Software

The computers were equipped with test software provided by the customer. The software was used to control the EUT in the tests.

	Name	Type	S/N	Number
EUT	**RING SCANNER**	**RING SCANNER**	N/A	E0001
Accessories	Laptop Computer	Compaq Presario M/N: 1694	3882A744	S0001
Software	CSR Bluesuite 1.20	Bluetest, BlueChat	N/A	N/A

EUT Information

Product Specification	Description
Model Name	RING SCANNER
Type of Modulation	Frequency Hopping Spread Spectrum (FHSS)
Number of Hopping Channels	79
Operating Frequency Range	2480 – 2483.5 MHz
Type of Equipment	Combined, Battery Powered
Extreme Operating Temperature Range	-20 C – 55 C
Extreme Operating Voltage Range	Fully Charged Battery
Type of Antenna	Integral
Antenna Gain (dBi)	-3.0
Transmitter Method of Frequency Generation	Synthesized
Transmitter Aggregate Data Rate	>250kbps
Transmitter Duty Type	Intermittant
Transmitter Duty Cycle	Tx ON: .326 ms, Tx OFF: .924 ms: Duty Cycle = .261
Continuous Operation for Testing Purposes?	Yes
Transmit Emissions Designator	1M00 Q1D

3.0 SUMMARY OF TEST RESULTS

Section in CFR 47	Section in RSS-210	Description	Results
15.247 (b)(1)	6.2.2(o) (a2)	Peak output power (Radiated Emissions)	***PASSED***
15.247 (a)(1)	6.2.2(o) (a3)	CF Separation	***PASSED***
15.247 (a)(1)(ii)	6.2.2(o) (a3)	Number of Hopping Frequencies	***PASSED***
15.247 (a)(1)(ii)	6.2.2(o) (a3)	Dwell Time	***PASSED***
15.247 (a)(1)(ii)	6.2.2(o) (a3)	20 dB Bandwidth	***PASSED***
15.247, c	6.2.2(o) (e1)	Band-edge compliance of RF Radiated emission	***PASSED***
15.247, c	6.2.2(o) (e1)	Restricted Band (Radiated Emissions)	***PASSED***
15.247(d)	6.2.2(o) (e1)	Spurious radiated emissions	***PASSED***
15.247(d)	6.2.2(o) (e1)	Spurious Antenna Conducted emissions	***PASSED***

PASS The EUT passed that particular test.
FAIL The EUT failed that particular test.

4.0 STANDARDS AND MEASUREMENT METHODS

The tests were performed in guidance of CFR 47 section 15.247, FCC Public Notice DA 00-705 (March 30, 2000), FCC Report & Order 97-114 (April 10, 1997),and ANSI C63.4 (2003). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method". For the test equipment, see device list in the end of this test.

4.1 Selection of operation mode for tests

Before tests, several operation modes, and modulation patterns were tried. The worst case was selected for each test and those results reported.

5.0 TEST SETUPS

To fulfill all requirements for the testing, total of two different test setups were used. One EUT was used, unmodified for radiated tests.

SMA connector added in place of internal antenna for Antenna Conducted measurements.

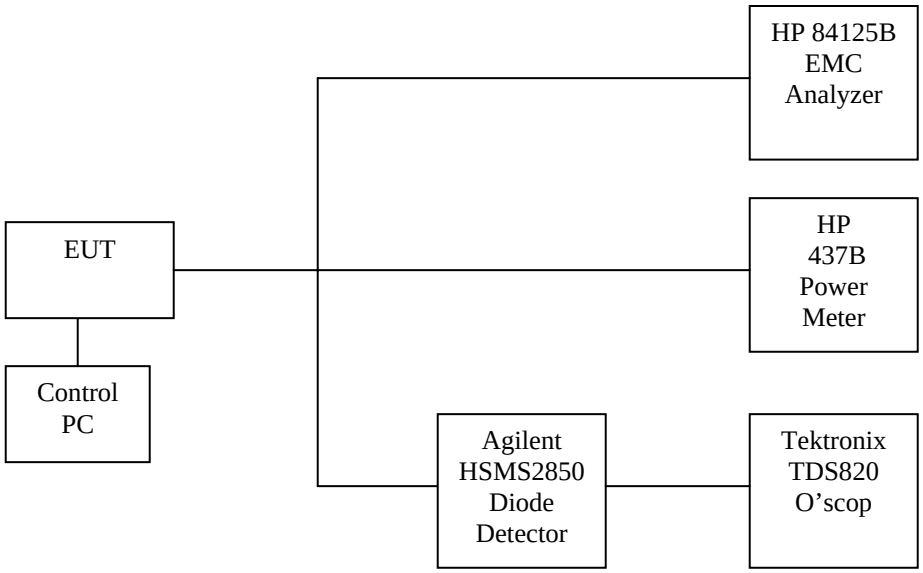
Setup A (Antenna Conducted measurements)

Operational description

ANTENNA CONDUCTED EMISSIONS MEASUREMENTS

The EUT was connected to the Laptop Computer through the serial port (COM1), the antenna bypassed and the SMA Cable connected to the Spectrum Analyzer. This setup was used for the ***PEAK POWER OUTPUT, CF SEPARATION, NUMBER OF HOPPING FREQUENCIES, 20 dB BW, BAND-EDGE COMPLIANCE, and RESTRICTED BAND*** measurements.

Block Diagram



The solid lines are coaxial cables and the dashed lines are either EUT insertion to the test board or control cables between test setup devices. The measurement results were adjusted with the attenuation of the coaxial cable.

Setup B (Radiated measurements)

Operational description

RADIATED EMISSIONS MEASUREMENTS

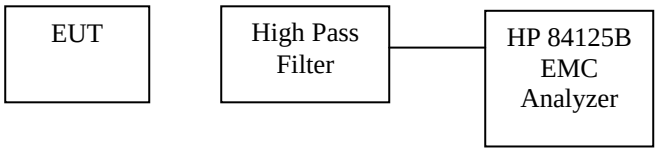
This setup was used in radiated emissions measurements with hopping enabled.

The EUT was tested in 3 orthogonal orientations.

Worst case data is presented.

THIS SETUP USED FOR ***RADIATED SPURIOUS EMISSIONS***

Block diagram



Note: The high –pass filter is used for the Radiated Spurious emissions above 2.4835 GHz. A pass-thru connector is used for Radiated Spurious emissions measurements from 30 MHz – 2.4 GHz.

The solid lines are coaxial cables and the dashed lines are either EUT insertion to the test board or control cables between test setup devices.

6.0 TEST RESULTS

The measurement results were adjusted for the attenuation of the cable between the EUT connector and receiver.

PEAK OUTPUT POWER

Peak Output Power [CFR 47, 15.247(b)(1) and RSS-210 6.2.2(o)]

EUT	**RING SCANNER**
Test setup	A (conducted – hopping DISABLED)
Temp, Humidity, Air Pressure	68º F, 30.28
Date of Measurement	2/23/06
Measured by	Bob Cole
Result	PASSED

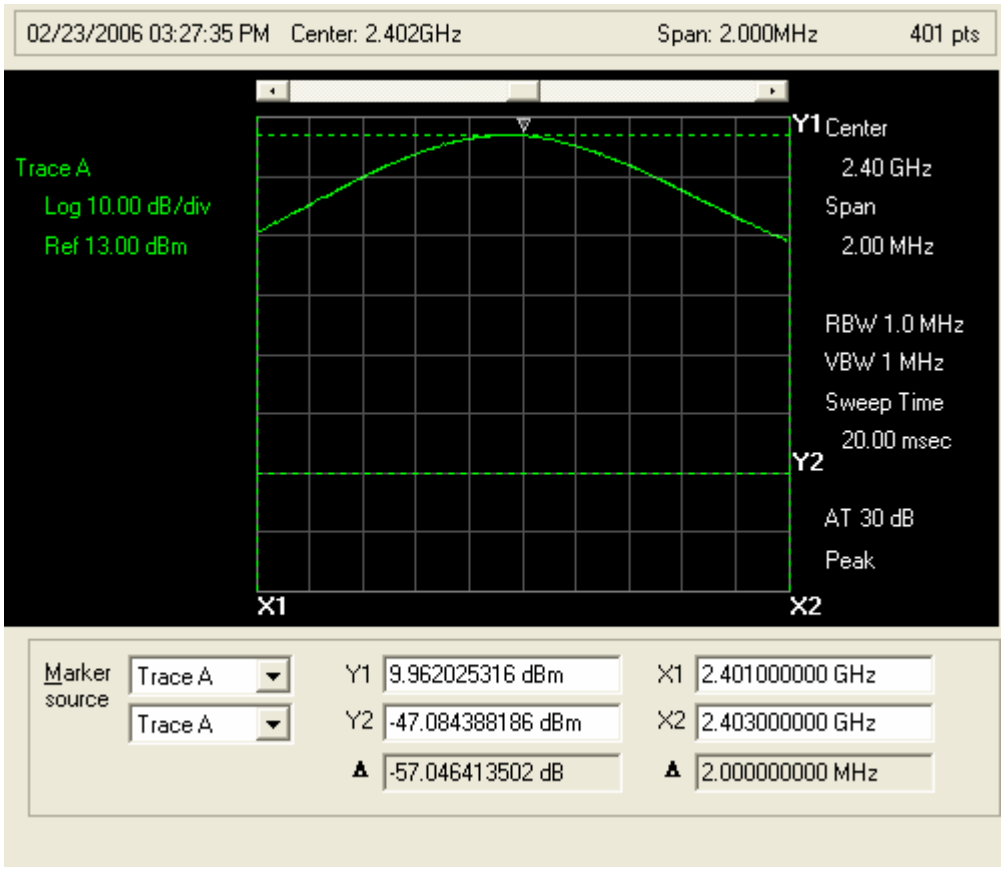
Limits and results

PEAK OUTPUT POWER

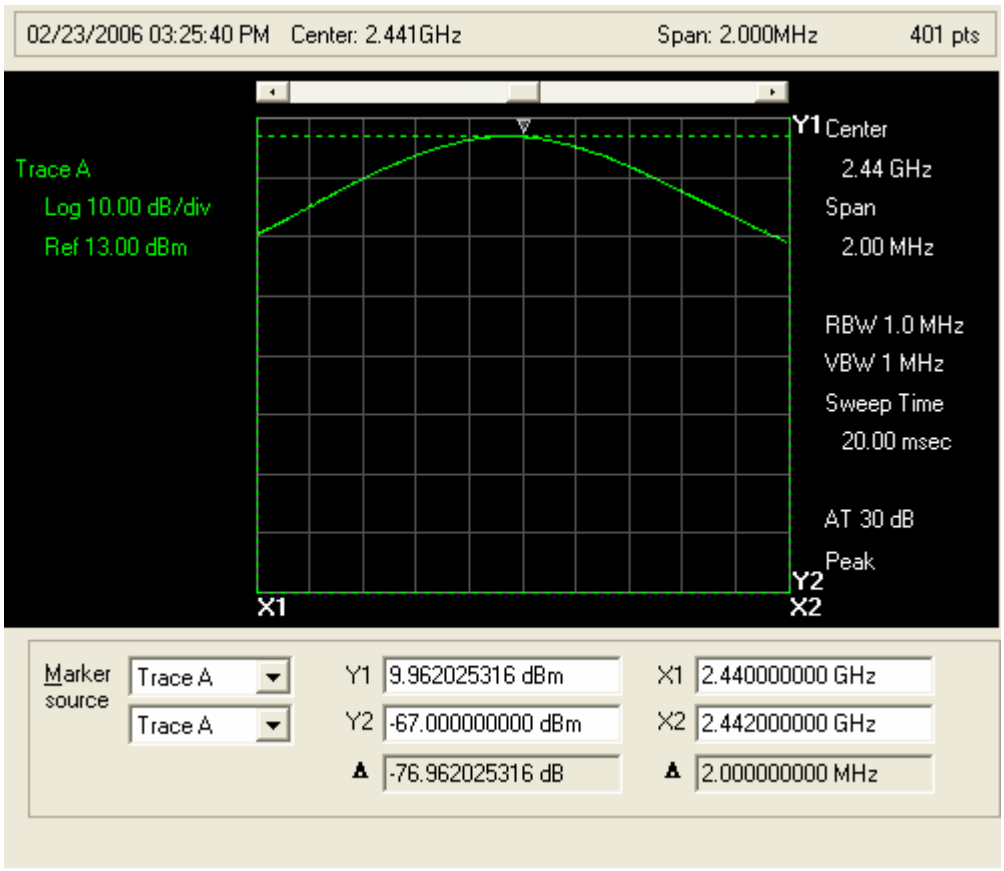
EUT Channel	Limit (dBm)	Test results (dBm)
2	30.0	9.962
40	30.0	9.962
80	30.0	8.274

Screen shots

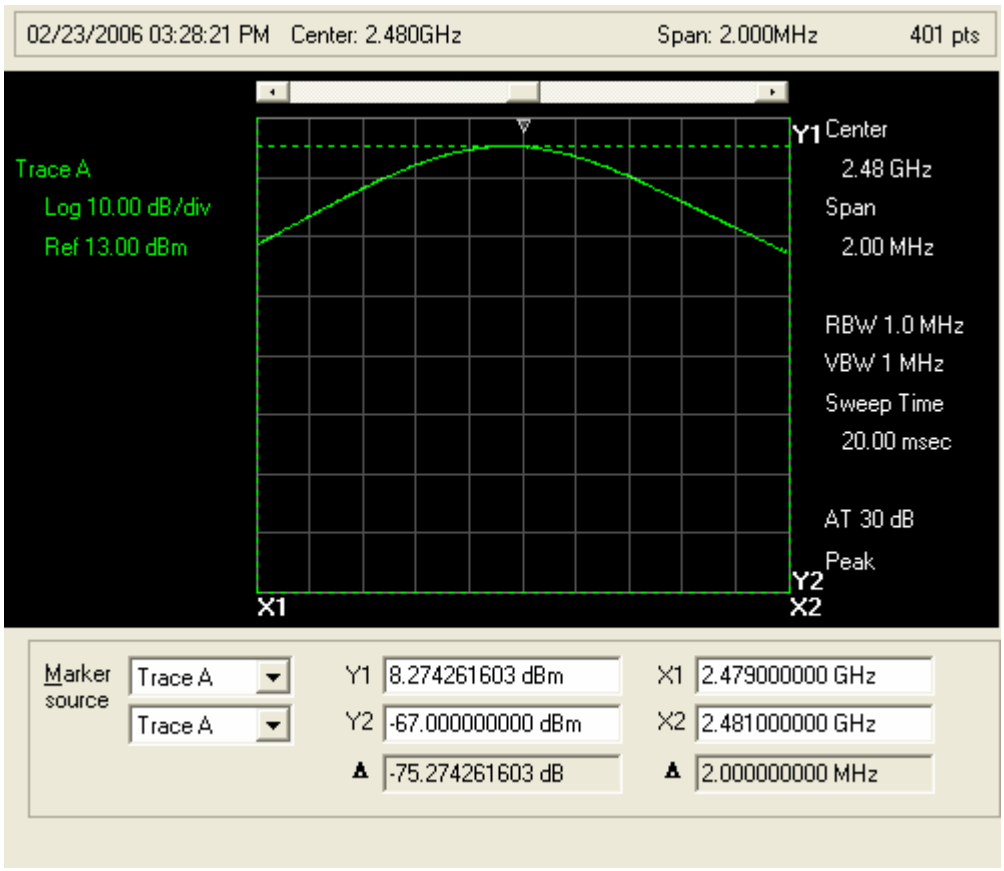
Plot 1: Peak output power 2402 MHz



Plot 2: Peak output power 2441 MHz



Plot 3: Peak output power 2480 MHz



CENTER FREQUENCY SEPARATION

CF Separation [CFR 47, 15.247 (a)(1) and RSS-210 6.2.2(o)]

EUT	**RING SCANNER**
Test setup	A (conducted – hopping enabled)
Temp, Humidity, Air Pressure	67º F, 29.96
Date of Measurement	2/27/06
Measured by	Bob Cole
Result	PASSED

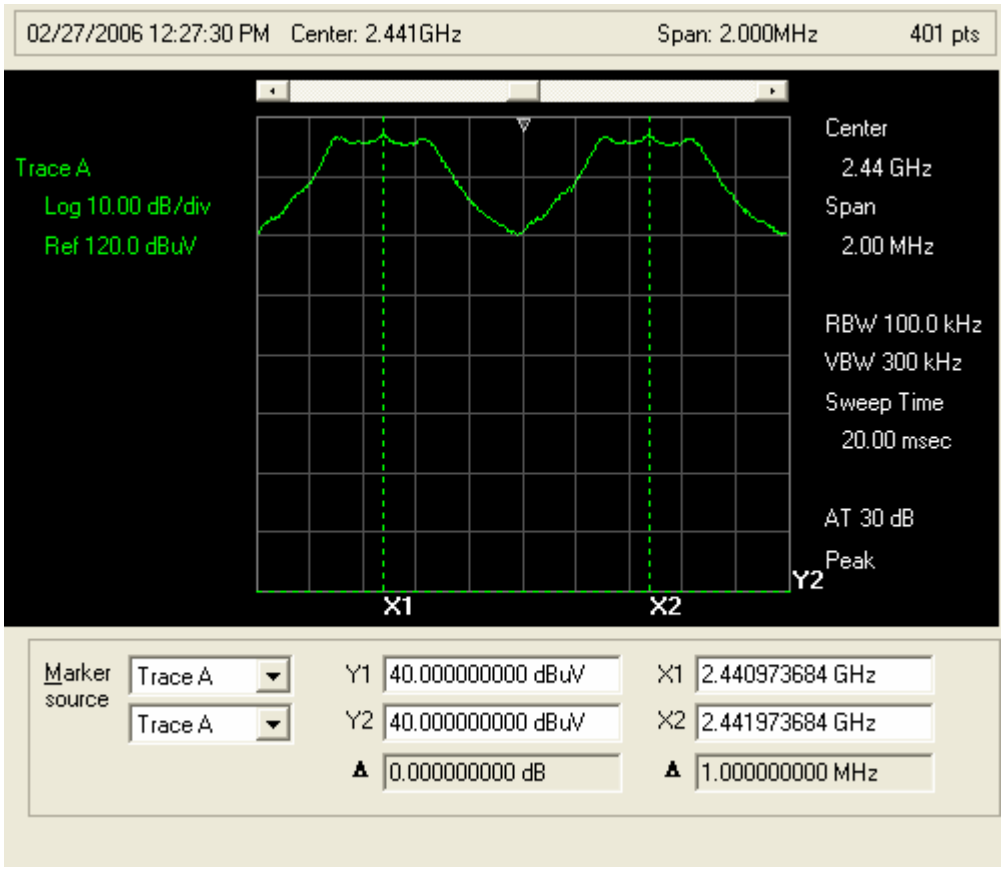
Limits and results

CENTER FREQUENCY SEPARATION

EUT Channel	Limit (MHz)	Test results (MHz)
41-42	</= 1.0	1.000

Screen Shot:

Plot 4: CF separation



NUMBER OF HOPPING FREQUENCIES

Number of Hopping Frequencies [CFR 47, 15.247 (a)(1)(ii) and RSS-210 6.2.2(o)]

EUT	**RING SCANNER**
Test setup	A (conducted – hopping enabled)
Temp, Humidity, Air Pressure	60º F, 29.92
Date of Measurement	2/23/06
Measured by	Bob Cole
Result	PASSED

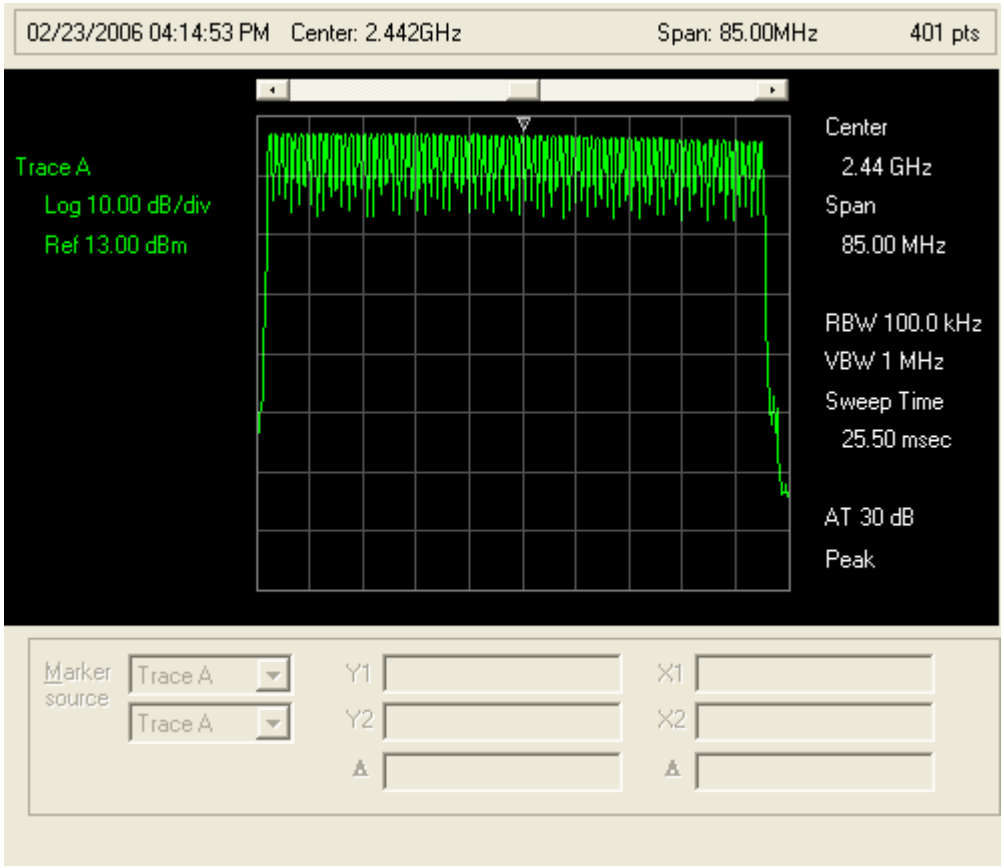
Limits and results

NUMBER OF HOPPING FREQUENCIES

EUT Channel	Limit (MHz)	Test results (MHz)
2-80	<= 75	79

Screen Shot:

Plot 5: Number of Hopping Frequencies



DWELL TIME

Dwell Time

EUT	**RING SCANNER**
Test setup	N/A
Temp, Humidity, Air Pressure	N/A
Date of Measurement	N/A
Measured by	Bob Cole
Result	PASSED – see Bluetooth Specification below

Limits and results

DWELL TIME

EUT Channel	Limit	Test results
2	400 ms per 30 second of operation	PASSED *See description that follows*

There are five hopping sequences (section 11, Bluetooth Spec. 1.1):

1) A **page hopping sequence** with 32 unique wake-up frequencies distributed equally over the 79 MHz, with a period length of 32; The basic slot time can be 312.5 uS or 625 uS. Min. hop repeat rate = 32*.3125mS = 10mS.
2) A **page response sequence (page scan)** covering 32 unique response frequencies that all are in a one-to-one correspondence to the current page hopping sequence. The master and slave use different rules to obtain the same sequence. The basic slot time can be 312.5 uS or 625 uS and the period is 1.28s.
3) An **inquiry sequence** with 32 unique wake-up frequencies distributed equally over the 79 MHz, with a period length of 32; The basic slot time can be 312.5 uS or 625 uS. Min. hop repeat rate = 32*.3125mS = 10mS.
4) An **inquiry response sequence (inquiry scan)** covering 32 unique response frequencies that all are in a one-to-one correspondence to the current inquiry hopping sequence. The basic slot time can be 312.5 uS or 625 uS and the period is 1.28s.
5) A **channel hopping sequence** which has a very long period length, which does not show repetitive patterns over a short time interval, but which distributes the hop frequencies equally over the 79 MHz during a short time interval; The basic slot time is 625 uS.

Worst case dwell times (largest dwell value) would be found with #5, the Channel Hopping (or data) sequence. The other hopping sequences may short shorter time sequences; however they are not repeated as often and hence have a lower overall dwell or duty cycle.

In normal transactions one may see occasional short periods between a chosen frequency due to inquiry and page scans possibly be interleaved during data transactions. It's my understanding that this would not create a dwell cycle result worse than the Channel hopping or data sequence.

Channel Hopping Sequence (Data sequence) Dwell Calculation

Cycle time for complete hopping sequence of a 79 hop cycle (data transmission mode) =

(1.1) Time slot period * 79 slots = 625uS * 79 = 49.375 mS

See page below from Bluetooth spec. Rev 1.1, section 2, for a depiction of the hopping sequence versus packet size. Figure 2.1 shows a DH1 cycle. Figure 2.2 shows a DH1, DH3 and DH5 sequence (resp.).

Every time slot has a frequency assignment, and the frequency used for a packet remains the same as the slot it started in, if the packet is longer than one time slot.

For a DH1 packet this does not have an impact. The channel selector steps thru the entire list of 79 pseudo-random channels and then start over from the beginning.

For a DH5 (5 Slot packet), the starting frequency will be used for all 5 time slots (f(k) in this example), and 4 following frequencies will not be used during that hopping cycle. Therefore instead of stepping sequential thru the 79 frequency channel list, only every 5th channel is used. Each time the 79 frequency channel list is started, is it a new randomized list of 79 channels. The probability that it will use the same frequency channel in the next list is 1/5.

Therefore even though the DH5 is at one frequency for 5 times longer than a DH1 packet, it repeats itself 1/5 as often, with the effective dwell time (averaged over a long period over a long period of time – for instance the 30 sec FCC dwell test) being the same.

For the "duty cycle correction factor", my "read" of the FCC doc says that one should take the "worst" 100mS period found, in contrast to the average 30 sec dwell time just mentioned. As a result the DH1 and DH5 numbers for the 100 mS dwell case will be different. For a worst case DH5 packet sequence, the same frequency channel could appear in two successive 79 channel sequences.

DH1 calculation: DH1 uses 1 time slot of 0.625 mS per hopping cycle.

Dwell time per 100mS – since one 79 hop sequence is approx 50mS, there will be approx. two hop sequences in 100 mS (more accurately 100/49.375).

(1.2) DH1 dwell time = 0.625 mS * (100ms/49.375mS) = 1.26 mS (per 100 mS)

DH5 calculation: DH5 uses 5 time slots of 0.625 mS per hopping cycle.

Dwell time per 100mS – since one 79 hop sequence is approx 50mS and there could be two appearances of a frequency channel in 100 mS (more accurately 100mms/49.375ms).

(1.3) DH5 dwell time =5* 0.625 mS * (100ms/49.375mS) = 6.3 mS (per 100 mS)

Using the FCC duty cycle correction factor:

(1.4) DH1 Dwell correction =
20 log (DH1 dwell time/100mS) = 20 log (0.0126) = -38 dB

(1.5) DH5 Dwell correction =
20 log (DH5 dwell time/100mS) = 20 log (0.0633) = -24 dB

Therefore the worst case duty cycle adjustment condition will be for the DH5 packet.

The calculation shows us that we can subtract 24 dB from our 2nd harmonic measurement to compensate for this duty cycle adjustment.

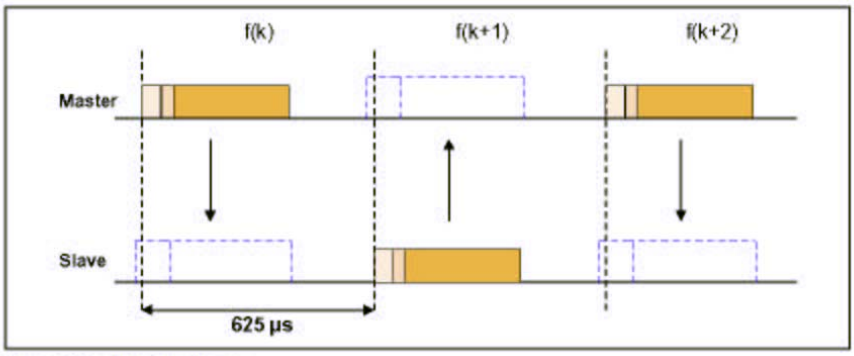


Figure 2.1: TDD and timing

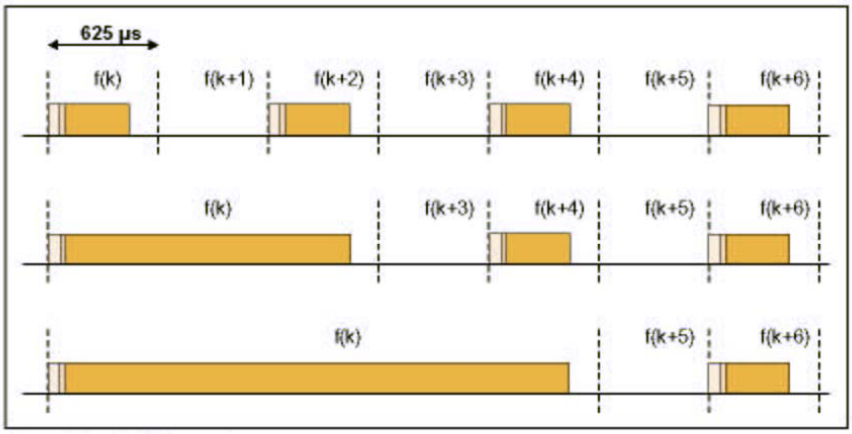


Figure 2.2: Multi-slot packets

20 dB Bandwidth

20 dB Bandwidth [CFR 47 15.247 (a)(1)(ii) and RSS-210 6.2.2(o)]

EUT	**RING SCANNER**
Test setup	A (conducted – hopping ENABLED)
Temp, Humidity, Air Pressure	58º F, 30.87
Date of Measurement	2/23/06
Measured by	Bob Cole
Result	PASSED

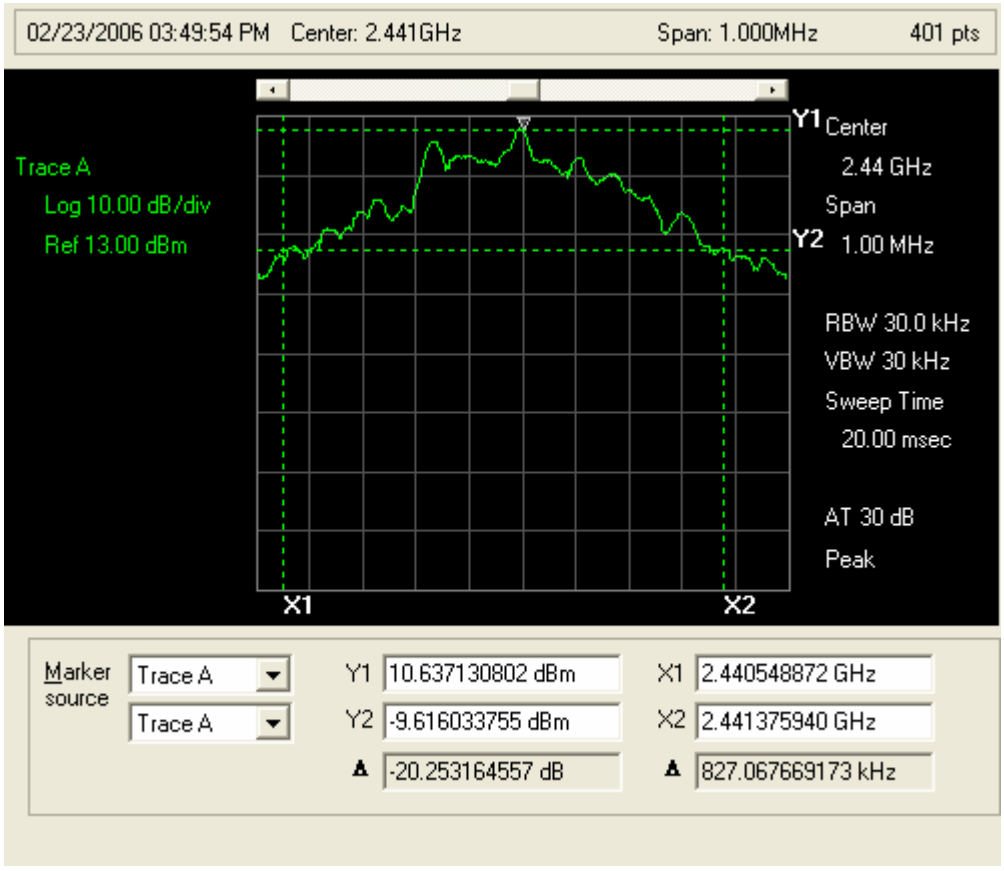
Limits and Results

20 dB BANDWIDTH

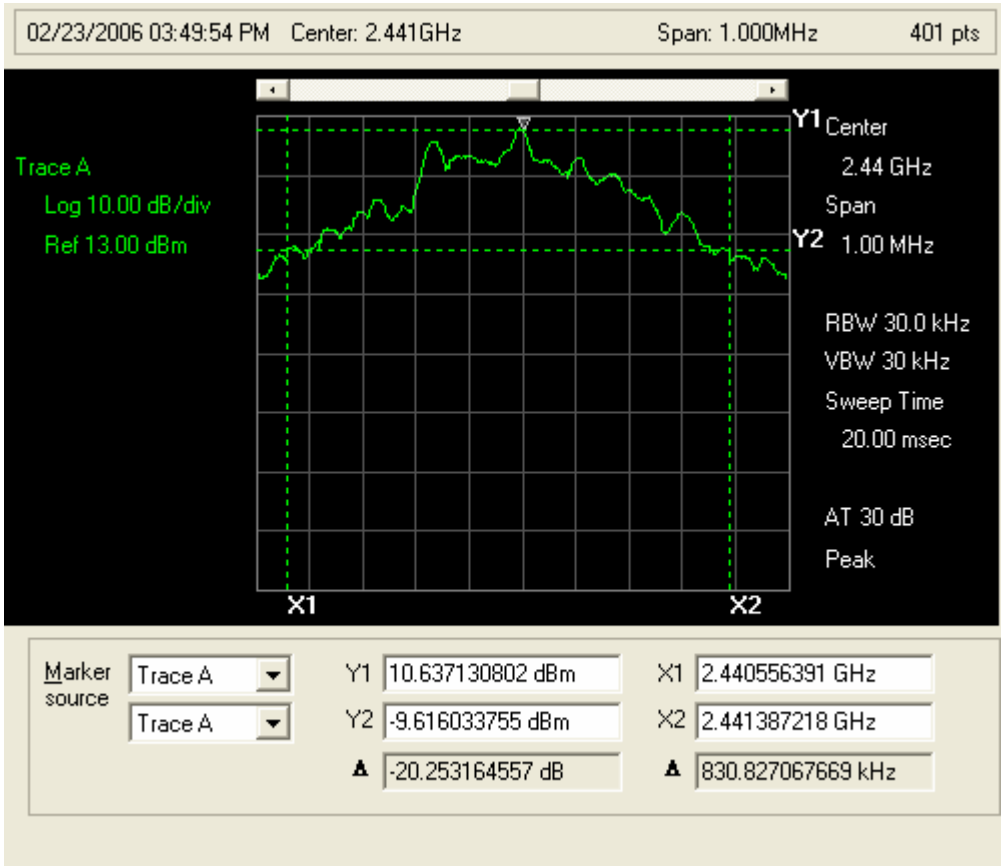
EUT Channel	Limit (MHz)	Test results (MHz)
2	</= 1.0	0.827
40	</= 1.0	0.830
80	</= 1.0	0.812

Screen Shots

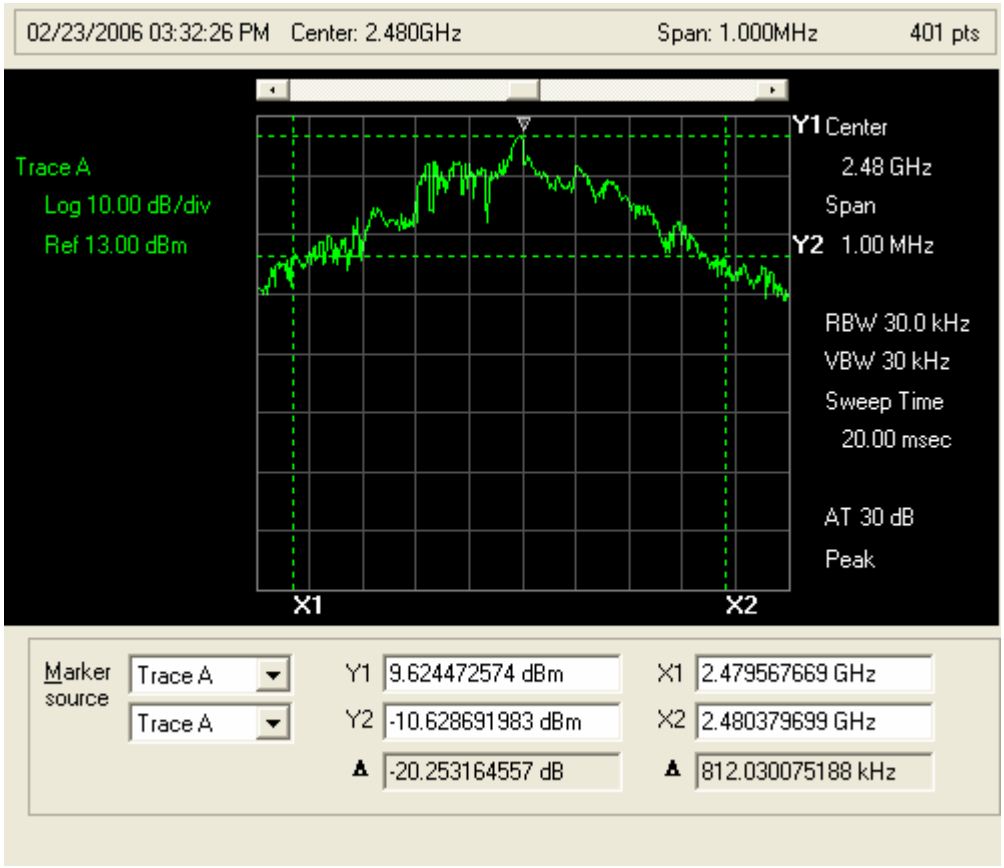
Plot 6: 20 dB BW 2402 MHz



Plot 7: 20 dB BW 2441 MHz



Plot 8: 20 dB BW 2480 MHz



BAND-EDGE COMPLIANCE

Band-edge compliance of RF Radiated emissions [CFR 47, 15.247c(1) and RSS-210 6.2.2(o)]

EUT	**RING SCANNER**
Test setup	A (conducted – hopping enabled & disabled)
Temp, Humidity, Air Pressure	59º F, 30.72
Date of Measurement	2/27/06
Measured by	Bob Cole
Result	PASSED

EUT operation mode

EUT operation mode	Hopping Enabled / Disabled
EUT channel	2, 80
EUT TX power level	Maximum

Limits and results

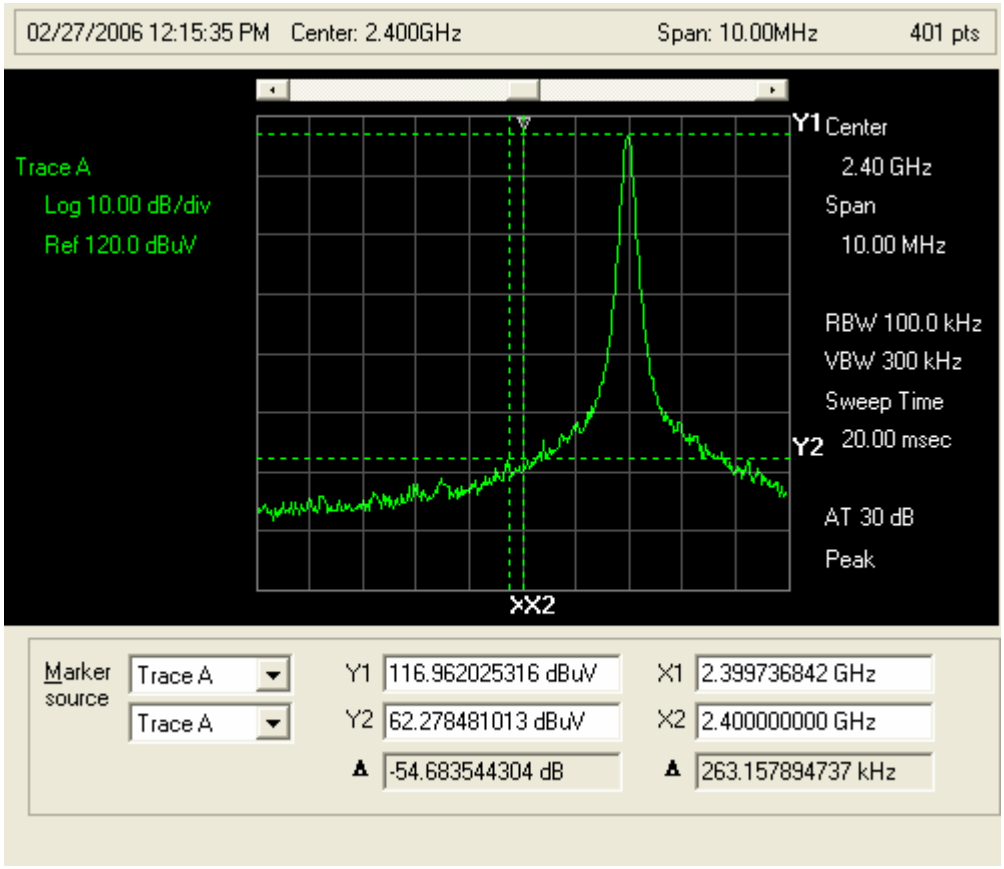
BAND-EDGE COMPLIANCE

Channel	Limit (dBuV)	Results (dBuV)
2	101.0	67.004
80	101.0	57.215

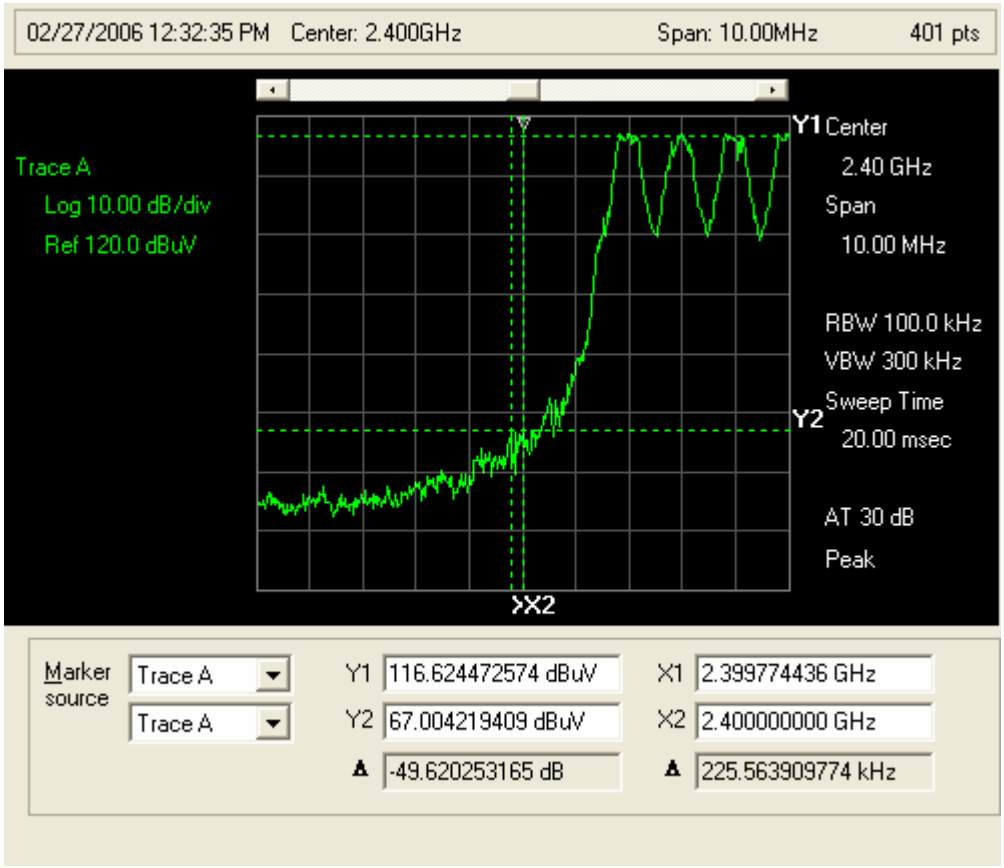
NOTE: 0 dBm = 107 dBuV

Screen shots:

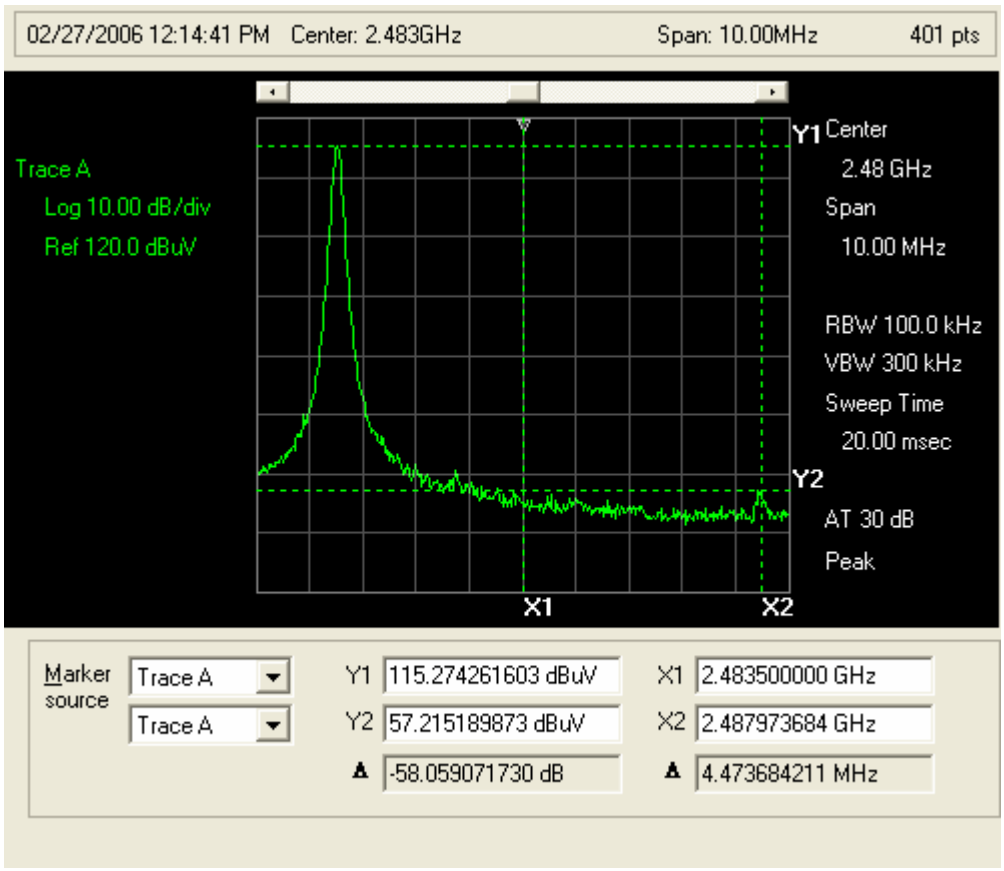
Plot 9: Band-edge Compliance, Lower Band-edge (Hopping Disabled)



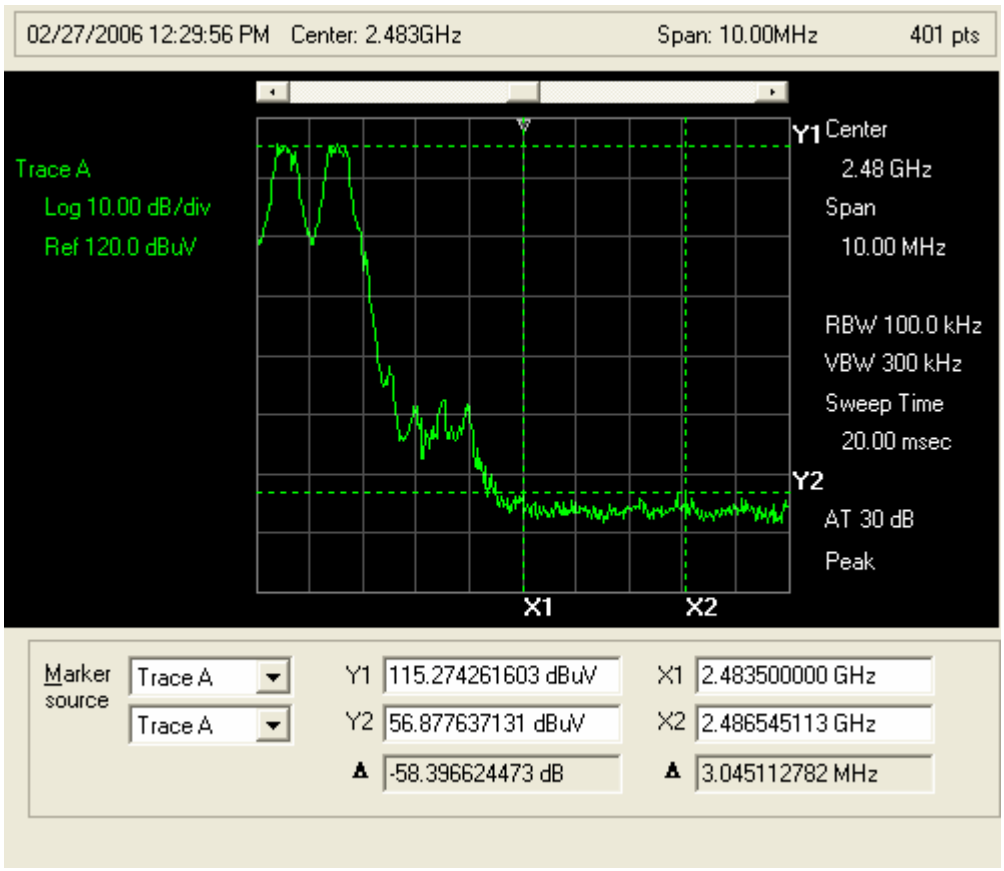
Plot 10: Band-edge Compliance, Lower Band-edge (Hopping Enabled)



Plot 11: Band-edge compliance, Upper Band-edge (Hopping Disabled)



Plot 12: Band-edge Compliance, Upper Band-edge (Hopping Enabled)



RESTRICTED BAND MEASUREMENTS

Restricted Band Measurements [CFR 47, 15.247(c) and RSS-210 6.2.2(o)]

EUT	**RING SCANNER**
Test setup	B (Radiated – hopping enabled)
Temp, Humidity, Air Pressure	59º F, 30.72
Date of Measurement	2/27/06
Measured by	Bob Cole
Result	PASSED

Limits and results

RESTRICTED BANDS

Frequency (MHz)	Limit (dBm)	Results (dBuV)
2310 - 2390	-6.0	-52.15
2483.5-2500	-6.0	-54.17

Note: All restricted Bands from 30 MHz to 18 GHz were examined.

SPURIOUS RF RADIATED EMISSIONS

Spurious RF Radiated Emissions [CFR 47, 15.247c1) and RSS-210 6.2.2(o)]

CLASS B LIMIT (10M MEASURING DISTANCE)

Frequency Band (MHz)	Limit (dBµV/m)	Detector
30-88	40	Q-Peak
88-230	43.5	Q-Peak
230-960	46	Q-Peak
960-1000	54	Q-Peak
1000-25000	54	Average

Emission measurement data, 30 MHz – 1GHz

The measurement results were obtained as described below.

E[uV/m]- URX + ACABLE + AF – GPREAMP

Where:

U_{RX}	receiver reading
A_{CABLE}	Attenuation of the cable
AF	Antenna Factor
G_{PREAMP}	Gain of the preamplifier

RADIATED EMISSIONS, 30-1000 MHz (3 meter Measurement Distance)
CFR 47, 15.209 Limits

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket**
Specification: **EN55022B RADIATED**
Work Order #: **2468** Date: 2/17/2006
Test Type: **Radiated Scan** Time: 12:14:35 PM
Equipment: **Ring Scanner** Sequence#: 2
Manufacturer: Socket Communications Tested By: Bob Cole
Model: Ring Scanner
S/N: EMI Sample

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

Function	Manufacturer	Model #	S/N

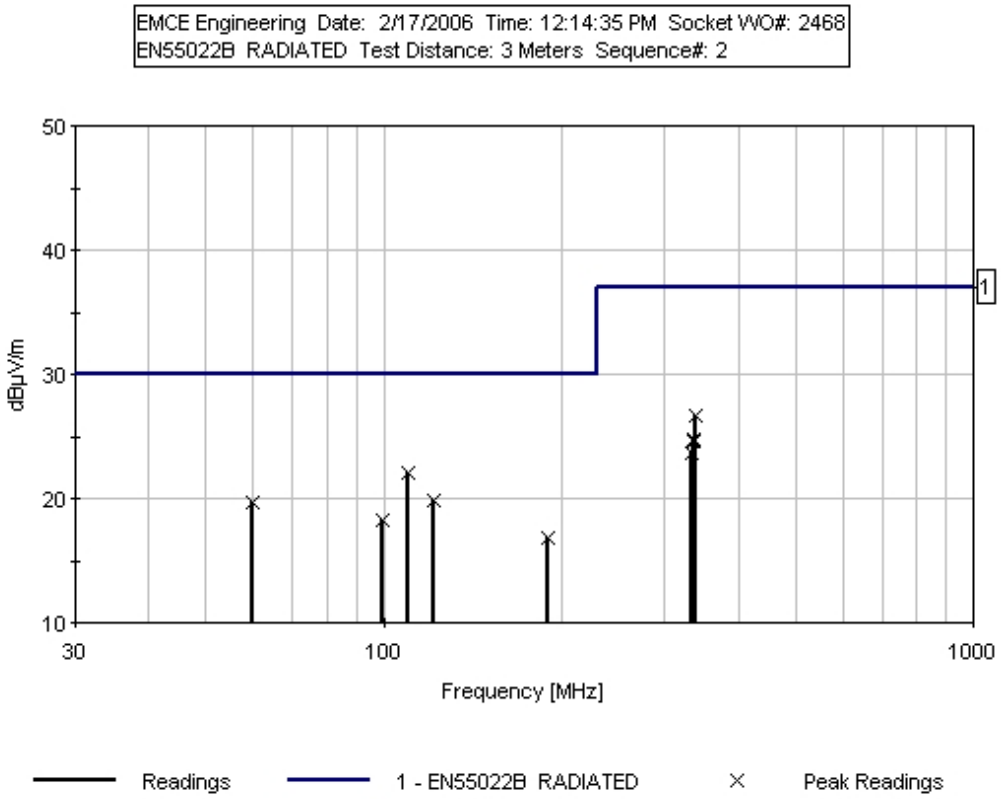
Test Conditions / Notes:

Transducer Legend:

T1=EMCO BIA30 Biconical S/N 4084	T2=EMCO LPA-30 Log Periodic 1 meter
T3=Chamber Receive Cable	T4=8447 Pre-Amp

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	109.955M	43.3	+14.5	+0.0	+1.0	+26.7	-10.0	22.1	30.0	-7.9	Vert
2	121.754M	41.5	+13.8	+0.0	+1.1	+26.6	-10.0	19.8	30.0	-10.2	Vert
3	60.076M	45.0	+10.5	+0.0	+1.0	+26.8	-10.0	19.7	30.0	-10.3	Horiz
4	339.076M	44.3	+0.0	+16.9	+2.3	+26.8	-10.0	26.7	37.0	-10.3	Vert
5	99.916M	41.7	+12.4	+0.0	+0.9	+26.7	-10.0	18.3	30.0	-11.7	Horiz
6	335.353M	42.3	+0.0	+17.0	+2.3	+26.8	-10.0	24.8	37.0	-12.2	Vert
7	335.953M	42.1	+0.0	+17.0	+2.3	+26.8	-10.0	24.6	37.0	-12.4	Vert
8	190.168M	34.8	+17.2	+0.0	+1.6	+26.7	-10.0	16.9	30.0	-13.1	Vert
9	332.711M	41.2	+0.0	+17.0	+2.3	+26.8	-10.0	23.7	37.0	-13.3	Horiz


EMCE Engineering Date: 2/17/2006 Time: 12:14:35 PM Socket WO#: 2468
EN55022B RADIATED Test Distance: 3 Meters Sequence#: 2
50
40
30
20
10
dBµV/m
30
100
1000
Frequency [MHz]
1
Readings
1 - EN55022B RADIATED
Peak Readings

1.0 - 2.4835 GHz Test Data

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket Communications**
Specification: **BT FCC Radiated 1--4 GHz2**
Work Order #: **2438** Date: 2/27/2006
Test Type: **Radiated Scan** Time: 4:11:38 PM
Equipment: **Compact Flash Bluetooth Card** Sequence#: 16
Manufacturer: Socket Communications, Inc. Tested By: Bob Cole
Model: CF BT2
S/N: N/A

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
P 84125B	E01	12/03/2005	12/03/2006	EMC Analyzer

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Compact Flash Bluetooth Card*	Socket Communications, Inc.	CF BT2	N/A

Support Devices:

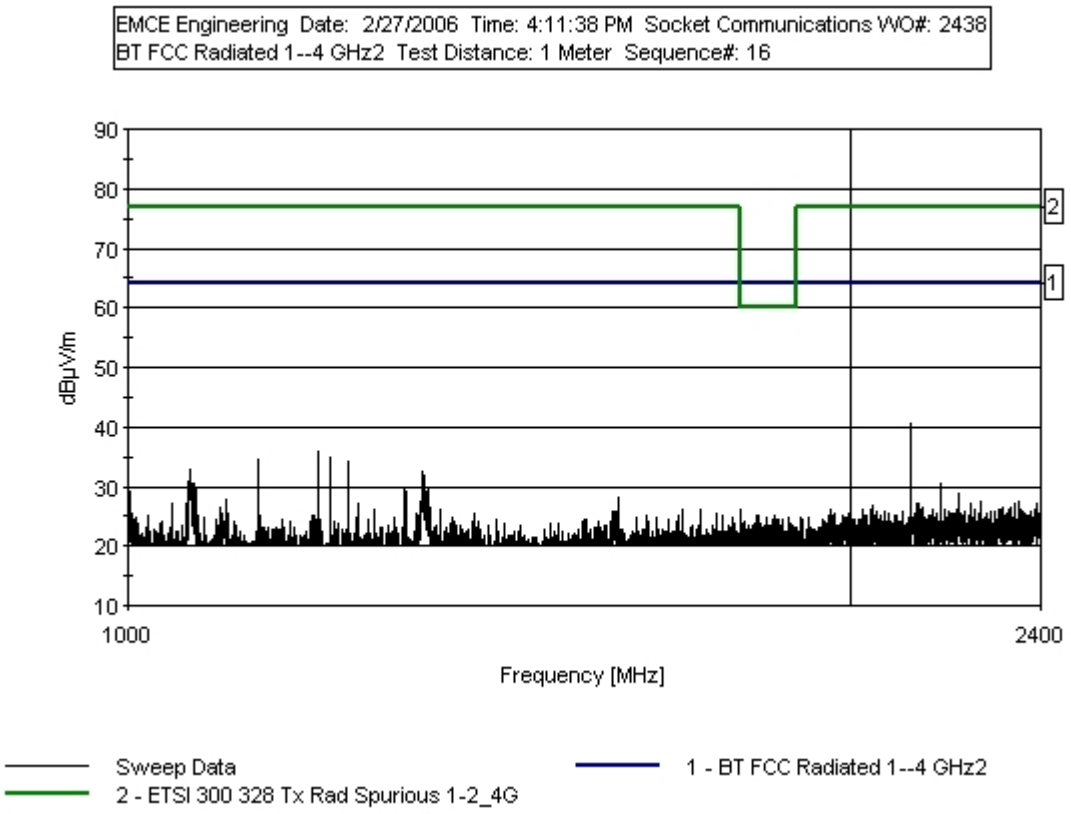
Function	Manufacturer	Model #	S/N
Laptop Computer	Compaq Presario	1649	3882A744

Test Conditions / Notes:

Transducer Legend:

Measurement Data: Reading listed by margin. Test Distance: 1 Meter

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	2117.616M	40.7					+0.0	40.7	64.0	-23.3	Vert
2	1000.250M	39.6					+0.0	39.6	64.0	-24.4	Vert
3	1213.964M	34.8					+0.0	34.8	64.0	-29.2	Vert
4	1133.633M	34.5					+0.0	34.5	64.0	-29.5	Vert
5	1200.200M	34.2					+0.0	34.2	64.0	-29.8	Vert
6	1234.985M	34.2					+0.0	34.2	64.0	-29.8	Vert
7	1061.562M	32.8					+0.0	32.8	64.0	-31.2	Vert
8	1325.575M	32.5					+0.0	32.5	64.0	-31.5	Vert
9	1328.078M	31.9					+0.0	31.9	64.0	-32.1	Vert
10	1329.329M	30.7					+0.0	30.7	64.0	-33.3	Vert


EMCE Engineering Date: 2/27/2006 Time: 4:11:38 PM Socket Communications WO#: 2438
BT FCC Radiated 1--4 GHz2 Test Distance: 1 Meter Sequence#: 16
90
80
70
60
50
40
30
20
10
dBµV/m
1000
2400
Frequency [MHz]
2
1
Sweep Data
2 - ETSI 300 328 Tx Rad Spurious 1-2_4G
1 - BT FCC Radiated 1--4 GHz2

2.4835 – 25 GHz Test Data

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket Communications**
Specification: **BT FCC Radiated 2483-12750 MHz**
Work Order #: **2438** Date: 2/28/2006
Test Type: **Radiated Scan** Time: 10:15:02 AM
Equipment: **Ring Scanner** Sequence#: 18
Manufacturer: Socket Communications Tested By: Bob Cole
Model: Ring Scanner
S/N: EMI Sample

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
P 84125B	E01	12/03/2005	12/03/2006	EMC Analyzer

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Compaq Presario	1649	3882A744

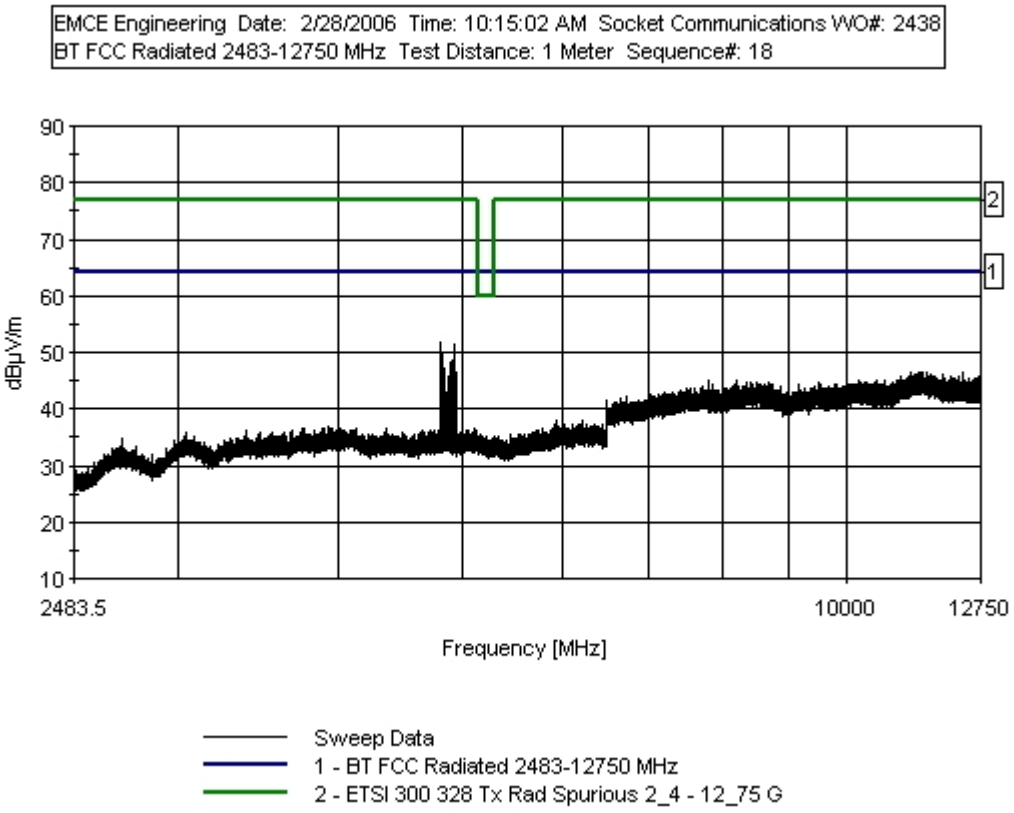
Test Conditions / Notes:

Transducer Legend:

Measurement Data: Reading listed by margin. Test Distance: 1 Meter

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	4808.074M	51.6					+0.0	51.6	64.0	-12.4	Vert
2	4932.198M	51.3					+0.0	51.3	64.0	-12.7	Vert
3	4830.597M	49.5					+0.0	49.5	64.0	-14.5	Vert
4	4909.676M	48.6					+0.0	48.6	64.0	-15.4	Vert
5	4898.415M	48.4					+0.0	48.4	64.0	-15.6	Vert
6	4842.108M	47.0					+0.0	47.0	64.0	-17.0	Vert
7	11386.130 M	46.6					+0.0	46.6	64.0	-17.4	Vert
8	11453.450 M	46.5					+0.0	46.5	64.0	-17.5	Vert
9	4954.721M	46.4					+0.0	46.4	64.0	-17.6	Vert

10	11575.570 M	46.4			+0.0	46.4	64.0	-17.6	Vert



RECEIVER SPURIOUS RADIATED EMISSIONS

Spurious RF Radiated Emissions [CFR 47, 15.247c1) and RSS-210 6.2.2(o)]

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket Communications**
Specification: **BT RX Radiated 1000-12750**
Work Order #: **2438** Date: 2/27/2006
Test Type: **Radiated Scan** Time: 4:13:24 PM
Equipment: **Ring Scanner** Sequence#: 17
Manufacturer: Socket Communications, Inc. Tested By: Bob Cole
Model: Ring Scanner
S/N: N/A

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
P 84125B	E01	12/03/2005	12/03/2006	EMC Analyzer

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner	Socket Communications, Inc.	Ring Scanner	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop Computer	Compaq Presario	1649	3882A744

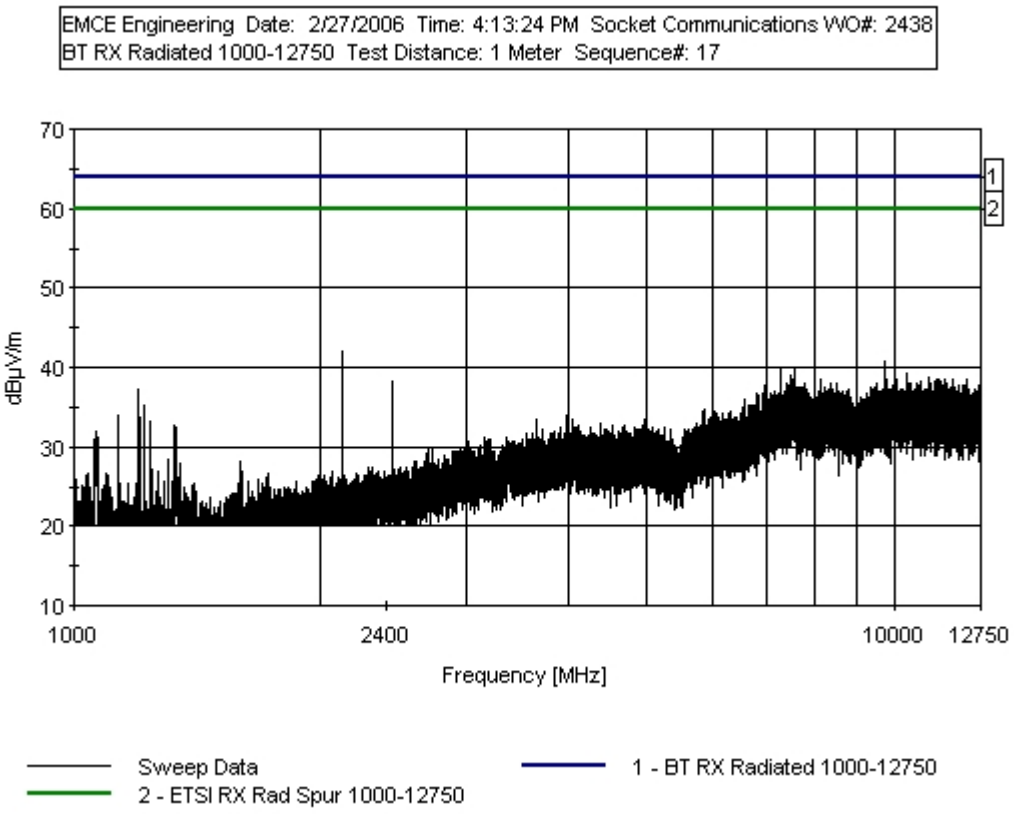
Test Conditions / Notes:

Transducer Legend:

Measurement Data: Reading listed by margin. Test Distance: 1 Meter

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	2127.626M	42.0					+0.0	42.0	64.0	-22.0	Vert
2	1000.500M	40.8					+0.0	40.8	64.0	-23.2	Vert
3	9758.248M	40.8					+0.0	40.8	64.0	-23.2	Vert
4	7543.542M	39.8					+0.0	39.8	64.0	-24.2	Vert
5	7257.756M	39.7					+0.0	39.7	64.0	-24.3	Vert
6	10375.870 M	39.3					+0.0	39.3	64.0	-24.7	Vert
7	7476.976M	38.9					+0.0	38.9	64.0	-25.1	Vert

8	7555.304M	38.7		+0.0	38.7	64.0	-25.3	Vert
9	11003.980 M	38.7		+0.0	38.7	64.0	-25.3	Vert
10	7519.268M	38.6		+0.0	38.6	64.0	-25.4	Vert



TRANSMITTER SPURIOUS CONDUCTED EMISSIONS

Spurious Conducted Emissions 1 GHz - 26 GHz – Worst Case Emission

Spurious Antenna Conducted Emissions 1.0 – 2.4 GHz

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket**
Specification: **ETSI 300 328 Tx Spurious Low**
Work Order #: **2486** Date: 2/27/2006
Test Type: **Conducted Emissions** Time: 12:45:06 PM
Equipment: **Ring Scanner** Sequence#: 1
Manufacturer: Socket Communications Tested By: Bob Cole
Model: Ring Scanner 120V 60Hz
S/N: EMI Sample

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

Function	Manufacturer	Model #	S/N

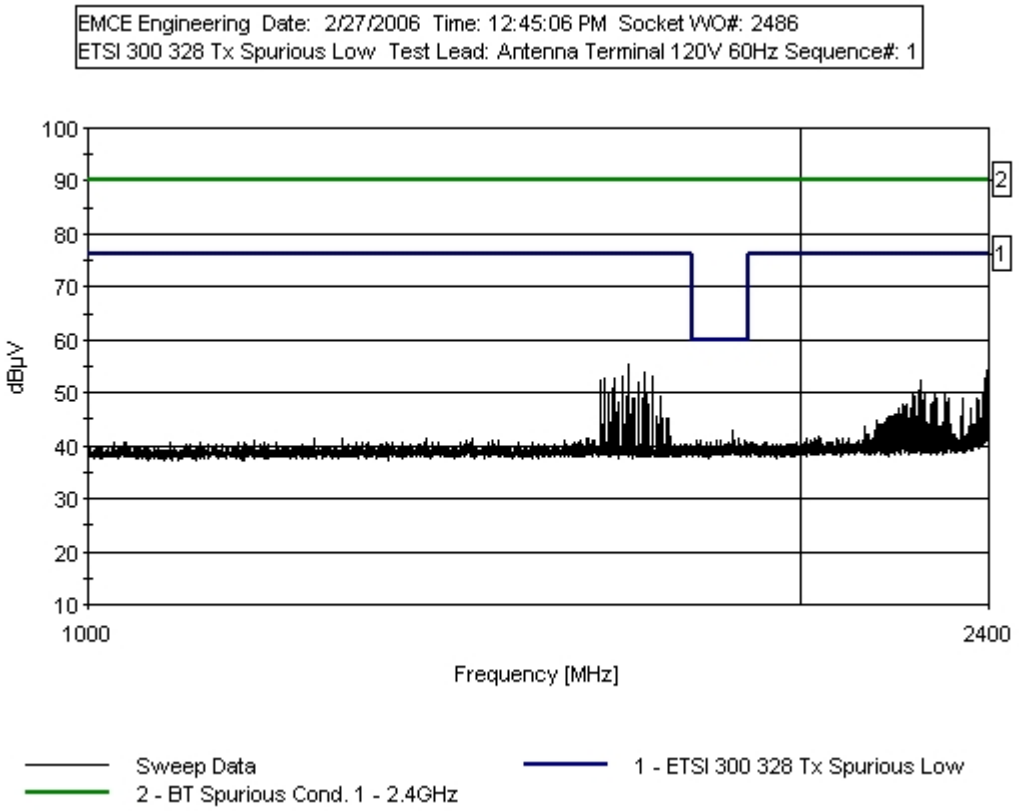
Test Conditions / Notes:

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1872.121M	43.0					+0.0	43.0	60.0	-17.0	Anten
2	1690.440M	55.5					+0.0	55.5	76.0	-20.5	Anten
3	2398.026M	54.4					+0.0	54.4	76.0	-21.6	Anten
4	2396.545M	54.3					+0.0	54.3	76.0	-21.7	Anten
5	1718.718M	53.7					+0.0	53.7	76.0	-22.3	Anten
6	1680.179M	53.2					+0.0	53.2	76.0	-22.8	Anten
7	1730.980M	53.0					+0.0	53.0	76.0	-23.0	Anten
8	2392.351M	52.9					+0.0	52.9	76.0	-23.1	Anten
9	1667.917M	52.8					+0.0	52.8	76.0	-23.2	Anten

10	1692.442M	52.8		+0.0	52.8	76.0	-23.2	Anten



Spurious Antenna Conducted Emissions 2.4835-18 GHz

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer:	**Socket**		
Specification:	**BT Ant Spur Cond Upper**		
Work Order #:	**2486**	Date:	2/27/2006
Test Type:	**Conducted Emissions**	Time:	12:50:57 PM
Equipment:	**Ring Scanner**	Sequence#:	2
Manufacturer:	Socket Communications	Tested By:	Bob Cole
Model:	Ring Scanner		120V 60Hz
S/N:	EMI Sample		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

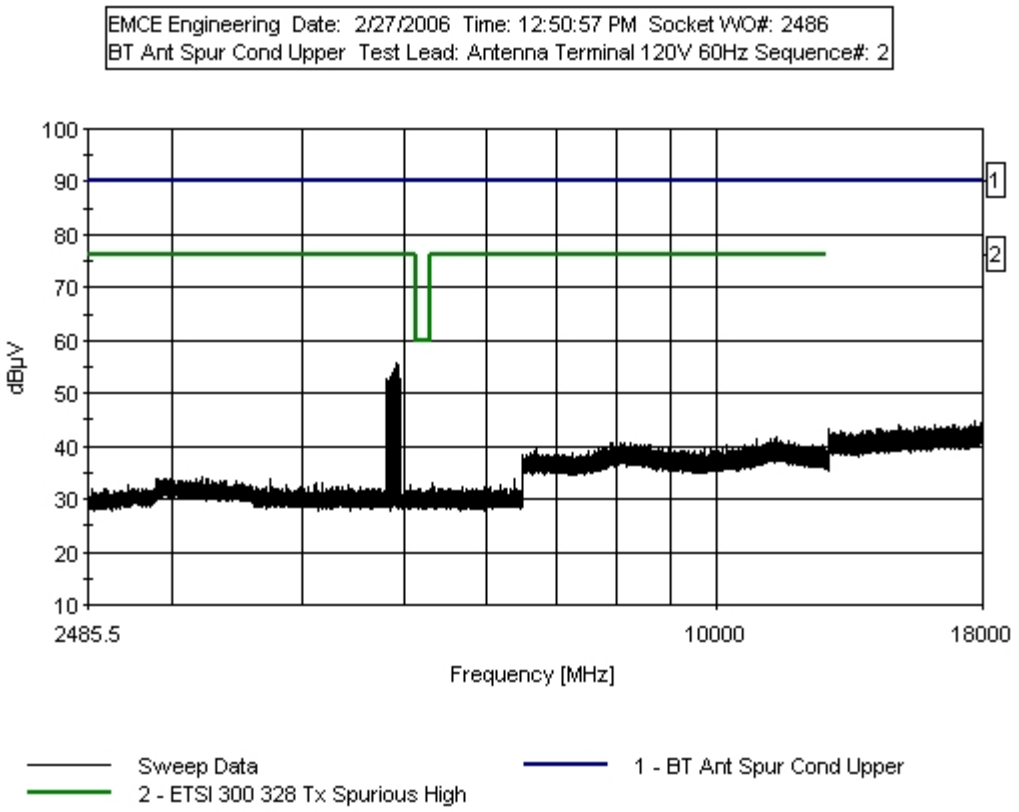
Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	4905.670M	55.7					+0.0	55.7	90.0	-34.3	Anten
2	4932.196M	55.4					+0.0	55.4	90.0	-34.6	Anten
3	4900.415M	54.6					+0.0	54.6	90.0	-35.4	Anten
4	4876.140M	53.9					+0.0	53.9	90.0	-36.1	Anten
5	4844.358M	53.2					+0.0	53.2	90.0	-36.8	Anten
6	4889.904M	52.9					+0.0	52.9	90.0	-37.1	Anten
7	4860.375M	52.8					+0.0	52.8	90.0	-37.2	Anten
8	4818.083M	52.7					+0.0	52.7	90.0	-37.3	Anten
9	4958.473M	52.7					+0.0	52.7	90.0	-37.3	Anten
10	4833.848M	52.3					+0.0	52.3	90.0	-37.7	Anten



RECEIVER CONDUCTED EMISSIONS

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer:	**Socket**		
Specification:	**BT RX Conducted 30M-18G**		
Work Order #:	**2486**	Date:	2/27/2006
Test Type:	**Conducted Emissions**	Time:	2:18:33 PM
Equipment:	**Ring Scanner**	Sequence#:	3
Manufacturer:	Socket Communications	Tested By:	Bob Cole
Model:	Ring Scanner		120V 60Hz
S/N:	EMI Sample		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

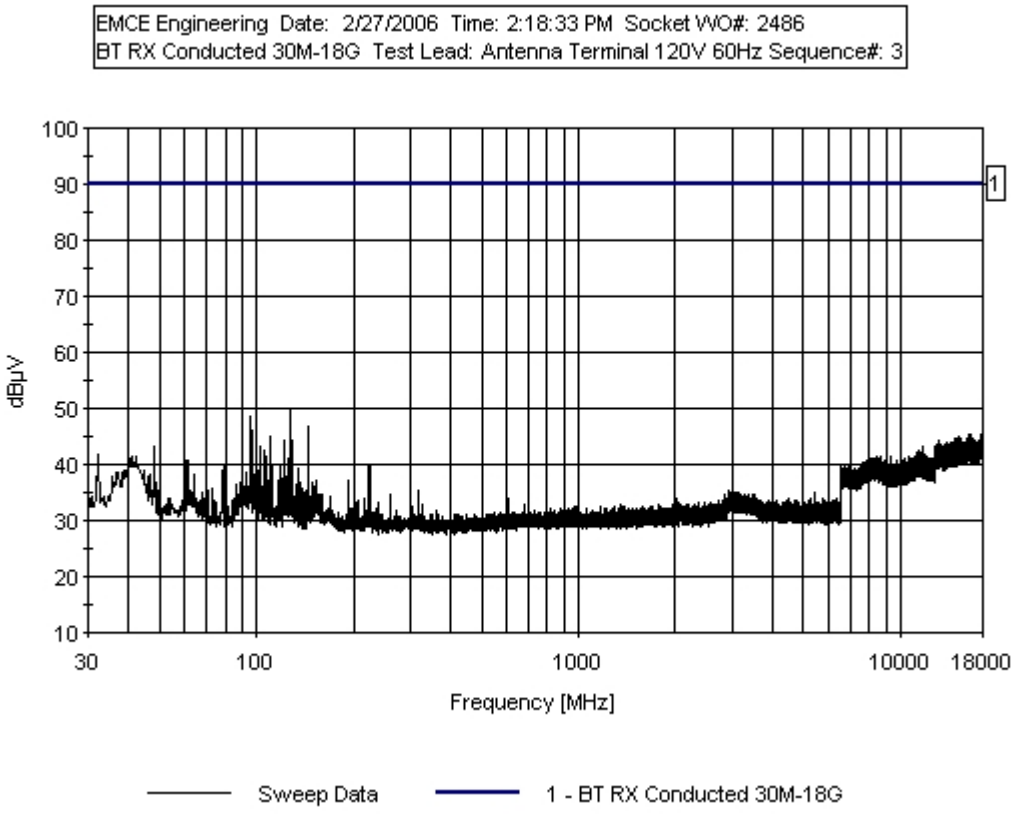
Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	128.098M	49.9					+0.0	49.9	90.0	-40.1	Anten
2	96.066M	48.7					+0.0	48.7	90.0	-41.3	Anten
3	144.114M	46.7					+0.0	46.7	90.0	-43.3	Anten
4	16429.660M	45.5					+0.0	45.5	90.0	-44.5	Anten
5	17990.230M	45.4					+0.0	45.4	90.0	-44.6	Anten
6	16263.250M	45.3					+0.0	45.3	90.0	-44.7	Anten
7	17817.800M	45.3					+0.0	45.3	90.0	-44.7	Anten
8	15203.940M	45.0					+0.0	45.0	90.0	-45.0	Anten
9	110.581M	44.9					+0.0	44.9	90.0	-45.1	Anten
10	16491.230M	44.8					+0.0	44.8	90.0	-45.2	Anten


EMCE Engineering Date: 2/27/2006 Time: 2:18:33 PM Socket WO#: 2486
BT RX Conducted 30M-18G Test Lead: Antenna Terminal 120V 60Hz Sequence#: 3
100
90
80
70
60
50
40
30
20
10
dBµV
1
30
100
1000
10000
18000
Frequency [MHz]
Sweep Data
1 - BT RX Conducted 30M-18G

AC LINE CONDUCTED EMISSIONS MEASUREMENT

AC Line Conducted Emissions Measurement 150 kHz – 30 MHz

CLASS B LIMIT

Frequency Band (MHz)	EN 55022 B Limit (dBµV/m)	Detector
0.15 – 0.5	66 to 56	QP
0.5 – 5.0	56	QP
5.0 – 30.0	60	QP

EUT operation mode

EUT operation mode	Hopping Enabled
EUT channel	Hopping
EUT TX power level	Maximum
EUT operation voltage	120 VAC

LINE CONDUCTED EMISSIONS, .15 - 30 MHz
EN 55022 Class B Limits

LINE 1 - HOT

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket**
Specification: **EN55022 B COND [AVE]**
Work Order #: **2492** Date: 3/27/2006
Test Type: **Conducted Emissions** Time: 3:44:27 PM
Equipment: **Ring Scanner** Sequence#: 6
Manufacturer: Socket Communications Tested By: Bob Cole
Model: Ring Scanner 120V 60Hz
S/N: EMI Sample

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

Function	Manufacturer	Model #	S/N

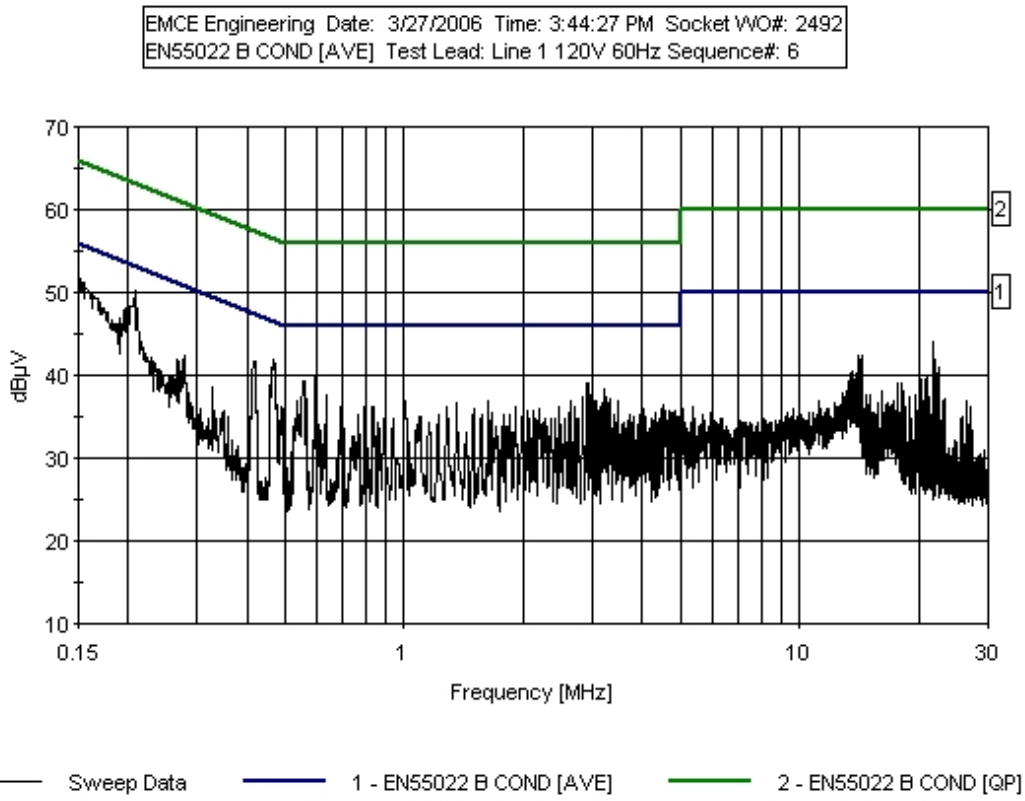
Test Conditions / Notes:

Transducer Legend:

T1=Chamber Receive Cable	T2=HP 11947A Transient Limiter

Measurement Data: Reading listed by margin. Test Lead: Line 1

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	208.176k	39.9	+0.4	+9.9			+0.0	50.2	53.3	-3.1	Line
2	150.727k	41.3	+0.4	+9.9			+0.0	51.6	56.0	-4.4	Line
3	467.786k	31.6	+0.4	+10.0			+0.0	42.0	46.6	-4.6	Line
4	196.541k	37.7	+0.4	+9.9			+0.0	48.0	53.8	-5.8	Line
5	415.428k	31.3	+0.4	+10.0			+0.0	41.7	47.5	-5.8	Line
6	21.677M	33.0	+0.9	+10.1			+0.0	44.0	50.0	-6.0	Line
7	596.501k	29.3	+0.4	+10.0			+0.0	39.7	46.0	-6.3	Line
8	557.232k	29.0	+0.4	+10.0			+0.0	39.4	46.0	-6.6	Line
9	473.604k	29.1	+0.4	+10.0			+0.0	39.5	46.5	-7.0	Line
10	2.906M	28.5	+0.5	+10.0			+0.0	39.0	46.0	-7.0	Line



LINE CONDUCTED EMISSIONS, .15 - 30 MHz
EN 55022 Class B Limits

LINE 2 – Neutral

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **Socket**
Specification: **EN55022 B COND [AVE]**
Work Order #: **2492** Date: 3/27/2006
Test Type: **Conducted Emissions** Time: 3:48:04 PM
Equipment: **Ring Scanner** Sequence#: 7
Manufacturer: Socket Communications Tested By: Bob Cole
Model: Ring Scanner 120V 60Hz
S/N: EMI Sample

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Ring Scanner*	Socket Communications	Ring Scanner	EMI Sample

Support Devices:

Function	Manufacturer	Model #	S/N

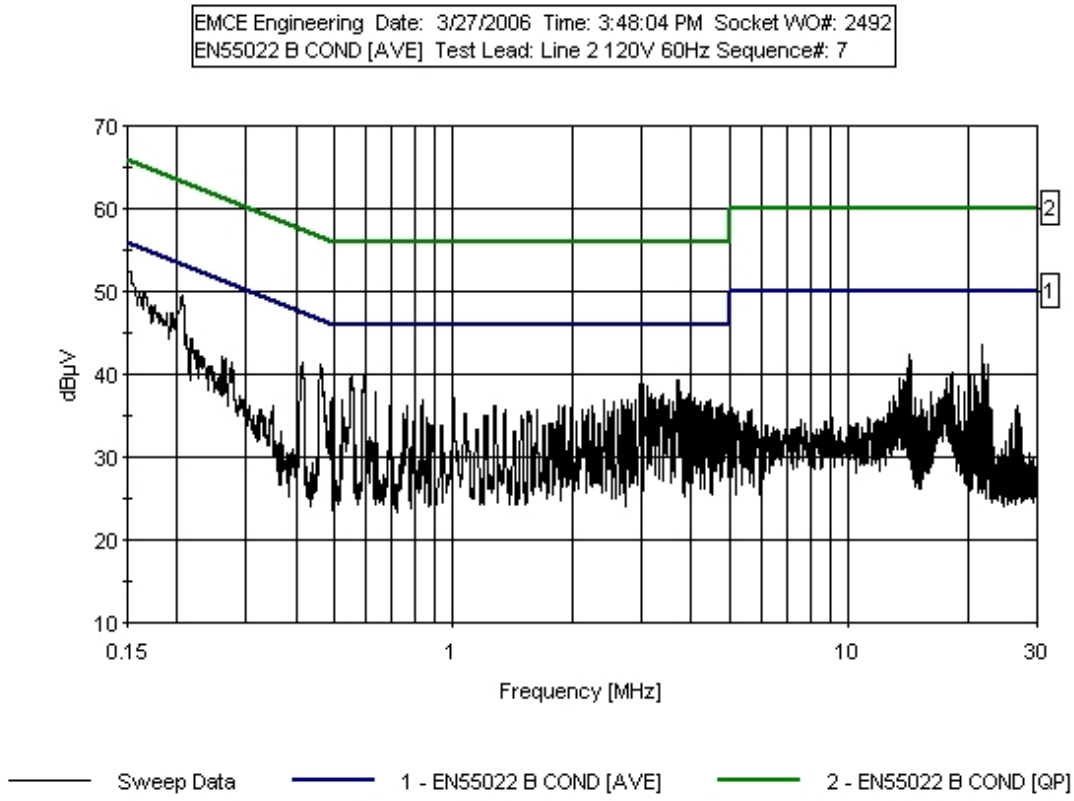
Test Conditions / Notes:

Transducer Legend:

T1=Chamber Receive Cable	T2=HP 11947A Transient Limiter

Measurement Data: Reading listed by margin. Test Lead: Line 2

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	150.727k	42.2	+0.4	+9.9			+0.0	52.5	56.0	-3.5	Line
2	464.150k	30.7	+0.4	+10.0			+0.0	41.1	46.6	-5.5	Line
3	592.865k	29.7	+0.4	+10.0			+0.0	40.1	46.0	-5.9	Line
4	417.610k	31.1	+0.4	+10.0			+0.0	41.5	47.5	-6.0	Line
5	551.414k	29.6	+0.4	+10.0			+0.0	40.0	46.0	-6.0	Line
6	21.667M	32.6	+0.9	+10.1			+0.0	43.6	50.0	-6.4	Line
7	3.697M	28.7	+0.5	+10.0			+0.0	39.2	46.0	-6.8	Line
8	2.961M	28.3	+0.5	+10.0			+0.0	38.8	46.0	-7.2	Line
9	3.029M	28.2	+0.5	+10.0			+0.0	38.7	46.0	-7.3	Line
10	3.101M	28.1	+0.5	+10.0			+0.0	38.6	46.0	-7.4	Line


EMCE Engineering Date: 3/27/2006 Time: 3:48:04 PM Socket WO#: 2492
EN55022 B COND [AVE] Test Lead: Line 2 120V 60Hz Sequence#: 7
70
60
50
40
30
20
10
dBµV
0.15
1
10
30
Frequency [MHz]
2
1
Sweep Data
1 - EN55022 B COND [AVE]
2 - EN55022 B COND [QP]

7.0 TEST EQUIPMENT

Antenna Conducted Measurements:

Equipment	Type	Manufacturer	Device Number
EMI Analyzer	84125B	Hewlett-Packard	E01
Oscilloscope	TDS820	Tektronix	E02
Power Meter	437B	Hewlett-Packard	E05
Coaxial cable	SMA Male – Reverse SMA Male (Length = 20 cm)	Own	C1

Spurious RF radiated emissions:

Equipment	Type	Manufacturer	Device Number
EMI Analyzer System	84125B	Hewlett-Packard	E01
Pre-Amp	83051A	Hewlett-Packard	E01
Pre-Amp	83017A	Hewlett-Packard	E01
High Pass Filter	9701	CMT	E01
Horn Antenna	3115	EMCO	E01
Cable		Hewlett Packard	E01

Note: The HP 84125B EMC Analyzer System is calibrated as a system, including the analyzer, pre-amps, filters, and cable.

EN 55022 (AC powerline conducted emissions)

Equipment	Type	Manufacturer	Device number
EMI Analyzer System	84125B	Hewlett-Packard	E01
LISN	3810/2	EMCO	E03
Transient Limiter	11947A	Hewlett-Packard	E04
Coaxial cable	N Type – BNC (5 Meters)	Own	C2