FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7
CERTIFICATION TEST REPORT

FOR

HANDHELD PRINTER TERMINAL

MODEL NUMBER: IT-3100M53E, IT-3100M54E, IT-3100M55U, IT-3100M56U

FCC ID: BBQIT3100
IC: 2388F-IT3100

REPORT NUMBER: 08J11800-1

ISSUE DATE: JUNE 03, 2008

Prepared for
CASIO COMPUTER CO., LTD.
6-2 HON-MACHI 1-CHOME
SHIBUYA-KU, TOKYO, 151-8543 JAPAN

Prepared by
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Details of specific model(s) tested and model differences are identified in the body of report.

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/03/08	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CASIO COMPUTER CO., LTD
6-2 HON-MACHI 1-CHOME
SHIBUYA-KU, TOKYO, JAPAN

EUT DESCRIPTION: HANDHELD PRINTER TERMINAL

MODEL: IT-3100M53E, IT-3100M54E, IT-3100M55U, IT-3100M56U

SERIAL NUMBER: 2S3S1054

DATE TESTED: MAY 23-24, 2008

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 PART 15 SUBPART C	PASS
INDUSTRY CANADA RSS-210 ISSUE 7 ANNEX 8	PASS
INDUSTRY CANADA RSS-GEN ISSUE 2	PASS

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

YOBI ZHOU
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Handheld Printer Terminal, and the radio module is manufactured by CASIO.

5.2. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES

The particular device that was tested is a sample of one version within the IT-3100M model series. The following table shows the model differences.

Model Number	Megnetic Card Reader	CMOS Imager	RS232C Interface for Bar Code Reader
IT-3100M53E	No	No	Yes
IT-3100M54E	Yes	No	Yes
IT-3100M55U	Yes	Yes	No
IT-3100M56U	No	Yes	No

NOTE: IT-3100M55U: tested model

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	1.48	1.41

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an IFA antenna, with a maximum gain of -0.35 dBi.

5.5. SOFTWARE AND FIRMWARE

The driver and the test utility software installed in the EUT during testing was BTRadioTest CE5.0, ver.1.00

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2402 MHz.

EUT has been evaluated at X, Y, Z-axis, .and with cradle. The highest measured output power was determined at Z-axis.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Cradle	Casio	HA-B30CHG	843AA766703706DAA81
AC Adapter	Casio	AD-S42120B	N/A

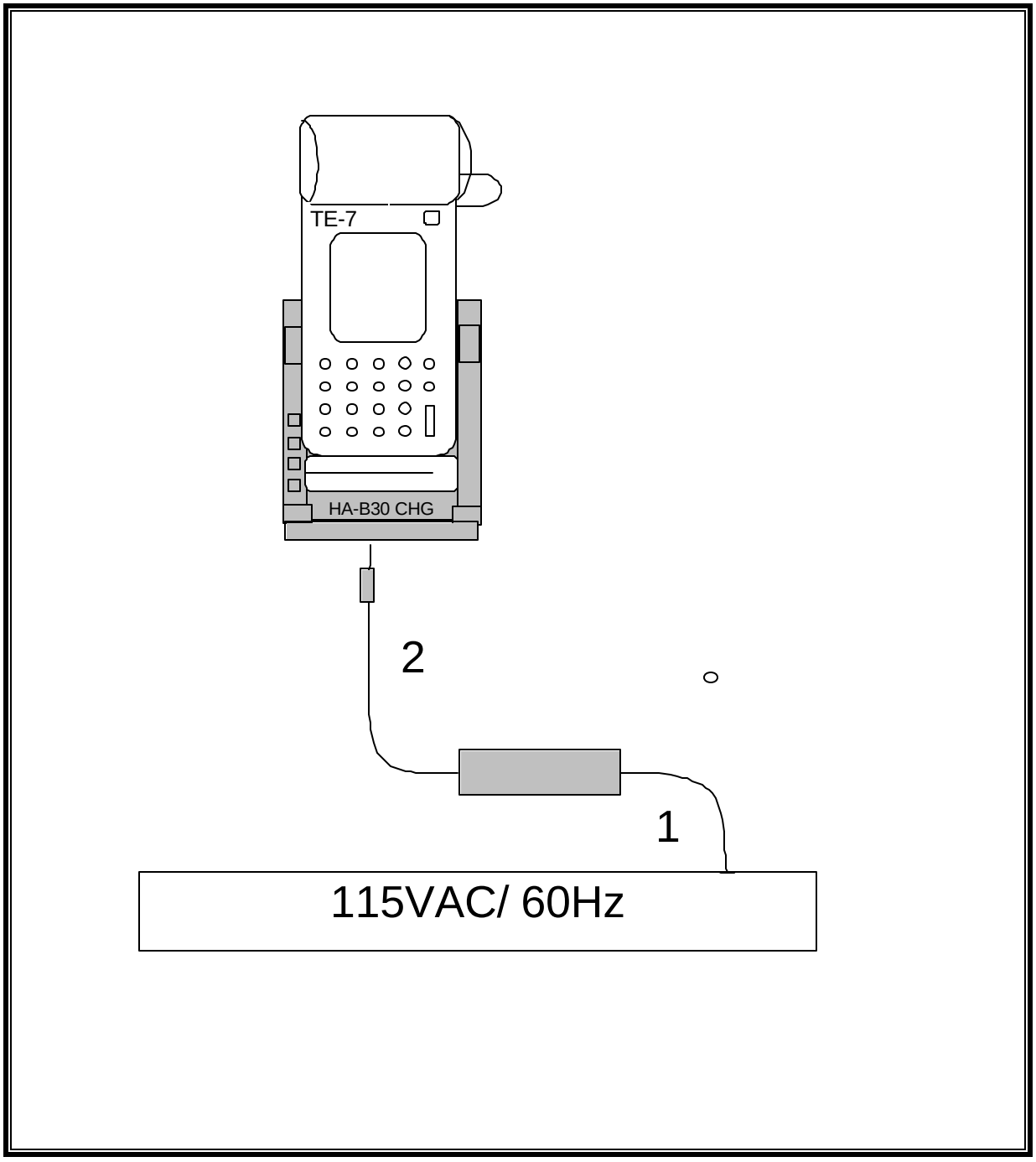
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	N/A
2	DC	1	DC	Un-shielded	2m	Ferrite on EUT's end

TEST SETUP

The EUT is connected to a laptop and basic peripheral during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/06/09
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/08
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	03/18/08
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/15/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	09/27/08
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	09/28/08
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	03/31/09
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	06/12/08
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	06/12/08
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/09
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/07/09
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

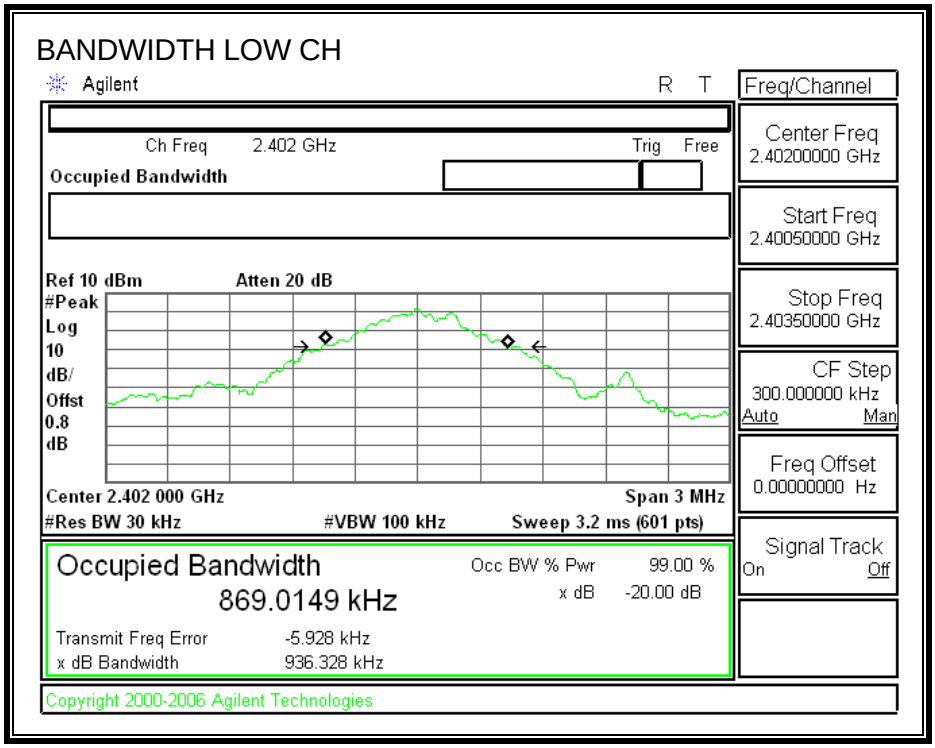
TEST PROCEDURE

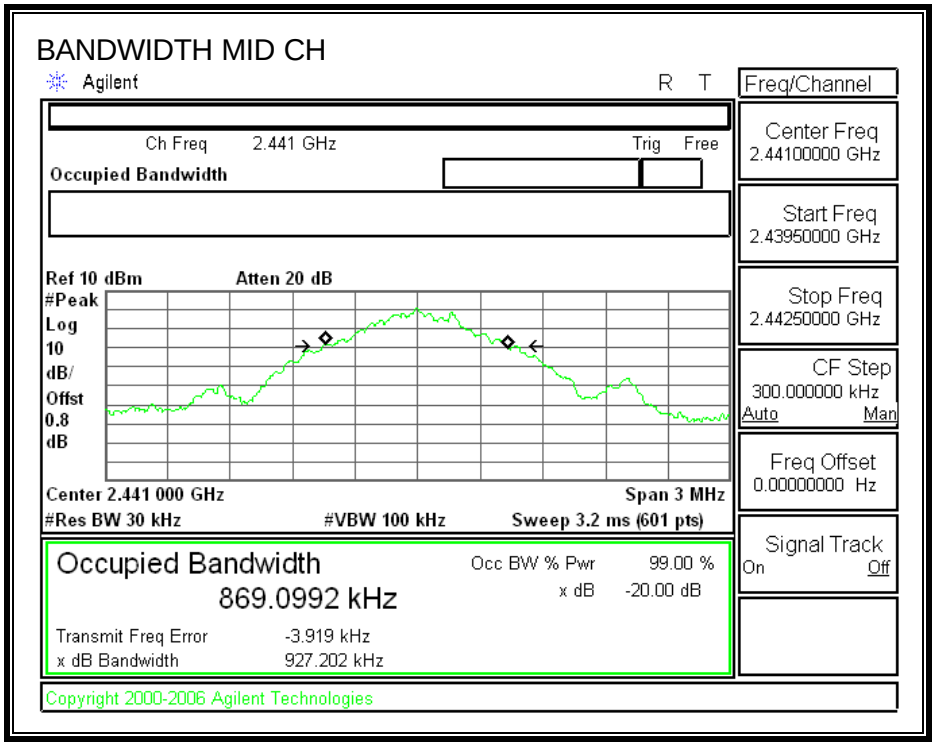
The transmitter output is connected to a spectrum analyzer. The RBW is set to = 1% of the 20 dB bandwidth. The VBW is set to = RBW. The sweep time is coupled.

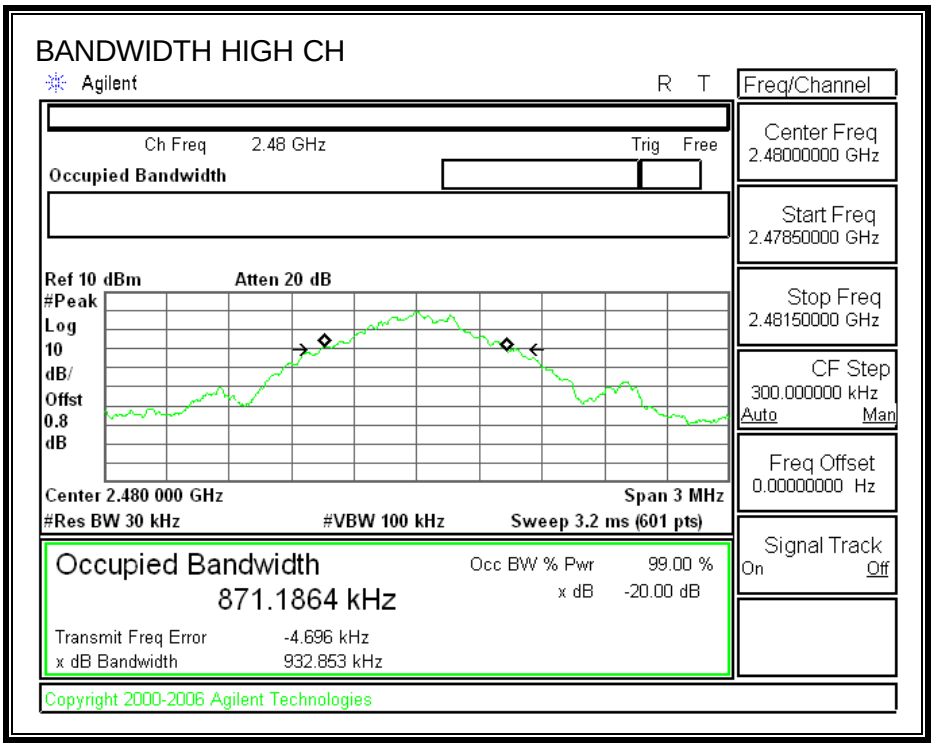
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	936.328	869.0149
Middle	2441	927.202	869.0992
High	2480	932.853	871.1864

20 dB AND 99% BANDWIDTH







7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)
IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

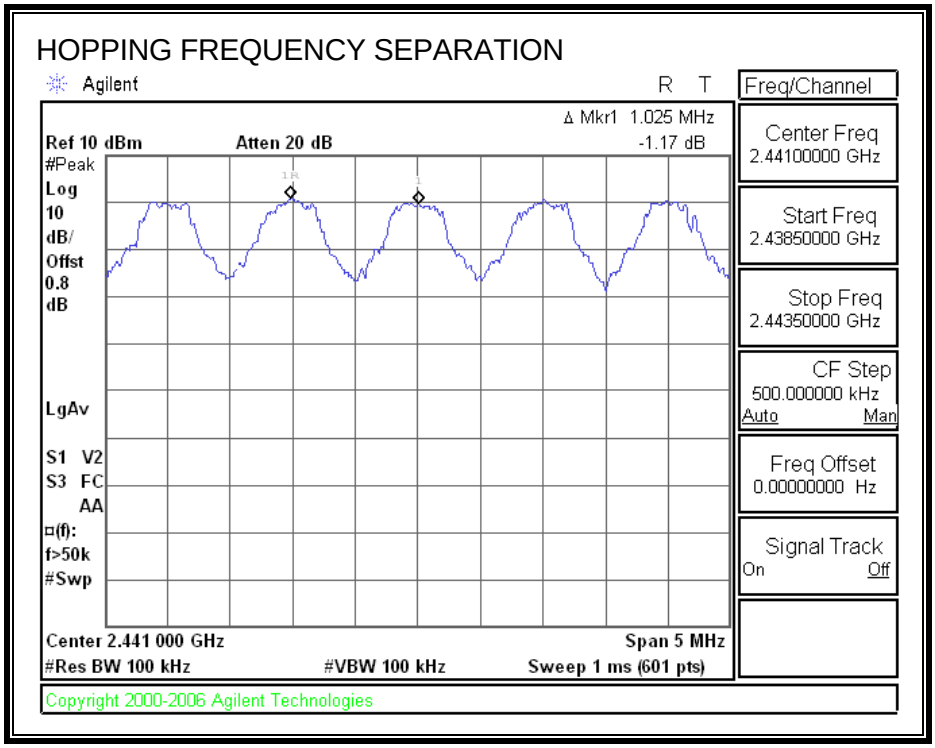
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)
IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

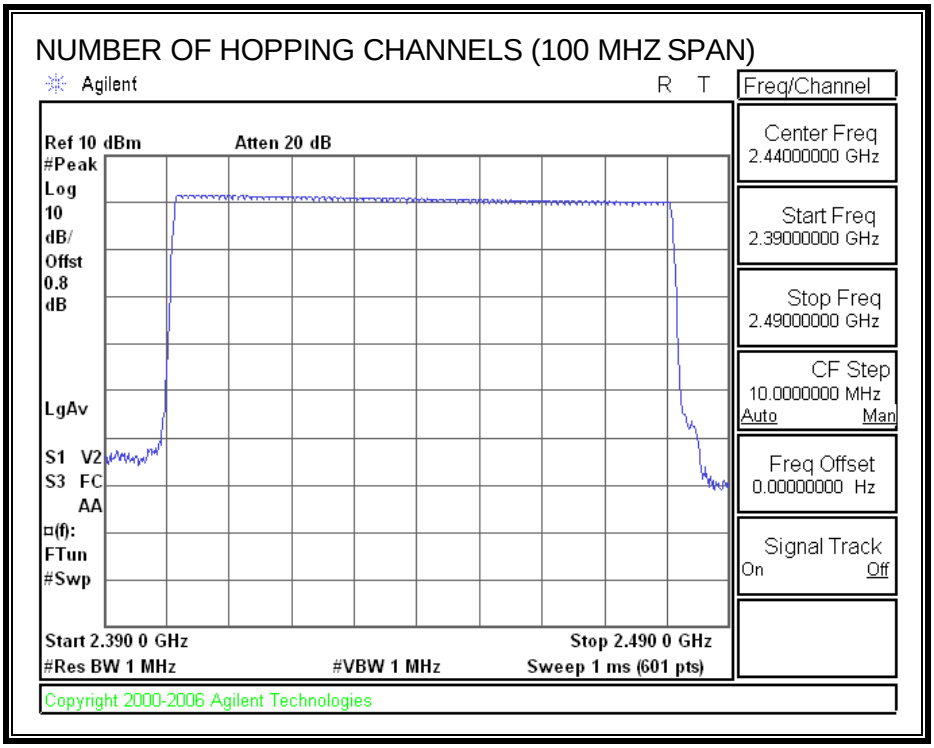
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

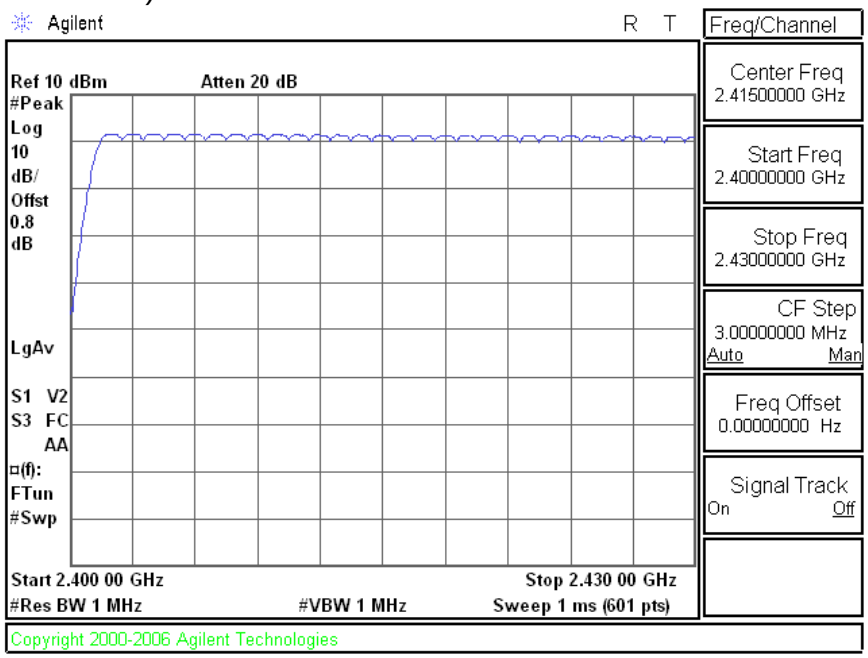
RESULTS

79 Channels observed.

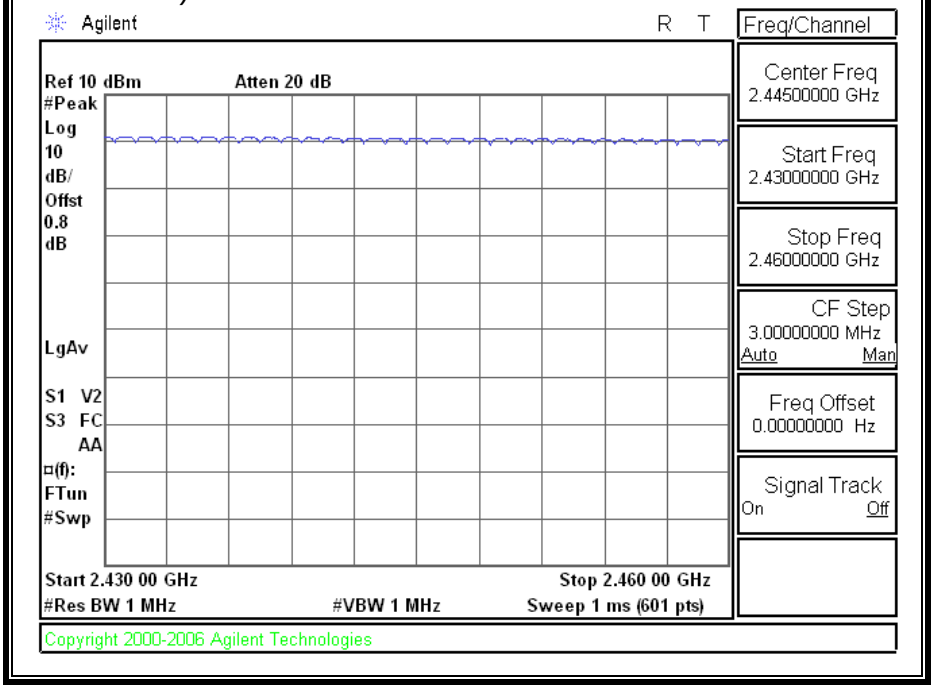
NUMBER OF HOPPING CHANNELS



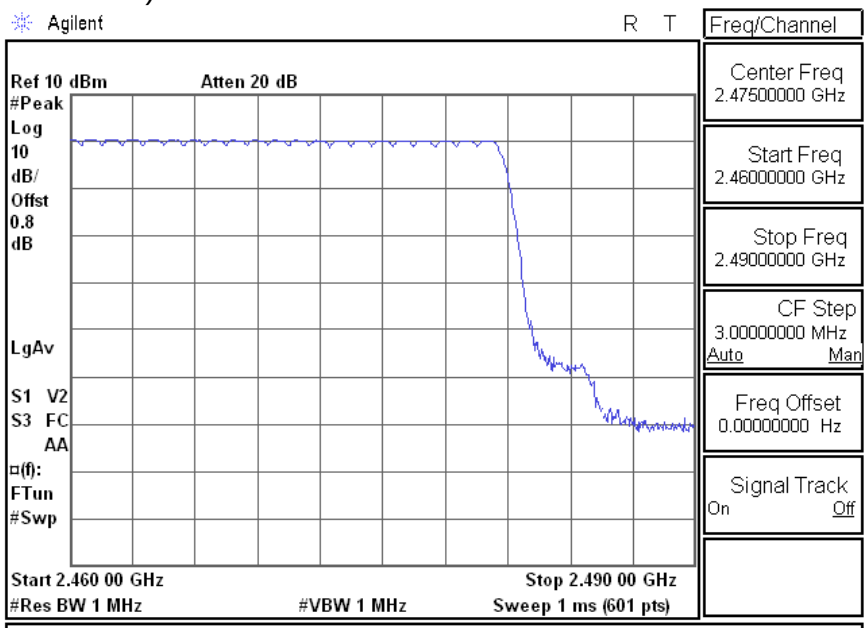
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)
IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

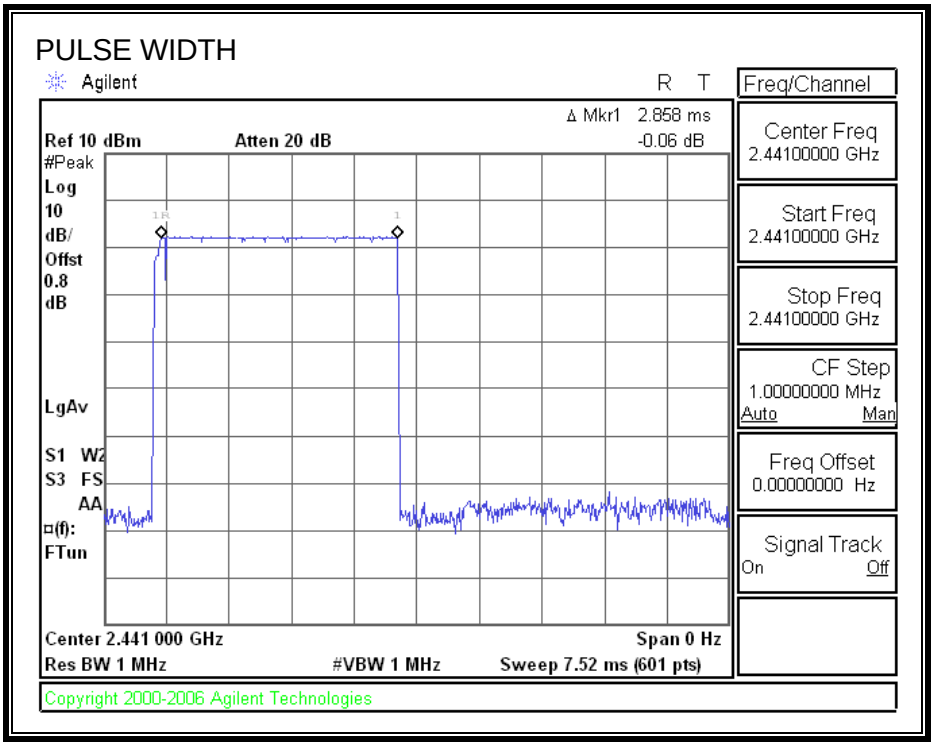
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

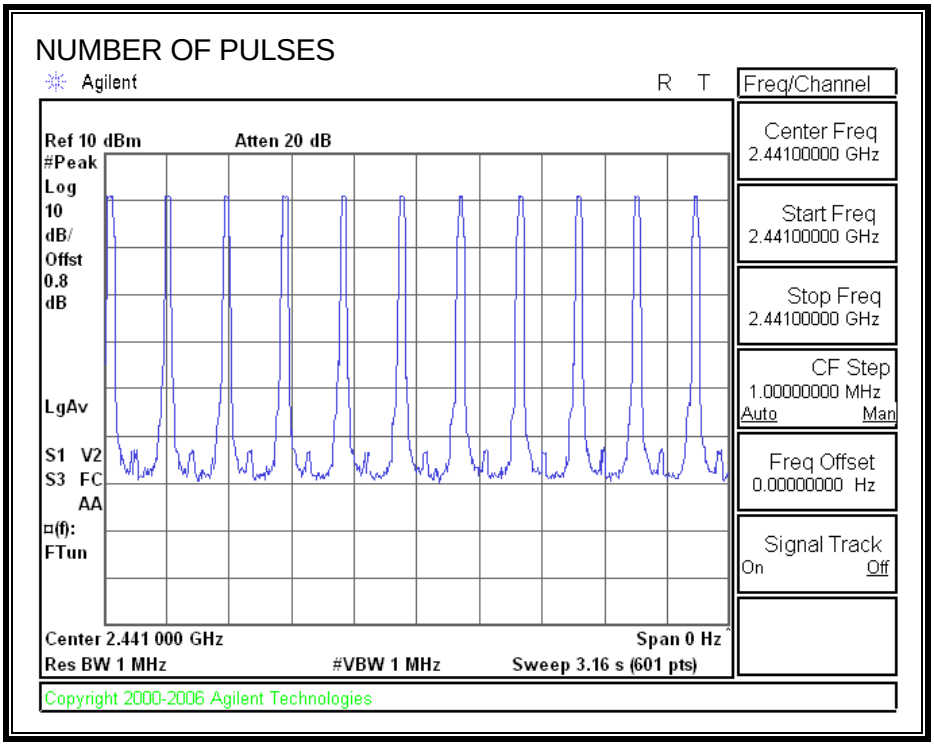
RESULTS

Time Of Occupancy = 10 * 11 pulses * 2.858 msec = 314.38 msec

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)
RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

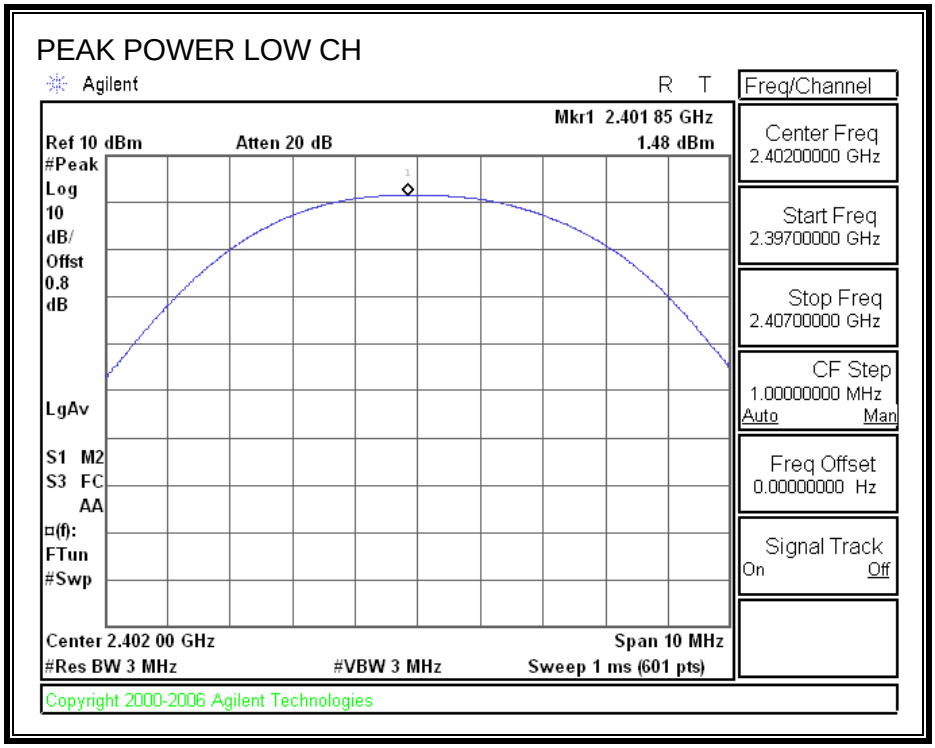
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

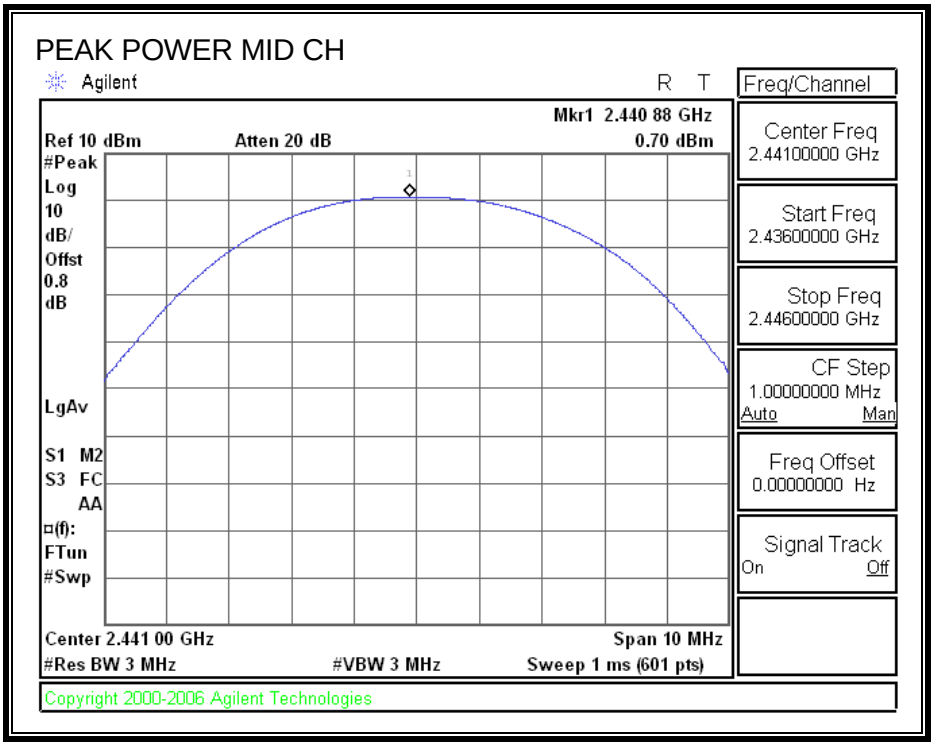
RESULTS

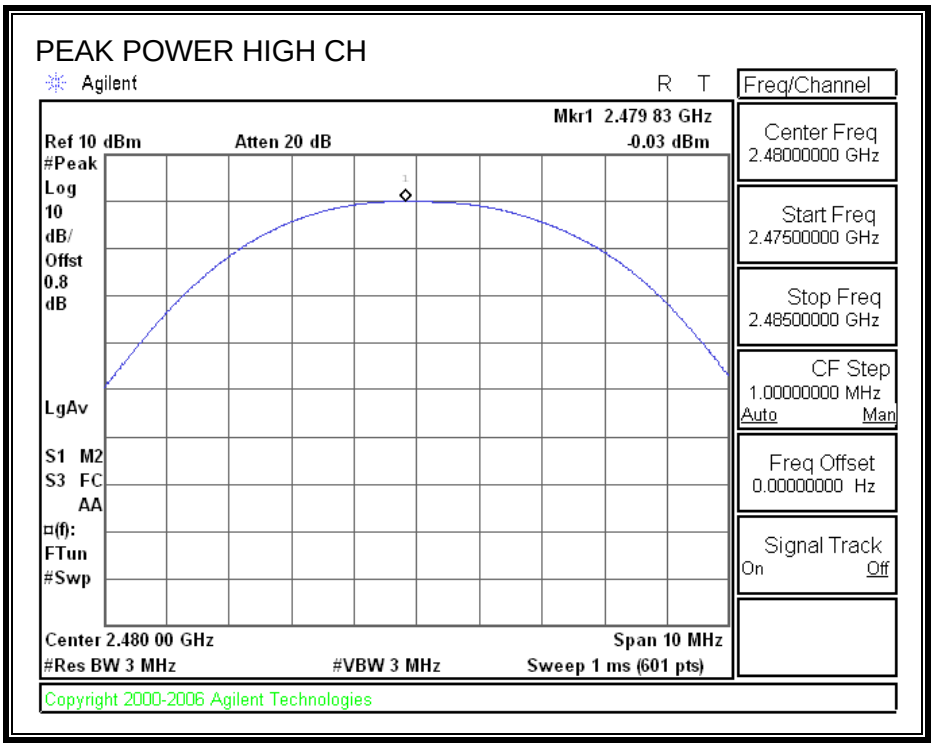
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.48	30	-28.52
Middle	2441	0.70	30	-29.30
High	2480	-0.03	30	-30.03

OUTPUT POWER



PEAK POWER MID CH





7.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 0.8 dB (including 0.8 dB cable) was entered as an offset in the power meter to allow for direct reading of power

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	0.10
Middle	2441	-0.55
High	2480	-1.29

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)
IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

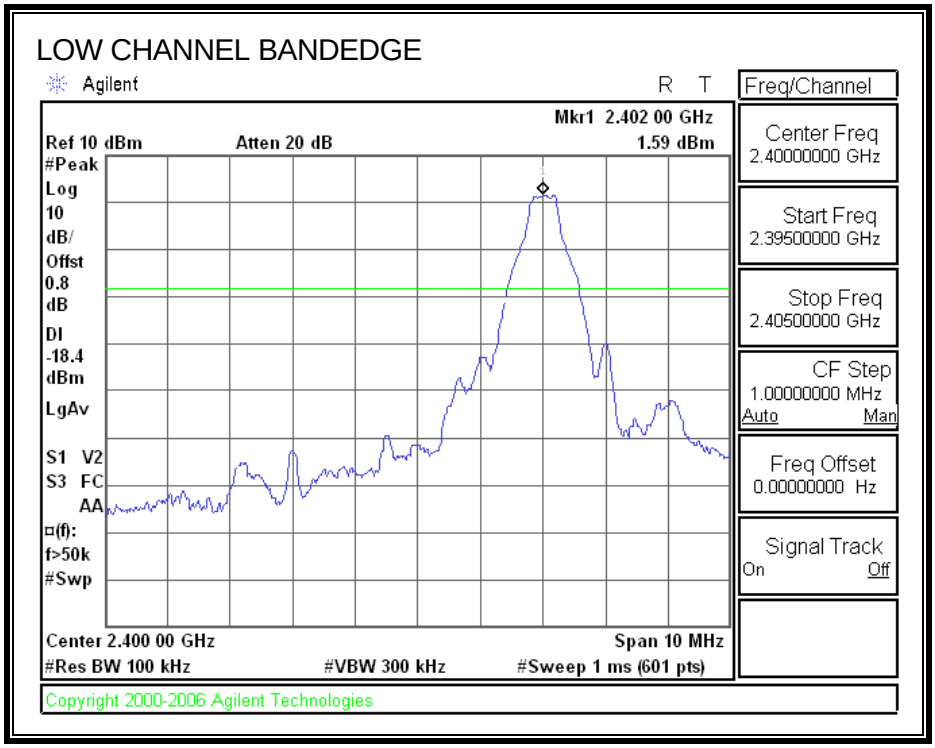
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

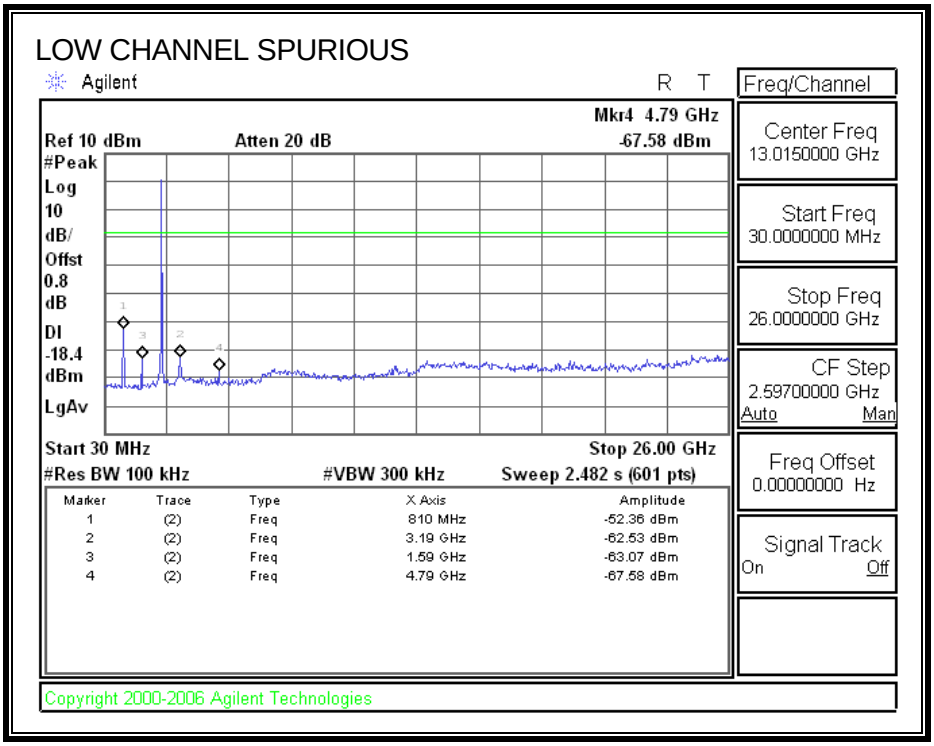
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

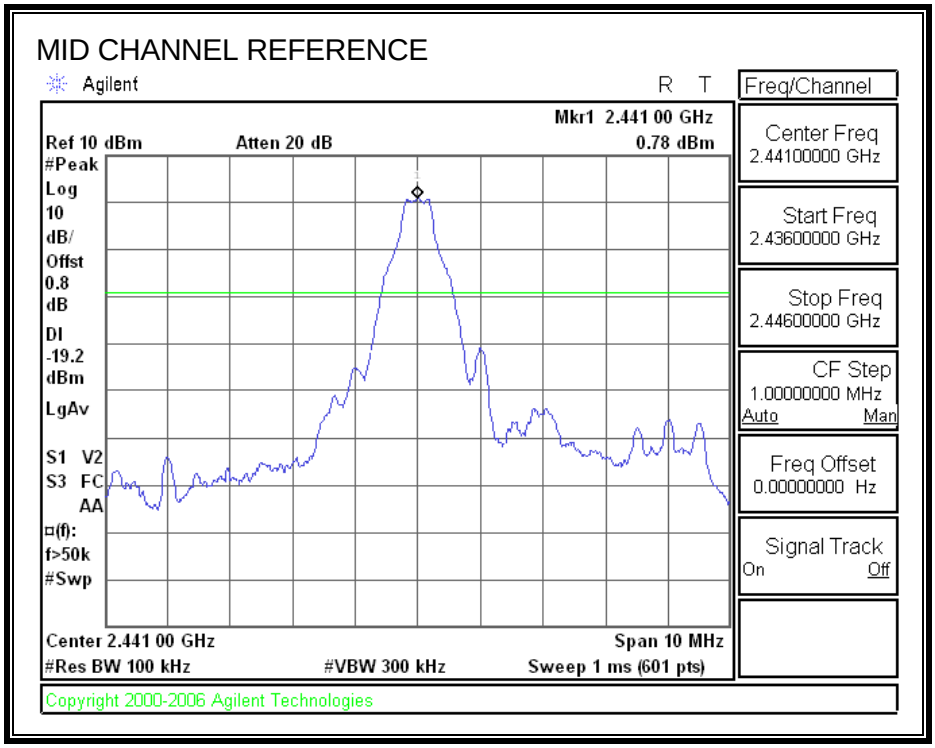
SPURIOUS EMISSIONS, LOW CHANNEL



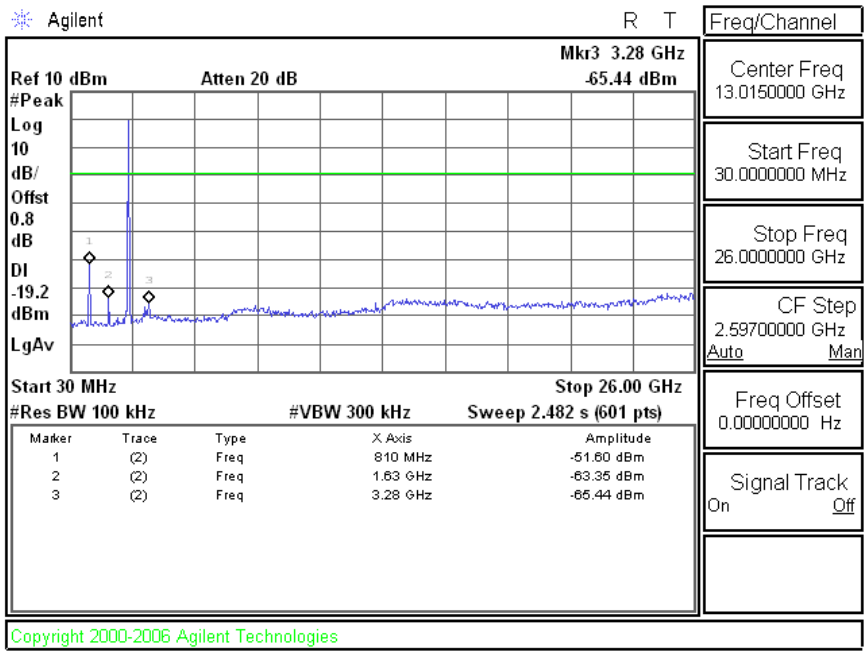
LOW CHANNEL SPURIOUS



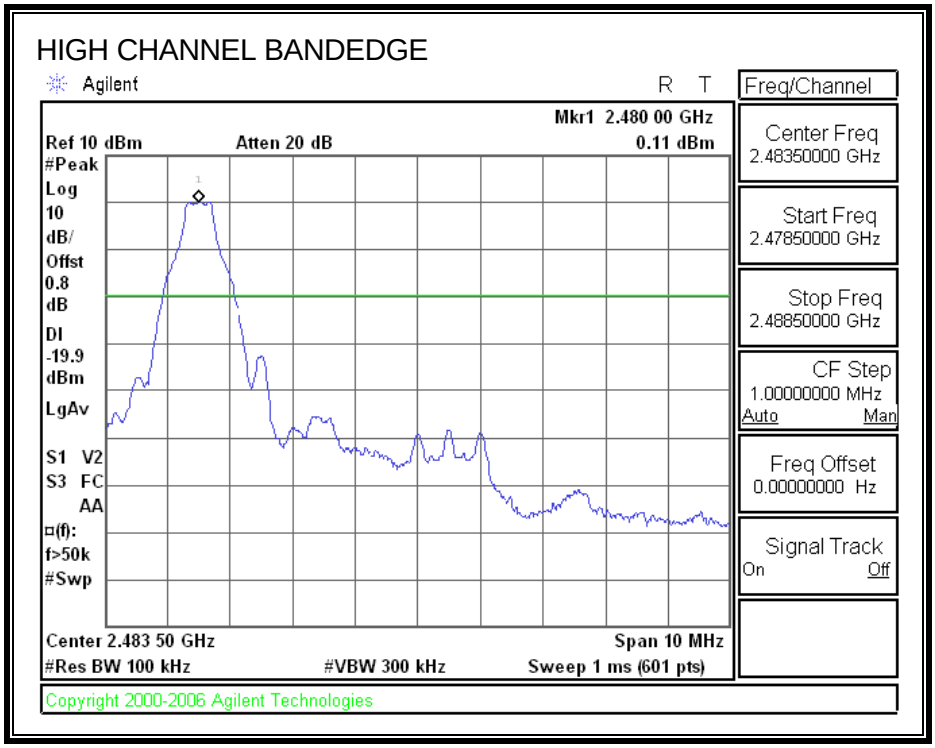
SPURIOUS EMISSIONS, MID CHANNEL



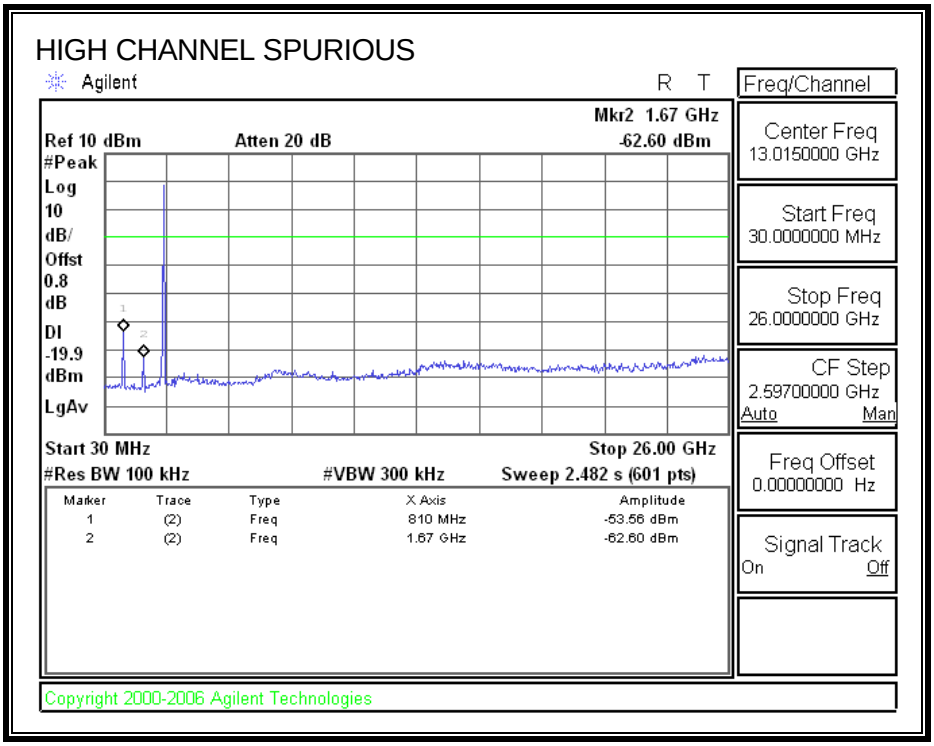
MID CHANNEL SPURIOUS



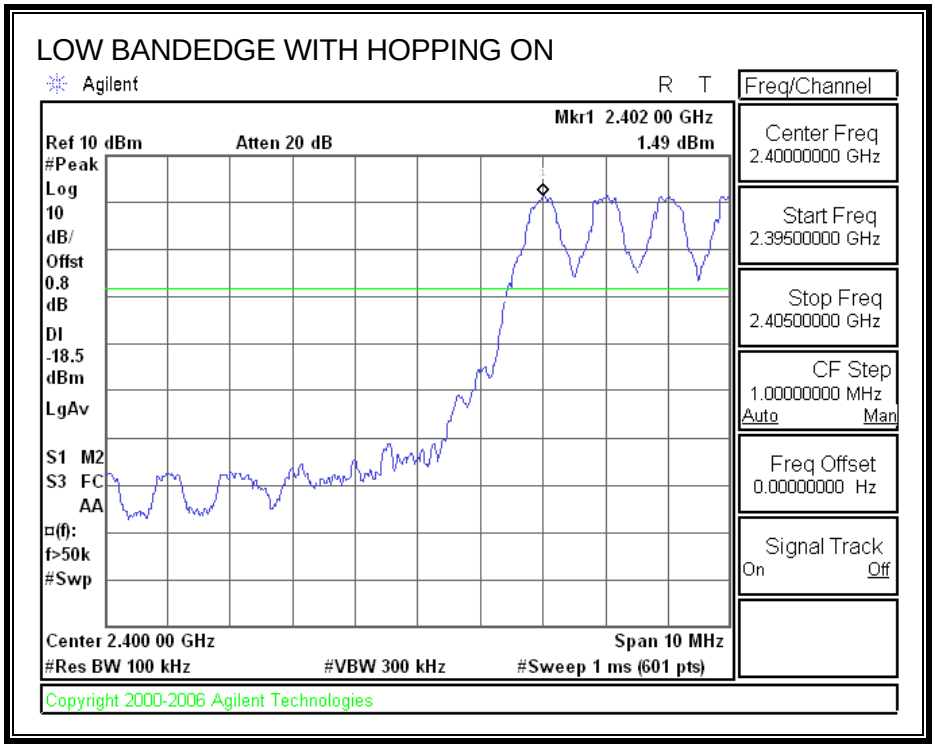
SPURIOUS EMISSIONS, HIGH CHANNEL



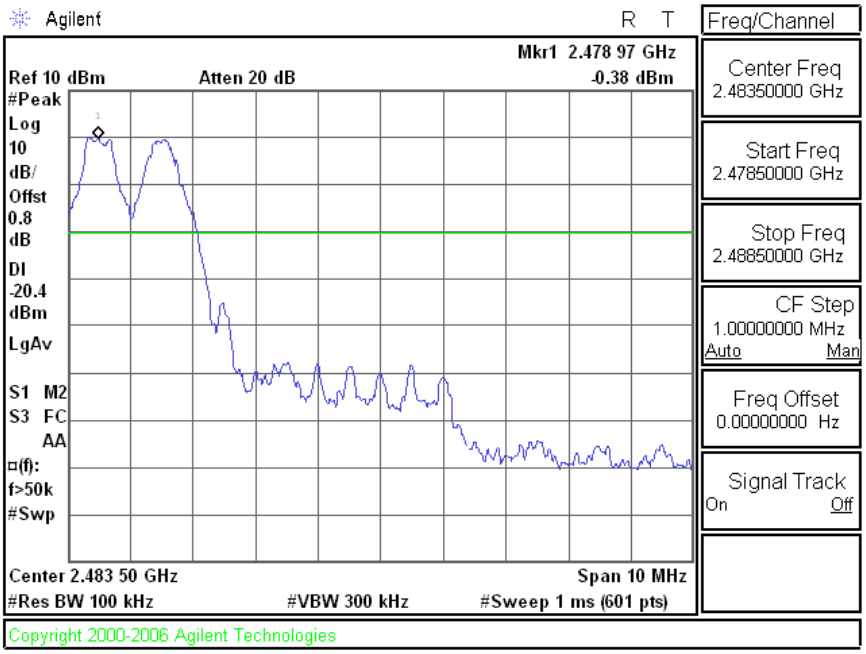
HIGH CHANNEL SPURIOUS



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
IC RSS-210 Clause 2.6 (Transmitter)
IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

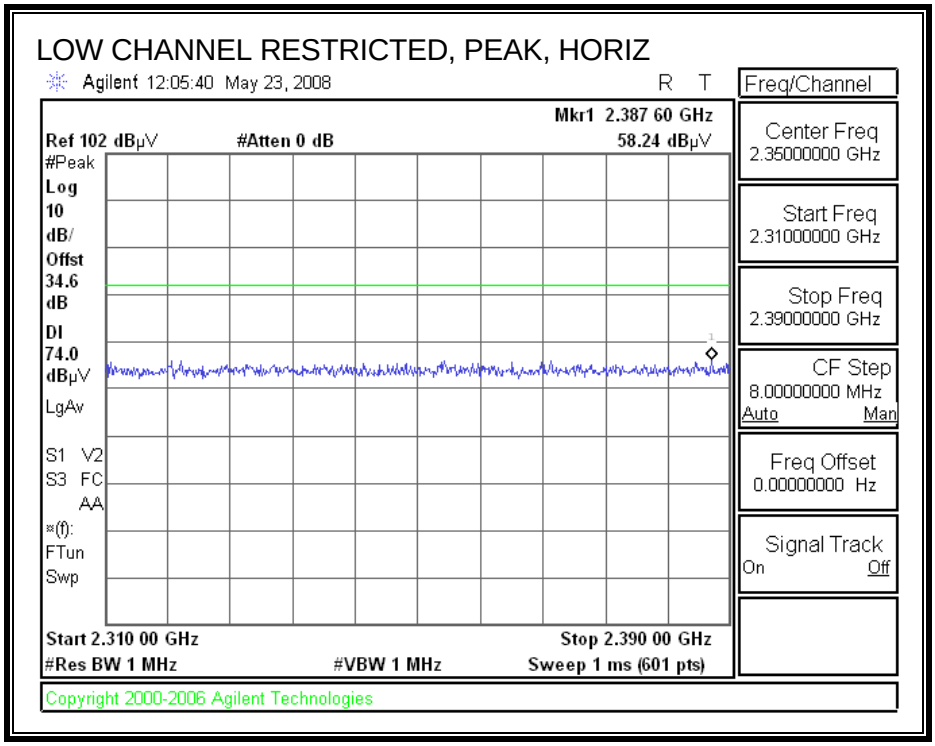
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

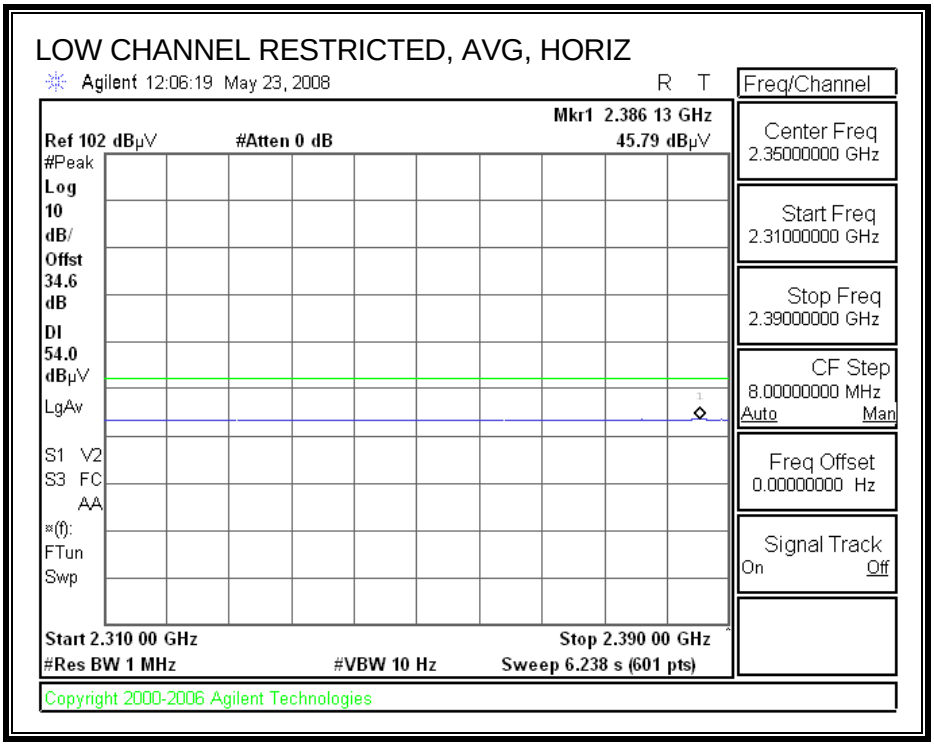
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

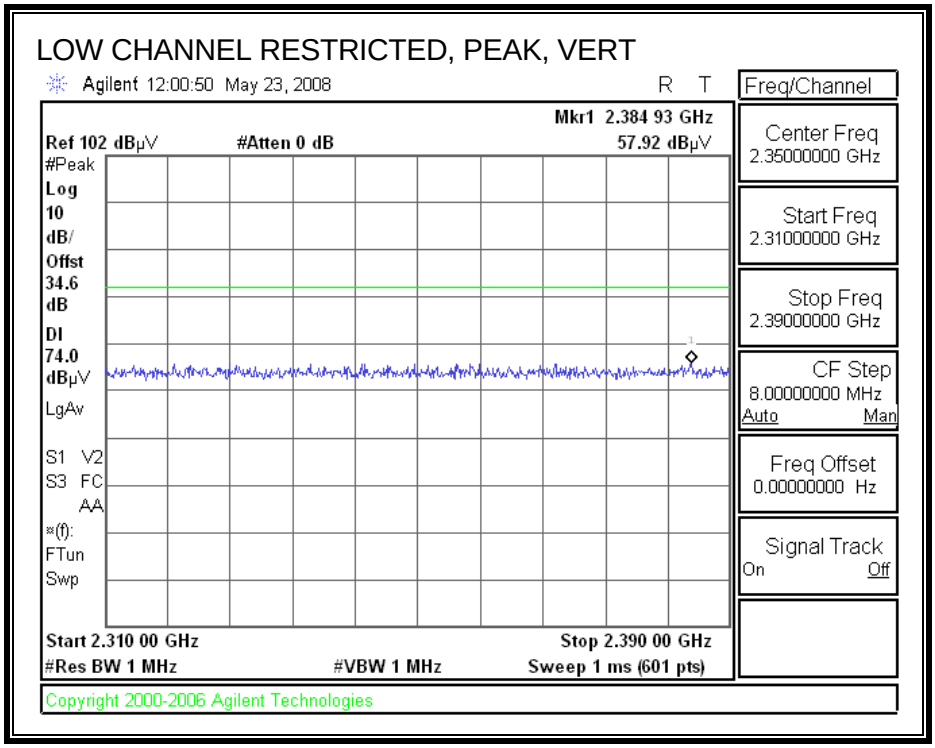
8.1.1. TRANSMITER ABOVE 1 GHz

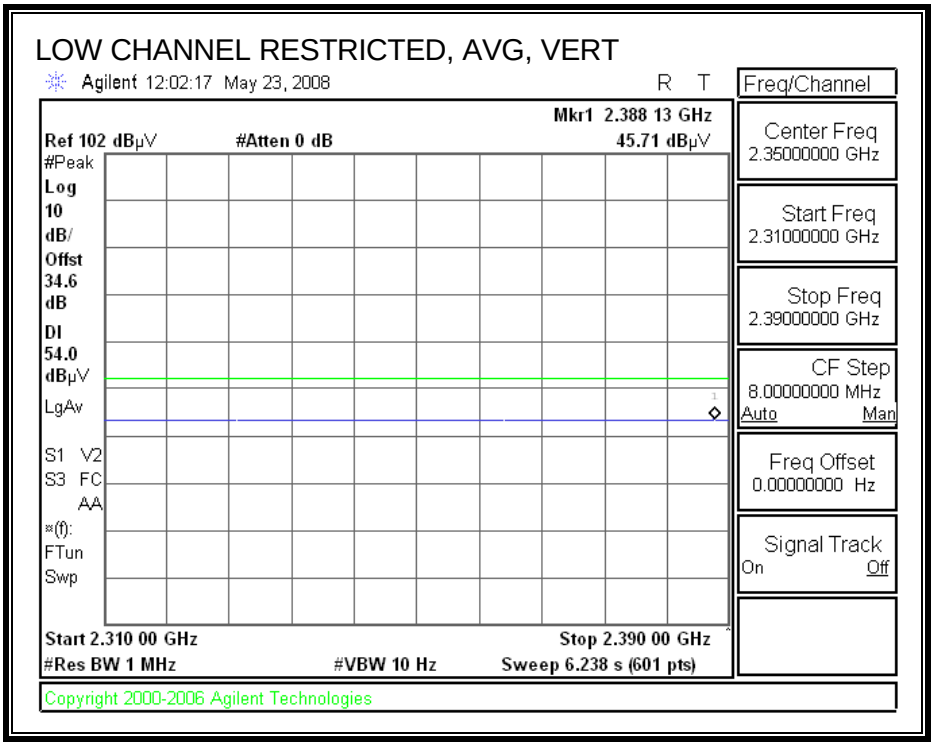
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



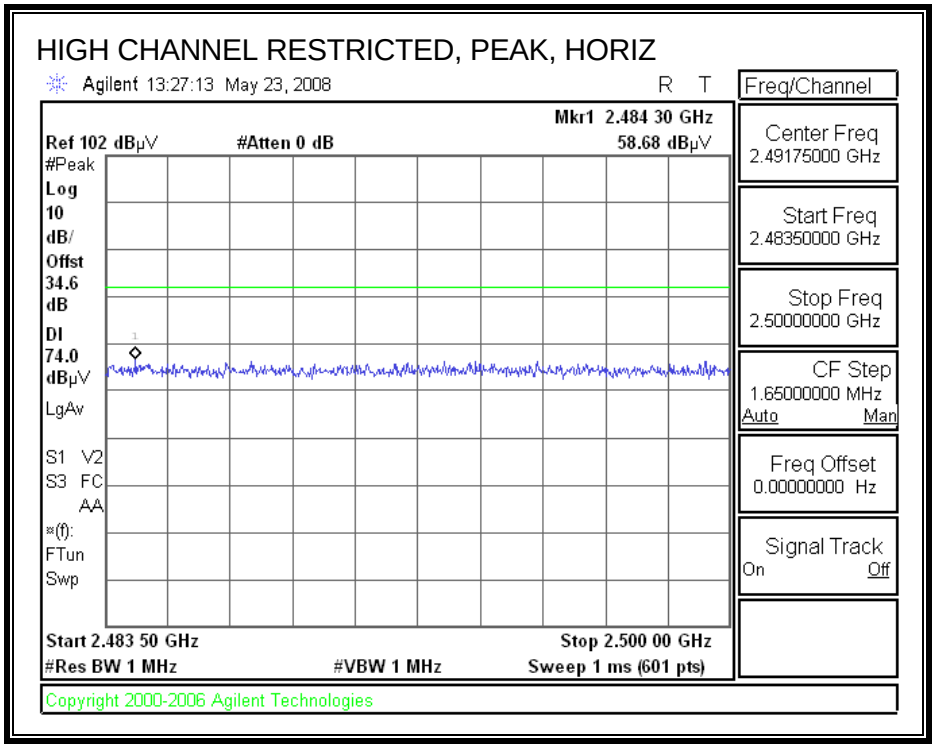


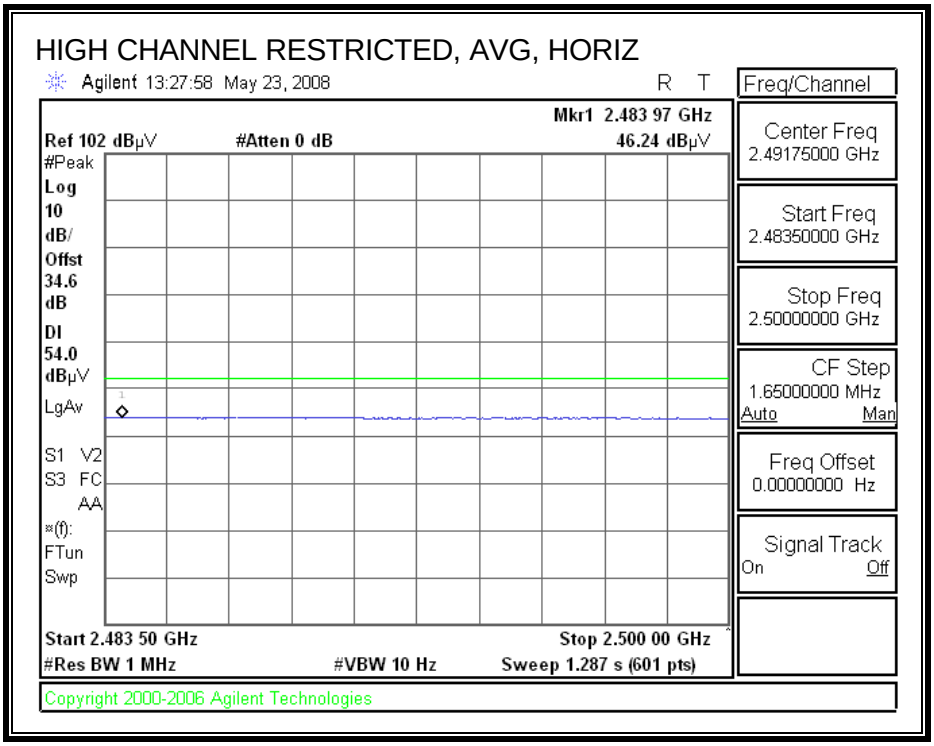
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



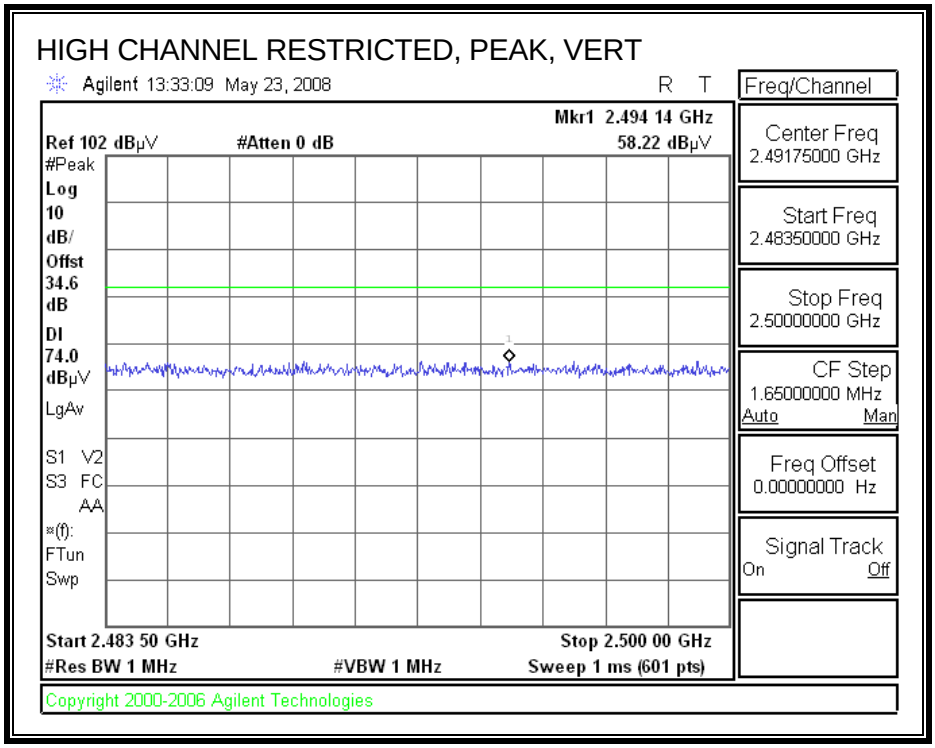


RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

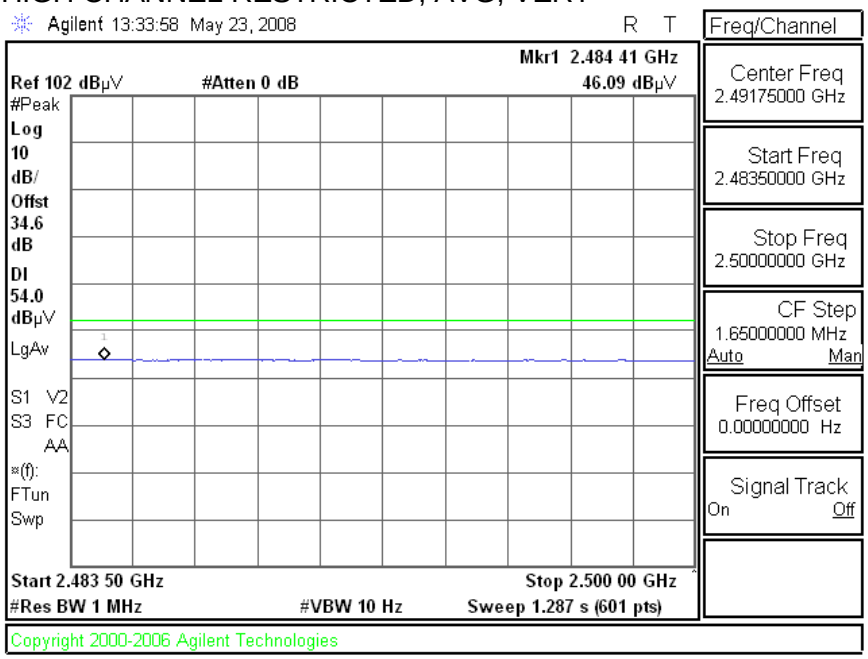




RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Casio
Project #: 08J11800
Date: 05. 23. 2008
Test Engineer: Y.Z.
Configuration: EUT Only
Mode: Tx On

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Chan															
1.603	3.0	44.8	31.0	28.0	3.8	-38.6	0.0	0.0	38.0	24.1	74	54	-36.0	-29.9	V
4.804	3.0	36.4	24.8	33.7	6.9	-36.5	0.0	0.0	40.4	28.8	74	54	-33.6	-25.2	V
1.603	3.0	43.3	31.7	28.0	3.8	-38.6	0.0	0.0	36.4	24.8	74	54	-37.6	-29.2	H
4.804	3.0	38.2	26.2	33.7	6.9	-36.5	0.0	0.0	42.2	30.3	74	54	-31.8	-23.7	H
Mid Chan															
1.627	3.0	44.9	37.2	28.1	3.8	-38.6	0.0	0.0	38.2	30.4	74	54	-35.8	-23.6	V
3.080	3.0	38.2	25.6	31.0	5.4	-37.3	0.0	0.0	37.3	24.8	74	54	-36.7	-29.2	V
1.627	3.0	45.7	38.1	28.1	3.8	-38.6	0.0	0.0	39.0	31.4	74	54	-35.0	-22.6	H
3.080	3.0	38.8	25.5	31.0	5.4	-37.3	0.0	0.0	38.0	24.6	74	54	-36.0	-29.4	H
High Chan															
1.653	3.0	44.1	36.1	28.1	3.8	-38.6	0.0	0.0	37.5	29.5	74	54	-36.5	-24.5	V
3.080	3.0	39.0	25.9	31.0	5.4	-37.3	0.0	0.0	38.1	25.1	74	54	-35.9	-28.9	V
1.653	3.0	45.6	39.4	28.1	3.8	-38.6	0.0	0.0	39.0	32.8	74	54	-35.0	-21.2	H
3.080	3.0	38.1	26.0	31.0	5.4	-37.3	0.0	0.0	37.3	25.1	74	54	-36.7	-28.9	H

Rev. 4.12.7

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.1.2. RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Casio
Project #: 08J11800
Date: 05. 23. 2008
Test Engineer: Y.Z.
Configuration: EUT Only
Mode: Rx On

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Mid Chan															
1.626	3.0	45.7	39.3	28.1	3.8	-38.6	0.0	0.0	39.0	32.6	74	54	-35.0	-21.4	H
1.793	3.0	40.1	28.5	28.5	4.0	-38.4	0.0	0.0	34.3	22.7	74	54	-39.7	-31.3	H
6.500	3.0	35.7	22.9	35.7	8.0	-36.3	0.0	0.0	43.1	30.4	74	54	-30.9	-23.6	H
1.047	3.0	36.0	23.5	26.5	3.1	-39.4	0.0	0.0	26.2	13.7	74	54	-47.8	-40.3	V
1.626	3.0	45.4	37.7	28.1	3.8	-38.6	0.0	0.0	38.7	31.0	74	54	-35.3	-23.0	V
6.500	3.0	35.4	22.9	35.7	8.0	-36.3	0.0	0.0	42.8	30.4	74	54	-31.2	-23.6	V

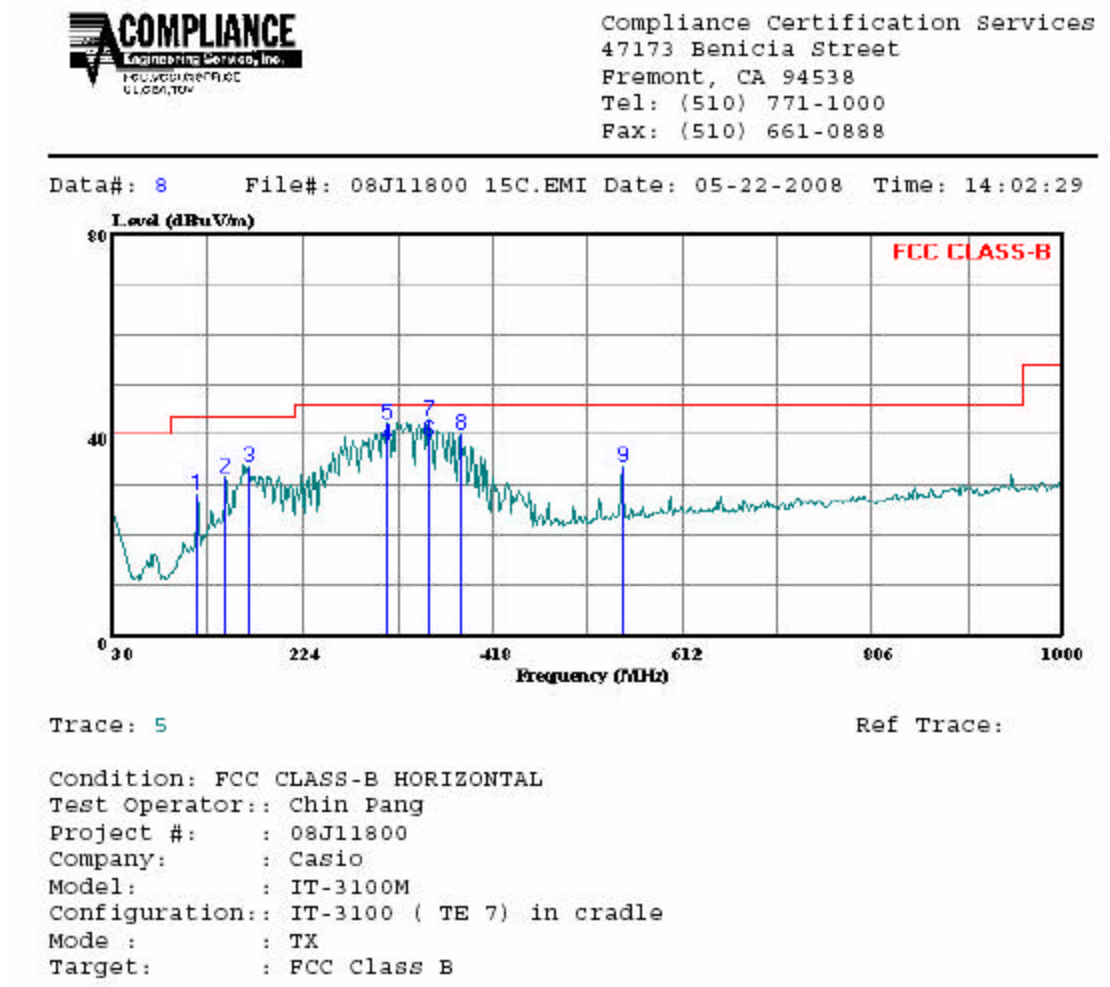
Rev. 4.12.7

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.1.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



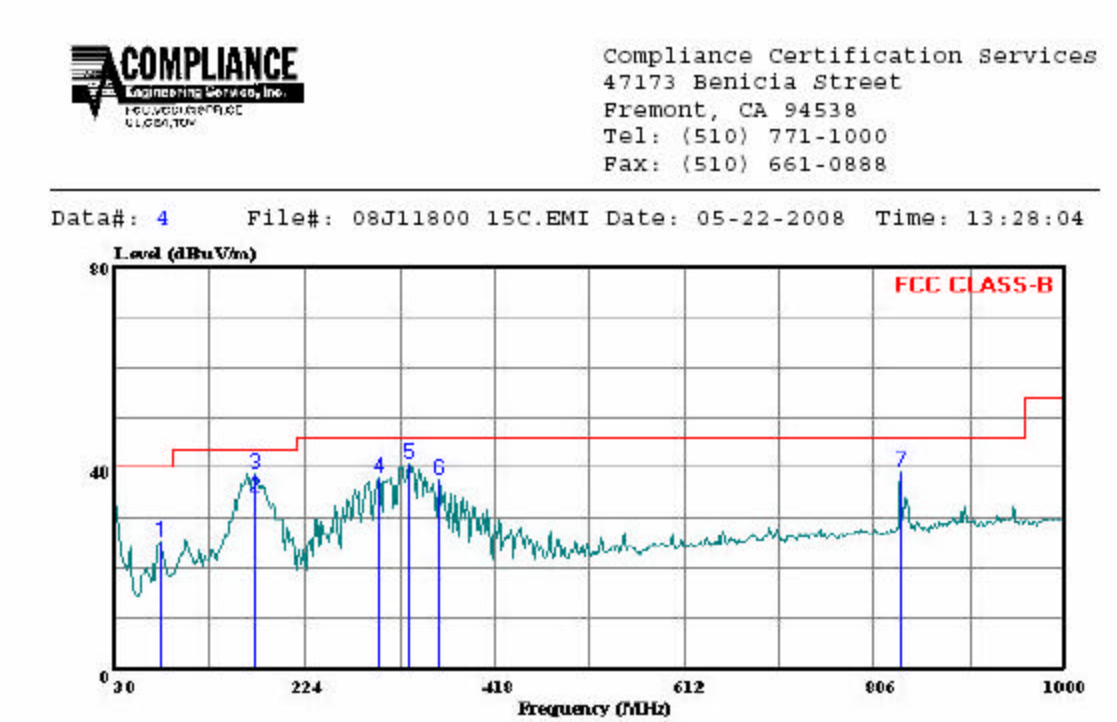
HORIZONTAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	116.330	42.15	-13.94	28.21	43.50	-15.29	Peak
2	145.430	45.18	-13.55	31.63	43.50	-11.87	Peak
3	167.740	48.12	-14.50	33.62	43.50	-9.88	Peak
4	310.330	50.25	-12.10	38.15	46.00	-7.85	QP
5	310.330	54.36	-12.10	42.26	46.00	-3.74	Peak
6	352.040	49.93	-11.17	38.76	46.00	-7.24	QP
7	352.040	54.18	-11.17	43.01	46.00	-2.99	Peak
8	385.990	50.46	-10.19	40.27	46.00	-5.73	Peak
9	550.890	39.88	-6.30	33.58	46.00	-12.42	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	75.590	44.41	-19.27	25.15	40.00	-14.86	Peak
2	172.590	49.12	-14.71	34.41	43.50	-9.09	QP
3	172.590	53.37	-14.71	38.66	43.50	-4.84	Peak
4	300.630	50.49	-12.42	38.07	46.00	-7.93	Peak
5	329.730	52.38	-11.57	40.81	46.00	-5.19	Peak
6	361.740	48.78	-10.90	37.88	46.00	-8.12	Peak
7	832.190	40.97	-1.87	39.10	46.00	-6.90	Peak

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

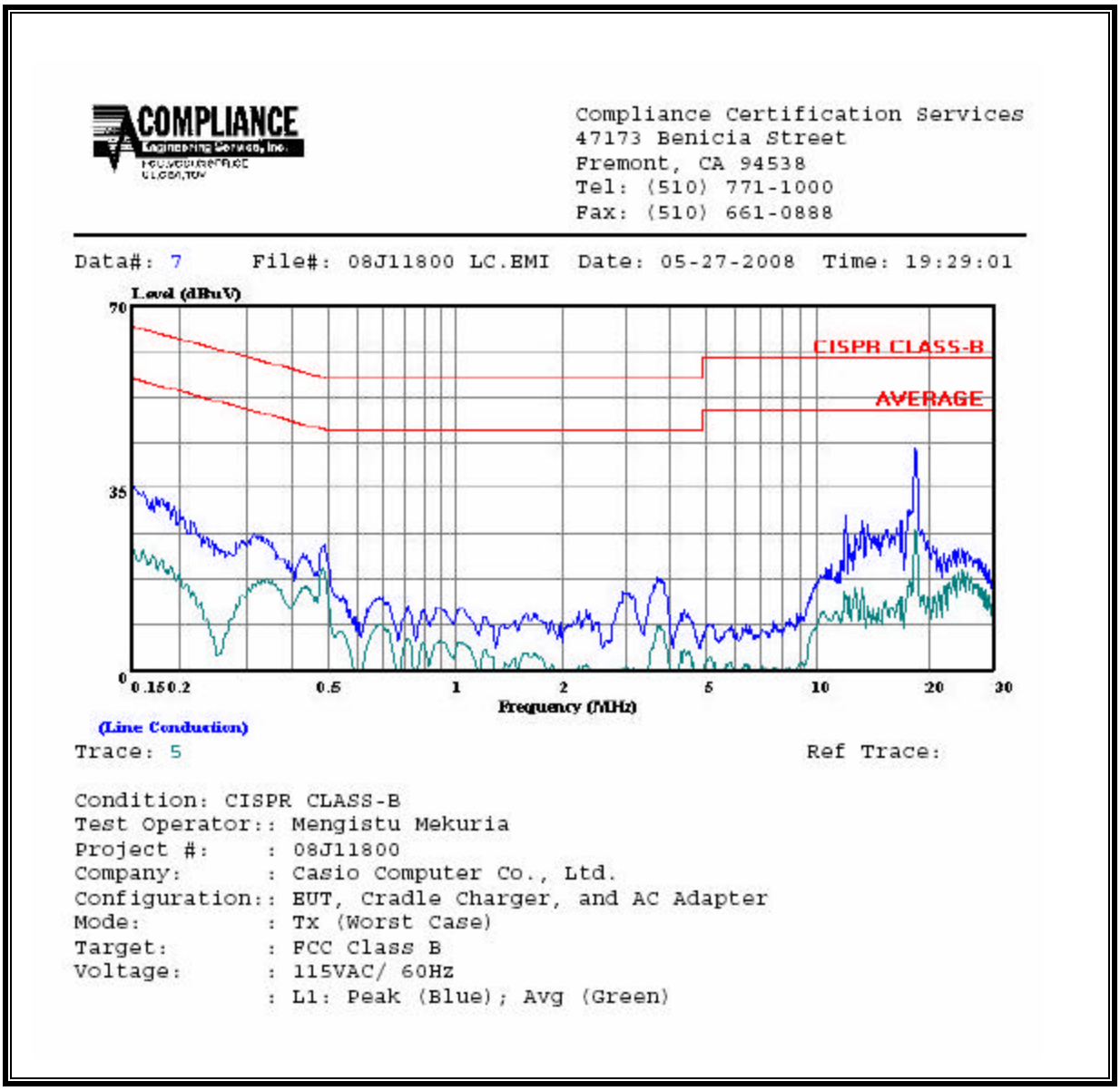
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

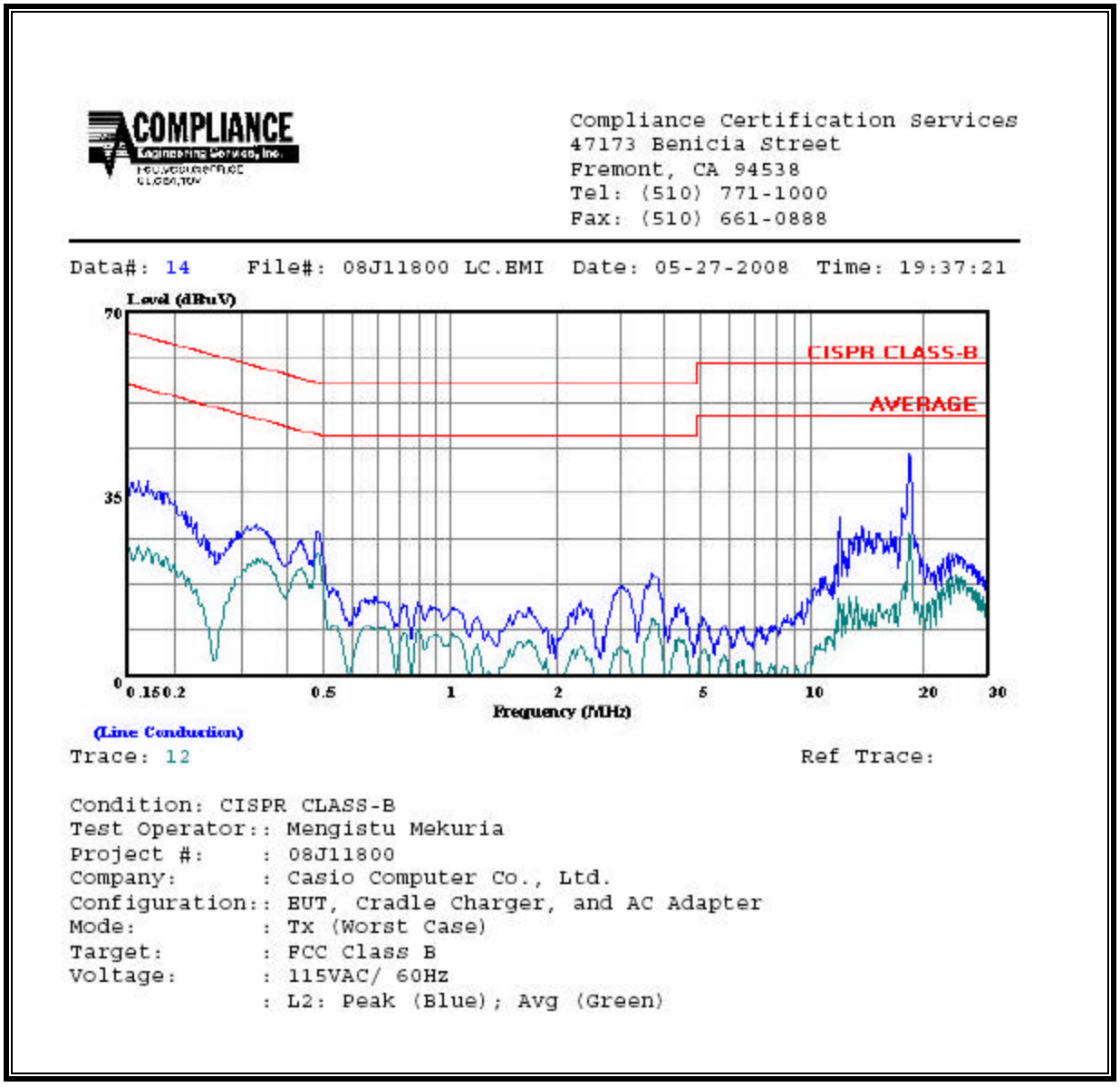
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	35.34	--	23.18	0.00	66.00	56.00	-30.66	-32.82	L1
0.32	26.27	--	17.55	0.00	59.79	49.79	-33.52	-32.24	L1
18.43	24.73	--	27.11	0.00	60.00	50.00	-35.27	-22.89	L1
0.17	37.20	--	24.47	0.00	65.01	55.01	-27.81	-30.54	L2
0.33	29.15	--	22.30	0.00	59.48	49.48	-30.33	-27.18	L2
18.43	42.71	--	27.29	0.00	60.00	50.00	-17.29	-22.71	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

CALCULATIONS

Given

$E = \sqrt{(30 * P * G) / d}$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

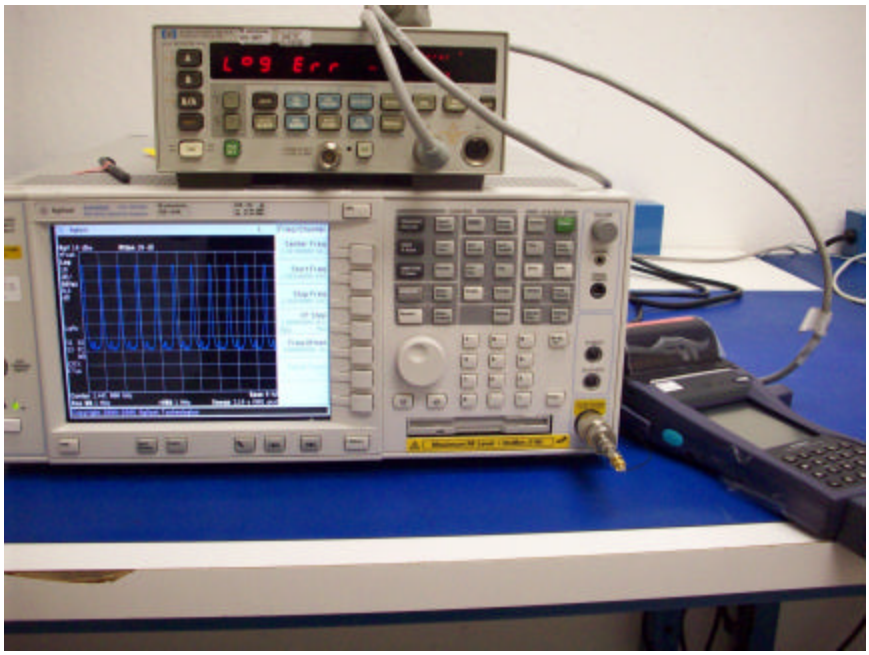
RESULTS

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)
Bluetooth	2.4 GHz	20.0	1.48	-0.35	0.0003

11. SETUP PHOTOS

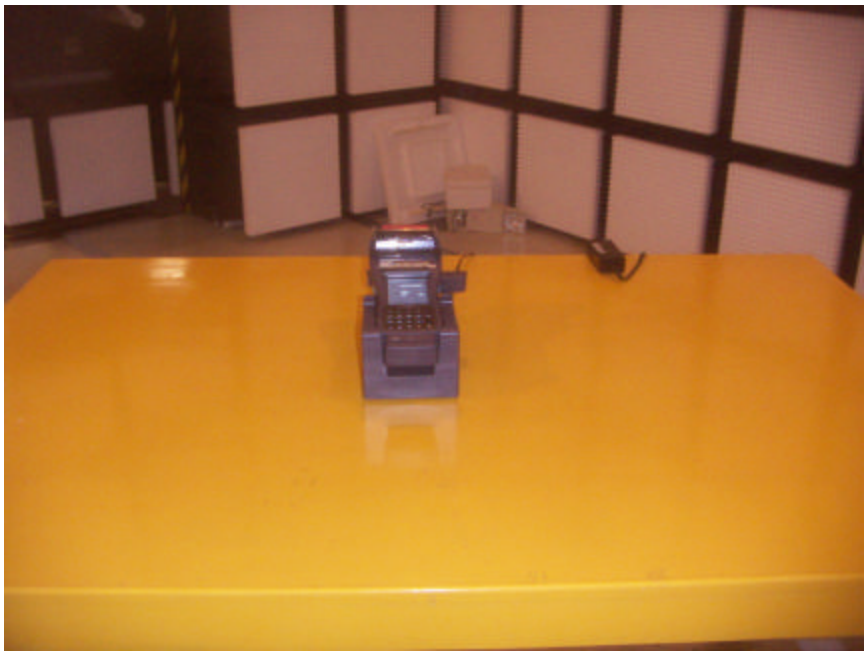
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

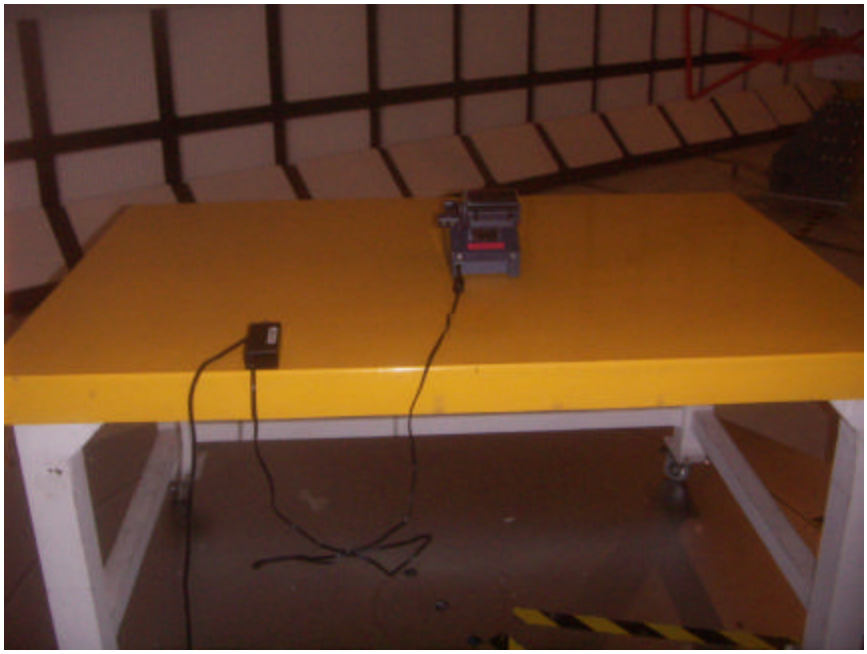


RADIATED RF MEASUREMENT SETUP (with Cradle Charger)

RADIATED FRONT PHOTO

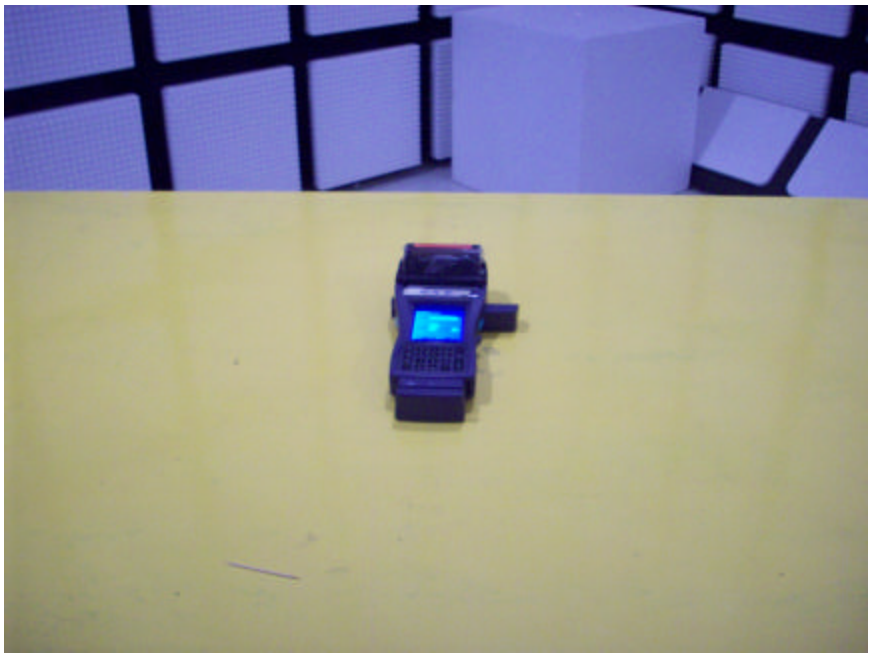


RADIATED BACK PHOTO

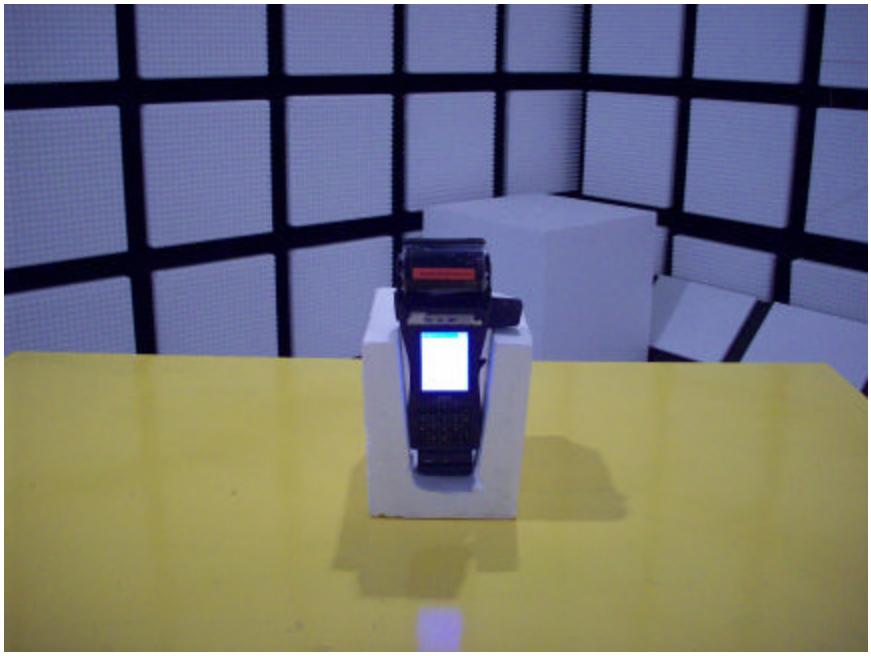


RADIATED RF MEASUREMENT SETUP (Portable)

RADIATED X-AXIS PHOTO



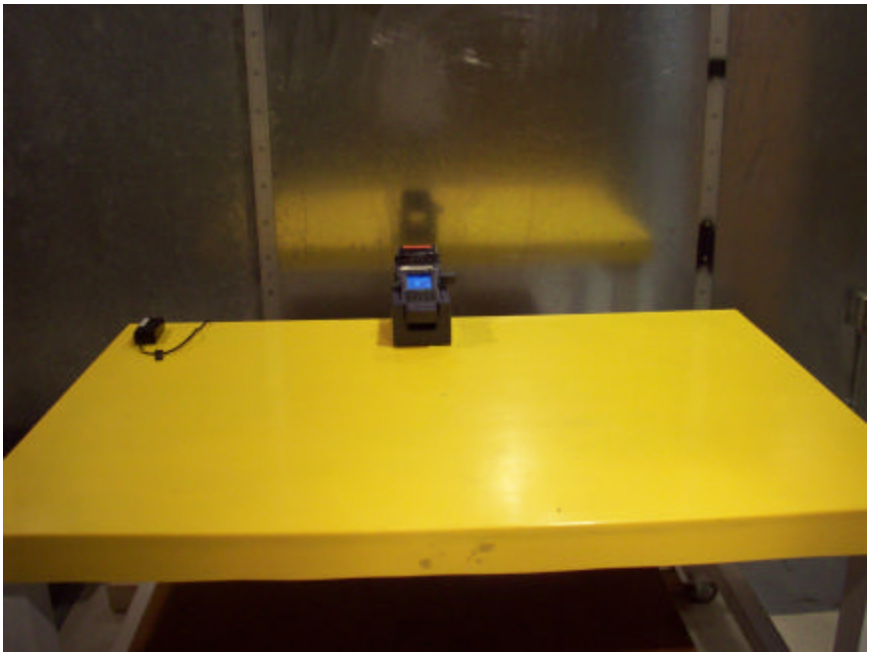
RADIATED Y-AXIS PHOTO



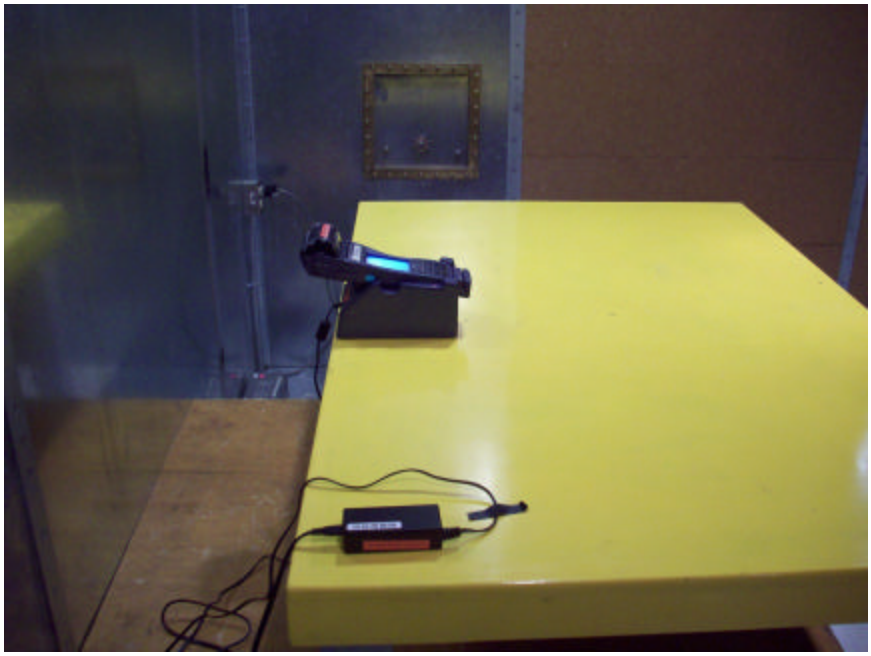
RADIATED Z-AXIS PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO



END OF REPORT