

# Intertek ETL SEMKO

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September 27, 2006

Mr. David Masucci  
Curtiss-Wright Controls, Inc.  
30 Porter Road  
Littleton, MA 01460

Mr. Masucci;

Enclosed you will find our emissions data report covering testing on the QUPID Assy Form C, Model: 20002637. Testing was performed on September 8<sup>th</sup> - 25<sup>th</sup>, 2006.

If there are any questions regarding this report, please contact the undersigned or your account representative.

Sincerely,



Nicholas Abbondante  
Project Engineer



Jeff Goulet  
Engineering Team Leader, EMC

Enclosure



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## **EMISSIONS TEST REPORT**

**Report Number: 3105077BOX-001**

**Project Number: 3105077**

**Testing performed on the**

**QUPID Assy Form C**

**Model: 20002637**

**To**

**FCC Part 15 Subpart F**

**For**

**Curtiss-Wright Controls, Inc.**

**Test Performed by:**

Intertek – ETL SEMKO  
70 Codman Hill Road  
Boxborough, MA 01719

**Test Authorized by:**

Curtiss-Wright Controls, Inc.  
30 Porter Road  
Littleton, MA 01460

Prepared by:

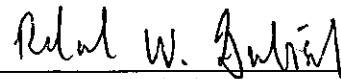


Nicholas Abbondante

Date:

9/27/06

Reviewed by:



Roland W. Gubisch

Date:

9-27-2006

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## **1.0 Job Description**

### **1.1 Client Information**

This EUT has been tested at the request of:

**Company:** Curtiss-Wright Controls, Inc.  
30 Porter Road  
Littleton, MA 01460

**Contact:** David Masucci

**Telephone:** 978-952-2058

**Fax:** 978-952-2001

**Email:** [dmasucci@curtiss-wright.com](mailto:dmasucci@curtiss-wright.com)

### **1.2 Equipment Under Test**

**Equipment Type:** QUPID Assy Form C

**Model Number(s):** 20002637

**Serial number(s):** L0026

**Manufacturer:** Curtiss-Wright Controls, Inc.

**EUT receive date:** 09/08/2006

**EUT received condition:** Prototype in Good Condition

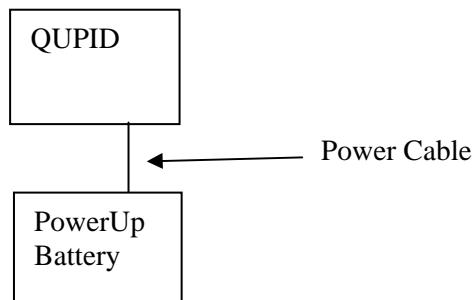
**Test start date:** 09/08/2006

**Test end date:** 09/25/2006

**1.3 Test Plan Reference:** Tested according to the standards listed and ANSI C63.4:2003.

### **1.4 Test Configuration**

#### **1.4.1 Block Diagram**



**1.4.2. Cables:**

Cable	Shielding	Connector	Length (m)	Qty.
EUT DC Power Cable	Braid	Wire	5.6	1
DC Power Supply AC Cable	None	Plastic	1.5	1

**1.4.3. Support Equipment:**

Name: PowerUp DC Power Source

Model No.: N/L

Serial No.: MKT0015

Name: BK Precision DC Power Supply

Model No.: 1710

Serial No.: 261-01526

**1.5 Mode(s) of Operation:**

The EUT was activated at the nominal 12V from the battery in the PowerUp DC Power Source during the radiated emissions testing and from the BK Precision DC Power Supply during AC line-conducted emissions. It was mounted on a Dutch Hill tripod during testing. Range settings were varied with no variation in emission levels.

**2.0 Test Summary**

TEST STANDARD	RESULTS	
FCC Part 15 Subpart F		
SUB-TEST	TEST PARAMETER	COMMENT
Radiated Emissions FCC 15.209, 15.511, 15.521	The radiated emissions from the UWB device below 960 MHz and the digital circuitry below 1000 MHz must not exceed the limits of FCC 15.209. UWB emissions in the ranges from 1164-1240 and 1559-1610 MHz must not exceed -63.3 dBm EIRP based on a 1 ms RMS average measurement using a 1 kHz resolution bandwidth. UWB emissions in the range from 960-1610 MHz must not exceed -53.3 dBm EIRP, must not exceed -51.3 dBm EIRP in the ranges from 1610-1990 MHz and above 10.6 GHz, and must not exceed -41.3 dBm in the range from 1.99-10.6 GHz based on a 1 ms RMS average measurement using a 1 MHz resolution bandwidth.	Data as Reported
Transmitter Characteristics FCC 15.511, 15.521	The frequency of the highest radiated emission must be within the UWB bandwidth. The UWB bandwidth must be at least 500 MHz and must be contained between 1.99 and 10.6 GHz.	Pass
AC Line-Conducted Emissions FCC 15.207	The AC Line-Conducted emissions must not exceed the limits of FCC 15.207.	Pass

Notes: The EUT is an Ultra-Wide Band surveillance radar transmitter.

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project</u>	<u>Project</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
<u>No.</u>		<u>Handler</u>			

### 3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where  $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

$RA$  = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$

$CF$  = Cable Attenuation Factor in dB

$AF$  = Antenna Factor in dB

$AG$  = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0  $\text{dB}\mu\text{V}$  is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32  $\text{dB}\mu\text{V}/\text{m}$ . This value in  $\text{dB}\mu\text{V}/\text{m}$  was converted to its corresponding level in  $\mu\text{V}/\text{m}$ .

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}/\text{m}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 32 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = [10(32 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where  $NF$  = Net Reading in  $\text{dB}\mu\text{V}$

$RF$  = Reading from receiver in  $\text{dB}\mu\text{V}$

$LF$  = LISN Correction Factor in dB

$CF$  = Cable Correction Factor in dB

$AF$  = Attenuator Loss Factor in dB

To convert from  $\text{dB}\mu\text{V}$  to  $\mu\text{V}$  or  $\text{mV}$  the following was used:

$$UF = 10^{(NF/20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

**Example:**

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 254 \mu\text{V}/\text{m}$$

### **3.1 Measurement Uncertainty**

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty ( $k = 2$ ) for radiated emissions from 30 to 1000 MHz has been determined to be:  
 $\pm 3.5$  dB at 10m,  $\pm 3.8$  dB at 3m

The expanded uncertainty ( $k = 2$ ) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

$\pm 2.6$  dB

The expanded uncertainty ( $k = 2$ ) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

$\pm 3.2$  for ISN and voltage probe measurements  
 $\pm 3.1$  for current probe measurements

### 3.2 Site Description

**Test Site(s): 2    FCC Registration #: 91658**

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

The EMC Lab has two Semi-anechoic Chambers and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference groundplanes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

**Test Results:** Data as Reported

**Test Standard:** FCC Part 15 Subpart F

**Test:** Radiated Emissions, FCC 15.209, 15.511, 15.521

**Performance Criterion:** The radiated emissions from the UWB device below 960 MHz and the digital circuitry below 1000 MHz must not exceed the limits of FCC 15.209. UWB emissions in the ranges from 1164-1240 and 1559-1610 MHz must not exceed -63.3 dBm EIRP based on a 1 ms RMS average measurement using a 1 kHz resolution bandwidth. UWB emissions in the range from 960-1610 MHz must not exceed -53.3 dBm EIRP, must not exceed -51.3 dBm EIRP in the ranges from 1610-1990 MHz and above 10.6 GHz, and must not exceed -41.3 dBm in the range from 1.99-10.6 GHz based on a 1 ms RMS average measurement using a 1 MHz resolution bandwidth.

**Test Environment:**

Environmental Conditions During Testing:	Humidity (%):	See Table	Pressure (hPa):	See Table	Ambient (°C):	See Table
Pretest Verification Performed	Yes		Equipment under Test:		QUPID Assy Form C	

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	07/01/2007
2	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007
3	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL028	12/12/2006
4	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 80	CBL029	12/20/2006
5	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 80	CBL030	12/12/2006
6	ANTENNA	EMCO	3142	9701-1116	11/10/2006
7	HORN ANTENNA	EMCO	3115	9610-4980	06/12/2007
8	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	12/13/2007
9	PREAMPLIFIER 1- 40 GHz	MITEQ	NSP4000-NF	507145	11/21/2006
10	EMI Receiver, 9kHz to 6.5GHz	Hewlett Packard	8546A	3410A00173	07/26/2007
11	EMI Filter	Hewlett Packard	85460A	344800203	07/26/2007
12	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	09/26/2007
13	6.0GHz High Pass Filter	Reactel, Inc	11HS- 6G/18G-S11	06-1	09/06/2007
14	Attenuator	Weinschel Corp	47-10-34	BD8309	06/23/2007
15	3GHz High Pass Filter	Reactel, Inc	7HSX- 3G/18G-S11	06-1	09/06/2007

**Software Utilized:**

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	1/17/06 Revision

**Test Results:**

Notes: In the range 960 MHz-4 GHz, data was collected without a preamplifier or filters external to the spectrum analyzer. In the 4-7 GHz plot, a 3 GHz high-pass filter, a 10 dB attenuator pad, and a preamplifier were used. Above 7 GHz, a 6 GHz high-pass filter and a preamplifier were utilized. All emissions above 7.125 GHz were measurements of instrumentation noise floor. In the range from 18-24 GHz, in addition to checking for emissions at 3 and 1 meters, a hand scan of the EUT was performed with the antenna at a 10-40 cm test distance. The antenna was then fixed in place at 0.4 meters and the signal levels were recorded. In the 1-4 GHz plots, the 1930-1990 MHz PCS band ambient has been removed from the plot where the notch appears. The frequency which contained the highest radiated emission is 2.114 GHz. The UWB signal crosses the limit lines at 960 MHz, 1.355 GHz, 1.926 GHz, 1.990 GHz, 3.327 GHz, 3.886 GHz, and 3.970 GHz.

### Radiated Emissions

Company: Curtiss-Wright Controls, Inc.

Model #: 20002637

Serial #: L0026

Engineers: Nicholas Abbondante

Location: Site 2

Project #: 3105077

Date(s): 09/20/06

Standard: FCC Part 15 Subpart C 15.209

Receiver: HP 85462A (Atlanta5/6)

Limit Distance (m): 3

PreAmp: NONE.

Test Distance (m): 3

Barometer: BAR2

Temp/Humidity/Pressure: 18c 60% 995mB

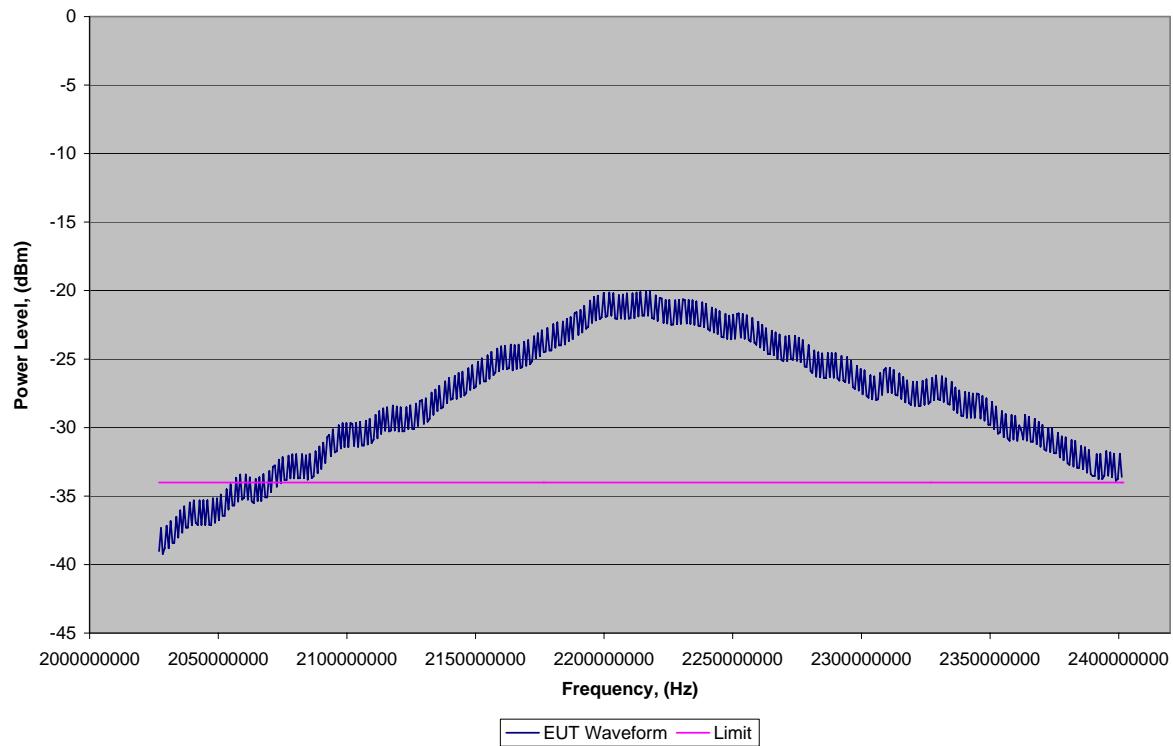
PreAmp Used? (Y or N): N

Voltage/Frequency: 12VDC Frequency Range: 30 - 1000 MHz

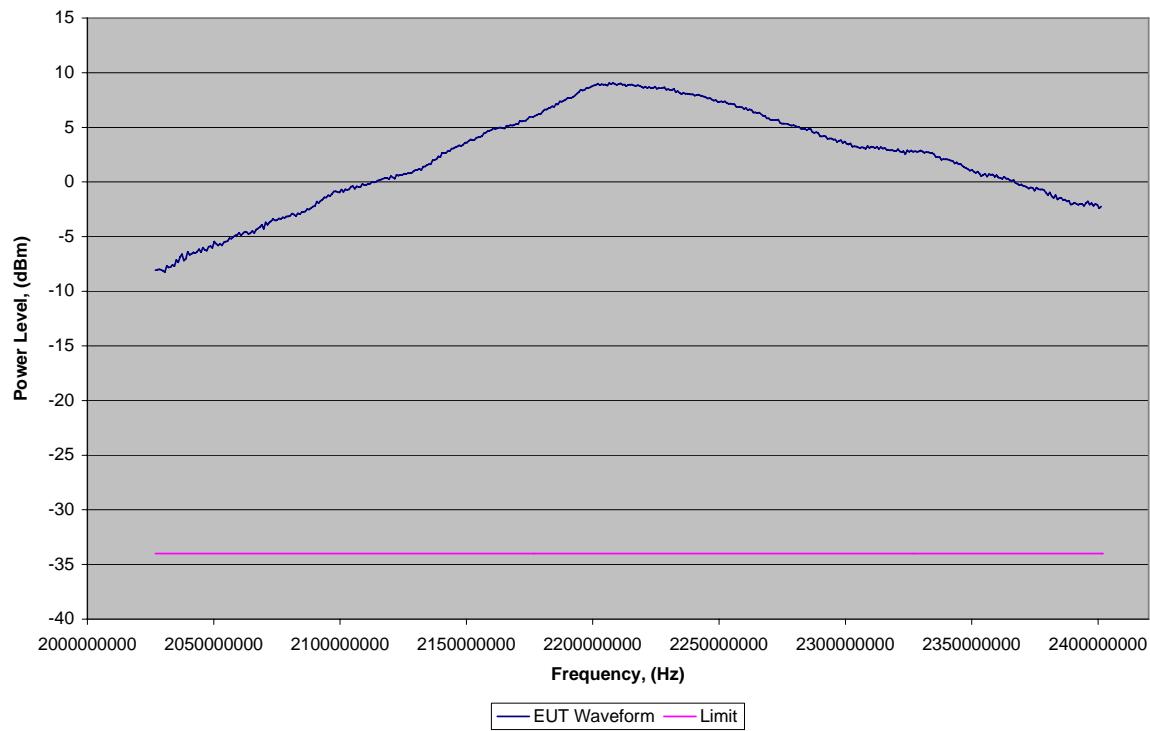
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
QP	V	109.100	8.3	8.9	1.4	0.0	0.0	18.6	43.5	-24.9	120/300 kHz	RB	RB
QP	V	110.000	21.3	8.8	1.4	0.0	0.0	31.5	43.5	-12.0	120/300 kHz	RB	RB
QP	V	113.400	8.0	8.3	1.5	0.0	0.0	17.8	43.5	-25.7	120/300 kHz	RB	RB
QP	V	131.500	6.5	7.4	1.6	0.0	0.0	15.5	43.5	-28.0	120/300 kHz	RB	RB
QP	H	136.800	2.1	7.8	1.4	0.0	0.0	11.3	43.5	-32.2	120/300 kHz	RB	RB
QP	H	145.900	0.7	8.8	1.5	0.0	0.0	11.0	43.5	-32.5	120/300 kHz		
QP	H	150.000	27.6	9.1	1.6	0.0	0.0	38.3	43.5	-5.2	120/300 kHz	RB	RB
QP	V	170.000	13.0	10.6	1.9	0.0	0.0	25.5	43.5	-18.0	120/300 kHz		
QP	V	190.000	18.6	10.4	1.9	0.0	0.0	30.9	43.5	-12.6	120/300 kHz		
QP	V	200.000	20.1	10.4	2.0	0.0	0.0	32.5	43.5	-11.0	120/300 kHz		
QP	V	210.000	10.0	11.1	2.0	0.0	0.0	23.1	43.5	-20.4	120/300 kHz		
QP	H	230.000	14.0	11.9	2.2	0.0	0.0	28.1	46.0	-17.9	120/300 kHz		
QP	V	240.000	16.5	12.4	2.2	0.0	0.0	31.1	46.0	-14.9	120/300 kHz	RB	RB
QP	V	247.000	4.0	12.4	2.2	0.0	0.0	18.6	46.0	-27.4	120/300 kHz	RB	RB
QP	V	250.000	26.3	12.5	2.2	0.0	0.0	41.0	46.0	-5.0	120/300 kHz	RB	RB
QP	H	260.000	17.7	12.8	2.2	0.0	0.0	32.7	46.0	-13.3	120/300 kHz	RB	RB
QP	V	270.000	18.8	12.7	2.3	0.0	0.0	33.8	46.0	-12.2	120/300 kHz	RB	RB
QP	V	280.000	20.0	12.7	2.4	0.0	0.0	35.1	46.0	-10.9	120/300 kHz	RB	RB
QP	V	290.000	11.8	13.0	2.4	0.0	0.0	27.2	46.0	-18.8	120/300 kHz		
QP	H	296.500	8.4	13.9	2.4	0.0	0.0	24.7	46.0	-21.3	120/300 kHz		
QP	V	310.000	22.8	13.7	2.6	0.0	0.0	39.1	46.0	-6.9	120/300 kHz		
QP	V	320.000	19.0	14.2	2.5	0.0	0.0	35.7	46.0	-10.3	120/300 kHz		
QP	V	330.000	23.9	14.7	2.4	0.0	0.0	41.0	46.0	-5.0	120/300 kHz	RB	RB
QP	V	340.000	14.6	14.6	2.3	0.0	0.0	31.5	46.0	-14.5	120/300 kHz		
QP	V	350.000	21.5	15.1	2.4	0.0	0.0	39.0	46.0	-7.0	120/300 kHz		
QP	V	360.000	18.3	15.6	2.7	0.0	0.0	36.6	46.0	-9.4	120/300 kHz		
QP	V	370.000	15.3	15.6	2.9	0.0	0.0	33.8	46.0	-12.2	120/300 kHz		
QP	V	372.000	12.6	15.6	3.1	0.0	0.0	31.2	46.0	-14.8	120/300 kHz		
QP	V	387.500	13.0	15.4	2.6	0.0	0.0	31.0	46.0	-15.0	120/300 kHz	RB	RB
QP	V	400.000	17.3	14.9	2.8	0.0	0.0	35.0	46.0	-11.0	120/300 kHz	RB	RB
QP	V	410.000	2.9	15.2	2.9	0.0	0.0	21.0	46.0	-25.0	120/300 kHz		
QP	V	420.000	-0.9	15.7	2.9	0.0	0.0	17.7	46.0	-28.3	120/300 kHz		
QP	V	440.000	12.8	16.1	2.9	0.0	0.0	31.8	46.0	-14.2	120/300 kHz		
QP	V	450.000	4.8	16.8	3.0	0.0	0.0	24.6	46.0	-21.4	120/300 kHz		
QP	V	468.000	-4.4	17.0	3.2	0.0	0.0	15.8	46.0	-30.2	120/300 kHz		
QP	V	470.000	7.6	17.1	3.1	0.0	0.0	27.8	46.0	-18.2	120/300 kHz		
QP	V	480.000	9.7	18.0	3.0	0.0	0.0	30.7	46.0	-15.3	120/300 kHz		
QP	V	490.000	3.3	17.6	3.1	0.0	0.0	24.0	46.0	-22.0	120/300 kHz		
QP	V	630.200	-4.2	19.5	3.7	0.0	0.0	19.0	46.0	-27.0	120/300 kHz		
QP	V	718.800	-3.6	21.1	3.9	0.0	0.0	21.4	46.0	-24.6	120/300 kHz		
QP	V	778.000	2.5	21.5	4.1	0.0	0.0	28.0	46.0	-18.0	120/300 kHz		
QP	V	820.300	7.6	21.9	4.2	0.0	0.0	33.7	46.0	-12.3	120/300 kHz		
QP	V	827.500	8.0	22.0	4.2	0.0	0.0	34.2	46.0	-11.9	120/300 kHz		
QP	V	842.100	5.1	22.0	4.5	0.0	0.0	31.6	46.0	-14.4	120/300 kHz		
QP	V	859.100	7.9	21.8	5.6	0.0	0.0	35.3	46.0	-10.7	120/300 kHz		
QP	V	867.300	5.7	21.8	4.8	0.0	0.0	32.3	46.0	-13.8	120/300 kHz		
QP	V	959.000	10.4	22.8	4.7	0.0	0.0	37.9	46.0	-8.1	120/300 kHz		
QP	V	999.000	24.8	22.8	4.8	0.0	0.0	52.4	54.0	-1.6	120/300 kHz	RB	RB

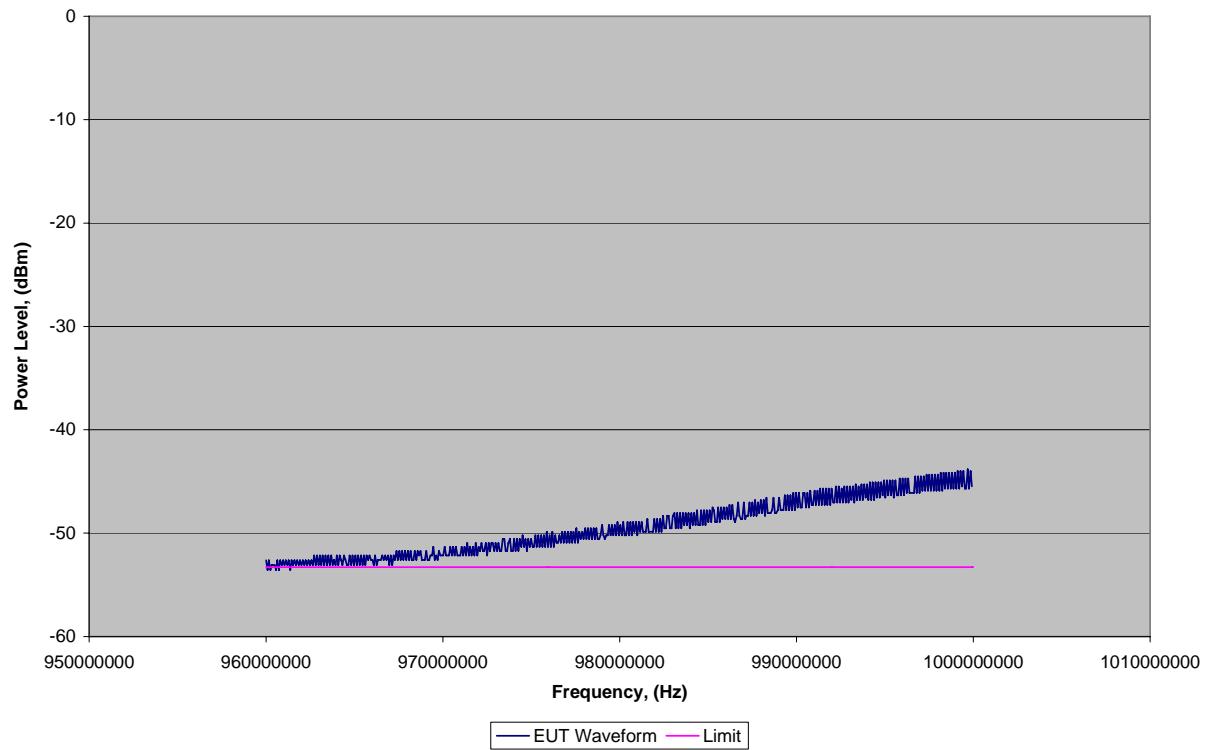
2.114GHz 1MHz RBW RMS, Max Data Point:-20.037dBm, Limit:-33.97dBm, Test Distance:1m



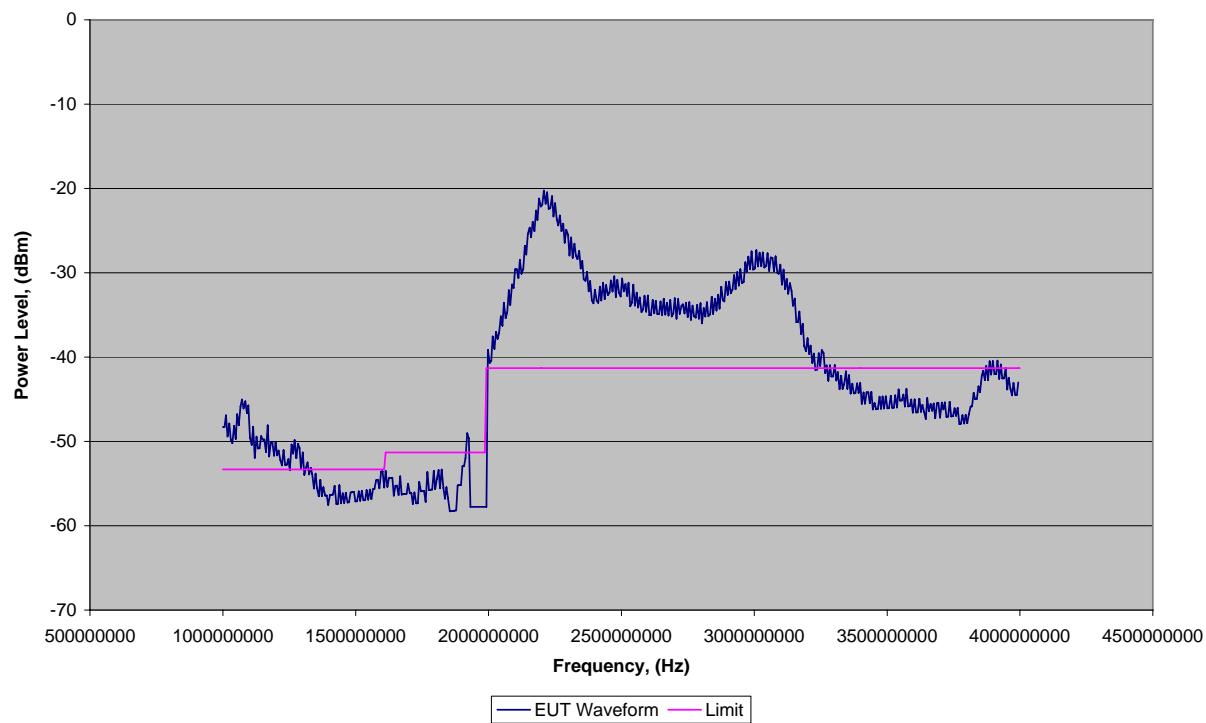
2.114GHz 1MHz RBW MaxPeak, Max Data Point:9.052dBm, Limit:-33.97dBm, Test Distance:1m



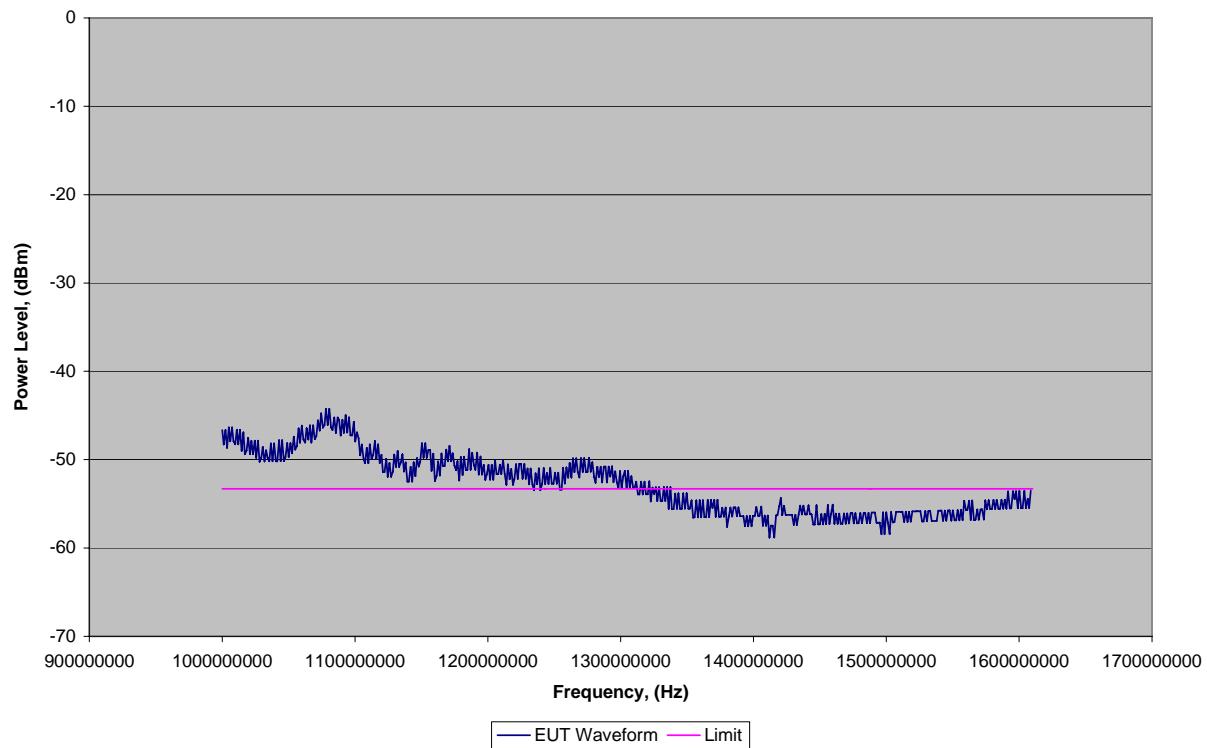
960-1000MHz 1MHz RBW, Max Data Point:-43.824dBm, Limit:-53.3dBm, Test Distance:3m



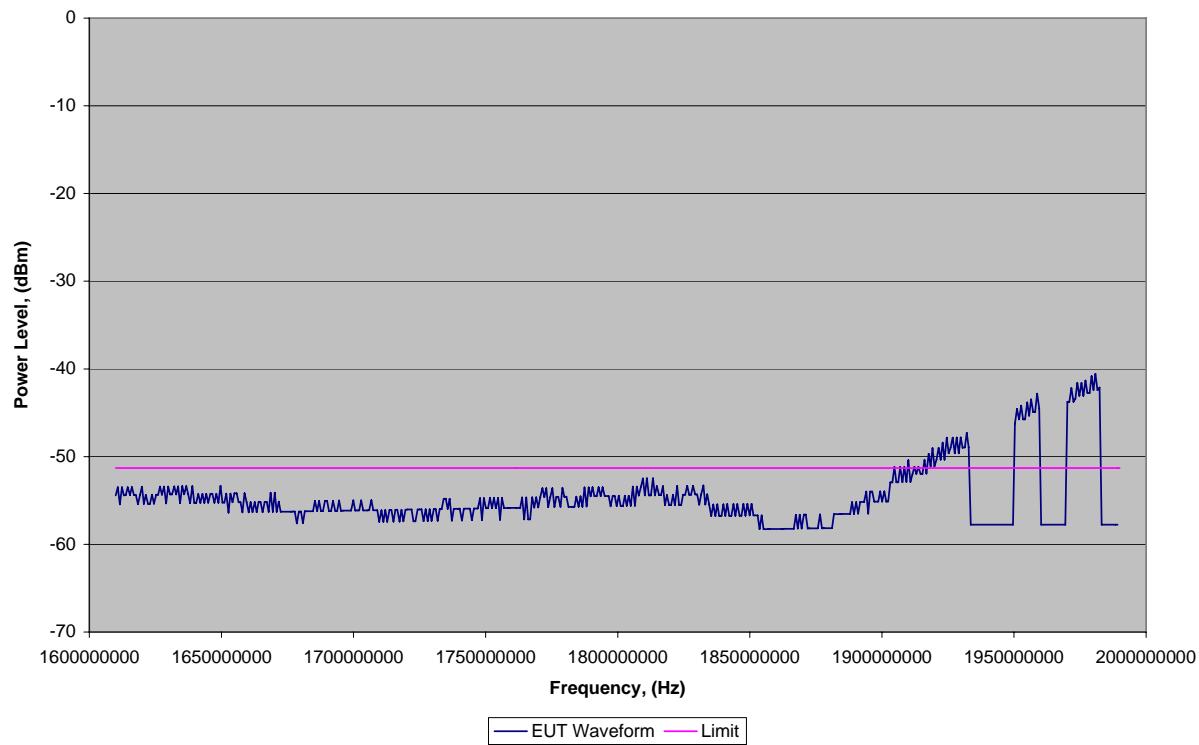
1-4GHz 1MHz RBW, Max Data Point:-20.234dBm, Limit:1000-1610MHz -53.3dBm, 1610-1990MHz -51.3dBm, 1990MHz-4GHz -41.3dBm, Test Distance:1m



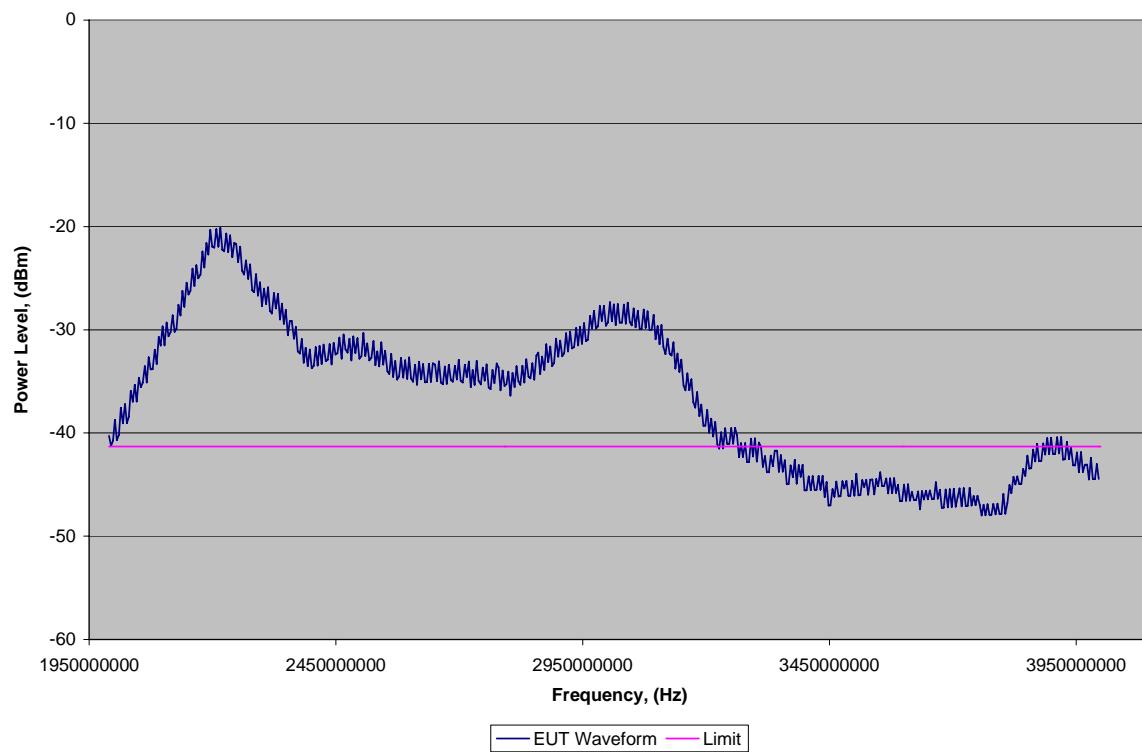
1000-1610MHz 1MHz RBW, Max Data Point:-44.252dBm, Limit:-53.3dBm, Test Distance:1m



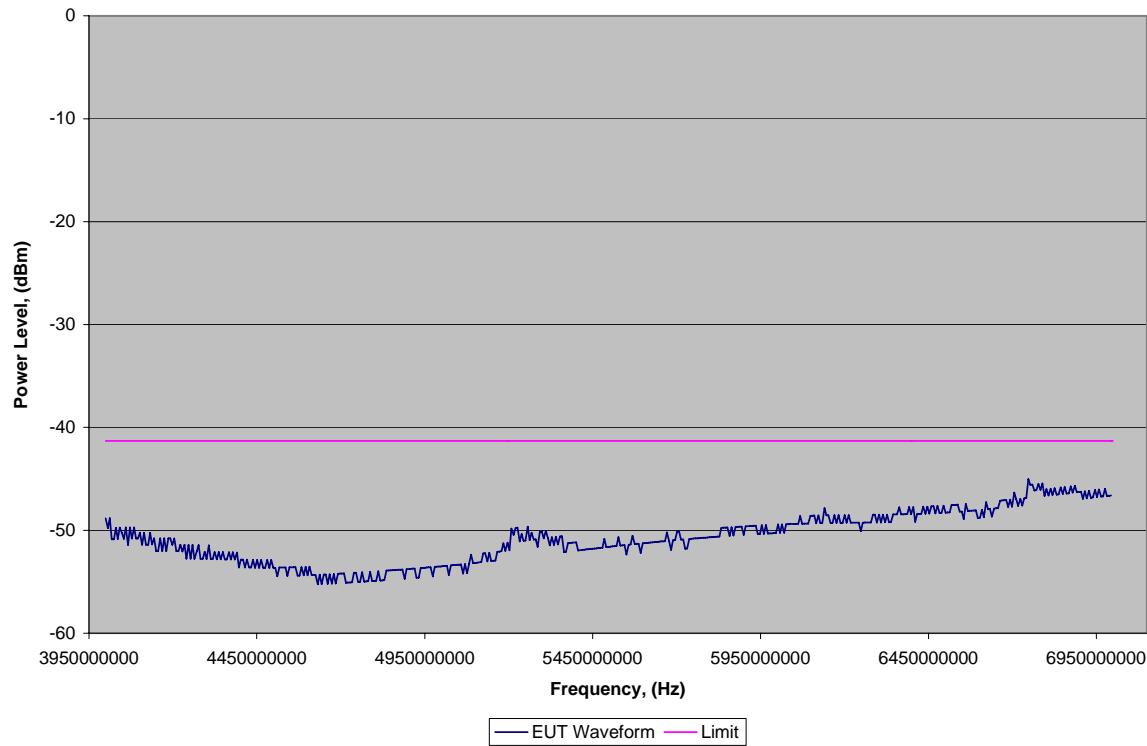
1610-1990MHz 1MHz RBW, Max Data Point:-40.548dBm, Limit:-51.3dBm, Test Distance:1m



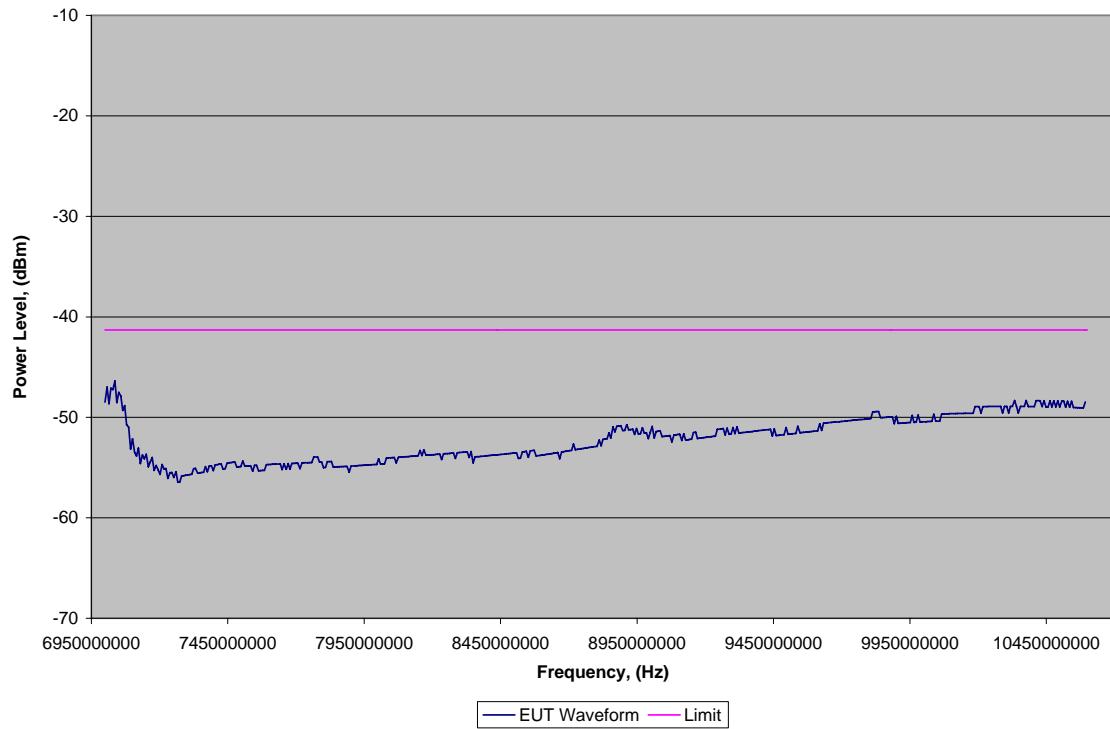
1990-4000MHz 1MHz RBW, Max Data Point:-20.114dBm, Limit:-41.3dBm, Test Distance:1m



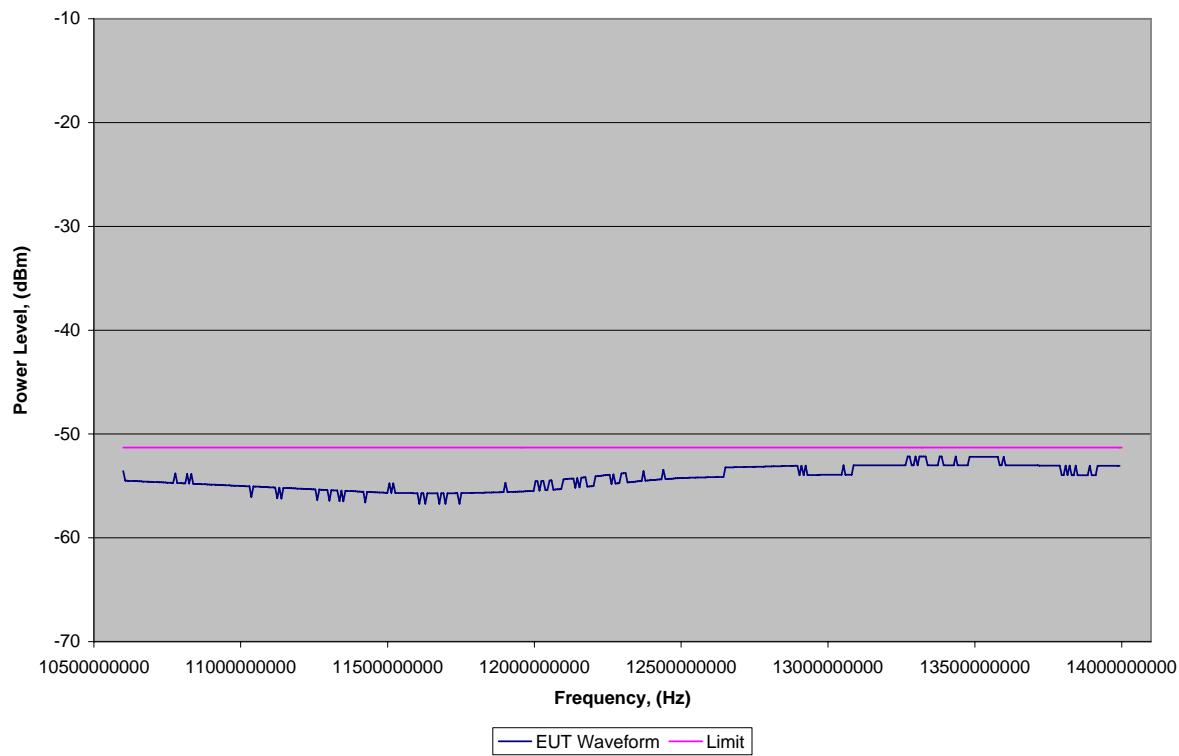
4-7GHz 1MHz RBW, Max Data Point:-45.031dBm, Limit:-41.3dBm, Test Distance:1m



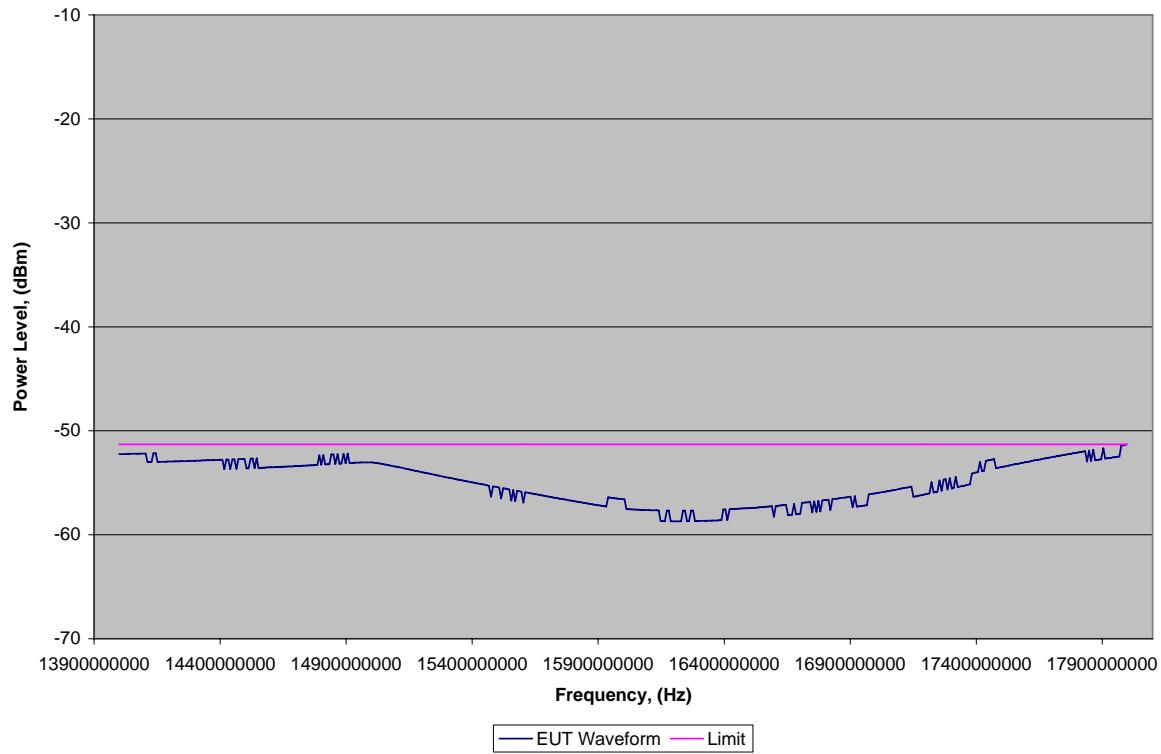
7-10.6GHz 1MHz RBW, Max Data Point:-46.373dBm, Limit:-41.3dBm, Test Distance:1m



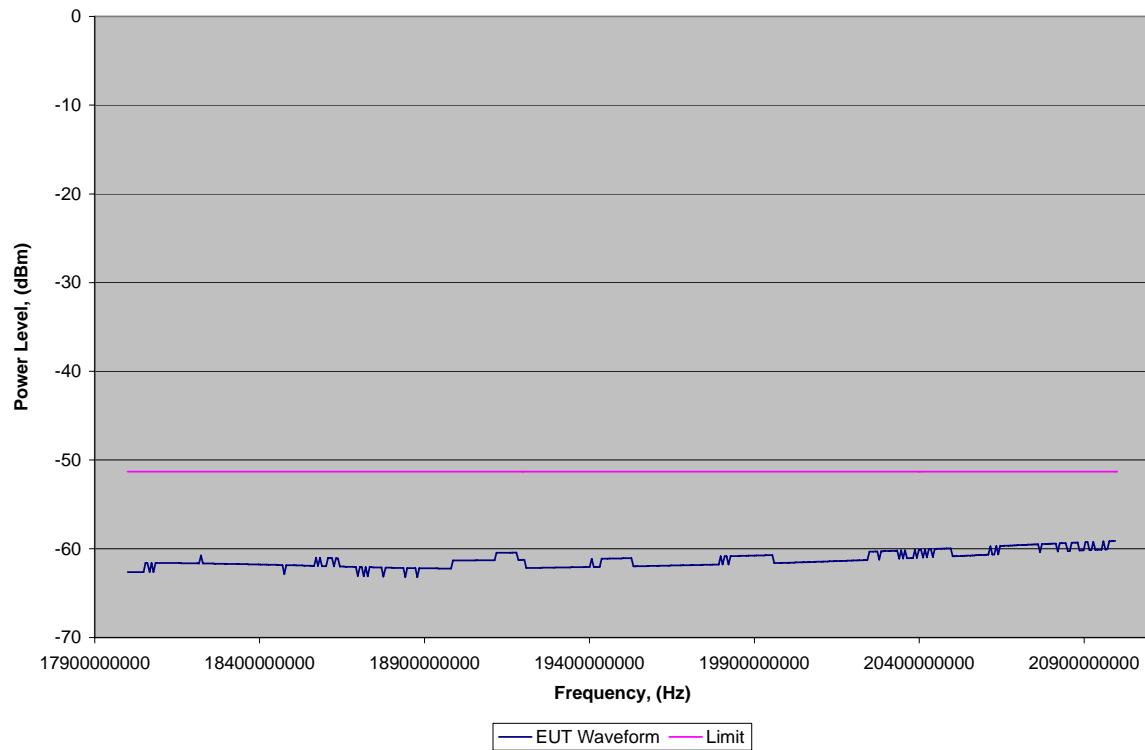
10.6-14GHz 1MHz RBW, Max Data Point:-52.181dBm, Limit:-51.3dBm, Test Distance:1m



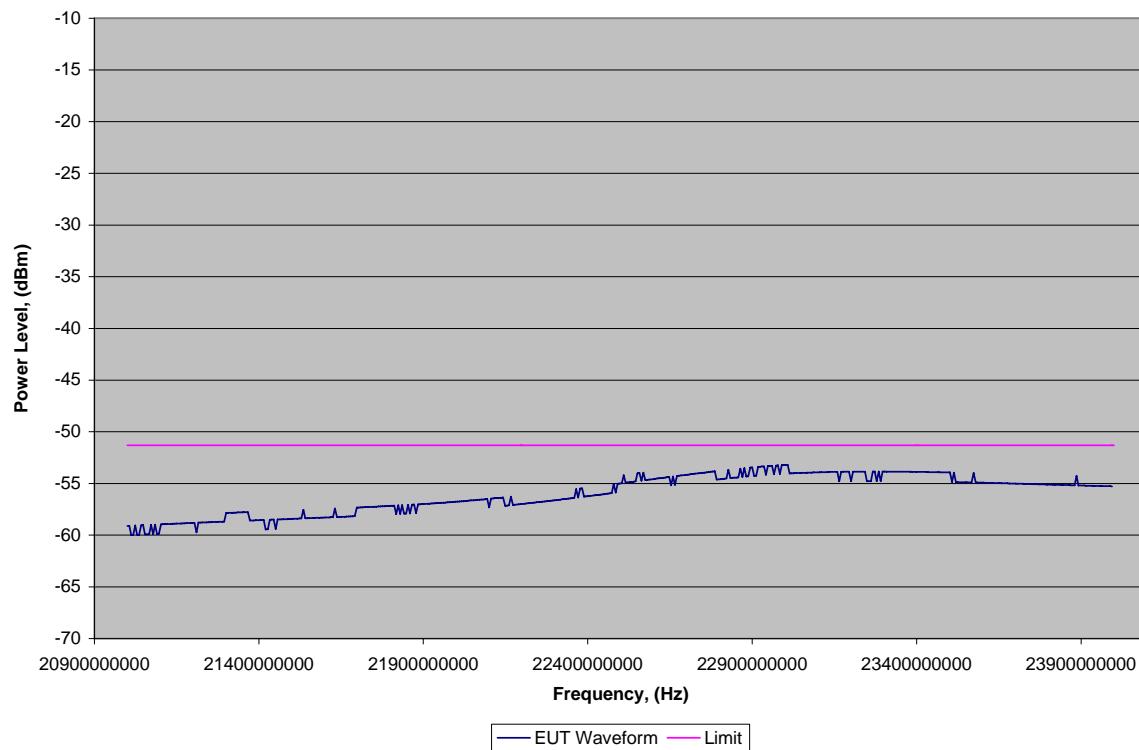
14-18GHz 1MHz RBW, Max Data Point:-51.361dBm, Limit:-51.3dBm, Test Distance:1m



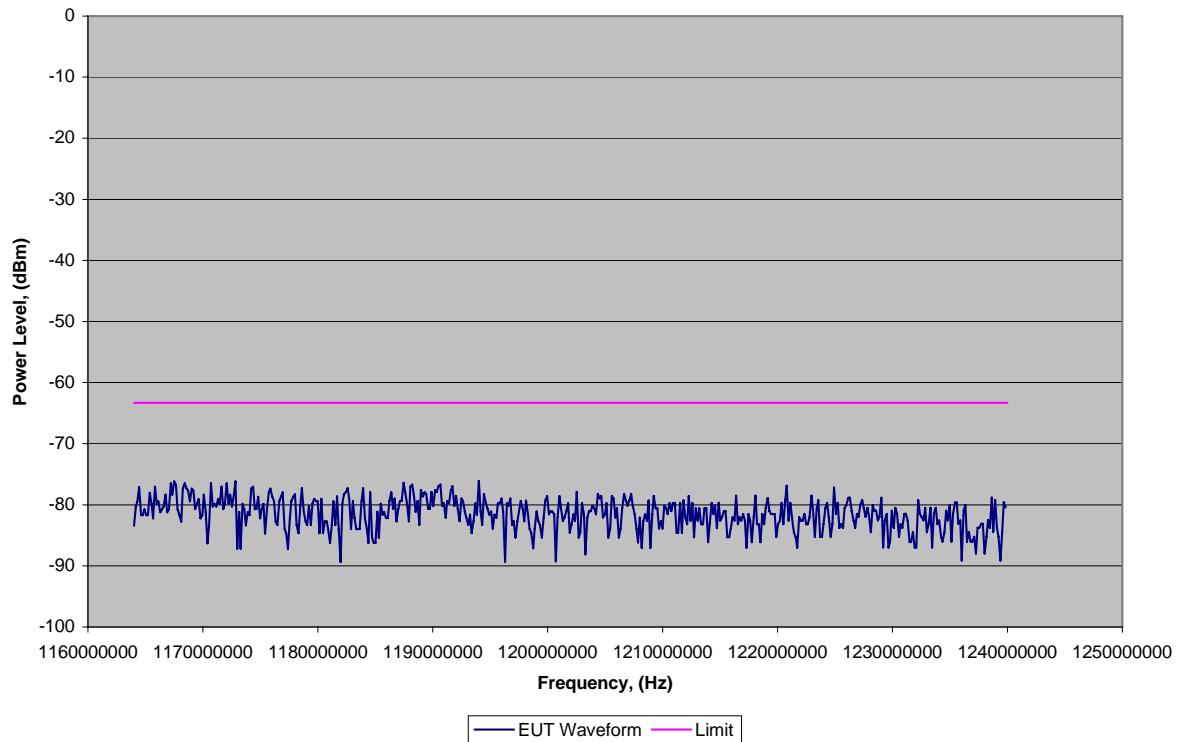
18-21GHz 1MHz RBW, Max Data Point:-59.104dBm, Limit:-51.3dBm, Test Distance:0.4m



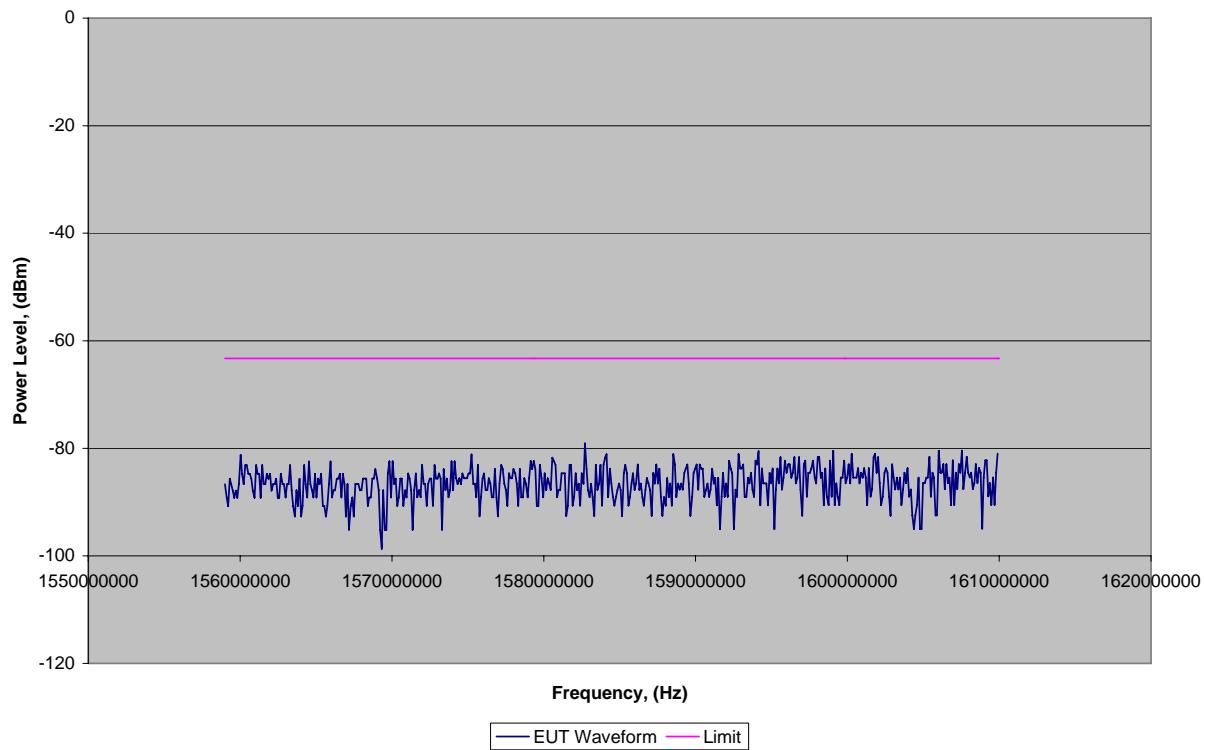
21-24GHz 1MHz RBW, Max Data Point:-53.204dBm, Limit:-51.3dBm, Test Distance:0.4m



1164-1240MHz 1kHz RBW, Max Data Point:-76.109dBm, Limit:-63.3dBm, Test Distance:1m



1559-1610MHz 1kHz RBW, Max Data Point:-79.063dBm, Limit:-63.3dBm, Test Distance:1m



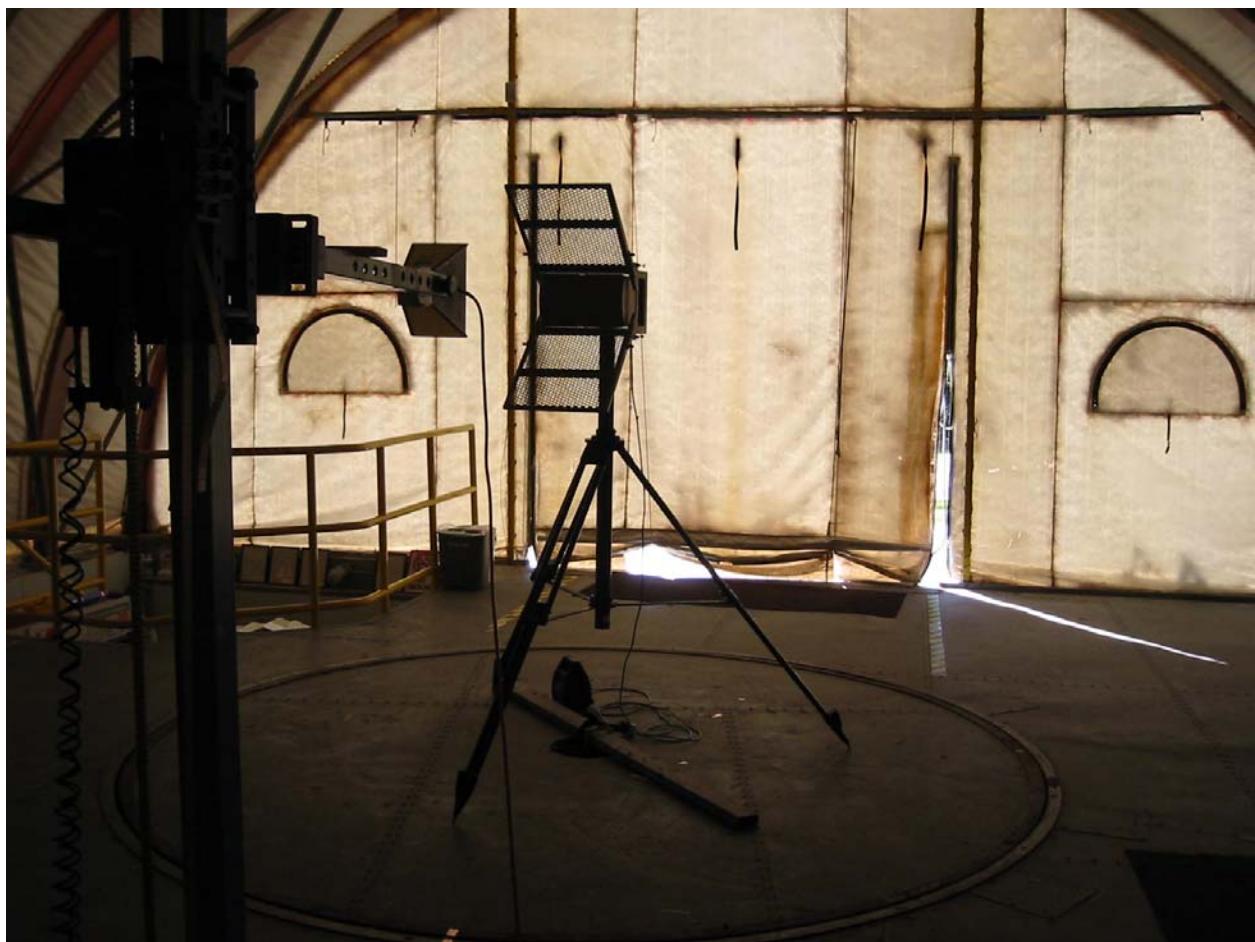
Radiated Emissions Setup Photos



Radiated Emissions, 30-1000 MHz



Radiated Emissions, 30-1000 MHz



Radiated Emissions, 1-18 GHz



Radiated Emissions, 1-18 GHz

**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart F

**Test:** Transmitter Characteristics, FCC 15.1511, 15.521

**Performance Criterion:** The frequency of the highest radiated emission must be within the UWB bandwidth. The UWB bandwidth must be at least 500 MHz and must be contained between 1.99 and 10.6 GHz.

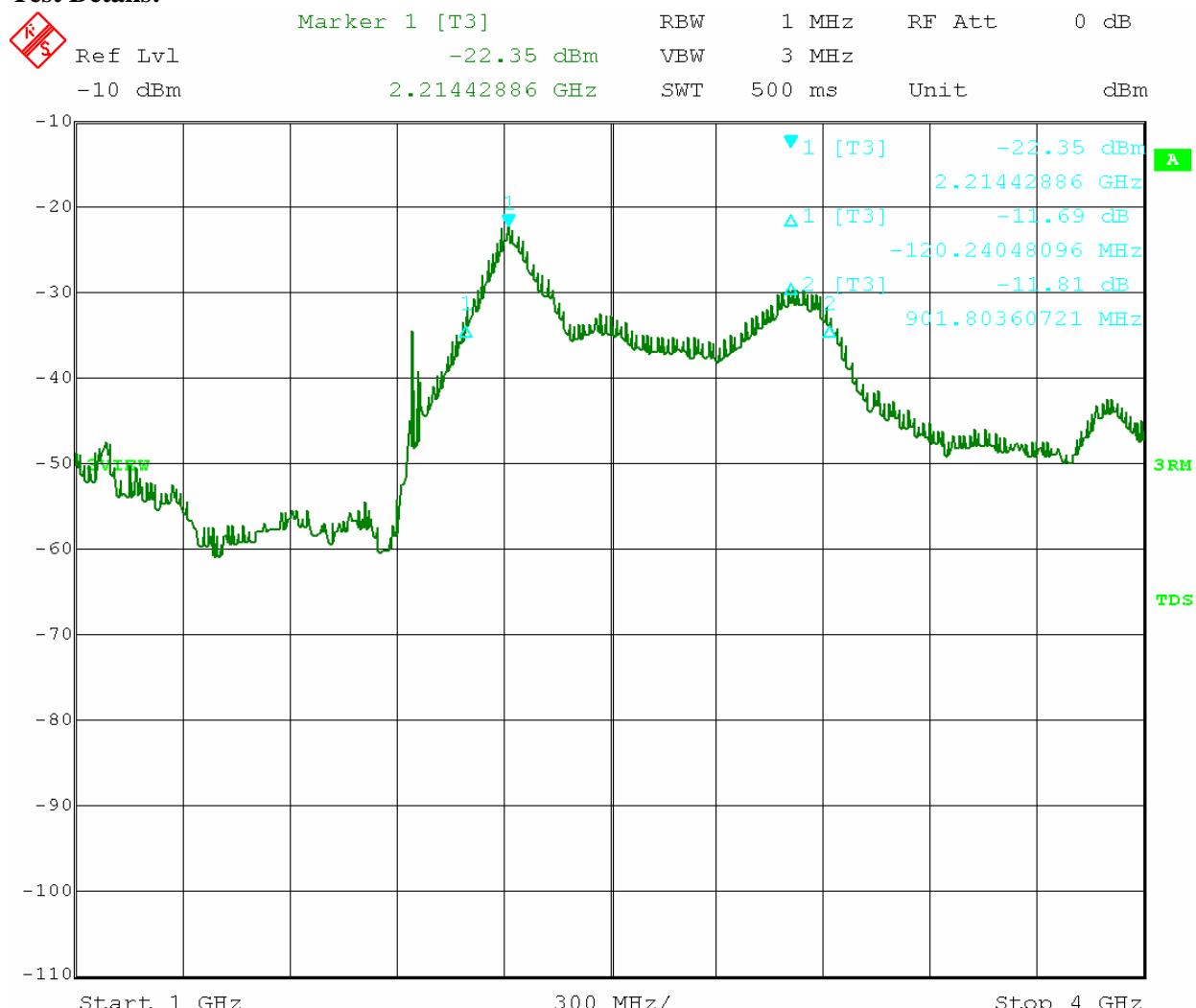
**Test Environment:**

Environmental Conditions During Testing:	Humidity (%):	N/A	Pressure (hPa):	N/A	Ambient (°C):	N/A
Pretest Verification Performed	Yes		Equipment under Test:	QUPID Assy Form C		

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	07/01/2007
2	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL028	12/12/2006
3	HORN ANTENNA	EMCO	3115	9610-4980	06/12/2007
4	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007

**Test Details:**



Date: 25.SEP.2006 18:00:41

-10 dB Bandwidth

Notes: The -10 dB Bandwidth is 1022 MHz. This is a relative measurement on the spectrum analyzer without correcting for path loss. The narrowband signals in the 1930-1990 MHz range are the PCS band ambient signals. The UWB bandwidth lower frequency is 2.094 GHz and the upper frequency is 3.116 GHz. The frequency at which the highest level of emissions occurs is 2.114 GHz, which is within the UWB bandwidth.

**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart F

**Test:** AC Line-Conducted Emissions, FCC 15.207

**Performance Criterion:** The AC Line-Conducted emissions must not exceed the limits of FCC 15.207.

**Test Environment:**

Environmental Conditions During Testing:	Humidity (%):	See Table	Pressure (hPa):	See Table	Ambient (°C):	See Table
Pretest Verification Performed	Yes		Equipment under Test:		QUPID Assy Form C	

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007
2	EMI Receiver, 9kHz to 6.5GHz	Hewlett Packard	8546A	3410A00173	07/26/2007
3	EMI Filter	Hewlett Packard	85460A	344800203	07/26/2007
4	Cable, BNC - BNC, 15' long	Belden	RG-58/U	CBL022	01/03/2007
5	LISN, 50uH, .01 - 50MHz, 24A	Solar Electronics	9252-50-R-24-BNC	941713	07/05/2007
6	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS24	08/12/2007

**Software Utilized:**

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	1/17/06 Revision

**Test Results:**
**Conducted Emissions**

Company: Curtiss-Wright Controls, Inc.  
 Model #: 20002637  
 Serial #: L0026  
 Engineer(s): Nicholas Abbondante  
 Project #: 3105077 Date: 09/12/06  
 Standard: FCC Part 15 Subpart C 15.207  
 Barometer: BAR2 Temp/Humidity/Pressure: 23c 47% 1012mB Attenuator: DS24 8-12-07.txt  
 Voltage/Frequency: 120V/60Hz Frequency Range: 150kHz - 30MHz

Net is the sum of worst-case lisn, cable, & attenuator losses, and initial reading, factors are not shown

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor; Bandwidth denoted as RBW/VBW

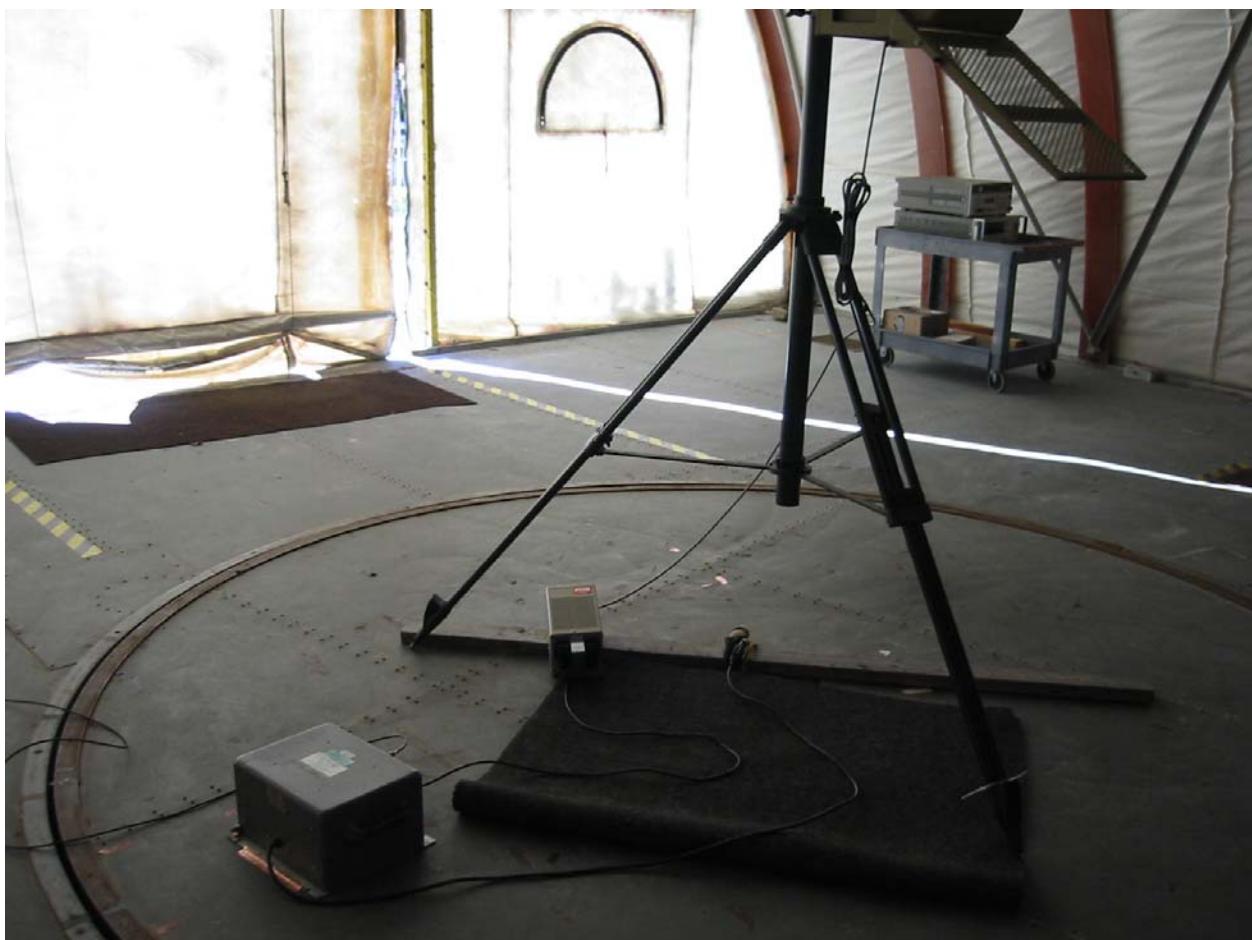
Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	QP Limit dB(uV)	Margin dB	Bandwidth
QP	0.153	23.6	24.1			44.9	65.8	-20.9	9/30 kHz
QP	0.275	21.4	22.6			43.4	61.0	-17.6	9/30 kHz
QP	0.465	7.4	9.9			30.7	56.6	-25.9	9/30 kHz
QP	0.511	3.8	6.4			27.2	56.0	-28.8	9/30 kHz
QP	9.370	29.8	25.7			51.0	60.0	-9.0	9/30 kHz
QP	12.160	22.2	28.6			49.9	60.0	-10.1	9/30 kHz
QP	13.690	28.7	25.4			50.0	60.0	-10.0	9/30 kHz
QP	15.560	20.8	27.0			48.4	60.0	-11.6	9/30 kHz
QP	17.630	11.9	8.8			33.5	60.0	-26.5	9/30 kHz

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	Average Limit dB(uV)	Margin dB	Bandwidth
AVG	0.153	-9.1	-6.7			14.1	55.8	-41.7	9/30 kHz
AVG	0.275	-11.3	-10.6			10.2	51.0	-40.8	9/30 kHz
AVG	0.465	-18.3	-16.5			4.3	46.6	-42.3	9/30 kHz
AVG	0.511	-18.4	-17.6			3.2	46.0	-42.8	9/30 kHz
AVG	9.370	28.4	22.1			49.6	50.0	-0.4	9/30 kHz
AVG	12.160	20.9	24.6			45.9	50.0	-4.1	9/30 kHz
AVG	13.690	27.0	25.0			48.3	50.0	-1.7	9/30 kHz
AVG	15.560	9.5	20.8			42.2	50.0	-7.8	9/30 kHz
AVG	17.630	9.1	5.4			30.7	50.0	-19.3	9/30 kHz

**AC Line-Conducted Emissions Setup Photos**



**AC Line-Conducted Emissions**



AC Line-Conducted Emissions