HEWLETT PACKARD

Fort Collins Hardware Test Center

3404 East Harmony Road, Fort Collins, Colorado 80528
Telephone: 970-898-3319 Fax: 970-898-7367

WORKORDER NUMBER ..... 145 NEWMARK

TEST TYPE ..... RADIATED EMISSIONS @ 3m

REGULATION/STANDARD ..... Intentional Radiator per FCC Part 15, ANSI C63.4

DATE TEST PERFORMED ..... Jul 19, 2001

PROJECT NAME ..... FCC PET

MODEL NUMBER ..... FCC PET

QUANTITY TESTED 1

CUSTOMER NAME ..... Newmark

COMPANY NAME ..... EMC Integrity

COMPANY ADDRESS ..... 8475 W. I-25 Frontage Road, Suite 200
Longmont, CO 80504

TECHNICIAN ..... Don Lighthart

ENGINEER ..... Brian Annis

TESTED BY: Donald E Lighthart Jr. 7/17/01

Report Date

APPROVED BY: 7/22/01

Approval Date

ACCREDITED 0905-01 DOTech TTI-P-G053/92-50 BSMI SL2-IN-E-1011 VCCI R-787

SUMMARY:	Emissions passed by 18.9 dB; bandwidth test passed
DEVIATIONS:	NONE
COMMENTS:	Product is a single-frequency 418 MHz motion-activated personnel ID transponder which transmits a recognition code 7 times at 0.7 second intervals for every event activation. During testing, the product was continuously transmitting, and its antenna was positioned in the axis of maximum radiation. Limits of Part 15.231(b) used. Test method per 15.231 and ANSI C63.4.

RADIATED EMISSIONS DATA – FCC Part 15.231(b)

Fundamental Frequency [MHz]	Polarity [V/H] Height [cm] Azimuth [deg]	Receiver Reading (dBuV)	Correction Factor[1] (dB)	Corrected Reading[2] (dBuV)	Margin (dB)	Limit (dBuV)
417.96	V,300,22	92.3	-36.5	55.8	24.5	80.3

Spur Frequency [MHz]	Polarity [V/H] Height [cm] Azimuth [deg]	Receiver Reading (dBuV)	Correction Factor[1] (dB)	Corrected Reading[2] (dBuV)	Margin (dB)	Limit (dBuV)
2507.77	H,200,202	60.3	-17.3	43.0	18.9	61.9
2925.69	H,200,180	55.0	-14.7	40.3	21.6	61.9
3343.72	H,200,0	51.9	-13.3	38.6	23.3	61.9
835.92	H,100,315	68.9	-30.6	38.3	23.6	61.9
1253.87	V,100,90	64.5	-27.1	37.4	24.5	61.9
3761.72	H,200,202	49.6	-12.3	37.3	24.6	61.9
1671.87	V,100,292	55.8	-23.7	32.1	29.8	61.9
442.08	V,100,45	47.4	-36.4	11.0	50.1	61.1

[1] To account for test system losses and gains, a correction factor is added to the spectrum analyzer readings to produce the "corrected" signal levels. This correction factor is the sum of the antenna factor and the cable losses, minus the preamplifier gain.
[2] Quasi-peak detection used for all final signal measurements <= 1 GHz, average detection used > 1 GHz.

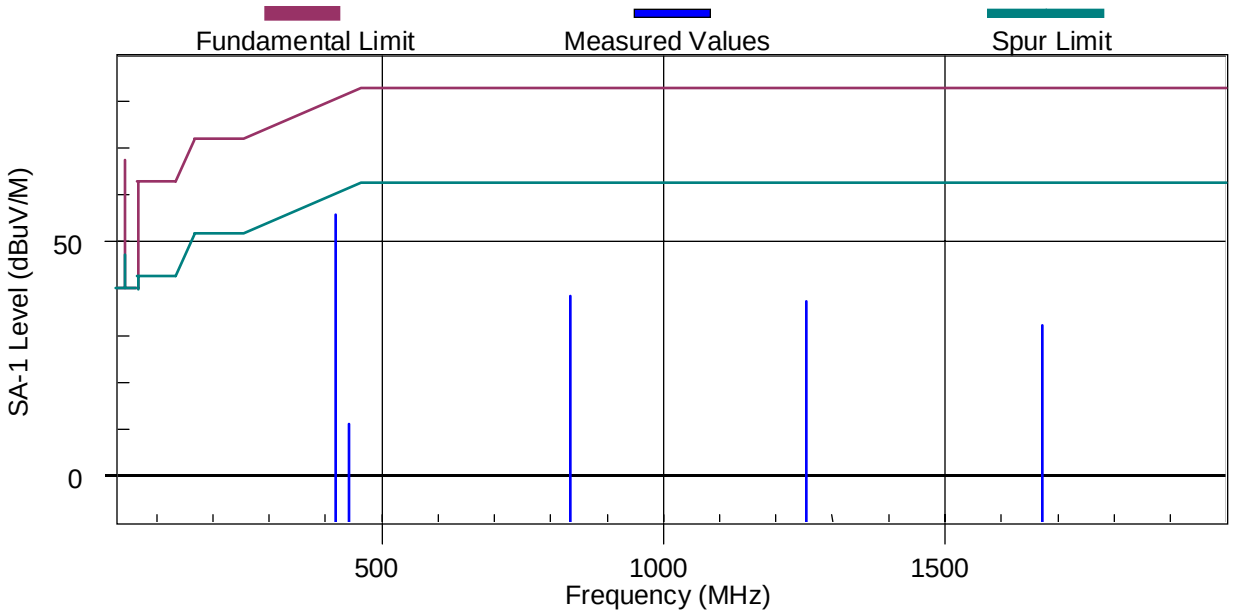
BANDWIDTH DATA – FCC Part 15.231(c)

f_0 Measured Fundamental Frequency [MHz]	f_L -20 dB Frequency Lower [MHz]	f_U -20 dB Frequency Upper [MHz]	$f_U - f_L$ -20dB Bandwidth [MHz]	-20 dB Bandwidth [% of f_0]	Limit (%)	Results (Pass/Fail)
417.9693	417.9667	417.9722	0.0055	0.0013	0.25	PASS

During bandwidth test, product was continuously transmitting, modulated by ID code. Resolution bandwidth of spectrum analyzer set to 10 kHz, and max hold was used.

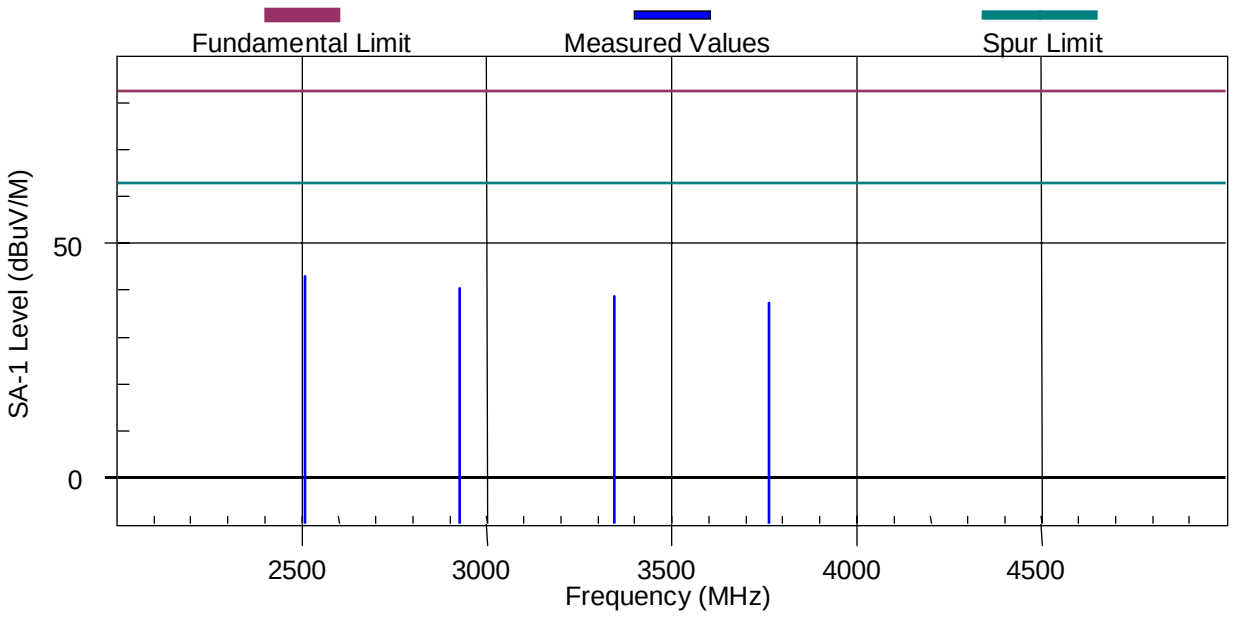
Final Test 30-2000 MHz

145 NEWMARK / WKEXT212_PET_A-LO / 63 1008 / 7/19/01 @ 6:30:01 PM



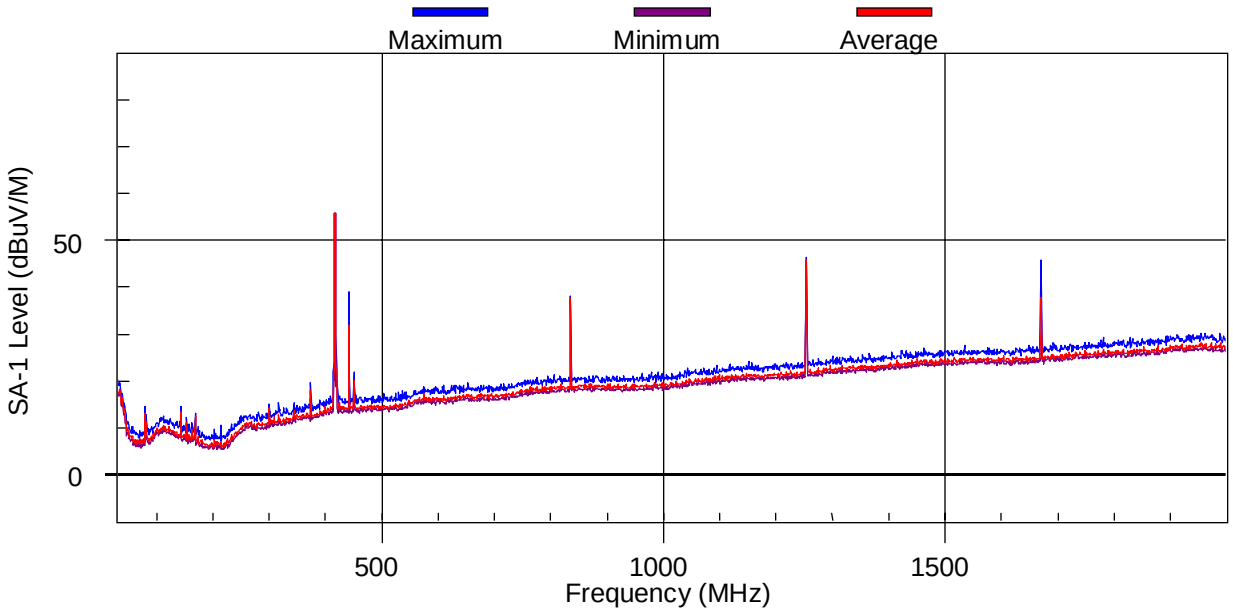
Final Test 2-5 GHz

145 NEWMARK / WKEXT212_PET_A-HI / 63 1008 / 7/19/01 @ 7:41:25 PM



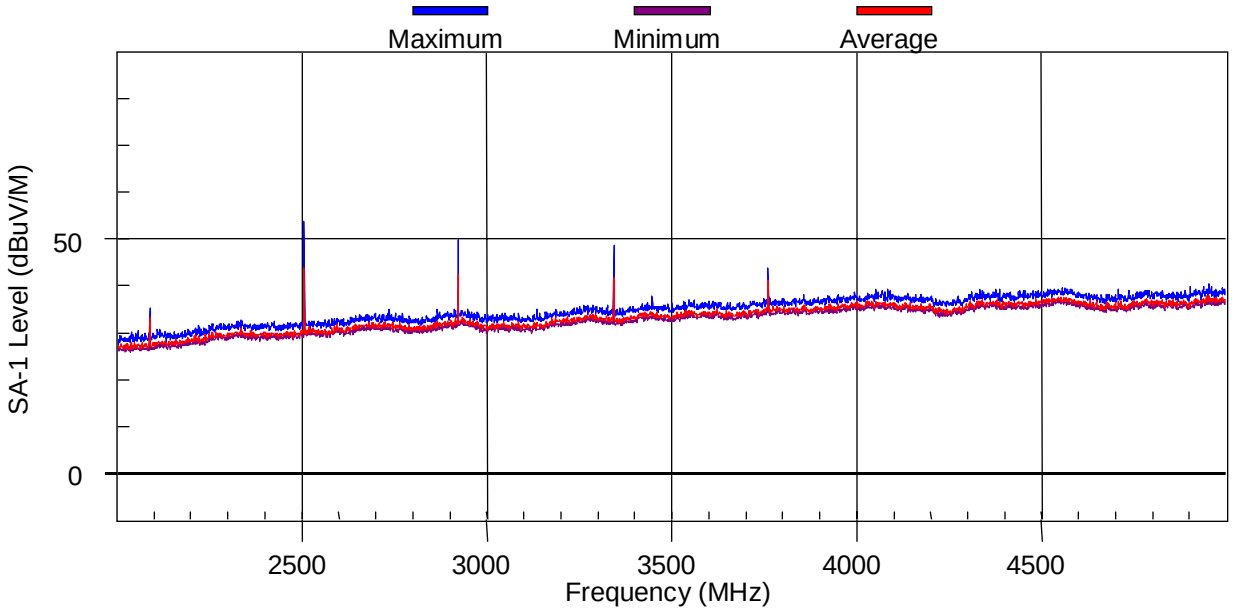
Prescan Test 30-2000 MHz

145 NEWMARK / WKEXT212_PET_A-LO / 63 1008 / 7/19/01 @ 6:21:03 PM
(Corrected Data)



Prescan Test 2-5 GHz

145 NEWMARK / WKEXT212_PET_A-HI / 63 1008 / 7/19/01 @ 7:34:46 PM
(Corrected Data)



EUT DESCRIPTION & SYSTEM CONFIGURATION:

Equipment Under Test:

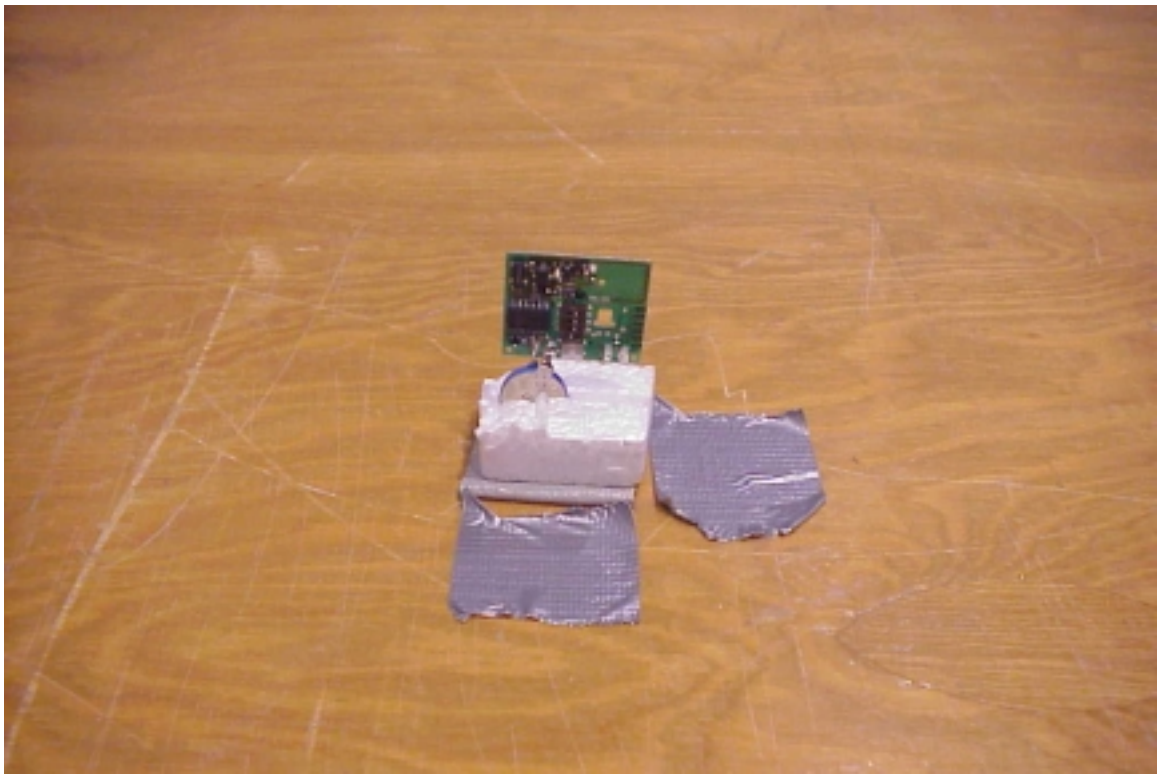
Product Type	Model	Ser. No.	Description
PERSONNEL TAG	FCC PET	63 1008	NEWMARK FCC PET PERSONNEL TAG

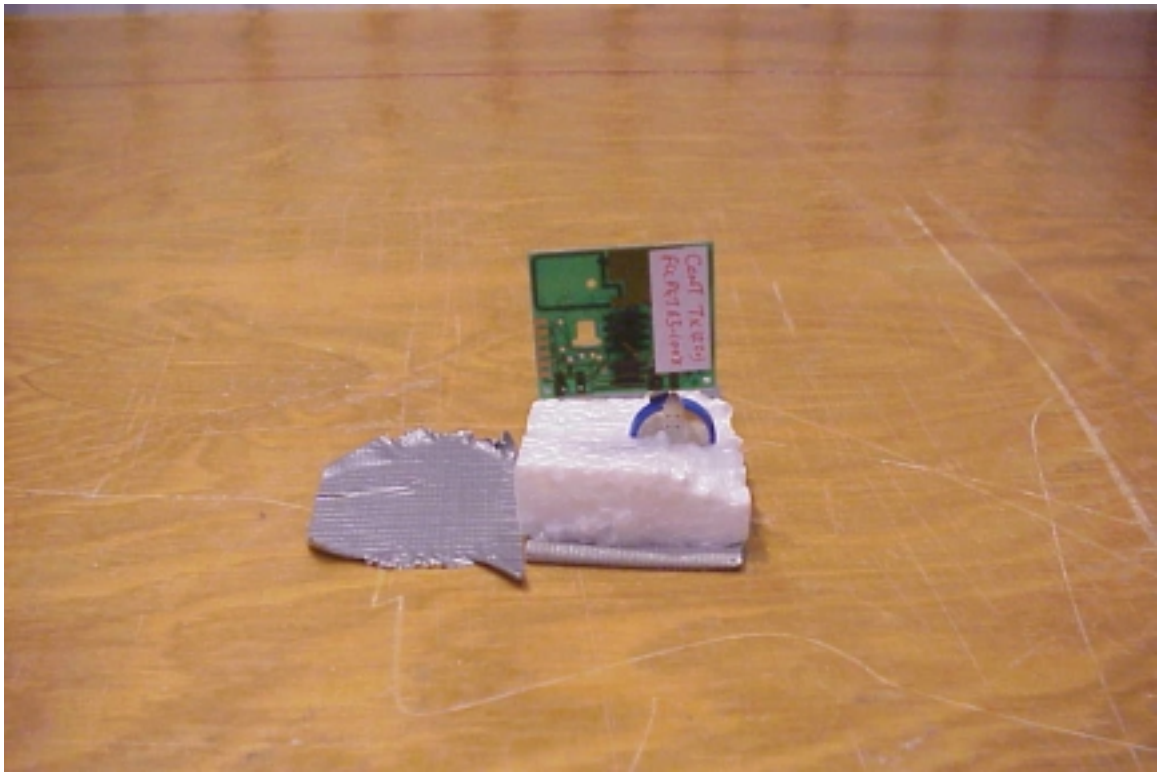
Test Environment:

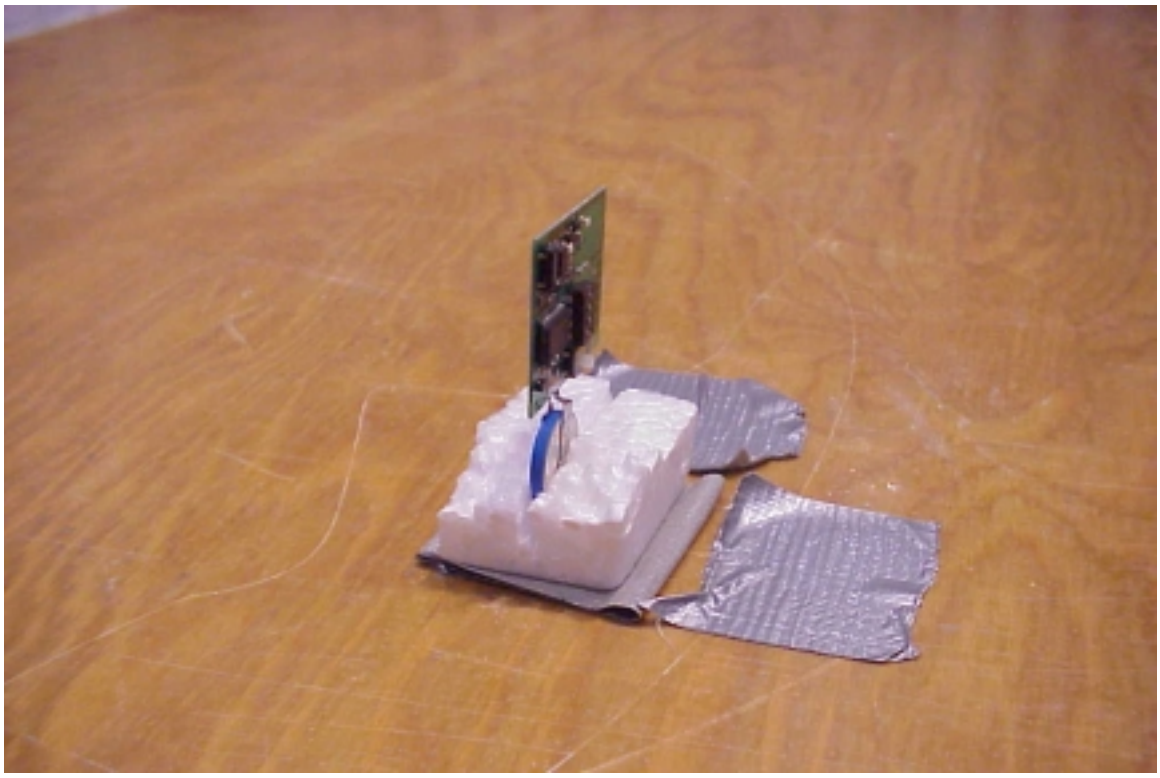
EUT Condition:	Functional and undamaged relative to test
***EUT Software/Firmware*:**	Rev 0.1-B
EUT Verification:	Transmitting continuously, modulated with ID code
***EUT/System Description*:**	EUT and battery
[3]EUT Power:	3 VDC (battery-operated)
Environmental Conditions:	22.7 Deg C, 40.0 % RH, 100.9 kPa

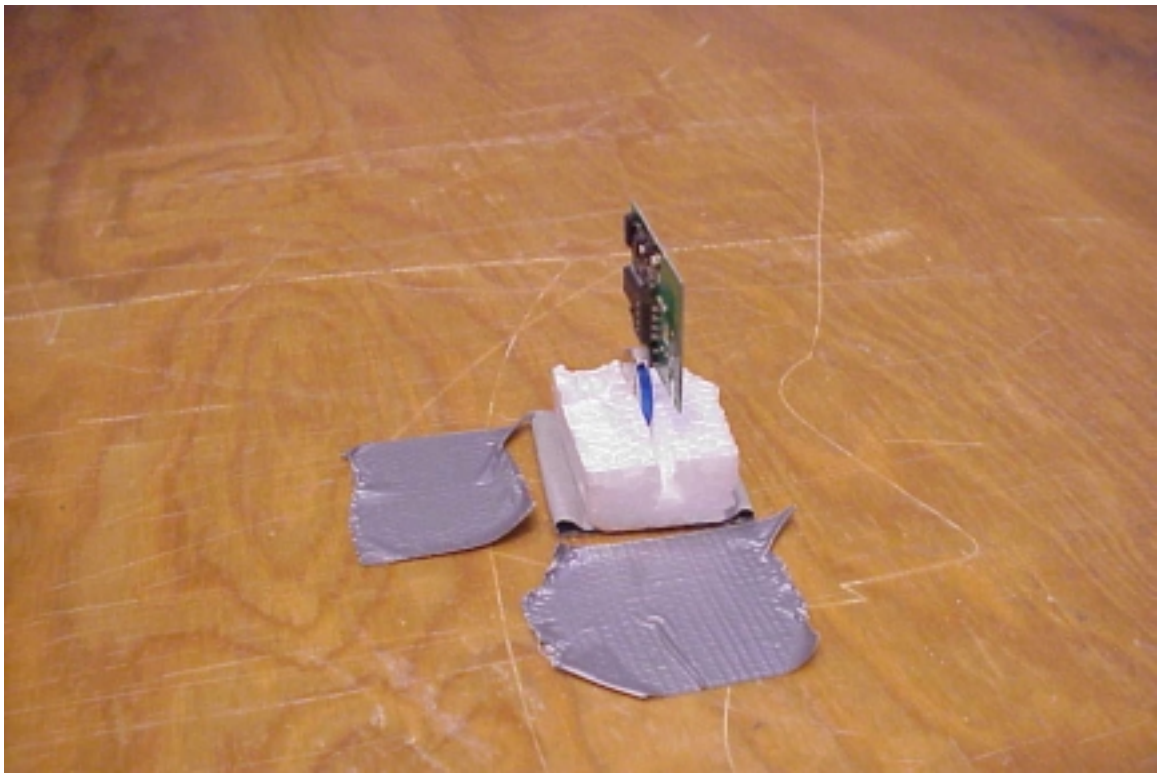
[3] 115VAC/60Hz source is the Ft. Collins public power supply system (filtered); 230VAC/50Hz source is a variable-voltage 50Hz motor generator. Both source voltages and frequencies are specified to ± 3%.

EUT/SYSTEM PHOTOGRAPHS & DIAGRAMS:









TEST DESCRIPTION/PROCEDURE:

A system verification test is performed prior to each test run. This "functional" test sequentially transmits a signal at predetermined frequencies across the spectrum of interest, and compares the signal levels received at each antenna with reference values determined when the system was known to be functioning properly. The received signal levels must be within ± 1 dB of the reference values for the functional test to pass. Prior to each test run, any necessary adjustments are also made to the turntable and mast controllers to maintain their specified positioning tolerances (± 5°, ± 3cm).

This test measures the radiated emissions of products from 30 MHz to 5000 MHz, as required, using a broadband receiving antenna, preamplifier, quasi-peak adapter, and spectrum analyzer. Testing is performed entirely in a 10-meter semi-anechoic chamber that meets the Normalized Site Attenuation requirements of ANSI C63.4. and CISPR 22. During prescan testing, the turntable is positioned to enable measurements at 16 separate azimuth angles. At each turntable azimuth, peak emission levels are then recorded for antenna elevations of 100, 250, and 400 cm, in both horizontal and vertical polarizations. The EUT, and any cables or antennas, if applicable, are configured for maximum emissions.

When prescan testing is completed, the fundamental frequency and all spurious signals are then maximized (by rotating the turntable and adjusting the antenna elevation/polarization for a maximum signal level on the spectrum analyzer) and re-measured, using quasi-peak detection for signals <= 1000 MHz, and average detection for signals > 1000 MHz. Measurements for signals <= 1000 MHz are obtained using a bandwidth of 120 kHz and a 20 ms sweep time; signals greater than 1000 MHz are averaged, using a bandwidth of 1 MHz and a 20 ms sweep time.

During the bandwidth test, the center frequency is measured and recorded (using a bandwidth of 10 kHz, unless otherwise noted) and its signal level noted. The marker is then moved on either side of the carrier until the –20 dBC points are reached, and the frequencies where this occurs are recorded. The difference between the upper and lower-20 dBC frequencies is the bandwidth. Max hold may be used to enable accurate measurement of the –20 dB frequencies when significant modulation is present.

With the exception of the final signal maximization and the bandwidth test, this testing is automated using Hewlett-Packard's *Radiated Emissions Module* (REM 2.2.6) test software. This test procedure is documented in the FCHTC's *Radiated Emissions Test Procedure* (TP018).

TEST AND MEASUREMENT EQUIPMENT:

ID	Description	Model	Mfgr	Serial #	Calibration	Cal'd	Cal	Cal Due
142	Antenna, Horn 1-18	3115	EMCO	9210-3947	EC3115-3947	03-Sep-00	12	30-Sep-01
376	Bilog Antenna 30MHz-	CBL6112A	Chase	2275	EC6112-2275	31-Oct-00	12	31-Oct-01
382	Front End, 10m North	EC4013	HP	NA	EC4013	28-Jan-01	12	31-Jan-02
375	Front-End, 10m South	EC4009	HP	NA	EC4009	28-Jan-01	12	31-Jan-02
380	Mast/Turntable	SC98V	Sunol	101797-2	NA	-	-	-
381	Mast/Turntable	SC98V	Sunol	111997-1	NA	-	-	-
349	Quasi-Peak Adapter	85650A	HP	3303A01836	C85650A-01836	2-March-	6	30-Sept-
355	Signal Generator, 9	8648D	HP	3613A00177	EC8648D-00177	31-Aug-00	24	31-Aug-02
137	Spectrum Analyzer	8566B	HP	3638A08701	EC8566B-06802	3-March-	6	30-Sep-01
362	Spectrum Analyzer	8566B	HP	3407A08388	EC8566B-08388	5-March-	6	30-Sep-01
331	Temp/Humidity	HMI41	Viasala	R5110009	MCT-333390	13-Apr-01	12	30-Apr-02
379	Turntable/Mast	2090	EMCO	9708-1246	NA	-	-	-
457	10-Meter Semi-	AP85	EMC Test	0001	AP85-0001	18-Oct-00	12	31-Oct-01
449	Antenna, Horn 1-18	3115	EMCO	9811-5627	EC3115-5627	30-Oct-00	12	30-Oct-01
377	Bilog Antenna 30MHz-	CBL6112A	Chase	2279	EC6112-2232	31-Oct-00	12	31-Oct-01

REGULATORY STANDARDS:

Where applicable, test methods are compliant with the following regulatory standards:

EN55022:1998-09	CISPR 22:1997-11	ANSI C63.4-1992	CNS 13438:1997-05
EN 55011:1998-05	CISPR 11:1997-12	FCC Parts 2, 15, 18	CNS 13803
AS/NZS 3548:1995	AS/NZS 2064:1997	EN 61326:1997 + A1:1998	VCCI