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NOTIFICATION OF COMPLIANCE

HITRON Systems, Inc.
555-34, Baiksuk-Dong, Cheonan-City,
ChoongNam, KOREA 330-220
Attn: Se Bong, LEE - Project Manager

Dates of Tests: April 07-08, 1998
Test Report S/N: Rx.980323229.LLI
Test Site: PCTEST Lab., MD U.S.A.

FCC IDENTIFIER	**LLIBWM24**
APPLICANT	**HITRON SYSTEMS, INC.**

FCC Rule Part(s):	**§15 (Notification); ANSI C-63.4 (1992)**
Equipment Class:	**Low Power Communications Receiver (CYY)**
EUT Type:	**Wireless Superheterodyne Receiver (Composite Device)**
	(5.5" Monochrome Monitor for Wireless Babycare System)
Rx Freq. Range:	**2.4 - 2.4835 GHz**
Resolution:	**400 TV Lines (at center)**
Trade Name/Model:	***HITRON BWM2412A***

This device has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63.4.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

Randy Ortanez
President & Chief Engineer

Lab Code 100431-0

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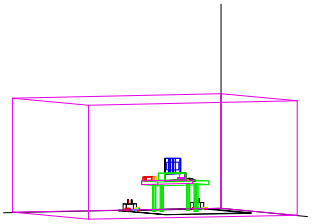
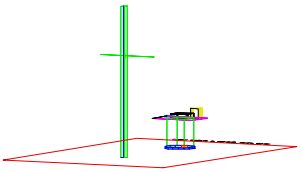
MEASUREMENT REPORT





Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Company Name:	**HITRON SYSTEMS, INC.**
Address:	**555-34, Baiksuk-Dong, Cheonan-City ChoongNam, KOREA 330-220**
Attention:	**Se Bong, Lee - Project Manager R & D Dept. Display Team**

- FCC ID: **LLIBWM24**
- Equipment Class: Low Power Communications Receiver (CYY)
- Equipment Type: Wireless Superheterodyne Receiver (Composite Device) **5.5" Monochrome Monitor for Wireless Babycare System**
- Model: ***BWM2412A***
- Camera Transmitter: FCC ID: LLIBWC24 (§15.249)
- Test Procedures: ANSI C63.4 (1992)
- FCC Rule Part(s): §15 (Notification)
- Rx Freq. Range: 2.4 - 2.4835 GHz
- Dates of Tests: April 07-08, 1998
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: Rx.980323229.LLI

NOTE: This receiver Notification application is simultaneously filed with the transmitter Certification application (FCC ID: LLIBWC24).

NVLAP Lab Code 100431-0

Introduction

The measurement procedures described in MP-3, entitled "FCC Methods of Measurements of Output Signal Level, Output Terminal Conducted Spurious Emissions, Transfer Switch Characteristics, and Radio Noise Emissions From TV Interface Devices," and ANSI C63.4-1992 were used in determining EME emanating from **HITRON Wireless Monitor Receiver.**

These measurement tests were conducted at ***PCTEST Engineering Laboratory*** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39°11'15" N latitude and 76°49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of PCTEST measurement facility was found to be in compliance with Federal Communications Commission requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

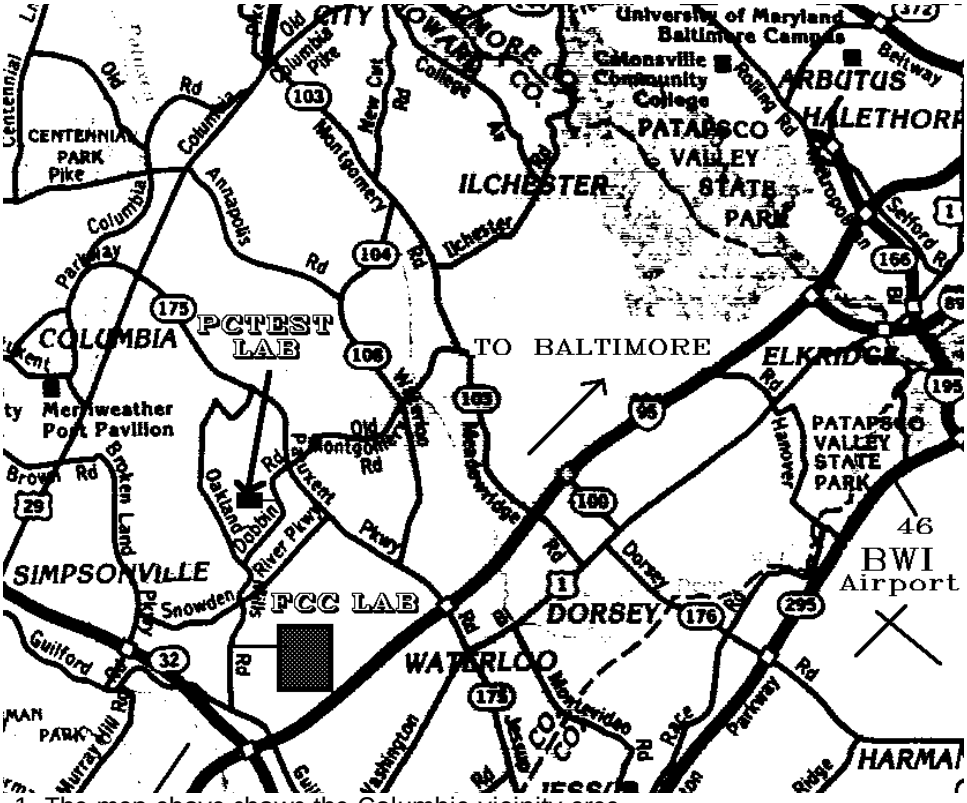


Fig. 1. The map above shows the Columbia vicinity area.
The map also shows PCTest Lab, FCC Lab and BWI airport. (Scale 1"=2miles)

Product Information

Equipment Description:

The Equipment Under Test (EUT) is the **HITRON Wireless Superheterodyne Monitor Receiver FCC ID: LLIBWM24.** The EUT is a wireless video babycare monitor unit with built-in Audio/Video Receiver.

Rx Frequency Range:	2.4 - 2.4835 GHz
CRT:	5.5"
Scan System:	CCIR Standard, 2:1 Interlaced
Scanning Frequency:	15.625 kHz - Horizontal 50 Hz - Vertical
Resolution:	400 TV Lines (at center)
Antenna:	High-Gain Telescopic Antenna
Video Input:	0.5 - 2.0 Vp-p (Synchronous negative polarity)
Audio Amp:	0.5W max. (Speaker 16Ω)
Power Supply:	Youk Young Electronics Co., Ltd. AC Power Adapter Model: AD60002 230VAC 50Hz, 15VDC 1.2A
Power Consumption:	12W (max.)
Power Cord:	*Unshielded*

EMI suppression device(s) installed in production:

* see schematics (Appendix B)

EMI suppression device(s) added and/or modified during testing:

* none

Description of Tests

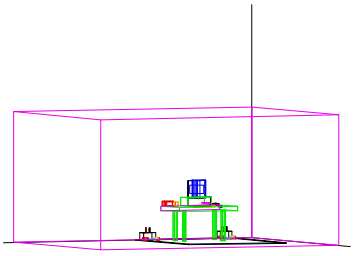


Fig. 2. Shielded Enclosure Line-Conducted Test Facility

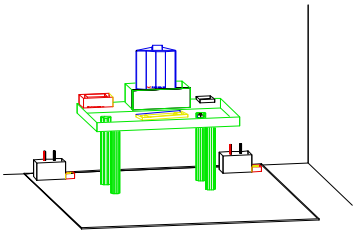


Fig. 3. Line-Conducted Emission Test Set-Up

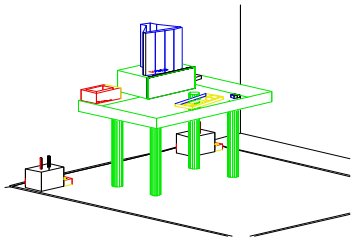


Fig. 4. Wooden Table & Bonded LISNs

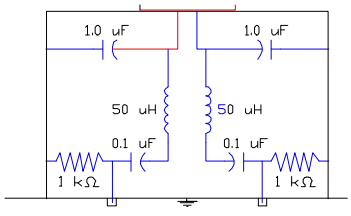


Fig. 5. LISN Schematic Diagram

Conducted Emissions

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure. It is manufactured by Ray Proof Series 81 (Fig. 2). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6.
A 1m.x1.5m. wooden table 80 cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room (Fig. 3). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50 Ω/50 uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (Flg. 4). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filters (100dB 14kHz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Solar LISN. LISN schematic diagram is shown in Figure 5. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450 kHz to 30 MHz with 20 msec sweep time. The frequency producing the maximum level was reexamined using EMI/ Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator.

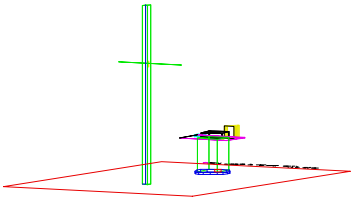


Fig. 6. 3-Meter Test Site

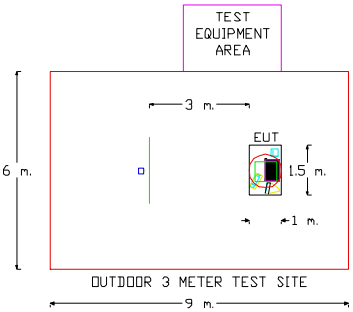


Fig. 7. Dimensions of Outdoor Test Site

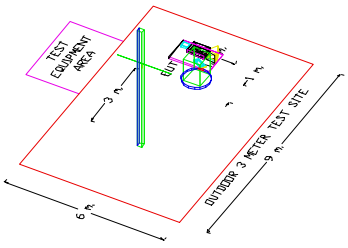


Fig. 8. Turntable and System Setup

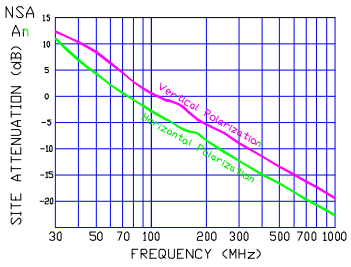


Fig. 9. Normalized Site Attenuation Curves (H & V)

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using biconical antenna and 200 to 1000 MHz using log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antenna (see Figure 6). The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area (see Figure 7). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 8). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 9.

Support Equipment Used

1. HITRON Monitor	**FCC ID: LLIBWM24**	**(EUT)**
Youk Young AC Adapter	30W Model: AD60002	
	1.8m. unshielded AC adapter cord	
	1.6m. unshielded DC adapter cord	
2. **HITRON** Transmitter	FCC ID: LLIBWC24	
Shin Se Elect. AC Adapter	8W Model: SSK 15025	
	1.8m. unshielded DC power cable	

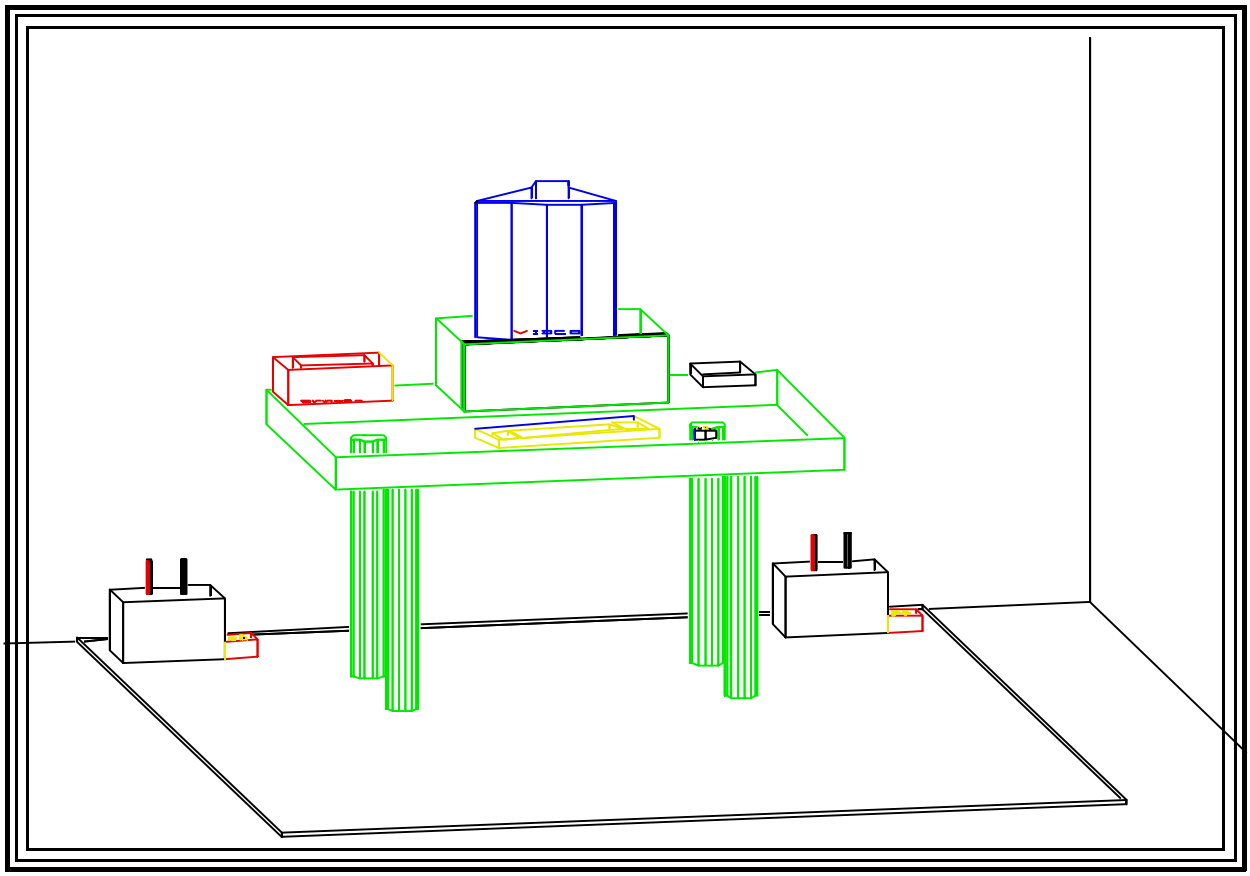


Fig. 10. System Setup.

(Please see Appendix C - Test Photographs for actual set-up.)

Test Data

Conducted Emissions

FREQ (MHz)	LEVEL * (dBm)	LINE	(mV)	MARGIN ** (dB)
0.67	- 64.29	A	136.6	- 5.3
0.97	- 74.71	A	41.2	- 15.7
25.57	- 76.36	A	34.0	- 17.3
0.67	- 62.16	B	174.6	- 3.1
1.56	- 77.77	B	28.9	- 18.7
2.00	- 78.10	B	27.9	- 19.1

Table 1. Line Conducted Emissions Tabulated Data

Channel 1

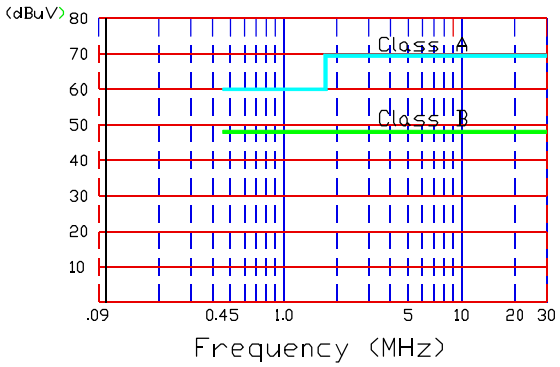


Fig. 11. Line-Conducted Limits

NOTES:

1. ***All channels and modes of operation were investigated and the worst-case emissions are reported.***
2. ***The limit for Class B digital device is 250μV from 450 kHz to 30 MHz. See Figure 11.***
3. ***Line A = Phase Line B = Neutral***
4. ***Deviations to the Specifications: None***

* *All readings are calibrated by HP8640B signal generator with accuracy traceable to the National Institute of Standards and Technology (formerly NBS).*

** *Measurements using CISPR quasi-peak mode.*

Test Data

Conducted Emissions

FREQ (MHz)	LEVEL * (dBm)	LINE	(mV)	MARGIN ** (dB)
0.75	- 61.61	A	186.0	- 2.6
6.06	- 81.46	A	18.9	- 22.4
15.74	- 85.76	A	11.5	- 26.7
0.67	- 63.40	B	151.4	- 4.4
3.04	- 77.89	B	28.5	- 18.9
4.73	- 78.63	B	26.2	- 19.6

Table 2. Line Conducted Emissions Tabulated Data

Channel 2

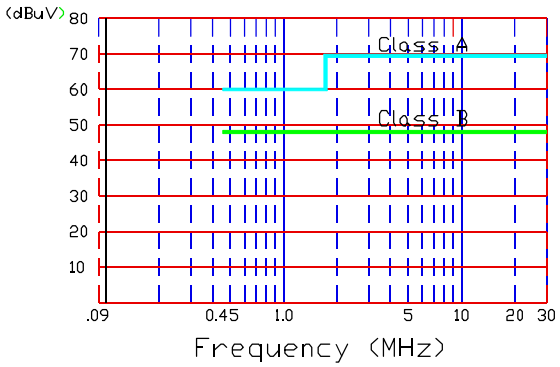


Fig. 12. Line-Conducted Limits

NOTES:

1. ***All channels and modes of operation were investigated and the worst-case emissions are reported.***
2. ***The limit for Class B digital device is 250μV from 450 kHz to 30 MHz. See Figure 12.***
3. ***Line A = Phase Line B = Neutral***
4. ***Deviations to the Specifications: None***

* *All readings are calibrated by HP8640B signal generator with accuracy traceable to the National Institute of Standards and Technology (formerly NBS).*

** *Measurements using CISPR quasi-peak mode.*

Test Data

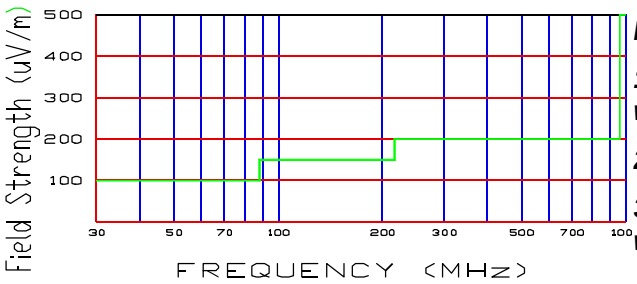
Radiated Emissions

******

Freq. (MHz)	**Level** (dBm)	**AFCL**** (dB)	**POL** (H/V)	**Height** (m)	**Azimuth** (° angle)	**F/S** (uV/m)	**Margin***** (dB)
41.5	- 78.0	1.5	V	2.9	10	33.4	- 9.5
50.0	- 80.0	3.1	V	2.7	90	32.0	- 9.9
65.6	- 80.2	5.7	V	2.6	180	42.1	- 7.5
78.0	- 81.0	7.3	V	2.6	310	46.0	- 6.7
93.1	- 85.0	8.9	V	2.5	190	35.1	- 12.6
156.0	- 87.0	14.0	V	2.2	80	50.2	- 9.5

Table 3. Radiated Measurements at 3-meters.

Channel 1/2



NOTES:

1. All channels & modes of operation were investigated and the worst-case emissions are reported..

2. The spurious radiated limits are shown on Figure 13.

3. The EUT was tested up to 10GHz and no significant emission was found (see plots).

Fig. 13. FCC Spurious Limits at 3 meters

* *All readings are calibrated by HP8640B signal generator with accuracy traceable to the National Institute of Standards and Technology (formerly NBS).*

** *AFCL = Antenna factor (Roberts Ô dipole) and cable loss (30 ft. RG58C/U)*

*** *Measurements using CISPR quasi-peak mode.*

Accuracy of Measurement

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Line Conducted)	Probability Distribution	Uncertainty (+/- dB)	
		9kHz-150MHz	150-30 MHz
Receiver specification	Rectangular	1.5	1.5
LISN coupling specification	Rectangular	1.5	1.5
Cable and input attenuator calibration	Normal (k=2)	0.3	0.5
Mismatch: Receiver VRC Γ_1=0.03 LISN VRC Γ_R=0.8 (9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1 +/-$\Gamma_1\Gamma_R$)	U-Shaped	0.2	0.35
System repeatability	Std. deviation	0.2	0.05
Repeatablility of EUT		-	-
Combined standard uncertainty	Normal	1.26	1.30
Expanded uncertainty	Normal (k=2)	2.5	2.6

Calculations for 150 kHz to 30 MHz:

$$u_c(y)=\sqrt{\sum_{i=1}^{m}u_i^2(y)} \quad =\pm\sqrt{\frac{1.5^2+1.5^2}{3}+(\frac{0.5}{2})^2+\frac{0.05^2}{2}+0.35^2}=\pm 1.298dB$$

$$U=2U_c(y)=\pm 2.6dB$$

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties (+/-dB)	
		3 m	10 m
Ambient Signals		-	-
Antenna factor Calibration	Normal (k=2)	+/- 1.0	+/- 1.0
Cable loss Calibration	Normal (k=2)	+/- 0.5	+/- 0.5
Receiver specification	Rectangular	+/- 1.5	+/- 1.5
Antenna directivit	Rectangular	+ 0.5/-0	+ 0.5
Antenna factor variaton with height	Rectangular	+/- 2.0	+/- 0.5
Antenna phase centre variation	Rectangular	0.0	+/- 0.2
Antenna factor frequency interpolation	Rectangular	+/- 0.25	+/- 0.25
Measurement distance variation	Rectangular	+/- 0.6	+/- 0.4
Site imperfections	Rectangular	+/- 2.0	+/- 2.0
Mismatch: Receiver VRC Γ1= 0.2 Antenna VRC Γ_R = 0.67 (Bi) 0.3 (Lp) Uncertainty limits 20Log(1+/- $\Gamma_1\Gamma_R$)	U-Shaped	+ 1.1 - 1.25	+/- 0.5
System repeatability	Std. Deviation	+/- 0.5	+/- 0.5
Repeatability of EUT		-	-
Combined Standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculations for 3m biconical antenna. Coverage factor of k=2 will ensure that the level of confidence will be approximately 95%, therefore:

$$U = 2u_c(y) = 2 \times +/- 2.19 = +/-4.38\ dB$$

Test Equipment

Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	HP8566B (100Hz-22GHz)	08/15/98	3638A08713
Microwave Spectrum Analyzer	HP8566B (100Hz-22GHz)	04/17/99	2542A11898
Spectrum Analyzer/Tracking Gen.	HP8591A (100Hz-1.8GHz)	08/10/98	3144A02458
Signal Generator*	HP8640B (500Hz-1GHz)	08/09/98	2232A19558
Signal Generator*	HP8640B (500Hz-1GHz)	08/09/98	1851A09816
Signal Generator*	Rohde & Schwarz (0.1-1000MHz)	09/11/98	894215/012
Ailtech/Eaton Receiver	NM37/57A-SL (30-1000MHz)	04/12/99	0792-03271
Ailtech/Eaton Receiver	NM37/57A (30-1000MHz)	03/11/99	0805-03334
Ailtech/Eaton Receiver	NM17/27A (0.1-32MHz)	09/17/98	0608-03241
Quasi-Peak Adapter	HP85650A	08/15/98	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/99	0194-04082
RG58 Coax Test Cable	No. 167		n/a
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP8447D		1145A00470, 1937A03348
Broadband Amplifier	HP8447F		2443A03784
Transient Limiter	HP11947A (9kHz-200MHz)		2820A00300
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design		1295, 1332, 0355
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set)		
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN	3816/2		1079
EMCO LISN	3816/2		1077
EMCO LISN	3725/2		2009
Microwave Preamplifier 40dB Gain	HP83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Ailtech/Eaton Receiver	NM37/57A-SL		0792-03271
Spectrum Analyzer	HP8594A		3051A00187
Spectrum Analyzer (2)	HP8591A		3034A01395, 3108A02053
Modulation Analyzer	HP8901A		2432A03467
NTSC Pattern Generator	Leader 408		0377433
Noise Figure Meter	HP 8970B		3106A02189
Noise Figure Meter	Ailtech 7510		TE31700
Noise Generator	Ailtech 7010		1473
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)		80931
Digital Thermometer	Extech Instruments 421305		426966
Attenuator	HP 8495A (0-70dB) DC-4GHz		
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)		
Shielded Screen Room	RF Lindgren Model 26-2/2-0		6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81		R2437 (PCT278)
Enviromental Chamber	Associated Systems Model 1025 (Temperature/Humidity)		PCT285

* Calibration traceable to the National Institute of Standards and Technology (NIST).

Test Software Used

Video/Audio program used:

Tx Camera was focused to different intensities of lights/objects to investigate different modulation characteristics.

NOTE:

This is a sample of the basic program used during the test. However, during testing a different software program may be used; whichever determines the worst-case condition. In addition, the program used also depends on the number and type of devices being tested.

Recommendation/Conclusion

The data collected shows that the **HITRON Systems Inc. Wireless Superheterodyne Monitor Receiver FCC ID: LLIBWM24** complies with Part 15 of the FCC Rules.

There are no modifications made to the device.