Underwriters Laboratories Inc.
1285 Walt Whitman Road
Melville, New York 11747-3081
(631) 271-6200

Report of Measurements
of Electromagnetic Compatibility Testing

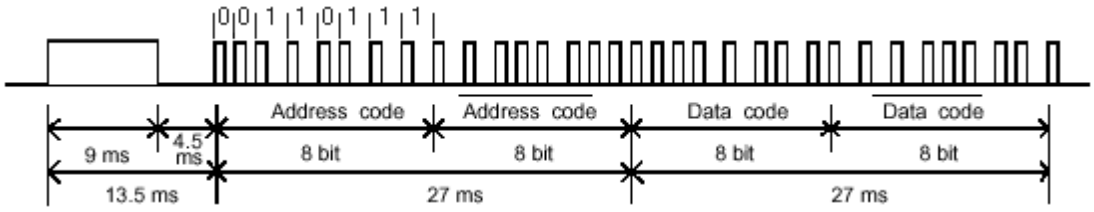
Test Report File No.	:	**NC1454** Date of issue: 6/19/2002
Applicant	:	Leviton Manufacturing
Model / Serial No.	:	HCCKR
Product Type	:	Wireless Key Chain Remote Control
Power Supply	:	Battery Operated
Manufacturer	:	Same As Applicant
License holder	:	Same As Applicant
Address	:	59-25 Little Neck Parkway
	:	Little Neck, NY 11362
Test Type	:	☒ **Compliance Investigation** ☐ **Manufacturer's Specification**
Test Project Number	:	02ME13082
References(s)		FCC ID: QGH-HCCKR

Report Directory

1.0 G E N E R A L - Product Description

The Leviton Wireless Key Chain Remote Control Catalog Number HCCKR is designed for use with DHC RF Transceiver System. The system uses frequencies to transmit DHC commands to remotely turn ON and OFF lights and devices in the home. The remote control will permit the operation of devices with two different "addresses" the control of different lights and loads. The device allows the user to select a specific address for the first control buttons, while the second buttons are set to the next sequential address. The device will transmit up to 75 feet making it useful to turn ON/OFF lights and loads while in home or driveway

The data envelope for a typical DHC RF code is pictured below.



Each code starts with a 9ms burst of carrier followed by a 4.5ms silence. After the leader, there are 32 bits with binary 1 represented by 2.25ms between rising edges and binary 0 represented by 1.125ms between rising edges. The rising edge of the 33rd and final pulse marks the end of the last bit and is followed by a silence of approximately 40ms. The burst duration is 0.6ms.

The DHC RF carrier frequency is 310MHz.

1.1 Device Configuration During Test

The HCCKR Wireless Key Chain Remote Control is powered by a 3.2 Volt CR2032 Lithium .It was determined that worst case for this remote is constantly in the ON position . Therefore all testing was done in the ON position with fresh batteries. During testing the EUT was moved into different orientations to find the highest emissions and worst case orientation. The transmitting time is virtually immediate see data on page 22.

Device	Manufacturer	Model Number	Serial Number	FCC ID
Wireless Key Chain Remote Control	Leviton Manufacturing	HCCKR	_____	_____

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

1.2 Deviations from ANSI C63.4

☒ Not Applicable

☐ As described below:

1.3 Device Modifications Necessary for Compliance

☒ N/A

☐ As described below:

1.4 Test Summary

Test	Basic Standard	Considered	Tested	In Compliance
Conducted Voltage Emissions	FCC Part 15 Subpart B Class A	✓	**N/A**	**N/A**
Discontinuous Interference (Click) Emissions		**N/A**	**N/A**	**N/A**
Conducted Current Emissions		**N/A**	**N/A**	**N/A**
Radiated Emissions	FCC Part 15 Subpart B Class A	✓	✓	✓
RFI Power		**N/A**	**N/A**	**N/A**
Harmonic Distortion	EN61000-3-2	**N/A**	**N/A**	**N/A**
Immunity to Voltage Fluctuations and Flicker	EN61000-3-3	**N/A**	**N/A**	**N/A**
Magnetic Field Emissions		**N/A**	**N/A**	**N/A**
Immunity to Electrostatic Discharge	EN61000-4-2	**N/A**	**N/A**	**N/A**
Immunity to Continuous Radiated Disturbances	EN61000-4-3	**N/A**	**N/A**	**N/A**
Immunity to Electrical Fast transients	EN61000-4-4	**N/A**	**N/A**	**N/A**
Immunity to Surges	EN61000-4-5	**N/A**	**N/A**	**N/A**
Immunity to Continuous Conducted Disturbances	EN61000-4-6	**N/A**	**N/A**	**N/A**
Immunity to Power-Frequency Magnetic Fields	EN61000-4-8	**N/A**	**N/A**	**N/A**
Immunity to Voltage Dips and Interruptions	EN61000-4-11	**N/A**	**N/A**	**N/A**

1.5 Immunity Performance Criteria

Performance Criteria A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonable expect from the apparatus if used as intended.

Performance Criteria B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonable expect from the apparatus if used as intended.

Performance Criteria C: Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

1.5.1 Manufacturer's Criteria for Immunity

Not Applicable for this project

Environmental conditions in the lab:

	Range
Temperature:	20-25°C
Relative Humidity	30 - 60 %
Atmospheric pressure	680 - 1060 mbar

2.0 EMISSIONS TEST REGULATIONS

FCC Part 15, Subpart B, Class B
FCC Part 15, Subpart C, Section 15.231; 15.209; 15.205; 15.35

2.1 EUT OPERATION MODE - EMISSIONS TESTS

☐ Standby
☐ Test program (H-Pattern)
☐ Test program (color bar)
☐ Test program (customer specific)
☐ Practice operation
☐ Normal operation Mode:
☒ As per manufacturer's instructions: key Chain was constantly in the ON Mode

2.1.1 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

☒ **Test Applicable**

Temperature: 23 °C
Humidity: 50 %RH
Pressure: 1023 milbar
Date test performed (mm/dd/yyyy): 06/19/2002

Measurement distance: ☒ 3 meters

Frequency Range: ☒ 30MHz - 1000MHz ☒ Electric
☒ 1GHz - 5GHz ☒ Electric

Test equipment used for final radiated emissions tests:

☒ **HP 8574A** **Hewlett-Packard** **EMI Receiver,** **Equipment No.: ME5A-461**
Range:30-1000 MHz Last Calibration Date: Jan. 25, 2002 Calibration Due Date: Jan. 25, 2003

Consisting of:

HP - 8566B **Hewlett-Packard** **Spectrum Analyzer,**
Resolution BW: **100kHz** **9kHz to 30 MHz**
1MHz **30MHz to 1000 MHz**
Video BW: **100kHz** **9kHz to 30 MHz**
1MHz **30MHz TO 1000**MHz
HP - 85662A **Hewlett-Packard** **Analyzer Display**
HP - 85650A **Hewlett-Packard** **Quasi-Peak Adapter,**
Quasi Peak BW: **200Hz** **9kHz to 150kHz**
9kHz **150kHz to 30MHz**
120kHz **30 to 1000 MHz**
HP - 85685A **Hewlett-Packard** **Preselector**

For Measurements above 1GHz:

☒ **HP - 8566B** **Hewlett-Packard** **Spectrum Analyzer,** **Equipment No.: ME5A-461**
Resolution BW: 1MHz
Video BW: 1MHz
Range:1.0-5.0 GHz Last Calibration Date: April 30, 2002 Calibration Due Date: April 30, 2003
☒ **HP - 85662A** **Hewlett-Packard** **Analyzer Display** **Equipment No. ME5A-461**
Last Calibration Date: April 30, 2002 Calibration Due Date: April 30, 2003

Test Accessories for Radiated Emissions:

☒ **94455-1** **Ailtech** **Biconnical Antenna** **Equipment No.: ME5-439**
Last Calibration Date: Oct. 15, 2001 Calibration Due Date; Oct. 15, 2002
☒ **3146** **EMCO** **Log Periodic Antenna** **Equipment No.: ME5-451**
Last Calibration Date: Oct. 15, 2001 Calibration Due Date; Oct. 15, 2002

☒ **3115** **EMCO** **Horn Antenna** **Equipment No.:ME5A-766**
Last Calibration Date: June 31, 2001 Calibration Due Date; June 31, 2002

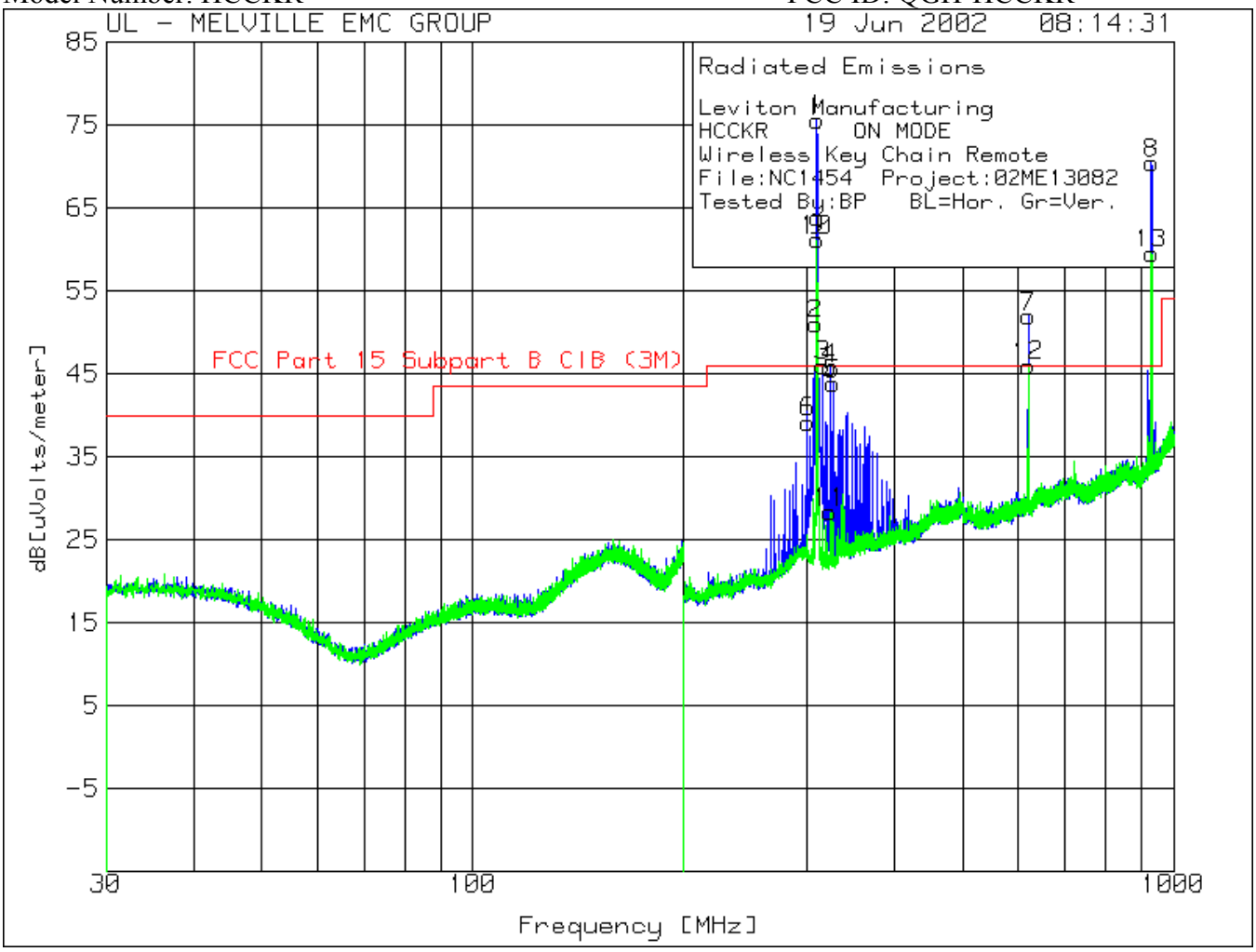
☒ **8449B** **Hewlett Packard** **1-26GHz Pre-Amp** **Equipment No.:ME5-914**

☒ **E702A** **Agilent Technologies** **EMI Spectrum Analyzer** **Equipment No.: ME5B-123**
Range: 0.030-3.0GHz Last Calibration Date: Aug. 30,2001 Calibration Due Date: Aug. 30, 2002

☒ **3121C** **EMCO** **Dipole Antennas** **Equipment No.: ME5A-751**
Last Calibration Date: Dec. 10, 2001 Calibration Due Date: : Dec. 10, 2002

☒ **Temp/Pressure** **Oakton** **Barometer** **Equipment No.: ME4-263**
Last Calibration Date: April 02,2002 Calibration Due Date: April. 02, 2003

☒ **453320** **Ex-Tech** **Hydro-Thermometer** **Equipment No.: ME4-264**
Last Calibration Date: April 02,2002 Calibration Due Date: April. 02, 2003


UL - MELVILLE EMC GROUP
19 Jun 2002 08:14:31
Radiated Emissions
Leviton Manufacturing
HCCKR ON MODE
Wireless Key Chain Remote
File:NC1454 Project:02ME13082
Tested By:BP BL=Hor. Gr=Ver.
FCC Part 15 Subpart B CIB (3M)
dB[uVolts/meter]
85
75
65
55
45
35
25
15
5
-5
30
100
1000
Frequency [MHz]

Leviton Manufacturing
HCCKR ON MODE
Wireless Key Chain Remote
File:NC1454 Project:02ME13082
Tested By:BP BL=Hor. Gr=Ver.

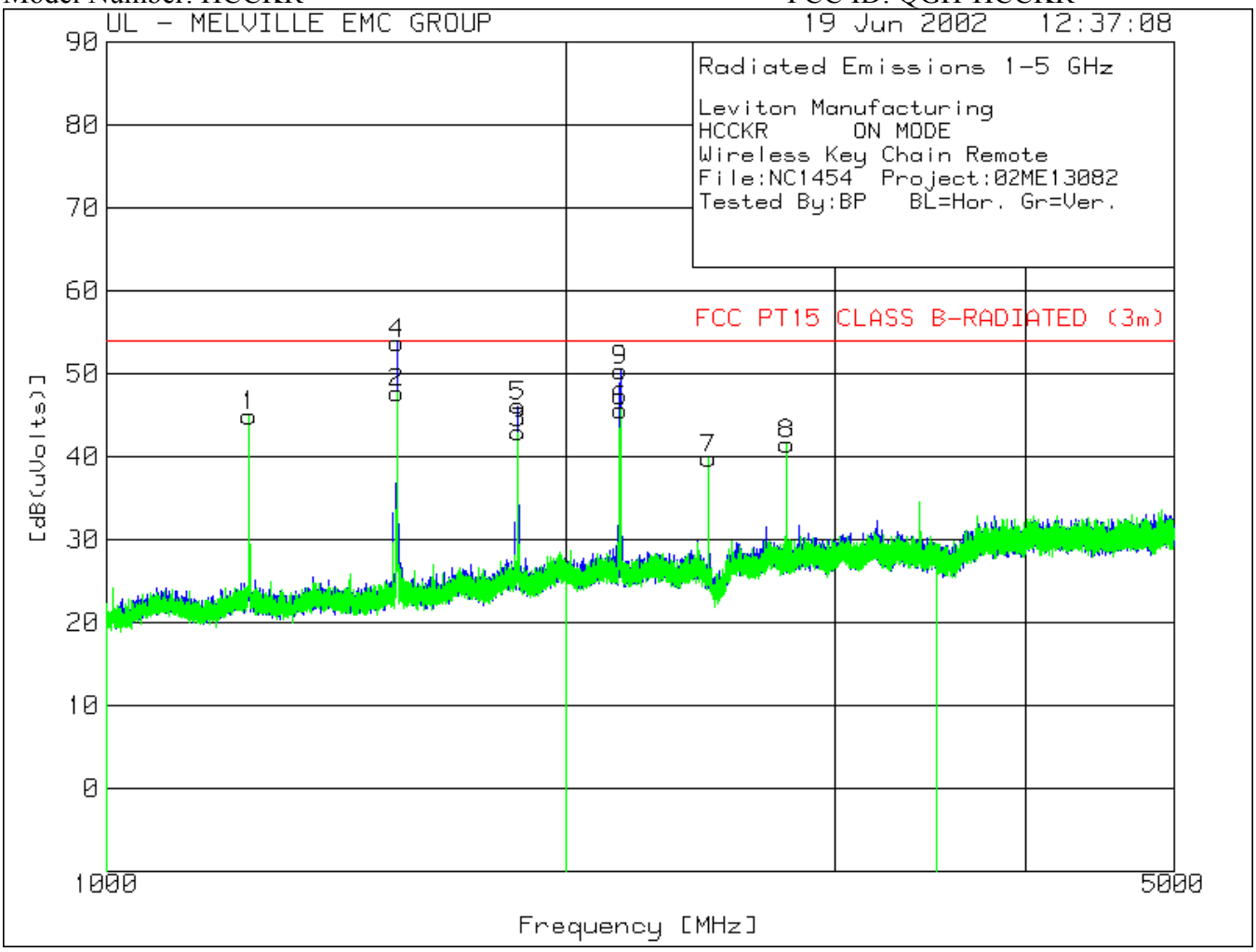
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Range: 3 200 - 1000MHz						
	309.7752	58.5 pk	2.4	14.7	75.6	95.321
	Azimuth:314	Height:100 Horz	Margin [dB]			-19.721
	619.9167	28.6 pk	3.7	19.6	51.9	75.321
	Azimuth:237	Height:199 Horz	Margin [dB]			-23.421
	929.7918	42.2 pk	4.5	23.7	70.4	75.321
	Azimuth:314	Height:100 Horz	Margin [dB]			-4.921
Range: 4 200 - 1000MHz						
	309.7752	44 pk	2.4	14.7	61.1	95.321
	Azimuth:141	Height:100 Vert	Margin [dB]			-34.22
	619.9834	22.7 pk	3.7	19.6	46	75.321
	Azimuth:315	Height:300 Vert	Margin [dB]			-29.32
	929.7918	31.3 pk	4.5	23.7	59.5	75.321
	Azimuth:72	Height:200 Vert	Margin [dB]			-15.82

LIMIT 1: FCC Part 15 Subpart C Section 15.35
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Leviton Manufacturing
HCCKR ON MODE
Wireless Key Chain Remote
File:NC1454 Project:02ME13082
Tested By:BP BL=Hor. Gr=Ver.

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1 [uVolts/meter]	
Range: 3 200 - 1000MHz						
310.0398	47.65 av	2.4	14.7	64.75	75.32	
Azimuth: 265	Height:106	Horz		Margin [dB]:	-10.57	
315.74	10.05 qp	2.4	14.6	27.05	46	
Azimuth: 252	Height:102	Horz		Margin [dB]:	-18	
308.84	25.91 qp	2.4	14.8	43.11	46	
Azimuth: 263	Height:106	Horz		Margin [dB]:	-2.	
323.23	-4.94 qp	2.5	14.9	12.46	46	
Azimuth: 27	Height:102	Horz		Margin [dB]:	-33	
328.428	-9.04 qp	2.5	15.1	8.56	46	
Azimuth: 0	Height:231	Horz		Margin [dB]:	-37	
300.33	22.74 qp	2.3	16	41.04	46	
Azimuth: 223	Height:101	Horz		Margin [dB]:	-4.	
620.005	26.24 av	3.7	19.6	49.54	55.32	
Azimuth: 255	Height:148	Horz		Margin [dB]:	-5.78	
930.018	25.61 av	4.5	23.7	53.81	55.32	
Azimuth: 360	Height:104	Horz		Margin [dB]:	-1.51	
Range: 4 200 - 1000MHz						
310.0171	45.21 av	2.4	14.7	62.31	75.32	
Azimuth: 315	Height:147	Vert		Margin [dB]:	-13.01	
323.295	-1.44 qp	2.5	14.9	15.96	46	
Azimuth: 21	Height:115	Vert		Margin [dB]:	-30	
620.04	16.92 av	3.7	19.6	40.22	55.32	
Azimuth: 110	Height:158	Vert		Margin [dB]:	-15.10	
930.0144	22.3 av	4.5	23.7	50.5	55.32	
Azimuth: 94	Height:102	Vert		Margin [dB]:	-4.82	

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector


UL - MELVILLE EMC GROUP
19 Jun 2002 12:37:08
Radiated Emissions 1-5 GHz
Leviton Manufacturing
HCCKR ON MODE
Wireless Key Chain Remote
File:NC1454 Project:02ME13082
Tested By:BP BL=Hor. Gr=Ver.
FCC PT15 CLASS B-RADIATED (3m)
[dB(uVolts)]
90
80
70
60
50
40
30
20
10
0
1000
5000
Frequency [MHz]

Leviton Manufacturing
HCCKR ON MODE
Wireless Key Chain Remote
File:NC1454 Project:02ME13082
Tested By:BP BL=Hor. Gr=Ver.

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 1 1000 - 2000MHz						
4	1550.208	59 pk	-32.2	26.9	53.7	54
	Azimuth:341	Height:200 Horz		Margin [dB]		-.3
5	1860.117	48.9 pk	-31.2	28.4	46.1	54
	Azimuth:132	Height:102 Horz		Margin [dB]		-7.
Range: 2 2000 - 3500MHz						
9	2169.726	51.3 pk	-30.6	29.7	50.4	54
	Azimuth:177	Height:200 Horz		Margin [dB]		-3.
Range: 4 1000 - 2000MHz						
1	1239.967	52.4 pk	-33.1	25.6	44.9	54
	Azimuth:181	Height:100 Vert		Margin [dB]		-9.
2	1550.042	53 pk	-32.2	26.9	47.7	54
	Azimuth:125	Height:100 Vert		Margin [dB]		-6.
3	1860.117	45.7 pk	-31.2	28.4	42.9	54
	Azimuth:20	Height:100 Vert		Margin [dB]		-11
Range: 5 2000 - 3500MHz						
6	2169.726	46.5 pk	-30.6	29.7	45.6	54
	Azimuth:204	Height:100 Vert		Margin [dB]		-8.
7	2479.768	39.4 pk	-30.4	30.8	39.8	54
	Azimuth:340	Height:100 Vert		Margin [dB]		-14
8	2789.996	39.8 pk	-29.7	31.4	41.5	54
	Azimuth:196	Height:199 Vert		Margin [dB]		-12

LIMIT 1: FCC PT15 CLASS B-RADIATED (3m)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

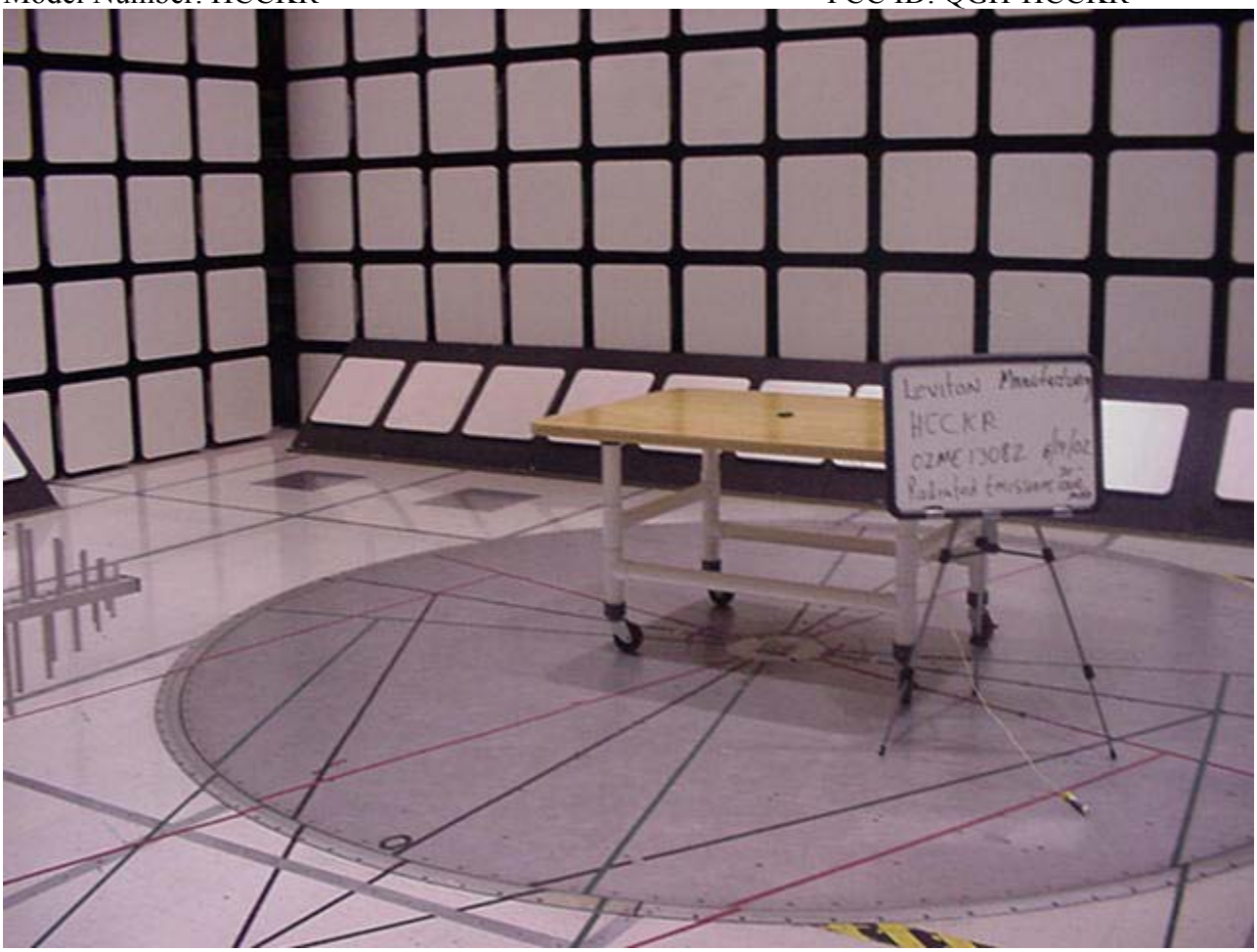
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

Leviton Manufacturing
HCCKR ON MODE
Wireless Key Chain Remote
File:NC1454 Project:02ME13082
Tested By:BP BL=Hor. Gr=Ver.

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 1 1000 - 2000MHz					
1550.078	55.36 av	-32.2	26.9	50.06	54
Azimuth: 123	Height:200 Horz		Margin [dB]:	-3.	
Range: 2 2000 - 3500MHz					
2170.093	49.73 av	-30.6	29.7	48.83	54
Azimuth: 123	Height:200 Horz		Margin [dB]:	-5.	

LIMIT 1: FCC PT15 CLASS B-RADIATED (3m)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector



Radiated Emissions 30-1000MHz

Radiated Emissions (1-5GHz)

2.1.2 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations and Measurement Techniques

Limit Calculation

Fundamental Frequency is 310.0395 MHz
From table in section 15.231
Limit =[(310.0395-260)* (12500-3750)/ (470-260)]+3750
Limit = 5834.995uV
Limit = Log 5834.995(20)
Limit = 75.321 dBuV/m
Limit for Spurious Emissions =[(310.0395-260)* (1250-375)/ (470-260)]+375
Limit for Spurious Emissions = 583.4995uV
Limit for Spurious Emissions = Log 583.4995 (20)
Limit for Spurious Emissions= 55.321 dBuV/m

Radiated Emissions Limit conversion from µV/m to dBµV/m (accordance with paragraph 15.209)

Radiated Emissions Limit (dBµV/m) = 20*log (µV/m)
Radiated Emissions Limit (dBµV/m) = 20 * log (200)
Radiated Emissions Limit (dBµV/m) = 46

Radiated Emissions test data obtained during measurements.

Field Strength (dBµV/m) = Measured field strength(dBµV/m) + Antenna Factor(dB) + Cable Factor(dB)
Field Strength (dBµV/m) = 47.65 dBuv/m + 2.4 dB + 14.7 dB
Field Strength (dBµV/m) = 64.75

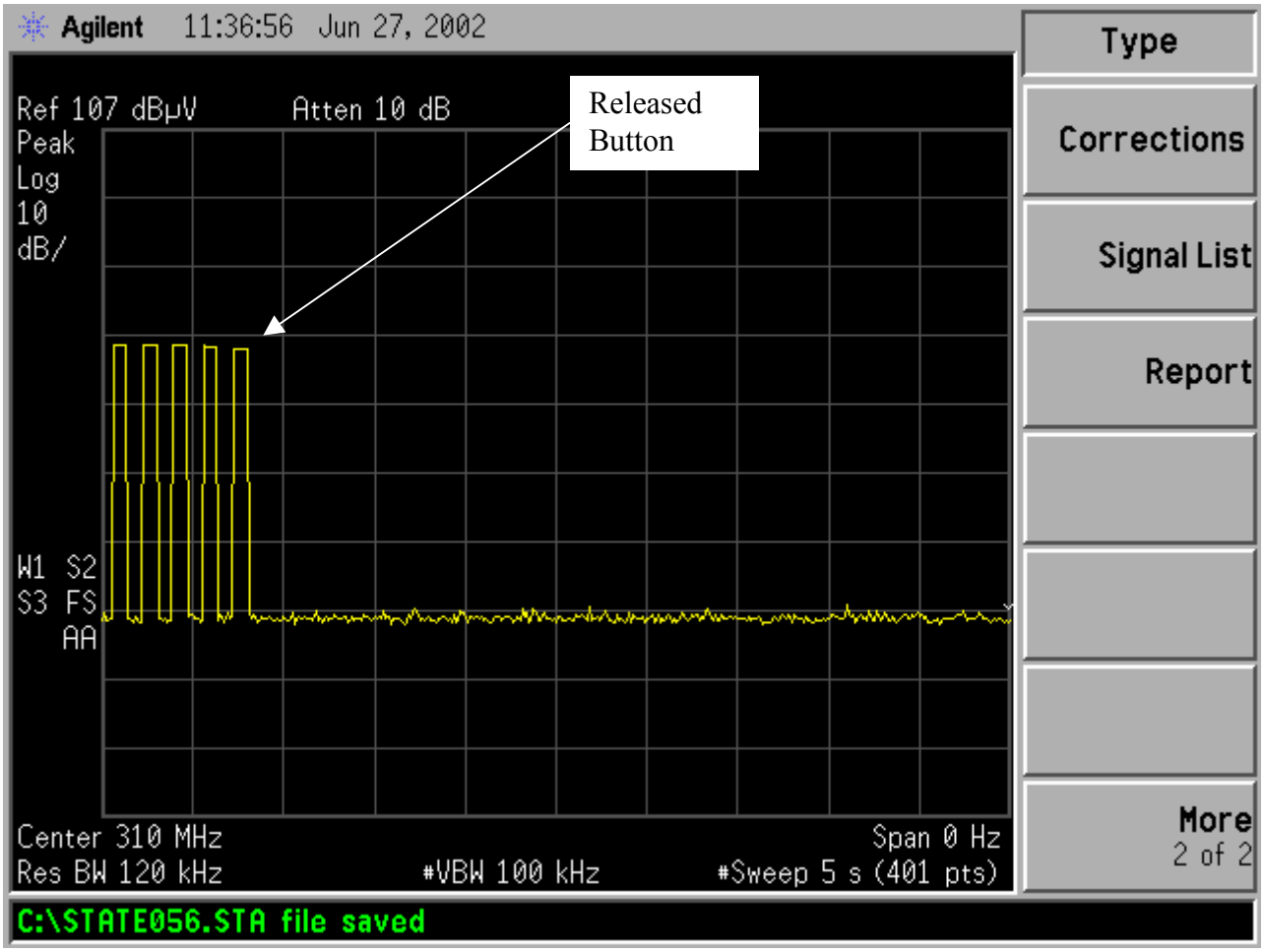
Average Measurement Technique using a Spectrum Analyzer

- Selected Peak Points for Maximum Orientation and Antenna height
- Peak Emission centered and Frequency Span set to Zero Hertz
- Reference Level set to less than 10 dB below peak emission
- Scale changed from logarithmic to linear
- Maximum orientation and Height adjusted for Peak Emission
- Video Bandwidth set to 1 Hz for average detection
- Measurement Made

2.1.3 Automatic Cease Operation

1. Set analyzer sweep time for 5 seconds
2. Key transmitter and release button
3. Ensure transmission stops before signal passes 5 second (10 divisions)

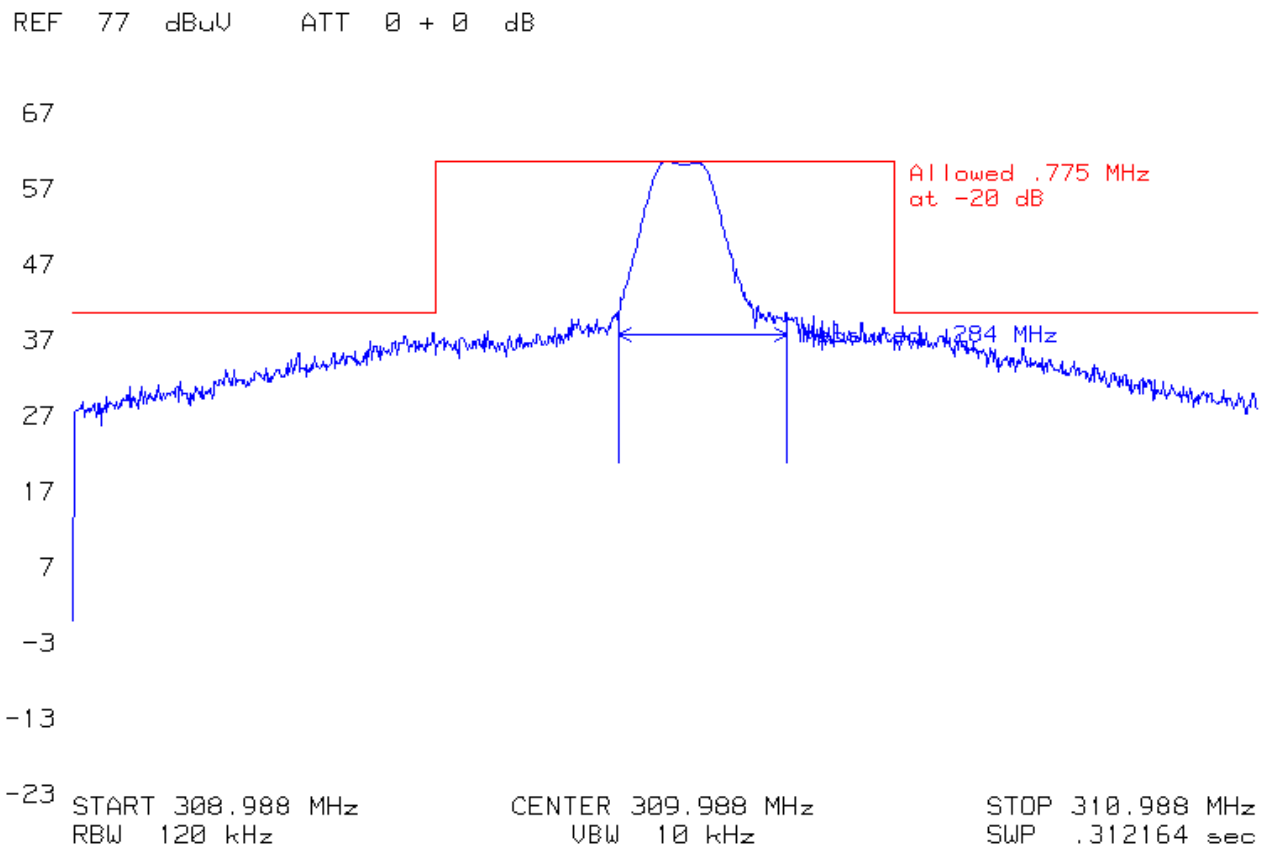
Complies (Y/N) YES



2.1.4 Bandwidth Determination

Max bandwidth (0.25% of Fundamental Frequency) = 310MHz * .0025 =0.775MHz

Complies (Y/N) YES



3.0 IMMUNITY TEST REGULATIONS

Not Applicable

In accordance with:

☐	IEC 801-2,	☐ EN61000-4-2	Electrostatic Discharge (ESD)
☐	IEC 801-3,	☐ EN61000-4-3	RF Immunity
☐	IEC 801-4,	☐ EN61000-4-4	Electrical Fast Transient (EFT)
☐	IEC 801-5,	☐ EN61000-4-5	Surge (Lighting)
☐	IEC 801-6,	☐ EN61000-4-6	Conducted Immunity
☐	IEC 801-8,	☐ EN61000-4-8	Magnetic Field Immunity
☐	IEC 801-11,	☐ EN61000-4-11	Voltage Dips and Interruptions
		☐ ENV50204	RF Immunity 900MHz pulse

3.1 EUT OPERATION MODE - IMMUNITY TESTS

☐ Standby
☐ Test program (H-Pattern)
☐ Test program (color bar)
☐ Test program (customer specific)
☐ Practice operation
☐ Normal operating Mode:
☐ As per manufacture's instructions:

4.0 SUMMARY:

The equipment under test has

☒ met the technical requirements as defined under section(s) ☒ 2.0 and ☐ 3.0

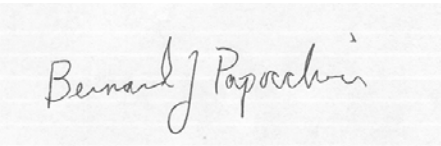
☐ not met the technical requirements as defined under section(s) ☐ 2.0 and ☐ 3.0

Test Start Date: 6/19/2002

Test Completion Date: 6/19/2002

- UNDERWRITERS LABORATORIES, INC. -

Project Engineer



Bernie Papocchia (Ext.23294)
Lead Engineering Associate
International EMC Services
Conformity Assessment Services-3014AMEL

Reviewer

Robert DeLisi (Ext.22452)
Staff Engineer
International EMC Services
Conformity Assessment Services -3014AMEL