



Electromagnetic Compatibility Test Report

Tests Performed on an RH Workshop, LLC

64 pixel Bluetooth Thermal Sensor, Model IR-BLUE-DM

Radiometrics Document RP-7580



Test Standards:

CENELEC EN 55022: 2010
 CENELEC EN 55024: 2010
 CENELEC EN 61000-6-1: 2007
 CENELEC EN 61000-6-3: 2007
 IEC 61000-4-2: 2008
 IEC 61000-4-3: 2006 +A1:2007 +A2:2010
 CENELEC EN 55022: 2010
 FCC Part 15 CFR Title 47: 2012
 ICES-003: 2012 Digital Apparatus (Industry Canada)
 2004/108/EC EMC Directive

Tests Performed For:

RH Workshop, LLC
 219 Coventry Pl.
 Edwardsville, IL 62025

Test Facility:

Radiometrics Midwest Corporation
 12 East Devonwood
 Romeoville, IL 60446
 (815) 293-0772

Test Completion Date:

May 13, 2013

RP-7580 Revisions:

Rev.	Issue Date	Affected Sections	Revised By
0	May 15, 2013		

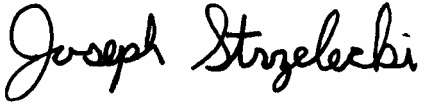
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Test Report for the RH Workshop, LLC, Model IR-BLUE-DM, 64 pixel Bluetooth Thermal Sensor

1.0 ADMINISTRATIVE DATA

<i>Equipment Under Test:</i> An RH Workshop, LLC, 64 pixel Bluetooth thermal sensor Model: IR-BLUE-DM Serial Number: none This will be referred to as the EUT in this Report	
<i>Date EUT Received at Radiometrics:</i> May 7, 2013	<i>Test Date(s):</i> May 8 thru 13, 2013
<i>Test Report Written By:</i> Joseph Strzelecki Senior EMC Engineer	<i>Test was not Witnessed by Personnel from:</i> RH Workshop, LLC
<i>Radiometrics' Personnel Responsible for Test:</i>  05/15/13 Date Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE Raymond Geijer EMC Engineer Chris E. Dalessio EMC Technician Richard L. Tichgelaar EMC Technician	<i>EUT Checked By:</i> Raymond Geijer Chris Dalessio Radiometrics Midwest Corp. The above personnel certifies: (1) The EUT had no loss of performance beyond the manufacture's performance level during the immunity tests. (2) A functional test was performed on the EUT after the immunity tests and no damage was sustained.

2.0 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is an RH Workshop, LLC 64 pixel Bluetooth thermal sensor, Model IR-BLUE-DM. The detailed test results are presented in a separate section. The following is a summary of the test results.

Emissions Tests Results

Environmental Phenomena	Frequency Range	Basic Standard	Test Level	Test Result
Conducted Emissions, AC Mains	0.15-30 MHz	EN 55022 FCC Part 15	N/A	Not performed
RF Radiated Emissions	30-10,000 MHz	EN 55022	Class B	Pass
RF Radiated Emissions	30-10,000 MHz	FCC Part 15	Class B	Pass Note 1

Note 1: Neither ANSI C63.4-2009 nor the FCC part 15 rules define how to apply measurement uncertainty for compliance determination. Therefore, the uncertainty listed in section 13.2.1 was not considered when applying this Pass/Fail judgment.

Conducted Emissions are not required since the EUT is not AC powered.

The test results conform to ICES-003: 2012 Digital Apparatus (Industry Canada) using ANSI C63.4-2009 as the test procedures.

Immunity Tests Results

Port Tested	Environmental Phenomena	Test Level	Basic Standard	Performance Criteria Met	Test Result
Enclosure	ESD	8 kV Air 4 kV Contact	61000-4-2	A	Pass
Enclosure	RF EM Field	3 V/m; 80-2000 MHz 1 V/m 2000-2700 MHz	61000-4-3	A	Pass
Power/Signal	Fast Transients	1.0 kV 5/50 nSec	61000-4-4	N/A	Note 1
Power/Signal	Surges	1 kV Diff.; 2kV Comm.	61000-4-5	N/A	Note 1
Power/Signal	RF Conducted	N/A	61000-4-6	N/A	Note 1, 2
Enclosure	Magnetic Field	N/A	61000-4-8	N/A	Note 3
AC Power	Voltage Dips and Interruptions	N/A	61000-4-11	N/A	Note 1

Note 1: Not Required Since EUT is not AC powered.

Note 2: Not Required since manufacturer declares that it is not intended to be used with cables longer than 3 m.

Note 3: Not Required since EUT is not magnetically sensitive.

CE Product-family Test Specifications and Results

Document	Date	Title	Test Results
CENELEC EN 61000-6-1	2007	Electromagnetic compatibility (EMC) Part 6-1 - Generic standards - Immunity for residential, commercial and light industrial environments	Complied with All Applicable Tests
CENELEC EN 61000-6-3	2007	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards – Emission standard for residential, commercial and light industrial environments	Complied with All Applicable Tests
CENELEC EN 55022	2010	Limits and methods of measurement of radio disturbance characteristics of information technology equipment	Complied with All Applicable Tests
CENELEC EN 55024	2010	Information technology equipment. Immunity characteristics. Limits and methods of measurement	Complied with All Applicable Tests

3.0 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
CENELEC EN 55022	2010	Limits and methods of measurement of radio disturbance characteristics of information technology equipment
FCC CFR Title 47	2012	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ICES-003 Issue 5	2012	Information Technology Equipment (ITE) — Limits and methods of measurement
ANSI C63.4-2009	2009	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IEC CISPR 16-1 CISPR 16-2	2010	Specification for radio disturbance and immunity measuring apparatus and methods; Methods of measurement of disturbance and immunity; Part 1 and Part 2

Document	Date	Title
IEC 61000-4-2	2008	Electromagnetic compatibility. Testing and measurement techniques. Electrostatic discharge immunity test. Basic EMC publication
IEC 61000-4-3	2006 +A1:07, +A2:10	Electromagnetic compatibility. Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test

The dates are the document dates or the latest applicable amendment.

4.0 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General requirements for the competence of testing and calibration laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. A full list of Radiometrics capabilities can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la.org/scopepdf/1495-01.pdf).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber D: Is a fully anechoic chamber that measures 22' L X 10' W X 10' H. The walls, ceiling and floor are fully lined with ferrite absorber tiles. Braden Shielding Systems of Tulsa, Oklahoma manufactured the chamber.

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures approximately 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid, grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST). The FCC test site Registration Number is 90897. The FCC has accepted these sites as test site number 31040/SIT 1300F2. Industry Canada has accepted these sites and assigned Radiometrics a code of 3124A-1.

5.0 EQUIPMENT UNDER TEST (EUT) DETAILS

5.1 EUT Description

The EUT is a 64 pixel Bluetooth thermal sensor accessory for smart phones and tablets. The EUT was in good working condition during the test, with no known defects.

The EUT was not grounded during the tests. The EUT is a Production sample.

5.2 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The peripherals were placed on an 80-cm high, nonconductive test stand. The I/O cables and peripherals were unmodified, commercially available products. The excess lengths of the cables were bundled near the center of the cable with the bundles 30 to 40 cm in length. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. Support and simulation equipment were remotely located during testing. Support equipment was not subjected to the test requirements.

Test Setup Configuration List

Item	Description	Type*	Company	Model Number	Serial Number
1	64 pixel Bluetooth thermal sensor	E	RH Workshop, LLC	IR-BLUE-DM	None
2	Tablet computer	P	Lenovo	A2107A	None

* Type: E = EUT, S = Support Equipment (not part of tested system); P = Peripherals or Host (part of the tested system)

5.3 Operating Conditions of EUT

The EUT was in a normal operating mode during the tests. It was communicating via Bluetooth to a tablet computer during all tests. All circuits were activated during the tests. Power was supplied from a new battery.

5.4 EUT Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

6.0 PERFORMANCE CRITERIA FOR IMMUNITY TESTS

The apparatus shall not become dangerous or unsafe as a result of the application of the required tests. The performance criteria is classified as follows:

Performance Criterion 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. In some cases, the performance level may be replaced by a permissible loss of performance.

Performance Criterion 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. In some cases, 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.

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

6.1 Minimum Performance Level

The minimum performance level as specified by the RH Workshop, LLC as follows: The EUT shall continue to communicate to the host computer via bluetooth. It shall continue to provide correct readings. Since in normal operation, the reading vary by 5%, this is allowable during the tests.

7.0 DEVIATIONS FROM THE TEST SPECIFICATIONS

There were no deviations from the test specifications.

8.0 EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no exclusions from the test specifications.

9.0 TEST PROCEDURES

9.1 RF Emissions Measurement Procedures

The test procedures used are in accordance with the ANSI document C63.4-2009 and the IEC document CISPR 16.

The emission measurements were performed with a spectrum analyzer. The bandwidth of the spectrum analyzer from 150 kHz to 30 MHz is 9 kHz, and the bandwidth from 30 to 1000 MHz is 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used.

9.1.1 Radiated Emission Measurement Procedures

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 2000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak or the quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT and by scanning the measurement antenna from 1 to 4 meters above the ground.

The field strength is calculated by adding the antenna factor, distance correction factor, cable loss, and subtracting the amplifier gain from the measured reading. Each antenna, cable and amplifier has individual factors across its usable frequency range. The antenna factor converts the voltage reading in dBuV to field strength in dBuV/meter. The distance correction is an inverse proportionality factor of 20 dB per decade of distance. The distance correction factor for a ten-meter specification distance to a three-meter test distance is calculated as follows: Distance Correction Factor = $20 * \log(3/10) = -10.5$ dB.

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is less.

Radiated Emissions Field Strength Limits

Frequency Range (MHz)	Test Distance (meters)	Class A Limits (dBuV/m)			Class B Limits (dBuV/m)		
		QP	Average	Peak	QP	Average	Peak
30 - 230	10	40	N/A	N/A	30	N/A	N/A
230 - 1000	10	47	N/A	N/A	37	N/A	N/A
1000 - 3000	3	N/A	56	76	N/A	50	70
>3000	3	N/A	60	80	N/A	54	74

9.1.1.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

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

Where: FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

DF = Distance Factor

9.2 Immunity Test Procedures**9.2.1 Electrostatic Discharge Immunity Test Procedures**

The tests were performed using procedures of the 61000-4-2 specification. For tabletop equipment, the HCP and the EUT were placed on a non-conductive, 80-cm high test stand. The EUT was monitored for proper operation after each test. The EUT was placed on a 0.8 x 1.6 meter, horizontal-coupling plane (HCP) with a 0.5 mm insulator. A 0.5 x 0.5 meter, vertical-conducting plane (VCP) was also used. It was placed 0.1 m from the EUT. The VCP and HCP were connected to earth ground via a wire with a 470-kOhm resistor at each end.

The ESD generator was probed around the accessible areas of the case of the EUT. At least 10 air discharges were applied to the EUT at each point normally accessible to the operator. The EUT was monitored for any responses. Discharges were applied to the HCP and VCP using the contact mode. At least 10 contact discharges were applied to the EUT at each point normally accessible to the operator. The discharges were applied in each polarity. The discharges were applied at the rate of 1 per second. The actual number of discharges, locations and voltages are listed on the ESD data pages.

9.2.2 Radiated RF Immunity Test Procedures

The tests were performed using procedures of the 61000-4-3 specification.

The RF immunity test was repeated so that each side of the EUT was facing the transmitting antenna. For each orientation of the EUT, the radiating antenna was positioned so that the E-field polarization is horizontal and vertical. The required electromagnetic field in the frequency range from 80 to 2700 MHz was generated using linearly polarized broadband antennas as the source. The required RF signals were generated and directed toward the EUT.

A computer controlled the signal generator, spectrum analyzer and the field strength sensor. The computer maintained the amplitude of the applied signal at or slightly above the required amplitude as recorded during the calibration procedures. If the EUT responded to the applied signal, the amplitude of the signal was reduced and then slowly raised until the threshold of response was determined. The nature of the response was recorded in addition to the frequency and threshold amplitude of the applied signal. The EUT operation was constantly monitored during the tests. The field intensity was monitored during the tests using an isotropic field sensor in order to verify proper operation.

The test distance from the antenna to the EUT was 2.5 meters from 80 to 1000 MHz and 1 meter from 1000 to 2700 MHz.

9.2.2.1 Calibration of Applied Field Intensity

The test system was calibrated by mapping the field uniformity in accordance with the specification requirements. System calibration was accomplished by establishing the net RF power that is required to be applied to the transmitting antenna in order to obtain a field intensity of 10 Volts per meter at each test frequency and each antenna orientation. A distance of 0.5 meters separated the probe locations. A directional coupler was used with a spectrum analyzer to measure the forward power levels. The signals were unmodulated. The field intensity was set to 10.0 Volts per meter with a tolerance of +5.0/-0.0 percent before the power levels were recorded. The forward power levels were recorded in an ASCII data file on the computer hard disk.

9.2.2.1.1 Calibration from 80 to 1000 MHz

The field intensity was established with the field probe located in each of 16 locations in an area measuring 1.5m x 1.5m. A distance of 0.5 meters separated the probe locations. The signals were unmodulated. Additional measurements were performed with the field probe at 0.4-meter height above the ground plane. The mapped plane was located 2.5 meters from the tip of the field generating antenna.

9.2.2.1.2 Calibration from 1000 to 2700 MHz

The field intensity was calibrated using the *Independent Windows Method* defined in Annex H of IEC 61000-4-3: 2006. The distance from the field generating antenna to the calibration area was 1m.

9.2.2.2 Test Software Sequence

Before each test section, the start and stop frequencies, dwell time and field strength were entered into the program. The tests were performed using a logarithmic sweep. Tests were performed at a minimum field intensity of 3 V/m. The testing was automated. The following is a description sequence of events that transpired under computer control at each frequency, and each antenna polarization.

- 1) The computer set the proper starting frequency as entered by the test personnel.
- 2) Calibration data obtained prior to the test was read from an ASCII file on the computer hard disk drive. The calibration data consisted of the required forward power levels for generation of a 5.0 Volt per meter field at the points in the 1.5m X 1.5m mapped plane.
- 3) The computer then read the forward power level. The measurement was performed using an average voltage detector function on the spectrum analyzer. The use of the average detector allows accurate comparison of the modulated test signal amplitude with the unmodulated calibration signal amplitude.
- 4) The computer calculated the forward power required to produce the intended field intensity. For example, when testing at 10 Volts per meter 6.0 dB was added to the calibration data. This amplitude is 6.0 dB above the amplitude in the calibration data file because 20 Volts per meter is 6.0 dB greater than 5.0 Volts per meter.

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- 5) The existing forward power was compared to the required forward power as calculated in step 3 above. If the measured power was more than 0.5 dB greater than the required power or if the measured power was less than the required power, then the computer adjusted the signal generator amplitude. Steps 2 and 4 were repeated as necessary until the power to the antenna was at least equal to the required power, but not more than 1.0 dB greater than the required power.
- 6) The system paused for the required dwell time while the RF signals were applied to the EUT at the required amplitude. This dwell time was greater than time necessary for the EUT to be exercised and to respond, but not less than 0.5 seconds.
- 7) The frequency was increased by 1%.
- 8) The RF field intensity was measured.
- 9) Obtained data was recorded in ASCII format on the computer hard disk drive.
- 10) The test was repeated starting with step 2.

10.0 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

11.0 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	01/15/13
AMP-18	RMC	RF Amplifier	1W1004	1001	10MHz-4.2GHz	N/A	NCR
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	01/16/13
AMP-34	IFI	10W Amplifier	M5500	0388-3315	0.01-1000MHz	N/A	NCR
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	12/05/12
ANT-43	Imp Machine	Super Log Antenna	SL-20M2G	1001	20-2000MHz	N/A	NCR
ANT-44	Imp Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	12/14/11
ANT-50	ETS-Lindgren	E-Field Sensor	HI-4453	109305	80MHz-40GHz	24 Mo.	04/11/13
DIR-10	Narda	Directional Coupler	27443	0018-85-39	1-18 GHz	12 Mo	06/06/12
DIR-11	Werlatone	Dir. Coupler	C5571-13	18051	0.01-1000MHz	12 Mo	11/05/12
ESD-02	Schaffner	ESD Generator	NSG438	14/201	N/A	24 Mo.	07/13/11
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	01/24/12
REC-01	HP / Agilent	Spectrum Analyzer	8566A	2106A02115, 2209A01349	30Hz-22GHz	24 Mo.	11/21/12
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	05/21/12
SIG-11	HP / Agilent	RF Synthesizer	8340B	2920A02533	0.01-26.5GHz	24 Mo.	07/24/12
THM-02	Fluke	Temp/Humid Meter	971	93490471	N/A	12 Mo.	05/25/12

Note: All calibrated equipment is subject to periodic checks.

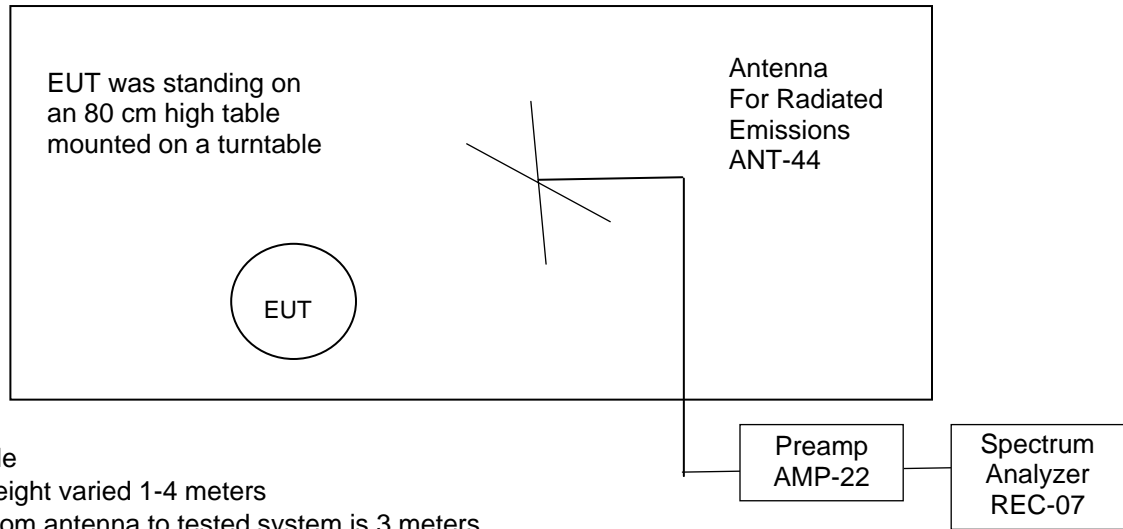
NCR – No Calibration Required. Device monitored by calibrated equipment. N/A: Not Applicable. The RMC ID is referenced in the Setup Diagrams.

12.0 TEST SETUP DOCUMENTATION

This section includes photographs of the actual test setup and drawings indicating the general test setup components. The drawings show the test equipment setup for each test. For the detailed EUT setup see the photographs and the “equipment under test (EUT) Details” in this report.

Figure 1. Drawing of Radiated Emissions Test Setup

Chamber E, anechoic

**Notes:**

- Not to Scale
- Antenna height varied 1-4 meters
- Distance from antenna to tested system is 3 meters

Figure 2. Drawing of Electrostatic Discharge Test Setup

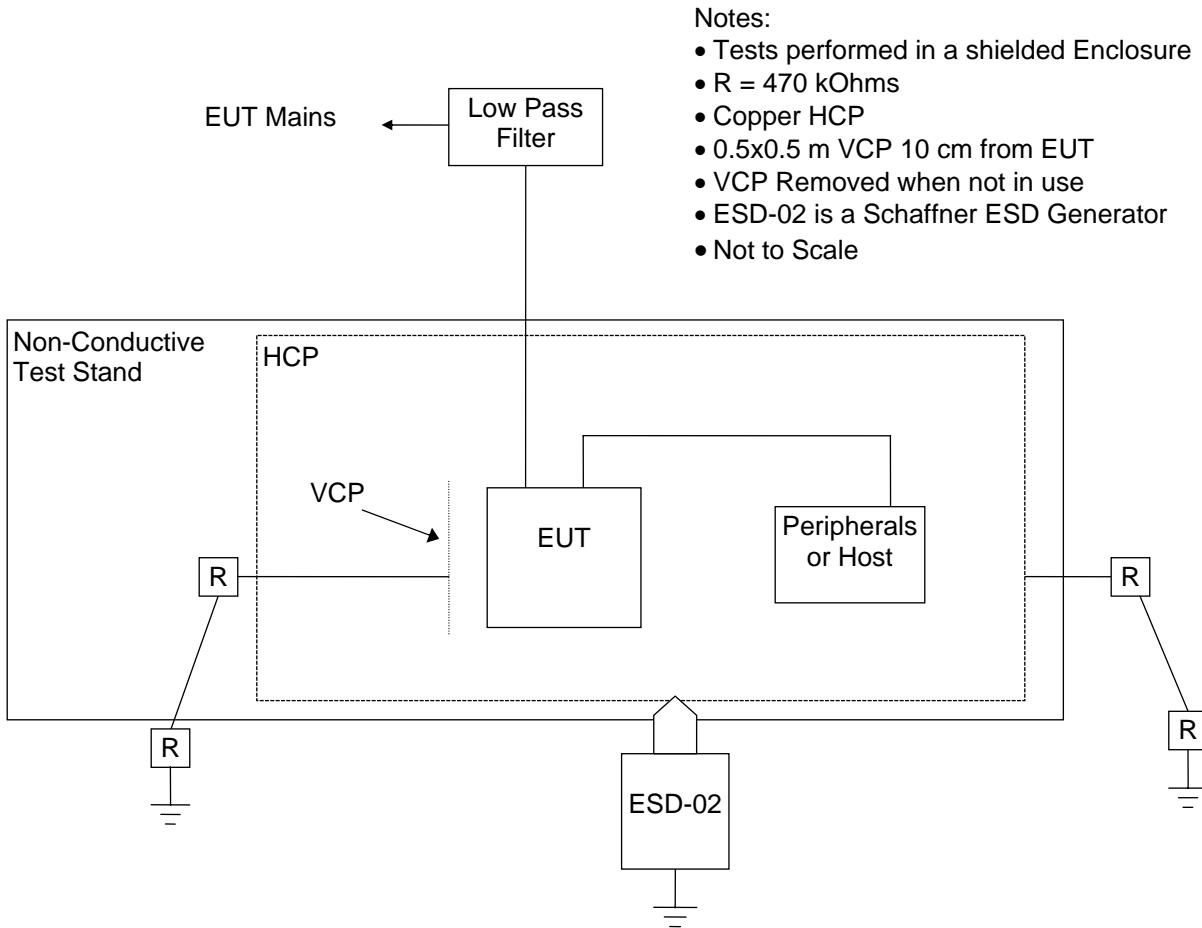
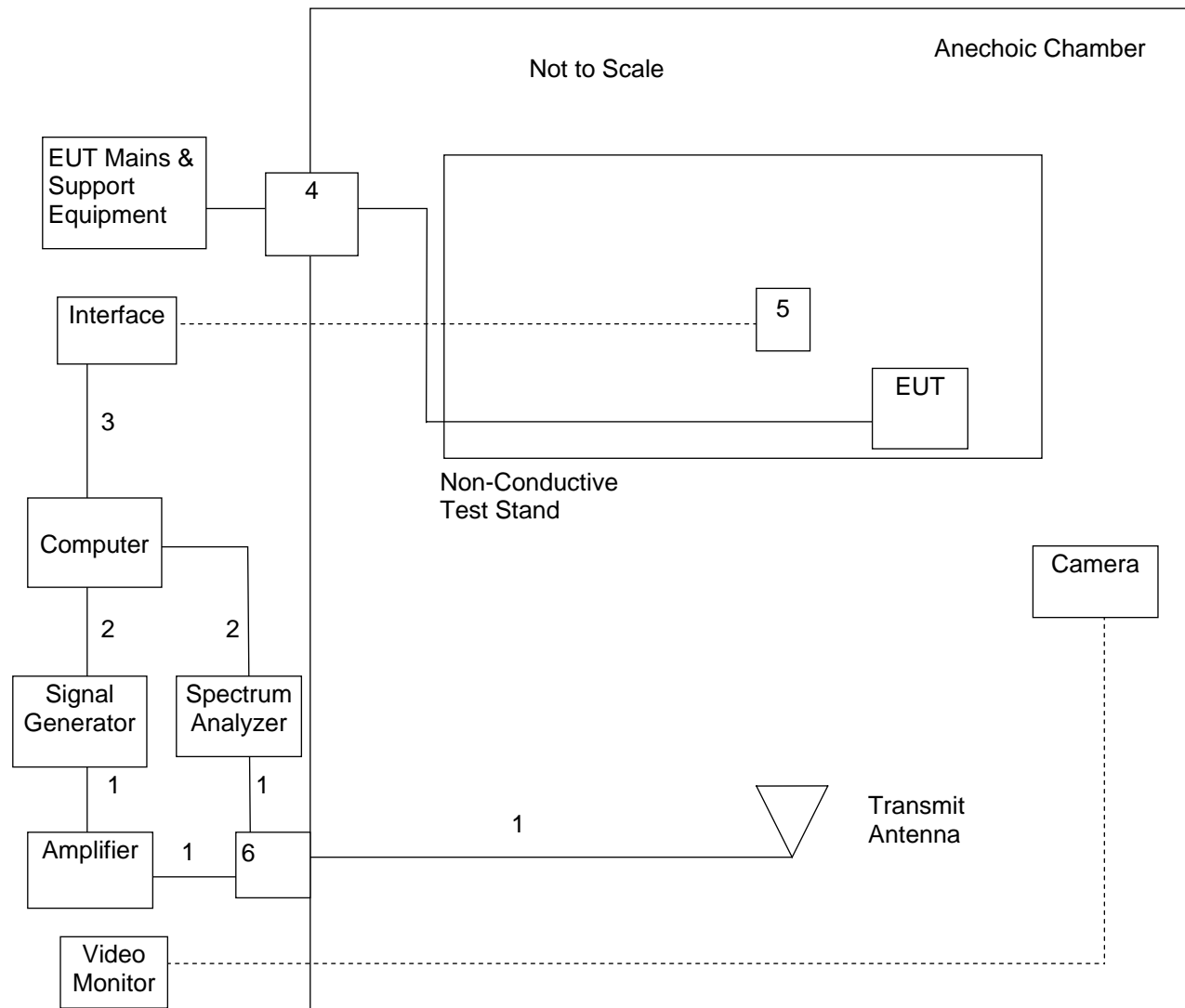


Figure 3. Drawing of Radiated RF Immunity Test Setup

1. 50-Ohm Coax Cable
2. GPIB Cable
3. RS232 Cable
4. Low Pass Filter
5. Field Sensor Rx ANT
6. Directional Coupler

----- Optical Fibers are routed through a small hole in the enclosure.



Frequency MHz	Tx to EUT Dist	Tx Antenna	Rx Antenna	Receiver to Coupler	Amplifier	Directional Coupler	Signal Generator
80 - 200	2 meters	ANT-43	ANT-50	REC-01	AMP-02	DIR-11	SIG-11
200 - 1000	2 meters	ANT-43	ANT-50	REC-01	AMP-39	DIR-11	SIG-11
1000 - 2700	1 meter	ANT-34	ANT-50	REC-01	AMP-18	DIR-10	SIG-11

Figure 4. Photographs of ESD Test Setup

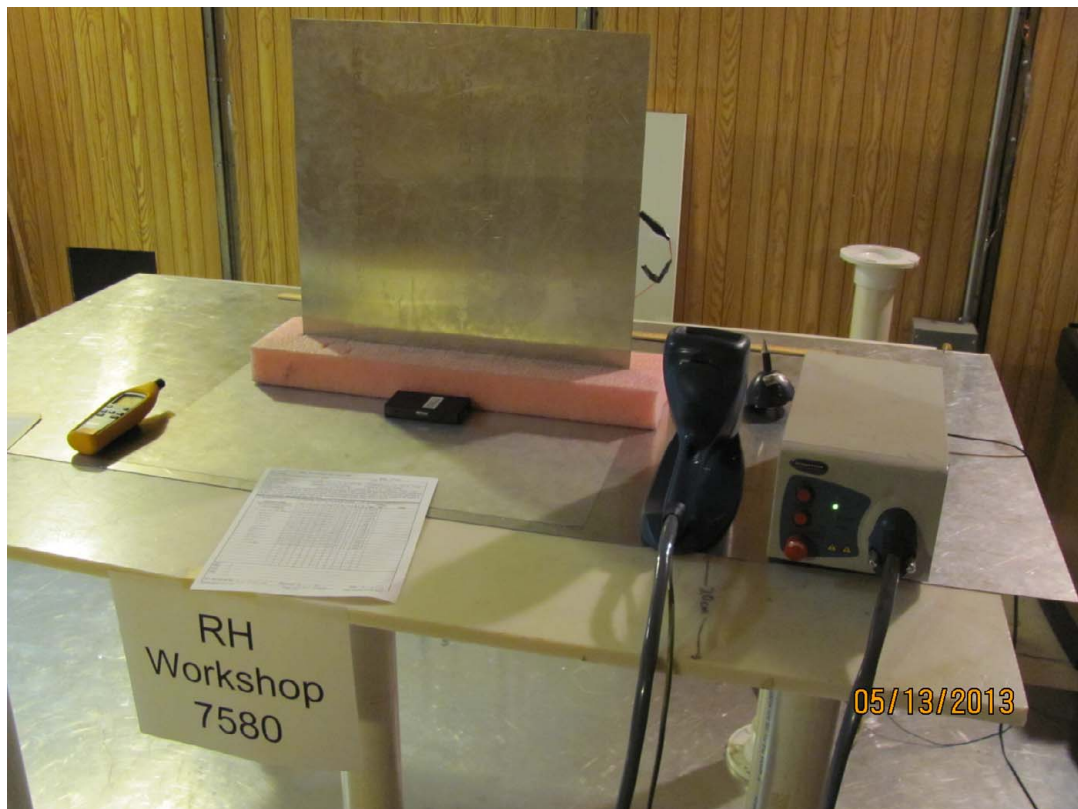


Figure 5. Photographs of RF Radiated Immunity Test Setup



Figure 6. Photographs of Radiated Emissions Test Setup



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13.0 DETAILED TEST RESULTS**13.1 Immunity Test Results****13.1.1 Electrostatic Discharge (ESD) Immunity Results**

Specification	61000-4-2	Test Date	5/13/2013
Model	IR-BLUE-DM	Description	Electrostatic Discharge
Temperature	23 C	Humidity	36.5 %
Test Personnel	Raymond Geijer	Test Location	Chamber B
Test Requirements	+2, -2, +4, -4, +8, -8 kV for Air and +2, -2, +4, -4, +6, -6 kV for Contact Discharge Performance Criterion B		
Notes	The number of discharges listed is for each of the test levels.		

ESD Location	Applied levels (kV)	Type	# of	Criteria Met	Observed Degradation of Performance
Front	+2, -2, +4, -4, +6, -6	Contact	10	A	None
Top	+2, -2, +4, -4, +6, -6	Contact	10	A	None
Left Side	+2, -2, +4, -4, +6, -6	Contact	10	A	None
Right Side	+2, -2, +4, -4, +6, -6	Contact	10	A	None
Rear	+2, -2, +4, -4, +6, -6	Contact	10	A	None
Bottom	+2, -2, +4, -4, +6, -6	Contact	10	A	None
Front	+2, -2, +4, -4, +8, -8	Air	10	A	None
Top	+2, -2, +4, -4, +8, -8	Air	10	A	None
Left Side	+2, -2, +4, -4, +8, -8	Air	10	A	None
Right Side	+2, -2, +4, -4, +8, -8	Air	10	A	None
Rear	+2, -2, +4, -4, +8, -8	Air	10	A	None
Bottom	+2, -2, +4, -4, +8, -8	Air	10	A	None
HCP	+2, -2, +4, -4, +6, -6	Contact	10	A	None
VCP (4 locations)	+2, -2, +4, -4, +6, -6	Contact	40	A	None
Judgement	Pass Criterion A; The EUT was fully functional during and after testing.				

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13.1.2 Radiated RF Immunity Test Results

Company	RH Workshop, LLC	Specification	61000-4-3
Model	IR-BLUE-DM	Description	Radiated RF Immunity
Serial Number	none	Test Date	5/8 & 5/9/2013
Test Personnel	Raymond Geijer, Chris Dalessio	Test Location	Chamber D
Test Requirements	3 V/m (80% AM 1 kHz Sine Wave) Performance Criterion A; 1 % Step Size		
Applied Modulation	80% AM 1 kHz Sine Wave		
Notes	The Dwell at each Frequency is 1 Seconds minimum.		

EUT side facing Antenna	Frequency MHz	Applied V/m	Antenna Polarization	Criteria Met	Observed Degradation of Performance
Front of EUT	80-2000	3	Vertical	A	None
Left Side	80-2000	3	Vertical	A	None
Right Side	80-2000	3	Vertical	A	None
Rear Side	80-2000	3	Vertical	A	None
Top Side	80-2000	3	Vertical	A	None
Bottom Side	80-2000	3	Vertical	A	None
Front of EUT	80-2000	3	Horizontal	A	None
Left Side	80-2000	3	Horizontal	A	None
Right Side	80-2000	3	Horizontal	A	None
Rear Side	80-2000	3	Horizontal	A	None
Top Side	80-2000	3	Horizontal	A	None
Bottom Side	80-2000	3	Horizontal	A	None
Front of EUT	2000-2700	1	Vertical	A	None
Left Side	2000-2700	1	Vertical	A	None
Right Side	2000-2700	1	Vertical	A	None
Rear Side	2000-2700	1	Vertical	A	None
Front of EUT	2000-2700	1	Horizontal	A	None
Left Side	2000-2700	1	Horizontal	A	None
Right Side	2000-2700	1	Horizontal	A	None
Rear Side	2000-2700	1	Horizontal	A	None
Top Side	2000-2700	1	Horizontal	A	None
Judgement	Pass Criterion A; The EUT was fully functional during and after the test.				

13.2 Emissions Test Results

13.2.1 Measurement Instrumentation Uncertainty

Measurement	Radiometrics Expanded Uncertainty (dB)	Ucisprr (dB) ¹
Radiated disturbance (electric field strength on an open area test site or alternative test site) 30 to 200 MHz	3.32	5.2
Radiated disturbance (electric field strength on an open area test site or alternative test site) 200 to 1000 MHz	4.88	5.2

¹Ucisprr is the calculated measurement Instrumentation uncertainty in CISPR 16-4-2: 2003.

Test Report for the RH Workshop, LLC, Model IR-BLUE-DM, 64 pixel Bluetooth Thermal Sensor

The uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

13.2.2 Radiated Emissions Test Results

Company	RH Workshop, LLC	Specification	EN 55022; Class B
Model	IR-BLUE-DM	Test Date	5/10/2013
Serial Number	none	Test Distance	3 Meters
Test Personnel	Joseph Strzelecki, Richard L. Tichgelaar	Test Location	Chamber E
Notes	Corr. Factors = cable loss - preamp gain - distance factor.		
Abbreviations	P = peak; Q = QP Pol = Antenna Polarization; V = Vertical; H = Horizontal; For Antenna Type Bi-Log = (ANT-44); Horn = (ANT-13)		
Configuration	EUT thermal sensor vertical on table		

Freq. MHz	Analyzer Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ Type		EUT	Limit	
36.0	35.4	P	16.2	H/44	-38.8	12.8	30.0	17.2
51.6	33.4	P	13.6	H/44	-38.6	8.5	30.0	21.5
102.8	32.9	P	10.3	H/44	-37.9	5.3	30.0	24.7
162.0	35.6	P	10.4	H/44	-37.2	8.8	30.0	21.2
211.6	38.5	P	10.6	H/44	-36.7	12.4	30.0	17.6
227.6	27.6	P	11.6	H/44	-36.5	2.6	30.0	27.4
230.0	26.6	P	11.6	H/44	-36.5	1.7	30.0	28.3
263.6	33.7	P	12.7	H/44	-37.8	8.5	37.0	28.5
270.9	41.3	P	12.9	H/44	-37.8	16.4	37.0	20.6
312.9	32.6	P	13.3	H/44	-37.8	8.1	37.0	28.9
410.4	31.9	P	15.6	H/44	-37.6	9.9	37.0	27.1
492.1	28.3	P	17.2	H/44	-37.2	8.3	37.0	28.7
511.0	27.7	P	17.8	H/44	-37.2	8.4	37.0	28.6
748.0	28.8	P	20.2	H/44	-36.4	12.6	37.0	24.4
898.0	27.1	P	21.5	H/44	-35.4	13.2	37.0	23.8
1000.0	27.1	P	22.5	H/44	-34.5	15.2	37.0	21.8
40.8	31.6	P	15.6	V/44	-38.7	8.5	30.0	21.5
47.2	32.2	P	14.6	V/44	-38.6	8.2	30.0	21.8
72.4	34.3	P	7.3	V/44	-38.3	3.3	30.0	26.7
75.2	35.7	P	7.0	V/44	-38.2	4.5	30.0	25.5
77.2	36.4	P	6.9	V/44	-38.2	5.1	30.0	24.9
153.2	35.2	P	9.8	V/44	-37.3	7.7	30.0	22.3
162.0	36.2	P	10.4	V/44	-37.2	9.4	30.0	20.6
186.4	33.2	P	9.3	V/44	-36.9	5.6	30.0	24.4
195.6	34.7	P	10.3	V/44	-36.8	8.1	30.0	21.9
225.6	27.4	P	11.7	V/44	-36.6	2.6	30.0	27.4
228.9	31.7	P	11.6	V/44	-36.5	6.8	30.0	23.2
246.3	42.8	P	12.1	V/44	-37.1	17.8	37.0	19.2
344.8	32.0	P	14.8	V/44	-37.8	8.9	37.0	28.1
376.8	34.4	P	15.4	V/44	-37.7	12.1	37.0	24.9
409.2	36.3	P	15.6	V/44	-37.6	14.3	37.0	22.7
432.2	31.0	P	16.6	V/44	-37.7	10.0	37.0	27.0

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Freq. MHz	Analyzer Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ Type		EUT	Limit	
500.0	29.0	P	17.5	V/44	-37.1	9.4	37.0	27.6
763.0	27.9	P	20.9	V/44	-36.2	12.6	37.0	24.4
839.0	28.9	P	21.4	V/44	-35.9	14.4	37.0	22.6
997.0	26.6	P	22.7	V/44	-34.5	14.8	37.0	22.2

Judgement	Pass By at least 17 dB
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The following are the radiated emissions from the EUT above 1 GHz. The Bluetooth RF signals were not recorded since the bluetooth has already been modularly certified.

Freq. MHz	Reading dBuV	Detector Function	Polarity	Factor dB	Field Strength dBuV/m		Margin Under Limit dB
					EUT	Limit	
1011.0	37.1	P	V	-4.8	32.3	54.0	21.7
1573.0	36.3	P	V	-3.2	33.1	54.0	20.9
1921.0	44.0	P	V	-1.0	43.0	54.0	11.0
2041.0	38.1	P	V	-0.6	37.5	54.0	16.5
2360.0	47.3	P	V	0.1	47.4	54.0	6.6
2382.0	45.7	P	V	0.1	45.8	54.0	8.2
2530.0	37.6	P	V	0.6	38.2	54.0	15.8
2962.0	34.8	P	V	3.7	38.5	54.0	15.5
3032.0	36.1	P	V	3.9	40.0	54.0	14.0
3573.0	34.6	P	V	4.7	39.3	54.0	14.7
3995.0	34.7	P	V	6.8	41.5	54.0	12.5
4021.0	33.2	P	V	6.7	39.9	54.0	14.1
4497.0	37.4	P	V	6.8	44.2	54.0	9.8
4855.0	41.2	P	V	6.3	47.5	54.0	6.5
4926.0	40.4	P	V	6.1	46.5	54.0	7.5
5037.0	34.8	P	V	5.8	40.6	54.0	13.4
5590.0	35.1	P	V	6.1	41.2	54.0	12.8
5816.0	37.7	P	V	6.3	44.0	54.0	10.0
5978.0	37.8	P	V	6.6	44.4	54.0	9.6
6097.0	39.7	P	V	6.8	46.5	54.0	7.5
6528.0	40.7	P	V	5.0	45.7	54.0	8.3
6988.0	38.9	P	V	6.4	45.3	54.0	8.7
7024.0	40.1	P	V	6.5	46.6	54.0	7.4
1016.0	36.7	P	H	-4.7	32.0	54.0	22.0
1479.0	37.6	P	H	-3.3	34.3	54.0	19.7
1921.0	42.6	P	H	-1.0	41.6	54.0	12.4
1999.0	34.7	P	H	-0.7	34.0	54.0	20.0
2041.0	36.1	P	H	-0.6	35.5	54.0	18.5
2363.0	40.7	P	H	0.1	40.8	54.0	13.2
2383.0	48.0	P	H	0.1	48.1	54.0	5.9
2490.0	39.7	P	H	0.5	40.2	54.0	13.8
2836.0	37.0	P	H	2.2	39.2	54.0	14.8
2988.0	34.2	P	H	3.9	38.1	54.0	15.9

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Freq. MHz	Reading dBuV	Detector Function	Polarity	Factor dB	Field Strength dBuV/m		Margin Under Limit dB
					EUT	Limit	
3011.0	33.0	P	H	3.9	36.9	54.0	17.1
3568.0	33.6	P	H	4.7	38.3	54.0	15.7
3982.0	35.2	P	H	6.9	42.1	54.0	11.9
4050.0	35.1	P	H	6.5	41.6	54.0	12.4
4550.0	35.7	P	H	7.1	42.8	54.0	11.2
4791.0	37.0	P	H	6.8	43.8	54.0	10.2
4941.0	40.8	P	H	6.0	46.8	54.0	7.2
4959.0	37.6	P	H	5.9	43.5	54.0	10.5
5047.0	35.5	P	H	5.8	41.3	54.0	12.7
5528.0	35.4	P	H	6.2	41.6	54.0	12.4
5817.0	38.5	P	H	6.3	44.8	54.0	9.2
6019.0	37.7	P	H	6.8	44.5	54.0	9.5
6395.0	39.9	P	H	4.8	44.7	54.0	9.3
7000.0	39.1	P	H	6.4	45.5	54.0	8.5
7021.0	40.2	P	H	6.5	46.7	54.0	7.3
7570.0	40.2	P	H	8.1	48.3	54.0	5.7
7840.0	40.1	P	H	8.8	48.9	54.0	5.1
7982.0	39.2	P	H	9.6	48.8	54.0	5.2

Judgement	Pass By at least 5 dB Since the Peak Readings passed the Average limits, Average detector mode measurements were not performed.
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14.0 SAMPLE DECLARATION OF CONFORMITY

Print On Company Letterhead. DO NOT include Underlined text in italics in the actual DOC.

Declaration of Conformity

The EU Directives covered by this Declaration:

Electromagnetic Compatibility Directive, 2004/108/EC Council Directive

Low Voltage Directive 2006/95/EC (*Not tested by Radiometrics List if applicable*)

Radio & Telecommunications Terminal Equipment Directive, 1999/5/EC

The Basis Upon Which Conformity Is Being Declared:

The products identified above comply with the requirements of the above EU directives by meeting the following standards: (The dates indicate release date or latest Amendment date)

CENELEC EN 55022: 2010

CENELEC EN 55024: 2010 Immunity

CENELEC EN 61000-6-1: 2007 Immunity (Residential Commercial & Light Industry)

CENELEC EN 61000-6-3: 2007 Class B Radiated and Conducted Emissions

(The list of 61000-4-X documents are optional)

IEC 61000-4-2: 2008

IEC 61000-4-3: 2006 +A1:2007, +A2:2010

(List applicable Low Voltage Directive standards)

The Products Covered by this Declaration

(product's name, type, variant, or other unique identifiers)

Date and Place of Issue of Declaration of Conformity

(List date and address - This may be combined with one of the next three items.)

Manufacturer:

(List company Name and Address)

Authorized Representative/Distributor in Europe

(List name, address and country)

(Signature)

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards. The CE mark was first applied in: *(give year only)*

(List Name, Title, Place, and Date)

(The following is included if appropriate:)

ATTENTION!

The attention of the specifier, purchaser, installer, or user is drawn to special measures and limitations to use, which must be observed when the product is taken into service to maintain compliance with the above directives. Details of these special methods and limitations to use are available on request, and are also contained in the product manuals.

This is required when importing to Europe.

The DOC, in the appropriate languages, must accompany import papers.

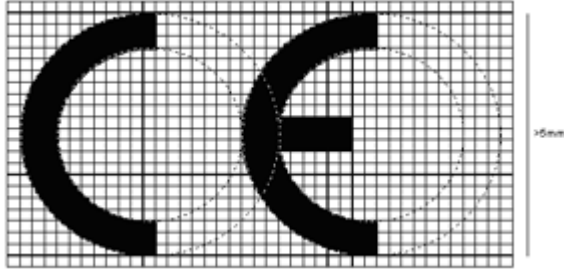
An unsigned copy can be in the user's documentation.

A person, who is authorized to bind the company, as the Declaration is a statement by the company, must sign the Declaration of Conformity. The person who signs should be one who has responsibility for determining that the design of the product is reasonably safe and has authority to direct changes to the design. It is not necessary for the signatory to reside in the European Union. The listing of an authorized representative in Europe is not mandatory.

14.1 CE Mark Requirements

This section is quoted from Annex V of the 2004/108/EC Council Directive:

The 'CE' marking shall consist in the initials 'CE' taking the following form:



The 'CE' marking must have a height of at least 5 mm. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.

The 'CE' marking must be affixed to the apparatus or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents.

Where the apparatus is the subject of other Directives covering other aspects and which also provide for the 'CE' marking, the latter shall indicate that the apparatus also conforms with those other Directives.

However, where one or more of those Directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the 'CE' marking shall indicate conformity only with the Directives applied by the manufacturer. In that case, particulars of the Directives applied, as published in the Official Journal of the European Union, must be given in the documents, notices or instructions required by the Directives and accompanying such apparatus.