

REGULATORY TEST REPORT

TITLE: HHSR3 FCC15.249/IC RSS 210 Test Report

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REV	CCO	DESCRIPTION OF CHANGE	DATE	APPROVALS	
001		INITIAL RELEASE		Engineering	
				Engineering	

REVISION HISTORY

				Engineering	
				Engineering	
				Engineering	

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Summary

Test Data Summary

**FCC Part 15.249 / IC RSS-210 A2.9
Field strength of low power Transmitters
908-923.8MHz Band**

**FCC ID: EO9HHSR3
IC ID: 864A-HHSR3**

**Device Model:
HHSR3**

**Serial Numbers:
7510800**

Rule	Description	Max. Reading	Pass/Fail
15.31(e)	Variation of Supply Voltage	NA	NA
15.207/RSS-Gen 7.2.2	Powerline conducted emissions	NA	NA
15.249(d)/RSS-210 sec. A2.9(b)	Out of band non-harmonic radiated emissions	None	Pass
15.249(a)/RSS-210 Sec A2.9(a)	Radiated emissions of transmitter fundamental and harmonics	Fund 93 dB μ V/m Harmonics 47 dB μ V/m	Pass
15.249(d)	Band Edge	38.9 dB μ V/m	Pass
RSP-100 Appendix B	99% Bandwidth	175.2 kHz	Pass

Cognizant Personnel	
W. Raymond Stoner	Engineer
Name	Title
Jay Holcomb	Regulatory Manager
Name	Title
Drew Rosenberg	Project Lead
Name	Title

CONDITIONS DURING TESTING

No Modifications to the EUT were necessary during the testing.

FCC 15.31(m) Number of Channels

This device was tested on three channels.

FCC 15.33(a) Frequency Ranges Tested

15.249 Radiated Emissions: 9kHz – 9.3 Ghz

FCC 15.203 Antenna Requirements

The antenna is removable and has a unique Reverse SMA connector; therefore the EUT complies with Section 15.203 of the FCC rules.

EUT Operating Frequency

The EUT was operating at 908 Mhz – 923.8 Mhz

Temperature and Humidity During Testing

The temperature during testing was within +15° C and +35° C.

The Relative humidity was between 20% and 75%.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Itron declares that the EUT tested was representative of a production unit.

EQUIPMENT UNDER TEST

Transmitter Module

Manuf: Itron, Inc.
Model: HHSR
Serial: 7510800
FCC ID: Pending

Peripheral Devices

The EUT was tested with the following peripheral devices:

5VDC Power Supply

Manuf: C&C Jetronic, Inc
Model: GPSU15U-1
Serial: NA

Laptop PC

Manuf: General Dynamics
Model: IX270
Serial: ZZGEG7201ZZ7266

AC Adapter for PC

Manuf: Delta Electronics
Model: ADP-90SB BB
Serial: VCW0717010678

Interface Board

Manuf: Itron, Inc
Model: KIT-0019-001 Rev 5
Serial: NA

Test 1: 15.31(e)

Variation of Supply Voltage

Vary the supply voltage from 85% to 115% of the nominal voltage. If the power level of the fundamental signal varies with supply voltage, record the voltage level at which the fundamental signal is at its highest and use that voltage level for all further testing.

Modular device is not connected to a power line. Therefore, this test is not applicable. During testing a 5VDC Power supply was utilized as noted above.

Test 2: 15.207 / RSS-Gen 7.2.2

Powerline Conducted Emissions

Measure the AC powerline conducted emissions from 150kHz to 30 MHz using a 50ΩH/50Ω line impedance stabilization network (LISN) according to the procedure specified in ANSI C63.4. Verify that no emissions exceed the following limits:

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)
0.15-0.5	66 to 56*	56 to 46
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of frequency

Modular device is not connected to a power line. Therefore, this test is not applicable. During testing a 5VDC Power supply was utilized as noted above.

Test 3: 15.209 / RSS-210 sec. A8.5

Out of band non-harmonic emissions

Measure the field strength of all spurious emissions that are not harmonics according to the procedure in Appendix A. The maximum field strength shall not exceed:

Frequency (MHz)	Field Strength (μ V/m)	Distance (meters)
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
>960	500	3

* Adjust 40dB/decade when measuring at different distances than specified.

For emissions measurements below 30MHz, rotate the loop antenna about its horizontal and vertical positions to maximize emissions.

Equipment Used	Serial Number	Cal Date	Due
JCA Pre Amplifier JCA010-415	103	NA	NA
H/S Sucoflex 40ft cable	220297001	12/3/07	12/3/09
Agilent E7405A Spectrum Analyzer	MY45113415	8/12/08	8/12/09
Emco 6502 Loop (9kHz to 30Mhz)	9509-2970	10/15/08	10/15/10
Emco 3110B Biconical (30MHz-to 300MHz)	9807-3129	04oct07	04oct09
Emco 3146 Log Periodic (200Mhz to 1GHz)	9203-3358	04oct07	04oct09
Emco 3115 wave guide (1GHz-18GHz)	9205-3878	3/17/08	3/17/09

Frequency range investigated was 9kHz to 9.28GHz.

Date	Tested by
2/10/09	Ray Stoner

All emissions were either fundamental or harmonics of the fundamental. Non-harmonic emissions were not detected. See next test for measurement data.

Test 4: 15.249(a)/RSS-210 2.9, 2.9(b)

Transmitter Fundamental and Harmonics

Measure the field strength of the transmitter fundamental and harmonic emissions at three meters according to the procedure in Appendix A. Record emissions levels with the transmitter near its lowest, middle, and highest frequencies. The maximum field strength of emissions may not exceed:

Fundamental (μ V/m)	Harmonics (μ V/m)
50,000	500

Equipment Used	Serial Number	Cal Date	Due
JCA Pre Amplifier JCA010-415	103	NA	NA
H/S Sucoflex 40ft cable	220297001	12/3/07	12/3/09
Agilent E7405A Spectrum Analyzer	MY45113415	8/12/08	8/12/09
Emco 6502 Loop (9kHz to 30Mhz)	9509-2970	10/15/08	10/15/10
Emco 3110B Biconical (30MHz-to 300MHz)	9807-3129	04oct07	04oct09
Emco 3146 Log Periodic (200Mhz to 1GHz)	9203-3358	04oct07	04oct09
Emco 3115 wave guide (1GHz-18GHz)	9205-3878	3/17/08	3/17/09
Hewlett Packard Power Meter 437B	3125U16900	6/08	6/10
Hewlett Packard Power Sensor 8481D	3318A11513	6/08	6/10
Hewlett Packard Signal Generator 8673D	3123A01161	Na	Na

Frequency range investigated was 9 kHz to 9.28GHz.

Date	Tested by
2/10/09	Ray Stoner

As all emissions were below the limits, duty cycle corrections were not utilized to demonstrate compliance. Amplifier gain measurements were taken at the time of EUT emissions measurement.

Frequency	Antenna Position	Antenna Height	Table Positon	Power Level	Amp Gain dB μ V/m	Antenna Factor	Cable Loss	Peak Level dB μ V/m	Limit	Margin
908	Horizontal	113	320	58.6	0.0	23.2	2.6	84.4	94.0	-9.6
908	Vertical	129	299	67.2	0.0	23.2	2.6	93.0	94.0	-1.0
916	Horizontal	108	316	56.8	0.0	23.2	2.6	82.6	94.0	-11.4
916	Vertical	124	204	65.3	0.0	23.2	2.6	91.1	94.0	-2.9
923.8	Horizontal	107	317	54.8	0.0	23.4	2.6	80.8	94.0	-13.2
923.8	Vertical	126	329	64.5	0.0	23.4	2.6	90.5	94.0	-3.5
3664	Horizontal	102	98	52.8	-45.1	31.6	4.6	44.0	54.0	-10.0
3664	Vertical	170	194	55.8	-45.1	31.6	4.6	47.0	54.0	-7.0

Test 5: FCC Part 15.249(d)

Band Edge

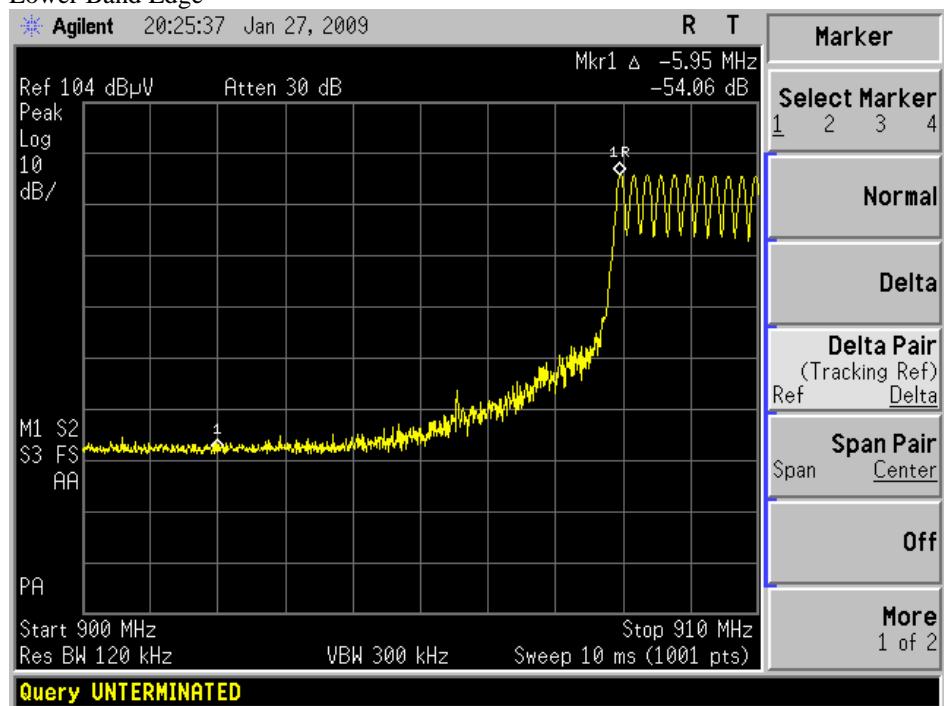
Demonstrate that the transmitter's emissions at the 902-928MHz band edge are at least 50dB below the carrier or less than 200uV/m at 3 meters, whichever is the lesser attenuation.

Equipment Used	Serial Number	Cal Date	Due
JCA Pre Amplifier JCA010-415	103	NA	NA
H/S Sucoflex 40ft cable	220297001	12/3/07	12/3/09
Agilent E7405A Spectrum Analyzer	MY45113415	8/12/08	8/12/09
Emco 6502 Loop (9kHz to 30Mhz)	9509-2970	10/15/08	10/15/10
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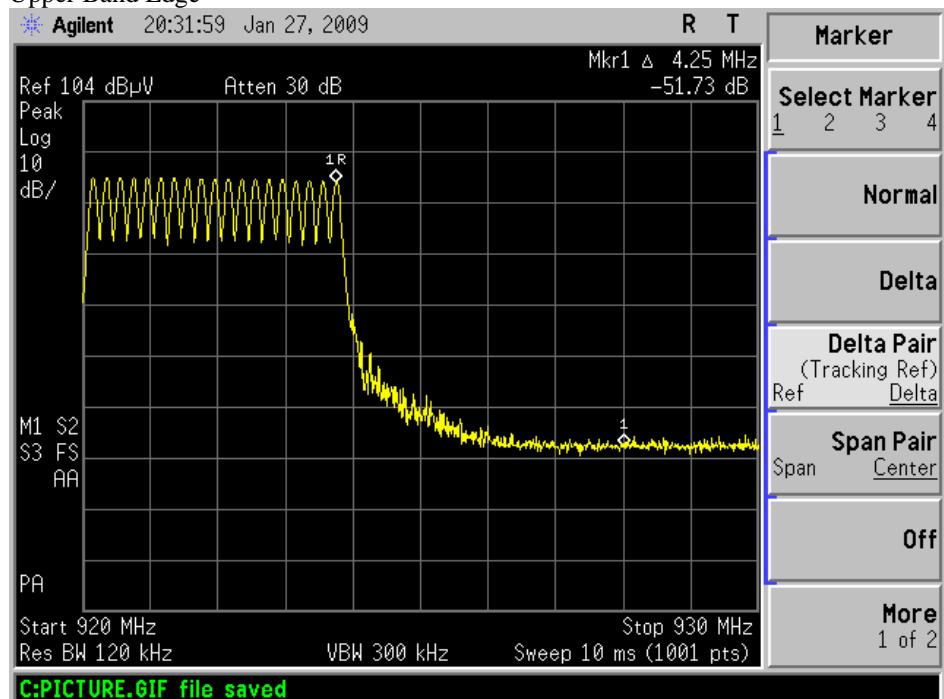
Date	Tested by
2/10/09	Ray Stoner

Channel	Frequency MHz	Level at edge of band dB μ V	15.209 limit dB μ V	Pass/Fail
Low	902	38.9	46	Pass
High	928	38.8	46	Pass

Lower Band Edge



Upper Band Edge



Test 6: RSP-100 Appendix II

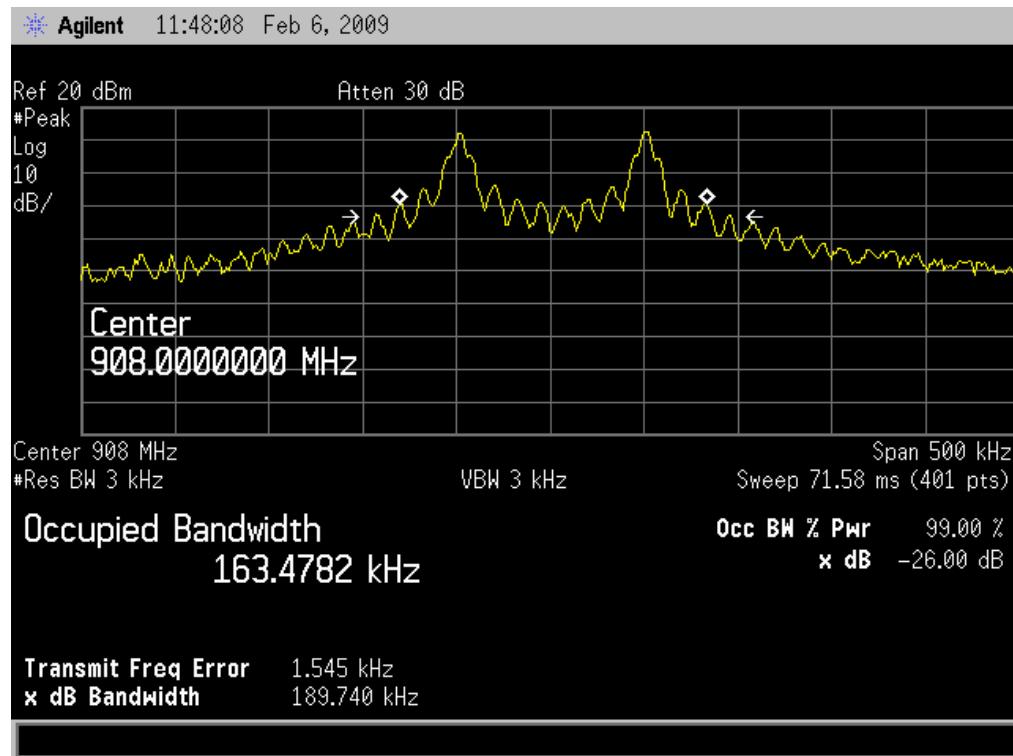
99% Bandwidth

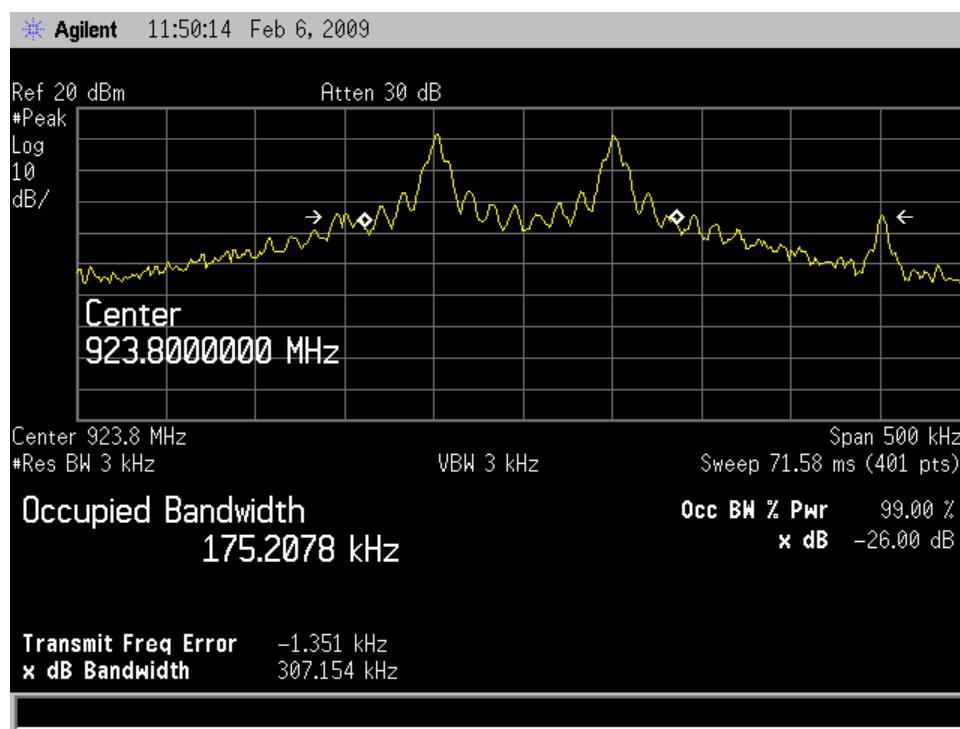
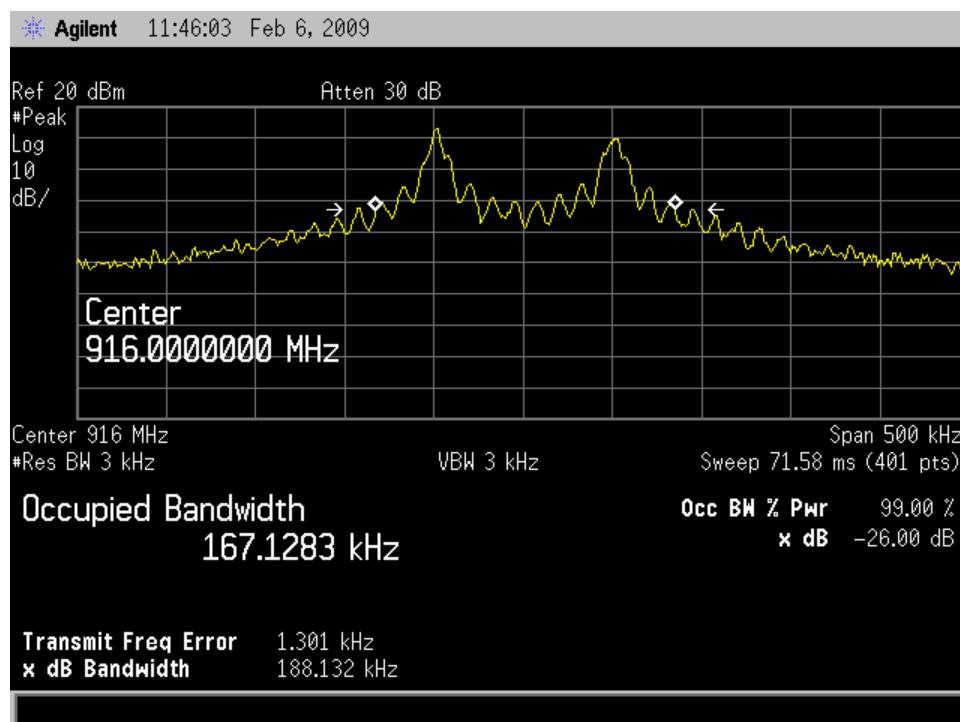
Capture a plot of the 99% bandwidth of a single transmission.

Equipment Used	Serial Number	Cal Date	Cal Due
Agilent 4407B Spectrum Analyzer	MY45107856	3/07	3/09

Date	Temp/Humidity °F / %	Tested by
2/6/09	72/25%	Ray Stoner

Frequency MHz	99% Bandwidth
908	163.5 kHz
916	167.1 kHz
923.8	175.2 kHz





Appendix A

Field Strength Measurement Procedure

This test measures the field strength of radiated emissions using a spectrum analyzer and a receiving antenna in accordance with ANSI C63.4-2003. During the test, the EUT is to be placed on a non-conducting support at 80 cm above the horizontal ground plane of the OATS. The horizontal distance between the antenna and the EUT is to be exactly 3 meters. The bandwidths used shall be; 200 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 120 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz, with the detector set to peak hold.

- 1) The antenna correction factor, preamplifier gain (if the preamplifier is installed), and cable loss are stored in tables in the EMC analyzer and the level at the analyzer is the corrected level in dbuV/m.
- 2) Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.
- 3) If appropriate, manipulate the system cables to produce the highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.
- 4) Rotate the EUT 360° to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat step 3). Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.
- 5) Move the antenna over its fully allowed range of travel to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to step 3) with the antenna fixed at this height. Otherwise, move the antenna to the height that repeats the highest amplitude observation and proceed.
- 6) Change the polarity of the antenna and repeat step 3), step 4), and step 5). Compare the resulting suspected highest amplitude signal with that found for the other polarity. Select and note the higher of the two signals.
- 7) The final maximized level displayed on the EMC analyzer is the field strength.

