



NVLAP LAB CODE 100396-0

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**EMC QUALIFICATION
TEST REPORT**

**ELECTRONIC SOLUTIONS, INC.
A HUNTER DOUGLAS COMPANY**

DONGLE, ESI RF RQ TRANS

FCC ID# P7RRFRQTRANS

TESTED TO CONFORM WITH:

☒ **EMISSIONS STANDARDS**

FOR

INDUSTRIAL, SCIENTIFIC AND MEDICAL (ISM)

Test Report Number: 120805-1791FCC

Date of Test Completion: September 10, 2012

Manufacturer's Address: 1355 Horizon Ave
Lafayette, CO 80026

Phone: (303) 469-9322

Approved by:

Laboratory Director

DOCUMENT REVISION HISTORY

REVISION #	REPORT NUMBER	DESCRIPTION OF REVISION	DATE OF REVISION
0	120805-1791FCC	ORIGINAL REPORT	2012-10-19
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2	120805-1791FCC	ADDED ADDITIONAL TEST DATA INFO	2012-12-21
3	120805-1791FCC	UPDATED TEST DATA CALCULATIONS	2013-1-28
4	120805-1791FCC	NOTE ADDED	2013-2-1

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Any questions regarding this report should be directed to:

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EMC QUALIFICATION TEST REPORT

DONGLE, ESI RF RQ TRANS

1.0 EXECUTIVE SUMMARY

1.1 PURPOSE

The purpose of this report is to present EMC test data and demonstrate conformity to the requirements of the prescribed standards for Emissions and/or Immunity.

1.2 CONFORMITY

The test article was tested to the standards listed in Table I with the indicated conformity status. All test methods were performed in accordance to with the standards listed.

TABLE I. EMISSIONS CONFORMITY SUMMARY

TEST TYPE	COMPLIANCE STANDARD	TESTING TECHNIQUE	TEST DESCRIPTION	PRODUCT CLASSIFICATION	CONFORMITY STATUS
EMISSIONS	<u>FCC Part 15</u>	☒ <u>Publication 558074</u> ☒ <u>FCC Part 15.109</u> ☒ <u>FCC Part 15.205</u> ☒ <u>FCC Part 15.209</u> ☒ <u>FCC Part 15.247</u>	Unintentional Radiated Emissions	Class B	PASSED
			Intentional Radiated Emissions		PASSED
		☒ <u>FCC Part 15.105</u>	Conducted Emissions ¹		PASSED

1.3 EQUIPMENT UNDER TEST (EUT)

EUT NAME(S): **Dongle**

MODEL NUMBER(S): **ESI RF RQ TRANS**

¹ Measurement of Conducted Emissions do not apply if the EUT is powered by an external DC power source.

2.0 EMISSIONS TEST STANDARDS

FCC Part 15

Class B

2.1 ☒ UNINTENTIONAL RADIATED EMISSIONS – 30 MHZ TO 1000 MHZ

Measurements for *Radiated Emissions* were performed with the transceiver in receive mode over the frequency range of 30 MHz to 1000 MHz in the horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.109

Testing Conditions

Date of Test: September 10, 2012
Temperature: 20° C
Relative Humidity: 44%
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

- ☒ Rohde and Schwarz Receiver, ESVS-30 ☒ Hewlett-Packard Quasi-Peak Detector, HP 85650A
- ☒ Mini Circuits Pre-Amp #2
- ☒ Chase BiLog Antenna, Model 1121

Test Accessories: See Appendix C for support equipment details

Test Results of Radiated Emissions

Test Status: **PASSED**

Frequency Range: **30 MHz to 1000 MHz**

Minimum Margin to Limit **-10.33** dB at **82.9808** MHz

Uncertainty Horizontal under 200 MHz: **4.64** dB
Uncertainty Horizontal over 200 MHz: **4.04** dB
Uncertainty Vertical under 200 MHz: **4.85** dB
Uncertainty Vertical over 200 MHz: **4.64** dB

Detector: **Peak**

Resolution Bandwidth: **100 kHz**

Measured iaw FCC publication KDB 558074 para. 5.4.1 and 5.4.2

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.2 ☒ RECEIVER SPURIOUS & UNINTENTIONAL RADIATED EMISSIONS - 30 MHZ TO 1000 MHZ

Measurements for *Radiated Emissions* were performed with transceiver in receive mode over the frequency range of 30 MHz to 1000 MHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.109Testing Conditions

Date of Test: September 10, 2012
Temperature: 20° C
Relative Humidity: 44 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location**Criterion Technology Open Area Test Site**Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ HP8566B Spectrum Analyzer	☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☒ Mini Circuits Pre-Amp #2	☒ Veratech Pre-Amp #3
☒ Chase BiLog Antenna, Model 1121	☒ Antenna Research, Horn Antenna, Model DRG118/A

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **30 MHz to 1000 MHz**

Minimum Margin to Limit **-10.33** dB at **82.9808** MHz

Detector: **Peak**

Resolution Bandwidth: **100 kHz**

Measured iaw FCC publication KDB 558074 para. 5.4.1 and 5.4.2

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.3 ☒ TRANSMITTER SPURIOUS & UNINTENTIONAL RADIATED EMISSIONS - 30 MHZ TO 1000 MHZ

Measurements for *Radiated Emissions* were performed with transceiver in transmit mode over the frequency range of 30 MHz to 1000 MHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.247Testing Conditions

Date of Test: September 10, 2012
Temperature: 20° C
Relative Humidity: 44 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location**Criterion Technology Open Area Test Site**Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ HP8566B Spectrum Analyzer	☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☒ Mini Circuits Pre-Amp #2	☒ Veratech Pre-Amp #3
☒ Chase BiLog Antenna, Model 1121	☒ Antenna Research, Horn Antenna, Model DRG118/A

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **30 MHz to 1000 MHz**

Minimum Margin to Limit **-10.33** dB at **82.9808** MHz

Detector: **Peak**

Resolution Bandwidth: **100 kHz**

Measured iaw FCC publication KDB 558074 para. 5.4.1 and 5.4.2

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.4 ☒ **UNINTENTIONAL RADIATED EMISSIONS – 1 GHZ TO 12.5 GHZ**

Measurements for *Radiated Emissions* were performed with the transceiver in receive mode over the frequency range of 1 GHz to 12.5 GHz in the horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.109Testing Conditions

Date of Test: September 6, 2012
Temperature: 20° C
Relative Humidity: 46%
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location**Criterion Technology Open Area Test Site**Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

- ☒ Rohde and Schwarz Receiver, ESVS-30 ☒ Hewlett-Packard Quasi-Peak Detector, HP 85650A
☒ Mini Circuits Pre-Amp #2
☒ Chase BiLog Antenna, Model 1121

Test Accessories: See Appendix C for support equipment details

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **1 GHz to 12.5 GHz**

Minimum Margin to Limit **-26.54** dB at **2409.4778** MHz

Uncertainty Horizontal under 200 MHz: **4.64** dB
Uncertainty Horizontal over 200 MHz: **4.04** dB
Uncertainty Vertical under 200 MHz: **4.85** dB
Uncertainty Vertical over 200 MHz: **4.64** dB

Detector: **Average**

Resolution Bandwidth: **1 MHz**

Video Bandwidth: **1 MHz**

Measured iaw FCC publication KDB 558074 para. 5.4.1 and 5.4.2

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.5 ☒ INTENTIONAL RADIATOR – RADIATED EMISSIONS

Measurements for *Radiated Emissions* were performed over the frequency range of 1 GHz to 24 GHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.205

FCC Part 15.209

FCC Part 15.247

Testing Conditions

Date of Test: August 31, 2012
Temperature: 21° C
Relative Humidity: 41 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP/LWS

Duty Cycle: Transmitter software configured for 100% duty cycle

Power levels: Radiated power measured. EUT has internal antenna with no provision for conducted measurement

Test LocationCriterion Technology Open Area Test SiteTest Distance

Antenna Distance: **3 meter(s)** Final Measurement(s)

Test Equipment

- ☒ Hewlett-Packard Spectrum Analyzer, HP 8566B
- ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
- ☒ Veratech Pre-Amp #3
- ☒ Antenna Research, Horn Antenna, Model DRG118/A

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **1 GHz to 24 GHz**

Fundamental Minimum Margin to Limit: **-24.50** dB at **2404.970** GHz

Detector: **Peak**

Resolution Bandwidth: **1 MHz**

Video Bandwidth: **3 MHz**

Measured iaw FCC publication KDB 558074 para 5.2.1.2. procedure PK2..

Spurious & Harmonics Minimum Margin to Limit: **-7.49** dB at **12402.3600** GHz

Detector: **Peak**

Resolution Bandwidth: **1 MHz**

Video Bandwidth: **3 MHz**

Measured iaw KDB 558074 para 5.4.1.1 and 5.4.1.2

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.6 BANDEDGE

Measurements for *Bandedge* were performed with transceiver in transmit mode over the frequency range of 2310 MHz to 2500 MHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.247

Testing Conditions

Date of Test: August 28, 2012
Temperature: 21° C
Relative Humidity: 42 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ HP8566B Spectrum Analyzer	☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☒ Mini Circuits Pre-Amp #2	☒ Veratech Pre-Amp #3
☒ Chase BiLog Antenna, Model 1121	☒ Antenna Research, Horn Antenna, Model DRG118/A

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **2310 MHz to 2500 MHz**

Low Channel:

Detector: **Peak** Max Level (dBuV): **35.73** Margin to Limit: **-38.27**

High Channel:

Detector: **Average** Max Level (dBuV): **46.03** Margin to Limit: **-7.97**

Measured iaw FCC publication KDB 558074 para 5.4.2.2.4

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.7 FREQUENCY LIMITS

Measurements for bandwidth, band edges, number of channels were performed in accordance with the Operations to the Requirements of:

FCC Part 15.205

FCC Part 15.209

FCC Part 15.247

Testing Conditions

Date of Test: August 28, 2012
Temperature: 21° C
Relative Humidity: 42 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location

Criterion Technology Open Area Test Site

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A

Test Results of Occupied Bandwidth and 20 dB / 6 dB Bandedges

Test Status: **PASSED**

Low Channel:

6 dB lower Bandedge: 2404.215 MHz
6 dB upper Bandedge: 2405.822 MHz
6 dB Occupied Channel Bandwidth: 1.607 MHz

Low Channel:

20 dB lower Bandedge: 2403.687 MHz
20 dB upper Bandedge: 2406.36 MHz
20 dB Occupied Channel Bandwidth: 2.673 MHz

Mid Channel:

6 dB lower Bandedge: 2439.194 MHz
6 dB upper Bandedge: 2440.843 MHz
6 dB Occupied Channel Bandwidth: 1.649 MHz

Mid Channel:

20 dB lower Bandedge: 2438.662 MHz
20 dB upper Bandedge: 2441.37 MHz
20 dB Occupied Channel Bandwidth: 2.708 MHz

High Channel:

6 dB lower Bandedge: 2479.222 MHz
6 dB upper Bandedge: 2480.824 MHz
6 dB Occupied Channel Bandwidth: 1.602 MHz

High Channel:

20 dB lower Bandedge: 2478.684 MHz
20 dB upper Bandedge: 2481.372 MHz
20 dB Occupied Channel Bandwidth: 2.688 MHz

Detector: **Average**

Resolution Bandwidth: **100 kHz**

Video Bandwidth: **3 kHz**

Measured iaw FCC publication KDB 558074 para 5.1

All fundamental 99% (-20 dB) bandwidth emissions are contained within the 2400 to 2783.5 MHz band

Remarks

See: **APPENDIX A** for EUT Photographs

APPENDIX B for Data Sheets

APPENDIX D for Test Equipment Calibration Status

2.8 POWER SPECTRAL DENSITY

Measurements for Power Spectrum Density were performed with the transceiver in the transmit modulated mode in accordance with the Operations to the Requirements of:

FCC Part 15.247

Testing Conditions

Date of Test: August 28, 2012
Temperature: 21° C
Relative Humidity: 42 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location

Criterion Technology Open Area Test Site

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A

Test Results of 3 kHz Power Spectrum Density

Test Status: **PASSED**

Low Channel:

Minimum Margin to Limit: **-35.7** dB at **2404.635** MHz

Mid Channel:

Minimum Margin to Limit: **-37.0** dB at **2439.645** MHz

High Channel: :

Minimum Margin to Limit: **-36.6** dB at **2481.372** MHz

Detector: **Peak**

Resolution Bandwidth: **100 kHz**

Video Bandwidth: **300 kHz**

Sweep Time: 5 minutes

Measured iaw KDB 558074 para 5.3.2

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.9 ☒ **CONDUCTED EMISSIONS**

Measurements for *Conducted Emissions* were performed over the frequency range of 150 kHz to 30 MHz to the requirements of:

FCC Part 15.105**Class B**Testing Conditions

Date of Test: September 5, 2012
Temperature: 15° C
Relative Humidity: 44 %
Test Voltage: 120 VAC 60 Hz
Test Operator: SP

Test Location**Criterion Technology Open Area Test Site**Test Equipment

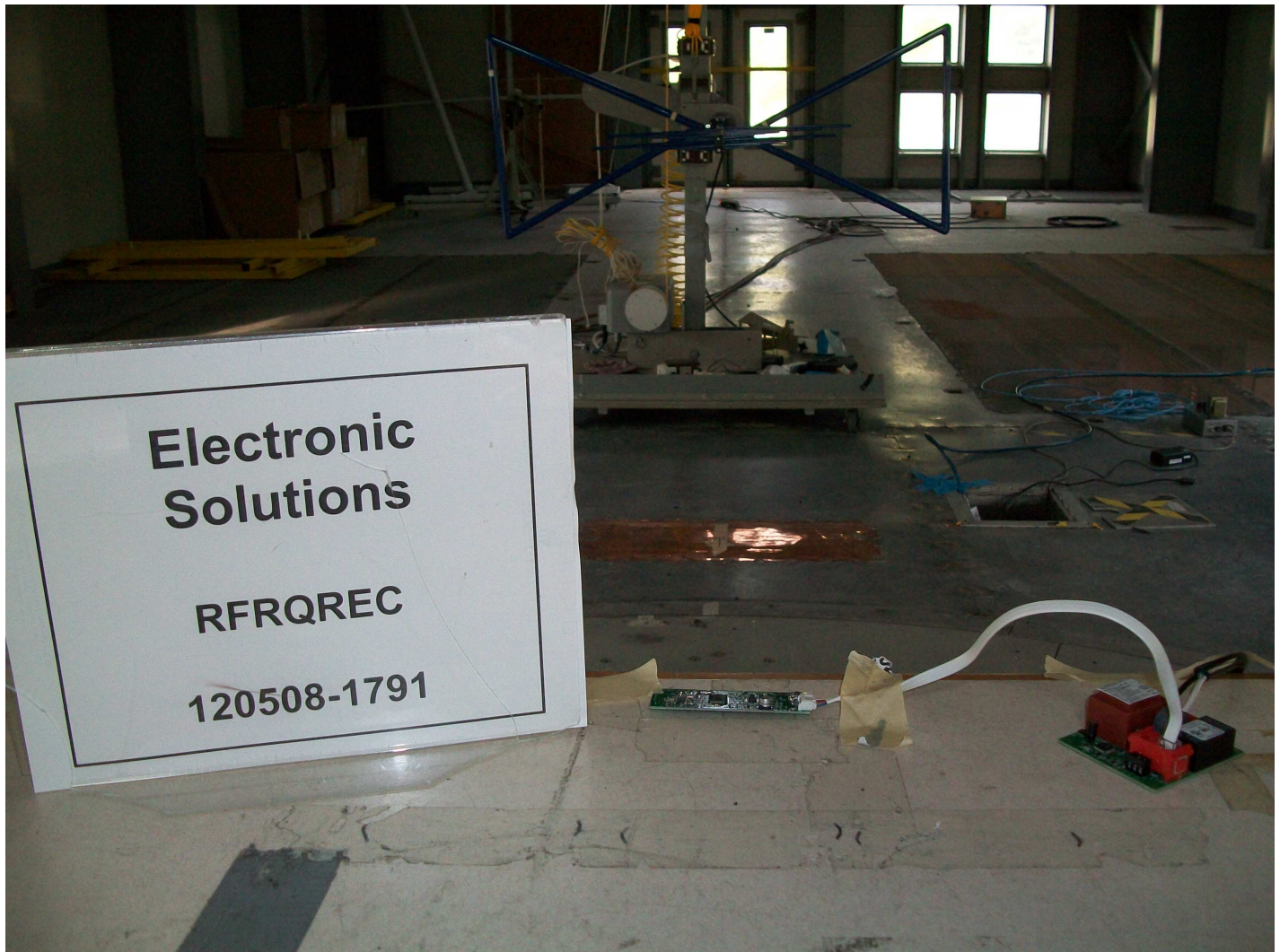
- ☒ Hewlett-Packard Spectrum Analyzer, HP 8566B
- ☒ Rohde and Schwarz Receiver, ESHS-30
- ☒ Rohde and Schwarz LISN, ESH2-Z5

Test Results of Conducted EmissionsTest Status: **PASSED**Frequency Range: **150 kHz TO 30 MHz**Minimum Margin to Limit: **-36.7** dB at **0.19000** MHzUncertainty: **3.66** dB atRemarks

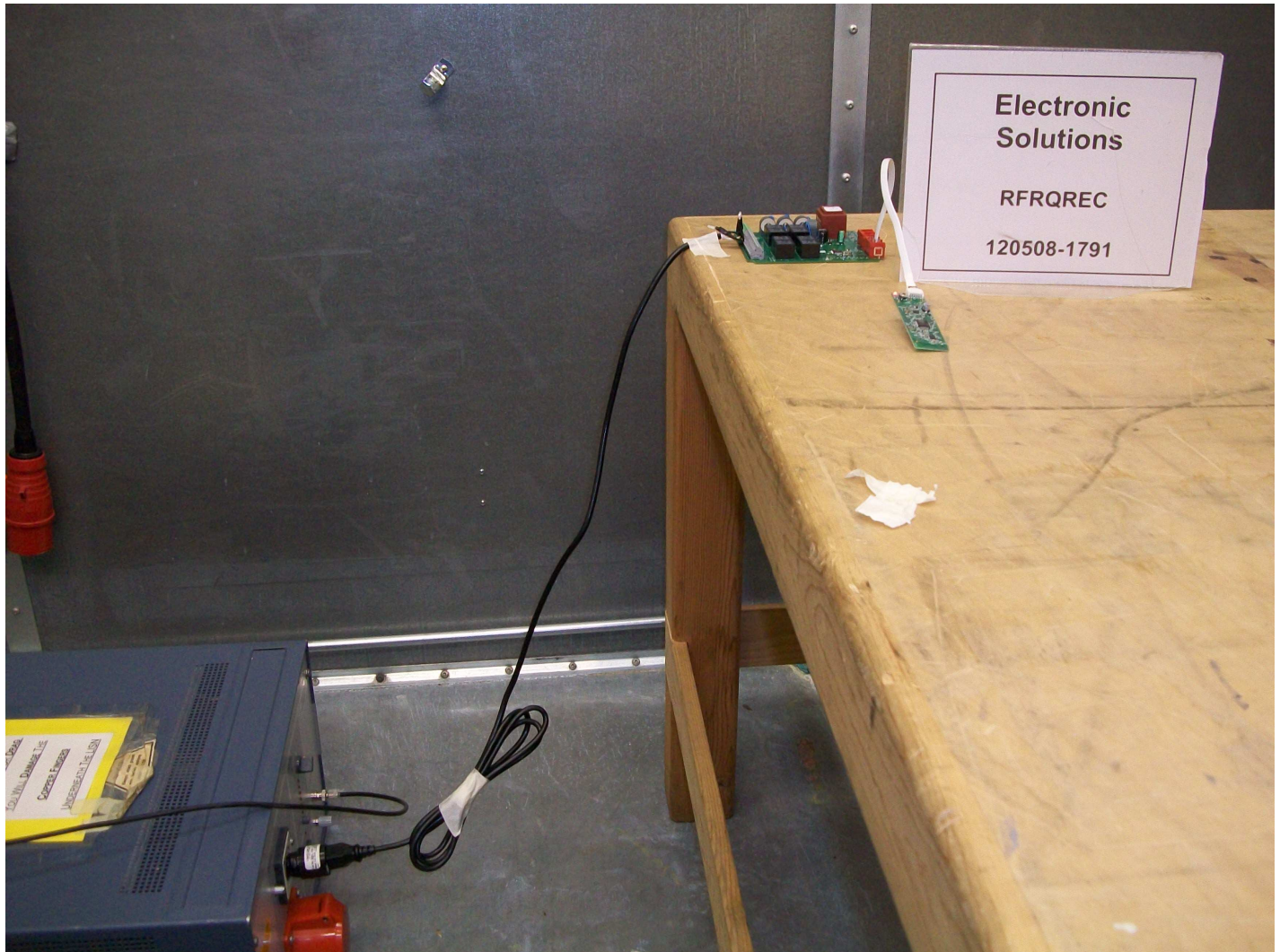
See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

3.0 APPENDIX A: EUT PHOTOGRAPHS

3.1 UNINTENTIONAL RADIATED EMISSIONS



3.2 CONDUCTED EMISSIONS



4.0 APPENDIX B: DATA SHEETS

4.1 UNINTENTIONAL RADIATED EMISSIONS PLOT – 30 MHZ TO 1 GHZ

Criterion Technology

Date: September 10, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

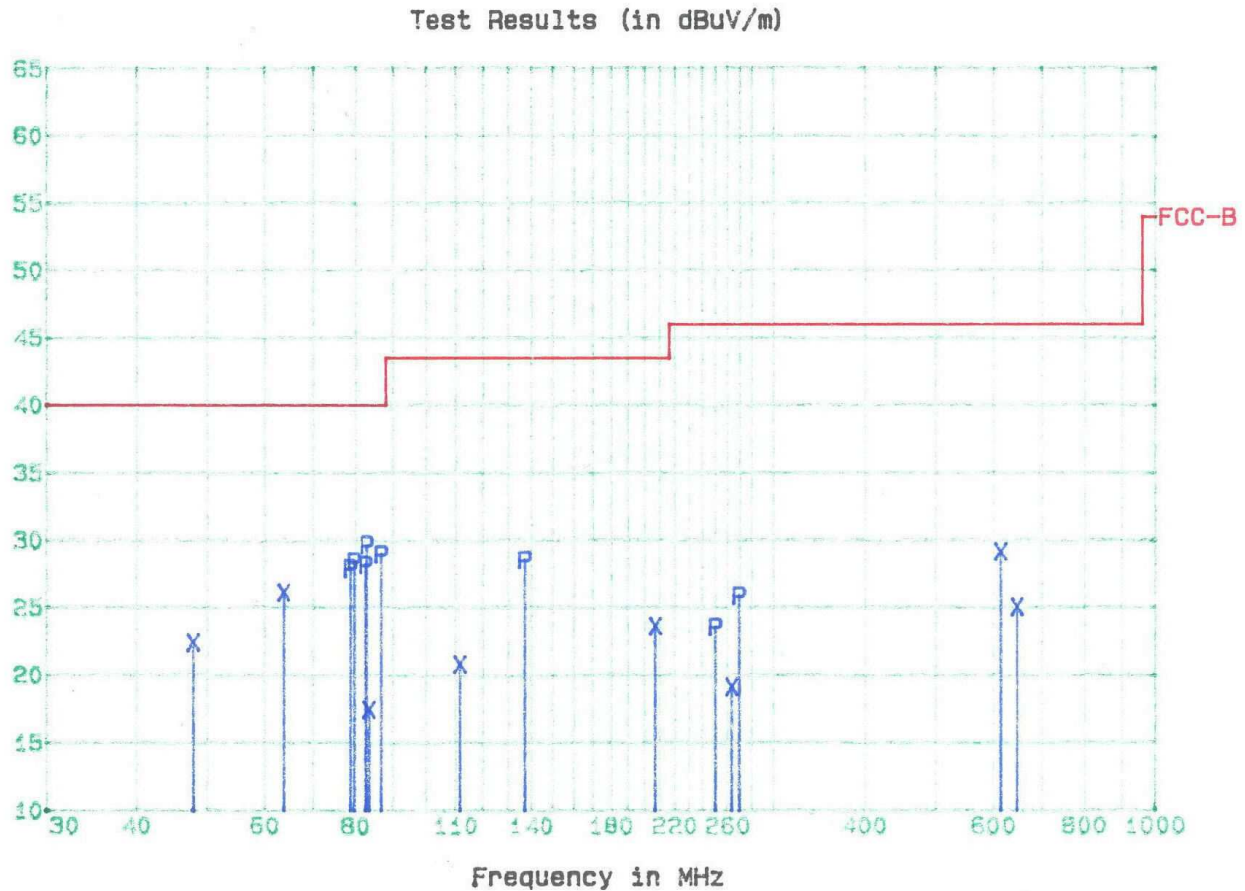
Tester: SP

SpiD: 120508-1791FCC

Test Information: 3 meters, 120 VAC 60 Hz, FCC Part 15 Class B

Test Cond: Temp: 20°C

Humidity: 44 %



4.2 UNINTENTIONAL RADIATED EMISSIONS TABLE – 30 MHZ TO 1 GHZ**Notes:**

$F_{val} = I_{val} + AF + Cable + Pads - Amp$

Where:

F_{val} is the final electric field in dbuv/m

I_{val} is the initial reading from the EMC receiver or spec an in dbuv.

AF is the antenna factor, a + value is loss

Cable is the cable attenuation in db, a + value is loss

Pads is the total attenuator loss in db, a + value is loss

Amp is the preamplifier gain in db, a + value is amplifier gain

A Sample calculation with I_{val} , AF, Cable, Pads, & Amp values of

50 dbuv, 18, 4, 3, 32 respectively is:

$F_{val} = 50 + 18 + 4 + 3 - 32 = 43 \text{ dbuv/m}$

Minimum Margin to Limit: **-10.33** dB at **82.9808** MHz

Criterion Technology Mon Sep 10 11:57:44 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

Special ID: 120508-1791

EUT Level: Table top Unit, normal ops

EUT Information: Production Unit

Test information: FCC Part 15 Class B, 3 meters, 120 VAC 60 Hz

Table 1: Scan List, sorted by margin to limit FCC-B, -50.0dB filter

<u>Freq, MHz</u>	<u>Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to FCC-B</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
82.9808	29.67	p	-10.33	0	351	H	.
86.8228	28.97	p	-11.03	270	200	H	.
79.6551	28.41	p	-11.59	0	151	H	.
82.7170	28.18	p	-11.82	90	351	H	.
78.7508	27.92	p	-12.08	0	151	H	.
63.7215	26.11	m	-13.89	259	100	V	.
137.2497	28.54	p	-14.98	0	251	V	.
614.3072	29.14	m	-16.88	195	152	H	.
47.7923	22.39	m	-17.61	116	100	V	.
207.1319	23.61	m	-19.91	334	100	V	.
269.6508	25.88	p	-20.14	270	100	V	.
647.4825	25.02	m	-21.00	270	100	H	.
250.0747	23.58	p	-22.44	90	351	H	.
83.6035	17.45	m	-22.55	324	100	V	.
111.5149	20.78	m	-22.74	177	100	V	.
263.6241	19.13	m	-26.89	222	152	V	.

Table 2: Scan List for FCC-B, sorted by Frequency, -50.0dB filter

<u>Freq. MHz</u>	<u>Final Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to FCC-B</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
47.7923	22.39	m	-17.61	116	100	V	.
63.7215	26.11	m	-13.89	259	100	V	.
78.7508	27.92	p	-12.08	0	151	H	.
79.6551	28.41	p	-11.59	0	151	H	.
82.7170	28.18	p	-11.82	90	351	H	.
82.9808	29.67	p	-10.33	0	351	H	.
83.6035	17.45	m	-22.55	324	100	V	.
86.8228	28.97	p	-11.03	270	200	H	.
111.5149	20.78	m	-22.74	177	100	V	.
137.2497	28.54	p	-14.98	0	251	V	.
207.1319	23.61	m	-19.91	334	100	V	.
250.0747	23.58	p	-22.44	90	351	H	.
263.6241	19.13	m	-26.89	222	152	V	.
269.6508	25.88	p	-20.14	270	100	V	.
614.3072	29.14	m	-16.88	195	152	H	.
647.4825	25.02	m	-21.00	270	100	H	.

Table 3: Complete Scan List Sorted by Frequency

<u>Freq. MHz</u>	<u>I-val before xducr</u> <u>factors dBuV</u>	<u>Final value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Time</u>	<u>Comment</u>
47.7923	35.41	22.39	m	116	100	V	Mon Sep 10 10:50:47 2012	.
63.7215	42.30	26.11	m	259	100	V	Mon Sep 10 10:43:18 2012	.
78.7508	42.95	27.92	p	0	151	H	Mon Sep 10 09:55:57 2012	.
79.6551	43.17	28.41	p	0	151	H	Mon Sep 10 09:55:58 2012	.
82.7170	42.22	28.18	p	90	351	H	Mon Sep 10 10:06:44 2012	.
82.9808	43.66	29.67	p	0	351	H	Mon Sep 10 10:02:42 2012	.
83.6035	31.36	17.45	m	324	100	V	Mon Sep 10 10:34:15 2012	.
86.8228	42.63	28.97	p	270	200	H	Mon Sep 10 10:20:49 2012	.
111.5149	31.30	20.78	m	177	100	V	Mon Sep 10 10:39:23 2012	.
137.2497	38.25	28.54	p	0	251	V	Mon Sep 10 10:01:56 2012	.
207.1319	35.15	23.61	m	334	100	V	Mon Sep 10 10:36:29 2012	.
250.0747	32.08	23.58	p	90	351	H	Mon Sep 10 10:07:03 2012	.
263.6241	27.50	19.13	m	222	152	V	Mon Sep 10 11:35:48 2012	.
269.6508	34.21	25.88	p	270	100	V	Mon Sep 10 10:23:38 2012	.
614.3072	29.36	29.14	m	195	152	H	Mon Sep 10 10:56:14 2012	.
647.4825	24.44	25.02	m	270	100	H	Mon Sep 10 10:30:02 2012	.

Emissions were maximized per Criterion procedure CT0457 Sec. 5.6.4 which details turntable rotation 0-360° raising the antenna 1-4 meters horizontal and vertical polariarity, and cable movement to maximize readings.

4.3 RECEIVER SPURIOUS & UNINTENTIONAL RADIATED EMISSIONS PLOT – 30 MHZ TO 1 GHZ

Criterion Technology

Date: September 10, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

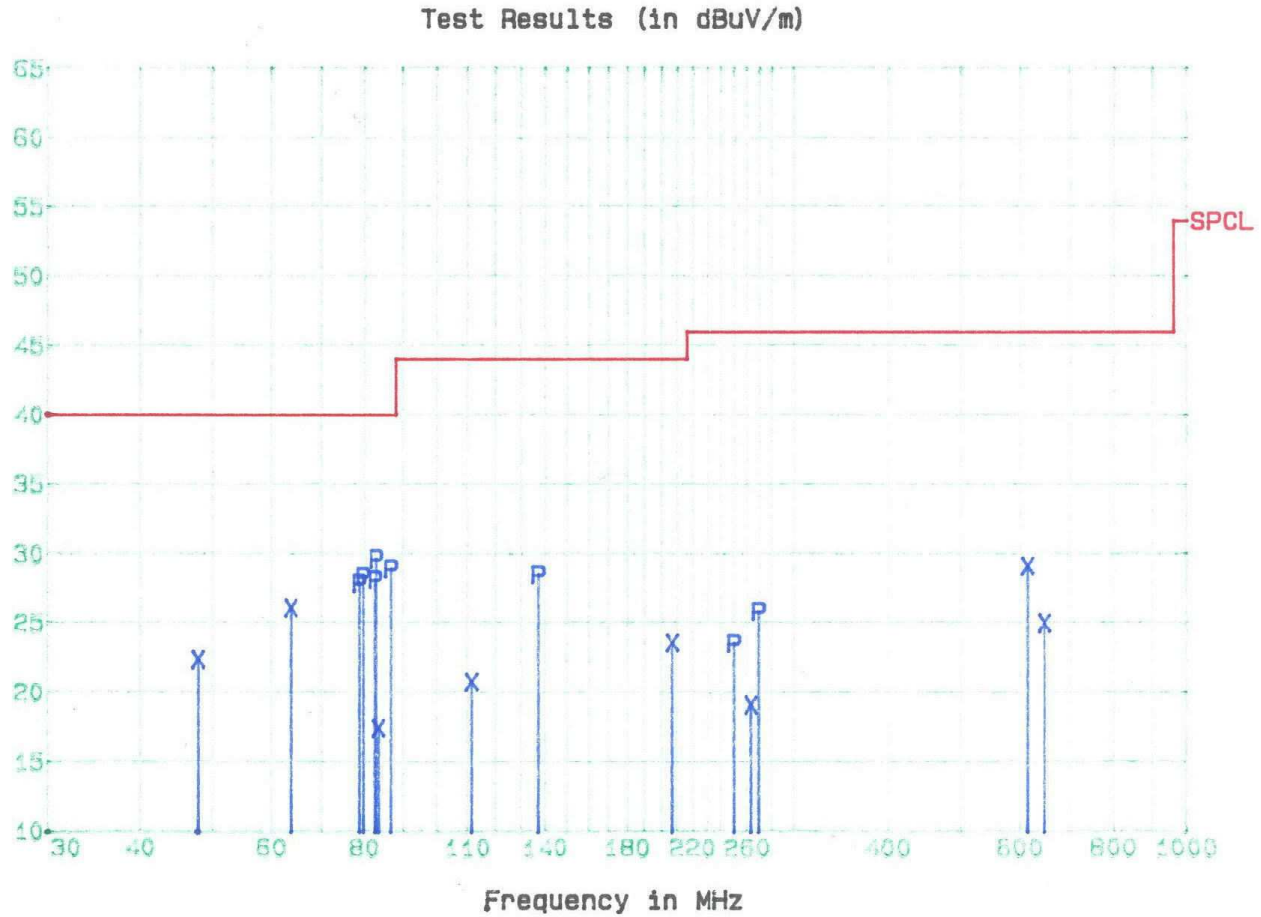
Tester: SP

SpiD: 120508-1791FCC

Test Information: 3 meters, 120 VAC 60 Hz, FCC Part 15 Class B

Test Cond: Temp: 20°C

Humidity: 44 %



4.4 RECEIVER SPURIOUS & UNINTENTIONAL RADIATED EMISSIONS TABLE – 30 MHZ TO 1 GHZ**Notes:**

$$F_{val} = I_{val} + AF + Cable + Pads - Amp$$

Where:

Fval is the final electric field in dbuv/m

Ival is the initial reading from the EMC receiver or spec an in dbuv.

AF is the antenna factor, a + value is loss

Cable is the cable attenuation in db, a + value is loss

Pads is the total attenuator loss in db, a + value is loss

Amp is the preamplifier gain in db, a + value is amplifier gain

A Sample calculation with Ival, AF, Cable, Pads, & Amp values of

50 dbuv, 18, 4, 3, 32 respectively is:

$$F_{val} = 50 + 18 + 4 + 3 - 32 = 43 \text{ dbuv/m}$$

Minimum Margin to Limit: **-10.33** dB at **82.9808** MHz

Criterion Technology Mon Sep 10 12:25:03 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

Special ID: 120508-1791

EUT Level: Table top Unit, normal ops

EUT Information: Production Unit

Test information: FCC Part 15 Class B Spurious Emissions, 3 meters, 120 VAC 60 Hz

Table 1: Scan List, sorted by margin to limit SPCL, -50.0dB filter

<u>Freq. MHz</u>	<u>Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to SPCL</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
82.9808	29.67	p	-10.33	0	351	H	.
86.8228	28.97	p	-11.03	270	200	H	.
79.6551	28.41	p	-11.59	0	151	H	.
82.7170	28.18	p	-11.82	90	351	H	.
78.7508	27.92	p	-12.08	0	151	H	.
63.7215	26.11	m	-13.89	259	100	V	.
137.2497	28.54	p	-15.46	0	251	V	.
614.3072	29.14	m	-16.86	195	152	H	.
47.7923	22.39	m	-17.61	116	100	V	.
269.6508	25.88	p	-20.12	270	100	V	.
207.1319	23.61	m	-20.39	334	100	V	.
647.4825	25.02	m	-20.98	270	100	H	.
250.0747	23.58	p	-22.42	90	351	H	.
83.6035	17.45	m	-22.55	324	100	V	.
111.5149	20.78	m	-23.22	177	100	V	.
263.6241	19.13	m	-26.87	222	152	V	.

Table 2: Scan List for SPCL, sorted by Frequency, -50.0dB filter

<u>Freq. MHz</u>	<u>Final Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to SPCL</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
47.7923	22.39	m	-17.61	116	100	V	.
63.7215	26.11	m	-13.89	259	100	V	.
78.7508	27.92	p	-12.08	0	151	H	.
79.6551	28.41	p	-11.59	0	151	H	.
82.7170	28.18	p	-11.82	90	351	H	.
82.9808	29.67	p	-10.33	0	351	H	.
83.6035	17.45	m	-22.55	324	100	V	.
86.8228	28.97	p	-11.03	270	200	H	.
111.5149	20.78	m	-23.22	177	100	V	.
137.2497	28.54	p	-15.46	0	251	V	.
207.1319	23.61	m	-20.39	334	100	V	.
250.0747	23.58	p	-22.42	90	351	H	.
263.6241	19.13	m	-26.87	222	152	V	.
269.6508	25.88	p	-20.12	270	100	V	.
614.3072	29.14	m	-16.86	195	152	H	.
647.4825	25.02	m	-20.98	270	100	H	.

Table 3: Complete Scan List Sorted by Frequency

<u>Freq. MHz</u>	<u>I-val before xducr</u> <u>factors dBuV</u>	<u>Final value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Time</u>	<u>Comment</u>
47.7923	35.41	22.39	m	116	100	V	Mon Sep 10 10:50:47 2012	.
63.7215	42.30	26.11	m	259	100	V	Mon Sep 10 10:43:18 2012	.
78.7508	42.95	27.92	p	0	151	H	Mon Sep 10 09:55:57 2012	.
79.6551	43.17	28.41	p	0	151	H	Mon Sep 10 09:55:58 2012	.
82.7170	42.22	28.18	p	90	351	H	Mon Sep 10 10:06:44 2012	.
82.9808	43.66	29.67	p	0	351	H	Mon Sep 10 10:02:42 2012	.
83.6035	31.36	17.45	m	324	100	V	Mon Sep 10 10:34:15 2012	.
86.8228	42.63	28.97	p	270	200	H	Mon Sep 10 10:20:49 2012	.
111.5149	31.30	20.78	m	177	100	V	Mon Sep 10 10:39:23 2012	.
137.2497	38.25	28.54	p	0	251	V	Mon Sep 10 10:01:56 2012	.
207.1319	35.15	23.61	m	334	100	V	Mon Sep 10 10:36:29 2012	.
250.0747	32.08	23.58	p	90	351	H	Mon Sep 10 10:07:03 2012	.
263.6241	27.50	19.13	m	222	152	V	Mon Sep 10 11:35:48 2012	.
269.6508	34.21	25.88	p	270	100	V	Mon Sep 10 10:23:38 2012	.
614.3072	29.36	29.14	m	195	152	H	Mon Sep 10 10:56:14 2012	.
647.4825	24.44	25.02	m	270	100	H	Mon Sep 10 10:30:02 2012	.

4.5 TRANSMITT SPURIOUS & UNINTENTIONAL RADIATED EMISSIONS PLOT – 30 MHZ TO 1 GHZ

Criterion Technology

Date: September 10, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

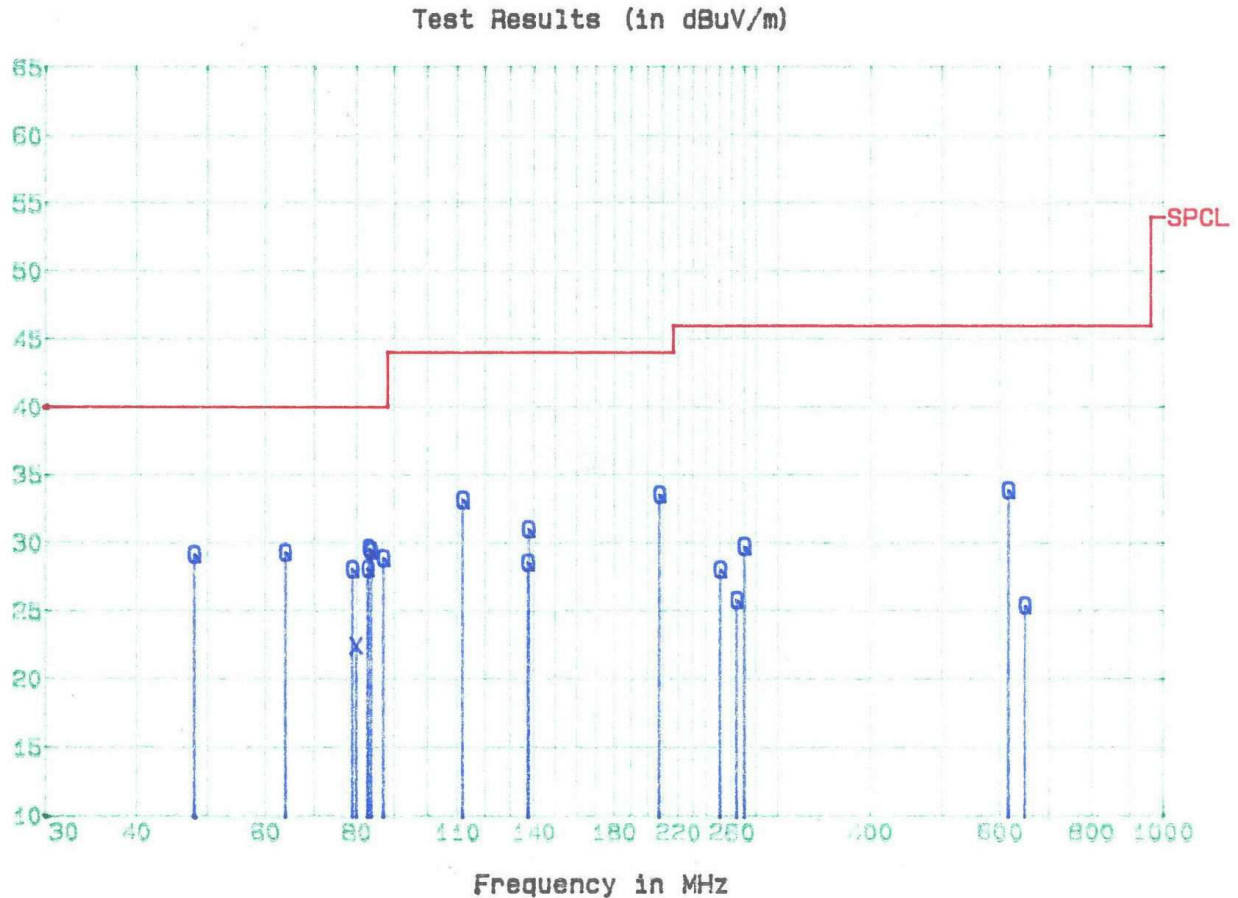
Tester: SP

SpiD: 120508-1791FCC

Test Information: 3 meters, 120 VAC 60 Hz, FCC Part 15 Class B

Test Cond: Temp: 20°C

Humidity: 44 %



4.6 TRANSMITT SPURIOUS & UNINTENTIONAL RADIATED EMISSIONS TABLE – 30 MHZ TO 1 GHZ**Notes:**

$F_{val} = I_{val} + AF + Cable + Pads - Amp$

Where:

F_{val} is the final electric field in dbuv/m

I_{val} is the initial reading from the EMC receiver or spec an in dbuv.

AF is the antenna factor, a + value is loss

Cable is the cable attenuation in db, a + value is loss

Pads is the total attenuator loss in db, a + value is loss

Amp is the preamplifier gain in db, a + value is amplifier gain

A Sample calculation with I_{val} , AF, Cable, Pads, & Amp values of

50 dbuv, 18, 4, 3, 32 respectively is:

$F_{val} = 50 + 18 + 4 + 3 - 32 = 43 \text{ dbuv/m}$

Minimum Margin to Limit: **-10.33** dB at **82.9808** MHz

Criterion Technology Mon Sep 10 15:44:49 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

Special ID: 120508-1791

EUT Level: Table top Unit, normal ops

EUT Information: Production Unit

Test information: FCC Part 15 Tx Spurious Emissions Class B, 3 meters, 120 VAC 60 Hz

Table 1: Scan List, sorted by margin to limit SPCL, -50.0dB filter

<u>Freq, MHz</u>	<u>Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to SPCL</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
82.9808	29.67	q	-10.33	0	351	H	.
207.1319	33.62	q	-10.38	180	200	V	.
83.6035	29.52	q	-10.48	180	200	H	.
63.7215	29.38	q	-10.62	0	151	H	.
47.7923	29.23	q	-10.77	180	200	H	.
111.5149	33.23	q	-10.77	0	151	H	.
86.8228	28.97	q	-11.03	270	200	H	.
82.7170	28.18	q	-11.82	90	351	H	.
78.7508	28.14	q	-11.86	180	151	H	.
614.3072	33.94	q	-12.06	270	151	H	.
137.4424	31.08	q	-12.92	180	100	V	.
137.2497	28.63	q	-15.37	0	200	V	.
269.6508	29.82	q	-16.18	270	200	H	.
79.6551	22.49	m	-17.51	150	200	V	.
250.0747	28.14	q	-17.86	180	200	H	.
263.6241	25.89	q	-20.11	90	200	H	.
647.4825	25.49	q	-20.51	270	151	H	.

Table 2: Scan List for SPCL, sorted by Frequency, -50.0dB filter

<u>Freq. MHz</u>	<u>Final Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to SPCL</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
47.7923	29.23	q	-10.77	180	200	H	.
63.7215	29.38	q	-10.62	0	151	H	.
78.7508	28.14	q	-11.86	180	151	H	.
79.6551	22.49	m	-17.51	150	200	V	.
82.7170	28.18	q	-11.82	90	351	H	.
82.9808	29.67	q	-10.33	0	351	H	.
83.6035	29.52	q	-10.48	180	200	H	.
86.8228	28.97	q	-11.03	270	200	H	.
111.5149	33.23	q	-10.77	0	151	H	.
137.2497	28.63	q	-15.37	0	200	V	.
137.4424	31.08	q	-12.92	180	100	V	.
207.1319	33.62	q	-10.38	180	200	V	.
250.0747	28.14	q	-17.86	180	200	H	.
263.6241	25.89	q	-20.11	90	200	H	.
269.6508	29.82	q	-16.18	270	200	H	.
614.3072	33.94	q	-12.06	270	151	H	.
647.4825	25.49	q	-20.51	270	151	H	.

Table 3: Complete Scan List Sorted by Frequency

<u>Freq. MHz</u>	<u>I-val before xducr</u> <u>factors dBuV</u>	<u>Final value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Time</u>	<u>Comment</u>
47.7923	42.25	29.23	q	180	200	H	Mon Sep 10 14:27:52 2012	.
63.7215	45.57	29.38	q	0	151	H	Mon Sep 10 14:32:29 2012	.
78.7508	43.17	28.14	q	180	151	H	Mon Sep 10 14:25:25 2012	.
79.6551	37.25	22.49	m	150	200	V	Mon Sep 10 14:42:44 2012	.
82.7170	42.22	28.18	q	90	351	H	Mon Sep 10 10:06:44 2012	.
82.9808	43.66	29.67	q	0	351	H	Mon Sep 10 10:02:42 2012	.
83.6035	43.43	29.52	q	180	200	H	Mon Sep 10 14:28:05 2012	.
86.8228	42.63	28.97	q	270	200	H	Mon Sep 10 10:20:49 2012	.
111.5149	43.75	33.23	q	0	151	H	Mon Sep 10 14:32:36 2012	.
137.2497	38.34	28.63	q	0	200	V	Mon Sep 10 14:31:30 2012	.
137.4424	40.78	31.08	q	180	100	V	Mon Sep 10 14:10:28 2012	.
207.1319	45.16	33.62	q	180	200	V	Mon Sep 10 14:27:07 2012	.
250.0747	36.64	28.14	q	180	200	H	Mon Sep 10 14:28:18 2012	.
263.6241	34.26	25.89	q	90	200	H	Mon Sep 10 14:29:40 2012	.
269.6508	38.15	29.82	q	270	200	H	Mon Sep 10 14:38:23 2012	.
614.3072	34.16	33.94	q	270	151	H	Mon Sep 10 14:36:04 2012	.
647.4825	24.91	25.49	q	270	151	H	Mon Sep 10 14:36:04 2012	.

4.7 UNINTENTIONAL RADIATED EMISSIONS PLOT – 1 GHZ TO 12.5 GHZ

Criterion Technology

Date: September 6, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

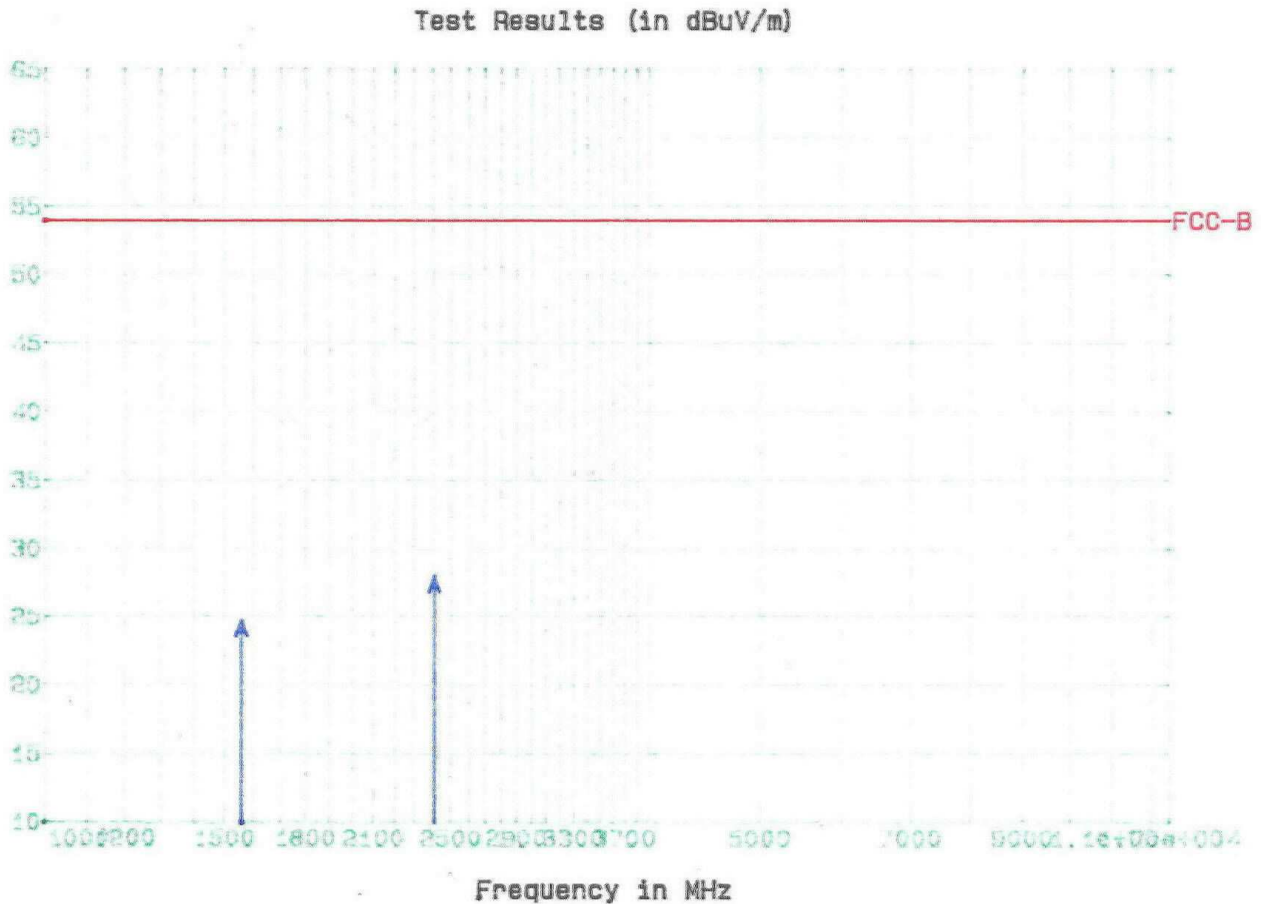
Tester: SP

SpiD: 120508-1791FCC

Test Information: 3 meters, 120 VAC 60 Hz, FCC Part 15 Class B

Test Cond: Temp: 20°C

Humidity: 46 %



4.8 UNINTENTIONAL RADIATED EMISSIONS TABLE – 1 GHZ TO 12.5 GHZ**Notes:**

Fval = Ival + AF + Cable + Pads – Amp

Where:

Fval is the final electric field in dbuv/m

Ival is the initial reading from the EMC receiver or spec an in dbuv.

AF is the antenna factor, a + value is loss

Cable is the cable attenuation in db, a + value is loss

Pads is the total attenuator loss in db, a + value is loss

Amp is the preamplifier gain in db, a + value is amplifier gain

A Sample calculation with Ival, AF, Cable, Pads, & Amp values of

50 dbuv, 18, 4, 3, 32 respectively is:

Fval = 50 + 18 + 4 + 3 – 32 = 43 dbuv/m

Minimum Margin to Limit: **-26.54** dB at **2409.4779** MHz

Criterion Technology Thu Sep 06 11:26:23 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

Special ID: 120508-1791

EUT Level: Table top Unit, normal ops

EUT Information: Production Unit

Test information: FCC Part 15 Class B, 3 meters, 120 VAC 60 Hz

Table 1: Scan List, sorted by margin to limit FCC-B, -60.0dB filter

<u>Freq, MHz</u>	<u>Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to FCC-B</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
2409.4778	27.44	a	-26.54	180	100	H	.
1557.0275	24.16	a	-29.82	180	100	H	.

Table 2: Scan List for FCC-B, sorted by Frequency, -60.0dB filter

<u>Freq, MHz</u>	<u>Final Value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>Margin to FCC-B</u> <u>limits (dB)</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Comment</u>
1557.0275	24.16	a	-29.82	180	100	H	.
2409.4778	27.44	a	-26.54	180	100	H	.

Table 3: Complete Scan List Sorted by Frequency

<u>Freq, MHz</u>	<u>I-val before xducr</u> <u>factors dBuV</u>	<u>Final value</u> <u>dBuV/m</u>	<u>Sts</u>	<u>TT</u>	<u>Hght</u>	<u>Az</u>	<u>Time</u>	<u>Comment</u>
1557.0275	30.92	24.16	a	180	100	H	Thu Sep 06 10:46:27 2012	.
2409.4778	30.57	27.44	a	180	100	H	Thu Sep 06 10:46:32 2012	.

4.9 INTENTIONAL RADIATED EMISSIONS TABLE

Criterion Technology

Date: August 31, 2012

EUT: Dongle, RSI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

SpiD: 120508-1791FCC

Test Cond: Temp: 21°C

Humidity: 41 %

Duty Cycle: Transmitter software configured for 100% duty cycle

Power levels: Radiated power measured. EUT has internal antenna with no provision for conducted measurement

NOTES:

- 1) Set detector to Peak and determine ctr. Freq.
- 2) Set span to zero. Set freq. To ctr. Freq. -500Hz
- 3) Set RBW = 1MHz
- 4) Set VBW = 3 MHz
- 5) Set detector
- 6) Record the radiated measurement taken at 3 meters
- 7) Set freq. To ctr freq. + 500kHz
- 8) Record the radiated measurement taken at 3 meters
- 9) Sum the spectral levels in power units.

Columns 3 and 4 are the instrument raw readings. These readings are added and then the appropriate corrections factors
For antenna gain, amplifier gain, cable loss, etc are then added in by column 7.

Fundamental freq. (GHz)	Channel setting	1 MHz RBW 3 m Radiated Raw Power @ EMC receiver for ctr freq minus 500 kHz (mw)	1 MHz RBW 3 m Radiated Raw Power @ EMC receiver for ctr freq plus 500 kHz (mw)	EBW Radiated power in mw & (dBm) @ EMC receiver @ 3m	EBW Radiated Raw power in (dBuV) @ EMC receiver @ 3m	EBW Radiated power corrected with transducer factor in (dBuV/m) @ 3m	AZ/Elev	P	A	EIRP per 558074 in mw	EIRP per 558074 in dBm	FCC limit 30 dBm	Margin to limit (dB)
2404.970	Low	0.12	0.123	0.243 (-6.14)	100.86	104.13	108/323	H	X	7.71	8.87	30	-21.13
2439.970	Middle	0.1023	0.0955	0.1978 (-7.04)	99.96	102.81	109/302	H	X	5.69	7.55	30	-22.45
2479.955	High	0.0955	0.0933	0.1888 (-7.24)	99.76	102.14	105/321	H	X	4.78	6.88	30	-23.12
2404.970	Low	0.1096	0.123	0.2326 (-6.33)	100.67	103.94	112/349	V	Y	7.38	8.68	30	-21.32
2439.970	Middle	0.1175	0.1148	0.2323 (-6.34)	100.66	103.51	112/350	V	Y	6.68	8.25	30	-21.75
2479.955	High	0.0912	0.089	0.1802 (-7.44)	99.56	101.94	112/353	V	Y	4.65	6.68	30	-23.32
2404.970	Low	0.1659	0.1698	0.3357 (-4.74)	102.26	105.53	104/205	V	Z	10.64	10.27	30	-19.73
2439.970	Middle	0.1698	0.1659	0.3357(-4.74)	102.26	105.11	102/208	V	Z	9.66	9.85	30	-20.15
2479.955	High	0.1479	0.1445	0.2924 (-5.34)	101.66	104.04	104/206	V	Z	7.55	8.78	30	-21.22

Harmonic Number	Frequency (Bold => restricted band)	F val (dBuV)	FCC limit, 54 (dBuV)	Margin to Limit (db)	Elev	AZ	Pol	Orientation	Antennas
2	4808.9480	38.90	54	-15.10	104.7	68	V	Y	DRG 118A
2	4878.9520	36.80	54	-17.20	101.6	69	V	Y	DRG 118A
2	4960.9440	36.90	54	-17.10	103.7	69	V	Y	DRG 118A
3	7213.4220	27.00	54	-27.00	*	*	*	Y	DRG 118A
3	7318.4280	36.28	54	-17.72	*	*	*	Y	DRG 118A
3	7441.4160	36.28	54	-17.72	*	*	*	Y	DRG 118A
4	9617.8960	49.20	69.58	-20.38	*	*	*	Y	DRG 118A
4	9757.9040	49.20	69.58	-20.38	*	*	*	Y	DRG 118A
4	9921.8880	49.20	69.58	-20.38	*	*	*	Y	DRG 118A
5	12022.3700	28.00	54	-26.00	*	*	*	Y	DRG 118A
5	12197.3800	46.51	54	-7.49	*	*	*	Y	DRG 118A
5	12402.3600	46.51	54	-7.49	*	*	*	Y	DRG 118A
6	14426.8440	41.47	69.58	-28.11	*	*	*	Y	3160 horn
6	14636.8560	41.47	69.58	-28.11	*	*	*	Y	3160 horn
6	14882.8320	41.47	69.58	-28.11	*	*	*	Y	3160 horn
7	16831.3180	45.99	69.58	-23.59	*	*	*	Y	3160 horn
7	17076.3320	45.99	69.58	-23.59	*	*	*	Y	3160 horn
7	17363.3040	45.99	69.58	-23.59	*	*	*	Y	3160 horn
8	19235.7920	26.50	54	-27.50	*	*	*	Y	SA 12A-18
8	19515.8080	26.50	54	-27.50	*	*	*	Y	SA 12A-18
8	19843.7760	26.50	54	-27.50	*	*	*	Y	SA 12A-18
9	21640.2660	26.60	69.58	-42.98	*	*	*	Y	SA 12A-18
9	21955.2840	26.60	69.58	-42.98	*	*	*	Y	SA 12A-18
9	22324.2480	26.60	69.58	-42.98	*	*	*	Y	SA 12A-18
10	24044.7400	27.00	69.58	-42.58	*	*	*	Y	SA 12A-18
10	24394.7600	27.00	69.58	-42.58	*	*	*	Y	SA 12A-18
10	24804.7200	27.00	69.58	-42.58	*	*	*	Y	SA 12A-18

* indicates noise floor measurement. Signal is less than this level. The signal is the same regardless of these parameters

4.10 BANDEDGE

Criterion Technology

Date: August 28, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

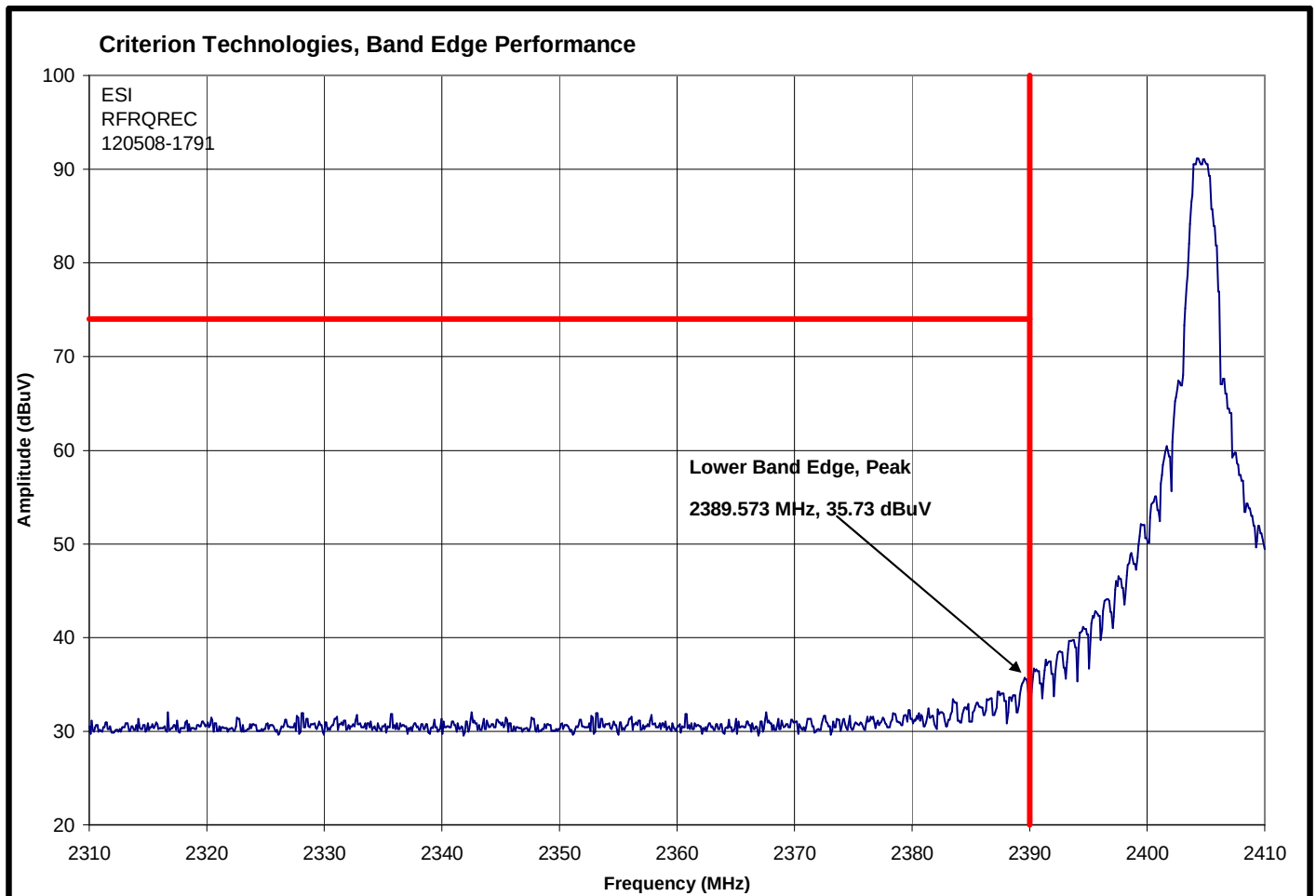
SpiD: 120508-1791FCC

Test Cond: Temp: 21°C

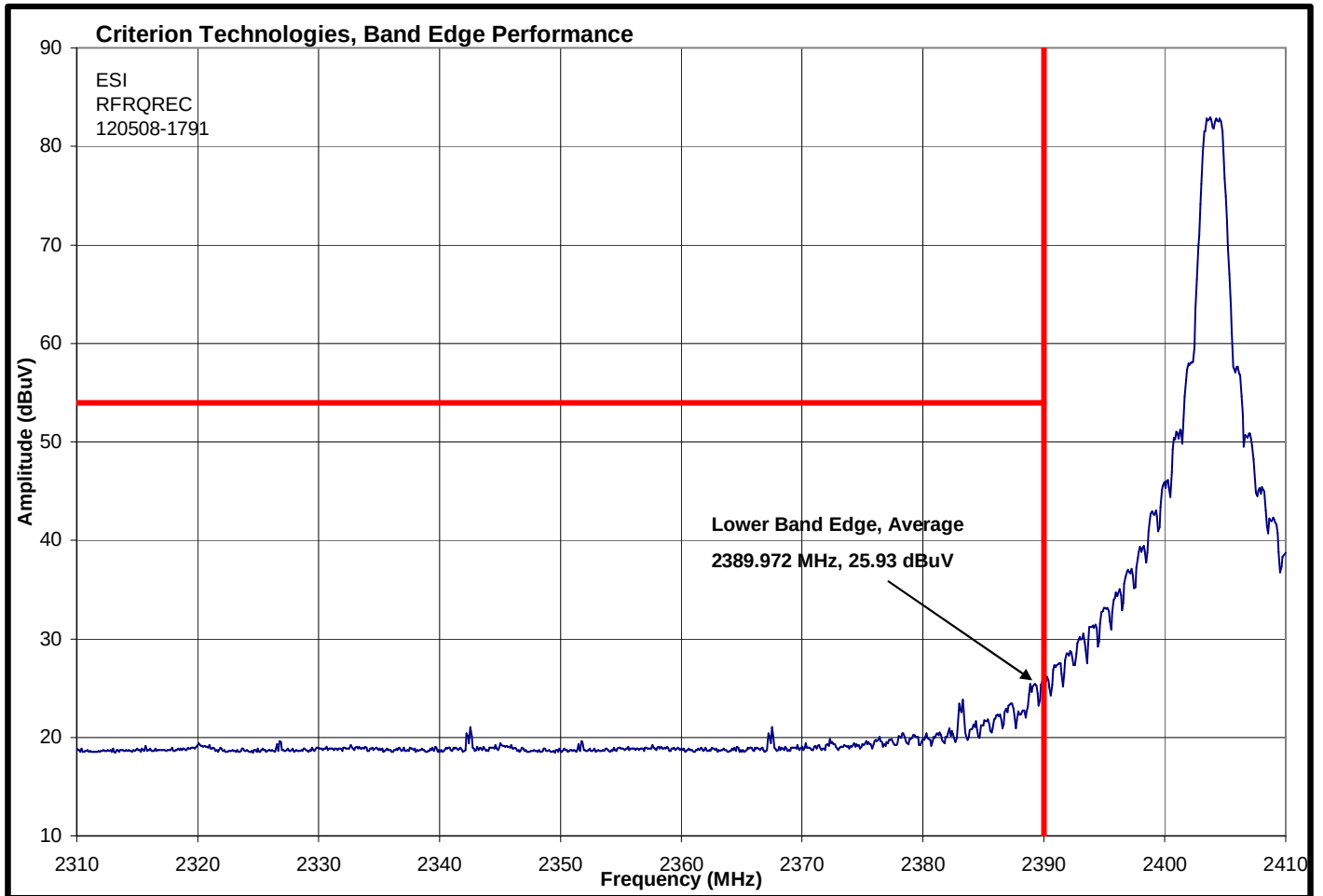
Humidity: 42 %

Band Edge, Restricted Band Emissions					
Channel	Restricted Band (MHz)	Detector	Max Level (dB μ V)	Limit (dB μ V)	Margin (dB)
Low	2310 to 2390	Pk	35.73	74	-38.27
Low		Av	25.93	54	-28.07
High	2483.5 to 2500	Pk	55.63	74	-18.37
High		Av	46.03	54	-7.97

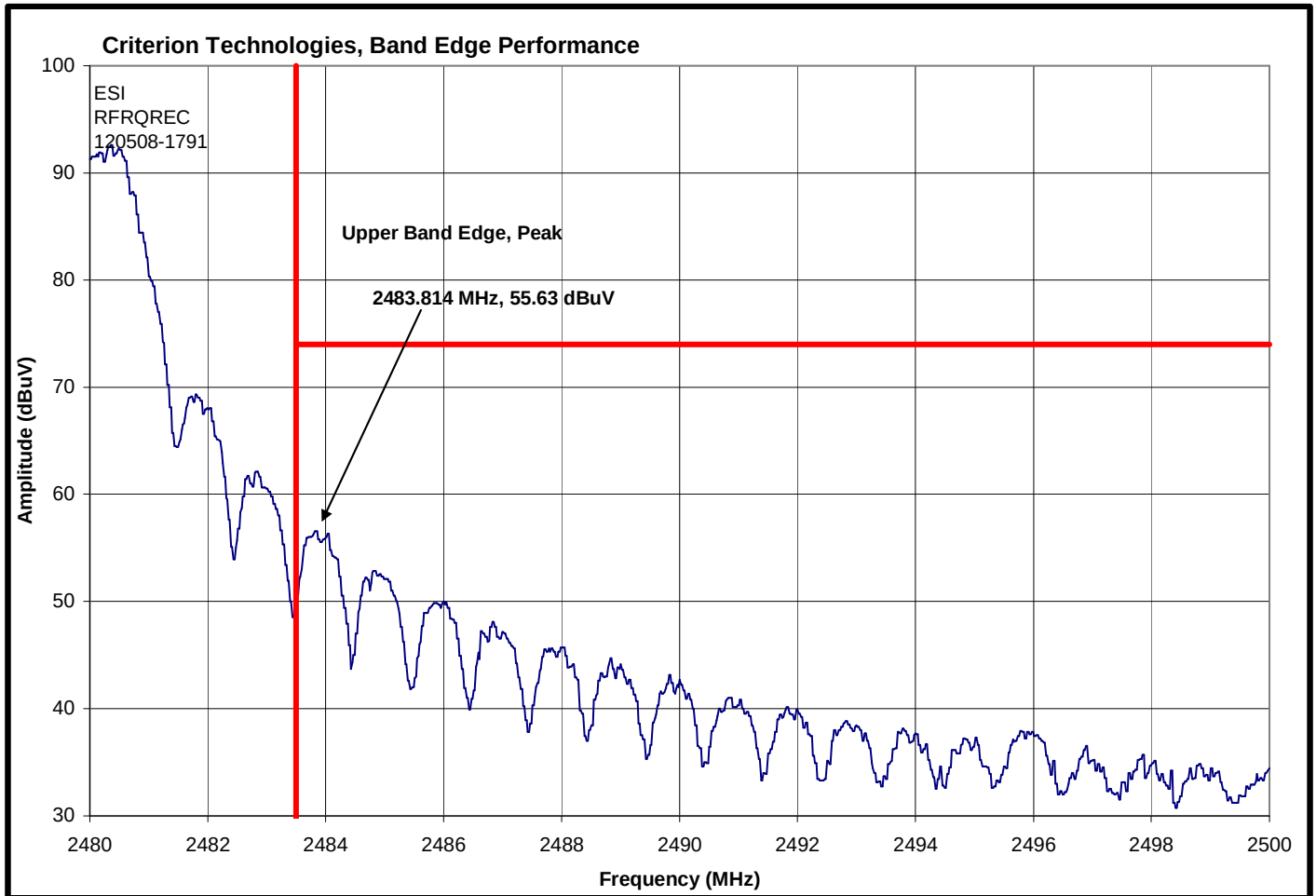
Low Channel

Detector: **Peak**Resolution Bandwidth: **1 MHz**Video Bandwidth: **1 MHz**

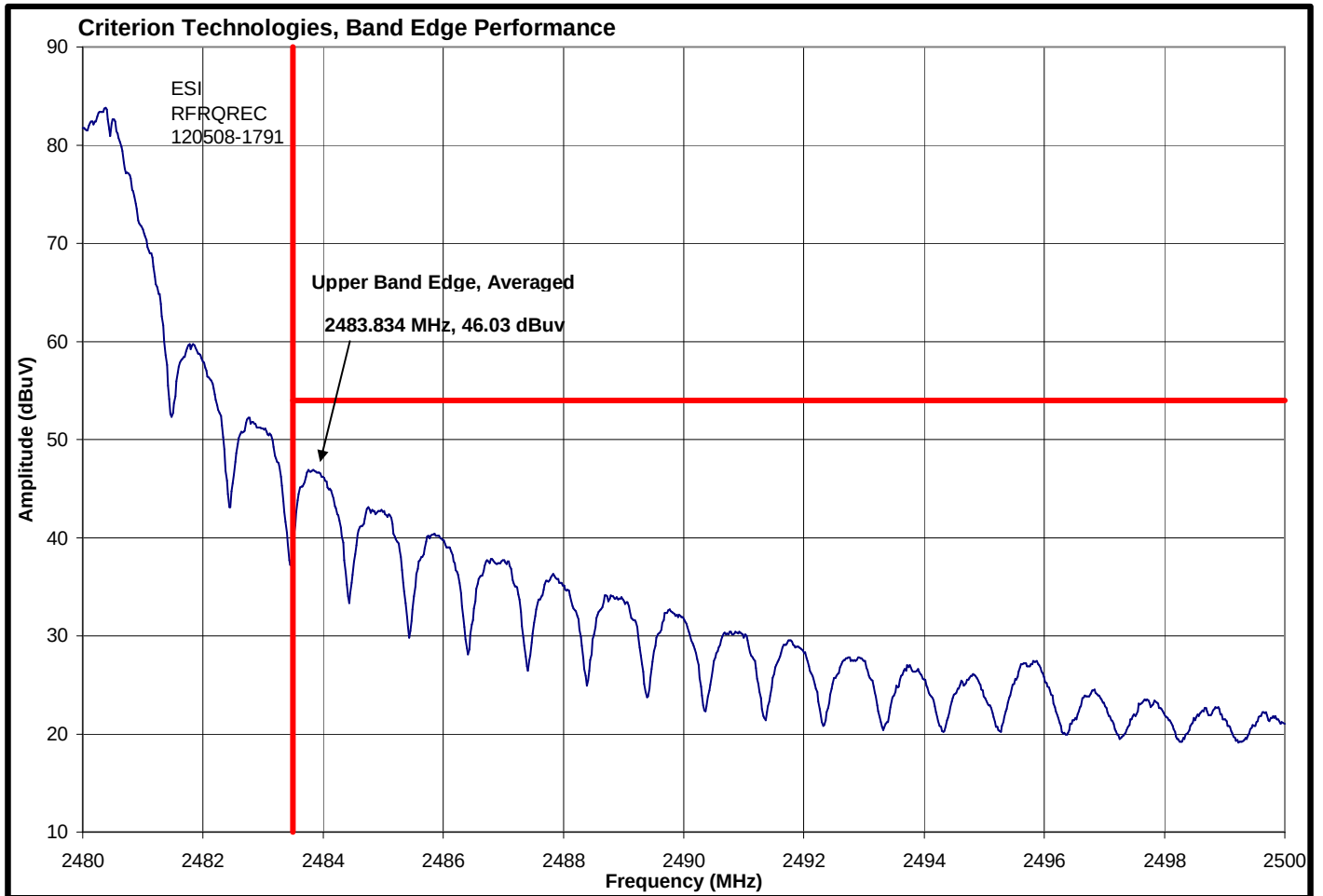
Low Channel

Detector: AverageResolution Bandwidth: 1 MHzVideo Bandwidth: 300 Hz

High Channel

Detector: **Peak**Resolution Bandwidth: **1 MHz**Video Bandwidth: **1 MHz**

High Channel; Average

Detector: AverageResolution Bandwidth: 1 MHzVideo Bandwidth: 10 Hz

4.11 FREQUENCY LIMITS

Criterion Technology

August 28, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

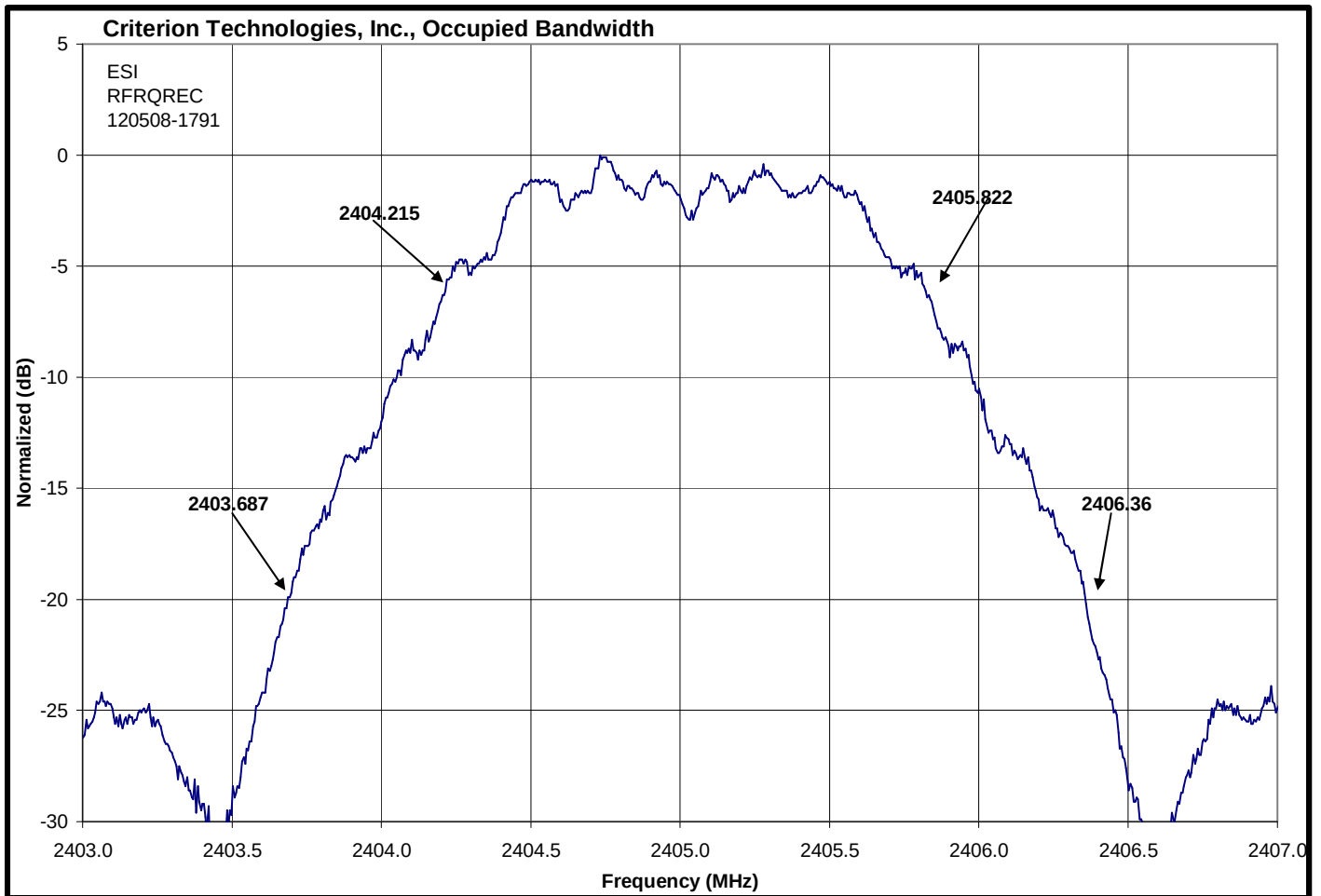
SpiD: 120805-1791FCC

Test Cond: Temp: 21°C

Humidity: 42 %

Emission Bandwidths <2483.5 MHz Low and High >2400 MHz

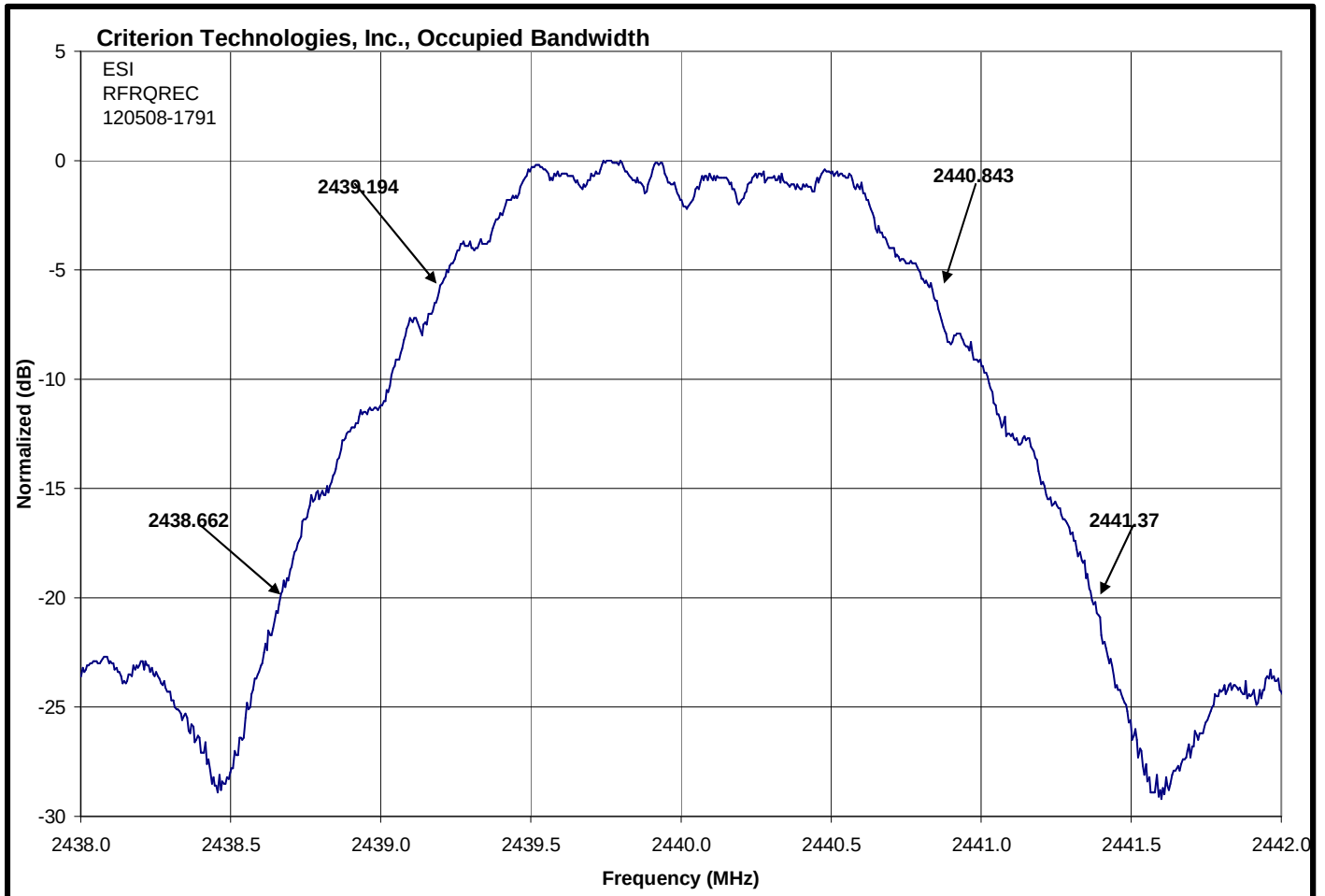
Required	Low	High	BW (MHz)	FCC 47 CFR P15.247 (a) (2) Limit	Margin
-6 dB	2404.215	2405.822	1.607	>500 kHz	1.107
-20dB	2403.687	2406.36	2.673		



Low Channel

-6db & -20 db occupied bandwidth caculated by data acquisition software

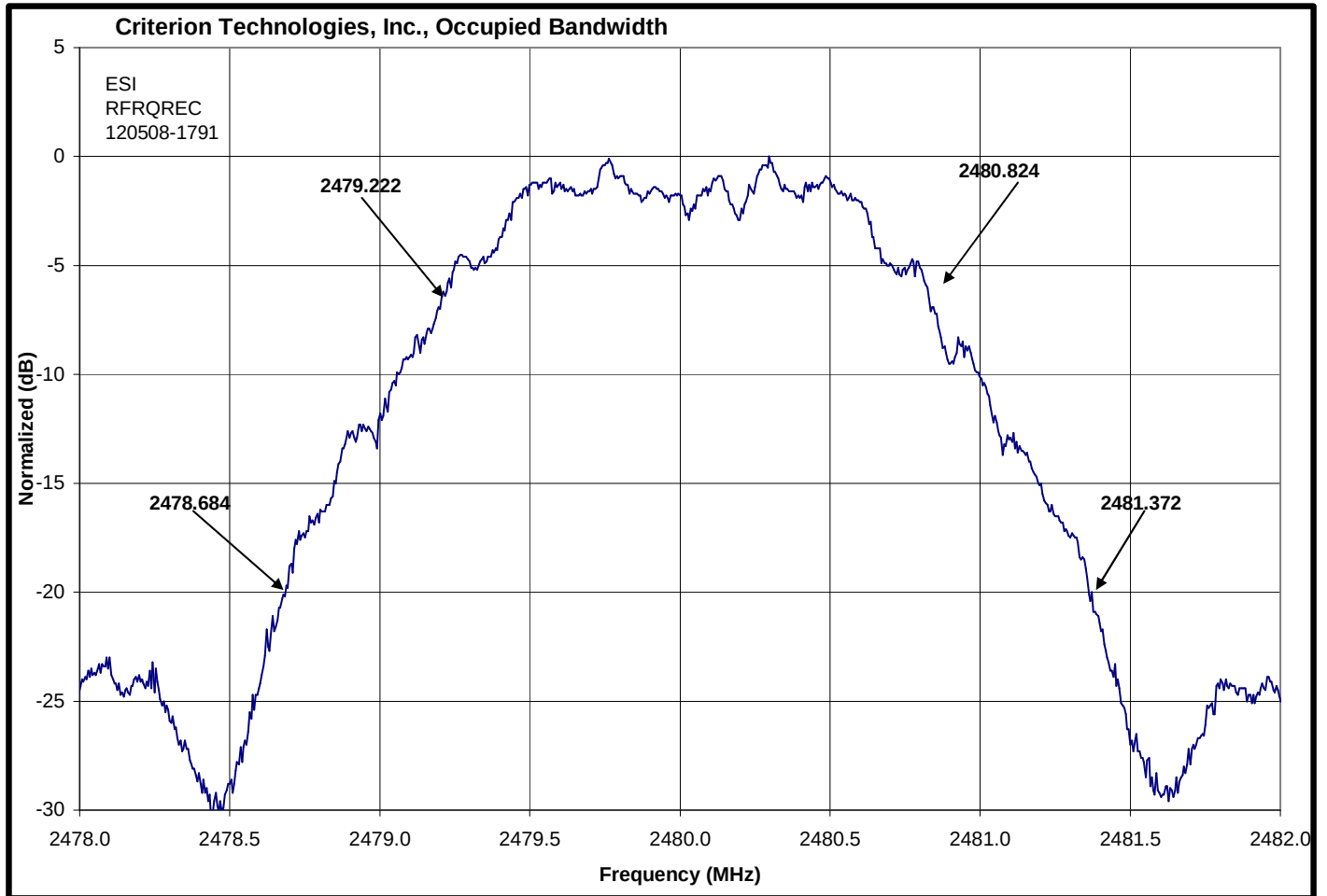
Bandwidth <2483.5 MHz Low and High >2400 MHz					
Required	Low	High	BW (MHz)	FCC 47 CFR P15.247 (a) (2) Limit	Margin
-6 dB	2439.194	2440.843	1.649	>500 kHz	1.149
-20dB	2438.662	2441.37	2.708		



Middle Channel

-6db & -20 db occupied bandwidth caculated by data acquisition software

Bandwidth <2483.5 MHz Low and High >2400 MHz					
Required	Low	High	BW (MHz)	FCC 47 CFR P15.247 (a) (2) Limit	Margin
-6 dB	2479.222	2480.824	1.602	>500 kHz	1.102
-20dB	2478.684	2481.372	2.688		



High Channel

-6db & -20 db occupied bandwidth caculated by data acquisition software

4.12 POWER SPECTRAL DENSITY

Criterion Technology

August 28, 2012

EUT: Dongle, ESI RF RQ TRANS

Manufacturer: Electronic Solutions, Inc. A Hunter Douglas Company

Tester: SP

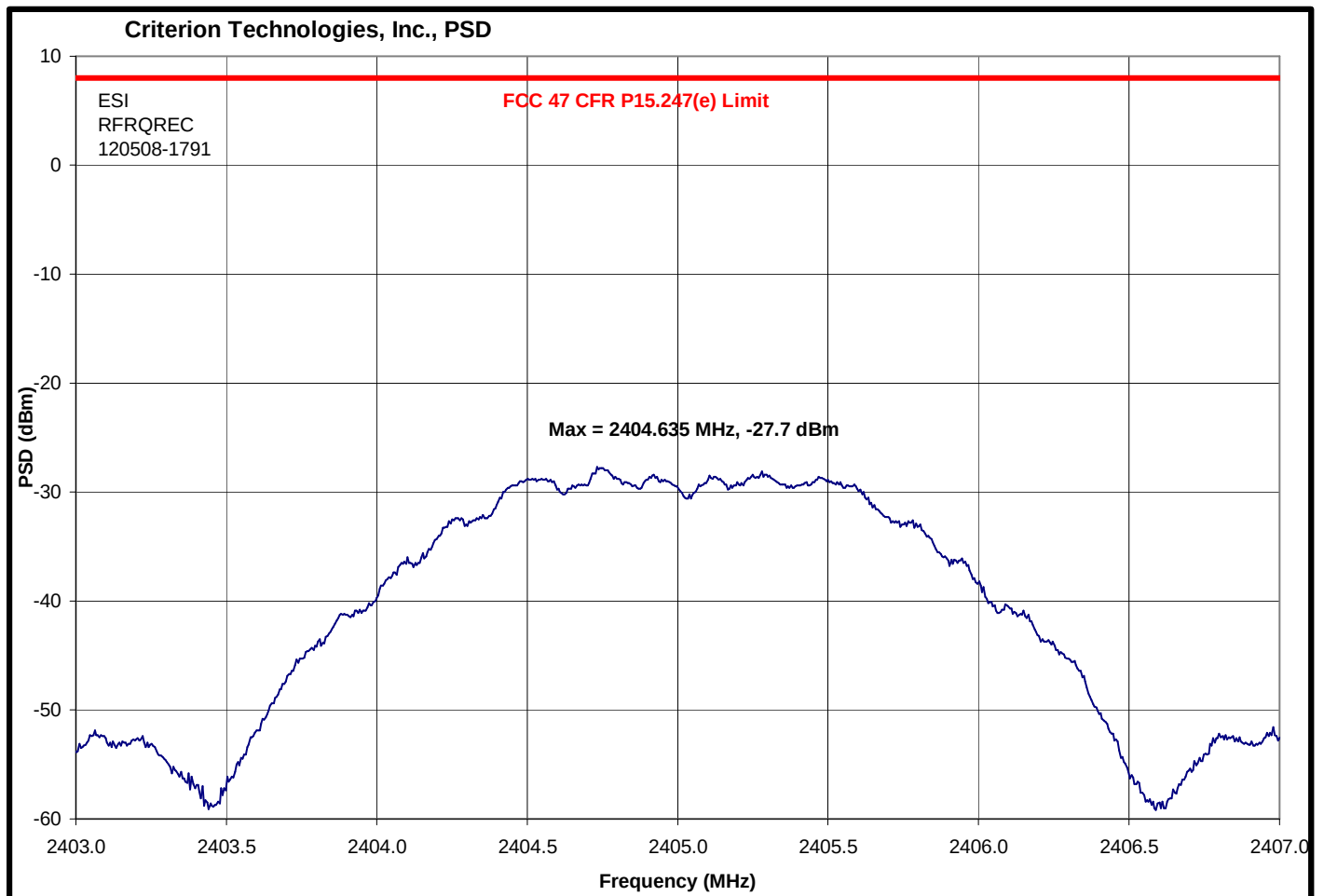
SpiD: 120805-1791FCC

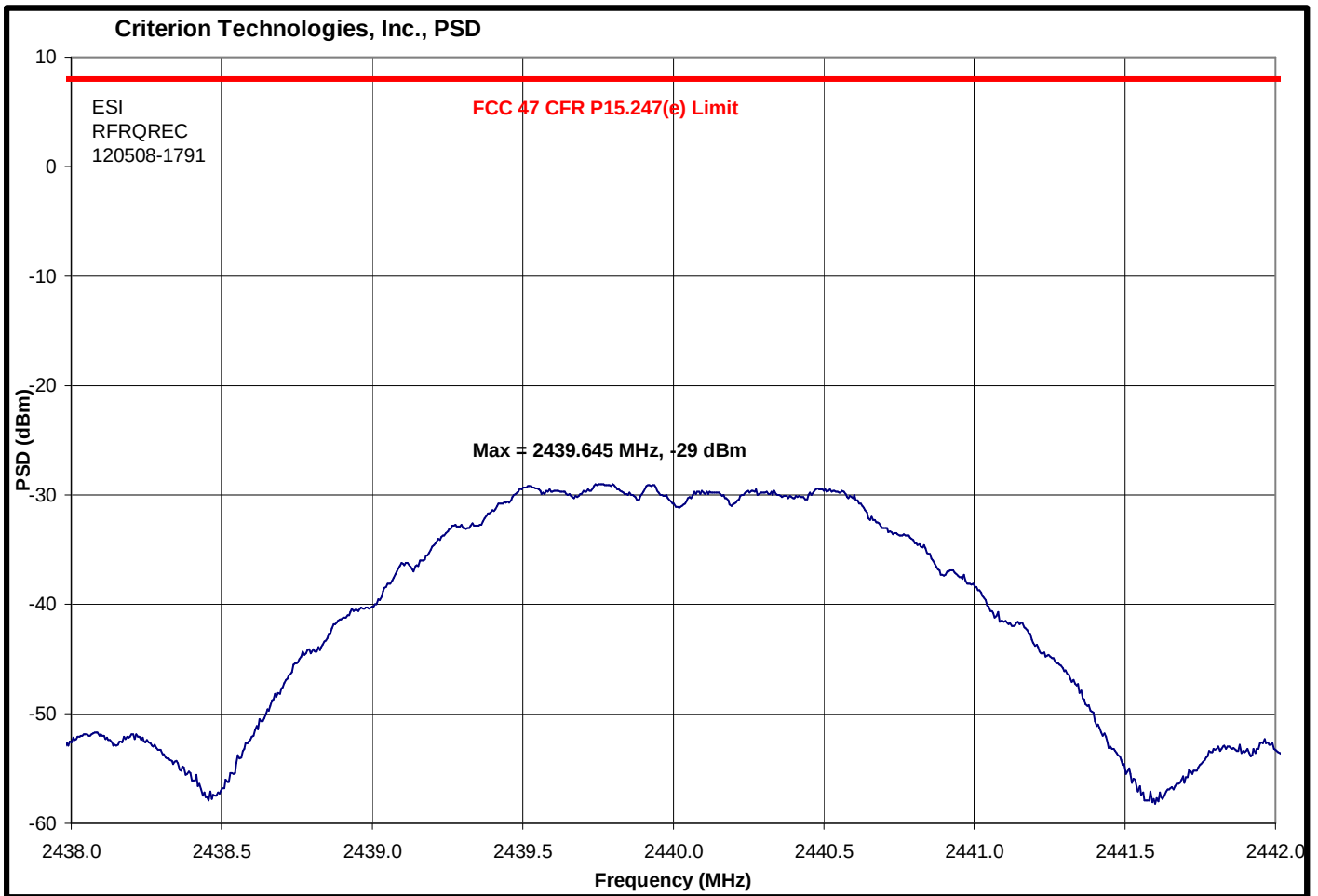
Test Cond: Temp: 21°C

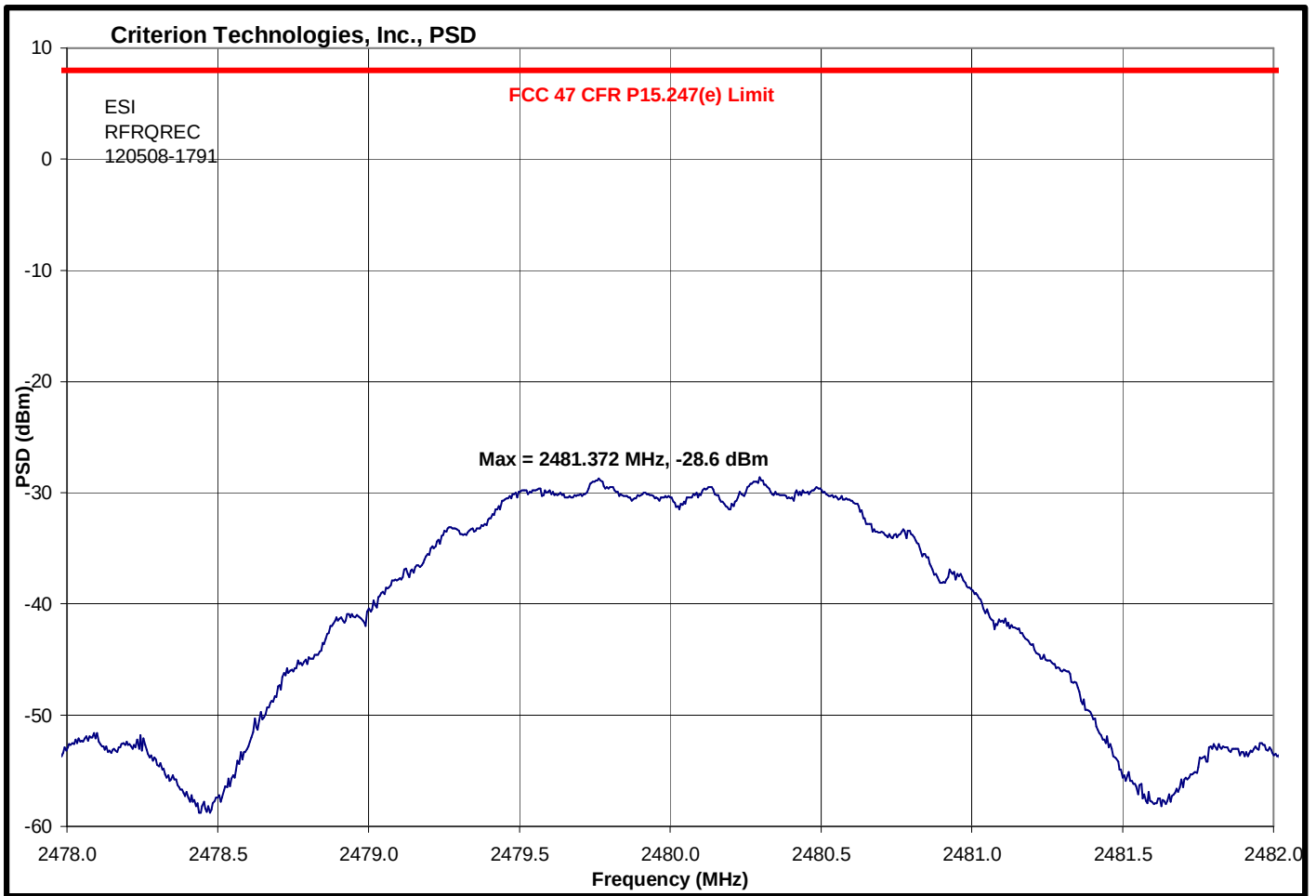
Humidity: 42 %

Sweep Time: 5 minutes

Frequency of Max Radiation (MHz)	Axis of Orientation	Max 3kHz Segment Power (dBm)	FCC 47 CFR P15.247(e) Limit (dBm)	Margin to Limit (dB)
2404.635	Y	-27.7	8	-37.5
2439.645	Y	-29.0	8	-37.0
2481.372	Y	-28.6	8	-36.6

Low Channel

Middle channel

High Channel

4.13 CONDUCTED EMISSIONS PLOT

Criterion Technology Inc.
Conducted Emissions

Manuf: Electronic Solutions Inc. A Hunter Douglas Company Date: September 5, 2012
EUT: Dongle, ESI RF RQ TRANS
Op Cond: Table top, production unit
Operator: SP SPID: 120508-1791FCC
Test Spec: FCC Part 15.105 Class B
Test Cond: Temp: 15°C Humidity: 44 %
Comment: 120 VAC 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	If BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	100MS	AUTO LN	OFF	60db

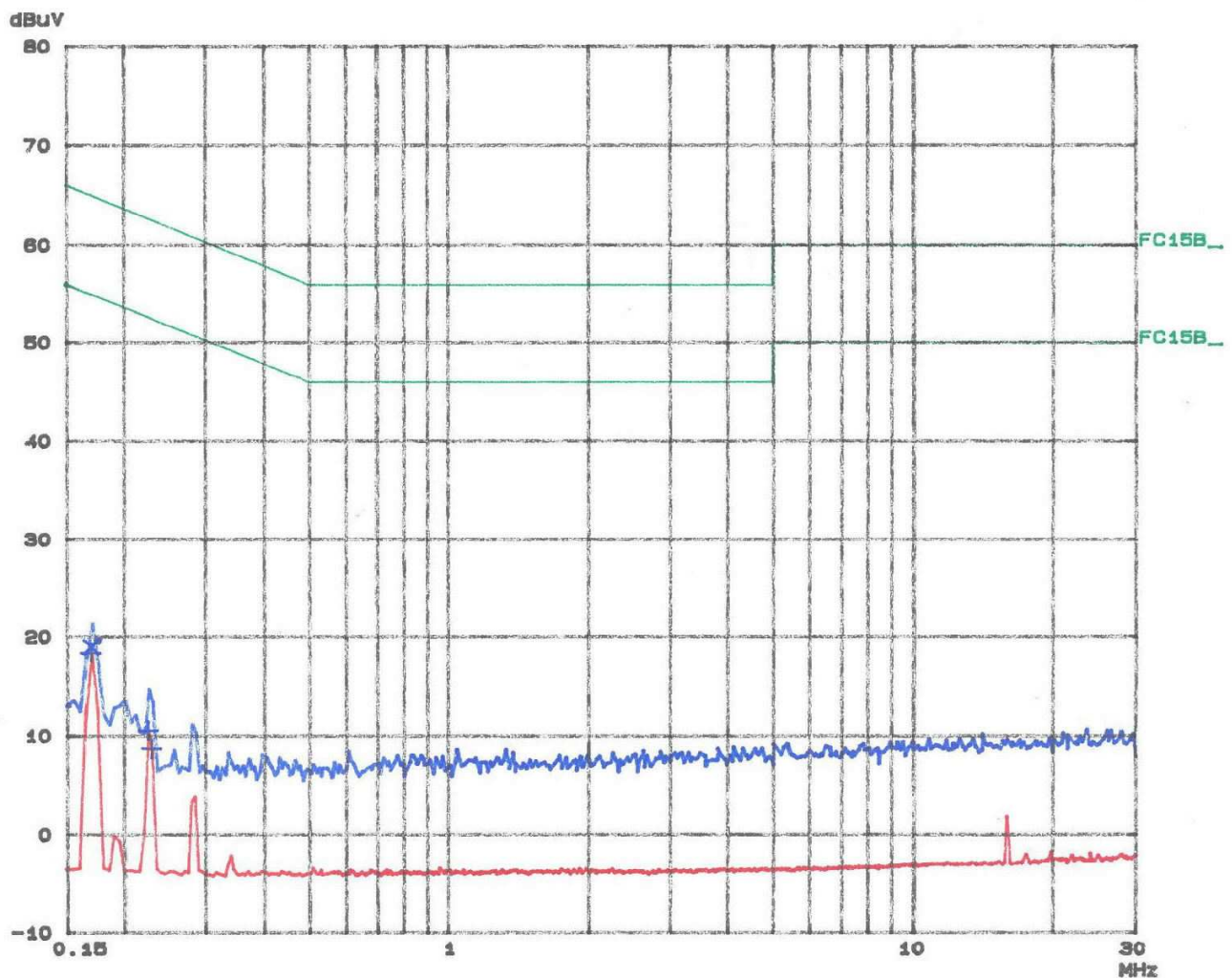
Final Measurement: x QP / + AV

Meas Time: 100 ms

Subranges: 25

Acc Margin: 45dB

Transducer	No.	Start	Stop	Name
1	9k	30M	SRw3dB	



4.14 CONDUCTED EMISSIONS TABLE**Criterion Technology Inc.
Conducted Emissions**

Manuf: Electronic Solutions Inc. A Hunter Douglas Company Date: September 5, 2012
 EUT: Dongle, ESI RF RQ TRANS
 Op Cond: Table top, production unit
 Operator: SP SPID: 120508-1791IC
 Test Spec: FCC Part 15.105 Class B
 Test Cond: Temp: 15°C Humidity: 44 %
 Comment: 120 VAC 60 Hz

Scan Settings (1 Range)

----- Frequencies -----			----- Receiver Settings -----					
Start	Stop	Step	If BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	100MS	AUTO	LN	OFF 60db

Final Measurement Results:**Indicated Phase/PE shows Configuration of max. Emission**

Frequency MHz	QP Level DBuv	QP Limit DBuv	Phase -	PE -
0.17000	18.9	65.0	L1	gnd

Frequency MHz	AV Level DBuv	AV Limit DBuv	Phase -	PE -
0.17000	18.3	55.0	N	gnd
0.22500	10.4	52.7	N	gnd
0.23000	8.6	52.4	L1	gnd

Minimum Margin to Limit: **-36.7** dB at **0.17000** MHz

5.0 APPENDIX C: PRODUCT INFORMATION FORM**General Information****Date:** 8/12/2012Company Name: Electronic Solutions Inc A Hunter Douglas CompanyCompany Address: 1355 Horizon Ave
Lafayette, CO 80026Contacts: Compliance Engineer: Douglas Barnes Phone: 303 663 3396**Market Information (Check all that Apply)**USA ☐ Canada ☒ Euro. Union ☐ Taiwan ☐ Japan ☐ New Zealand ☐ Australia ☐
Other ☐**Product Information**Name: DongleModel Number: ESI RF RQ TRANSProduct Dimensions: 80mm x 40 mmWeight: 4 oz**Product Power Source:**Battery: ☒ No ☒ YesVoltage 5 VDC

AC Supply:

of cords: 0

Voltage for each: _____

I/O Cables:

of cords under 10 meters: 0# of cords over 10 meters: 0

List Support equipment if any:

Device: RQManufacturing: ESI**Emissions Testing:**Is this equipment to be used in a residence: ☐ No (Class A) ☒ Yes (Class B)Does this have a transmitter or Transceiver: ☐ No ☒ YesHighest oscillator/Clock frequency (including internal clocks only to the microprocessor): 16 MHz, 2.4 GHz

To be compliant with C63.4-2003 test methodology, for the emissions testing, the equipment must be exercising all of the functionality within the capability of the Equipment under test. In addition, the equipment must be equipped in the configuration of maximum capability, which will be offered to customers. The test software installed in the Equipment Under Test (EUT) must exercise all of the modules in this maximum capability configuration.

Description of the maximum capability configuration: 1Name and revision # of the test software used for the emissions test: N/A

6.0 APPENDIX D: TEST EQUIPMENT AND CALIBRATION STATUS

Manufacturer	Name/Description	Model Number	Serial Number	Cal. Due Date	Intervals
FCC	CDN	FCC-801-M3-25	9714	11/22/2012	24 months
Schaffner	ESD Gun	NSG 432	00555	11/24/2012	24 months
Rohde/ Schwarz	LISN	ESH2-Z5	828739-001	11/29/2012	24 months
Gigatronics	Power Sensor	80301A-410	1831996	11/30/2012	24 months
Gigatronics	Power Meter	8541C	1830945	11/30/2012	24 months
Hewlett Packard	Tracking Generator	HP85645A	3210A00124	11/30/2012	24 months
Rohde/ Schwarz	VHF/UHF Receiver	ESVS-30	863342014	11/30/2012	24 months
Rohde/ Schwarz	HF Receiver	ESHS-30	826003/011	11/30/2012	24 months
Solar Electronics	LISN	8610-50-TS-100N	13691	3/15/2013	24 months
Solar Electronics	LISN	8610-50-TS-100N	13692	3/15/2013	24 months
Solar Electronics	LISN	8610-50-TS-100N	13693	3/15/2013	24 months
Solar Electronics	LISN	8610-50-TS-100N	13690	3/26/2013	24 months
Califorina Instruments	AC Power Source Pacs-1	5001iX-CTS-411	55637/ 72242	6/11/2013	24 months
Fischer Custom Communications	Balanced Telecom Impedance Stabilization Network	FCC-TLISN-T4-02	202252	8/11/2013	24 months
Veratech	Preamplifier (AMP2)	unknown	N/A	11/26/2013	24 months
Haefely Trench	Test Mag	Mag 100	80162	11/28/2013	24 months
Haefely Trench	Surge Generator	PSURGE 6.1	083-906-07	11/28/2013	24 months
Haefely Trench	EFT Tester	PEFT Junior	583-333-51	11/28/2013	24 months
Haefely Trench	Surge Coupler	FP-Surge 32.1	083-925-05	11/28/2013	24 months
Amplifier Research	E-Field Probe	FP2000	19682	11/29/2013	24 months
Amplifier Research	E-Field Probe	FP2080	20236	11/30/2013	24 months
Hewlett Packard	Signal Generator	HP 8648D	3642000145	7/13/2014	24 months
Hewlett Packard	Quasi Peak Adapter	85650A	2420A00441	7/15/2014	24 months
Hewlett Packard	Spectrum Analyzer Display	HP 8566B	2403A09179	7/15/2014	24 months
Hewlett Packard	Spectrum Analyzer	HP 8566B	2240A01951	7/15/2014	24 months

7.0 APPENDIX E: TEST DIRECTIVES, STANDARDS AND METHODS

7.1.1 EUROPEAN DIRECTIVES, STANDARDS AND METHODS

89/336/EEC: Council Directive of 03 May 1989 on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility, OJEC No. L 139/19-26, Aug 1993.

EN 55011:2009+A1:2010(CENELEC): ISM Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement.

EN 55022:2010 (CENELEC): ITE - Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement.

EN 55024:2010 (CENELEC): ITE - Immunity Characteristics - Limits and Methods of Measurement.

EN 55103-2: Product Family standard for audio, video, audio - visual and entertainment lighting control apparatus for professional use. Part 2: Immunity, April 1997.

EN 60601-1-2:Third Edition 2007-03 (CENELEC): Medical Electrical Equipment. Part 1. General Requirements for Safety - Section 1.2. Collateral Standard: Electromagnetic Compatibility - Requirements and Tests.

EN 61000-6-2:2005 EMC- Part 6-2. Generic Standard-Immunity for Industrial Environments, 2005.

EN 61000-6-3:2007 EMC- Part 6-3. Generic Standard-Emissions for residential, commercial and light-industrial Environments 2007.

EN61000-6-4:2007 (CENELEC): EMC - Generic Emission Standard, Part 6-4: Industrial Environment, 2007.

EN 61000-3-2:2006+A2:2009 (CENELEC): EMC - Part 2. Limits for Harmonic Current Emissions (Equipment Input Current ≤ 16 A per phase).

EN 61000-3-3:2008 (CENELEC): EMC - Part 3. Limitation of Voltage Fluctuation and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤ 16 A.

EN 61000-4-7: 2002, incorporating corrigenda Nos. 1:2004 and 2:2005. (CENELEC): EMC – Part 4-7 Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto: .

EN 61000-4-2:2009 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 2. Electrostatic Discharge Immunity Test, 2009.

EN 61000-4-3:2006+A2:2010 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 3. Radiated, Radio-Frequency, Electromagnetic Field Immunity.

EN 61000-4-4:2004+A1:2010 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 4. Electrical Fast Transient/Burst Immunity Test.

EN 61000-4-5:2006 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 5. Surge Immunity Test.

EN 61000-4-6:2009 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 6. Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields.

EN 61000-4-8:2010 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 8. Power Frequency Magnetic Field Immunity Test.

EN 61000-4-11:2004 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 11. Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests.

ETSI EN 300 220-1 V2.1.1 – Electromagnetic Compatibility and Radio spectrum Matters (ERM); Short range devices (SRD); radio equipment to be used in the 25MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods; 2006.

ETSI EN 300 220-2 V2.1.1 – Electromagnetic Compatibility and Radio spectrum Matters (ERM); Short range devices (SRD); radio equipment to be used in the 25MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive, 2006

ETSI EN 300 220-3 V1.1.1 – Electromagnetic Compatibility and Radio spectrum Matters (ERM); Short range devices (SRD); radio equipment to be used in the 25MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 3: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive

ETSI EN 300 328 v1.7.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive, 2006.

ETSI EN 300 328-1 v1.3.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using Spread Spectrum modulation techniques; Part 1: Technical characteristics and test methods, 2001.

ETSI EN 300 440-1 V1.6.1 – Electromagnetic Compatibility and Radio spectrum Matters (ERM); Short range devices (SRD); radio equipment to be used in the 1 GHz to 40 GHz frequency range ; Part 1: Technical characteristics and test methods. 2008

ETSI EN 300 683 –Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) Standard for Short Range Devices (SRD) Operating on Frequencies between 9 kHz and 25kHz, 1997

EN 301 489-1 v1.8.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements, 2008.

EN 301 489-3 v1.4.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Rangr Devices (SRD) operating on frequencies between 9kHz and 40 GHz, 2002.

EN 301 489-17 v2.1.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems, 2008.

EN 61326:2005 (CENELEC): Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements.

EN 61326-1:2006 Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements, - Part 1: General Requirments.

8.1 47 CFR FCC PART 15 RADIO FREQUENCY DEVICES: OCT 2011

Subpart A General.

Subpart B Unintentional Radiators.

Subpart C Intentional Radiators.

Subpart D Unlicensed Personal Communications Service Devices.

8.2 47 CFR FCC PART 22 PUBLIC MOBILE SERVICES: OCT 2011

8.3 47 CFR FCC PART 24 PERSONAL COMMUNICATIONS SERVICES: OCT 2011

7.1.2 JAPAN

VCCI V-3

7.1.3 CANADA

ICES-001: Interference-Causing Equipment Standard - ISM RF Generators, 2006.ICES-003: Interference-Causing Equipment Standard - Digital Apparatus, 2004.

7.1.4 AUSTRALIA/NEW ZEALAND

SAA AS/NZ 3548: Limits and Methods of Measurement of Radio Disturbance Characteristics of ITE, 1997.AS/NZS 4268:2003: Radio Equipment and systems-Short range devices-Limits and methods of measurement. 2003AS/NZS CISPR22:2009

7.1.5 TAIWAN

CNS13438, 2006.

7.1.6 KOREA

KN22: 2008KN 24: 2008

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