FCC/IC Partial Scope Test Report

FOR

Manufacturer: Securitron Magnalock Corp.

Model Number: R100-1-PA

Product Description: Aperio Wall Mounted Reader

FCC ID: KSF-R1001PA
IC Certification Number: 11564A-R1001PA

FCC CFR 47 Part 15.247 for DTS

IC RSS-210 Issue 8, Annex 8

TEST REPORT #: EMC_HANC1-001-13501_R100LF_DTS-C
DATE: March 11, 2014

FCC : Accredited

IC recognized # 3462B-1

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following equipment, as detailed in section 3 of this test report, was evaluated against the applicable criteria specified in FCC CFR 47 Part 15.247 and Industry Canada Standards RSS 210 Issue 8, Annex 8.
No deviations were ascertained during the course of the tests performed.

This partial scope test report only contains the details of the *conducted* RF antenna port measurements of the above listed rules. *Radiated* measurements are documented in a separate test report as identified in section 4.

Manufacturer	Description	Model #
Securitron Magnalock Corp.	Aperio Wall Mounted Reader	R100-1-PA

Responsible for Testing Laboratory:

Date	Section	Name	Signature
March 11, 2014	Compliance	Franz Engert (Manager of Compliance)	Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Compliance, email=franz.engert@cetecom.com Date: 2014.03.11 18:13:44 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
March 11, 2014	Compliance	Josie Sabado (Test Lab Manager)	

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Acting Test Lab Manager:	Franz Engert
Test Engineer:	Josie Sabado

2.2 Identification of the Client

Applicant's Name:	Assa Abloy
Street Address:	10027 S. 51st St. Ste. 102
City/Zip Code	Phoenix, AZ 85044
Country	USA
Contact Person:	Josh Peabody
Phone No.	623-582-4626
e-mail:	josh.peabody@assaabloy.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Securitron Magnalock Corp.
Manufacturers Address:	10027 S. 51st St. Ste. 102
City/Zip Code	Phoenix, AZ 85044
Country	USA

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	R100-1-PA Aperio Reader
Model Number:	R100-1-PA
FCC ID :	KSF-R1001PA
IC Certification Number:	11564A-R1001PA
Product Description:	Aperio Wall Mounted Reader
Technology / Type(s) of Modulation:	802.15.4 Zigbee: OQPSK
Nominal Channel Bandwidths:	5 MHz
Operating Frequency Ranges (MHz) / Channels:	Nominal band: 2400 – 2483.5; Channel Center to center: 2405 (Ch. 11) – 2475 (Ch. 25), 15 channels
Antenna Information:	Temporary antenna cable soldered to PCB at antenna input, replacing antenna. 1.2 dB cable loss.
Max. Output Powers:	Conducted: -16.78 dBm
Rated Operating Voltage Range:	Battery, type CR2, 3.0V Li-ion
Rated Operating Temperature Range:	-40 °C to +50 °C
Test Sample Status:	Prototype with temporary antenna connector
Other Radios included:	125 kHz RFID

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Note
1	10046	7080058.014	r100_main2_aperio_lowFreq-0.0.24450_bl-0.0.24450	

3.3 Identification of Accessory Equipment

No accessory equipment

3.4 Other EUT Notes

The device was configured with manufacturer provided test software, capable of setting the unit in different supported modulation schemes, data rates and channels of operation.

The device was set to continuous framed transmit (burst) mode using test software, which allowed the EUT to be operated with 100% duty cycle during testing.

4 Summary of Measurement Results

Test Specification	Test Case	Temperature and Voltage Conditions	Pass	Fail	NA	NP	Result
§15.247(a)(2) RSS210 A8.2(a)	6 dB Bandwidth	Nominal	■	☐	☐	☐	Complies
§15.247(b)(3) RSS210 A8.4(4)	Maximum Peak Conducted Output Power	Nominal	■	☐	☐	☐	Complies
§15.247(b)(4)	Antenna Gain	Nominal	☐	☐	☐	■	Note 1
RSS210 A8.4(4)	EIRP	Nominal	☐	☐	☐	■	Note 1
§15.247(d) RSS210 A8.5	Unwanted Emissions at the Band Edges - Conducted	Nominal	☐	☐	☐	■	Note 2
§15.247(d) RSS210 A8.5	Unwanted Emissions at the Band Edges - Radiated	Nominal	☐	☐	☐	■	Note 1
§15.247(d) RSS210 A8.5	Unwanted Emissions into Non-Restricted Bands	Nominal	■	☐	☐	☐	Complies
§15.247(d) RSS210 A8.5	Unwanted Emissions into Restricted Bands	Nominal	☐	☐	☐	■	Note 2
§15.247(e) RSS210 A8.2(b)	Power Spectral Density	Nominal	■	☐	☐	☐	Complies
§15.207(a) RSS Gen	AC Power Line Conducted Emissions	Nominal	☐	☐	☐	■	Note 1

Note: NA= Not Applicable; NP= Not Performed.

1. Radiated measurements are documented in a separate test report described in section 5.7
2. Measurements for unwanted emissions in restricted bands are performed as a radiated measurement. Conducted measurements are not required because it is tested against stricter radiated limits.

5 Measurement Information

5.1 Dates of Testing

November 13, 2013

5.2 Measurement Uncertainty

The following measurement uncertainties are applicable to the measurements described in this test report:

Conducted power and emission measurements: +/- 0.5dB
Radiated power and emission measurements: +/- 3.0 dB

5.3 Nominal EUT Conditions During Test

The following nominal EUT conditions were used during the course of testing, unless otherwise stated:

EUT Voltage: External power supply, 3.0 VDC nominal

5.4 Nominal Environmental Conditions During Test

The following nominal environmental conditions were maintained during the course of testing, unless otherwise stated:

Ambient Temperature: 20-25°C
Relative humidity: 40-60%

5.5 Measurement Method

All conducted testing is performed according to guidelines in FCC publication KDB558074 D01Meas Guidance v03r01: Measurement Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) operating under 15.247, April 2013 and in ANSI C63.4 (2009).

5.6 RF Antenna Port Conducted Measurement Procedure

1. Connect the EUT to the measurement equipment using the appropriate attenuation and power splitter.
2. Set the EUT to operate in the required mode of operation.
3. Measurements are to be performed with the EUT in all modes of operation.
    a. All measurements should be performed with the EUT transmitting at full power
    b. All measurements should be performed with all modulations supported by the EUT

5.7 Associated Test Reports

Radiated measurements are documented in test report number EMC_HANC1-001-13501_R100LF_DTS-R issued by CETECOM Inc.

5.8 Other Testing Notes:

The EUT was tested on the low, mid, and high channels of the tested frequency band, unless otherwise stated.

RF antenna port measurements were performed with a temporary antenna connector/cable.

6 Measurement Results

6.1 6 dB Bandwidth

6.1.1 References

§15.247 (a)(2)
RSS 210- A8.2(a)
The minimum 6 dB bandwidth shall be at least 500 kHz.

6.1.2 Spectrum Analyzer Settings

Center Frequency	Center of channel frequency
Span	10 MHz
Resolution Bandwidth	100 kHz
Video Bandwidth	300 kHz
Detector	Peak
Trace Mode	Max Hold
Sweep Time	Auto

6.1.3 Testing Notes

Measurement according to FCC KDB 558074 D01 Meas Guidance v03r01, section 8.1

6.1.4 Test Result

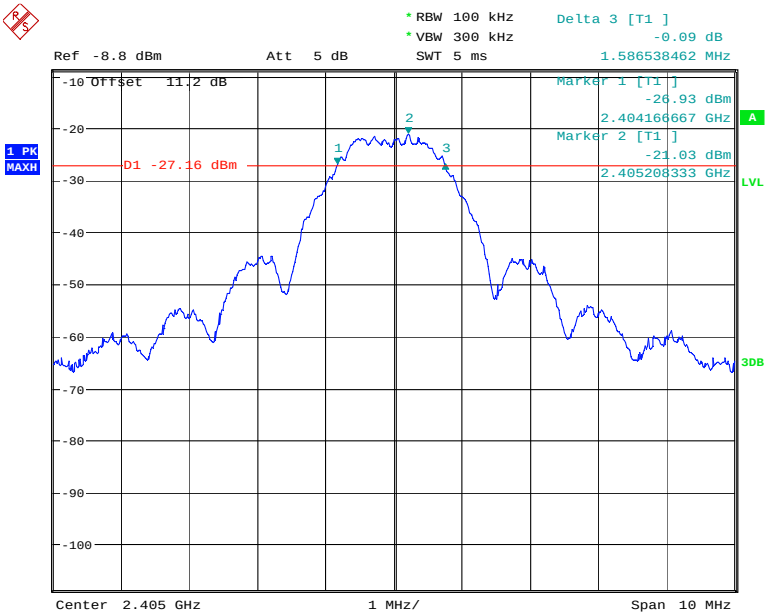
6 dB Bandwidth (MHz)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4 ZigBee	1.59	1.60	1.60

6.1.5 Measurement Verdict

Pass

6.1.6 Test Plots

6dB Bandwidth: 2405 MHz



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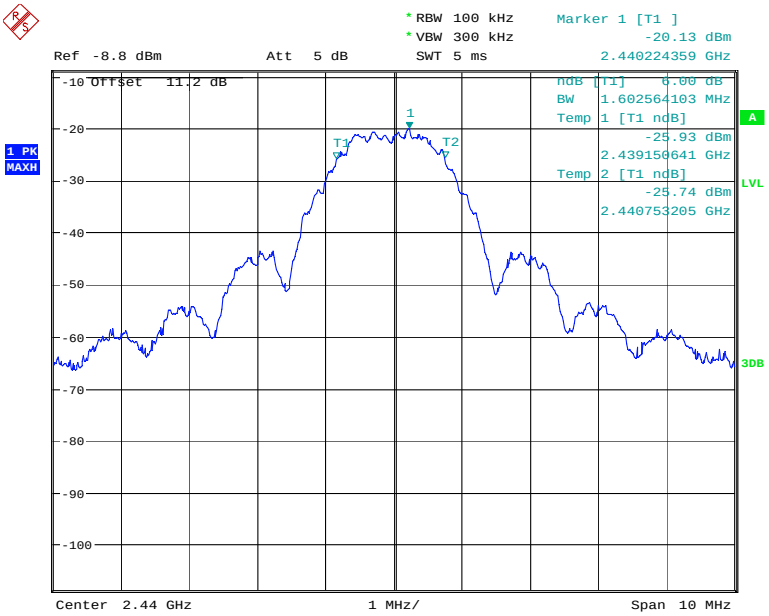
6dB Bandwidth: 2440 MHz



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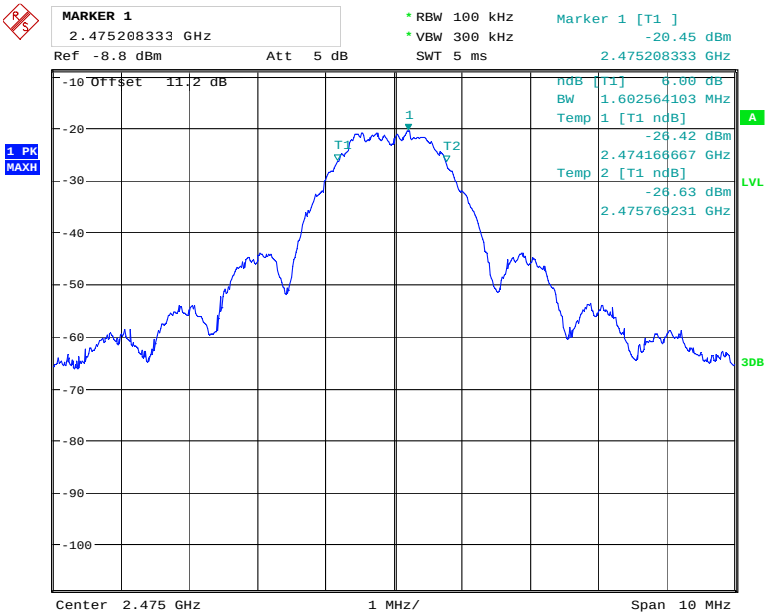
6dB Bandwidth: 2475 MHz



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6.2 Maximum Peak Conducted Output Power

6.2.1 References

§15.247 (b)(3)
RSS 210- A8.4(4)
Maximum peak conducted output power shall not exceed 1 W (30 dBm)

6.2.2 Spectrum Analyzer Settings

Center Frequency	Center of channel frequency
Span	10 MHz
Resolution Bandwidth	2 MHz
Video Bandwidth	10 MHz
Detector	Peak
Trace Mode	Max Hold
Sweep Time	Auto

6.2.3 Test Procedure

Measurement according to FCC KDB 558074 D01 DTS Meas Guidance v03r01, section 9.1.1

6.2.4 Test Result

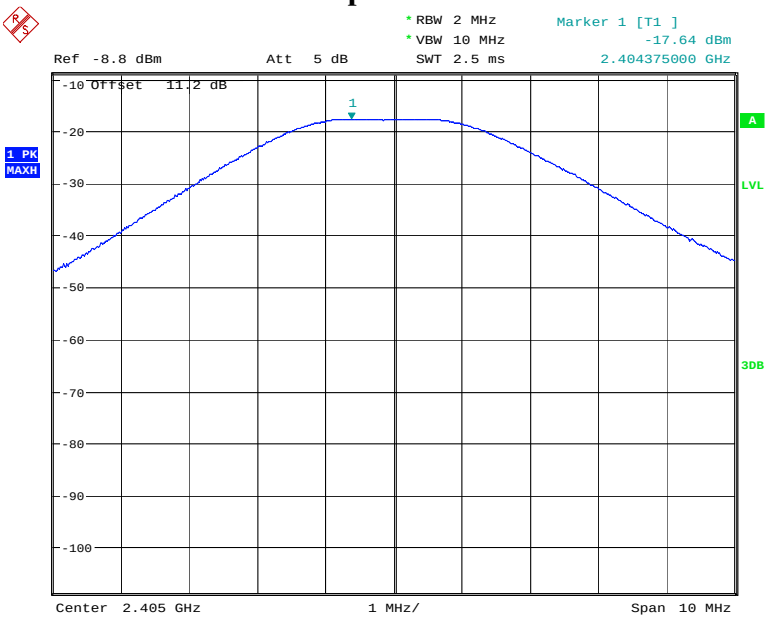
Measured Maximum Peak Conducted Output Power (dBm)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4 ZigBee	-17.64	-16.78	-16.81

6.2.5 Measurement Verdict

Pass

6.2.6 Test Plots

Measured Maximum Peak Conducted Output Power: 2405 MHz



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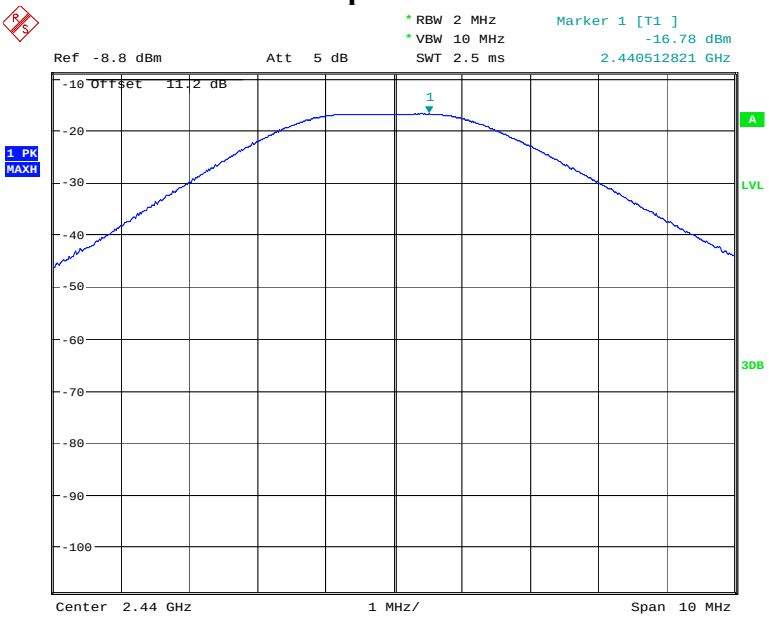
Measured Maximum Peak Conducted Output Power: 2440 MHz



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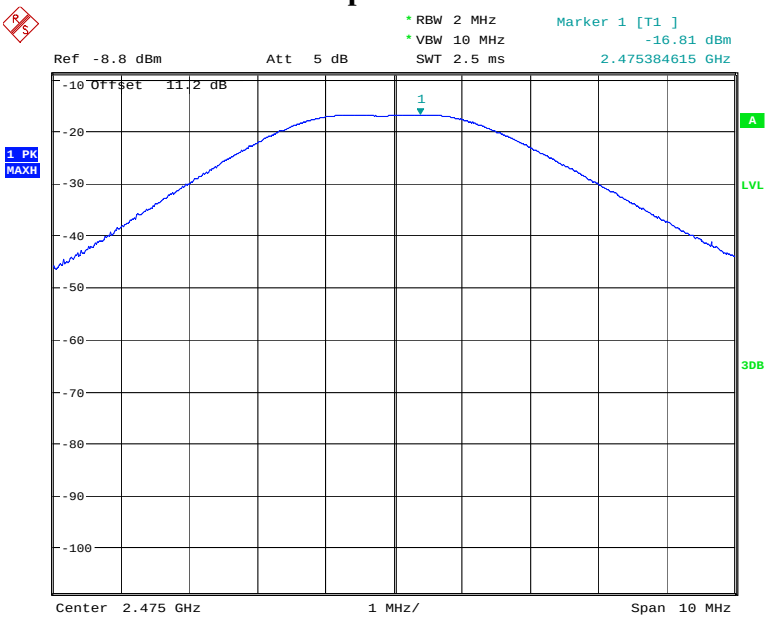
Measured Maximum Peak Conducted Output Power: 2475 MHz



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6.3 Power Spectral Density (PSD)

6.3.1 References

§ 15.247 (e)
RSS 210- A8.2(b)
For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.3.2 Spectrum Analyzer Settings

Center Frequency	Center of channel frequency
Span	2.4 MHz
Resolution Bandwidth	100 kHz
Video Bandwidth	300 kHz
Detector	Peak
Trace Mode	Max Hold
Sweep Time	Auto

6.3.3 Testing Notes

Measurement according to FCC KDB 558074 D01 DTS Meas Guidance v03r01, section 10.2.

The measured 100 kHz PSD value is corrected to 3 kHz PSD by using the formula

PSD in 3 kHz band = (measured PSD) + [10 log (3 kHz / RBW)]

6.3.4 Test results

Measured Conducted Power Spectral Density in 100 kHz band (dBm)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4 ZigBee	-21.05	-19.88	-19.90

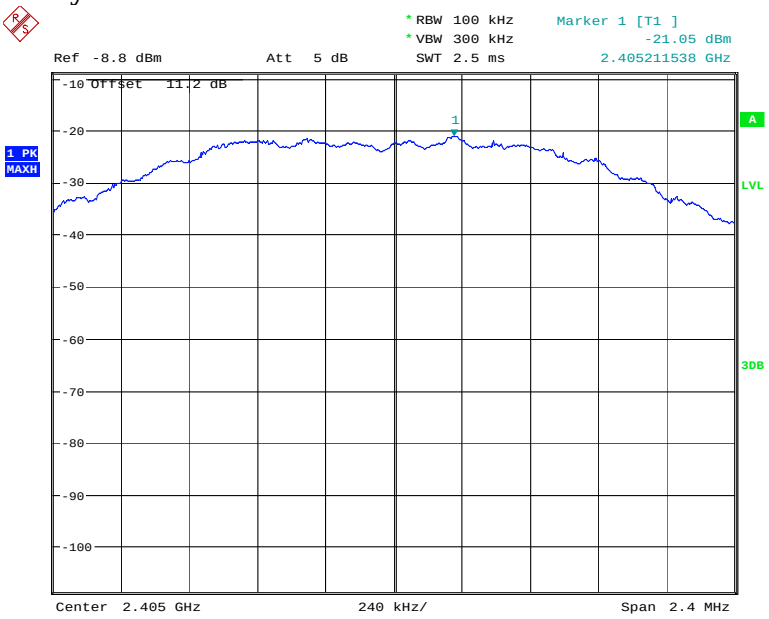
Corrected Power Spectral Density in 3 kHz band (dBm)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4 ZigBee	-36.25	-35.08	-35.1

6.3.5 Measurement Verdict

Pass

6.3.6 Test Plots

Power Spectral Density: 2405 MHz



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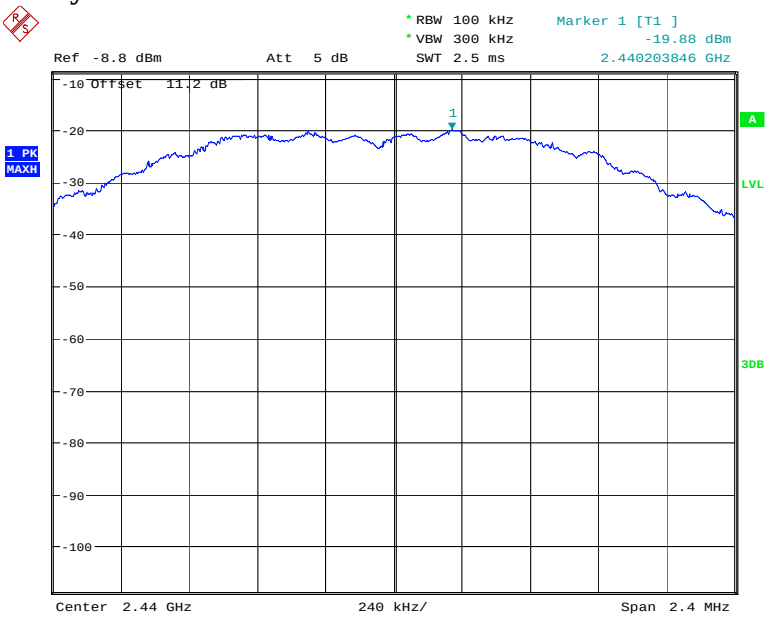
Power Spectral Density: 2440 MHz



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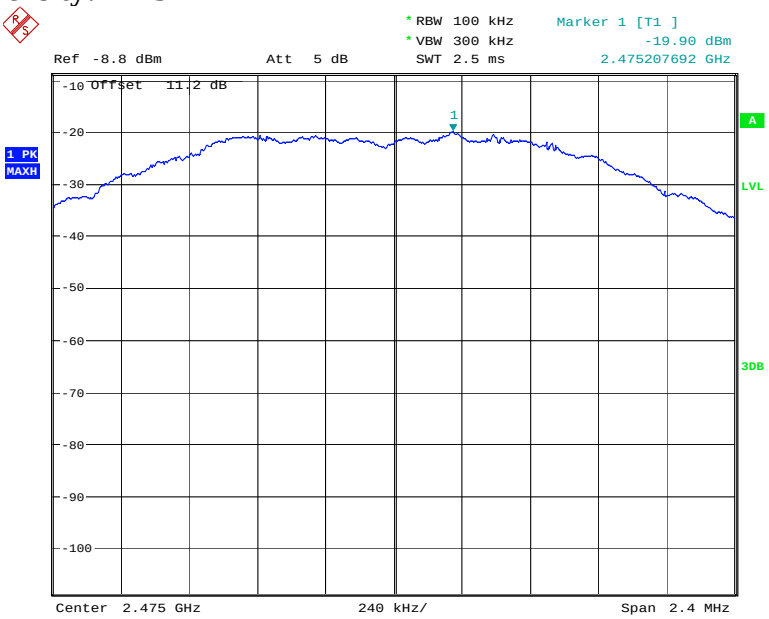
Power Spectral Density: 2475 MHz



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6.4 Unwanted Emissions into Non-Restricted Frequency Bands- Conducted

6.4.1 References

§ 15.247 (d)
RSS 210-A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

6.4.2 Spectrum Analyzer Settings

	Reference Level Measurement	Emission Level Measurement
Center Frequency	Center of channel frequency	Set the center frequency and span to encompass frequency range to be measured
Span	2.4 MHz	
Resolution Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Detector	Peak	Peak
Trace Mode	Max Hold	Max Hold
Sweep Time	Auto	Auto

6.4.3 Testing Notes

Measurement according to FCC KDB 558074 D01 DTS Meas Guidance v03r01, section 11

The EUT meets the peak conducted power limits as demonstrated in section 6.2. The limit for emissions in non-restricted frequency bands is -20 dBc / 100 kHz.

6.4.4 Test Result

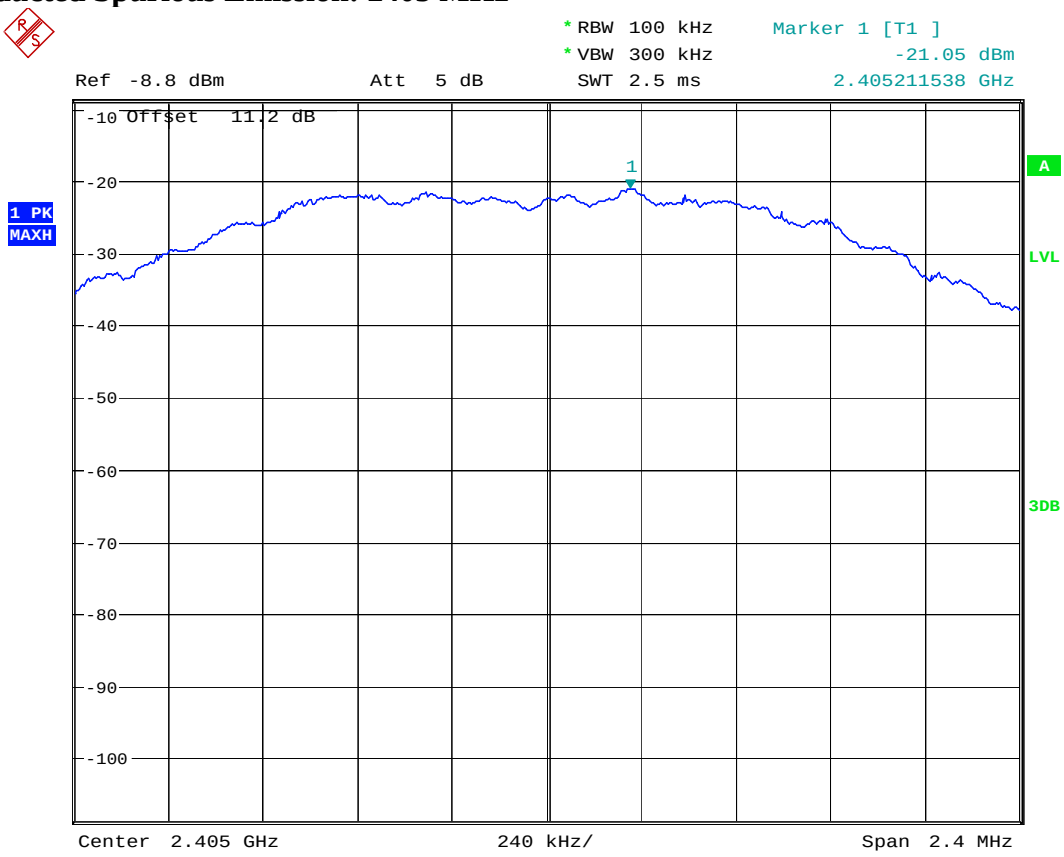
Conducted Spurious Emissions		
Frequency (MHz)		**Amplitude (dBm)**
2405 Channel 11	**Reference Level**	-21.05
	- 20 dBc Limit	-41.05
	Highest Unwanted Emission	-57.21 @ 4.79 GHz
2440 Channel 18	**Reference Level**	-19.88
	- 20 dBc Limit	-39.88
	Highest Unwanted Emission	-56.84 @ 4.87 GHz
2475 Channel 25	**Reference Level**	-19.90
	- 20 dBc Limit	-39.90
	Highest Unwanted Emission	-55.37 @ 4.95 GHz

6.4.5 Measurement Verdict

Pass

6.4.6 Test Plots

Conducted Spurious Emission: 2405 MHz



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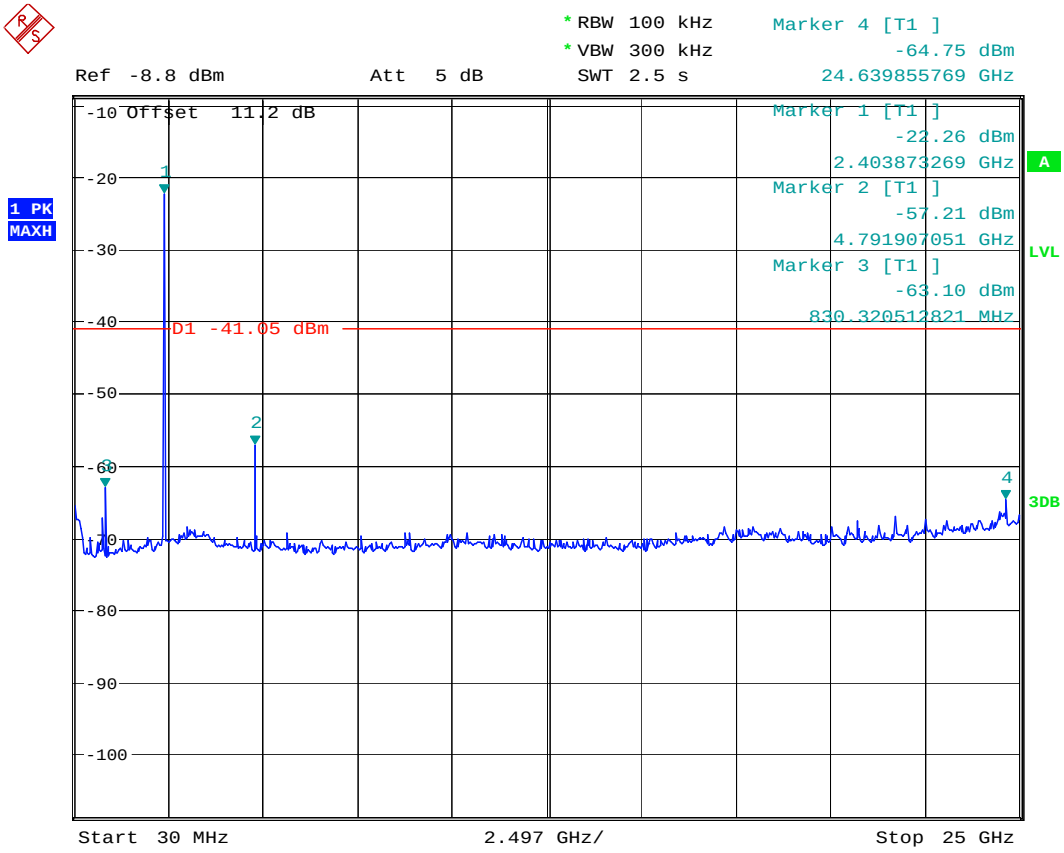
Reference Level Measurement



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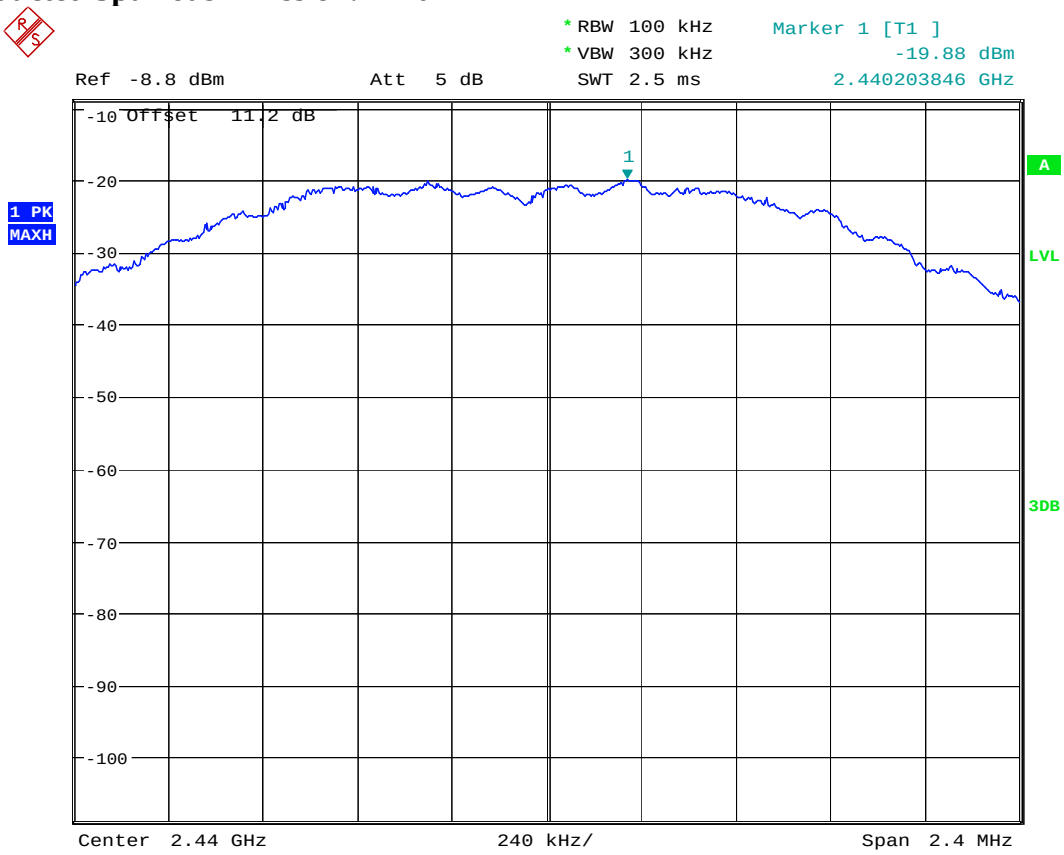
Unwanted Emissions Measurement

Conducted Spurious Emission: 2440 MHz



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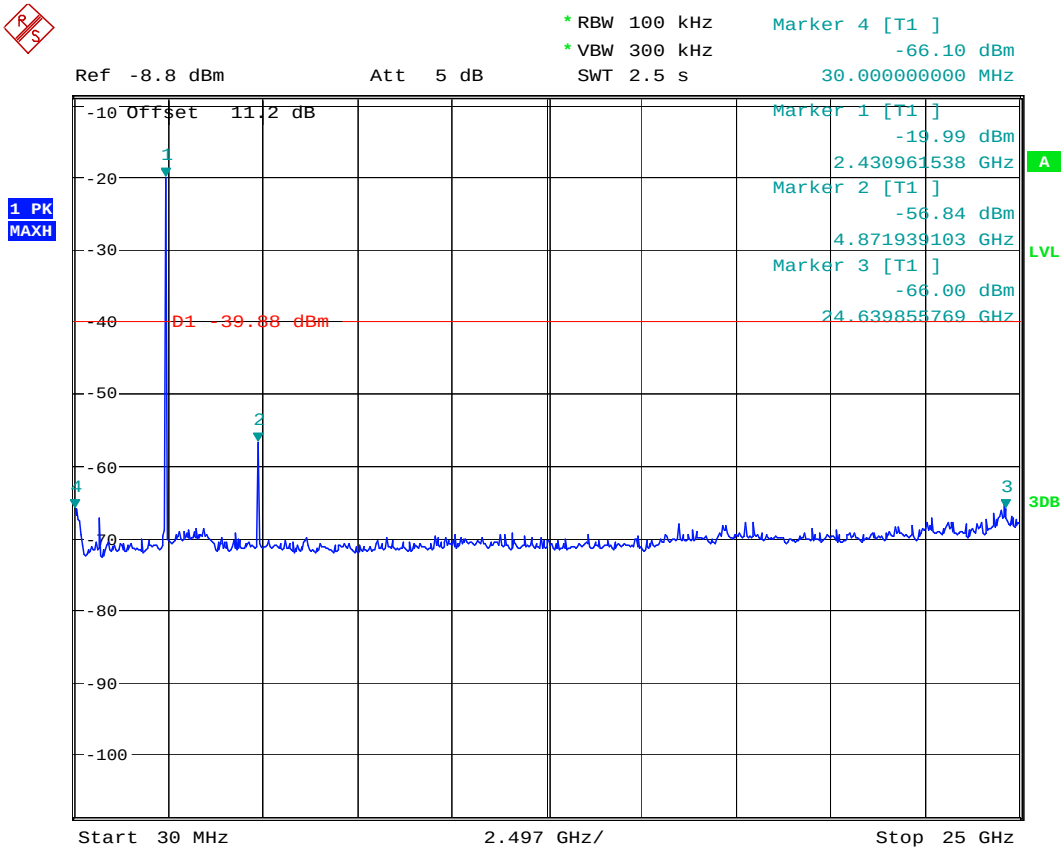
Reference Level Measurement



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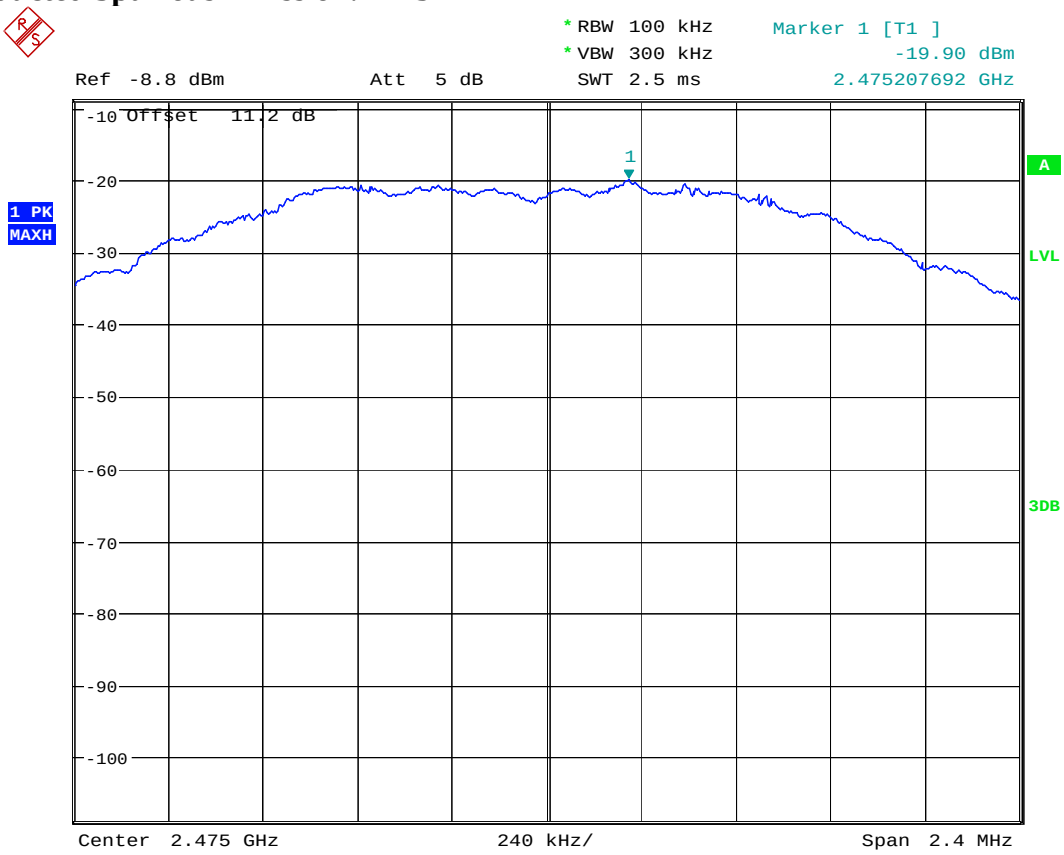
Unwanted Emissions Measurement

Conducted Spurious Emission: 2475 MHz



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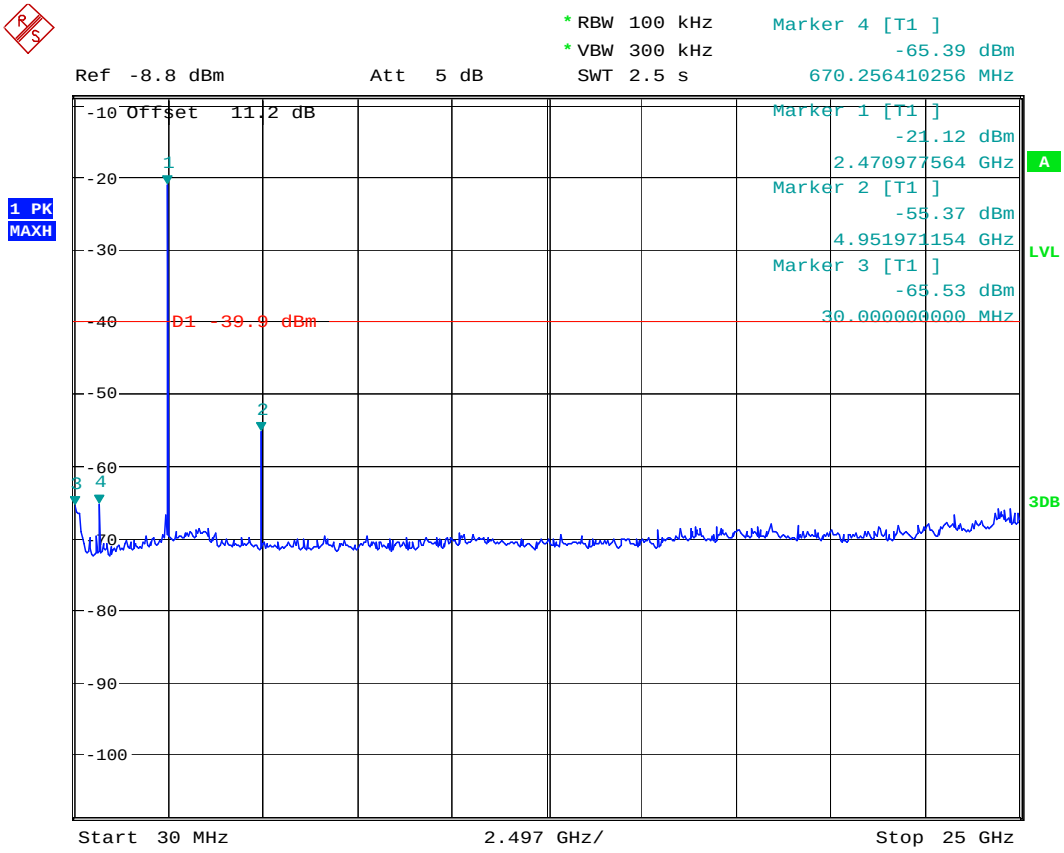
Reference Level Measurement



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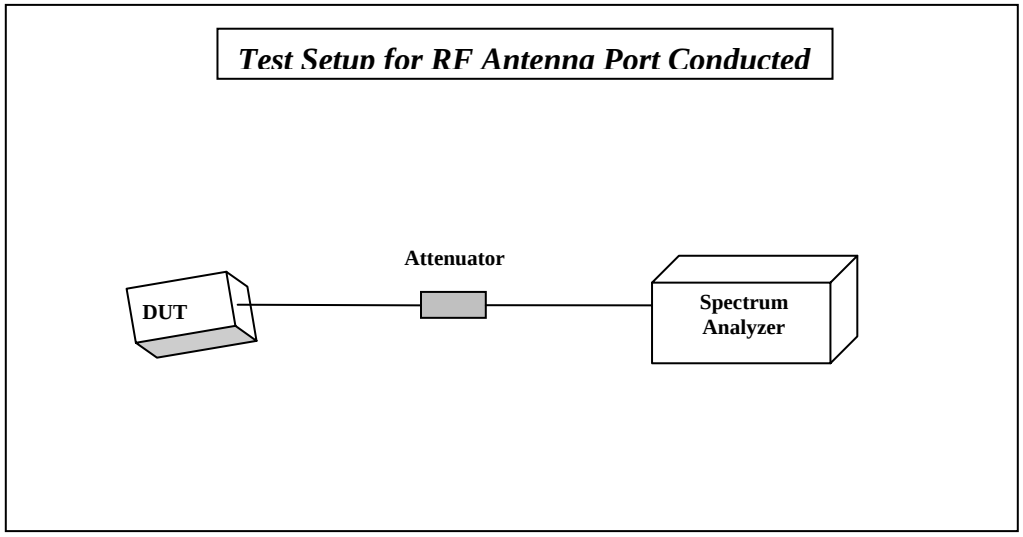
Unwanted Emissions Measurement

7 Test Equipment and Ancillaries used for tests

No.	Equipment Name	Manufacturer	Type/model	Serial No.	Cal Date	Cal Interval
3m Semi- Anechoic Chamber:						
	EMC32 Measurement Software	Rohde&Schwarz	8.52.0	N/A	N/A	N/A
	Turn table	EMCO	2075	N/A	N/A	N/A
	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
	Antenna Mast	EMCO	2075	N/A	N/A	N/A
	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
	EMI Receiver/Analyzer(*)	Rohde&Schwarz	ESU 40	100365	Feb 2013	1 Year
	1500MHz HP Filter	Filtek	HP12/1700	14c48	N/A	N/A
	2800 MHz HP Filter	Filtek	HP12/2800	14C47	N/A	N/A
	Pre-Amplifier	Miteq	JS40010260	340125	N/A	N/A
	Binconilog Antenna	EMCO	3141	0005-1186	Apr 2012	3 Years
	Binconilog Antenna	ETS	3149	J000123908	Feb 2012	3 years
	Horn Antenna	EMCO	3115	35114	Mar 2012	3 Years
	LISN	FCC	50-25-2-08	08014	Jul 2012	2 Year
Ancillary equipment						
	Multimeter	Klein Tools	MM200	001	Apr 2011	3 Years
	Humidity Temperature Logger	Dickson	TM320	03280063	Apr 2013	1 Year
	Digital Barometer	VWR	35519-055	91119547	Nov 2011	3 Years
	DC Power Supply	HP	E3610A	KR83023316	N/A	N/A
	DC Power Supply	Protek	3003B	H012771	N/A	N/A
	Communication Antenna	IBP5-900/1940	Kathrein	N/A	N/A	N/A

8 Block Diagrams



9 Revision History

Date	Report Name – Changes to Report	Report prepared by
March 11, 2014	**EMC_HANC1-001-13501_R100LF_DTS-C** 1. Original Report	J. Sabado