



## Electromagnetic Compatibility Test Report

Tests Performed on a Horizon Hobby, Inc.

Delta Ray, Model SPMA3160

Radiometrics Document RP-7574



*Product Detail:*

FCC ID: BRWDASRX17

IC: 6157A-AMRX17

Equipment type: 2.4 GHz transceiver

*Test Standards:*

US CFR Title 47, Chapter I, FCC Part 15 Subpart C

FCC Part 15 CFR Title 47: 2012

Industry Canada RSS-210, Issue 8: 2010 as required for Category I Equipment

This report concerns: Original Grant for Certification

FCC Part 15.249

*Tests Performed For:*

**Horizon Hobby, Inc.**

4105 Field Stone Rd.

Champaign, IL 61822

*Test Facility:*

**Radiometrics Midwest Corporation**

12 East Devonwood

Romeoville, IL 60446

(815) 293-0772

*Test Date(s): (Month-Day-Year)*

April 26 thru May 29, 2013

Document RP-7574 Revisions:

Rev.	Issue Date	Affected Sections	Revised By
0	June 26, 2013		
1	June 28, 2013	Table of Contents	Joseph Strzelecki

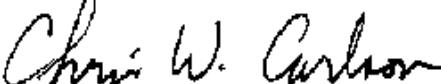
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Testing of the Horizon Hobby, Inc., Model SPMA3160,

## 1 ADMINISTRATIVE DATA

<i>Equipment Under Test:</i> A Horizon Hobby, Inc., Transceiver/ESC Delta Ray Model: SPMA3160 Serial Number: None This will be referred to as the EUT in this Report	
<i>Date EUT Received at Radiometrics: (Month-Day-Year)</i> April 26, 2013	<i>Test Date(s): (Month-Day-Year)</i> April 26 thru May 29, 2013
<i>Test Report Written By:</i> Joseph Strzelecki Senior EMC Engineer	<i>Test Witnessed By:</i> Jeff Walker Horizon Hobby, Inc.
<i>Radiometrics' Personnel Responsible for Test:</i>  Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	<i>Test Report Approved By</i>  Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

## 2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Delta Ray Transmitter, Model SPMA3160, manufactured by Horizon Hobby, Inc. The detailed test results are presented in a separate section. The following is a summary of the test results.

### Test Results

Environmental Phenomena	Frequency Range	FCC Section	RSS- Section	Test Result
RF Radiated Emissions (Unintentional Radiation Receive mode)	30-25,000 MHz	15.209	GEN; 7.2.5	Pass
20 dB Bandwidth Test	2400 to 2483 MHz	15.249	210	Pass
Radiated Emissions	30 MHz to 25 GHz	15.249	210; A2.9	Pass

Note: The RSS-210 specification is not currently covered in Radiometrics' Scope of Accreditation. This is technically very similar to FCC, CFR 47 Part 15 which is on Radiometrics scope.

### 2.1 RF Exposure Compliance Requirements

Since the EUT is not handheld and the power output is 100 mW, the EUT meets the FCC requirement for RF exposure, and it is exempt from RSS-102 SAR and RF exposure evaluations. There are no power level adjustments and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

Testing of the Horizon Hobby, Inc., Model SPMA3160,

### 3 EQUIPMENT UNDER TEST (EUT) DETAILS

#### 3.1 EUT Description

The EUT is a 2.4 GHz transciever in a remote control aircraft, Model SPMA3160, manufactured by Horizon Hobby, Inc. The EUT was in good working condition during the tests, with no known defects.

##### 3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The Antenna is directly soldered to the PCB and is internal to the product; therefore it meets the FCC 15.203 Requirements.

#### 3.2 Related Submittals

Horizon Hobby, Inc. is not submitting any other products simultaneously for equipment authorization related to the EUT.

### 4 TESTED SYSTEM DETAILS

#### 4.1 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 testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. Power was supplied at 115 VAC, 60 Hz single-phase to its external power supply.

The identification for all equipment, plus descriptions of all cables used in the tested system, are:

**Tested System Configuration List**

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Delta Ray with 2.4 GHz Transceiver	E	Horizon Hobby, Inc.	SPMA3160	None

\* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

#### 4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

#### 4.3 Equipment Modifications

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

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## 5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2012	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
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
IC RSS-210 Issue 8	2010	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-Gen Issue 3	2010	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)

The test procedures used are in accordance with the Industry Canada RSS-GEN and ANSI document C63.4, "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

## 6 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 Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site ([www.radiomet.com](http://www.radiomet.com)). Radiometrics accreditation status can be verified at A2LA's web site ([www.a2la2.org](http://www.a2la2.org)).

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

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. The floor has a 9' x 9' section of microwave absorber for testing above 1 GHz.

Test Station F: Is an area that measures 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.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC3124A-1.

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).

## 7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

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## 8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification and the data contained herein was taken with calibrated test equipment. The results relate only to the EUT listed herein.

## 9 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-20	Avantek	Pre-amplifier	SF8-0652	15221	8-18GHz	12 Mo	01/15/13
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	01/16/13
AMP-29	HP / Agilent	Amplifier	11975A	2304A00158	2-8 GHz	12 Mo.	11/06/12
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	12/05/12
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	12/14/11
ANT-48	RMC	Std Gain Horn	HW2020	1001	18-26 GHz	24 Mo.	04/05/12
ANT-53	EMCO	Loop Antenna	6507	1453	1 KHz-30 MHz	24 Mo	10/26/11
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	01/24/12
LSN-01	Electrometrics	50 uH LISN	FCC/VDE 50/2	1001	0.01-30MHz	24 Mo.	06/14/11
LSN-03	Farnell	50 uH LISN	1EXLSN30B	000314	0.01-30MHz	24 Mo.	06/14/11
MXR-02	HP / Agilent	Harmonic Mixer	11970K	2332A00489	18-26.5GHz	12 Mo.	11/06/12
REC-01	Hewlett Packard	Spectrum Analyzer	8566A	2106A02115, 2209A01349	30Hz-22GHz	24 Mo.	11/21/12
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	04/08/13
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	05/21/12
REC-08	Hewlett Packard	Spectrum Analyzer	8566B	2648A13481 2209A01436	30Hz-22GHz	24 Mo.	10/28/11
THM-02	Fluke	Temp/Humid Meter	971	93490471	N/A	12 Mo.	05/25/12

Note: All calibrated equipment is subject to periodic checks.

## 10 TEST SECTIONS

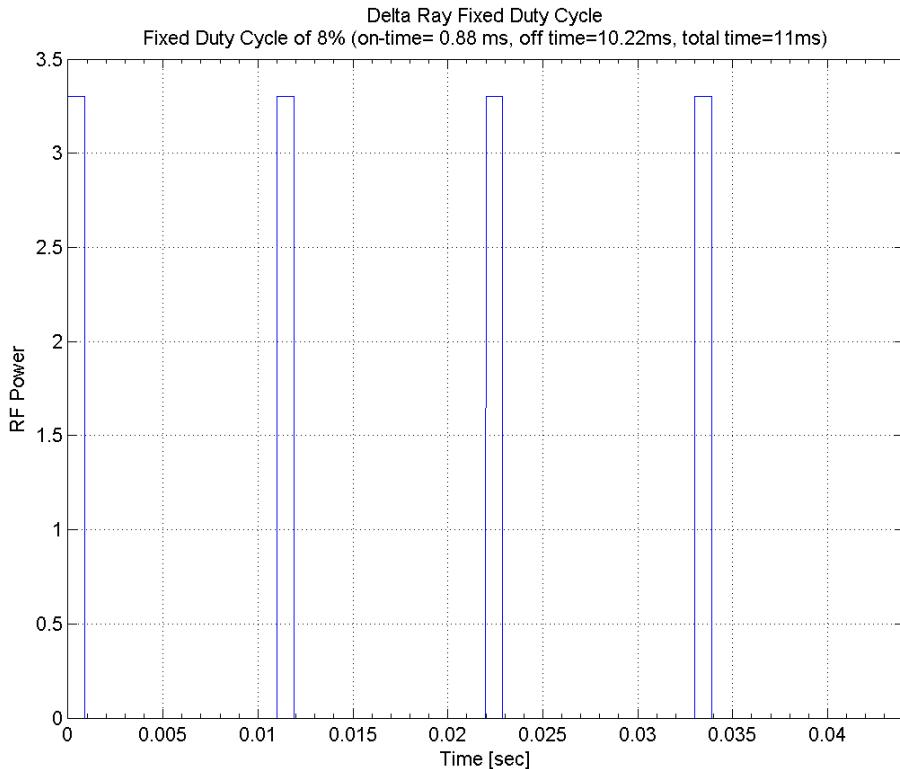
### 10.1 Duty Cycle Calculation

The Peak to average factor is calculated by the highest duty cycle in percent over any 100mS transmission. The factor in dB is  $20 * \log(\text{Duty cycle}/100)$ .

The duty factor is established when the device is bound to the system and is different for the surface and air systems. It is a time-division link with a set duty cycle. Servo data is transmitted in each packet. The antenna gain is 2.0dBi.

The system when installed in a transmitter has a fixed duty cycle of 8% (on-time= 0.88 ms, off time=10.22ms, total time=11ms). See figures 1 below.

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**Figure 1. Transmitter Duty Cycle**

The transmitter operates for a maximum duration of 8 ms in any 100 ms interval for a **8%** maximum duty cycle:

$20 \text{ Log}^*(8\text{mSec}/100\text{mSec}) = -21.9 \text{ dB}$  Peak to average Correction factor.

## 10.2 Occupied Bandwidth

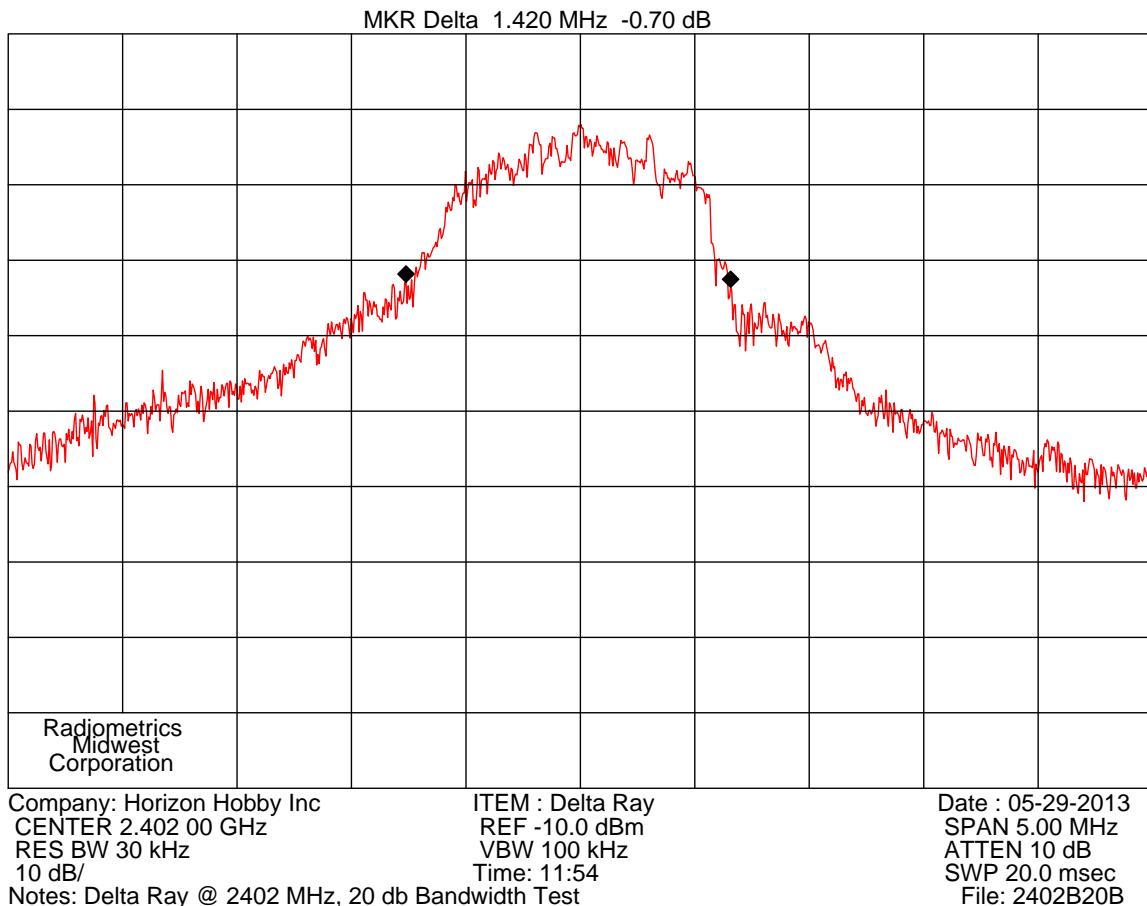
The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

The marker-to-peak function was set to the peak of the emission. Then the marker-delta function was used to measure 6 or 20 dB down one side of the emission. The marker-delta function was reset and then moved to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the bandwidth of the emission.

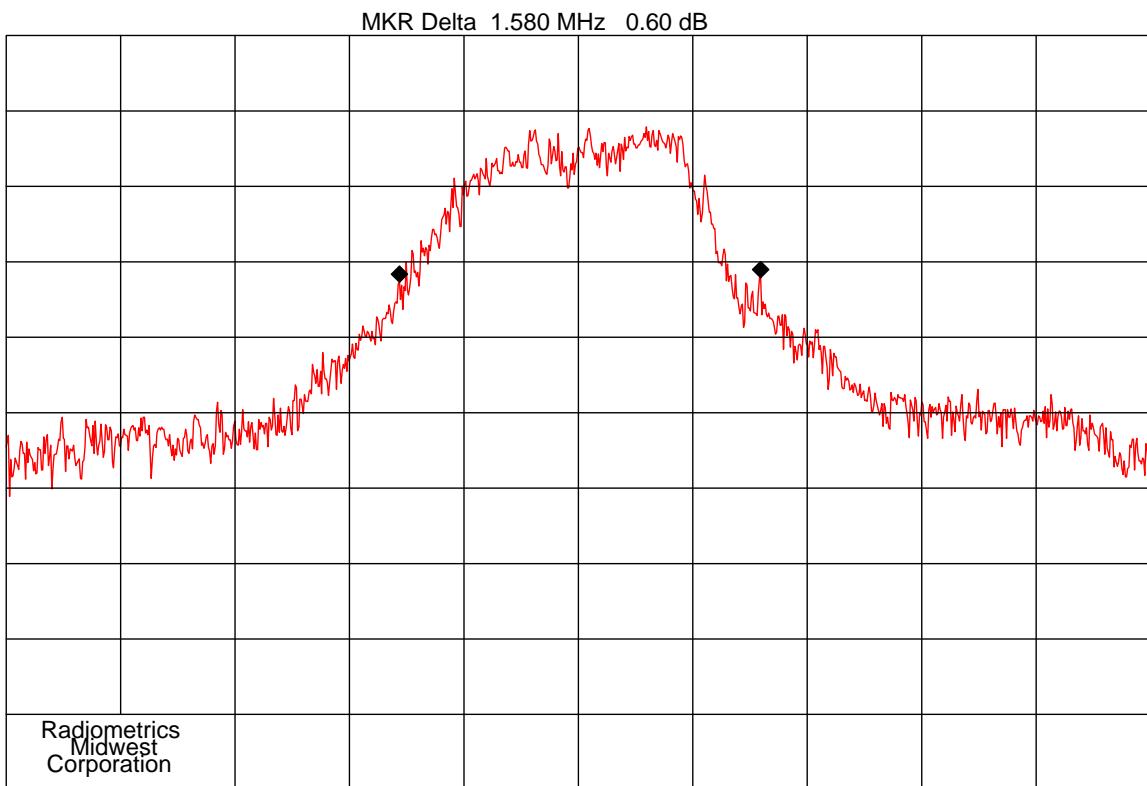
Channel	20 dB EBW MHz
2402	1.42
2440	1.58
2478	2.715

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Figure 2. Occupied Bandwidth Plots



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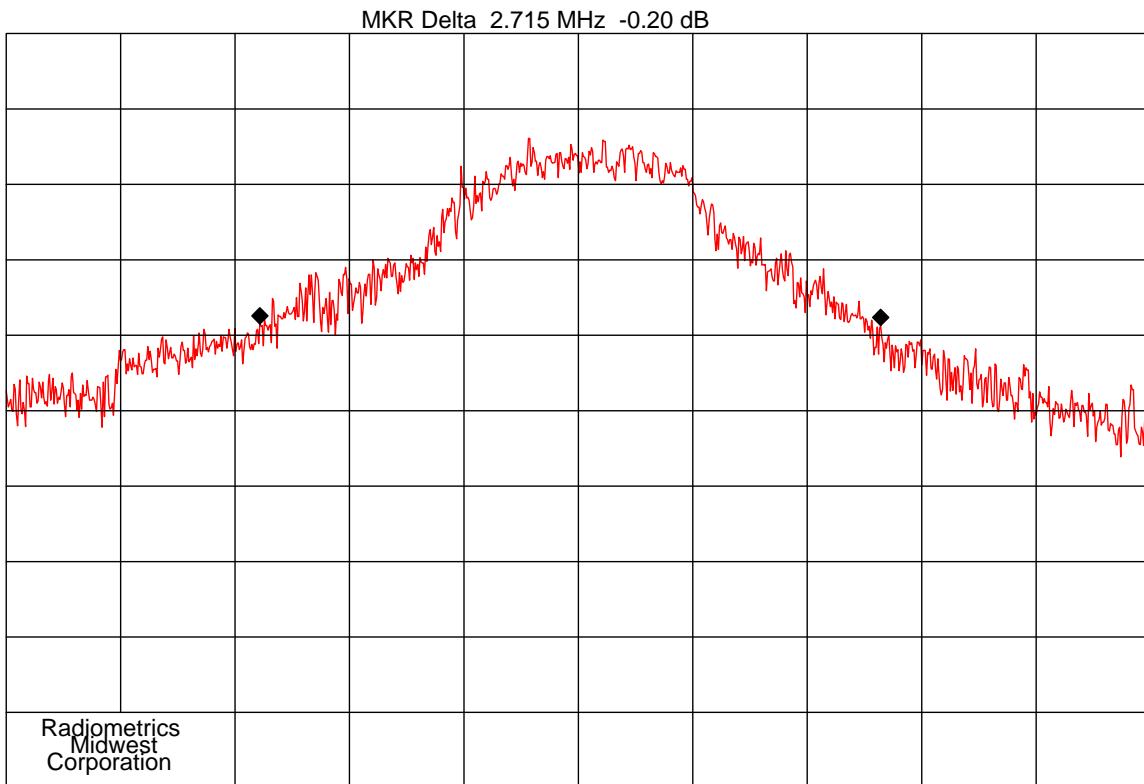


Company: Horizon Hobby Inc  
CENTER 2.440 00 GHz  
RES BW 30 kHz  
10 dB/  
Notes: Delta Ray @ 2440 MHz, 20 db Bandwidth Test

ITEM : Delta Ray  
REF -10.0 dBm  
VBW 100 kHz  
Time: 11:50

Date : 05-29-2013  
SPAN 5.00 MHz  
ATTEN 10 dB  
SWP 20.0 msec  
File: 2440B20B

Testing of the Horizon Hobby, Inc., Model SPMA3160,



Company: Horizon Hobby Inc  
CENTER 2.478 00 GHz  
RES BW 30 kHz  
10 dB/  
Notes: Delta Ray @ 2478 MHz, 20 db Bandwidth Test

ITEM : Delta Ray  
REF -10.0 dBm  
VBW 100 kHz  
Time: 11:46

Date : 05-29-2013  
SPAN 5.00 MHz  
ATTEN 10 dB  
SWP 20.0 msec  
File: 2478B20B

### 10.3 Radiated RF Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu spectrum analyzer was used. For tests from 1 to 25 GHz, an HP 8566 spectrum analyzer was used. For tests from 1 to 10 GHz, a high pass filter was used to reduce the fundamental emission. A harmonic mixer was used from 18 to 25 GHz. Figure 4 herein lists the details of the test equipment used during radiated emissions tests. In addition, a high pass filter was used to reduce the fundamental emission.

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.

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The entire frequency range from 30 to 25000 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, average or 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 or average function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

### 10.3.1 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:

$$FS = RA + AF + CF - AG + HPF + PKA$$

Where: FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

PKA = Peak to Average Factor (This is zero for non-average measurements)

The Peak to average factor is used when average measurements are required. It is calculated by the highest duty cycle in percent over any 100mS transmission. The factor in dB is  $20 * \log(\text{Duty cycle}/100)$ .

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## 10.3.2 Radiated Emissions Test Results Transmit mode

Test Date : May 21, 2013

		Spectrum Analyzer Readings								EUT	Peak	Ave	Peak	Ave	Margin	
hrm	Tx	Peak		Ave	Peak		Ave	Corr.	Emission	Tot. FS		Limit		Under		
#	Freq	Vertical Polarization				Horizontal Polarization				Fact.	Freq MHz	dBuV/m		dBuV/m		Limit
		X	Y	Z	Max	X	Y	Z	Max							
1	2402	81.4	88.5	94.4	72.5	92.8	94.2	88.1	72.3	2.3	2402	96.7	74.8	114	94	17.3
BE	2402	38.0	45.1	51.0	29.1	49.4	50.8	44.7	28.9	2.3	2390	53.3	31.4	74	54	20.7
2	2402	50.0	51.3	51.7	29.8	51.0	51.6	49.6	29.7	10.1	4804	61.8	39.9	74	54	12.2
3	2402	49.4	51.7	54.6	32.7	54.2	54.3	51.0	32.4	11.2	7206	65.8	43.9	74	54	8.2
4	2402	42.9	45.8	47.6	25.7	46.7	48.2	44.2	26.3	18.8	9608	67.0	45.1	94	74	27.0
5	2402	39.7	39.7	41.9	20.0	40.9	43.3	40.0	21.4	17.6	12010	60.9	39.0	74	54	13.1
1	2440	82.2	89.0	94.4	72.5	93.0	94.6	87.6	72.7	2.5	2440	97.1	75.2	114	94	16.9
2	2440	50.0	51.8	52.1	30.2	51.1	51.6	50.9	29.7	9.7	4880	61.8	39.9	74	54	12.2
3	2440	47.6	51.0	53.7	31.8	53.7	53.2	48.9	31.8	11.6	7320	65.3	43.4	74	54	8.7
4	2440	43.2	44.4	46.8	24.9	46.2	47.4	44.6	25.5	20.7	9760	68.1	46.2	94	74	25.9
5	2440	40.8	39.8	41.6	19.7	40.0	43.6	40.8	21.7	17.4	12200	61.0	39.1	74	54	13.0
1	2478	88.1	92.6	97.0	75.1	94.9	96.8	90.0	74.9	2.6	2478	99.6	77.7	114	94	14.4
BE	2478	42.9	47.4	51.8	29.9	49.7	51.6	44.8	29.7	2.6	2484	54.4	32.5	74	54	19.6
2	2478	50.8	50.7	53.4	31.5	50.9	51.2	50.2	29.3	9.5	4956	62.9	41.0	74	54	11.1
3	2478	47.2	50.3	51.8	29.9	53.1	50.9	46.0	31.2	11.9	7434	65.0	43.1	74	54	9.0
4	2478	43.8	44.3	46.8	24.9	46.7	47.7	44.9	25.8	20.7	9912	68.4	46.5	74	54	5.6
5	2478	40.3	40.5	40.5	18.6	39.8	41.9	39.4	20.0	17.4	12390	59.3	37.4	74	54	14.7
Column numbers (see below for explanations)																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Column #1. hrm = Harmonic; BE = Band Edge emissions  
 Column #2. Frequency of Transmitter.  
 Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.  
 Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.  
 Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.  
 Column #6. Average Reading based on peak reading reduced by the Duty cycle correction  
 Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.  
 Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.  
 Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.  
 Column #10. Average Reading based on peak reading reduced by the Duty cycle correction  
 Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor  
 Column #12. Frequency of Tested Emission  
 Column #13. Highest peak field strength at listed frequency.  
 Column #14. Highest Average field strength at listed frequency.  
 Column #15. Peak Limit.  
 Column #16. Average Limit.  
 Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.

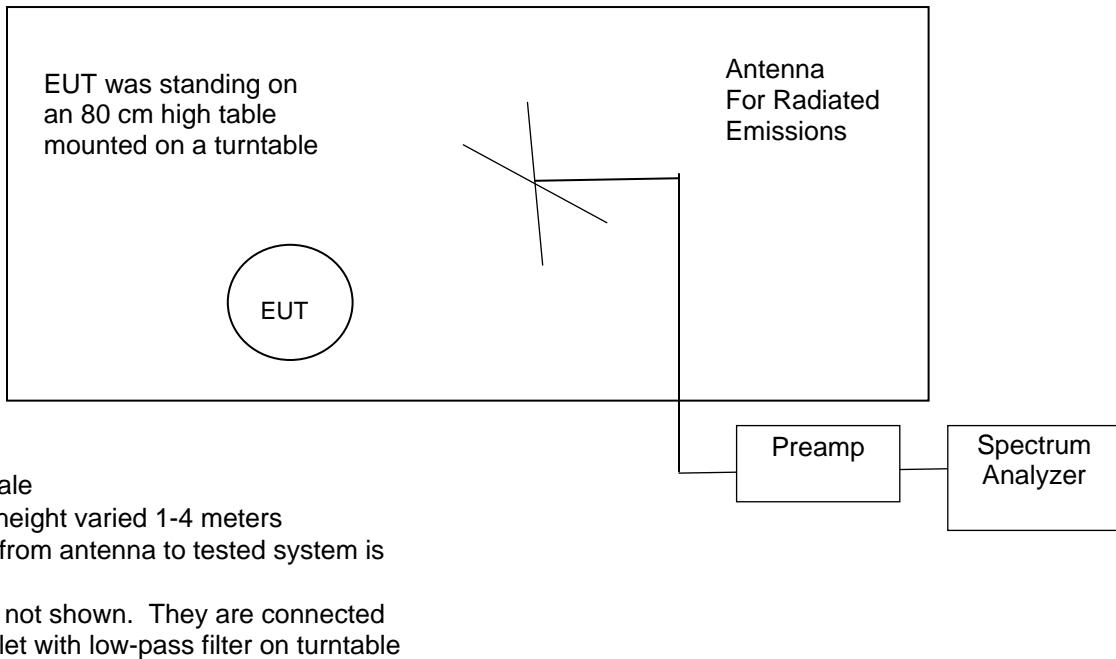
Judgment: Passed by 5.6 dB

No other emissions were detected from the transmitter between 30 MHz to 25 GHz within 10 dB of the limits.

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Figure 3. Drawing of Radiated Emissions Setup

Chamber E, anechoic



Frequency Range	Receive Antenna	Pre-Amplifier	Spectrum Analyzer
0.01 to 30 MHz	ANT-53	None	REC-03
30 to 1000 MHz	ANT-44	AMP-22	REC-03
1 to 10 GHz	ANT-13	AMP-05	REC-01
10 to 18 GHz	ANT-13	AMP-20	REC-01
18 to 25 GHz	ANT-48	AMP-29	REC-08; MXR-01

#### 10.4 Unintentional Emissions (Receive Mode)

Manufacturer	SMART Temps	Specification	FCC Part 15.209 & RSS-210
Model	SPMA3160	Test Date	May 21, 2013
Serial Number	none	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain – Duty Cycle Factor + HP Filter Loss		
Configuration	Receive mode		

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ ID#		EUT	Limit	
48.8	30.8	P	14.3	H/44	-28.1	17.0	40.0	23.0
71.2	31.5	P	7.5	H/44	-27.8	11.2	40.0	28.8
96.0	30.6	P	8.7	H/44	-27.5	11.8	43.5	31.7
111.2	36.6	P	12.1	H/44	-27.3	21.4	43.5	22.1
143.6	40.6	P	10.3	H/44	-26.9	24.0	43.5	19.5

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Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ ID#		EUT	Limit	
162.0	36.2	P	10.4	H/44	-26.7	19.9	43.5	23.6
191.2	51.3	P	9.9	H/44	-26.4	34.8	43.5	8.7
206.4	46.2	P	10.0	H/44	-26.3	29.9	43.5	13.6
192.0	50.0	Q	9.9	H/44	-26.4	33.5	43.5	10.0
240.1	39.9	P	11.8	H/44	-26.1	25.6	46.0	20.4
267.6	35.9	P	12.8	H/44	-27.3	21.4	46.0	24.6
288.3	44.6	P	12.7	H/44	-27.3	30.0	46.0	16.0
307.3	35.2	P	13.3	H/44	-27.3	21.2	46.0	24.8
336.4	34.5	P	14.0	H/44	-27.3	21.2	46.0	24.8
384.0	43.3	P	15.5	H/44	-27.2	31.6	46.0	14.4
408.1	32.3	P	15.6	H/44	-27.1	20.8	46.0	25.2
459.6	28.9	P	16.4	H/44	-26.8	18.5	46.0	27.5
500.0	28.9	P	17.5	H/44	-26.6	19.8	46.0	26.2
552.0	30.7	P	19.0	H/44	-26.3	23.4	46.0	22.6
712.0	27.1	P	20.4	H/44	-26.1	21.4	46.0	24.6
822.0	41.8	P	21.3	H/44	-25.3	37.8	46.0	8.2
49.6	37.1	P	14.2	V/44	-28.1	23.2	40.0	16.8
78.4	35.7	P	6.9	V/44	-27.7	14.9	40.0	25.1
92.8	34.9	P	8.3	V/44	-27.5	15.7	43.5	27.8
107.6	34.4	P	11.2	V/44	-27.4	18.2	43.5	25.3
116.0	33.3	P	13.5	V/44	-27.3	19.5	43.5	24.0
163.6	34.5	P	10.2	V/44	-26.6	18.1	43.5	25.4
197.2	40.6	P	10.3	V/44	-26.3	24.6	43.5	18.9
208.4	36.1	P	10.2	V/44	-26.2	20.1	43.5	23.4
227.6	38.3	P	11.6	V/44	-26.0	23.9	46.0	22.1
236.8	41.2	P	11.7	V/44	-26.1	26.8	46.0	19.2
248.0	37.5	P	12.4	V/44	-27.0	22.9	46.0	23.1
274.3	35.1	P	13.1	V/44	-27.3	20.9	46.0	25.1
288.3	34.8	P	12.7	V/44	-27.3	20.2	46.0	25.8
303.4	32.2	P	13.1	V/44	-27.3	18.0	46.0	28.0
344.8	32.9	P	14.8	V/44	-27.3	20.4	46.0	25.6
384.0	38.0	P	15.5	V/44	-27.2	26.3	46.0	19.7
431.6	33.3	P	16.5	V/44	-27.2	22.6	46.0	23.4
479.8	30.4	P	17.6	V/44	-26.8	21.2	46.0	24.8
518.0	28.1	P	17.8	V/44	-26.7	19.2	46.0	26.8
661.0	28.0	P	20.4	V/44	-26.3	22.1	46.0	23.9
824.0	42.5	P	21.2	V/44	-25.4	38.3	46.0	7.7

Judgment: Passed by 7.7 dB