

# EMC Test Report

**Project Number:** 3720850

**Report Number:** 3720850EMC04

**Revision Level:** 0

**Client:** Hi-P (SINGAPORE) TECHNOLOGY PTE LTD

**Equipment Under Test:** iDEN Phone with Bluetooth

**Model:** H375i

**FCC ID:** 2ACUZH375I

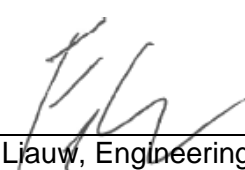
**Applicable Standards:** FCC Part 15 Subpart C, § 15.247

**ANSI C63.10: 2009**

**Report issued on:** 13 May 2015

**Test Result:** Compliant

Tested by:

  
Fendy Liauw, Engineering Technician

Reviewed by:

  
David Schramm, EMC/RF/SAR/HAC Manager

**Remarks:**

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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# 1 Summary of Test Results

Test Description	Test Specification	Test Result
Occupied Bandwidth	15.247(a) (1)	Compliant
Peak Power Output	15.247(a) (1)	Compliant
Conducted Spurious Emissions	15.247(d)	Compliant
Band Edge	15.247(d)	Compliant
Radiated Spurious Emissions	15.247(d), 15.35(b), 15.209	Compliant
Dwell time	15.247(a) (1)(iii)	Compliant
Number of Hopping Frequencies	15.247(a) (1)(iii)	Compliant
Channel separation	15.247(a) (1)(iii)	Compliant

## 1.1 Modifications Required for Compliance

None

## 2 General Information

### 2.1 Client Information

Name: Hi-P (SINGAPORE) TECHNOLOGY PTE LTD  
Address: 12 ANG MO KIO STREET 64 #03-02, UE BIZHUB CENTRAL (BLK A)  
City, State, Zip, Country: SINGAPORE  
569088

### 2.2 Test Laboratory

Name: SGS North America, Inc.  
Address: 620 Old Peachtree Road NW, Suite 100  
City, State, Zip, Country: Suwanee, GA 30024, USA

### 2.3 General Information of EUT

Marketing Name: H375i  
Model: H375i

FCC ID: 2ACUZH375i  
Frequency Range: 2402 to 2480 MHz  
Number of channels: 79  
Modulation type: GFSK, DQPSK, 8DPSK  
Channel spacing: 1 MHz  
Antenna: Integral

Rated Voltage: 3.7 VDC Internal Battery

Sample Received Date: 31 March 2015 (radiated sample)  
22 April 2015 (conducted sample)  
Dates of testing: 28 April – 13 May 2015

### Operating Modes and Conditions

The EUT was configured in software to allow the user to the control the EUT to run continuously exercising all modes of operation.

During testing, the hopping sequence was stopped in accordance with Section 5.1 of ANSI C63.10-2009 so that the low, mid and high channels could be tested independently.

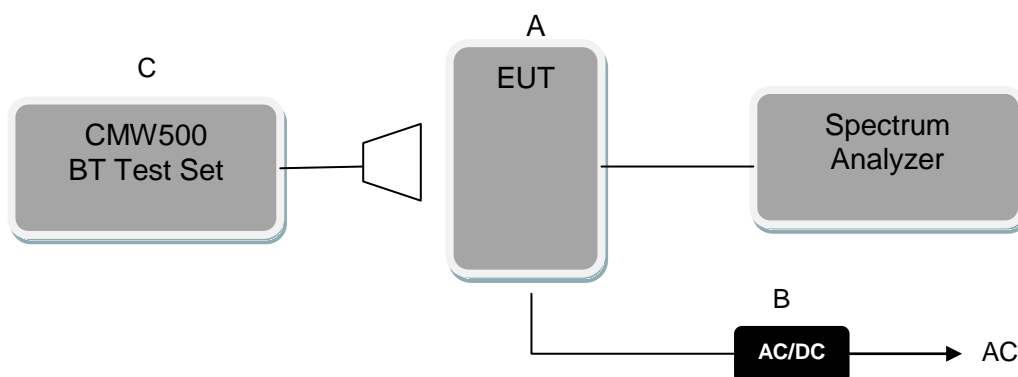
Modulations used: For fundamental and spurious measurements, the EUT was configured to operate continuously with Bluetooth modulation enabled.

As specified in Section 5.10.5 of ANSI C63.10:2009:

- Software was designed to allow the EUT to operate
  - at 100 % duty cycle
  - at the worst-case duty cycle to allow measurements in instances where an average correction factor needs to be determined to calculate the average field strength from the measured peak field strength

- The software allowed configuration and operation on all available unlicensed wireless device channels.
- The software allowed configuration and operation using all available modulations and data rates
- The software allowed configuration and operation on all available power out levels
- Since this is a frequency hopping system, the software allowed the hopping sequence to be turned off

## 2.4 EUT Connection Block Diagram



## 2.5 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Hi-P	EUT	H375i	Radiated: 364KRE00H1 Conducted: 364KRE009J
B	Motorola	AC Adapter	SSW-2442EU	SPN5655A
C	R&S	Bluetooth test set	CMW500	100232

### 3 Occupied Bandwidth

#### 3.1 Test Result

Test Description	Basic Standards	Test Result
20 dB bandwidth	15.247(a) (1)	Pass

#### 3.2 Test Method

The procedures from ANSI C63.10 (2009) clause 6.9 were used to determine the 20 dB bandwidth.

#### 3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C

Relative Humidity: 36.9 %

#### 3.4 Test Equipment

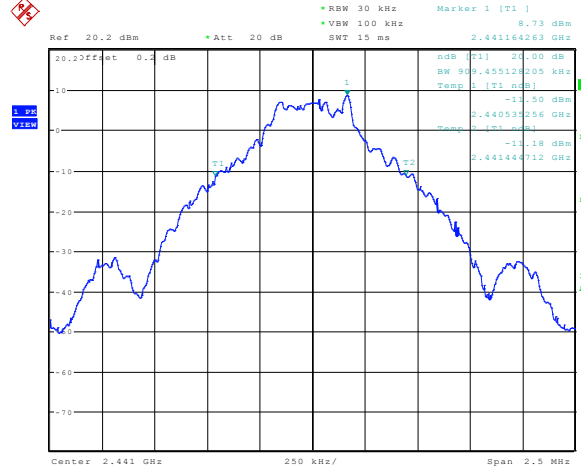
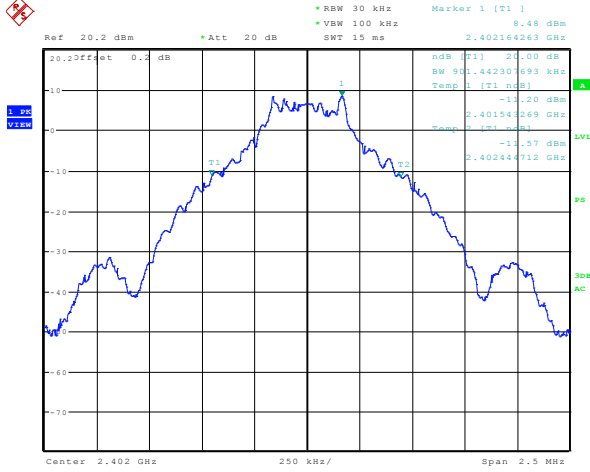
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R&S	B079629	28 JUL 2015
RF Cable	Sucoflex 102	Huber-Suhner	B079823	06 AUG 2015

Note: The calibration period equipment is 1 year.

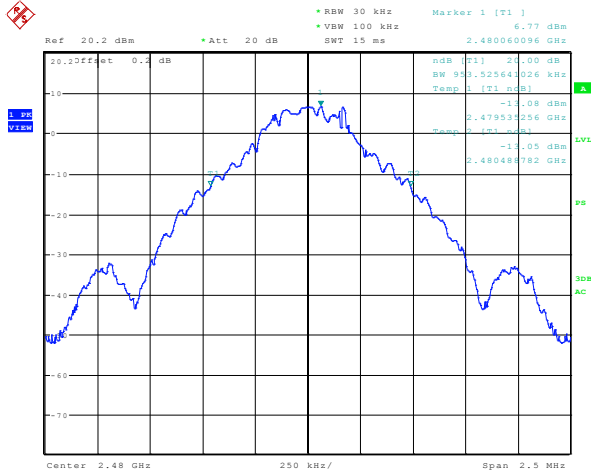
#### 3.5 Test Data

Frequency	Channel No	Modulation	20 dB bandwidth kHz
2402	0	GFSK	901
		EDR-2	1298
		EDR-3	1338
2441	39	GFSK	909
		EDR-2	1346
		EDR-3	1334
2480	78	GFSK	953
		EDR-2	1342
		EDR-3	1334

## GFSK



Date: 28.APR.2015 05:40:52

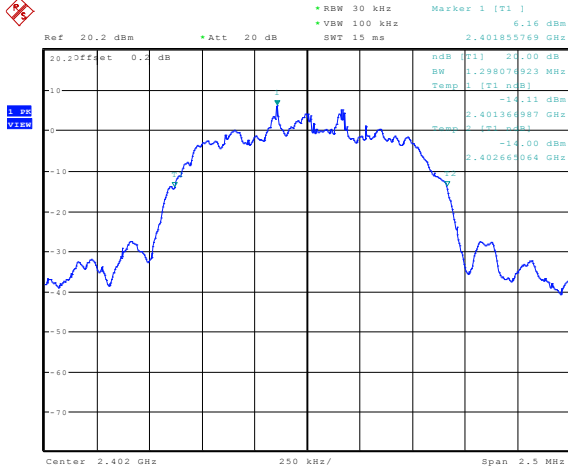


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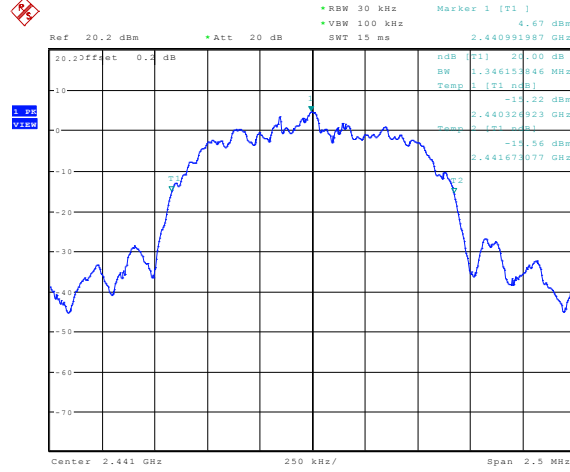
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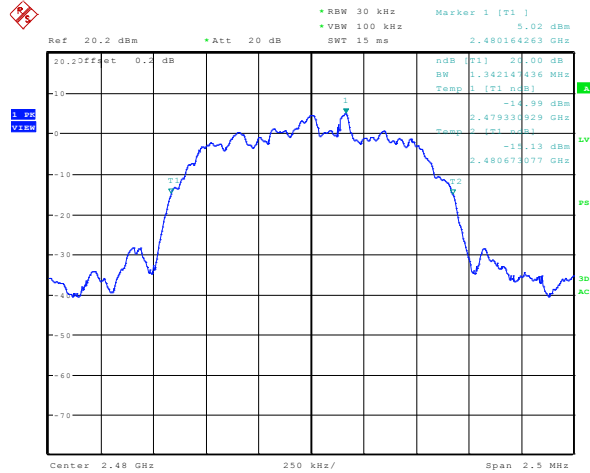
## EDR 2



Date: 28.APR.2015 05:42:16

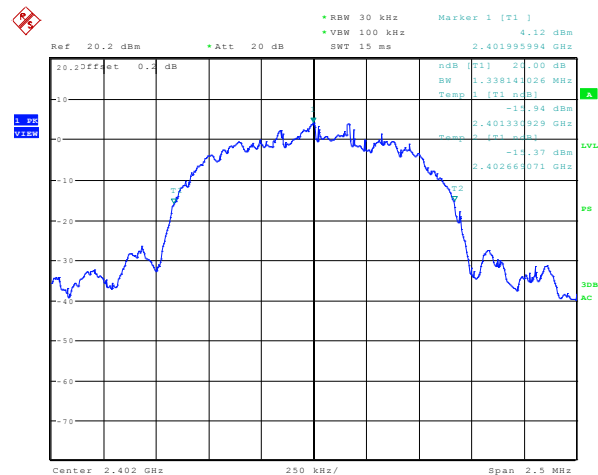


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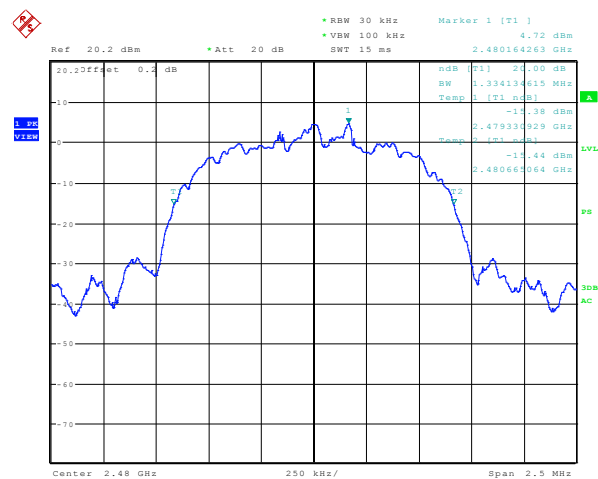


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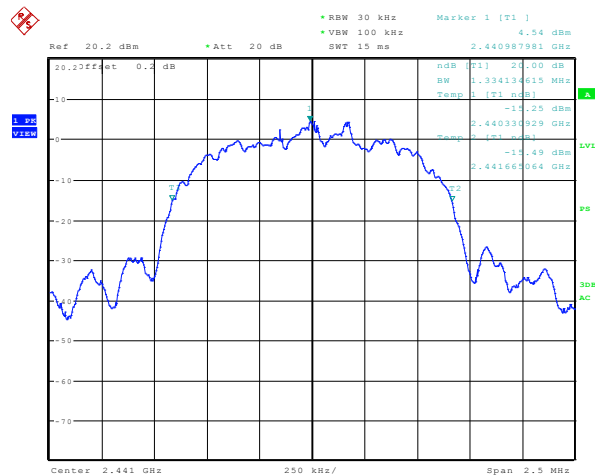
## EDR-3



Date: 28.APR.2015 05:43:14



Date: 28.APR.2015 05:54:32



Date: 28.APR.2015 05:50:42

## 4 Peak Output Power

### 4.1 Test Result

Test Description	Test Specification	Test Result
Peak Output Power	15.247(a) (1)	Compliant

### 4.2 Test Method

The test data was measured using a spectrum analyzer with Peak detector and a resolution bandwidth of 3 MHz.

#### Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt.

### 4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

#### Environmental Conditions

Temperature: 22.7 °C  
Relative Humidity: 36.9 %

### 4.4 Test Equipment

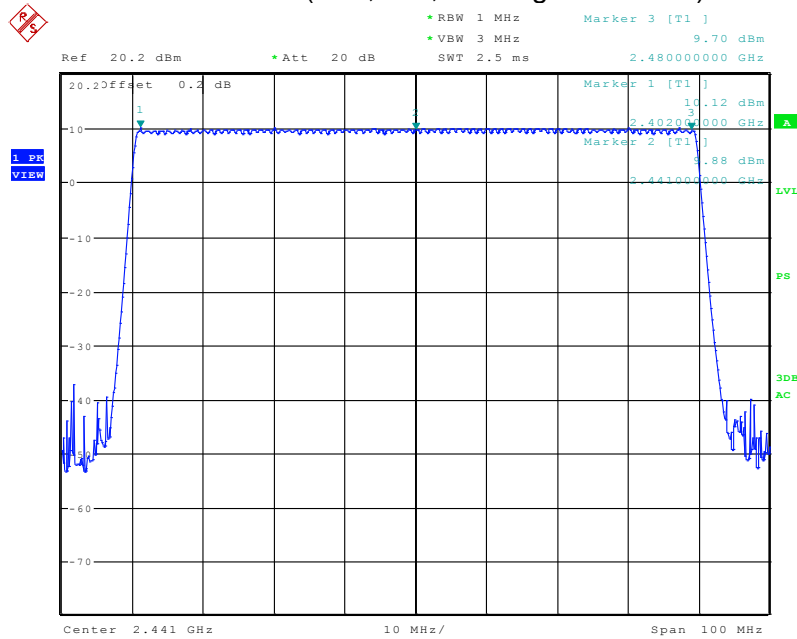
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R&S	B079629	28 JUL 2015
RF Cable	Sucoflex 102	Huber-Suhner	B079823	06 AUG 2015

Note: The calibration period equipment is 1 year.

#### 4.5 Test Data

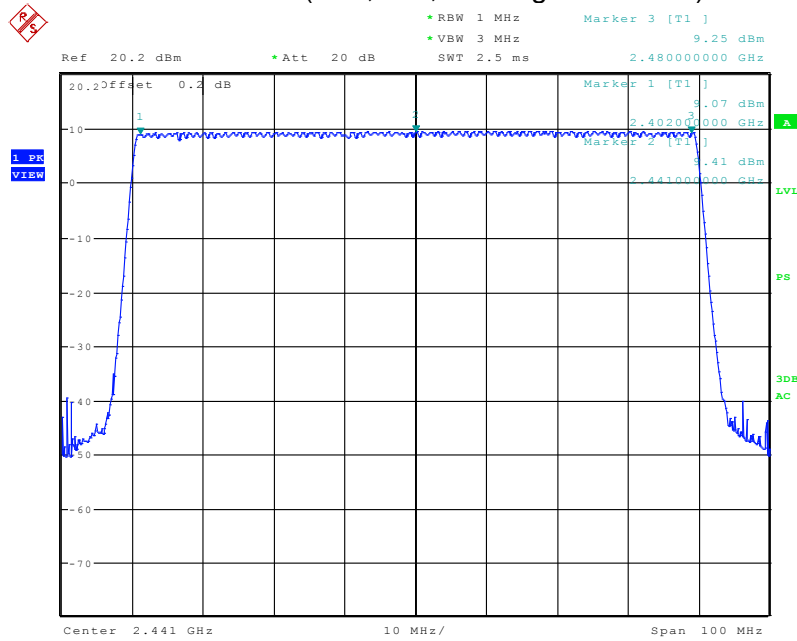
Frequency	Channel No	Modulation	Peak Output Power (dBm)	Peak Output Power (W)
2402	0	GFSK	10.1	0.010
		EDR-2	9.1	0.008
		EDR-3	9.3	0.008
2441	39	GFSK	9.9	0.010
		EDR-2	9.4	0.009
		EDR-3	9.8	0.010
2480	78	GFSK	9.7	0.009
		EDR-2	9.3	0.008
		EDR-3	9.6	0.009

### GFSK (Low, Mid, and High Channels)



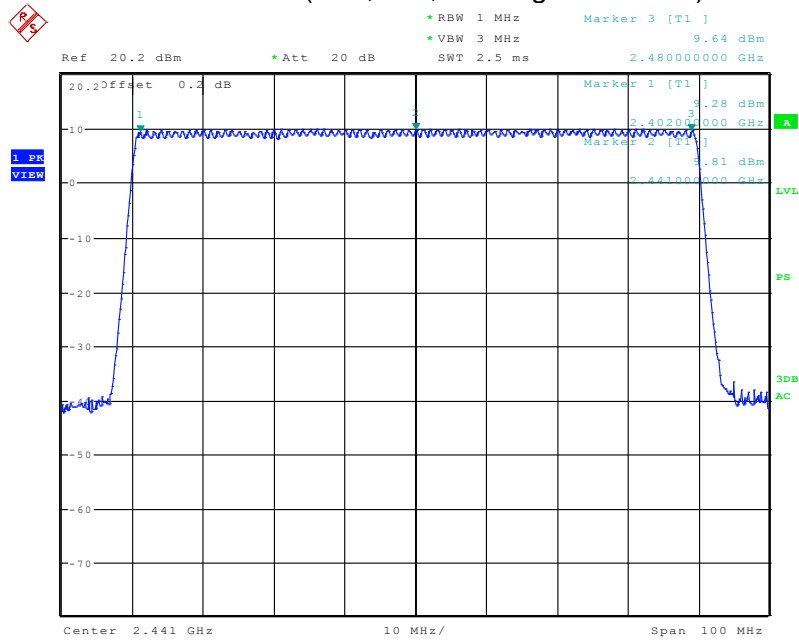
Date: 28.APR.2015 03:30:03

### EDR2 (Low, Mid, and High Channels)



Date: 28.APR.2015 05:30:06

### EDR3 (Low, Mid, and High Channels)



Date: 28.APR.2015 05:31:58

## 5 Conducted Spurious Emissions and Band Edge Measurements

### 5.1 Test Result

Test Description	Test Specification	Test Result
Conducted Spurious Emissions	15.247(d)	Compliant

### 5.2 Test Method

The test data was measured using a spectrum analyzer with

- Peak detector, max hold
- Resolution bandwidth of at least 100 kHz
- Video bandwidth at least 3x RBW
- Frequency range: 30 MHz to 26 GHz

The limit is 20 dB below the measured peak power.

### 5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C

Relative Humidity: 37.1 %

### 5.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R&S	B079629	28 JUL 2015
RF Cable	Sucoflex 102	Huber-Suhner	B079823	06 AUG 2015

Note: The calibration period equipment is 1 year.

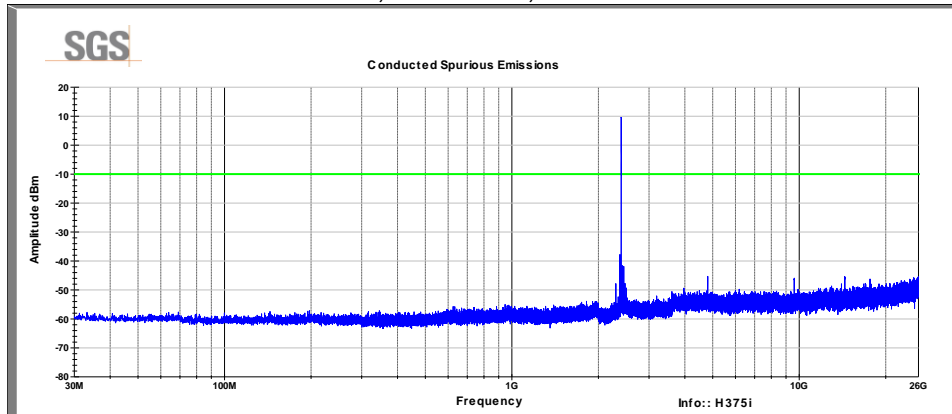


## 5.5 Test Data

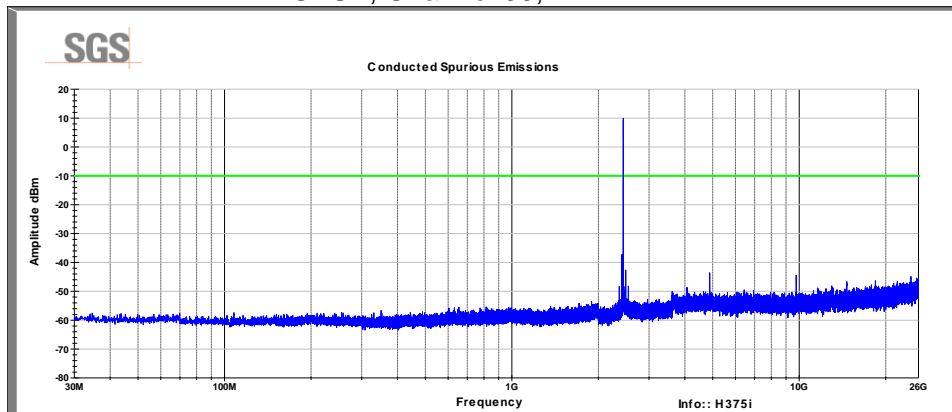
### 5.5.1 Spurious Emissions

No spurious emissions detected within 20dB of the limit.

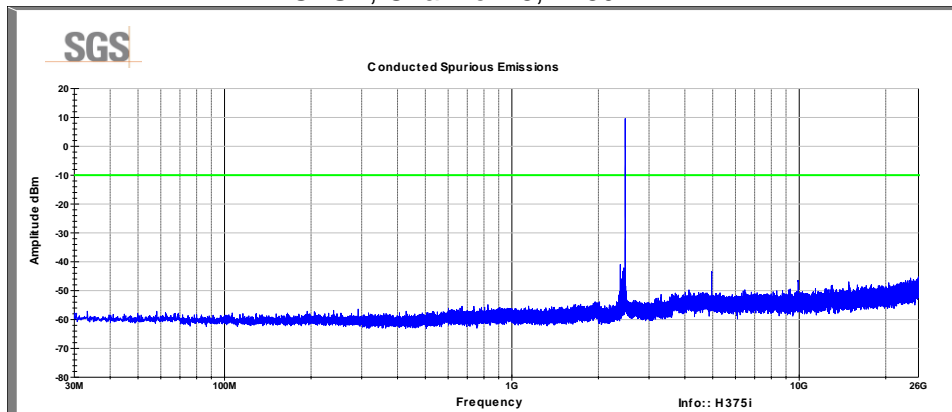
GFSK, Channel 0, 2402 MHz



GFSK, Channel 39, 2441 MHz



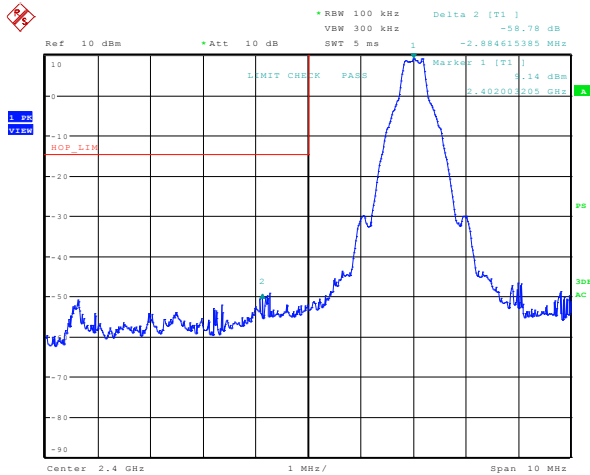
GFSK, Channel 78, 2480 MHz



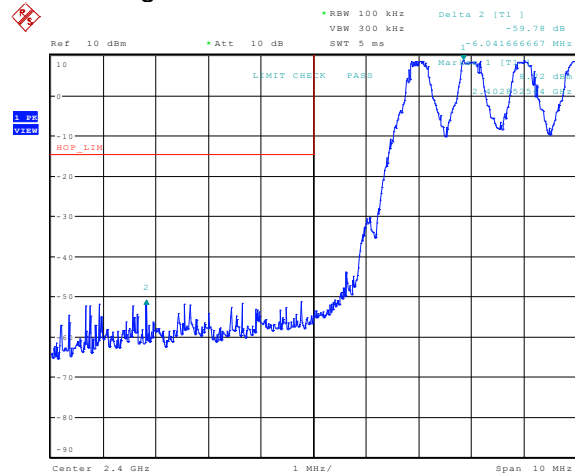
## 5.6 Band Edges

There were no emissions within 20 dB of the limit.  
Tests performed in hopping and non-hopping modes.

### GFSK, Lower band edge

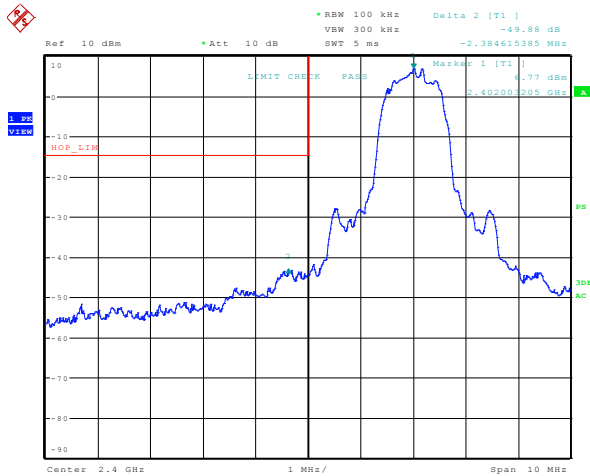


Date: 28.APR.2015 06:56:38

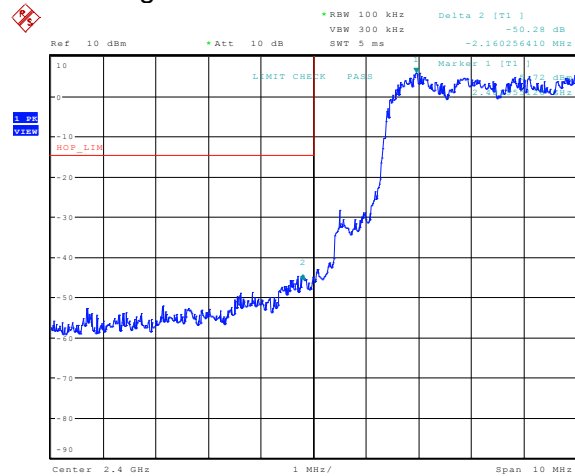


Date: 28.APR.2015 06:55:31

### EDR3, Lower band edge

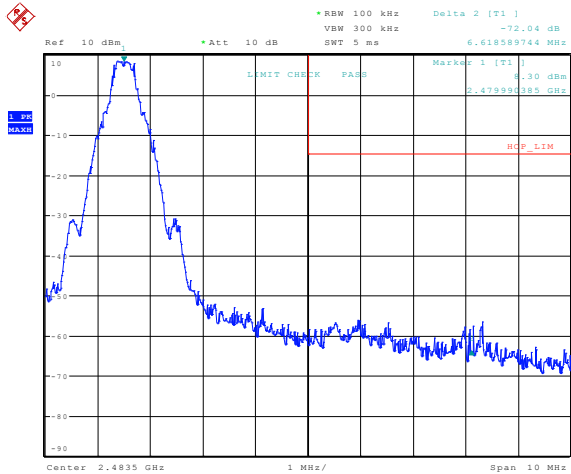


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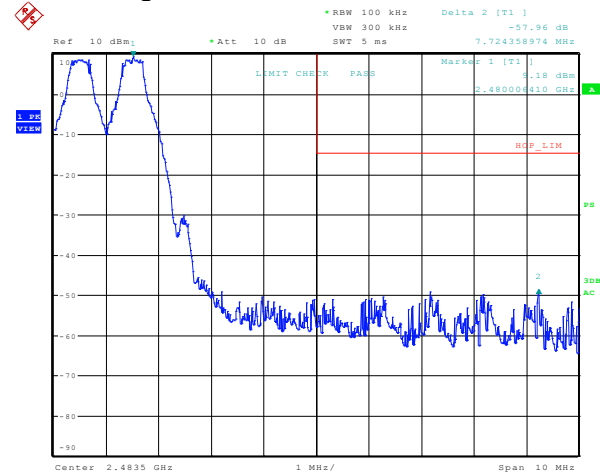


Date: 28.APR.2015 06:52:40

## GFSK, Upper band edge

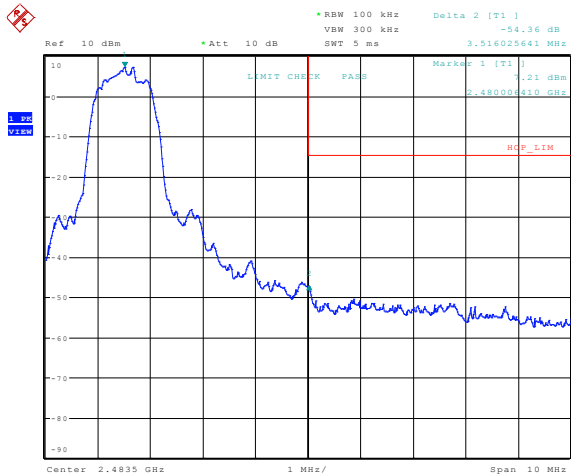


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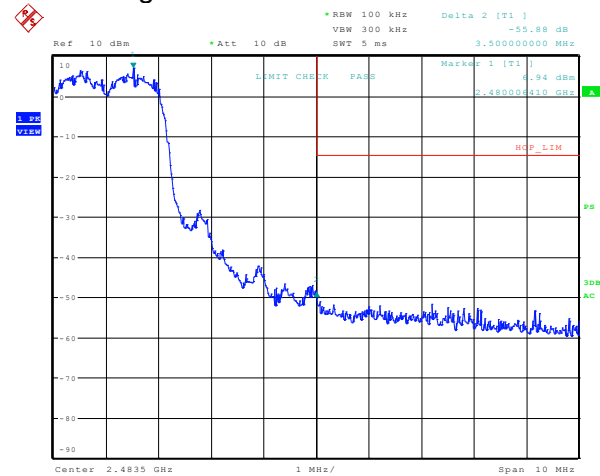


Date: 28.APR.2015 07:01:22

## EDR3, Upper band edge



Date: 28.APR.2015 07:03:35



Date: 28.APR.2015 07:06:09

## 6 Field Strength of Spurious Radiation

### 6.1 Test Result

Test Description	Test Specification	Test Result
Field strength of spurious radiation	15.249 (a) and 15.209 RSS 210 2.6, A2.9 (1)(2)	Compliant

### 6.2 Test Method

The initial preliminary exploratory scans were performed over the frequency range as indicated in the tables below using the max hold function and incorporating a Peak detector and using TILE! software. The final test data was measured using a Quasi-Peak detector below 1GHz and a Peak detector above 1GHz. For harmonics of the fundamental, Average measurements were made by correcting the peak value with the duty cycle correction factor. For emissions other than harmonics of the fundamental, the Average measurements were made using the Average detector. The receivers resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

The device was manipulated through three orthogonal axes.

Test distance:

30 MHz to 1 GHz - The EUT to measurement antenna distance is 3 meters

1 to 18 GHz - The EUT to measurement antenna distance is 3 meters

18 to 40 GHz - The EUT to measurement antenna distance is 1 meter

Frequency	Limits <sup>(1)</sup>		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 <sup>(2)</sup>	--
88 - 216 MHz	150	43.5 <sup>(2)</sup>	--
216 - 960 MHz	200	46 <sup>(2)</sup>	--
960 - 1000 MHz	500	54 <sup>(2)</sup>	--
1 - 40 GHz	500	54 <sup>(3)</sup>	74

(1) These limits are applicable to emissions outside of the intentional transmit frequency band.

(2) Quasi-peak limit

(3) Average limit

### 6.3 Test Site

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 23.8 °C

Relative Humidity: 46.6 %

### 6.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Bilog Antenna	JB6	Sunol	B079689	3 SEP 2015
DRWG Antenna	3117	ETS	B079691	24 Jun 2015
Horn Antenna	LB-180400-20-C-KF	A-INFOMW	N/A	11 Mar 2016
Receiver	ESU40	R & S	B079629	28 Jul 2015
Pre-Amplifier	NSP1800-25-HG	Miteq	B085572	30 Mar 2016
Pre-Amplifier	NSP1840-HG	Miteq	B087572	14 Oct 2015
Filter	HPM50111	Micro-tronics	B085747	07 Aug 2015
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079714	4 Aug 2015
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079659	5 Aug 2015
Coaxial Cable	Sucoflex 102	Huber+Suhner	B079822	6 Aug 2015
Coaxial Cable	Sucoflex 102	Huber+Suhner	B079823	6 Aug 2015

Note: The calibration period equipment is 1 year.

## 6.5 Test Data

### CH0, 2402 MHz

Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
2390.00	48.4	V	359.0	333.0	32.1	5.2	43.7	42.0	74.0	-32.0	X	Peak
2443.15	47.9	V	52.0	113.0	32.2	5.2	43.7	41.6	74.0	-32.4	X	Peak
2390.00	36.2	V	359.0	333.0	32.1	5.2	43.7	29.8	54.0	-24.2	X	Avg
2443.15	35.9	V	52.0	113.0	32.2	5.2	43.7	29.6	54.0	-24.4	X	Avg
1736.05	47.0	H	-3.0	254.0	29.5	4.4	42.8	38.0	74.0	-36.0	X	Peak
2380.45	56.8	H	339.0	336.0	32.0	5.2	43.7	50.3	74.0	-23.7	X	Peak
2390.00	47.6	H	334.0	392.0	32.1	5.2	43.7	41.2	74.0	-32.8	X	Peak
2469.85	48.0	H	293.0	122.0	32.3	5.2	43.7	41.8	54.0	-12.2	X	Peak
1736.05	34.9	H	-3.0	254.0	29.5	4.4	42.8	25.9	54.0	-28.1	X	Avg
2380.45	36.0	H	339.0	336.0	32.0	5.2	43.7	29.5	54.0	-24.5	x	Avg
2390.00	36.0	H	334.0	392.0	32.1	5.2	43.7	29.6	54.0	-24.4	X	Avg
2469.85	36.2	H	293.0	122.0	32.3	5.2	43.7	30.0	54.0	-24.0	X	Avg
Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
2307.25	60.1	V	205.0	292.0	31.8	5.0	43.6	53.3	74.0	-20.7	Y	Peak
2380.90	47.8	V	173.0	247.0	32.0	5.2	43.7	41.3	74.0	-32.7	Y	Peak
2390.00	47.6	V	-2.0	369.0	32.1	5.2	43.7	41.2	74.0	-32.8	Y	Peak
2307.25	36.1	V	205.0	292.0	31.8	5.0	43.6	29.3	54.0	-24.7	Y	Avg
2380.90	35.9	V	173.0	247.0	32.0	5.2	43.7	29.4	54.0	-24.6	Y	Avg
2390.00	36.0	V	-2.0	369.0	32.1	5.2	43.7	29.6	54.0	-24.4	Y	Avg
2380.15	59.2	H	36.0	255.0	32.0	5.2	43.7	52.8	74.0	-21.2	Y	Peak
2390.00	48.2	H	171.0	335.0	32.1	5.2	43.7	41.8	74.0	-32.2	Y	Peak
2380.15	36.1	H	36.0	255.0	32.0	5.2	43.7	29.6	54.0	-24.4	Y	Avg
2390.00	36.0	H	171.0	335.0	32.1	5.2	43.7	29.6	54.0	-24.4	Y	Avg
Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
2307.10	53.1	V	248.0	163.0	31.8	5.0	43.6	46.3	74.0	-27.7	Y	Peak
2380.15	54.3	V	4.0	291.0	32.0	5.2	43.7	47.9	74.0	-26.1	Y	Peak
2390.00	48.5	V	246.0	343.0	32.1	5.2	43.7	42.1	74.0	-31.9	Y	Peak
2307.10	36.1	V	248.0	163.0	31.8	5.0	43.6	29.3	54.0	-24.7	Y	Avg
2380.15	36.0	V	4.0	291.0	32.0	5.2	43.7	29.5	54.0	-24.5	Y	Avg
2390.00	36.2	V	246.0	343.0	32.1	5.2	43.7	29.8	54.0	-24.2	Y	Avg
2307.25	59.9	H	-3.0	226.0	31.8	5.0	43.6	53.2	74.0	-20.8	Y	Peak
2380.15	56.3	H	16.0	241.0	32.0	5.2	43.7	49.8	74.0	-24.2	Y	Peak
2390.00	48.6	H	19.0	220.0	32.1	5.2	43.7	42.2	74.0	-31.8	Y	Peak
2307.25	36.1	H	-3.0	226.0	31.8	5.0	43.6	29.3	54.0	-24.7	Y	Avg
2380.15	36.0	H	16.0	241.0	32.0	5.2	43.7	29.6	54.0	-24.4	Y	Avg
2390.00	36.4	H	19.0	220.0	32.1	5.2	43.7	30.0	54.0	-24.0	Y	Avg
Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
4003.50	51.7	V	226.0	100.0	33.4	6.8	44.1	47.9	74.0	-26.1	Y	Peak
4804.00	56.6	V	266.0	213.0	34.0	7.5	43.9	54.2	74.0	-19.8	Y	Peak
9607.50	49.3	V	42.0	398.0	36.8	11.0	39.4	57.7	74.0	-16.3	Y	Peak
4003.50	42.0	V	226.0	100.0	33.4	6.8	44.1	38.2	54.0	-15.8	Y	Avg
4804.00	50.1	V	266.0	213.0	34.0	7.5	43.9	47.7	54.0	-6.3	Y	Avg
9607.50	38.5	V	42.0	398.0	36.8	11.0	39.4	46.9	54.0	-7.1	Y	Avg
4003.25	47.9	H	157.0	270.0	33.4	6.8	44.1	44.0	74.0	-30.0	Y	Peak
4804.00	45.5	H	-3.0	176.0	34.0	7.5	43.9	43.1	74.0	-30.9	Y	Peak
9607.50	39.3	H	326.0	307.0	36.8	11.0	39.4	47.7	74.0	-26.3	Y	Peak
4003.25	47.9	H	157.0	270.0	33.4	6.8	44.1	44.0	54.0	-10.0	Y	Avg
4804.00	45.5	H	-3.0	176.0	34.0	7.5	43.9	43.1	54.0	-10.9	Y	Avg
9607.50	39.3	H	326.0	307.0	36.8	11.0	39.4	47.7	54.0	-6.3	Y	Avg

## CH 39, 2441 MHz

Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
4068.25	50.9	V	327.0	100.0	33.4	6.9	44.1	47.1	74.0	-26.9	Z	Peak
4882.25	59.0	V	347.0	233.0	34.0	7.6	43.9	56.6	74.0	-17.4	Z	Peak
4068.25	41.4	V	327.0	100.0	33.4	6.9	44.1	37.7	54.0	-16.3	Z	Avg
4882.25	52.2	V	347.0	233.0	34.0	7.6	43.9	49.8	54.0	-4.2	Z	Avg

Frequency MHz	Raw AVG (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	AVG value dBuV/m	Limit (dBuV/m)	Margin (dB)	Axis	Detector
4882.00	53.1	H	99.0	272.0	34.0	7.6	43.9	50.7	74.0	-23.3	Z	Peak
4882.00	53.1	H	99.0	272.0	34.0	7.6	43.9	50.7	54.0	-3.3	Z	Avg

## CH 78, 2480 MHz

Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
2382.25	48.4	V	203.0	134.0	32.1	5.2	43.7	42.0	74.0	-32.0	X	Peak
2483.50	52.3	V	18.0	128.0	32.3	5.3	43.7	46.1	74.0	-27.9	X	Peak
2382.25	35.9	V	203.0	134.0	32.1	5.2	43.7	29.5	54.0	-24.5	X	Avg
2483.50	37.3	V	18.0	128.0	32.3	5.3	43.7	31.1	54.0	-22.9	X	Avg
2310.55	48.1	H	134.0	211.0	31.8	5.0	43.6	41.4	74.0	-32.6	X	Peak
2382.55	48.5	H	227.0	341.0	32.1	5.2	43.7	42.1	74.0	-31.9	X	Peak
2483.50	55.5	H	266.0	208.0	32.3	5.3	43.7	49.3	74.0	-24.7	X	Peak
2310.55	36.0	H	134.0	211.0	31.8	5.0	43.6	29.2	54.0	-24.8	X	Avg
2382.55	36.0	H	227.0	341.0	32.1	5.2	43.7	29.6	54.0	-24.4	X	Avg
2483.50	38.5	H	266.0	208.0	32.3	5.3	43.7	32.3	54.0	-21.7	X	Avg
Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
2307.55	56.2	V	180.0	235.0	31.8	5.0	43.6	49.4	74.0	-24.6	Y	Peak
2380.00	55.1	V	25.0	170.0	32.0	5.2	43.7	48.6	74.0	-25.4	Y	Peak
2483.50	52.7	V	206.0	336.0	32.3	5.3	43.7	46.5	74.0	-27.5	Y	Peak
2307.55	36.0	V	180.0	235.0	31.8	5.0	43.6	29.3	54.0	-24.7	Y	Avg
2380.00	35.9	V	25.0	170.0	32.0	5.2	43.7	29.5	54.0	-24.5	Y	Avg
2483.50	38.1	V	206.0	336.0	32.3	5.3	43.7	32.0	54.0	-22.0	Y	Avg
1742.65	47.4	H	-3.0	368.0	29.5	4.4	42.8	38.5	74.0	-35.5	Y	Peak
2380.75	48.2	H	138.0	386.0	32.0	5.2	43.7	41.7	74.0	-32.3	Y	Peak
2483.50	51.2	H	45.0	349.0	32.3	5.3	43.7	45.0	74.0	-29.0	Y	Peak
1742.65	35.3	H	-3.0	368.0	29.5	4.4	42.8	26.4	54.0	-27.6	Y	Avg
2380.75	35.9	H	138.0	386.0	32.0	5.2	43.7	29.4	54.0	-24.6	Y	Avg
2483.50	37.9	H	45.0	349.0	32.3	5.3	43.7	31.7	54.0	-22.3	Y	Avg
Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
1735.00	46.9	V	34.0	340.0	29.4	4.4	42.8	37.9	74.0	-36.1	Z	Peak
1960.90	51.3	V	184.0	127.0	31.0	4.6	43.0	43.9	74.0	-30.1	Z	Peak
2339.50	51.5	V	140.0	100.0	31.9	5.1	43.6	44.8	74.0	-29.2	Z	Peak
2459.95	57.5	V	345.0	186.0	32.3	5.2	43.7	51.3	74.0	-22.7	Z	Peak
2483.50	55.7	V	331.0	176.0	32.3	5.3	43.7	49.5	74.0	-24.5	Z	Peak
1735.00	35.1	V	34.0	340.0	29.4	4.4	42.8	26.1	54.0	-27.9	Z	Avg
1960.90	40.8	V	184.0	127.0	31.0	4.6	43.0	33.4	54.0	-20.6	Z	Avg
2339.50	36.3	V	140.0	100.0	31.9	5.1	43.6	29.7	54.0	-24.3	Z	Avg
2459.95	43.4	V	345.0	186.0	32.3	5.2	43.7	37.2	54.0	-16.8	Z	Avg
2483.50	40.5	V	331.0	176.0	32.3	5.3	43.7	34.3	54.0	-19.7	Z	Avg
1739.65	35.6	H	233.0	105.0	29.5	4.4	42.8	26.6	74.0	-47.4	Z	Peak
1961.05	41.0	H	221.0	246.0	31.0	4.6	43.0	33.6	74.0	-40.4	Z	Peak
2339.20	36.6	H	354.0	298.0	31.9	5.1	43.6	29.9	74.0	-44.1	Z	Peak
2460.25	46.9	H	346.0	230.0	32.3	5.2	43.7	40.6	74.0	-33.4	Z	Peak
2483.50	40.7	H	9.0	263.0	32.3	5.3	43.7	34.5	74.0	-39.5	Z	Peak
1739.65	35.6	H	233.0	105.0	29.5	4.4	42.8	26.6	54.0	-27.4	Z	Avg
1961.05	41.0	H	221.0	246.0	31.0	4.6	43.0	33.6	54.0	-20.4	Z	Avg
2339.20	36.6	H	354.0	298.0	31.9	5.1	43.6	29.9	54.0	-24.1	Z	Avg
2460.25	46.9	H	346.0	230.0	32.3	5.2	43.7	40.6	54.0	-13.4	Z	Avg
2483.50	40.7	H	9.0	263.0	32.3	5.3	43.7	34.5	54.0	-19.5	Z	Avg

Frequency MHz	Raw Peak (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	CL (dB)	Amp (dB)	Peak Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Axis	Detector
4960.50	60.0	V	341.0	199.0	34.0	7.7	44.0	57.7	74.0	-16.3	Z	Peak
9919.75	51.0	V	259.0	400.0	37.1	11.1	39.1	60.1	74.0	-13.9	Z	Peak
4960.50	51.5	V	341.0	199.0	34.0	7.7	44.0	49.2	54.0	-4.8	Z	Avg
9919.75	42.1	V	259.0	400.0	37.1	11.1	39.1	51.2	54.0	-2.8	Z	Avg
4960.00	53.2	H	85.0	328.0	34.0	7.7	44.0	50.9	74.0	-23.1	Z	Peak
9920.25	44.1	H	104.0	163.0	37.1	11.1	39.1	53.2	74.0	-20.8	Z	Peak
4960.00	53.2	H	85.0	328.0	34.0	7.7	44.0	50.9	54.0	-3.1	Z	Avg
9920.25	44.1	H	104.0	163.0	37.1	11.1	39.1	53.2	54.0	-0.8	Z	Avg



## 7 Pseudo-Random Hop Sequence

### 7.1 Test Result

Test Description	Test Specification	Test Result
Pseudo-Random Hop Sequence	RSS-210 A8.1(a)	Compliant <sup>(1)</sup>

Note (1): The theory of operation states that the device is Bluetooth and operates using a pseudo-random hopping technique.

### 7.2 Test Method

Compliance is demonstrated by Manufacturer's declaration or is stated in the Theory of Operation.

#### Requirement

The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset, while the long-term distribution appears evenly distributed.

## 8 Channel Separation

### 8.1 Test Result

Test Description	Test Specification	Test Result
Number of Hopping Channels	RSS-210 A8.1(b)	Compliant

### 8.2 Test Method

The test data was measured using a spectrum analyzer with Peak detector (max hold) and a resolution bandwidth of 100 kHz. The trace was allowed to stabilize until all channels were displayed.

#### Requirement

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the -20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

### 8.3 Test Site

SGS EMC Laboratory, Suwanee, GA

#### Environmental Conditions

Temperature: 22.9 °C

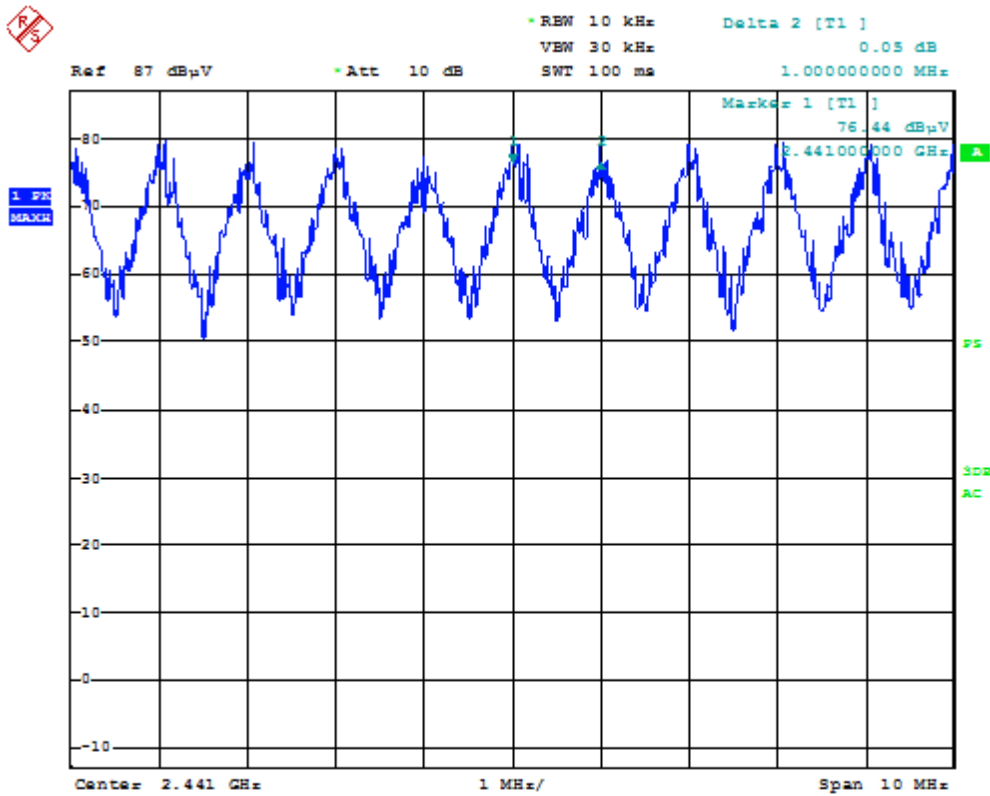
Relative Humidity: 49.4 %

### 8.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU08	R&S	B085759	26 JUN 2015
Coaxial Cable	141	Huber-Suhner	B095589	06 AUG 2015

Note: The calibration period equipment is 1 year.

## 8.5 Test Data



Date: 12.MAY.2015 08:29:36

## 9 Number of Hopping Channels

### 9.1 Test Result

Test Description	Test Specification	Test Result
Number of Hopping Channels	RSS-210 A8.1(d)	Compliant

### 9.2 Test Method

The test data was measured using a spectrum analyzer with Peak detector (max hold) and a resolution bandwidth of 30 kHz. The trace was allowed to stabilize until all channels were displayed.

#### Requirement

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

### 9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

#### Environmental Conditions

Temperature: 23.1 °C  
Relative Humidity: 43.9 %

### 9.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU08	R&S	B085759	26 JUN 2015
Coaxial Cable	141	Huber-Suhner	B095589	06 AUG 2015

Note: The calibration period equipment is 1 year.

## 9.5 Test Data

There are 79 Channels.

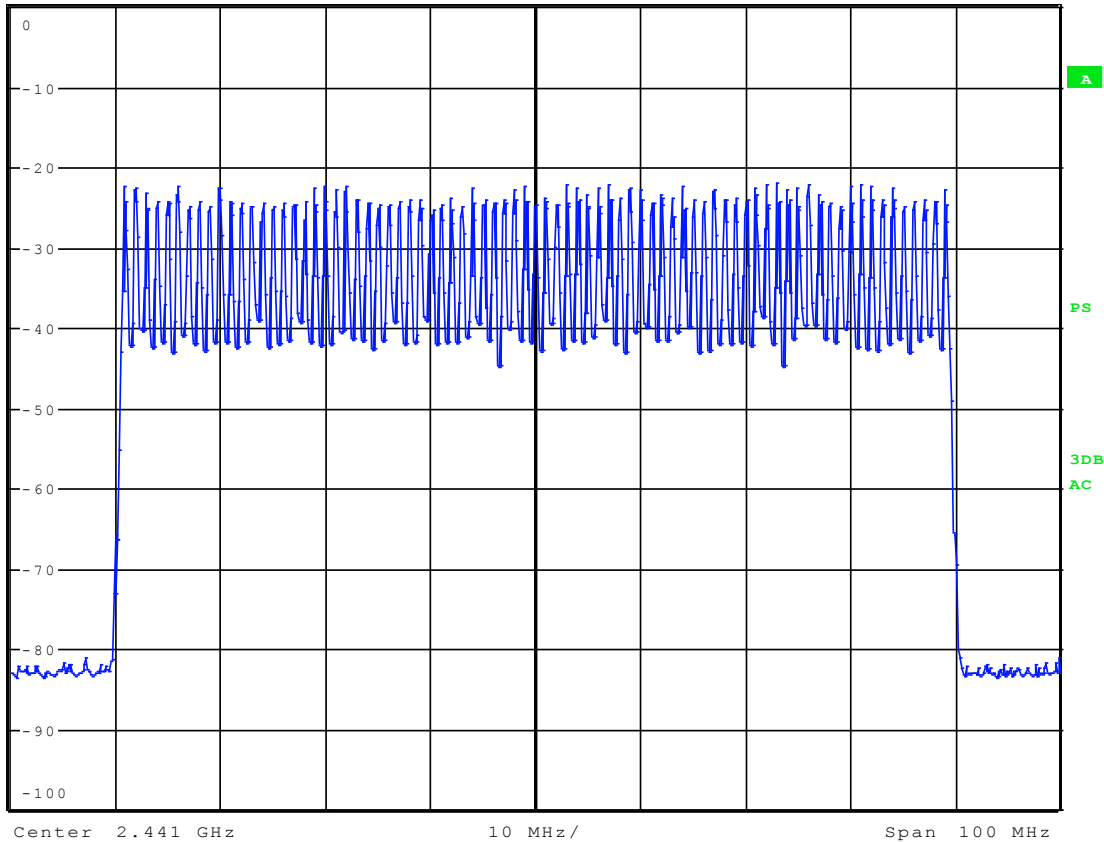


\* RBW 30 kHz  
VBW 100 kHz  
SWT 115 ms

Ref 0 dBm

\* Att 10 dB

1 PK  
VIEW



Date: 12.MAY.2015 09:16:27

## 10 Dwell Time

### 10.1 Test Result

Test Description	Test Specification	Test Result
Dwell Time	RSS-210 A8.1(d)	Compliant

### 10.2 Test Method

Bluetooth BR/EDR mode has a channel hopping rate of 1600 hops/s. Since BR/EDR modes use 5 transmit and 1 receive slot, for a total of 6 slots, the Bluetooth transmitter is actually hopping at a rate of  $1600 / 6 = 266.67$  hops/s.

- $400\text{ms} \times 79$  hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for BR/EDR modes with DH5 operation)
- $266.67$  hops/second / 79 channels = 3.38 hops/second (# hops/second on one channel)
- $3.38$  hops/second/channel \* 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- $106.67$  hops x 2.9 ms/channel = 309.34 ms (worst case dwell time for one channel in BR/EDR modes)

#### Requirement

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.

### 10.3 Test Site

SGS EMC Laboratory, Suwanee, GA

#### Environmental Conditions

Temperature: 23.1 °C  
Relative Humidity: 43.9 %

### 10.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU08	R&S	B085759	26 JUN 2015
Coaxial Cable	141	Huber-Suhner	B095589	06 AUG 2015

Note: The calibration period equipment is 1 year.

## 10.5 Test Data

	Packet Type	Pulse Width ms	Dwell Time Sec	Limit	Result
BR	DH1	0.399	0.13	0.4	PASS
	DH3	1.657	0.27	0.4	PASS
	DH5	2.907	0.31	0.4	PASS
EDR2	DH1	0.399	0.13	0.4	PASS
	DH3	1.657	0.27	0.4	PASS
	DH5	2.907	0.31	0.4	PASS
EDR3	DH1	0.399	0.13	0.4	PASS
	DH3	1.657	0.27	0.4	PASS
	DH5	2.907	0.31	0.4	PASS

## 11 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	13 May 2015