

## FCC Test Report

Product Name	PIR Motion Detector
Model No.	HSP01-0
FCC ID.	FU5HSP01

Applicant	EVERSPRING INDUSTRY CO., LTD
Address	3F, No.50, Sec.1, Zhonghua Rd., Tucheng Dist., New Taipei City 23666, Taiwan

Date of Receipt	May 17, 2017
Issued Date	Jun. 28, 2017
Report No.	1750444R-RFUSP01V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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# Test Report

Issued Date: Jun. 28, 2017

Report No.: 1750444R-RFUSP01V00



Product Name	PIR Motion Detector
Applicant	EVERSPRING INDUSTRY CO., LTD
Address	3F, No.50, Sec.1, Zhonghua Rd., Tucheng Dist., New Taipei City 23666, Taiwan
Manufacturer	Dong-Guan Li Yuan Electronics Co.,Ltd
Model No.	HSP01-0
FCC ID.	FU5HSP01
EUT Rated Voltage	DC 3V (Power by Battery)
EUT Test Voltage	DC 3V (Power by Battery)
Trade Name	EVERSPRING
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

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( Director / Vincent Lin )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	PIR Motion Detector
Trade Name	EVERSPRING
Model No.	HSP01-0
FCC ID.	FU5HSP01
Frequency Range	923MHz
Channel Number	1CH
Type of Modulation	FSK
Antenna Type	PIFA Antenna
Channel Control	Auto
Antenna Gain	Refer to the table "Antenna List"

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Dong-Guan Li Yuan Electronics Co.,Ltd	N/A	PIFA	-2 dBi

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency
01	923 MHz

Note:

1. The EUT is a PIR Motion Detector with a built-in 923MHz transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of 923MHz transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
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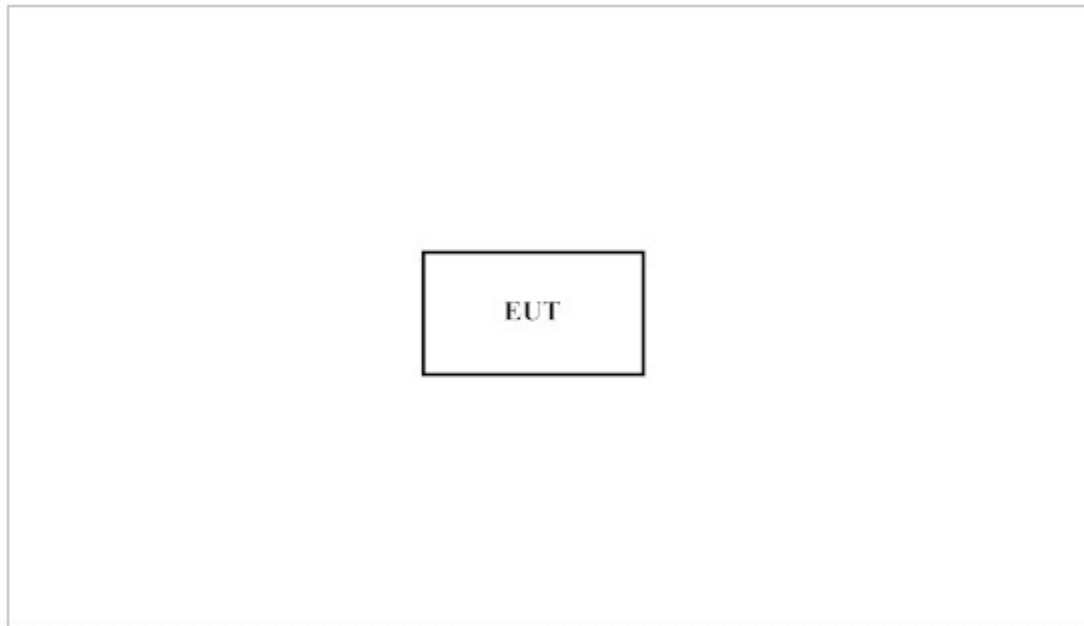
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
N/A				

Signal Cable Type	Signal cable Description
N/A	

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Press the button of EUT.
- (3) Start the continuous Transmit.
- (4) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: [http://www.dekra.com.tw/index\\_en](http://www.dekra.com.tw/index_en)

Site Description: Accredited by TAF  
Accredited Number: 3023

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E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)

FCC Accreditation Number: TW1014

## 1.7. List of Test Equipment

### For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.25	2018.05.24

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

### For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2017.01.09	2018.01.08
X	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
	Bluetooth Tester	R&S	CBT	101238	2017.01.03	2018.01.02

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek Conduction Test System V8.0.110

### For Radiated measurements /ACB1

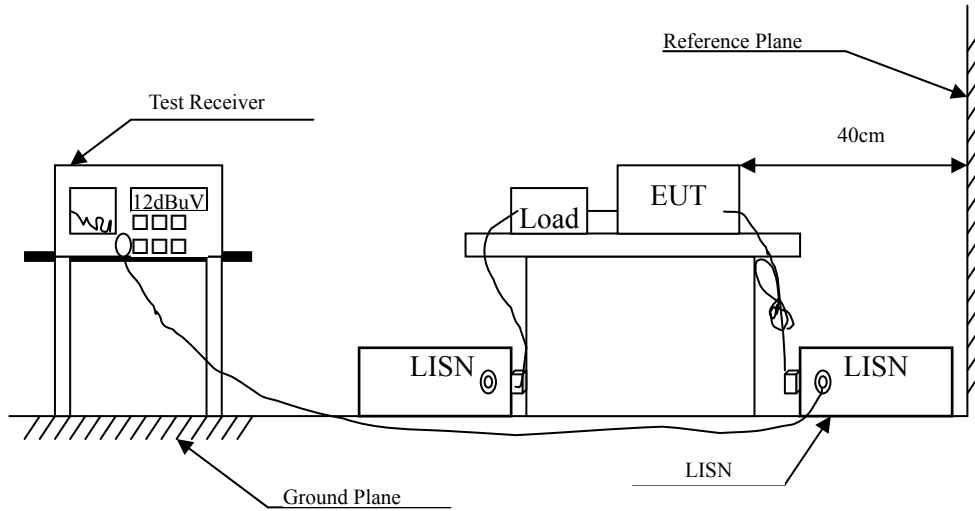
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.09	2018.02.08
X	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
	Horn Antenna	Com-Power	AH-840	101087	2017.05.03	2018.05.02
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.14	2018.05.13
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.15	2018.05.14
	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.15	2018.05.14
	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
	Filter	MICRO TRONICS	BRM50702	G251	2016.08.11	2017.08.10
	Filter	MICRO TRONICS	BRM50716	G188	2016.08.11	2017.08.10
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2016.08.11	2017.08.10

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

## 2. Conducted Emission

### 2.1. Test Setup



### 2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.



### **2.3. Test Procedure**

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

### **2.4. Uncertainty**

±2.35dB

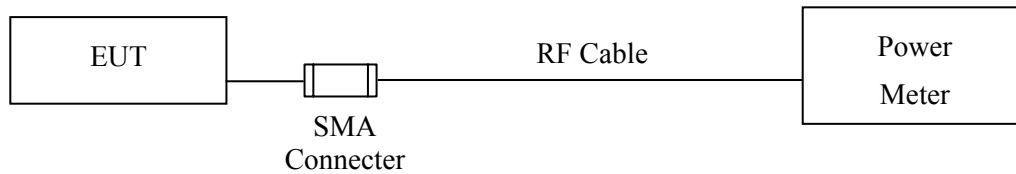
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## **2.5. Test Result of Conducted Emission**

Owing to the Battery operation of EUT, this test item is not performed.

### 3. Peak Power Output

#### 3.1. Test Setup



#### 3.2. Limit

The maximum peak power shall be less 1Watt.

#### 3.3. Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak-reading power meter method

#### 3.4. Uncertainty

$\pm 0.86$  dB

### 3.5. Test Result of Peak Power Output

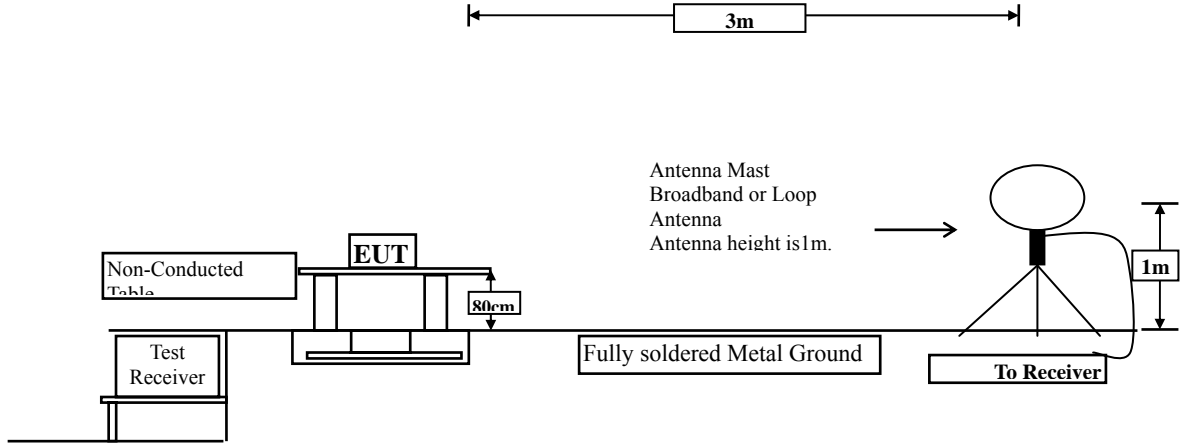
Product : PIR Motion Detector  
Test Item : Peak Power Output  
Test Mode : Mode 1: Transmit (923MHz)  
Test Date : 2017/05/26

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
01	923	10.98	1 Watt= 30 dBm	Pass

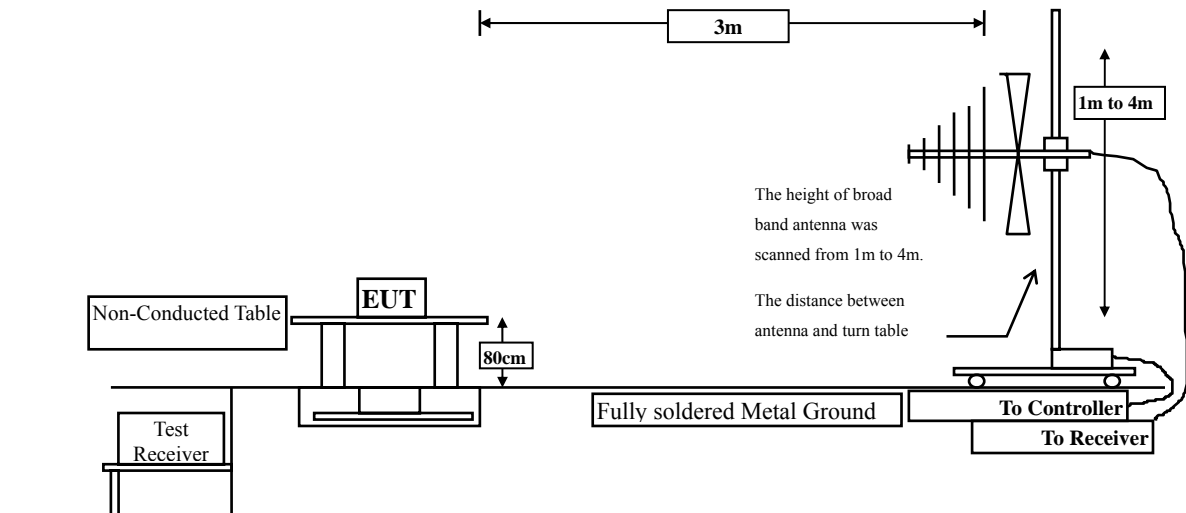
#### 4. Radiated Emission

##### 4.1. Test Setup

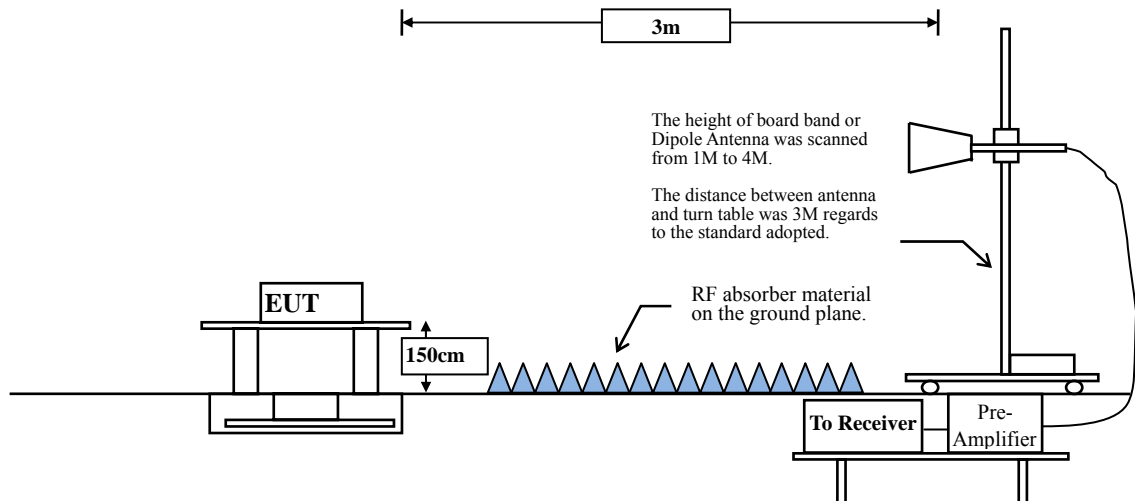
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



## 4.2. Limits

### ➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209 Limits</b>		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### 4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

### 4.4. Uncertainty

Horizontal polarization :

30-300MHz:  $\pm 4.08$ dB ; 300M-1GHz:  $\pm 3.86$ dB ; 1-18GHz:  $\pm 3.77$ dB ; 18-40GHz:  $\pm 3.98$ dB

Vertical polarization :

30-300MHz:  $\pm 4.81$ dB ; 300M-1GHz:  $\pm 3.87$ dB ; 1-18GHz :  $\pm 3.83$ dB ; 18-40GHz:  $\pm 3.98$ dB

#### 4.5. Test Result of Radiated Emission

Product : PIR Motion Detector  
 Test Item : Harmonic Radiated Emission  
 Test Mode : Mode 1: Transmit (923MHz)  
 Test Date : 2017/05/23

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
1846.000	-8.627	56.250	47.623	-26.377	74.000
2769.000	-6.072	52.410	46.339	-27.661	74.000
3692.000	-5.458	60.480	55.022	-18.978	74.000
4615.000	-3.872	54.200	50.328	-23.672	74.000
5538.000	-2.985	60.780	57.795	-16.205	74.000
6461.000	-1.259	52.320	51.062	-22.938	74.000
7384.000	-0.685	55.360	54.675	-19.325	74.000
8307.000	-0.271	44.090	43.819	-30.181	74.000
9230.000	0.554	47.090	47.644	-26.356	74.000
<b>Average</b>					
<b>Detector:</b>					
3692.000	-5.458	52.680	47.222	-6.778	54.000
5538.000	-2.985	46.080	43.095	-10.905	54.000
7384.000	-0.685	41.010	40.325	-13.675	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
1846.000	-8.627	54.290	45.663	-28.337	74.000
2769.000	-6.072	48.960	42.889	-31.111	74.000
3692.000	-5.458	58.150	52.692	-21.308	74.000
4615.000	-3.872	51.310	47.438	-26.562	74.000
5538.000	-2.985	57.350	54.365	-19.635	74.000
6461.000	-1.259	51.740	50.482	-23.518	74.000
7384.000	-0.685	51.490	50.805	-23.195	74.000
8307.000	-0.271	44.180	43.909	-30.091	74.000
9230.000	0.554	46.370	46.924	-27.076	74.000



**Average****Detector:**

5538.000	-2.985	43.220	40.235	-13.765	54.000
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## Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : PIR Motion Detector  
 Test Item : General Radiated Emission  
 Test Mode : Mode 1: Transmit (923MHz)  
 Test Date : 2017/05/24

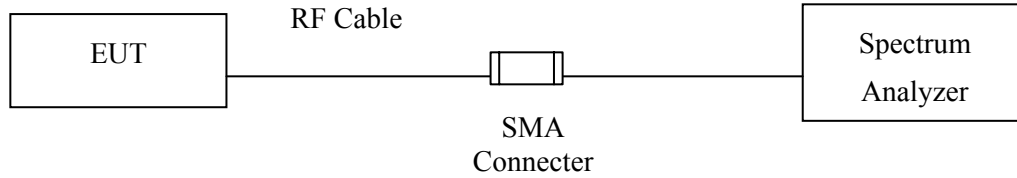
Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
181.320	-12.537	30.836	18.299	-25.201	43.500
329.730	-9.424	29.627	20.203	-25.797	46.000
438.370	-6.690	29.791	23.101	-22.899	46.000
594.540	-3.457	29.777	26.320	-19.680	46.000
747.800	-1.274	36.359	35.085	-10.915	46.000
964.110	1.292	32.166	33.458	-20.542	54.000
<b>Vertical</b>					
268.620	-11.117	30.063	18.945	-27.055	46.000
407.330	-7.412	30.087	22.674	-23.326	46.000
532.460	-4.890	30.238	25.348	-20.652	46.000
675.050	-2.422	30.207	27.785	-18.215	46.000
836.070	-0.232	31.722	31.490	-14.510	46.000
976.720	1.487	30.564	32.051	-21.949	54.000

## Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

## 5. RF Antenna Conducted Test

### 5.1. Test Setup



### 5.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

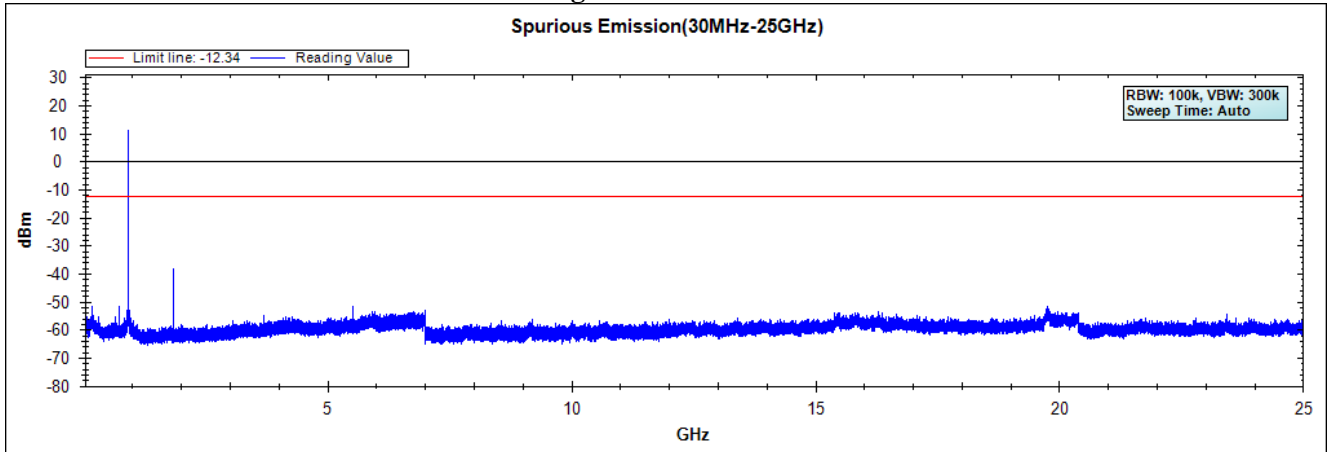
### 5.4. Uncertainty

±1.23dB

### 5.5. Test Result of RF Antenna Conducted Test

Product : PIR Motion Detector  
Test Item : RF Antenna Conducted Test  
Test Mode : Mode 1: Transmit (923MHz)  
Test Date : 2017/06/01

**Figure Channel 01:**

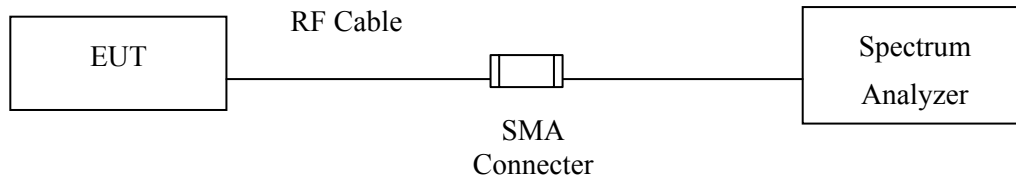


Note: The above test pattern is synthesized by multiple of the frequency range.

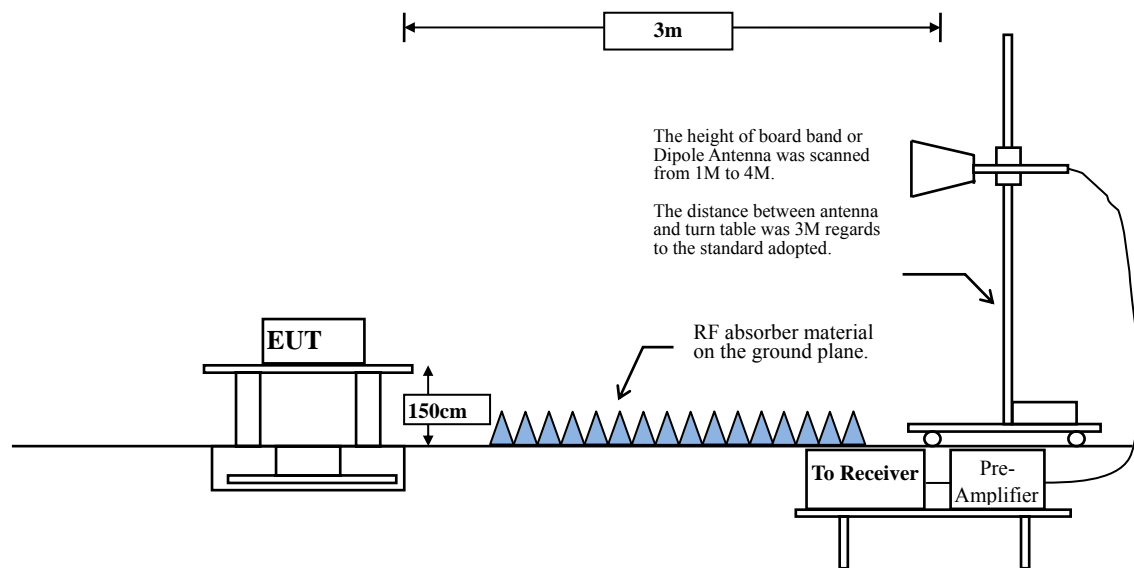
## 6. Band Edge

### 6.1. Test Setup

#### RF Conducted Measurement



#### RF Radiated Measurement:



## 6.2. Limit

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

## 6.4. Uncertainty

Conducted:  $\pm 1.23$ dB

Radiated:

Horizontal polarization :

30-300MHz:  $\pm 4.08$ dB ; 300M-1GHz:  $\pm 3.86$ dB ; 1-18GHz:  $\pm 3.77$ dB ; 18-40GHz:  $\pm 3.98$ dB

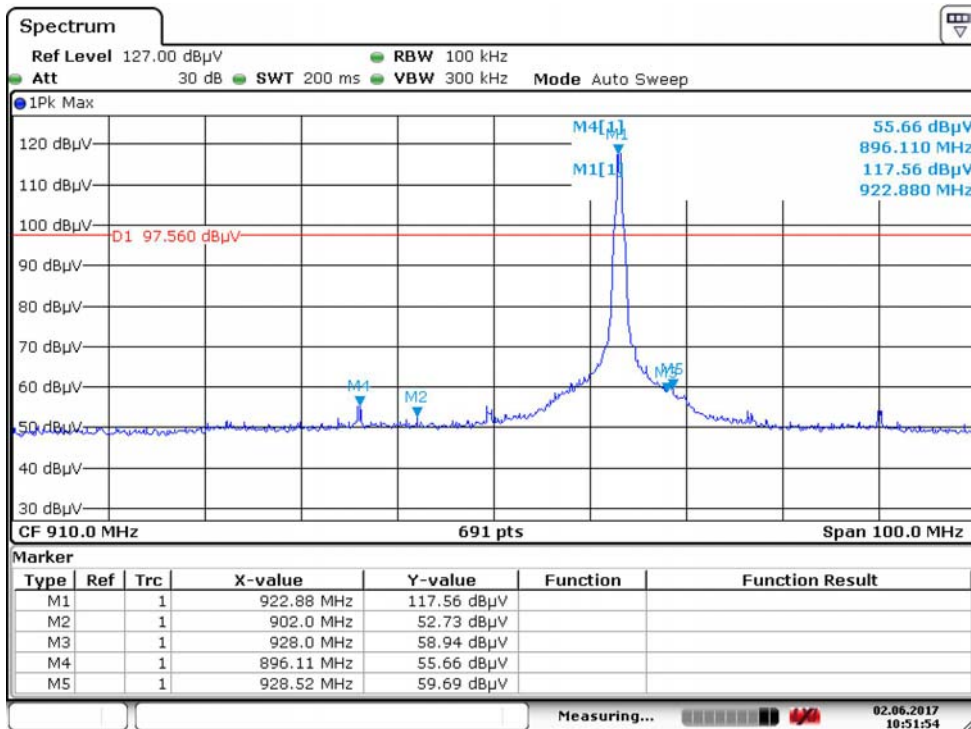
Vertical polarization :

30-300MHz:  $\pm 4.81$ dB ; 300M-1GHz:  $\pm 3.87$ dB ; 1-18GHz :  $\pm 3.83$ dB ; 18-40GHz:  $\pm 3.98$ dB

### 6.5. Test Result of Band Edge

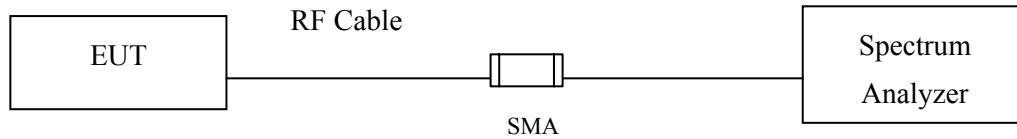
Product : PIR Motion Detector  
 Test Item : Band Edge  
 Test Mode : Mode 1: Transmit (923MHz)  
 Test Date : 2017/06/02

Measurement Level	Result
$\Delta$ (dB)	
> 20	PASS



## 7. 6dB Bandwidth

### 7.1. Test Setup



### 7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

### 7.3. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth,  $VBW \geq 3 * RBW$

### 7.4. Uncertainty

$\pm 279.2\text{Hz}$

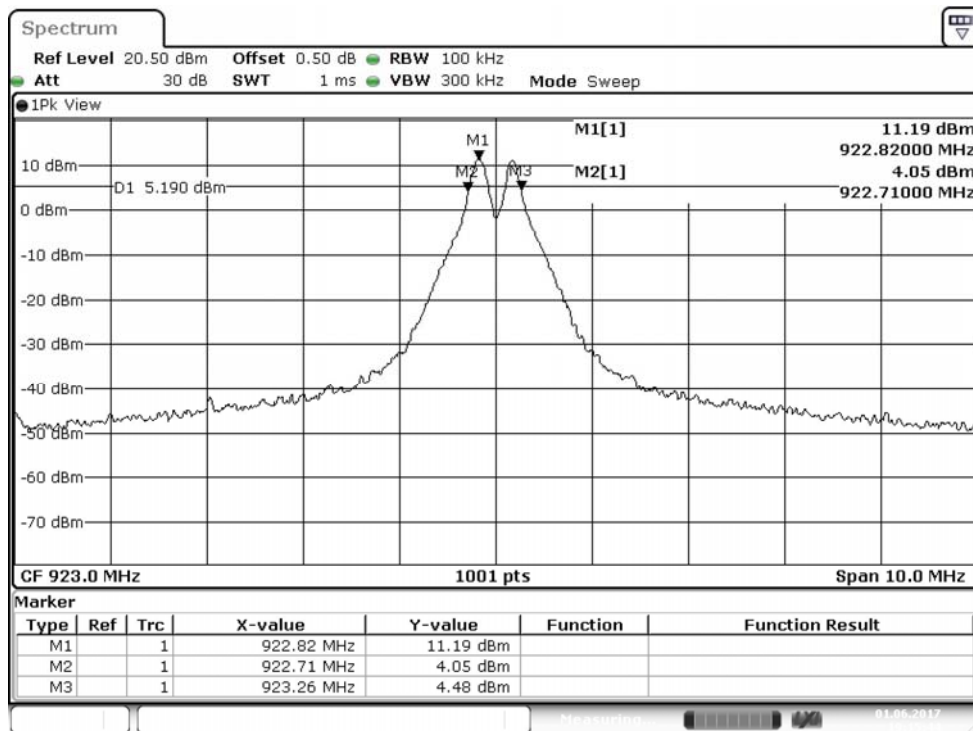


### 7.5. Test Result of 6dB Bandwidth

Product : PIR Motion Detector  
 Test Item : 6dB Bandwidth Data  
 Test Mode : Mode 1: Transmit (923MHz)  
 Test Date : 2017/05/26

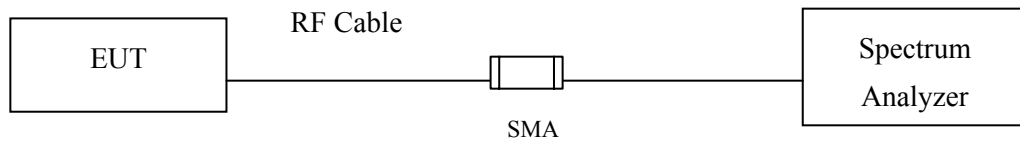
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	923	550	≥ 500	Pass

Figure Channel 01:



## 8. Power Density

### 8.1. Test Setup



### 8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

### 8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013, the maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

### 8.4. Uncertainty

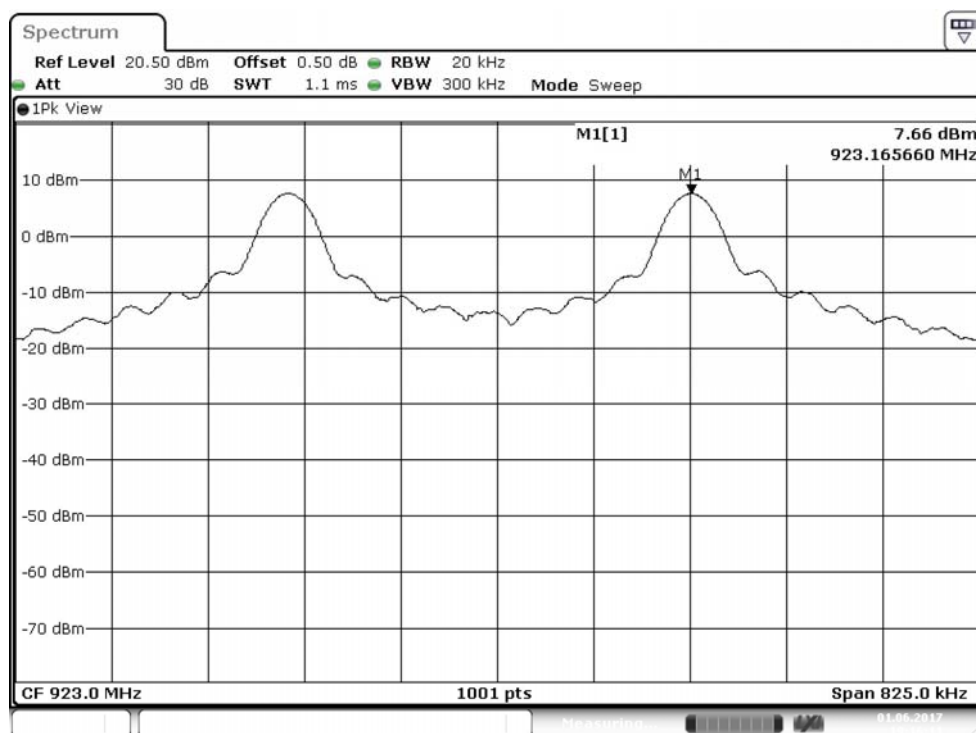
$\pm 1.23\text{dB}$

### 8.5. Test Result of Power Density

Product : PIR Motion Detector  
 Test Item : Power Density Data  
 Test Mode : Mode 1: Transmit (923MHz)  
 Test Date : 2017/05/26

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	923	7.66	≤ 8dBm	Pass

Figure Channel 01:



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**9. EMI Reduction Method During Compliance Testing**

No modification was made during testing.