

FCC Test Report

Product Name	Recessed Door Sensor
Model No.	PSM09
FCC ID	RHHPSM09

Applicant	Philio Technology Corporation
Address	8F.,No.653-2,Zhongzheng Rd., Xinzhuang Dist., New Taipei City 24257,Taiwan(R.O.C)

Date of Receipt	Aug. 16, 2018
Issued Date	Sep. 17, 2018
Report No.	1880239R-RFUSP15V00
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: Sep. 17, 2018


Report No.: 1880239R-RFUSP15V00



Product Name	Recessed Door Sensor
Applicant	Philio Technology Corporation
Address	8F.,No.653-2,Zhongzheng Rd., Xinzhuang Dist., New Taipei City 24257,Taiwan(R.O.C)
Manufacturer	Philio Technology Corporation
Model No.	PSM09
EUT Rated Voltage	DC 3.6V (Power by Battery)
EUT Test Voltage	DC 3.6V (Power by Battery)
Trade Name	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By

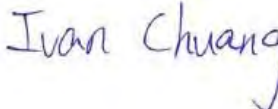
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(Senior Adm. Specialist / Jinn Chen)

Tested By

:



(Senior Engineer / Ivan Chuang)

Approved By

:



(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Recessed Door Sensor
Trade Name	
Model No.	PSM09
FCC ID	RHHPSM09
Frequency Range	908.40MHz, 916.00MHz
Channel Number	2
Type of Modulation	FSK
Channel Control	Auto
Antenna Type	Monopole Antenna
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	Philio	ANT-022	Monopole Antenna	0dBi

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel

Channel	Frequency	Channel	Frequency
Channel 01:	908.40 MHz	Channel 02:	916.00 MHz

Note:

1. The EUT is a Recessed Door Sensor with a built-in Z-Wave transceiver.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
3. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart C Paragraph 15.249 for spread spectrum devices.

Test Mode	Mode 1: Transmit
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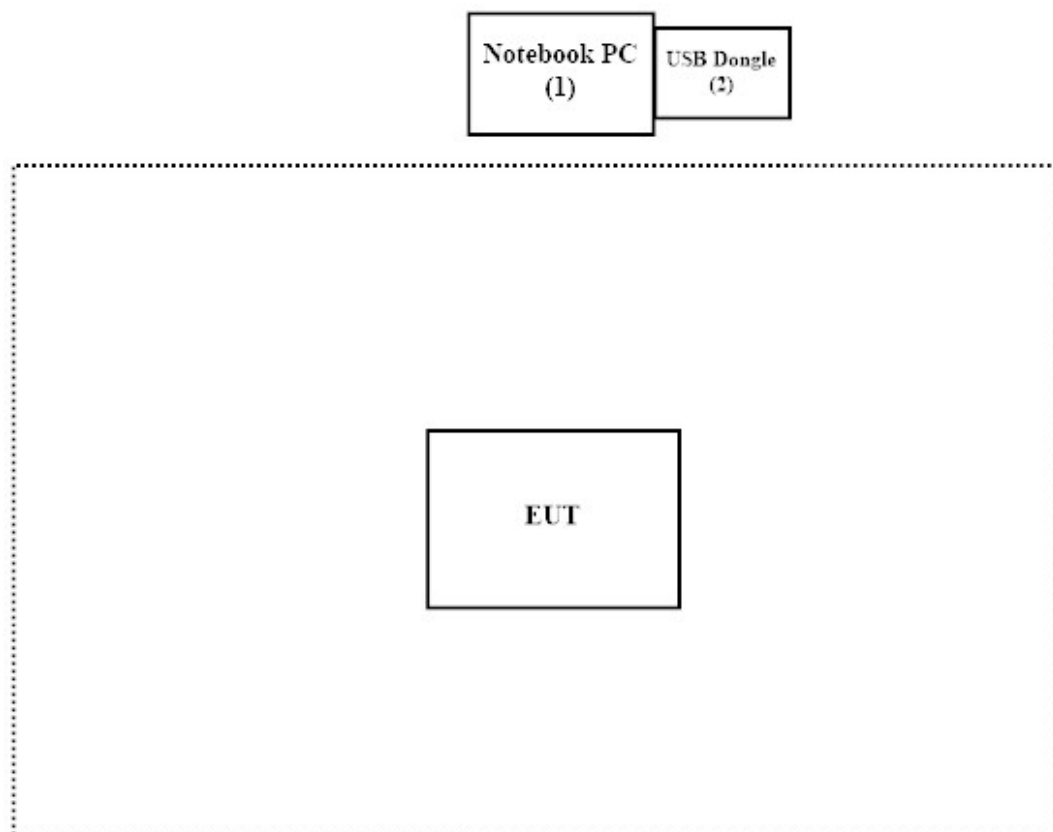
1.3. Tested System Details

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
1 Notebook PC	DELL	Inspiron 15 3000	GT5JPJ2	N/A
2 USB Dongle	Philio	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
N/A	

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute “TeraTerm Version 1.0.0.18” program on the Notebook.
- (3) Configure the test mode and the test channel
- (4) Start the continuous Transmit.
- (5) 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

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd.
Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW0023

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	101601	2018.02.08	2019.02.07
	Two-Line V-Network	R&S	ENV216	101306	2018.03.09	2019.03.08
	Two-Line V-Network	R&S	ENV216	101307	2018.03.20	2019.03.19
	Coaxial Cable	Quietek	RG400_BNC	RF001	2018.05.24	2019.05.23

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
	Spectrum Analyzer	R&S	FSV30	103464	2018.01.23	2019.01.22
	Power Meter	Anritsu	ML2496A	1548003	2017.12.11	2018.12.10
	Power Sensor	Anritsu	MA2411B	1531024	2017.12.11	2018.12.10
	Power Sensor	Anritsu	MA2411B	1531025	2017.12.11	2018.12.10
	Bluetooth Tester	R&S	CBT	101238	2018.01.18	2019.01.17

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 : DEKRA Conduction Test System V9.0.1

For Radiated measurements /ACB1

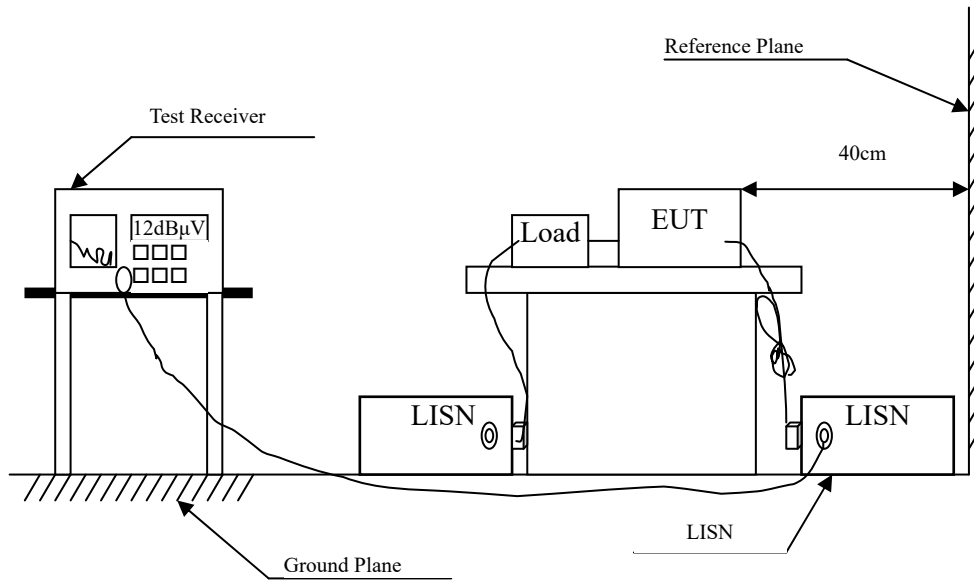
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2018.01.26	2019.01.25
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2018.04.02	2019.04.01
X	Horn Antenna	ETS-Lindgren	3117	00203800	2017.11.10	2018.11.09
	Horn Antenna	Com-Power	AH-840	101087	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC001330	980316	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2018.06.04	2019.06.03
	Pre-Amplifier	EMCI	EMC05820SE	980310	2018.06.04	2019.06.03
	Pre-Amplifier	EMCI	EMC184045SE	980314	2018.05.16	2019.05.15
	Filter	MICRO TRONICS	BRM50702	G251	2018.09.04	2019.09.03
	Filter	MICRO TRONICS	BRM50716	G188	2018.09.04	2019.09.03
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101148	2018.02.08	2019.02.07
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2018.05.25	2019.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2018.05.16	2019.05.15

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 (dB μ V) 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 simulators 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 refers 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 of 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.

2.4. Uncertainty

± 2.35 dB

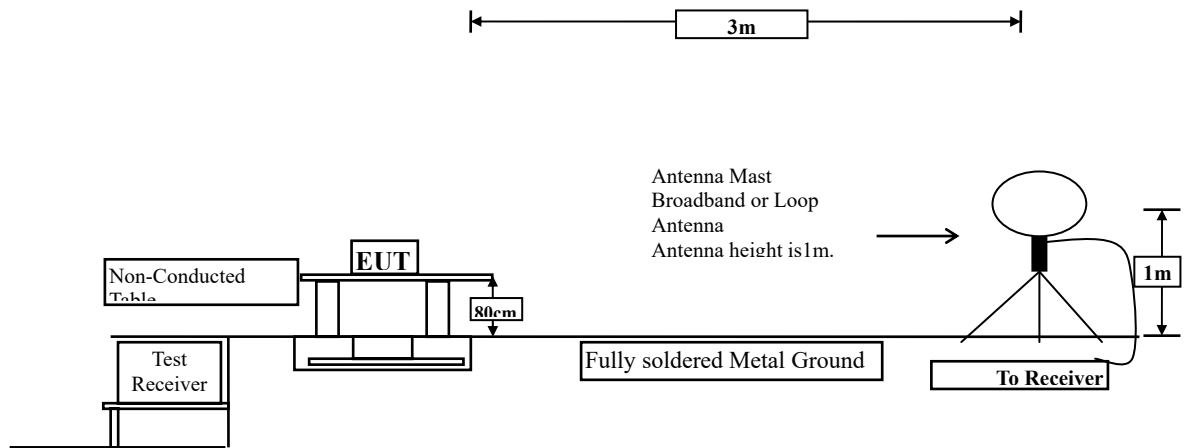
2.5. Test Result of Conducted Emission

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

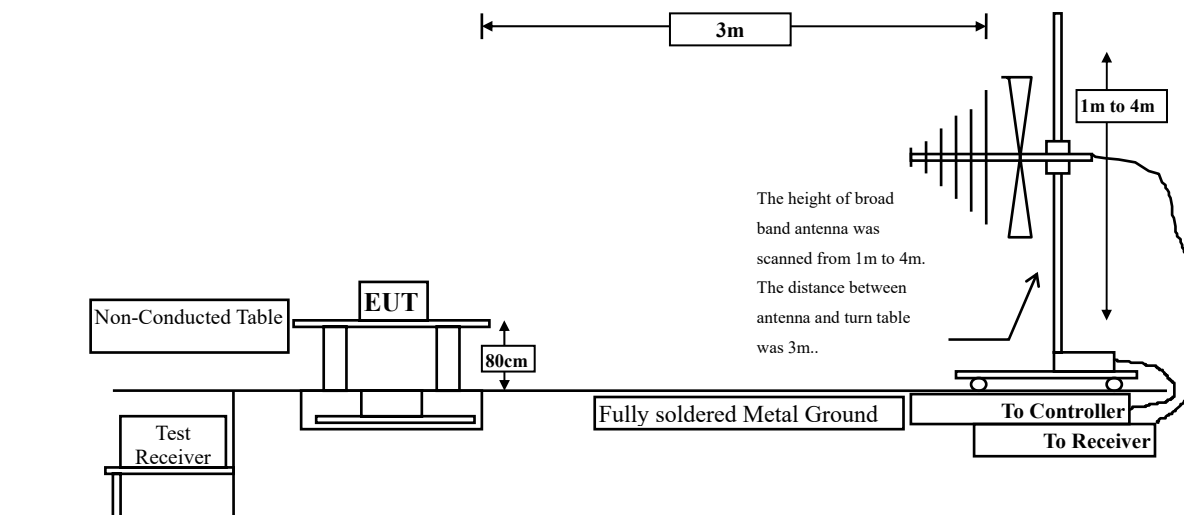
3. Radiated Emission

3.1. Test Setup

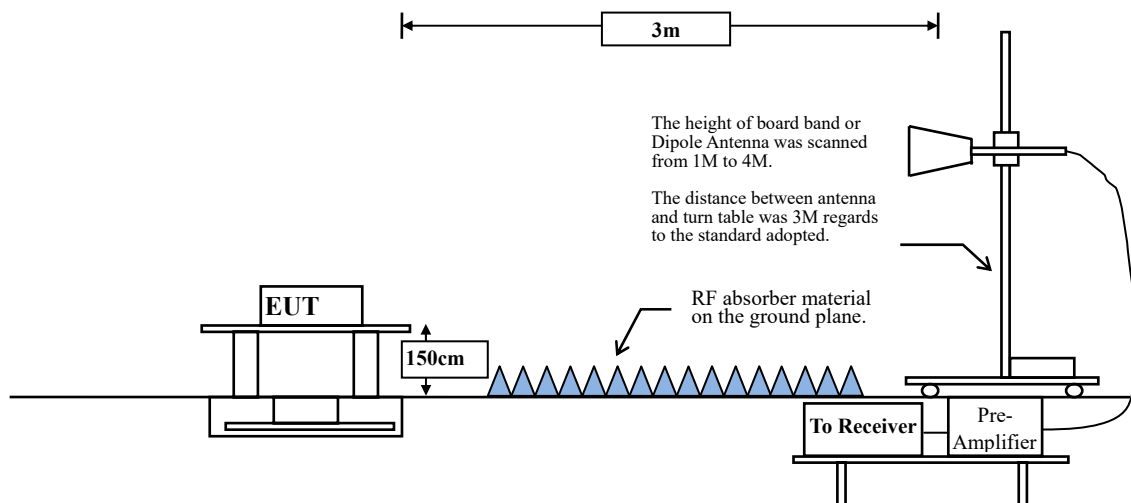
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.2. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBμV /m @3m)	(uV/m @3m)	(dBμV /m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBμV /m) = 20 log RF Voltage (uV/m)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
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: E field strength (dBμV /m) = 20 log E field strength (uV/m)

3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 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.

3.4. Uncertainty

Horizontal :

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

Vertical :

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

3.5. Test Result of Radiated Emission

Product : Recessed Door Sensor
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit

X-Axis

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Limit dBμV /m
Horizontal					
Quasi-Peak					
Detector:					
908.400	1.189	92.600	93.790	-0.210	94.000
916.000	1.276	91.700	92.976	-1.024	94.000

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.

Product : Recessed Door Sensor
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit

X-Axis

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Vertical					
Quasi-Peak					
Detector:					
908.400	1.189	87.700	88.890	-5.110	94.000
916.000	1.276	87.200	88.476	-5.524	94.000

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.

Product : Recessed Door Sensor
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit

Y-Axis

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Horizontal					
Quasi-Peak					
Detector:					
908.400	1.189	91.100	92.290	-1.710	94.000
916.000	1.276	89.600	90.876	-3.124	94.000

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.

Product : Recessed Door Sensor
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit

Y-Axis

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Vertical					
Quasi-Peak					
Detector:					
908.400	1.189	87.400	88.590	-5.410	94.000
916.000	1.276	87.000	88.276	-5.724	94.000

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.

Product : Recessed Door Sensor
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit

Z-Axis

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Horizontal					
Quasi-Peak					
Detector:					
908.400	1.189	92.000	93.190	-0.810	94.000
916.000	1.276	90.500	91.776	-2.224	94.000

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.

Product : Recessed Door Sensor
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit

Z-Axis

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Vertical					
Quasi-Peak					
Detector:					
908.400	1.189	83.300	84.490	-9.510	94.000
916.000	1.276	84.800	86.076	-7.924	94.000

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.

Product : Recessed Door Sensor
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (908.4MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Horizontal					
Peak Detector:					
1816.800	-8.117	47.060	38.943	-35.057	74.000
2725.200	-5.230	49.910	44.681	-29.319	74.000
3633.600	-4.380	46.240	41.860	-32.140	74.000
4542.000	-2.707	47.000	44.293	-29.707	74.000
5450.400	-1.792	46.620	44.829	-29.171	74.000
6358.800	0.044	48.400	48.444	-25.556	74.000
7267.200	0.800	45.130	45.930	-28.070	74.000
8175.600	1.413	52.140	53.553	-20.447	74.000
9084.000	2.513	45.120	47.633	-26.367	74.000
Average Detector:					
--					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.

Product : Recessed Door Sensor
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (908.4MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Vertical					
Peak Detector:					
1816.800	-8.117	46.750	38.633	-35.367	74.000
2725.200	-5.230	53.670	48.441	-25.559	74.000
3633.600	-4.380	46.110	41.730	-32.270	74.000
4542.000	-2.707	49.350	46.643	-27.357	74.000
5450.400	-1.792	46.230	44.439	-29.561	74.000
6358.800	0.044	48.640	48.684	-25.316	74.000
7267.200	0.800	44.960	45.760	-28.240	74.000
8175.600	1.413	48.570	49.983	-24.017	74.000
9084.000	2.513	44.830	47.343	-26.657	74.000
Average Detector:					
--					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.

Product : Recessed Door Sensor
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (916MHz)

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V /m	Margin dB	Peak Limit dB μ V /m
Horizontal					
Peak Detector:					
1832.000	-8.000	46.840	38.840	-35.160	74.000
2748.000	-5.202	50.040	44.839	-29.161	74.000
3664.000	-4.406	46.340	41.934	-32.066	74.000
4580.000	-2.657	47.320	44.663	-29.337	74.000
5496.000	-1.736	46.480	44.744	-29.256	74.000
6412.000	0.044	48.820	48.864	-25.136	74.000
7328.000	0.788	45.080	45.867	-28.133	74.000
8244.000	1.487	55.240	56.727	-17.273	74.000
9160.000	2.635	45.990	48.625	-25.375	74.000
Average Detector:					
8244.000	1.487	51.080	52.567	-1.433	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.

Product : Recessed Door Sensor
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (916MHz)

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V /m	Margin dB	Peak Limit dB μ V /m
Vertical					
Peak Detector:					
1832.000	-8.000	46.240	38.240	-35.760	74.000
2748.000	-5.202	53.670	48.469	-25.531	74.000
3664.000	-4.406	45.970	41.564	-32.436	74.000
4580.000	-2.657	48.910	46.253	-27.747	74.000
5496.000	-1.736	46.010	44.274	-29.726	74.000
6412.000	0.044	49.480	49.524	-24.476	74.000
7328.000	0.788	45.390	46.177	-27.823	74.000
8244.000	1.487	49.900	51.387	-22.613	74.000
9160.000	2.635	45.520	48.155	-25.845	74.000
Average Detector:					
--					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.

Product : Recessed Door Sensor
 Test Item : General Radiated Emission Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (908.4MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Horizontal					
724.520	-1.122	35.830	34.708	-11.292	46.000
755.560	-0.653	35.368	34.715	-11.285	46.000
788.540	-0.267	36.633	36.366	-9.634	46.000
821.520	0.130	38.736	38.866	-7.134	46.000
852.560	0.512	43.761	44.273	-1.727	46.000
885.540	0.925	42.108	43.033	-2.967	46.000
Vertical					
396.660	-7.207	36.700	29.493	-16.507	46.000
755.560	-0.653	31.216	30.563	-15.437	46.000
788.540	-0.267	34.869	34.602	-11.398	46.000
821.520	0.130	33.637	33.767	-12.233	46.000
852.560	0.512	34.023	34.535	-11.465	46.000
885.540	0.925	34.607	35.532	-10.468	46.000

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.

Product : Recessed Door Sensor
 Test Item : General Radiated Emission Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (916MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V /m	dB	dB μ V /m
Horizontal					
532.460	-4.370	32.348	27.978	-18.022	46.000
596.480	-2.908	32.570	29.662	-16.338	46.000
794.360	-0.197	32.546	32.349	-13.651	46.000
852.560	0.512	37.635	38.147	-7.853	46.000
885.540	0.925	36.708	37.633	-8.367	46.000
949.560	1.651	31.138	32.789	-13.211	46.000
Vertical					
596.480	-2.908	31.523	28.615	-17.385	46.000
676.020	-1.948	30.308	28.360	-17.640	46.000
788.540	-0.267	33.925	33.658	-12.342	46.000
821.520	0.130	33.000	33.130	-12.870	46.000
852.560	0.512	33.319	33.831	-12.169	46.000
885.540	0.925	34.740	35.665	-10.335	46.000

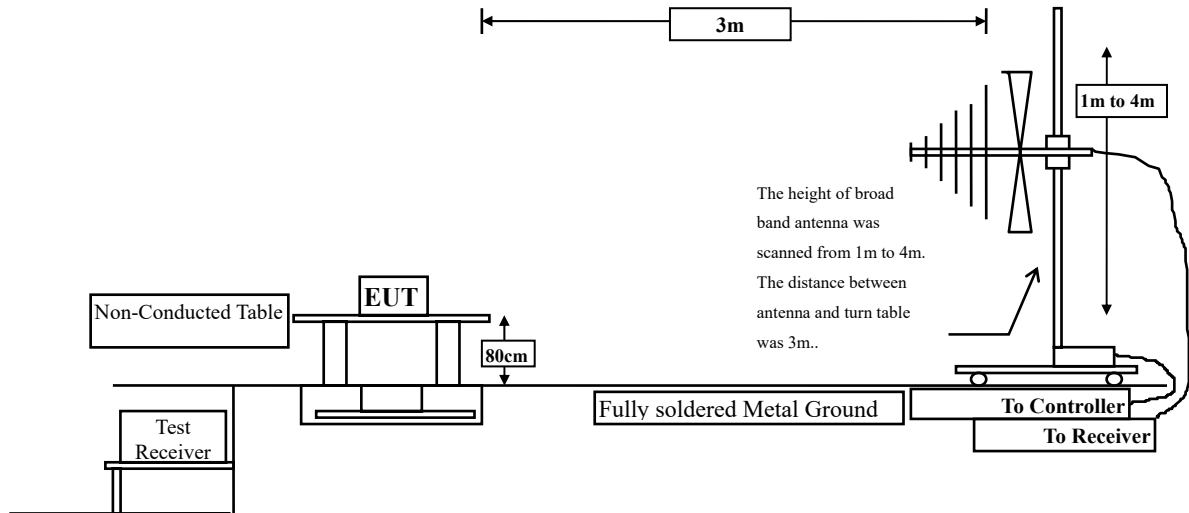
Note:

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.

4. Band Edge

4.1. Test Setup

RF Radiated Measurement:



4.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
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: E field strength (dB μ V /m) = 20 log E field strength (uV/m)

4.3. Test Procedure

The EUT is placed on a turn table which is 0.8 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

4.4. Uncertainty

Horizontal :

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

Vertical :

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

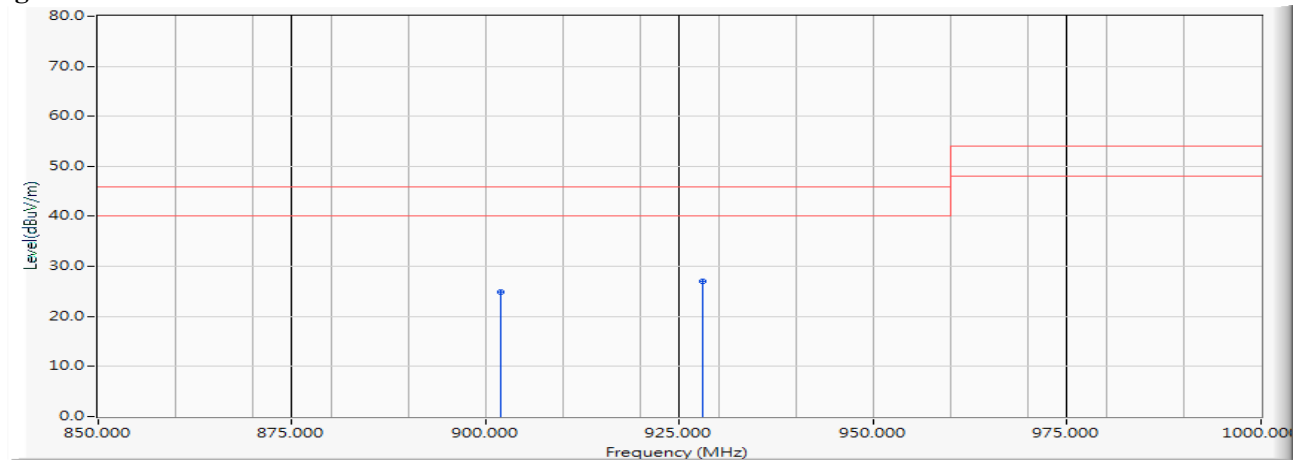
4.5. Test Result of Band Edge

Product : Recessed Door Sensor
 Test Item : Band Edge Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (908.4MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V /m)	Quasi-Peak Limit (dB μ V /m)	Result
01 (Quasi-Peak)	902.000	1.119	23.700	24.818	46.00	Pass
01 (Quasi-Peak)	928.000	1.414	25.600	27.013	46.00	Pass

Figure Channel 01:



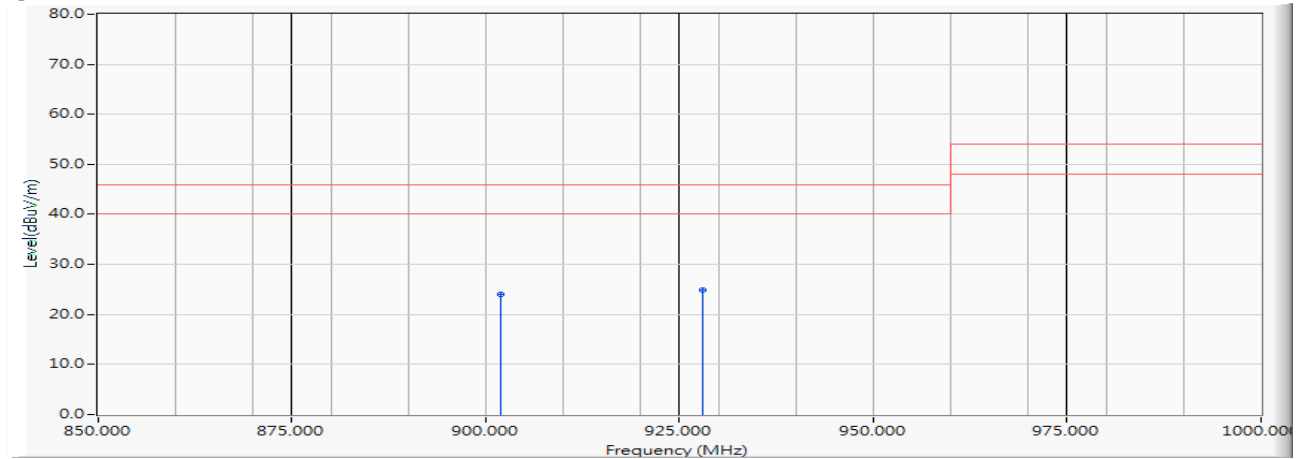
Note:

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.

Product : Recessed Door Sensor
 Test Item : Band Edge Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (908.4MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Quasi-Peak Limit (dB μ V/m)	Result
01 (Quasi-Peak)	902.000	1.119	22.900	24.018	46.00	Pass
01 (Quasi-Peak)	928.000	1.414	23.510	24.923	46.00	Pass

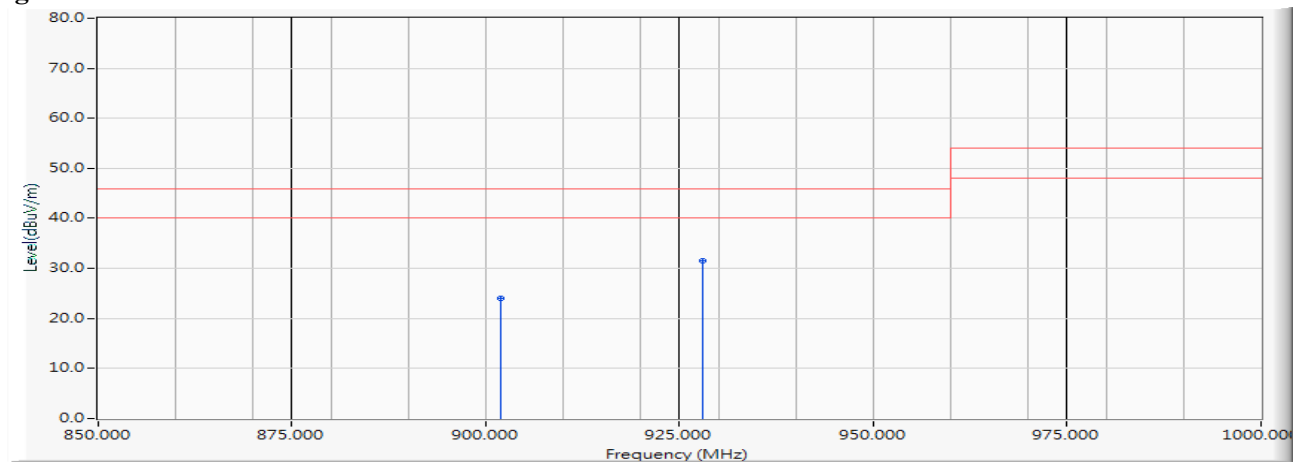
Figure Channel 01:**Note:**

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.

Product : Recessed Door Sensor
 Test Item : Band Edge Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (916MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V /m)	Quasi-Peak Limit (dB μ V /m)	Result
02 (Quasi-Peak)	902.000	1.119	23.010	24.128	46.00	Pass
02 (Quasi-Peak)	928.000	1.414	30.200	31.613	46.00	Pass

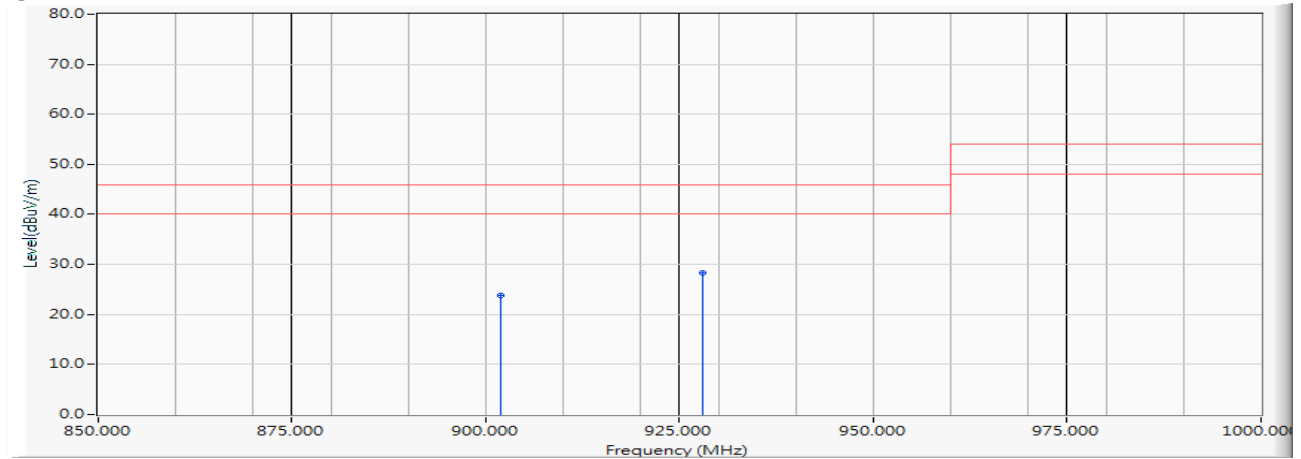
Figure Channel 02:

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.

Product : Recessed Door Sensor
 Test Item : Band Edge Data
 Test Date : 2018/09/04
 Test Mode : Mode 1: Transmit (916MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V /m)	Quasi-Peak Limit (dB μ V /m)	Result
02 (Quasi-Peak)	902.000	1.119	22.700	23.818	46.00	Pass
02 (Quasi-Peak)	928.000	1.414	26.900	28.313	46.00	Pass

Figure Channel 02:**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.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.