

FCC Test Report

Product Name	Smart Touch in-wall switch
Model No.	PAN24
FCC ID	RHHPAN24

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

Date of Receipt	Mar. 31, 2018
Issued Date	May 08, 2018
Report No.	1830473R-RFUSP15V00-A
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

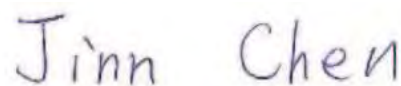
Issued Date: May 08, 2018

Report No.: 1830473R-RFUSP15V00-A



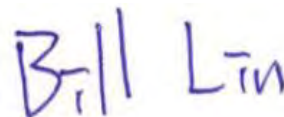
Product Name	Smart Touch in-wall switch
Applicant	Philio Technology Corporation
Address	8F.,No.653-2,Zhongzheng Rd., Xinzhuang Dist., New Taipei City 24257,Taiwan(R.O.C)
Manufacturer	Philio Technology Corporation
Model No.	PAN24
EUT Rated Voltage	AC 120V 60Hz
EUT Test Voltage	AC 120V 60Hz
Trade Name	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Jinn Chen)

Tested By :



(Senior Engineer / Bill Lin)

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	Smart Touch in-wall switch
Trade Name	
Model No.	PAN24
FCC ID	RHHPAN24
Frequency Range	908.4MHz, 916MHz
Channel Control	Auto
Type of Modulation	FSK
Antenna Type	Print on PCB Antenna
Power Cable	Shielded, 1.5m

Center Frequency of Each Channel

Channel	Frequency	Channel	Frequency
Channel 1:	908.4 MHz	Channel 2:	916 MHz

Note:

1. The EUT is a Smart Touch in-wall switch 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.

Test Mode	Mode 1: Transmit
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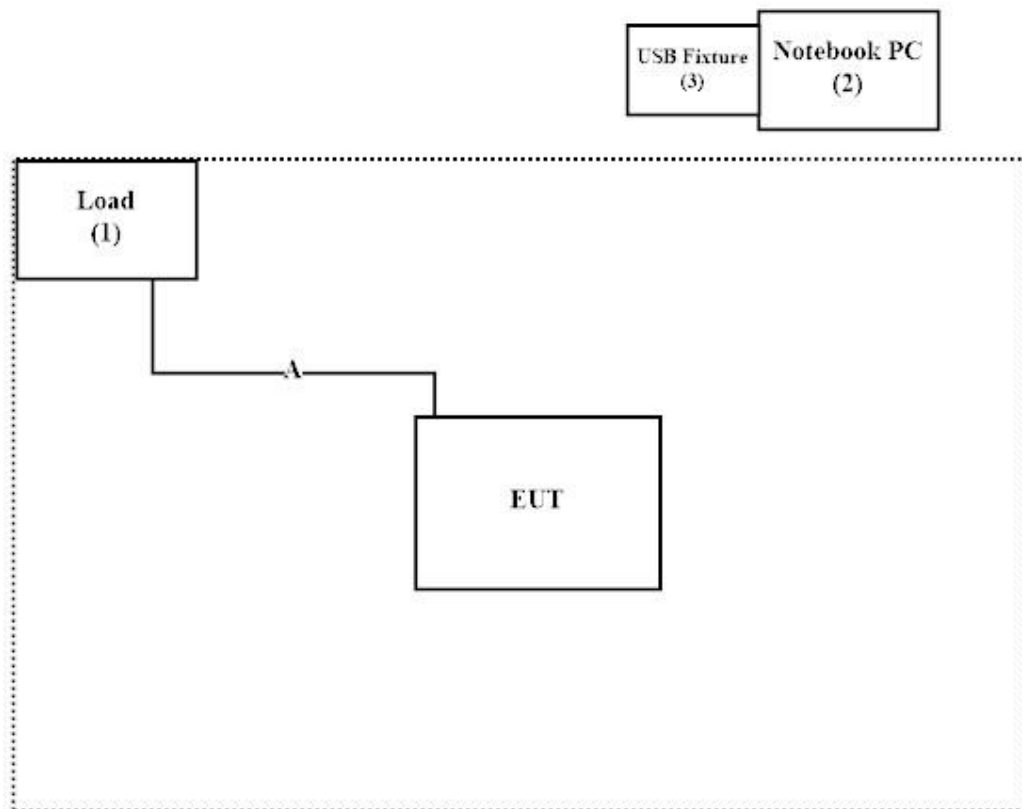
1.3. Tested System Details

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 Load	DEKRA	N/A	N/A	N/A
2 Notebook PC	DELL	P62G	CY9FJC2	Non-Shielded, 0.8m
3 USB Fixture	Philio	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A Power Cable	Shielded, 1.8m

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 4.73" 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.,
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TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	161601	2018.02.08	2019.02.07
X	Two-Line V-Network	R&S	ENV216	101306	2018.03.09	2019.03.08
X	Two-Line V-Network	R&S	ENV216	101307	2018.03.20	2019.03.19
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.24	2018.05.23

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
X	Spectrum Analyzer	R&S	FSV30	103464	2018.01.23	2019.01.22
X	Power Meter	Anritsu	ML2496A	1548003	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531024	2017.12.11	2018.12.10
X	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 : QuieTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

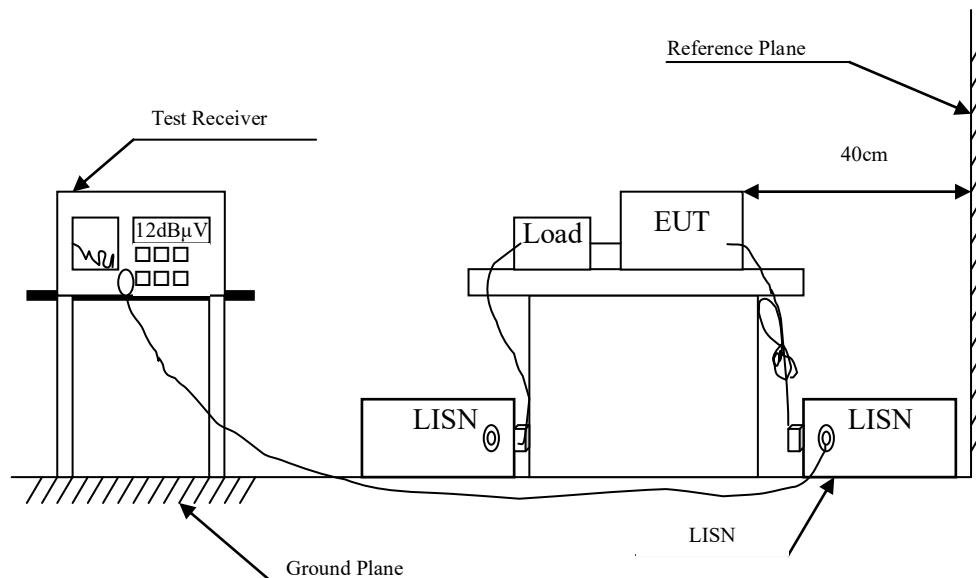
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2018.01.26	2019.01.25
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2018.04.02	2019.04.01
X	Horn Antenna	ETS-Lindgren	3117	00203800	2017.11.10	2018.11.09
X	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.16	2018.05.15
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.17	2018.05.16
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.17	2018.05.16
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
X	Filter	MICRO TRONICS	BRM50702	G251	2017.08.30	2018.08.29
	Filter	MICRO TRONICS	BRM50716	G188	2017.08.30	2018.08.29
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101149	2018.02.08	2019.02.07
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2017.08.11	2018.08.10

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 (dBμV) 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

Product : Smart Touch in-wall switch
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Date : 2018/04/23
 Test Mode : Mode 1: Transmit (908.4MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V	dB	dB μ V
LINE 1					
Quasi-Peak					
0.170	9.657	53.279	62.936	-2.493	65.429
0.227	9.682	50.563	60.245	-3.555	63.800
0.283	9.685	47.820	57.505	-4.695	62.200
0.341	9.689	46.594	56.283	-4.260	60.543
1.147	9.720	26.424	36.144	-19.856	56.000
17.441	10.059	24.462	34.521	-25.479	60.000
Average					
0.170	9.657	35.545	45.202	-10.227	55.429
0.227	9.682	32.711	42.392	-11.408	53.800
0.283	9.685	28.821	38.506	-13.694	52.200
0.341	9.689	28.246	37.935	-12.608	50.543
1.147	9.720	13.408	23.128	-22.872	46.000
17.441	10.059	20.070	30.128	-19.872	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Smart Touch in-wall switch
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Date : 2018/04/23
 Test Mode : Mode 1: Transmit (908.4MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	dB	dB μ V
	dB	dB μ V	dB μ V		
LINE 2					
Quasi-Peak					
0.170	9.651	44.405	54.057	-11.372	65.429
0.227	9.681	48.403	58.084	-5.716	63.800
0.285	9.683	46.413	56.096	-6.047	62.143
0.341	9.685	45.081	54.766	-5.777	60.543
1.109	9.720	27.225	36.945	-19.055	56.000
17.493	10.070	23.407	33.477	-26.523	60.000
Average					
0.170	9.651	34.564	44.216	-11.213	55.429
0.227	9.681	29.763	39.444	-14.356	53.800
0.285	9.683	30.240	39.923	-12.220	52.143
0.341	9.685	26.658	36.343	-14.200	50.543
1.109	9.720	16.030	25.750	-20.250	46.000
17.493	10.070	18.557	28.627	-21.373	50.000

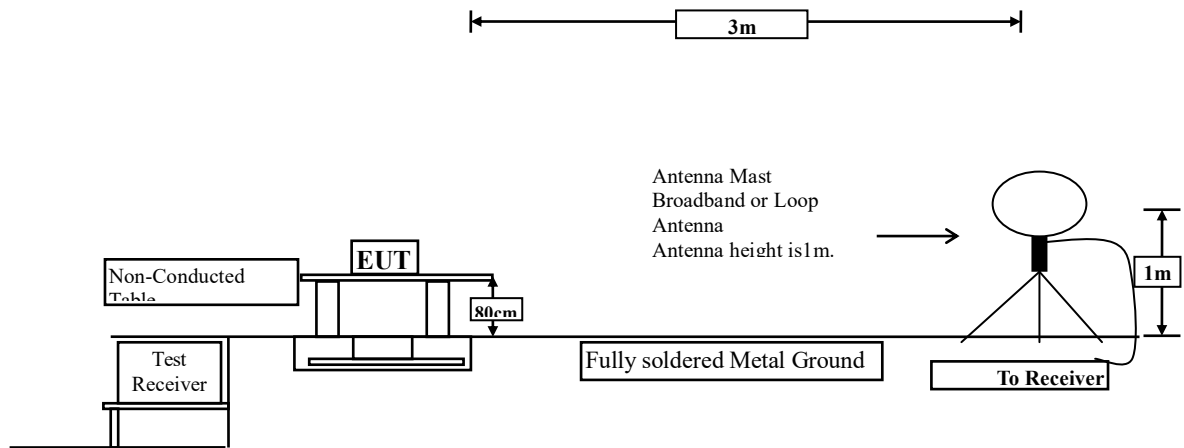
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

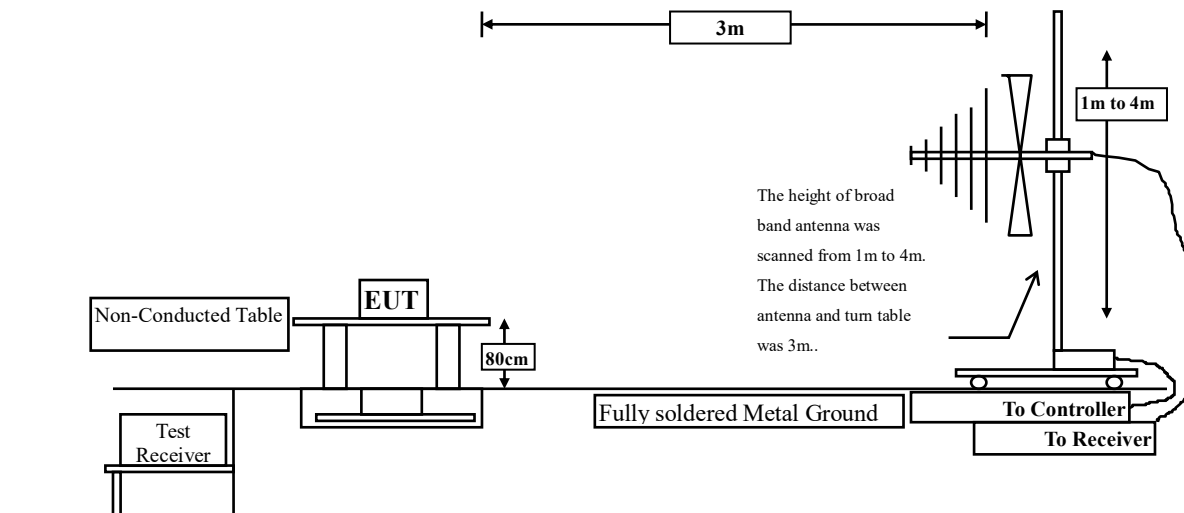
3. Radiated Emission

3.1. Test Setup

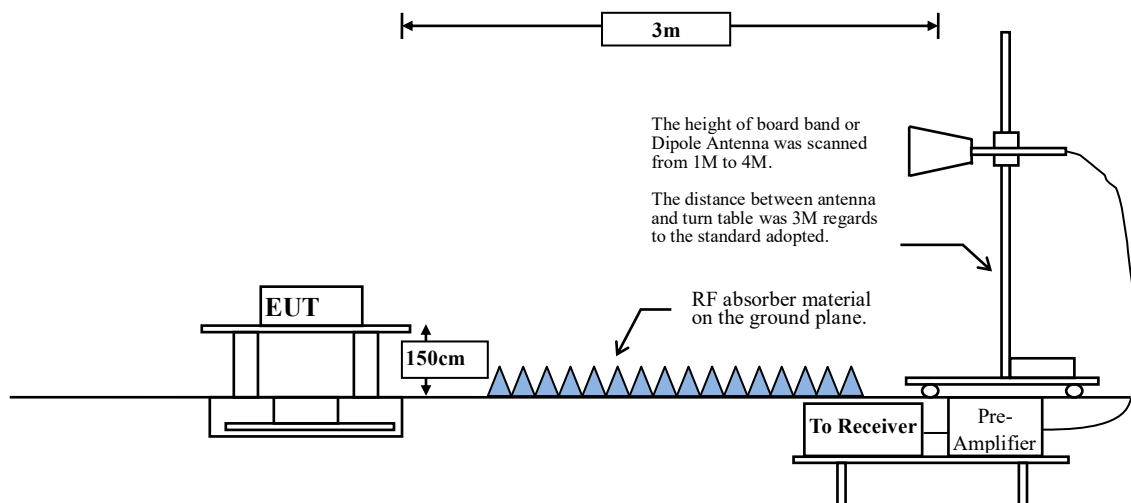
Radiated Emission Under 30MHz



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 worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

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 : Smart Touch in-wall switch
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/04/23
 Test Mode : Mode 1: Transmit

X-Axis

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m
Horizontal					
Peak Detector:					
908.400	-0.230	82.200	81.970	-12.030	94.000
916.000	-0.148	82.040	81.892	-12.108	94.000
Average					
Detector:					
--					

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 : Smart Touch in-wall switch
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/04/23
 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**Peak Detector:**

908.400	-0.230	77.950	77.720	-16.280	94.000
916.000	-0.148	77.290	77.142	-16.858	94.000

Average**Detector:**

--

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 : Smart Touch in-wall switch
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/04/23
 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**Peak Detector:**

908.400	-0.230	76.130	75.900	-18.100	94.000
916.000	-0.148	76.580	76.432	-17.568	94.000

Average**Detector:**

--

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 : Smart Touch in-wall switch
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/04/23
 Test Mode : Mode 1: Transmit

Y-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					
Peak Detector:					
908.400	-0.230	79.450	79.220	-14.780	94.000
916.000	-0.148	79.410	79.262	-14.738	94.000
Average					
Detector:					
--					

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 : Smart Touch in-wall switch
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/04/23
 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**Peak Detector:**

908.400	-0.230	77.490	77.260	-16.740	94.000
916.000	-0.148	77.350	77.202	-16.798	94.000

Average**Detector:**

--

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 : Smart Touch in-wall switch
 Test Item : Fundamental Radiated Emission
 Test Date : 2018/04/23
 Test Mode : Mode 1: Transmit

Z-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**Peak Detector:**

908.400	-0.230	76.910	76.680	-17.320	94.000
916.000	-0.148	76.660	76.512	-17.488	94.000

Average**Detector:**

--

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 : Smart Touch in-wall switch
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/04/25
 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					
Peak Detector:					
1816.800	-10.702	58.470	47.767	-26.233	74.000
2725.200	-8.390	56.500	48.110	-25.890	74.000
3633.600	-7.627	52.510	44.884	-29.116	74.000
4542.000	-6.415	53.320	46.904	-27.096	74.000
5450.400	-5.382	48.560	43.178	-30.822	74.000
6358.800	-3.605	53.200	49.594	-24.406	74.000
7267.200	-3.098	48.410	45.311	-28.689	74.000
8175.600	-2.359	52.550	50.190	-23.810	74.000
9084.000	-1.496	46.900	45.404	-28.596	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 : Smart Touch in-wall switch
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/04/25
 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
Vertical					
Peak Detector:					
1816.800	-10.702	50.730	40.027	-33.973	74.000
2725.200	-8.390	56.390	48.000	-26.000	74.000
3633.600	-7.627	54.040	46.414	-27.586	74.000
4542.000	-6.415	52.400	45.984	-28.016	74.000
5450.400	-5.382	48.310	42.928	-31.072	74.000
6358.800	-3.605	53.840	50.234	-23.766	74.000
7267.200	-3.098	48.350	45.251	-28.749	74.000
8175.600	-2.359	52.900	50.540	-23.460	74.000
9084.000	-1.496	47.310	45.814	-28.186	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 : Smart Touch in-wall switch
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/04/25
 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					
Peak Detector:					
1832.000	-10.585	50.380	39.795	-34.205	74.000
2748.000	-8.374	56.890	48.515	-25.485	74.000
3664.000	-7.606	49.720	42.114	-31.886	74.000
4580.000	-6.347	53.700	47.353	-26.647	74.000
5496.000	-5.356	48.300	42.944	-31.056	74.000
6412.000	-3.541	53.990	50.450	-23.550	74.000
7328.000	-3.012	47.350	44.338	-29.662	74.000
8244.000	-2.310	52.760	50.450	-23.550	74.000
9160.000	-1.431	46.880	45.449	-28.551	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 : Smart Touch in-wall switch
 Test Item : Harmonic Radiated Emission Data
 Test Date : 2018/04/25
 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
Vertical					
Peak Detector:					
1832.000	-10.585	52.440	41.855	-32.145	74.000
2748.000	-8.374	56.010	47.635	-26.365	74.000
3664.000	-7.606	52.230	44.624	-29.376	74.000
4580.000	-6.347	52.770	46.423	-27.577	74.000
5496.000	-5.356	48.440	43.084	-30.916	74.000
6412.000	-3.541	54.170	50.630	-23.370	74.000
7328.000	-3.012	47.280	44.268	-29.732	74.000
8244.000	-2.310	54.570	52.260	-21.740	74.000
9160.000	-1.431	46.810	45.379	-28.621	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 : Smart Touch in-wall switch
 Test Item : General Radiated Emission Data
 Test Date : 2018/04/11
 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					
119.971	-13.428	34.905	21.477	-22.023	43.500
215.565	-13.426	43.689	30.264	-13.236	43.500
263.362	-11.772	44.254	32.482	-13.518	46.000
311.159	-10.098	40.917	30.819	-15.181	46.000
551.551	-5.202	32.269	27.067	-18.933	46.000
768.043	-1.957	31.092	29.135	-16.865	46.000
Vertical					
31.406	-12.134	46.645	34.511	-5.489	40.000
52.493	-11.212	40.577	29.365	-10.635	40.000
79.203	-15.468	48.228	32.760	-7.240	40.000
239.464	-12.295	40.141	27.846	-18.154	46.000
263.362	-11.772	43.813	32.041	-13.959	46.000
891.754	-0.427	30.867	30.440	-15.560	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 : Smart Touch in-wall switch
 Test Item : General Radiated Emission Data
 Test Date : 2018/04/11
 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					
184.638	-13.063	43.859	30.796	-12.704	43.500
215.565	-13.426	44.560	31.135	-12.365	43.500
311.159	-10.098	43.944	33.846	-12.154	46.000
358.957	-9.006	41.228	32.221	-13.779	46.000
432.058	-7.289	37.950	30.661	-15.339	46.000
789.130	-1.800	31.134	29.334	-16.666	46.000
Vertical					
37.029	-11.549	46.234	34.685	-5.315	40.000
119.971	-13.428	36.665	23.237	-20.263	43.500
263.362	-11.772	41.765	29.993	-16.007	46.000
335.058	-9.553	35.741	26.188	-19.812	46.000
680.884	-3.319	30.329	27.010	-18.990	46.000
873.478	-0.663	30.758	30.095	-15.905	46.000

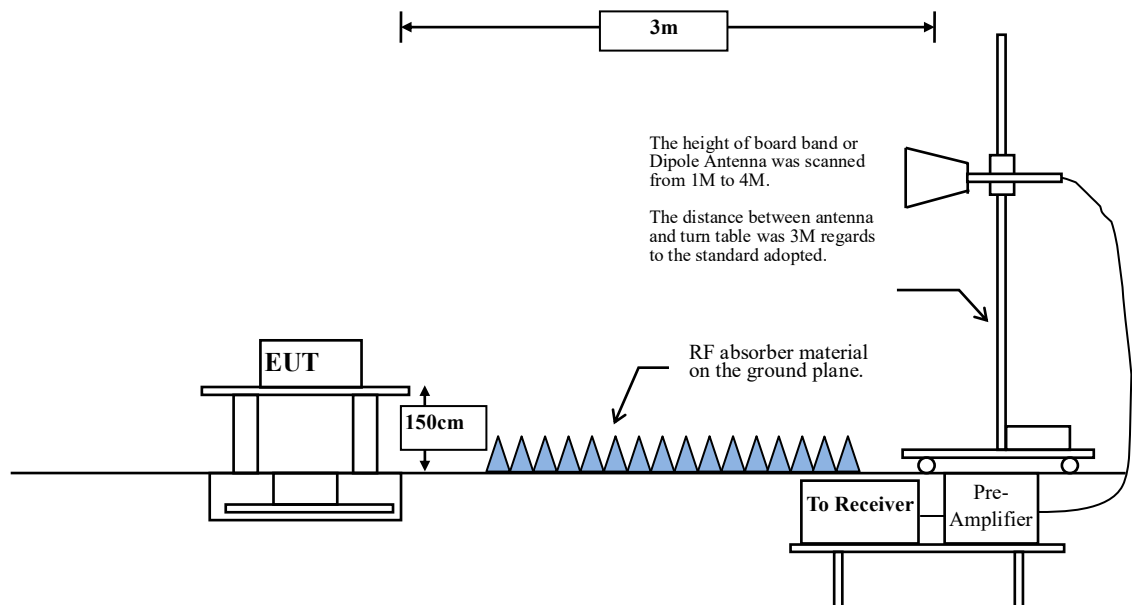
Note:

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.
9. The emission levels of other frequencies are very lower than the limit and not show in test report.
10. 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 (dBμV /m) = 20 log E field strength (uV/m)

4.3. Test Procedure

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 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 polarization : 1-18GHz: ± 3.77 dB

Vertical polarization : 1-18GHz : ± 3.83 dB

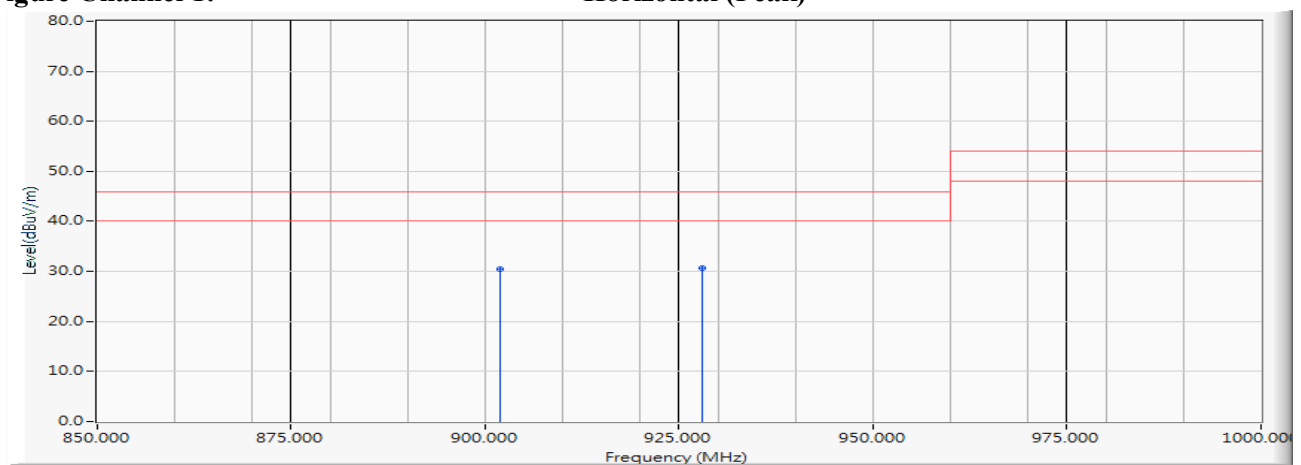
4.5. Test Result of Band Edge

Product : Smart Touch in-wall switch
 Test Item : Band Edge Data
 Test Date : 2018/04/23
 Test Mode : Mode 1: Transmit (908.4MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Quasi-Peak Limit (dBuV/m)	Result
1 (Quasi-Peak)	902.000	-0.299	30.722	30.423	46.020	Pass
1 (Quasi-Peak)	928.000	-0.016	30.610	30.594	46.020	Pass

Figure Channel 1: Horizontal (Peak)



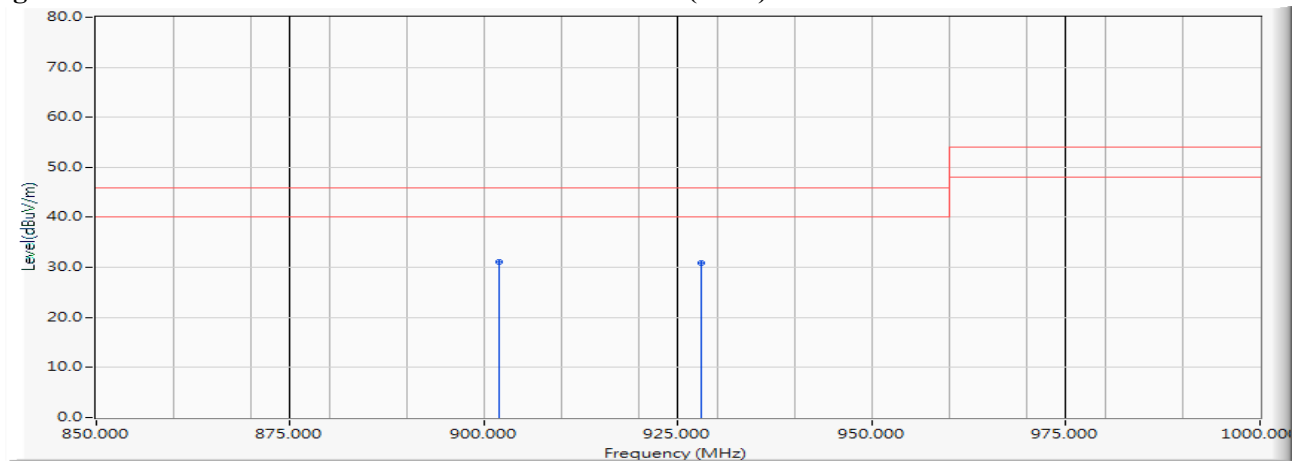
Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. Measurement Level = Reading Level + Correct Factor.

Product : Smart Touch in-wall switch
 Test Item : Band Edge Data
 Test Date : 2018/04/23
 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
1 (Quasi-Peak)	902.000	-0.299	31.478	31.179	46.020	Pass
1 (Quasi-Peak)	928.000	-0.016	30.947	30.931	46.020	Pass

Figure Channel 1: Vertical (Peak)

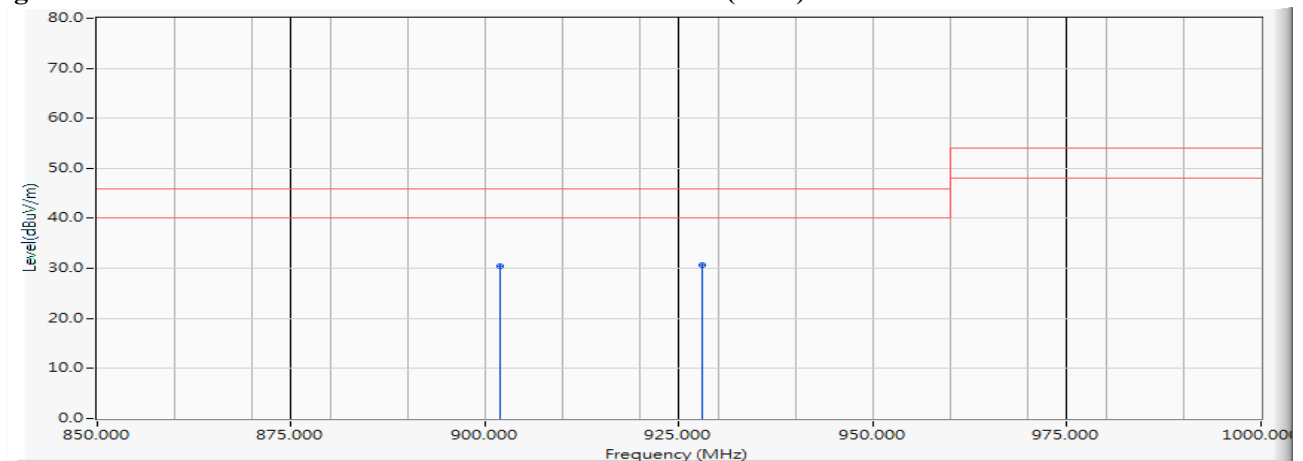
Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. Measurement Level = Reading Level + Correct Factor.

Product : Smart Touch in-wall switch
 Test Item : Band Edge Data
 Test Date : 2018/04/23
 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
2 (Quasi-Peak)	902.000	-0.299	30.922	30.623	46.020	Pass
2 (Quasi-Peak)	928.000	-0.016	32.291	32.275	46.020	Pass

Figure Channel 2: Horizontal (Peak)

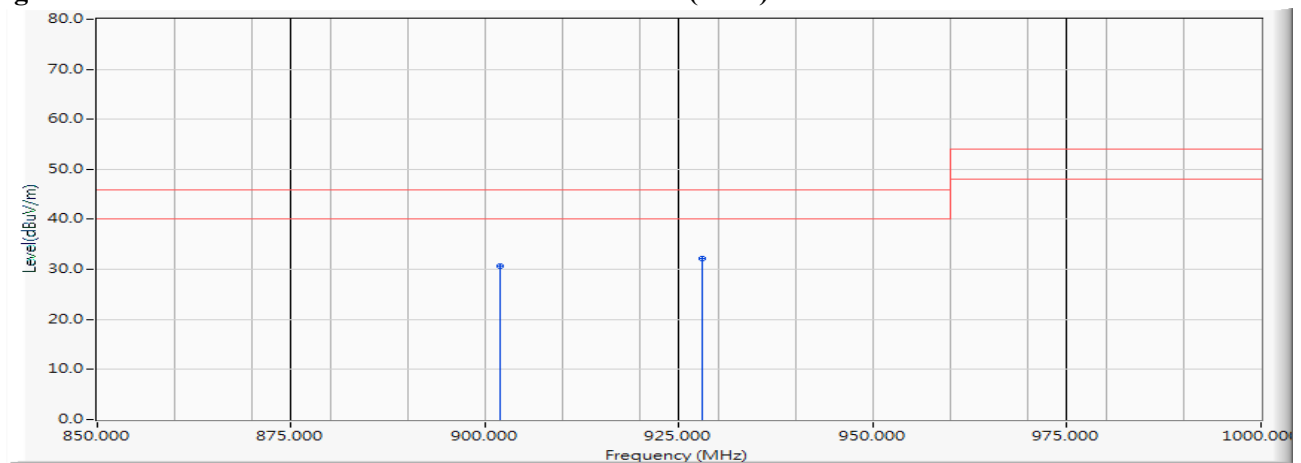
Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. Measurement Level = Reading Level + Correct Factor.

Product : Smart Touch in-wall switch
 Test Item : Band Edge Data
 Test Date : 2018/04/23
 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
2 (Quasi-Peak)	902.000	-0.299	30.403	30.104	46.020	Pass
2 (Quasi-Peak)	928.000	-0.016	31.128	31.112	46.020	Pass

Figure Channel 2:**Vertical (Peak)**

Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. Measurement Level = Reading Level + Correct Factor.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.