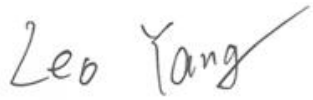
FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No..... : **PTC21070902601E-FC01**
FCC ID..... : **2AXVCMGZST1**

Test Engineer : Leo Yang / Engineer



Technical Manager : Henry Wang /Manager

Date of issue.....: Aug. 13, 2021

Representative Laboratory Name. : **Precise Testing & Certification Co., LTD.**

Address..... : Building 1, No.6 Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China

Applicant's name..... : **Fujian Nexhome Intelligent Technology Co.,Ltd.**

Address..... : 7th floor, building 1, No. 9, Gaoxin Avenue, Shangjie Town, Minhou County, Fuzhou City

Test specification..... :

Standard.....: **FCC Part 15.247**

Test item description.....: **Smart Wall Switch**

Trade Mark.....: Nexhome

Manufacturer.....: Fujian Nexhome Intelligent Technology Co.,Ltd.

Model/Type reference..... : MG-ZS-T1

Listed Models ..... : MG-ZS-T2,MG-ZS-G1,MG-ZS-Q4

Modulation ..... : QPSK (DSSS)

Frequency..... From 2405MHz to 2480MHz

Ratings.....: AC 120V 60Hz

Result.....: **PASS**

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices
KDB558074 D01 V05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Jul. 15, 2021
Testing commenced on	:	Jul. 15, 2021
Testing concluded on	:	Aug. 13, 2021

2.2 Product Description

Product Description:	Smart Wall Switch
Model/Type reference:	MG-ZS-T1
Power supply:	AC 120V 60Hz
Zigbee	
Modulation:	QPSK (DSSS)
Operation frequency:	2405MHz to 2480MHz
Channel number:	16
Channel separation:	5 MHz
Antenna type:	PCB antenna
Antenna gain:	0.00 dBi

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

AC 120V 60Hz

2.4 Short description of the Equipment under Test (EUT)

This is a Smart Wall Switch
For more details, refer to the user's manual of the EUT.

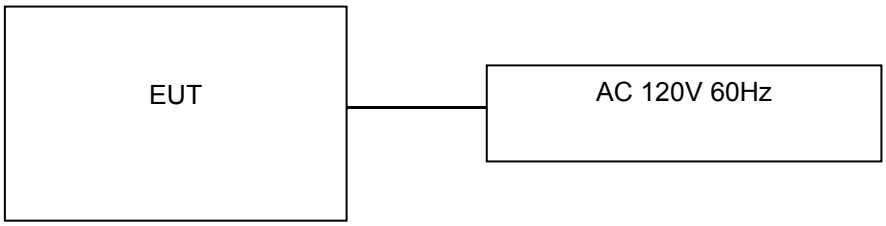
2.5 EUT operation mode

The Applicant provides communication tools software(Engineer mode) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 16 channels provided to the EUT and Channel 11/18/26 were selected to test.

Operation Frequency：

Channel	Frequency (MHz)
11	**2405**
12	2410
13	2415
⋮	⋮
18	**2440**
⋮	⋮
24	2470
25	2475
26	**2480**

2.6 Block Diagram of Test Setup



2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

Precise Testing & Certification Co., LTD.
Building 1, No.6 Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China
FCC Registration Number: 790290
A2LA Certificate No.: 4408.01
IC Registration Number: 12191A-1

3.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:
Radiated Emission:

Temperature:	25 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

AC Main Conducted testing：

Temperature:	25 ° C
Humidity:	46 %
Atmospheric pressure:	950-1050mbar

Conducted testing：

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

3.2 Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Test result
§15.247(e)	Power spectral density	QPSK	☒ Lowest ☒ Middle ☒ Highest	QPSK	☒ Lowest ☒ Middle ☒ Highest	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	QPSK	☒ Lowest ☒ Middle ☒ Highest	QPSK	☒ Lowest ☒ Middle ☒ Highest	complies
§15.247(b)(1)	Maximum output power	QPSK	☒ Lowest ☒ Middle ☒ Highest	QPSK	☒ Lowest ☒ Middle ☒ Highest	complies
§15.247(d)	Band edge compliance conducted	QPSK	☒ Lowest ☒ Highest	QPSK	☒ Lowest ☒ Highest	complies
§15.205	Band edge compliance radiated	QPSK	☒ Lowest ☒ Highest	QPSK	☒ Lowest ☒ Highest	complies
§15.247(d)	TX spurious emissions conducted	QPSK	☒ Lowest ☒ Middle ☒ Highest	QPSK	☒ Lowest ☒ Middle ☒ Highest	complies
§15.247(d)	TX spurious emissions radiated	QPSK	☒ Lowest ☒ Middle ☒ Highest	QPSK	☒ Lowest ☒ Middle ☒ Highest	complies
§15.209(a)	TX spurious Emissions radiated Below 1GHz	QPSK	-/-	QPSK	-/-	complies
§15.107(a)	Conducted	QPSK	-/-	QPSK	-/-	complies

§15.207	Emissions < 30 MHz					

Remark:
1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report

3.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.4 Equipments Used during the Test

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	Sep. 19, 2022
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Sep. 19, 2022
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Sep. 19, 2022
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Sep. 19, 2022

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 19, 2022
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Sep. 19, 2022
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Sep. 19, 2022
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep. 19, 2022
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep. 19, 2022
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Sep. 19, 2022
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Sep. 19, 2022
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Sep. 19, 2022
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	Sep. 19, 2022
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Sep. 19, 2022
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep. 19, 2022
RF Cable	R&S	R204	R21X	1GHz-40GHz	Sep. 19, 2022

Conducted Emissions

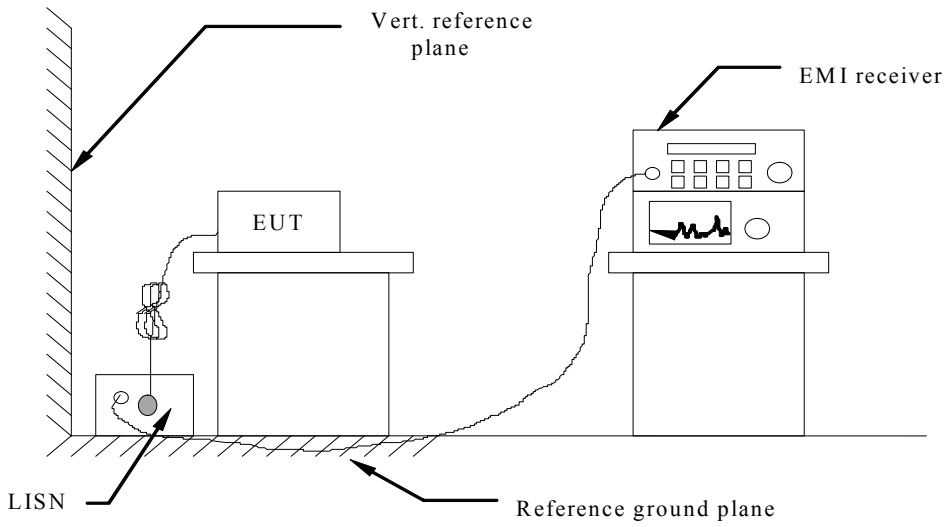
Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 19, 2022
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep. 19, 2022
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep. 19, 2022

Note: The Cal.Interval was one year.

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

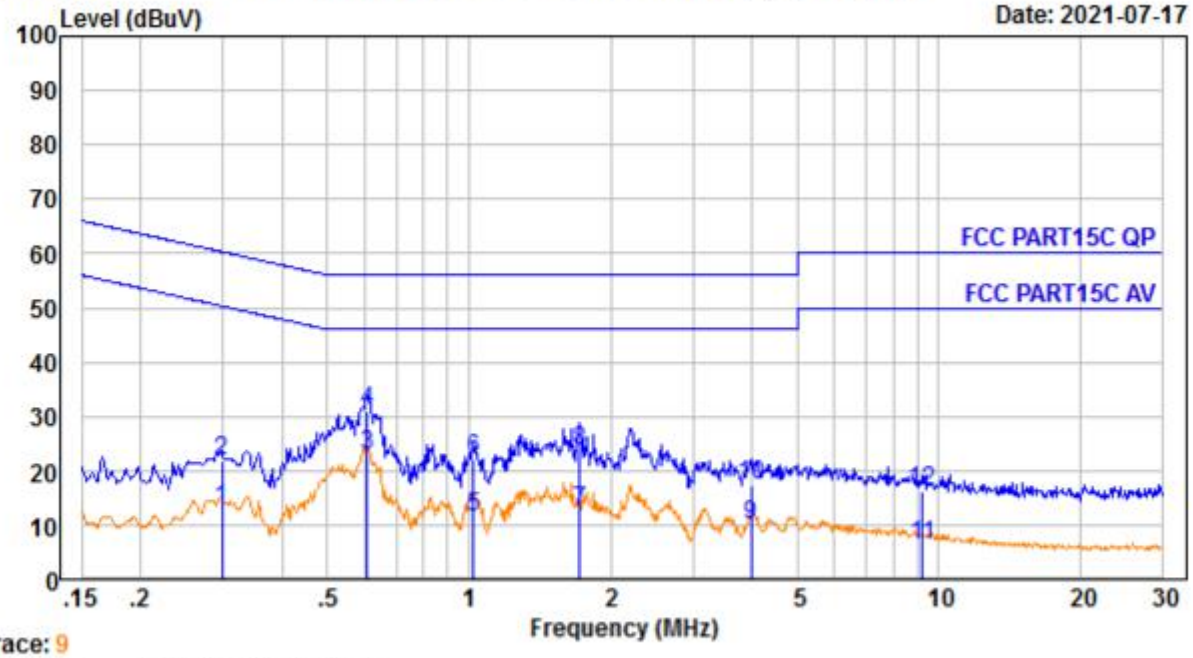
Remark:

1. Both modes of QPSK were tested at Low, Middle, and High channel; only the worst result of QPSK was reported as below:

1. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:.

Power supply:	AC 120V 60Hz	Polarization	L

Data: 10 File: E:\Test Data 843\Conduction Data\2021\X\星网.EM6 (12)

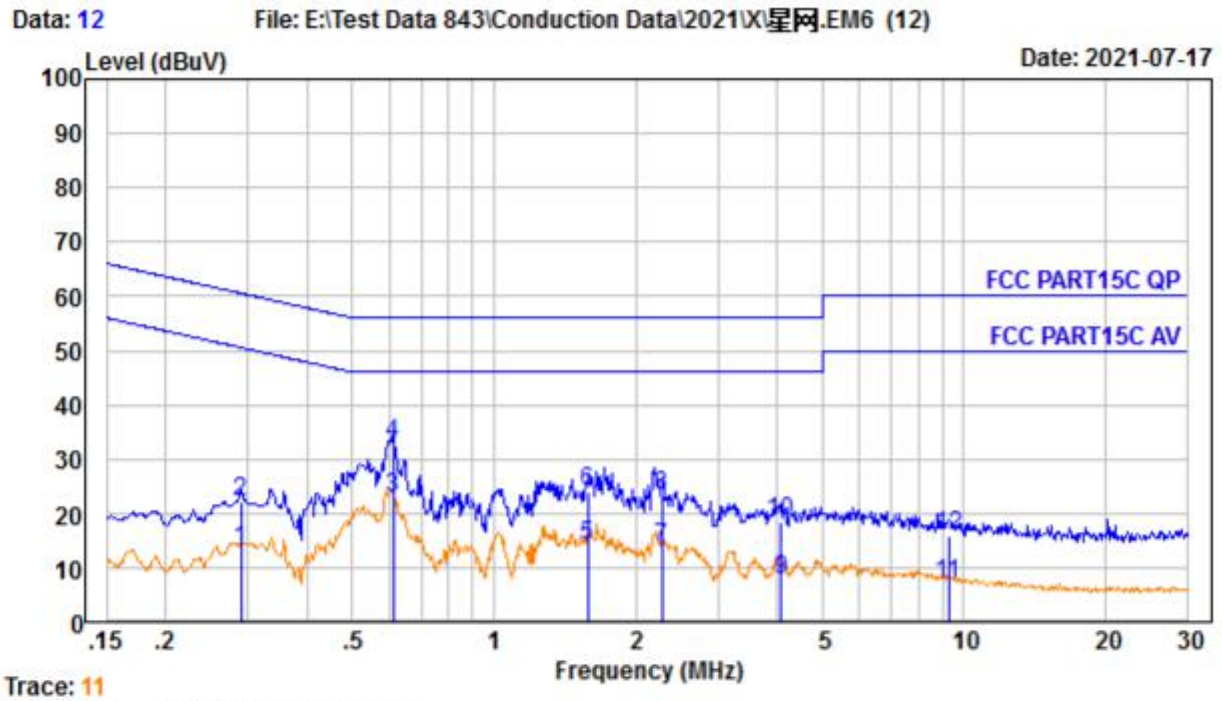


Trace: 9

Test Site : 843 Shielded Room
Test Phase : LINE
Limit : FCC PART15C QP
EUT : Smart Wall Switch
M/N : MG-ZS-T1
Power Input : AC 120V/60Hz
Test Mode : Working
Engineer : TZR

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBµV	Emission Level dBµV	Limit dBµV	Over Limit dB	Remark
1.	0.299	0.37	9.60	2.82	12.79	50.28	-37.49	Average
2.	0.299	0.37	9.60	11.83	21.80	60.28	-38.48	QP
3.	0.608	0.44	9.61	12.92	22.97	46.00	-23.03	Average
4.	0.608	0.44	9.61	20.97	31.02	56.00	-24.98	QP
5.	1.021	0.46	9.61	1.24	11.31	46.00	-34.69	Average
6.	1.021	0.46	9.61	12.23	22.30	56.00	-33.70	QP
7.	1.725	0.47	9.61	2.56	12.64	46.00	-33.36	Average
8.	1.725	0.47	9.61	13.51	23.59	56.00	-32.41	QP
9.	3.985	0.47	9.65	-0.01	10.11	46.00	-35.89	Average
10.	3.985	0.47	9.65	7.08	17.20	56.00	-38.80	QP
11.	9.253	0.56	9.76	-3.99	6.33	50.00	-43.67	Average
12.	9.253	0.56	9.76	6.00	16.32	60.00	-43.68	QP

Power supply:	AC 120V 60Hz	Polarization	N



Trace: 11

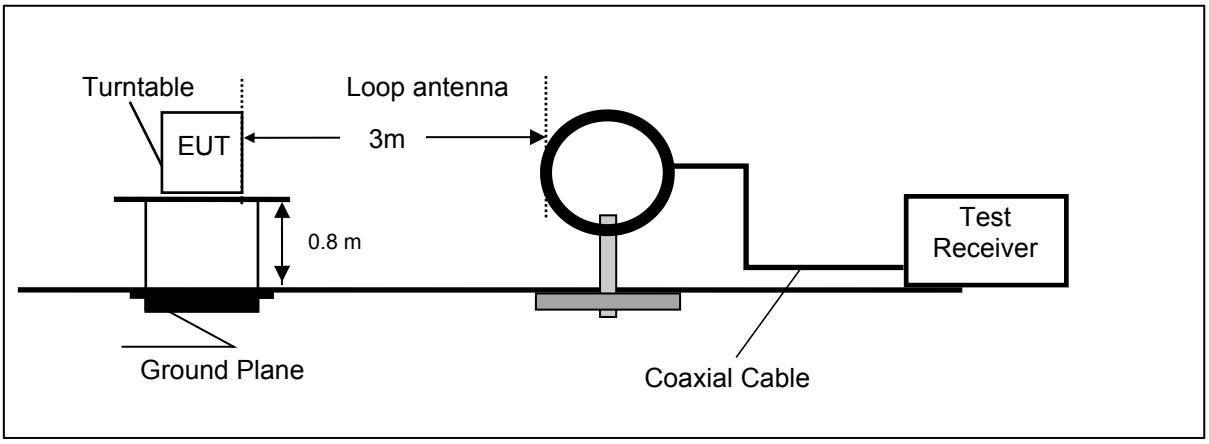
Test Site : 843 Shielded Room
Test Phase : NEUTRAL
Limit : FCC PART15C QP
EUT : Smart Wall Switch
M/N : MG-ZS-T1
Power Input : AC 120V/60Hz
Test Mode : Working
Engineer : TZR

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBµV	Emission Level dBµV	Limit dBµV	Over Limit dB	Remark
1.	0.289	0.36	9.62	3.26	13.24	50.54	-37.30	Average
2.	0.289	0.36	9.62	12.30	22.28	60.54	-38.26	QP
3.	0.611	0.44	9.64	12.87	22.95	46.00	-23.05	Average
4.	0.611	0.44	9.64	22.87	32.95	56.00	-23.05	QP
5.	1.585	0.47	9.64	3.81	13.92	46.00	-32.08	Average
6.	1.585	0.47	9.64	13.82	23.93	56.00	-32.07	QP
7.	2.273	0.47	9.65	3.44	13.56	46.00	-32.44	Average
8.	2.273	0.47	9.65	13.27	23.39	56.00	-32.61	QP
9.	4.092	0.47	9.68	-2.54	7.61	46.00	-38.39	Average
10.	4.092	0.47	9.68	8.47	18.62	56.00	-37.38	QP
11.	9.302	0.56	9.80	-3.50	6.86	50.00	-43.14	Average
12.	9.302	0.56	9.80	5.60	15.96	60.00	-44.04	QP

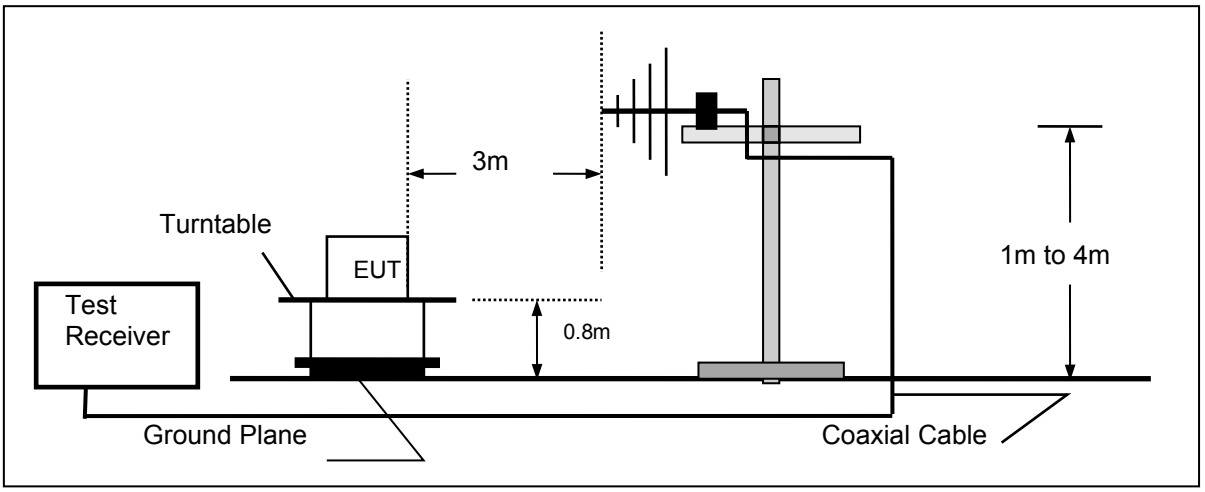
4.2 Radiated Emissions and Band Edge

TEST CONFIGURATION

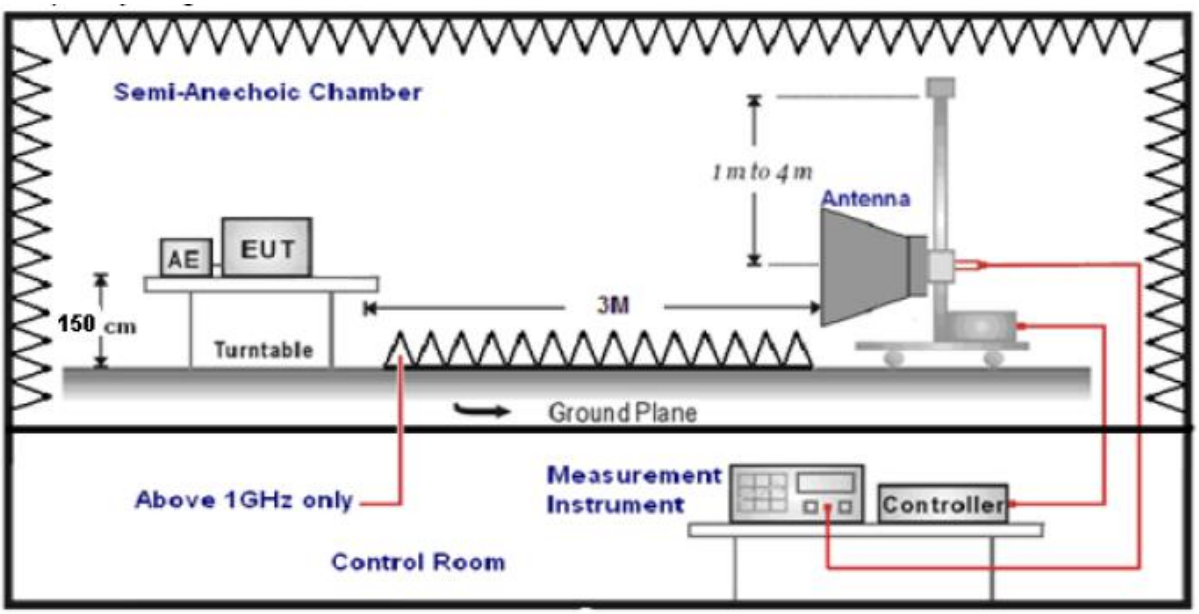
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

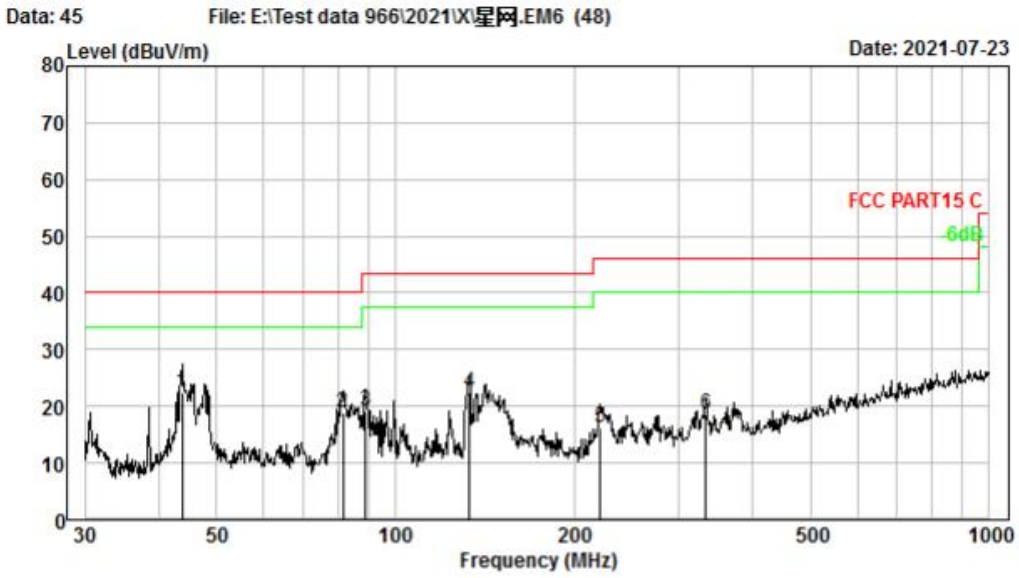
TEST RESULTS

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. Both modes of QPSK were tested at Low, Middle, and High channel and recorded worst mode at Zigbee 1Mpbs.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Vertical

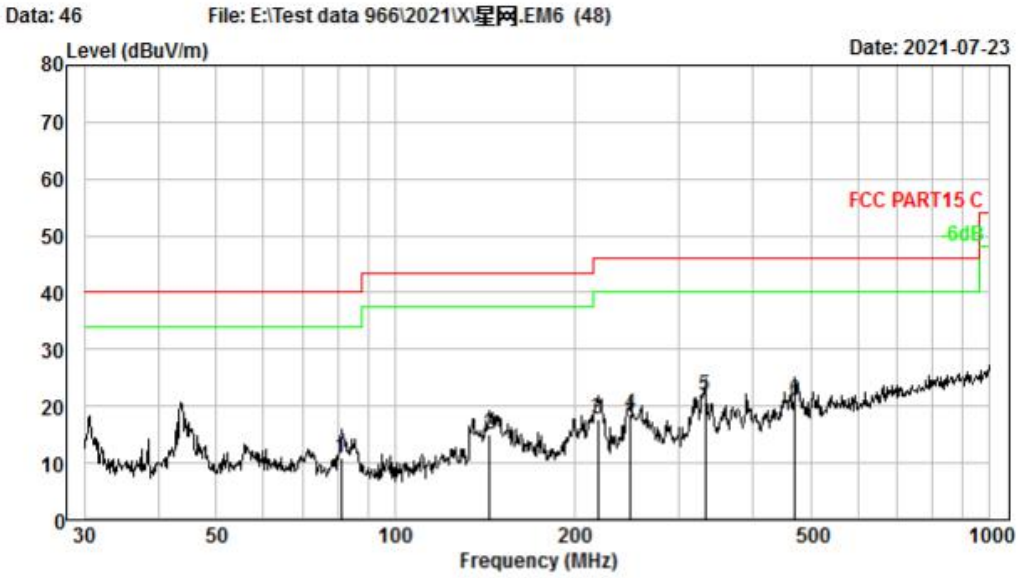


Test Site : 3m chamber
Dis. / Ant. : 3m ANT-RE-L
Ant. pol. : VERTICAL
Limit : FCC PART15 C
EUT : Smart Wall Stwitch
M/N : MG-ZS-T1
Power Input : AC120V/60Hz
Test Mode : Working
Engineer : YJQ

Env. / Ins. : Temp.:24.5℃ Humi.:52% Press.:101.3 kPa

No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	43.659	1.85	12.25	38.22	29.91	22.41	40.00	-17.59	QP
2.	81.497	2.92	8.91	36.96	29.97	18.82	40.00	-21.18	QP
3.	88.964	3.07	9.10	36.97	29.98	19.16	43.50	-24.34	QP
4.	133.151	3.77	12.88	35.88	30.01	22.52	43.50	-20.98	QP
5.	221.392	4.64	11.68	30.04	30.11	16.25	46.00	-29.75	QP
6.	333.687	5.34	14.03	29.55	30.46	18.46	46.00	-27.54	QP

Horizontal



Test Site : 3m chamber
Dis. / Ant. : 3m ANT-RE-L
Ant. pol. : HORIZONTAL
Limit : FCC PART15 C
EUT : Smart Wall Stwitch
M/N : MG-ZS-T1
Power Input : AC120V/60Hz
Test Mode : Working
Engineer : YJQ

Env. / Ins. : Temp.:24.5℃ Humi.:52% Press.:101.3 kPa

No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	81.212	2.92	8.93	29.02	29.97	10.90	40.00	-29.10	QP
2.	144.335	3.90	13.48	27.71	30.02	15.07	43.50	-28.43	QP
3.	219.075	4.62	11.61	31.69	30.10	17.82	46.00	-28.18	QP
4.	248.552	4.84	12.46	31.62	30.19	18.73	46.00	-27.27	QP
5.	332.519	5.34	14.00	33.03	30.46	21.91	46.00	-24.09	QP
6.	470.523	5.94	16.41	29.48	30.85	20.98	46.00	-25.02	QP

For 1GHz to 25GHz

QPSK(above 1GHz)

Frequency(MHz):			2405		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4810	52.44	PK	74	21.56	50.54	31.42	6.98	36.5	1.9
4810	40.69	AV	54	13.31	38.79	31.42	6.98	36.5	1.9
7215	52.78	PK	74	21.22	42.18	37.03	8.87	35.3	10.6
7215	40.38	AV	54	13.62	29.78	37.03	8.87	35.3	10.6

Frequency(MHz):			2405		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4810	55.08	PK	74	18.92	53.18	31.42	6.98	36.5	1.9
4810	42.45	AV	54	11.55	40.55	31.42	6.98	36.5	1.9
7215	54.29	PK	74	19.71	43.69	37.03	8.87	35.3	10.6
7215	39.39	AV	54	14.61	28.79	37.03	8.87	35.3	10.6

Frequency(MHz):			2440		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4880	58.54	PK	74	15.46	56.48	30.98	7.58	36.5	2.06
4880	42.61	AV	54	11.39	40.55	30.98	7.58	36.5	2.06
7320	57.92	PK	74	16.08	47.00	37.66	8.56	35.3	10.92
7320	42.10	AV	54	11.9	31.18	37.66	8.56	35.3	10.92

Frequency(MHz):			2440		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4880	57.93	PK	74	16.07	55.87	30.98	7.58	36.5	2.06
4880	42.75	AV	54	11.25	40.69	30.98	7.58	36.5	2.06
7320	58.41	PK	74	15.59	47.49	37.66	8.56	35.3	10.92
7320	43.51	AV	54	10.49	32.59	37.66	8.56	35.3	10.92

Frequency(MHz):			2480		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4960	61.94	PK	74	12.06	58.87	31.47	7.8	36.2	3.07
4960	45.65	AV	54	8.35	42.58	31.47	7.8	36.2	3.07
7440	57.61	PK	74	16.39	45.87	38.32	8.72	35.3	11.74
7440	42.92	PK	54	11.08	31.18	38.32	8.72	35.3	11.74

Frequency(MHz):			2480		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4960	60.21	PK	74	13.79	57.14	31.47	7.8	36.2	3.07
4960	45.65	AV	54	8.35	42.58	31.47	7.8	36.2	3.07
7440	55.4	PK	74	18.6	43.66	38.32	8.72	35.3	11.74
7440	42.92	PK	54	11.08	31.18	38.32	8.72	35.3	11.74

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)- Pre-amplifier
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Results of Band Edges Test (Radiated)

QPSK

Frequency(MHz):			**2405**		**Polarity:**		**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390	50.05	PK	74	23.95	55.46	27.49	3.32	36.22	-5.41
2390	35.76	AV	54	18.24	41.17	27.49	3.32	36.22	-5.41
Frequency(MHz):			**2405**		**Polarity:**		**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390	52.08	PK	74	21.92	57.49	27.49	3.32	36.22	-5.41
2390	38.25	AV	54	15.75	43.66	27.49	3.32	36.22	-5.41
Frequency(MHz):			**2480**		**Polarity:**		**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.5	48.46	PK	74	25.54	53.97	27.45	3.38	36.34	-5.51
2483.5	37.04	AV	54	16.96	42.55	27.45	3.38	36.34	-5.51
Frequency(MHz):			**2480**		**Polarity:**		**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.5	54.96	PK	74	19.04	60.47	27.45	3.38	36.34	-5.51
2483.5	39.46	AV	54	14.54	44.97	27.45	3.38	36.34	-5.51

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)- Pre-amplifier
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.

4.3 Maximum Peak Output Power

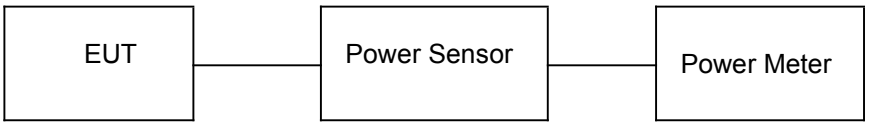
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

Type	Channel	Output power (dBm)	Limit (dBm)	Result
QPSK	11	0.58	30.00	Pass
	18	0.74		
	26	0.69		

Note: 1.The test results including the cable lose.

4.4 Power Spectral Density

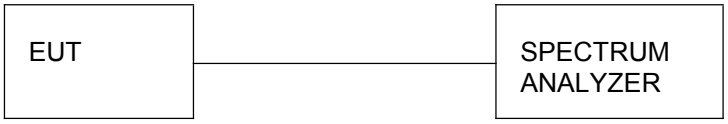
Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration



Test Results

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
QPSK	11	-16.734	8.00	Pass
	18	-16.780		
	26	-16.042		

Test plot as follows:

QPSK

CH11

CH18

CH26

4.5 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

Test Results

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
QPSK	11	1.641	≥500	Pass
	18	1.645		
	26	1.643		

Test plot as follows:

QPSK

CH11

CH18

CH26

4.6 Out-of-band Emissions

Limit

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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

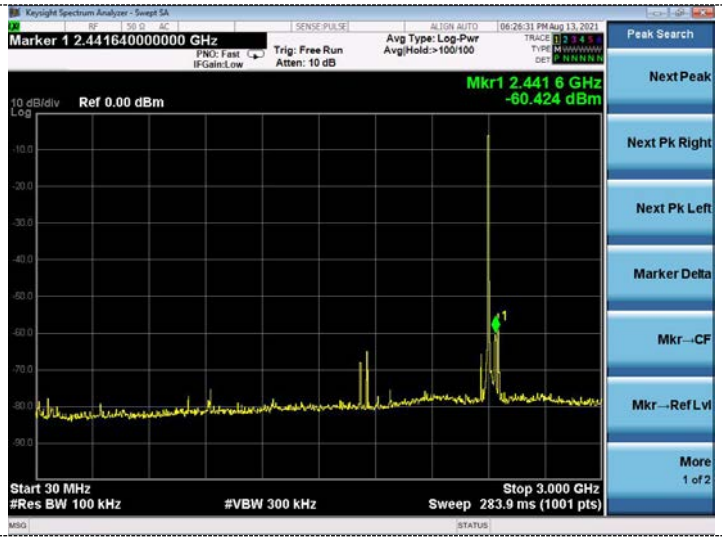
Test Configuration

Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

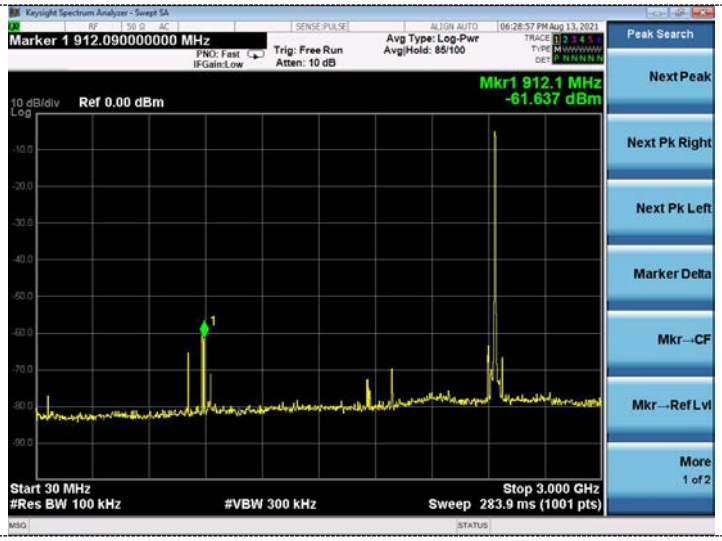
Test plot as follows:

QPSK CH11

reference

30MHz-3GHz

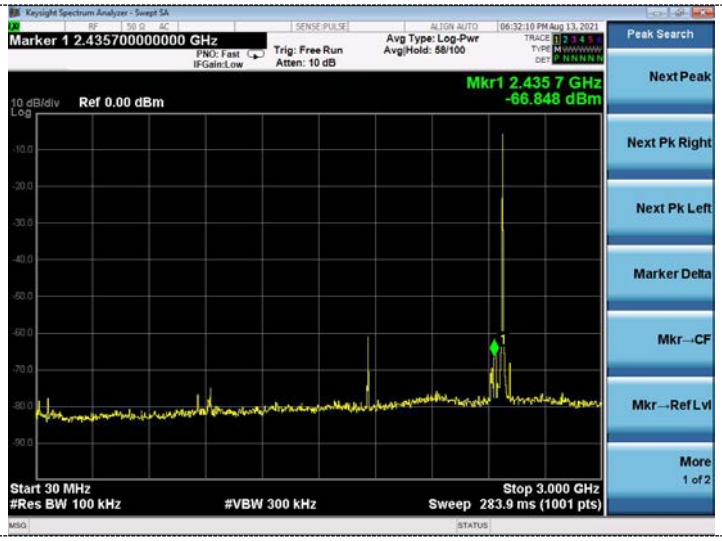
3GHz-25GHz

QPSK CH18

reference

30MHz-3GHz

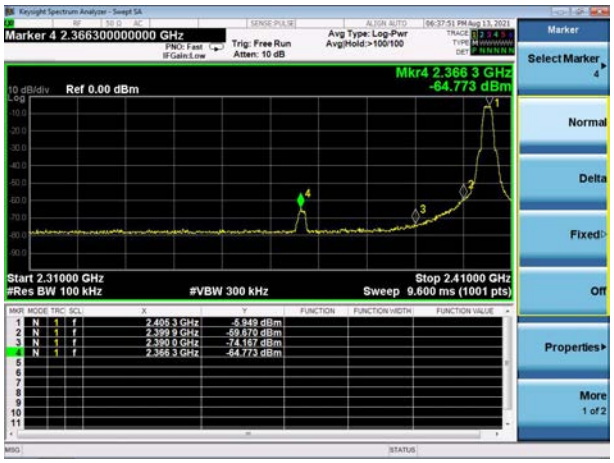
3GHz-25GHz

QPSK CH26

reference

30MHz-3GHz

3GHz-25GHz

Band-edge Measurements for RF Conducted Emissions:

QPSK	
	
Left bandedge	Right bandedge

4.7 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

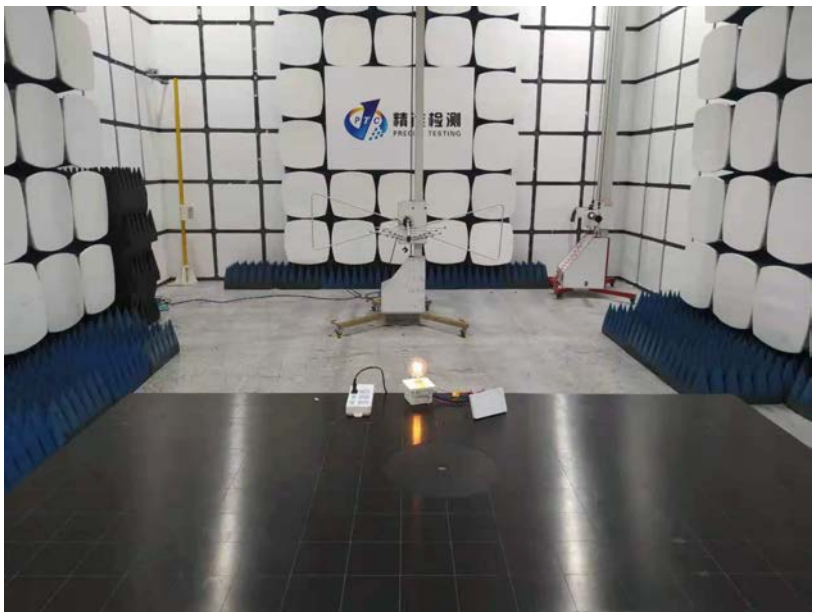
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

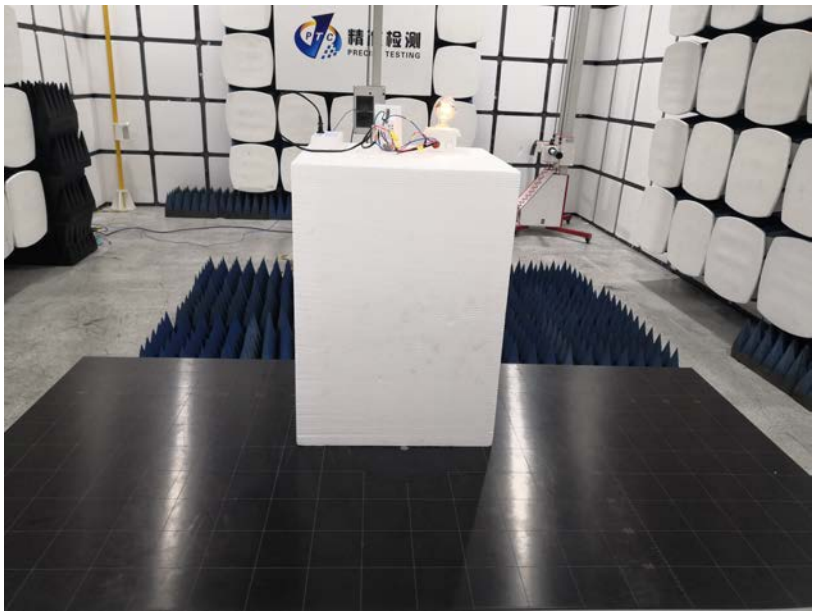
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Antenna Connected Construction

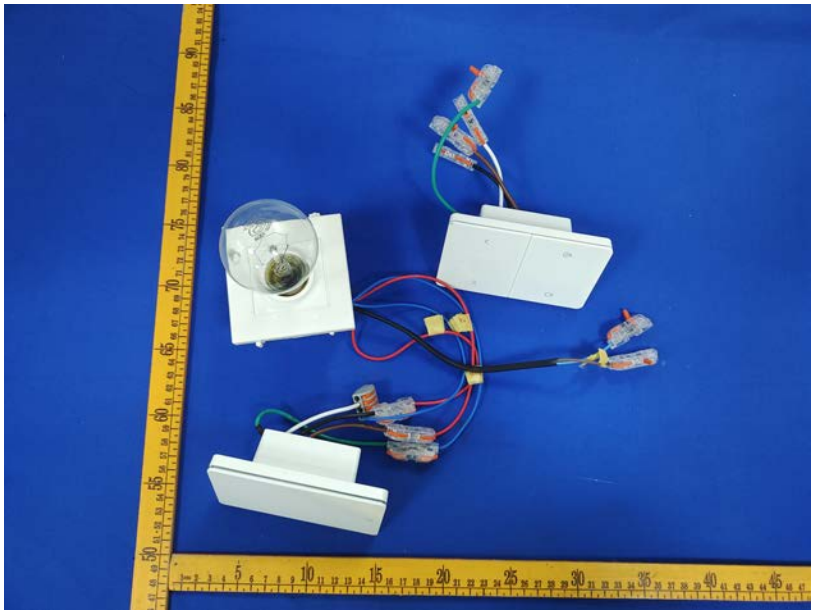
The maximum gain of antenna was 0.00dBi.

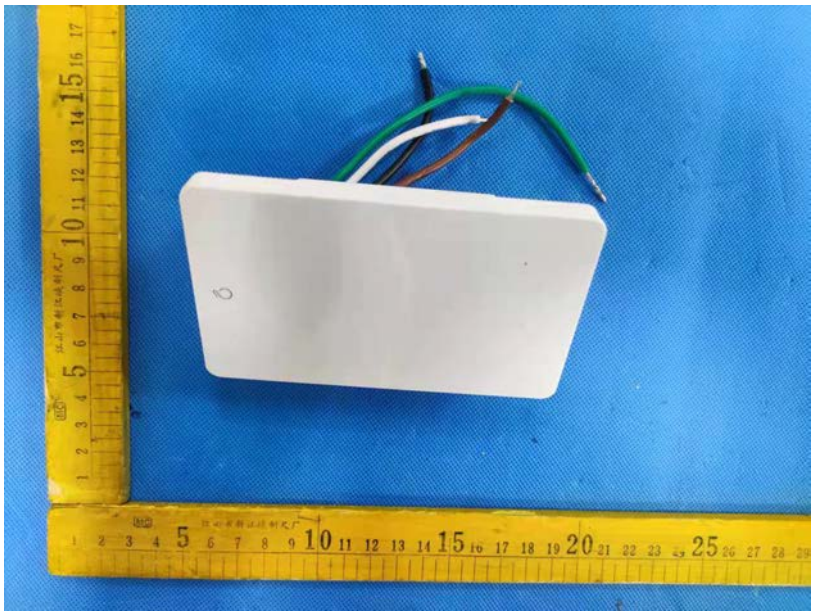
5 Test Setup Photos of the EUT

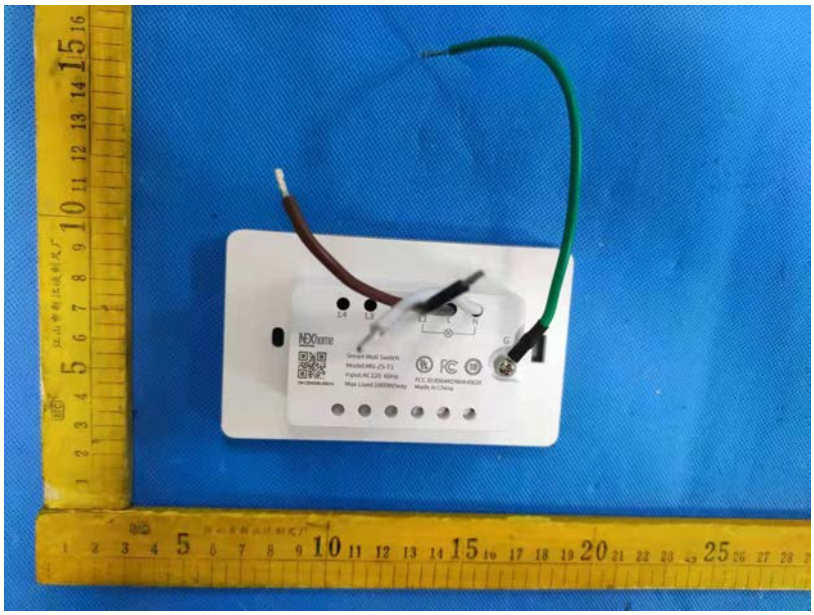




6 Photos of the EUT







********** End of Report **********