



FCC TEST REPORT

FCC ID: QOBZBN4007DV

Product	:	Zigbee 3.0 In-Wall Paddle Switch with Energy Monitoring, 120/277V
Model Name	:	ZBN4007DV
Additional Model	:	83233,83232
Brand	:	JascoPro
Report No.	:	PTC26042418203E-FC01
Prepared for		
Jasco Products Company LLC		
10 E Memorial Road Bldg Office Oklahoma City, Oklahoma 73114 United States		
Prepared by		
Precise Testing & Certification Co., Ltd		
Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China		



1 TEST RESULT CERTIFICATION

Applicant's name : Jasco Products Company LLC
Address : 10 E Memorial Road Bldg Office Oklahoma City, Oklahoma 73114
United States
Manufacture's name : Ultra Tech Industries Company Limited
Address : NON SAO INDUSTRIAL CLUSTER, TAN DINH COMMUNE, Bac Ninh
Province, VIETNAM
Product name : Zigbee 3.0 In-Wall Paddle Switch with Energy Monitoring, 120/277V
Model name : ZBN4007DV
Additional Model : 83233,83232
Standards : FCC CFR47 Part 15 Section 15.247
Test procedure : ANSI C63.10-2020
Test Date : April 28, 2026 to July 30, 2026
Date of Issue : July 30, 2026
Test Result : Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Engineer:

A handwritten signature in black ink, appearing to read 'Jack Zhou'.

Jack Zhou / Engineer

Technical Manager:

A handwritten signature in black ink, appearing to read 'Simon Pu'.

Simon Pu / Manager



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2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Conducted Spurious Emission	15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS



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2.1 Test Site

Precise Testing & Certification Co., Ltd

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

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A

FCC Designation Number: CN1219



3 General Information

3.1 General Description of E.U.T.

Product Name	:	Zigbee 3.0 In-Wall Paddle Switch with Energy Monitoring, 120/277V
Model name	:	ZBN4007DV
Additional Model	:	83233,83232
Models Difference	:	The only difference between the models is their names.
Specification	:	Zigbee
Operating frequency	:	2405-2480MHz
Modulation	:	GFSK For Zigbee
Number of Channel	:	16 channels For Zigbee
Antenna installation	:	PCB antenna
Antenna Gain	:	-2.92 dBi
Power supply	:	Input:125V 60Hz Output:125V 60Hz 15A
Hardware Version	:	N/A
Software Version	:	N/A



3.2 Channel List

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2020 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The details of test channels and bandwidth were for RF conductive measurement.

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2405	6	2435	12	2465
1	2410	7	2440	13	2470
2	2415	8	2445	14	2475
3	2420	9	2450	15	2480
4	2425	10	2455		
5	2430	11	2460		
Note: $F_c = 2405 + 5(k - 11)$ in MHz, for $k = 11, 12, \dots, 26$.					

Test Frequency and channel for Zigbee:

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2405	7	2440	15	2480



4 Equipment During Test

4.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Last Calibration	Calibration Interval
MXG Signal Analyzer	Agilent	N9020A	SER MY5111038	10Hz-26.5GHz	Aug.14, 2025	1 Year
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Aug.14, 2025	1 Year
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Aug.14, 2025	1 Year
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Aug.14, 2025	1 Year
DC power Supply	Agilent	E3642A	MY52420017	0-8V,5A/0-20 ,2.5A	Aug.14, 2025	1 Year
Test S/W	Tonscend	JS1120-3	/	/	/	/
6dB Attenuation	/	DC-3GHz	/	0.09MHz-3GHz	Aug.14, 2025	1 Year

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

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Last Calibration	Calibration Interval
EMI Test Receiver	Rohde&Schwarz	ESPI7	101671	9KHz-7GHz	Aug.14, 2025	1 Year
Loop Antenna	Schwarzbeck	FMZB 1519	192	9 KHz -30MHz	Nov.27, 2025	1 Year
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Sep.09, 2025	1 Year
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	9KHz-1GHz	Mar.21, 2026	1 Year
Cable	IMRO	AK-9515E(9m)	Cable-L	9KHz-3GHz	Aug.14, 2025	1 Year
Spectrum	Rohde&Schwarz	FSV40	6625-01-588-55	9KHz-40GHz	Aug.14,	1 Year



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Analyzer			15		2025	
Horn Antenna	SCHWARZBEC K	BBHA9120D	9120D-1246	1GHz-18GHz	Dec.11, 2025	1 Year
Power Amplifier	ZHINAN	ZN3380C	15002	1GHz-26.5GHz	Aug.14, 2025	1 Year
Horn Antenna	SCHWARZBEC K	BBHA 9170	9170-1066	15GHz-40GHz	Jun. 24, 2025	1 Year
Horn Antenna	SCHWARZBEC K	BBHA 9170	9170-1066	15GHz-40GHz	Jun. 11, 2026	1 Year
Amplifier	SCHWARZBEC K	BBV 9721	9721-205	18GHz-40GHz	Jun. 23, 2025	1 Year
Amplifier	SCHWARZBEC K	BBV 9721	9721-205	18GHz-40GHz	Jun. 08, 2026	1 Year
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Aug.14, 2025	1 Year
RF Cable	R&S	R204	R21X	1GHz-40GHz	Aug.14, 2025	1 Year
Test S/W	Tonscend	TS+	/	/	/	/

Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Date	Calibration Interval
EMI Test Receiver	Rohde&Schwarz	ESCI3	101417	9KHz-3GHz	Aug.14, 2025	1 Year
Artificial Mains Network	Rohde&Schwarz	ENV216	102453	9KHz-300MHz	Oct.29, 2025	1 Year
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Oct.29, 2025	1 Year
Limiter	R&S	ESH3-Z2	0357.8810.54-102808-NB	0Hz-30MHz	Aug.14, 2025	1 Year



RF Switch	DIAMOND ANTENNA	CX-210	/	0.09MHz-6GHz	Mar. 21,2026	1 Year
Test S/W	Tonscend	JS32-C E	/	/	/	/

4.2 Measurement Uncertainty

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

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(9kHz~30MHz)	±3.15dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB



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4.3 Description of Support Units

Equipment	Model No.	Series No.
N/A	N/A	N/A

5 Conducted Emission

Test Requirement	: FCC CFR 47 Part 15 Section 15.207
Test Method	: ANSI C63.10-2020
Test Result	: PASS
Frequency Range	: 150kHz to 30MHz
Class/Severity	: Class B

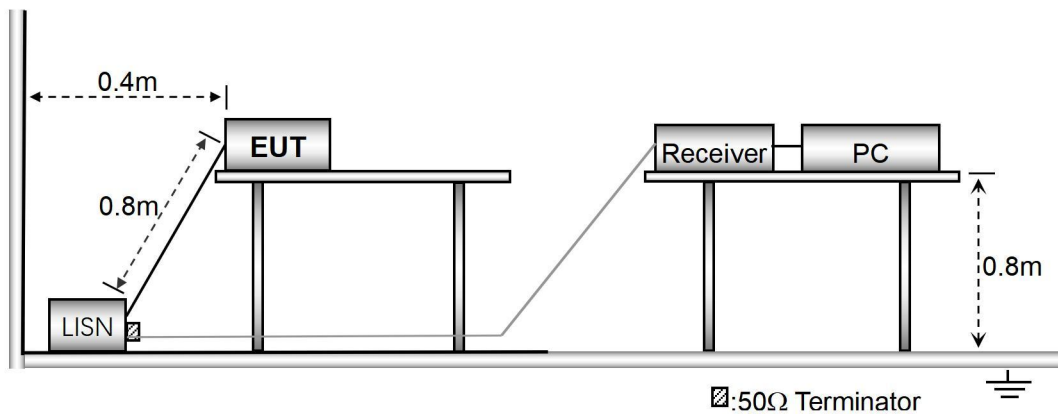
5.1 E.U.T. Operation

Operating Environment :

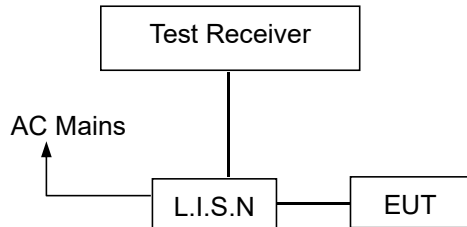
Temperature	: 25.5 °C
Humidity	: 51 % RH
Atmospheric Pressure	: 101.2kPa

5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10-2020.



5.3 Test SET-UP (Block Diagram of Configuration)



5.4 Measurement Procedure

1. Place the EUT on a non-conductive tabletop at a height of 80 cm. A vertical conductive shielding wall is located 40 cm behind the EUT.
2. The excess length of the power cord between the EUT and the LISN receptacle (or ac power receptacle where a LISN cannot be used), or an adapter or extension cord connected to and measured with the LISN shall be folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
3. EUT shall be placed at a distance of 80 cm from the LISN (or power receptacle where a LISN cannot be used) and connected thereto by a power lead or appropriate connection no more than 1 m long.
4. The equipment shall be arranged and installed in compliance with the standards, and operated in a manner that maximizes its emission characteristics in normal applications, with the six highest points on the waveform recorded.

5.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.



5.6 Measurement Receiver Parameters:

Receiver Parameters	Setting
Start Frequency	150kHz
Stop Frequency	30MHz
IF Bandwidth	9 kHz

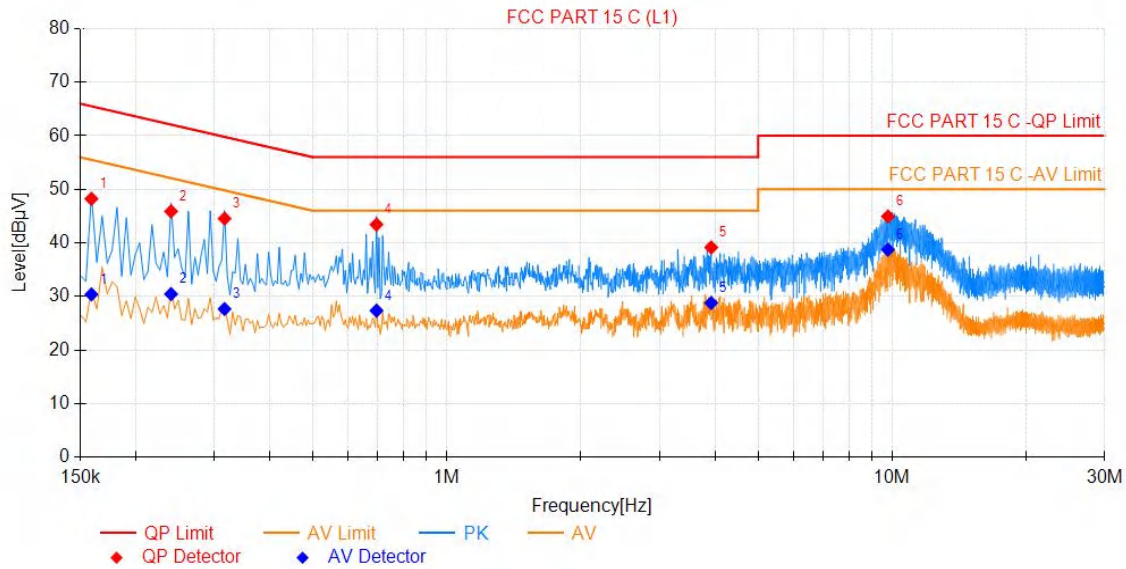
5.7 Conducted Emission Test Result

Pass.

Please refer to the following test plots for the worst test mode (GFSK (CH00: 2405MHz)).



Line -125V/60Hz:

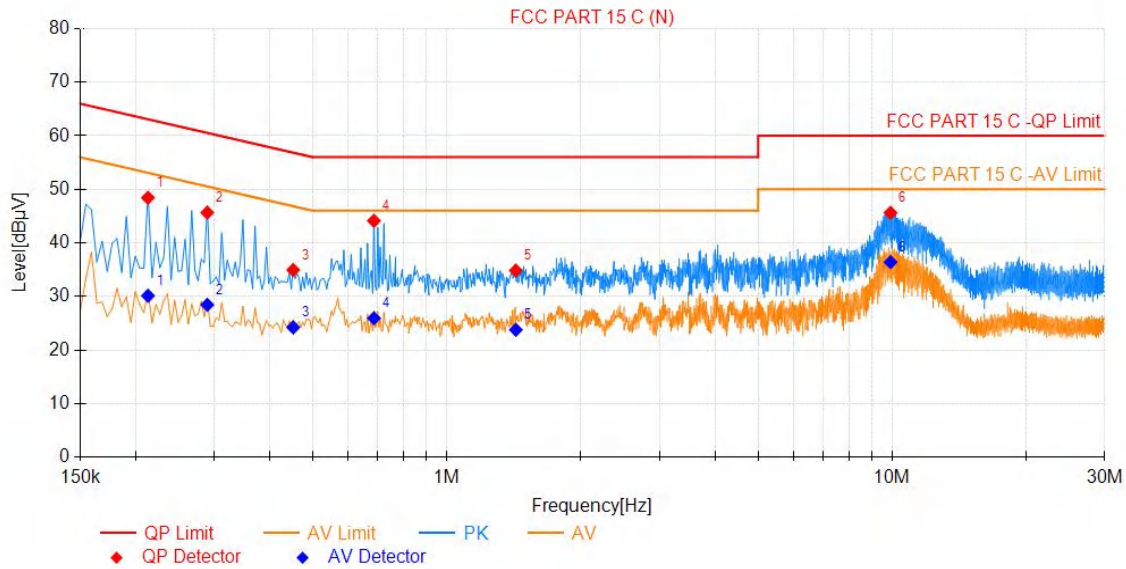


Final Data List

NO.	Freq. [MHz]	QP Reading [dBμV]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.159	28.76	19.47	48.23	65.52	17.29	10.92	30.39	55.52	25.13	PASS
2	0.240	26.42	19.47	45.89	62.10	16.21	10.97	30.44	52.10	21.66	PASS
3	0.317	25.12	19.42	44.54	59.80	15.26	8.23	27.65	49.80	22.15	PASS
4	0.695	24.01	19.42	43.43	56.00	12.57	7.93	27.35	46.00	18.65	PASS
5	3.921	19.69	19.46	39.15	56.00	16.85	9.32	28.78	46.00	17.22	PASS
6	9.785	25.28	19.66	44.94	60.00	15.06	19.07	38.73	50.00	11.27	PASS



Neutral -125V/60Hz:



Final Data List

NO.	Freq. [MHz]	QP Reading [dBμV]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.213	29.03	19.40	48.43	63.09	14.66	10.72	30.12	53.09	22.97	PASS
2	0.290	26.26	19.40	45.66	60.54	14.88	9.03	28.43	50.54	22.11	PASS
3	0.452	15.53	19.41	34.94	56.85	21.91	4.81	24.22	46.85	22.63	PASS
4	0.686	24.71	19.41	44.12	56.00	11.88	6.52	25.93	46.00	20.07	PASS
5	1.428	15.42	19.42	34.84	56.00	21.16	4.34	23.76	46.00	22.24	PASS
6	9.915	26.02	19.59	45.61	60.00	14.39	16.82	36.41	50.00	13.59	PASS



6 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247
 Test Method : ANSI C63.10-2020
 Test Result : PASS
 Measurement Distance : 3m
 Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

6.1 EUT Operation

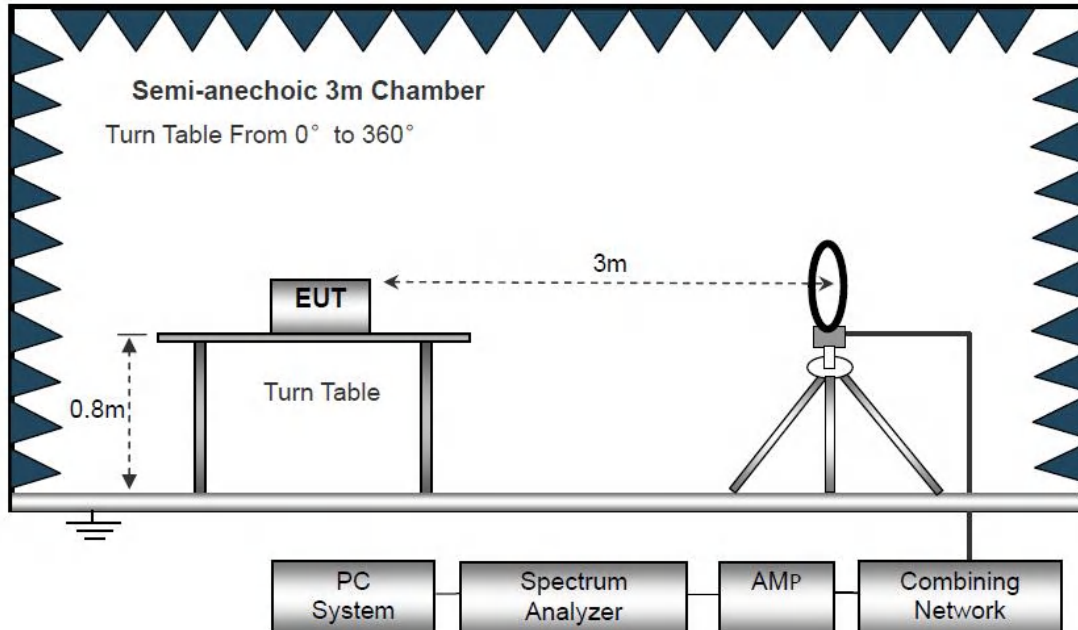
Operating Environment :

Temperature : 23.5 °C
 Humidity : 51.1 % RH
 Atmospheric Pressure : 101.2kPa

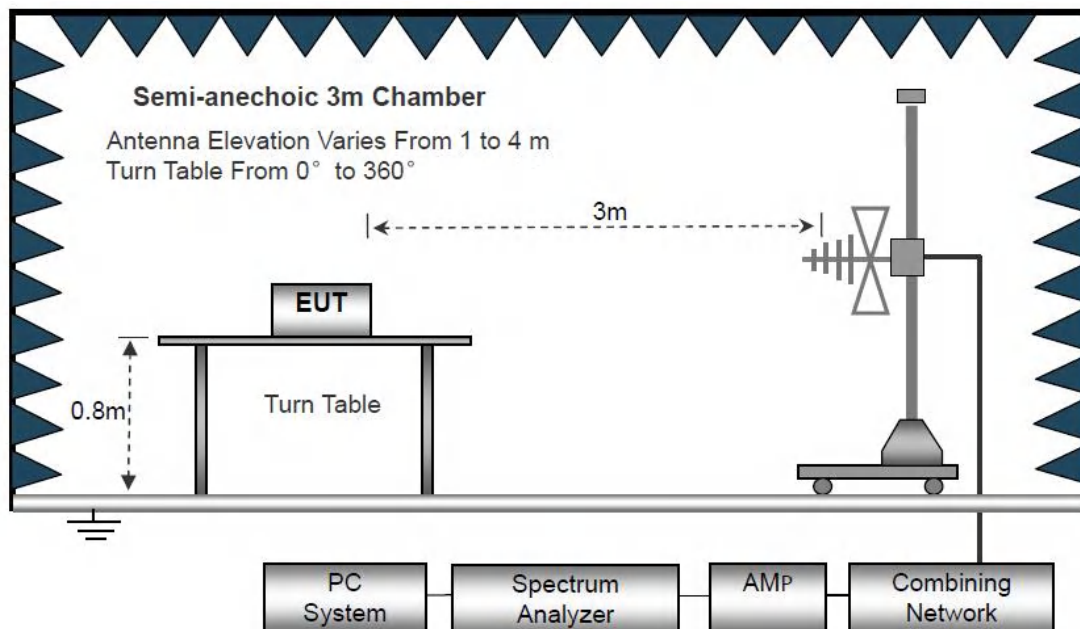
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

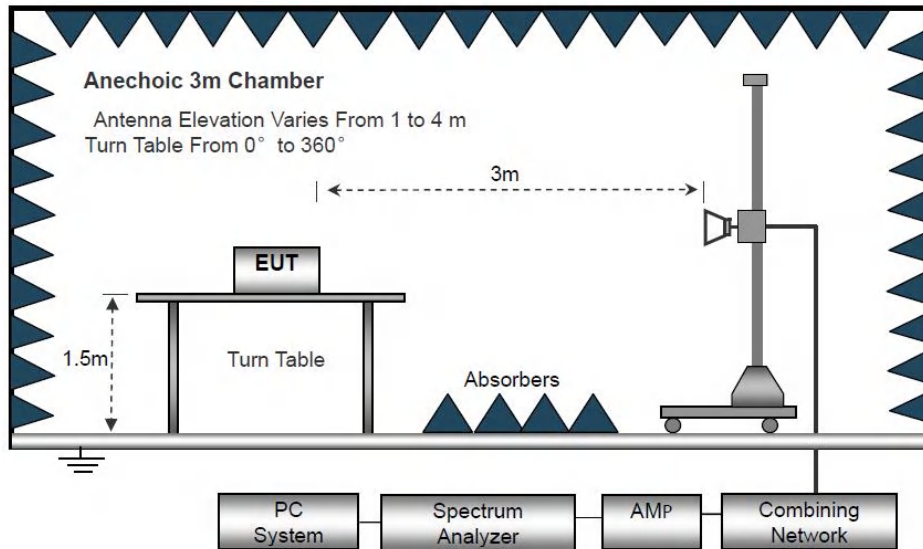
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



6.3 Spectrum Analyzer Setup

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value



6.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2020.
2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
7. Test Procedure of measurement (For Above 1GHz):
 - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
 - 2) Change the antenna polarization and repeat 1) with vertical polarization.
 - 3) Make a hardcopy of the spectrum.
 - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
 - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
 - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
 - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
 - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.
8. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.



For Average Measurement:

VBW=10Hz, when duty cycle is no less than 98 percent.

VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(μ s)	1/T(KHz)	Average Correction Factor	VBW Setting
2405-2480	100	-	-	0	10Hz



6.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over Limit (dB)
--	--	--	--	>20

Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance/ test distance})$ (dB);

Limit line = Specific limits (dBuV) + distance extrapolation factor.

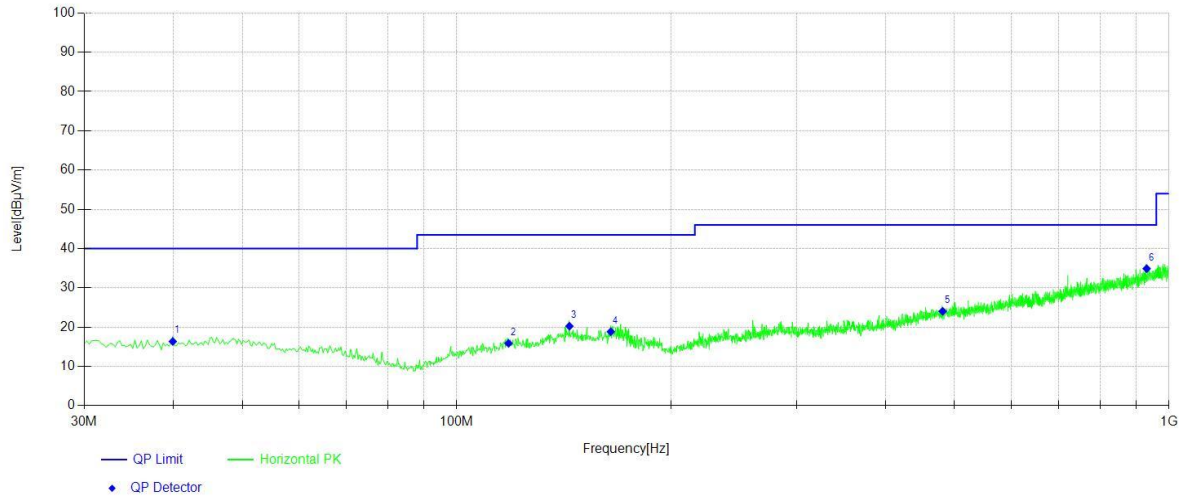
Test Frequency: 30MHz ~ 1GHz

Pass.

Please refer to the following test plots for the worst test mode (GFSK (CH00: 2405MHz)).



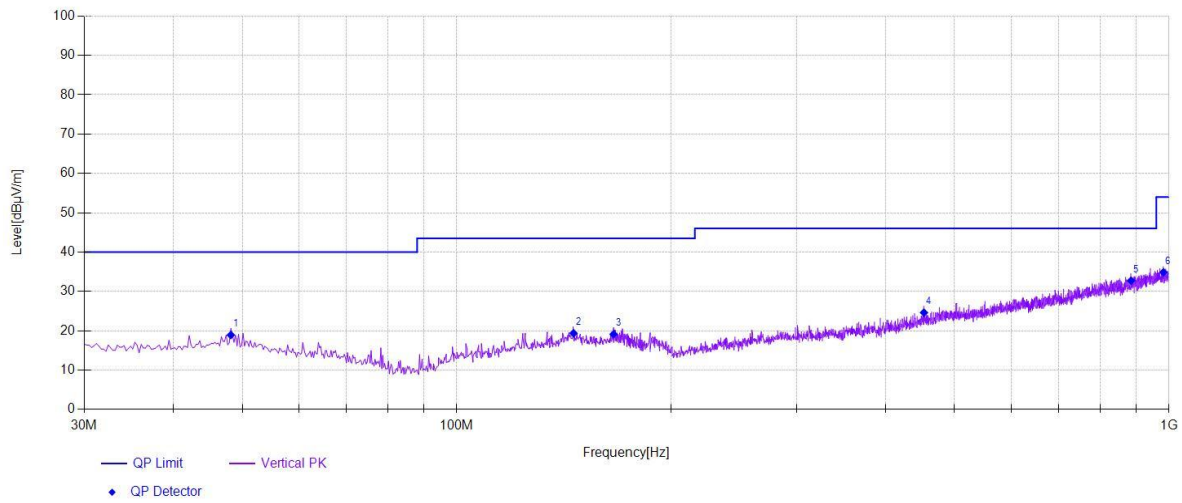
Antenna Polarization: Horizontal GFSK(CH00: 2405MHz)



Final Data List[QP]								
NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity	Verdict
1	39.94	26.2	-9.85	16.35	40.00	23.65	Horizontal	PASS
2	118.27	25.97	-10.10	15.87	43.50	27.63	Horizontal	PASS
3	143.98	28.51	-8.27	20.24	43.50	23.26	Horizontal	PASS
4	164.59	26.73	-7.89	18.84	43.50	24.66	Horizontal	PASS
5	481.05	25.48	-1.45	24.03	46.00	21.97	Horizontal	PASS
6	930.40	26.98	7.92	34.90	46.00	11.10	Horizontal	PASS

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Antenna Polarization: Vertical GFSK(CH00: 2405MHz)

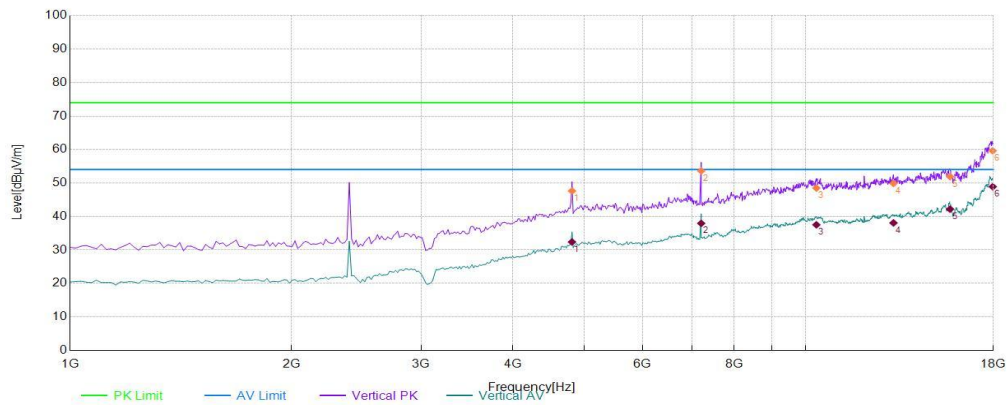


Final Data List[QP]								
NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity	Verdict
1	48.19	28.7	-9.78	18.92	40.00	21.08	Vertical	PASS
2	145.92	27.51	-8.13	19.38	43.50	24.12	Vertical	PASS
3	166.04	27.09	-7.97	19.12	43.50	24.38	Vertical	PASS
4	452.92	26.9	-2.28	24.62	46.00	21.38	Vertical	PASS
5	884.57	26	6.74	32.74	46.00	13.26	Vertical	PASS
6	982.30	26.03	8.83	34.86	54.00	19.14	Vertical	PASS

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor

Test Frequency 1GHz-25GHz:

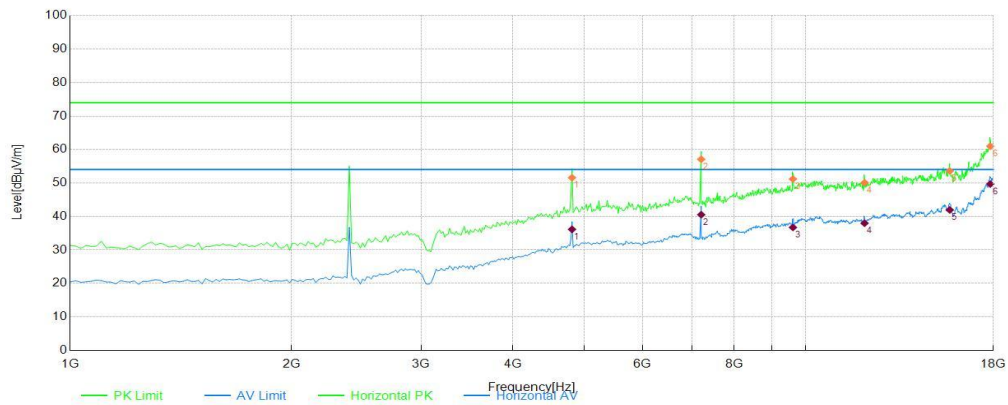
Test Channel: O-QPSK (CH00: 2405MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4811.81	-12.74	47.62	74.00	26.38	Peak	100	180	Vertical
2	7211.21	-9.38	53.61	74.00	20.39	Peak	100	170	Vertical
3	10342.34	-5.66	48.48	74.00	25.52	Peak	100	280	Vertical
4	13167.17	-4.63	49.87	74.00	24.13	Peak	100	110	Vertical
5	15719.72	-4.44	51.87	74.00	22.13	Peak	100	50	Vertical
6	17965.97	5.31	59.61	74.00	14.39	Peak	100	290	Vertical

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4811.81	-12.74	32.37	54.00	21.63	AV	100	180	Vertical
2	7211.21	-9.38	37.93	54.00	16.07	AV	100	170	Vertical
3	10342.34	-5.66	37.49	54.00	16.51	AV	100	280	Vertical
4	13167.17	-4.63	38.06	54.00	15.94	AV	100	110	Vertical
5	15719.72	-4.44	42.18	54.00	11.82	AV	100	50	Vertical
6	17965.97	5.31	48.89	54.00	5.11	AV	100	290	Vertical

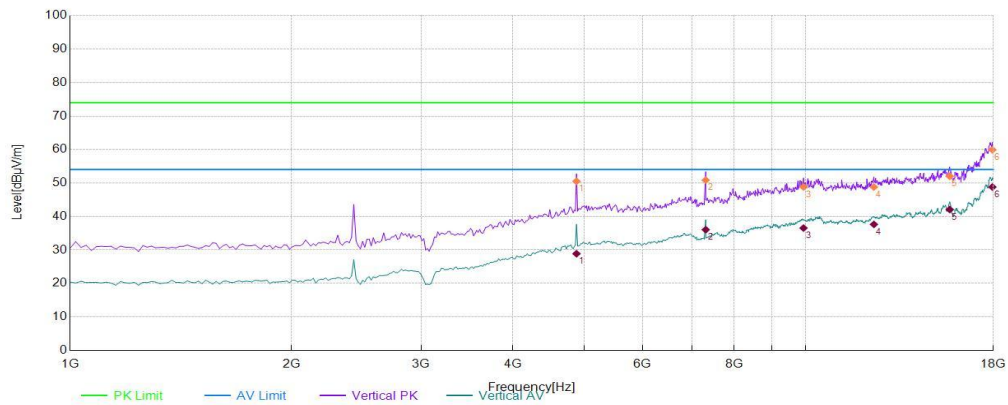
Test Channel:O-QPSK(CH00: 2405MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4811.81	-12.74	51.58	74.00	22.42	Peak	100	190	Horizontal
2	7211.21	-9.38	57.07	74.00	16.93	Peak	100	90	Horizontal
3	9610.61	-6.40	51.18	74.00	22.82	Peak	100	90	Horizontal
4	12027.03	-5.92	50.08	74.00	23.92	Peak	100	30	Horizontal
5	15702.70	-4.39	53.59	74.00	20.41	Peak	100	160	Horizontal
6	17829.83	4.36	60.97	74.00	13.03	Peak	100	160	Horizontal

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4811.81	-12.74	36.13	54.00	17.87	AV	100	190	Horizontal
2	7211.21	-9.38	40.52	54.00	13.48	AV	100	90	Horizontal
3	9610.61	-6.40	36.70	54.00	17.30	AV	100	90	Horizontal
4	12027.03	-5.92	37.96	54.00	16.04	AV	100	30	Horizontal
5	15702.70	-4.39	41.94	54.00	12.06	AV	100	160	Horizontal
6	17829.83	4.36	49.69	54.00	4.31	AV	100	160	Horizontal

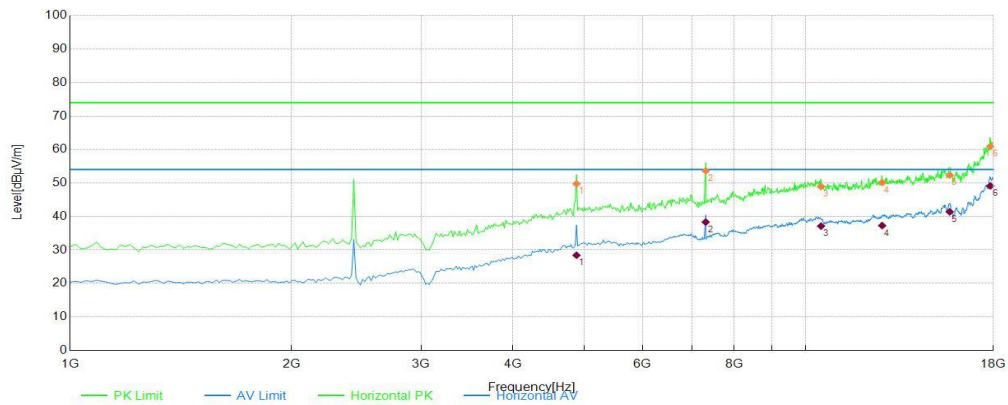
Test Channel:O-QPSK(CH07: 2440MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4879.88	-12.49	50.49	74.00	23.51	Peak	100	250	Vertical
2	7313.31	-9.22	50.84	74.00	23.16	Peak	100	40	Vertical
3	9933.93	-5.83	48.80	74.00	25.20	Peak	100	220	Vertical
4	12384.38	-5.59	48.78	74.00	25.22	Peak	100	60	Vertical
5	15702.70	-4.39	52.00	74.00	22.00	Peak	100	350	Vertical
6	17948.95	5.19	59.92	74.00	14.08	Peak	100	340	Vertical

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4879.88	-12.49	28.85	54.00	25.15	AV	100	250	Vertical
2	7313.31	-9.22	36.03	54.00	17.97	AV	100	40	Vertical
3	9933.93	-5.83	36.52	54.00	17.48	AV	100	220	Vertical
4	12384.38	-5.59	37.62	54.00	16.38	AV	100	60	Vertical
5	15702.70	-4.39	42.05	54.00	11.95	AV	100	350	Vertical
6	17948.95	5.19	48.79	54.00	5.21	AV	100	340	Vertical

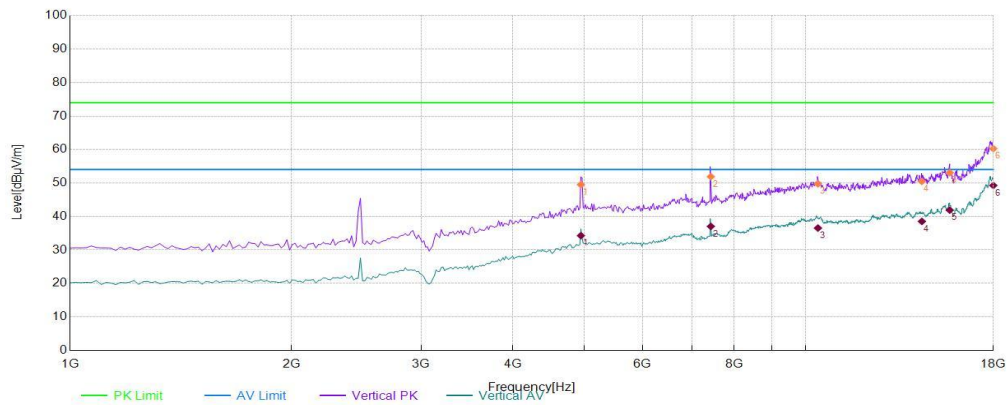
Test Channel:O-QPSK(CH07: 2440MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4879.88	-12.49	49.74	74.00	24.26	Peak	100	350	Horizontal
2	7313.31	-9.22	53.60	74.00	20.40	Peak	100	130	Horizontal
3	10495.50	-5.64	48.92	74.00	25.08	Peak	100	330	Horizontal
4	12707.71	-5.28	50.14	74.00	23.86	Peak	100	20	Horizontal
5	15702.70	-4.39	52.35	74.00	21.65	Peak	100	100	Horizontal
6	17829.83	4.36	60.90	74.00	13.10	Peak	100	350	Horizontal

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4879.88	-12.49	28.40	54.00	25.60	AV	100	350	Horizontal
2	7313.31	-9.22	38.30	54.00	15.70	AV	100	130	Horizontal
3	10495.50	-5.64	37.10	54.00	16.90	AV	100	330	Horizontal
4	12707.71	-5.28	37.26	54.00	16.74	AV	100	20	Horizontal
5	15702.70	-4.39	41.36	54.00	12.64	AV	100	100	Horizontal
6	17829.83	4.36	49.12	54.00	4.88	AV	100	350	Horizontal

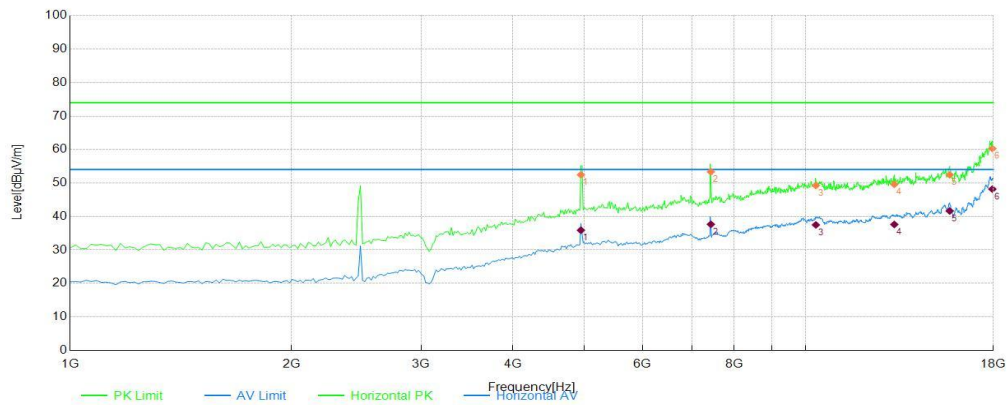
Test Channel:O-QPSK(CH15: 2480MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4947.95	-12.22	49.49	74.00	24.51	Peak	100	70	Vertical
2	7432.43	-9.03	51.89	74.00	22.11	Peak	100	310	Vertical
3	10393.39	-5.66	49.74	74.00	24.26	Peak	100	30	Vertical
4	14392.39	-2.59	50.47	74.00	23.53	Peak	100	270	Vertical
5	15702.70	-4.39	53.06	74.00	20.94	Peak	100	90	Vertical
6	18000.00	5.55	60.26	74.00	13.74	Peak	100	200	Vertical

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4947.95	-12.22	34.25	54.00	19.75	AV	100	70	Vertical
2	7432.43	-9.03	37.02	54.00	16.98	AV	100	310	Vertical
3	10393.39	-5.66	36.52	54.00	17.48	AV	100	30	Vertical
4	14392.39	-2.59	38.51	54.00	15.49	AV	100	270	Vertical
5	15702.70	-4.39	41.88	54.00	12.12	AV	100	90	Vertical
6	18000.00	5.55	49.25	54.00	4.75	AV	100	200	Vertical

Test Channel:O-QPSK(CH15: 2480MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4947.95	-12.22	52.44	74.00	21.56	Peak	100	250	Horizontal
2	7432.43	-9.03	53.35	74.00	20.65	Peak	100	240	Horizontal
3	10325.33	-5.67	49.23	74.00	24.77	Peak	100	40	Horizontal
4	13201.20	-4.55	49.58	74.00	24.42	Peak	100	240	Horizontal
5	15702.70	-4.39	52.42	74.00	21.58	Peak	100	100	Horizontal
6	17948.95	5.19	60.27	74.00	13.73	Peak	100	210	Horizontal

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	4947.95	-12.22	35.87	54.00	18.13	AV	100	250	Horizontal
2	7432.43	-9.03	37.64	54.00	16.36	AV	100	240	Horizontal
3	10325.33	-5.67	37.47	54.00	16.53	AV	100	40	Horizontal
4	13201.20	-4.55	37.60	54.00	16.40	AV	100	240	Horizontal
5	15702.70	-4.39	41.63	54.00	12.37	AV	100	100	Horizontal
6	17948.95	5.19	48.16	54.00	5.84	AV	100	210	Horizontal

Note: 1. The testing has been conformed to $10 \times 2480 \text{ MHz} = 24800 \text{ MHz}$.

2. All other emissions more than 30dB below the limit.

3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



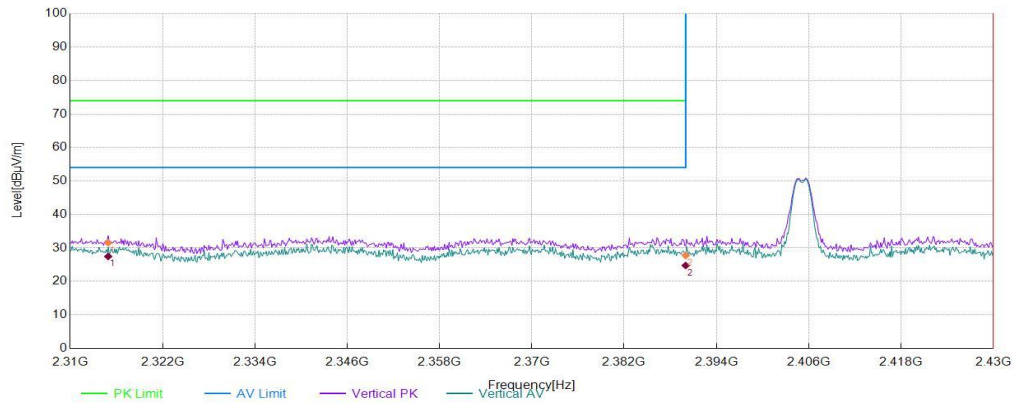
Report No.: PTC26042418203E-FC01

Emission Level = Reading + Factor
Margin=Emission Level-Limit



Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

Test Channel:O-QPSK(CH00: 2405MHz)

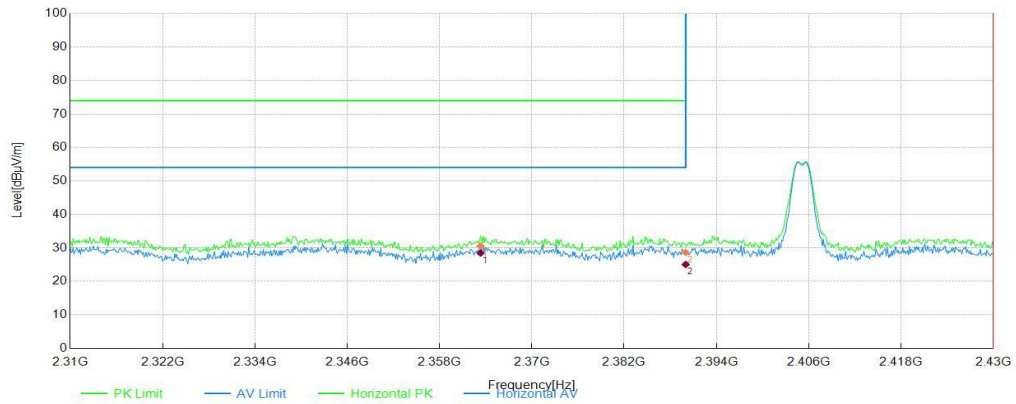


NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2314.92	-23.60	31.52	74.00	42.48	Peak	150	40	Vertical
2	2390.00	-23.26	27.73	74.00	46.27	Peak	150	240	Vertical

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2314.92	-23.60	27.44	54.00	26.56	AV	150	40	Vertical
2	2390.00	-23.26	24.73	54.00	29.27	AV	150	240	Vertical



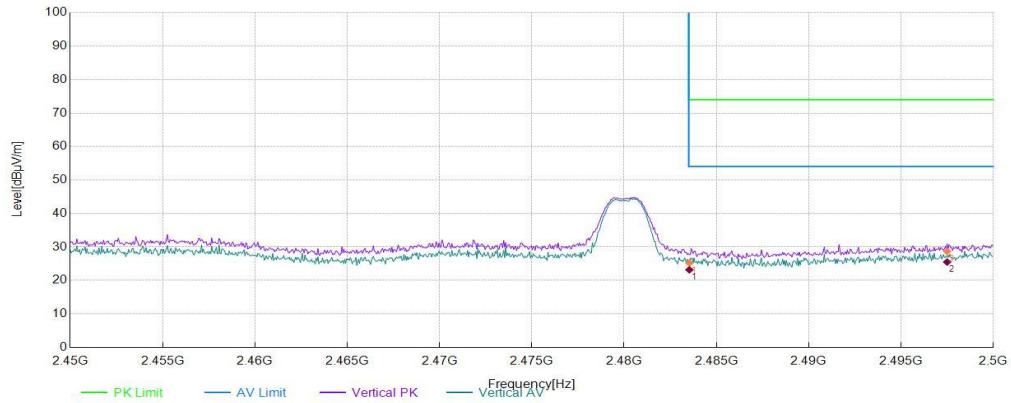
Test Channel:O-QPSK(CH00: 2405MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2363.33	-23.38	30.57	74.00	43.43	Peak	150	260	Horizontal
2	2390.00	-23.26	28.63	74.00	45.37	Peak	150	200	Horizontal

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2363.33	-23.38	28.45	54.00	25.55	AV	150	260	Horizontal
2	2390.00	-23.26	25.04	54.00	28.96	AV	150	200	Horizontal

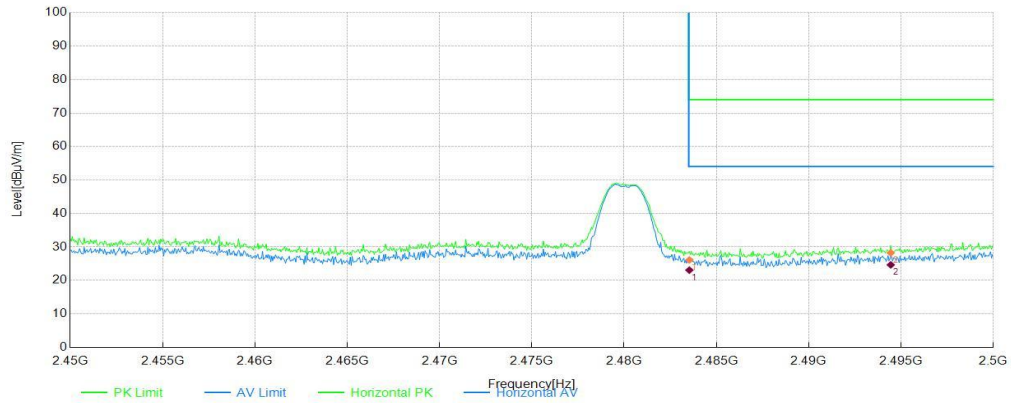
Test Channel:O-QPSK(CH15: 2480MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2483.53	-22.85	25.20	74.00	48.80	Peak	150	280	Vertical
2	2497.50	-22.79	28.63	74.00	45.37	Peak	150	60	Vertical

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2483.53	-22.85	23.15	54.00	30.85	AV	150	280	Vertical
2	2497.50	-22.79	25.48	54.00	28.52	AV	150	60	Vertical

Test Channel:O-QPSK(CH15: 2480MHz)



NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2483.53	-22.85	26.08	74.00	47.92	Peak	150	280	Horizontal
2	2494.44	-22.80	28.21	74.00	45.79	Peak	150	70	Horizontal

NO.	Freq. [MHz]	Factor [dB/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Detector	Height [cm]	Angle [°]	Polarity
1	2483.53	-22.85	23.05	54.00	30.95	AV	150	280	Horizontal
2	2494.44	-22.80	24.63	54.00	29.37	AV	150	70	Horizontal



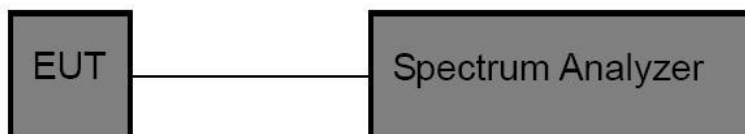
7 Conduct Band Edge And Spurious Emissions Measurement

Test Requirement	: Section 15.247(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	: ANSI C63.10-2020
Test Limit	: Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

7.2 Test Setup





7.3 Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	2405	0~Reference	-3.62	-3.62	---	PASS
ZIGB	Ant1	2405	30~1000	-3.62	-54.48	≤ -23.62	PASS
ZIGB	Ant1	2405	1000~26500	-3.62	-42.47	≤ -23.62	PASS
ZIGB	Ant1	2440	0~Reference	-1.43	-1.43	---	PASS
ZIGB	Ant1	2440	30~1000	-1.43	-54.89	≤ -21.43	PASS
ZIGB	Ant1	2440	1000~26500	-1.43	-40.27	≤ -21.43	PASS
ZIGB	Ant1	2480	0~Reference	-2.76	-2.76	---	PASS
ZIGB	Ant1	2480	30~1000	-2.76	-54.9	≤ -22.76	PASS
ZIGB	Ant1	2480	1000~26500	-2.76	-42.57	≤ -22.76	PASS



Test Graphs:

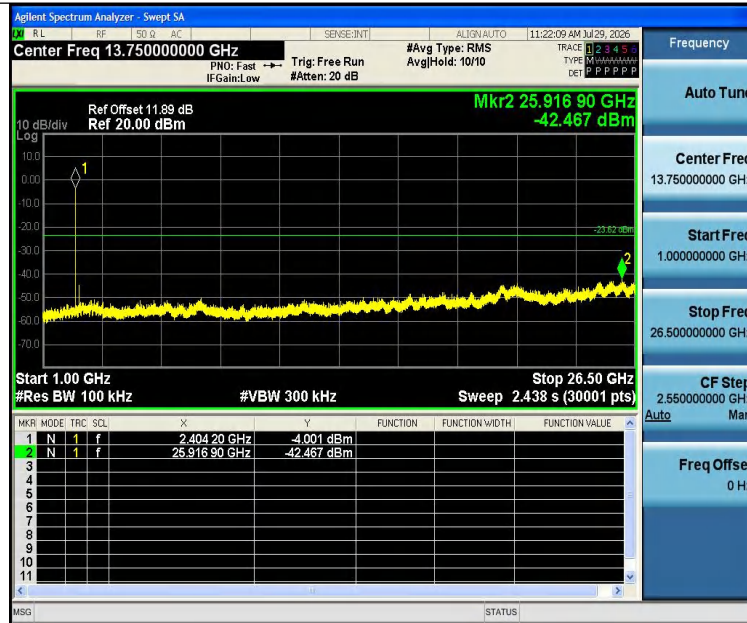
ZIGB-Ant1-2405-0~Reference-PASS



ZIGB-Ant1-2405-30~1000-PASS



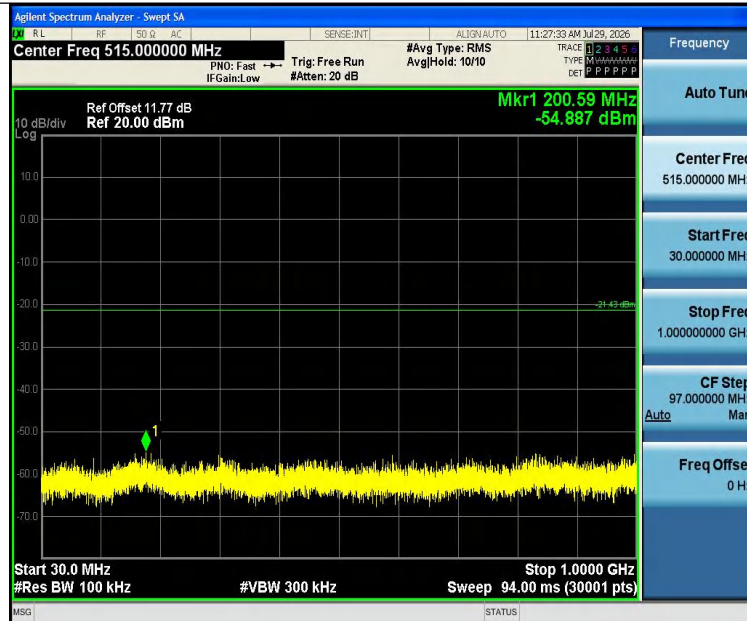
ZIGB-Ant1-2405-1000~26500-PASS



ZIGB-Ant1-2440-0~Reference-PASS



ZIGB-Ant1-2440-30~1000-PASS



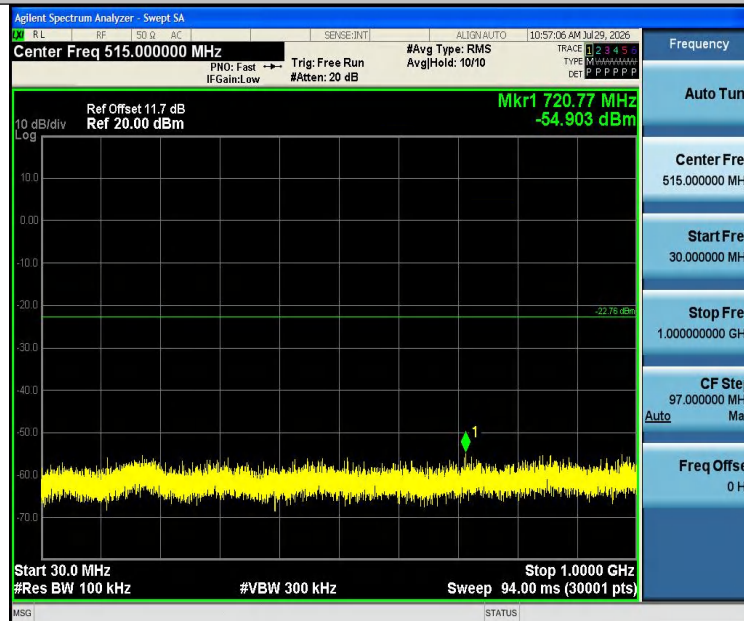
ZIGB-Ant1-2440-1000~26500-PASS



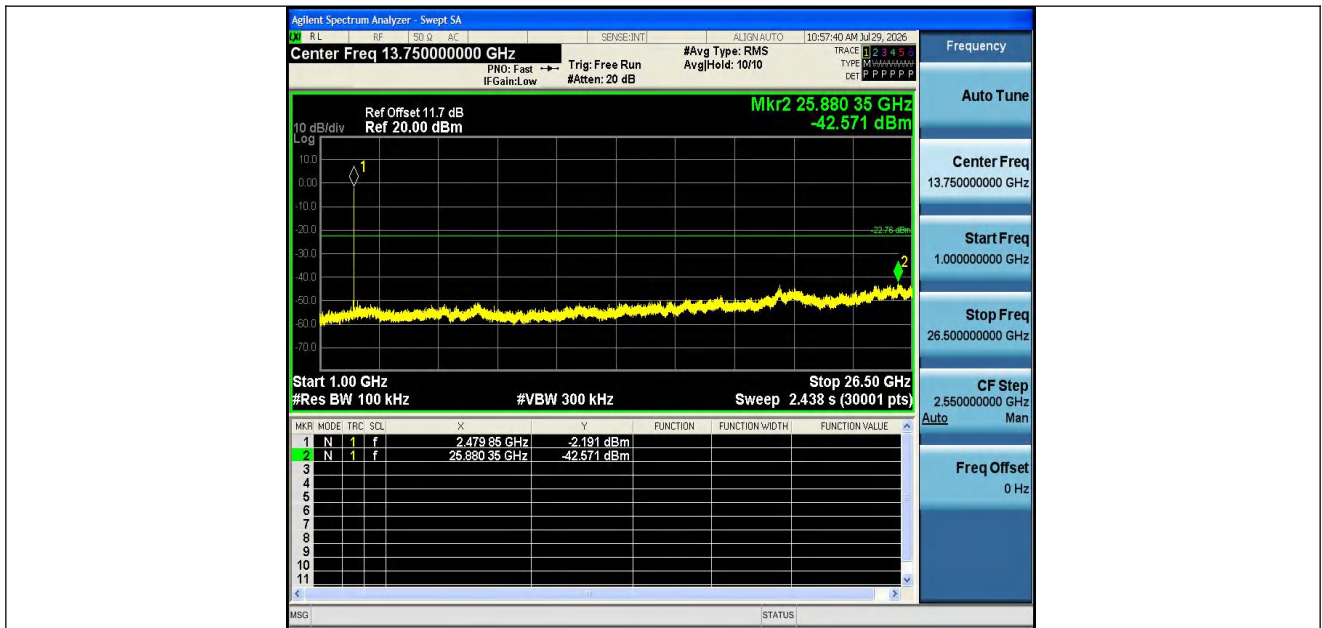
ZIGB-Ant1-2480-0~Reference-PASS



ZIGB-Ant1-2480-30~1000-PASS



ZIGB-Ant1-2480-1000~26500-PASS

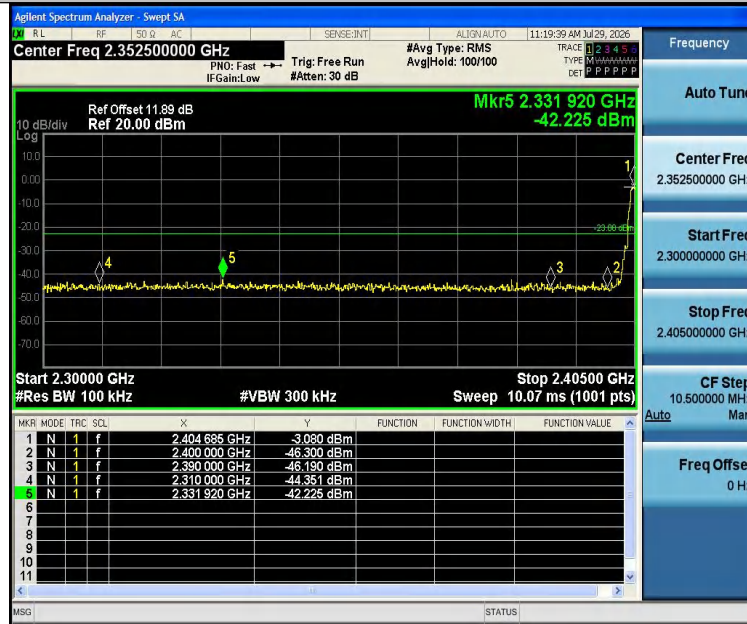




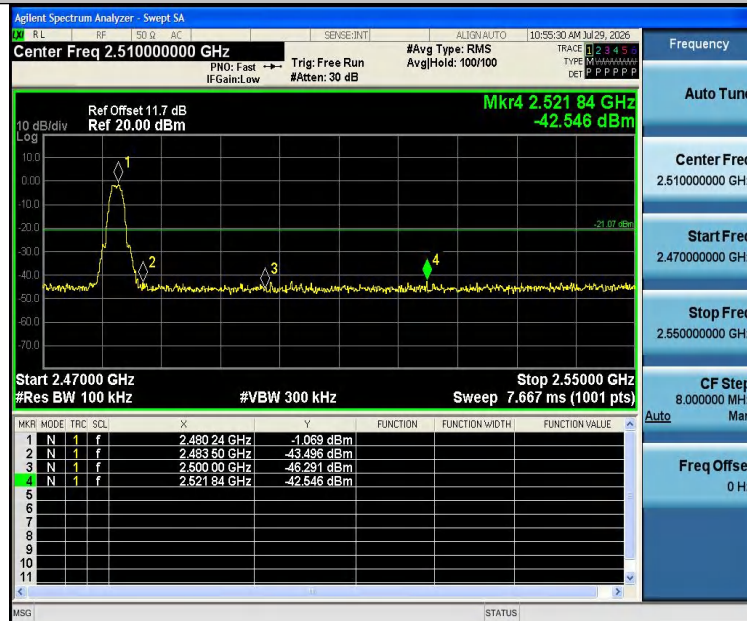
Band edge:

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	Low	2405	-3.08	-42.23	≤-23.08	PASS
ZIGB	Ant1	High	2480	-1.07	-42.55	≤-21.07	PASS

ZIGB-Ant1-2405-PASS



ZIGB-Ant1-2480-PASS





8 6dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

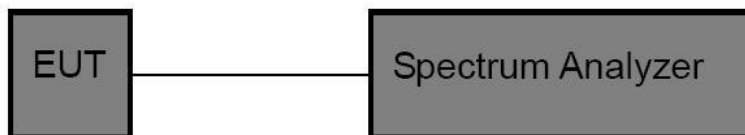
Test Method : ANSI C63.10-2020

Test Limit : Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

Test Setup



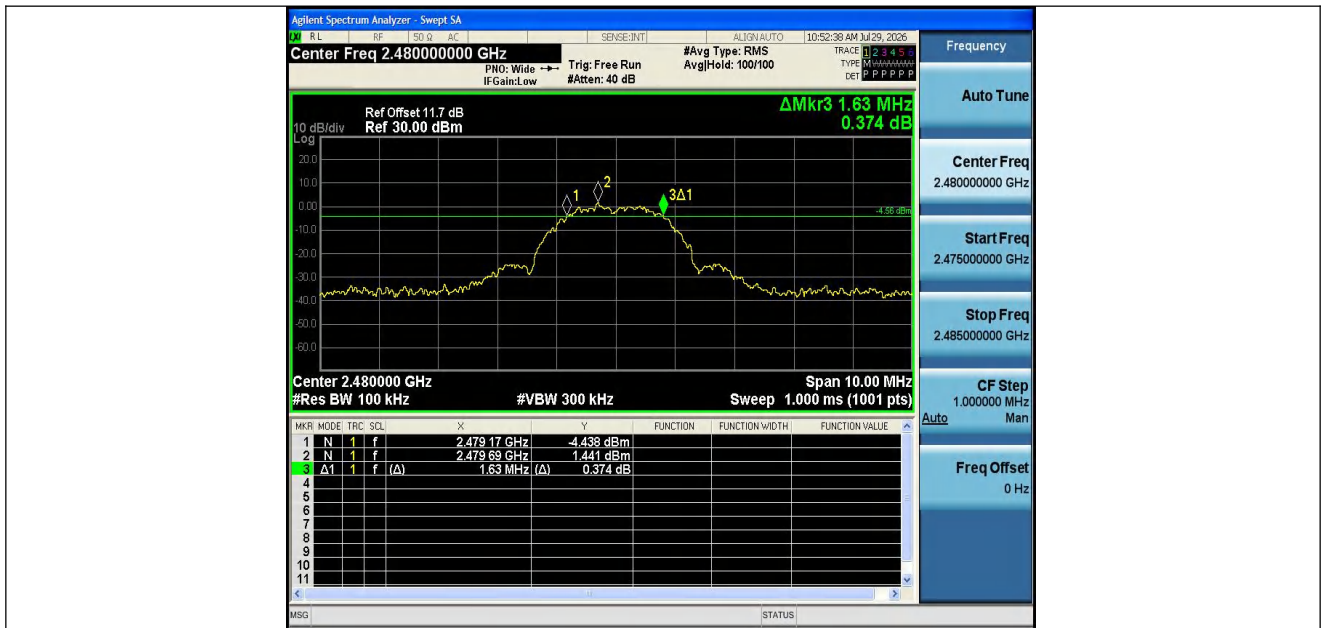
Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
ZIGB	Ant1	2405	1.670	2404.170	2405.840	0.5	PASS
ZIGB	Ant1	2440	1.700	2439.140	2440.840	0.5	PASS
ZIGB	Ant1	2480	1.630	2479.170	2480.800	0.5	PASS



Test Graphs:







9 Maximum Peak Output Power

Test Requirement : FCC CFR47 Part 15 Section 15.247

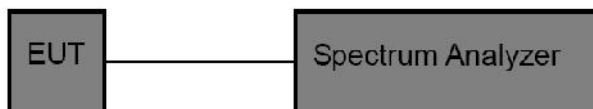
Test Method : ANSI C63.10-2020

Test Limit : Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

9.1 Test Procedure

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power and record the results in the test report.

9.2 Test Setup



9.3 Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm]	Limit[dBm]	Verdict
ZIGB	Ant1	2405	2.58	≤30	PASS
ZIGB	Ant1	2440	3.23	≤30	PASS
ZIGB	Ant1	2480	3.59	≤30	PASS

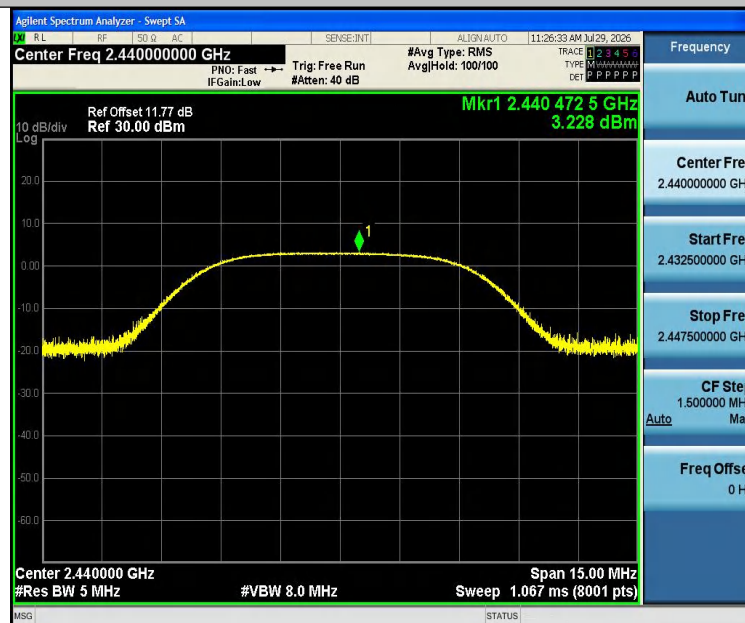


Test Graphs:

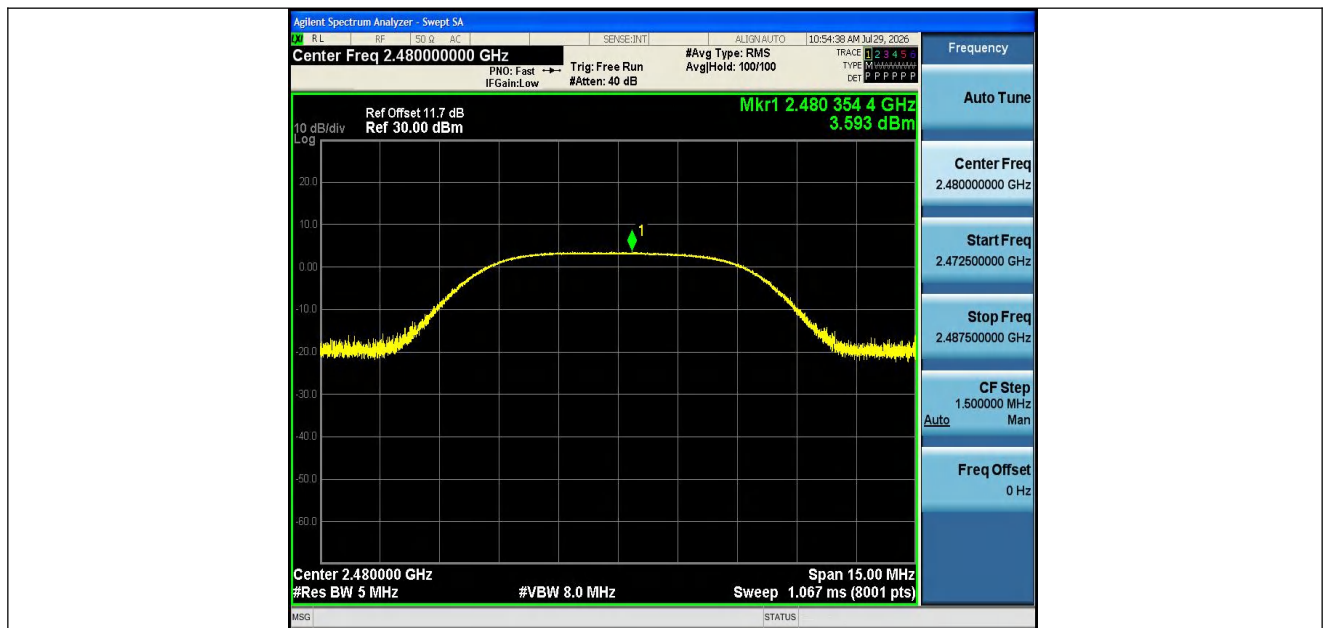
ZIGB-Ant1-2405-PASS



ZIGB-Ant1-2440-PASS



ZIGB-Ant1-2480-PASS





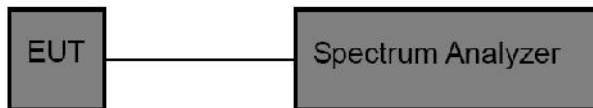
10 Power Spectral density

Test Requirement	: FCC CFR47 Part 15 Section 15.247
Test Method	: ANSI C63.10-2020
Test Limit	: Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

10.2 Test Setup



10.3 Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
ZIGB	Ant1	2405	-13.41	≤8.00	PASS
ZIGB	Ant1	2440	-13.03	≤8.00	PASS
ZIGB	Ant1	2480	-12.66	≤8.00	PASS



Test Graphs:

ZIGB-Ant1-2405-PASS



ZIGB-Ant1-2440-PASS



ZIGB-Ant1-2480-PASS



Report No.: PTC26042418203E-FC01





11 Antenna Application

11.1 Antenna Requirement

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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2 Result

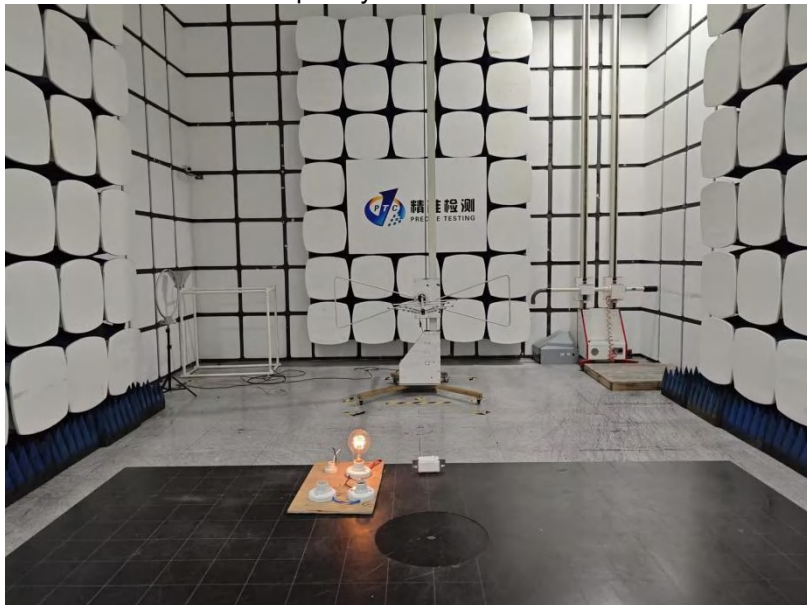
The EUT'S antenna, permanent attached antenna, is internal PCB antenna. The antenna's gain is -2.92 dBi and meets the requirement.

12 Test Setup

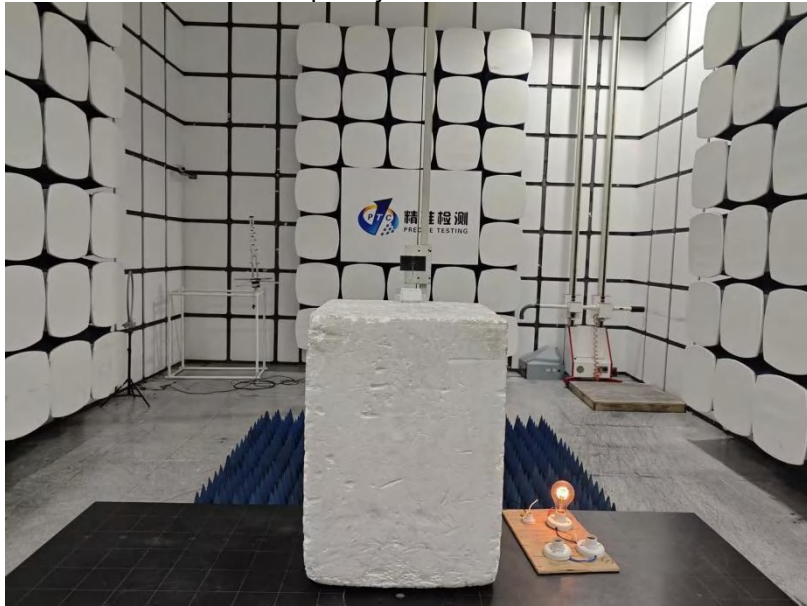
Conducted Spurious Emissions



Radiated Spurious Emissions
Test Frequency From 30MHz-1GHz

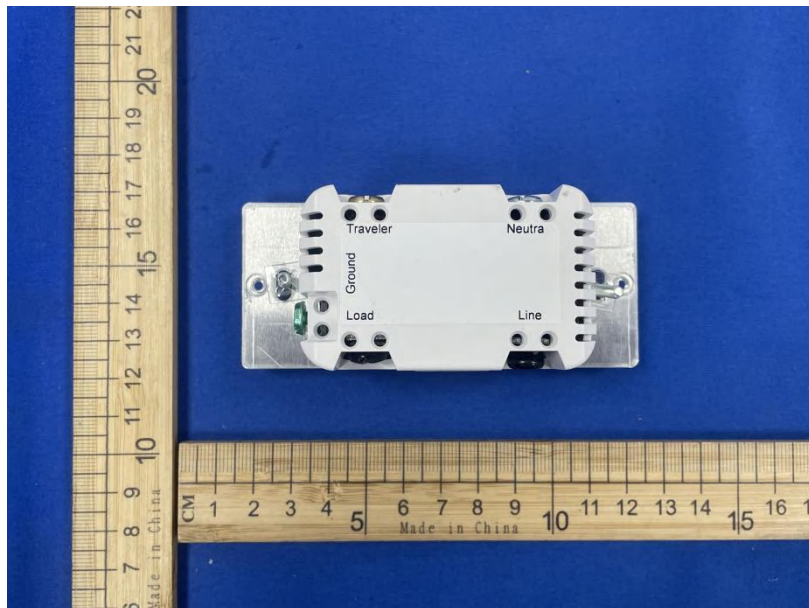


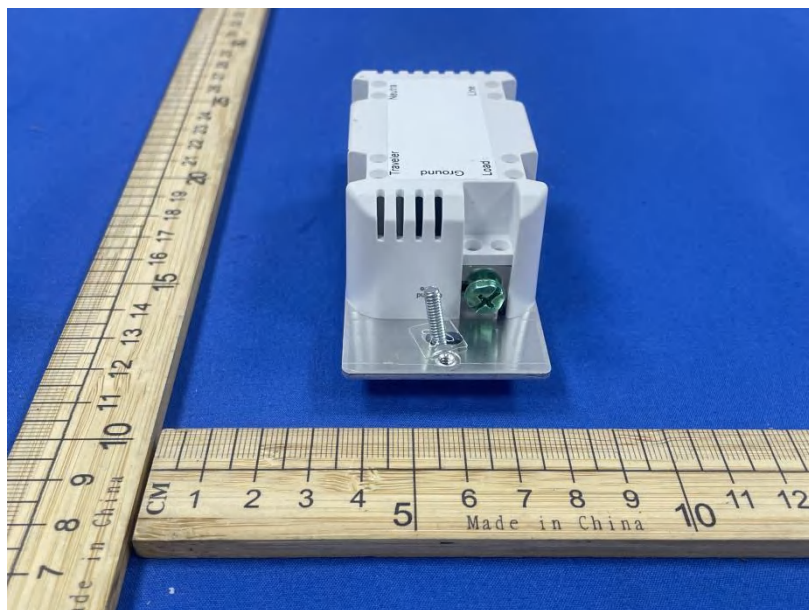
Test frequency from Above 1GHz



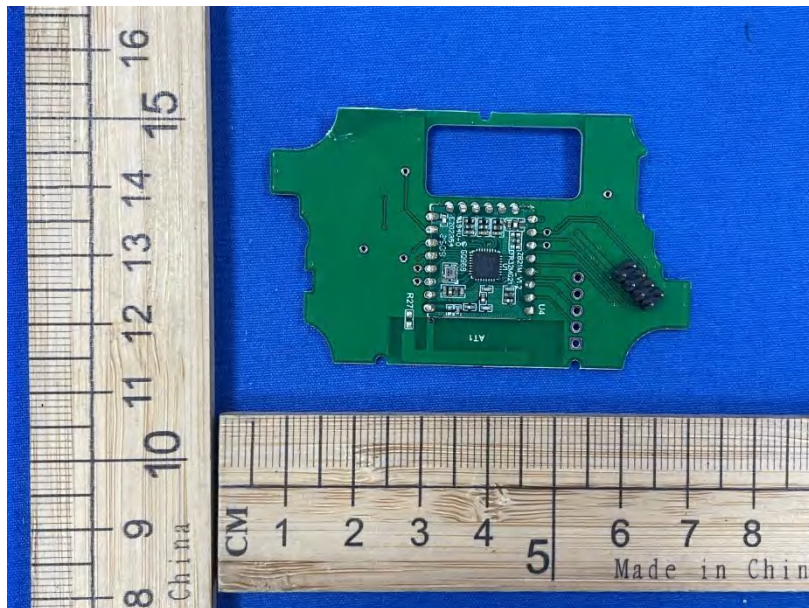
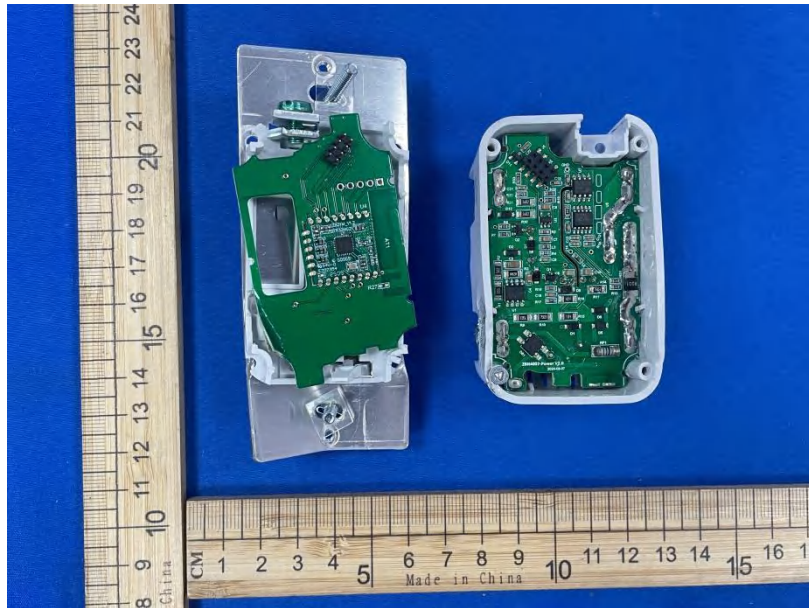


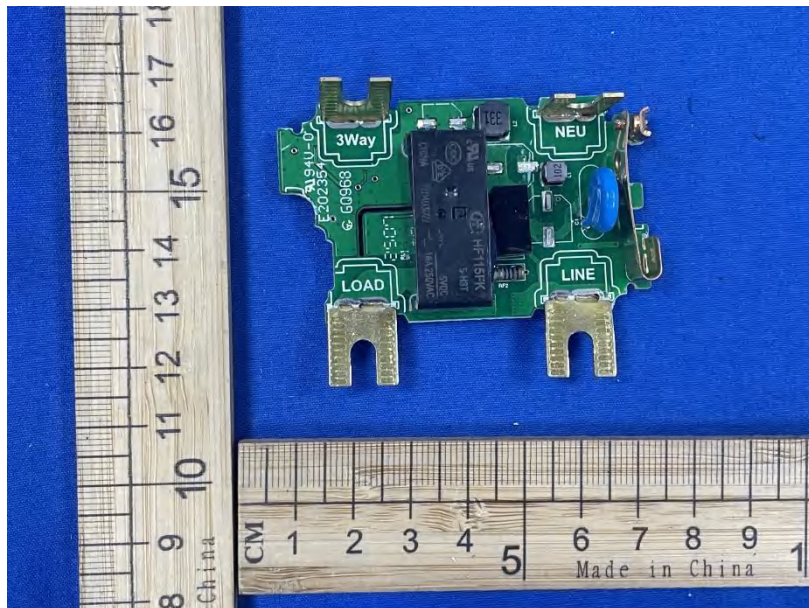
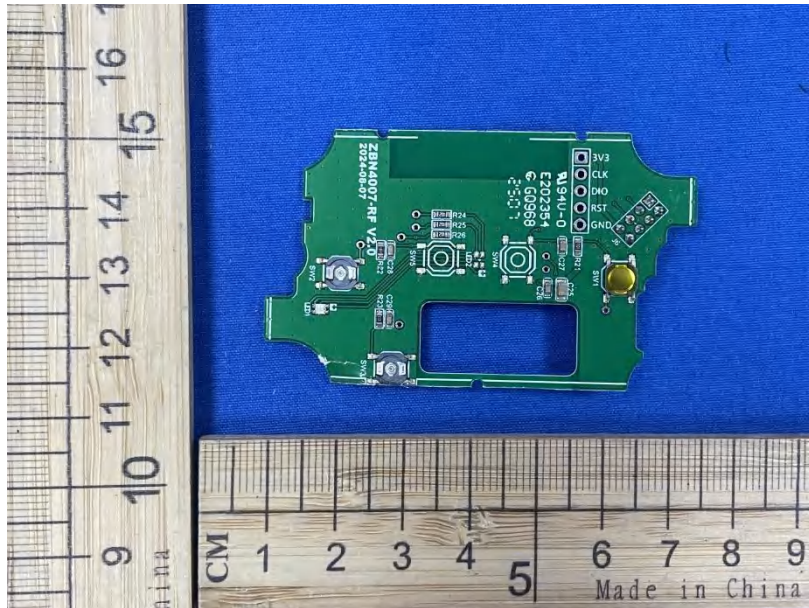
13 EUT Photos

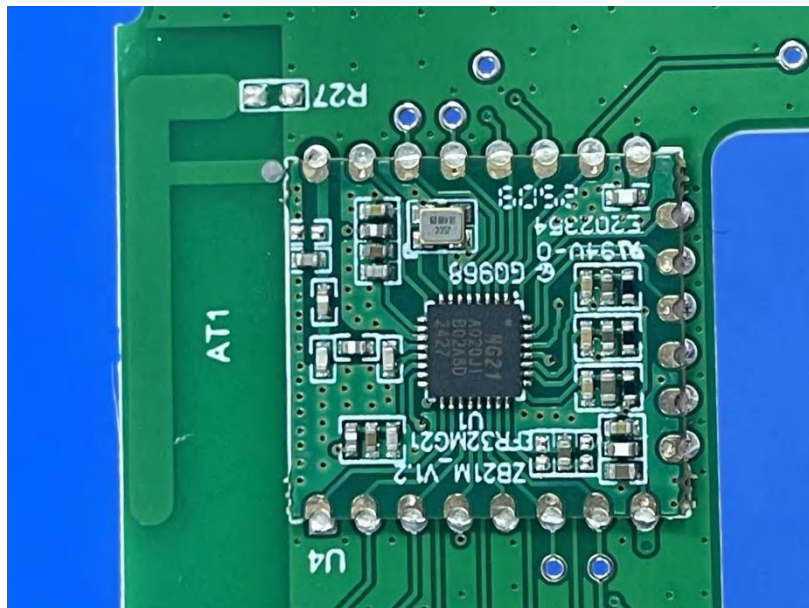
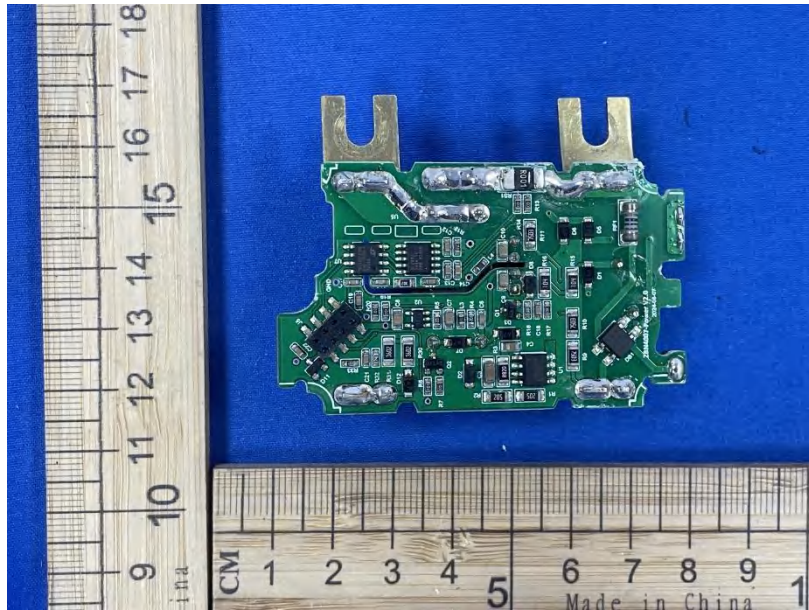












*****THE END REPORT*****