

FCC Test Report

Product Name : PACKTALK EDGE
PACKTALK CUSTOM
Brand Name : Cardo Systems, LTD
Model No. : PACKTALK EDGE/CUSTOM
FCC ID : Q95ER28

Applicant : Cardo Systems, LTD
Address : 101 E. Park Blvd, Suite 600, Plano TX, 75074 USA

Date of Receipt : Oct. 22, 2021
Issued Date : Dec. 10, 2021
Report No. : 21A0733R-RFUSOTHV05-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 of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

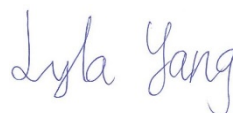
The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Report Certification



Product Name : PACKTALK EDGE
PACKTALK CUSTOM
Applicant : Cardo Systems, LTD
Address : 101 E. Park Blvd, Suite 600, Plano TX, 75074 USA
Manufacturer : Cardo Systems, LTD
Address : 101 E. Park Blvd, Suite 600, Plano TX, 75074 USA
Brand Name : Cardo Systems, LTD
Model No. : PACKTALK EDGE/CUSTOM
FCC ID : Q95ER28
EUT Voltage : DC 5V (adapter or host equipment)
DC 3.7 for battery
Testing Voltage : AC 120V/60Hz
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247
ANSI C63.10: 2013
Laboratory Name : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied

Documented By :



(Lyla Yang / Engineering Adm. Specialist)

Approved By :



(Louis Hsu / Deputy Manager)

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA
Testing and Certification Co., Ltd.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Dec. 10, 2021

TABLE OF CONTENTS

Description	Page
1. General Information	6
1.1 EUT Description	6
1.2 Test Mode	8
1.3 Comments and Remarks	8
1.4 Tested System Details	9
1.5 Configuration of tested System	9
1.6 EUT Operation of during Test	9
1.7 Test Facility	10
1.8 List of Test Equipment	12
1.9 Measurement Uncertainty	13
1.10 Duty Cycle	14
2. AC Power Line Conducted Emission	15
2.1 Test Setup	15
2.2 Test Limit	15
2.3 Test Procedure	15
2.4 Test Specification	15
2.5 Test Result of AC Power Line Conducted Emission	16
3. Maximum Conducted Output Power	18
3.1 Test Setup	18
3.2 Test Limit	18
3.3 Test procedures	18
3.4 Test Specification	18
3.5 Test Result of Maximum Conducted Output Power	19
4. Radiated Emission	20
4.1 Test Setup	20
4.2 Test Limit	21
4.3 Test Procedure	21
4.4 Test Specification	21
4.5 Test Result of Radiated Emissions (30 MHz ~ 1 GHz)	22
4.6 Test Result of Radiated Emissions (1 GHz ~ 10 th Harmonic)	23
5. Antenna Port Conducted Emission	25
5.1 Test Setup	25
5.2 Test Limit	25
5.3 Test Procedure	25
5.4 Test Specification	25
5.5 Test Result of Antenna Port Conducted Emission	26
6. Radiated Emission Band Edge	27
6.1 Test Setup	27
6.2 Test Limit	27
6.3 Test Procedure	28
6.4 Test Specification	28
6.5 Test Result of Radiated Emission Band Edge	29

7.	Occupied Bandwidth & DTS Bandwidth	31
7.1	Test Setup.....	31
7.2	Test Limit	31
7.3	Test Procedures.....	31
7.4	Test Specification.....	31
7.5	Test Result of Occupied Bandwidth.....	32
7.6	Test Result of DTS Bandwidth.....	33
8.	Maximum Power Spectral Density.....	34
8.1	Test Setup.....	34
8.2	Test Limit	34
8.3	Test Procedures.....	34
8.4	Test Specification.....	34
8.5	Test Result of Maximum Power Spectral Density.....	35
Appendix A		36
	Test Setup Photograph.....	36

1. General Information

1.1 EUT Description

Product Name	PACKTALK EDGE PACKTALK CUSTOM
Brand Name	Cardo Systems, LTD
Model No.	PACKTALK EDGE/CUSTOM
Frequency Range	2405 ~ 2475 MHz
Channel Number	8 Channels
Type of Modulation / Data Rate	O-QPSK / 1 Mbps

Accessories Information				
No.	Equipment Name	Brand Name	Model No.	Description
1	Headphone	JBL	40mm 32ohm speakers	3 wire audio lines
2	USB Cable	Hailink	USB 2.0 A/M to Type C cable 28# L=60cm	Shielded cable w/o ferrite core, 0.6m
3	Microphone	Transound	Boom Microphone	2 wire audio lines
4	Audio Kit	Leflexo	Pack Talk Edge Audio kit	5 wire audio lines

The difference for each product name is shown as below:

Product Name	Description
PACKTALK EDGE	The difference are related to pay per feature on the mobile application that manufacturer enable the user to use but the product is exactly the same. For instance, noise cancellation feature can be operate by mobile app and for PACKTALK CUSTOM user pay per this feature.
PACKTALK CUSTOM	

From the above product, product name: PACKTALK CUSTOM was selected as representative model for the test and its data was recorded in this report.

Antenna Information				
Ant.	Brand Name	Model No.	Type	Gain (dBi)
0	N/A	N/A	PCB	0

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2405 MHz	01	2415 MHz	02	2425 MHz	03	2435 MHz
04	2445 MHz	05	2455 MHz	06	2465 MHz	07	2475 MHz

Note:

1. Regards to the frequency band operation; the lowest , middle and highest frequency of channel were selected to perform the test, and then shown on this report.
2. The above EUT information is declared by the manufacturer.

1.2 Test Mode

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Test Mode	Mode 1: Transmit
-----------	------------------

Test Items	Test Mode	Modulation	Channel	Result
AC Power Line Conducted Emission	Mode 1	O-QPSK	00	Pass
Maximum Conducted Output Power	Mode 1	O-QPSK	00/04/07	Pass
Radiated Emission Below 1 GHz	Mode 1	O-QPSK	00	Pass
Radiated Emission Above 1 GHz	Mode 1	O-QPSK	00/04/07	Pass
Antenna Port Conducted Emission	Mode 1	O-QPSK	00/04/07	Pass
Radiated Emission Band Edge	Mode 1	O-QPSK	00/04/07	Pass
Occupied Bandwidth & DTS Bandwidth	Mode 1	O-QPSK	00/04/07	Pass
Maximum Power Spectral Density	Mode 1	O-QPSK	00/04/07	Pass

Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. For below 1 GHz radiated emission and AC Power Line Conducted Emission have performed all modes of operation were investigated and the worst-case emissions are reported.
3. The EUT was performed at X axis, Y axis and Z axis position for radiated emission and band edge tests. The worst case was found at Z axis, so the measurement will follow this same test configuration.

1.3 Comments and Remarks

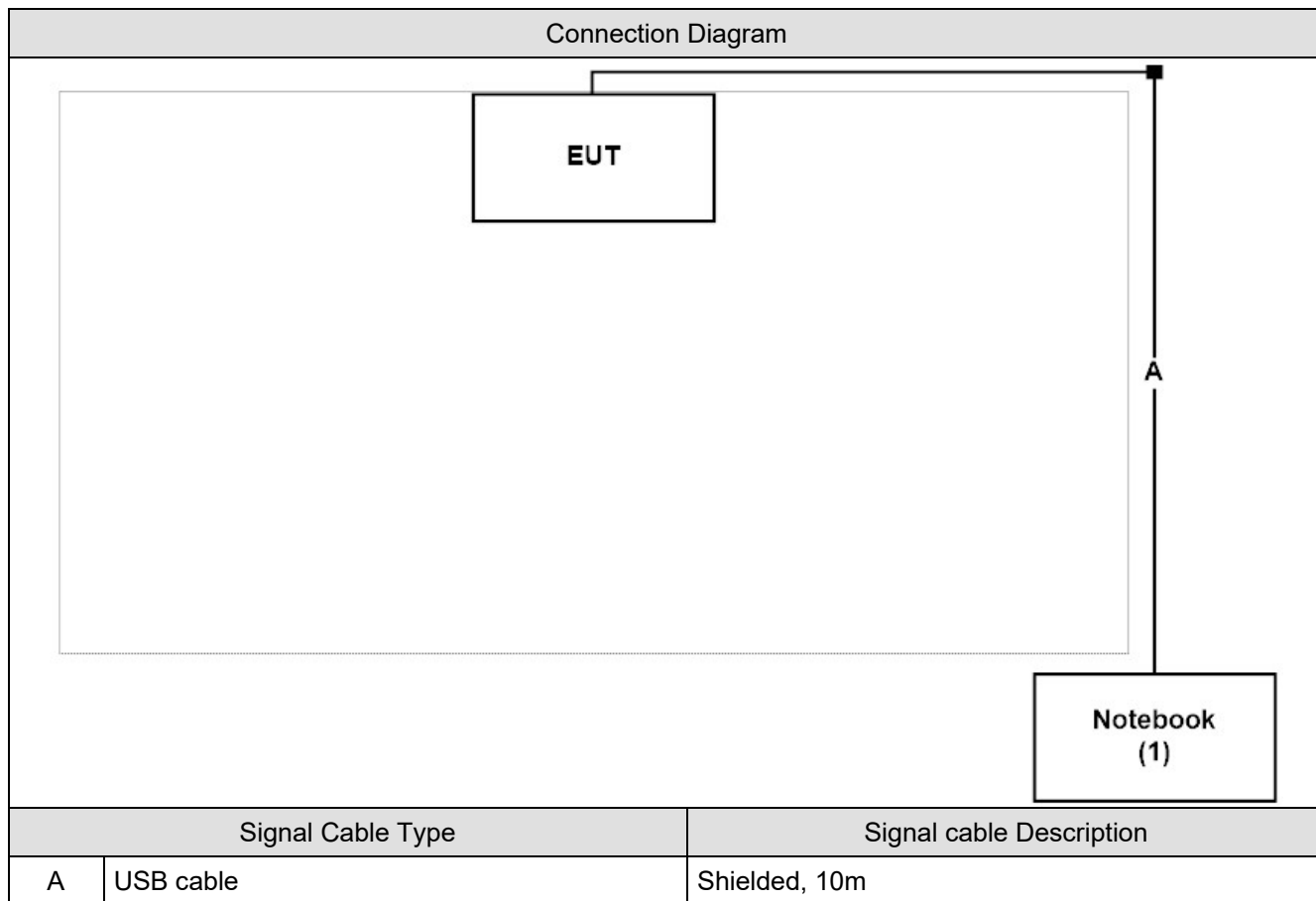
The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1.4 Tested System Details

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

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Notebook	HP	HSTNN-I33C-4	N/A	Non-Shielded, 1.8m, One ferrite core bonded

1.5 Configuration of tested System



1.6 EUT Operation of during Test

1	Set the EUT as shown.
2	Execute the control command from software CMD.exe
3	Configure test mode, test channel and data rate.
4	Let the EUT start transmitting signal continuously.
5	Verify that device is working properly.

1.7 Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	AC power Line Conducted	23.2	Max Chang	2021/11/23	SR2-H
Humidity (%RH)	Emission	51.0			
Temperature (°C)	Maximum Peak Conducted	20.0	Elwin Lin	2021/11/09	SR12-H
Humidity (%RH)	Output Power	60.0			
Temperature (°C)	Radiated Emission	25.4	Ling Chen	2021/11/01	CB2-H
Humidity (%RH)		56.0			
Temperature (°C)	Antenna Port Conducted	20.0	Elwin Lin	2021/11/09	SR12-H
Humidity (%RH)	Emission	60.0			
Temperature (°C)	Radiated Emission Band Edge	21.1 ~ 23.8	Ling Chen	2021/11/01 ~ 2021/11/05	CB2-H
Humidity (%RH)		58.8 ~ 60.0	Getaz Yang		
Temperature (°C)	Occupied Bandwidth &	20.0	Elwin Lin	2021/11/09	SR12-H
Humidity (%RH)	DTS Bandwidth	60.0			
Temperature (°C)	Maximum Power Spectral	20.0	Elwin Lin	2021/11/09	SR12-H
Humidity (%RH)	Density	60.0			

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA : **FCC Registration Number: TW3024**
Canada : **CAB identifier : TW3024**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
Email address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: Test site number for address 1 includes SR2-H. Test site number for address 2 includes CB2-H, CB3-H, CB4-H, SR10-H and SR12-H.	

1.8 List of Test Equipment

SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2020/12/24	2021/12/23
Test Receiver	R&S	ESCS 30	836858/022	2021/02/22	2022/02/21
LISN	R&S	ENV216	100092	2021/06/08	2022/06/07
Coaxial Cable(9 m)	Harbour	RG-400	SR2-H	2021/08/15	2022/08/14
DEKRA Testing System	DEKRA	Version 2.0	SR2-H	NA	NA

SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2021/01/25	2022/01/24
Power Meter	Keysight	8990B	MY51000248	2021/05/21	2022/05/20
Power Sensor	Keysight	N1923A	MY57240005	2021/05/21	2022/05/20
Spectrum Analyzer	Keysight	N9010B	MY57110159	2021/03/29	2022/03/28
Spectrum Analyzer	Agilent	N9010A	US47140172	2021/05/28	2022/05/27
Signal & Spectrum Analyzer	R&S	FSV40	101049	2021/03/31	2022/03/30

CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2021/03/31	2022/03/30
Signal Analyzer	R&S	FSVA40	101435	2021/06/04	2022/06/03
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2021/01/25	2022/01/24
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1272	2021/08/20	2022/08/19
Bilog Antenna	Teseq	CBL6112D	23191	2021/02/26	2022/02/25
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2021/05/17	2022/05/16
Horn Antenna	Schwarzbeck	BBHA 9170	202	2020/12/16	2021/12/15
Pre-Amplifier	EMCI	EMC01820I	980365	2021/05/28	2022/05/27
Pre-Amplifier	EMEC	EM01G18GA	060741	2021/07/02	2022/07/01
Pre-Amplifier	DEKRA	AP-400C	201801231	2021/11/12	2022/11/11
EMI Test Receiver	R&S	ESR7	102,260	2020/12/28	2021/12/27
Magnetic Loop Antenna	Teseq	HLA 6121	44287	2021/09/06	2022/09/05
Coaxial Cable(13m)	Huber+Suhner	SF104	CB2-H	2021/08/17	2022/08/16
Radiated Software	AUDIX	e3 V9	CB2-H_1	NA	NA
Coaxial Cable(3m)	Suhnerr,Rosnol	SF102_Rosnol	CB2-H_1	2021/08/17	2022/08/18

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.9 Measurement Uncertainty

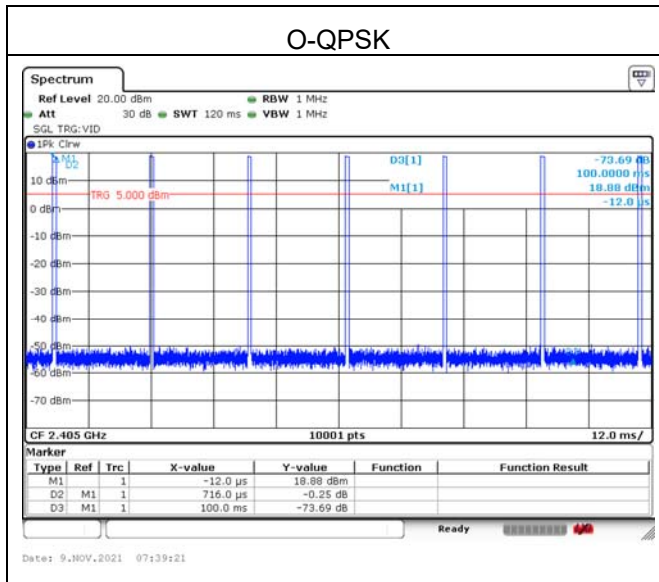
Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Test item	Uncertainty
AC Power Line Conducted Emission	± 2.10 dB
Maximum Conducted Output Power	± 1.16 dB
Radiated Emission	± 3.25 dB below 1 GHz ± 3.32 dB above 1 GHz
Antenna Port Conducted Emission	± 1.60 dB
Radiated Emission Band Edge	± 3.32 dB
Occupied Bandwidth & DTS Bandwidth	± 282.55 Hz
Maximum Power Spectral Density	± 1.60 dB

1.10 Duty Cycle

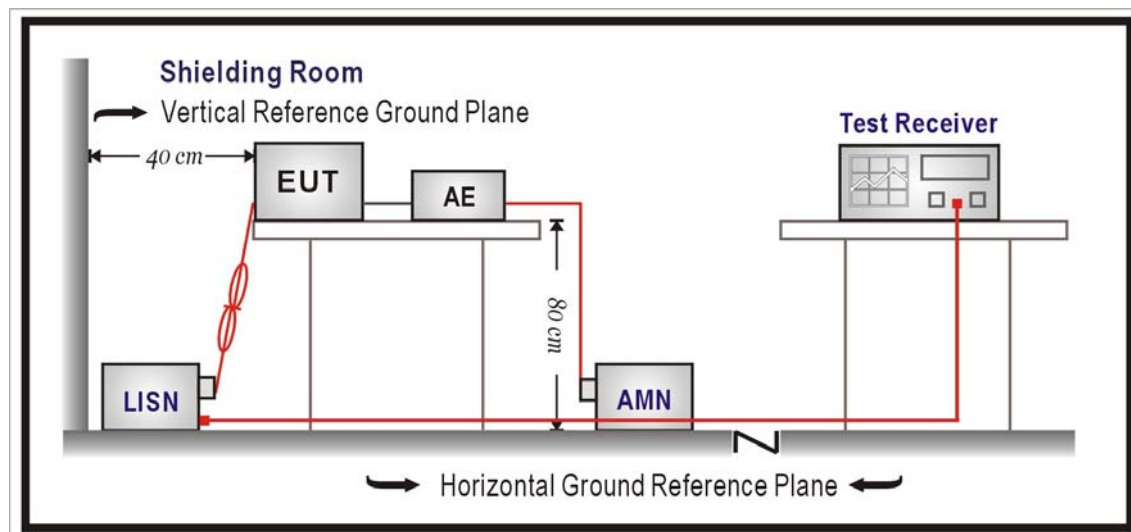
Modulation	On Times (ms)	On+Off Times (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
O-QPSK	4.296	100	4.3%	-27.34

Note: If the duty cycle correction factor lower than -20dB, the Max. duty cycle correction factor is -20dB.



2. AC Power Line Conducted Emission

2.1 Test Setup



2.2 Test Limit

Frequency (MHz)	QP (dBuV)	AV (dBuV)
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 /50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50 uH coupling impedance with 50 ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

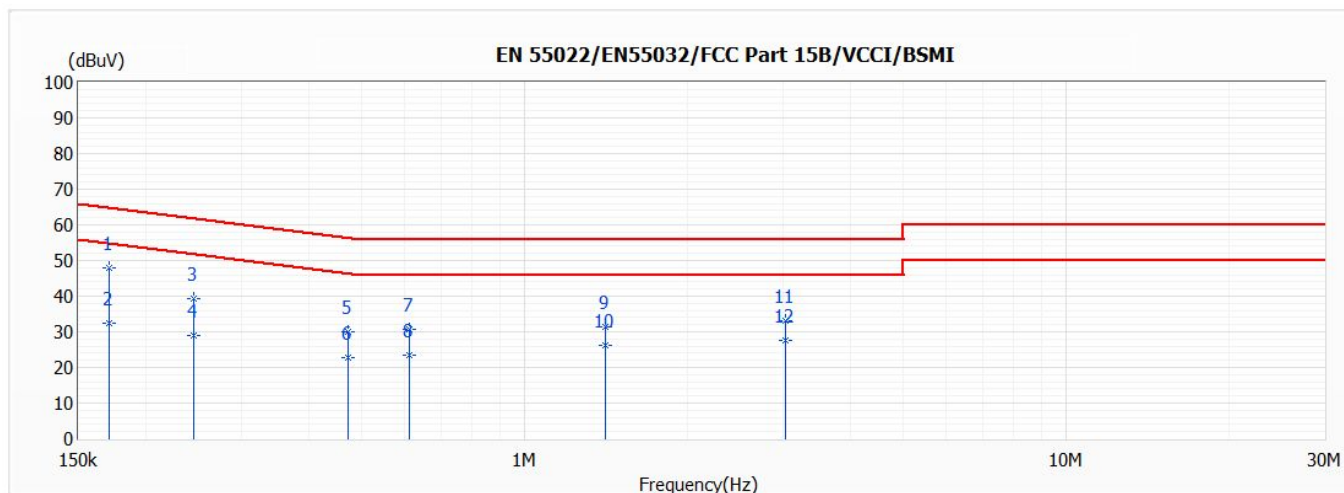
AC Power Line Conducted Emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

2.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207.

2.5 Test Result of AC Power Line Conducted Emission

Test Mode	Mode 1: Transmit	Phase	Line
Test Condition	O-QPSK / 2405MHz		

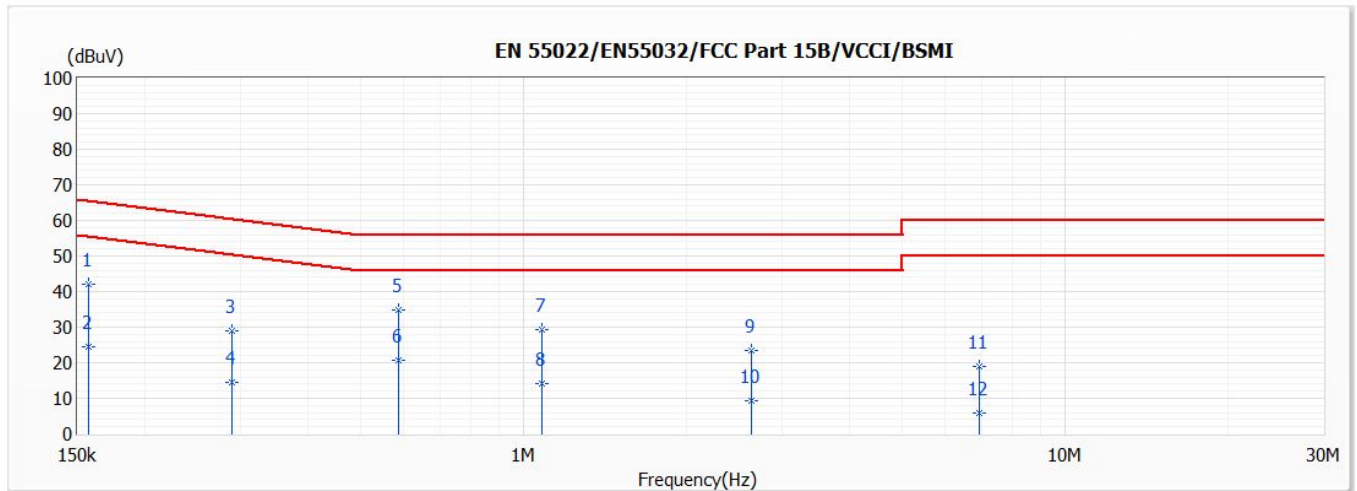


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.171	47.91	64.92	-17.01	38.28	9.63	QP
2	0.171	32.32	54.92	-22.60	22.69	9.63	AV
3	0.245	39.40	61.91	-22.51	29.76	9.64	QP
4	0.245	28.92	51.91	-22.99	19.28	9.64	AV
5	0.471	29.96	56.50	-26.54	20.29	9.67	QP
6	0.471	22.66	46.50	-23.84	12.99	9.67	AV
7	0.612	30.76	56.00	-25.24	21.08	9.68	QP
8	0.612	23.35	46.00	-22.65	13.67	9.68	AV
9	1.412	31.54	56.00	-24.46	21.80	9.74	QP
10	1.412	26.20	46.00	-19.80	16.46	9.74	AV
11	3.031	33.13	56.00	-22.87	23.30	9.83	QP
12	3.031	27.62	46.00	-18.38	17.79	9.83	AV

Remark:

1. "*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

Test Mode	Mode 1: Transmit	Phase	Neutral
Test Condition	O-QPSK / 2405MHz		



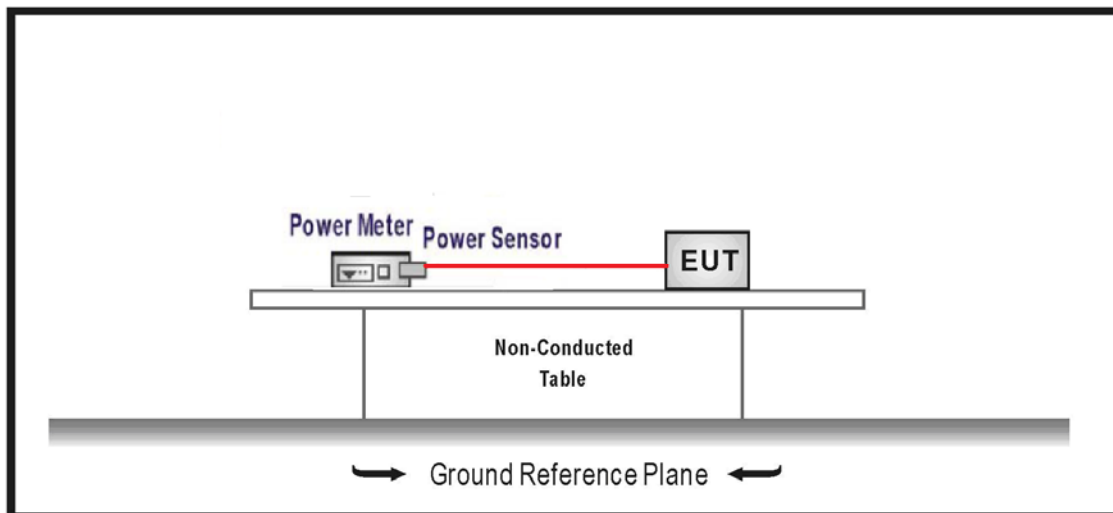
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.157	42.01	65.61	-23.60	32.37	9.64	QP
2	0.157	24.32	55.61	-31.29	14.68	9.64	AV
3	0.289	29.00	60.55	-31.55	19.35	9.65	QP
4	0.289	14.60	50.55	-35.95	4.95	9.65	AV
*5	0.588	34.76	56.00	-21.24	25.07	9.69	QP
6	0.588	20.70	46.00	-25.30	11.01	9.69	AV
7	1.081	29.20	56.00	-26.80	19.47	9.73	QP
8	1.081	14.15	46.00	-31.85	4.42	9.73	AV
9	2.640	23.50	56.00	-32.50	13.67	9.83	QP
10	2.640	9.38	46.00	-36.62	-0.45	9.83	AV
11	6.940	19.11	60.00	-40.89	9.08	10.03	QP
12	6.940	5.97	50.00	-44.03	-4.06	10.03	AV

Remark:

1. "*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

3. Maximum Conducted Output Power

3.1 Test Setup



3.2 Test Limit

The Maximum Conducted Output Power shall be less 1 Watt.

3.3 Test procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 v05r02 for compliance to FCC 47CFR 15.247 requirements.

3.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

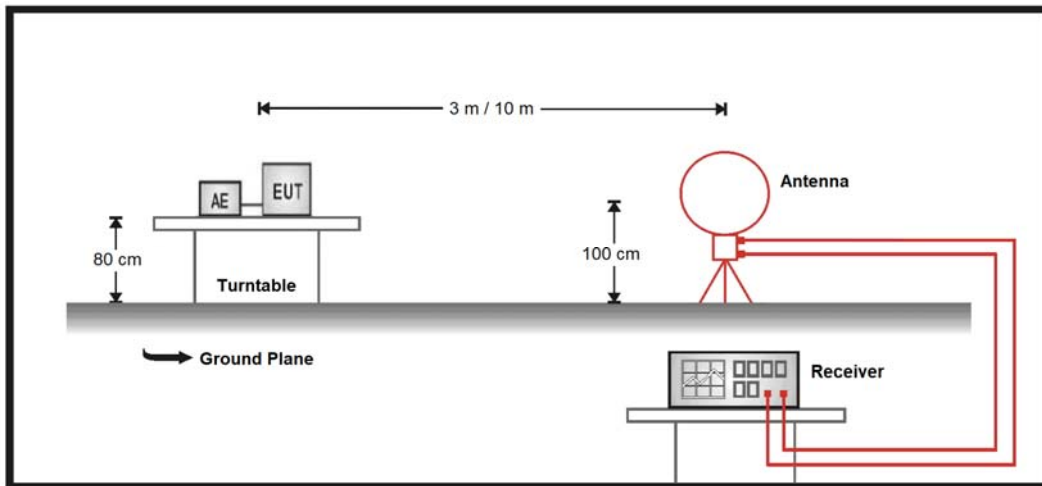
3.5 Test Result of Maximum Conducted Output Power

Modulation	Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
O-QPSK	00	2405	19.660	≤ 30.00	Pass
	04	2445	19.790	≤ 30.00	Pass
	07	2475	6.710	≤ 30.00	Pass

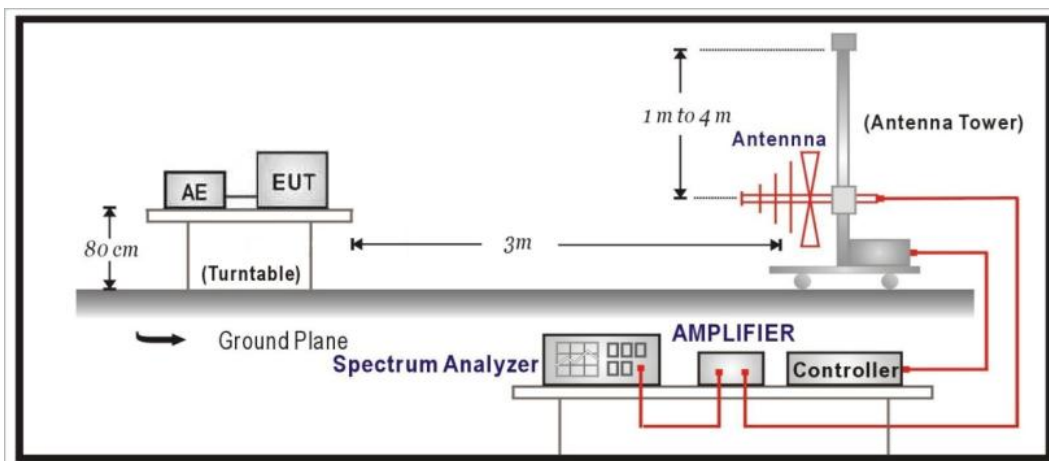
4. Radiated Emission

4.1 Test Setup

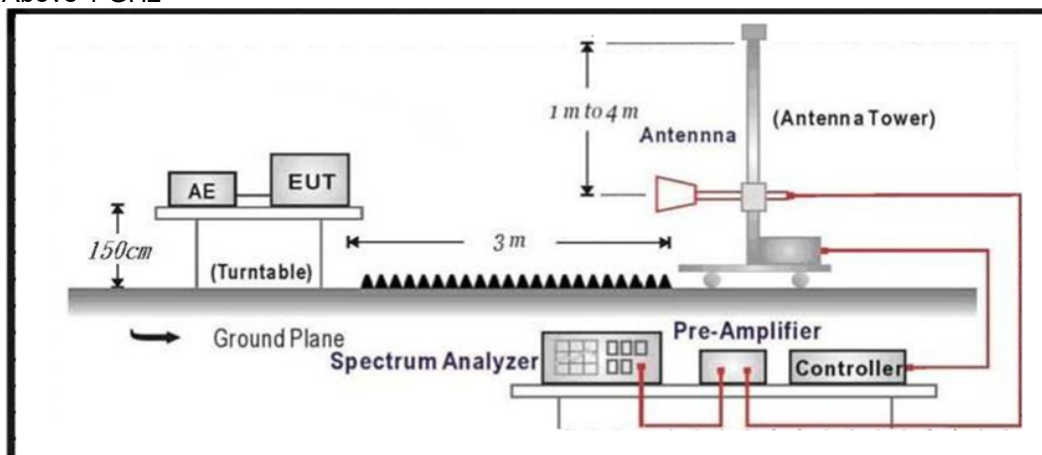
9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



Above 1 GHz



4.2 Test Limit

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

Frequency (MHz)	Field strength (uV/m)	Field strength (dBuV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	20 log (2400/F(kHz))	300
0.490 – 1.705	24000/F(kHz)	20 log (24000/F(kHz))	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks:

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

4.3 Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01V05r02 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

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.

On any frequency or frequencies from 9 kHz(include The the lowest oscillator frequency generated within the device up to the 10th harmonic) to 1000 MHz, the limit shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limit shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

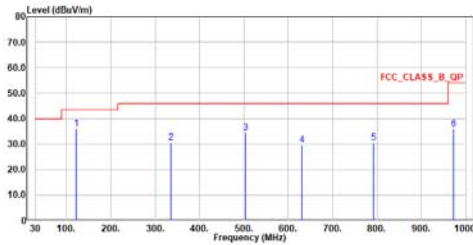
The bandwidth below 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1MHz.

4.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

4.5 Test Result of Radiated Emissions (30 MHz ~ 1 GHz)

Site :CB2-M
Condition :3m Horizontal
Mode :Zigbee_TX_2405MHz
Test by :Getaz

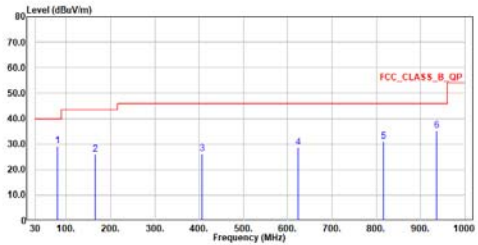


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	122.150	36.00	43.50	-7.50	40.55	-4.55	QP
2	335.550	30.39	46.00	-15.61	31.14	-0.75	QP
3	584.330	34.54	46.00	-11.46	31.14	3.40	QP
4	630.430	29.44	46.00	-16.56	23.11	6.33	QP
5	791.450	30.49	46.00	-15.51	21.48	9.01	QP
6	972.840	35.88	54.00	-18.12	24.61	11.27	QP

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.
5. The other emission levels were very low against the limit.

Site :CB2-M
Condition :3m Vertical
Mode :Zigbee_TX_2405MHz
Test by :Getaz



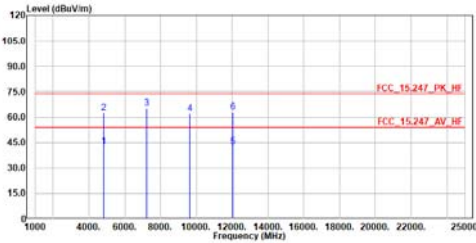
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	79.470	29.42	40.00	-10.58	35.94	-6.52	QP
2	165.800	26.10	43.50	-17.40	28.69	-2.59	QP
3	406.360	26.31	46.00	-19.69	25.34	0.97	QP
4	623.640	28.55	46.00	-17.45	22.36	6.19	QP
5	816.670	31.05	46.00	-14.95	21.82	9.23	QP
6	935.980	35.41	46.00	-10.59	24.58	10.83	QP

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.
5. The other emission levels were very low against the limit.

4.6 Test Result of Radiated Emissions (1 GHz ~ 10th Harmonic)

Site :CB2-H
Condition :3m Horizontal
Mode :Zigbee_TX_2485MHz
Test by :Ling

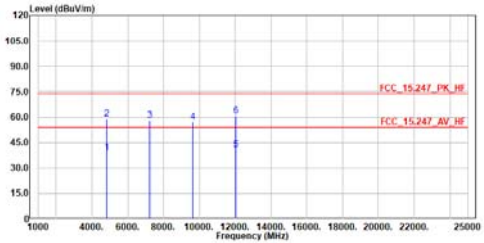


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
1	4810.000	42.35	54.00	-11.65	56.17	-13.82	Average
2	4810.000	62.35	74.00	-11.65	76.17	-13.82	Peak
3	7215.000	65.10	74.00	-8.90	69.82	-4.72	Peak
4	9620.000	61.95	74.00	-12.05	64.31	-2.36	Peak
5	12025.000	42.78	54.00	-11.22	42.13	0.65	Average
6	12025.000	62.78	74.00	-11.22	62.13	0.65	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Vertical
Mode :Zigbee_TX_2485MHz
Test by :Ling

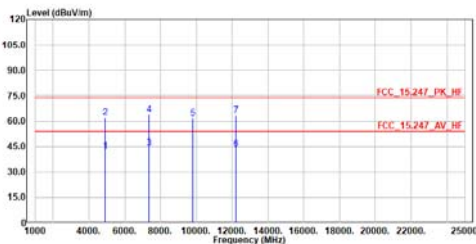


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
1	4810.000	38.72	54.00	-15.28	52.54	-13.82	Average
2	4810.000	58.72	74.00	-15.28	72.54	-13.82	Peak
3	7215.000	57.90	74.00	-16.10	62.62	-4.72	Peak
4	9620.000	56.91	74.00	-17.09	59.27	-2.36	Peak
5	12025.000	40.86	54.00	-13.14	40.21	0.65	Average
6	12025.000	60.86	74.00	-13.14	60.21	0.65	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Horizontal
Mode :Zigbee_TX_2445MHz
Test by :Ling

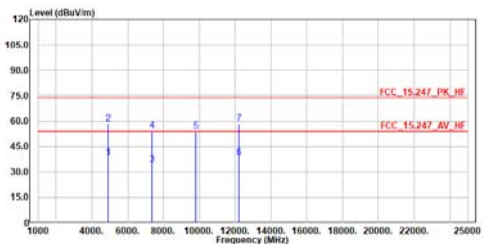


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
1	4890.000	42.24	54.00	-11.76	55.73	-13.49	Average
2	4890.000	62.24	74.00	-11.76	75.73	-13.49	Peak
3	7335.000	43.83	54.00	-10.17	48.41	-4.58	Average
4	7335.000	63.83	74.00	-10.17	68.41	-4.58	Peak
5	9780.000	61.36	74.00	-12.64	63.34	-1.98	Peak
6	12225.000	43.58	54.00	-10.42	42.97	0.61	Average
7	12225.000	63.58	74.00	-10.42	62.97	0.61	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Vertical
Mode :Zigbee_TX_2445MHz
Test by :Ling

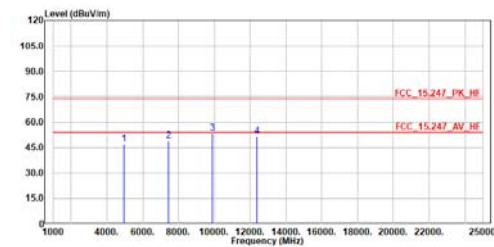


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
1	4890.000	38.61	54.00	-15.39	52.10	-13.49	Average
2	4890.000	58.61	74.00	-15.39	72.10	-13.49	Peak
3	7335.000	34.24	54.00	-19.76	38.82	-4.58	Average
4	7335.000	54.24	74.00	-19.76	58.82	-4.58	Peak
5	9780.000	53.67	74.00	-20.33	55.65	-1.98	Peak
6	12225.000	38.53	54.00	-15.47	37.92	0.61	Average
7	12225.000	58.53	74.00	-15.47	57.92	0.61	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Horizontal
Mode :Zigbee_TX_2475MHz
Test by :Ling

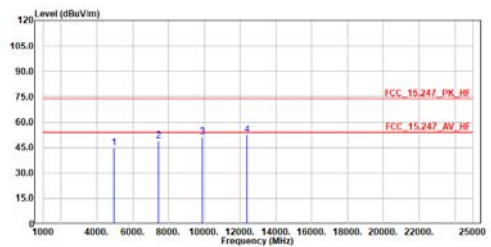


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4950.000	46.90	74.00	-27.10	60.15	-13.25	Peak
2	7425.000	48.73	74.00	-25.27	53.19	-4.46	Peak
3	9900.000	53.34	74.00	-20.66	55.03	-1.69	Peak
4	12375.000	51.69	74.00	-22.31	51.11	0.58	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Vertical
Mode :Zigbee_TX_2475MHz
Test by :Ling



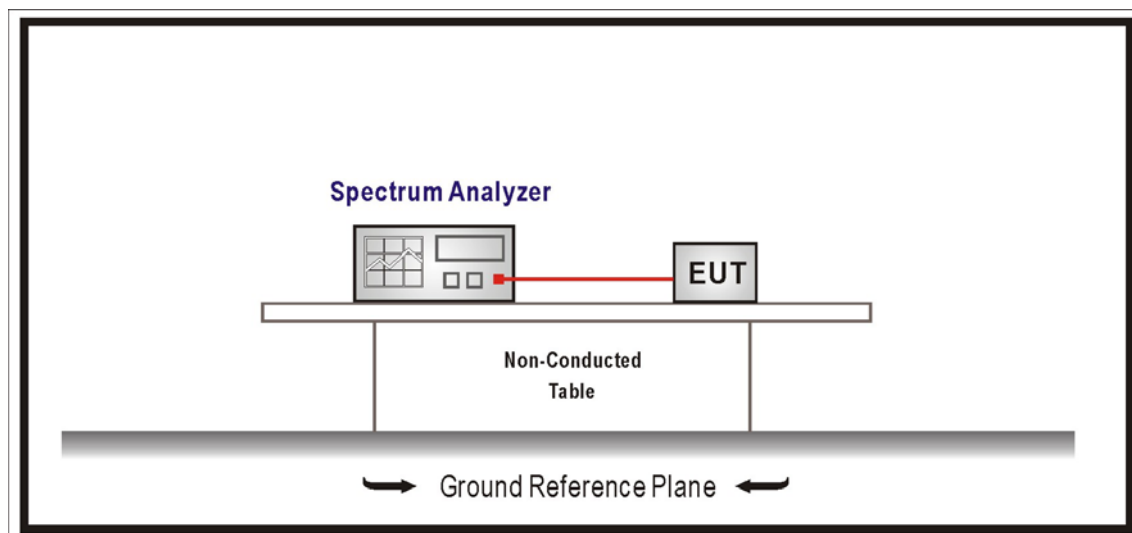
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4950.000	45.02	74.00	-28.98	50.27	-13.25	Peak
2	7425.000	48.99	74.00	-25.01	53.45	-4.46	Peak
3	9900.000	51.29	74.00	-22.71	52.98	-1.69	Peak
4	12375.000	52.50	74.00	-21.50	51.92	0.58	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

5. Antenna Port Conducted Emission

5.1 Test Setup



5.2 Test 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 conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limit. If the transmitter complies with the conducted power limit based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limit 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 limit specified in §15.209(a) (see §15.205(c)).

5.3 Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.

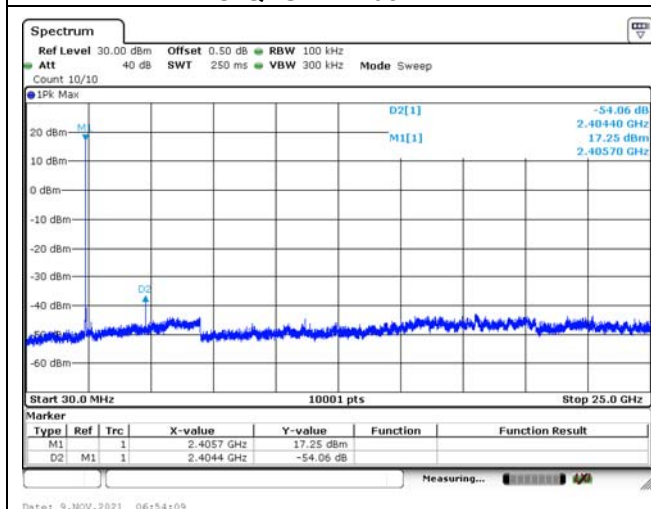
Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

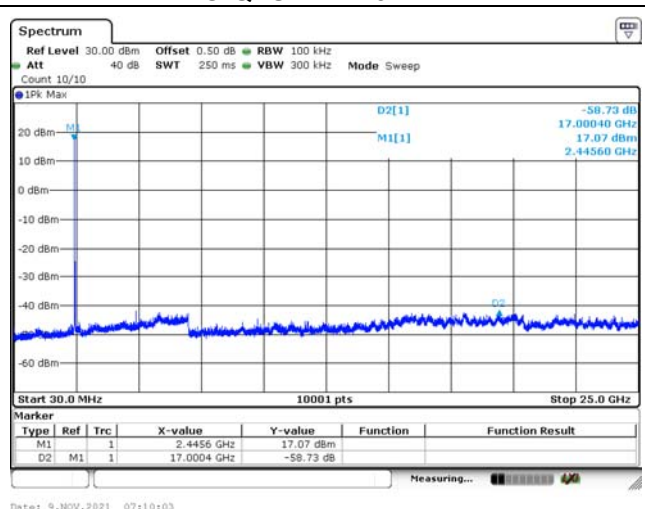
5.5 Test Result of Antenna Port Conducted Emission

O-QPSK / 2405 MHz



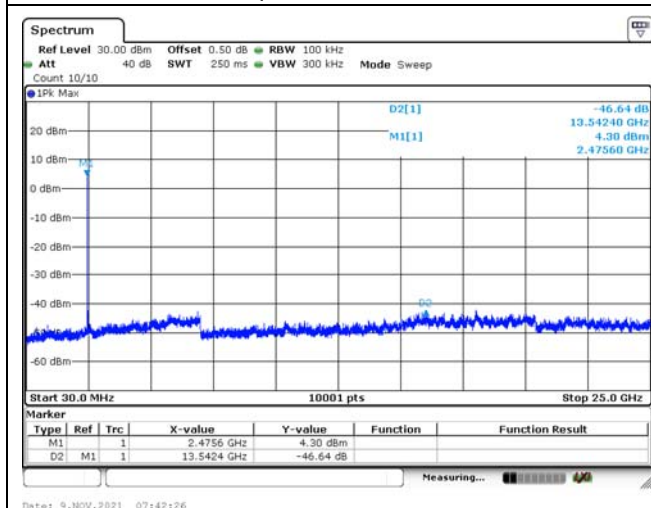
Date: 9.NOV.2021 06:54:09

O-QPSK / 2445 MHz



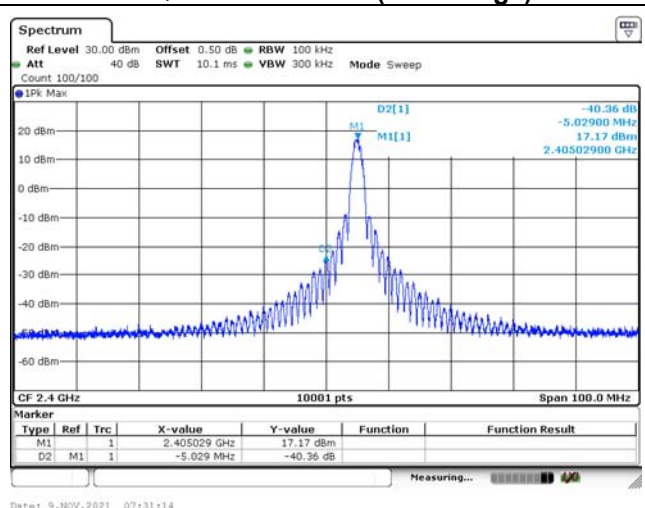
Date: 9.NOV.2021 07:10:03

O-QPSK / 2475 MHz



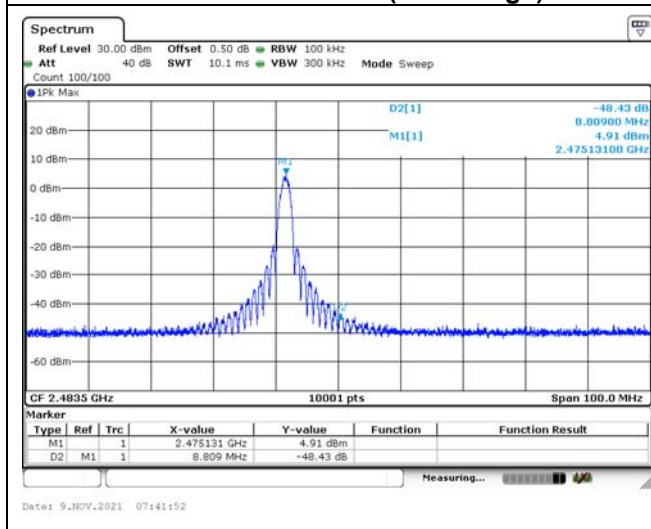
Date: 9.NOV.2021 07:42:26

O-QPSK / 2405 MHz (Band Edge)



Date: 9.NOV.2021 07:31:14

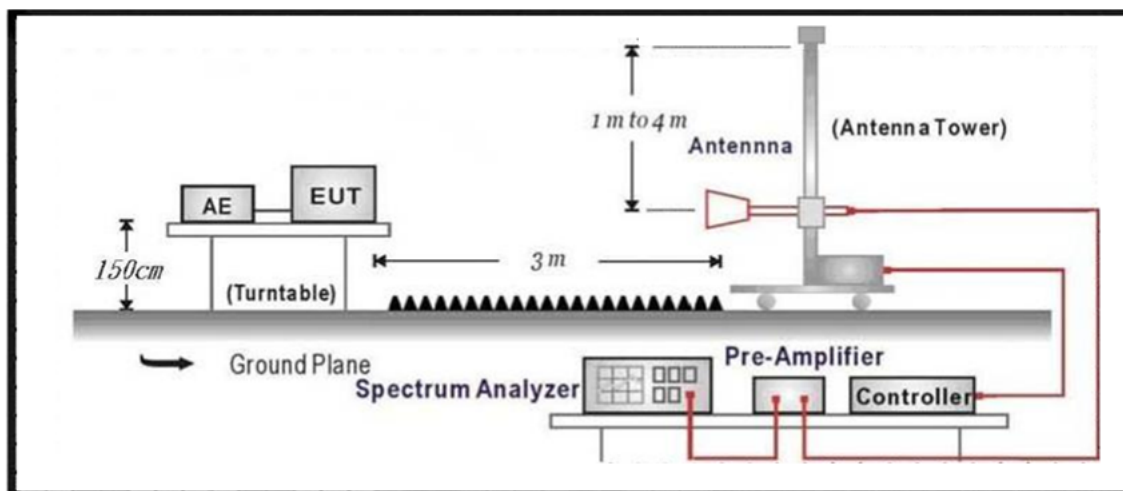
O-QPSK / 2475 MHz (Band Edge)



Date: 9.NOV.2021 07:41:52

6. Radiated Emission Band Edge

6.1 Test Setup



6.2 Test Limit

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

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks:

- Field strength (dB $\mu\text{V/m}$) = 20 log Field strength ($\mu\text{V/m}$)
- In the Above Table, the tighter limit applies at the band edges.
- Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

6.3 Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of FCC KDB 558074 D01 v05r02 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

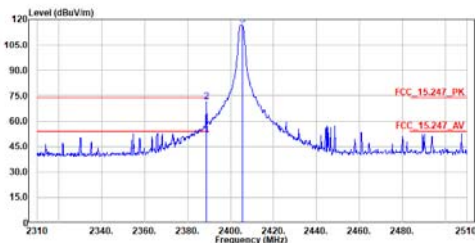
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

6.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

6.5 Test Result of Radiated Emission Band Edge

Site :CB2-H
Condition :3m Horizontal
Mode :Zigbee_TX_2405MHz
Test By :Ling

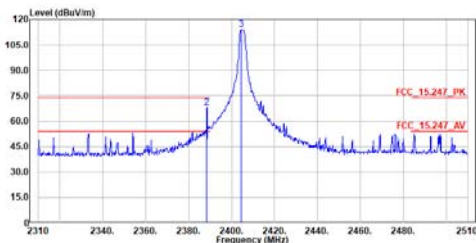


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2388.800	51.47	54.00	-2.53	37.99	13.48	Average
2	2388.800	71.47	74.00	-2.53	57.99	13.48	Peak
3	2405.600	116.68	-----	-----	103.09	13.59	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Vertical
Mode :Zigbee_TX_2405MHz
Test By :Ling

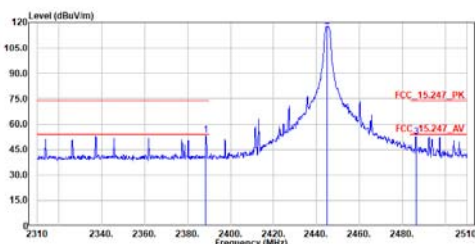


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2388.400	47.90	54.00	-6.10	34.42	13.48	Average
2	2388.400	67.90	74.00	-6.10	54.42	13.48	Peak
3	2404.600	114.22	-----	-----	100.65	13.57	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Horizontal
Mode :Zigbee_TX_2445MHz
Test By :Ling

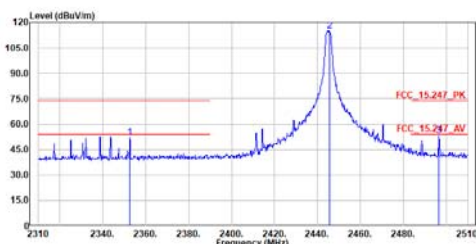


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2388.400	53.28	74.00	-20.72	39.80	13.48	Peak
2	2444.800	117.84	-----	-----	104.02	13.82	Peak
3	2486.400	52.69	74.00	-21.31	38.60	14.09	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Vertical
Mode :Zigbee_TX_2445MHz
Test By :Ling

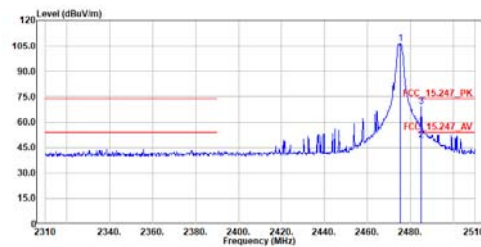


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2352.600	52.22	74.00	-21.78	38.97	13.25	Peak
2	2445.600	114.99	-----	-----	101.16	13.83	Peak
3	2496.600	52.94	74.00	-21.06	38.79	14.15	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Horizontal
Mode :Zigbee_TX_2475MHz
Test By :Ling

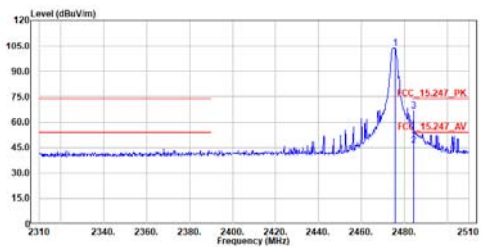


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2475.000	106.20	-----	-----	92.18	14.02	Peak
2	2485.000	49.20	54.00	-4.80	35.12	14.08	Average
3	2485.000	69.20	74.00	-4.80	55.12	14.08	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :CB2-H
Condition :3m Vertical
Mode :Zigbee_TX_2475MHz
Test By :Ling



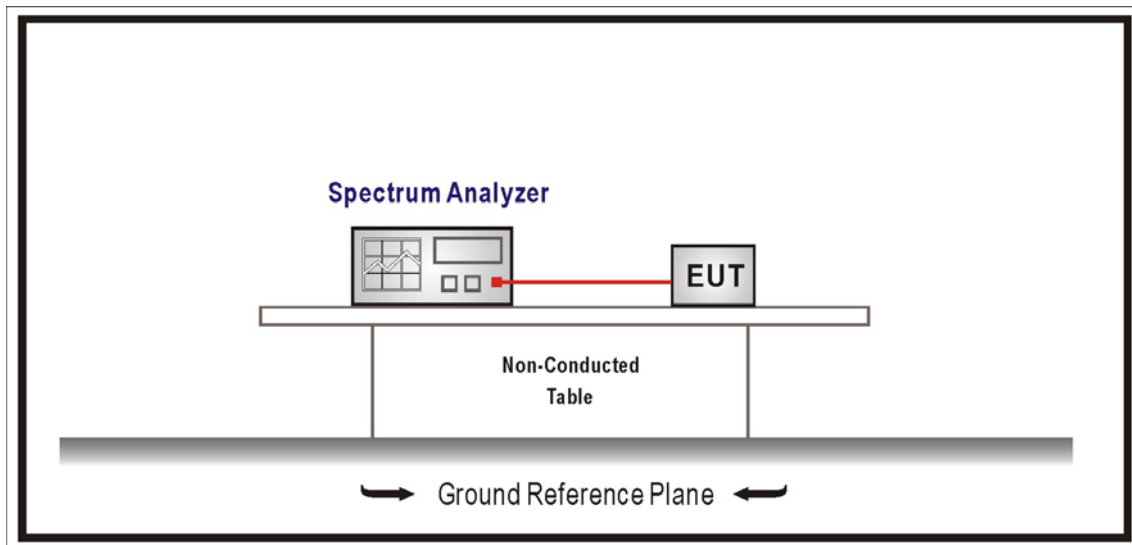
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2475.000	103.61	-----	-----	89.58	14.03	Peak
2	2484.200	46.41	54.00	-7.59	32.34	14.07	Average
3	2484.200	66.41	74.00	-7.59	52.34	14.07	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

7. Occupied Bandwidth & DTS Bandwidth

7.1 Test Setup



7.2 Test Limit

The 6 dB bandwidth: ≥ 500 kHz.

Occupied Bandwidth: NA

7.3 Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.

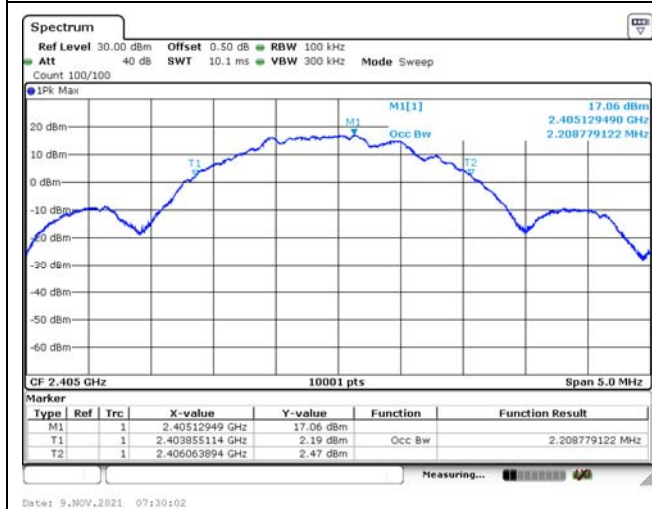
7.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

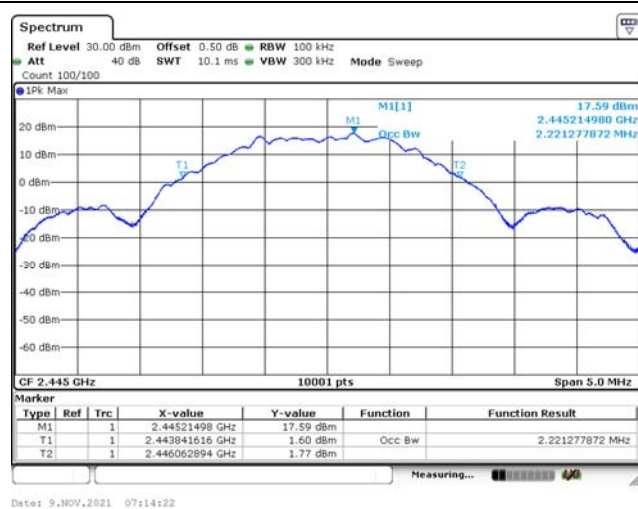
7.5 Test Result of Occupied Bandwidth

Modulation	Channel	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)
O-QPSK	00	2405	2.208	-
	04	2445	2.221	-
	07	2475	2.299	-

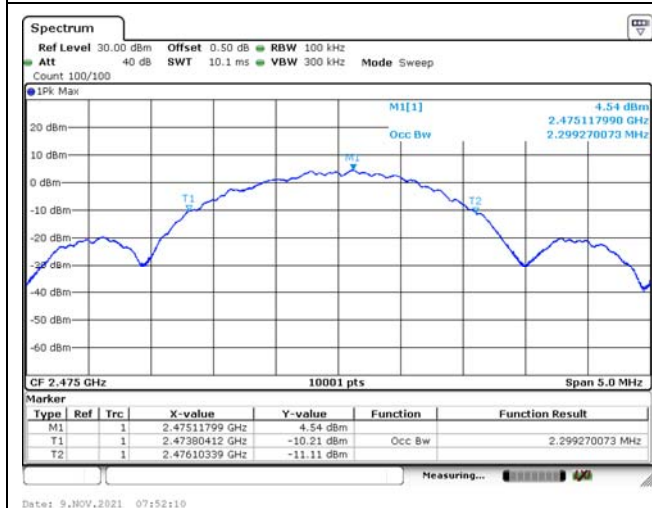
O-QPSK / 2405 MHz



O-QPSK / 2445 MHz



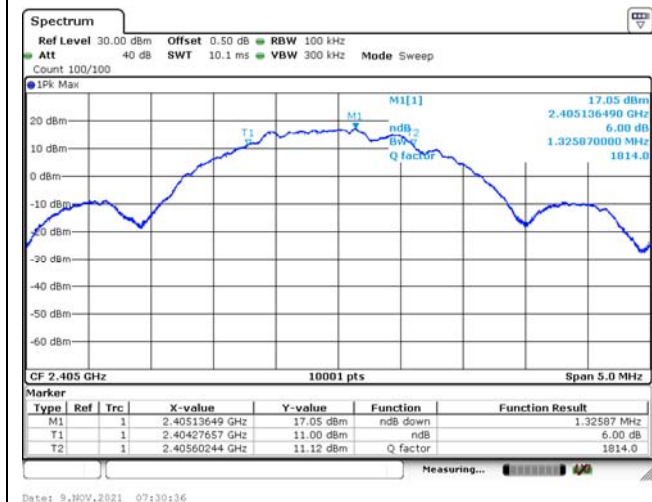
O-QPSK / 2475 MHz



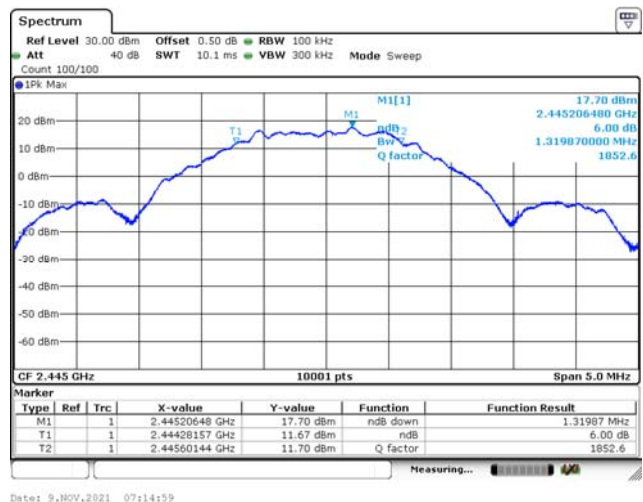
7.6 Test Result of DTS Bandwidth

Modulation	Channel	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
O-QPSK	00	2405	1.326	≥ 0.500	Pass
	04	2445	1.320	≥ 0.500	Pass
	07	2475	1.327	≥ 0.500	Pass

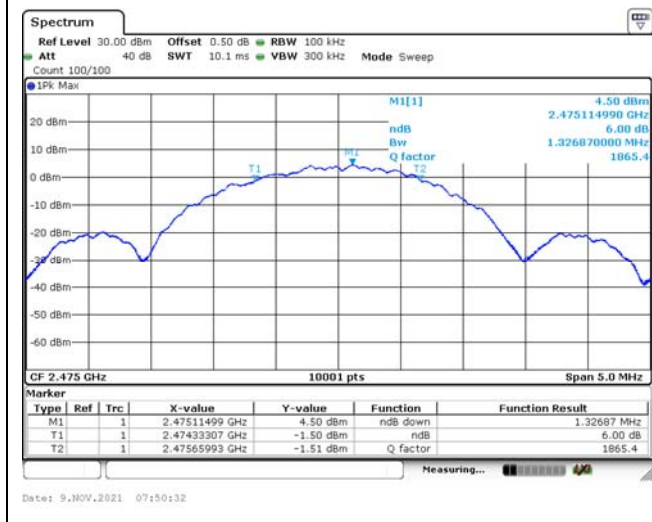
O-QPSK / 2405 MHz



O-QPSK / 2445 MHz

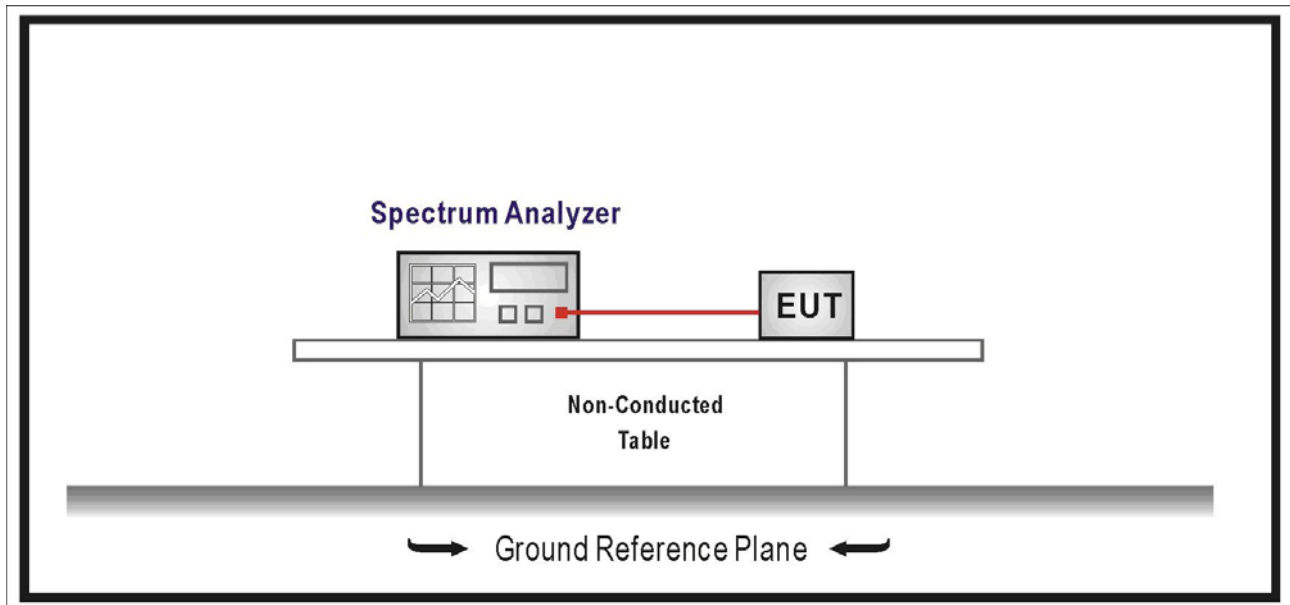


O-QPSK / 2475 MHz



8. Maximum Power Spectral Density

8.1 Test Setup



8.2 Test Limit

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.3 Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.

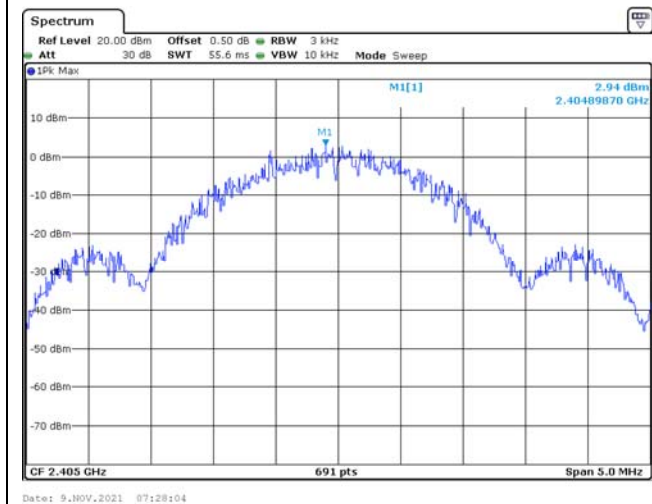
8.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

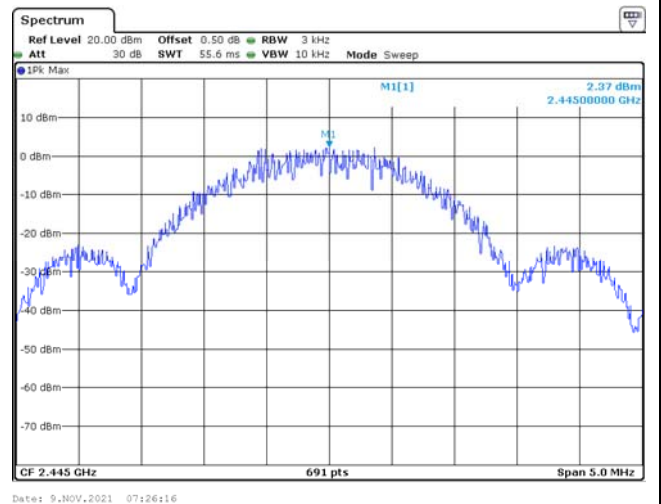
8.5 Test Result of Maximum Power Spectral Density

Modulation	Channel	Frequency (MHz)	Measure Value (dBm/3kHz)	Limit (dBm/3kHz)	Result
O-QPSK	00	2405	2.940	≤ 8.000	Pass
	04	2445	2.370	≤ 8.000	Pass
	07	2475	-10.02	≤ 8.000	Pass

O-QPSK / 2405 MHz



O-QPSK / 2445 MHz



O-QPSK / 2475 MHz

