

Test Report No:
2330851R-RFNAOTHV02-B

VARIANT TEST REPORT

FCC Rules&Regulations

Product Name	PACKTALK EDGE, PACKTALK CUSTOM, PACKTALK NEO, PACKTALK EDGEPHONES
Brand Name	Cardo Systems, LTD
Model No.	PACKTALK EDGE/CUSTOM, PACKTALK NEO
FCC ID	Q95ER28
Applicant's Name / Address	Cardo Systems, LTD 101 E. Park Blvd, Suite 600, Plano TX, 75074 USA
Manufacturer's Name / Address	Cardo Systems, LTD 101 E. Park Blvd, Suite 600, Plano TX, 75074 USA
Test Method Requested, Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10-2013
Verdict Summary	IN COMPLIANCE
Documented By	 Amelia Wu / Project Specialist
Approved By	 Rueyyan Lin / Supervisor
Date of Receipt	Mar. 23, 2023
Date of Issue	May 29, 2023
Report Version	V1.0

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Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

General Conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. 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.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	May 29, 2023

Permissive Change

Report No.	Version	Description	Issued Date
21A0733R-RFUSBT2V01-B	V1.0	Original application.	Dec. 10, 2021
2290111R-RFNAOTHV02-B	V1.0	<u>Class I Permissive Change (C1PC)</u> 1. Adding a new product name / model number "PACKTALK NEO". The difference between original product name / model number and new product name / model number, please refer to the section 1.1 for detail. 2. Adding new accessory "USB audio kit and Cradle" for model: PACKTALK NEO use only. After evaluating, the worst result of original report is selected to verify radiated emission, radiated emission band edge tests and record in the report.	Dec. 16, 2022
2330851R-RFNAOTHV02-B	V1.0	<u>Class II Permissive Change (C2PC)</u> 1. Adding a new product name "PACKTALK EDGEPHONES". The difference between original product name and new product name, please refer to the section 1.1 for detail. 2. Adding new accessory "Edge phone microphone and Edge phone Headphone" for product name: PACKTALK EDGEPHONES use only. After evaluating, the worst result of original report is selected to verify radiated emission, radiated emission band edge tests and record in the report.	May 29, 2023

1. General Information

1.1 EUT Description

Product Name	PACKTALK EDGE, PACKTALK CUSTOM, PACKTALK NEO, PACKTALK EDGEPHONES
Brand Name	Cardo Systems, LTD
Model No.	PACKTALK EDGE/CUSTOM, PACKTALK NEO
EUT Voltage	DC 5V (host equipment) DC 3.7V for battery
Frequency Range	1 Mbps: 2402 ~ 2480 MHz 2 Mbps: 2402 ~ 2480 MHz
Channel Number	1 Mbps: 40 Channels 2 Mbps: 40 Channels
Type of Modulation	GFSK

Product Name: PACKTALK EDGE and PACKTALK CUSTOM				
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

Product Name: PACKTALK NEO				
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	USB audio kit	Cardo	USB audio kit	N/A
5	Cradle	Cardo	Cradle	N/A

Product Name: PACKTALK EDGEPHONES				
Accessories Information				
No.	Equipment Name	Brand Name	Model No.	Description
1	USB Cable	Hailink	USB 2.0 A/M to Type C cable 28# L=60cm	Shielded cable w/o ferrite core, 0.6m
2	Edge phone microphone	KING CHUANG TECH	Boom Microphone	2 audio wire lines
3	Edge phone Headphone	KING CHUANG TECH	40mm 32ohm speakers	3 wire audio lines

The difference for each product name / model number is shown as below:

EUT	1		3	2
Product Name	PACKTALK EDGE	PACKTALK CUSTOM	PACKTALK EDGEPHONES	PACKTALK NEO
Model No.	PACKTALK EDGE/CUSTOM			PACKTALK NEO
PCB Version	PCB00291			PCB00295
Hardware	USB type C (without audio function) USB Data			USB type C (with audio function) Audio Switch Chip = USB has 2 input option (Data or Audio)
Accessory	Headphone Microphone Audiokit		Edge phone microphone Edge phone Headphone	Headphone Microphone USB audio kit Cradle
Note	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 operated by mobile app and for PACKTALK CUSTOM user pay per this feature.			-

Antenna Information				
Ant.	Brand Name	Model No.	Type	Gain (dBi)
1	AMOTECH	AMAN301512ST01	Chip	2.21

EUT Operational Condition	
Testing Voltage	AC 120V/60Hz

GFSK (1 Mbps/2 Mbps)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	10	2422 MHz	20	2442 MHz	30	2462 MHz
01	2404 MHz	11	2424 MHz	21	2444 MHz	31	2464 MHz
02	2406 MHz	12	2426 MHz	22	2446 MHz	32	2466 MHz
03	2408 MHz	13	2428 MHz	23	2448 MHz	33	2468 MHz
04	2410 MHz	14	2430 MHz	24	2450 MHz	34	2470 MHz
05	2412 MHz	15	2432 MHz	25	2452 MHz	35	2472 MHz
06	2414 MHz	16	2434 MHz	26	2454 MHz	36	2474 MHz
07	2416MHz	17	2436 MHz	27	2456 MHz	37	2476 MHz
08	2418 MHz	18	2438 MHz	28	2458 MHz	38	2478 MHz
09	2420 MHz	19	2440 MHz	29	2460 MHz	39	2480 MHz

Note: 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
Radiated Emission Below 1 GHz	Mode 1	GFSK (2 Mbps)	39	Pass
Radiated Emission Band Edge	Mode 1	GFSK (2 Mbps)	39	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

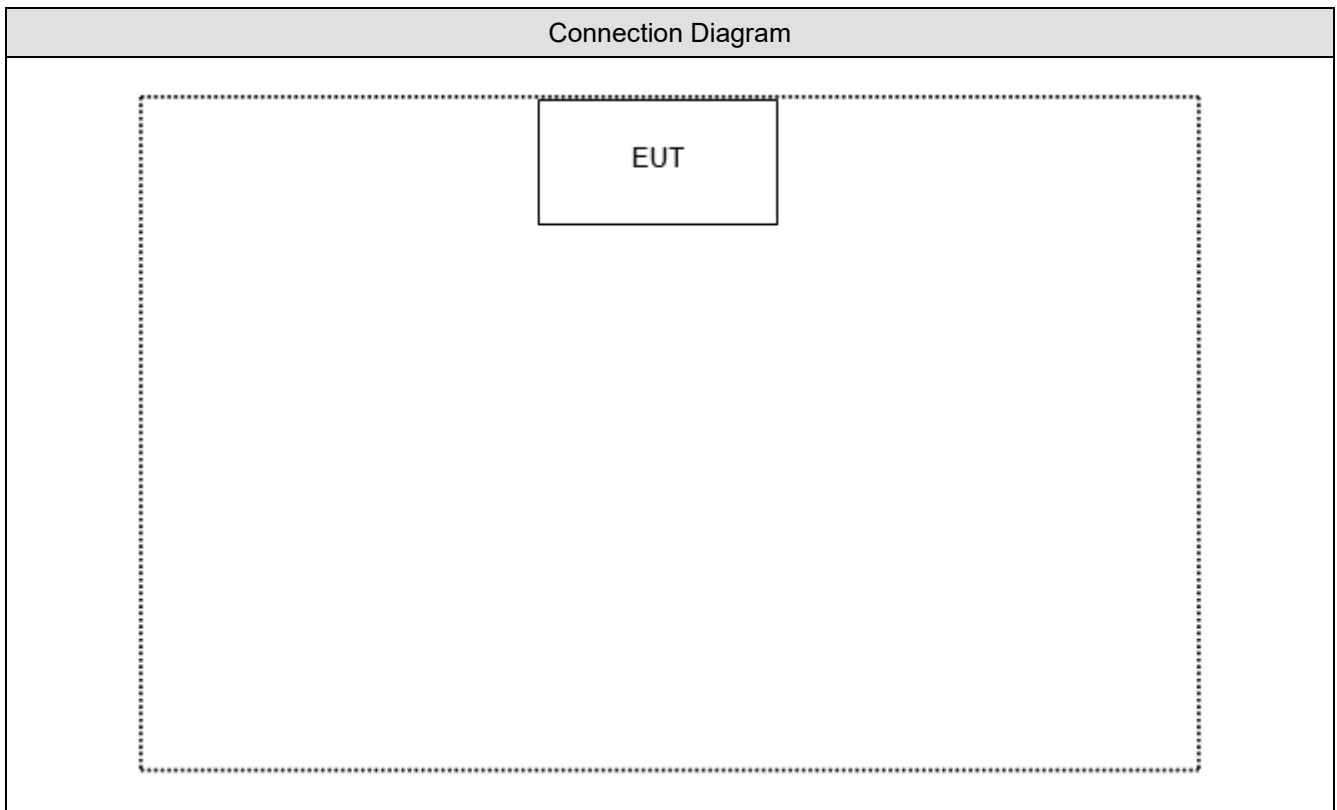
1.3 Comments and Remarks

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

N/A

1.5 Configuration of tested System



1.6 EUT Operation of during Test

1	Remove the notebook after the notebook executed control command by software "Bluetest3".
2	Configure the test mode, the test channel, and the data rate.
3	Press "Start TX" to start the continuous transmitting.
4	Verify that the EUT works properly.

1.7 Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	Radiated Emission	23.6	Ling Chang	2023/04/21	HC-CB02
Humidity (%RH)		64			
Temperature (°C)	Radiated Emission Band Edge	22.8	Ling Chang	2023/04/20	HC-CB02
Humidity (%RH)		66			

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 HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.	

1.8 List of Test Equipment

HC-CB02

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal and Spectrum Analyzer	R&S	FSVA40	101435	2022/05/30	2023/05/29
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1272	2023/04/13	2024/04/12
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2022/05/06	2023/05/05
Double Ridged Horn Antenna	RF SPIN	DRH18-E	211211A18EN	2022/11/15	2023/11/14
Horn Antenna	Schwarzbeck	BBHA 9170	203	2023/02/13	2024/02/12
Pre-Amplifier	EMCI	EMC01820I	980365	2023/04/07	2024/04/06
Pre-Amplifier	EMEC	EM01G18GA	060741	2022/05/06	2023/05/05
Pre-Amplifier	DEKRA	AP-400C	201801231	2022/09/27	2023/09/26
EMI Test Receiver	R&S	ESR7	102260	2022/12/01	2023/11/30
Magnetic Loop Antenna	Teseq	HLA 6121	44287	2022/10/21	2023/10/20
Coaxial Cable(13m)	Suhner	SF104	HC-CB02	2022/08/15	2023/08/14
Coaxial Cable(3m)	Suhner,Rosnol	SF102_UP0264	HC-CB02_1	2022/08/14	2023/08/13
Radiated Software	AUDIX	e3 V9	HC-CB02_1	N/A	N/A

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

1.9 Measurement Uncertainty

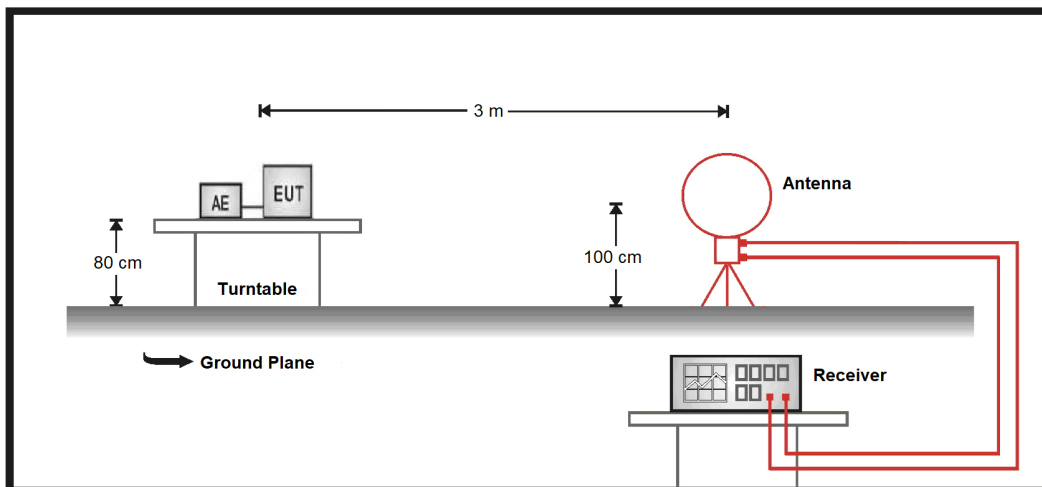
Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Test item	Uncertainty
Radiated Emission	± 3.52 dB below 1 GHz ± 3.56 dB above 1 GHz
Radiated Emission Band Edge	± 3.56 dB

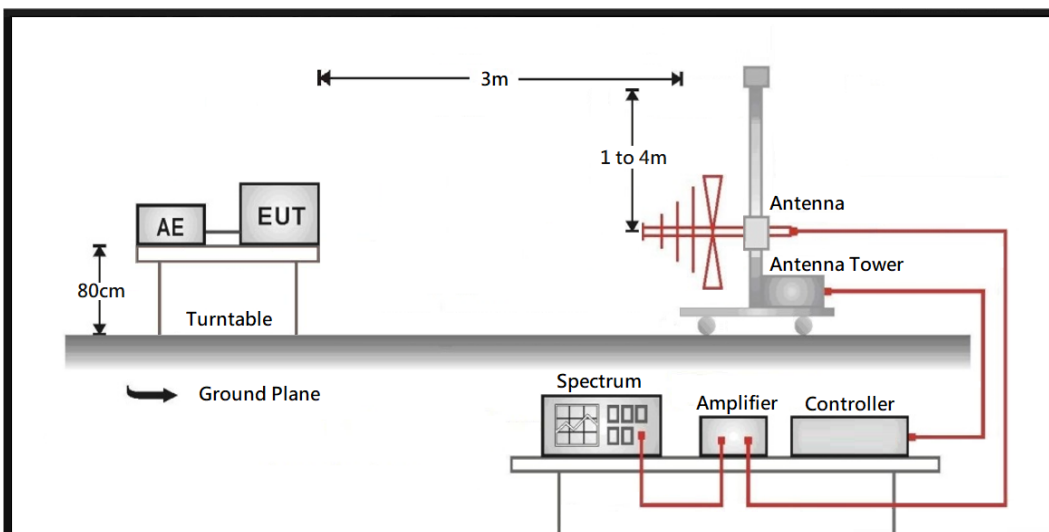
2. Radiated Emission

2.1 Test Setup

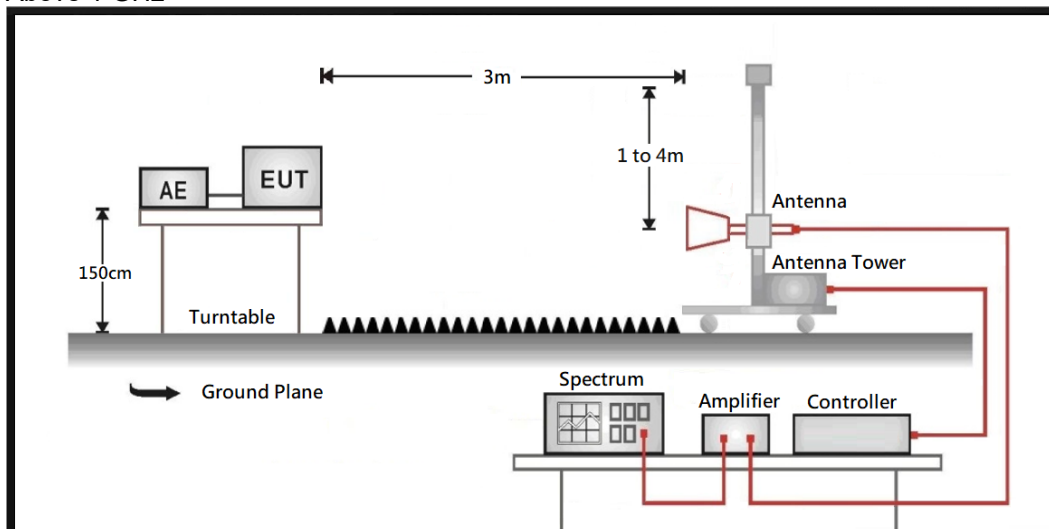
9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



Above 1 GHz



2.2 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

2.3 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.

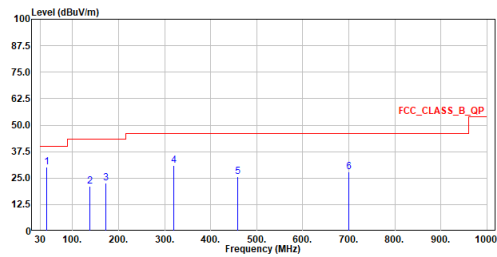
The bandwidth below 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1MHz.

2.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

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

Site :HC-CB02
Condition :3m Horizontal
Mode :LF_BLE_2M_TX_2480MHz
Test by :Ling

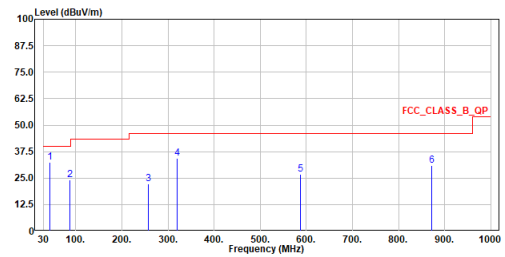


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	43.580	30.25	40.00	-9.75	32.21	-1.96	QP
2	138.010	21.27	43.50	-22.23	24.67	-3.40	QP
3	171.378	22.69	43.50	-20.81	25.79	-3.10	QP
4	320.030	31.13	46.00	-14.87	32.56	-1.43	QP
5	457.819	25.49	46.00	-20.51	23.09	2.40	QP
6	699.349	28.08	46.00	-17.92	21.00	7.08	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 :HC-CB02
Condition :3m Vertical
Mode :LF_BLE_2M_TX_2480MHz
Test by :Ling



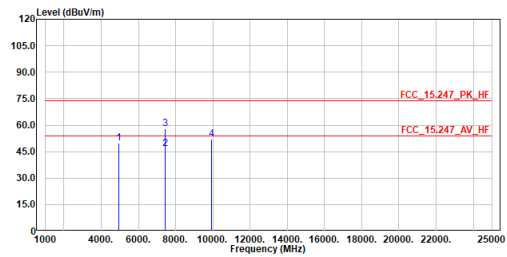
No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	43.338	32.38	40.00	-7.62	34.28	-1.90	QP
2	86.260	24.15	40.00	-15.85	32.18	-8.03	QP
3	257.999	22.41	46.00	-23.59	26.02	-3.61	QP
4	319.982	34.41	46.00	-11.59	35.84	-1.43	QP
5	586.392	26.80	46.00	-19.20	21.68	5.12	QP
6	872.057	31.00	46.00	-15.00	21.60	9.40	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.

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

Site :HC-CB02
Condition :3m Horizontal
Mode :BLE_2M_TX_2480MHz
Test by :Ling

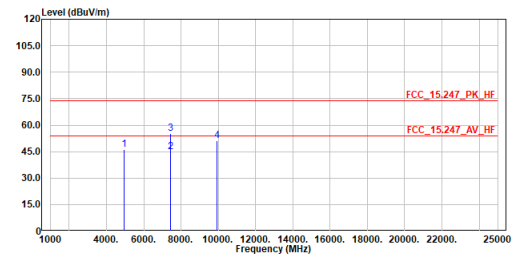


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	49.64	74.00	-24.36	61.67	-12.03	Peak
2	7440.000	46.53	54.00	-7.47	52.16	-5.63	Average
3	7440.000	57.82	74.00	-16.18	63.45	-5.63	Peak
4	9920.000	51.93	74.00	-22.07	54.55	-2.62	Peak

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 :HC-CB02
Condition :3m Vertical
Mode :BLE_2M_TX_2480MHz
Test by :Ling



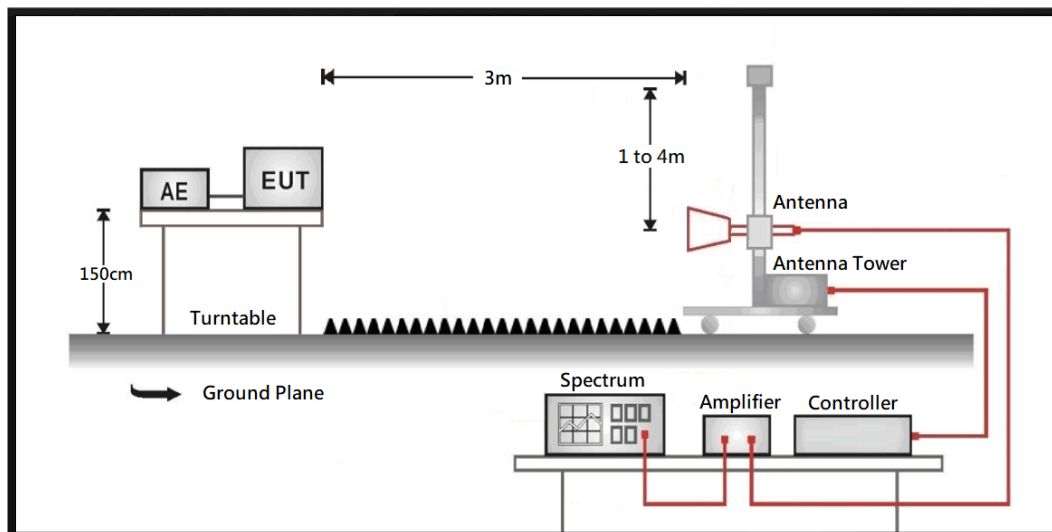
No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	46.22	74.00	-27.78	58.25	-12.03	Peak
2	7440.000	44.68	54.00	-9.32	50.31	-5.63	Average
3	7440.000	55.02	74.00	-18.98	60.65	-5.63	Peak
4	9920.000	51.02	74.00	-22.98	53.64	-2.62	Peak

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.

3. Radiated Emission Band Edge

3.1 Test Setup



3.2 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)
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

3.3 Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to the 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.

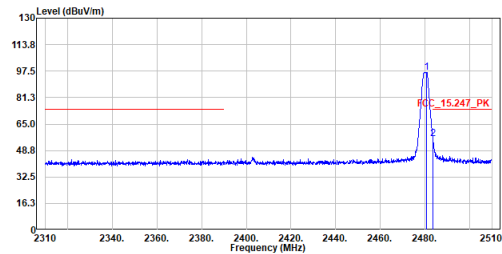
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

3.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

3.5 Test Result of Radiated Emission Band Edge

Site :HC-CB02
Condition :3m Horizontal
Mode :BLE_2M_TX_2480MHz
Test by :Ling

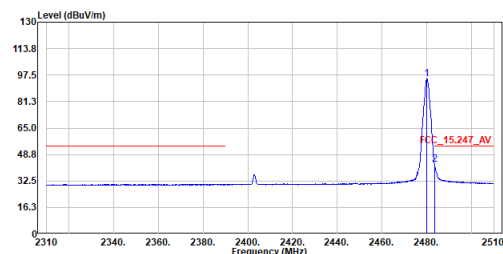


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2480.700	96.71	-----	-----	83.19	13.52	Peak
2	2483.500	55.99	74.00	-18.01	42.45	13.54	Peak

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 :HC-CB02
Condition :3m Horizontal
Mode :BLE_2M_TX_2480MHz
Test by :Ling

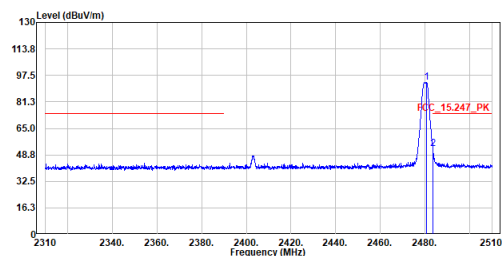


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2480.100	94.96	-----	-----	81.44	13.52	Average
2	2483.500	42.67	54.00	-11.33	29.13	13.54	Average

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 :HC-CB02
Condition :3m Vertical
Mode :BLE_2M_TX_2480MHz
Test by :Ling

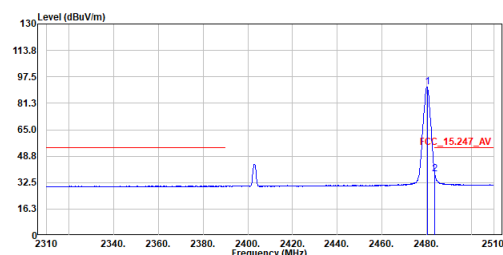


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2480.700	93.03	-----	-----	79.51	13.52	Peak
2	2483.500	52.55	74.00	-21.45	39.01	13.54	Peak

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 :HC-CB02
Condition :3m Vertical
Mode :BLE_2M_TX_2480MHz
Test by :Ling



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2480.200	91.32	-----	-----	77.80	13.52	Average
2	2483.600	37.65	54.00	-16.35	24.11	13.54	Average

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.