

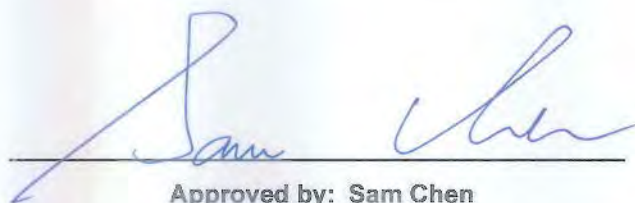


RADIO TEST REPORT

FCC ID : RAXWN9711
Equipment : Wireless LAN Network Module
Brand Name : Arcadyan
Model Name : WN9711BTAAC-YA
Applicant : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Manufacturer : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Standard : 47 CFR FCC Part 15.247

The product was received on Dec. 02, 2021, and testing was started from Mar. 07, 2022 and completed on Mar. 07, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A10_10 Ver1.3

Page Number : 3 of 17
Issued Date : Apr. 08, 2022
Report Version : 01



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Declaration of Conformity:

1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to report "Measurement Uncertainty".

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: **Sam Chen**

Report Producer: **Penny Kao**

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40)	2422-2452	3-9 [7]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	1TX
2.4-2.4835GHz	802.11g	20	1TX
2.4-2.4835GHz	802.11n HT20	20	1TX
2.4-2.4835GHz	802.11n HT40	40	1TX

Note:

- ♦ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- ♦ 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ♦ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Set	Ant.	Brand	Model Name	Type	Connector	Gain (dBi)		Cable Length (mm)
						2.4GHz	5GHz	
1	1	ACON	AEMEE-10000	Dipole	Reversed-SMA	3.24	4.54	Note 1
	2		AEMEE-10000	Dipole	Reversed-SMA	3.24	4.54	
Set	Ant.	Brand	Model Name	Type	Connector	Gain (dBi)		Cable Length (mm)
						2.4GHz	5GHz	
2	3	ACON	AEP6P-100009 (Black)	PIFA	I-PEX	3.15	3.15	300
	4		AEP6P-100010 (Gray)	PIFA	I-PEX	2.30	3.15	400
3	5	Walsin Technology Corporation	RFMTA370615IMLB302 (Black)	PIFA	I-PEX	3.10	4.32	150
	6		RFMTA270710IM5B301 (Gray)	PIFA	I-PEX	-	4.26	99
4	7	Walsin Technology Corporation	RFMTA370620IMLB302 (Black)	PIFA	I-PEX	2.39	3.91	206
	8		RFMTA270718IM5B301 (Gray)	PIFA	I-PEX	-	2.89	180
5	9	WNC	81XCBA15.G01(Black)	PIFA	I-PEX	2.49	3.91	400
	10		81XCBA15.G02(Gray)	PIFA	I-PEX	-	1.86	400
6	11	WNC	81XCBA15.G03(Black)	PIFA	I-PEX	1.96	2.52	300
	12		81XCBA15.G04(Gray)	PIFA	I-PEX	-	4.18	250
7	13	Walsin Technology Corporation	RFMTA370629IMLB301(Black)	PIFA	I-PEX	3.01	3.99	290
	14		RFMTA270726IM5B301(Gray)	PIFA	I-PEX	-	3.62	260

Note 1:

Dipole Cable	Brand	Model Name	Cable Length (mm)	Cable Loss (dB)		True Gain (dBi)	
				2.4GHz / BT	5GHz	2.4GHz / BT	5GHz
1	ACON	AEC8P-1000000 (Gray)	30	0.08	0.12	3.16	4.42
		AEC8P-1000001 (Black)					
2	ACON	AEC8P-1000002 (Gray)	50	0.13	0.19	3.11	4.35
		AEC8P-1000003 (Black)					



Dipole Cable	Brand	Model Name	Cable Length (mm)	Cable Loss (dB)		True Gain (dBi)	
				2.4GHz / BT	5GHz	2.4GHz / BT	5GHz
3	ACON	AEC8P-1000004 (Gray) AEC8P-1000005 (Black)	70	0.19	0.27	3.05	4.27
4	ACON	AEC8P-1000006 (Gray) AEC8P-1000007 (Black)	90	0.24	0.35	3.00	4.19
5	ACON	AEC8P-1000008 (Gray) AEC8P-1000009 (Black)	120	0.32	0.46	2.92	4.08
6	ACON	AEC8P-1000010 (Gray) AEC8P-1000011 (Black)	160	0.43	0.62	2.81	3.92
7	ACON	AEC8P-1000012 (Gray) AEC8P-1000013 (Black)	200	0.54	0.77	2.70	3.77
8	ACON	AEC8P-1000014 (Gray) AEC8P-1000015 (Black)	240	0.64	0.93	2.60	3.61
9	ACON	AEC8P-1000016 (Gray) AEC8P-1000017 (Black)	280	0.75	1.08	2.49	3.46
10	ACON	AEC8P-1000018 (Gray) AEC8P-1000019 (Black)	320	0.86	1.24	2.38	3.30
11	ACON	AEC8P-1000020 (Gray) AEC8P-1000021 (Black)	360	0.96	1.39	2.28	3.15
12	ACON	AEC8P-1000022 (Gray) AEC8P-1000023 (Black)	400	1.07	1.54	2.17	3.00
13	ACON	AEC8P-1000024 (Gray) AEC8P-1000025 (Black)	450	1.21	1.74	2.03	2.80
14	ACON	AEC8P-1000026 (Gray) AEC8P-1000027 (Black)	500	1.34	1.93	1.90	2.61

Note 2: 1. The EUT has two radios.

Radio 1 supports WLAN 2.4GHz, WLAN 5GHz and Bluetooth function, Radio 2 supports WLAN 5GHz function only.

Radio 1 collocate with Black antenna cable, Radio 2 collocate with Gray antenna cable.

2. The EUT has two type antennas, and there are two antennas for each set.

For SKU 1, Dipole Antenna collocate with 14 set cable selling, only the highest gain antenna "cable 1" was tested and recorded in the report. PIFA Antenna collocate with set 2~7 selling, the higher gain antennas "set 2 and set 3" were tested and recorded in the report.

For SKU 2, Dipole Antenna collocate with 14 set cable selling, only the highest gain antenna "cable 1"



was tested and recorded in the report. PIFA Antenna collocates with Ant.13 selling.

For Radio 1 (WLAN 2.4GHz, WLAN 5GHz and Bluetooth):

For IEEE 802.11a/b/g/n/ac mode (1TX/1RX):

Dipole Antenna: Only Ant. 1 (Port 1) can be used as transmitting/receiving antenna.

PIFA Antenna: Only Ant. 3 (Port 1) can be used as transmitting/receiving antenna.

For Radio 2 (WLAN 5GHz):

For IEEE 802.11a/n/ac mode (1TX/1RX):

Dipole Antenna: Only Ant. 2 (Port 1) can be used as transmitting/receiving antenna.

PIFA Antenna: Only Ant. 6 (Port 1) can be used as transmitting/receiving antenna.

1.1.3 EUT Operational Condition

EUT Power Type	From host system			
Beamforming Function	☐	With beamforming	☒	Without beamforming
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	MTool_3.0.0.3.exe			

1.1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR770523-11AA

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Changing the Dipole Antenna to be equipped with "cable 1~14" from "cable 14 only" for SKU 2.	Radiated Emissions below 1GHz test.

**1.1.5 Table for SKU Information**

SKU	Radio 1 (WLAN 2.4GHz, WLAN 5GHz and Bluetooth)	Radio 2 (WLAN 5GHz)	Antennas	Dipole Cable	DDR and Flash Source	Remark
1	V	V	1~14	1~14	Main / Second	There is no change in hardware or in existing RF relevant portion between these two SKUs.
2	V	Disable by FW	1,13	1~14	Main	

Note: The above information was declared by manufacturer.

1.1.6 Table for DDR and Flash Detail Information

SKU	Source	Item	Arcadyan P/N	Brand	Model Name	Capacity
1, 2	Main	DDR	109100303400J	SAMSUNG	K4B2G1646F-BYK0	256MB
		Flash	107100262600J	TOSHIBA	TC58NVG1S3HTAI0	256MB
1	Second	DDR	109100305500J	SAMSUNG	K4B4G1646E-BYMA	512MB
		Flash	107100267000J	TOSHIBA	TH58NVG2S3HTAI0	512MB

Note : The above information was declared by manufacturer



1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15.247
- ♦ ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ FCC KDB 558074 D01 v05r02
- ♦ FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) TEL: 886-3-656-9065 FAX: 886-3-656-9085 Test site Designation No. TW3787 with FCC. Conformity Assessment Body Identifier (CABID) TW3787 with ISCED.

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH05-CB	KJ Chang	24.1-25.2 °C / 55-58%	Mar. 07, 2022

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated 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 Items	Uncertainty	Remark
Radiated Emission (9kHz ~ 30MHz)	4.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.5 dB	Confidence levels of 95%

2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
According to the original test report, EUT in Z axis AP Mode - Radio 1 (2.4GHz+Bluetooth) has been evaluated to be the worst case. So the measurement will follow this same test configuration.	
1	EUT-SKU 2 in Z axis AP Mode (main source) - Radio 1 (2.4GHz+Bluetooth) with Dipole antenna set 1 + cable 1

2.2 EUT Operation during Test

During the test, the EUT operation to normal function.

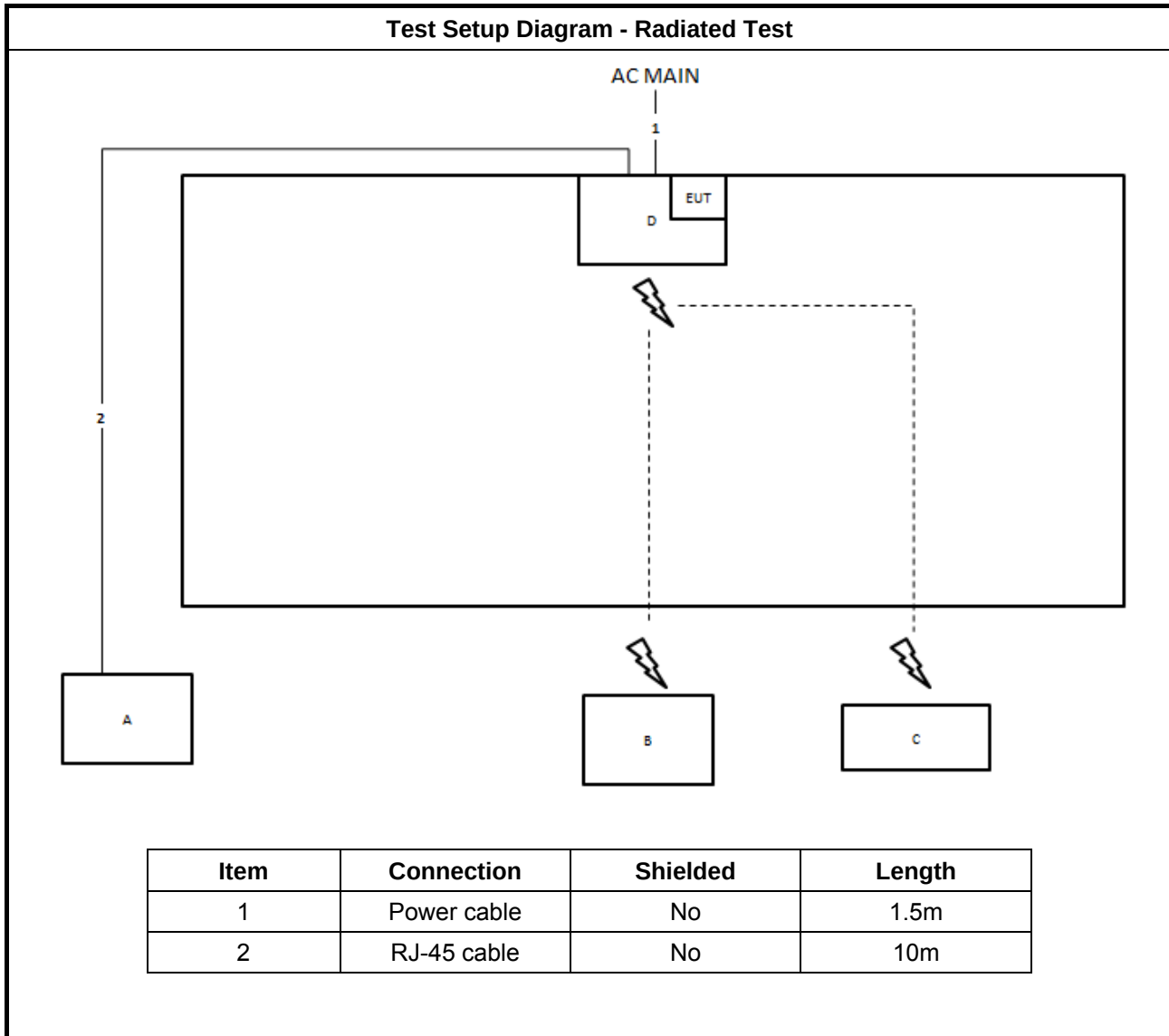
2.3 Accessories

N/A

2.4 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Notebook	DELL	E4300	N/A
B	Notebook	DELL	E4300	N/A
C	Bluetooth speaker	marus	MSK06C-RD	N/A
D	Fixture	Arcadyan	WN9711BTAAC Test jig	N/A
E	AC Adapter	APD	WA-30J12FU	N/A

2.5 Test Setup Diagram





3 Transmitter Test Result

3.1 Emissions in Restricted Frequency Bands

3.1.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

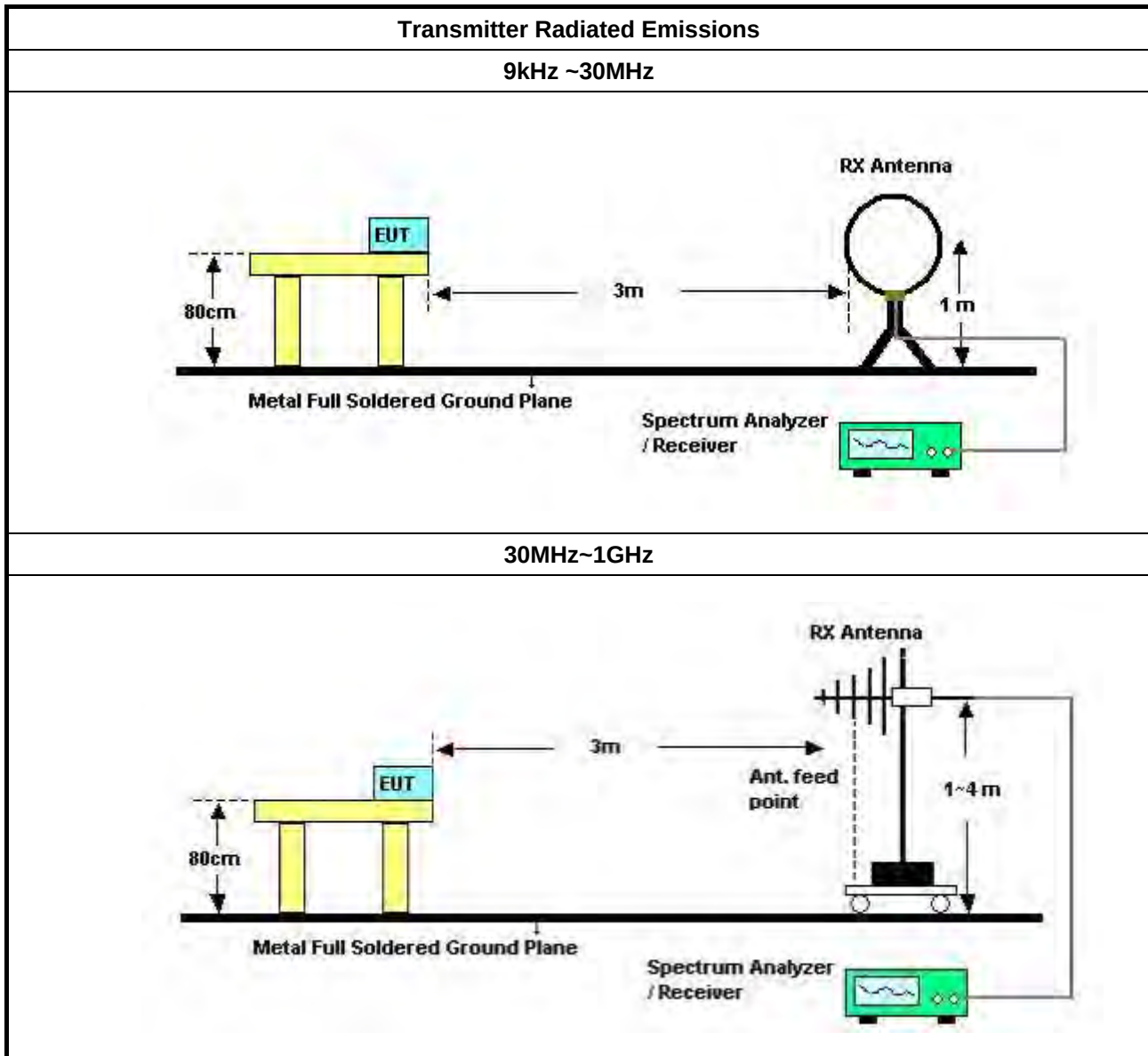
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

**3.1.3 Test Procedures**

Test Method	
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
▪ For the transmitter unwanted emissions shall be measured using following options below:	
	▪ Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.
	☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle $\geq 98\%$).
	☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
	☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW $\geq 1/T$).
	☐ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
	☐ Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
	☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:	
	▪ Refer as FCC KDB 558074 clause 8.7 & C63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	▪ Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.
	▪ Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB
	▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.

3.1.4 Test Setup



3.1.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.1.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.



3.1.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix A



4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 14, 2021	Apr. 13, 2022	Radiation (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 09, 2021	Aug. 08, 2022	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 26, 2021	Mar. 25, 2022	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 27, 2021	Apr. 26, 2022	Radiation (03CH05-CB)
Signal Analyzer	R&S	FSV40	101903	9kHz ~ 40GHz	Mar. 22, 2021	Mar. 21, 2022	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 21, 2021	Jun. 20, 2022	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Oct. 13, 2021	Oct. 12, 2022	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)

Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.



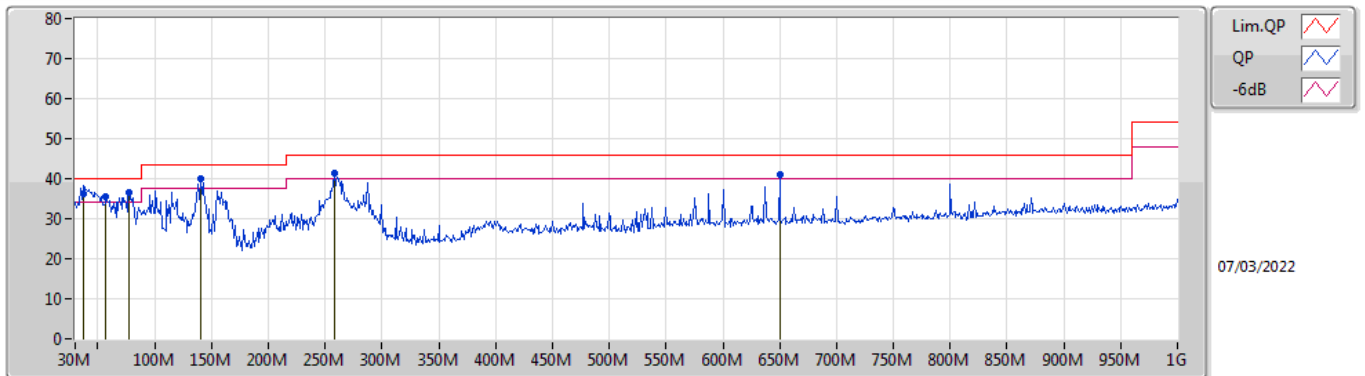
Radiated Emissions below 1GHz

Appendix A

Summary

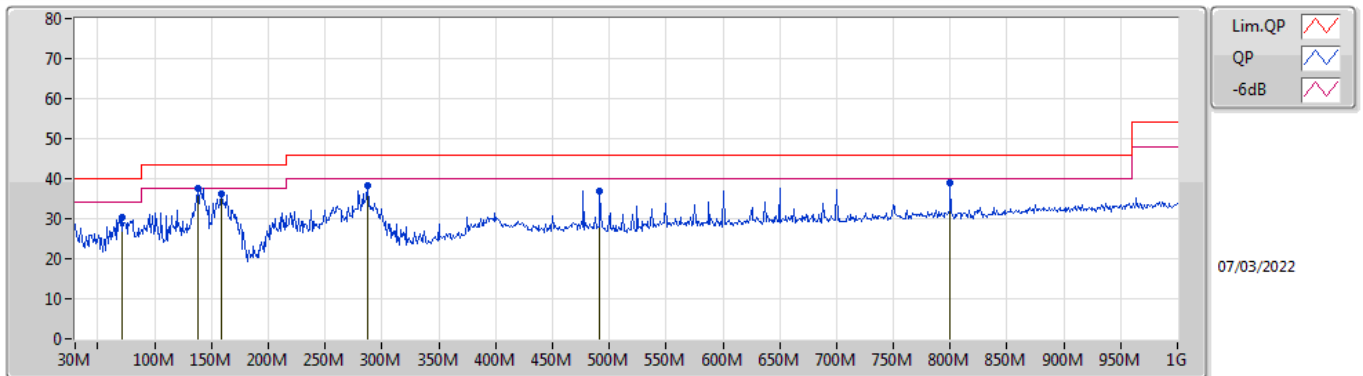
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	77.53M	36.63	40.00	-3.37	Vertical

Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
QP	36.79M	36.11	40.00	-3.89	-10.19	3	Vertical	198	1.00	"	46.30	20.53	0.90	31.62
PK	57.16M	35.54	40.00	-4.46	-18.31	3	Vertical	198	1.00	-	53.85	12.37	1.14	31.82
QP	77.53M	36.63	40.00	-3.37	-18.15	3	Vertical	198	1.00	"Worst"	54.78	12.46	1.30	31.91
PK	140.58M	39.92	43.50	-3.58	-13.26	3	Vertical	133	1.00	-	53.18	16.90	1.80	31.96
PK	257.95M	41.22	46.00	-4.78	-10.32	3	Vertical	200	2.00	-	51.54	19.25	2.45	32.02
PK	649.83M	40.99	46.00	-5.01	-3.97	3	Vertical	248	1.00	-	44.96	24.57	4.00	32.54

Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	70.74M	30.22	40.00	-9.78	-18.30	3	Horizontal	221	2.00	-	48.52	12.29	1.30	31.89
PK	138.64M	37.69	43.50	-5.81	-13.19	3	Horizontal	121	2.00	"Worst"	50.88	16.98	1.79	31.96
PK	159.01M	36.16	43.50	-7.34	-14.12	3	Horizontal	188	2.00	-	50.28	15.85	1.99	31.96
PK	287.05M	38.24	46.00	-7.76	-10.65	3	Horizontal	134	1.25	-	48.89	18.76	2.65	32.06
PK	491.72M	36.88	46.00	-9.12	-5.57	3	Horizontal	201	1.00	-	42.45	23.17	3.58	32.32
PK	800.18M	39.03	46.00	-6.97	-2.22	3	Horizontal	117	1.25	-	41.25	25.57	4.90	32.69