

# ELECTROMAGNETIC EMISSIONS **COMPLIANCE REPORT**



FCC Applicant:	Qisda Corporation NO. 157, SHAN-YING ROAD, SHAN-TING LI, GUEISHAN DIST., TAOYUAN CITY 333, TAIWAN
ISED Applicant:	Qisda Corporation 157 Shan-Ying Road, Gueishan, Taoyuan 333, Taiwan
Product Name:	Bluetooth/WLAN Antenna Device
Brand Name:	QISDA
Model No.:	S4CWM-11WS-B255C
Model Difference:	N/A
Report Number:	TERF2306001370E2
FCC ID	VRSS4CWM11B255
IC:	8729A-S4CWM11B255
Date of EUT Received:	January 11, 2023
Date of Test:	June 4, 2023 $\sim$ July 21, 2023
Issue Date:	September 20, 2023

Vit. Pei

Approved By

Vito Pei

# We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.247, ISED RSS-247.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History							
Report Number Revision Description Issue Date Revised By Revised By							
TERF2306001370E2	00	Original.	August 18, 2023	Karen Huang			
TERF2306001370E2	01	Modify product name	September 20, 2023	Karen Huang	*		

# Note:

1 . The remark "\*" indicates modification of the report upon requests from certification body.

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### **GENERAL INFORMATION** 1

### 1.1 **Product Description**

Product Name:	Bluetooth/WLAN Antenna Device
Brand Name:	QISDA
Model No.:	S4CWM-11WS-B255C
Model Difference:	N/A
Hardware Version:	CO
Firmware Version:	P219
EUT Series No.:	N/A
Power Supply:	12Vdc
Test Software (Name/Version)	Putty/V 0.62 & Dutapimimoapapp/V 2.0.0.88

#### 1.2 **RF Specification**

Radio Technology:	BLE
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	BLE 1M: 7.31dBm BLE 2M: 7.33dBm

#### 1.3 **Antenna Designation**

Antenna Type	Freq.	Peak Antenna Gain (dBi)
Metal Stamping Antenna	2.4GHz	-1.06

# Note:

Antenna information is provided by the applicant. 1.

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#### 1.4 **Test Methodology of Applied Standards**

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 RSS-247 issue 2 Feb. 2017 RSS-Gen, Issue 5 April 2018 ANSI C63.10:2013

#### 1.5 **Test Facility**

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier		
		SAC 1				
		SAC 2				
		SAC 3				
		Conduction 1				
	No.134, Wu Kung Road, New Taipei	Conducted 1	T\00007			
	Industrial Park, Wuku District, New	Conducted 2	TW0027			
	Taipei City, Taiwan.	Conducted 3				
		Conducted 4				
		Conducted 5				
SGS Taiwan Ltd.		Conducted 6				
Central RF Lab.		Conduction C		TW3702		
(TAF code 3702)		SAC C				
		SAC D				
		SAC G				
	No 2 Koji 1et Rd. Quishan District	Conducted A	_			
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conducted B	TW0028			
	Tabyuan City, Taiwan 555	Conducted C				
		Conducted D				
		Conducted E				
		Conducted F				
		Conducted G				
Note: Test site name is remarked on the equipment list in each section of this report as an indica-						
tion where	tion where measurements occurred in specific test site and address.					

### 1.6 **Special Accessories**

There are no special accessories used while test was conducted.

#### 1.7 **Equipment Modifications**

There was no modification incorporated into the EUT.

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### SYSTEM TEST CONFIGURATION 2

### 2.1 **EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 **EUT Exercise**

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 **Test Procedure**

### 2.3.1 **Conducted Emissions**

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

### 2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 **Radiated Emissions**

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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### 2.4 Measurement Results Explanation Example

# 2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

# 2.4.2 For all conducted test items:

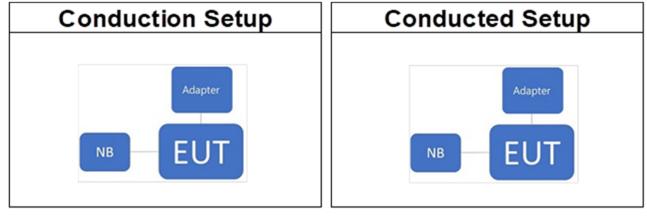
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

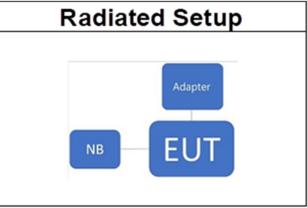
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#### 2.5 **Test Configuration**





### 2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Notebook	Lenovo	L480	P0002332	N/A	N/A	
	Conducted Emission Test Site: Conducted F					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Notebook	Lenovo	L480	P0002332	N/A	N/A	
	Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Notebook	Lenovo	L480	P0002332	N/A	N/A	

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### SUMMARY OF TEST RESULTS 3

FC	C Rules	ISED Rules	Description Of Test	Result
§1	5.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.	247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.	247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	Emission Bandwidth	Compliant
§	5.247(d) 15.205 15.209	RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10	Radiated & Conducted Band Edge and Spurious Emission	Compliant
§1	5.247(e)	RSS-247 §5.2 b	Peak Power Density	Compliant
§	15.203	N/A	Antenna Requirement	Compliant

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### **DESCRIPTION OF TEST MODES** 4

#### 4.1 **Operating Frequencies**

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	15	2430 MHz	29	2458 MHz
2	2404 MHz	16	2432 MHz	30	2460 MHz
3	2406 MHz	17	2434 MHz	31	2462 MHz
4	2408 MHz	18	2436 MHz	32	2464 MHz
5	2410 MHz	19	2438 MHz	33	2466 MHz
6	2412 MHz	20	2440 MHz	34	2468 MHz
7	2414 MHz	21	2442 MHz	35	2470 MHz
8	2416MHz	22	2444 MHz	36	2472 MHz
9	2418 MHz	23	2446 MHz	37	2474 MHz
10	2420 MHz	24	2448 MHz	38	2476 MHz
11	2422 MHz	25	2450 MHz	39	2478 MHz
12	2424 MHz	26	2452 MHz	40	2480 MHz
13	2426 MHz	27	2454 MHz		
14	2428 MHz	28	2456 MHz		

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### 4.2 The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 3. The field strength of radiation emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.
- 4. Investigation has been done on all the possible configurations for searching the worst case.

CONDUCTED TEST					
MODEAVAILABLE CHANNELTESTED CHANNELMODULATIONDATA RATE (Mbps)					
Bluetooth LE	0 to 39	0,20,39	GFSK	1	
Bluetooth LE	0 to 39	0,20,39	GFSK	2	

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	MODE AVAILABLE TESTED MODULATION CHANNEL CHANNEL					
Bluetooth LE	0 to 39	20	GFSK	1		
Bluetooth LE	0 to 39	20	GFSK	2		
	TRANSMIT RAD	IATED EMISSION T	EST (ABOVE 1 GH	z)		
MODEAVAILABLE CHANNELTESTED CHANNELMODULATIONDATA RATE (Mbps)						
Bluetooth LE	0 to 39	0,20,39	GFSK	1		
Bluetooth LE	0 to 39	0,20,39	GFSK	2		

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### **MEASUREMENT UNCERTAINTY** 5

Test Items	Uı	ncertaint	ÿ
AC Power Line Conducted Emission	+/-	2.32	dB
Output Power measurement	+/-	1	dB
Emission Bandwidth		1.53	Hz
Undesignable radiated emission measurement	+/-	1.68	dB
Peak Power Density	+/-	2.16	dB
Temperature	+/-	0.7	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty						
	+/-	2.8	dB	9kHz~30MHz		
Polarization: Vertical	+/-	4.82	dB	30MHz - 1000MHz		
	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		
	+/-	2.8	dB	9kHz~30MHz		
Polarization: Horizontal	+/-	4.54	dB	30MHz - 1000MHz		
	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		

## Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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### MEASUREMENT EQUIPMENT USED 6

#### 6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction C						
EQUIPMENT TYPE	EQUIPMENT TYPE MFR		SERIAL NUMBER	LAST CAL.	CAL DUE.	
LISN	SCHWARZBECK	NSLK8127	973	04/20/2023	04/19/2024	
EMI Test Receiver	R&S	ESCI	101342	04/25/2023	04/24/2024	
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2023	03/26/2024	
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2023	03/26/2024	
Test Software	audix	e3	E3 20923 SGS Ver.9	N.C.R	N.C.R	

### 6.2 **Conducted Measurement**

Conducted Emission Test Site: Conducted F							
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.		
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	07/07/2022	07/06/2023		
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071573	05/23/2023	05/22/2024		
Power Meter	Anritsu	ML2496A	1804002	04/26/2023	04/25/2024		
Power Sensor	Anritsu	MA2411B	1726106	04/26/2023	04/25/2024		
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R		
Attenuator	Marvelous	MVE2213-10	RF12	11/16/2022	11/15/2023		
Attenuator	Woken	WATT-218FS-10	RF18	11/16/2022	11/15/2023		
DC Block	PASTERNACK	PE8210	RF153	11/16/2022	11/15/2023		

#### 6.3 **Radiated Measurement**

Radiated Emission Test Site: SAC G							
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.		
Broadband Antenna	SCHWARZBECK	VULB 9168	1206	01/17/2023	01/16/2024		
Horn Antenna	Schwarzbeck	BBHA9170	184	12/30/2022	12/29/2023		
Horn Antenna	RF SPIN	DRH18-E	210105A18E	04/18/2023	04/17/2024		
Loop Antenna	ETS.LINDGREN	6502	14303	05/23/2023	05/22/2024		
3m Site NSA	SGS	966 chamber G	N/A	03/30/2023	03/29/2024		
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/11/2023	04/10/2024		
Test Software	audix	e3	E3 20923 SGS Ver.9 ( C )	N.C.R	N.C.R		
Pre-Amplifier	EMC Instruments	EMC18405SEE	980881	10/25/2022	10/24/2023		
Pre-Amplifier	EMC Instruments	EMC330N	980781	03/15/2023	03/14/2024		
Pre-Amplifier	EMC Instruments	EMC118A45SE	980815	03/15/2023	03/14/2024		
Coaxial Cable	EMC Instruments	EMCCFD400-NM- NM-8000-5000- 2000	210216 <sup>、</sup> 210217 <sup>、</sup> 210218	03/15/2023	03/14/2024		
Coaxial Cable	EMC Instruments	EMC104-SM-SM- 8000-5000-5000	210219 \ 210220 \ 210221	03/15/2023	03/14/2024		
Coaxial Cable	EMC Instruments	EMC105-NM-NM- 5000-15000	210224 ` 210306	03/15/2023	03/14/2024		

# NOTE: N.C.R refers to Not Calibrated Required.

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### CONDUCTED EMISSION TEST 7

### 7.1 **Standard Applicable:**

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits (dBµV)			
MHz	Quasi-peak	Average		
0.15 to 0.50	66 to 56	56 to 46		
0.50 to 5	56	46		
5 to 30	60	50		
NL (				

Note

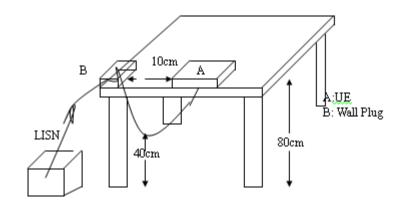
1. The lower limit shall apply at the transition frequencies

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 7.2 **EUT Setup:**

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

### 7.3 **Test Setup**



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### 7.4 **Measurement Procedure:**

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed

#### 7.5 **Measurement Result:**

Note: Refer to next page for measurement data and plots. Note2: The \* reveals the worst-case results that closest to the limit.

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# AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number Test Mode	:TERF2306001370E2 :BLE	Test Site Test Date	:Conductio :2023-07-2		
Power	:120V/60Hz	Temp./Humi.	:23.8/55		
Probe	:L1	Engineer	:Temo Che	n	
		Lighteet			
80 Level (	dBuV)				
70.0					
60.0					
60.0					
50.0					
40.0	Minute and A		7		
30.0	" mayor Mary	mon	mart	MX KI	
20.0			× \/~	YM4	
10.0					
0.15	0.5 1 2	2 5	10	20 30	
0.15	0.5 T Frequer	icy (MHz)	10	20 30	
Freq.	Detector Spectrum Mode Reading Level		ctual FS	Limit	Margin
MHz	PK/QP/AV dBµV		ΒμV	dBµV	dB
0.158	Peak 39.89		0.58	65.56	-14.98
0.167 0.172	Peak 39.39 Peak 39.14		0.08 9.82	65.12 64.86	-15.04 -15.03
0.172	Peak 39.14 Peak 37.74		9.02 8.43	64.86 64.33	-15.03 -15.90
0.452	Average 29.50		0.43 0.14	46.85	-6.71
0.452	QP 34.70		5.34	56.85	-11.51
15.066	Peak 22.91		3.99	60.00	-26.01

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Report Number Test Mode Power Probe	:TERF2306001370E2 :BLE :120V/60Hz :N	Test Site Test Date Temp./Humi. Engineer	:Conduction :2023-07-2 :23.8/55 :Temo Che	0	
80 Level (d	dBuV)				
70.0					
60.0					
50.0	8				
40.0	m. A.				
30.0	WW Var	Marine Marine Marine	madra	Ψh μ	
20.0			· • • • ·	- Yru	
10.0					
0.15	0.5 1 2 Frequen	cy (MHz)	10	20 30	
Freq.	Detector Spectrum Mode Reading Level		ctual FS	Limit	Margin
MHz I	PK/QP/AV dBµV	dB d	BμV	dBµV	dB
0.162 0.170	Peak 38.78 Peak 37.06		9.45 7.73	65.38 64.94	-15.93 -17.22
0.170	Peak 37.00 Peak 35.57		6.24	64.94 64.24	-17.22
0.193	Peak 35.02		5.69	63.89	-18.20
0.456	Average 31.30		1.92	46.76	-4.84
0.456	QP 36.10	10.62 4	6.72	56.76	-10.04
19.224	Peak 18.84	11.23 3	0.07	60.00	-29.93

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# 8 PEAK OUTPUT POWER MEASUREMENT

# 8.1 Standard Applicable:

# 8.1.1 Duty Cycle

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

# 8.1.2 FCC

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

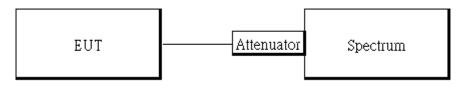
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

# 8.1.3 ISED

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W.

# 8.2 Test Setup

# 8.2.1 Duty Cycle



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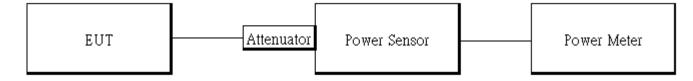
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# 8.2.2 Output Power



### 8.3 **Measurement Procedure:**

### 8.3.1 **Duty Cycle**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Set span = Zero
- 3. RBW = 8MHz, VBW = 8MHz,
- 4. Detector = Peak

### 8.3.2 **Output Power**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
- 4. Record the max. Reading as observed from Power Meter.
- 5. Repeat above procedures until all test default channel measured was complete.

#### **Duty Factor:** 8.4

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
BLE 1M	62.40	2.05	2.56	3.00
BLE 2M	32.80	4.84	4.88	5.00

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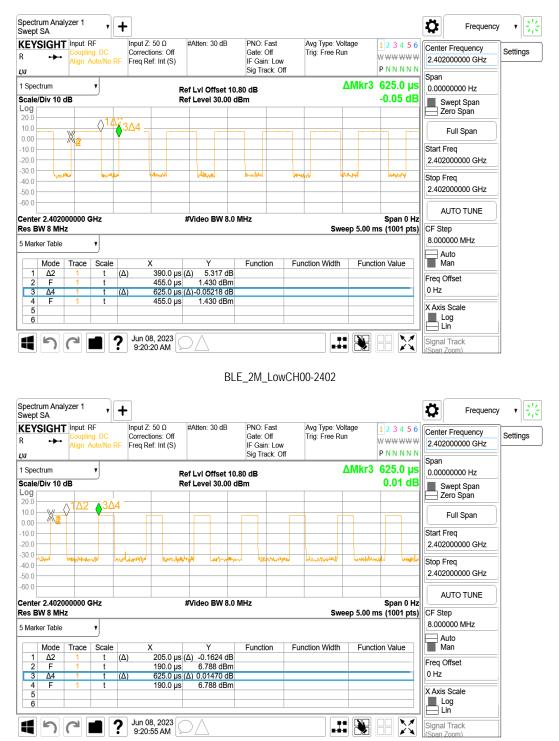
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BLE\_1M\_LowCH00-2402



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#### 8.5 **Output Power:**

#### 8.5.1 Peak & Avg

# BLE 1M mode:

СН	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	2402	10	7.03	30
Mid	2442	10	7.17	30
High	2480	10	7.31	30
СН	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Required Limit (dBm)
1				
Low	2402	10	6.83	30
Low Mid	2402 2442	10 10	6.83 7.15	30 30

\*Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

## BLE 2M mode:

СН	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	2402	10	7.05	30
Mid	2442	10	7.18	30
High	2480	10	7.33	30
СН	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Required Limit (dBm)
Low	2402	10	6.99	30
Mid	2442	10	7.08	30
High	2480	10	7.30	30

\*Note:

1.Measured by power meter, cable loss dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

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#### 8.5.2 EIRP

## **EIRP BLE 1M mode**

СН	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
Low	2402	10	6.83	-1.06	5.77	4W=	36	dBm
Mid	2442	10	7.15	-1.06	6.09	4W=	36	dBm
High	2480	10	7.28	-1.06	6.22	4W=	36	dBm

\* Note: EIRP = Average Power + Gain

### EIRP BLE 2M mode

СН	Frequency (MHz)	Frequency Power Avg. Output Power		Antenna Gain (dBi)	EIRP (dBm)		Limit		
Low	2402	10	6.99	-1.06	5.93	4W=	36	dBm	
Mid	2442	10	7.08	-1.06	6.02	4W=	36	dBm	
High	2480	10	7.30	-1.06	6.24	4W=	36	dBm	

\* Note: EIRP = Average Power + Gain

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### 9 EMISSION BANDWIDTH MEASUREMENT

### 9.1 **Standard Applicable**

The minimum 6 dB bandwidth shall be at least 500 kHz.

### 9.2 **Test Setup**



### 9.3 **Measurement Procedure:**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

### 9.3.1 FCC measurements

- 1. The testing follows the Measurement Procedure of the KDB 558074 D01.
- 2. Set the spectrum analyzer as

RBW= 100 kHz, VBW = 3 X RBW. Span= 2 to 5 times of the OBW, Sweep=auto, Detector = Peak, and Max hold.

- 3. Mark the upper and lower frequencies of -6dB.
- 4. Repeat above procedures until all test default channel is completed.

### 9.3.2 **ISED** measurements

- 1. The testing follows the Measurement Procedure of the RSS-Gen section 6.7.
- 2. Set the spectrum analyzer as RBW= 1 % to 5% of 99% and -6dB Bandwidth, VBW  $\geq$  3 X RBW. Span= large enough to capture all products of the modulation process Sweep=auto, Detector = Peak, and Max hold.
- 3. Mark the upper and lower frequencies of 99% and -6dB.
- 4. Repeat above procedures until all test default channel is completed.

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#### 9.4 **Measurement Result:**

# BLE 1M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.7004	$\ge$ 0.5	PASS
2442	0.7008	$\ge$ 0.5	PASS
2480	0.6991	$\geq$ 0.5	PASS

# **BLE 2M mode**

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	1.173	$\ge$ 0.5	PASS
2442	1.172	≧ 0.5	PASS
2480	1.172	≧ 0.5	PASS

# **BLE 1M mode**

Frequency (MHz)	99%Bandwidth (MHz)
2402	1.0281
2442	1.0284
2480	1.0298

## **BLE 2M mode**

Frequency (MHz)	99%Bandwidth (MHz)			
2402	2.0432			
2442	2.0437			
2480	2.0431			

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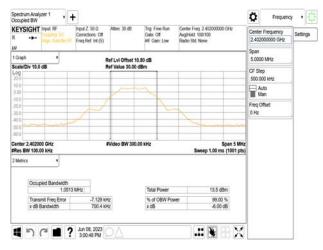
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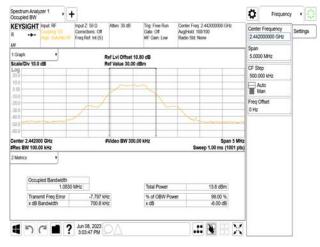
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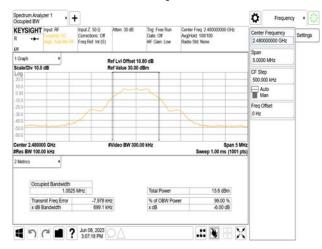
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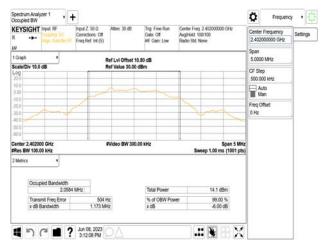
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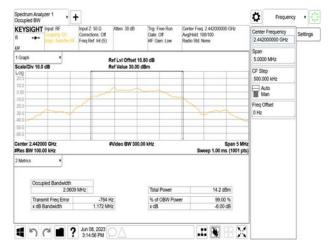
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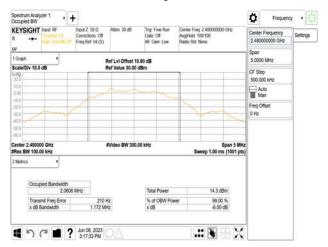
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OBW\_BLE 2M\_MidCH20-2442MHz



### OBW\_BLE 2M\_HighCH39-2480MHz



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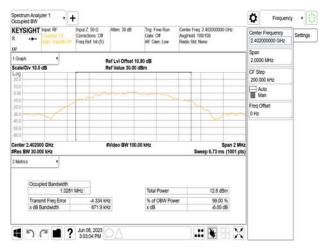
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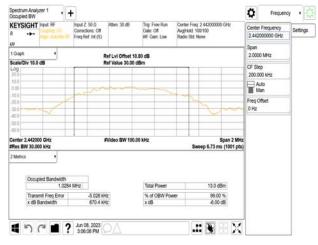
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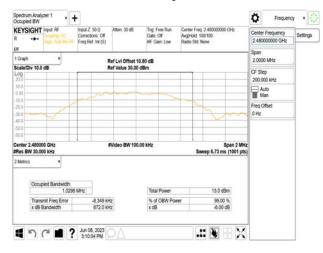
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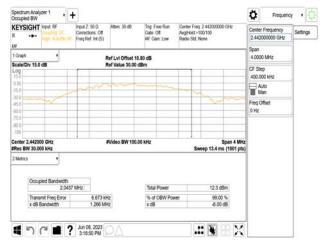
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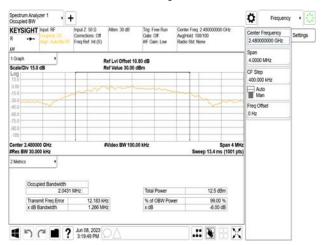
### IC OBW\_BLE 2M\_LowCH00-2402MHz



IC OBW\_BLE 2M\_MidCH20-2442MHz



### IC OBW\_BLE 2M\_HighCH39-2480MHz



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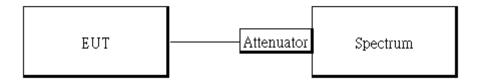


# **10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT**

# **10.1 Standard Applicable**

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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

# 10.2 Test Setup



# 10.3 Measurement Procedure

# **10.3.1** Reference Level of Emission Limit:

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 100kHz & VBW = 300 kHz.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.

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# 10.3.2 Conducted Band Edge:

- 1. To connect Antenna Port of EUT to Spectrum.
- **2.** The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- **3.** Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- **4.** Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
- **5.** Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
- 6. Set DL as the limit = reading on marker of reference level measurement 20dBm
- 7. Mark the highest readings of the emissions outside of 2400MHz~2483.5MHz.
- 8. Repeat above procedures until all default test channel (low and high) was complete.

# 10.3.3 Conducted Spurious Emission:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set RBW = 100 kHz & VBW=300 kHz, Detector =Peak, Sweep = Auto
- 4. Allow trace to fully stabilize.
- 5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 6. Repeat above procedures until all default test channel measured were complete.

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#### 10.4 **Measurement Result**

RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)		
6.29	-13.71		
6.42	-13.58		
6.51	-13.49		
	Density (dBm) 6.29 6.42		

# BLE 1M Reference Level of Limit

\*Note:

1.cable loss as 10.8dB that offsets in the spectrum 2. Refer to next page for plots.

# **BLE 2M Reference Level of Limit**

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB		
2402	6.30	(dBm) -13.70		
2442	6.42	-13.58		
2480	6.52	-13.48		

\*Note:

1.cable loss as dB that offsets in the spectrum

2. Refer to next page for plots.

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### Reference Level\_BLE 1M\_LowCH00-2402MHz



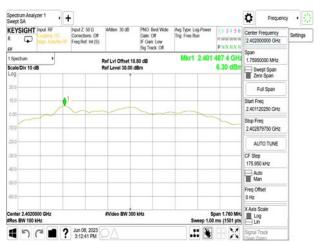
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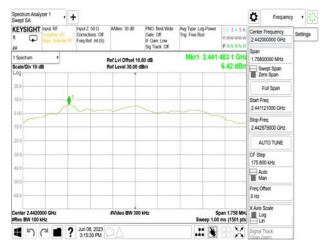
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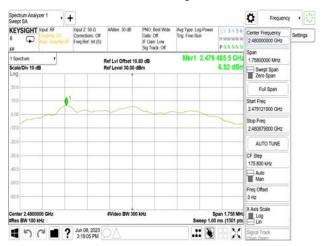
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Reference Level\_BLE 2M\_MidCH20-2442MHz







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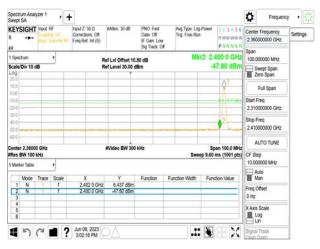
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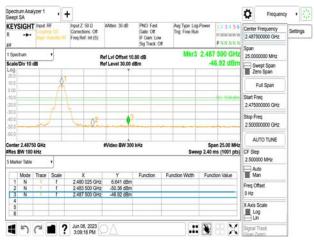
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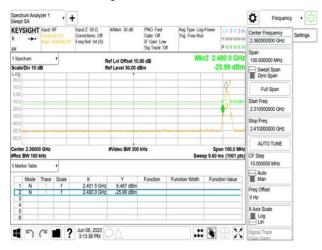
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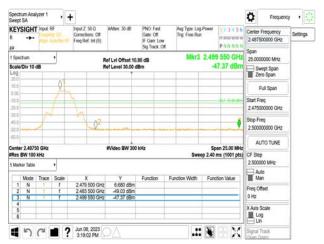
Band Edge\_BLE 1M\_HighCH39-2480MHz



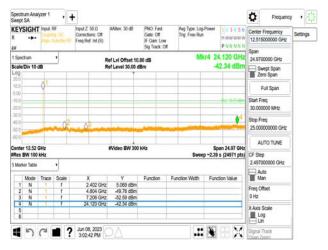
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### Band Edge\_BLE 2M\_HighCH39-2480MHz



Spurious Emission\_BLE 1M\_LowCH00-2402MHz



### Spurious Emission\_BLE 1M\_MidCH20-2442MHz



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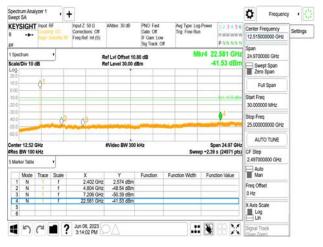
# Report No.: TERF2306001370E2 Page: 32 of 63



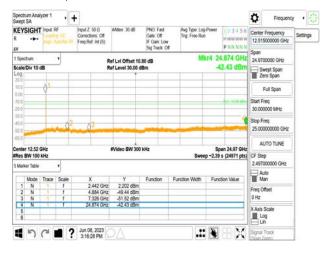
### Spurious Emission\_BLE 1M\_HighCH39-2480MHz

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(EYS	GIGHT	Input P	40 PC		Input Z: 50 () Corrections: Off Freq Ref. Int (S)	#Atten: 30 dB	PNO Fast Gate Off IF Gain Low Sig Track O		Power 123456	12.51	r Frequency 5000000 GHz	Setti	ngs
Spec	tum		•	-		ef Lvi Offset 10			4 23.927 GHz	Span 24.97	00000 GHz		
cale/	Div 10 d	B	_			of Level 30.00 d			-42.27 dBm		wept Span		
.og				1		1	1				ero Span		
20.0		Q			_						Full Span		
0.00									0.080	Start F 30.00	ireq 0000 MHz		
30 0 40 0 50 0		-	-	2	03.	-				Stop F 25.00	req 0000000 GHz		
60.0	12.52 0					#Video BW 300			Span 24.97 GHz		UTO TUNE	1	
	12.52 GW 100					WVIDEO BAV 300	KPIE	Sweep	~2.39 s (24971 pts)		ep de		
Mark	er Table									2.497	000000 GHz		
man			J.,							PA	uto	1	
		Trace	Scale		X	Y	Function	Function Width	Function Value	M	lan		
1	N	1	1	-	2.480 GHz	6.397 dBm				Freq C	Mant		
2	NN	1	1	-	4.960 GHz 7.440 GHz	-50.31 dBm -52.43 dBm				0 Hz			
4	N	-1	-	-	23.927 GHz	-52.43 dBm				U The			
5	~	_			23.3(2) GH2	-42.27 GBM				X Axis	00		
4	5	3		?	Jun 08, 2023 3:09:42 PM			.::		Signal	Track		

Spurious Emission\_BLE 2M\_LowCH00-2402MHz



Spurious Emission\_BLE 2M\_MidCH20-2442MHz



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### Spurious Emission\_BLE 2M\_HighCH39-2480MHz

Spectr	um Anal SA	yzer 1	•	+							ø	Frequency	•	-
REYS	SIGHT	Input P	A PA		Input Z: 50 D Corrections: Off Freq Ref. Int (S)	#Atten: 30 dB	PNO Fast Gate Off IF Gain Lor Sig Track O			123456 MWWWWW PNNNNN		r Frequency 5000000 GHz	Setti	ngs
Spec			•	-		ef Lvi Offset 10	1.80 dB			4.741 GHz		00000 GHz		
Log	Div 10 d	18			8	ef Level 30.00 o	dBm		-	1.79 dBm		wept Span ero Span		
10.0		01	_									Full Span		
10.0		+	_		_		_	_		A1 10.00	Start F 30.00	Freq 0000 MHz		
30.0 40.0 50.0		-	•••	2	03	-				-	Stop P 25.00	req 0000000 GHz		
60.0	12.52	147				#Video BW 300	144+			an 24.97 GHz		UTO TUNE		
#Res BW 100 kHz Sweep ~2.39 s (24971 pts)														
5 Mark	er Table										2.497	000000 GHz		
	Mode	Trace	Scale		x	Y	Function	Function Width	Func	tion Value		uto tan		
1	N		1		2.480 GHz	1.082 dBm					Freg	Mart		
2	N		t		4.960 GHz	-47.34 dBm						Alber		
3	N	1	1		7.440 GHz	-50.69 dBm				1	0 Hz			
4 5 6	N	1	'		24.741 GHz	-41.79 dBm					X Axis	Scale og in		
4	5	3		?	Jun 08, 2023			.:		HX	Signal	Track		

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# 11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

# 11.1 Standard Applicable

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. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 and RSS-Gen §8.9 Table 5 and 6 limit as below.

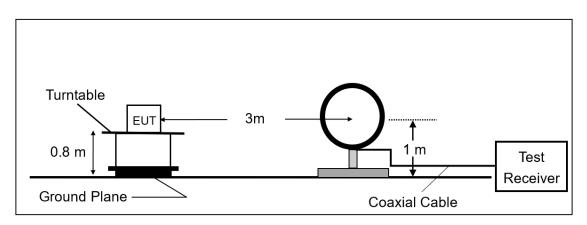
And according to §15.33(a) (1) & RSS-Gen §6.13.2.a for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note: The lower limit shall apply at the transition frequencies.

# 11.2 Test Setup

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



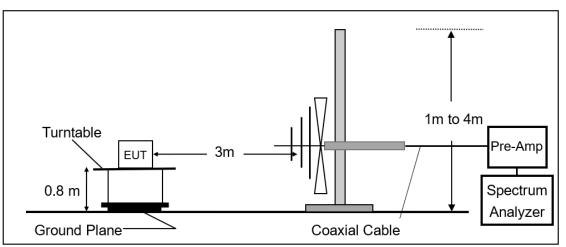
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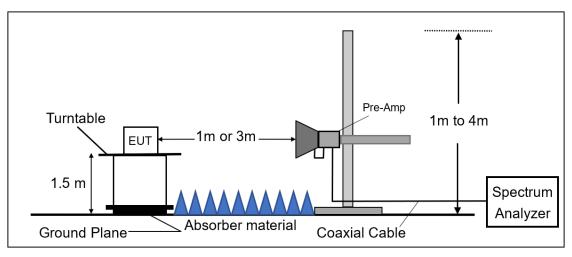
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(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(C) Radiated Emission Test Set-Up, Frequency Above 1GHz.



### 11.3 **Measurement Procedure**

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) at frequency between 30MHz and 1 GHz.
- 6. Use receiver mode as RBW=120 kHz for Quasi-peak (QP) at frequency between 30MHz and 1 GHz.

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- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Maximum Emission Measurements at frequency above 1 GHz.
- 8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Emission Measurements at frequency above 1 GHz.
- 9. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 12. Repeat above procedures until all default test channel measured were complete.

### 11.4 Field Strength Calculation

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

# FS = RA + AF + CL - AG

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

The limit of the emission level is expressed in dBuV/m, which converts 20\*log(uV/m)

Actual  $FS(dB\mu V/m) = SPA$ . Reading level(dB $\mu V$ ) + Factor(dB) Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

### 11.5 Test Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) & RSS-GEN §6.13.2 was not reported.

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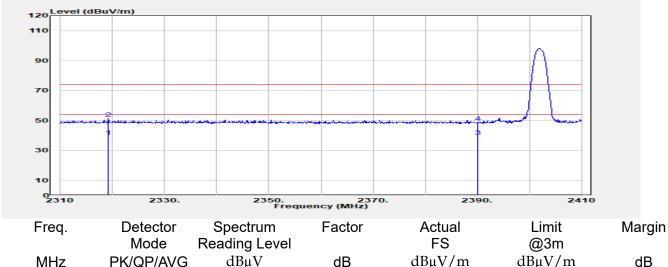




#### 11.6 **Measurement Result:**

### 11.6.1 **Radiated Band Edge Measurement Result**

Report Number	:TERF2306001370E2	Test Site	:SAC G Chamber
Operation Mode	:BLE 1M	Test Date	:2023-06-20
Test Frequency	:2402 MHz	Temp./Humi.	:22.8°C/64%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Temo Chen



		abuv	чD	αυμ / / / / /	αυμ / /	чD	
2319.200	Average	42.68	-3.27	39.41	54.00	-14.59	
2319.200	Peak	54.68	-3.27	51.40	74.00	-22.60	
2390.000	Average	42.92	-3.51	39.41	54.00	-14.59	
2390.000	Peak	52.22	-3.51	48.71	74.00	-25.29	

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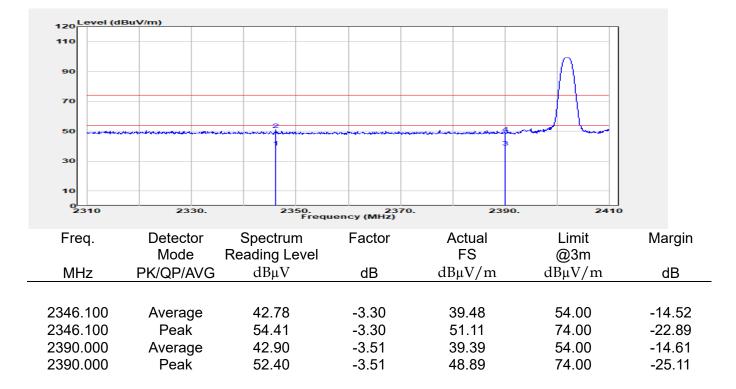
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Report Number	:TERF2306001370E2
Operation Mode	:BLE 1M
Test Frequency	:2402 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



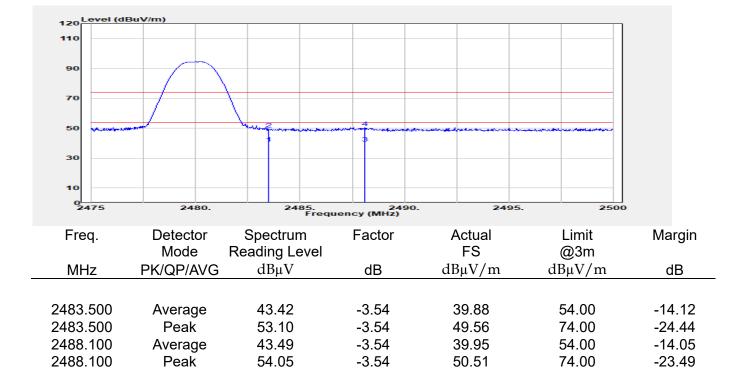
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Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



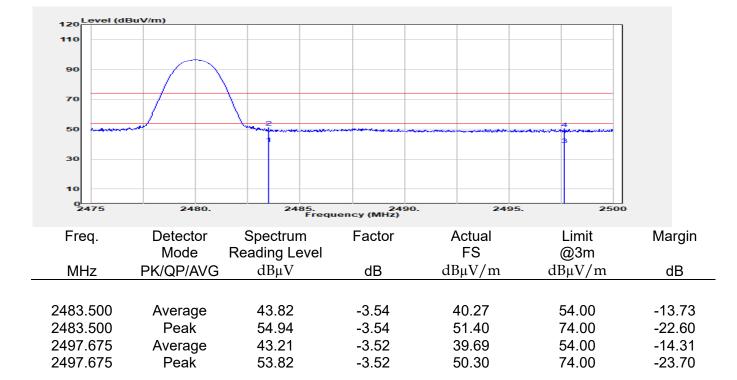
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Operation Mode	:BLE 1M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



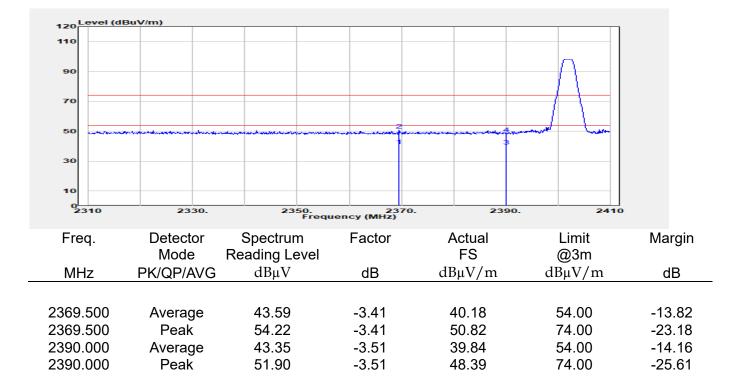
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Test Frequency	:2402 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



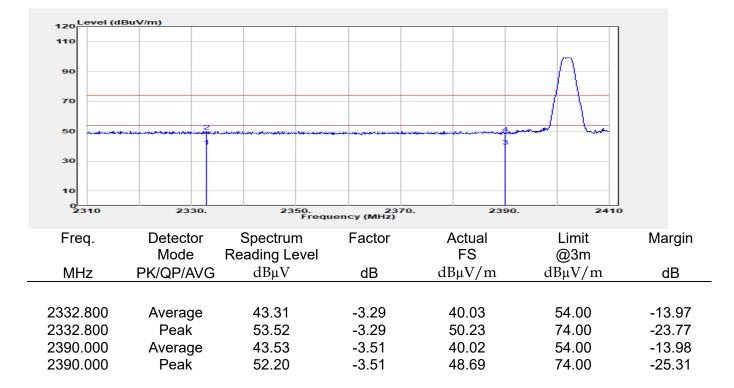
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Engineer	:Temo Chen



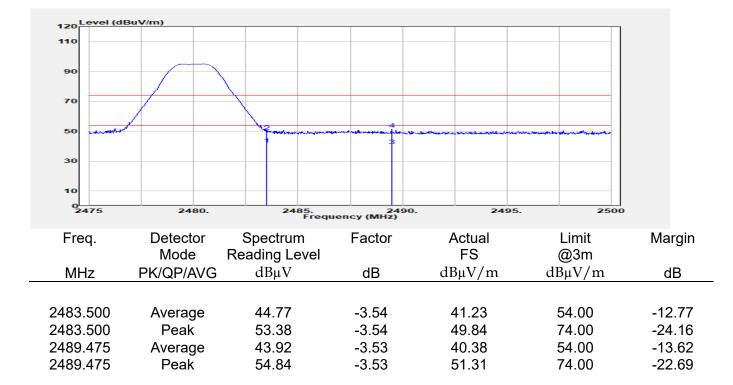
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Report Number	:TERF2306001370E2
Operation Mode	:BLE 2M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



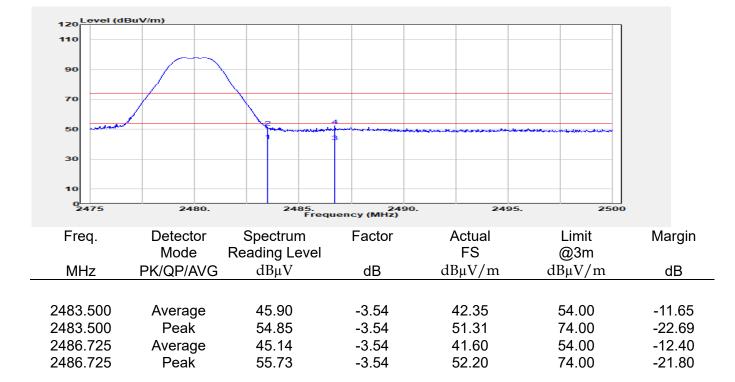
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Report Number	:TERF2306001370E2
Operation Mode	:BLE 2M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



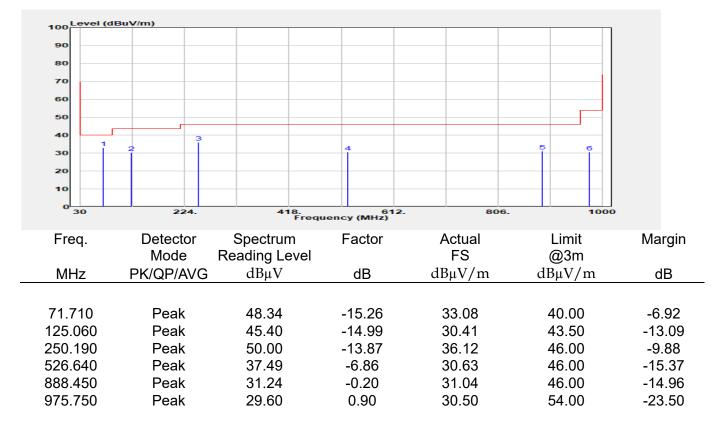
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### 11.6.2 **Radiated Spurious Emission**

Report Number	:TERF2306001370E2	Test Site	:SAC G Chamber
Operation Mode	:BLE 1M	Test Date	:2023-07-21
Test Frequency	:2442 MHz	Temp./Humi.	:24.0°C/58%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Temo Chen



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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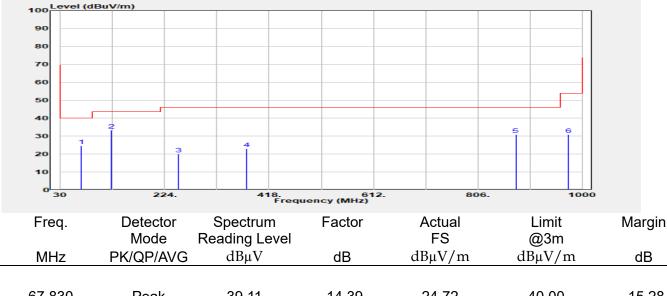
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Report Number	:TERF2306001370E2
Operation Mode	:BLE 1M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-07-21
Temp./Humi.	:24.0°C/58%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



67.830	Peak	39.11	-14.39	24.72	40.00	-15.28
125.060	QP	48.40	-14.99	33.41	43.50	-10.09
250.190	QP	33.90	-13.87	20.03	46.00	-25.97
375.320	QP	33.00	-9.94	23.06	46.00	-22.94
876.810	Peak	30.86	-0.06	30.80	46.00	-15.20
973.810	Peak	30.07	0.92	30.99	54.00	-23.01

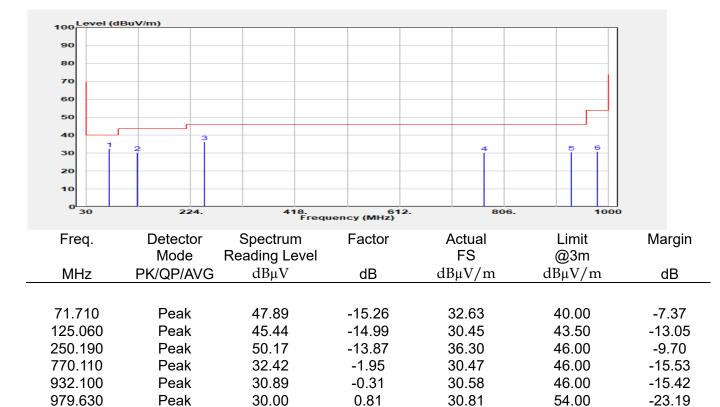
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Report Number	:TERF2306001370E2
Operation Mode	:BLE 2M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-07-21
Temp./Humi.	:24.0°C/58%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



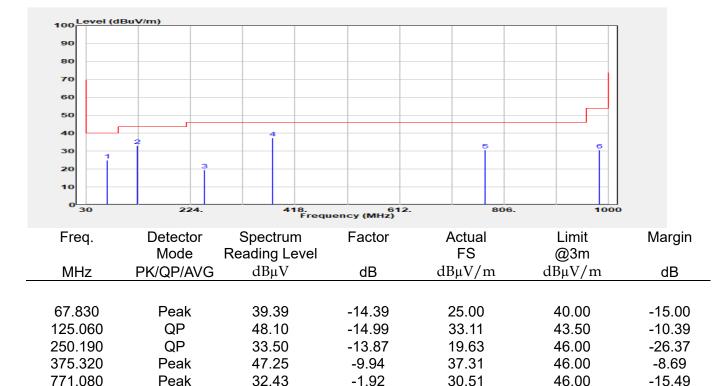
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Report Number	:TERF2306001370E2
Operation Mode	:BLE 2M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-07-21
Temp./Humi.	:24.0°C/58%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



0.80

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29.72

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30.51

54.00

-23.49

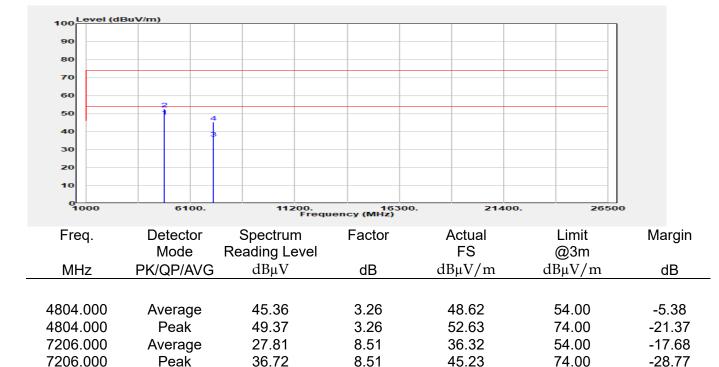
984.480

Peak



:TERF2306001370E2
:BLE 1M
:2402 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



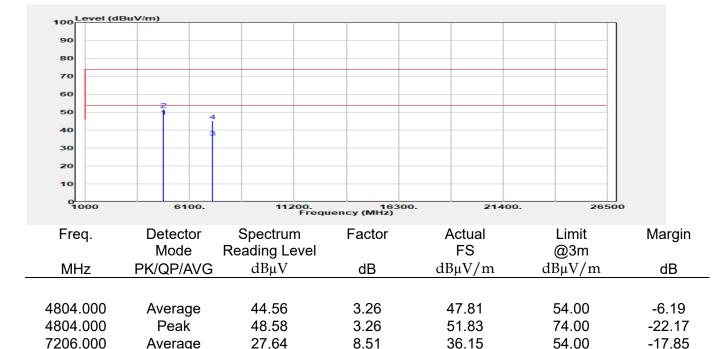
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:TERF2306001370E2
:BLE 1M
:2402 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



8.51

45.28

74.00

-28.72

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

36.77

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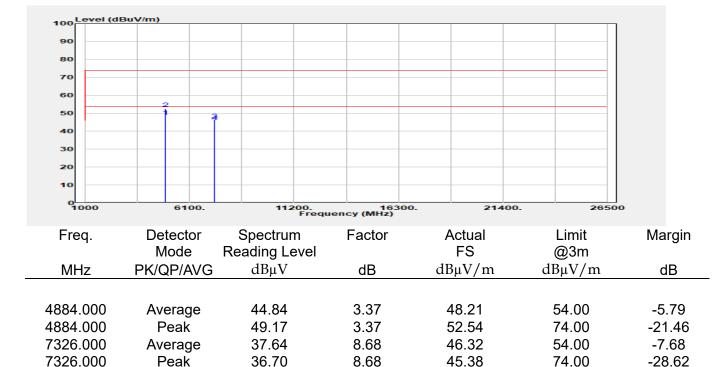
7206.000

Peak



:TERF2306001370E2
:BLE 1M
:2442 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



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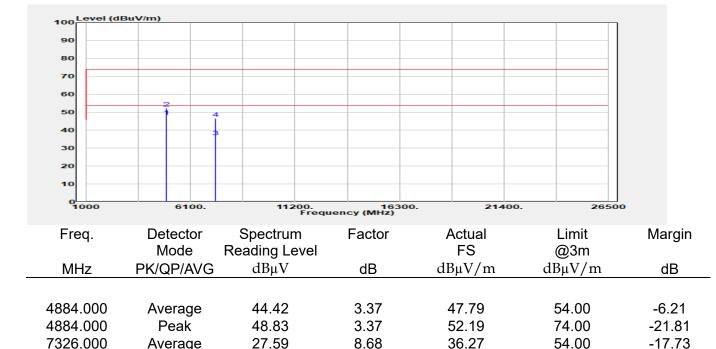
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:TERF2306001370E2
:BLE 1M
:2442 MHz
:Tx
:E2 Plane

Peak

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



8.68

46.52

74.00

-27.48

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37.84

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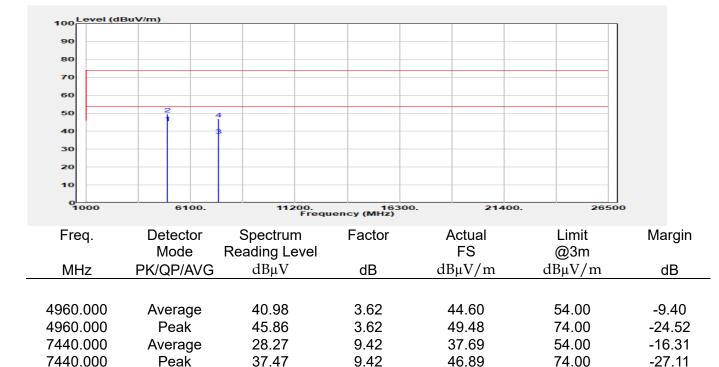
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7326.000



:TERF2306001370E2
:BLE 1M
:2480 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



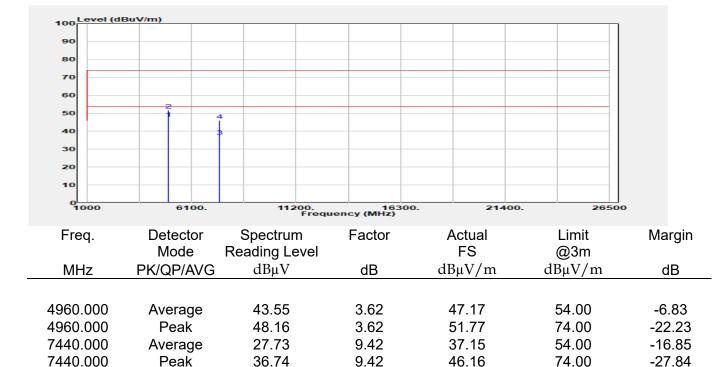
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:TERF2306001370E2
:BLE 1M
:2480 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-20
Temp./Humi.	:22.8°C/64%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



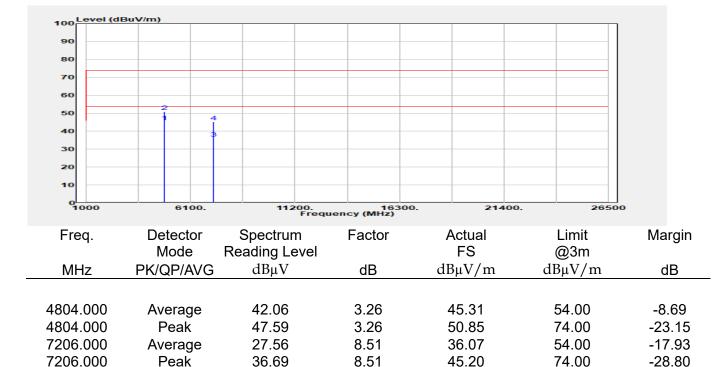
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:TERF2306001370E2
:BLE 2M
:2402 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-21
Temp./Humi.	:23.6°C/65%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



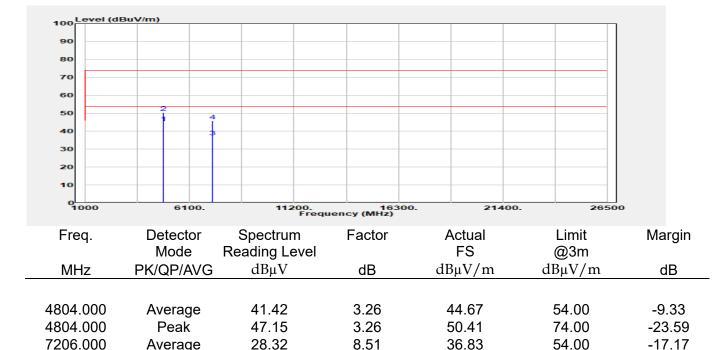
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:TERF2306001370E2
:BLE 2M
:2402 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-21
Temp./Humi.	:23.6°C/65%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



8.51

45.68

74.00

-28.32

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

37.17

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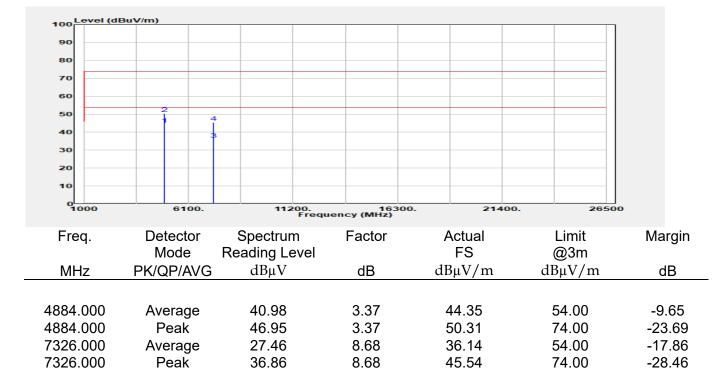
7206.000

Peak



Report Number	:TERF2306001370E2
Operation Mode	:BLE 2M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-21
Temp./Humi.	:23.6°C/65%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



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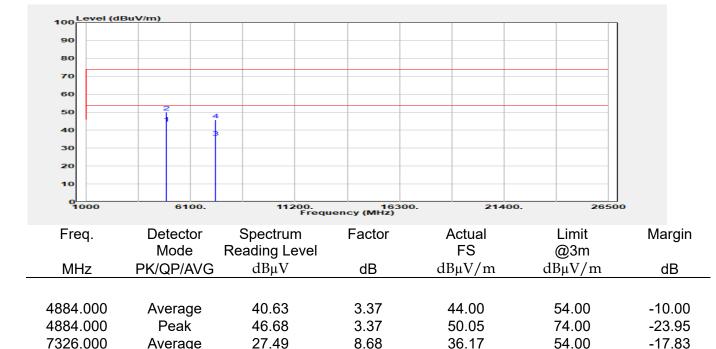
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:TERF2306001370E2
:BLE 2M
:2442 MHz
:Tx
:E2 Plane

Peak

Test Site	:SAC G Chamber
Test Date	:2023-06-21
Temp./Humi.	:23.6°C/65%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



8.68

45.70

74.00

-28.30

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37.02

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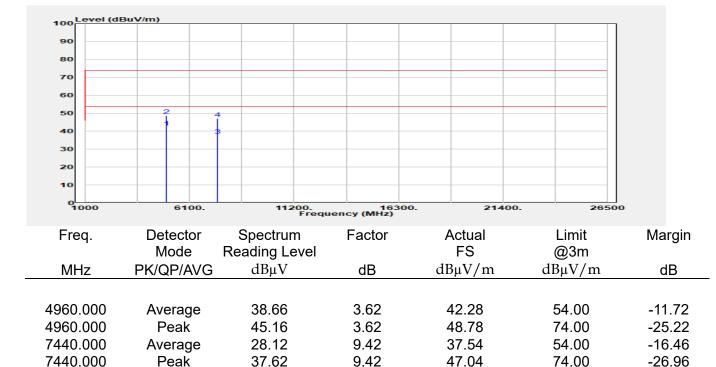
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:TERF2306001370E2
:BLE 2M
:2480 MHz
:Tx
:E2 Plane

Test Site	:SAC G Chamber
Test Date	:2023-06-21
Temp./Humi.	:23.6°C/65%
Antenna Pol.	:Vertical
Engineer	:Temo Chen



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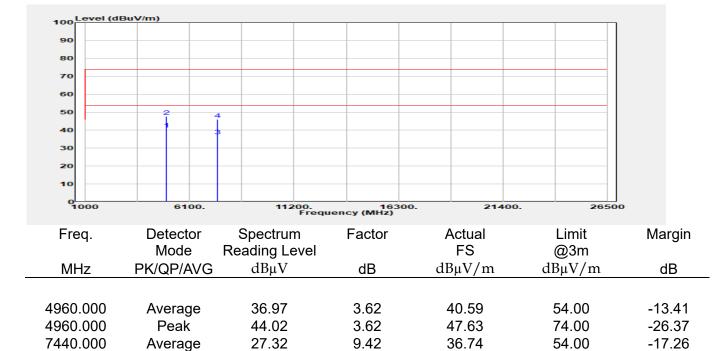
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:TERF2306001370E2
:BLE 2M
:2480 MHz
:Tx
:E2 Plane

Peak

Test Site	:SAC G Chamber
Test Date	:2023-06-21
Temp./Humi.	:23.6°C/65%
Antenna Pol.	:Horizontal
Engineer	:Temo Chen



9.42

46.05

74.00

-27.95

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36.63

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# **12 POWER SPECTRAL DENSITY**

### 12.1 **Standard Applicable:**

Per Part 15.247 (e) & RSS-247 section 5.2 b.

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

### 12.2 Test Setup



### 12.3 **Measurement Procedure:**

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.

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#### 12.4 **Measurement Result:**

## BLE 1M mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-8.850	8	PASS
2442	-8.760	8	PASS
2480	-8.750	8	PASS

\*Note:

1.cable loss as 10.8dB that offsets in the spectrum

## BLE 2M mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-11.920	8	PASS
2442	-11.800	8	PASS
2480	-11.620	8	PASS

\*Note:

1.cable loss as 10.8dB that offsets in the spectrum

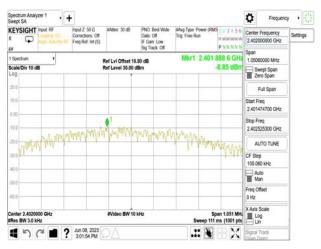
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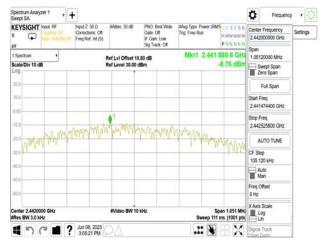
## Report No.: TERF2306001370E2 Page: 62 of 63



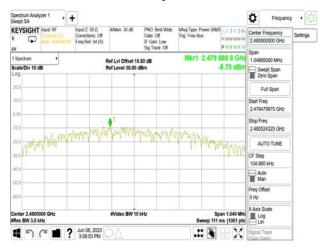
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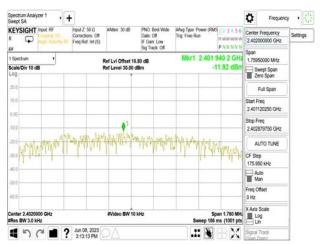
PSD\_BLE 1M\_MidCH20-2442MHz



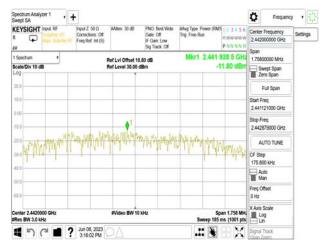
### PSD\_BLE 1M\_HighCH39-2480MHz



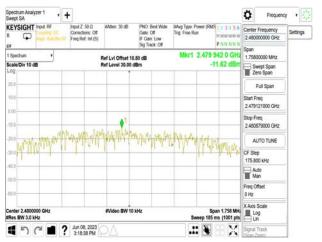
### PSD\_BLE 2M\_LowCH00-2402MHz











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# **13 ANTENNA REQUIREMENT**

### 13.1 **Standard Applicable:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

### 13.2 Antenna Connected Construction:

The antenna complies with this requirement and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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