

# ELECTROMAGNETIC EMISSIONS **COMPLIANCE REPORT**



Applicant:	DIGIMAX INNOVATIVE PRODUCTS LTD. 2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist. New Taipe City				
Manufacturer:	Digisine Energytech Co., Ltd. 2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist. New Taipei City				
Product Name:	Hearing Aid				
Brand Name:	Mimitakara, Digisine, Digimax				
Model No.:	DP-6KNX, UP-6KNX				
Model Difference:	For marketing purpose				
Report Number:	TERF2303000420E2				
FCC ID	2BBAZ-6KNX				
Date of EUT Received:	March 1, 2023				
Date of Test:	March 15, 2023 ~ April 13, 2023				
Issue Date:	June 8, 2023				

ALNO HSIEL

Approved By

### 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.

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

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2303000420E2	00	Original	June 8, 2023	Yuri Tsai	

### 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:	Hearing Aid
Brand Name:	Mimitakara, Digisine, Digimax
Model No.:	DP-6KNX, UP-6KNX
Model Difference:	For marketing purpose
Hardware Version:	V1
Firmware Version:	V1
EUT Series No.:	TE_SP_20230301624
Power Supply:	3.7V from Battery or 5V from USB Cable
Test Software (Name/Version)	AWBTRDLAB 1.0.9.22

#### 1.2 **RF Specification**

Radio Technology:	BLE
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	BLE 1M: 9.75dBm BLE 2M: 9.73dBm

#### 1.3 **Antenna Designation**

Antenna	Freq.	Peak Antenna
Type	(MHz)	Gain (dBi)
Chip	2402 - 2480	2.93

**Note:** Antenna information is provided by the applicant.

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### Test Methodology of Applied Standards 1.4

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 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			
	No 124 W/W/W/PE Dood Now Tainai	Conduction 1			
	No.134, Wu Kung Road, New Taipei	Conducted 1	TW0027		
	Industrial Park, Wuku District, New Taipei City, Taiwan.	Conducted 2	100027		
		Conducted 3			
		Conducted 4			
		Conducted 5			
SGS Taiwan Ltd.		Conducted 6			
Central RF Lab.		Conduction C	TW0028	TW3702	
(TAF code 3702)		SAC C			
		SAC D			
		SAC G			
		Conducted A			
	No.2, Keji 1st Rd., Guishan District,	Conducted B			
	Taoyuan City, Taiwan 333	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	measurements occurred in specif	fic test site and add	dress.		

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#### 1.7 **Special Accessories**

There are no special accessories used while test was conducted.

#### **Equipment Modifications** 1.8

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

#### 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

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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.

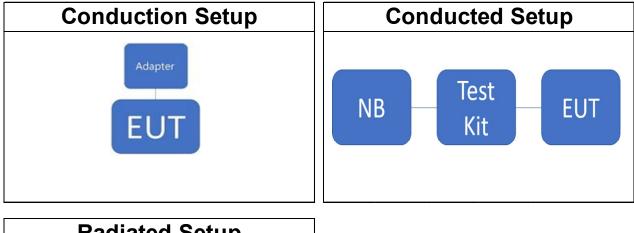
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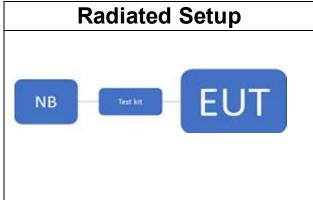
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#### 2.5 **Test Configuration**





#### 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.	
USB Cable	MI	SJX10ZM	N/A	N/A	N/A	
Adapter	Lapo	WT-02CA	4712966931002	N/A	N/A	
	Conducted Emission Test Site: Conducted F					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
CP2104 USB TO TTL	YouXin Electronic	CNT-0038	TE_SP_20230201117	N/A	N/A	
Notebook	Notebook Lenovo		P0002332	N/A	N/A	
		Radiated Emissic	on Test Site: SAC D			
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
CP2104 USB TO TTL	YouXin Electronic	CNT-0038	TE_SP_20230201117	N.C.R	N.C.R	
Notebook	Lenovo	L480	P0002332	N.C.R	N.C.R	

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### SUMMARY OF TEST RESULTS 3

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	Emission Bandwidth	Compliant
§15.247(d) §15.205 §15.209	Radiated & Conducted Band Edge and Spurious Emission	Compliant
§15.247(e)	Peak Power Density	Compliant
§15.203	Antenna Requirement	Compliant

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# **DESCRIPTION OF TEST MODES**

#### 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		

#### 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						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA 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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RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)		
Bluetooth LE	0 to 39	20	GFSK	1		
Bluetooth LE	0 to 39	20	GFSK	2		
	RADIATED EN	MISSION TEST (ABOV	/E 1 GHz)			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA 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

	AC Power-Line Conducted Emission Test Site: Conduction C						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.		
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	973	04/13/2022	04/12/2023		
EMI Test Receiver R&S		ESCI	101342	04/25/2022	04/24/2023		
Coaxial Cable EC Lab		RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2022	03/26/2023		
Coaxial Cable EMC Instruments Corp		EMC5D-BM-BM- 3000	1401004	03/27/2022	03/26/2023		
Test Software audix		e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R		

#### 6.1 **Emission from AC power line**

#### 6.2 **Conducted Measurement**

Conducted Emission Test Site: Conducted F						
EQUIPMENT TYPE MFR		MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Spectrum Analyzer KEYSIGHT		N9010B	MY59071574	06/20/2022	06/19/2023	
DC Block	PASTERNACK	PE8210	RF153	11/16/2022	11/15/2023	
Power Meter	Anritsu	ML2496A	1512003	07/26/2022	07/25/2023	
Power Sensor	Anritsu	MA2411B	1339378	07/26/2022	07/25/2023	
Test Software SGS Taiwan		Radio Test Software	Ver.21	N.C.R	N.C.R	
Attenuator	Attenuator Woken WATT-218FS-10		RF18	11/16/2022	11/15/2023	
Attenuator	Woken	WATT-218FS-10	RF20	11/16/2022	11/15/2023	

#### 6.3 **Radiated Measurement**

Radiated Emission Test Site: SAC D						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/19/2022	12/18/2023	
Horn Antenna	Schwarzbeck	BBHA9170	184	12/30/2022	12/29/2023	
Horn Antenna	Schwarzbeck	BBHA9170	185	08/22/2022	08/21/2023	
Horn Antenna	Horn Antenna Schwarzbeck		1341	05/31/2022	05/30/2023	
Loop Antenna	ETS.LINDGREN	6502	143303	05/14/2022	05/13/2023	
3m Site NSA	SGS	966 chamber D	N/A	04/30/2022	04/29/2023	
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	EMC9135	980234	11/16/2022	11/15/2023	
Pre-Amplifier	EMC Instruments	EMC12630SE	980273	11/16/2022	11/15/2023	
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	11/16/2022	11/15/2023	
Coaxial Cable	Coaxial Cable Huber Suhner EMC106-SM-SM- 7200		150703	11/16/2022	11/15/2023	
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/16/2022	11/15/2023	

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		mits ΒμV)
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

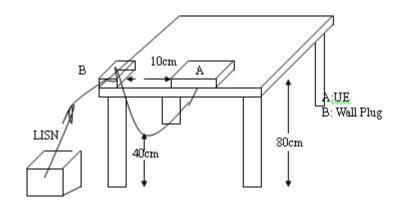
1. The lower limit shall apply at the transition frequencies

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**



#### 7.4 Measurement Procedure:

## 1. The EUT was placed on a table which is 0.8m above ground plane.

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- 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	:TERF2303000420E2	Test Site	:Conductior	ר C	
Test Mode	:BLE	Test Date	:2023-03-1	5	
Power	:120V/60Hz	Temp./Humi.	:22.5/52		
Probe	:L1	Engineer	:Howard Hu	lang	
		-		-	
80 Level (	dBuV)				
70.0					
60.0					
50.0					
40.0	MANNA MANNA		6		
30.0	The second secon	5	m.	Á.	
	and for many man			MV III	
20.0					
10.0					
0.15	0.5 1 Freque	2 5 ency (MHz)	10	20 30	
Freq.	Detector Spectrum	Factor A	ctual	Limit	Margin
	Mode Reading Level		FS		5
MHz	PK/QP/AV dBµV	dB d	BμV	dBµV	dB
0.153	Average 13.90		4.17	55.82	-31.65
0.153 0.471	QP 34.90 Peak 27.56	-	5.17 7.87	65.82 56.49	-20.65 -18.62
0.809	Peak 19.97		0.32	56.00	-25.68
2.012	Peak 19.79		0.96	56.00	-25.04
8.323	Peak 24.77		5.39	60.00	-24.61
20.704	Peak 23.46	10.89 3	4.35	60.00	-25.65

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Report Number	:TERF2303000420E2	Test Site	:Conductio	n C	
Test Mode	:BLE	Test Date	:2023-03-1	5	
Power	:120V/60Hz	Temp./Humi.	:22.5/52		
Probe	:N	Engineer	:Howard H	uang	
80 Level (d	dBuV)				
70.0					
60.0					
50.0 2					
40.0		_			
30.0	Mary John Marine	Manyanada	Photo Manager	- The last	
20.0				$\sqrt{1}$	
20.0					
10.0					
0.15	0.5 1	2 5	10	20 30	
		ency (MHz)			
Freq.	Detector Spectrum Mode Reading Level		ctual FS	Limit	Margin
MHz F	PK/QP/AV dBµV		ΙΒμV	dBµV	dB
0.153	Average 15.40		5.68	55.82	-30.14
0.153	QP 35.70		5.98	65.82	-19.84
0.476	Peak 30.81		1.12	56.41	-15.29
0.683	Peak 24.02		4.34	56.00	-21.66
2.012	Peak 23.55		4.69	56.00	-21.31
4.454	Peak 22.05		2.62	56.00	-23.38
20.704	Peak 19.92	10.86 3	0.79	60.00	-29.21

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# 8 PEAK OUTPUT POWER MEASUREMENT

## 8.1 Standard Applicable:

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.

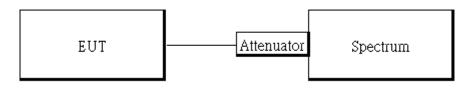
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

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.

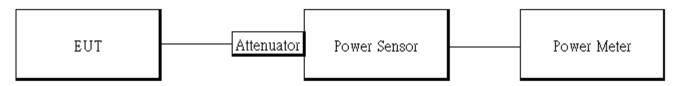
All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

## 8.2 Test Setup

# 8.2.1 Duty Cycle



# 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

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- 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	69.60	1.57	2.30	3.00
BLE 2M	40.00	3.98	4.00	4.00

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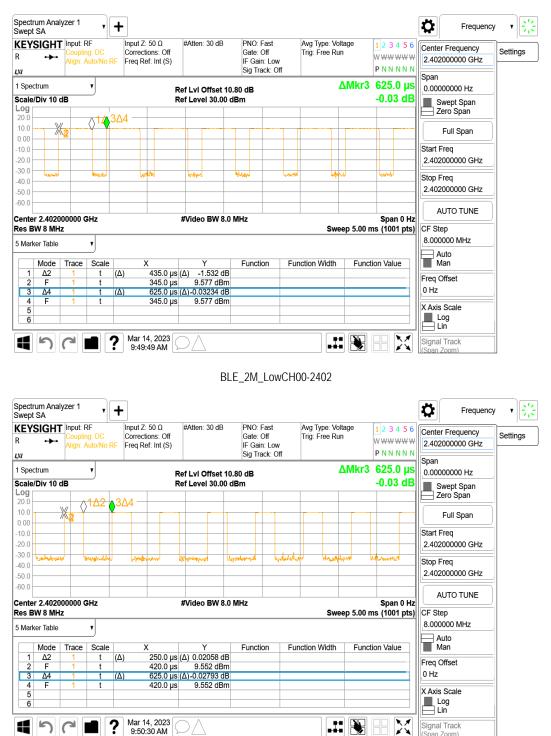
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BLE\_1M\_LowCH00-2402



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

#### 8.5.1 Peak & Avg

### BLE 1M mode:

СН	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit (dBm)
Low	2402	01	9.65	30
Mid	2442	01	9.69	30
High	2480	01	9.75	30
СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit (dBm)
Low	2402	01	9.41	30
Mid	2442	01	9.46	30
High	2480	01	9.48	30

\*Note: 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 Power Output (dBm)	Required Limit (dBm)
Low	2402	01	9.62	30
Mid	2442	01	9.67	30
High	2480	01	9.73	30
СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit (dBm)
Low	2402	01	9.37	30
Mid	2442	01	9.42	30
High	2480	01	9.46	30

\*Note: 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.

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### **EMISSION BANDWIDTH MEASUREMENT** 9

### 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.

#### 9.4 Measurement Result:

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.6928	$\ge$ 0.5	PASS
2442	0.6902	$\ge$ 0.5	PASS
2480	0.6866	<b>≧</b> 0.5	PASS

### BLE 1M mode

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### **BLE 2M mode**

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	1.213	$\ge$ 0.5	PASS
2442	1.213	$\ge$ 0.5	PASS
2480	1.216	$\geq$ 0.5	PASS

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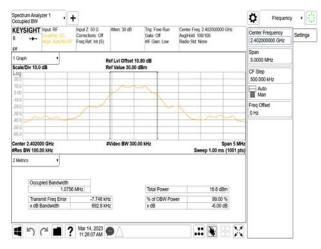
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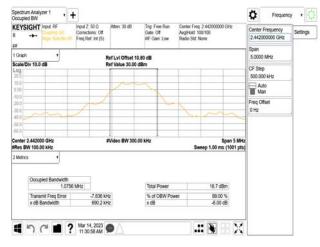
### Report No.: TERF2303000420E2 Page: 25 of 61



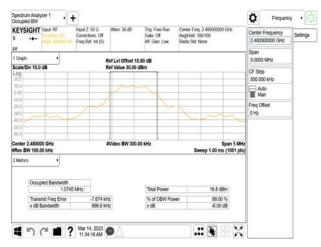
### OBW\_BLE 1M\_LowCH00-2402MHz



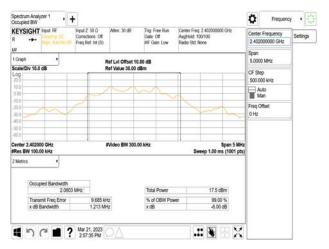
### OBW\_BLE 1M\_MidCH20-2442MHz



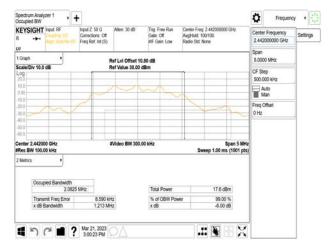
### OBW\_BLE 1M\_HighCH39-2480MHz



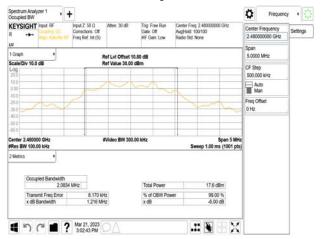
### OBW\_BLE 2M\_LowCH00-2402MHz



OBW\_BLE 2M\_MidCH20-2442MHz



### 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), must also comply with the radiated emission limits specified in §15.209(a).

## 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.

## 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

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the spectrum to be examined.

- 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.

## 10.4 Measurement Result

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)		
2402	9.14	-10.86		
2442	9.24	-10.76		
2480	9.23	-10.77		

### **BLE 1M\_Reference Level of Limit**

*NOTE: cable loss as 10.8dB that offsets in the spectrum NOTE: Refer to next page for plots.* 

### **BLE 2M\_Reference Level of Limit**

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
2402	9.17	-10.83
2442	9.25	-10.75
2480	9.26	-10.74

*NOTE: cable loss as 10.8dB that offsets in the spectrum NOTE: Refer to next page for plots.* 

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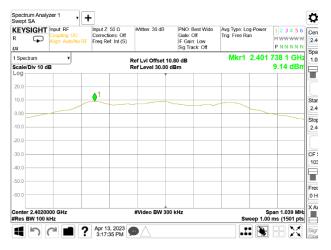
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### Reference Level\_BLE 1M\_LowCH00-2402MHz



Reference Level\_BLE 1M\_MidCH20-2442MHz







### Reference Level\_BLE 2M\_LowCH00-2402MHz



Reference Level\_BLE 2M\_MidCH20-2442MHz







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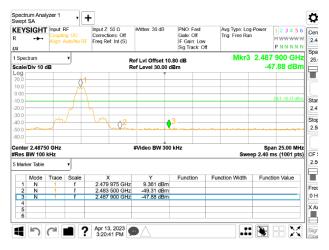
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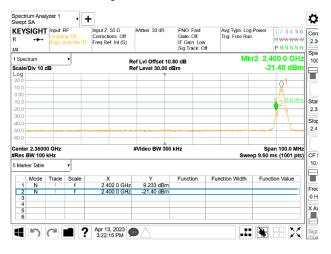
### Band Edge\_BLE 1M\_LowCH00-2402MHz

EYSIGI +		RF ng: DC Auto/No RF	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 30 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: O		
Spectrum		•		ef Lvi Offset 10.		Mk	r2 2.400 0 GHz
cale/Div 1	0 dB		R	ef Level 30.00 dl	Bm		-35.48 dBm
og				Ť			
0.0							$\Diamond$
0.0							1
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0.0							
enter 2.36 Res BW 1				#Video BW 300	kHz	Swee	Span 100.0 MHz p 9.60 ms (1001 pts)
Marker Tal	le	•					
Mod	e Trace	Scale	х	Y	Function	Function Width	Function Value
1 N	1	f	2.402 0 GHz	9.283 dBm			
2 N	1	f	2.400 0 GHz	-35.48 dBm			
3	_						
5							
6							

Band Edge\_BLE 1M\_HighCH39-2480MHz



Band Edge\_BLE 2M\_LowCH00-2402MHz



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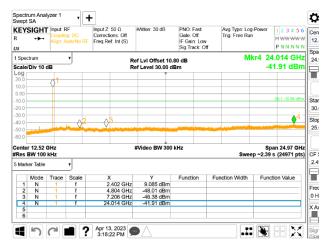
### Band Edge\_BLE 2M\_HighCH39-2480MHz

rsight ++-	Input: F Couplin Align: A	RF ng: DC Auto/No RF	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 30 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Log Trig: Free Run		1 2 3 4 5 6 M WWWWW P N N N N N
ectrum le/Div 10 e	iB	•		tef Lvi Offset 10. tef Level 30.00 d		Mkr2		500 GHz 7.24 dBm
0	_	JVW	hy					DL1 -10.74 dBm
0	M		M 2					
0 				·····				
ter 2.4875 s BW 100				#Video BW 300	kHz	Swee		an 25.00 MHz ns (1001 pts)
arker Table		•						
Mode	Trace	Scale	Х	Y	Function	Function Width	Fund	ion Value
1 N 2 N	1	f	2.479 975 GHz	9.398 dBm				
2 N 3	1	T	2.483 500 GHz	-47.24 dBm				
4								
5								

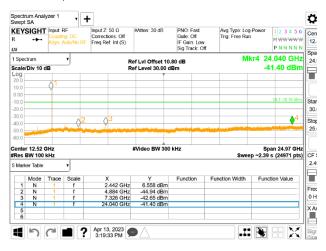
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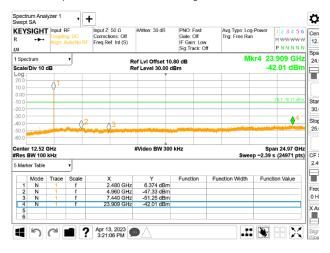
### Spurious Emission\_BLE 1M\_LowCH00-2402MHz



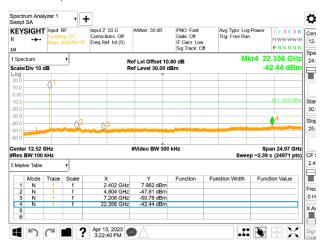
Spurious Emission\_BLE 1M\_MidCH20-2442MHz



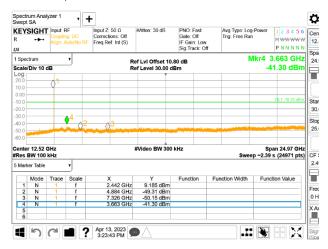
Spurious Emission\_BLE 1M\_HighCH39-2480MHz



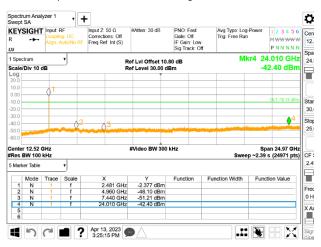
### Spurious Emission\_BLE 2M\_LowCH00-2402MHz



Spurious Emission\_BLE 2M\_MidCH20-2442MHz



Spurious Emission\_BLE 2M\_HighCH39-2480MHz



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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 limit as below.

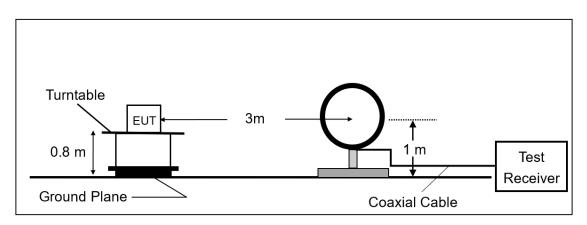
And according to §15.33(a) (1) for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

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.



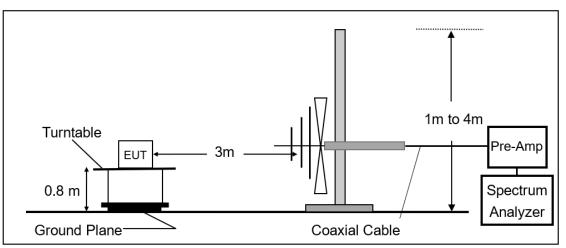
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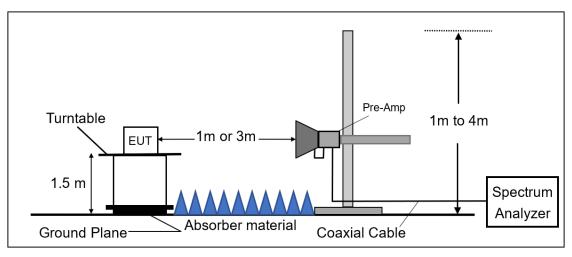
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(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(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)

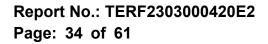
Actual  $FS(dB\mu V/m) = SPA$ . Reading level(dB $\mu V$ ) + Factor(dB) Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

### 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) was not reported.

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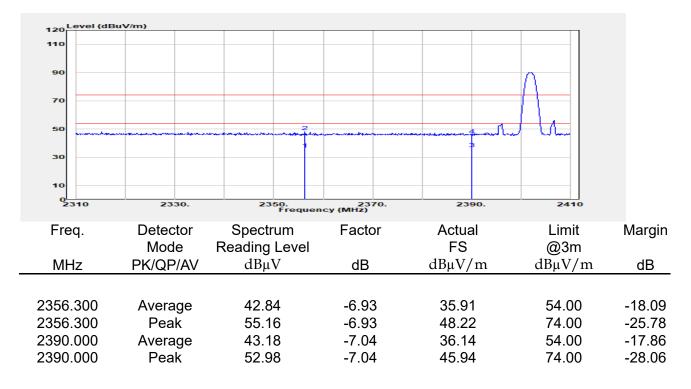




#### 11.6 **Measurement Result:**

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

Report Number	:TERF2303000420E2	Test Site	:SAC D
Operation Mode	:BLE 1M	Test Date	:2023-03-16
Test Frequency	:2402 MHz	Temp./Humi.	:21.0/57
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



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f (886-2) 2298-0488



Report Numbe Operation Mo Test Frequence Test Mode EUT Pol	de :BLE 1M	lz je	T T A	est Date :2 emp./Humi. :2 ntenna Pol. :H		
120 Level (dBs 110 90 70 50 30 10	ıV/m)				A	
2310	2330.	2350. Frequen	2370. cy (MHz)	2390.	2410	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBµV/m	dBµV/m	dB
2374.100 2374.100 2390.000 2390.000	Average Peak Average Peak	43.02 55.38 43.15 53.36	-6.99 -6.99 -7.04 -7.04	36.03 48.39 36.10 46.32	54.00 74.00 54.00 74.00	-17.97 -25.61 -17.90 -27.68

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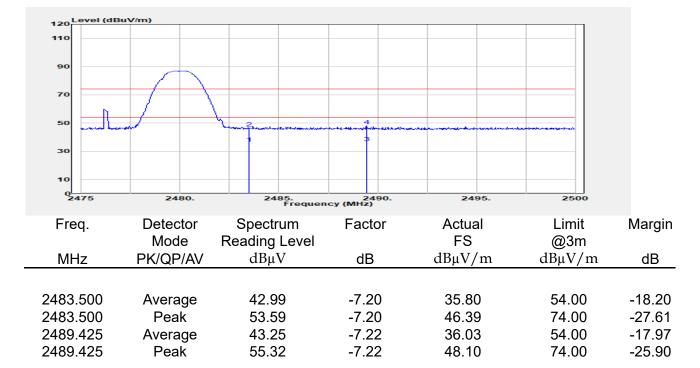
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Report Number	:TERF2303000420E2
Operation Mode	:BLE 1M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane
Operation Mode Test Frequency Test Mode	:BLE 1M :2480 MHz :Bandedge

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.0/57
Antenna Pol.	:Vertical
Engineer	:Howard Huang



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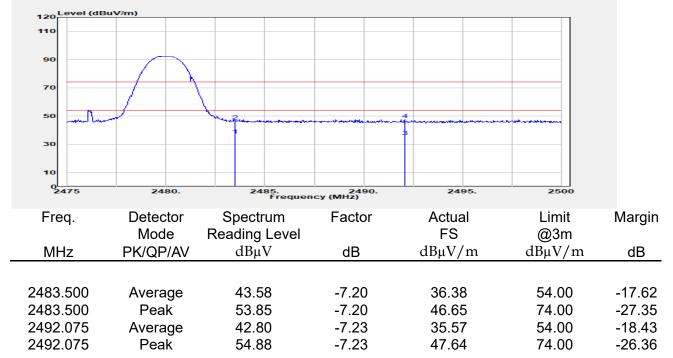
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Report Number	:TERF2303000420E2
Operation Mode	:BLE 1M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.0/57
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



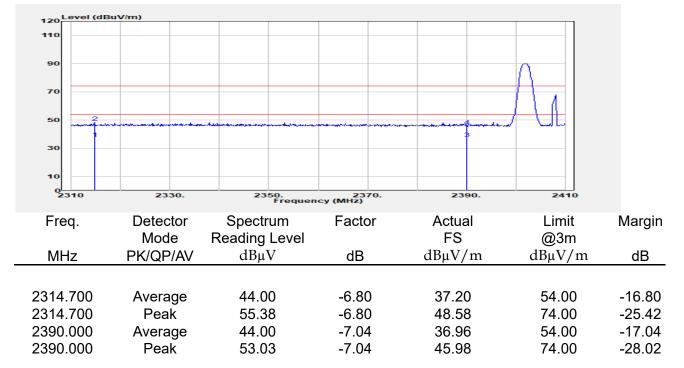
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Report Number	:TERF2303000420E2
Operation Mode	:BLE 2M
Test Frequency	:2402 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.0/57
Antenna Pol.	:Vertical
Engineer	:Howard Huang



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Margin

dB

-16.98

-26.12-17.02

-26.93

54.00

74.00

54.00

74.00



2359.300

2359.300

2390.000

2390.000

Average

Peak

Average

Peak

Report Numbe Operation Mod Test Frequenc Test Mode EUT Pol	de :BLE 2M	lz je		Test Tem Ante	•	:SAC D :2023-03-16 :21.0/57 :Horizontal :Howard Huang
120 Level (dBu	IV/m)					
110						
90						
70						
50			-			-
50 mmmahum		and the second			er en	menand have
30						
10						
0 2310	2330.	2350. Frequer	2370 ncy (MHz)	).	2390	. 2410
Freq.	Detector	Spectrum	Factor		Actual	Limit
	Mode	Reading Level			FS	@3m
MHz	PK/QP/AV	dBµV	dB		dBµV/n	-
		•			• /	• •

43.96

54.82

44.02

54.11

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-6.94

-6.94

-7.04

-7.04

37.02

47.88

36.98

47.07

:SAC D

:21.0/57 :Vertical

:2023-03-16

:Howard Huang



Report Number	:TERF2303000420E2	Test Site
<b>Operation Mode</b>	:BLE 2M	Test Date
Test Frequency	:2480 MHz	Temp./Humi.
Test Mode	:Bandedge	Antenna Pol.
EUT Pol	:E2 Plane	Engineer
120 Level (dBuV/r	n)	
110		
90		
70	<del>۲</del>	
50 Million Martine	the state as we are a second with the	WYTH Management and the second second
30		

10						
2475	2480.	2485. Frequen	2490. cy (MHz)	2495.	2500	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	45.33	-7.20	38.14	54.00	-15.86
2483.500	Peak	53.82	-7.20	46.62	74.00	-27.38
2489.600	Average	55.79	-7.22	48.57	54.00	-5.43
2489.600	Peak	62.71	-7.22	55.49	74.00	-18.51

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Report Numbe Operation Mod Test Frequenc Test Mode EUT Pol	de :BLE 2M	z e	Te Te A		:SAC D :2023-03-16 :21.0/57 :Horizontal :Howard Huang
120 Level (dBu	IV/m)				
110					
90	m				
	$  /   \rangle$				
70					
	J.		4		
50	1	Mar Sun work on survey and some	una Hall brand		
30					
10					
0 2475	2480.	2485.	2490.	2495.	2500
		Frequen	cy (MHz)		
Freq.	Detector	Spectrum	Factor	Actual	Limit
	Mode	Reading Level		FS	@3m

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500 2483.500 2489.500 2489.500	Average Peak Average Peak	44.66 53.66 50.14 58.54	-7.20 -7.20 -7.22 -7.22	37.47 46.46 42.92 51.32	54.00 74.00 54.00 74.00	-16.53 -27.54 -11.08 -22.68

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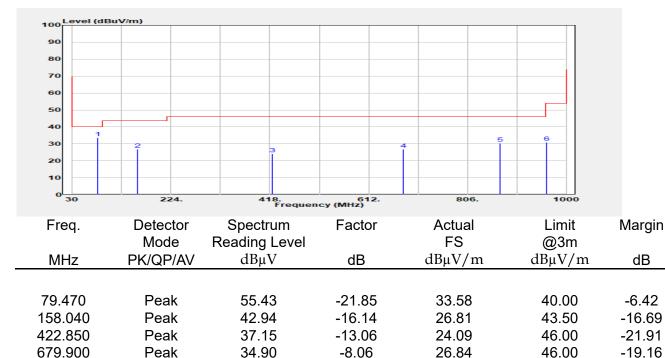
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Report No.: TERF2303000420E2 Page: 42 of 61



### 11.6.2 **Radiated Spurious Emission**

Report Number	:TERF2303000420E2	Test Site	:SAC D
Operation Mode	:BLE 1M	Test Date	:2023-03-16
Test Frequency	:2442 MHz	Temp./Humi.	:21.3/56
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



-5.90

-4.34

30.30

30.80

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36.21

35.14

Peak

Peak

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870.990

962.170

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www.sqs.com.tw
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46.00

54.00

-15.70

-23.20



Report Number	r :TERF230	)3000420E2		Test Site	:SAC D	
Operation Mod	e :BLE 1M			Test Date	:2023-03-16	
Test Frequency	/ :2442 MH	Z		Temp./Humi.	:21.3/56	
Test Mode	:Tx			Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane	ļ		Engineer	:Howard Huang	
100 Level (dBuV	//m)					
90						
80						
70						
60 50						
40						
30	2	4		5	6	
20		3				
10						
30	224.	418. Frequen	612. cy (MHz)	806.	1000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	n dBµV/m	dB
71.710	Peak	43.12	-19.74	23.38	40.00	-16.62
191.990	Peak	44.59	-19.29	25.31	43.50	-18.19
322.940	Peak	36.87	-15.17	21.70	46.00	-24.30
428.670	Peak	36.80	-13.02	23.78	46.00	-22.22
772.050 927.250	Peak Peak	35.40 35.86	-6.61 -4.86	28.79 31.00	46.00 46.00	-17.21 -15.00
921.200	rean	55.00	-4.00	51.00	40.00	-15.00

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Report No.: TERF2303000420E2 Page: 44 of 61



Report Number	:TERF2303	3000420E2		Test Site	:SAC D	
Operation Mode	e:BLE 2M			Test Date	:2023-03-16	
Test Frequency	:2442 MHz	:		Temp./Humi.	:21.3/56	
Test Mode	:Tx			Antenna Pol.	:Vertical	
EUT Pol	:E2 Plane			Engineer	:Howard Huang	
100 Level (dBuV/ 90 80	/m)					
70						
60						
50						
40 +2					6	
30 20	3	4				
10						
0 30	224.	418. Frequen	612. cy (MHz)	806.	1000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode I	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dBµV	dB	dBµV/m	n dBµV∕m	dB
67.830	Peak	51.60	-18.87	32.73	40.00	-7.27
76.560	Peak	54.92	-21.10	33.82	40.00	-6.18
158.040	Peak	43.25	-16.14	27.12	43.50	-16.38
422.850	Peak	37.26	-13.06	24.20	46.00	-21.80
776.900 957.320	Peak Peak	35.54 35.35	-6.76 -4.45	28.78 30.90	46.00 46.00	-17.22 -15.10
907.320	reak	30.30	-4.40	30.90	40.00	-15.10

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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Report No.: TERF2303000420E2 Page: 45 of 61



Report Number Operation Mode Test Frequency Test Mode	e :BLE 2M			Test Site Test Date Temp./Humi. Antenna Pol.		
EUT Pol	:E2 Plane			Engineer	:Howard Huang	
100 Level (dBuV/ 90 80 70 60 50 40 30 1 10	m)				5 6	
0 30	224.	418. Frequen	612. cy (MHz)	806.	1000	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	$dB\mu V/m$	dB
71.710 191.990 329.730 676.020 870.990 955.380	Peak Peak Peak Peak Peak Peak	42.57 45.25 36.79 34.53 35.23 35.05	-19.74 -19.29 -15.05 -7.81 -5.90 -4.47	22.83 25.96 21.74 26.72 29.33 30.58	40.00 43.50 46.00 46.00 46.00 46.00	-17.17 -17.54 -24.26 -19.28 -16.67 -15.42

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.

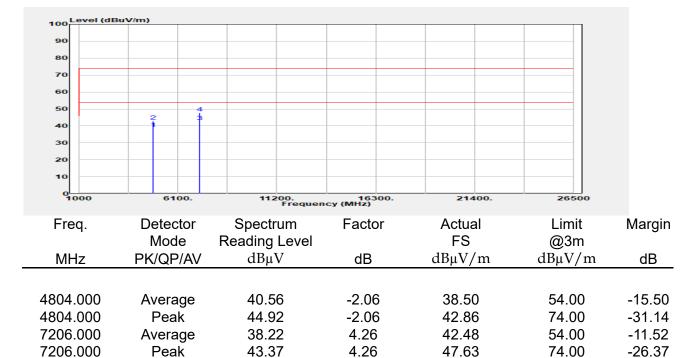
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Report Number	:TERF2303000420E2
<b>Operation Mode</b>	:BLE 1M
Test Frequency	:2402 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Vertical
Engineer	:Howard Huang



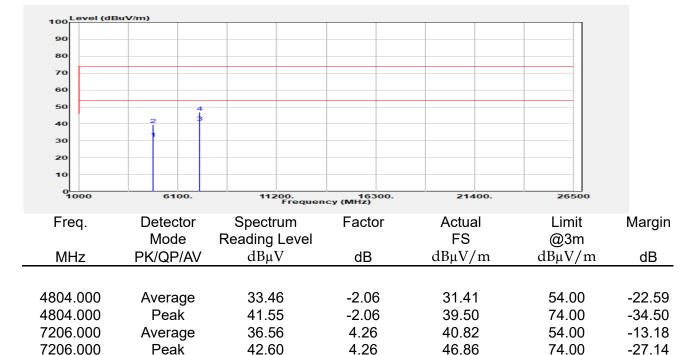
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Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



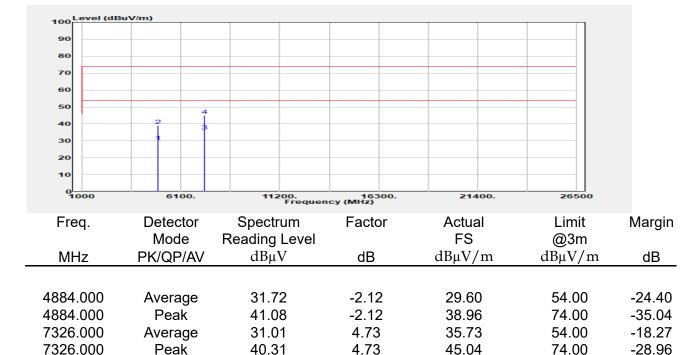
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<b>Operation Mode</b>	:BLE 1M
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Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Vertical
Engineer	:Howard Huang



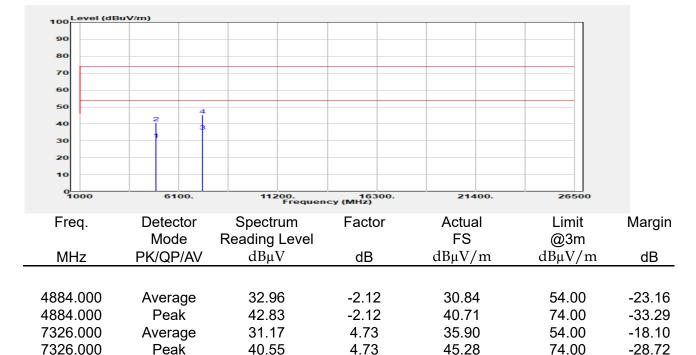
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Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



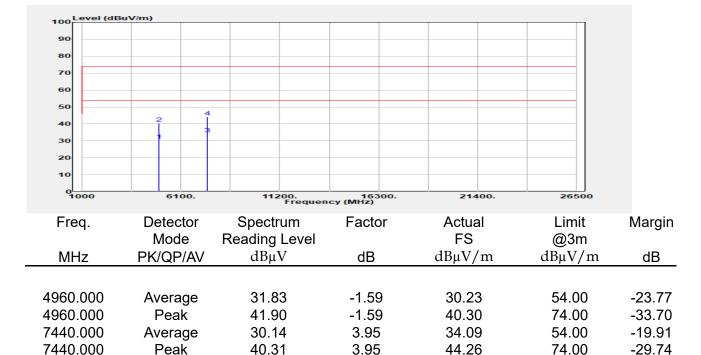
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Report Number	:TERF2303000420E2
<b>Operation Mode</b>	:BLE 1M
Test Frequency	:2480 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Vertical
Engineer	:Howard Huang



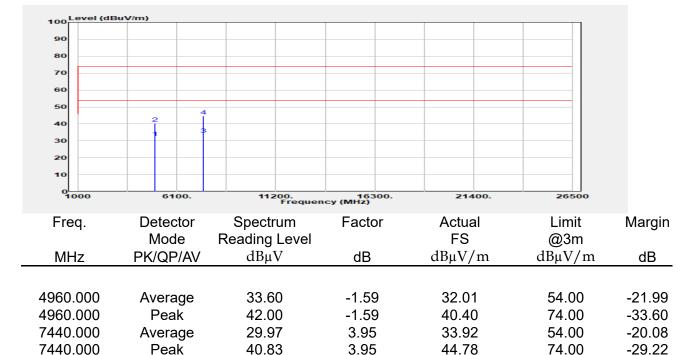
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<b>Operation Mode</b>	:BLE 1M
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Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



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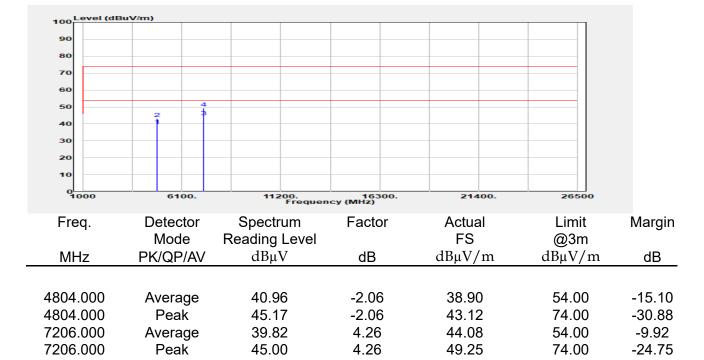
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Report Number	:TERF2303000420E2
Operation Mode	:BLE 2M
Test Frequency	:2402 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Vertical
Engineer	:Howard Huang



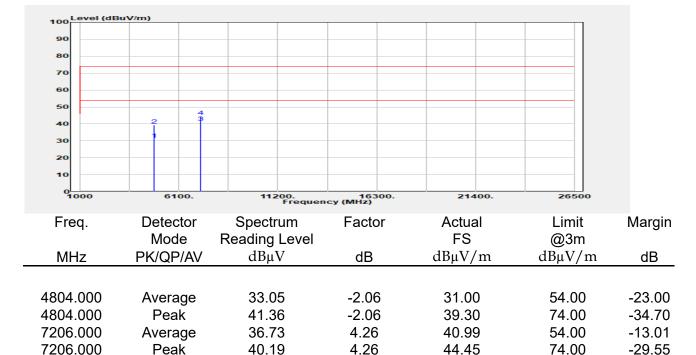
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Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



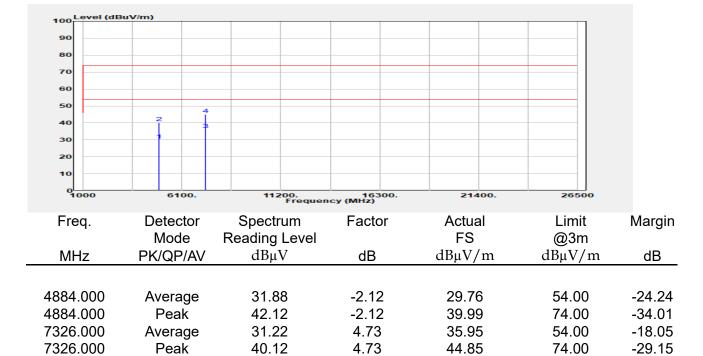
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Operation Mode	:BLE 2M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

:SAC D
:2023-03-16
:21.3/56
:Vertical
:Howard Huang



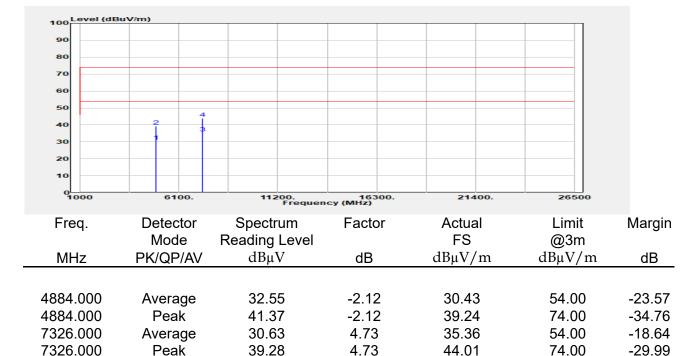
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Operation Mode	:BLE 2M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



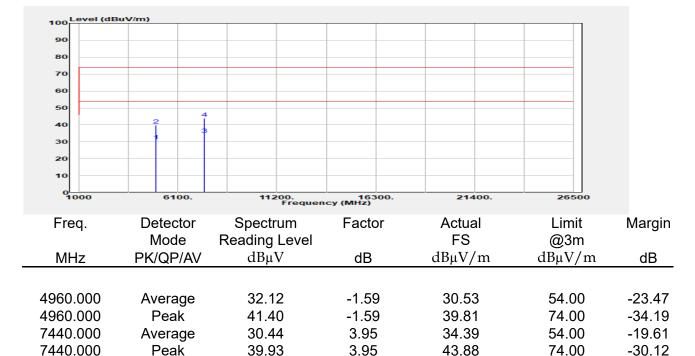
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Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Vertical
Engineer	:Howard Huang



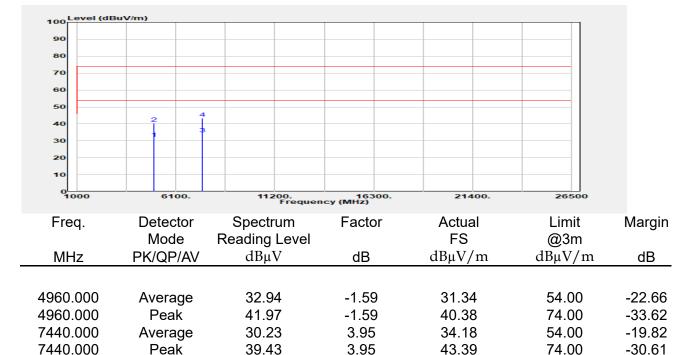
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Report Number	:TERF2303000420E2
<b>Operation Mode</b>	:BLE 2M
Test Frequency	:2480 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-16
Temp./Humi.	:21.3/56
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



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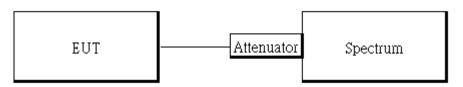


# **12 POWER SPECTRAL DENSITY**

### 12.1 **Standard Applicable:**

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.

#### 12.4 Measurement Result:

BLE 1M mode						
Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result			
2402	-3.450	8	PASS			
2442	-3.370	8	PASS			
2480	-3.210	8	PASS			

NOTE: cable loss as 10.8dB that offsets in the spectrum

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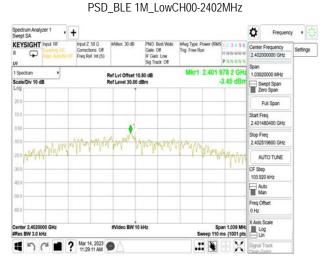
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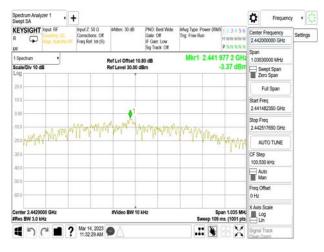
## **BLE 2M mode**

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	1.370	8	PASS
2442	1.400	8	PASS
2480	1.380	8	PASS

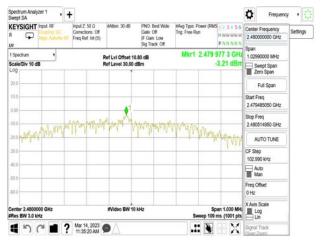
NOTE: cable loss as 10.8dB that offsets in the spectrum



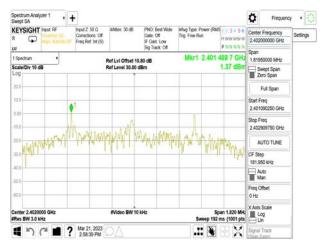
### PSD\_BLE 1M\_MidCH20-2442MHz



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







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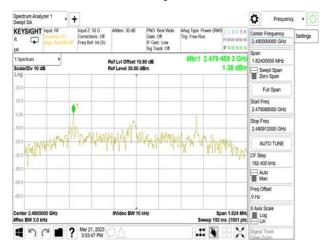
## Report No.: TERF2303000420E2 Page: 60 of 61



### PSD\_BLE 2M\_MidCH20-2442MHz

Spectrum Analyzer 1 Swept SA	• +			Prequence	y . 3
KEYSIGHT laput RF R	Input Z 50 Q Corrections: Off Freq Ref. Int (S)	#Atten: 30 dB PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	e #Avg Type Power (RMS 1 2 3 4 5 6 Trig: Free Run WWWWW W P.N.N.N.N.	Center Frequency 2.442000000 GHz	Settings
I Spectrum •		Ref Lvi Offset 10.80 dB	Mkr1 2.441 488 7 GHz	Span 1.81950000 MHz	
cale/Div 10 dB		Ref Level 30.00 dBm	1.40 dBm		1
.09				Zero Span	
20.0				Full Span	
10.0	•1			Start Freq 2.441090250 GHz	
10.0	11	A		Stop Freq 2.442909750 GHz	
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30.0			- no al Abb	CF Step 181.950 kHz	
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Center 2.4420000 GHz Res BW 3.0 kHz		#Video BW 10 kHz	Span 1.820 MH Sweep 192 ms (1001 pts	X Axis Scale	
	? Mar 21, 2023 3:01:27 PM	DΔ	.:: 🕃 🗄 🔀	Signal Track (Sean Zoon)	1

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



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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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