

ELECTROMAGNETIC EMISSIONS **COMPLIANCE REPORT**



Applicant:	DIGIMAX INNOVATIVE PRODUCTS LTD. 2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist.					
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-6ENX, UP-6ENX					
Model Difference:	For marketing segmentation					
Report Number:	TERF2302000273E2					
FCC ID	2BBAZ-6ENX					
Date of EUT Received:	February 10, 2023					
Date of Test:	February 23, 2023 \sim April 13, 2023					
Issue Date:	June 7, 2023					

ALMO MSIEK

Approved By

Arno Hsieh

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.

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	Remark	
TERF2302000273E2	00	Original	June 7, 2023	Celery Wei		

Note:

- 1 . The remark "*" indicates modification of the report upon requests from certification body.
- 2 Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received. And are assessed as electrically identical in RF characteristics, therefore, no further assessment required for the variant(s).

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GENERAL INFORMATION 1

1.1 **Product Description**

Product Name:	Hearing Aid			
Brand Name:	Mimitakara, Digisine, Digimax			
Model No.:	DP-6ENX, UP-6ENX			
Model Difference:	For marketing segmentation			
Hardware Version:	V1			
Firmware Version:	V1			
EUT Series No.:	TE_SP_20230201116			
Power Supply:	3.66Vdc from battery			
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: 9.44 dBm BLE 2M: 9.24 dBm

1.3 **Antenna Designation**

Antenna	Freq.	Peak Antenna
Type	(MHz)	Gain (dBi)
РСВ	2402– 2480	2.93

Note: Antenna information is provided by the applicant.

1.4 **Test Methodology of Applied Standards**

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10:2013

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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	TW0027	
	Industrial Park, Wuku District, New	Conducted 2	1 00027	
	Taipei City, Taiwan.	Conducted 3	_	TW3702
		Conducted 4	-	
		Conducted 5		
SGS Taiwan Ltd.		Conducted 6		
Central RF Lab.		Conduction C	 TW0028	
(TAF code 3702)		SAC C		
		SAC D		
		SAC G		
	No 2, Kaji 1et Rd., Quishan District	Conducted A		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conducted B		
	Tabyuan City, Taiwan 555	Conducted C	_	
		Conducted D		
		Conducted E	_	
		Conducted F	_	
		Conducted G		

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:

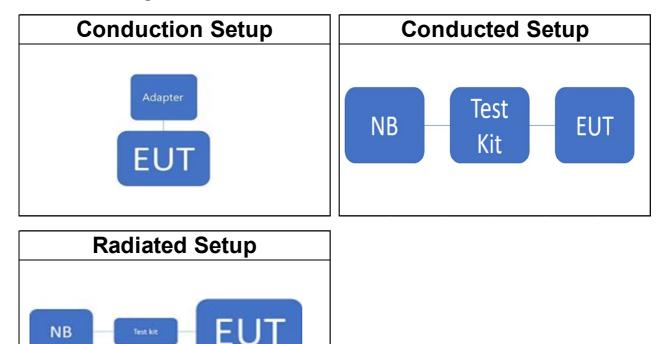
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 **Test Configuration**



2.6 Control Unit(s)

Test kit

NB

AC Power-Line Conducted Emission Test Site: Conduction C						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
USB Cable	МІ	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 L4		L480	P0002332	N.C.R	N.C.R	

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3 SUMMARY OF TEST RESULTS

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		

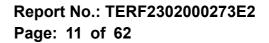
4.2 The Worst Test Modes and Channel Details

- 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.

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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		

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	ISSION 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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5 MEASUREMENT UNCERTAINTY

Test Items	Ur	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				
Polarization: Vertical	+/-	2.8	dB	9kHz~30MHz
	+/-	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	Woken	WATT-218FS-10	RF18	11/16/2022	11/15/2023	
Attenuator	Woken	WATT-218FS-10	RF20	11/16/2022	11/15/2023	

Radiated Measurement 6.3

	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	Schwarzbeck	BBHA9120D	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	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	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		

Note

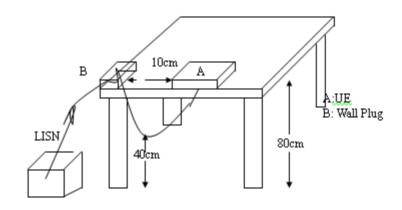
1. The lower limit shall apply at the transition frequencies

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

Test Mode Power	:TERF2302000273E2 :BLE :120V/60Hz	Test Site Test Date Temp./Humi.	:Conductior :2023-03-1 :22.5/52	5	
Probe	:L1	Engineer	:Howard Hu	lang	
80 Level (d	dBuV)				
70.0					
60.0					
50.0 2					
40.0	my Am m	haavan	m.e.		
30.0		γνι			
20.0					
10.0					
0.15	0.5 1	2 5	10	20 30	
	Freque	2 5 ency (MHz)			
Freq.	Detector Spectrum Mode Reading Level		ctual FS	Limit	Margin
MHz	PK/QP/AV dBµV		BμV	dBµV	dB
0.153	Average 18.10		8.37	55.82	-27.45
0.153	QP 35.30		5.57	65.82	-20.25
0.189	Peak 37.79		8.06	64.06	-16.00
0.456	Average 23.90		4.21	46.76	-12.55
0.456	QP 30.60		0.91	56.76	-15.85
0.614	Peak 30.48		0.81	56.00	-15.19
1.848	Peak 29.65		0.74	56.00	-15.26
5.277	Peak 27.42	10.55 3	7.97	60.00	-22.03

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Report Number Test Mode Power Probe	:TERF23020 :BLE :120V/60Hz :N	00273E2	Test Site Test Dat Temp./⊢ Enginee	te :2 Iumi. :2	Conduction C 023-03-15 2.5/52 Ioward Huang	
80 Level (d	dBuV)					_
70.0						-
60.0						-
50.0 2						-
40.0	m. Ina	u m ñ	Anan	. 7		
30.0	NW V	\mathbb{V} \mathbb{V}	V V V V V VV	mm	N man	-
20.0					man	-
10.0						
0.15	0.5	1 Freq	2 uency (MHz)	5	10 20 3	30
Freq.	Detector	Spectrum	Factor	Actua	al Limit	Margin
		ading Level	, actor	FS		margin
MHz I	PK/QP/AV	dBµV	dB	dBµ∖	/ dBµV	dB
0.455		45.50	40.00	05.7		~~~~
0.155	Average	15.50	10.28	25.78		-29.96
0.155 0.172	QP Peak	35.10 39.39	10.28 10.28	45.38 49.67		-20.36 -15.19
0.456	Peak	39.39 31.25	10.28	49.0		-15.19
0.634	Peak	27.98	10.30	38.29		-17.71
1.495	Peak	27.13	10.80	37.93		-18.07
5.333	Peak	24.41	10.51	34.92		-25.08

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8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable:

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.

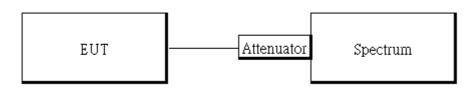
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

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.

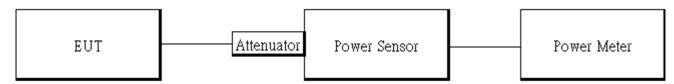
All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

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
- 3. RBW = 8MHz, VBW = 8MHz,
- 4. Detector = Peak

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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.
- 3. 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.

8.4 **Duty Factor:**

	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	39.20	4.07	4.08	5.00

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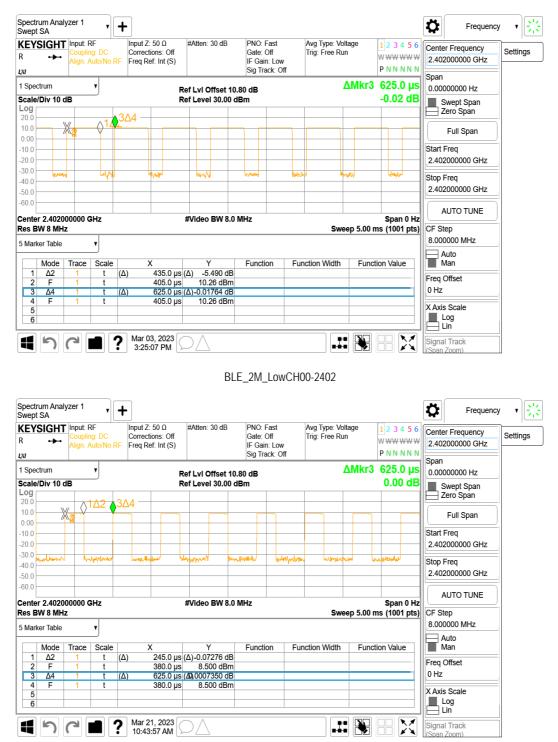
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BLE_1M_LowCH00-2402



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8.5 **Output Power:**

8.5.1 Peak & Avg

BLE 1M mode:

СН	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit (dBm)
Low	2402	02	9.31	30
Mid	2442	02	9.38	30
High	2480	02	9.44	30
СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit (dBm)
Low	2402	02	9.20	30
Mid	2442	02	9.27	30
High	2480	02	9.35	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	02	9.18	30
Mid	2442	02	9.21	30
High	2480	02	9.24	30
СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit (dBm)
Low	2402	02	9.11	30
Mid	2442	02	9.20	30
High	2480	02	9.23	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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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.

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9.4 **Measurement Result:**

BLE 1M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.6952	\ge 0.5	PASS
2442	0.6914	\ge 0.5	PASS
2480	0.6929	\geq 0.5	PASS

BLE 2M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result	
2402	1.212	\ge 0.5	PASS	
2442	1.214	\ge 0.5	PASS	
2480	1.214	≧ 0.5	PASS	

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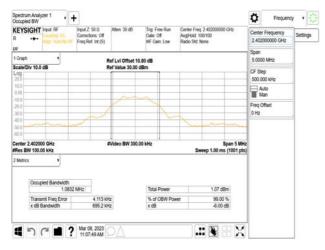
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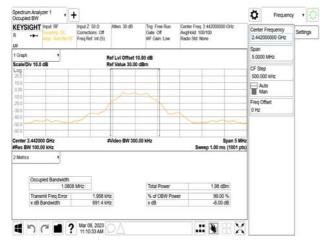
Report No.: TERF2302000273E2 Page: 24 of 62



OBW_BLE 1M_LowCH00-2402MHz



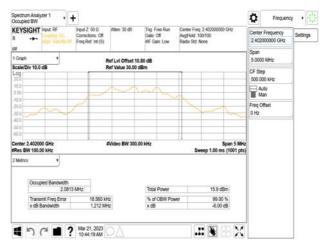
OBW BLE 1M MidCH20-2442MHz



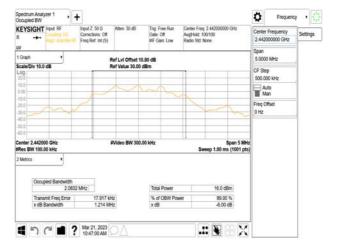
OBW_BLE 1M_HighCH39-2480MHz



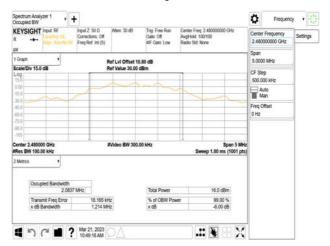
OBW_BLE 2M_LowCH00-2402MHz



OBW_BLE 2M_MidCH20-2442MHz



OBW_BLE 2M_HighCH39-2480MHz



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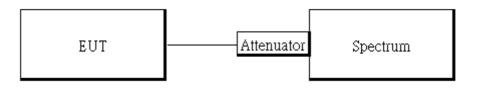


10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

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

Reference Level of Emission Limit: 10.3.1

- 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

BLE 1M_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
2402	8.85	-11.15
2442	8.90	-11.10
2480	8.88	-11.12

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	8.48	-11.52
2442	8.62	-11.38
2480	8.63	-11.37

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

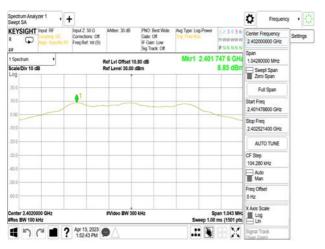
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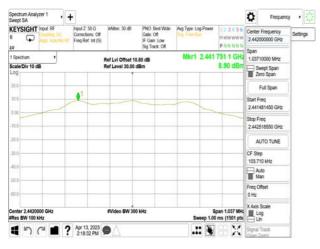
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Reference Level_BLE 1M_LowCH00-2402MHz



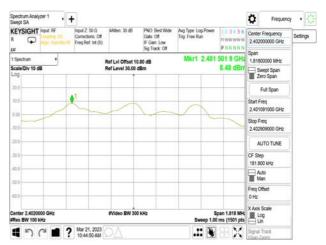
Reference Level_BLE 1M_MidCH20-2442MHz



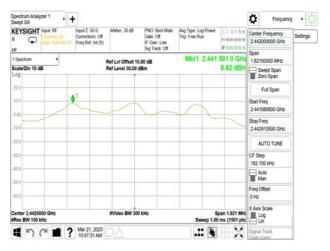
Reference Level_BLE 1M_HighCH39-2480MHz



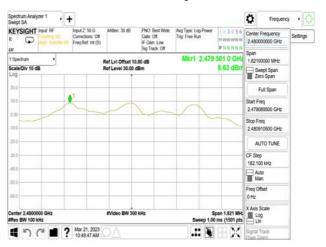
Reference Level_BLE 2M_LowCH00-2402MHz



Reference Level_BLE 2M_MidCH20-2442MHz







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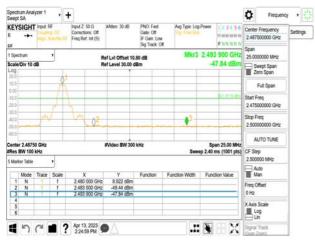
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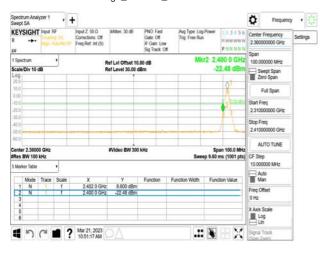
Band Edge_BLE 1M_LowCH00-2402MHz



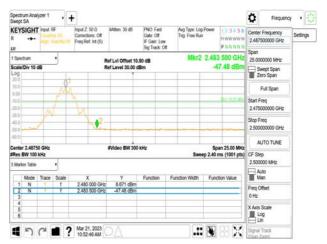
Band Edge_BLE 1M_HighCH39-2480MHz



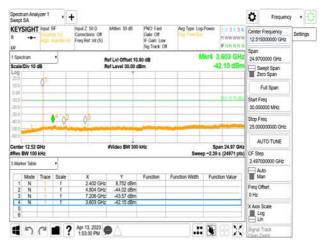
Band Edge_BLE 2M_LowCH00-2402MHz



Band Edge_BLE 2M_HighCH39-2480MHz



Spurious Emission_BLE 1M_LowCH00-2402MHz



Spurious Emission_BLE 1M_MidCH20-2442MHz

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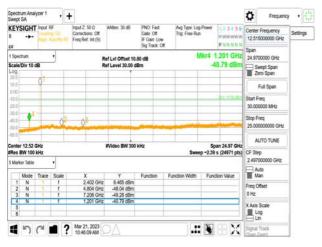
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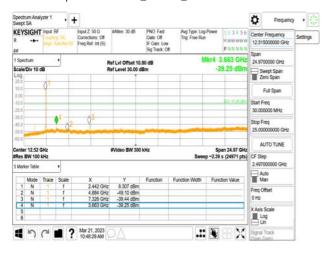
Spurious Emission_BLE 1M_HighCH39-2480MHz

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4	N	4	1	23.815 GHz	-41.09 dBm					-
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Spurious Emission_BLE 2M_LowCH00-2402MHz



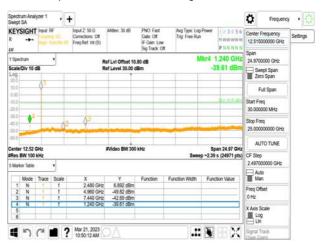
Spurious Emission_BLE 2M_MidCH20-2442MHz



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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.

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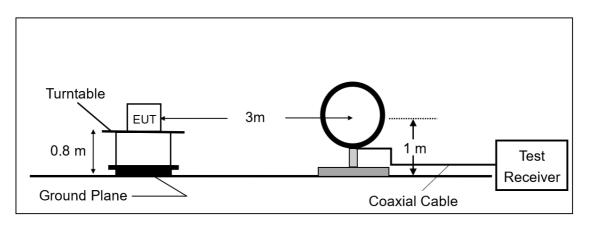
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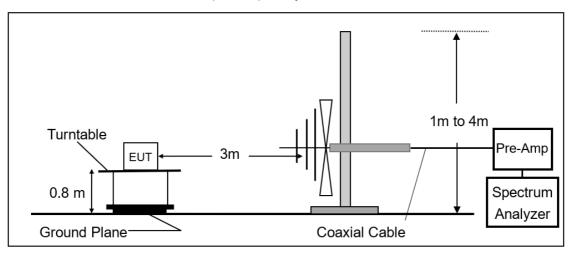


11.2 Test Setup

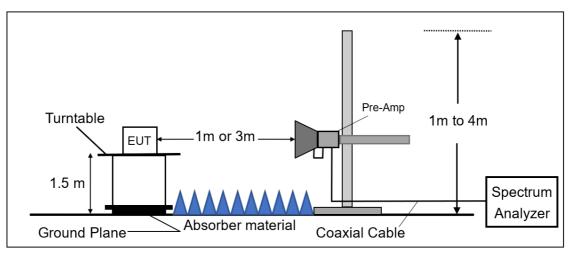
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



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



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



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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.
- 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.

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

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)

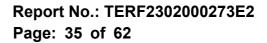
11.5 Test Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

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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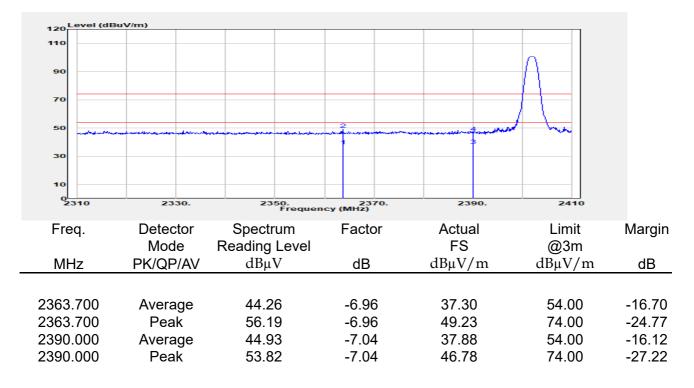




11.6 **Measurement Result:**

11.6.1 **Radiated Band Edge Measurement Result**

Report Number	:TERF2302000273E2	Test Site	:SAC D
Operation Mode	:BLE 1M	Test Date	:2023-02-23
Test Frequency	:2402 MHz	Temp./Humi.	:22.9/54
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



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台灣檢驗科技股份有限公司

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Report Numbe Operation Mo Test Frequence Test Mode EUT Pol	de :BLE 1M	Ηz ge	T T A	ēst Date :2 ēmp./Humi. :2 Antenna Pol. :H		
Level (dBu	11/122)					
120 Level (dBl	IV/m)					
110					0	
90					-A	
70						
50		ورجع والمستحد ومستحدين مراجع	2 - set ou brand and a set of a	man and the	-	
				3		
30						
10						
0 2310	2330.	2350. Frequen	2370. cy (MHz)	2390.	2410	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
rieq.	Mode	Reading Level	T actor	FS	@3m	Maryin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
		αDμγ	dD		αυμ γ π	
0074 700		45.00	6.00	20.00	E4.00	15 01
2374.700	Average Peak	45.08 57.12	-6.99	38.09	54.00	-15.91
2374.700		-	-6.99	50.12	74.00	-23.88
2390.000 2390.000	Average Peak	45.92 54.66	-7.04 -7.04	38.88 47.62	54.00 74.00	-15.12 -26.38
2390.000	reak	04.00	-7.04	47.02	74.00	-20.30

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Report Numbe Operation Moo Test Frequenc Test Mode EUT Pol	de :BLE 1M	<u>r</u>	ד ד <i>ו</i>	۲est Date :2 ۲emp./Humi. :2 Antenna Pol. :۱		
120 Level (dBu 110 90 70	v/m)					
50 30						
0 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 2483.500 2483.675 2483.675	Average Peak Average Peak	50.36 54.70 47.77 56.75	-7.20 -7.20 -7.20 -7.20	43.16 47.50 40.57 49.55	54.00 74.00 54.00 74.00	-10.84 -26.50 -13.43 -24.45

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Report Number	r :TERF230)2000273E2		Test Site	:SAC D	
Operation Mod	e :BLE 1M			Test Date	:2023-02-23	
Test Frequency	/ :2480 MH	Z		Temp./Humi.	:22.9/54	
Test Mode	:Bandedg	е		Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane	;		Engineer	:Howard Huang	
Level (dBu)	//m)					
120						
90	\square					
70						
50		24 Martine and the second	damara valance		tentertrete the second of	
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	0	dB
	_					
2483.500	Average	54.91	-7.20	47.71	54.00	-6.29
2483.500	Peak	60.69	-7.20	53.49	74.00	-20.51
2483.775 2483.775	Average Peak	50.60 59.52	-7.20 -7.20	43.40 52.32	54.00 74.00	-10.60 -21.68
2100.110	i oun	00.02	1.20	02.02	14.00	21.00

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Report Numbe Operation Mo Test Frequence Test Mode EUT Pol	de :BLE 2M	lz e	- - /	Test Date :20 Temp./Humi. :2 Antenna Pol. :V		
120 Level (dBr	uV/m)					
110						
90						
70						
50				2		
winter	and the second	a	and the second second second	- Andrew Alexandrew (and a strategy and a strategy		
30						
10						
0 2310	2330.	2350. Frequen	2370. cy (MHz)	2390.	2410	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
rieq.	Mode	Reading Level		FS	@3m	margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2386.100	Average	44.26	-7.03	37.23	54.00	-16.77
2386.100	Peak	56.87	-7.03	49.84	74.00	-24.16
2390.000	Average	44.33	-7.04	37.28	54.00	-16.72
2390.000	Peak	53.93	-7.04	46.89	74.00	-27.11

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Report Numbe Operation Moe Test Frequenc Test Mode EUT Pol	de :BLE 2M	Hz ge	-	Test Date :2 Temp./Humi. :2 Antenna Pol. :H		
Level (dBu						
120 Level (dBt						
90						
70						
50		an all man an a		maniful	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
30						
10 0 2310				2390.	2410	
2310	2330.	2350. Frequen	2370. cy (MHz)	2390.	2410	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2385.200	Average	43.99	-7.03	36.96	54.00	-17.04
2385.200	Peak	55.99	-7.03	48.96	74.00	-25.04
2390.000	Average	44.10	-7.04	37.05	54.00	-16.95
2390.000	Peak	53.99	-7.04	46.95	74.00	-27.05

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-19.76



2483.725

Report Numbe Operation Moe Test Frequenc Test Mode EUT Pol	de :BLE 2M	2	Te Te Aı	est Date :2 emp./Humi. :2 ntenna Pol. :\		
120 Level (dBu 110 90 70 50 30	V/m)					
10 0 2475	2480.	2485. Frequen	2490. Icy (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 2483.500 2483.725	Average Peak Average	58.94 62.10 50.95	-7.20 -7.20 -7.20	51.75 54.90 43.75	54.00 74.00 54.00	-2.25 -19.10 -10.25

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台灣檢驗科技股份有限公司



Report Numbe	er :TERF230	02000273E2	-	Test Site	:SAC D	
Operation Mod	de :BLE 2M		-	Test Date	:2023-03-20	
Test Frequenc	y :2480 MH	z	-	Temp./Humi.	:21.4/51	
Test Mode	:Bandedg	е		Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane	9	I	Engineer	:Howard Huang	
120 Level (dBu	V/m)					
110						
90 Л						
70						
50		3 mandard startinger	en motoden ven a	an a	Munda marta an Antonia da sa	
30						
10						
0 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	•	dB
2483.500	Average	56.92	-7.20	49.72	54.00	-4.28
2483.500	Peak	59.78	-7.20	52.59	74.00	-21.41
2483.775	Average	52.03	-7.20	44.83	54.00	-9.17
2483.775	Peak	58.80	-7.20	51.60	74.00	-22.40

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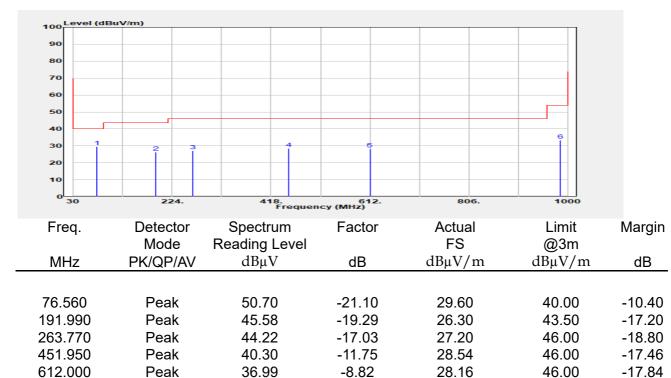
f (886-2) 2298-0488

Report No.: TERF2302000273E2 Page: 43 of 62



11.6.2 **Radiated Spurious Emission**

Report Number	:TERF2302000273E2	Test Site	:SAC D
Operation Mode	:BLE 1M	Test Date	:2023-02-23
Test Frequency	:2442 MHz	Temp./Humi.	:23.5/61
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



-4.28

33.39

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37.67

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986.420

Peak

t (886-2) 2299-3279

f (886-2) 2298-0488

54.00

-20.61

Report No.: TERF2302000273E2 Page: 44 of 62



Report Numbe	r :TERF230	2000273E2	-	Test Site	:SAC D	
Operation Mod	e :BLE 1M		-	Test Date	:2023-02-23	
Test Frequency	y :2442 MHz	2	-	Temp./Humi.	:23.5/61	
Test Mode	:Tx		/	Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane		I	Engineer	:Howard Huang	
100 Level (dBu)	//m)					
90						
80						
70						
60 50						
40						
30		4 5		6		
20	2 3					
10						
30	224.	418. Frequen	612. cy (MHz)	806.	1000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
84.320	Peak	44.46	-22.83	21.63	40.00	-18.37
156.100	QP	37.10	-16.20	20.90	43.50	-22.60
275.410 371.440	QP Peak	32.20 48.86	-16.63 -13.92	15.57 34.95	46.00 46.00	-30.43 -11.05
455.830	Peak Peak	48.86 42.02	-13.92 -11.64	34.95 30.39	46.00	-11.05 -15.61
776.900	Peak	38.86	-6.76	32.10	46.00	-13.01
110.000	i oun	00.00	0.70	02.10	10.00	10.00

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Report Numbe	r :TERF23	02000273E2	Т	Fest Site :	SAC D	
Operation Mod	le :BLE 2M		Т	Test Date ::	2023-02-23	
Test Frequenc	y :2442 MH	İz	Т	[emp./Humi. ::	23.5/61	
Test Mode	:Tx		A	Antenna Pol. :	Vertical	
EUT Pol	:E2 Plane	9	E	Engineer :	Howard Huang	
100 Level (dBu	V/m)					
80						
70						
60 50						
40					6	
30	2	3 4	5			
10						
0 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	dBµV/m	dB
76.560	Peak	53.70	-21.10	32.60	40.00	-7.40
191.990	Peak	42.58	-19.29	23.30	43.50	-20.20
296.750 487.840	Peak Peak	43.56 41.73	-16.20 -12.01	27.35 29.72	46.00 46.00	-18.65 -16.28
648.860	Peak	36.58	-12.01	29.72	46.00	-10.20 -18.35
995.150	Peak	38.10	-4.22	33.88	54.00	-20.12

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Report Number	r :TERF2302	2000273E2		Test Site	:SAC D	
Operation Mod	e :BLE 2M			Test Date	:2023-02-23	
Test Frequency	/ :2442 MHz	<u>.</u>		Temp./Humi.	:23.5/61	
Test Mode	:Tx			Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane			Engineer	:Howard Huang	
100 Level (dBu)	//m)					
80						
70						
60						
50						
30		4		5	6	
20	2 3					
10						
0 30	224.	418. Frequen	612. cy (MHz)	806.	1000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
71.710	Peak	42.19	-19.74	22.45	40.00	-17.55
156.100	QP	38.12	-16.20	21.92	43.50	-21.58
275.410	QP	31.50	-16.63	14.87	46.00	-31.13
491.720 776.900	Peak Peak	44.78 37.86	-12.08 -6.76	32.70 31.10	46.00 46.00	-13.30 -14.90
987.390	Peak Peak	37.67	-6.76 -4.29	31.10	46.00 54.00	-14.90 -20.62
301.330	I Can	51.01	-4.23	55.50	54.00	-20.02

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Report Numbe Operation Moo Test Frequenc Test Mode	de :BLE 1M sy :2402 MF		ר ר			
	:Tx					
EUT Pol	:E2 Plane	9	E	Engineer :Ho	oward Huang	
100 Level (dBu 90 80 70 60 50 40 30 20 10 1000						
	6100.	11200. Frequen		21400.	26500	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBµV/m	dBµV/m	dB
4804.000 4804.000 7206.000 7206.000	Average Peak Average Peak	34.77 42.05 41.62 46.47	-0.18 -0.18 6.49 6.49	34.59 41.87 48.11 52.96	54.00 74.00 54.00 74.00	-19.41 -32.13 -5.89 -21.04

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Report Numbe Operation Moo Test Frequenc Test Mode EUT Pol	de :BLE 1M	Ιz		•	:SAC D :2023-02-2 ni. :22.5/56 ol. :Horizontal :Howard He	
100 Level (dBu 90 80 70	V/m)					
60 50 40 30	4 2 1					
20 10 1000	6100.	11200. Frequen	1630(cy (MHz)	0. 214	400. 26	500
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actua FS dBμV/	@3	m
4804.000 4804.000 7206.000 7206.000	Average Peak Average Peak	31.89 41.30 40.47 46.05	-2.06 -2.06 4.26 4.26	29.8 39.2 44.7 50.3	4 74.0 3 54.0	00 -34.76 00 -9.27

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:2023-02-24

:Howard Huang



Report Number	:TERF2302000273E2	Test Site	:SAC D
Operation Mode	BLE 1M	Test Date	:2023-02
Test Frequency	:2442 MHz	Temp./Humi.	:22.5/56
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard
100 Level (dBuV/r	m)		
90			
80			
70			
60			
50	4		
40	2 3		
30			

		- I I I					
	40	2 3					
	30	1					
	20						
	10						
	0 1000	6100.	11200. Frequer	16300. псу (MHz)	21400.	26500	
	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
_	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	4884.000	Average	32.22	-2.12	30.09	54.00	-23.91
	4884.000	Peak	40.85	-2.12	38.73	74.00	-35.27
	7326.000	Average	36.35	4.73	41.08	54.00	-12.92
	7326.000	Peak	43.24	4.73	47.97	74.00	-26.03

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-23.73

74.00



7326.000

Peak

Report Numbe Operation Moe Test Frequenc Test Mode EUT Pol	de :BLE 1M	łz	T T A	ēst Date : ēmp./Humi. : antenna Pol. :		
100 Level (dBu 90 80 70 60 50 40 30 20 10 1000	1V/m)	11200. Frequen	16300. cy (MH2)	21400.	26500	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4884.000 4884.000 7326.000	Average Peak Average	32.33 40.83 39.55	-2.12 -2.12 4.73	30.20 38.71 44.28	54.00 74.00 54.00	-23.80 -35.29 -9.72

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45.54

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50.27



Report Numbe	er :TERF23	02000273E2		Test Site	:SAC D	
Operation Mod	de :BLE 1M			Test Date	:2023-02-24	
Test Frequenc	y :2480 Mł	Ηz		Temp./Humi.	:22.5/56	
Test Mode	:Tx			Antenna Pol.	:Vertical	
EUT Pol	:E2 Plane	e		Engineer	:Howard Huang	
-				5	5	
100 Level (dBu	V/m)					
90						
80						
70 60						
50	4					
40	2					
30						
10						
0	6100.	11200. Frequen	16300 су (MHz)	. 21400.	. 26500	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	33.55	-1.59	31.96	54.00	-22.04
4960.000	Peak	41.26	-1.59	39.66	74.00	-34.34
7440.000	Average	41.33	3.95	45.28	54.00	-8.72
7440.000	Peak	46.53	3.95	50.49	74.00	-23.51

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Report Numbe	r :TERF23	02000273E2		Test Site	:SAC D	
Operation Mod	le :BLE 1M			Test Date	:2023-02-24	
Test Frequenc	y :2480 Mł	Ηz		Temp./Humi.	:22.5/56	
Test Mode	:Tx			Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane	Э		Engineer	:Howard Huang	
				0	5	
100 Level (dBu	V/m)					
90						
80						
60						
50	4					
40	2					
30 20						
10						
01000	6100.	11200. Frequen	16300 су (MHz)	. 21400.	26500	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	30.71	-1.59	29.11	54.00	-24.89
4960.000	Peak	41.42	-1.59	39.83	74.00	-34.17
7440.000	Average	41.06	3.95	45.01	54.00	-8.99
7440.000	Peak	47.22	3.95	51.17	74.00	-22.83

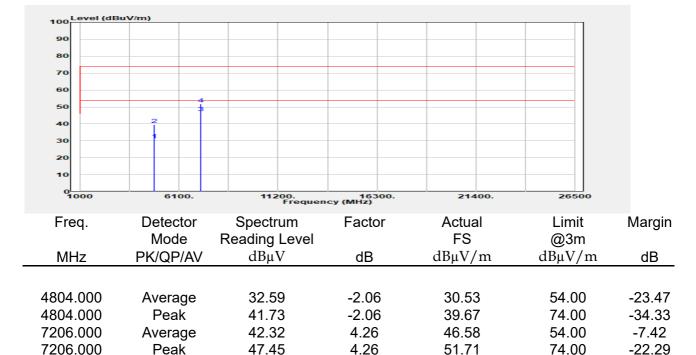
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:TERF2302000273E2
:BLE 2M
:2402 MHz
:Tx
:E2 Plane

Test Site	:SAC D
Test Date	:2023-03-20
Temp./Humi.	:21.4/51
Antenna Pol.	:Vertical
Engineer	:Howard Huang



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Report Numbe	er :TERF23	02000273E2		Test Site :S	SAC D	
Operation Mo	de :BLE 2M			Test Date :2	2023-03-20	
Test Frequence	y :2402 M⊦	łz		Temp./Humi. :2	21.4/51	
Test Mode	:Tx			Antenna Pol. :	Horizontal	
EUT Pol	:E2 Plane	9		Engineer :	Howard Huang	
		-				
100 Level (dBu	ıV/m)					
90						
80						
70 60						
50	4					
40	2					
30						
20						
10 0 1000						
	6100.		16300. cy (MHz)	21400.	26500	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
		ασμν	UD	ασμ γ / Πι	αυμ ν / Πι	
4804.000	Average	31.65	-2.06	29.59	54.00	-24.41
4804.000	Peak	40.91	-2.06	38.85	74.00	-35.15
7206.000	Average	39.42	4.26	43.68	54.00	-10.32
7206.000	Peak	44.70	4.26	48.96	74.00	-25.04

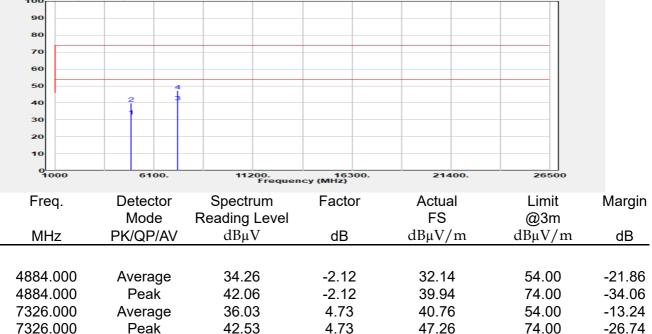
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Report Number	:TERF2302000273E2	Te
Operation Mode	:BLE 2M	Te
Test Frequency	:2442 MHz	Te
Test Mode	:Tx	Ar
EUT Pol	:E2 Plane	Er
	-	
100 Level (dBuV/n	n)	
90		

Test Site	:SAC D
Test Date	:2023-03-20
Temp./Humi.	:21.4/51
Antenna Pol.	:Vertical
Engineer	:Howard Huang



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Report Number	:TERF23	02000273E2		Test Site	:SAC D	
Operation Mode	BLE 2M			Test Date	:2023-03-20	
Test Frequency	:2442 Mł	Ηz		Temp./Humi.	:21.4/51	
Test Mode	:Tx			Antenna Pol.	:Horizontal	
EUT Pol	:E2 Plane	9		Engineer	:Howard Huang	
		-				
100 Level (dBuV/	m)		1 1			
90						
80						
70 60						
50	4					
40	2 3					
30						
20						
0	6100.	11200. Frequen	16300 cy (MHz)	. 21400	. 26500	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	0
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
1001.000		04 50	0.40	00.40	54.00	04.00
4884.000 4884.000	Average Peak	31.52 40.90	-2.12 -2.12	29.40 38.77	54.00 74.00	-24.60 -35.23
7326.000	Average	40.90 38.02	-2.12 4.73	42.75	74.00 54.00	-35.23 -11.25
7326.000	Peak	43.86	4.73	48.59	74.00	-25.41

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Report Numbe	er :TERF23	02000273E2		Test Site	:SAC D	
Operation Mod	de :BLE 2M			Test Date	:2023-03-20	
Test Frequenc	y :2480 M⊦	łz		Temp./Humi.	:21.4/51	
Test Mode	:Tx			Antenna Pol.	:Vertical	
EUT Pol	:E2 Plane	è		Engineer	:Howard Huang	
201101		-		gee.	in tothal a ridarig	
100 Level (dBu	V/m)					
90						
80						
70 60						
50	4					
40	2 3					
30	1					
20						
10						
1000	6100.	-	16300 су (MHz)). 21400		
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBμV	dB	FS dBµV/n	@3m n dBµV/m	dB
		ασμν	UD	α <i>D</i> μ v / Π		UD
4960.000	Average	32.26	-1.59	30.67	54.00	-23.33
4960.000	Peak	40.78	-1.59	39.19	74.00	-34.81
7440.000	Average	38.64	3.95	42.59	54.00	-11.41
7440.000	Peak	44.84	3.95	48.79	74.00	-25.21

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Report Number:TERF2302000273E2Operation Mode:BLE 2MTest Frequency:2480 MHzTest Mode:TxEUT Pol:E2 Plane			ר ר ק	Test Site:SAC DTest Date:2023-03-20Temp./Humi:21.4/51Antenna Pol:HorizontalEngineer:Howard Huang		
100 Level (dBu 90 80 70 60 50 40 30 20 10 1000						
Freq.	6100. Detector	11200. Frequen	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
4960.000 4960.000 7440.000 7440.000	Average Peak Average Peak	32.20 42.49 37.99 44.35	-1.59 -1.59 3.95 3.95	30.61 40.90 41.94 48.30	54.00 74.00 54.00 74.00	-23.39 -33.10 -12.06 -25.70

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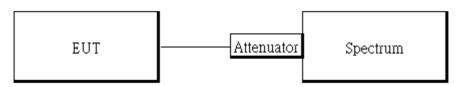


12 POWER SPECTRAL DENSITY

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.

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12.4 **Measurement Result:**

BLE 1M mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-4.310	8	PASS
2442	-4.170	8	PASS
2480	-4.250	8	PASS

NOTE: 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	-0.290	8	PASS
2442	-0.160	8	PASS
2480	-0.170	8	PASS

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

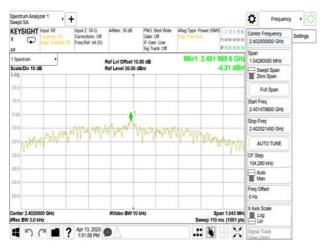
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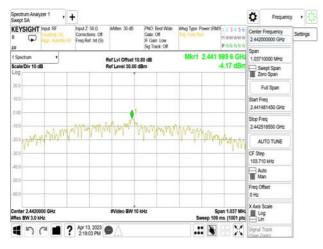
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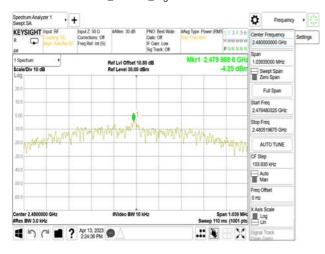
PSD_BLE 1M_LowCH00-2402MHz



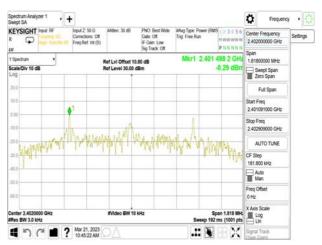
PSD_BLE 1M_MidCH20-2442MHz



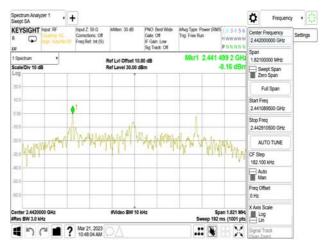
PSD_BLE 1M_HighCH39-2480MHz



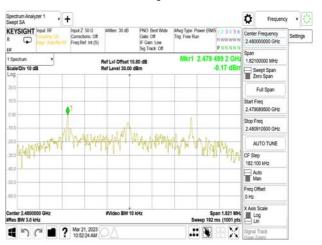
PSD_BLE 2M_LowCH00-2402MHz



PSD_BLE 2M_MidCH20-2442MHz







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f (886-2) 2298-0488



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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