

# ELECTROMAGNETIC EMISSIONS **COMPLIANCE REPORT**



Applicant: Manufacturer:	B&W Group Ltd. Dale Road, Worthing, West Sussex, BN11 2BH, United Kingdom B&W Group Ltd. Dale Road, Worthing, West Sussex, BN11 2BH, United Kingdom
Product Name:	Noise Cancelling Wireless Headphones
Brand Name:	Bowers & Wilkins
Model No.: /ISED HVIN:	Px7 S3
Family Model No.: / Family ISED HVIN:	Px8 S2
Model Difference:	Refer to page4
Report Number:	TERF2411003813E2
FCC ID	2ACIX-PX8S2
IC:	11946B-PX8S2
Date of EUT Received:	November 20, 2024
Date of Test:	November 21, 2024 $\sim$ December 13, 2024
Issue Date:	December 26, 2024

Aken Huana

Approved By

Aken Huana

### We hereby certify that:

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

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

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

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Revision History							
Report Number	Revision	Description	Issue Date	<b>Revised By</b>	Remark		
TERF2411003813E2	00	Original	December 26, 2024	Yuri Tsai			

### 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.

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#### **GENERAL INFORMATION** 1

#### **Product Description** 1.1

Product Name:	Noise Cancelling Wireless Headphones
Brand Name:	Bowers & Wilkins
Model No.: /ISED HVIN:	Px7 S3
Family Model No.: / Family ISED HVIN:	Px8 S2
Hardware Version:	Dv2.1
Firmware Version:	N/A
EUT Series No.:	PE453302443DV00057
Power Supply:	3.85 Vdc
Test Software (Name/Version)	BlueTest3

#### 1.2 Model Difference

- The appearance material and color are different. a)
- b) The display names differ due to the software (traditional Bluetooth name, USB device name, BLE name, USB PID, configuration design, and speaker distinction).
- The antenna gain is different. C)

#### 1.3 **RF Specification**

Radio Technology:	QHS
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	<ul> <li>π/4 QPSK (2/3Mbps),</li> <li>π/4 DQPSK (4Mbps),</li> <li>8PSK (5Mbps),</li> <li>D8PSK (6Mbps)</li> </ul>
Transmit Power:	10.88dBm

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#### 1.4 **Antenna Designation**

Antenna Type	Antenna Model No.	Freq. (MHz)	Peak Antenna Gain (dBi)
FDO	HDT559	0.4011-	1.99
FPC	HDT659	2.4GHz	1.02

### Note:

- 1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
- Antenna information is provided by the applicant. 2.

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#### 1.5 **Test Methodology of Applied Standards**

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 RSS-247 issue 3 Aug. 2023 RSS-Gen, Issue 5 April 2018, Amendment 2 (February 2021) ANSI C63.10:2013

#### 1.6 **Test Facility**

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
		SAC 1		
		SAC 2	-	
		SAC 3		
	No 404 M/w Krise Deed New Trinei	Conduction 1		
	No.134, Wu Kung Road, New Taipei	Conducted 1	T\0007	
	Industrial Park, Wuku District, New	Conducted 2	TW0027	
	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		
		Conducted A		
	No.2, Keji 1st Rd., Guishan District,	Conducted B		
	Taoyuan City, Taiwan 333	Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
	me is remarked on the equipmen	Conducted G		

#### 1.7 **Special Accessories**

There are no special accessories used while test was conducted.

#### 1.8 **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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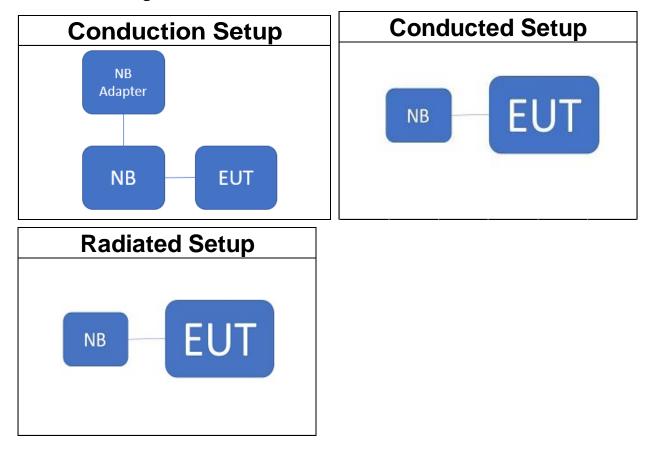
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#### 2.5 **Test Configuration**



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#### 2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)	
NB Adapter	Lenovo	ADLX65YLC3A	8SSA10M13945L1CZ 88N0F8W	N/A	N/A	
Notebook	Lenovo	T14	P0003332	N/A	N/A	
USB-C to C Cable	Liangang Optoelectronic Technology Co., Ltd.	112440001105	NA	N/A	N/A	
	Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	R SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)	
Notebook	Lenovo	T14	P0003332	N/A	N/A	
USB-C to C Cable	Liangang Optoelectror Technology Co., Ltd.	112440001105	N/A	N.C.R	N.C.R	
		Radiated Emissio	n Test Site: SAC D			
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)	
Notebook	Lenovo	T14	P0003332	N/A	N/A	
USB-C to C Cable	Liangang Optoelectronic Technology Co., Ltd.	112440001105	NA	N/A	N/A	

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#### 3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.247(d) §15.209	RSS-247 §5.5 RSS-Gen §8.9	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d) §15.209	RSS-247 §5.5 RSS-Gen §8.9	Radiated Band Edge and Spurious Emission	Compliant
§15.205	RSS-Gen § 8.10	Restricted Bands	Compliant
§15.247(e)	RSS-247 §5.2 b	Peak Power Density	Compliant
§15.203	N/A	Antenna Requirement	Compliant

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

#### 4.1 **Operating Frequencies**

2400~2483.5 MHz							
СН	Freq. (MHz)	СН	Freq. (MHz)	СН	Freq. (MHz)	СН	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

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#### 4.2 The Worst Test Modes and Channel Details

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

CONDUCTED TEST						
MODE	MODE AVAILABLE TESTED MODULATION DATA RATE (Mbps)					
QHS 6M	0 to 39	0,20,39	D8PSK	6		

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	AVAILABLE CHANNEL	DATA RATE (Mbps)				
QHS	0 to 39	20	D8PSK	6		
	TRANSMIT RAI	DIATED EMISSION TI	EST (ABOVE 1 GHz)			
MODE AVAILABLE TESTED MODULATION DATA RATE (Mbps)						
QHS	0 to 39	0,20,39	D8PSK	6		

RECEIVE RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION			
QHS	0 to 39	20	_			
	RECEIVE RAD	IATED EMISSION TE	ST (ABOVE 1 GHz)			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION			
QHS	0 to 39	20	_			

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#### **MEASUREMENT UNCERTAINTY** 5

Test Items	Ur	ncertaint	y
AC Power Line Conducted Emission	+/-	1.54	dB
Output Power measurement	+/-	0.97	dB
Emission Bandwidth	+/-	1.38	Hz
Conducted emission measurement	+/-	0.77	dB
Peak Power Density	+/-	0.61	dB
Temperature	+/-	0.6	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty						
	+/-	1.89	dB	9kHz~30MHz		
Polarization: Vertical	+/-	4.15	dB	30MHz - 1000MHz		
	+/-	3.43	dB	1GHz - 18GHz		
	+/-	3.86	dB	18GHz - 40GHz		
	+/-	1.89	dB	9kHz~30MHz		
Polarization: Horizontal	+/-	4.02	dB	30MHz - 1000MHz		
	+/-	3.43	dB	1GHz - 18GHz		
	+/-	3.86	dB	18GHz - 40GHz		
	+/-	2	dB	33GHz-50GHz		
	+/-	1.59	dB	50GHz-60GHz		
Radiated Spurious Emission	+/-	1.7	dB	60GHz-90GHz		
	+/-	1.64	dB	90GHz-140GHz		
	+/-	3.83	dB	140GHz-220GHz		

### 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

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

AC Power-Line Conducted Emission Test Site: Conduction C								
EQUIPMENT TYPE	MFR	MODEL NUMBER SERIAL NUMBER		MER I MODELNUMBER I SERIALNUMBER		LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)	
Coaxial Cable	EC Lab RF-HY-CAB-250		RF-HY-CAB-250-01	03/27/2024	03/26/2025			
EMI Test Receiver	EMI Test Receiver R&S		101342	04/29/2024	04/28/2025			
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	974	06/26/2024	06/25/2025			
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2024	03/26/2025			
Test Software	audix	e3	E3 20923 SGS Ver.9 ( C )	N.C.R	N.C.R			

#### 6.2 **Conducted Measurement**

Conducted Emission Test Site: Conducted D							
EQUIPMENT TYPE	MFR	MODEL NUMBER SERIAL NUMBER		LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)		
Attenuator	Woken	WATT-218FS-10	RF18	11/14/2024	11/13/2025		
Attenuator	Attenuator Woken DC Block PASTERNACK		RF19	11/14/2024	11/13/2025		
DC Block			RF157	11/14/2024	11/13/2025		
Power Meter	Anritsu	ML2496A	2138002	08/28/2024	08/27/2025		
Power Sensor	Anritsu	MA2411B	1911390	08/28/2024	08/27/2025		
Power Sensor	Anritsu	MA2411B	1911398	08/28/2024	08/27/2025		
Spectrum Analyzer	KEYSIGHT	N9010B	MY60240506	06/17/2024	06/16/2025		
Test Software	Keysight	IOT0047A	Ver.24.4.19.13	N.C.R	N.C.R		
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R		

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#### 6.3 **Radiated Measurement**

	Radiated Emission Test Site: SAC D							
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)			
3m Site NSA	SGS	966 chamber D	N/A	04/30/2024	04/29/2025			
Active Loop Antenna	COM-POWER	AL-130R	10160105	12/11/2024	12/10/2025			
Attenuator	Woken	WATT-218FS-10	RF17	11/14/2024	11/13/2025			
Band Rejection Filter	Micro Tronics	BRM50701-01	RF201	11/14/2024	11/13/2025			
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/14/2023	12/13/2024			
Coaxial Cable	Huber+Suhner	EMC106-SM-SM- 7200	150703	11/14/2024	11/13/2025			
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	11/14/2024	11/13/2025			
Highpass Filter	R&S	F13 HPF 3GHz	RF175	11/14/2024	11/13/2025			
Horn Antenna	Schwarzbeck	BBHA9120D	1341	05/30/2024	05/29/2025			
Horn Antenna	Schwarzbeck	BBHA9170	185	08/15/2024	08/14/2025			
Lowpass Filter	Woken	EWT-56-0019	RF173	11/14/2024	11/13/2025			
Pre-Amplifier	EMC Instruments	EMC12630SE	980273	11/14/2024	11/13/2025			
Pre-Amplifier	EMC Instruments	EMC184045SEE	980881	11/14/2024	11/13/2025			
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/14/2024	11/13/2025			
Spectrum Analyzer	KEYSIGHT	N9010B	MY60240506	06/17/2024	06/16/2025			
Test Software	audix	e3	E3 20923 SGS Ver.9 ( C )	N.C.R	N.C.R			

**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 BµV)
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
NI /		

Note

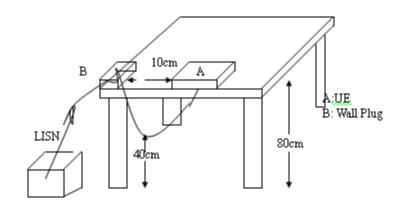
1. The lower limit shall apply at the transition frequencies

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

#### 7.2 **EUT Setup:**

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

#### 7.3 **Test Setup**



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#### 7.4 **Measurement Procedure:**

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

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

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

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number Test Mode Power Probe	:TERF2411003 :QHS :120V/60Hz :L1	813E2	Test Site Test Date Temp./Humi. Engineer	:Conduction :2024-12-12 :22.4°C/64% :Howard Hu	2
10					
0.15 0.2	0.5	1 2 Frequency	(MHz) 5	10	20 30
Freq.		ectrum Fa ing Level		tual L S	imit Margin
MHz F	PK/QP/AV d	lBμV	d <b>B</b> dB	μV d	BμV dB
0.159 0.159 0.199	QP 3	37.20 10	0.65 47	.85 6	5.51-22.365.51-17.663.67-15.78
0.229 0.505					2.47-18.586.00-16.19
4.329					6.00 -16.19 6.00 -22.85
5.680					0.00 -27.46

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Report Number Test Mode Power Probe	:TERF241100381 :QHS :120V/60Hz :N	Tes Ter	st Date :: np./Humi. ::	Conduction C 2024-12-12 22.4°C/64% Howard Huang	
100 Level (dBuV 90 80 70 60 50 2 40 30 20 10					
0.15 0.2	0.5 1	1 2 Frequency (MHz	5	10 20	30
Freq.	Detector Spect Mode Reading	g Level	Actual FS		Margin
MHz	PK/QP/AV dBµ	μV dB	dBµV	dBµV	dB
0.158 0.158 0.229 0.243 0.488 0.505 11.204	Average19.8QP34.1Peak33.2Peak30.3Peak27.3Peak27.3Peak19.2	6010.667410.643210.643010.605210.60	30.16 45.26 44.38 40.96 37.90 38.12 30.74	55.58 65.58 62.47 61.98 56.20 56.00 60.00	-25.42 -20.32 -18.09 -21.02 -18.29 -17.88 -29.26

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## 8 PEAK OUTPUT POWER MEASUREMENT

## 8.1 Standard Applicable:

## 8.1.1 Duty Cycle

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

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

## 8.1.2 FCC

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

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

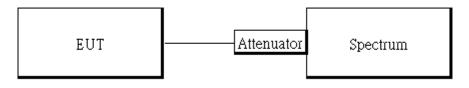
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

## 8.1.3 ISED

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

## 8.2 Test Setup

## 8.2.1 Duty Cycle



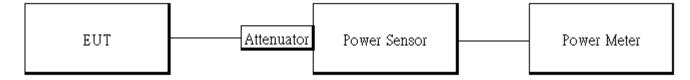
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#### 8.2.2 **Output Power**



#### 8.3 **Measurement Procedure:**

#### 8.3.1 **Duty Cycle**

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

#### 8.3.2 **Output Power**

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

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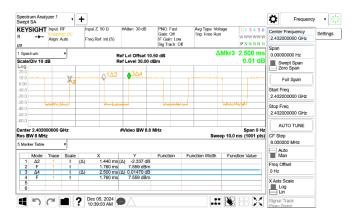
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#### **Duty Factor:** 8.4

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log(1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
QHS 6M	57.60	2.40	0.69	1.00

### QHS\_6M\_LowCH00-2402



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

#### 8.5.1 Peak & Avg

### QHS 6M mode:

СН	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Required Limit (dBm)
0	2402	6	10.88	30
20	2442	6	10.43	30
39	2480	6	10.09	30
СН	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Required Limit (dBm)
0	2402	6	9.29	30
20	2442	6	8.90	30
39	2480	6	8.51	30

\*Note:

1.Measured by power meter, cable loss 10.5 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

#### 8.5.2 EIRP

EIRP QHS 6M mode

СН	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
0	2402	6	9.29	1.99	11.28	4W=	36	dBm
20	2442	6	8.90	1.99	10.89	4W=	36	dBm
39	2480	6	8.51	1.99	10.50	4W=	36	dBm

\* Note: EIRP = Average Power + Gain

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Report No.: TERF2411003813E2 Page: 25 of 54

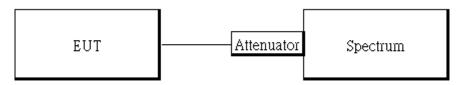


## 9 EMISSION BANDWIDTH MEASUREMENT

## 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 6dB BW measurements

- 1. The testing follows the Measurement Procedure of the KDB 558074 D01.
- Set the spectrum analyzer as RBW= 100 kHz , VBW = 3 X RBW, Span= 2 to 5 times of the OBW, Sweep=auto, Detector = Peak, and Max hold.
- 3. Mark the upper and lower frequencies of -6dB.
- 4. Repeat above procedures until all test default channel is completed.

## 9.3.2 99% BW measurements

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

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

#### 9.4.1 6dB BW measurements

### QHS 6M mode:

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	1.543	$\ge$ 0.5	PASS
2442	1.538	$\ge$ 0.5	PASS
2480	1.546	$\ge$ 0.5	PASS

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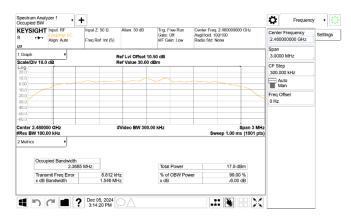
### OBW\_QHS 6M\_LowCH00-2402MHz



### OBW\_QHS 6M\_MidCH20-2442MHz



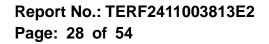
### OBW\_QHS 6M\_HighCH39-2480MHz



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#### 9.4.2 99% Bandwidth

### QHS 6M mode:

Frequency (MHz)	99%Bandwidth (MHz)
2402	2.3648
2442	2.367
2480	2.3676

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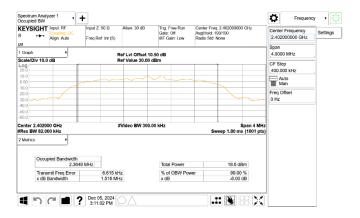
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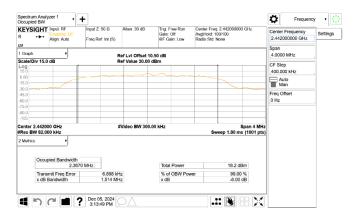
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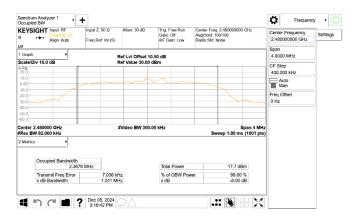
### IC OBW\_QHS 6M\_LowCH00-2402MHz



### IC OBW\_QHS 6M\_MidCH20-2442MHz



### IC OBW\_QHS 6M\_HighCH39-2480MHz



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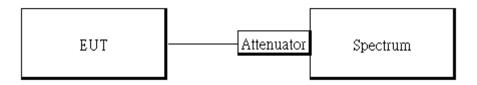


## **10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT**

#### 10.1 **Standard Applicable**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

#### 10.2 Test Setup



#### 10.3 **Measurement Procedure**

#### 10.3.1 Reference Level of Emission Limit:

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

#### 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.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

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- 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.

#### Measurement Result 10.4

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
2402	10.69	-9.31
2442	10.36	-9.64
2480	9.82	-10.18
*Note:	÷	

### QHS 6M Reference Level of Limit

1.cable loss as 10.5dB that offsets in the spectrum 2.Refer to next page for plots.

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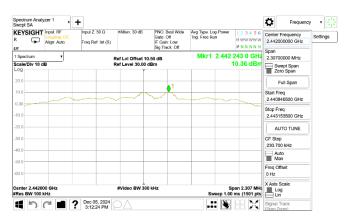
### Report No.: TERF2411003813E2 Page: 32 of 54



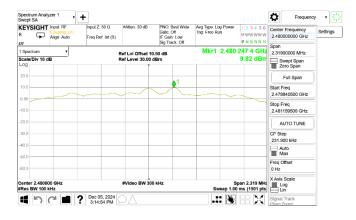
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Reference Level\_QHS 6M\_MidCH20-2442MHz



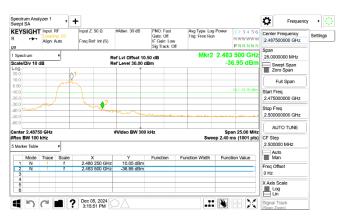
Reference Level\_QHS 6M\_HighCH39-2480MHz



Band Edge\_QHS 6M\_LowCH00-2402MHz



Band Edge\_QHS 6M\_HighCH39-2480MHz



### Spurious Emission QHS 6M LowCH00-2402MHz

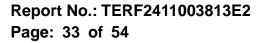


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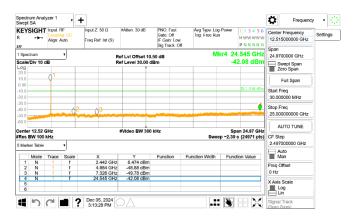
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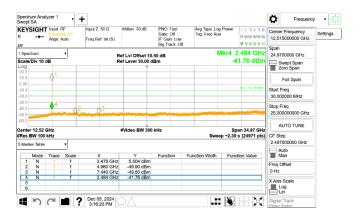




Spurious Emission\_QHS 6M\_MidCH20-2442MHz



Spurious Emission\_QHS 6M\_HighCH39-2480MHz



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# 11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

### **Spurious Emission**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 and RSS-Gen §8.9 Table 5 and 6 limit as below.

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

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

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

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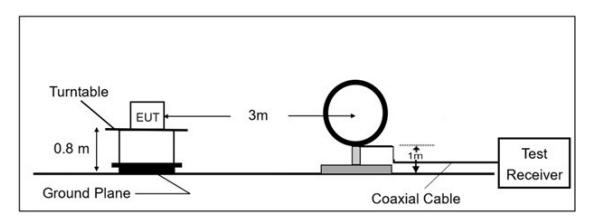
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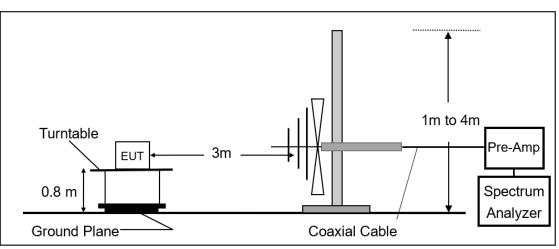


#### 11.1 **Test Setup**

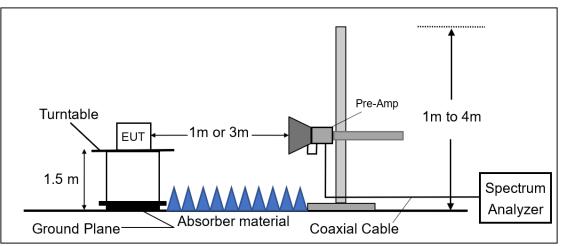
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



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



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



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#### 11.2 **Measurement Procedure**

- 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.
- 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.

#### 11.3 **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

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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)

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

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

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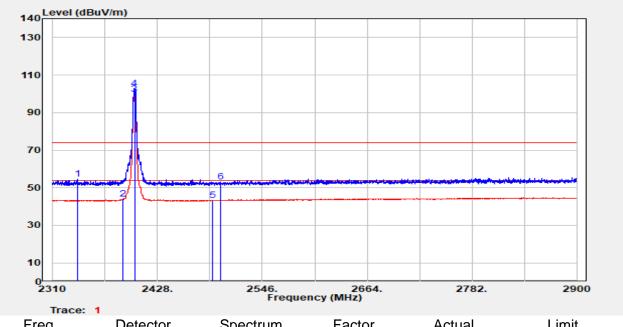
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Report No.: TERF2411003813E2 Page: 38 of 54



#### 11.4.1 **Radiated Band Edge Measurement Result**

Report Number	:TERF2411003813E2	Test Site	:SAC D
Operation Mode	:QHS 6M	Test Date	:2024-12-11
Test Frequency	:2402 MHz	Temp./Humi.	:21.6℃/67%
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Howard Huang



I	Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
23	37.739	Peak	51.52	2.96	54.48	74.00	-19.52
23	89.480	Average	40.99	2.95	43.95	54.00	-10.05
24	02.000	Average	96.70	2.96	99.67	-	-
24	02.000	Peak	99.70	2.96	102.67	-	-
24	89.813	Average	40.40	3.00	43.40	54.00	-10.60
24	98.469	Peak	50.22	3.02	53.24	74.00	-20.76

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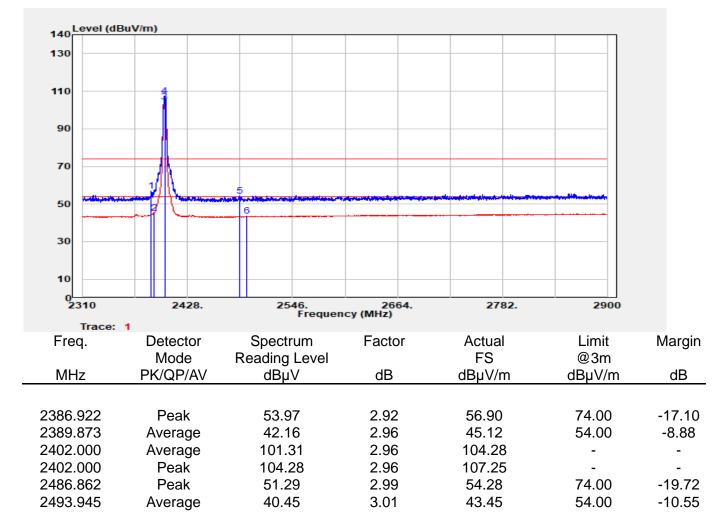
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Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2402 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2024-12-11
Temp./Humi.	:21.6℃/67%
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



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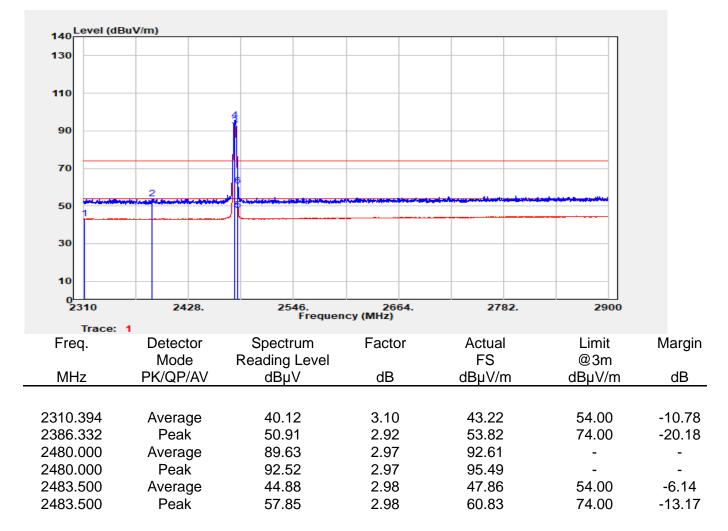
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Report No.: TERF2411003813E2 Page: 40 of 54



Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2024-12-11
Temp./Humi.	:21.6℃/67%
Antenna Pol.	:Vertical
Engineer	:Howard Huang



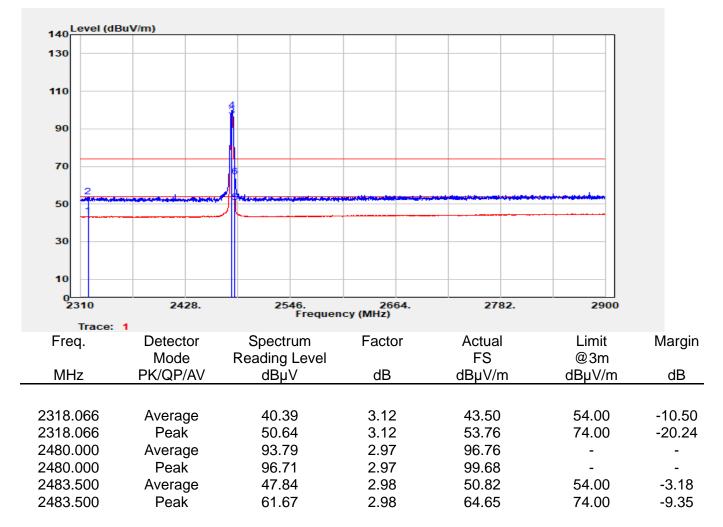
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Report Number	:TERF2411003813E2
<b>Operation Mode</b>	:QHS 6M
Test Frequency	:2480 MHz
Test Mode	:Bandedge
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2024-12-11
Temp./Humi.	:21.6℃/67%
Antenna Pol.	:Horizontal
Engineer	:Howard Huang



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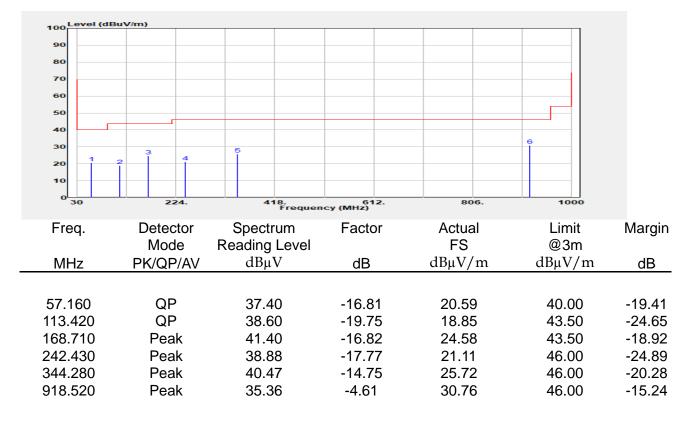


#### 11.4.2 **Radiated Spurious Emission**

1 st

Test Site :SAC D Report Number :TERF2411003813E2 Operation Mode :QHS 6M Test Date Test Frequency :2442 MHz Test Mode :Tx EUT Pol :E2 Plane

:2024-12-12 Temp./Humi. :22.0 ℃/58% Antenna Pol. :Vertical Engineer :Howard Huang



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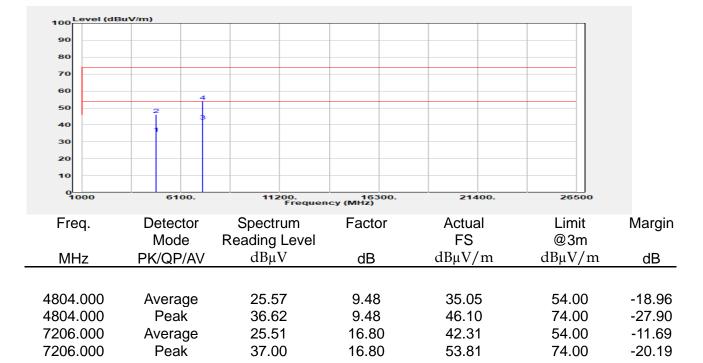
Report Number Operation Mode Test Frequency Test Mode EUT Pol	:QHS 6M			Test Site Test Date Temp./Humi. Antenna Pol. Engineer	:SAC D :2024-12-12 :22.0 °C/58% :Horizontal :Howard Huang	
100 Level (dBuV/ 90 80 70 60 50 40 30 20 10 0 30	m)	5 6 5 6 4 18. Frequence	612. cy (MHz)	806.		
Freq.	Detector Mode I	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	-	dB
57.160 113.420 162.890 242.430 343.310 471.350	QP QP Peak Peak Peak Peak	38.30 44.80 48.67 49.87 48.07 39.67	-16.81 -19.75 -16.48 -17.77 -14.74 -11.93	21.49 25.05 32.19 32.10 33.33 27.74	40.00 43.50 43.50 46.00 46.00 46.00	-18.51 -18.45 -11.31 -13.90 -12.67 -18.26

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Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2402 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2024-12-11
Temp./Humi.	:21.6 ℃/67%
Antenna Pol.	:Vertical
Engineer	:Howard Huang



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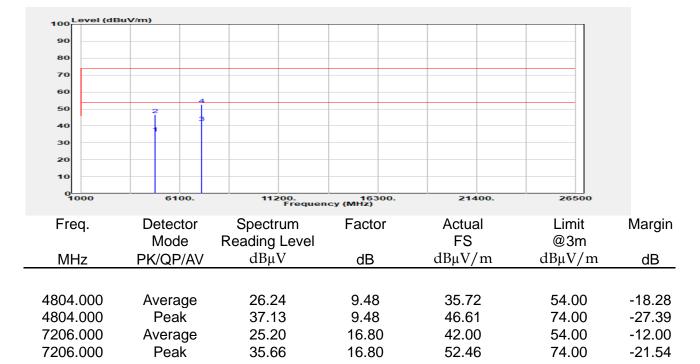
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Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2402 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D				
Test Date	:2024-12-11				
Temp./Humi.	:21.6 ℃/67%				
Antenna Pol.	:Horizontal				
Engineer	:Howard Huang				



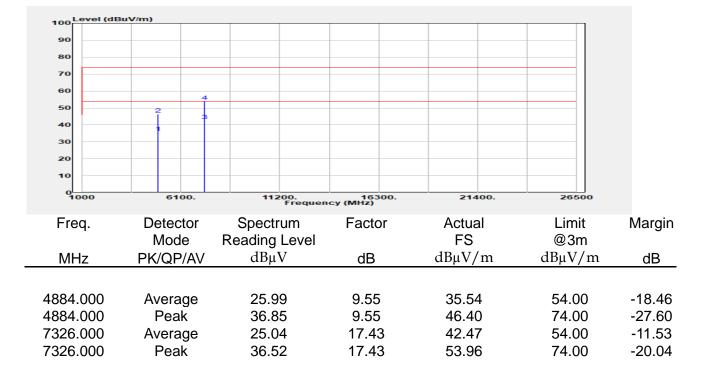
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Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D				
Test Date	:2024-12-11				
Temp./Humi.	:21.6 ℃/67%				
Antenna Pol.	:Vertical				
Engineer	:Howard Huang				



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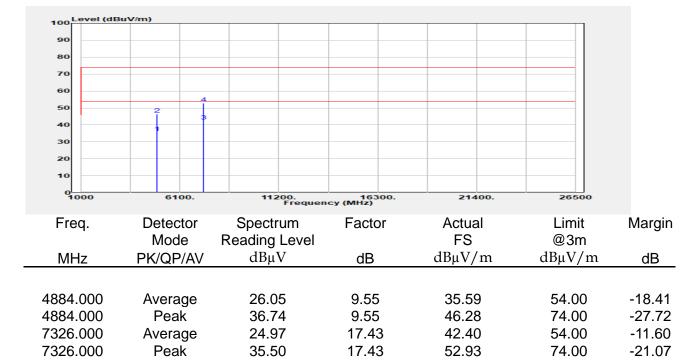
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Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D				
Test Date	:2024-12-11				
Temp./Humi.	:21.6 ℃/67%				
Antenna Pol.	:Horizontal				
Engineer	:Howard Huang				



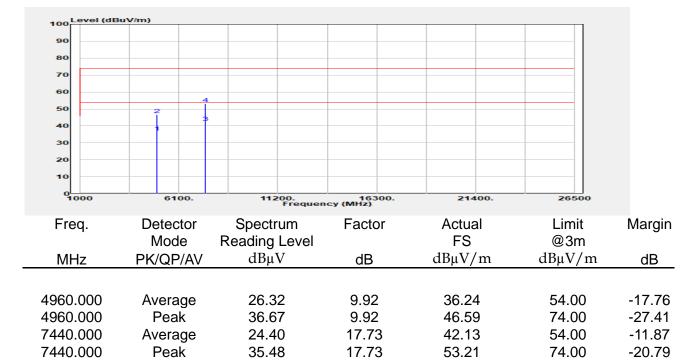
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Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2480 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D				
Test Date	:2024-12-11				
Temp./Humi.	:21.6 ℃/67%				
Antenna Pol.	:Vertical				
Engineer	:Howard Huang				



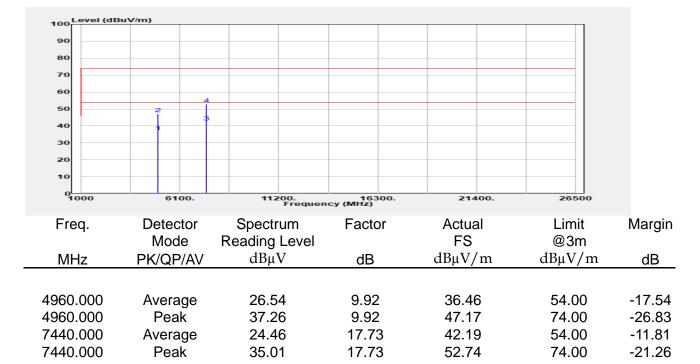
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TERF2411003813E2
QHS 6M
2480 MHz
Tx
E2 Plane

Test Site	:SAC D				
Test Date	:2024-12-11				
Temp./Humi.	:21.6 ℃/67%				
Antenna Pol.	:Horizontal				
Engineer	:Howard Huang				



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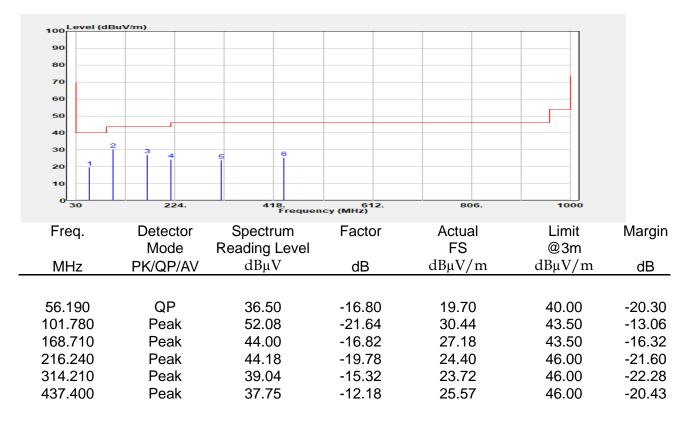
Report No.: TERF2411003813E2 Page: 50 of 54



2<sup>nd</sup>

Report Number	:TERF2411003813E2
Operation Mode	:QHS 6M
Test Frequency	:2442 MHz
Test Mode	:Tx
EUT Pol	:E2 Plane

Test Site	:SAC D
Test Date	:2024-12-12
Temp./Humi.	:22.0 ℃/58%
Antenna Pol.	:Vertical
Engineer	:Howard Huang



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Report Number Operation Mode Test Frequency Test Mode	e :QHS 6M			Test Site Test Date Temp./Humi. Antenna Pol.	:SAC D :2024-12-12 :22.0 ℃/58% :Horizontal	
EUT Pol	:E2 Plane			Engineer	:Howard Huang	9
100 Level (dBuV	/m)					
80						
70 60						
50						
40 2	3 4					
30 20						
10						
0 30	224.	418. Frequent	612. cy (MHz)	806.	1000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	n dBµV/m	dB
56.190	QP	37.10	-16.80	20.30	40.00	-19.70
107.600	Peak	54.12	-20.34	33.78	43.50	-9.72
162.890 224.000	Peak Peak	53.12 55.81	-16.48 -19.70	36.64 36.11	43.50 46.00	-6.86 -9.89
310.330	Peak Peak	45.43	-19.70	29.71	46.00 46.00	-9.89 -16.29
423.820	Peak	43.24	-12.76	30.48	46.00	-15.52

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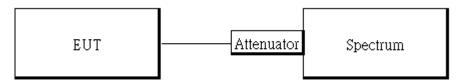
# **12 POWER SPECTRAL DENSITY**

#### 12.1 **Standard Applicable:**

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

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

## 12.2 Test Setup



#### **Measurement Procedure:** 12.3

- 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.
- 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:**

QHS 6M mode:			
Frequency			

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-7.43	8	PASS
2442	-7.85	8	PASS
2480	-8.00	8	PASS

\*Note:

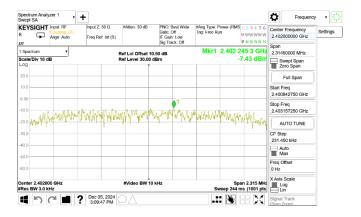
1.cable loss as 10.5dB that offsets in the spectrum

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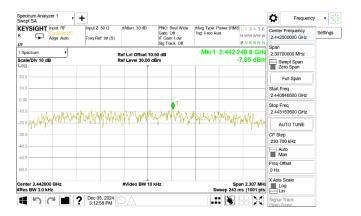
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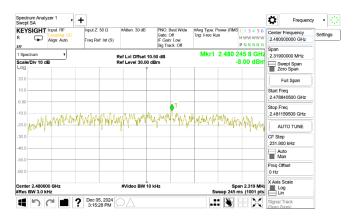
## PSD\_QHS 6M\_LowCH00-2402MHz



### PSD\_QHS 6M\_MidCH20-2442MHz



### PSD\_QHS 6M\_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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