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# **ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**





**Applicant:** DIGIMAX INNOVATIVE PRODUCTS LTD.

2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist. New Taipei

City

Manufacturer: Digisine Energytech Co., Ltd.

2F., No.196, Sec.2, Zhongxing Rd., Xindian Dist. New Taipei City

**Product Name:** Hearing Aid

**Brand Name:** Mimitakara, Digisine, Digimax

DP-6KNX, UP-6KNX Model No.:

**Model Difference:** For marketing purpose

**Report Number:** TERF2303000419E2

FCC ID 2BBAZ-6KNX

Date of EUT Received: March 1, 2023

Date of Test: March 15, 2023 ~ March 16, 2023

Issue Date: June 8, 2023

Approved By

### We hereby certify that:

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

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

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Revision History						
Report Number	Revision	Description	Issue Date	Revised By	Remark	
TERF2303000419E2	00	Original	June 8, 2023	Yuri Tsai		

### Note:

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

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### **GENERAL INFORMATION**

### 1.1 **Product Description**

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

### 1.2 **RF Specification**

Radio Technology:	BT BR+EDR
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	10.83 dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	≦ 0.4s

### **Antenna Designation** 1.3

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

Note: Antenna information is provided by the applicant.

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## Test Methodology of Applied Standards

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

#### **Test Facility** 1.6

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
		SAC 1		
		SAC 2		
		SAC 3		
	No 124 West Road Now Toingi	Conduction 1		
	No.134, Wu Kung Road, New Taipei	Conducted 1	TW0027	TW3702
	Industrial Park, Wuku District, New Taipei City, Taiwan.	Conducted 2	1 000027	
	raiper City, Taiwan.	Conducted 3		
		Conducted 4		
		Conducted 5		
SGS Taiwan Ltd.		Conducted 6		
Central RF Lab.	N. O. K. "A I D. I. O. i. I. v. District	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		
		Conducted G		

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

#### 1.7 **Special Accessories**

There is no special accessory used while test was conducted.

#### 1.8 **Equipment Modifications**

There was no modification incorporated into the EUT.

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### 2 SYSTEM TEST CONFIGURATION

### 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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## **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-ane choic 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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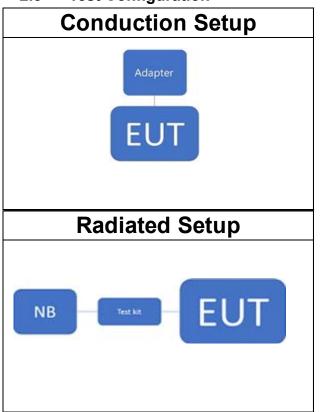
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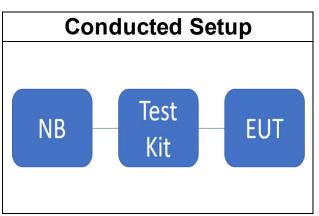


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# 2.5 Test Configuration





# 2.6 Control Unit(s)

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

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# SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)(1)	Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	Conducted & Radiated Band Edge and Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii )	Number of hopping frequency Time of Occupancy	Compliant
§15.203	Antenna Requirement	Compliant

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### 4 DESCRIPTION OF TEST MODES

## 4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	21	2422 MHz	41	2442 MHz	71	2462 MHz
2	2403 MHz	22	2423 MHz	42	2443 MHz	72	2463 MHz
3	2404 MHz	23	2424 MHz	43	2444 MHz	73	2464 MHz
4	2405 MHz	24	2425 MHz	44	2445 MHz	74	2465 MHz
5	2406 MHz	25	2426 MHz	45	2446 MHz	75	2466 MHz
6	2407 MHz	26	2427 MHz	46	2447 MHz	76	2467 MHz
7	2408 MHz	27	2428 MHz	47	2448 MHz	77	2468 MHz
8	2409 MHz	28	2429 MHz	48	2449 MHz	78	2469 MHz
9	2410 MHz	29	2430 MHz	49	2450 MHz	79	2470 MHz
10	2411 MHz	30	2431 MHz	50	2451 MHz	70	2471 MHz
11	2412 MHz	31	2432 MHz	51	2452 MHz	71	2472 MHz
12	2413 MHz	32	2433 MHz	52	2453 MHz	72	2473 MHz
13	2414 MHz	33	2434 MHz	53	2454 MHz	73	2474 MHz
14	2415 MHz	34	2435 MHz	54	2455 MHz	74	2475 MHz
15	2416 MHz	35	2436 MHz	55	2456 MHz	75	2476 MHz
16	2417 MHz	36	2437 MHz	56	2457 MHz	76	2477 MHz
17	2418 MHz	37	2438 MHz	57	2458 MHz	77	2478 MHz
18	2419 MHz	38	2439 MHz	58	2459 MHz	78	2479 MHz
19	2420 MHz	39	2440 MHz	59	2460 MHz	79	2480 MHz
20	2421 MHz	40	2441 MHz	60	2461 MHz		

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### The Worst Test Modes and Channel Details

- The EUT has been tested under operating condition.
- Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- The field strength of radiated 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.
- Investigation has been done on all the possible configurations for searching the worst case.

ANTNNA PORT CONDUCTED TEST						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE		
Peak Output Power, 20dB Band Width						
	0 to 78	0,39,78	GFSK	DH5		
Bluetooth	0 to 78	0,39,78	π/4-DQPSK	2DH5		
	0 to 78	0,39,78	8-DPSK	3DH5		
Band Edge						
Bluetooth	0 to 78	0,78	GFSK/π/4-DQPSK	DH5/2DH5		
	Frequency Separation					
Bluetooth	0 to 78	0,1,2,38,39,40,76,77,	GFSK π/4-DQPSK 8-DPSK	DH5 2DH5 3DH5		
	Number of F	lopping Frequency, H	opping Band edge			
Bluetooth	0 to 78	0 to 78	GFSK/π/4-DQPSK	DH5/2DH5		
	Т	me of Occupancy(Dw	ell time)			
			GFSK	DH1/DH3/DH5		
Bluetooth	0 to 78	39	π/4-DQPSK	2DH1/2DH3/2DH5		
			8-DPSK	3DH1/3DH3/3DH5		
	A) (A    A    L	TEOTER	1	DAOMET		
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE		
	RADIA	TED EMISSION TEST (B	ELOW 1 GHz)			
Pluotooth	0 to 79	30	CESK/#// DODSK			

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE	
	RADIATED EMISSION TEST (BELOW 1 GHz)				
Bluetooth	0 to 78	39	GFSK/π/4-DQPSK	DH5/2DH5	
	RADIATED EMISSION TEST (ABOVE 1 GHz)				
Bluetooth	0 to 78	0,39,78	GFSK/π/4-DQPSK	DH5/2DH5	

Note: The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for channel Low, Mid and High, the worst case position was reported.

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### 5 MEASUREMENT UNCERTAINTY

Test Items	l	Incertair	nty
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
Frequency Separation	+/-	1.53	Hz
Number of hopping frequency	+/-	1.53	Hz
Time of Occupancy	+/-	1.53	Hz
Temperature	+/-	0.7	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty						
	+/-	2.8	dB	9kHz~30MHz		
Delevization, Vertical	+/-	4.82	dB	30MHz - 1000MHz		
Polarization: Vertical	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		
	+/-	2.8	dB	9kHz~30MHz		
Polarization: Horizontal	+/-	4.54	dB	30MHz - 1000MHz		
Polarization: Horizontal	+/-	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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## 6 MEASUREMENT EQUIPMENT USED

### 6.1 Emission from AC power line

	•								
	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				

### 6.2 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	o Test Ver.21 N.C.R		N.C.R				
Attenuator	Attenuator Woken		RF18	11/16/2022	11/15/2023				
Attenuator	Woken	WATT-218FS-10	RF20	11/16/2022	11/15/2023				

### 6.3 Radiated Measurement

	Radiated Emission Test Site: SAC D							
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/19/2022	12/18/2023			
Horn Antenna	Schwarzbeck	BBHA9170	184	12/30/2022	12/29/2023			
Horn Antenna	Schwarzbeck	BBHA9170	185	08/22/2022	08/21/2023			
Horn Antenna	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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## 7 CONDUCTED EMISSION TEST

### 7.1 Standard Applicable

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

Frequency range	Limits dB(uV)				
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			

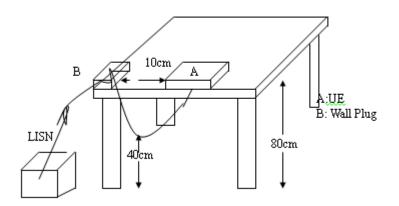
### Note

- 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 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

## 7.3 Test Setup



### 7.4 Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

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### 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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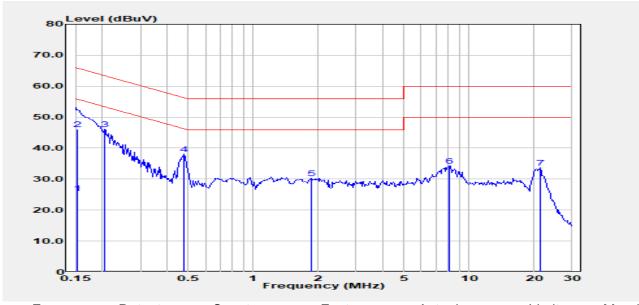
# AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number :TERF2303000419E2 Test Site :Conduction C

Test Mode :BT Test Date :2023-03-15

Power :120V/60Hz Temp./Humi. :22.5/52

Probe :L1 Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.153	Average	15.10	10.27	25.37	55.82	-30.45
0.153	QP	35.80	10.27	46.07	65.82	-19.75
0.204	Peak	35.78	10.27	46.05	63.45	-17.40
0.476	Peak	27.74	10.31	38.06	56.41	-18.35
1.848	Peak	19.24	11.09	30.33	56.00	-25.67
8.148	Peak	23.73	10.63	34.35	60.00	-25.65
21.373	Peak	22.76	10.91	33.67	60.00	-26.33

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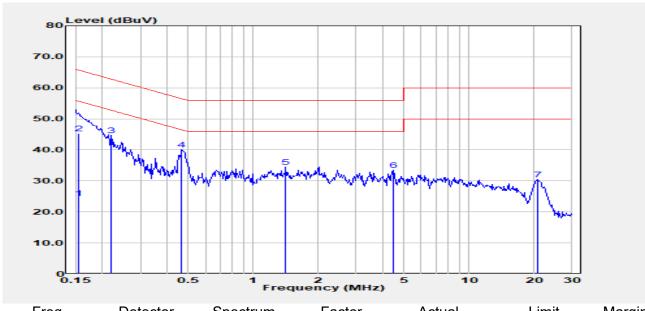
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Report Number :TERF2303000419E2 Test Site :Conduction C

Test Mode :BT Test Date :2023-03-15

Power :120V/60Hz Temp./Humi. :22.5/52

Probe :N Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.155	Average	14.10	10.28	24.38	55.74	-31.36
0.155	QP	35.10	10.28	45.38	65.74	-20.36
0.220	Peak	34.46	10.27	44.74	62.83	-18.09
0.466	Peak	29.72	10.30	40.02	56.58	-16.57
1.418	Peak	23.80	10.74	34.54	56.00	-21.46
4.454	Peak	22.87	10.57	33.44	56.00	-22.56
20.704	Peak	19.69	10.86	30.55	60.00	-29.45

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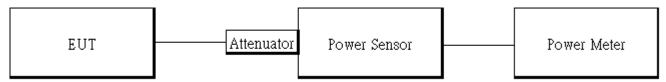
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### 8 PEAK OUTPUT POWER MEASUREMENT

### 8.1 Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, The Limit: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: The Limit: 0.125 Watts. The power limit for 1Mbps is 1watt, and 2Mbps, 3Mbps and AFH mode are 0.125 watts.

## 8.2 Test Setup



### 8.3 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10 Measurement Guidelines.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >=20dB bandwidth)
- 4. Record the max. reading.
- 5. Repeat above procedures until all default test channel is completed.

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## 8.4 Peak & Average Power Measurement Result

### 1M BR mode (Peak):

СН	Freq. (MHz)	Power set	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)			
Low	2402	default	8.92	7.798	1000			
Mid	2441	default	9.12	8.166	1000			
High	2480	default	8.95	7.852	1000			

### 1M BR mode (Average):

СН	Freq. (MHz)	Power set	Max. Avg.Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	8.74	7.487	1000
Mid	2441	default	8.97	7.894	1000
High	2480	default	8.86	7.697	1000

### 2M FDR mode (Peak):

ZIN EDIT Mode (Fedity.						
СН	Freq. (MHz)	Power set	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)	
Low	2402	default	10.78	11.967	125	
Mid	2441	default	10.83	12.106	125	
High	2480	default	10.81	12.050	125	

### 2M EDR mode (Average):

СН	Freq. (MHz)	Power set	Max. Avg.Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)		
Low	2402	default	8.73	7.470	125		
Mid	2441	default	8.79	7.574	125		
High	2480	default	8.77	7.539	125		

### 3M EDR mode (Peak):

СН	Freq. (MHz)	Power set	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	10.76	11.912	125
Mid	2441	default	10.80	12.023	125
High	2480	default	10.77	11.940	125

### 3M EDR mode (Average):

					_
СН	Freq. (MHz)	Power set	Max. Avg.Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	8.68	7.384	125
Mid	2441	default	8.75	7.504	125
High	2480	default	8.71	7.435	125

\*Note: Max. Output include tune up tolerance Power measured by using average detector.

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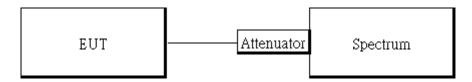
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### **EMISSION BANDWIDTH MEASUREMENT**

## Standard Applicable

For frequency hopping systems operating in the 2400 MHz-2483.5 MHz no limit for 20dB bandwidth.

#### 9.2 **Test Setup**



#### 9.3 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013.
- 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 the spectrum analyzer as

RBW= 1 % to 5% of OBW,

VBW = 3 X RBW

Span= 2 to 5 times of the OBW,

Sweep=auto,

Detector = Peak, and Max hold for 20dB Bandwidth test.

- 5. Mark the peak frequency and -20dB (upper and lower) frequency
- 6. Repeat above procedures until all test default channel is completed

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### **GFSK**

СН	20 dB BW (MHz)	2/3 BW (MHz)	
Low	0.9284	0.62	
Mid	0.9297	0.62	
High	0.9291	0.62	

### π/4-DQPSK

СН	20 dB BW	2/3 BW	
OII	(MHz)	(MHz)	
Low	1.270	0.85	
Mid	1.269	0.85	
High	1.269	0.85	

### 8-DPSK

СН	20 dB BW (MHz)	2/3 BW (MHz)		
Low	1.275	0.85		
Mid	1.275	0.85		
High	1.274	0.85		

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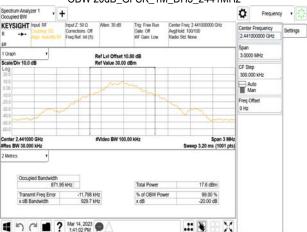
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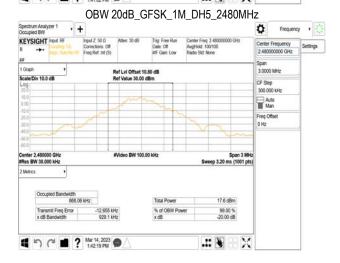
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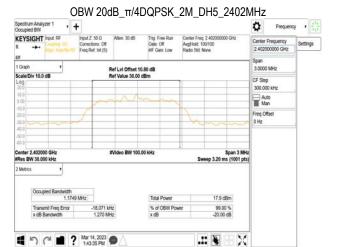


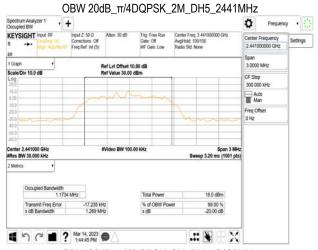
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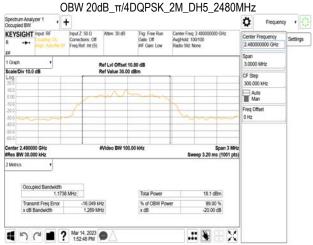
### OBW 20dB\_GFSK\_1M\_DH5\_2402MHz Spectrum Analyzer 1 Frequency • Trig: Free Run Gate: Off #IF Gain: Low KEYSIGHT Input RF Settings 1 Graph Ref Lvl Offset 10.80 dB Ref Value 30.00 dBm Scale/Div 10.0 dB Auto Man Freq Offset 0 Hz Occupied Bandy 874.08 kHz Total Powe 17.4 dBm Transmit Freq Error x dB Bandwidth % of OBW Power x dB 99.00 % -20.00 dB ■ 9 C ■ ? Mar 14, 2023 ● .: 🗑 - X OBW 20dB\_GFSK\_1M\_DH5\_2441MHz











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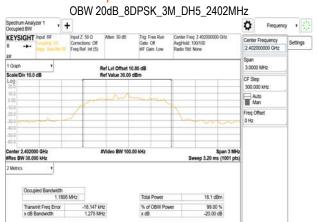
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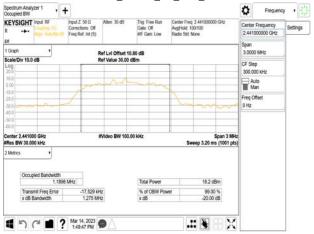
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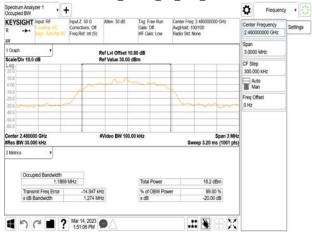


## OBW 20dB\_8DPSK\_3M\_DH5\_2441MHz

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### OBW 20dB\_8DPSK\_3M\_DH5\_2480MHz



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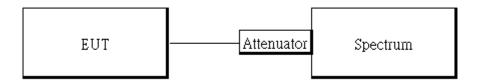
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### 10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

### Standard Applicable

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

#### 10.2 Test Setup



#### 10.3 **Measurement Procedure**

### 10.3.1 **Conducted Band Edge:**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013.
- 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 center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Sweep = auto
- 6. Mark Peak, below 2.4GHz and above 2.4835GHz and record the max. level.
- 7. Repeat above procedures until all frequency measured were complete.

#### 10.3.2 **Conducted Spurious Emission:**

- To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows ANSI C63.10:2013.
- 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**

See next page for test plots.

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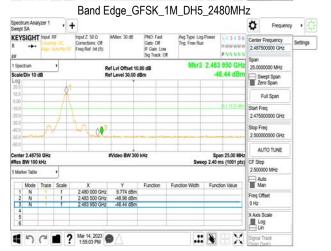
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## 





Band Edge\_π/4DQPSK\_2M\_DH5\_2480MHz



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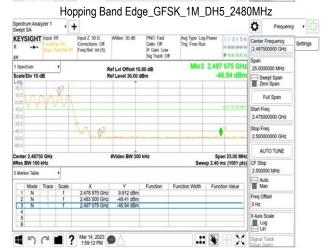
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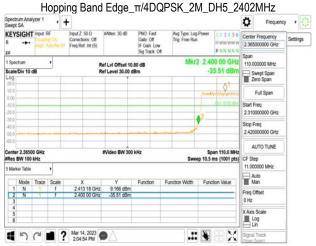
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### Hopping Band Edge GFSK 1M DH5 2402MHz ٥ KEYSIGHT Input RF ut 7 50 0 Settings -37 23 0 Swept Span Zero Span Full Span Stop Freq 2.4200000 Center 2.36500 GH: #Res BW 100 kHz an 110.0 Mi Auto Man Mode Trace Scale Function Function Width Function Value Freq Offset 0 Hz X Axis Scale Log Lin ■ ? Mar 14, 2023 ● .:: ₹ Signal Trad





Hopping Band Edge\_π/4DQPSK\_2M\_DH5\_2480MHz



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#### Spurious Emission GFSK 1M DH5 2402MHz Spurious Emission π/4DQPSK 2M DH5 2402MHz Frequency + ٥ ٥ KEYSIGHT Input RF ut 7 50 0 KEYSIGHT Input RF ut 7 50 0 12.515000000 GH Settings 12.515000000 GHz Settings Mkr4 4.803 GH Mkr4 2.399 GH Ref Lvi Offset 10.80 dB Scale/Div 10 dB 34 47 6 Swept Span Zero Span Swept Span Zero Span Full Span Full Span Center 12.52 GHz #Res BW 100 kHz an 24.97 GI nter 12.52 GH #Video BW 300 kHz n 24.97 GI FRes BW 100 kHz Auto Man Auto Man Mode Trace Sc Function Width Function Value Mode Trace Sc Function Width Function Value Freq Offset Freq Offset 0 Hz 0 Hz X Axis Scal X Axis Scale Log Lin Log Lin ■ ? Mar 14, 2023 ● Mar 14, 2023 9 .:: ₹ Signal Trac .:: 🔻 Signal Trac Spurious Emission\_GFSK\_1M\_DH5\_2441MHz Spurious Emission\_π/4DQPSK\_2M\_DH5\_2441MHz ٥ ٥ Frequency + KEYSIGHT Input RF KEYSIGHT Input RF 12.515000000 GHz 12.515000000 GHz 24.9700000 GHz 24.9700000 GHz Scale/Div 10 dB -41.52 d Scale/Div 10 dR Swept Span Zero Span Swept Span Zero Span Full Span Full Span 30.000000 MHz 30.000000 MHz . 4 0 AUTO TUNE Auto Man Function Width Function Value X Axis Scale X Axis Scale Log Lin ■ 9 C ■ ? Mar 14, 2023 ● 4 5 C 1 ? Mar 14, 2023 9 .:: ₹ .:: 🤻 Spurious Emission\_GFSK\_1M\_DH5\_2480MHz Spurious Emission\_π/4DQPSK\_2M\_DH5\_2480MHz ٥ ٥ KEYSIGHT KEYSIGHT r4 2.484 GH r4 23 023 G 24.9700000 GHz 24.9700000 GHz Ref LvI Offset 10.80 dB Ref Level 30.00 dBm Ref Lvl Offset 10.80 dB Ref Level 30.00 dBm Scale/Div 10 dB -41.66 di Swept Spar Zero Span Swept Spar Zero Span 30.000000 MHz 30.000000 MHz . Stop Freq Stop Freq 25.000000000 GH AUTO TUNE AUTO TUNE n 24 97 G Auto Man Auto Man Freq Offset 0 Hz Freq Offset 0 Hz

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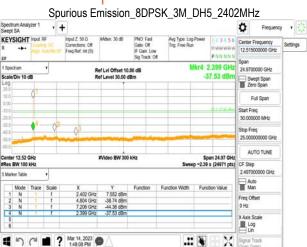
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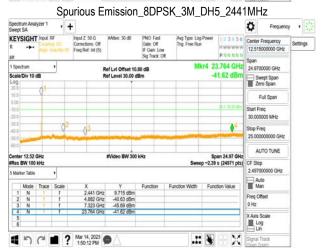
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### 11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

### Standard Applicable

#### 11.1.1 **Duty Cycle Correction Factor**

According to 15. 35(c), the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification.

### 11.1.2 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 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:

1. The lower limit shall apply at the transition frequencies.

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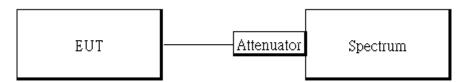


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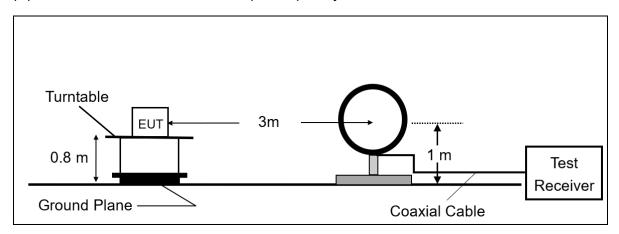
### 11.2 Test Setup

# 11.2.1 Duty Cycle Correction Factor

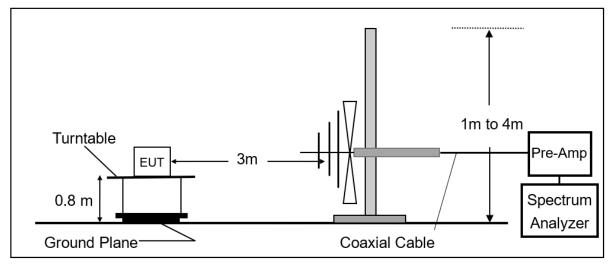


### 11.2.2 Radiated Emission

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



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



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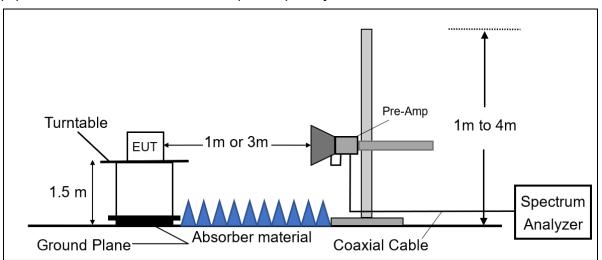
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## (C) Radiated Emission Test Set-Up, Frequency Above 1 GHz.



### 11.3 Measurement Procedure

## 11.3.1 Duty Cycle Correction Factor

- 1.Adjust and configure any EUT switches, controls, or input data streams to ensure that the EUT is transmitting or encoded to obtain the "worst-case" pulse ON time.
- 2. The testing follows ANSI C63.10:2013.
- 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 center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz, Detector = Peak, Adjust Sweep=100ms.
- 6. Repeat above procedures until all frequency of the interest measured were complete.

## 11.3.2 Radiated Emission

- 1. The testing follows the Measurement Procedure of ANSI C63.10:2013.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) at frequency between 30MHz and 1 GHz.
- 6. Use receiver mode as RBW=120 kHz for Quasi-peak (QP) at frequency between 30MHz and 1 GHz.

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- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Maximum Emission Measurements at frequency above 1 GHz.
- 8. According to C63.10:2013 Section 7.5 Procedure for determining the average value of pulsed emissions with duty cycle correction factor 20 log (Ton/100ms).
- 9. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 12. Repeat above procedures until all default test channel measured were complete.

## 11.4 Field Strength Calculation

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

# FS = RA + AF + CL - AG

Where FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

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

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Average value(dBµV/m)=Peak Actual FS(dBµV/m)+ Duty Cycle Correction Factor(dB)

Duty Cycle Correction Factor(dB) = 20 log (Ton/100 ms)

### 11.5 Test Results of Radiated Spurious Emissions form 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 Duty Cycle Correction Factor

BR			
Time ON of 100ms:	5.800	ms	
Duty Cycle=5.8ms / 100ms	0.058	%	
Duty Cycle correction factor=20 LOG 0.058=		-24.73	dB

EDR 2M			
Time ON of 100ms:	5.800	ms	
Duty Cycle=5.8ms / 100ms	0.058	%	
Duty Cycle correction factor	-24.73	dB	

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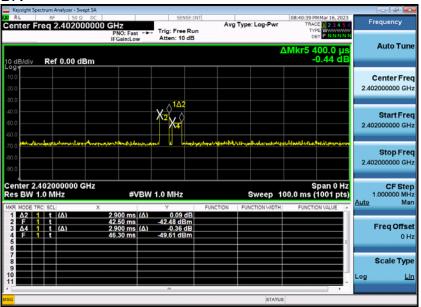
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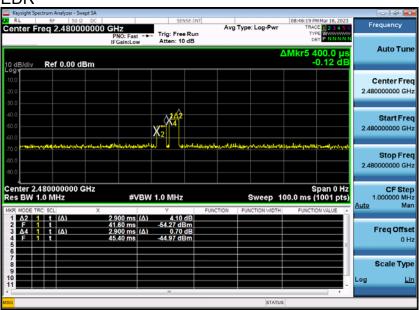
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### 11.6.2 **Duty Cycle test plot**

### BR



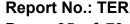
### **EDR**



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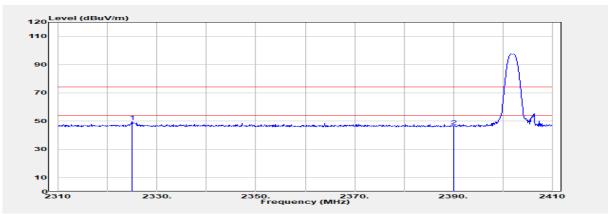
# 11.6.3 Bandedge Result

Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :BR :2023-03-16 Test Date

Test Frequency :2402 MHz Temp./Humi. :21.0/57 Test Mode :Bandedge Antenna Pol. :Vertical

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2325.000	Peak	56.51	-6.83	49.67	74.00	-24.33
2390.000	Peak	53.53	-7.04	46.48	74.00	-27.52
_				_	_	
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2325.000	Average	49.67	-24.73	24.94	54.00	-29.06
2390.000	Average	46.48	-24.73	21.75	54.00	-32.25

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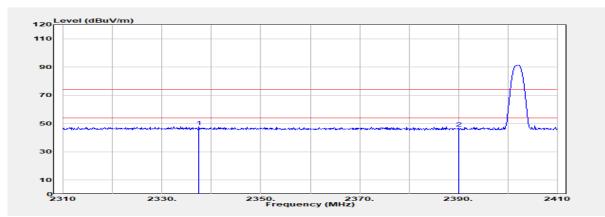
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Operation Mode: BR Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2337.500	Peak	54.63	-6.87	47.76	74.00	-26.24
2390.000	Peak	53.93	-7.04	46.88	74.00	-27.12
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
						_
2337.500	Average	47.76	-24.73	23.03	54.00	-30.97
2390.000	Average	46.88	-24.73	22.15	54.00	-31.85

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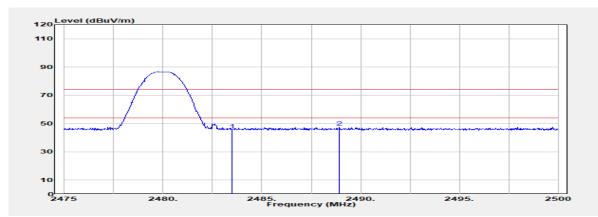
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

**EUT Pol** :E2 Plane :Howard Huang Engineer



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2483.500	Peak	52.87	-7.20	45.67	74.00	-28.33
2488.925	Peak	54.60	-7.22	47.38	74.00	-26.62
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	45.67	-24.73	20.94	54.00	-33.06
2488.925	Average	47.38	-24.73	22.65	54.00	-31.35

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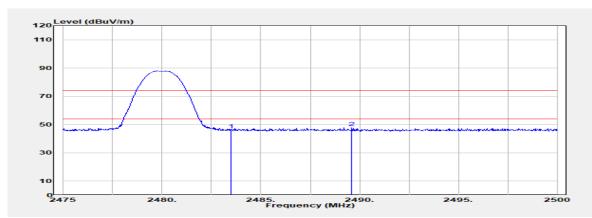
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2483.500	Peak	53.49	-7.20	46.30	74.00	-27.70
2489.600	Peak	55.01	-7.22	47.78	74.00	-26.22
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	46.30	-24.73	21.57	54.00	-32.43
2489.600	Average	47.78	-24.73	23.05	54.00	-30.95

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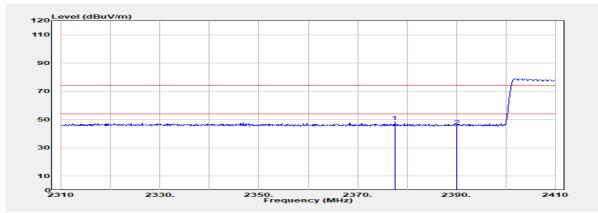
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :BR HOPPING Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2377.500	Peak	55.40	-7.00	48.39	74.00	-25.61
2390.000	Peak	52.68	-7.04	45.64	74.00	-28.36
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2377.500	Average	48.39	-24.73	23.66	54.00	-30.34
2390.000	Average	45.64	-24.73	20.91	54.00	-33.09

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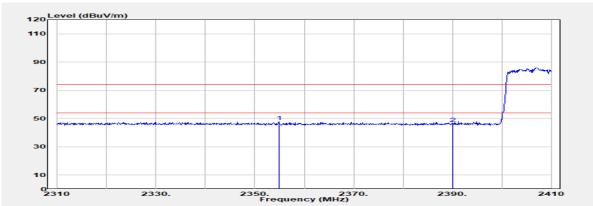
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :BR HOPPING Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :E2 Plane Engineer :Howard Huang



	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
	2354.900	Peak	54.66	-6.93	47.73	74.00	-26.27
	2390.000	Peak	53.68	-7.04	46.64	74.00	-27.36
	_	5	D   A	D 1 0 1	•	•	
	Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
-		7.11	(42,47111)	(42)	(4247711)	(4241,)	(42)
	2354.900	Average	47.73	-24.73	23.00	54.00	-31.00
	2390.000	Average	46.64	-24.73	21.91	54.00	-32.09

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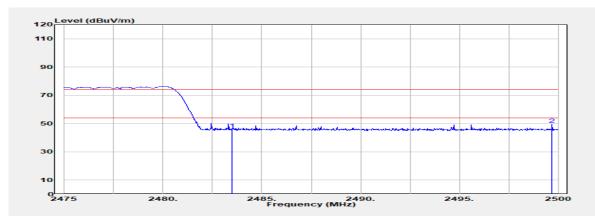
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :BR HOPPING Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2483.500	Peak	52.95	-7.20	45.75	74.00	-28.25
2499.700	Peak	56.61	-7.27	49.35	74.00	-24.65
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	45.75	-24.73	21.02	54.00	-32.98
2499.700	Average	49.35	-24.73	24.62	54.00	-29.38

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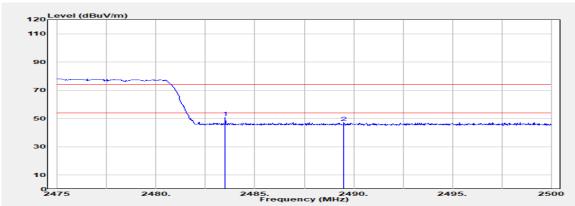
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :BR HOPPING Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
•	Mode	Reading Level		FS	@3m	_
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
		·		• •	•	
2483.500	Peak	57.89	-7.20	50.69	74.00	-23.31
			•			
2489.500	Peak	54.40	-7.22	47.17	74.00	-26.83
Freq.	Detector	Peak Actual	<b>Duty Cycle</b>	Average	Average	Margin
•	Mode	FS	Factor	Value	Limit@3m	J
N 41 1—	A\ /		(4D)		_	(-ID)
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	50.69	-24.73	25.96	54.00	-28.04
	•		_			
2489.500	Average	47.17	-24.73	22.44	54.00	-31.56

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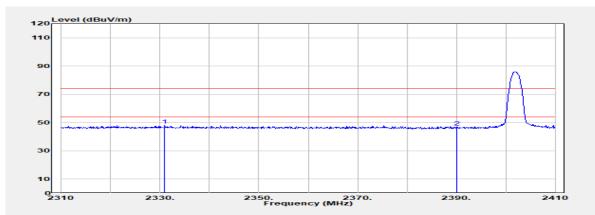
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

**EUT Pol** :E2 Plane :Howard Huang Engineer



Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
Peak	54.86	-6.85	48.01	74.00	-25.99
Peak	53.82	-7.04	46.78	74.00	-27.22
Datastan	Da als A atrial	Dutu Ovala	A	A	Manain
		, ,	•	•	Margin
AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Average	48.01	-24.73	23.28	54.00	-30.72
Average	46.78	-24.73	22.05	54.00	-31.95
	Mode PK/QP/AV  Peak Peak  Detector Mode AV  Average	Mode PK/QP/AV Reading Level dBμV  Peak 54.86 Peak 53.82  Detector Peak Actual FS (dBμV/m)  Average 48.01	Mode PK/QP/AV         Reading Level dBμV         dB           Peak Peak         54.86 -6.85 -7.04           Detector Mode AV         Peak Actual Ps Factor (dBμV/m)         Duty Cycle Factor (dBμV/m)           Average         48.01 -24.73	Mode PK/QP/AVReading Level dBμVFS dBμV/mPeak $54.86$ $-6.85$ $48.01$ Peak $53.82$ $-7.04$ $46.78$ Detector Mode FS Factor AVPeak Actual Factor Value (dBμV/m) $(dBμV/m)$ $(dBμV/m)$	Mode PK/QP/AV         Reading Level dBμV         FS dBμV/m         @3m dBμV/m           Peak         54.86         -6.85         48.01         74.00           Peak         53.82         -7.04         46.78         74.00           Detector Mode FS Factor AV         Peak Actual Psactor Value Limit@3m (dBμV/m)         Value (dBμV/m)         Limit@3m (dBuV/m)           AV (dBμV/m)         (dB)         (dBuV/m)         54.00

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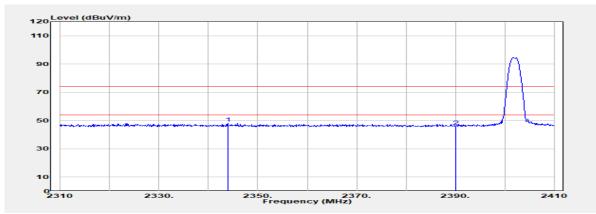
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2343.900	Peak	54.91	-6.89	48.02	74.00	-25.98
2390.000	Peak	52.78	-7.04	45.73	74.00	-28.27
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2343.900	Average	48.02	-24.73	23.29	54.00	-30.71
2390.000	Average	45.73	-24.73	21.00	54.00	-33.00

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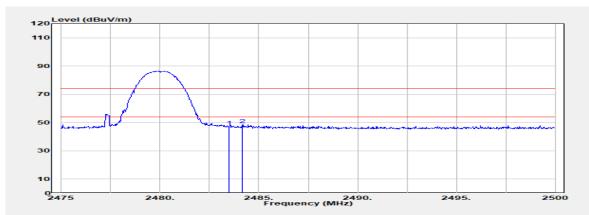
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :EDR 2M Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2483.500	Peak	54.34	-7.20	47.14	74.00	-26.86
2484.175	Peak	55.79	-7.20	48.59	74.00	-25.41
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
N 41 1—	Mode	FS	Factor	Value	Limit@3m	(-ID)
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	47.14	-24.73	22.41	54.00	-31.59
2484.175	Average	48.59	-24.73	23.86	54.00	-30.14

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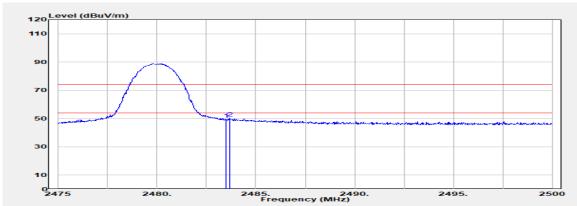
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
	MHz	PK/QP/AV	dB <sub>µ</sub> V	dB	σο dBμV/m	@3m dBµV/m	٩D
-	IVIПZ	PN/QP/AV	ασμν	uБ	ασμ ν / πι	ασμν/ πι	dB
	2483.500	Peak	56.72	-7.20	49.52	74.00	-24.48
	2483.675	Peak	57.46	-7.20	50.27	74.00	-23.73
	Freq.	Detector	Peak Actual	<b>Duty Cycle</b>	Average	Average	Margin
		Mode	FS	Factor	Value	Limit@3m	
	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
	2483.500	Average	49.52	-24.73	24.79	54.00	-29.21
	2483.675	Average	50.27	-24.73	25.54	54.00	-28.46

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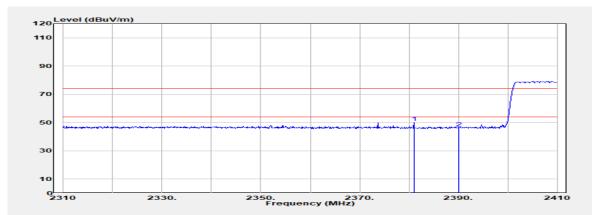
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :EDR 2M HOPPING Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
	2381.000	Peak	57.18	-7.01	50.17	74.00	-23.83
	2390.000	Peak	53.34	-7.04	46.30	74.00	-27.70
	_	5	D   A	D 1 0 1		Δ.	
	Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
-			(	()	(	(======================================	(==)
	2381.000	Average	50.17	-24.73	25.44	54.00	-28.56
	2390.000	Average	46.30	-24.73	21.57	54.00	-32.43

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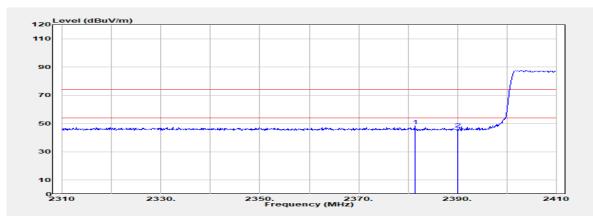
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M HOPPING Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2381.400	Peak	55.47	-7.02	48.45	74.00	-25.55
2390.000	Peak	53.14	-7.04	46.09	74.00	-27.91
_				_	_	
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
		, , ,	` '	` '	, ,	, /
2381.400	Average	48.45	-24.73	23.72	54.00	-30.28
2390.000	Average	46.09	-24.73	21.36	54.00	-32.64

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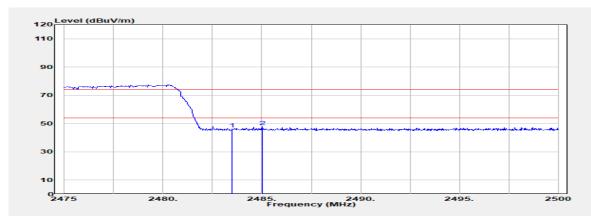
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M HOPPING Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Vertical

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2483.500	Peak	53.26	-7.20	46.06	74.00	-27.94
2485.025	Peak	55.03	-7.20	47.83	74.00	-26.17
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	46.06	-24.73	21.33	54.00	-32.67
2485.025	Average	47.83	-24.73	23.10	54.00	-30.90

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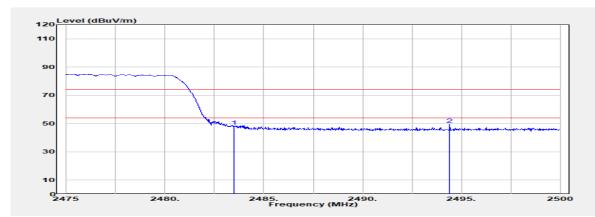
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M HOPPING Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.0/57

Test Mode :Bandedge Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
2483.500	Peak	55.48	-7.20	48.29	74.00	-25.71
2494.400	Peak	56.61	-7.24	49.36	74.00	-24.64
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2483.500	Average	48.29	-24.73	23.56	54.00	-30.44
2494.400	Average	49.36	-24.73	24.63	54.00	-29.37

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# 11.6.4 Radiated Spurious Emission

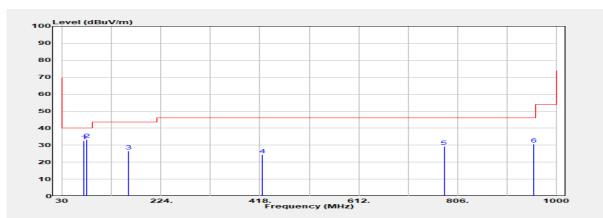
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

Test Mode :Tx Antenna Pol. :Vertical

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
71.710	Peak	52.15	-19.74	32.40	40.00	-7.60
78.500	Peak	54.89	-21.66	33.23	40.00	-6.77
159.010	Peak	42.68	-16.11	26.56	43.50	-16.94
422.850	Peak	37.35	-13.06	24.30	46.00	-21.70
779.810	Peak	36.23	-6.96	29.27	46.00	-16.73
956.350	Peak	35.09	-4.46	30.63	46.00	-15.37

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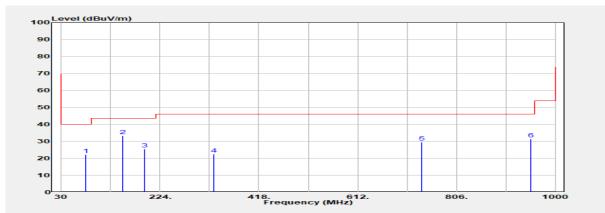
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
78.500	Peak	43.81	-21.66	22.15	40.00	-17.85
151.250	Peak	49.88	-16.44	33.44	43.50	-10.06
192.960	Peak	44.85	-19.40	25.45	43.50	-18.05
329.730	Peak	37.57	-15.05	22.52	46.00	-23.48
737.130	Peak	36.28	-6.83	29.45	46.00	-16.55
951.500	Peak	35.85	-4.47	31.39	46.00	-14.61

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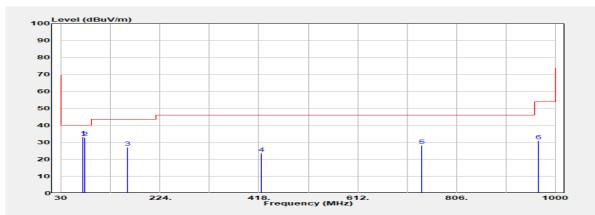
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :EDR 2M Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
71.710	Peak	53.12	-19.74	33.38	40.00	-6.62
76.560	Peak	53.82	-21.10	32.73	40.00	-7.27
159.010	Peak	43.34	-16.11	27.23	43.50	-16.27
422.850	Peak	36.59	-13.06	23.54	46.00	-22.46
738.100	Peak	34.95	-6.80	28.15	46.00	-17.85
967.020	Peak	35.20	-4.21	30.99	54.00	-23.01

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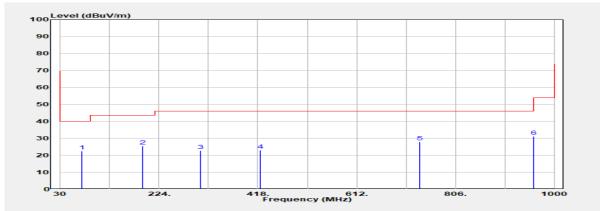
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :EDR 2M Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

Test Mode :Tx Antenna Pol. :Horizontal

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
71.710	Peak	42.15	-19.74	22.41	40.00	-17.59
191.990	Peak	44.66	-19.29	25.37	43.50	-18.13
304.510	Peak	38.75	-16.01	22.74	46.00	-23.26
422.850	Peak	36.01	-13.06	22.96	46.00	-23.04
736.160	Peak	34.70	-6.85	27.85	46.00	-18.15
959.260	Peak	35.51	-4.43	31.08	46.00	-14.92

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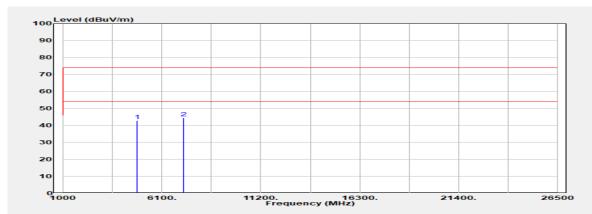
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.3/56

:Tx Antenna Pol. :Vertical Test Mode

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4804.000	Peak	44.76	-2.06	42.70	74.00	-31.30
7206.000	Peak	40.24	4.26	44.49	74.00	-29.51
<b>-</b>	Datastan	Da ala Alataral	Destre Occala	<b>A</b>	Δ	N 4
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
					•	
4804.000	Average	42.70	-24.73	17.97	54.00	-36.03
7206.000	Average	44.49	-24.73	19.76	54.00	-34.24

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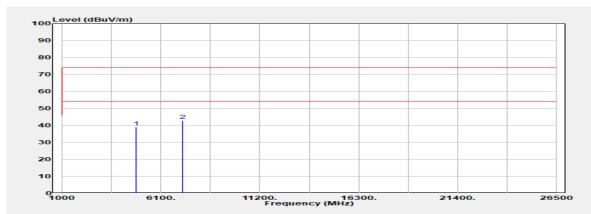
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4804.000	Peak	41.08	-2.06	39.02	74.00	-34.98
7206.000	Peak	38.54	4.26	42.79	74.00	-31.21
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4804.000	Average	39.02	-24.73	14.29	54.00	-39.71
7206.000	Average	42.79	-24.73	18.06	54.00	-35.94

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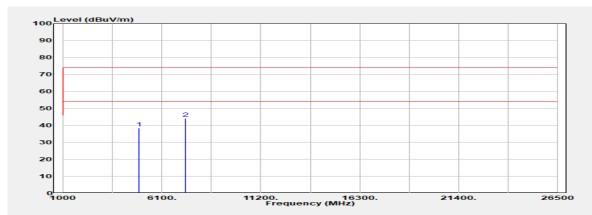
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Vertical

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4882.000	Peak	40.60	-2.12	38.47	74.00	-35.53
7323.000	Peak	39.52	4.73	44.24	74.00	-29.76
_				_	_	
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
MHz	Mode AV	FS (dBµV/m)	Factor	Value	Limit@3m (dBuV/m)	(AD)
IVITIZ	AV	(ασμν/ιιι)	(dB)	(dBuV/m)	(ubuv/III)	(dB)
	_					
4882.000	Average	38.47	-24.73	13.74	54.00	<b>-</b> 40.26
7323.000	Average	44.24	-24.73	19.51	54.00	-34.49

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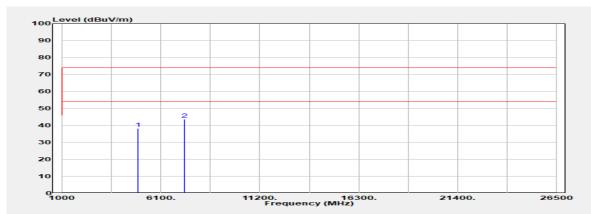
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4882.000	Peak	40.23	-2.12	38.10	74.00	-35.90
7323.000	Peak	38.83	4.73	43.56	74.00	-30.44
-	<b>D</b> ( )	D   A	D 1 0 1		•	
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
			, ,			
4882.000	Average	38.10	-24.73	13.37	54.00	-40.63
7323.000	Average	43.56	-24.73	18.83	54.00	-35.17

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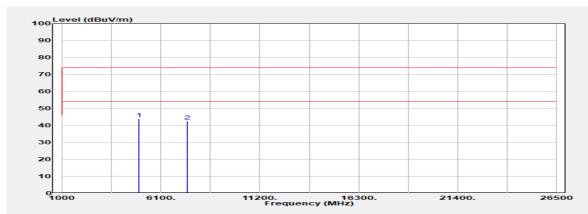
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: BR Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Vertical

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4960.000	Peak	45.58	-1.59	43.99	74.00	-30.01
7440.000	Peak	38.62	3.95	42.57	74.00	-31.43
<b>F</b>	Datastan	Da ala Alata al	Destre Occala	A	<b>A</b>	N.A. a. a. a. i. a.
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4960.000	Average	43.99	-24.73	19.26	54.00	-34.74
7440.000	Average	42.57	-24.73	17.84	54.00	-36.16

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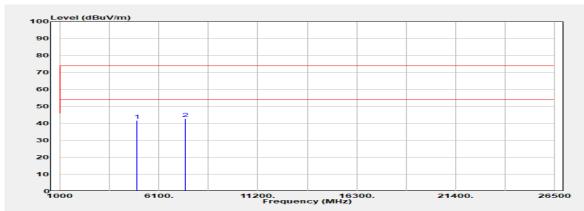
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :BR Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.3/56

Test Mode :Tx Antenna Pol. :Horizontal

EUT Pol :E2 Plane Engineer :Howard Huang



	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
	4960.000	Peak	43.46	-1.59	41.86	74.00	-32.14
	7440.000	Peak	38.77	3.95	42.72	74.00	-31.28
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS	Factor	Value	Limit@3m	
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
	4960.000	Average	41.86	-24.73	17.13	54.00	-36.87
	7440.000	Average	42.72	-24.73	17.99	54.00	-36.01
		0					

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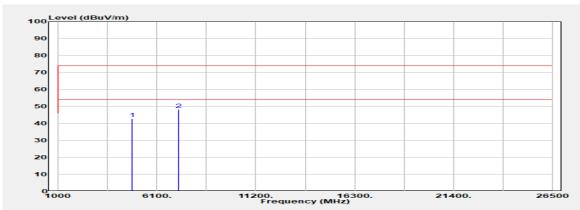
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Vertical

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
•	Mode	Reading Level		FS	@3m	3
		•			_	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
						_
1001000	5 .	44.00	0.00	40.77	74.00	04.00
4804.000	Peak	44.83	-2.06	42.77	74.00	-31.23
7206.000	Peak	43.99	4.26	48.25	74.00	-25.75
Eroa	Detector	Peak Actual	Duty Cycle	Averege	Averege	Morgin
Freq.			Duty Cycle	Average	Average	Margin
	Mode	FS	Factor	Value	Limit@3m	
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
		<u> </u>	, ,	, ,	1 1	
4804.000	Average	42.77	-24.73	18.04	54.00	-35.96
7206.000	Average	48.25	-24.73	23.52	54.00	-30.48
1200.000	Average	40.23	-24.13	23.32	54.00	-30.40

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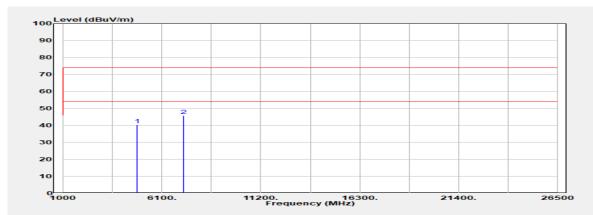
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2402 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4804.000	Peak	42.51	-2.06	40.46	74.00	-33.54
7206.000	Peak	41.42	4.26	45.68	74.00	-28.32
<b>-</b>	Datastan	Da ala Alataral	Destruction	<b>A</b>	<b>A</b>	N 4
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4804.000	Average	40.46	-24.73	15.73	54.00	-38.27
7206.000	Average	45.68	-24.73	20.95	54.00	-33.05

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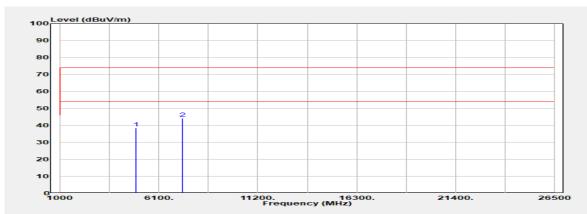
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :EDR 2M Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4882.000	Peak	40.54	-2.12	38.42	74.00	-35.58
7323.000	Peak	39.48	4.73	44.21	74.00	-29.79
_	5		5 . 6 .		•	
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	Limit@3m (dBuV/m)	(dB)
IVII IZ	ΛV	(ασμν/π)	(dD)	(dDd V/III)	(ubuv/iii)	(ub)
4882.000	Averege	38.42	-24.73	13.69	54.00	-40.31
	Average		_			
7323.000	Average	44.21	-24.73	19.48	54.00	-34.52

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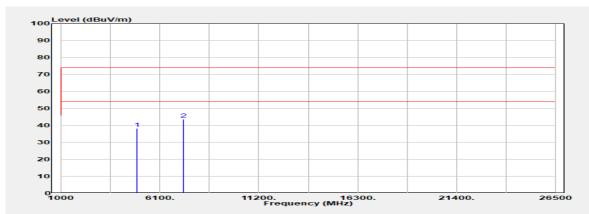
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2441 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4882.000	Peak	40.23	-2.12	38.11	74.00	-35.89
7323.000	Peak	38.98	4.73	43.71	74.00	-30.29
Frog	Detector	Peak Actual	Duty Cycle	Avorago	Average	Morgin
Freq.	Mode	Feak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4882.000	Average	38.11	-24.73	13.38	54.00	-40.62
7323.000	Average	43.71	-24.73	18.98	54.00	-35.02

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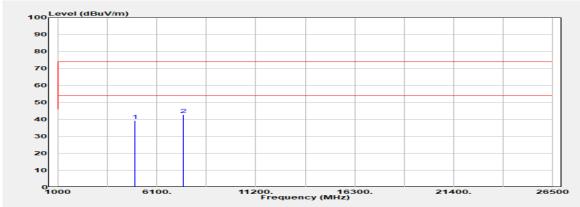
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode :EDR 2M Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.3/56

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :E2 Plane Engineer :Howard Huang



	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	N 41 I		•	٩D		_	٩D
	MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
	4960.000	Peak	40.88	-1.59	39.28	74.00	-34.72
	7440.000	Peak	38.95	3.95	42.90	74.00	-31.10
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS	Factor	Value	Limit@3m	
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
	4960.000	Average	39.28	-24.73	14.55	54.00	-39.45
	7440.000	Average	42.90	-24.73	18.17	54.00	-35.83

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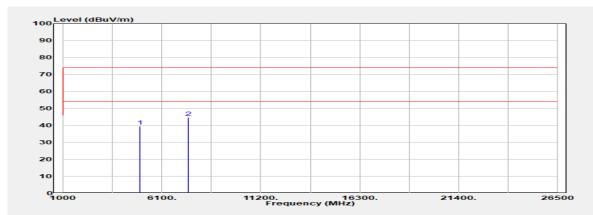
Report Number :TERF2303000419E2 Test Site :SAC D

Operation Mode: EDR 2M Test Date :2023-03-16

Test Frequency :2480 MHz Temp./Humi. :21.3/56

:Tx Test Mode Antenna Pol. :Horizontal

**EUT Pol** :E2 Plane Engineer :Howard Huang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
4960.000	Peak	41.27	-1.59	39.67	74.00	-34.33
7440.000	Peak	40.83	3.95	44.78	74.00	-29.22
<b>-</b>	Datastan	Da ala Alataral	Destruction	<b>A</b>	Δ	N 4
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
		•	· ·	,		· ·
4960.000	Average	39.67	-24.73	14.94	54.00	-39.06
7440.000	Average	44.78	-24.73	20.05	54.00	-33.95

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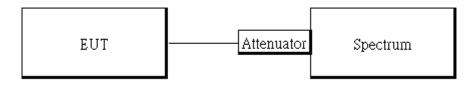
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## 12 FREQUENCY SEPARATION

#### Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 2/3\*20dB bandwidth of the hopping channel, whichever is greater.

#### 12.2 Test Setup



#### 12.3 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- The testing follows ANSI C63.10:2013.
- 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 center frequency of spectrum analyzer = middle of hopping channel.
- 5. Set the RBW approximately 30% of the channel spacing, VBW ≥ RBW.
- 6. Adjust Span to Wide enough to capture the peaks of two adjacent channels.
- 7. Sweep = auto.
- 8. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

#### 12.4 **Measurement Result**

Channel separation (MHz)	Limit	Result
1	≥25 kHz or 2/3 times 20dB bandwidth	PASS

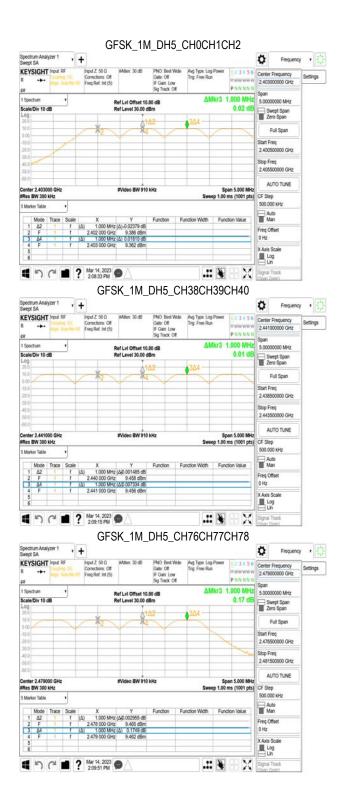
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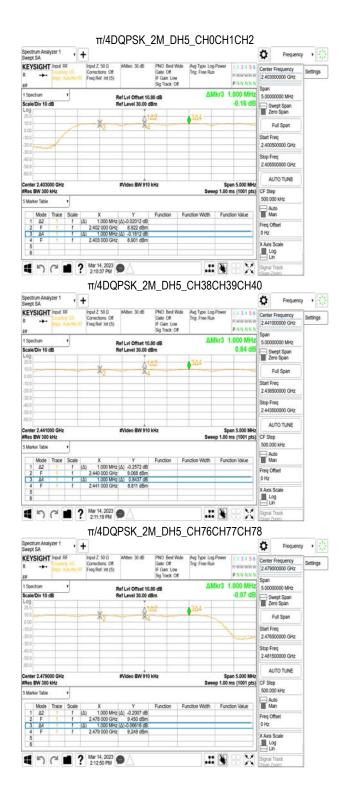
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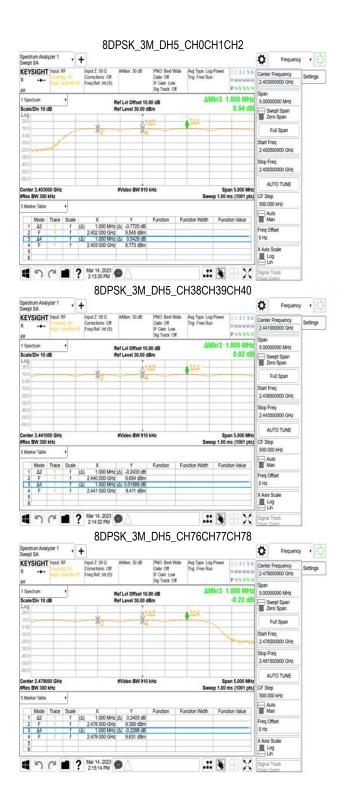
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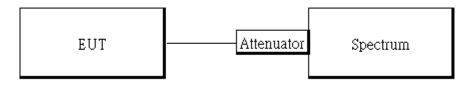
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# 13 NUMBER OF HOPPING FREQUENCY

#### 13.1 Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

#### 13.2 Test Setup



#### 13.3 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013.
- 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 spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 5. Set the spectrum analyzer as RBW = 30% of the channel spacing, VBW ≥ RBW., Detector = Peak
- 6. Max hold, view and count how many channel in the band.

#### 13.4 Measurement Result

#### Tabular Data of Total Channel Number

	Channel Number	Limit
2.4 GHz – 2.441 GHz	40	
2.441 GHz – 2.4835 GHz	39	>15
2.4 GHz ~2.4835 GHz	(40+39) = 79	

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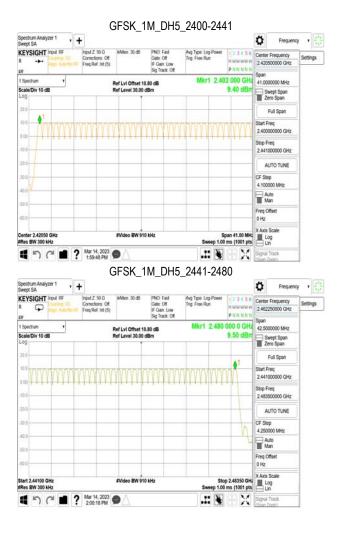
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#### π/4DQPSK 2M DH5 2400-2441 ٥ KEYSIGHT Input RF rd 2.402 000 GHz 41,0000000 MHz Ref Lvi Offset 10.80 dB Swept Span Zero Span Full Span Stop Freq 2.441000000 GHz AUTO TUNE CF Step 4.100000 MHz Auto Man Freq Offset 0 Hz Span 41.00 MH; Sweep 1.00 ms (1001 pts ■ ? Mar 14, 2023 ● Signal Trac π/4DQPSK\_2M\_DH5\_2441-2480 Spectrum Analyzer 1 Swept SA ٥ Frequency + KEYSIGHT Input RF 9 2.462250000 GH Ref Lvi Offset 10.80 dB Ref Level 30.00 dBm 42.5000000 MHz Scale/Div 10 dB 8.85 d Swept Span Zero Span Full Span 2.441000000 GHz AUTO TUNE Auto Man Freq Offset 0 Hz Stop 2.48350 GHz Sweep 1.00 ms (1001 pts) Log Lin

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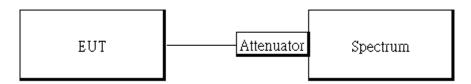
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# 14 TIME OF OCCUPANCY (DWELL TIME)

#### **Standard Applicable**

Frequency hopping systems operating in the 2400MHz-2483.5MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

#### 14.2 Test Setup



#### 14.3 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C63.10:2013.
- 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 center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz, Detector = Peak, Adjust Sweep = 2~8ms.
- 6. Repeat above procedures until all frequency of the interest measured were complete.

Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels.

Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2 DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4 DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

Note: the result of the complete test default channel at 1Mbps is recorded on the test report, 2Mbps, and 3Mbps only records the measurement result at middle channel that reveals no much deviation.

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# 14.4 Measurement Result GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)			
	DH1	152.00	400ms			
Mid	DH3	278.40	400ms			
	DH5	316.80	400ms			

## π/4 DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	2DH1	156.80	400ms
Mid	2DH3	281.60	400ms
	2DH5	318.40	400ms

### 8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
Mid	3DH1	156.80	400ms
	3DH3	281.60	400ms
	3DH5	318.40	400ms

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## GFSK (1Mbps):

CH Mid	DH1 time slot	=	0.475 *	(1600/2/79) *	31.6 =	152.00 (ı	ms)	,
--------	---------------	---	---------	---------------	--------	-----------	-----	---

(1600/4/79) \* DH3 time slot = 1.740 \* 31.6 = 278.40 (ms)

DH5 time slot = 2.970 \* (1600/6/79) \* 31.6 = 316.80 (ms)

# $\pi/4$ -DQPSK (2Mbps):

	CH Mid	2DH1 time slot =	0.490 *	(1600/2/79) *	31.6 =	156.80 (	(ms	)
--	--------	------------------	---------	---------------	--------	----------	-----	---

(1600/4/79) \* 2DH3 time slot = 1.760 \*31.6 = 281.60 (ms) 2DH5 time slot = 2.985 \* (1600/6/79) \* 31.6 = 318.40 (ms)

#### 8-DPSK (3Mbps):

CH Mid	3DH1 time slot =	0.490 *	(1600/2/79) *	31.6 =	156.80 (ms)

3DH3 time slot = 1.760 \* (1600/4/79) \* 31.6 = 281.60 (ms) 3DH5 time slot = 2.985 \* (1600/6/79) \* 31.6 = 318.40 (ms)

A period time = 0.4 (s) \* 79 = 31.6 (s)

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Swept Span Zero Span

Auto Man

Freq Offse

X Axis Scale

0 Hz

٥

2.441000000 GHz

0.000000000 Hz

Swept Span Zerp Span

Full Span

2.441000000 GHz

AUTO TUNE

Auto Man

X Axis Scale Log Lin

٥

2.441000000 GHz

2.441000000 GHz

AUTO TUNE

Stop Freq

Auto Man

Freq Offse 0 Hz

X Axis Sc Log Lin

.: W

Frequency +

Full Span

Settings

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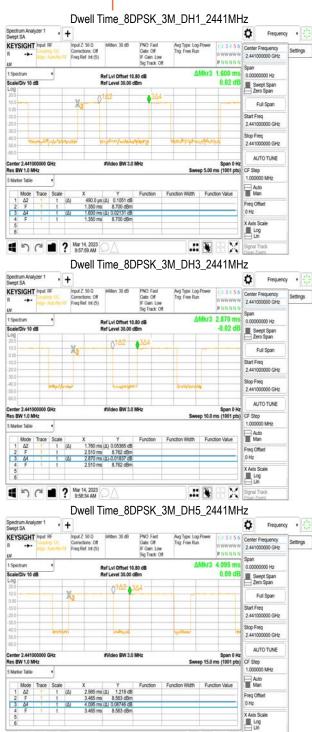
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#### 15 ANTENNA REQUIREMENT

#### 15.1 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.

#### 15.2 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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