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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT





Applicant: Brivo Systems LLC

7700 Old Georgetown Road Suite 300, Bethesda, MD 20814,

United States

Manufacturer: TELE System Communications Pte. Ltd.

5F,No 437, Tao Ying Rd., Taoyuan 33068, Taiwan

Product Name: ACS300 Access Control System

Brand Name: Brivo

Model No.: B-ACS300V2-E, B-ACS300V2-S

Model Difference: 1. Different server: B-ACS300V2-E for ON Air Server,

B-ACS300V2-S for no Server

2. Different enclosures: Enclosure 1 (white color) L/W/H: 188.3/190.5/38.6 mm Enclosure 2 (black color) L/W/H: 193.8/199.5/66.7 mm

TERF2310002514ER **Report Number:**

FCC ID O9U-ACS300-2

Date of EUT Received: October 4, 2023

Date of Test: October 5, 2023 ~ November 14, 2023

Issue Date: January 29, 2024

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.

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

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Revision History							
Report Number	Revision	Description	Issue Date	Revised By	Remark		
TERF2310002514ER	00	Original.	January 11, 2024	Susan Lin			
TERF2310002514ER	01	1. Update chapter 2.5 and 2.6 2. Add duty cycle information in page 20.	January 29, 2024	Susan Lin	*		

Note:

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

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GENERAL INFORMATION

1.1 **Product Description**

Product Name:	ACS300 Access Control System
Brand Name:	Brivo
Model No.:	B-ACS300V2-E, B-ACS300V2-S
Model Difference:	1. Different server: B-ACS300V2-E for ON Air Server, B-ACS300V2-S for no Server 2. Different enclosures: Enclosure 1 (white color) L /W/H: 188.3/190.5/38.6 mm Enclosure 2 (black color) L /W/H: 193.8/199.5/66.7 mm
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	3C2330TR0200036
Power Supply:	56Vdc from POE
Test Software (Name/Version):	Tera Term/4.102 Connect with MT8852B

1.2 **RF Specification**

Radio Technology:	BT BR+EDR
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	6.88 dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	≤ 0.4s

1.3 **Antenna Designation**

Antenna	Freq.	Peak Antenna
Type	(MHz)	Gain (dBi)
PIFA	2402~2480	1.35

Note: Antenna information is provided by the applicant.

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1.4 Test Methodology of Applied Standards

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

1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
		SAC 1		
		SAC 2		
		SAC 3		
	No 124 We Keep Dood Now Toingi	Conduction 1		
	No.134, Wu Kung Road, New Taipei	Conducted 1	TM/0027	
	Industrial Park, Wuku District, New	Conducted 2	TW0027	
	Taipei City, Taiwan.	Conducted 3		
		Conducted 4		
		Conducted 5		
SGS Taiwan Ltd.		Conducted 6		
Central RF Lab.		Conduction C	C C C D	TW3702
(TAF code 3702)		SAC C		
		SAC D		
		SAC G		
	No 2 Kaji 1et Dd. Cujeben Dietriet	Conducted A		
	No.2, Keji 1st Rd., Guishan District,	Conducted B	TW0028	
	Taoyuan City, Taiwan 333	Conducted C		TW3702
		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.

1.6 Special Accessories

There is no special accessory used while test was conducted.

1.7 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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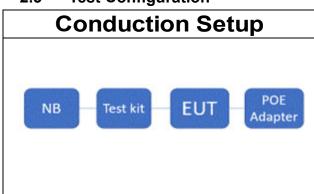
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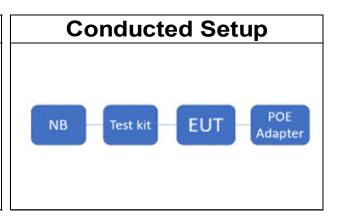
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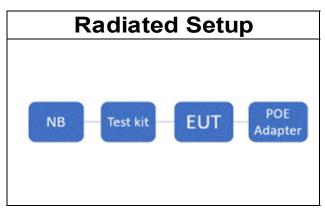


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Test Configuration







2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction 1						
EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. CAL DUE.						
Notebook	Lenovo	L480	PF-1D07MW 19/08	N/A	N/A	
Test kit	FTDI	FT232HQ	N/A	N/A	N/A	
PoE Adapter	GME	GME40A- 480050FDA	N/A	N/A	N/A	

Conducted Emission Test Site: Conducted 1						
EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. CAL DUE.						
Test Kit	FTDI	FT232HQ	N/A	N/A	N/A	
PoE Adapter	GME	GME40A- 480050FDA	N/A	N/A	N/A	
Notebook	HP	HSN-Q35C-4	5CD2428X45	N/A	N/A	

	Radiated Emission Test Site: SAC 3						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.		
Notebook	Lenovo	L480	PF-1D07MW 19/08	N/A	N/A		
Test kit	FTDI	FT232HQ	N/A	N/A	N/A		
PoE Adapter	GME	GME40A- 480050FDA	N/A	N/A	N/A		

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b)(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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DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

2400~2483.5 MHz							
СН	Freq. (MHz)	СН	Freq. (MHz)	СН	Freq. (MHz)	СН	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

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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 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.
- 4 Investigation has been done on all the possible configurations for searching the worst case.

ANTNNA PORT CONDUCTED TEST					
AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE		
Peak Output Pov	ver, 20dB Band Wid	th, Spurious Emiss	ion		
0 to 78	0,39,78	GFSK	DH5		
0 to 78	0,39,78	π/4-DQPSK	2DH5		
0 to 78	0,39,78	8-DPSK	3DH5		
	Band Edge				
0 to 78	0,78	GFSK/π/4-DQPSK	DH5/2DH5		
	Frequency Separa	tion			
	0 1 2 20 20 10 76 7	GFSK	DH5		
0 to 78	7,78	π/4-DQPSK	2DH5		
		8-DPSK	3DH5		
Number of Ho	opping Frequency, H	lopping Band edge			
0 to 78	0 to 78	GFSK/π/4-DQPSK	DH5/2DH5		
Tin	ne of Occupancy(Dw	vell time)			
		GFSK	DH1/DH3/DH5		
0 to 78	39	π/4-DQPSK	2DH1/2DH3/2DH5		
		8-DPSK	3DH1/3DH3/3DH5		
1	1				
AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE		
TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)					
0 to 78	39	π/4-DQPSK	2DH5		
TRANSMIT RAD	DIATED EMISSION T	EST (ABOVE 1 GH	z)		
0 to 78	0,39,78	GFSK/π/4-DQPSK	DH5/2DH5		
	AVAILABLE CHANNEL Peak Output Pove	AVAILABLE CHANNEL Peak Output Power, 20dB Band Wide 0 to 78	AVAILABLE CHANNEL TESTED CHANNEL MODULATION Peak Output Power, 20dB Band Width, Spurious Emiss 0 to 78 0,39,78 GFSK 0 to 78 0,39,78 π/4-DQPSK 0 to 78 0,39,78 8-DPSK Band Edge 0 to 78 0,78 GFSK/π/4-DQPSK Frequency Separation 0 to 78 0,1,2,38,39,40,76,7 7,78 GFSK π/4-DQPSK 8-DPSK Number of Hopping Frequency, Hopping Band edge 0 to 78 0 to 78 GFSK/π/4-DQPSK Time of Occupancy(Dwell time) 0 to 78 39 π/4-DQPSK AVAILABLE CHANNEL TESTED CHANNEL MODULATION TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHOULD GROW) TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHOULD GROW)		

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	Test Items Uncertain		nty
AC Power Line Conducted Emission	+/-	2.32	dB
Output Power measurement	+/-	1	dB
Emission Bandwidth	+/- 1.53 H		Hz
Conducted 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						
Polarization: Vertical	+/-	2.8	dB	9kHz~30MHz		
	+/-	4.82	dB	30MHz - 1000MHz		
	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		
Polarization: Horizontal	+/-	2.8	dB	9kHz~30MHz		
	+/-	4.54	dB	30MHz - 1000MHz		
	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		

Note:

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

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MEASUREMENT EQUIPMENT USED

6.1 **Emission from AC power line**

	AC Power-Line Conducted Emission Test Site: Conduction 1						
EQUIPMENT TYPE	MFR MODEL NUMBER SERIAL NUMBER LAST CAL.						
EMI Test Receiver	R&S	ESR 7	102525	02/18/2023	02/17/2024		
Bluetooth Test Set	Anritsu	MT8852B	6K00006107	08/13/2023	08/12/2024		
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2023	06/21/2024		
LISN	SCHWARZBECK	NSLK 8127	01040	09/06/2023	09/05/2024		
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM- BM-3000	161207	06/22/2023	06/21/2024		
Test Software	audix	e3	Ver. 9 210322	N.C.R	N.C.R		

Conducted Measurement 6.2

0.2 00.10	0.2 Conducted incucaronicity						
	Conducted Emission Test Site: Conducted 1						
EQUIPMENT TYPE	MFR MODEL NUMBER SERIAL NUMBER LAST CAI		LAST CAL.	CAL DUE.			
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071571	06/07/2023	06/06/2024		
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R		
Power Meter	Anritsu	ML2496A	1242004	10/24/2023	10/23/2024		
Power Sensor	Anritsu	MA2411B	1207365	10/24/2023	10/23/2024		
Power Sensor	Anritsu	MA2411B	1207368	10/24/2023	10/23/2024		
Bluetooth Test Set	Anritsu	MT8852B	6K00006107	08/13/2023	08/12/2024		
DC Block	Mini-Circuits	BLK-18-S+	1	12/13/2022	12/12/2023		
2WayDivider	Titan	T0510E2W118Q	22015157	12/13/2022	12/12/2023		

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Radiated Measurement 6.3

		Radiated Emissio	n Test Site: SAC 3		
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/03/2023	07/02/2024
Horn Antenna	SCHWARZBECK	BBHA9120D	1441	09/23/2023	09/22/2024
Bi-log Antenna	SCHWARZBECK	VULB9168	378	08/09/2023	08/08/2024
Loop Antenna	ETS.LINDGREN	6502	148045	10/13/2023	10/12/2024
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY63440386	01/17/2023	01/16/2024
EMI Test Receiver	R&S	ESCI 7	100759	08/21/2023	08/20/2024
Bluetooth Test Set	Anritsu	MT8852B	6K00006107	08/13/2023	08/12/2024
Pre-Amplifier	EMC Instruments	EMC118A45SEE	980868	08/31/2023	08/30/2024
Pre-Amplifier	EMC Instruments	EMC184045B	980135	08/31/2023	08/30/2024
Pre-Amplifier	НР	8447D	2944A07676	08/31/2023	08/30/2024
Attenuator	Mini-Circuit	BW-S10W2+	4	12/13/2022	12/12/2023
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	12/13/2022	12/12/2023
High Pass Filter	WI	WHKX4.0/18G- 10SS	22	12/13/2022	12/12/2023
Coaxial Cables	EMCI+Huber Suhner	EMC107-SM-SM- 1000+EMC107-SM- SM-1500+EMC107- SM-SM- 8000+SUCOFLEX 104PEA	RX Cable 9K-18G (221110+221106+2 21212+MY4251/4P EA)	08/31/2023	08/30/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062 /2	08/31/2023	08/30/2024
Site Cal	SGS	SAC 3	N/A	08/31/2023	08/30/2024
Test Software	audix	e3	Ver. 9.210616	N.C.R	N.C.R

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

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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		

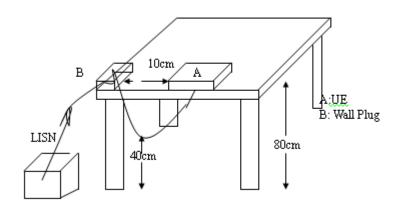
Note

- 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 C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

7.3 **Test Setup**



7.4 **Measurement Procedure**

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

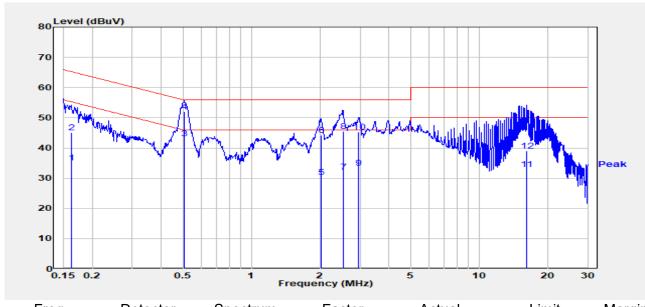
Report Number :TERF2310002514ER Test Site :Conduction 1

Operation Mode :BT **Test Date** :2023-11-07

:120V/60Hz Power Temp./Humi. :24.0°C/57%

Probe :Nick Lin Engineer

Note:



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.162	Average	24.93	10.13	35.06	55.38	-20.32
0.162	QP	35.06	10.13	45.19	65.38	-20.19
0.507	Average	32.87	10.17	43.04	46.00	-2.96
0.507	QP	41.92	10.17	52.09	56.00	-3.91
2.023	Average	20.16	10.19	30.35	46.00	-15.65
2.023	QP	33.97	10.19	44.16	56.00	-11.84
2.527	Average	21.77	10.23	32.00	46.00	-14.00
2.527	QP	35.32	10.23	45.55	56.00	-10.45
2.962	Average	23.08	10.25	33.33	46.00	-12.67
2.962	QP	35.06	10.25	45.31	56.00	-10.69
16.140	Average	22.49	10.48	32.97	50.00	-17.03
16.140	QP	28.54	10.48	39.02	60.00	-20.98

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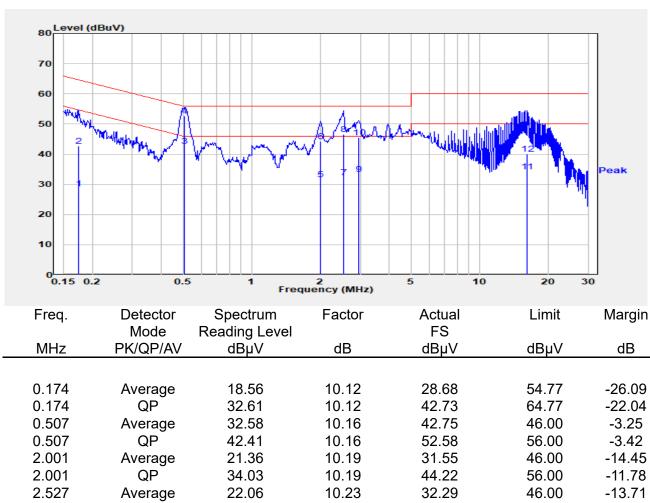
Report Number :TERF2310002514ER **Test Site** :Conduction 1

Operation Mode :BT **Test Date** :2023-11-07

:120V/60Hz Power Temp./Humi. :24.0°C/57%

Probe :N Engineer :Nick Lin

Note:



	Mode	Reading Level		FS		
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.174	Average	18.56	10.12	28.68	54.77	-26.09
0.174	QP	32.61	10.12	42.73	64.77	-22.04
0.507	Average	32.58	10.16	42.75	46.00	-3.25
0.507	QP	42.41	10.16	52.58	56.00	-3.42
2.001	Average	21.36	10.19	31.55	46.00	-14.45
2.001	QP	34.03	10.19	44.22	56.00	-11.78
2.527	Average	22.06	10.23	32.29	46.00	-13.71
2.527	QP	36.34	10.23	46.57	56.00	-9.43
2.962	Average	23.11	10.26	33.37	46.00	-12.63
2.962	QP	35.28	10.26	45.54	56.00	-10.46
16.140	Average	23.71	10.53	34.24	50.00	-15.76
16.140	QP	29.48	10.53	40.01	60.00	-19.99

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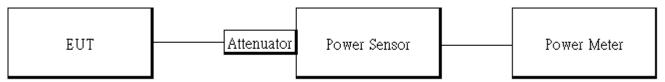
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8 PEAK OUTPUT POWER MEASUREMENT

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.
- 3. Duty cycle of test signal is < 98 %, duty factor shall be considered.
- 4. 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)
- 5. Record the max. reading.
- 6. Repeat above procedures until all default test channel is completed.

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8.4 Peak & Average Power Measurement Result

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cy- cle)
DH5	77.20	1.12
2DH5	77.20	1.12
3DH5	77.20	1.12

1M BR mode (Peak):

СН	Freq. (MHz)	Power set	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	4.70	2.951	1000
Mid	2441	default	4.19	2.624	1000
High	2480	default	4.87	3.069	1000

1M BR mode (Average):

	(3 - /				
СН	Freq. (MHz)	Power set	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	4.40	2.757	1000
Mid	2441	default	3.92	2.468	1000
Hiah	2480	default	4.60	2.887	1000

2M EDR mode (Peak):

СН	Freq. (MHz)	Power set	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	6.54	4.508	125
Mid	2441	default	6.22	4.188	125
High	2480	default	6.88	4.875	125

2M EDR mode (Average):

СН	Freq. (MHz)	Power set	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	4.08	2.561	125
Mid	2441	default	3.78	2.390	125
High	2480	default	4.39	2.750	125

3M EDR mode (Peak):

СН	Freq. (MHz)	Power set	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	6.21	4.178	125
Mid	2441	default	5.91	3.899	125
High	2480	default	6.65	4.624	125

3M EDR mode (Average):

	• • •				
СН	Freq. (MHz)	Power set	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	default	3.31	2.145	125
Mid	2441	default	3.01	2.002	125
High	2480	default	3.68	2.336	125

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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	1.046	0.70
Mid	1.047	0.70
High	1.047	0.70

π/4-DQPSK

СН	20 dB BW	2/3 BW
	(MHz)	(MHz)
Low	1.272	0.85
Mid	1.273	0.85
High	1.277	0.85

8-DPSK

СН	20 dB BW (MHz)	2/3 BW (MHz)
Low	1.296	0.86
Mid	1.296	0.86
High	1.292	0.86

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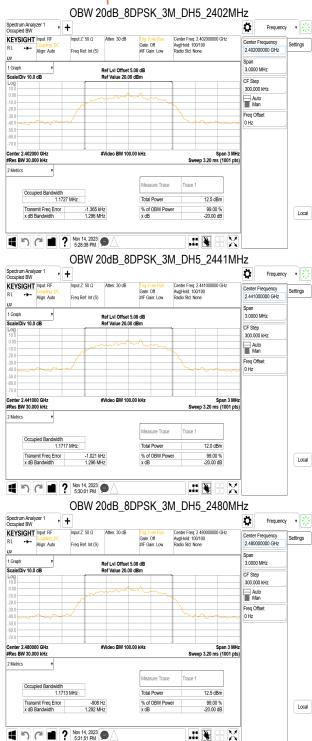
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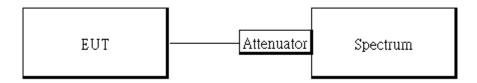
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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

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

10.2 Test Setup



10.3 Measurement Procedure

10.3.1 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.

10.4 Measurement Result

See next page for test plots.

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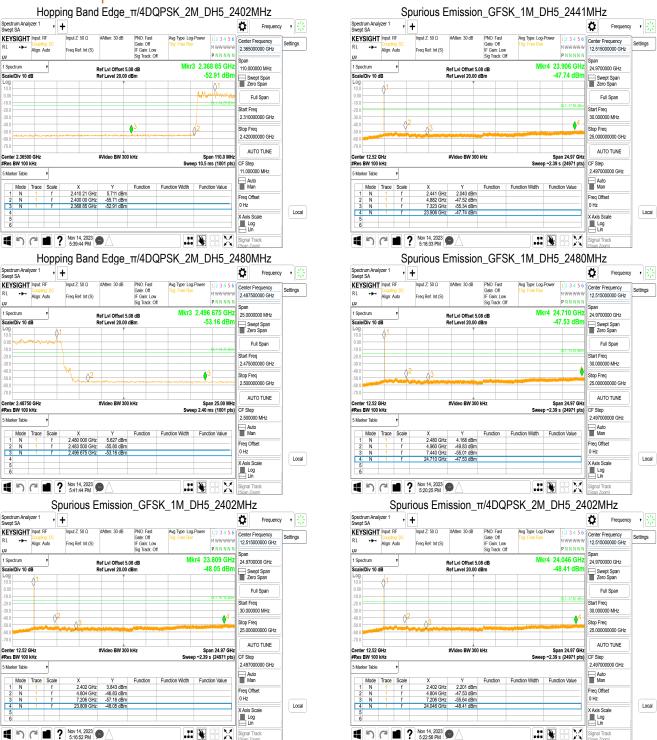
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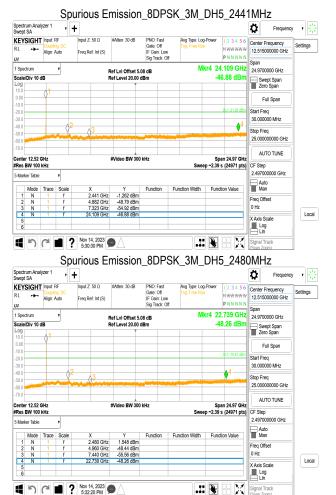
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Spurious Emission π/4DQPSK 2M DH5 2441MHz Ö KEYSIGHT Input RF # 7: 50 O Settings 12.515000000 GHz PNNNNI Span 24.9700000 GHz Mkr4 23.480 GHz 1 Spectrum -48.19 dBn Swept Span Zero Span Full Span •4 Stop Freq 25.000000000 GHz Center 12.52 GHz #Res BW 100 kHz #Video BW 300 kHz 2.497000000 GHz Auto Man Function Width Function Value Freq Offse 0 Hz Local X Axis Scale 1 Nov 14, 2023 S:24:22 PM .:: 👺 X Spurious Emission_π/4DQPSK_2M_DH5_2480MHz Frequency v Ö KEYSIGHT Input: RF Settings 12.515000000 GHz PNNNN Mkr4 23.179 GHz 1 Spectrum 24.9700000 GHz Scale/Div 10 dB -47 76 dBi Swept Span Zero Span Full Span Center 12.52 GHz #Res BW 100 kHz #Video BW 300 kHz Span 24.97 GHz Sweep ~2.39 s (24971 pts) CF Step 2.497000000 GHz Auto Man Mode Trace Scale Function Function Width Function Value Freq Offse 0 Hz Local X Axis Scale Log .:: 👺 1 Nov 14, 2023 5:26:51 PM Spurious Emission_8DPSK_3M_DH5_2402MHz Frequency v Spectrum Analyzer 1 Swept SA Ö KEYSIGHT Input: RF Input Z: 50 Q Settings 12.515000000 GHz PNNNN Mkr4 24.606 GHz 1 Spectrum 24.9700000 GHz Ref Lvi Offset 5.08 dB Ref Level 20.00 dBm Scale/Div 10 dB -48 46 dBi Swept Span Zero Span Full Span



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2.497000000 GHz Auto Man

Local

Freq Offse 0 Hz

X Axis Scale

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Center 12.52 GHz #Res BW 100 kHz

Mode Trace Scal

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Function Function Width Function Value

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11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 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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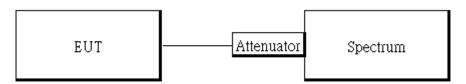


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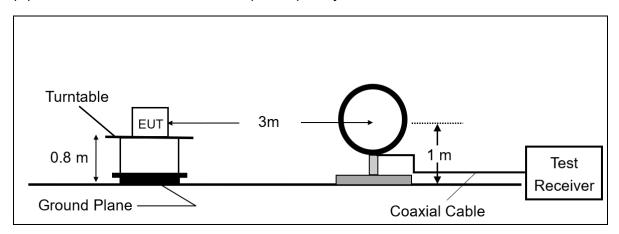
Test Setup

11.2.1 **Duty Cycle Correction Factor**

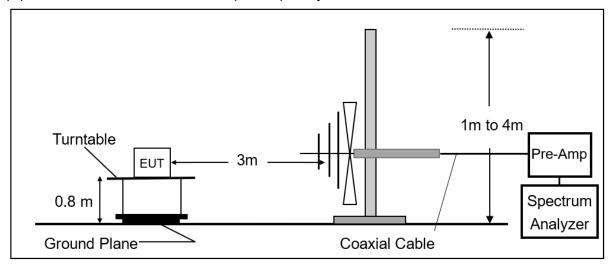


11.2.2 **Radiated Emission**

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



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



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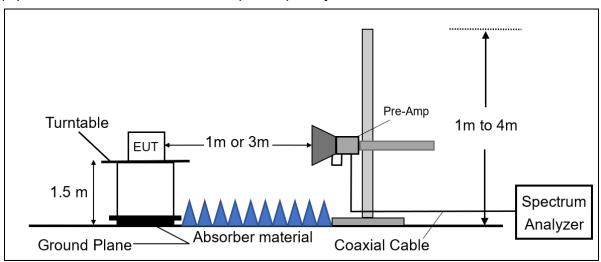
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(C) Radiated Emission Test Set-Up, Frequency Above 1 GHz.



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

- 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 μ V/m) = SPA. Reading level(dB μ 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

Bluetooth 1M

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

Bluetooth 2M

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

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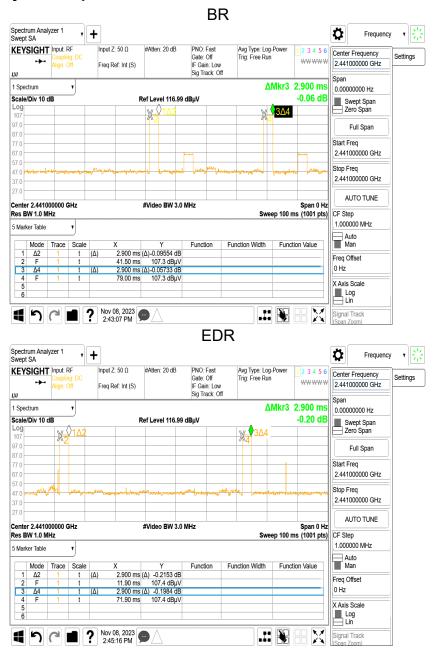
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11.6.2 **Duty Cycle test plot**



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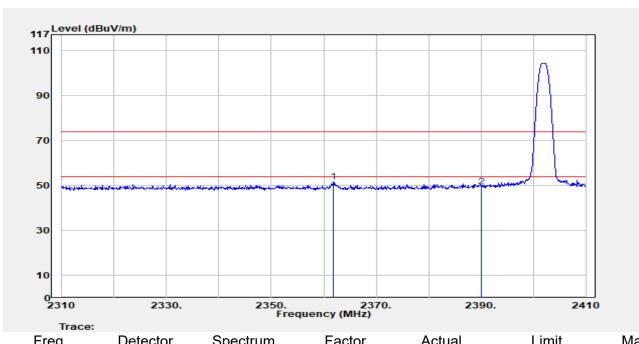
11.6.3 Bandedge Result

Report Number :TERF2310002514ER **Test Site** :SAC 3

Operation Mode Test Date :2023-11-08 :BR

:23.2°C/61% **Test Frequency** :2402 MHz Temp./Humi.

Test Mode :Bandedge Antenna Pol. :Vertical **EUT Pol** :H Plane Engineer :Nick Lin



	Trace:						
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBμV/m	dB
							_
	2361.800	Peak	56.16	-4.60	51.57	74.00	-22.43
	2390.000	Peak	54.21	-4.64	49.57	74.00	-24.43
	Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average	Margin
	MHz	AV	rs (dBµV/m)	(dB)	(dBuV/m)	Limit@3m (dBuV/m)	(dB)
_	IVII IZ		(аррулп)	(db)	(abaviii)	(abav/iii)	
	2361.800	Average	51.57	-24.73	26.84	54.00	-27.16
	2361.800 2390.000	Average Average	51.57 49.57	-24.73 -24.73	26.84 24.84	54.00 54.00	-27.16 -29.16

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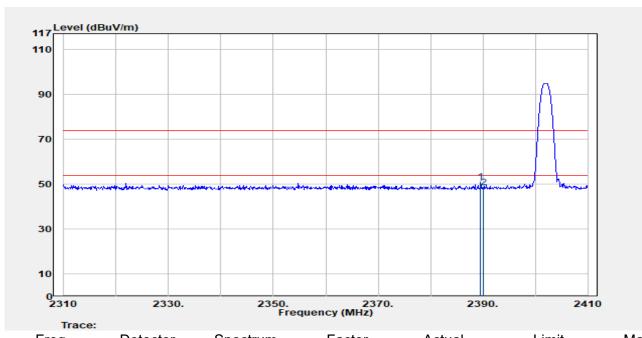
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :BR Test Date :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2℃/61%

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



	mace:						
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dΒμV/m	dB
	2389.600	Peak	55.58	-4.64	50.94	74.00	-23.06
	2390.000	Peak	53.07	-4.64	48.43	74.00	-25.57
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Marain
	•			, ,	\	1 : :4 🔾 0	wargin
	·	Mode	FS	Factor	Value	Limit@3m	Margin (dB)
	MHz			, ,	Value (dBuV/m)	Limit@3m (dBuV/m)	•
,	·	Mode	FS	Factor		_	•
	·	Mode	FS	Factor		_	•
·	MHz	Mode AV	FS (dBµV/m)	Factor (dB)	(dBuV/m)	(dBuV/m)	(dB)

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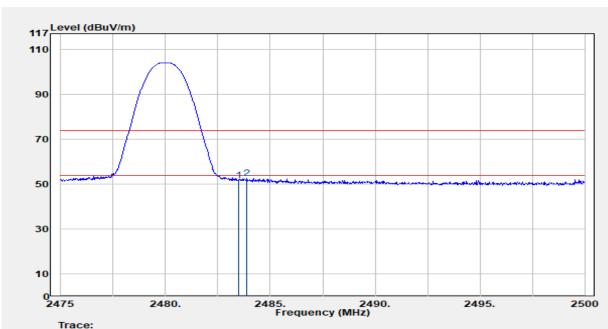
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :BR Test Date :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



II acc.						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dΒμV/m	dB
2483.500	Peak	56.44	-4.85	51.59	74.00	-22.41
2483.850	Peak	57.57	-4.85	52.72	74.00	-21.28
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	51.59	-24.73	26.86	54.00	-27.14
2483.850	Average	52.72	-24.73	27.99	54.00	-26.01

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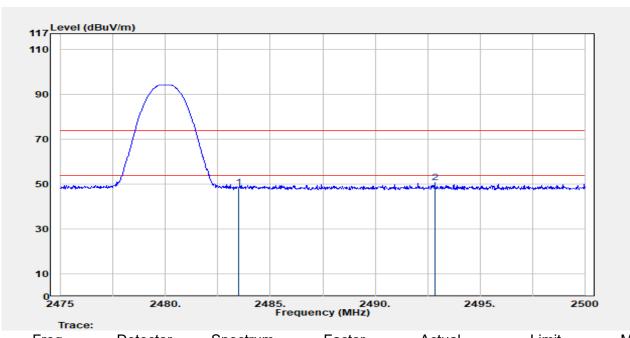
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Bandedge :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



	Trace:						
	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	53.48	-4.85	48.63	74.00	-25.37
	2492.850	Peak	55.56	-4.84	50.72	74.00	-23.28
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS	Factor	Value	Limit@3m	(dB)
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	()
	2483.500	Average	48.63	-24.73	23.90	54.00	-30.10
	2483.500 2492.850	Average Average	48.63 50.72	-24.73 -24.73	23.90 25.99	54.00 54.00	-30.10 -28.01

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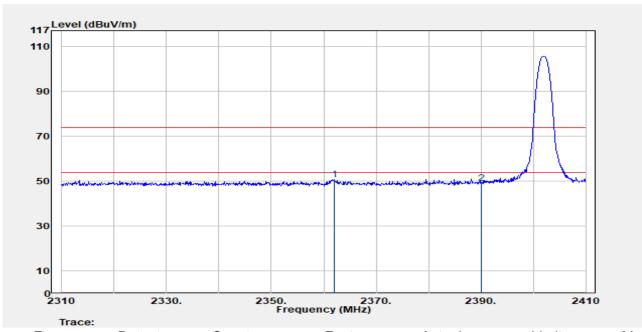
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Bandedge :Vertical

EUT Pol :H Plane Engineer :Nick Lin



mace.						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dBμV/m	dB
2362.000	Peak	55.44	-4.60	50.84	74.00	-23.16
2390.000	Peak	53.76	-4.64	49.11	74.00	-24.89
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
MHz	Mode AV	FS (dBµV/m)	Factor (dB)	Value (dBuV/m)	Limit@3m (dBuV/m)	(dB)
IVII IZ	Av	(ασμν/π)	(GD)	(dDd V/III)	(dbdv/iii)	
2362.000	Average	50.84	-24.73	26.11	54.00	-27.89
2390.000	Average	49.11	-24.73	24.38	54.00	-29.62

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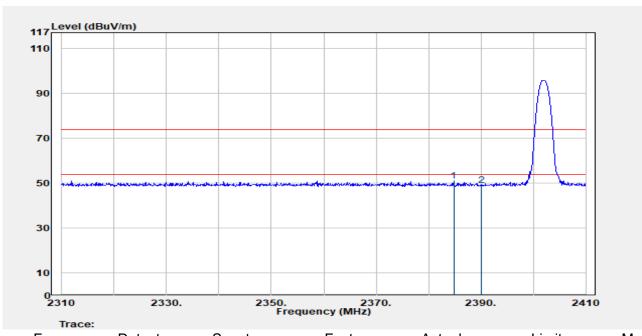
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :EDR 2M Test Date :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2℃/61%

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



	mace.						
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
	2384.800	Peak	55.83	-4.64	51.20	74.00	-22.80
	2390.000	Peak	53.80	-4.64	49.15	74.00	-24.85
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS (dDay)(ma)	Factor	Value	Limit@3m	(dB)
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	
	2384.800	Average	51.20	-24.73	26.47	54.00	-27.53
	2390.000	Average	49.15	-24.73	24.42	54.00	-29.58

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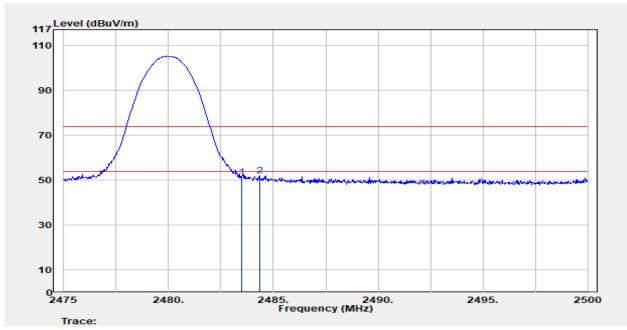
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Bandedge :Vertical

EUT Pol :H Plane Engineer :Nick Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	@3m dBµV/m	dB
		p		p ,	p. 1,111	
2483.500	Peak	56.32	-4.85	51.47	74.00	-22.53
2484.375	Peak	56.97	-4.85	52.12	74.00	-21.88
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
•	Mode	FS	Factor	Value	Limit@3m	Margin (dB)
Freq.			• •	•	0	•
MHz	Mode AV	FS (dBµV/m)	Factor (dB)	Value (dBuV/m)	Limit@3m (dBuV/m)	(dB)
•	Mode	FS	Factor	Value	Limit@3m	•

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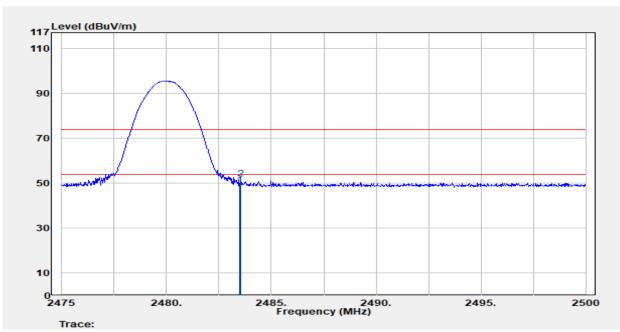
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Bandedge :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dΒμV/m	dB
2483.500	Peak	53.95	-4.85	49.10	74.00	-24.90
2483.550	Peak	56.76	-4.85	51.91	74.00	-22.09
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
Freq. MHz			, ,	•	Average Limit@3m (dBuV/m)	Margin (dB)
•	Mode	FS	Factor	Value	Limit@3m	•
•	Mode	FS	Factor	Value	Limit@3m	•

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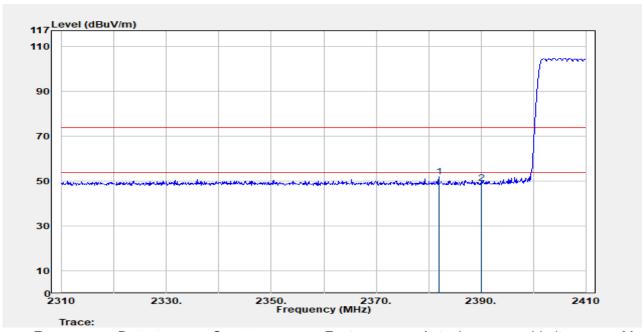
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :BR Hopping Test Date :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2℃/61%

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



mace.						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
2382.000	Peak	56.60	-4.63	51.97	74.00	-22.03
2390.000	Peak	53.73	-4.64	49.09	74.00	-24.91
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)
		(1 - /	,	(====,,,,,	(======================================	
2202 222	A	F4 07	04.70	07.04	54.00	00.70
2382.000	Average	51.97	-24.73	27.24	54.00	-26.76
2390.000	Average	49.09	-24.73	24.36	54.00	-29.64

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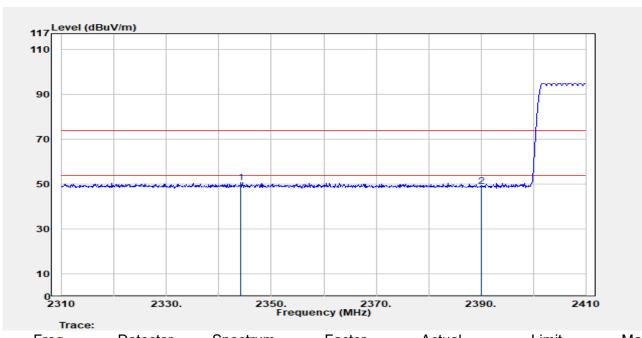
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR Hopping **Test Date** :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



mace.						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2344.200	Peak	55.36	-4.57	50.79	74.00	-23.21
2390.000	Peak	53.95	-4.64	49.30	74.00	-24.70
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
	Mode	FS (dDay)(a)	Factor	Value	Limit@3m	(dB)
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	
2344.200	Average	50.79	-24.73	26.06	54.00	-27.94
2390.000	Average	49.30	-24.73	24.57	54.00	-29.43

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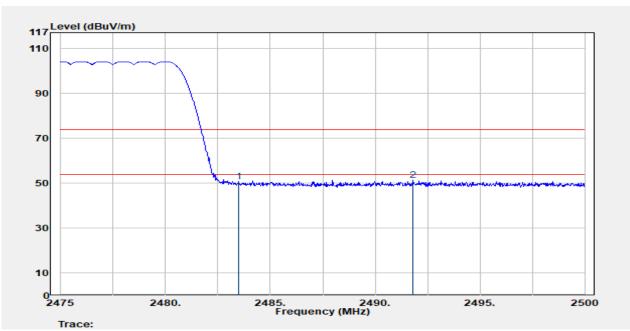
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR Hopping **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



Irace:						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
2483.500	Peak	55.64	-4.85	50.79	74.00	-23.21
2491.825	Peak	56.12	-4.84	51.28	74.00	-22.72
Freq.	Detector	Peak Actual FS	Duty Cycle	Average Value	Average	Margin
MHz	Mode AV	(dBµV/m)	Factor (dB)	(dBuV/m)	Limit@3m (dBuV/m)	(dB)
		(αΒμν/ιιι)	(GD)	(abaviii)	(dbdv/iii)	
2483.500	Average	50.79	-24.73	26.06	54.00	-27.94
2491.825	Average	51.28	-24.73	26.55	54.00	-27.45

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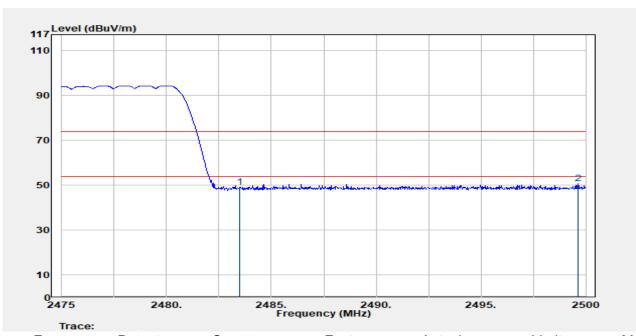
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :BR Hopping Test Date :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



Irace:						
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	53.86	-4.85	49.01	74.00	-24.99
2499.625	Peak	55.55	-4.83	50.72	74.00	-23.28
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
MHz	Mode AV	FS (dBµV/m)	Factor (dB)	Value (dBuV/m)	Limit@3m (dBuV/m)	(dB)
1711 12		(αΒμν/ιιι)	(GD)	(abaviii)	(dDd V/III)	
2483.500	Average	49.01	-24.73	24.28	54.00	-29.72
2499.625	Average	50.72	-24.73	25.99	54.00	-28.01

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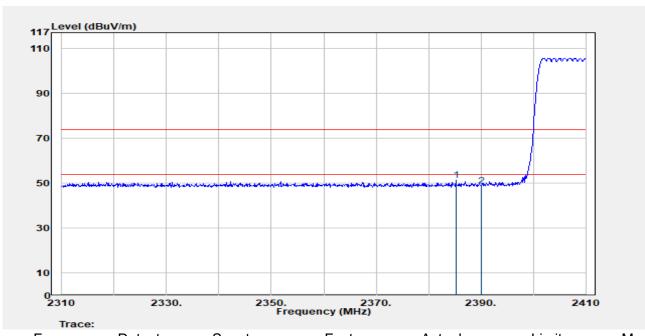
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Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :EDR 2M Hopping Test Date :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode :Bandedge Antenna Pol. :Vertical EUT Pol :H Plane Engineer :Nick Lin



	Trace:						
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
	2385.200	Peak	56.09	-4.64	51.46	74.00	-22.54
	2390.000	Peak	53.50	-4.64	48.85	74.00	-25.15
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS	Factor	Value	Limit@3m	(dB)
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	()
	2385.200	Average	51.46	-24.73	26.73	54.00	-27.27
	2390.000	Average	48.85	-24.73	24.12	54.00	-29.88

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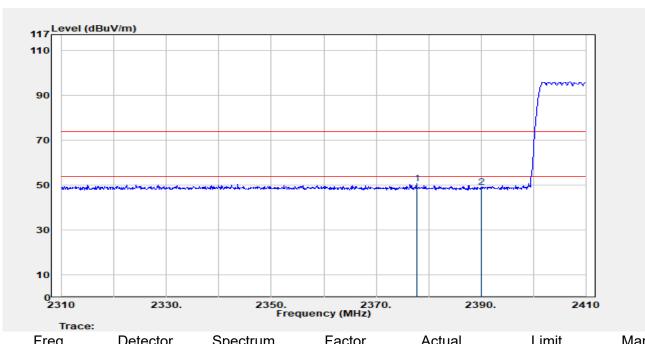
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M Hopping **Test Date** :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Bandedge :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



	mace:						
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
	2377.700	Peak	55.47	-4.62	50.85	74.00	-23.15
	2390.000	Peak	53.87	-4.64	49.22	74.00	-24.78
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		N /l -	TC .	Eactor	\/alua	l imit@2m	iviaigiii
		Mode	FS	Factor	Value	Limit@3m	(dB)
	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
•	MHz					_	(dB)
	MHz 2377.700					_	(dB) -27.88
		AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	

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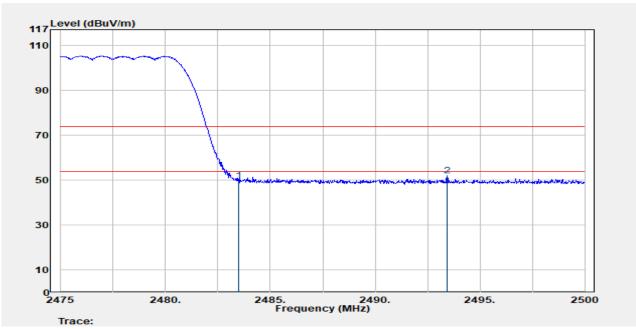
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M Hopping **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode :Bandedge Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



mace:						
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	54.75	-4.85	49.90	74.00	-24.10
2493.450	Peak	56.85	-4.84	52.01	74.00	-21.99
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
B 41 1	Mode	FS (dDay(fee)	Factor	Value	Limit@3m	(dB)
MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	
2483.500	Average	49.90	-24.73	25.17	54.00	-28.83
2493.450	Average	52.01	-24.73	27.28	54.00	-26.72

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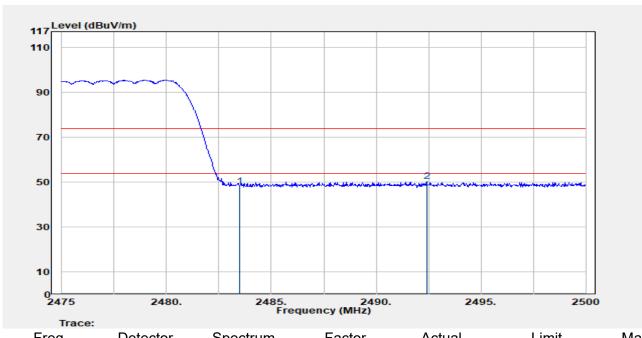
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :EDR 2M Hopping Test Date :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2℃/61%

Test Mode :Bandedge Antenna Pol. :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



	mace.						
	Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
	2483.500	Peak	53.08	-4.85	48.22	74.00	-25.78
	2492.425	Peak	55.19	-4.84	50.35	74.00	-23.65
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS (ID) (Factor	Value	Limit@3m	(dB)
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	
	2483.500	Averege	48.22	-24.73	23.49	54.00	-30.51
	2463.500	Average	40.22	-24.73	20.40	J -1 .00	-00.01
	2492.425	Average	50.35	-24.73	25.62	54.00	-28.38

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11.6.4 Radiated Spurious Emission

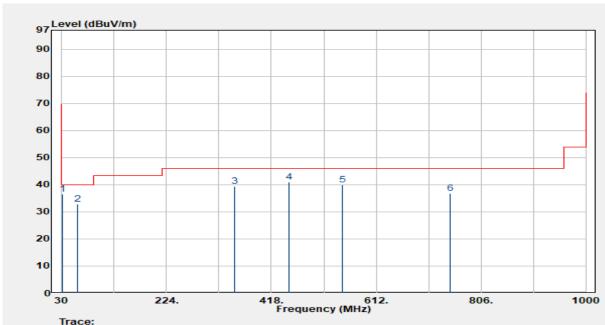
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :EDR 2M Test Date :2023-11-08

Test Frequency :2441 MHz Temp./Humi. :23.2°C/61%

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



mace.						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.970	QP	46.80	-10.21	36.59	40.00	-3.41
59.100	Peak	42.17	-9.25	32.92	40.00	-7.08
350.100	Peak	45.92	-6.42	39.51	46.00	-6.49
450.010	QP	45.17	-4.08	41.09	46.00	-4.91
549.920	Peak	42.94	-3.00	39.94	46.00	-6.06
749.740	Peak	35.45	1.37	36.82	46.00	-9.18

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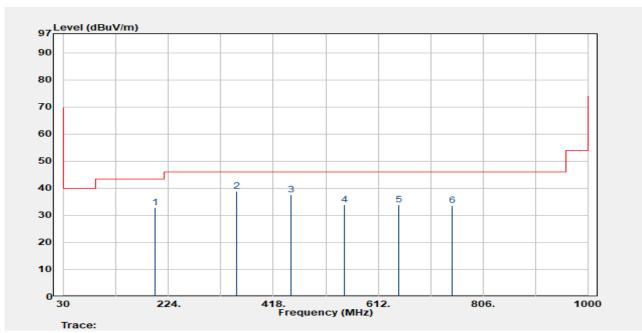
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :EDR 2M Test Date :2023-11-08

Test Frequency :2441 MHz Temp./Humi. :23.2℃/61%

Test Mode :Tx Antenna Pol. :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
199.750	Peak	43.96	-11.14	32.83	43.50	-10.67
350.100	Peak	45.24	-6.42	38.82	46.00	-7.18
450.010	Peak	41.73	-4.08	37.65	46.00	-8.35
549.920	Peak	37.03	-3.00	34.03	46.00	-11.97
649.830	Peak	34.71	-0.83	33.88	46.00	-12.12
749.740	Peak	32.22	1.37	33.59	46.00	-12.41

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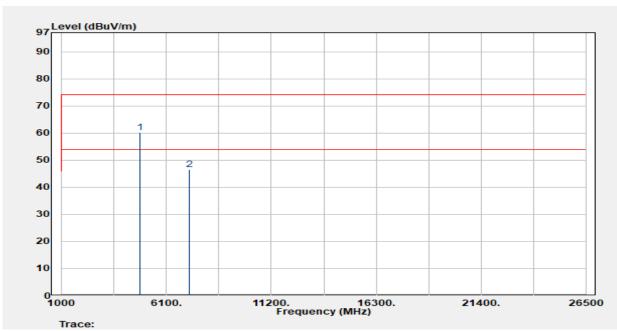
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR **Test Date** :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Vertical

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4804.000	Peak	60.13	0.07	60.20	74.00	-13.80
7206.000	Peak	40.08	6.45	46.52	74.00	-27.48
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
MHz	Mode AV	FS (dBµV/m)	Factor (dB)	Value (dBuV/m)	Limit@3m (dBuV/m)	(dB)
IVII 12		(αΒμν/ιιι)	(dD)	(dDd V/III)	(dbdv/iii)	
4804.000	Average	60.20	-24.73	35.47	54.00	-18.53
7206.000	Average	46.52	-24.73	21.79	54.00	-32.21

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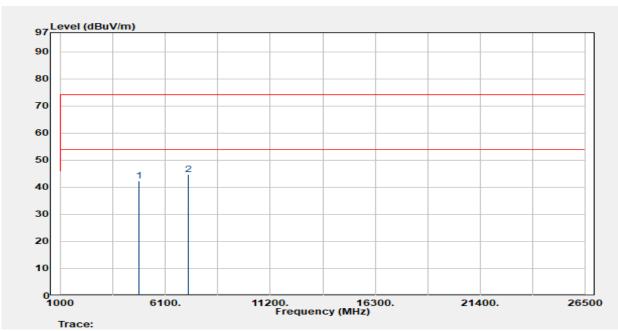
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR **Test Date** :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4804.000	Peak	42.24	0.07	42.31	74.00	-31.69
7206.000	Peak	38.25	6.45	44.70	74.00	-29.30
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	42.31	-24.73	17.58	54.00	-36.42
7206.000	Average	44.70	-24.73	19.97	54.00	-34.03

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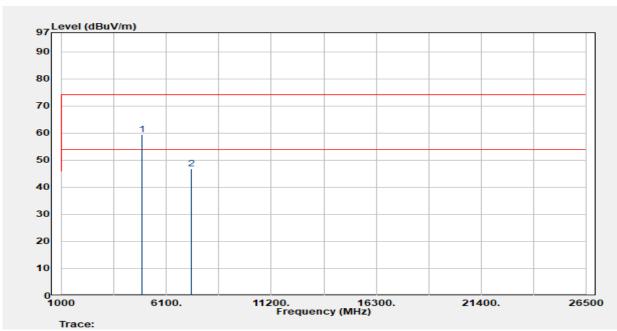
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :BR Test Date :2023-11-08

Test Frequency :2441 MHz Temp./Humi. :23.2℃/61%

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4882.000	Peak	59.09	0.29	59.38	74.00	-14.62
7323.000	Peak	40.50	6.24	46.74	74.00	-27.26
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	$(dB\mu V/m)$	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4882.000	Average	59.38	-24.73	34.65	54.00	-19.35
7323.000	Average	46.74	-24.73	22.01	54.00	-31.99

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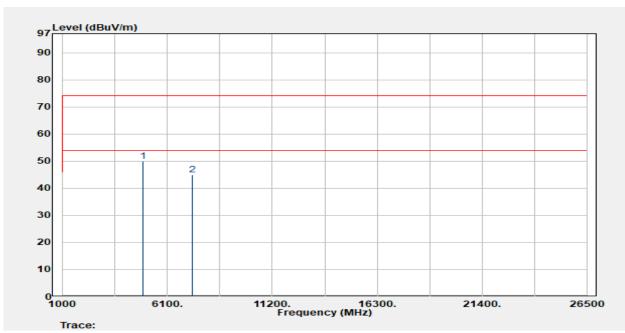
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR **Test Date** :2023-11-08

Test Frequency :2441 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	го dBµV/m	@3m dBµV/m	dB
4882.000	Peak	49.55	0.29	49.84	74.00	-24.16
7323.000	Peak	38.82	6.24	45.07	74.00	-28.93
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
Freq. MHz		Peak Actual FS (dBµV/m)	, ,	•	Average Limit@3m (dBuV/m)	Margin (dB)
•	Mode	FS	Factor	Value	Limit@3m	•
•	Mode	FS	Factor	Value	Limit@3m	•

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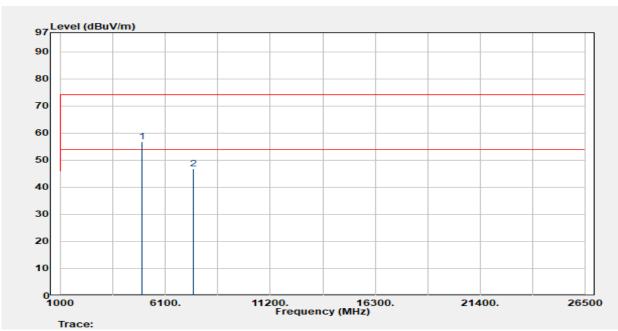
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :BR Test Date :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4960.000	Peak	56.07	0.69	56.76	74.00	-17.24
7440.000	Peak	40.73	6.06	46.79	74.00	-27.21
Freq.	Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
MHz	AV	$(dB\mu V/m)$	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4960.000	Average	56.76	-24.73	32.03	54.00	-21.97
7440.000	Average	46.79	-24.73	22.06	54.00	-31.94

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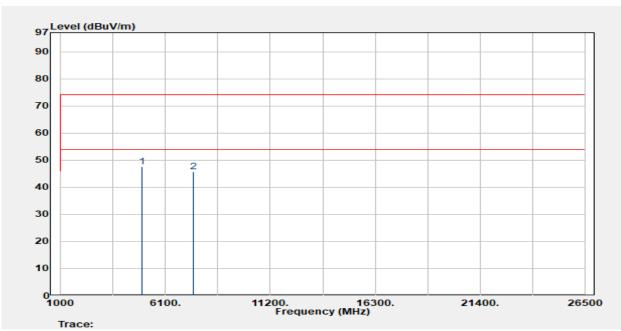
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :BR **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
4960.000	Peak	46.84	0.69	47.53	74.00	-26.47
7440.000	Peak	39.71	6.06	45.77	74.00	-28.23
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	47.53	-24.73	22.80	54.00	-31.20
7440.000	Average	45.77	-24.73	21.04	54.00	-32.96

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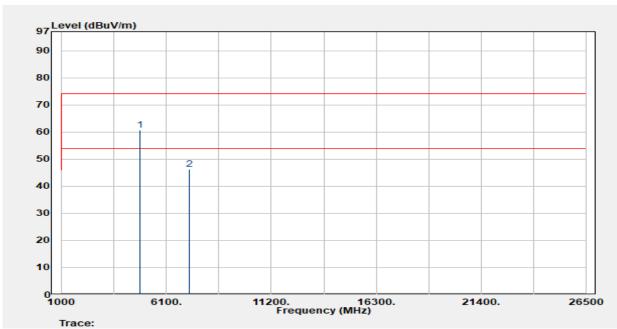
Report Number :TERF2310002514ER Test Site :SAC 3

Operation Mode :EDR 2M Test Date :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode :Tx Antenna Pol. :Vertical

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4804.000	Peak	60.61	0.07	60.68	74.00	-13.32
7206.000	Peak	39.73	6.45	46.18	74.00	-27.82
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	60.68	-24.73	35.95	54.00	-18.05
7206.000	Average	46.18	-24.73	21.45	54.00	-32.55

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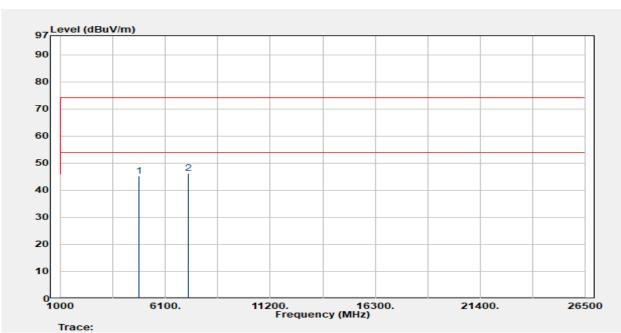
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2402 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4804.000	Peak	45.02	0.07	45.09	74.00	-28.91
7206.000	Peak	39.76	6.45	46.21	74.00	-27.79
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	45.09	-24.73	20.36	54.00	-33.64
7206.000	Average	46.21	-24.73	21.48	54.00	-32.52

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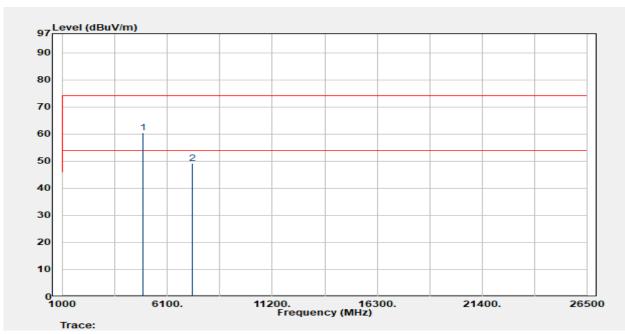
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2441 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Vertical

EUT Pol :H Plane Engineer :Nick Lin



Freq		Spectrum	Factor	Actual	Limit	Margin
N 41 1-	Mode	Reading Level	-ID	FS	@3m	-ID
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	<u>dB</u>
4882.0	00 Peak	60.13	0.29	60.42	74.00	-13.58
7323.0	00 Peak	42.80	6.24	49.04	74.00	-24.96
Freq	. Detector	Peak Actual	Duty Cycle	Average	Average	Marain
Freq	. Detector Mode	Peak Actual FS	Duty Cycle Factor	Average Value	Average Limit@3m	Margin
Freq MHz	Mode		• •	•	•	Margin (dB)
	Mode	FS	Factor	Value	Limit@3m	•
MHz	Mode z AV	FS (dBµV/m)	Factor (dB)	Value (dBuV/m)	Limit@3m (dBuV/m)	•
	Mode z AV	FS	Factor	Value	Limit@3m	•
MHz	Mode AV 000 Average	FS (dBµV/m)	Factor (dB)	Value (dBuV/m)	Limit@3m (dBuV/m)	(dB)

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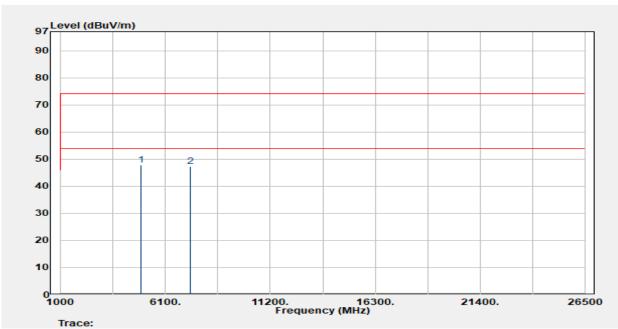
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2441 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dΒμV/m	dΒμV/m	dB
4882.000	Peak	47.45	0.29	47.75	74.00	-26.25
7323.000	Peak	41.16	6.24	47.40	74.00	-26.60
Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
MHz	Mode	FS	Factor	Value	Limit@3m	(dB)
IVITZ	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	
4882.000	Average	47.75	-24.73	23.02	54.00	-30.98
7323.000	Average	47.40	-24.73	22.67	54.00	-31.33

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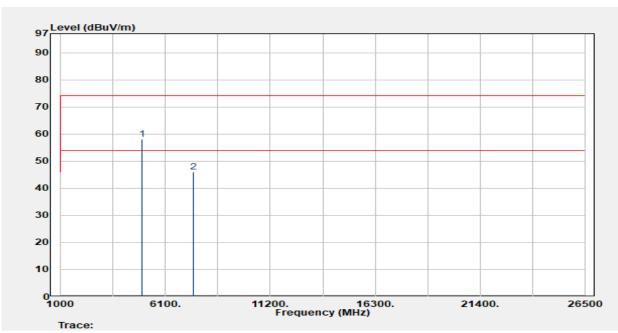
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Vertical

EUT Pol :H Plane Engineer :Nick Lin



	mace.						
	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	57.44	0.69	58.13	74.00	-15.87
	7440.000	Peak	39.88	6.06	45.94	74.00	-28.06
	Freq.	Detector	Peak Actual	Duty Cycle	Average	Average	Margin
		Mode	FS (ID) (Factor	Value	Limit@3m	(dB)
_	MHz	AV	(dBµV/m)	(dB)	(dBuV/m)	(dBuV/m)	
	4960.000	Average	58.13	-24.73	33.40	54.00	-20.60
	7440.000	Average	45.94	-24.73	21.21	54.00	-32.79
	7 1 10.000	, worago	10.01	21.70	21.21	01.00	02.70

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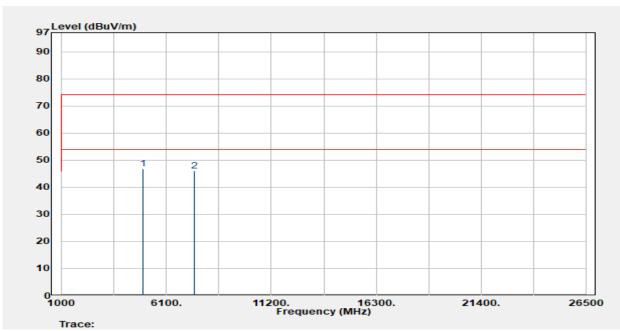
Report Number Test Site :SAC 3 :TERF2310002514ER

Operation Mode :EDR 2M **Test Date** :2023-11-08

Test Frequency :2480 MHz Temp./Humi. :23.2°C/61%

Test Mode Antenna Pol. :Tx :Horizontal

EUT Pol :H Plane Engineer :Nick Lin



mucc.						
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dΒμV/m	dB
4960.000	Peak	46.11	0.69	46.80	74.00	-27.20
7440.000	Peak	39.94	6.06	46.00	74.00	-28.00
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	46.80	-24.73	22.07	54.00	-31.93
7440.000	Average	46.00	-24.73	21.27	54.00	-32.73

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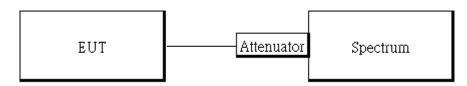
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12 FREQUENCY SEPARATION

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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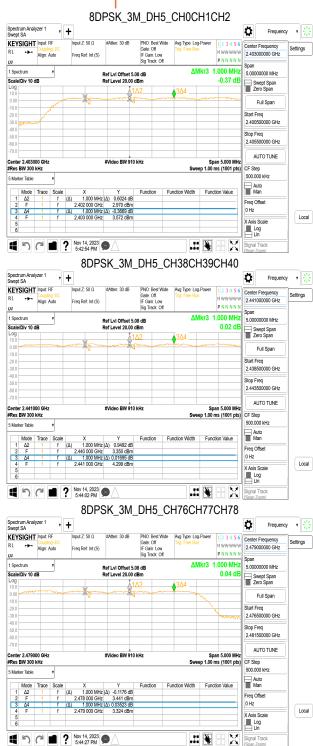
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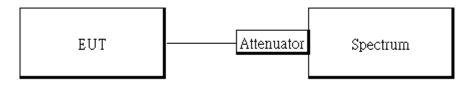
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13 NUMBER OF HOPPING FREQUENCY

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

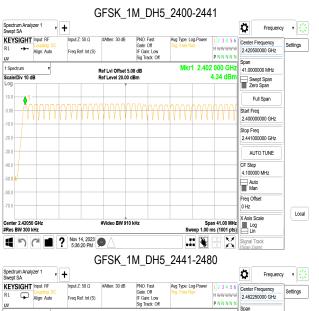
	Channel Number	Limit
2.4 GHz – 2.441 GHz	40	
2.441 GHz – 2.4835 GHz	39	>15
2.4 GHz ~2.4835 GHz	(40+39) = 79	

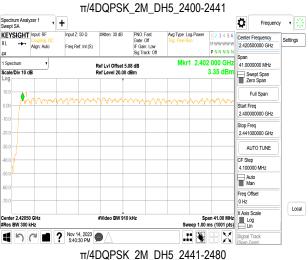
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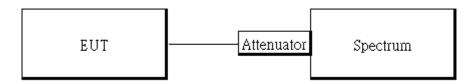
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14 TIME OF OCCUPANCY (DWELL TIME)

14.1 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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Measurement Result GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	123.20	400
Mid	DH3	262.40	400
	DH5	308.80	400

π/4 DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	2DH1	124.80	400
Mid	2DH3	262.40	400
	2DH5	308.80	400

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	3DH1	124.80	400
Mid	3DH3	262.40	400
	3DH5	308.80	400

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GFSK (1Mbps):

CH Mid	DH1 time slot	=	0.385 *	(1600/2/79) *	31.6 =	123.20 (r	ms)
--------	---------------	---	---------	---------------	--------	-----------	-----

(1600/4/79) * DH3 time slot = 1.640 * 31.6 = 262.40 (ms)

DH5 time slot = 2.895 * (1600/6/79) * 31.6 = 308.80 (ms)

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

CH Mid 2DH1 time slot = 0.390 * (1600/2/79) * 31.6 = 124.80 (11 time slot = 0.390 * (1600/2/79) * 31.6 = 124.80	(ms
---	--	-----

(1600/4/79) * 2DH3 time slot = 1.640 *31.6 = 262.40 (ms) 2DH5 time slot = 2.895 * (1600/6/79) * 31.6 = 308.80 (ms)

8-DPSK (3Mbps):

CH Mid	3DH1 time slot =	0.390 *	(1600/2/79) *	31.6 =	124.80 (ms)

(1600/4/79) * 31.6 = 262.40 (ms) 1.640 * 3DH3 time slot = (1600/6/79) * 3DH5 time slot = 2.895 *

31.6 = 308.80 (ms)

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

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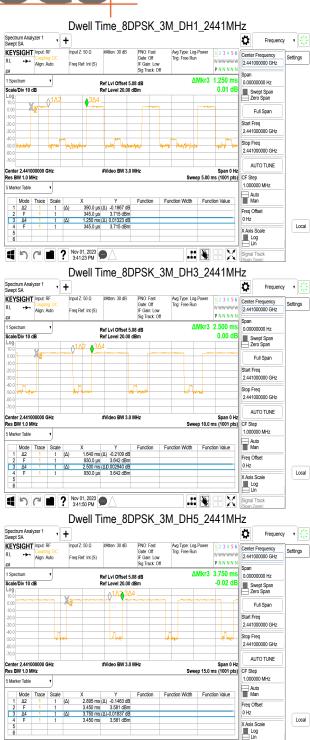
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15 ANTENNA REQUIREMENT

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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