

**ELECTROMAGNETIC EMISSIONS
COMPLIANCE REPORT**

Applicant: Advanced Radiotech Corporation
No.3, South 1st Road, Chien Chen District, Kaohsiung, 806,
Taiwan

Manufacturer: Advanced Radiotech Corporation
No.3, South 1st Road, Chien Chen District, Kaohsiung, 806,
Taiwan

Product Name: 406TX(2.4GHz)

Brand Name: Advanced Radiotech Corporation

Model No.: 406TX(2.4GHz)

Model Difference: N/A

Report Number: TERF2403000809ER

FCC ID R4UARCRCFM2400TX

Date of EUT Received: April 1, 2024

Date of Test: April 8, 2024 ~ August 28, 2024

Issue Date: September 10, 2024

Approved By**Paul Chiang****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
TERF2403000809ER	00	Original	August 8, 2024	Susan Lin	
TERF2403000809ER	01	Update chapter 8.4, 12, 13 and 14	August 29, 2024	Susan Lin	*
TERF2403000809ER	02	Update EUT Series No. and conducted equipment list	September 6, 2024	Susan Lin	*
TERF2403000809ER	03	Update EUT Series No.	September 10, 2024	Susan Lin	*

Note:

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

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	406TX(2.4GHz)
Brand Name:	Advanced Radiotech Corporation
Model No.:	406TX(2.4GHz)
Model Difference:	N/A
Hardware Version:	V.01.01
Firmware Version:	V1.1.1
EUT Series No.:	Radiated/Conducted: 000001 Normal: 000003
Power Supply:	3.3Vdc
Test Software (Name/Version):	Default

1.2 RF Specification

Radio Technology:	SRD
Channel number:	16 channels
Modulation type:	QPSK
Transmit Power:	19.19 dBm
Frequency Range:	2.405GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$

1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Chip	Johanson Technology, Inc.	2450AT42B100	2405~2480	0

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 Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		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.

1.6 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 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 placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 For all conducted test items:

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

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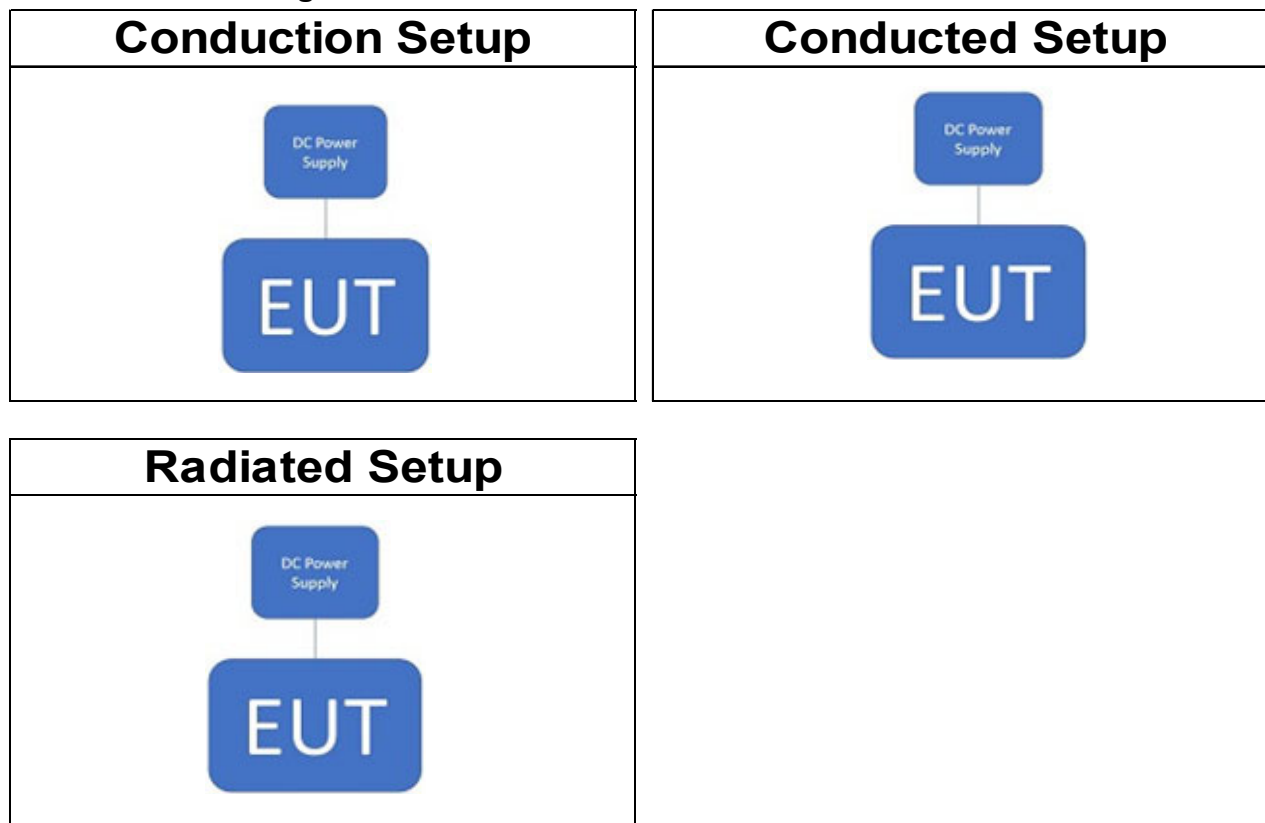
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2.5 Test Configuration



2.6 Control Unit(s)

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
§15.247(d) §15.209	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d) §15.209	Radiated Band Edge and Spurious Emission	Compliant
§15.205	Restricted Bands	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

2400~2483.5 MHz

CH	Freq. (MHz)
1	2405
2	2410
3	2415
4	2420
5	2425
6	2430
7	2435
8	2440
9	2445
10	2450
11	2455
12	2460
13	2465
14	2470
15	2475
16	2480

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4.2 The Worst Test Modes and Channel Details

- 1 The EUT has been tested under operating condition.
- 2 Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 3 The field strength of 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				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Peak Output Power, 20dB Band Width, Spurious Emission				
SRD	1 to 16	1,8,16	QPSK	2
Band Edge				
SRD	1 to 16	1,16	QPSK	2
Frequency Separation				
SRD	1 to 16	1,2,3, 8,9,10, 14,15,16	QPSK	2
Number of Hopping Frequency, Hopping Band edge				
SRD	1 to 16	1 to 16	QPSK	2
Time of Occupancy(Dwell time)				
SRD	1 to 16	8	QPSK	2

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
SRD	1 to 16	8	QPSK	2
TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
SRD	1 to 16	1,8,15,16	QPSK	2

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 1.54 dB
Output Power measurement	+/- 0.97 dB
Emission Bandwidth	+/- 1.38 Hz
Conducted emission measurement	+/- 0.77 dB
Frequency Separation	+/- 1.48 Hz
Number of hopping frequency	+/- 1.48 Hz
Time of Occupancy	+/- 1.48 Hz
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

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

Note:

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

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6 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.	CAL DUE.
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM-BM-3000	161207	06/22/2024	06/21/2025
DC Power Supply	HILA	DP-3003N	11233K1019035	03/18/2024	03/17/2025
EMI Test Receiver	R&S	ESCI 7	100759	08/21/2023	08/20/2024
LISN	SCHWARZBECK	NSLK 8127	1040	09/06/2023	09/05/2024
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2024	06/21/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Block	Mini-Circuits	BLK-18-S+	31129	12/12/2023	12/11/2024
DC Power Supply	Gwinstek	SPS-3610	GEV856750	08/14/2024	08/13/2025
DC Power Supply	Gwinstek	SPS-3610	GEV856750	08/04/2023	08/03/2024
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071571	06/04/2024	06/03/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071571	06/07/2023	06/06/2024
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
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R

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6.3 Radiated Measurement

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
4G High Pass Filter	WI	WHKX4.0	24	12/12/2023	12/11/2024
Band Reject Filter 2400-2483.5	Titan	T04N2400248350S 01	23040703-10	12/12/2023	12/11/2024
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	12/18/2023	12/17/2024
Coaxial Cable	EMCI	EMC104-SM-SM- 8000+EMC106-SM- SM-7600	RX Cable 9K- 18G(160125+15081 7)	09/12/2023	09/11/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062 /2	08/31/2023	08/30/2024
DC Power Supply	HILA	DP-3003N	11233K1019035	03/18/2024	03/17/2025
EMI Test Receiver	R&S	ESCI 7	100759	08/21/2023	08/20/2024
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60242081	10/17/2023	10/16/2024
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/03/2023	07/02/2024
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/10/2024	07/09/2025
Horn Antenna	SCHWARZBECK	BBHA9120D	D803	01/12/2024	01/11/2025
Loop Antenna	COM-POWER	AL-130R	10160104	12/04/2023	12/03/2024
Pre-Amplifier	EMCI	EMC118A45SEE	980933	07/31/2023	07/30/2024
Pre-Amplifier	EMCI	EMC184045B	980135	08/31/2023	08/30/2024
Pre-Amplifier	HP	8447D	2944A09469	08/31/2023	08/30/2024
Site Cal	SGS	SAC 1	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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7 CONDUCTED EMISSION TEST

7.1 Standard Applicable

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

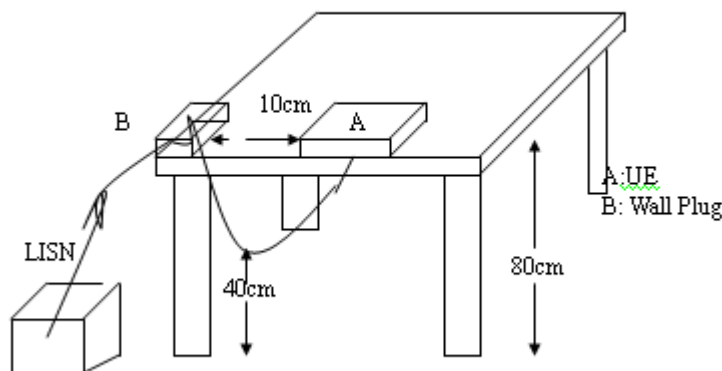
Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

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 :TERF2403000809ER

Test Site :Conduction 1

Operation Mode :SRD

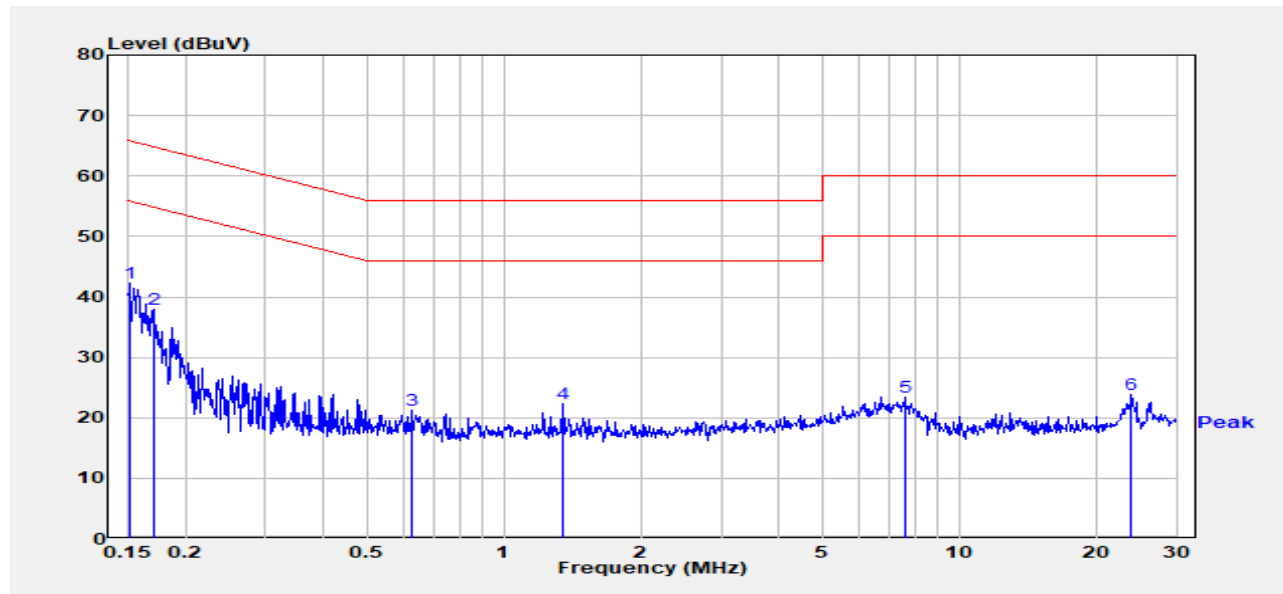
Test Date :2024-07-22

Power :120V/60Hz

Temp./Humi. :23.0°C/51%

Probe :L

Engineer :WJ Lin



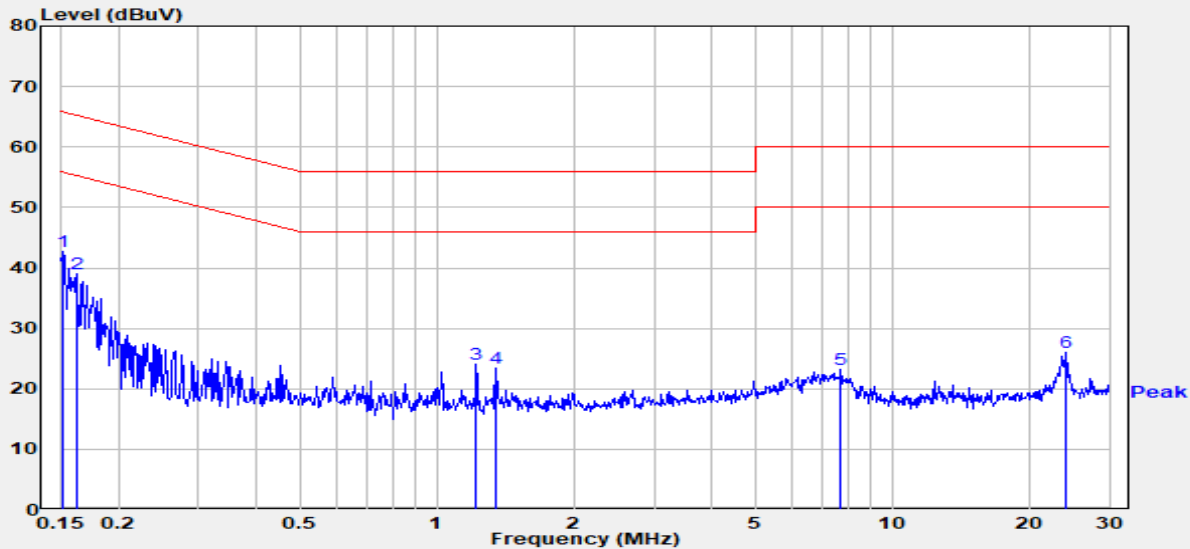
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.152	Peak	32.11	10.13	42.24	65.91	-23.67
0.170	Peak	27.77	10.13	37.90	64.94	-27.05
0.630	Peak	11.15	10.18	21.33	56.00	-34.67
1.352	Peak	12.18	10.20	22.38	56.00	-33.62
7.606	Peak	12.97	10.36	23.33	60.00	-36.67
23.888	Peak	13.26	10.53	23.79	60.00	-36.21

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Report Number :TERF2403000809ER
Operation Mode :SRD
Power :120V/60Hz
Probe :N

Test Site :Conduction 1
Test Date :2024-07-22
Temp./Humi. :23.0°C/51%
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.152	Peak	32.61	10.12	42.73	65.91	-23.19
0.162	Peak	29.00	10.12	39.12	65.38	-26.26
1.223	Peak	13.85	10.19	24.04	56.00	-31.96
1.345	Peak	13.13	10.19	23.32	56.00	-32.68
7.728	Peak	12.75	10.38	23.14	60.00	-36.86
24.015	Peak	15.32	10.62	25.94	60.00	-34.06

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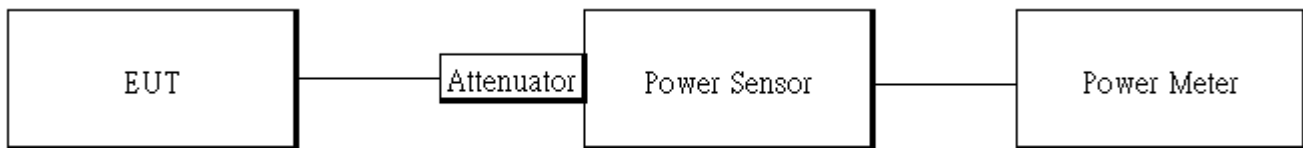
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8 PEAK OUTPUT POWER MEASUREMENT

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

SRD mode (Peak):

CH	Freq. (MHz)	Power Setting	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
1	2405	down 2	19.19	82.985	1000
8	2440	down 2	18.61	72.611	1000
15	2475	down 2	18.62	72.778	1000
16	2480	down 2	0.03	1.007	1000

SRD mode (Average):

CH	Freq. (MHz)	Power Setting	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
1	2405	down 2	19.17	82.604	1000
8	2440	down 2	18.58	72.111	1000
15	2475	down 2	18.60	72.444	1000
16	2480	down 2	-0.03	0.993	1000

*Note: Avg. output power has been calculated with duty factor.

Duty Cycle		
	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)
SRD	16.37	7.86

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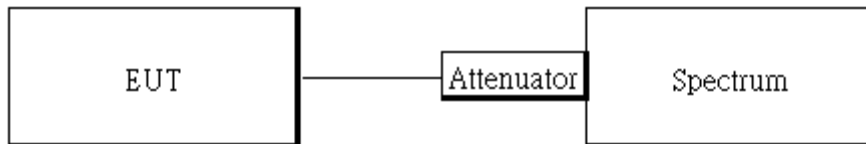
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9 EMISSION BANDWIDTH MEASUREMENT

9.1 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

9.4 20dB Bandwidth

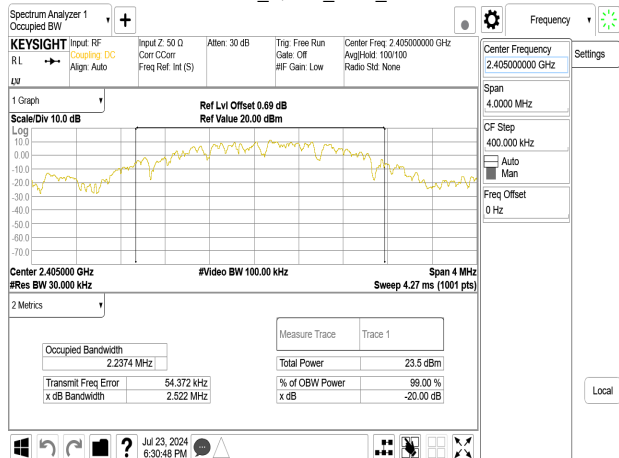
QPSK

CH	20 dB BW (MHz)	2/3 BW (MHz)
1	2.522	1.68
8	2.516	1.68
16	2.537	1.69

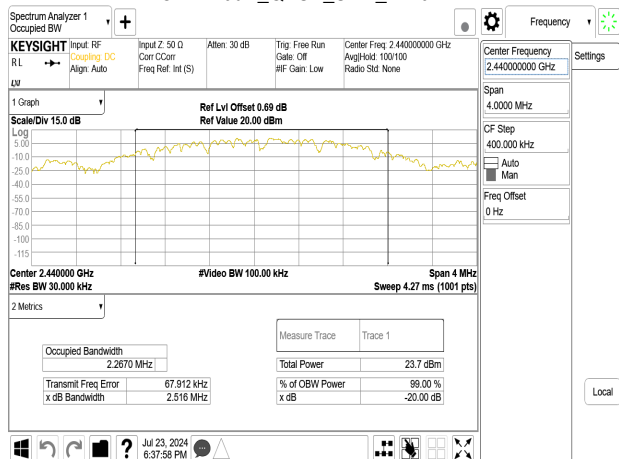
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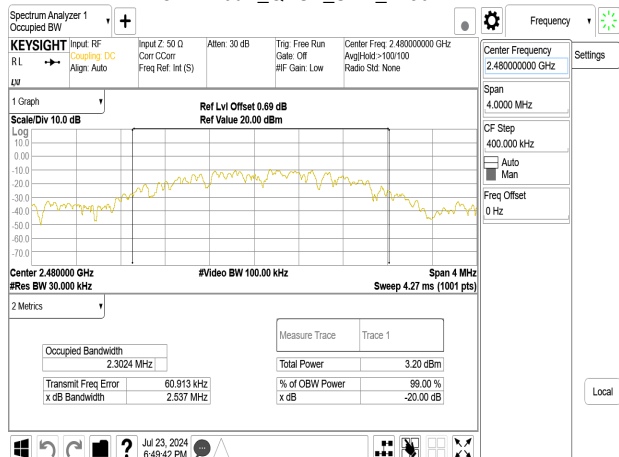
OBW 20dB_QPSK_SRD_2405MHz



OBW 20dB_QPSK_SRD_2440MHz



OBW 20dB_QPSK_SRD_2480MHz



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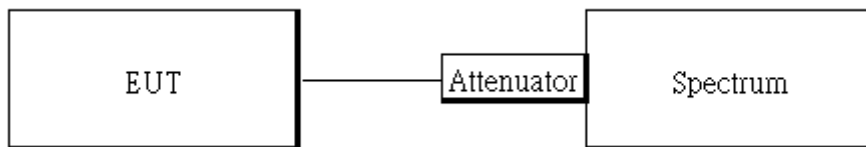
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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

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:

1. 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.

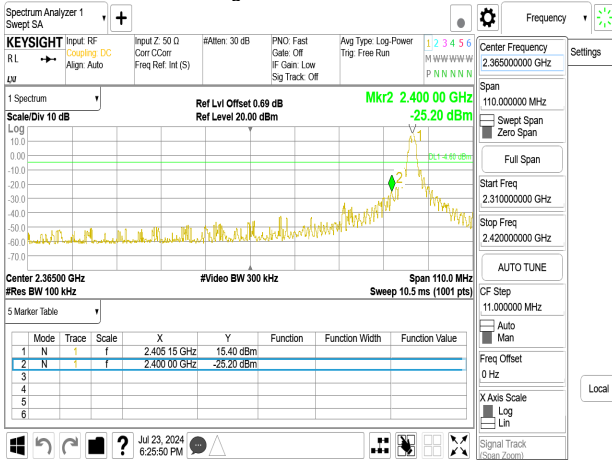
10.4 Measurement Result

See next page for test plots.

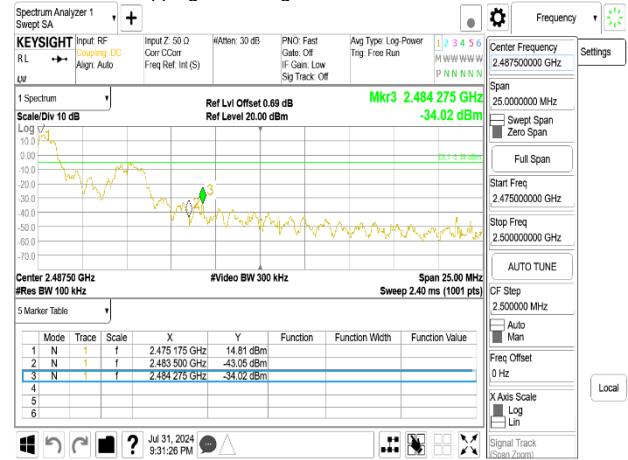
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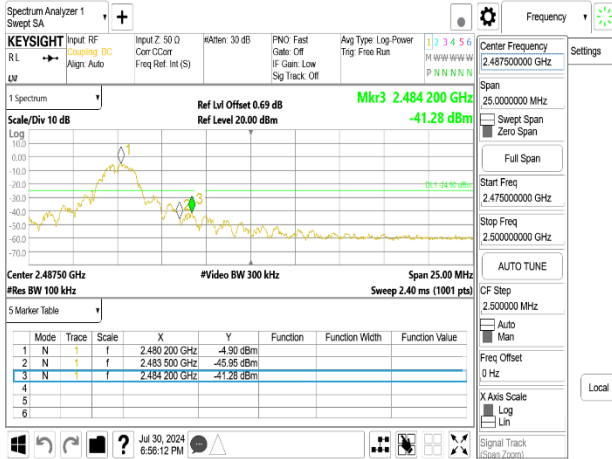
Band Edge_QPSK_SRD_2405MHz



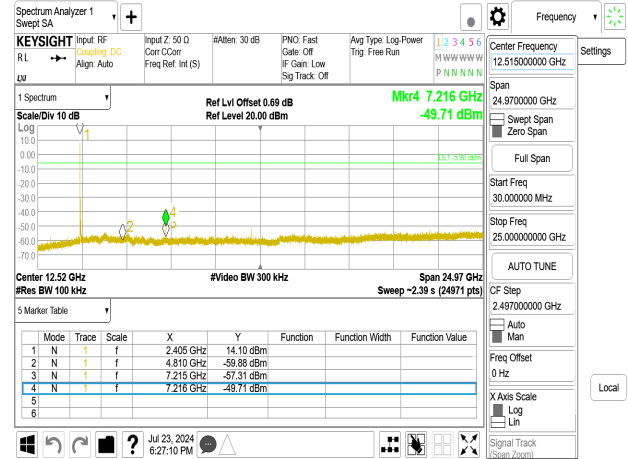
Hopping Band Edge_QPSK_SRD_2480MHz



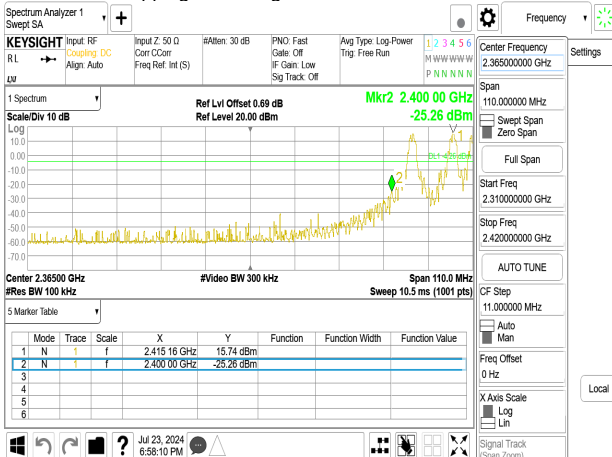
Band Edge_QPSK_SRD_2480MHz



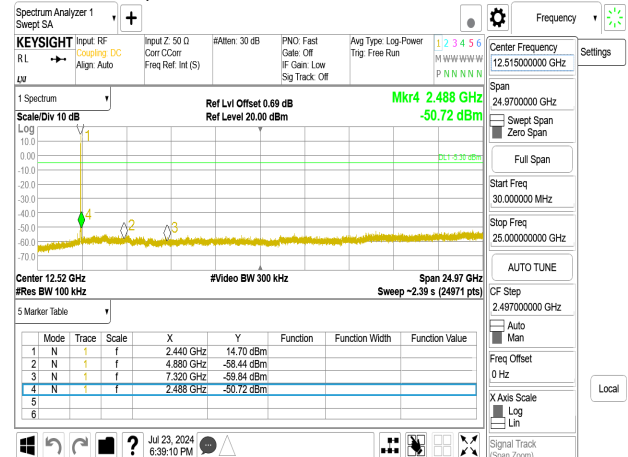
Spurious Emission_QPSK_SRD_2405MHz



Hopping Band Edge_QPSK_SRD_2405MHz



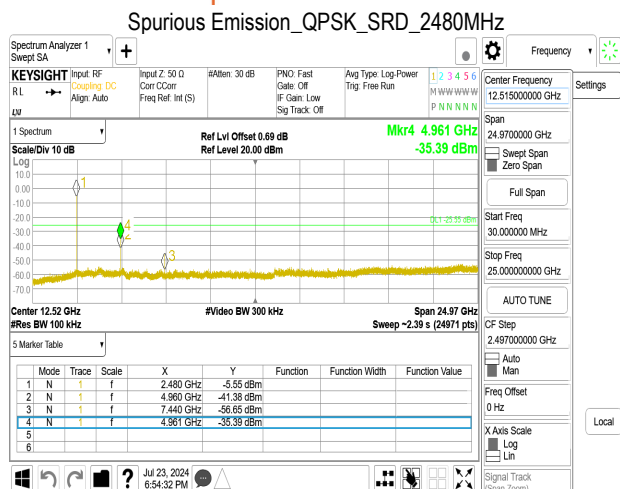
Spurious Emission_QPSK_SRD_2440MHz



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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 and 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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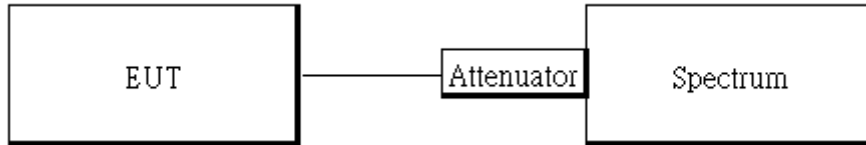
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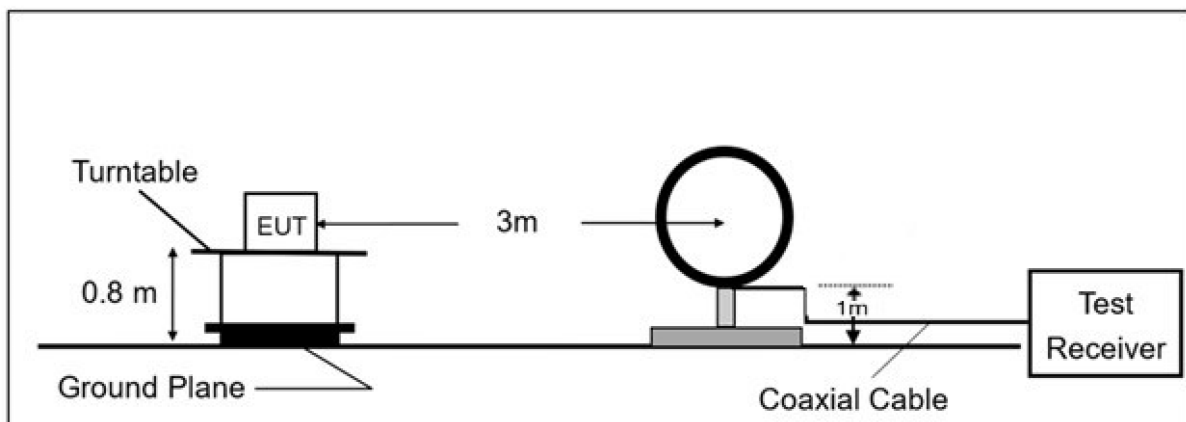
11.2 Test Setup

11.2.1 Duty Cycle Correction Factor

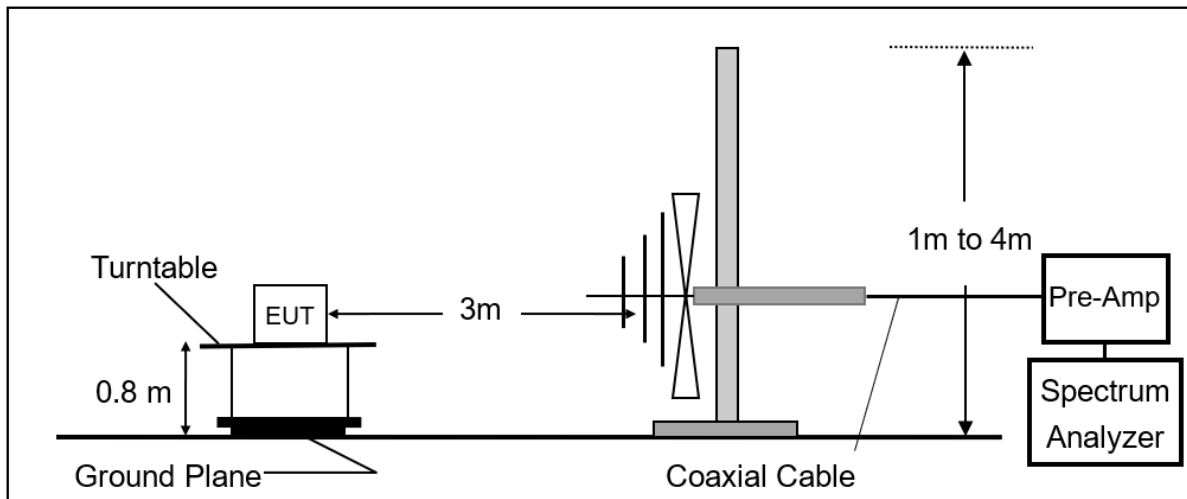


11.2.2 Radiated Emission

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



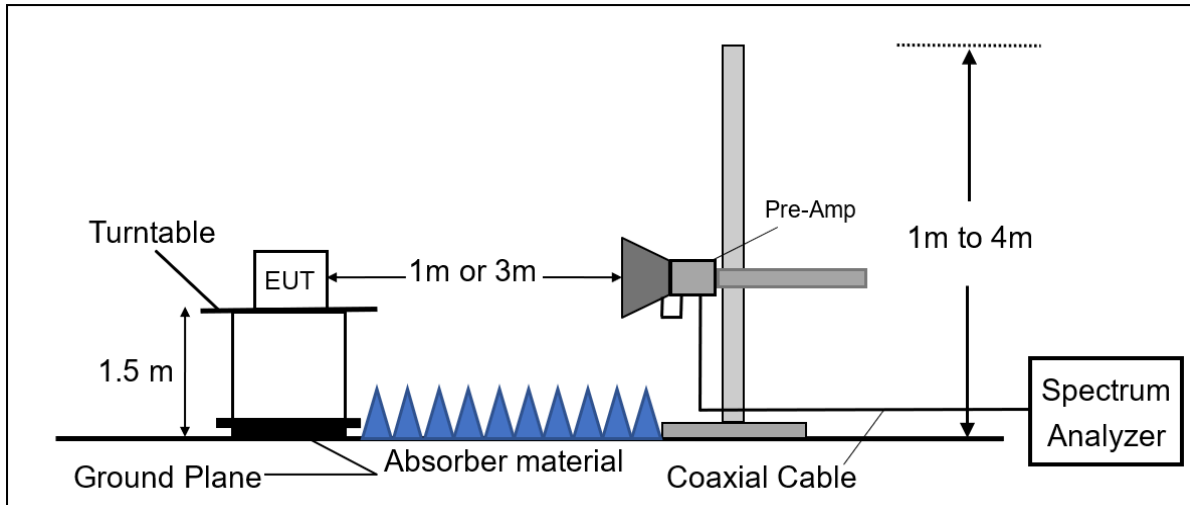
(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



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(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=8MHz, 8MHz, 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 $20 \log (T_{on}/100ms)$.
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 $20 \cdot \log(uV/m)$

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + 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) = $20 \log (T_{on}/100 \text{ ms})$

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

SRD

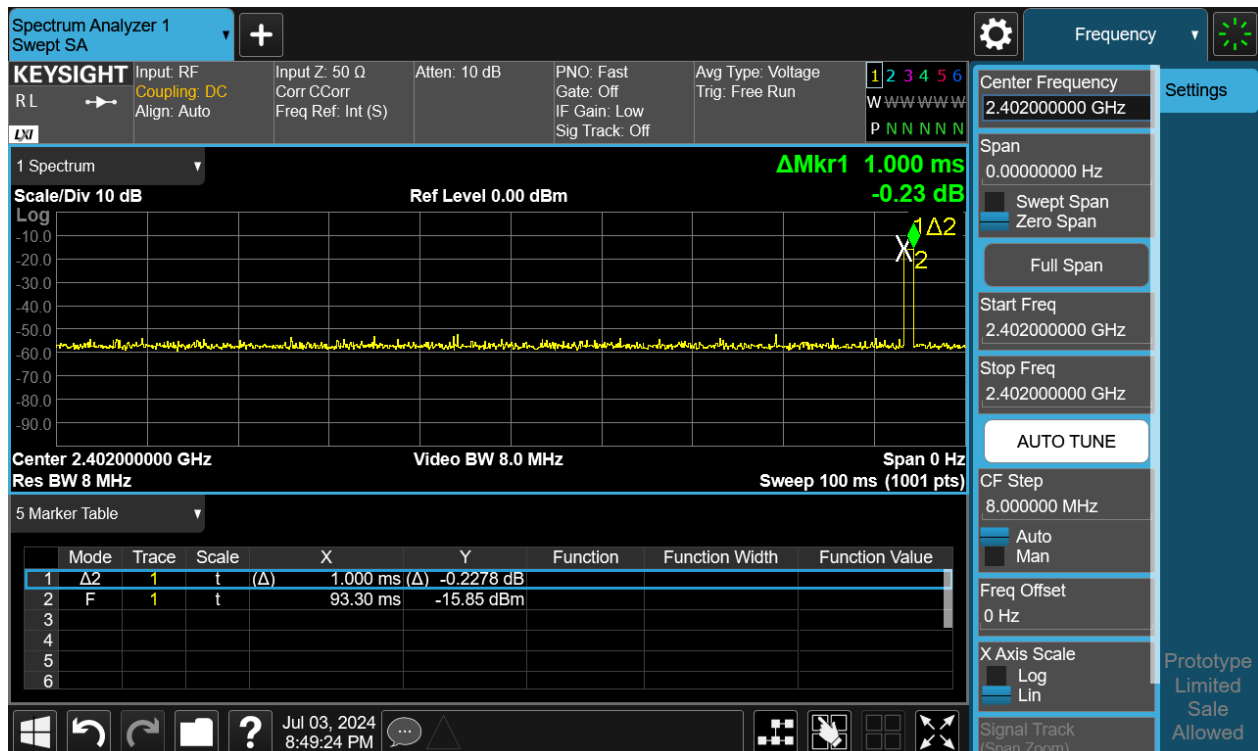
Time ON of 100ms: 1.000 ms

Duty Cycle=1ms / 100ms= 0.01

Duty Cycle correction factor=20 LOG 0.01 = -40 dB

11.6.2 Duty Cycle test plot

SRD



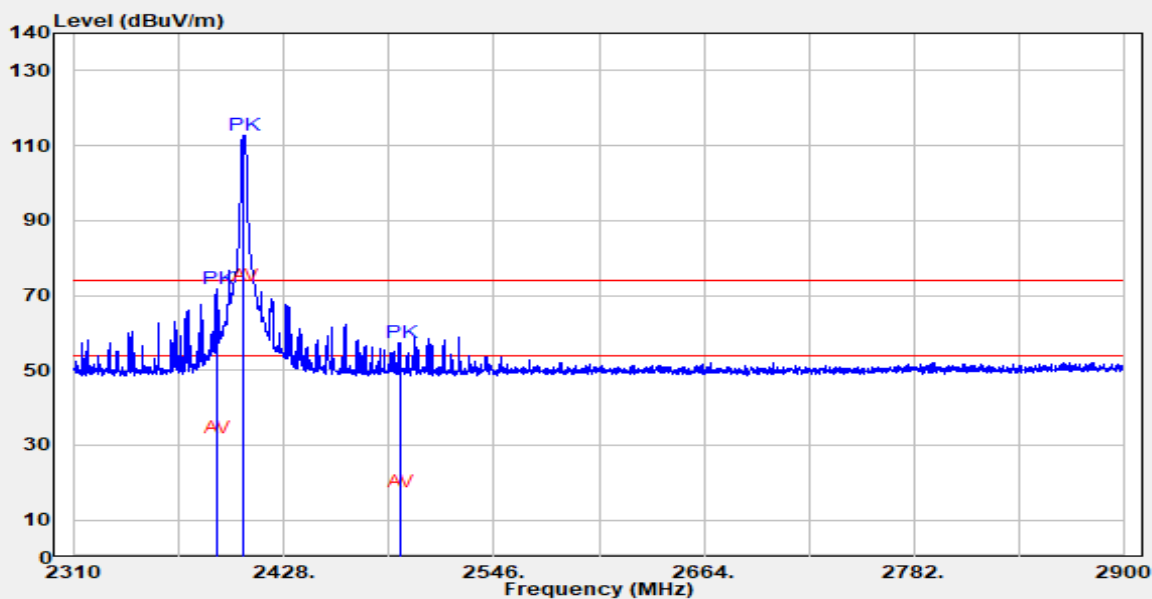
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11.6.3 Bandedge Result

Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2405 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-19
Temp./Humi. :25.9°C/51%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.68	Average	-	-	31.79	54.00	-22.21
2389.68	Peak	74.80	-3.01	71.79	74.00	-2.21
2405.00	Average	-	-	72.60	-	-
2405.00	Peak	115.40	-2.80	112.60	-	-
2492.96	Average	-	-	17.30	54.00	-36.70
2492.96	Peak	60.02	-2.72	57.30	74.00	-16.70

Average Duty Cycle Factor=-40 (dB)

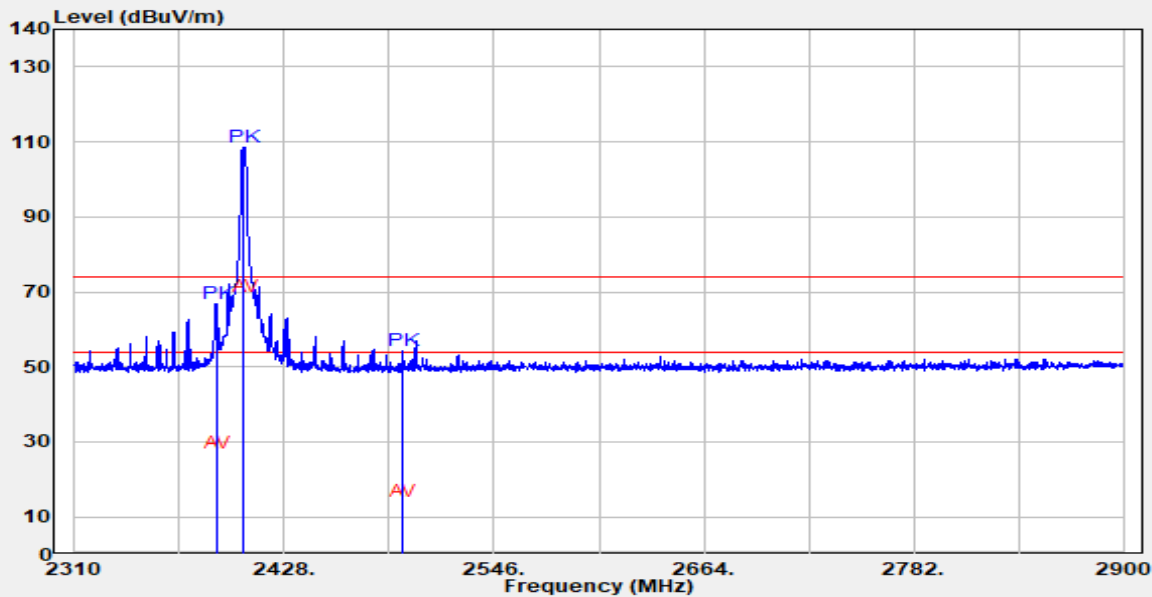
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2405 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-19
Temp./Humi. :25.9°C/51%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d μ V	Factor dB	Actual FS d μ V/m	Limit @3m d μ V/m	Margin dB
2389.68	Average	-	-	26.92	54.00	-27.08
2389.68	Peak	69.93	-3.01	66.92	74.00	-7.08
2405.00	Average	-	-	68.51	-	-
2405.00	Peak	111.31	-2.80	108.51	-	-
2494.14	Average	-	-	14.09	54.00	-39.91
2494.14	Peak	56.81	-2.72	54.09	74.00	-19.91

Average Duty Cycle Factor=-40 (dB)

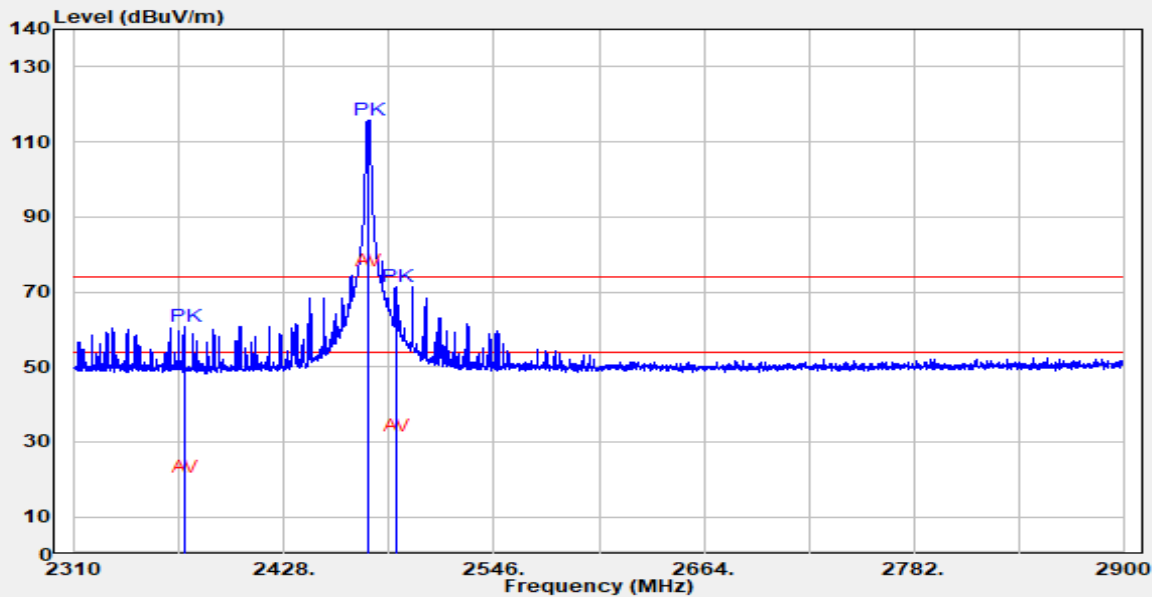
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2475 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-19
Temp./Humi. :25.9°C/51%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
2371.97	Average	-	-	20.59	54.00	-33.41
2371.97	Peak	63.36	-2.77	60.59	74.00	-13.41
2475.00	Average	-	-	75.54	-	-
2475.00	Peak	118.47	-2.93	115.54	-	-
2490.60	Average	-	-	31.43	54.00	-22.57
2490.60	Peak	74.14	-2.71	71.43	74.00	-2.57

Average Duty Cycle Factor=-40 (dB)

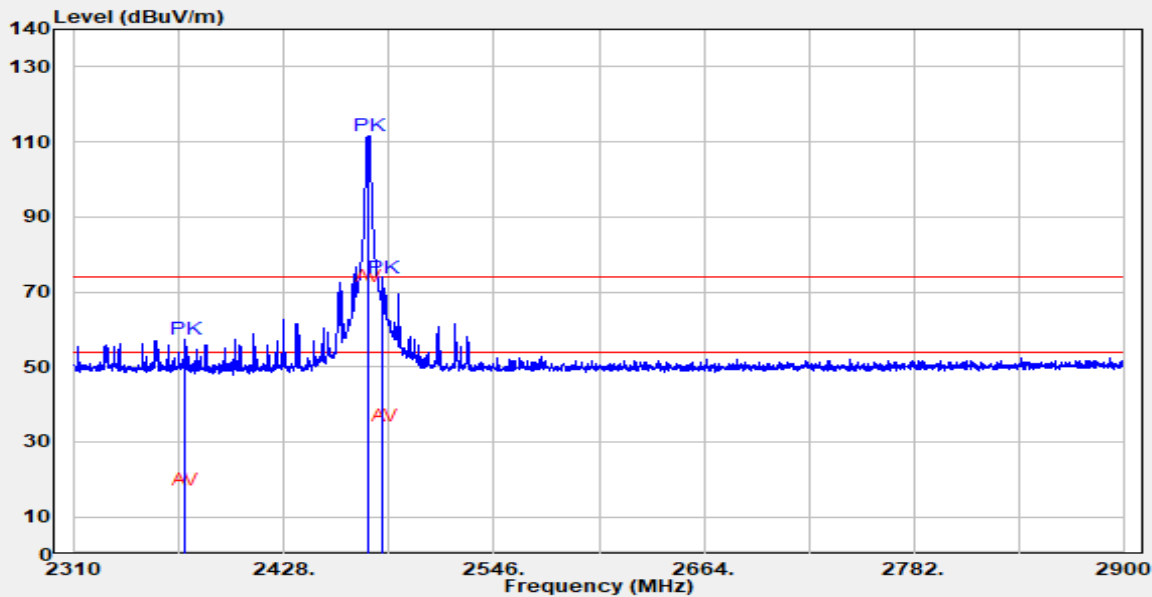
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2475 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-19
Temp./Humi. :25.9°C/51%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
2371.97	Average	-	-	17.17	54.00	-36.83
2371.97	Peak	59.94	-2.77	57.17	74.00	-16.83
2475.00	Average	-	-	71.45	-	-
2475.00	Peak	114.38	-2.93	111.45	-	-
2483.52	Average	-	-	34.06	54.00	-19.94
2483.52	Peak	76.30	-2.77	73.53	74.00	-0.47

Average Duty Cycle Factor=-40 (dB)

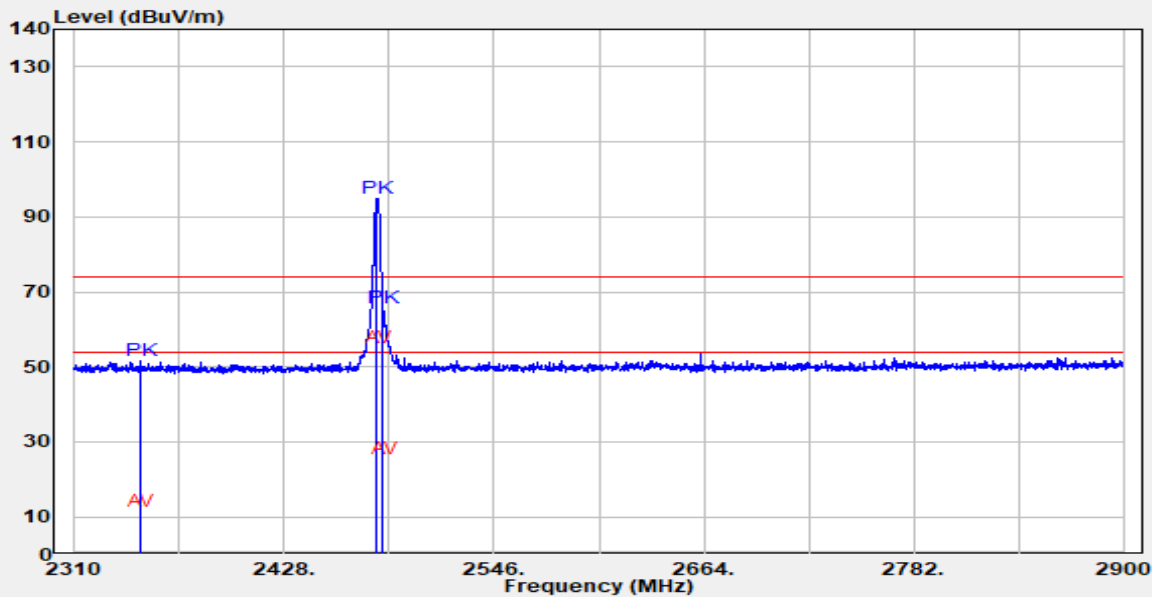
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2480 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-18
Temp./Humi. :25.9°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2346.99	Average	-	-	11.46	54.00	-42.54
2346.99	Peak	54.26	-2.80	51.46	74.00	-22.54
2480.00	Average	-	-	54.92	-	-
2480.00	Peak	97.74	-2.82	94.92	-	-
2483.52	Average	-	-	25.60	54.00	-28.40
2483.52	Peak	68.37	-2.77	65.60	74.00	-8.40

Average Duty Cycle Factor=-40 (dB)

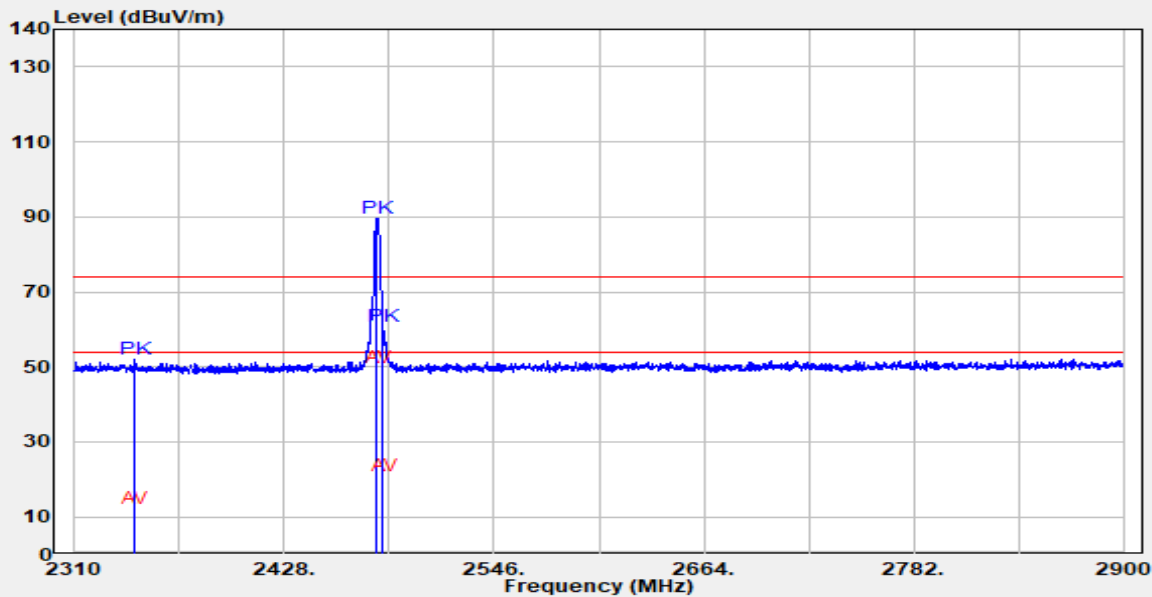
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2480 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-18
Temp./Humi. :25.9°C/50%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
2343.25	Average	-	-	12.14	54.00	-41.86
2343.25	Peak	54.95	-2.81	52.14	74.00	-21.86
2480.00	Average	-	-	49.53	-	-
2480.00	Peak	92.35	-2.82	89.53	-	-
2483.52	Average	-	-	20.75	54.00	-33.25
2483.52	Peak	63.52	-2.77	60.75	74.00	-13.25

Average Duty Cycle Factor=-40 (dB)

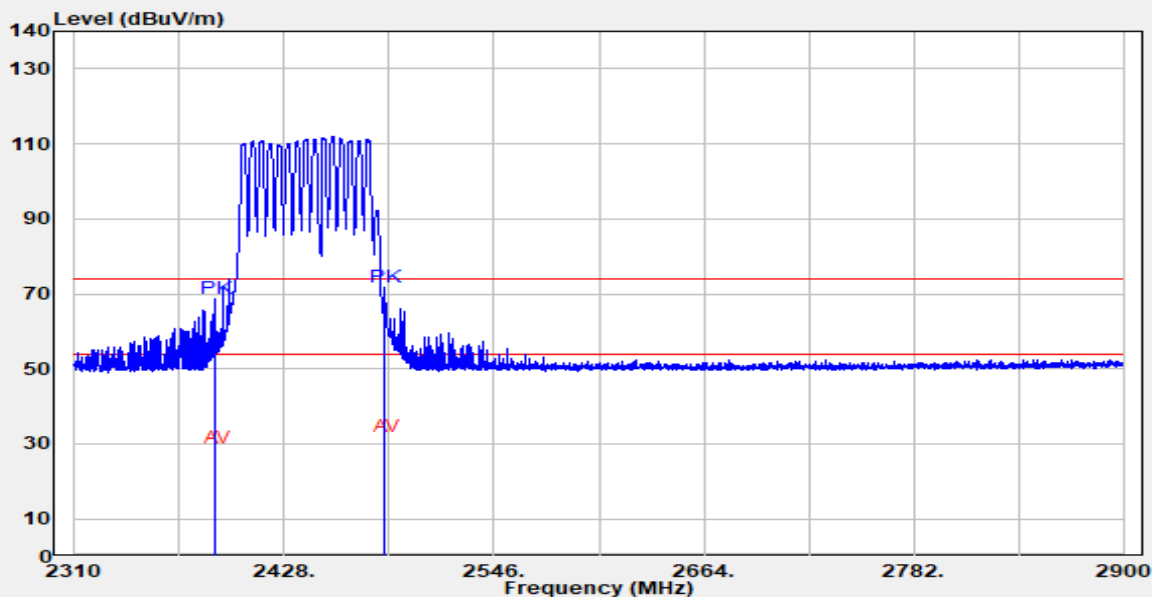
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD Hopping
Test Frequency :2405~2480 MHz
Test Mode :Bandedge
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-18
Temp./Humi. :25.9°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2389.28	Average	-	-	28.66	54.00	-25.34
2389.28	Peak	71.67	-3.01	68.66	74.00	-5.34
2484.70	Average	-	-	31.72	54.00	-22.28
2484.70	Peak	74.47	-2.75	71.72	74.00	-2.28

Average Duty Cycle Factor=-40 (dB)

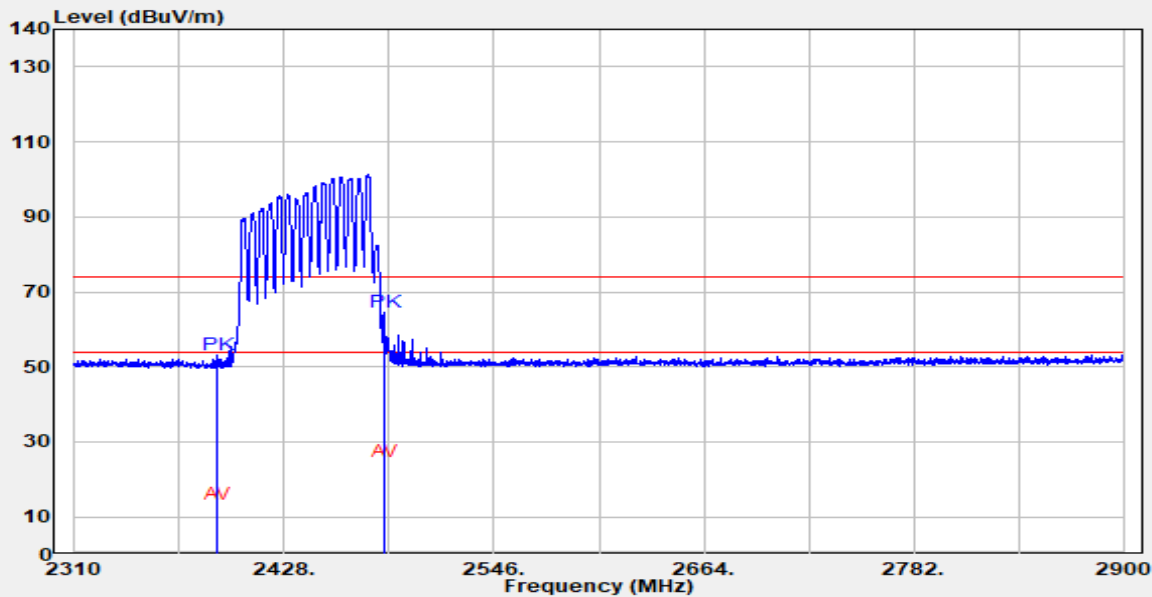
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
 Operation Mode :SRD Hopping
 Test Frequency :2405~2480 MHz
 Test Mode :Bandedge
 EUT Pol :H Plane

Test Site :SAC 1
 Test Date :2024-07-18
 Temp./Humi. :25.9°C/50%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
2389.68	Average	-	-	13.15	54.00	-40.85
2389.68	Peak	56.16	-3.01	53.15	74.00	-20.85
2483.72	Average	-	-	24.50	54.00	-29.50
2483.72	Peak	67.27	-2.77	64.50	74.00	-9.50

Average Duty Cycle Factor=-40 (dB)

Average Level= Peak Level+ Duty Cycle Factor

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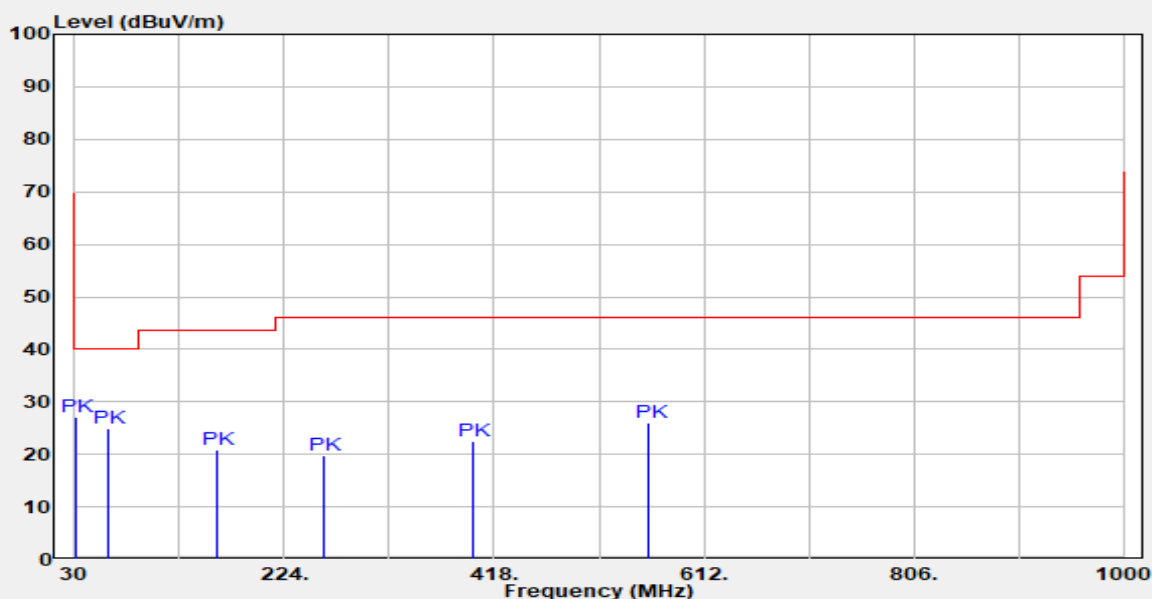
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11.6.4 Radiated Spurious Emission

Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2440 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
31.94	Peak	33.13	-6.02	27.11	40.00	-12.89
60.07	Peak	43.01	-18.14	24.87	40.00	-15.13
161.92	Peak	34.16	-13.38	20.78	43.50	-22.72
260.86	Peak	28.17	-8.38	19.79	46.00	-26.21
397.63	Peak	29.34	-6.73	22.61	46.00	-23.39
561.56	Peak	29.75	-3.77	25.98	46.00	-20.02

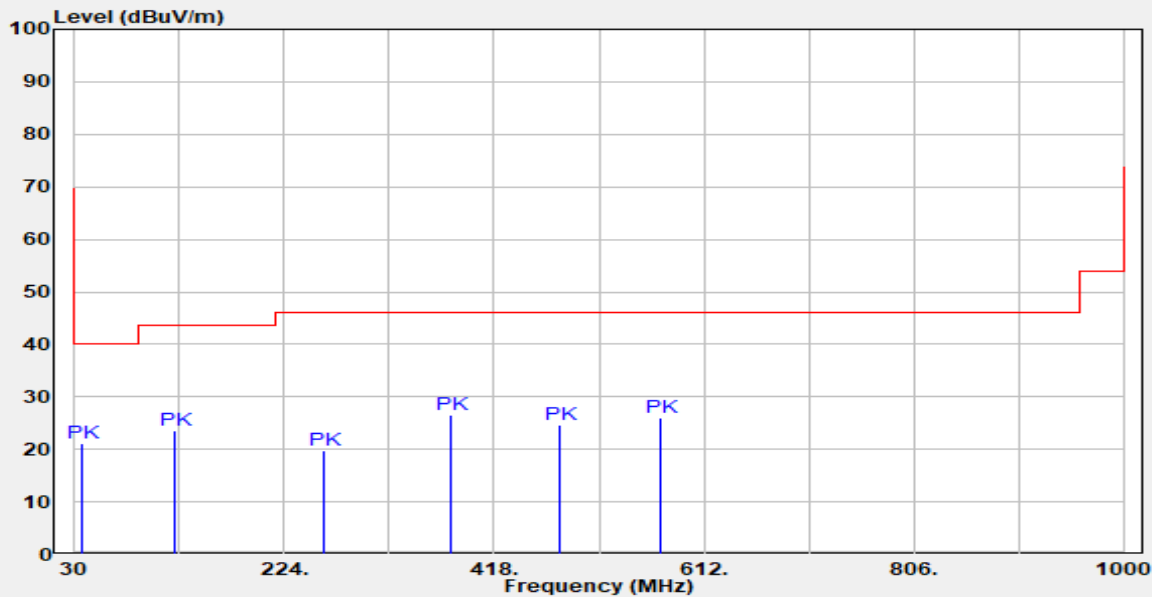
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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2440 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Horizontal
Engineer :WJ Lin



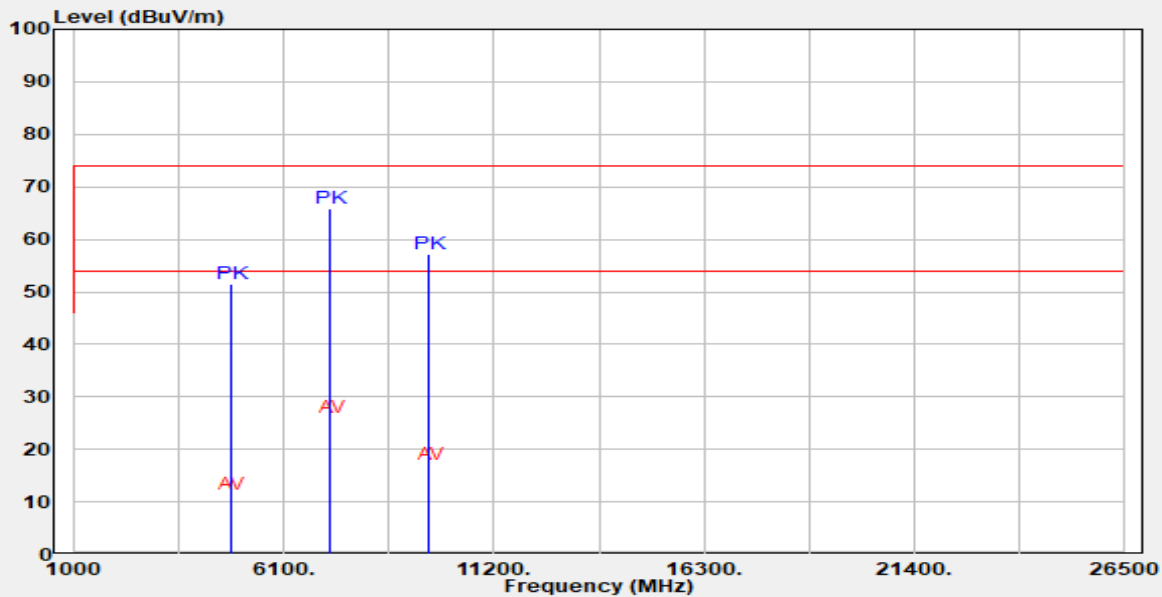
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
35.82	Peak	29.49	-8.29	21.20	40.00	-18.80
122.15	Peak	35.34	-11.69	23.65	43.50	-19.85
260.86	Peak	28.09	-8.38	19.71	46.00	-26.29
377.26	Peak	34.23	-7.55	26.68	46.00	-19.32
479.11	Peak	30.07	-5.37	24.70	46.00	-21.30
571.26	Peak	29.50	-3.58	25.92	46.00	-20.08

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2405 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
4810.00	Average	-	-	11.50	54.00	-42.50
4810.00	Peak	49.25	2.25	51.50	74.00	-22.50
7215.00	Average	-	-	25.96	54.00	-28.04
7215.00	Peak	57.34	8.62	65.96	74.00	-8.04
9620.00	Average	-	-	17.06	54.00	-36.94
9620.00	Peak	47.09	9.97	57.06	74.00	-16.94

Average Duty Cycle Factor=-40 (dB)

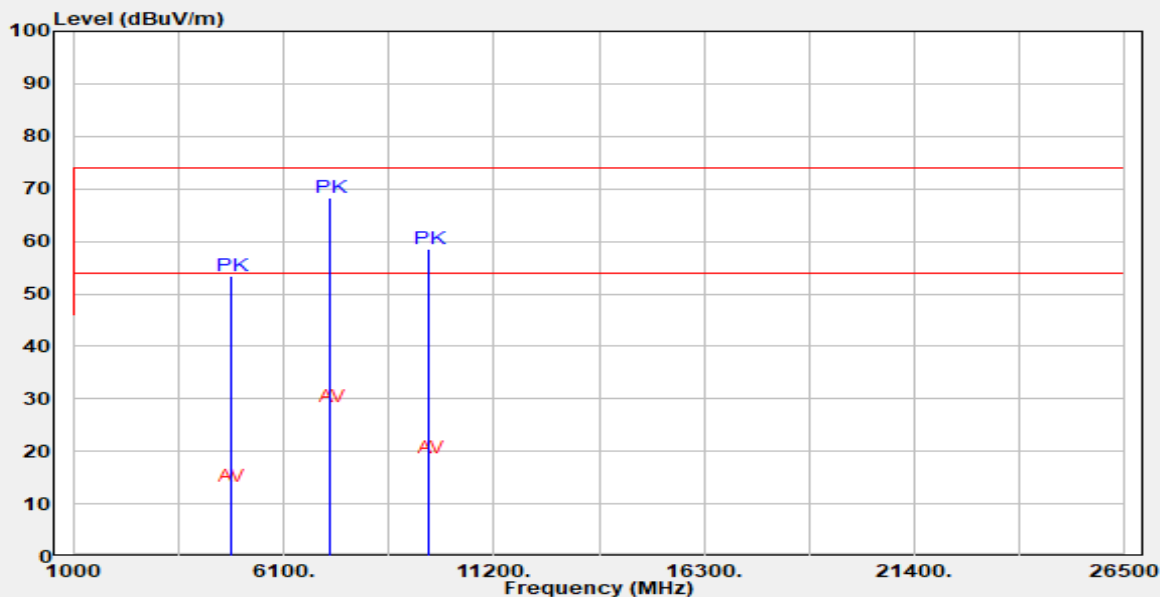
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2405 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4810.00	Average	-	-	13.41	54.00	-40.59
4810.00	Peak	51.16	2.25	53.41	74.00	-20.59
7215.00	Average	-	-	28.42	54.00	-25.58
7215.00	Peak	59.80	8.62	68.42	74.00	-5.58
9620.00	Average	-	-	18.59	54.00	-35.41
9620.00	Peak	48.62	9.97	58.59	74.00	-15.41

Average Duty Cycle Factor=-40 (dB)

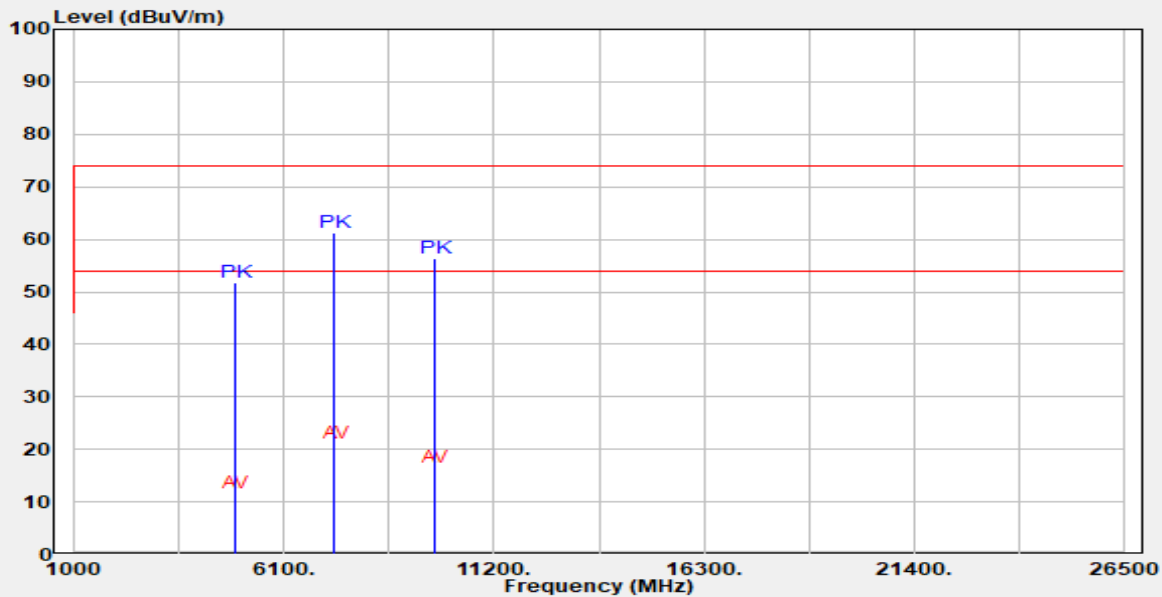
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2440 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
4880.00	Average	-	-	11.63	54.00	-42.37
4880.00	Peak	49.05	2.58	51.63	74.00	-22.37
7320.00	Average	-	-	21.14	54.00	-32.86
7320.00	Peak	52.10	9.04	61.14	74.00	-12.86
9760.00	Average	-	-	16.43	54.00	-37.57
9760.00	Peak	46.09	10.34	56.43	74.00	-17.57

Average Duty Cycle Factor=-40 (dB)

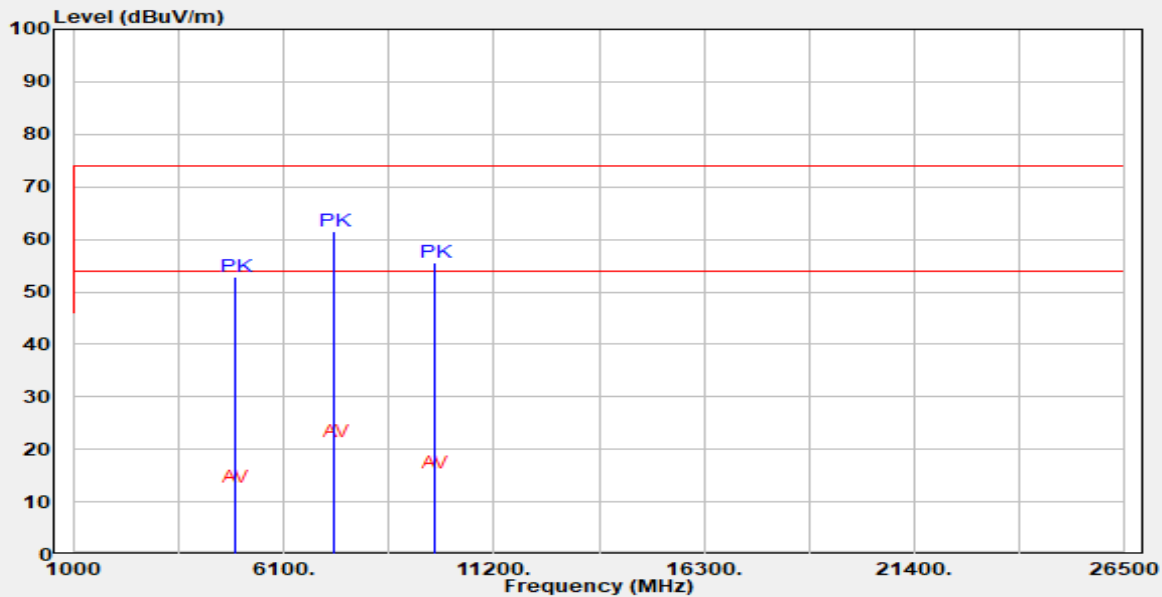
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2440 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d μ V	Factor dB	Actual FS d μ V/m	Limit @3m d μ V/m	Margin dB
4880.00	Average	-	-	12.84	54.00	-41.16
4880.00	Peak	50.26	2.58	52.84	74.00	-21.16
7320.00	Average	-	-	21.43	54.00	-32.57
7320.00	Peak	52.39	9.04	61.43	74.00	-12.57
9760.00	Average	-	-	15.55	54.00	-38.45
9760.00	Peak	45.21	10.34	55.55	74.00	-18.45

Average Duty Cycle Factor=-40 (dB)

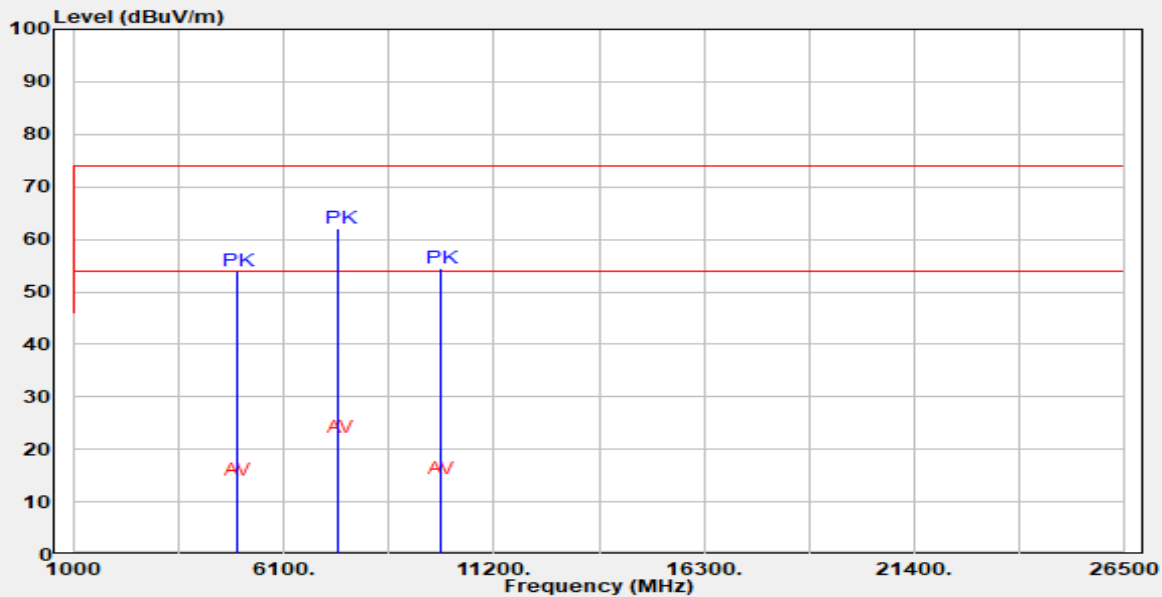
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2475 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4950.00	Average	-	-	13.97	54.00	-40.03
4950.00	Peak	50.77	3.20	53.97	74.00	-20.03
7425.00	Average	-	-	22.18	54.00	-31.82
7425.00	Peak	53.31	8.87	62.18	74.00	-11.82
9900.00	Average	-	-	14.42	54.00	-39.58
9900.00	Peak	43.93	10.49	54.42	74.00	-19.58

Average Duty Cycle Factor=-40 (dB)

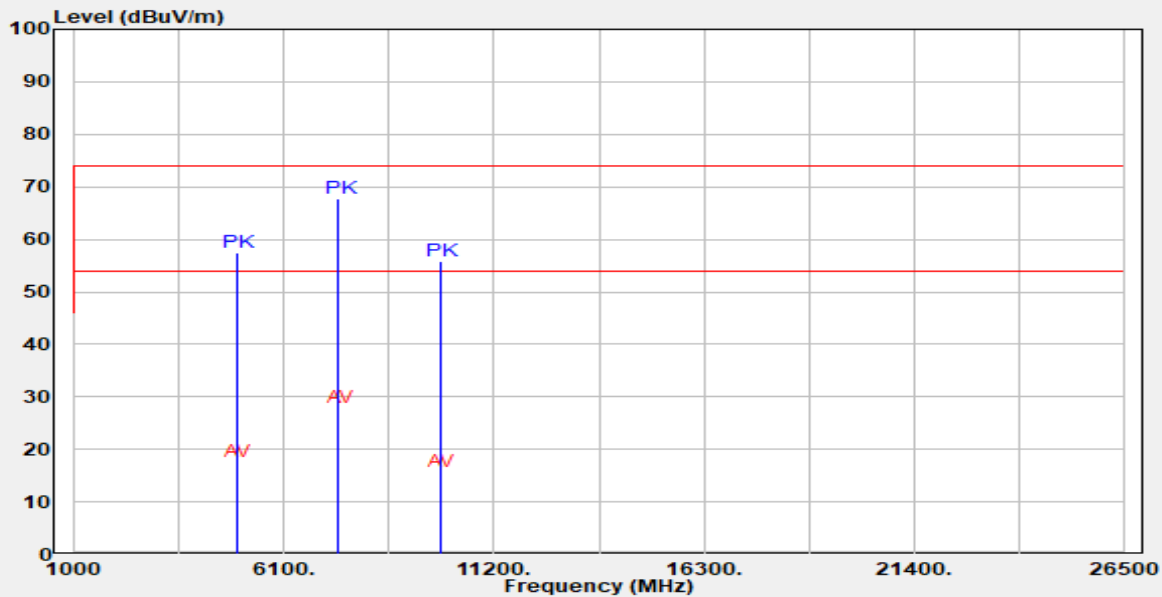
Average Level= Peak Level+ Duty Cycle Factor

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Operation Mode :SRD
Test Frequency :2475 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-05
Temp./Humi. :25.8°C/50%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4950.00	Average	-	-	17.48	54.00	-36.52
4950.00	Peak	54.28	3.20	57.48	74.00	-16.52
7425.00	Average	-	-	27.83	54.00	-26.17
7425.00	Peak	58.96	8.87	67.83	74.00	-6.17
9900.00	Average	-	-	15.78	54.00	-38.22
9900.00	Peak	45.29	10.49	55.78	74.00	-18.22

Average Duty Cycle Factor=-40 (dB)

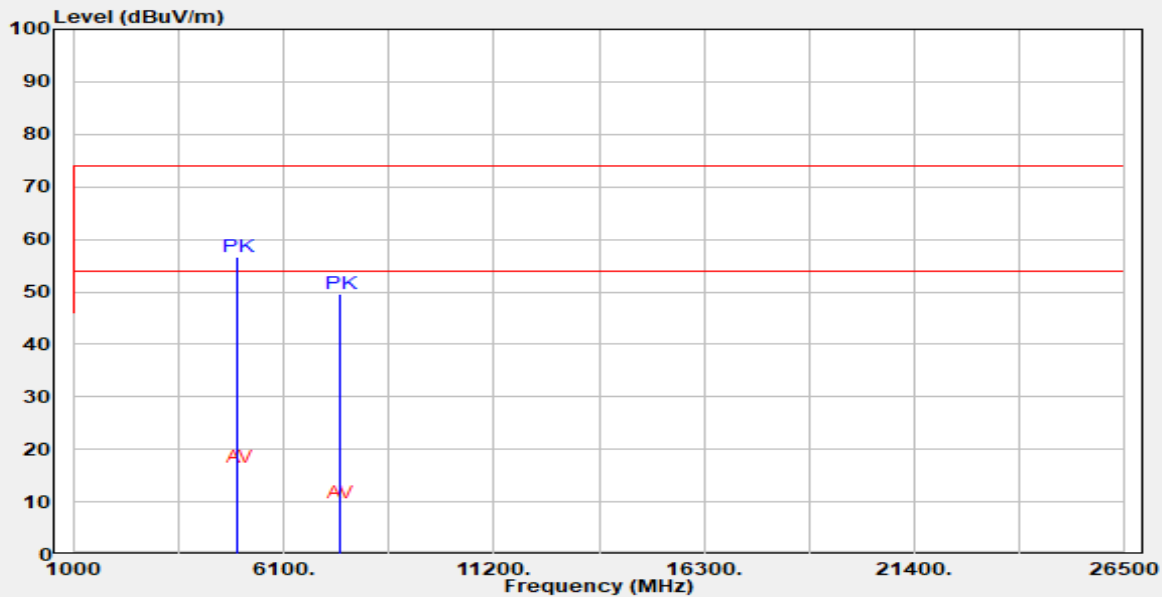
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2480 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-18
Temp./Humi. :25.9°C/50%
Antenna Pol. :Vertical
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
4960.00	Average	-	-	16.55	54.00	-37.45
4960.00	Peak	53.29	3.26	56.55	74.00	-17.45
7440.00	Average	-	-	9.62	54.00	-44.38
7440.00	Peak	40.78	8.84	49.62	74.00	-24.38

Average Duty Cycle Factor=-40 (dB)

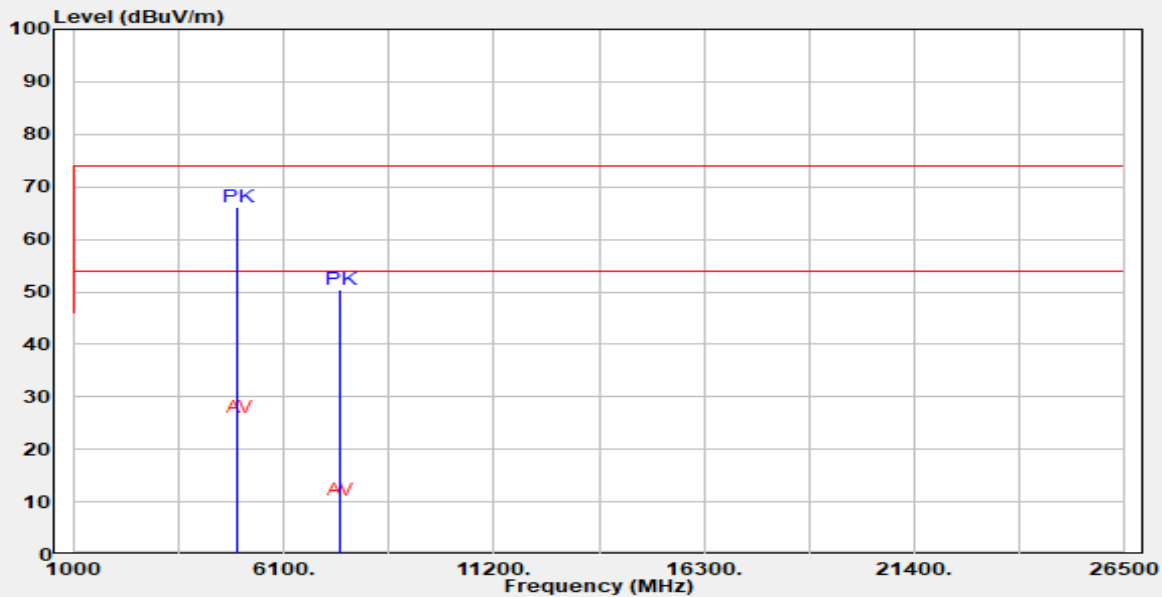
Average Level= Peak Level+ Duty Cycle Factor

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Report Number :TERF2403000809ER
Operation Mode :SRD
Test Frequency :2480 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 1
Test Date :2024-07-18
Temp./Humi. :25.9°C/50%
Antenna Pol. :Horizontal
Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
4960.00	Average	-	-	26.03	54.00	-27.97
4960.00	Peak	62.77	3.26	66.03	74.00	-7.97
7440.00	Average	-	-	10.42	54.00	-43.58
7440.00	Peak	41.58	8.84	50.42	74.00	-23.58

Average Duty Cycle Factor=-40 (dB)

Average Level= Peak Level+ Duty Cycle Factor

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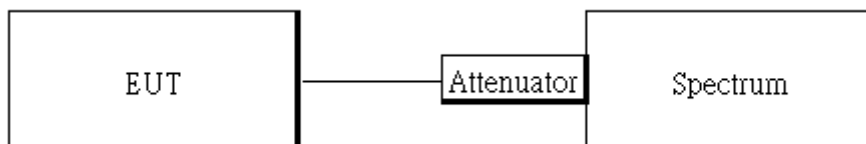
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12 FREQUENCY SEPARATION

12.1 Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the $2/3 \times 20\text{dB}$ 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.
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 = middle of hopping channel.
5. Set the RBW approximately 30% of the channel spacing, $\text{VBW} \geq \text{RBW}$.
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.

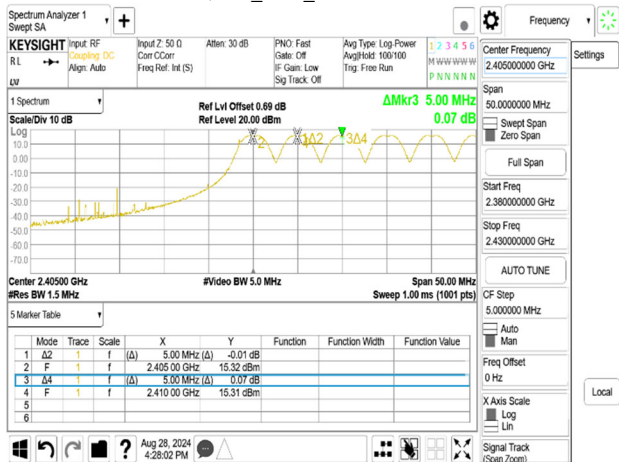
12.4 Measurement Result

Channel separation (MHz)	Limit	Result
5	$\geq 25 \text{ kHz}$ or $2/3 \text{ times } 20\text{dB bandwidth}$	PASS

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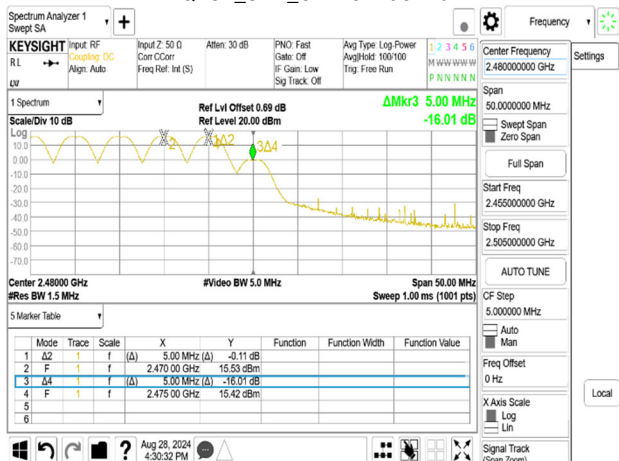
QPSK_SRD_CH1CH2CH3



QPSK_SRD_CH8CH9CH10



QPSK_SRD_CH14CH15CH16



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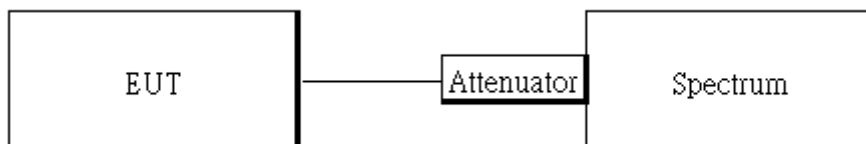
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13 NUMBER OF HOPPING FREQUENCY

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 \geq RBW., Detector = Peak
6. Max hold, view and count how many channel in the band.

13.4 Measurement Result

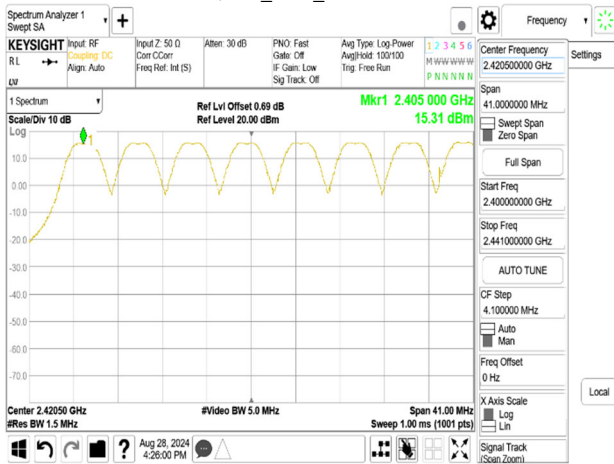
Tabular Data of Total Channel Number

	Channel Number	Limit
2.4 GHz – 2.441 GHz	8	>15
2.441 GHz – 2.4835 GHz	8	
2.4 GHz ~2.4835 GHz	(8+8) = 16	

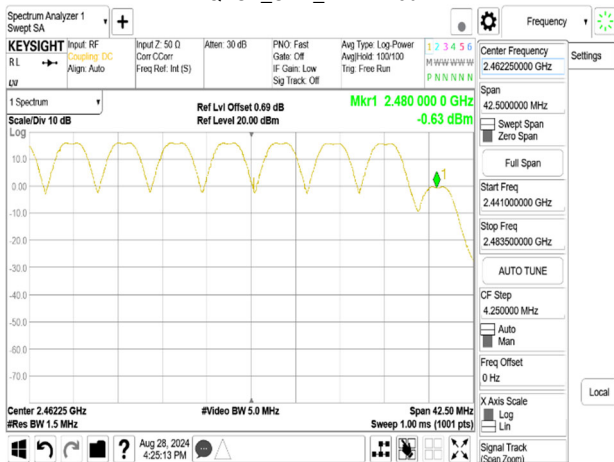
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QPSK_SRD_2400-2441



QPSK_SRD_2441-2480



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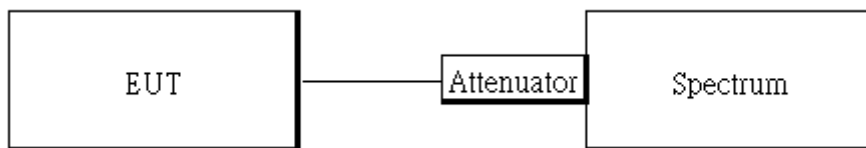
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14 TIME OF OCCUPANCY (DWELL TIME)

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 = 30ms~6.4s.
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**QPSK**

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
8	QPSK	69.87	400

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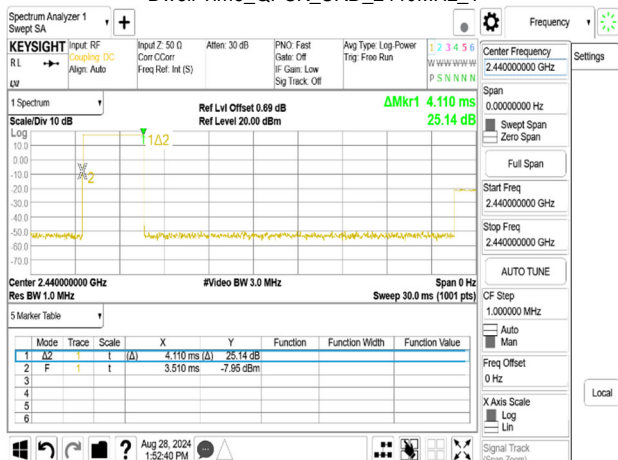
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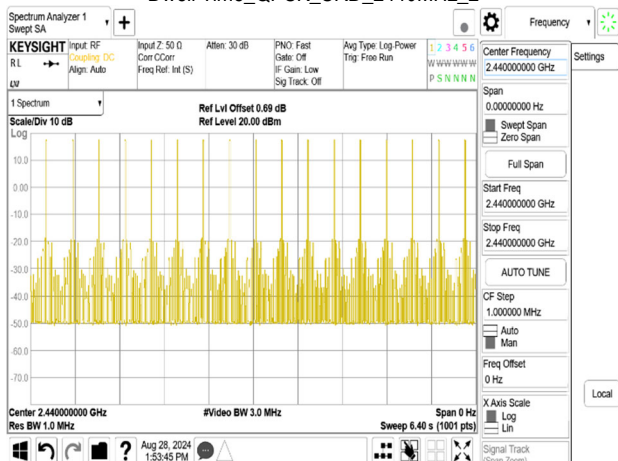
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Dwell Time_QPSK_SRD_2440MHz_1



Dwell Time_QPSK_SRD_2440MHz_2



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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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