

Project No: TM-2405000384P
Report No.: TMWK2405001753KR

FCC ID: 2AWUU6099001
IC: 26271-6099001

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RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

INDUSTRY CANADA RSS-247

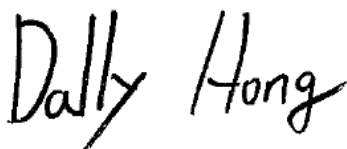
Test Standard	FCC Part 15.247 IC RSS-247 issue 3 and IC RSS-GEN issue 5
Product name	Video Intercom
Brand Name	Verkada
Model No.	TD63-HW / TD53-HW
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:



Dally Hong
Sr. Engineer

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.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	October 22, 2024	Initial Issue	ALL	Peggy Tsai
01	October 28, 2024	See the following Note Rev. (01)	P.5, 47-70	Peggy Tsai
02	October 29, 2024	See the following Note Rev. (02)	P.4, 5	Peggy Tsai

Note:

Rev. (01)

1. Modify Antenna Information in section 1.3.
2. Add setting information in section 4.6.

Rev. (02)

1. Modify Remark in section 1.1.
2. Add Antenna Connector in section 1.3.

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	FCC: Verkada Inc 405 E. 4th Ave. San Mateo California United States 94401 IC: Verkada, Inc. 405 E. 4th Ave. San Mateo CA 94401 United States Of America (Excluding The States Of Alaska)
Manufacturer	CHICONY ELECTRONICS (THAILAND) CO., LTD 82 MOO 4 T. THAKHAM A. BANGPAKONG, CHACHOENGSAO, THAILAND 24130
Equipment	Video Intercom
Model No.	TD63-HW / TD53-HW
Model Discrepancy	Difference of the model number (list on this report) is just with or without keypad and corresponding housing. All the other HW and FW features are all the same.
Trade Name	Verkada
Received Date	May 31, 2024
Date of Test	June 25 ~ September 6, 2024
Power Supply	Power from Poe Adapter. ZYXEL / PoE12-60W I/P: 100-240VAC, 2.0A, 50-60Hz O/P: 56.0VDC, 1.161A, 65.1W
PMN	TD63-HW: TD63 TD53-HW: TD53
EUT Serial #	TD63-HW: KENW-T9L4-7D7H TD53-HW: LKEJ-6CR7-LNWW
HW Version	B02
FW Version	v259

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. Disclaimer: The variant model numbers are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.
4. The manufacturer stated that the PoE adapter will provide corresponding current according to the product.

1.2 EUT CHANNEL INFORMATION

Frequency Range	2402MHz-2480MHz
Modulation Type	GFSK for BLE 1 Mbps GFSK for BLE 2 Mbps
Number of channel	40 Channels

Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 and RSS-GEN Table 1 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☒ PIFA ☐ PCB ☐ Dipole ☐ Chip Antenna
Antenna Gain	Gain: 1.9 dBi
Antenna Trade / Model	SPEED / F-0Q-51-6009-001-00
Antenna Connector	I-PEX

Notes:

1. The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203 and RSS-GEN 6.8.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.213 dB
Channel Bandwidth	± 2.7 %
RF output power (Power Meter + Power sensor)	± 0.243 dB
Power Spectral density	± 2.739 dB
Conducted Bandedge	± 2.739 dB
Conducted Spurious Emission	± 2.742 dB
Radiated Emission_9kHz-30MHz	± 3.761 dB
Radiated Emission_30MHz-200MHz	± 3.473 dB
Radiated Emission_200MHz-1GHz	± 3.946 dB
Radiated Emission_1GHz-6GHz	± 4.797 dB
Radiated Emission_6GHz-18GHz	± 4.803 dB
Radiated Emission_18GHz-26GHz	± 3.459 dB
Radiated Emission_26GHz-40GHz	± 3.297 dB

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Ben Yang	-
Radiation	Tony Chao	-
RF Conducted	Marco Chan	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC pubic Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.6 INSTRUMENT CALIBRATION

Conducted_FCC/NCC/IC(All)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Sensor	Anritsu	MA2411B	1726104	2024-04-16	2025-04-15
Power Sensor	Anritsu	MA2412B	1726107	2024-04-16	2025-04-15
Power Meter	Anritsu	ML2496A	1804001	2024-04-16	2025-04-15
Cable	Woken	SUMITOMO	1	2024-03-02	2025-03-01
Signal Analyzer	KEYSIGHT	N9030B	MY62291089	2023-10-13	2024-10-12
Software	Radio Test Software Ver. 21				

966A_Radiated Wi-Fi 2.4GHz					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Analyzer	KEYSIGHT	N9010A	MY52220817	2024-03-15	2025-03-14
Thermo-Hygro Meter	WISEWIND	1206	D07	2023-12-08	2024-12-07
Active Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2023-12-13	2024-12-12
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2023-08-08	2024-08-07
				2024-07-12	2025-07-11
Preamplifier	EMEC	EM330	060609	2024-02-21	2025-02-20
Cable	Huber+Suhner	104PEA	20995+21000+182330	2024-02-21	2025-02-20
Horn Antenna	ETC	MCTD 1209	DRH13M02003	2023-12-28	2024-12-27
Preamplifier	HP	8449B	3008A00965	2023-12-22	2024-12-21
Cable	EMCI	EMC101G	221213+221011+221012	2023-10-17	2024-10-16
Attenuator	Mini-Circuits	BW-S9W5	BWS9W5-09-966A-01	2024-02-07	2025-02-06
High Pass Filters	Titan Microwave	T04H30001800070S01	22011402-4	2024-06-12	2025-06-13
Horn Antenna	SCHWARZBECK	BBHA9170	1047	2023-12-13	2024-12-12
Pre-Amplifier	EMCI	EMC184045SE	980860	2023-12-12	2024-12-11
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Software	e3 V9-210616c				

Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Required.



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AC Mains Conduction					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESCI	100064	2024-06-14	2025-06-13
LISN	TESEQ	LN2-16N	22012	2024-02-29	2025-02-27
Cable	Woken	SFL402	185A	2024-07-08	2025-07-07
Software	e3 V6-110812				

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

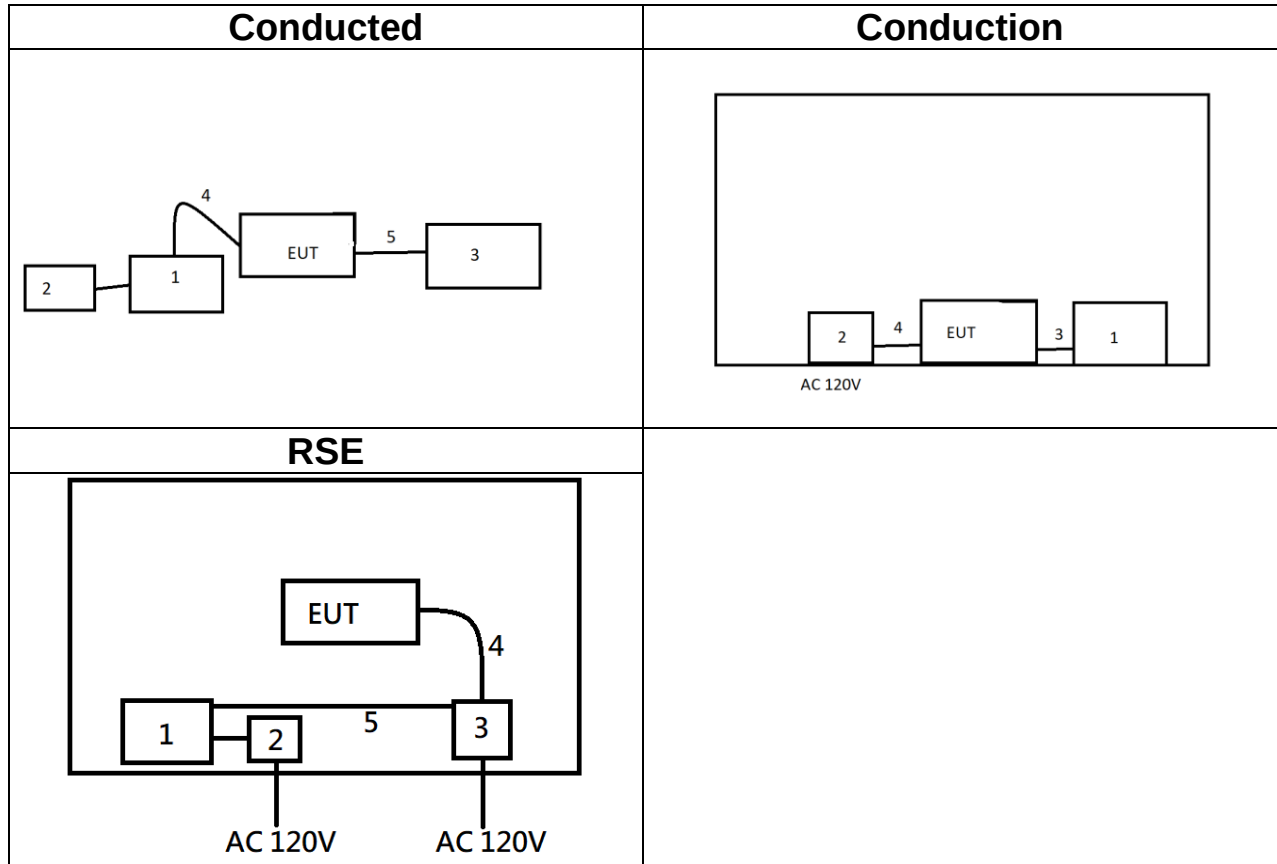
EUT Accessories Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
	N/A					

Support Equipment (Conducted)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(B)	Lenovo	T470	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
3	PoE Injector	Zyxel	PoE12-60W	S212L41486914	N/A
4	RJ45	LINKOMM	E530529	N/A	N/A
5	RJ45	LINKOMM	E530529	N/A	N/A

Support Equipment (RSE)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
3	PoE Injector	Zyxel	PoE12-60W	N/A	N/A
4	Ethernet Cable	Rasto	R-PCC004	N/A	N/A
5	Ethernet Cable	Atake	AC6-FL10	N/A	N/A

Support Equipment (Conduction)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	PoE Injector	Zyxel	PoE12-60W	S212L41486914	N/A
3	Ethernet Cable	Rasto	R-PCC004	N/A	N/A
4	Ethernet Cable	Atake	AC6-FL10	N/A	N/A

1.8 TEST SET UP DIAGRAM



1.9 TEST PROGRAM

The EUT connection corresponds to the surrounding fixture control board.
This EUT uses "Tera term v4.73" software and setup command to set the frequency, modulation, and power to allow the sample to continuously transmit (including frequency hopping mode).

1.10 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 558074, RSS-247 Issue 3 and RSS-GEN Issue 5.

2. TEST SUMMERY

IC Standard Section	FCC Standard Section	Report Section	Test Item	Result
RSS-Gen 6.8	15.203	1.3	Antenna Requirement	Pass
RSS-GEN 8.8	15.207(a)	4.1	AC Conducted Emission	Pass
RSS-247(5.2)(a)	15.247(a)(2)	4.2	6 dB Bandwidth	Pass
RSS-GEN 6.7	-	4.2	Occupied Bandwidth (99%)	Pass
RSS-247(5.4)(d)	15.247(b)(3)	4.3	Output Power Measurement	Pass
RSS-247(5.2)(b)	15.247(e)	4.4	Power Spectral Density	Pass
RSS-247(5.5)	15.247(d)	4.5	Conducted Band Edge	Pass
RSS-247(5.5)	15.247(d)	4.5	Conducted Spurious Emission	Pass
RSS-GEN 8.9, 8.10	15.247(d) 15.205, 15.209	4.6	Radiation Band Edge	Pass
RSS-GEN 8.9, 8.10	15.247(d) 15.205, 15.209	4.6	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	BLE Mode (1Mbps) BLE Mode (2Mbps)
Test Channel Frequencies	1.Lowest Channel : 2402MHz 2.Middle Channel : 2442MHz 3.Highest Channel : 2480MHz

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.
2. Based on FCC Part 15.31(m), the laboratory conducts a comprehensive evaluation of CH low, CH middle, and CH high. Other additional channels only evaluate the radiated restricted bands of operation and powers.

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT Power by PoE Adapter(TD63-HW) Mode 2: EUT Power by PoE Adapter(TD53-HW)
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by PoE Adapter (TD63-HW) Mode 2: EUT power by PoE Adapter (TD53-HW)
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☐ Placed in fixed position at X-Plane (E2-Plane) ☒ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by PoE Adapter (TD63-HW) Mode 2: EUT power by PoE Adapter (TD53-HW)
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

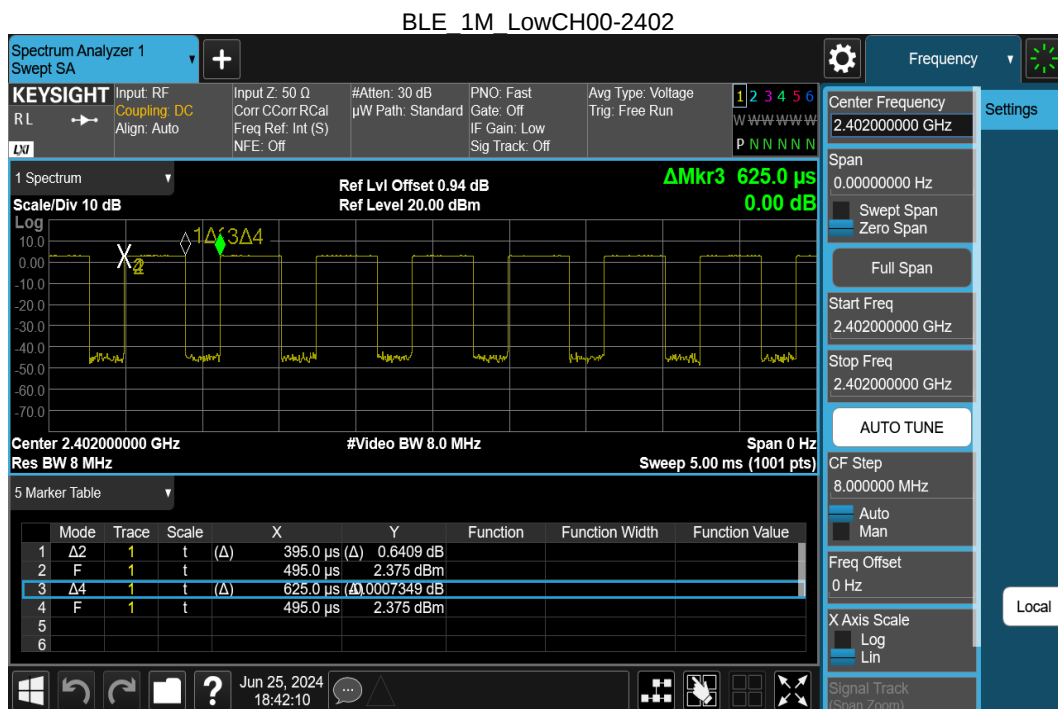
Remark:

1. The worst mode was record in this test report.
2. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.
3. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Y-Plane) were recorded in this report

3.3 EUT DUTY CYCLE

Temperature: 22 ~ 22.5°C Test date: June 25 ~ 26, 2024
Humidity: 54 ~ 57% RH Tested by: Marco Chan

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) = 10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
BLE 1M	63.20	1.99	2.53	3.00



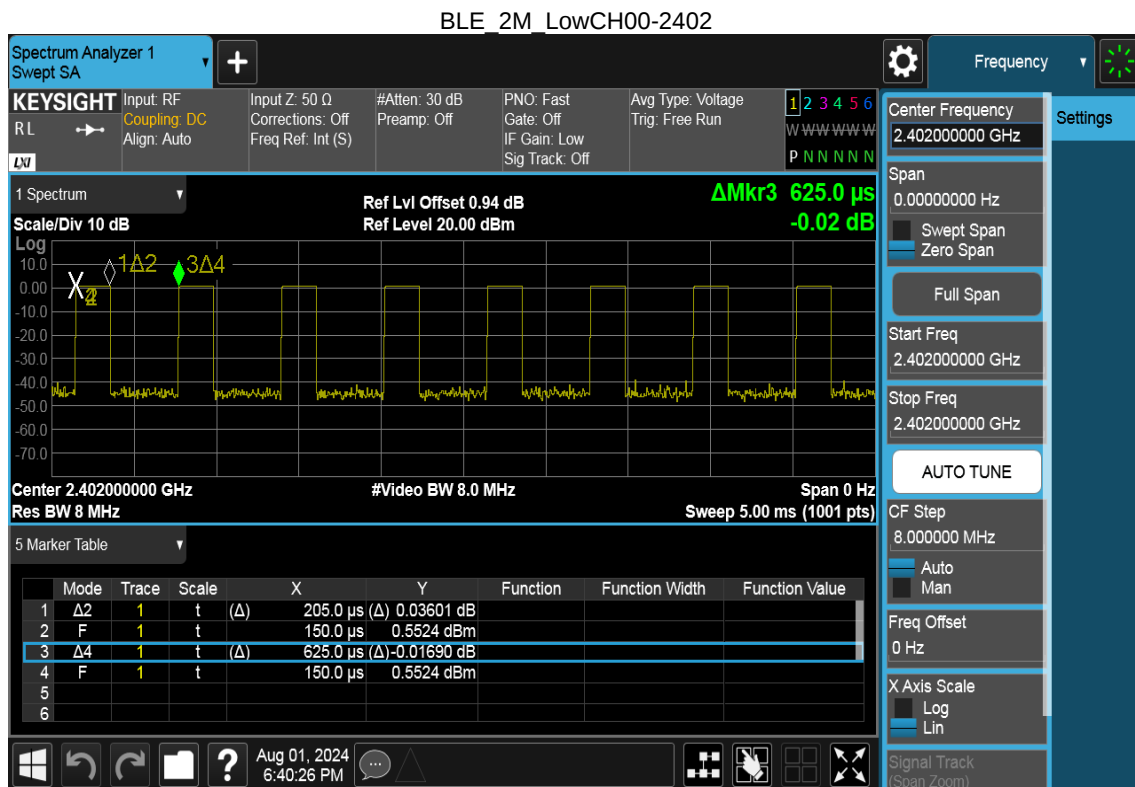
Temperature: 23.1°C

Test date: August 1, 2024

Humidity: 54% RH

Tested by: Marco Chan

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) = 10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
BLE 2M	32.80	4.84	4.88	5.00



4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a) and RSS-GEN section 8.8,

Frequency Range (MHz)	Limits(dB μ V)	
	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

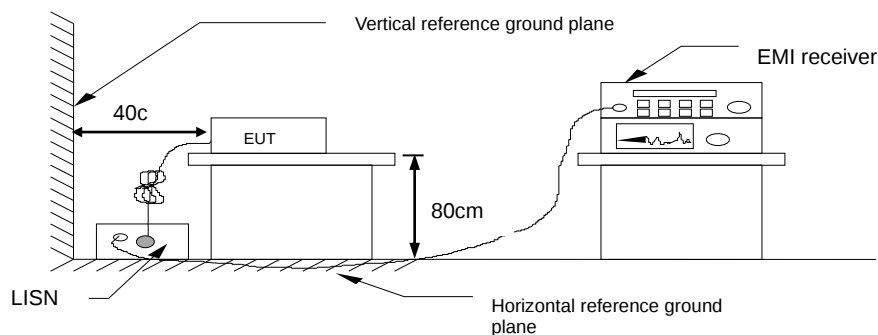
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

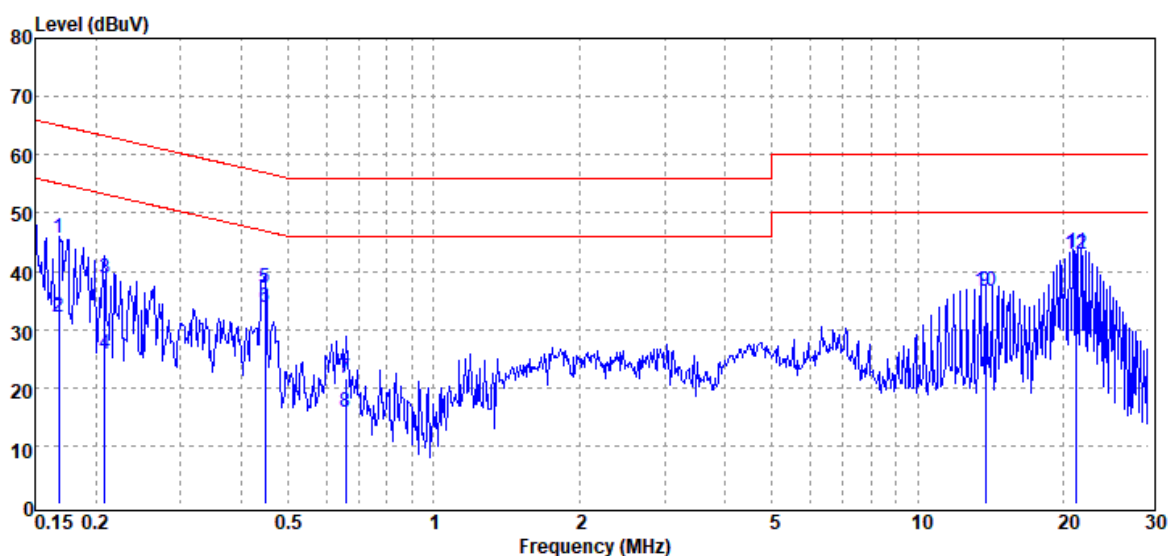
4.1.3 Test Setup



4.1.4 Test Result

Project No : TM-2405000384P
Operation Mode : BLE 1M
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2024-07-10
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.168	QP	45.53	0.23	45.76	65.07	-19.31
0.168	Average	31.96	0.23	32.19	55.07	-22.88
0.209	QP	38.25	0.39	38.64	63.25	-24.61
0.209	Average	25.25	0.39	25.64	53.25	-27.61
0.447	QP	36.65	0.38	37.03	56.92	-19.89
0.447	Average	33.34	0.38	33.72	46.92	-13.20
0.656	QP	21.09	0.39	21.48	56.00	-34.52
0.656	Average	15.41	0.39	15.80	46.00	-30.20
13.818	QP	36.20	0.41	36.61	60.00	-23.39
13.818	Average	36.01	0.41	36.42	50.00	-13.58
21.317	QP	42.74	0.51	43.25	60.00	-16.75
21.317	Average	42.45	0.51	42.96	50.00	-7.04

Note: 1. Actual FS= Spectrum Read Level + Factor

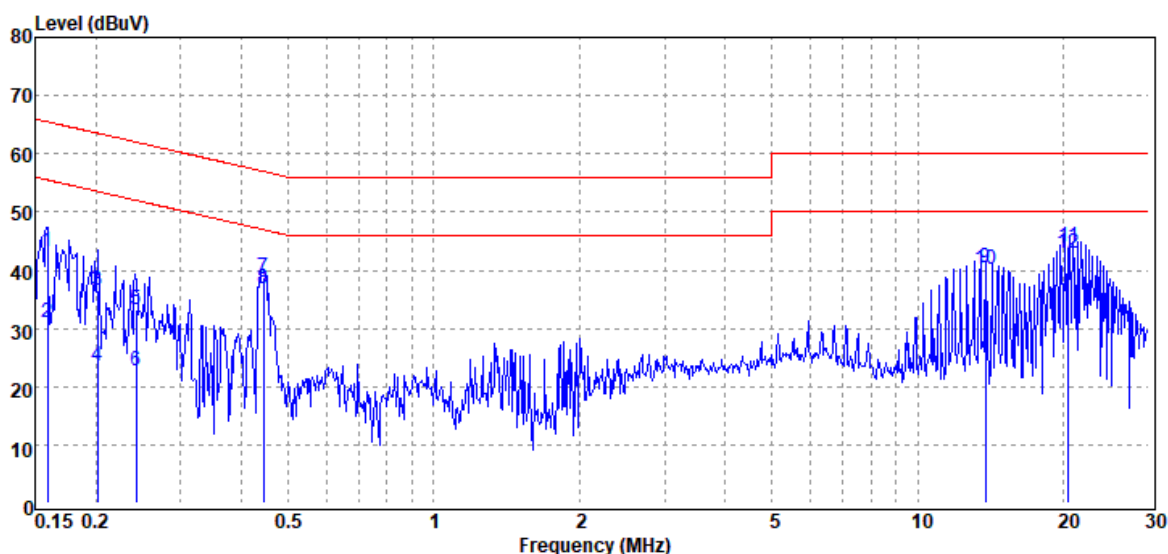
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 1M
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2024-07-10
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.159	QP	43.03	0.16	43.19	65.51	-22.32
0.159	Average	30.97	0.16	31.13	55.51	-24.38
0.202	QP	36.28	0.36	36.64	63.52	-26.88
0.202	Average	23.11	0.36	23.47	53.52	-30.05
0.243	QP	32.77	0.36	33.13	62.00	-28.87
0.243	Average	22.46	0.36	22.82	52.00	-29.18
0.446	QP	38.36	0.35	38.71	56.96	-18.25
0.446	Average	36.54	0.35	36.89	46.96	-10.07
13.814	QP	40.03	0.38	40.41	60.00	-19.59
13.814	Average	39.72	0.38	40.10	50.00	-9.90
20.525	QP	43.48	0.45	43.93	60.00	-16.07
20.525	Average	42.35	0.45	42.80	50.00	-7.20

Note: 1. Actual FS= Spectrum Read Level + Factor

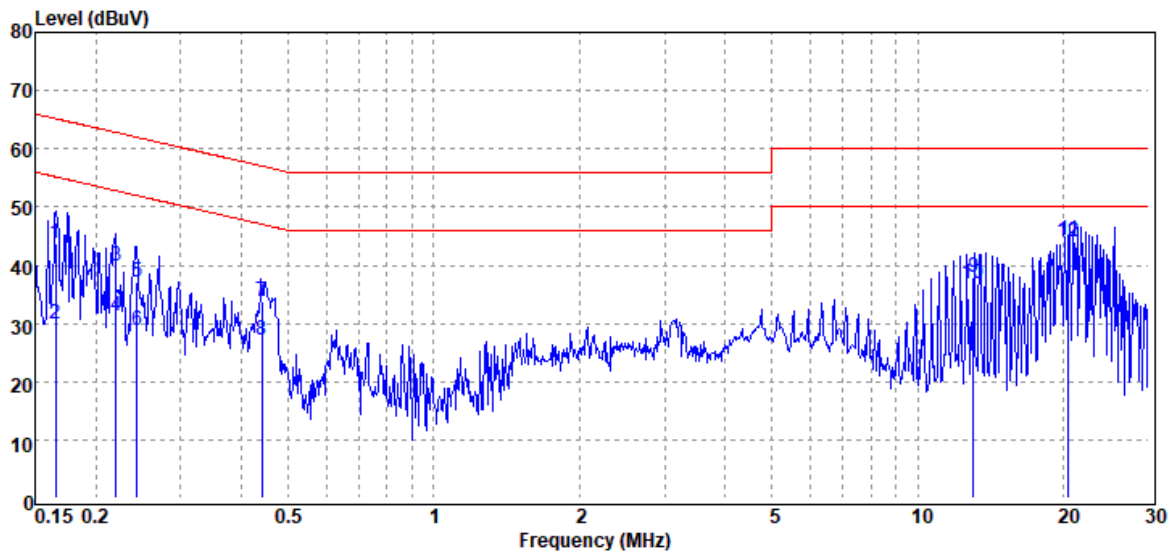
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 1M
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2024-07-10
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.166	QP	43.53	0.22	43.75	65.18	-21.43
0.166	Average	29.55	0.22	29.77	55.18	-25.41
0.220	QP	39.41	0.39	39.80	62.81	-23.01
0.220	Average	30.87	0.39	31.26	52.81	-21.55
0.243	QP	36.72	0.39	37.11	61.98	-24.87
0.243	Average	28.29	0.39	28.68	51.98	-23.30
0.441	QP	33.52	0.38	33.90	57.04	-23.14
0.441	Average	26.70	0.38	27.08	47.04	-19.96
13.008	QP	37.54	0.40	37.94	60.00	-22.06
13.008	Average	36.55	0.40	36.95	50.00	-13.05
20.520	QP	43.71	0.49	44.20	60.00	-15.80
20.520	Average	43.51	0.49	44.00	50.00	-6.00

Note: 1. Actual FS= Spectrum Read Level + Factor

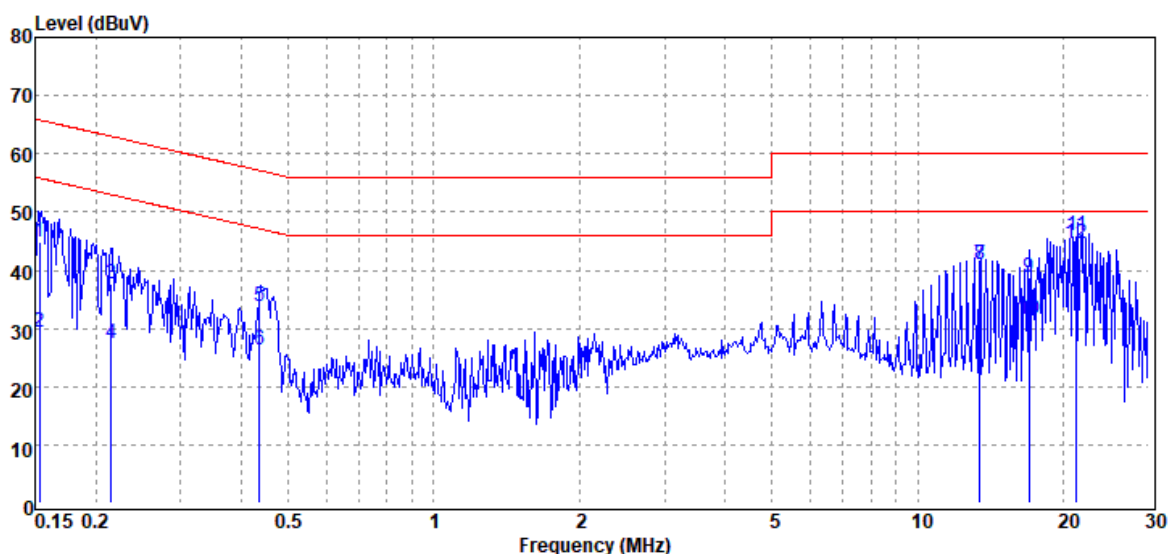
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 1M
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2024-07-10
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.153	QP	44.62	0.12	44.74	65.84	-21.10
0.153	Average	29.34	0.12	29.46	55.84	-26.38
0.216	QP	37.28	0.36	37.64	62.98	-25.34
0.216	Average	27.12	0.36	27.48	52.98	-25.50
0.437	QP	33.47	0.35	33.82	57.12	-23.30
0.437	Average	25.96	0.35	26.31	47.12	-20.81
13.422	QP	40.62	0.38	41.00	60.00	-19.00
13.422	Average	40.53	0.38	40.91	50.00	-9.09
16.977	QP	38.46	0.42	38.88	60.00	-21.12
16.977	Average	31.14	0.42	31.56	50.00	-18.44
21.313	QP	45.61	0.47	46.08	60.00	-13.92
21.313	Average	44.20	0.47	44.67	50.00	-5.33

Note: 1. Actual FS= Spectrum Read Level + Factor

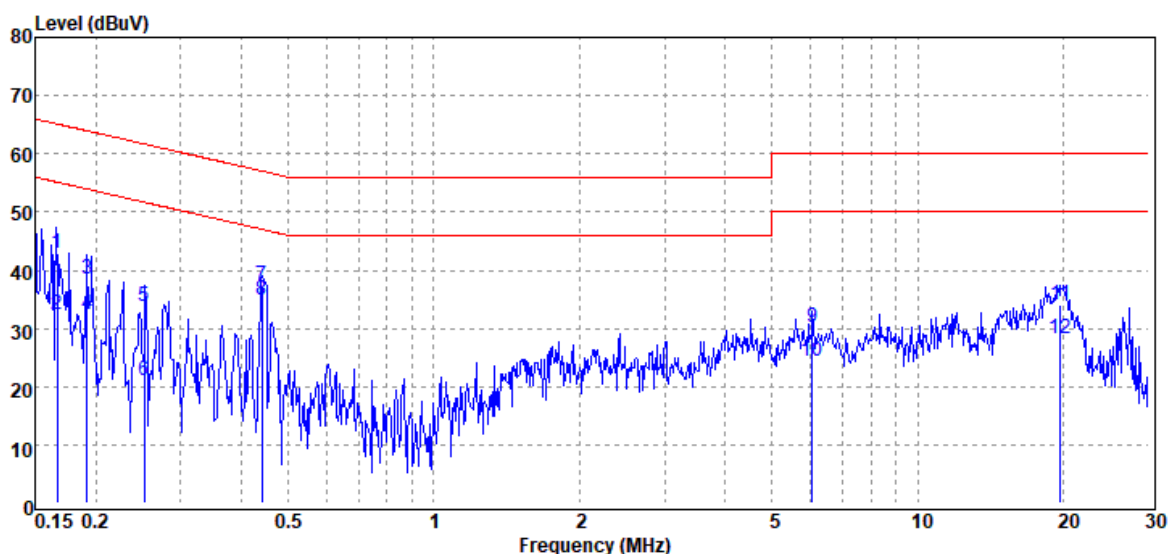
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 2M
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2024-08-06
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.166	QP	42.67	0.22	42.89	65.14	-22.25
0.166	Average	32.12	0.22	32.34	55.14	-22.80
0.192	QP	38.14	0.35	38.49	63.95	-25.46
0.192	Average	31.95	0.35	32.30	53.95	-21.65
0.253	QP	33.41	0.39	33.80	61.67	-27.87
0.253	Average	20.57	0.39	20.96	51.67	-30.71
0.442	QP	37.11	0.38	37.49	57.03	-19.54
0.442	Average	34.39	0.38	34.77	47.03	-12.26
6.042	QP	29.88	0.29	30.17	60.00	-29.83
6.042	Average	23.96	0.29	24.25	50.00	-25.75
19.713	QP	33.68	0.48	34.16	60.00	-25.84
19.713	Average	27.83	0.48	28.31	50.00	-21.69

Note: 1. Actual FS= Spectrum Read Level + Factor

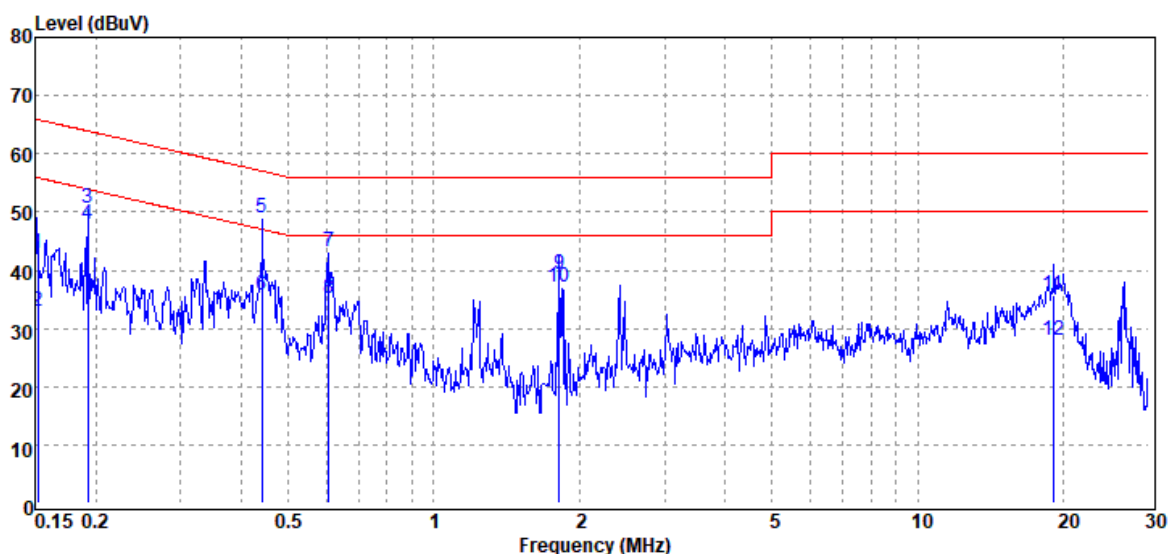
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 2M
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2024-08-06
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.152	QP	42.82	0.11	42.93	65.90	-22.97
0.152	Average	32.93	0.11	33.04	55.90	-22.86
0.193	QP	50.21	0.33	50.54	63.92	-13.38
0.193	Average	47.52	0.33	47.85	53.92	-6.07
0.441	QP	48.53	0.35	48.88	57.05	-8.17
0.441	Average	35.38	0.35	35.73	47.05	-11.32
0.607	QP	42.80	0.35	43.15	56.00	-12.85
0.607	Average	34.81	0.35	35.16	46.00	-10.84
1.814	QP	39.17	0.16	39.33	56.00	-16.67
1.814	Average	37.05	0.16	37.21	46.00	-8.79
19.028	QP	35.20	0.44	35.64	60.00	-24.36
19.028	Average	27.55	0.44	27.99	50.00	-22.01

Note: 1. Actual FS= Spectrum Read Level + Factor

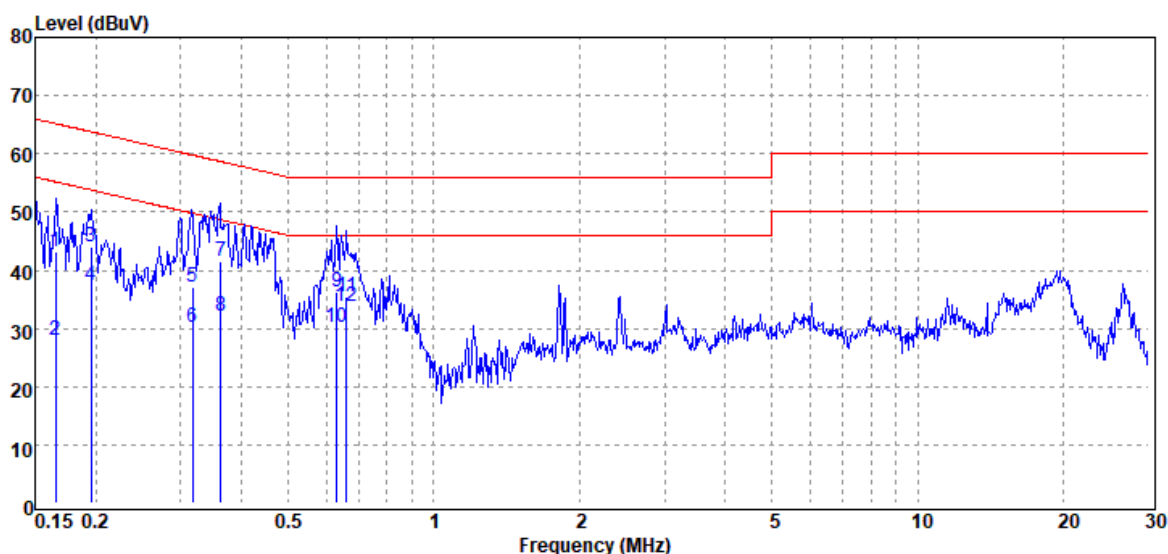
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 2M
Test Chamber : Conduction
Probe : LINE
Note :

Test Date : 2024-08-06
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.165	QP	42.90	0.22	43.12	65.19	-22.07
0.165	Average	27.75	0.22	27.97	55.19	-27.22
0.196	QP	43.65	0.37	44.02	63.80	-19.78
0.196	Average	36.96	0.37	37.33	53.80	-16.47
0.317	QP	36.76	0.38	37.14	59.78	-22.64
0.317	Average	29.81	0.38	30.19	49.78	-19.59
0.363	QP	41.26	0.38	41.64	58.67	-17.03
0.363	Average	31.77	0.38	32.15	48.67	-16.52
0.631	QP	35.82	0.38	36.20	56.00	-19.80
0.631	Average	29.93	0.38	30.31	46.00	-15.69
0.660	QP	35.17	0.39	35.56	56.00	-20.44
0.660	Average	33.44	0.39	33.83	46.00	-12.17

Note: 1. Actual FS= Spectrum Read Level + Factor

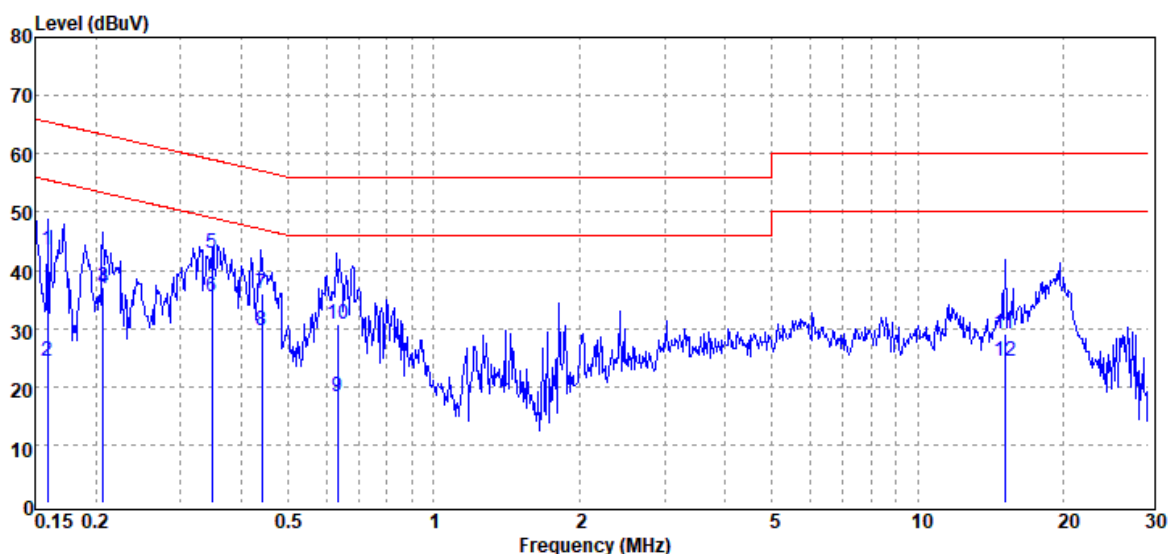
Note: 2. Margin= Actual FS - Limit

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Project No : TM-2405000384P
Operation Mode : BLE 2M
Test Chamber : Conduction
Probe : NEUTRAL
Note :

Test Date : 2024-08-06
Temp./Humi. : 23.4°C / 54%
Engineer : Ben Yang
Test Voltage : AC 230V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.159	QP	43.38	0.16	43.54	65.50	-21.96
0.159	Average	24.10	0.16	24.26	55.50	-31.24
0.207	QP	36.81	0.36	37.17	63.32	-26.15
0.207	Average	36.39	0.36	36.75	53.32	-16.57
0.348	QP	42.57	0.35	42.92	59.00	-16.08
0.348	Average	35.21	0.35	35.56	49.00	-13.44
0.441	QP	35.72	0.35	36.07	57.04	-20.97
0.441	Average	29.20	0.35	29.55	47.04	-17.49
0.633	QP	17.94	0.35	18.29	56.00	-37.71
0.633	Average	30.34	0.35	30.69	46.00	-15.31
15.106	QP	28.60	0.40	29.00	60.00	-31.00
15.106	Average	24.01	0.40	24.41	50.00	-25.59

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

4.2 6dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

4.2.1 Test Limit

According to §15.247(a)(2) and RSS-247 section 5.2(a),

6 dB Bandwidth :

Limit	Shall be at least 500kHz
-------	--------------------------

Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as KDB 558074 D01 and ANSI C63.10: 2013 clause 6.9.2.

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup

Refer to section 1.8.

4.2.4 Test Result

Temperature: 22 ~ 22.5°C Test date: June 25 ~ 26, 2024
Humidity: 54 ~ 57% RH Tested by: Marco Chan

6dB BANDWIDTH

BLE 1M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.6775	≥ 0.5	PASS
2440	0.6736	≥ 0.5	PASS
2480	0.6717	≥ 0.5	PASS

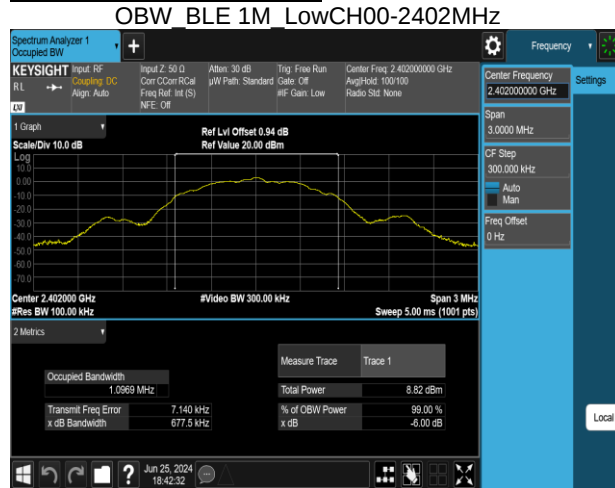
BANDWIDTH 99%

BLE 1M mode

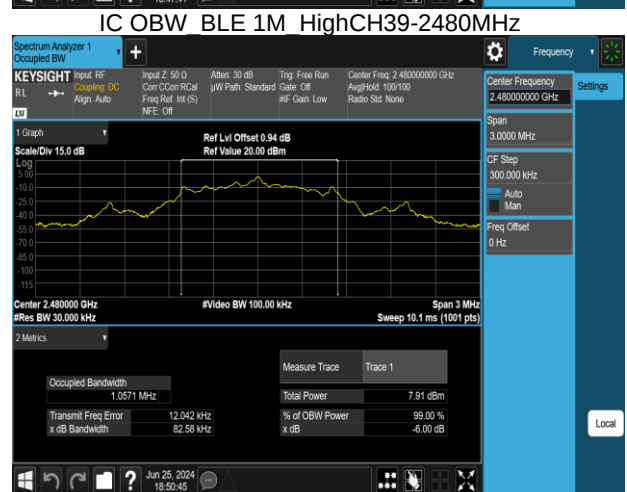
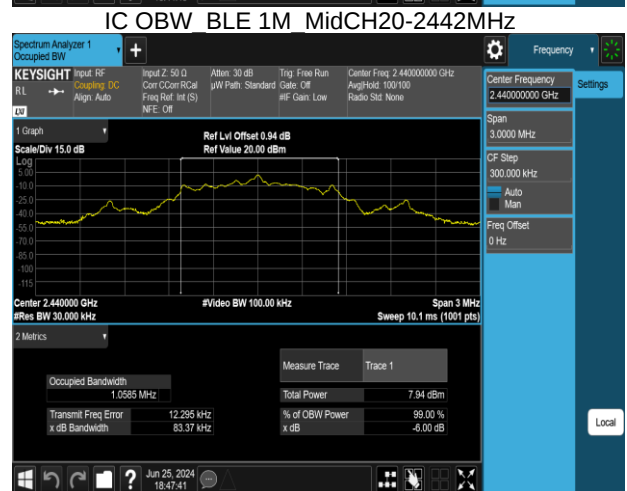
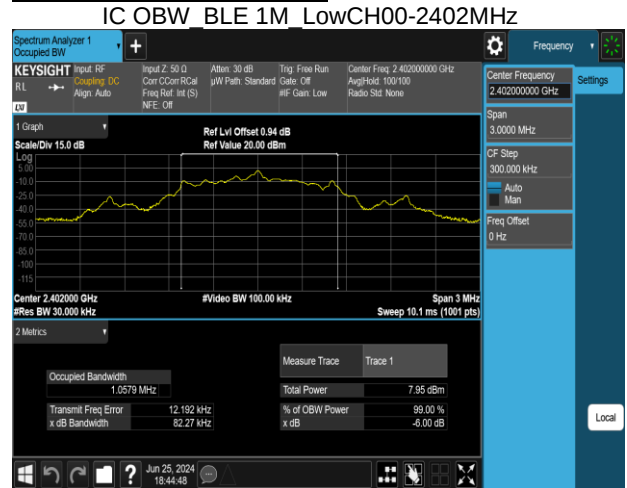
Frequency (MHz)	99%Bandwidth (MHz)
2402	1.0579
2440	1.0585
2480	1.0571

Test Data

6dB BANDWIDTH



BANDWIDTH 99%



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Temperature: 23.1°C
Humidity: 54% RH

Test date: August 1, 2024
Tested by: Marco Chan

6dB BANDWIDTH

BLE 2M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.7824	≥ 0.5	PASS
2440	1.019	≥ 0.5	PASS
2480	0.7590	≥ 0.5	PASS

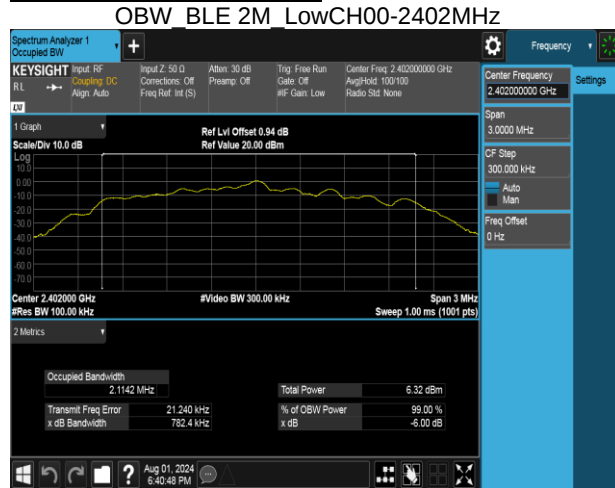
BANDWIDTH 99%

BLE 2M mode

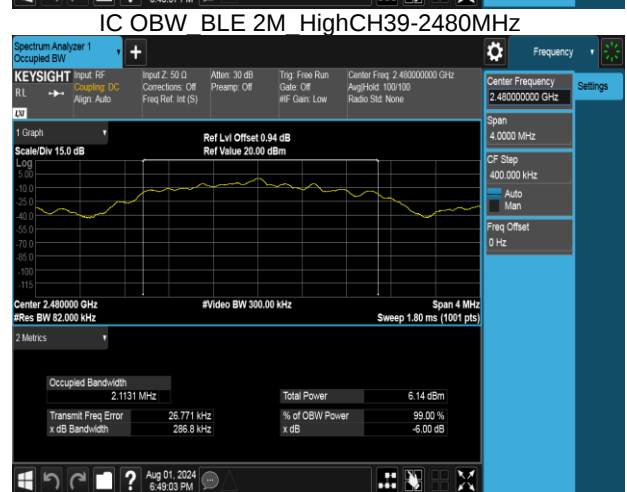
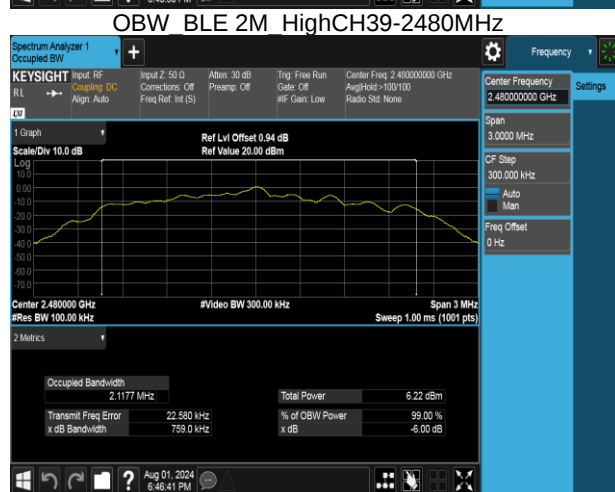
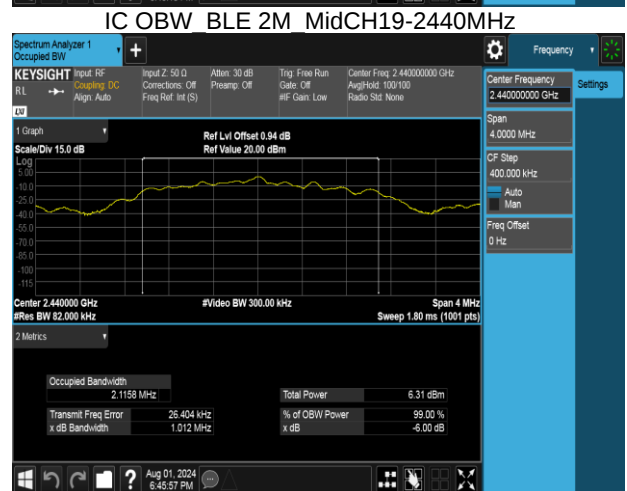
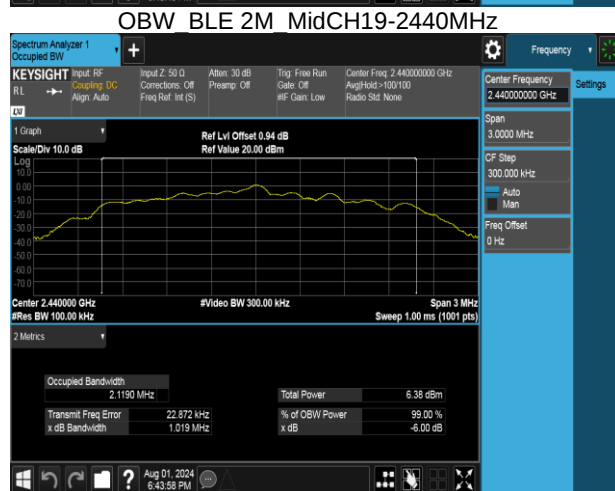
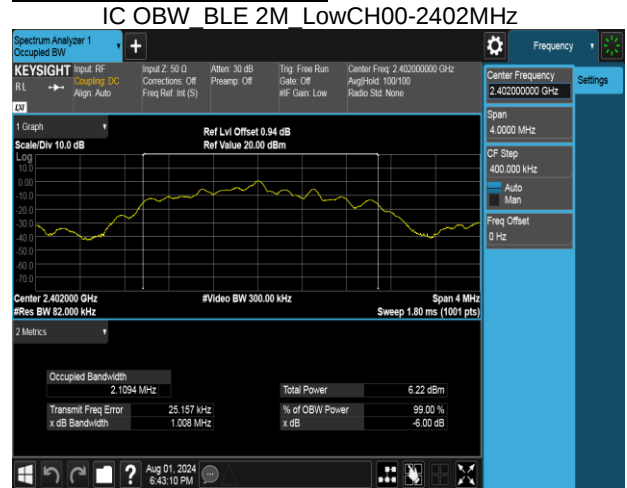
Frequency (MHz)	99%Bandwidth (MHz)
2402	2.1094
2440	2.1158
2480	2.1131

Test Data

6dB BANDWIDTH



BANDWIDTH 99%



4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(b)(3) and RSS-247 section 5.4(d),

Peak output power :

FCC

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

IC

For DTSSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Limit	☒ Antenna not exceed 6 dBi : 30dBm ☐ Antenna with DG greater than 6 dBi [Limit = 30 – (DG – 6)] ☐ Point-to-point operation
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Average output power : For reporting purposes only.

4.3.2 Test Procedure

Test method Refer as KDB 558074 D01

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

4.3.3 Test Setup

Refer to section 1.8.

4.3.4 Test Result

Temperature: 22 ~ 22.5°C Test date: June 25 ~ 26, 2024
Humidity: 54 ~ 57% RH Tested by: Marco Chan

Peak & Average output power :

BLE 1M mode:

CH	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Required Limit (dBm)
Low	2402	default	3.26	30
Mid	2440	default	3.17	30
High	2480	default	3.06	30
CH	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Required Limit (dBm)
Low	2402	default	3.25	30
Mid	2440	default	3.16	30
High	2480	default	3.04	30

***Note:**

1. Measured by power meter, cable loss 0.94 dB + Duty cycle factor has been offsetted to the power meter for Avg. power and cable loss has been offsetted for Peak power measurement.

EIRP :

EIRP BLE 1M mode

CH	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit
Low	2402	default	3.25	1.90	5.15	4W= 36 dBm
Mid	2440	default	3.16	1.90	5.06	4W= 36 dBm
High	2480	default	3.04	1.90	4.94	4W= 36 dBm

*** Note:** EIRP = Average Power + Gain

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Temperature: 23.1°C
Humidity: 54% RH

Test date: August 1, 2024
Tested by: Marco Chan

Peak & Average output power :

BLE 2M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	2402	default	0.65	30
Mid	2440	default	0.68	30
High	2480	default	0.62	30
CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Required Limit (dBm)
Low	2402	default	0.62	30
Mid	2440	default	0.66	30
High	2480	default	0.60	30

***Note:**

1.Measured by power meter, cable loss 0.94 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

EIRP :

EIRP BLE 2M mode

CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit
Low	2402	default	0.62	1.90	2.52	4W= 36 dBm
Mid	2440	default	0.66	1.90	2.56	4W= 36 dBm
High	2480	default	0.60	1.90	2.50	4W= 36 dBm

*** Note:** EIRP = Average Power + Gain

4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.247(e) and RSS-247 section 5.2(b),

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

Limit	☒ Antenna not exceed 6 dBi : 8dBm ☐ Antenna with DG greater than 6 dBi [Limit = 8 – (DG – 6)] ☐ Point-to-point operation :
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4.4.2 Test Procedure

Test method Refer as KDB 558074 D01

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 10kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
4. The path loss was compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup

Refer to section 1.8.

4.4.4 Test Result

Temperature: 22 ~ 22.5°C Test date: June 25 ~ 26, 2024
Humidity: 54 ~ 57% RH Tested by: Marco Chan

BLE 1M mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	1.64	8	PASS
2440	1.61	8	PASS
2480	1.60	8	PASS

***Note:**

1.cable loss as 0.94dB that offsets in the spectrum

Temperature: 23.1°C Test date: August 1, 2024
Humidity: 54% RH Tested by: Marco Chan

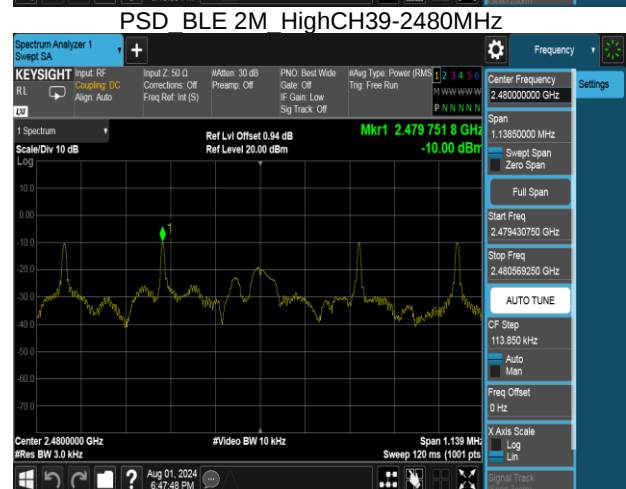
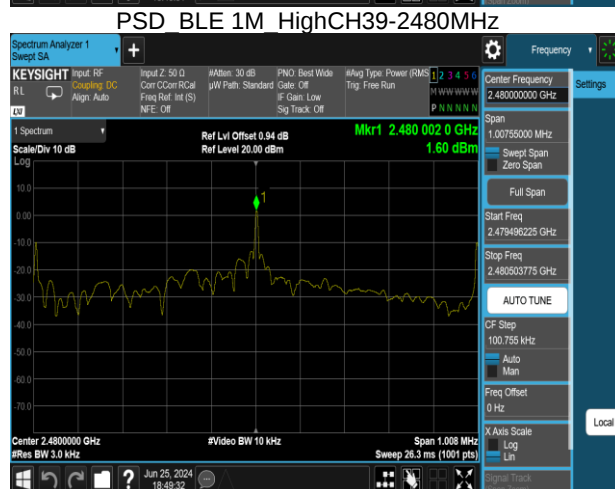
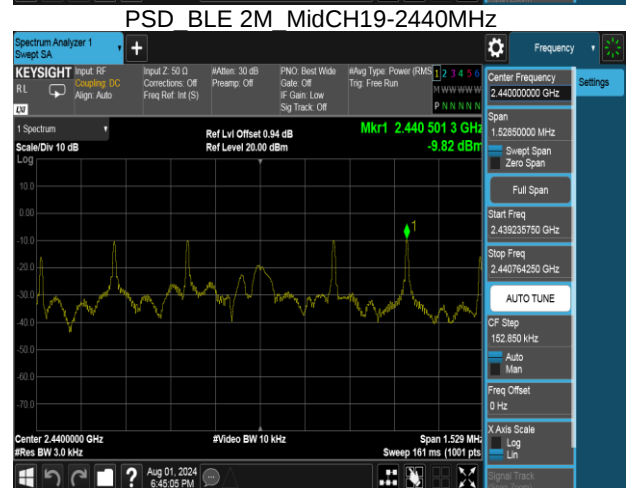
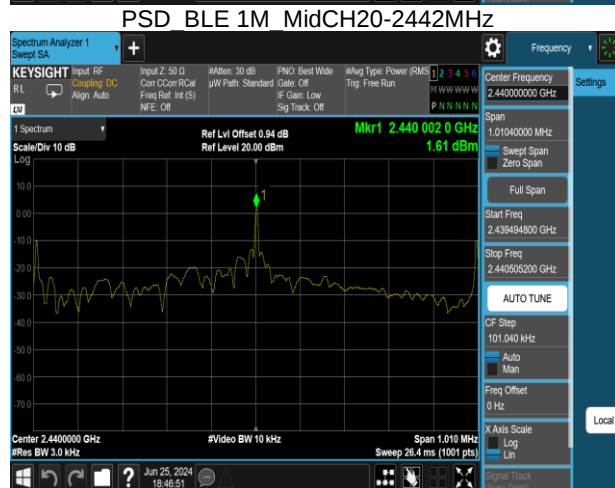
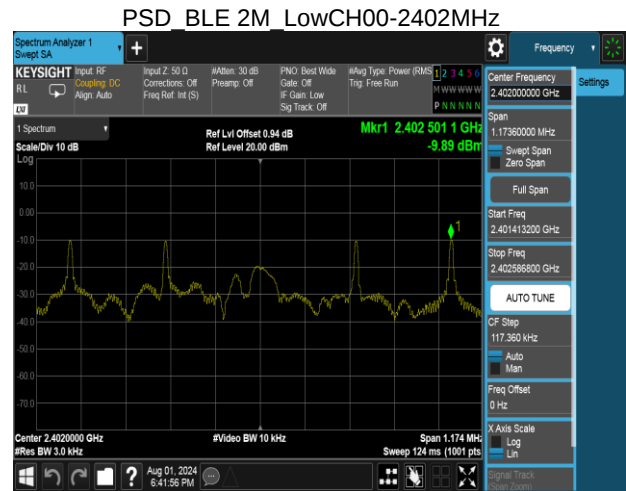
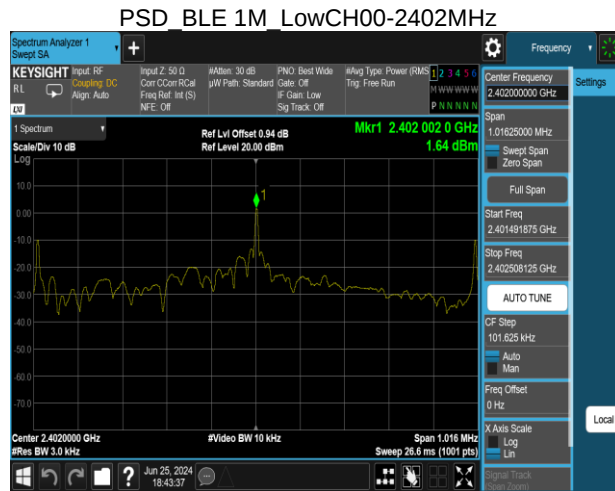
BLE 2M mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-9.89	8	PASS
2440	-9.82	8	PASS
2480	-10.00	8	PASS

***Note:**

1.cable loss as 0.94dB that offsets in the spectrum

Test Data



4.5 CONDUCTED BAND EDGE AND SPURIOUS EMISSION

4.5.1 Test Limit

According to §15.247(d) and RSS-247 section 5.5,

FCC: In any 100 kHz bandwidth outside the authorized frequency band, Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement 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).

IC: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

4.5.2 Test Procedure

Test method Refer as KDB 558074 D01

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

4.5.3 Test Setup

Refer to section 1.8.

4.5.4 Test Result

BLE 1 Mbps

Temperature: 22 ~ 22.5°C

Humidity: 54 ~ 57% RH

Test date: June 25 ~ 26, 2024

Tested by: Marco Chan

BLE 2 Mbps

Temperature: 23.1°C

Humidity: 54% RH

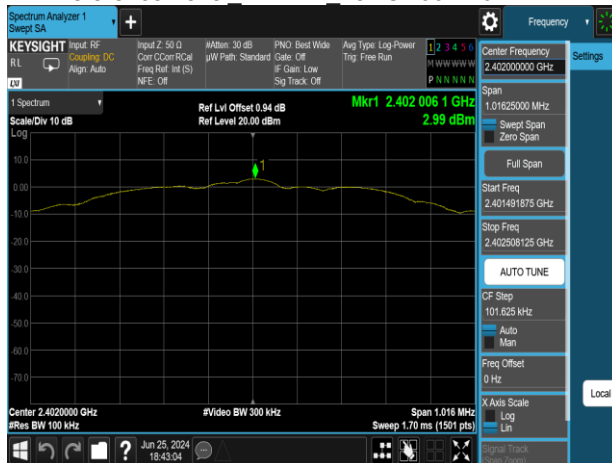
Test date: August 1, 2024

Tested by: Marco Chan

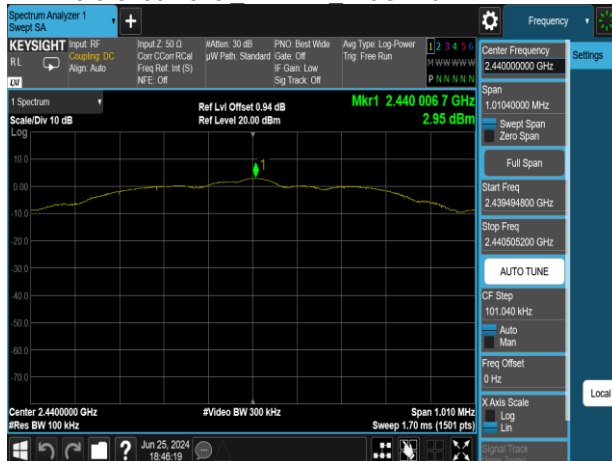
Test Data

Reference Level

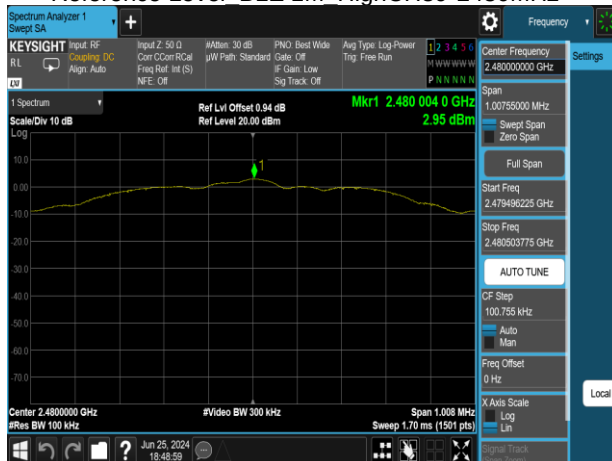
Reference Level BLE 1M LowCH00-2402MHz



Reference Level BLE 1M MidCH20-2442MHz

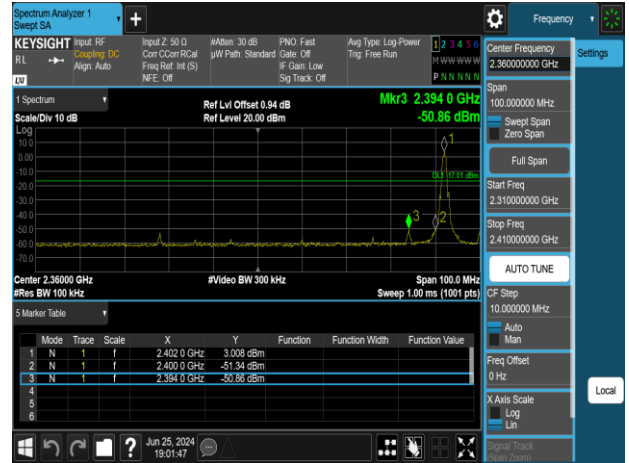


Reference Level BLE 1M HighCH39-2480MHz



Band Edge

Band Edge_BLE 1M_LowCH00-2402MHz



Band Edge BLE 1M HighCH39-2480MHz



Spurious Emission

Spurious Emission BLE 1M LowCH00-2402MHz



Spurious Emission BLE 1M MidCH20-2442MHz



Spurious Emission BLE 1M HighCH39-2480MHz



Test Data

Reference Level

Reference Level BLE 2M LowCH00-2402MHz



Reference Level BLE 2M MidCH19-2440MHz

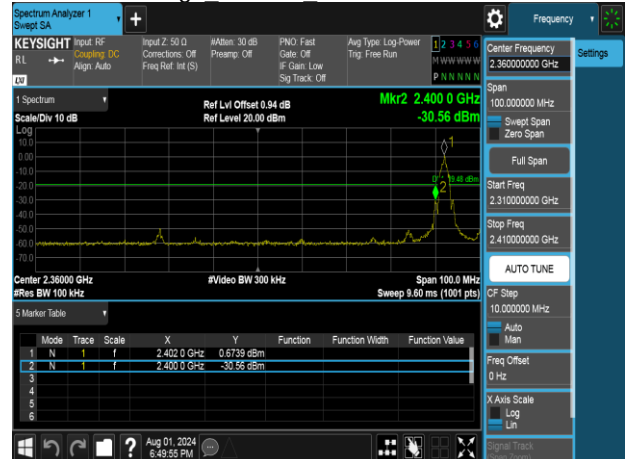


Reference Level BLE 2M HighCH39-2480MHz



Band Edge

Band Edge BLE 2M LowCH00-2402MHz



Band Edge BLE 2M HighCH39-2480MHz



Spurious Emission

Spurious Emission BLE 2M LowCH00-2402MHz



Spurious Emission BLE 2M MidCH19-2440MHz



Spurious Emission BLE 2M HighCH39-2480MHz



4.6 RADIATION BANDEDGE AND SPURIOUS EMISSION

4.6.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Remark:

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

IC according to RSS-247 section 5.5, RSS-Gen, Section 8.9 and 8.10

RSS-Gen Table 3 and Table 5 – General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz ^(Note)

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Note: Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with Section 6.6.

RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (m)
9-490 kHz ^{Note}	6.37/F (F in kHz)	300
490-1,705 kHz	63.7/F (F in kHz)	30
1.705-30 MHz	0.08	30

Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

4.6.2 Test Procedure

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.
3. Span shall wide enough to full capture the emission measured. The SA from 9KHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.
4. No emission found between lowest internal used/generated frequency to 30MHz (9KHz~30MHz).

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.

5. The SA setting following :

- (1) Below 30MHz :

(1.1) 9KHz-490KHz : RBW=200Hz / VBW=1kHz / Sweep=AUTO

(1.2) 490KHz-30MHz : RBW=10kHz / VBW=30kHz / Sweep=AUTO

- (2) 30MHz to 1GHz : RBW = 100kHz, VBW $\geq 3 \times$ RBW, Sweep = Auto,

Detector = Peak, Trace = Max hold.

- (3) Above 1GHz :

(3.1) For Peak measurement : RBW = 1MHz, VBW $\geq 3 \times$ RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(3.2) For Average measurement : RBW = 1MHz, VBW

·If Duty Cycle $\geq 98\%$, VBW=10Hz.

·If Duty Cycle $< 98\%$, VBW=1/T.

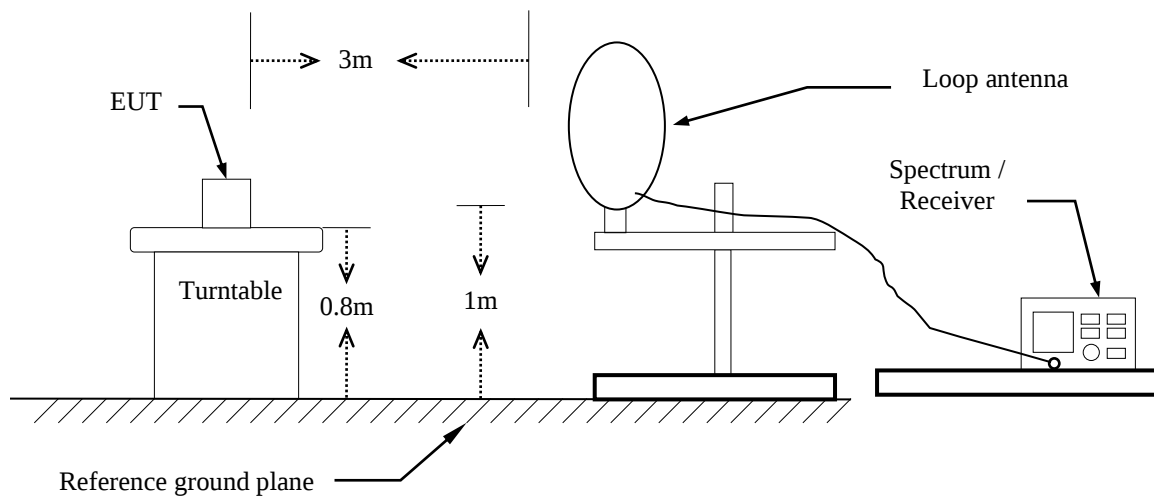
6. Data result :

Actual FS=Spectrum Reading Level + Factor

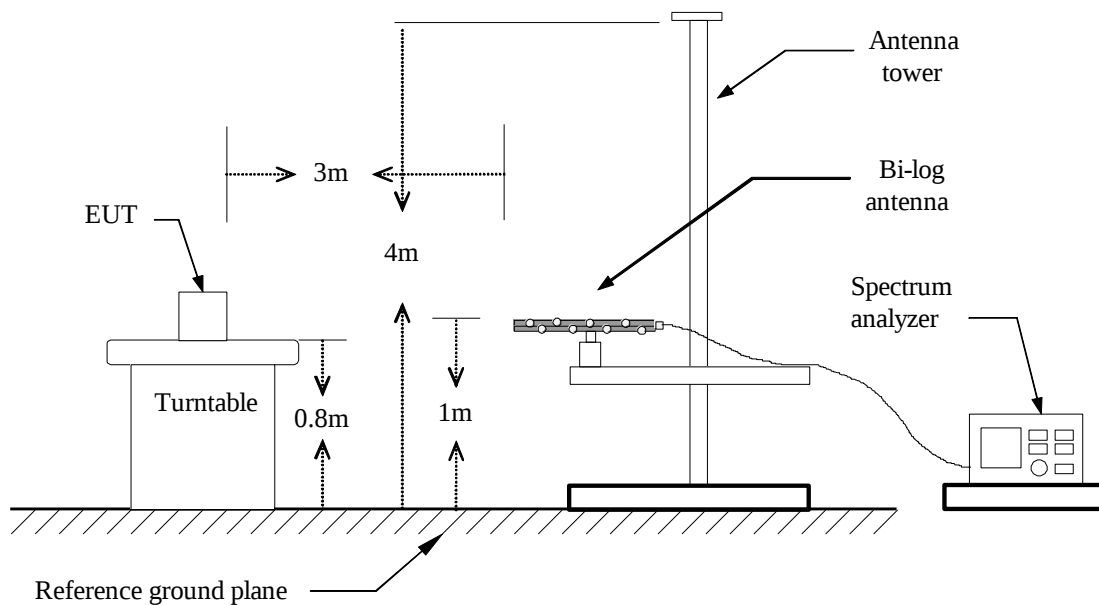
Margin=Actual FS- Limit

4.6.3 Test Setup

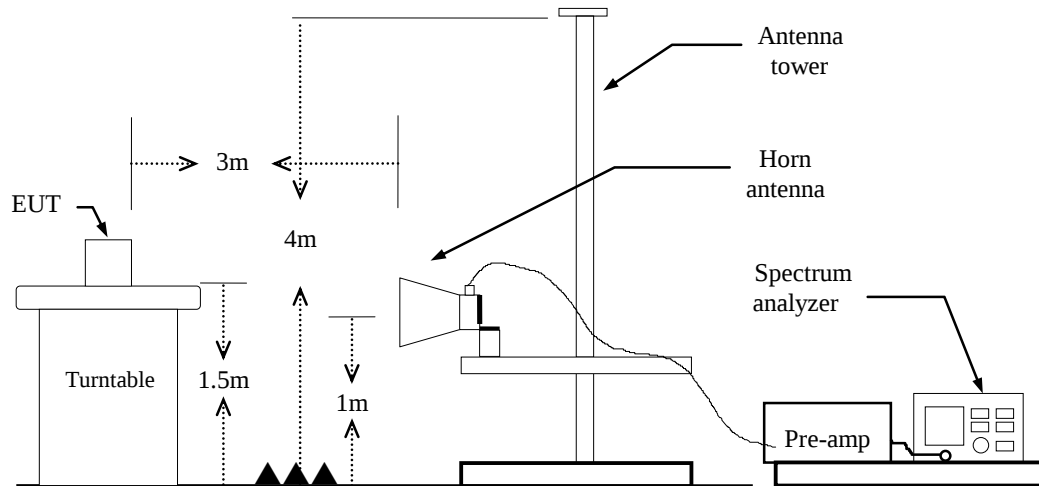
9kHz ~ 30MHz



30MHz ~ 1GHz



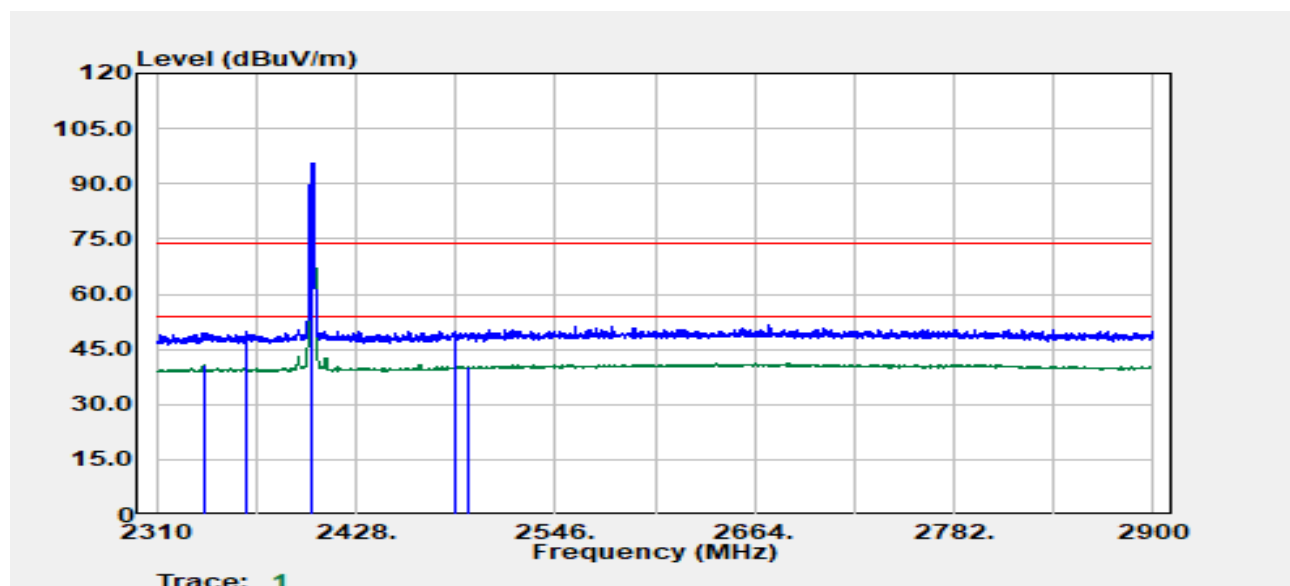
Above 1 GHz



4.6.4 Test Result

Band Edge Test Data

Project No	:TM-2405000384P	Test Date	:2024-07-09
Operation Band	:BLE_1M	Temp./Humi.	:24.6/57
Frequency	:2402 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Bandedge	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		



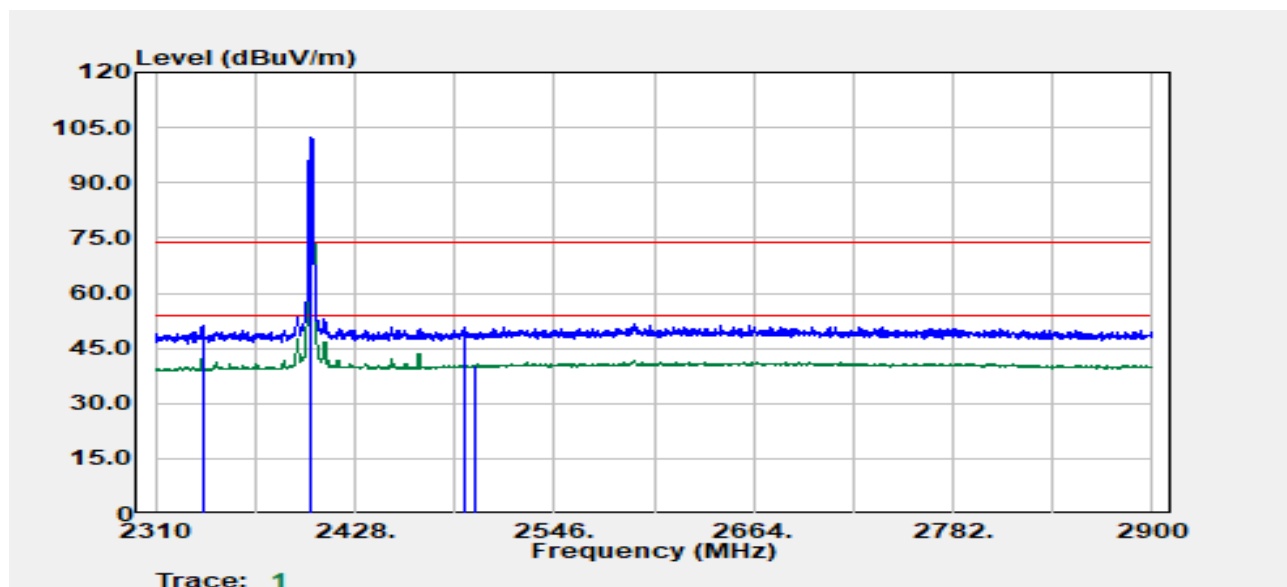
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2338.01	Average	34.58	6.13	40.71	54.00	-13.29
2362.52	Peak	43.58	6.23	49.81	74.00	-24.19
2402.00	Peak	89.43	6.29	95.72	--	--
2402.00	Average	89.27	6.29	95.56	--	--
2486.83	Peak	42.99	6.76	49.75	74.00	-24.25
2494.58	Average	33.45	6.82	40.27	54.00	-13.73

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Project No :TM-2405000384P
Operation Band :BLE_1M
Frequency :2402 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-07-09
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



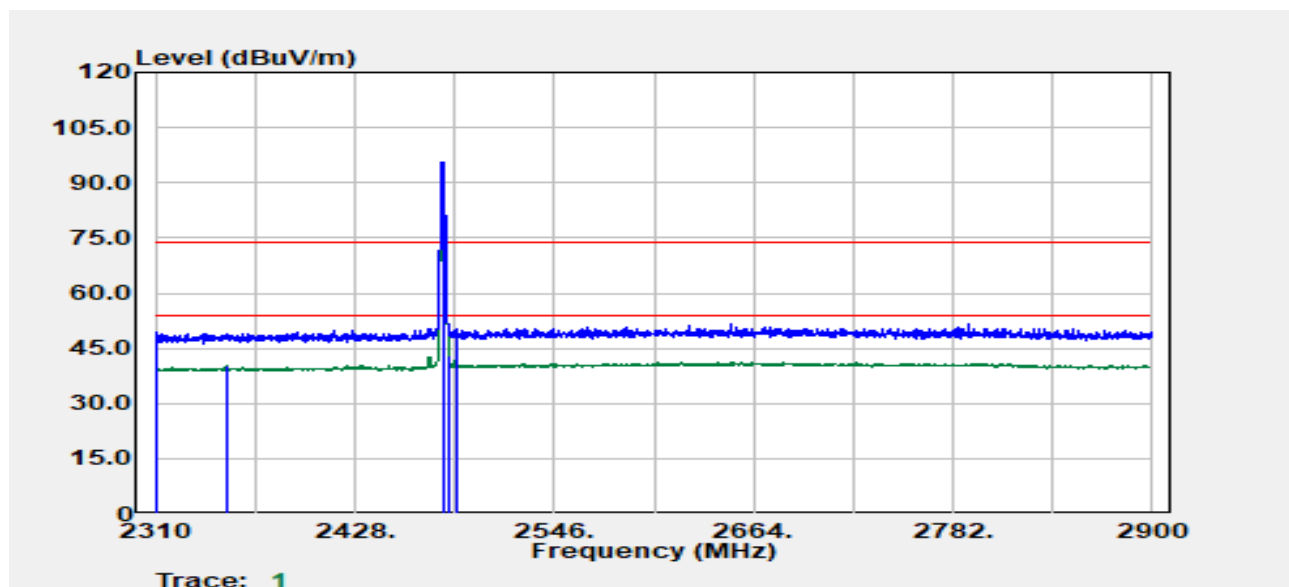
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2338.01	Peak	45.06	6.13	51.19	74.00	-22.81
2338.01	Average	36.71	6.13	42.84	54.00	-11.16
2402.00	Peak	96.02	6.29	102.31	--	--
2402.00	Average	95.83	6.29	102.12	--	--
2493.58	Peak	43.77	6.82	50.59	74.00	-23.41
2499.33	Average	33.66	6.84	40.50	54.00	-13.50

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Project No :TM-2405000384P
Operation Band :BLE_1M
Frequency :2480 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-07-09
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Tony Chao
Test Chamber : 966A



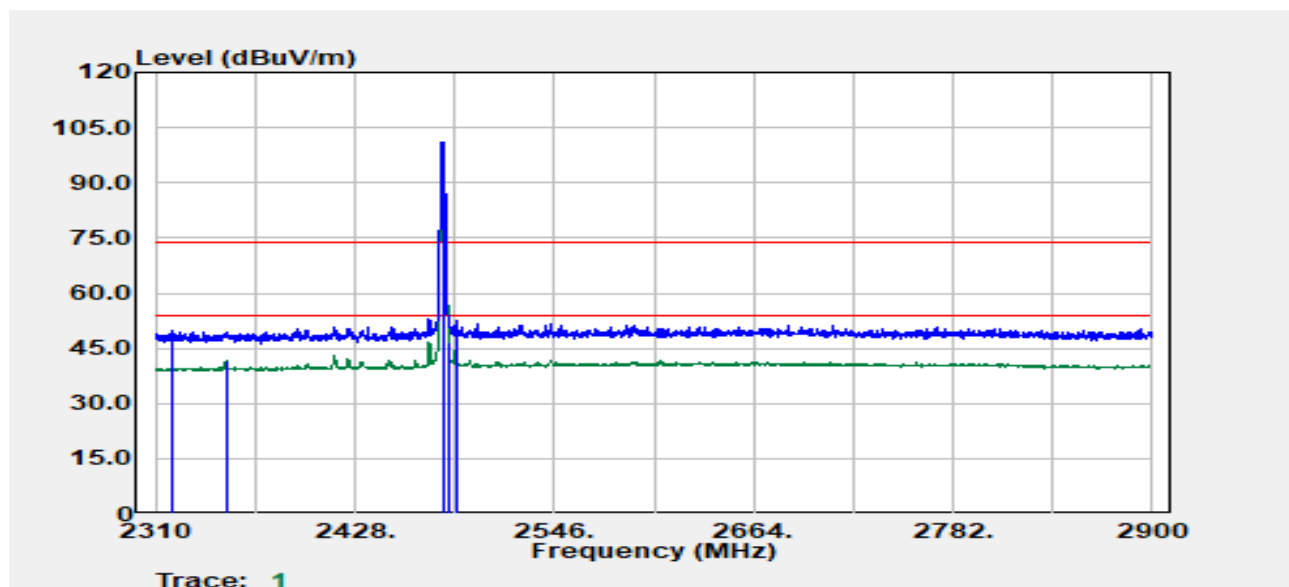
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2311.25	Peak	43.04	6.13	49.17	74.00	-24.83
2351.77	Average	33.94	6.24	40.18	54.00	-13.82
2480.00	Peak	88.84	6.67	95.50	--	--
2480.00	Average	88.68	6.67	95.35	--	--
2483.57	Average	36.25	6.72	42.96	54.00	-11.04
2488.33	Peak	43.54	6.78	50.32	74.00	-23.68

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Project No :TM-2405000384P
Operation Band :BLE_1M
Frequency :2480 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-07-09
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



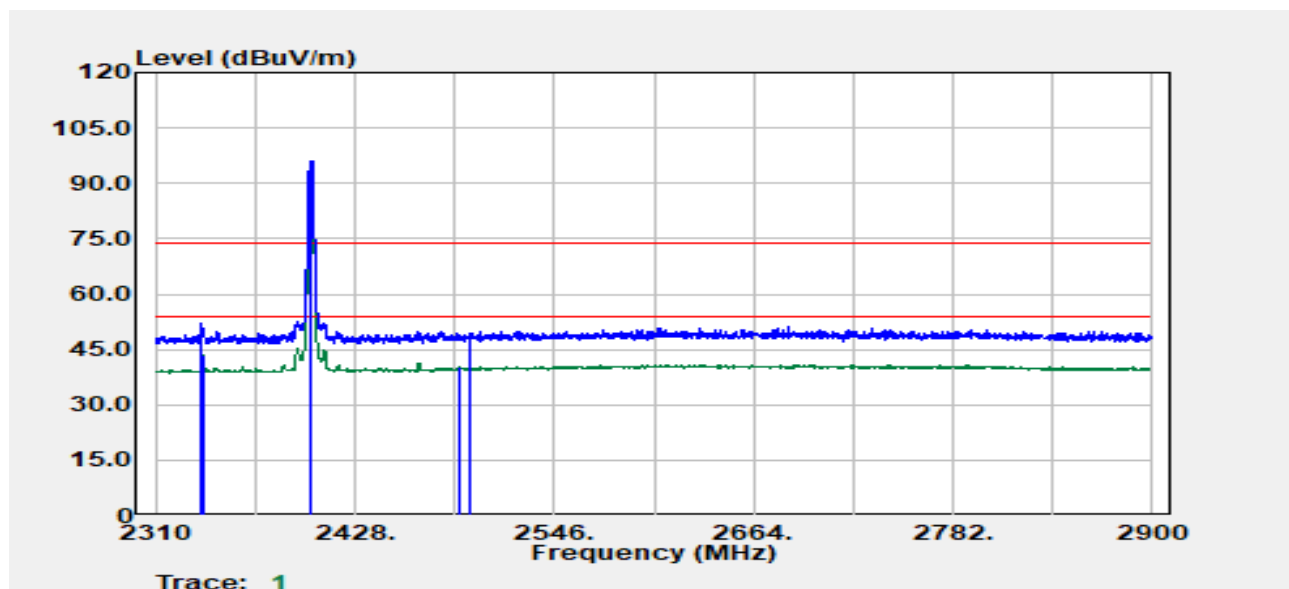
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2320.50	Peak	43.46	6.16	49.62	74.00	-24.38
2351.77	Average	35.61	6.24	41.86	54.00	-12.14
2480.00	Peak	94.37	6.67	101.04	--	--
2480.00	Average	94.20	6.67	100.87	--	--
2483.57	Average	39.96	6.72	46.68	54.00	-7.32
2487.83	Peak	45.56	6.77	52.33	74.00	-21.67

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2402 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Tony Chao
Test Chamber : 966A



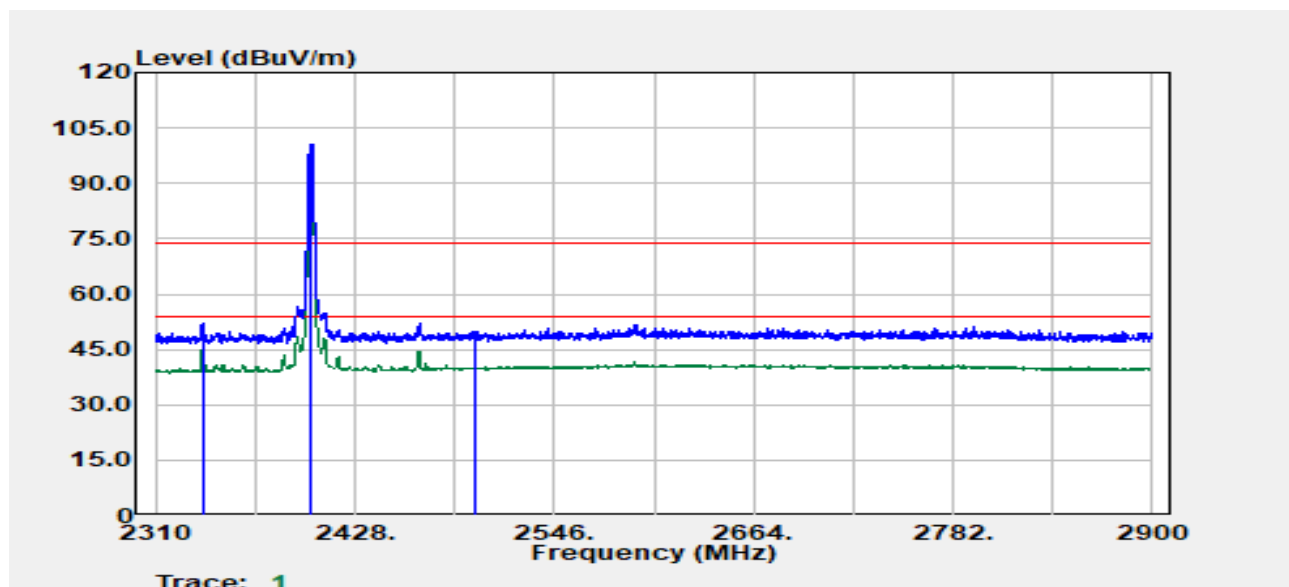
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2337.51	Peak	46.10	6.13	52.23	74.00	-21.77
2337.76	Average	37.15	6.13	43.27	54.00	-10.73
2402.00	Peak	89.83	6.29	96.13	--	--
2402.00	Average	88.20	6.29	94.49	--	--
2490.58	Average	33.43	6.81	40.24	54.00	-13.76
2496.58	Peak	42.75	6.83	49.58	74.00	-24.42

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2402 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



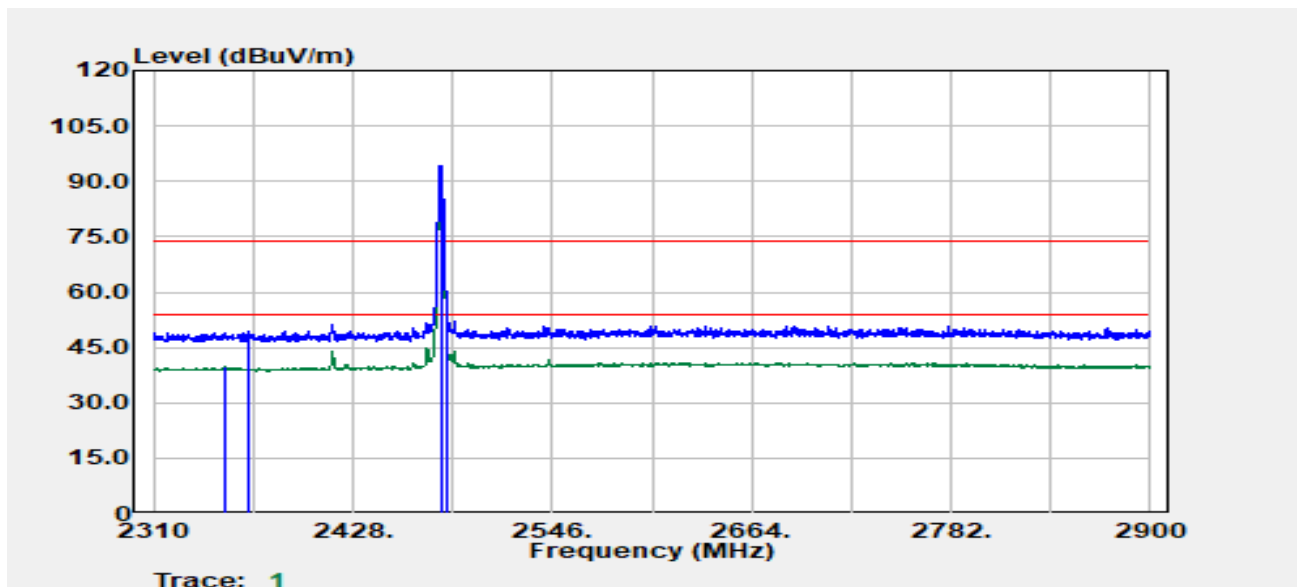
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2337.76	Peak	46.00	6.13	52.13	74.00	-21.87
2337.76	Average	39.01	6.13	45.14	54.00	-8.86
2402.00	Peak	94.31	6.29	100.61	--	--
2402.00	Average	92.75	6.29	99.04	--	--
2499.08	Average	33.25	6.84	40.08	54.00	-13.92
2499.58	Peak	43.09	6.84	49.93	74.00	-24.07

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Report No.: TMWK2405001753KR

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2480 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :VERTICAL
Engineer :Tony Chao
Test Chamber : 966A



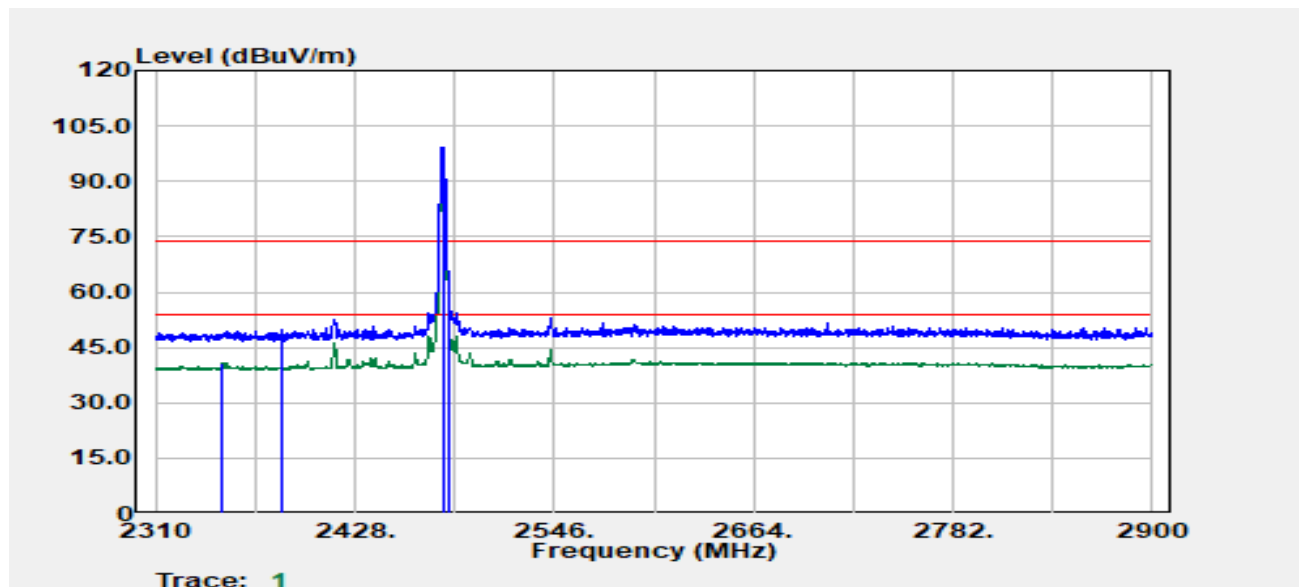
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2352.02	Average	33.69	6.24	39.93	54.00	-14.07
2365.52	Peak	43.22	6.20	49.42	74.00	-24.58
2480.00	Peak	87.38	6.67	94.05	--	--
2480.00	Average	86.90	6.67	93.56	--	--
2483.57	Peak	49.50	6.72	56.21	74.00	-17.79
2483.57	Average	40.35	6.72	47.06	54.00	-6.94

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2480 MHz
Operation Mode :Bandedge
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



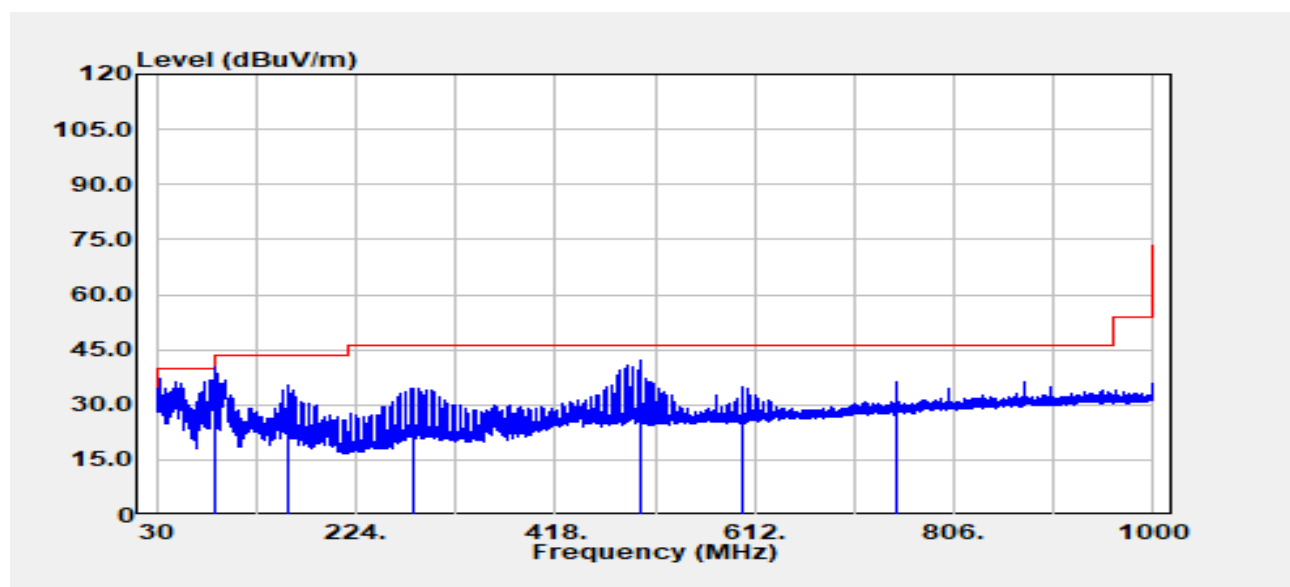
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
2349.77	Average	34.63	6.24	40.87	54.00	-13.13
2384.28	Peak	43.82	6.16	49.98	74.00	-24.02
2480.00	Peak	92.35	6.67	99.02	--	--
2480.00	Average	91.92	6.67	98.58	--	--
2483.57	Peak	51.41	6.72	58.13	74.00	-15.87
2483.57	Average	44.98	6.72	51.70	54.00	-2.30

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TX Test Data

Project No	:TM-2405000384P	Test Date	:2024-07-09
Operation Band	:BLE_1M	Temp./Humi.	:24.6/57
Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		



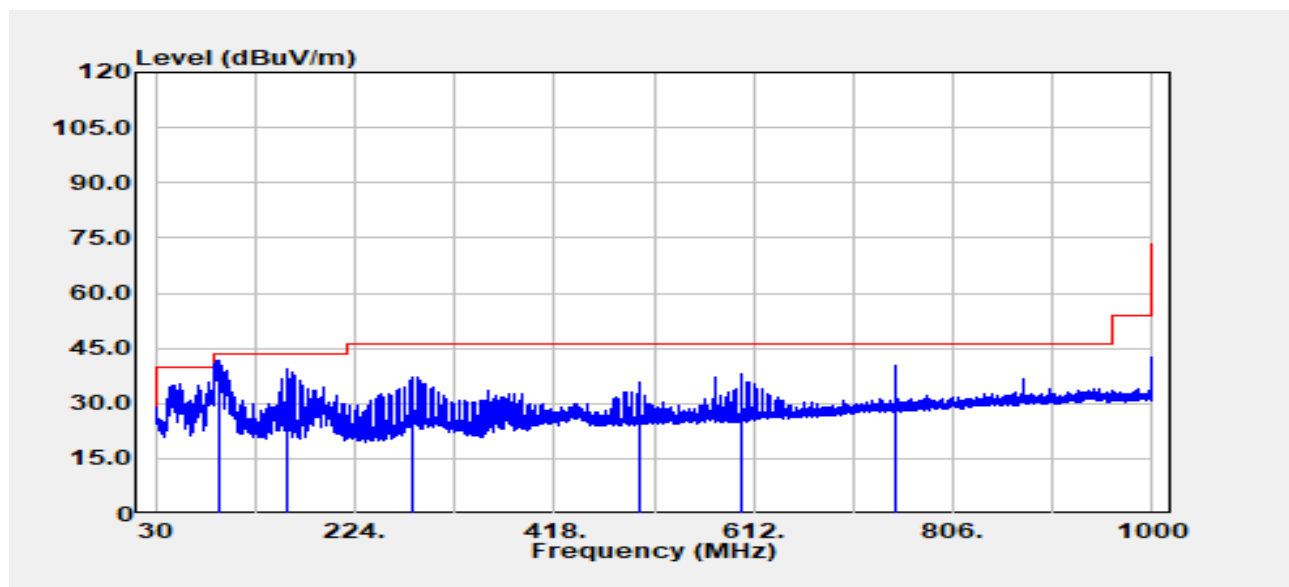
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
88.08	Peak	55.81	-15.44	40.37	43.50	-3.13
157.68	Peak	45.68	-10.43	35.25	43.50	-8.25
280.62	Peak	43.48	-8.86	34.62	46.00	-11.38
499.97	Peak	45.32	-3.41	41.91	46.00	-4.09
600.12	Peak	37.01	-2.32	34.69	46.00	-11.31
749.98	Peak	35.36	0.64	36.00	46.00	-10.00

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Project No :TM-2405000384P
Operation Band :BLE_1M
Frequency :2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-07-09
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A

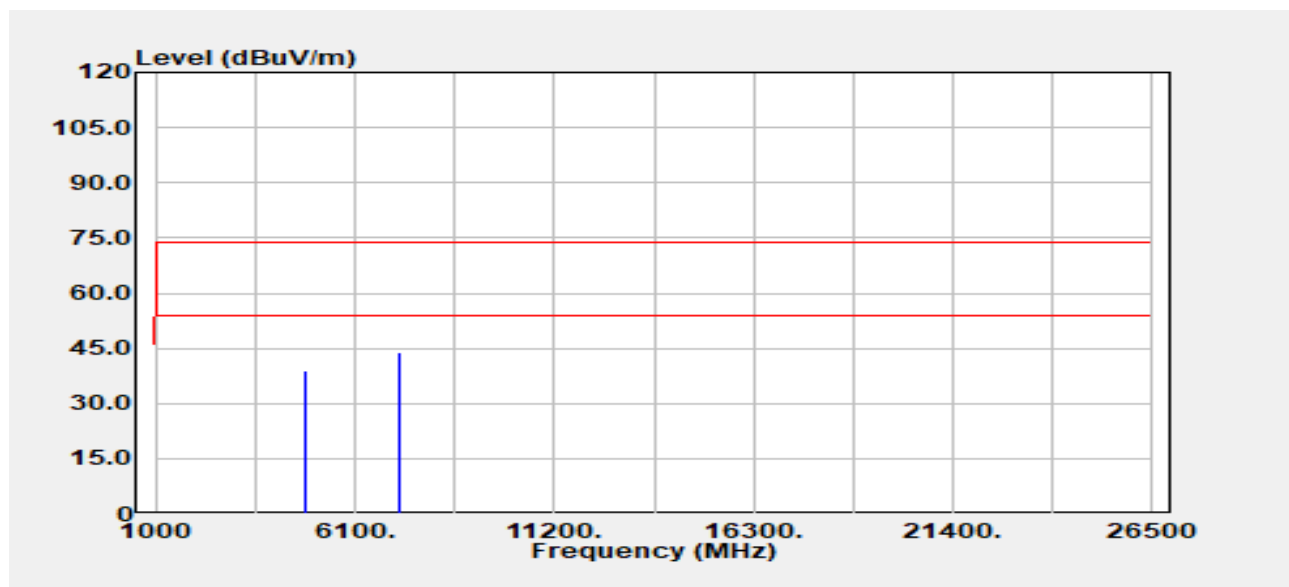


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
91.72	Peak	56.85	-15.03	41.82	43.50	-1.68
157.68	Peak	49.82	-10.43	39.40	43.50	-4.10
280.62	Peak	45.96	-8.86	37.10	46.00	-8.90
499.97	Peak	39.37	-3.41	35.96	46.00	-10.04
600.00	Peak	40.30	-2.33	37.97	46.00	-8.03
749.98	Peak	39.84	0.64	40.48	46.00	-5.52

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Project No	:TM-2405000384P	Test Date	:2024-07-09
Operation Band	:BLE_1M	Temp./Humi.	:24.6/57
Frequency	:2402 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		

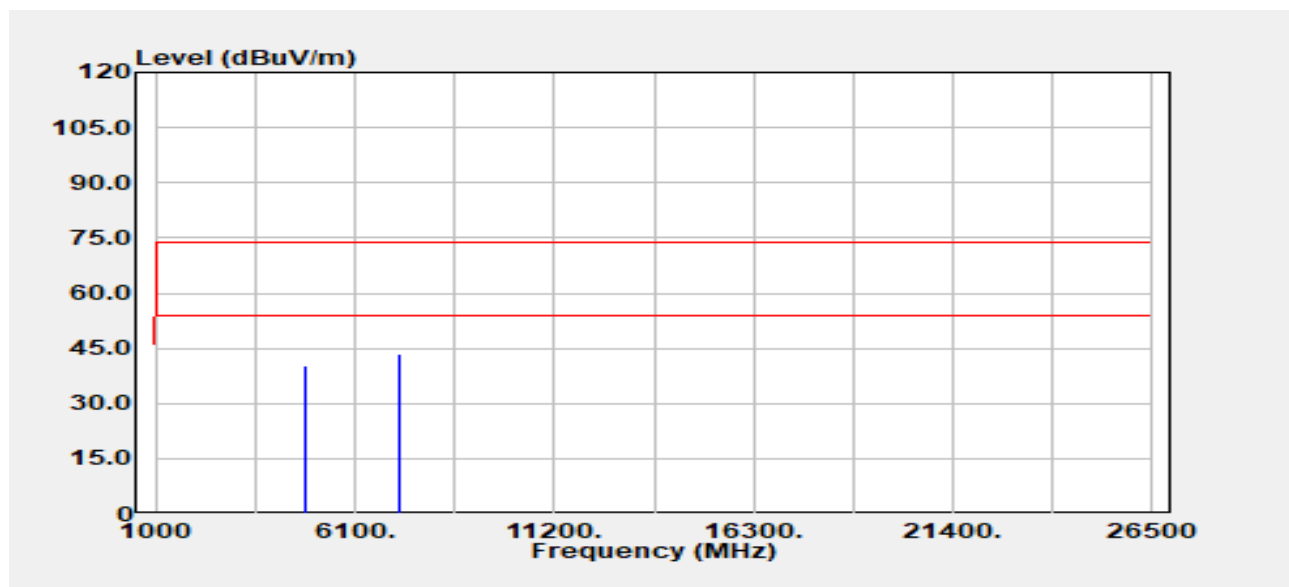


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBUV/m	Limit dBUV/m	Margin dB
4804.00	Peak	36.92	2.23	39.15	74.00	-34.85
4804.00	Average	29.48	2.23	31.70	54.00	-22.30
7206.00	Peak	35.00	9.01	44.01	74.00	-29.99
7206.00	Average	26.71	9.01	35.72	54.00	-18.28

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Project No	:TM-2405000384P	Test Date	:2024-07-09
Operation Band	:BLE_1M	Temp./Humi.	:24.6/57
Frequency	:2402 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		

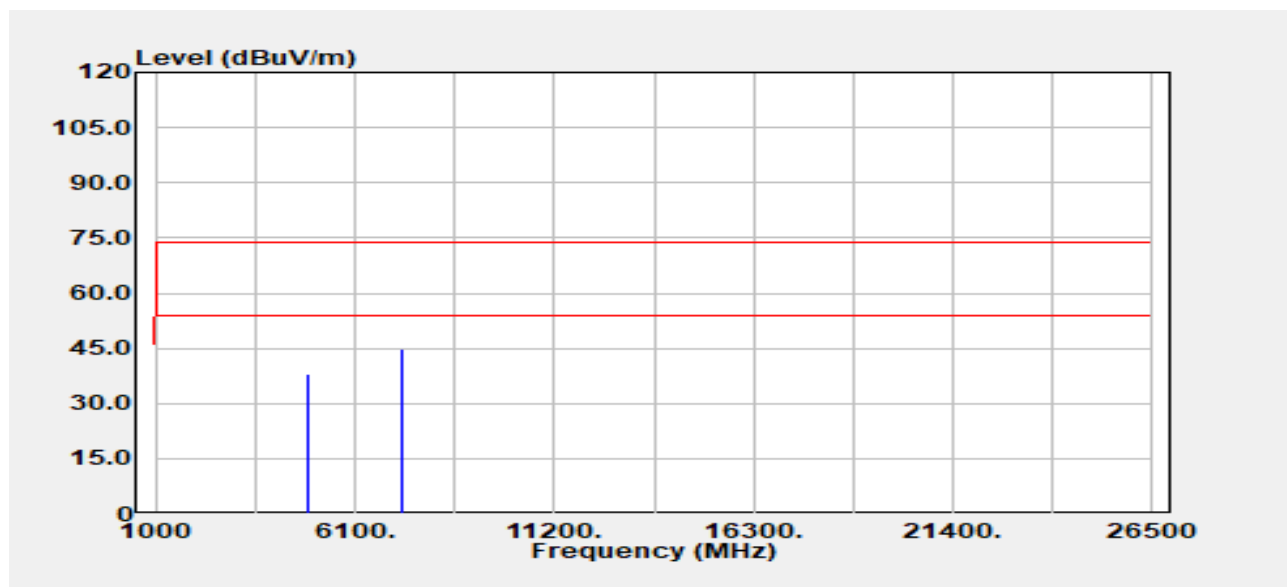


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4804.00	Peak	37.90	2.23	40.12	74.00	-33.88
4804.00	Average	31.77	2.23	34.00	54.00	-20.00
7206.00	Peak	34.38	9.01	43.39	74.00	-30.61
7206.00	Average	26.76	9.01	35.77	54.00	-18.23

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Report No.: TMWK2405001753KR

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Project No	:TM-2405000384P	Test Date	:2024-07-09
Operation Band	:BLE_1M	Temp./Humi.	:24.6/57
Frequency	:2440 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		



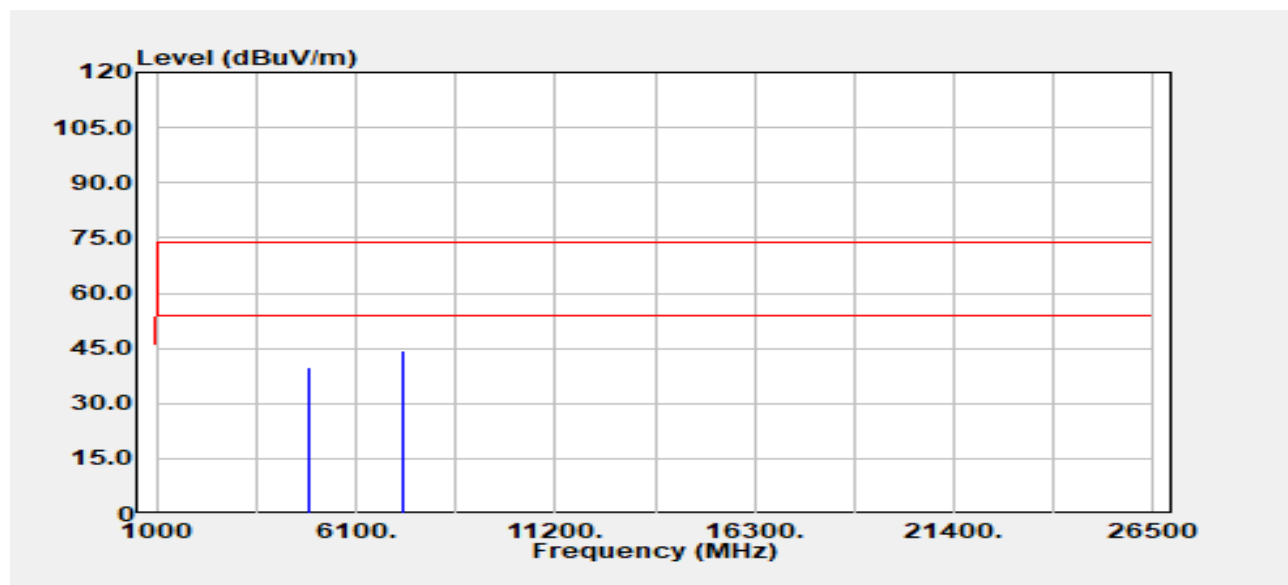
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4880.00	Peak	35.67	2.55	38.21	74.00	-35.79
4880.00	Average	28.56	2.55	31.10	54.00	-22.90
7320.00	Peak	35.83	8.96	44.79	74.00	-29.21
7320.00	Average	27.14	8.96	36.10	54.00	-17.90

Project No: TM-2405000384P
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Project No :TM-2405000384P
Operation Band :BLE_1M
Frequency :2440 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-07-09
Temp./Humi. :24.6/57
Antenna Pol. :Horizontal
Engineer :Tony Chao
Test Chamber : 966A



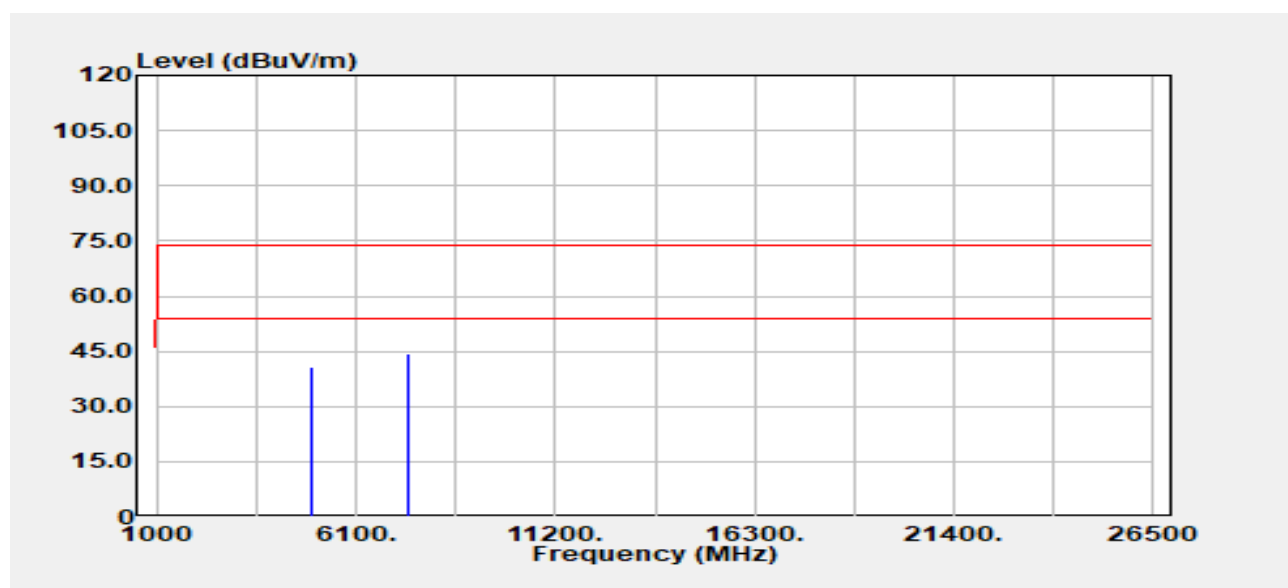
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4880.00	Peak	37.10	2.55	39.64	74.00	-34.36
4880.00	Average	30.97	2.55	33.52	54.00	-20.48
7320.00	Peak	35.45	8.96	44.41	74.00	-29.59
7320.00	Average	26.97	8.96	35.93	54.00	-18.07

Project No: TM-2405000384P
Report No.: TMWK2405001753KR

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Rev.: 02

Project No :TM-2405000384P
Operation Band :BLE_1M
Frequency :2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-07-09
Temp./Humi. :24.6/57
Antenna Pol. :Vertical
Engineer :Tony Chao
Test Chamber : 966A

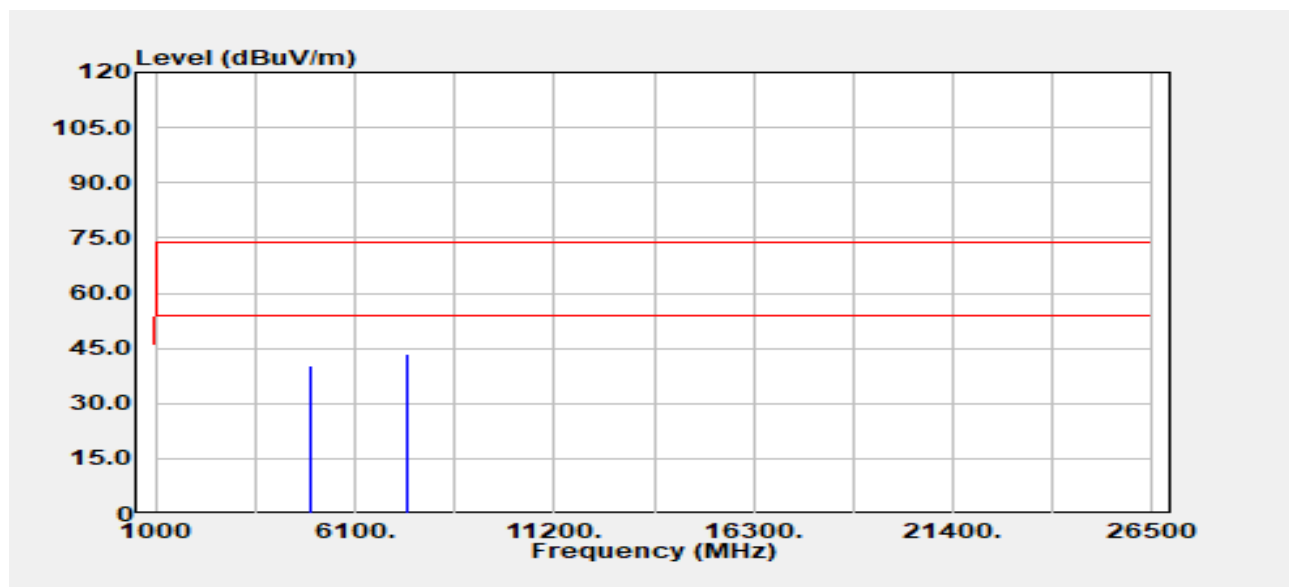


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4960.00	Peak	37.33	3.21	40.54	74.00	-33.46
4960.00	Average	29.30	3.21	32.52	54.00	-21.48
7440.00	Peak	35.24	8.92	44.16	74.00	-29.84
7440.00	Average	26.86	8.92	35.78	54.00	-18.22

Project No: TM-2405000384P
Report No.: TMWK2405001753KR

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Project No	:TM-2405000384P	Test Date	:2024-07-09
Operation Band	:BLE_1M	Temp./Humi.	:24.6/57
Frequency	:2480 MHz	Antenna Pol.	:Horizontal
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		

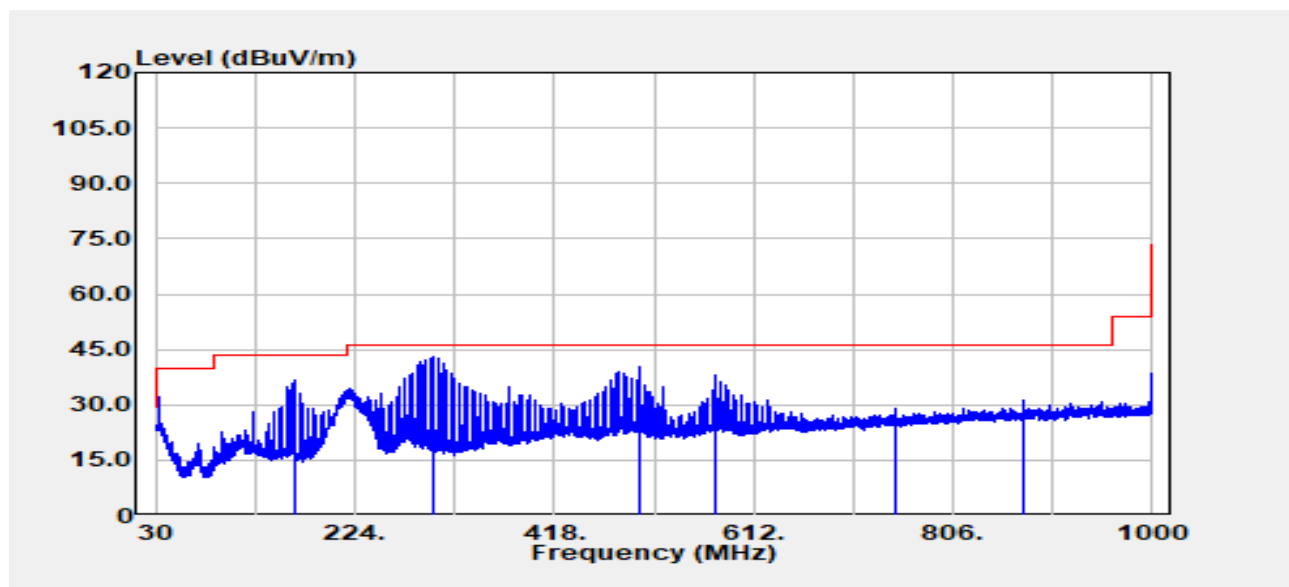


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4960.00	Peak	37.12	3.21	40.33	74.00	-33.67
4960.00	Average	29.95	3.21	33.16	54.00	-20.84
7440.00	Peak	34.71	8.92	43.63	74.00	-30.37
7440.00	Average	26.65	8.92	35.57	54.00	-18.43

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Project No	:TM-2405000384P	Test Date	:2024-09-06
Operation Band	:BLE 2M	Temp./Humi.	:24.6/57
Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		



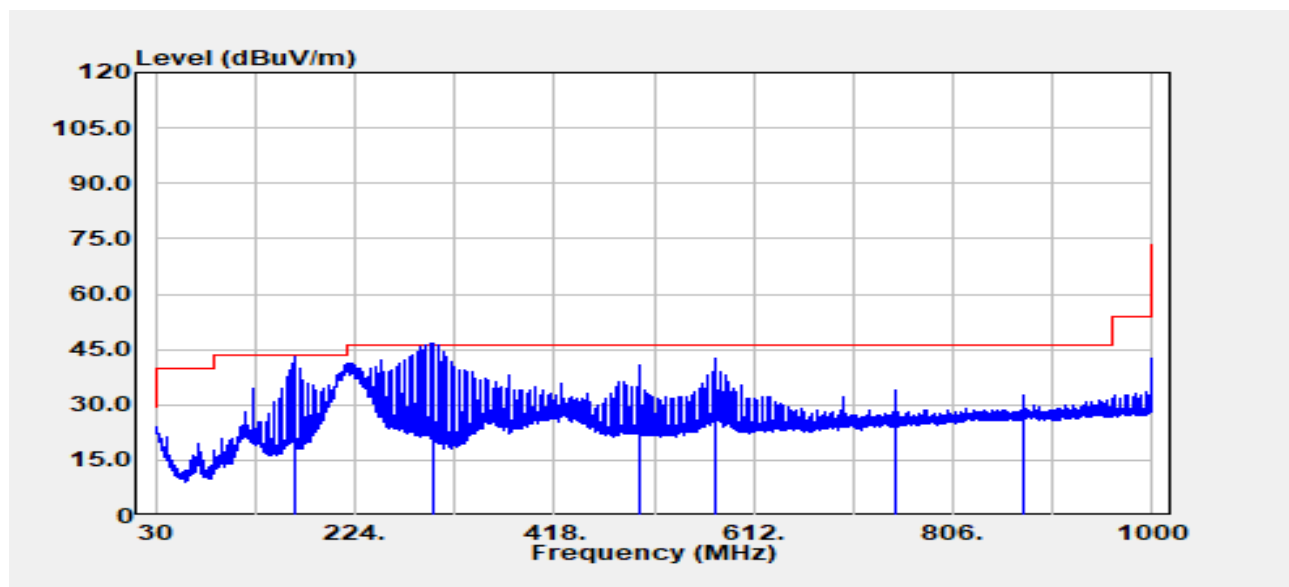
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
165.92	Peak	48.20	-11.50	36.70	43.50	-6.80
301.12	Peak	52.30	-9.31	42.99	46.00	-3.01
499.97	Peak	44.66	-4.40	40.26	46.00	-5.74
575.02	Peak	41.15	-3.19	37.96	46.00	-8.04
749.98	Peak	29.40	-0.25	29.15	46.00	-16.85
874.99	Peak	29.75	1.50	31.25	46.00	-14.75

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-09-06
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



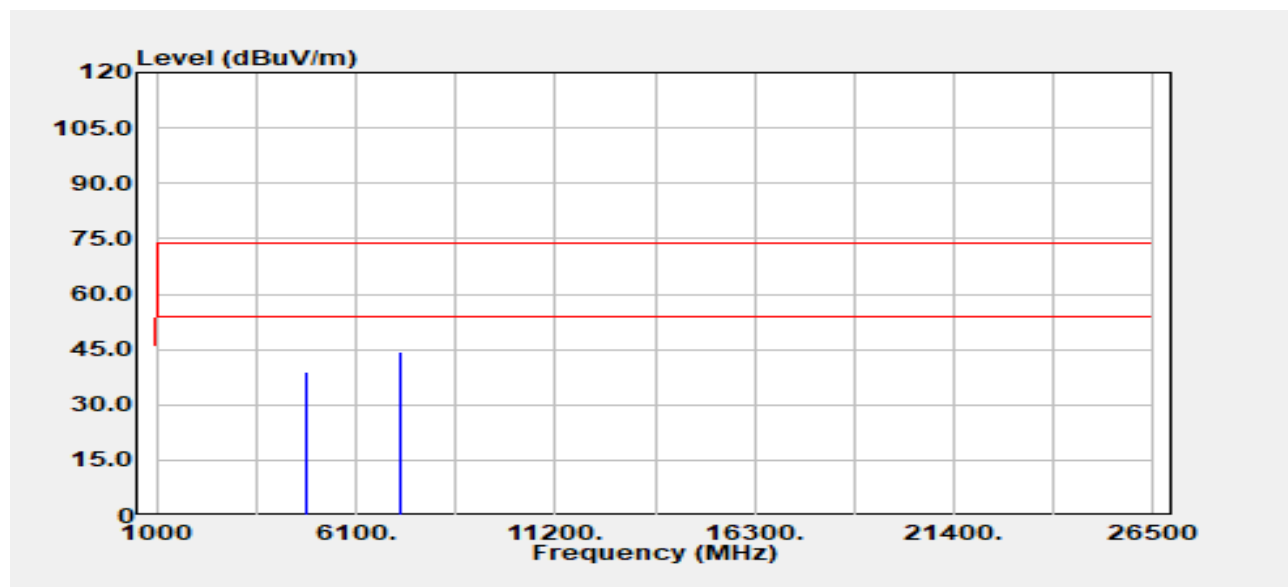
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
165.92	Peak	54.39	-11.50	42.89	43.50	-0.61
301.12	QP	55.02	-9.31	45.71	46.00	-0.29
499.97	Peak	45.25	-4.40	40.85	46.00	-5.15
575.02	Peak	45.68	-3.19	42.49	46.00	-3.51
749.98	Peak	34.41	-0.25	34.16	46.00	-11.84
874.99	Peak	31.17	1.50	32.67	46.00	-13.33

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2402 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :Vertical
Engineer :Tony Chao
Test Chamber : 966A



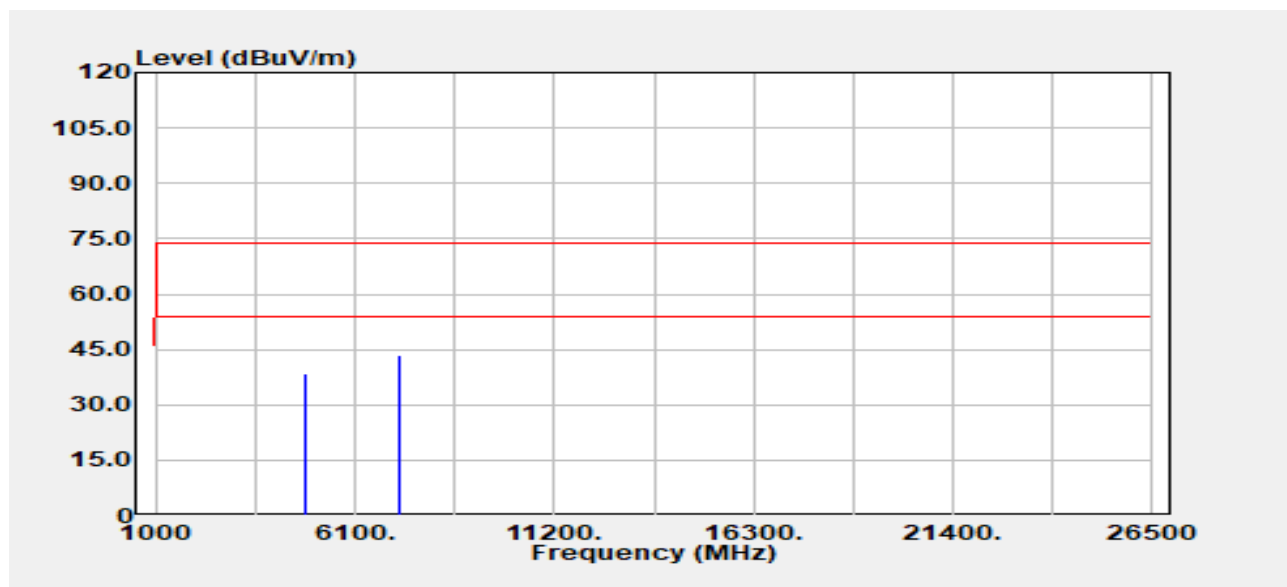
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4804.00	Peak	36.89	2.23	39.12	74.00	-34.88
4804.00	Average	29.11	2.23	31.34	54.00	-22.66
7206.00	Peak	35.40	9.01	44.41	74.00	-29.59
7206.00	Average	27.40	9.01	36.41	54.00	-17.59

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2402 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :Horizontal
Engineer :Tony Chao
Test Chamber : 966A

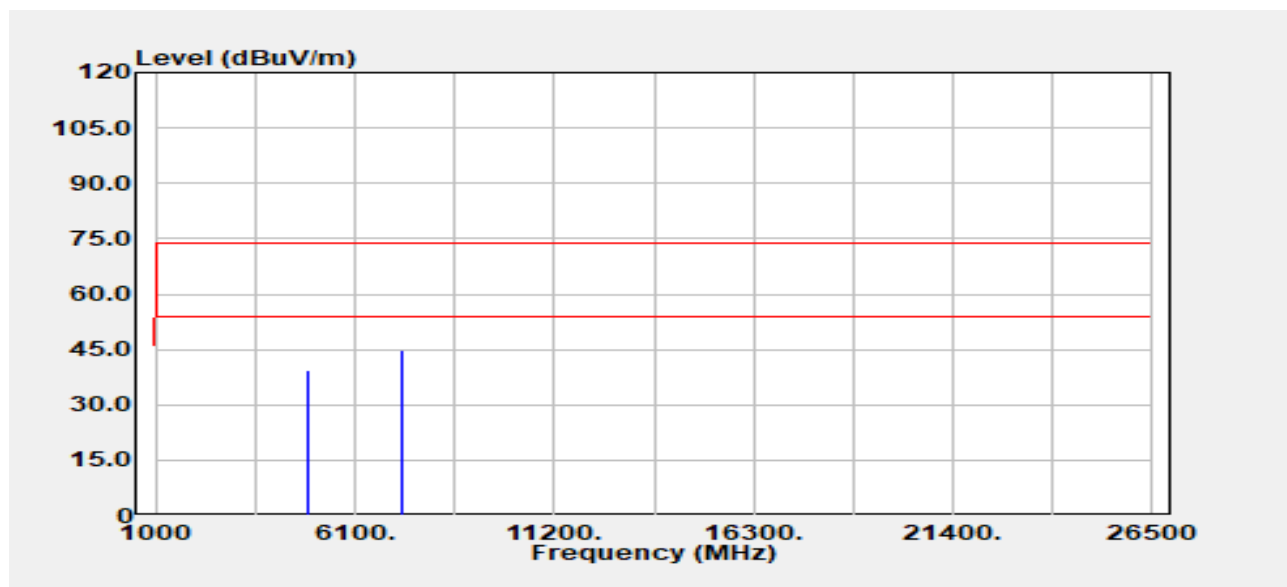


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4804.00	Peak	36.47	2.23	38.69	74.00	-35.31
4804.00	Average	29.54	2.23	31.77	54.00	-22.23
7206.00	Peak	34.47	9.01	43.48	74.00	-30.52
7206.00	Average	27.42	9.01	36.43	54.00	-17.57

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Project No	:TM-2405000384P	Test Date	:2024-08-02
Operation Band	:BLE 2M	Temp./Humi.	:24.6/57
Frequency	:2440 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		



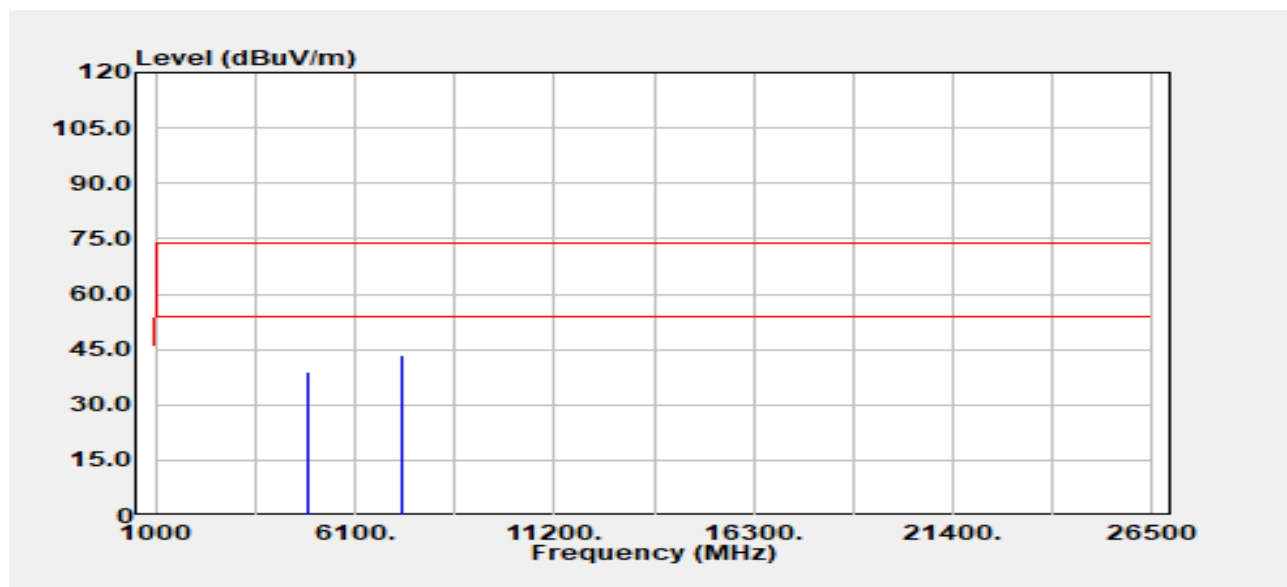
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4880.00	Peak	36.98	2.55	39.53	74.00	-34.47
4880.00	Average	29.34	2.55	31.89	54.00	-22.11
7320.00	Peak	35.90	8.96	44.86	74.00	-29.14
7320.00	Average	27.59	8.96	36.55	54.00	-17.45

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2440 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A

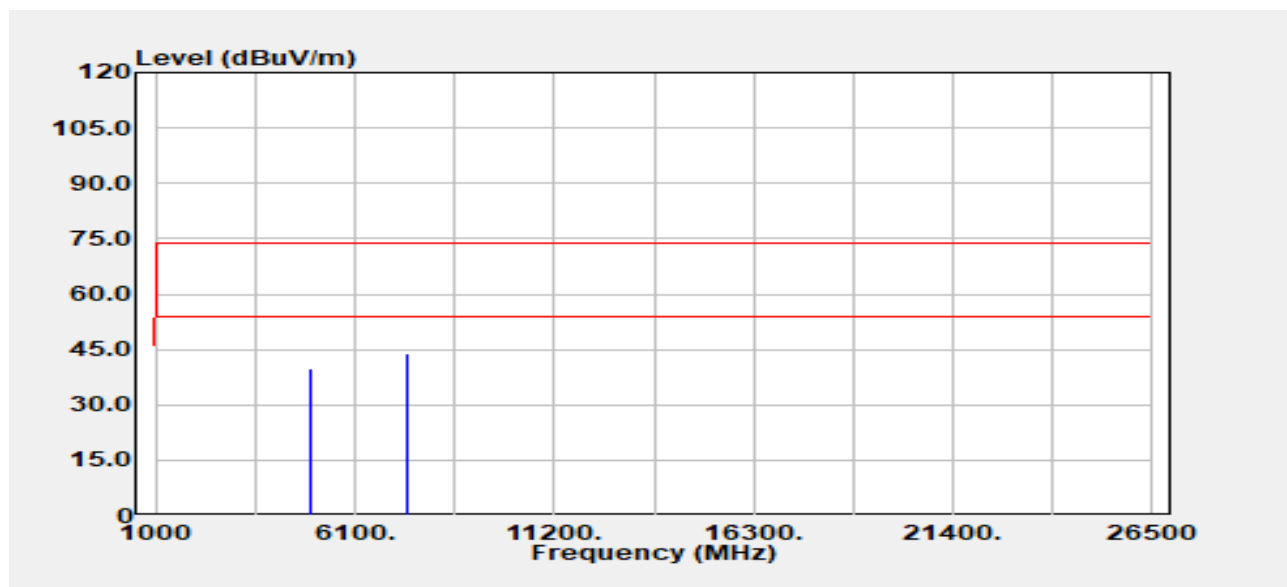


Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4880.00	Peak	36.60	2.55	39.14	74.00	-34.86
4880.00	Average	27.68	2.55	30.23	54.00	-23.77
7320.00	Peak	34.55	8.96	43.51	74.00	-30.49
7320.00	Average	28.49	8.96	37.45	54.00	-16.55

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Project No	:TM-2405000384P	Test Date	:2024-08-02
Operation Band	:BLE 2M	Temp./Humi.	:24.6/57
Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:TX	Engineer	:Tony Chao
EUT Pol	:E1	Test Chamber	: 966A
Setting	:Default		



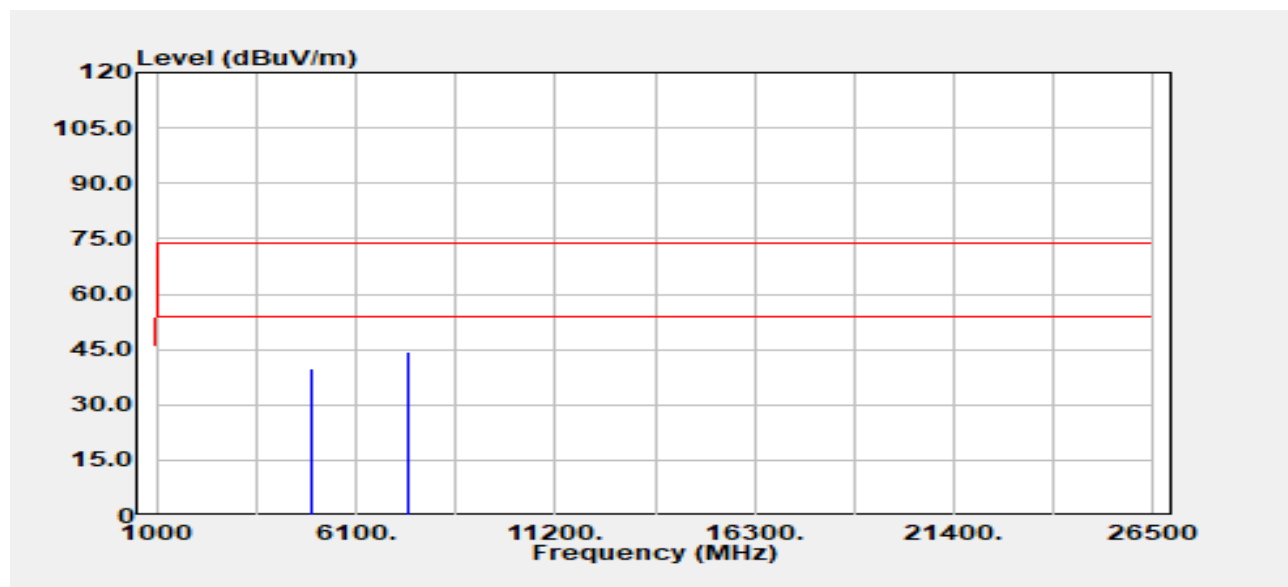
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4960.00	Peak	36.69	3.21	39.90	74.00	-34.10
4960.00	Average	28.48	3.21	31.69	54.00	-22.31
7440.00	Peak	34.82	8.92	43.74	74.00	-30.26
7440.00	Average	27.94	8.92	36.86	54.00	-17.14

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Project No :TM-2405000384P
Operation Band :BLE 2M
Frequency :2480 MHz
Operation Mode :TX
EUT Pol :E1
Setting :Default

Test Date :2024-08-02
Temp./Humi. :24.6/57
Antenna Pol. :HORIZONTAL
Engineer :Tony Chao
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
4960.00	Peak	36.47	3.21	39.68	74.00	-34.32
4960.00	Average	29.68	3.21	32.89	54.00	-21.11
7440.00	Peak	35.31	8.92	44.23	74.00	-29.77
7440.00	Average	28.57	8.92	37.49	54.00	-16.51

- End of Test Report -