TEST REPORT

Applicant Name:	QUEST USA CORP
Address:	495 Flatbush Ave, Brooklyn, NY 11225, USA
Report Number:	2501Q32248E-RF-00
FCC ID:	2AJQ7-DONGLE

Test Standard (s)

FCC PART 15.249

Sample Description

Product Type:	2.4G Wireless Dongle
Model No.:	DS20615-FB
Multiple Model(s) No.:	DS20616-FB, DS20617-FB, DSAST461-FB
Trade Mark:	N/A
Date Received:	2025/02/25
Issue Date:	2025/04/08

Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Allen Bai
RF Engineer

Approved By:

Michelle Zeng
RF Supervisor

Note: The information marked# is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2501Q32248E-RF-00	Original Report	2025/04/08

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	2.4G Wireless Dongle
Tested Model	DS20615-FB
Multiple Model(s)	DS20616-FB, DS20617-FB, DSAST461-FB
Frequency Range	2402-2480MHz
Maximum E-field strength	95.87 dBuV/m@3m
Modulation Technique	GFSK
Voltage Range	DC 5V
Sample serial number	2YW8-1 (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A:
Note: The multiple models are electrically identical with the test model except for model name and sales channels. Please refer to the declaration letter[#] for more detail, which was provided by manufacturer.	

Objective

This test report is in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2020, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		109.2kHz(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.63dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.66dB(k=2, 95% level of confidence)
Radiated Emissions	0.009MHz~30MHz	3.60dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	5.32dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	5.43dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	5.77dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.73dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing by manufacturer.

Frequency Channel List:

channel	Frequency (Mhz)	channel	Frequency (MHz)
1	2402	21	2442
2	2404	22	2444
3	2406	23	2446
4	2408	24	2448
5	2410	25	2450
6	2412	26	2452
7	2414	27	2454
8	2416	28	2456
9	2418	29	2458
10	2420	30	2460
11	2422	31	2462
12	2424	32	2464
13	2426	33	2466
14	2428	34	2468
15	2430	35	2470
16	2432	36	2472
17	2434	37	2474
18	2436	38	2476
19	2438	39	2478
20	2440	40	2480

Note: Test on Channel 1, 20 and 40.

EUT Exercise Software

“fcc_test_tool.exe”exercise software was used, the power level was “default” that was provided by the applicant.

Equipment Modifications

No modifications were made to the unit tested.

Support Equipment List and Details

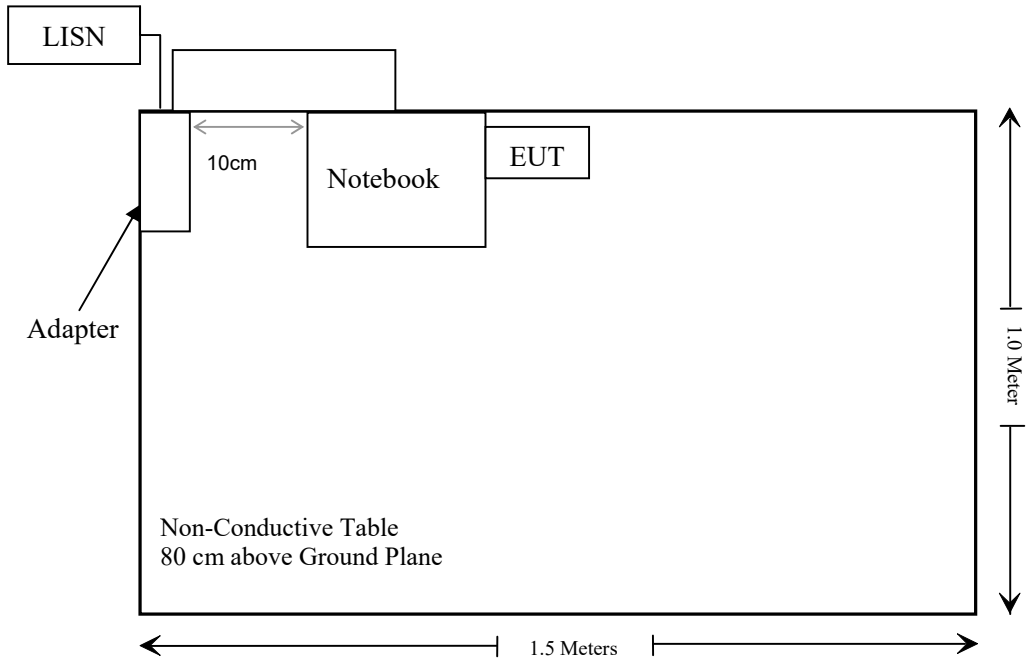
Manufacturer	Description	Model	Serial Number
Dell	Adapter	DA90PE1-00	Unknown
Dell	Notebook	Latitude 7280	B0CB5M2

Support Cable Descriptions

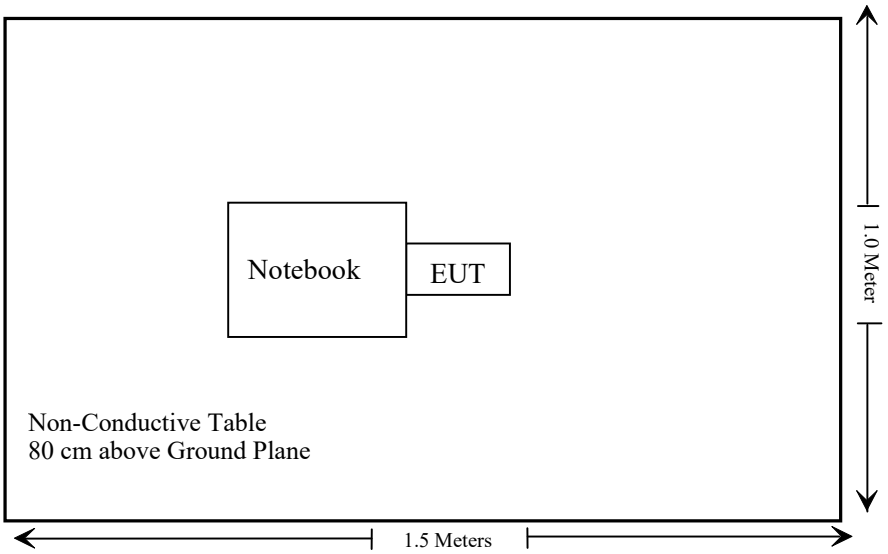
Cable Description	Length (m)	From/Port	To
Shielded Un-detachable DC cable	1.2	Notebook	Adapter
Unshielded Detachable AC cable	1.5	Adapter	LISN

Block Diagram of Test Setup

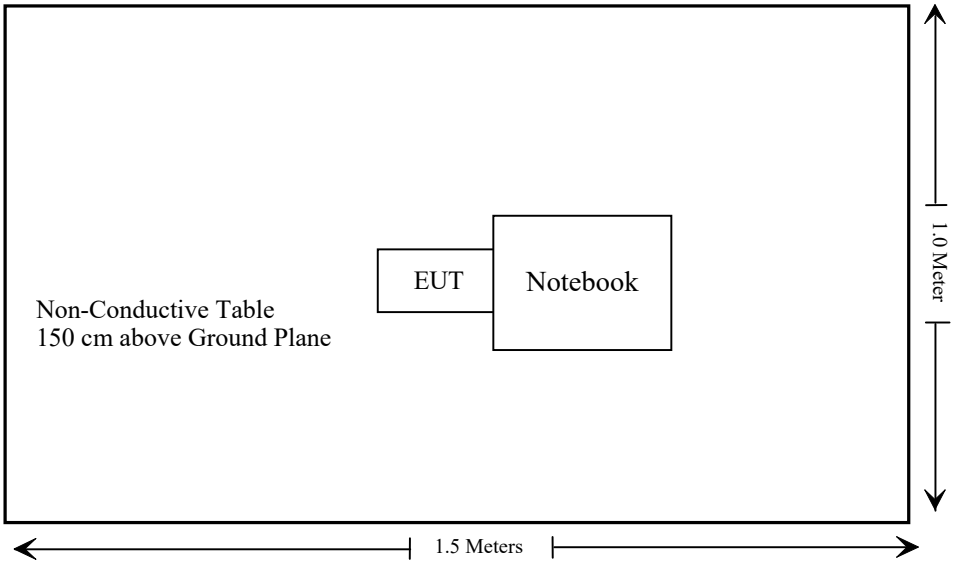
For Conducted Emissions:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) 1) &§2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conducted Emissions	Compliant
15.205, §15.209, §15.249(d)	Radiated Emissions& Outside of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/12/04	2025/12/03
Rohde & Schwarz	LISN	ENV216	101613	2024/12/04	2025/12/03
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2024/05/21	2025/05/20
Unknown	CE Cable	Unknown	UF A210B-1-0720-504504	2024/05/21	2025/05/20
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated Emissions&20 dB Bandwidth Test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/12/04	2025/12/03
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Unknown	Cable	2Y194	0735	2024/12/04	2025/12/03
Unknown	Cable	PNG214	1354	2024/12/04	2025/12/03
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
A.H.System	Preamplifier	PAM-0118P	489	2024/11/15	2025/11/14
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/12/06	2025/12/05
Unknown	RF Cable	UFA147	219661	2024/12/06	2025/12/05
Unknown	RF Cable	XH750A-N	J-10M	2024/12/06	2025/12/05
JD	Filter Switch Unit	DT7220FSU	DS79906	2024/09/09	2025/09/08
JD	Multiplex Switch Test Control Set	DT7220SCU	DS79903	2024/09/09	2025/09/08
A.H.System	Pre-amplifier	PAM-1840VH	190	2024/06/18	2025/06/17
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/12/18	2025/12/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§1.1307 (b) (1) & §2.1093- RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance V06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Result

Mode	Frequency (MHz)	Maximum E-Field (dBuV/m@3m)	Maximum EIRP(dBm)	Maximum EIRP (mW)	Distance (mm)	Calculated value	Threshold (1-g SAR)	SAR Test Exclusion
GFSK	2402-2480	95.87	0.67	1.17	5	0.4	3	Yes

Note: EIRP = E-Field – 95.2 @3m

Result: Compliant.

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, 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.

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.

Antenna Connector Construction

The EUT has one internal antenna which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

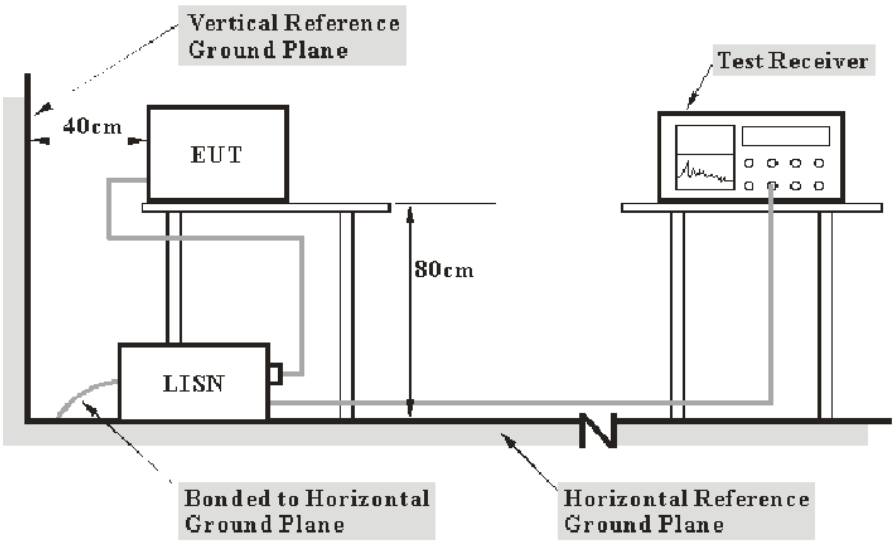
Result: Compliant.

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2020. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

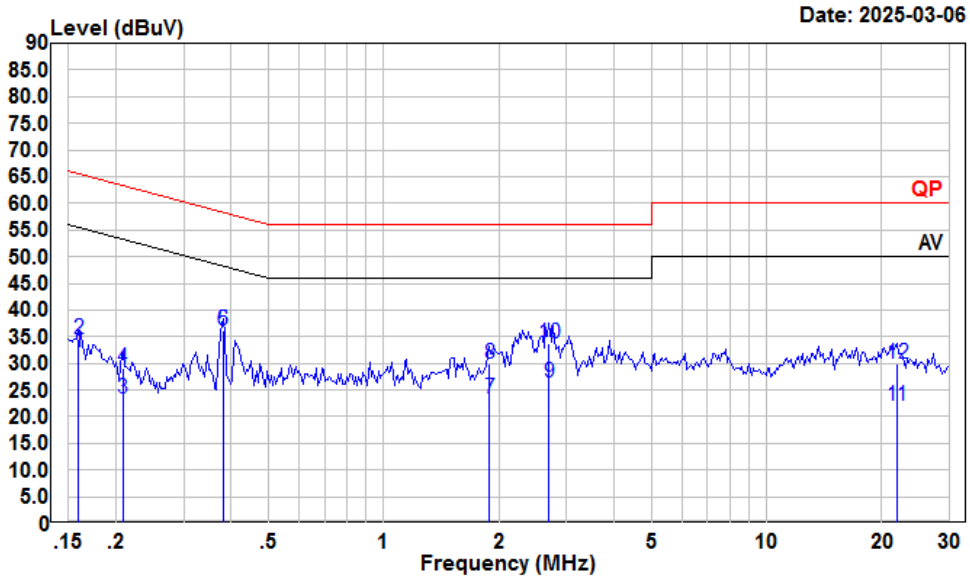
Environmental Conditions

Temperature:	22℃
Relative Humidity:	40%
ATM Pressure:	100kPa

The testing was performed by Macy shi on 2025-03-06.

EUT operation mode: Transmitting (Maximum output power mode: High channel)

AC 120V/60 Hz, Line

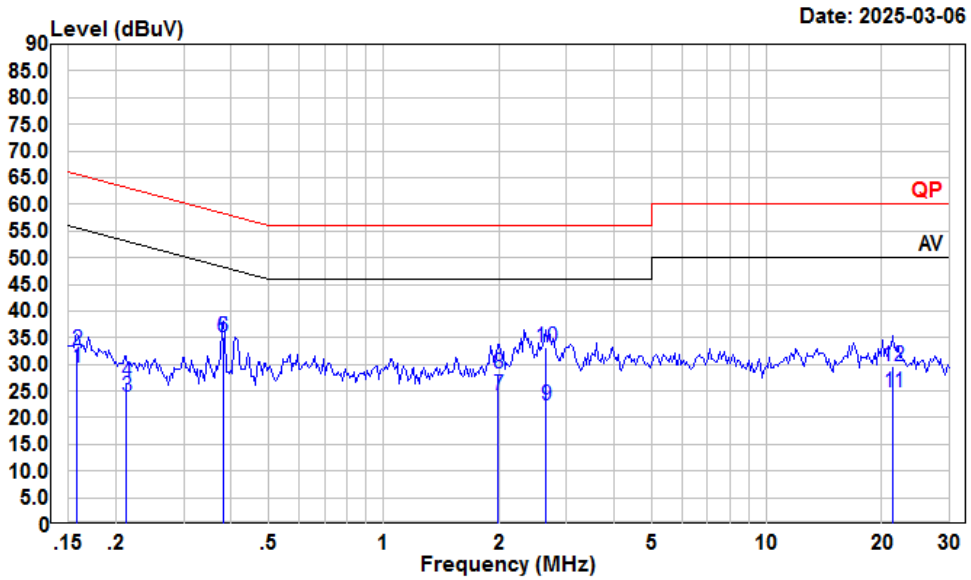


Condition: Line
Project : 2501Q32248E-RF
tester : Macy.shi Note:Transmitting
Setting : RBW:9kHz VBW:30KHz

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.160	10.74	32.08	11.22	10.12	55.47	-23.39	Average
2	0.160	13.13	34.47	11.22	10.12	65.47	-31.00	QP
3	0.208	2.07	23.45	11.29	10.09	53.27	-29.82	Average
4	0.208	7.84	29.22	11.29	10.09	63.27	-34.05	QP
5	0.381	15.03	36.23	11.09	10.11	48.25	-12.02	Average
6	0.381	15.07	36.27	11.09	10.11	58.25	-21.98	QP
7	1.888	2.09	23.47	11.20	10.18	46.00	-22.53	Average
8	1.888	8.62	30.00	11.20	10.18	56.00	-26.00	QP
9	2.707	4.94	26.35	11.24	10.17	46.00	-19.65	Average
10	2.707	12.30	33.71	11.24	10.17	56.00	-22.29	QP
11	21.830	0.98	22.09	10.93	10.18	50.00	-27.91	Average
12	21.830	8.94	30.05	10.93	10.18	60.00	-29.95	QP

Note: The detector of the plot is peak

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : 2501Q32248E-RF
tester : Macy.shi Note:Transmitting
Setting : RBW:9kHz VBW:30KHz

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.158	9.05	29.30	10.13	10.12	55.56	-26.26	Average
2	0.158	12.28	32.53	10.13	10.12	65.56	-33.03	QP
3	0.213	3.27	24.02	10.66	10.09	53.10	-29.08	Average
4	0.213	5.99	26.74	10.66	10.09	63.10	-36.36	QP
5	0.381	14.76	35.15	10.28	10.11	48.25	-13.10	Average
6	0.381	14.82	35.21	10.28	10.11	58.25	-23.04	QP
7	1.991	3.76	24.15	10.20	10.19	46.00	-21.85	Average
8	1.991	7.93	28.32	10.20	10.19	56.00	-27.68	QP
9	2.650	1.72	22.17	10.28	10.17	46.00	-23.83	Average
10	2.650	12.66	33.11	10.28	10.17	56.00	-22.89	QP
11	21.373	4.63	24.78	9.97	10.18	50.00	-25.22	Average
12	21.373	9.51	29.66	9.97	10.18	60.00	-30.34	QP

Note: The detector of the plot is peak

FCC§15.205, §15.209 & §15.249(d) - RADIATED EMISSIONS

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

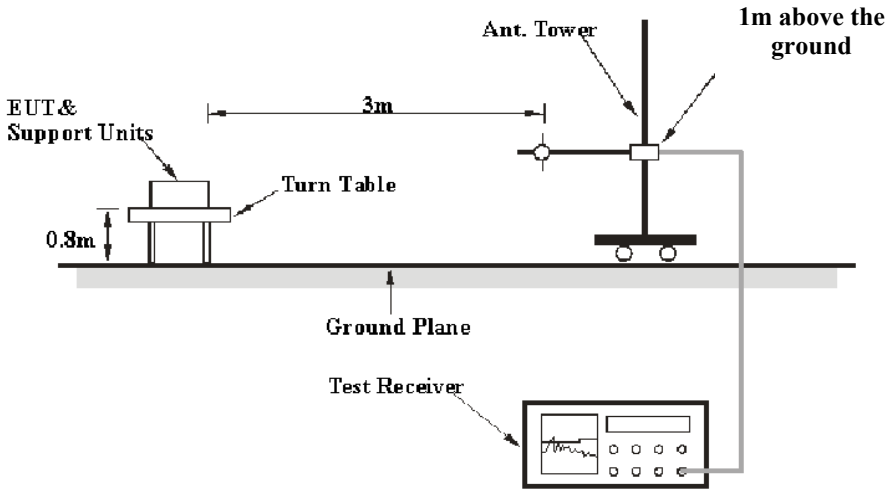
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

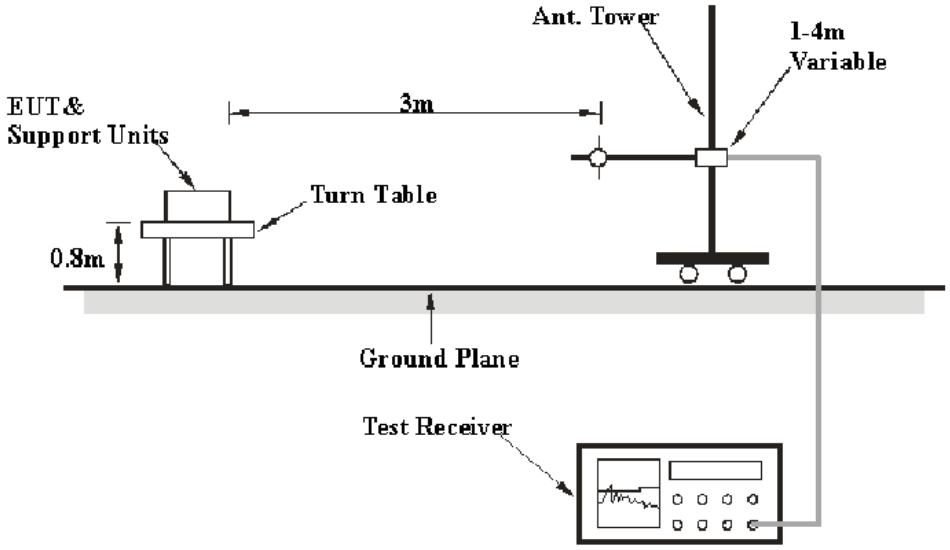
As per FCC§15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

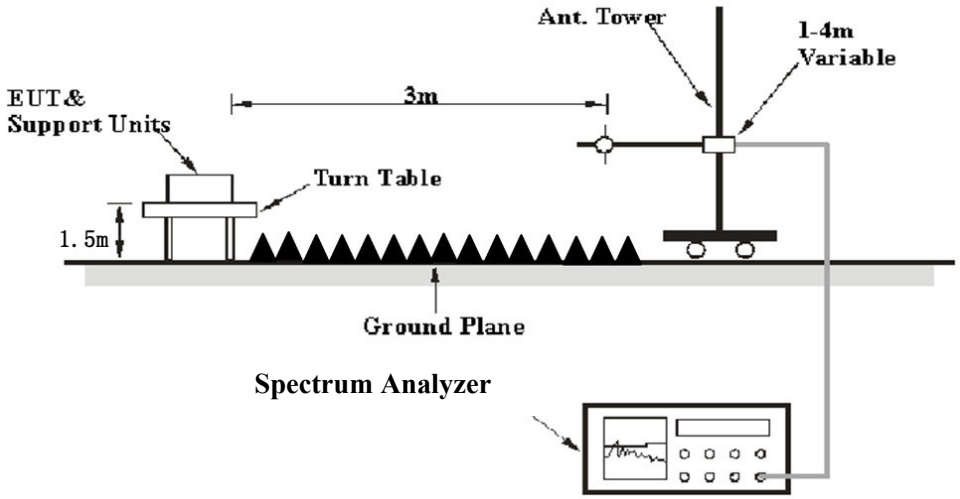
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement	Detector
9 kHz – 150 kHz	/	/	200 Hz	QP	QP
	300 Hz	1 kHz	/	PK	Peak
150 kHz – 30 MHz	/	/	9 kHz	QP	QP
	10 kHz	30 kHz	/	PK	Peak
30 MHz – 1000 MHz	/	/	120 kHz	QP	QP
	100 kHz	300 kHz	/	PK	Peak
Above 1 GHz	Harmonics				
	1MHz	3 MHz	/	PK	Peak
	Average Emission Level=Peak Emission Level+20*log(Duty cycle)				
	Band Edge & Other Emissions				
	1MHz	3 MHz	/	PK	Peak
	1MHz	≥10 Hz	/	Average	Peak

For Duty cycle measurement:

Use the duty cycle factor correction factor method per 15.35(c).
Duty cycle=On time/100milliseconds, On time=N1*L1+N2*L2+…Nn-1*Ln-1+Nn*Ln,
Where N1 is number of type 1 pulses, L1 is length of type 1 pulse, etc.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

All emissions under the average limit and under the noise floor have not recorded in the report.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit; Margin = Limit–Corrected Amplitude
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	22.8~23.6℃
Relative Humidity:	51~60 %
ATM Pressure:	101.3~102.2 kPa

The testing was performed by Anson Su on 2025-03-10 for below 1GHz and Visen Wu on 2025-03-11 for above 1GHz.

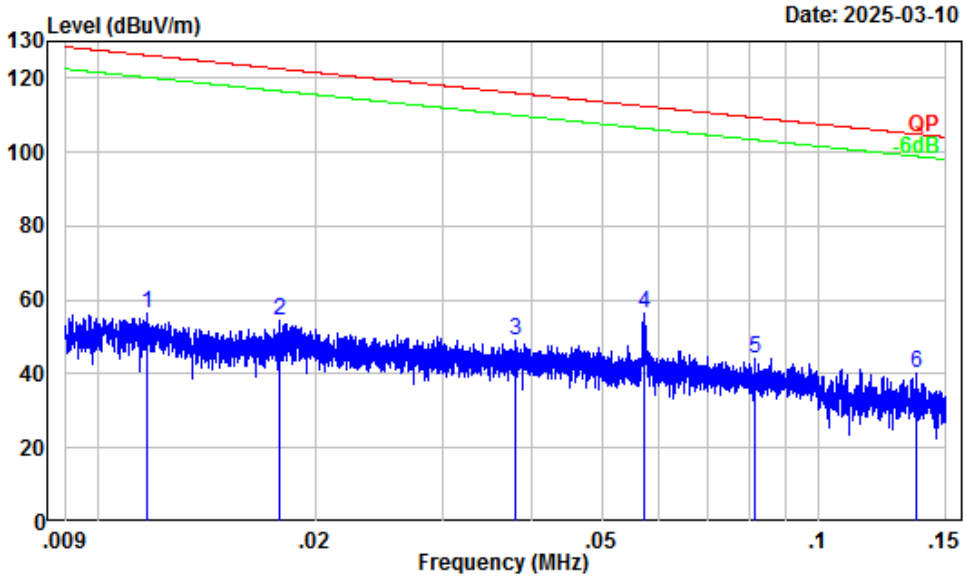
EUT operation mode: Transmitting

Note: Pre-scan in the X, Y and Z axes of orientation, the worst case Z-axis of orientation was recorded

9 kHz-30MHz: *(Maximum output power mode, High channel)*

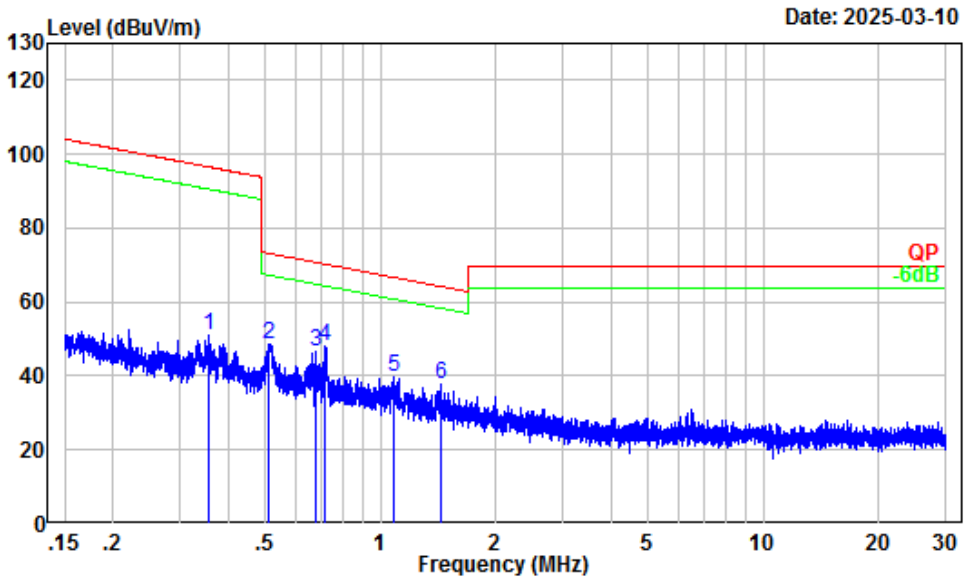
Note: When the test result of peak was less than the limit of QP/Average more than 6dB, just peak value were recorded.

Parallel (worst case)



Site : Chamber A
Condition : 3m
Project Number : 2501Q32248E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 0.3/1kHz
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	31.98	24.34	56.32	126.26	-69.94	Peak
2	0.02	30.81	23.80	54.61	122.58	-67.97	Peak
3	0.04	27.66	21.42	49.08	116.01	-66.93	Peak
4	0.06	25.67	30.52	56.19	112.45	-56.26	Peak
5	0.08	23.28	20.86	44.14	109.36	-65.22	Peak
6	0.14	19.85	20.32	40.17	104.91	-64.74	Peak

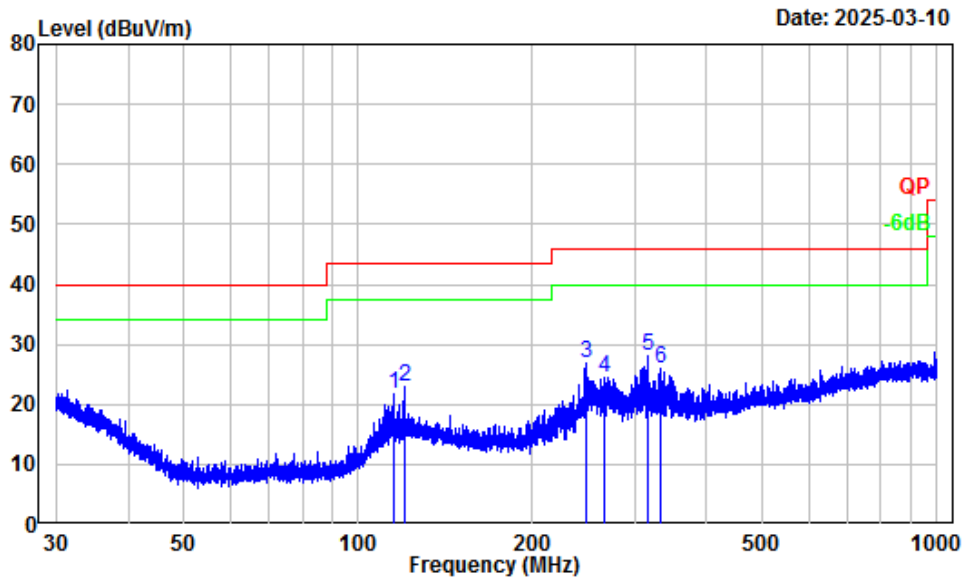


Site : Chamber A
Condition : 3m
Project Number : 2501Q32248E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 10/30kHz
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.36	9.13	41.67	50.80	96.57	-45.77	Peak
2	0.51	6.24	42.51	48.75	73.39	-24.64	Peak
3	0.68	4.19	42.57	46.76	70.91	-24.15	Peak
4	0.72	3.73	44.17	47.90	70.43	-22.53	Peak
5	1.08	0.97	38.80	39.77	66.77	-27.00	Peak
6	1.44	-0.02	38.00	37.98	64.27	-26.29	Peak

30MHz-1GHz: *(Maximum output power mode, High channel)*

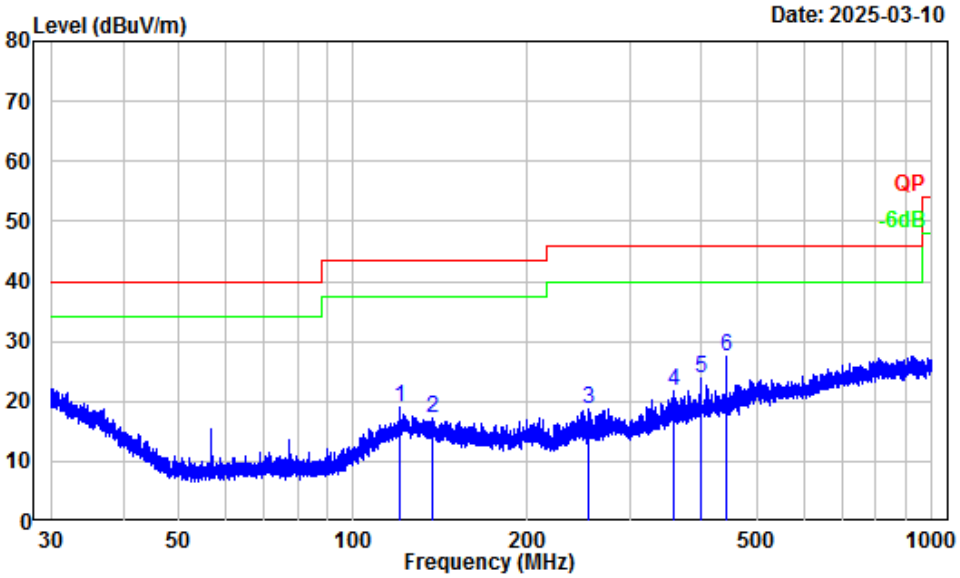
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number : 2501Q32248E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	115.12	-12.11	33.95	21.84	43.50	-21.66	Peak
2	119.96	-11.45	34.40	22.95	43.50	-20.55	Peak
3	247.90	-13.14	40.14	27.00	46.00	-19.00	Peak
4	265.68	-12.21	36.71	24.50	46.00	-21.50	Peak
5	316.03	-10.90	38.94	28.04	46.00	-17.96	Peak
6	333.83	-10.56	36.47	25.91	46.00	-20.09	Peak

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number : 2501Q32248E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	120.43	-11.41	30.34	18.93	43.50	-24.57	Peak
2	136.64	-11.60	28.95	17.35	43.50	-26.15	Peak
3	254.95	-13.08	31.73	18.65	46.00	-27.35	Peak
4	357.30	-9.96	31.83	21.87	46.00	-24.13	Peak
5	399.03	-8.45	32.20	23.75	46.00	-22.25	Peak
6	441.16	-7.63	35.09	27.46	46.00	-18.54	Peak

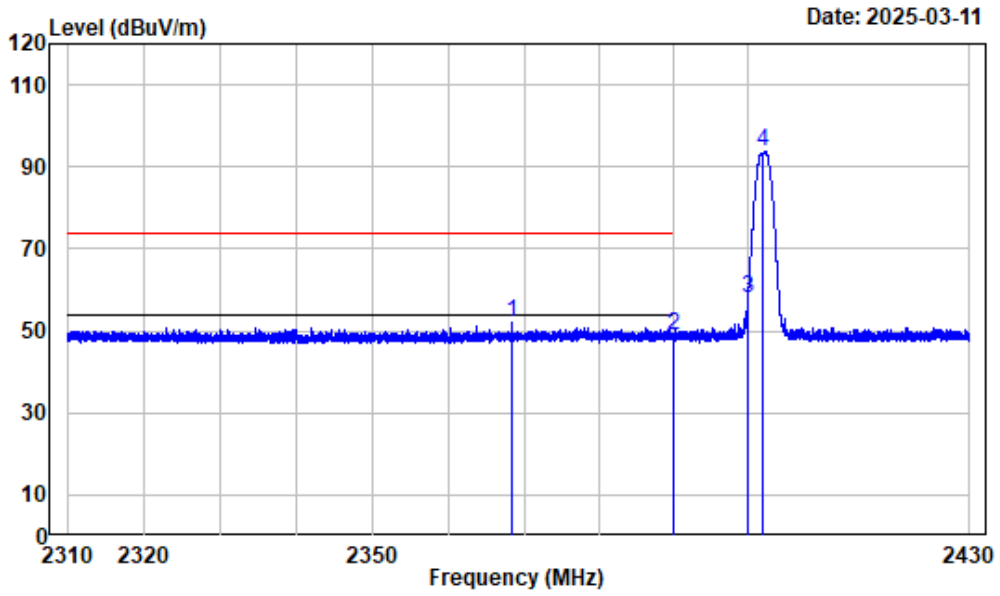
Above 1GHz:

Frequency (MHz)	Reading (dBµV)	PK/AV	Polar (H/V)	Factor (dB/m)	Absolute Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low Channel							
2402.00	104.54	PK	H	-11.01	93.53	114.00	-20.47
2402.00	92.85	PK	V	-11.01	81.84	114.00	-32.16
4804.00	58.53	PK	H	-7.79	50.74	74	-23.26
4804.00	55.23	PK	V	-7.79	47.44	74	-26.56
Middle Channel							
2440.00	105.68	PK	H	-10.93	94.75	114.00	-19.25
2440.00	94.75	PK	V	-10.93	83.82	114.00	-30.18
4880.00	59.04	PK	H	-7.59	51.45	74	-22.55
4880.00	56.90	PK	V	-7.59	49.31	74	-24.69
High Channel							
2480.00	106.84	PK	H	-10.97	95.87	114.00	-18.13
2480.00	94.18	PK	V	-10.97	83.21	114.00	-30.79
4960.00	60.17	PK	H	-7.56	52.61	74	-21.39
4960.00	57.28	PK	V	-7.56	49.72	74	-24.28

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Absolute Level/Level= Factor + Reading
Margin = Absolute Level/Level - Limit
The other spurious emission which is 20dB to the limit or in noise floor level was not recorded.
The test result of peak was less than the limit of average, so it meets the average limit and just peak values were recorded.

Test plots for Band Edge Measurements (Radiated):

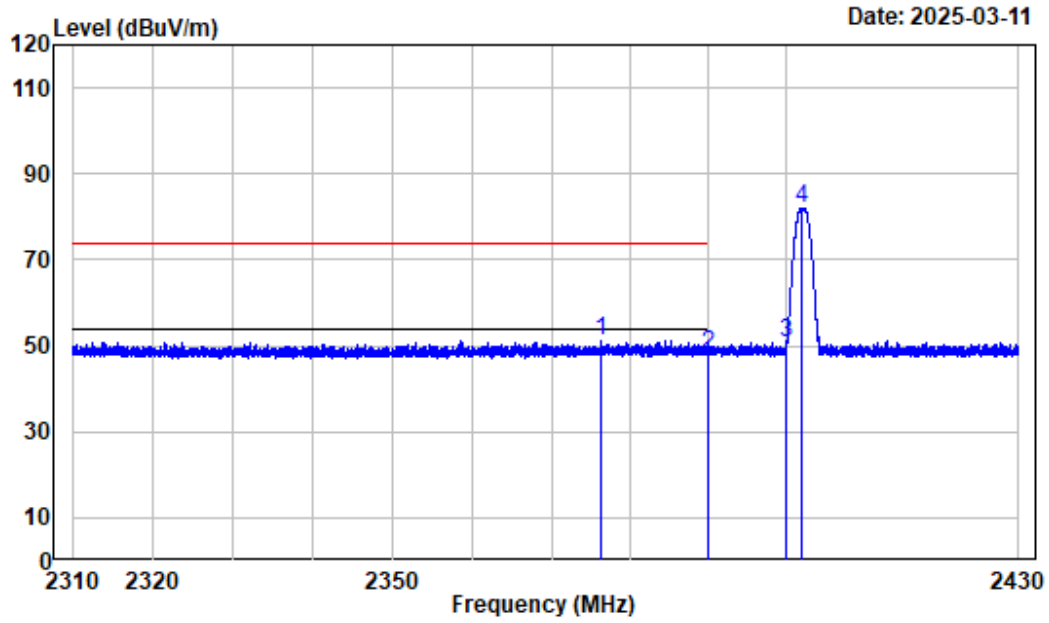
Test Channel:	2402MHz	Ant. Polar. :	Horizontal



Condition : Horizontal
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2402

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2368.312	-10.94	63.22	52.28	74.00	-21.72	Peak
2	2390.000	-10.98	60.02	49.04	74.00	-24.96	Peak
3	2400.000	-11.01	68.86	57.85	74.00	-16.15	Peak
4	2402.000	-11.01	104.54	93.53	114.00	-20.47	Peak

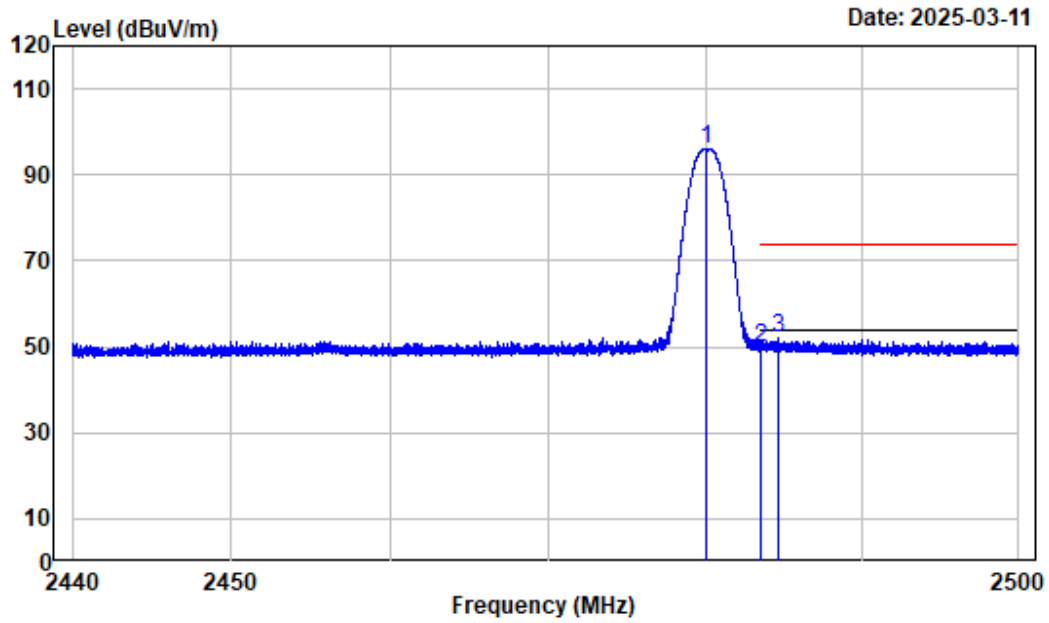
Test Channel:	2402MHz	Ant. Polar. :	Vertical



Condition : Vertical
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2402

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2376.293	-10.95	62.11	51.16	74.00	-22.84	Peak
2	2390.000	-10.98	59.07	48.09	74.00	-25.91	Peak
3	2400.000	-11.01	61.63	50.62	74.00	-23.38	Peak
4	2402.000	-11.01	92.85	81.84	114.00	-32.16	Peak

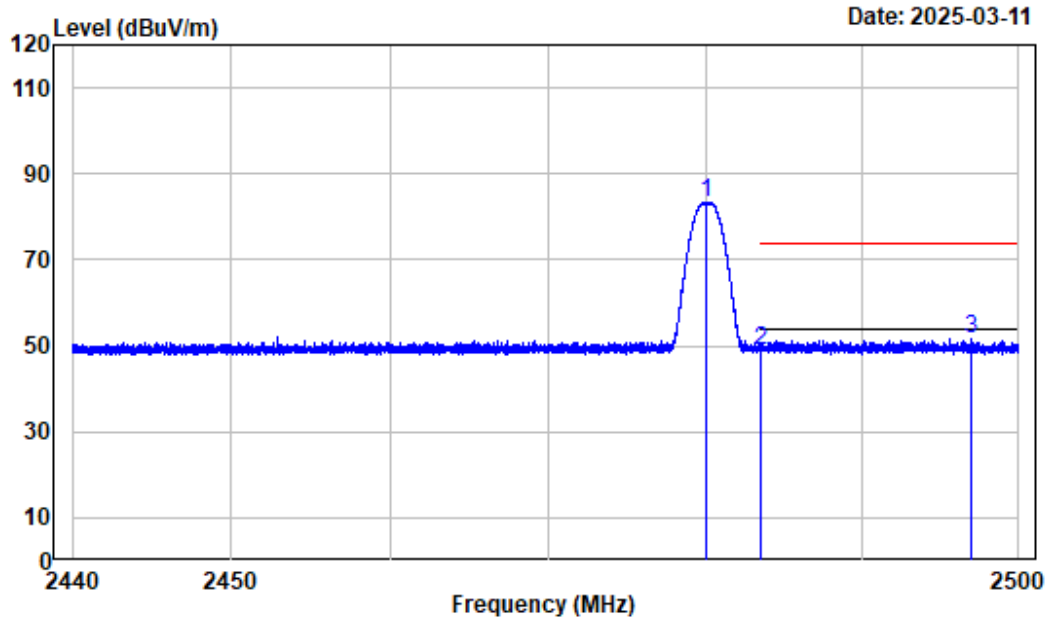
Test Channel:	2480MHz	Ant. Polar. :	Horizontal



Condition : Horizontal
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2480.000	-10.97	106.84	95.87	114.00	-18.13	Peak
2	2483.500	-10.97	60.93	49.96	74.00	-24.04	Peak
3	2484.646	-10.97	62.92	51.95	74.00	-22.05	Peak

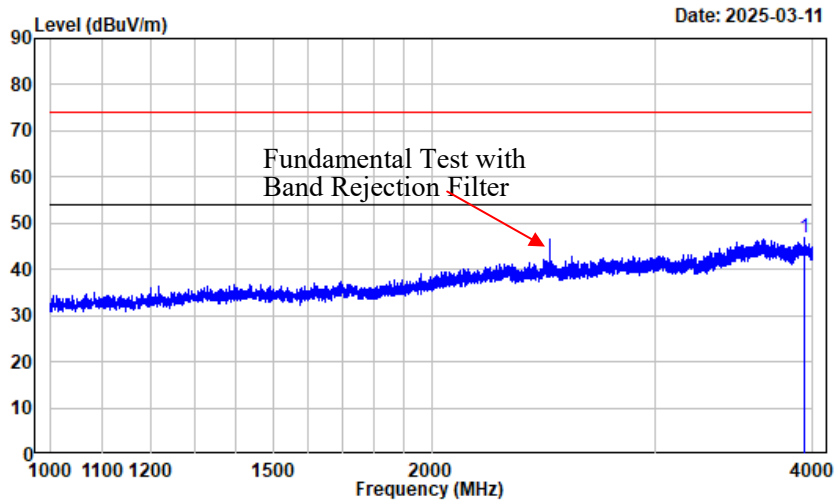
Test Channel:	2480MHz	Ant. Polar. :	Vertical



Condition : Vertical
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2480.000	-10.97	94.18	83.21	114.00	-30.79	Peak
2	2483.500	-10.97	59.87	48.90	74.00	-25.10	Peak
3	2496.977	-10.99	62.52	51.53	74.00	-22.47	Peak

Listed with the worst harmonic margin test plot: (High channel)

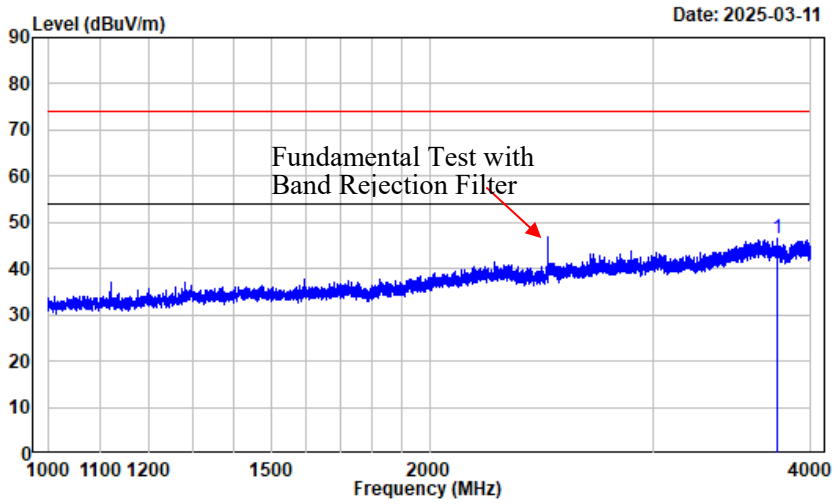
Horizontal	
1-4GHz	


```
Condition        : Horizontal
Project No.      : 2501Q32248E-RF
Tester           : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note             : GFSK_2.4G_2480
```

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3935.867	-9.46	56.21	46.75	74.00	-27.25	Peak

Vertical

1-4GHz

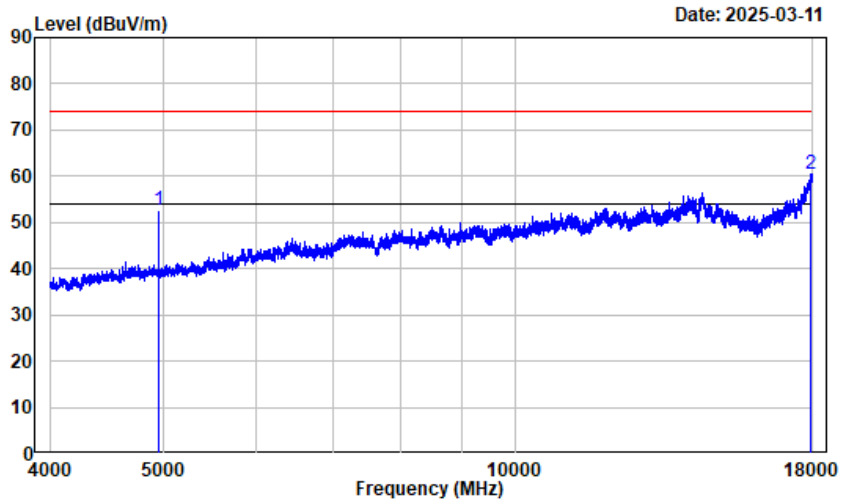



```
Condition        : Vertical
Project No.      : 2501Q32248E-RF
Tester           : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note             : GFSK_2.4G_2480
```

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3767.471	-9.68	56.13	46.45	74.00	-27.55	Peak

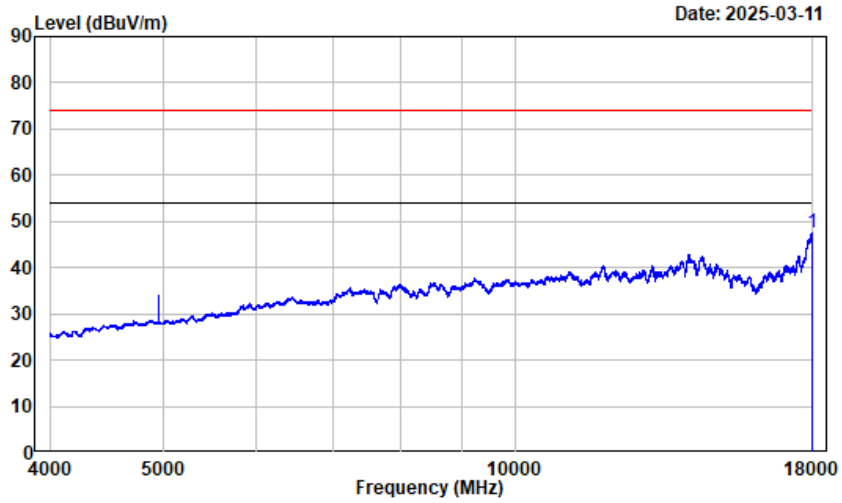
Horizontal-Peak

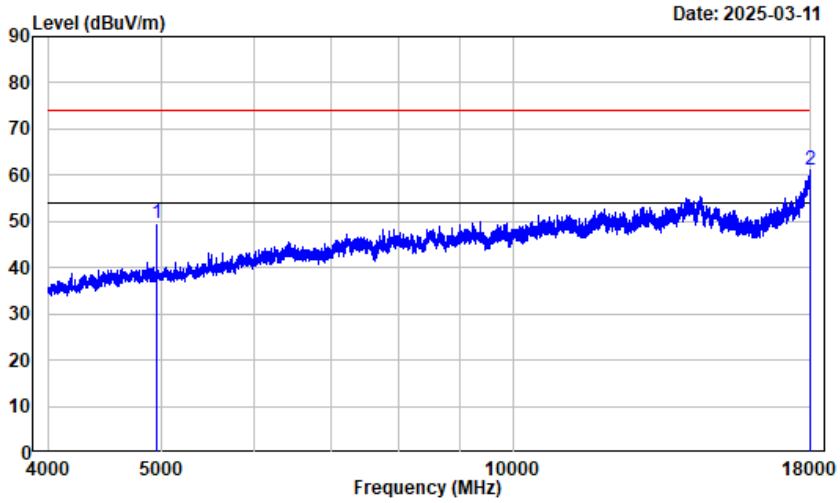
4-18GHz



Condition : Horizontal
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2480

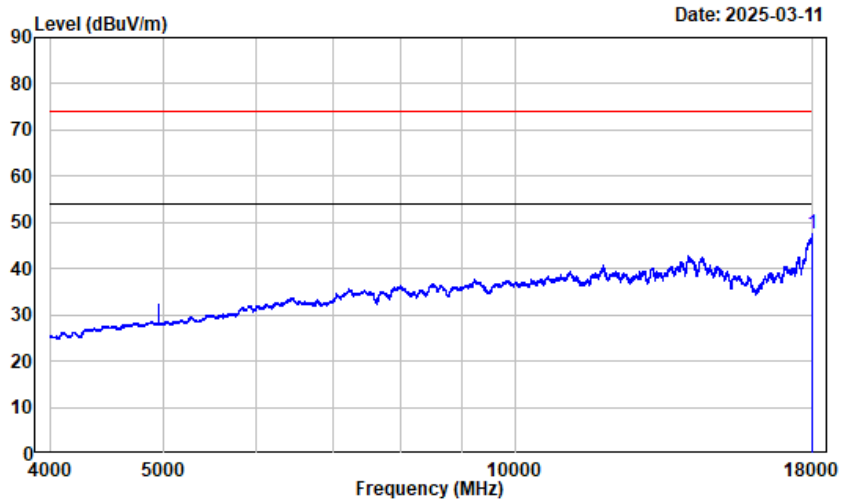
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4960.000	-7.56	60.17	52.61	74.00	-21.39	Peak
2	17931.740	12.86	47.70	60.56	74.00	-13.44	Peak

Horizontal- Average	
4-18GHz	 Condition : Horizontal Project No. : 2501Q32248E-RF Tester : Visen Wu Spectrum setting: Average reading: RBW:1MHz VBW:1kHz Detector:Peak Note : GFSK_2.4G_2480 Freq / Factor / Read Level / Limit Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 18000.000 13.20 34.48 47.68 54.00 -6.32 Average

Vertical-Peak	
4-18GHz	 Condition : Vertical Project No. : 2501Q32248E-RF Tester : Visen Wu Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak Note : GFSK_2.4G_2480 Freq / Factor / Read Level / Limit Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 4960.870 -7.56 57.28 49.72 74.00 -24.28 Peak 2 17998.250 13.19 47.98 61.17 74.00 -12.83 Peak

Vertical- Average

4-18GHz

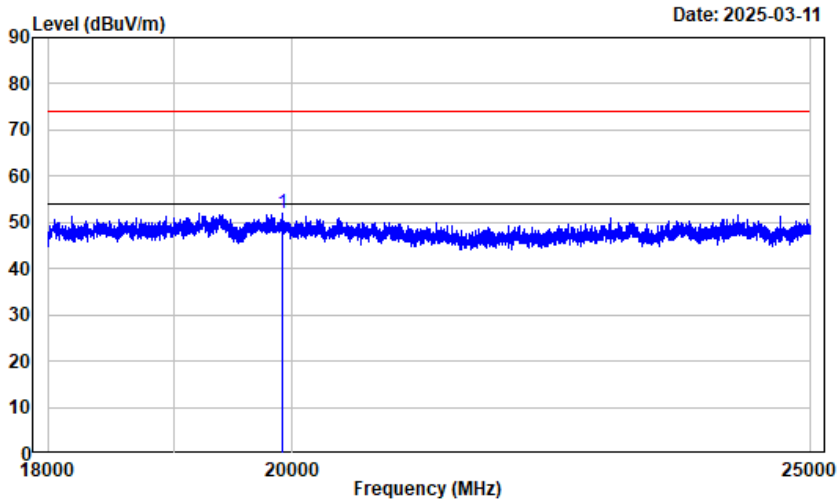


Condition : Vertical
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Average reading: RBW:1MHz VBW:1kHz Detector:Peak
Note : GFSK_2.4G_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	17998.250	13.19	34.44	47.63	54.00	-6.37	Average

Horizontal

18-25GHz

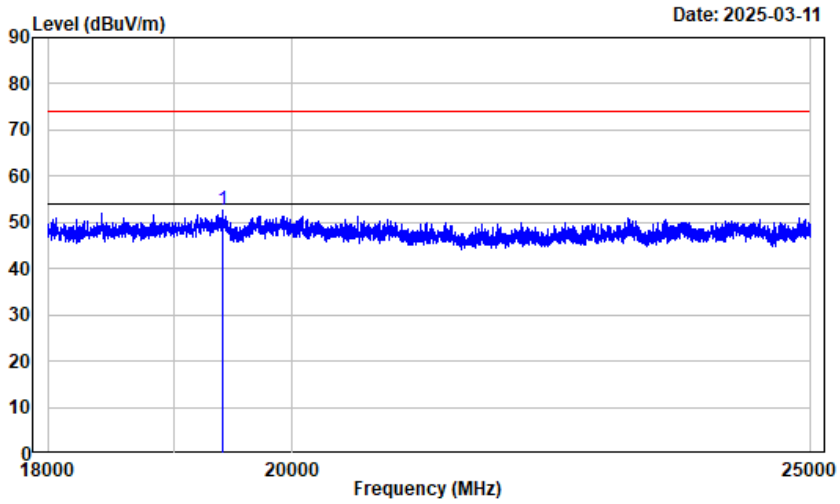


Condition : Horizontal
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	19914.240	15.42	36.53	51.95	74.00	-22.05	Peak

Vertical

18-25GHz



Condition : Vertical
Project No. : 2501Q32248E-RF
Tester : Visen Wu
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : GFSK_2.4G_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	19402.680	15.08	37.45	52.53	74.00	-21.47	Peak

FCC§15.215(c) - 20dB EMISSION BANDWIDTH

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure

Test Method: ANSI C63.10-2020 Clause 6.9.2

• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be at least three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.6.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max-hold.

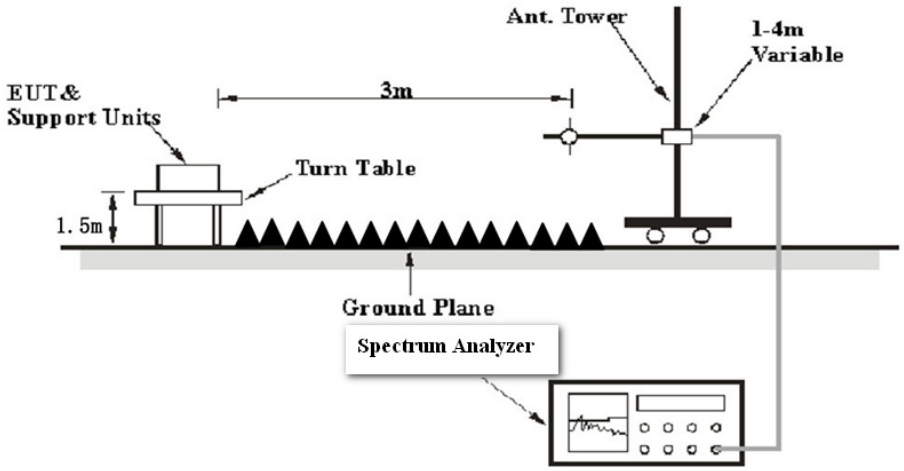
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The dBc bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The dBc bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).



Test Data

Environmental Conditions

Temperature:	22.8℃
Relative Humidity:	60 %
ATM Pressure:	102.2 kPa

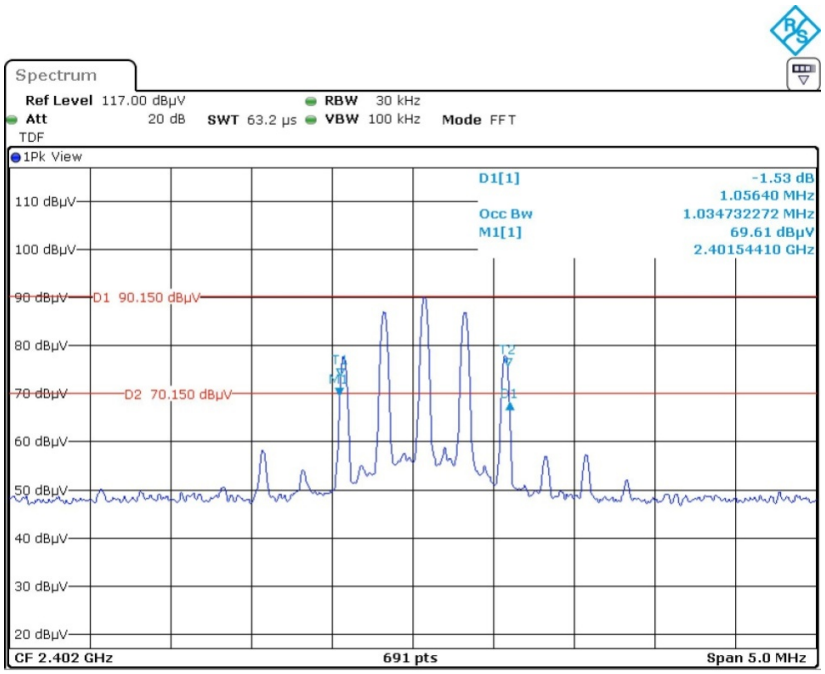
The testing was performed by Visen Wu on 2025-03-11..

EUT operation mode: Transmitting

Please refer to the following table and plots.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.056
Middle	2440	1.056
High	2480	1.056

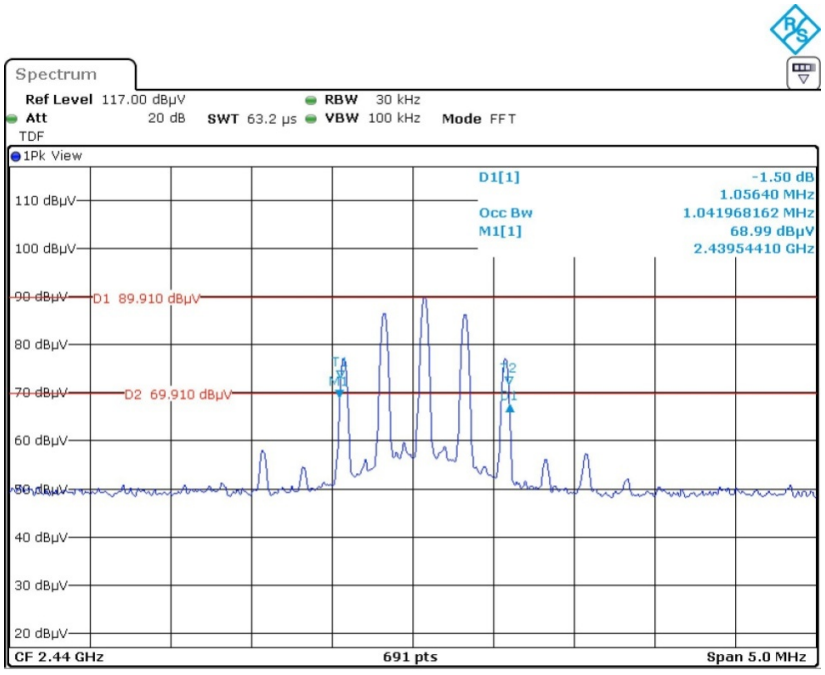
Low channel



ProjectNo.:2501Q32248E-RF Tester:Visen Wu

Date: 11.MAR.2025 00:42:16

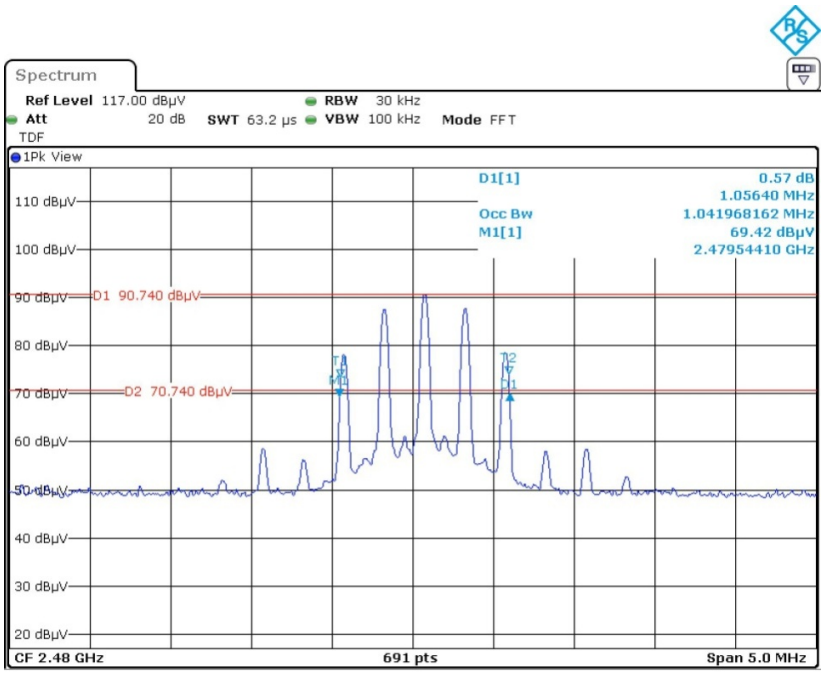
Middle Channel



ProjectNo.:2501Q32248E-RF Tester:Visen Wu

Date: 11.MAR.2025 00:45:18

High Channel



ProjectNo.:2501Q32248E-RF Tester:Visen Wu

Date: 11.MAR.2025 00:47:41

EUT PHOTOGRAPHS

Please refer to the attachment 2501Q32248E-RF External photo and 2501Q32248E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2501Q32248E-RF Test Setup photo.

******* END OF REPORT *******