FCC/IC - TEST REPORT

Report Number	:	4842025220300B	Date of Issue:	2025.03.28

Model	:	T1-M
Product Type	:	Wi-Fi and Bluetooth Module
Applicant	:	Hangzhou Tuya Information Technology Co., Ltd
Address	:	Room 301, Building 1, Huace Center, Xihu District, 310000 Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA
Manufacturer	:	Hangzhou Tuya Information Technology Co., Ltd.
Address	:	Room 301, Building 1, Huace Center, Xihu District, 310000 Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA
Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	53

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1 Table of Contents

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2 Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China
Test Firm FCC Registration Number:	571980
Designation number:	CN1405
IC Company Number:	33393
CAB identifier:	CN0184
Telephone: Fax:	+86 510 8820 3737 +86 510 8820 3636

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Wi-Fi and Bluetooth Module

PMN / HVIN / Model no.: T1-M

FCC ID: 2ANDL-T1-M

Rating: 3.0-3.6V DC
Normal: 3.3V DC

RF Transmission Frequency: Wi-Fi:2412-2462MHz
Bluetooth LE:2402~2480MHz

No. of Operated Channel: 2.4GHz WIFI: 11 for 802.11b/g/n(HT20)
2.4GHz BLE: 40

Modulation: Direct Sequence Spread Spectrum (DSSS) for 802.11b
Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n; 2.4GHz BLE: GFSK

Channel list:

802.11b/g/n(HT20)			
Ch	Fre(MHz)	Ch	Fre(MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Bluetooth Low Energy							
Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Antenna Type: Onboard PCB antenna

Antenna Gain:	-0.66dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Wi-Fi and Bluetooth module which support 2.4GHz Wi-Fi and BLE 4.2(support 1Mbps data rate). We tested it and listed the worst data in this report.
Test sample no.:	WUX-889391-2 (RF radiated); WUX-889391-1 (RF conducted)

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10 (2020).

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5 Summary of Test Results

Technical Requirements						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	13-17	Site 1	☒	☐	☐
§15.247 (b) (3)	Conducted peak output power	18-20	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2)	6dB bandwidth	21-23	Site 1	☒	☐	☐
§15.247(e)	Power spectral density	24-26	Site 1	☒	☐	☐
§15.247(d)	Spurious RF conducted emissions	27-33	Site 1	☒	☐	☐
§15.247(d)	Band edge	34-36	Site 1	☒	☐	☐
§15.247(d) & §15.209	Spurious radiated emissions for transmitter	37-50	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses a PCB antenna, which gain is -0.66dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ANDL-T1-M, complies with Section 15.207,15.209,15.231,15.247 of the FCC Part 15, Subpart C Rules.

This report is only for the 2.4GHz BLE test report, for the 2.4GHz Wi-Fi test report please refer to 4842025220300A.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	February 10, 2025
Testing Start Date:	February 12, 2025
Testing End Date:	February 28, 2025

-TÜV SÜD Certification and Testing (China) Co., Ltd.

Reviewed by:	Prepared by:	Tested by:
Bo Dai	Yiquan Wang	Xia Zhihua
Review Engineer	Project Engineer	Test Engineer

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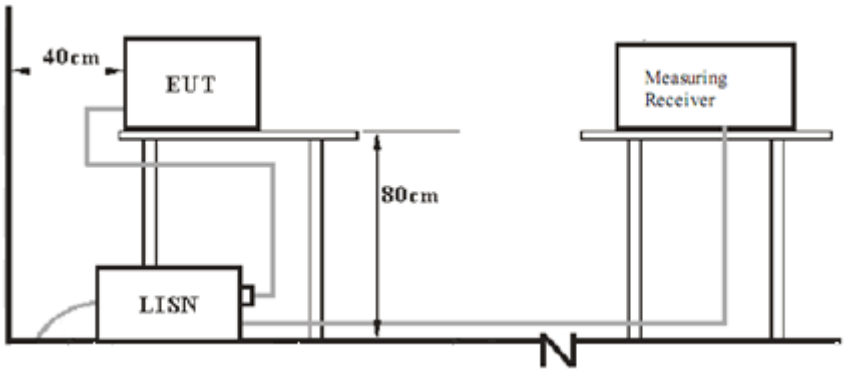
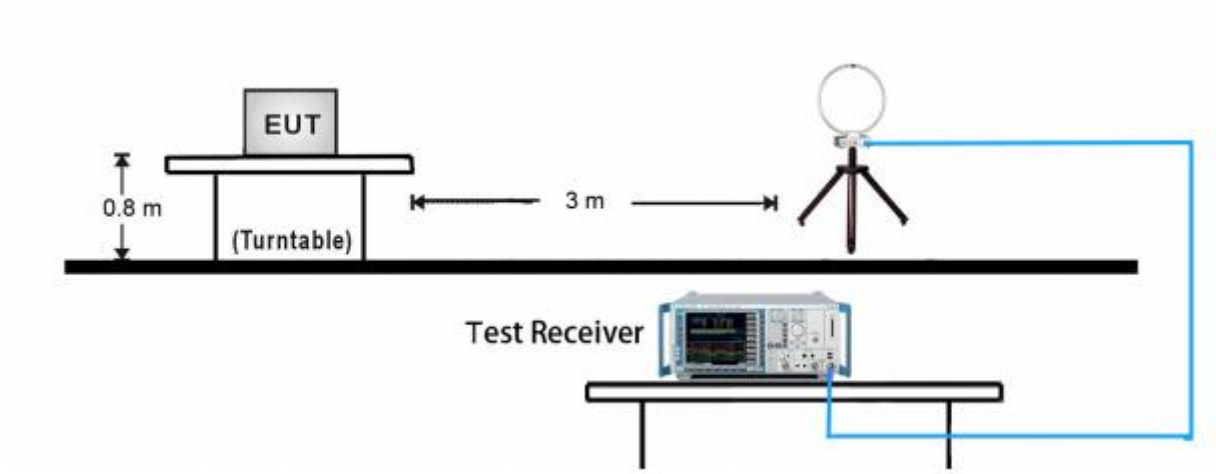
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

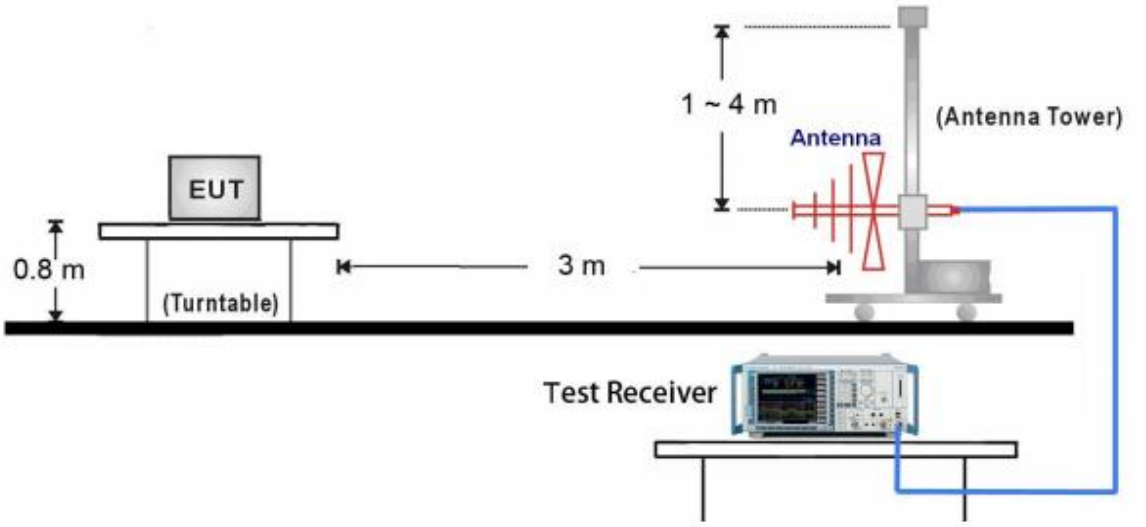


7.2 Radiated test setups

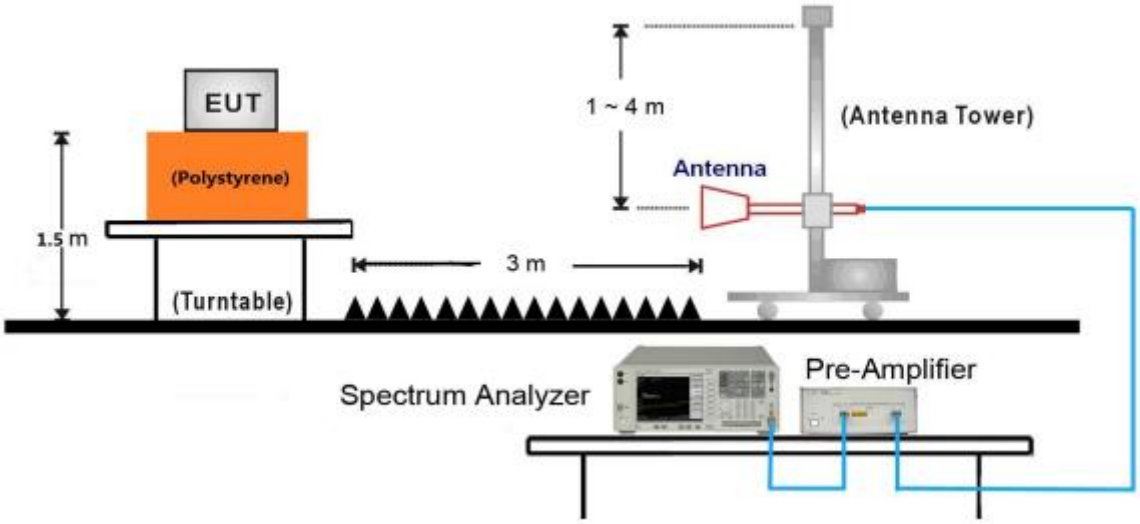
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



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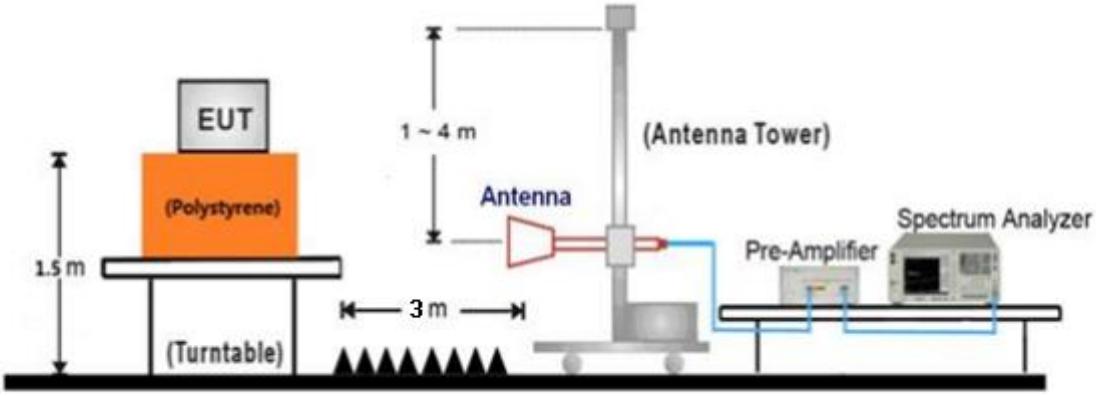
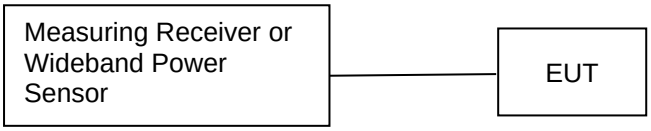
18GHz ~ 25GHz Test Setup:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	HONOR	NDR-WFH	ET247
Notebook	HONOR	VLT-W50	ET137

Test software: Wifi Test tool v1.7.4

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate (Mbps)	Modulation	Power level setting
Bluetooth LE	0	1	GFSK	Auto
	19	1	GFSK	Auto
	39	1	GFSK	Auto

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

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Conducted Emission

150k-30MHz Conducted Emission Test

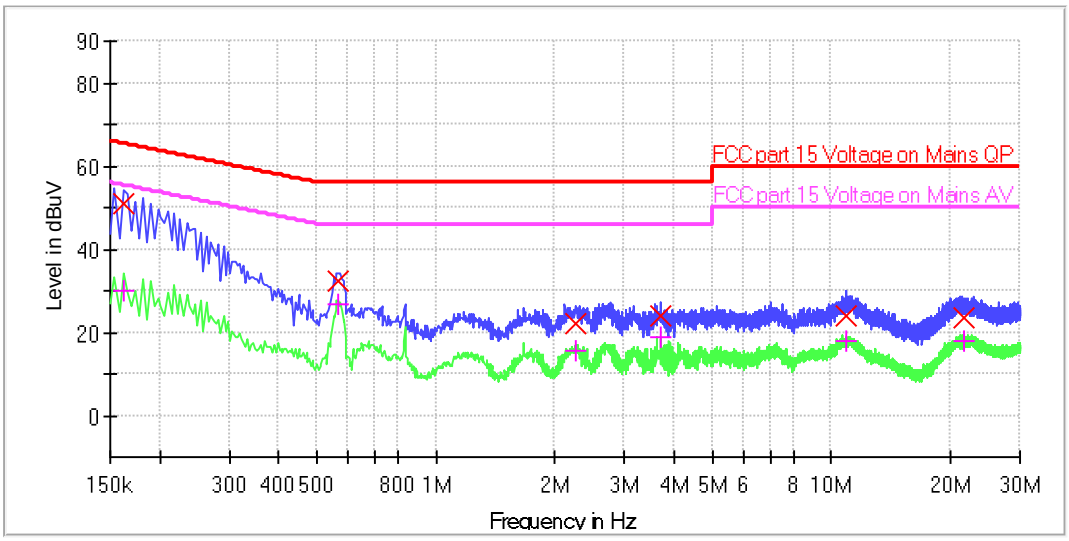
EUT Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	AC 120V/60Hz
Sample No:	WUX-889391-1
Test standard:	FCC Part 15.209(a)
Comment:	Phase L
Comment:	T21.2℃, H51.7%, P100.1kPa

Scan Setup: Mains Voltage LISN 2 Lines 150kHz-30MHz Pre Fcc [EMI conducted]

Hardware Setup:	Mains Voltage LISN 2 Lines 150kHz-30MHz_Fcc
Receiver:	[ESW 8]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+ ; AVG	9 kHz	0.01 s	0 dB



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Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.162000	51.0	30.0	1000.0	9.000	10.6	14.3	65.4	25.3	55.4
0.566000	32.5	26.8	1000.0	9.000	10.5	23.5	56.0	19.2	46.0
2.254000	22.0	15.6	1000.0	9.000	10.6	34.0	56.0	30.4	46.0
3.698000	23.9	19.1	1000.0	9.000	10.6	32.2	56.0	27.0	46.0
10.950000	23.9	17.8	1000.0	9.000	10.9	36.1	60.0	32.2	50.0
21.590000	23.3	17.7	1000.0	9.000	11.1	36.7	60.0	32.3	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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150k-30MHz Conducted Emission Test

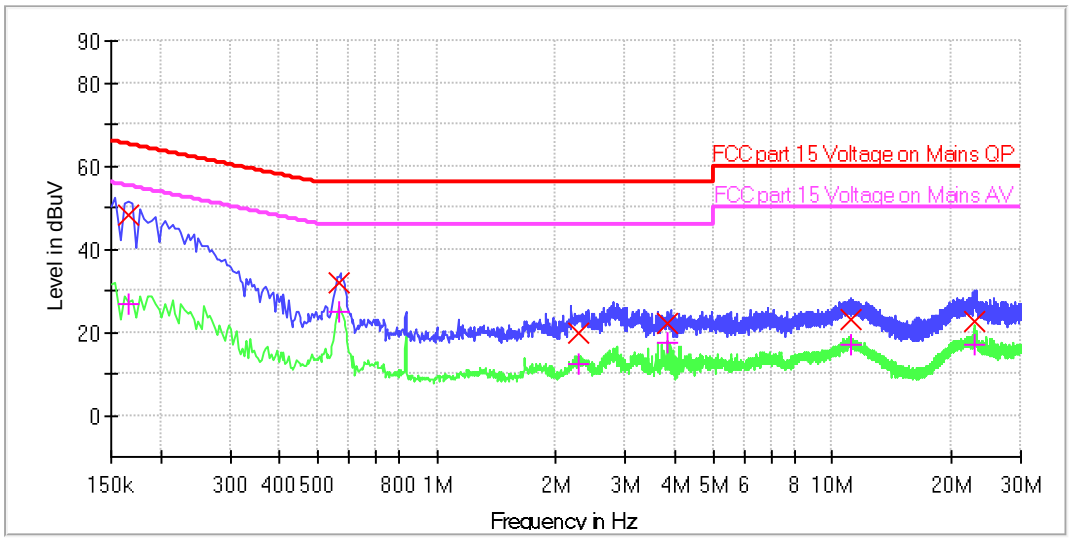
EUT Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	AC 120V/60Hz
Sample No:	WUX-889391-1
Test standard:	FCC Part 15.209(a)
Comment:	Phase N
Comment:	T21.2℃, H51.7%, P100.1kPa

Scan Setup: Mains Voltage LISN 2 Lines 150kHz-30MHz Pre Fcc [EMI conducted]

Hardware Setup:	Mains Voltage LISN 2 Lines 150kHz-30MHz_Fcc
Receiver:	[ESW 8]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+ ; AVG	9 kHz	0.01 s	0 dB



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Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.166000	48.3	26.7	1000.0	9.000	10.6	16.9	65.2	28.5	55.2
0.566000	31.8	25.0	1000.0	9.000	10.5	24.2	56.0	21.0	46.0
2.294000	20.0	12.3	1000.0	9.000	10.6	36.0	56.0	33.7	46.0
3.830000	22.1	17.3	1000.0	9.000	10.6	33.9	56.0	28.7	46.0
11.110000	23.2	17.2	1000.0	9.000	10.9	36.8	60.0	32.8	50.0
22.802000	22.6	17.2	1000.0	9.000	11.2	37.4	60.0	32.8	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   RBW > the 6 dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW
   Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Use a power meter to measure the conducted peak output power.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Conducted peak output power

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

e.i.r.p

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤4	≤36

Test result as below table

Frequency MHz	Conducted Peak Output Power(dBm) §15.247 (b) (3)	Result
2402MHz	5	Pass
2440MHz	5.63	Pass
2480MHz	6.03	Pass

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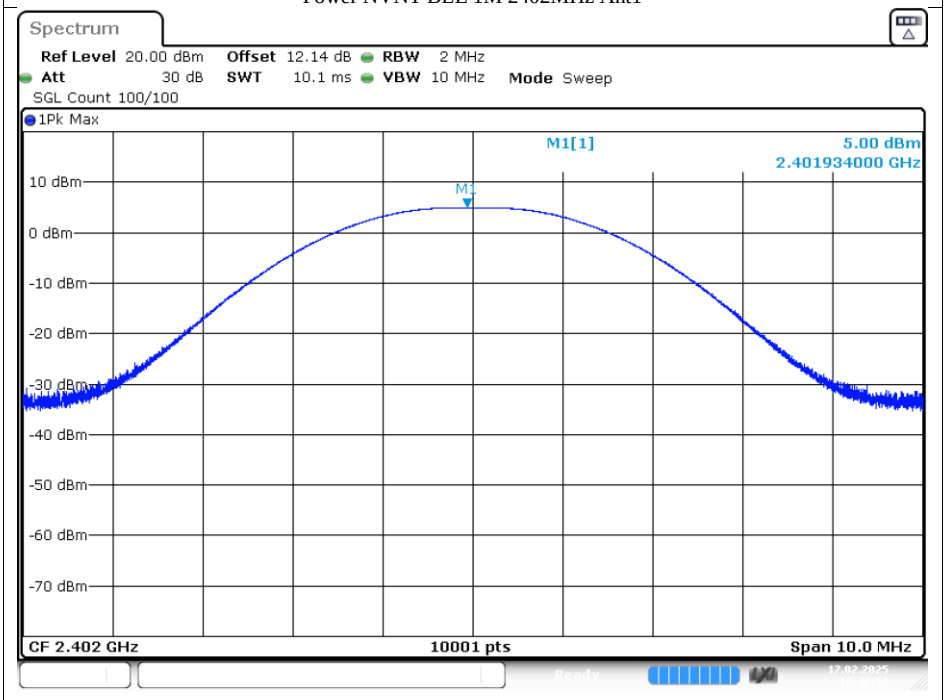
Test Graphs

Power NVNT BLE 1M 2402MHz Ant1



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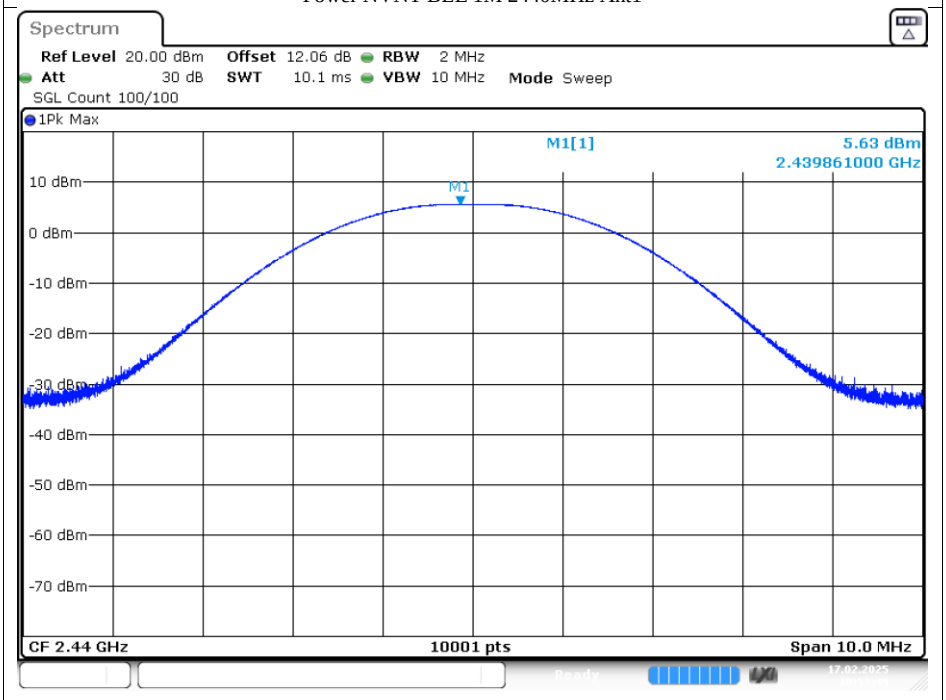
Power NVNT BLE 1M 2440MHz Ant1



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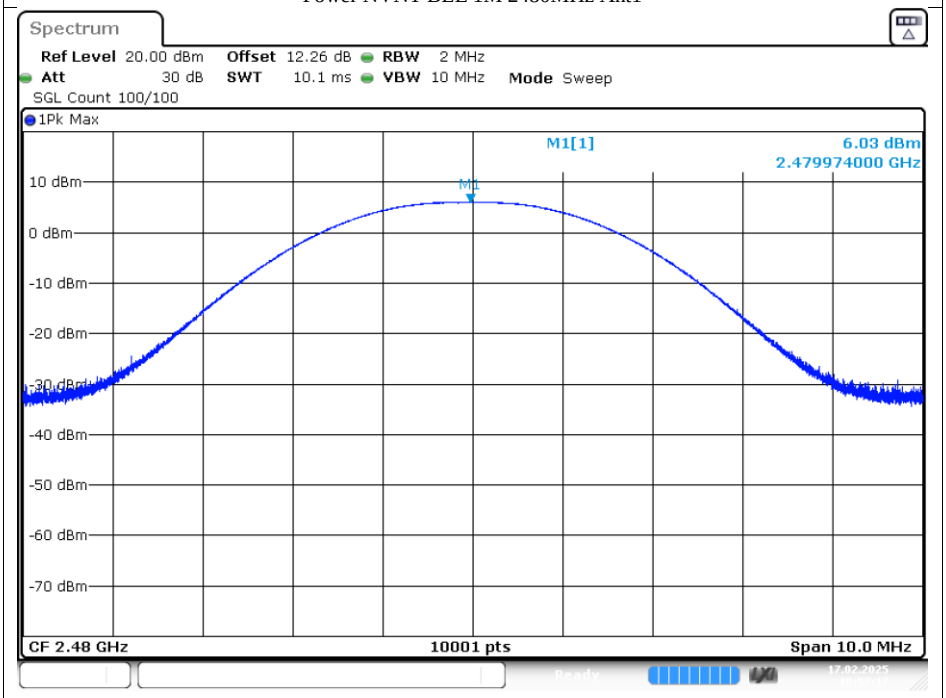
Power NVNT BLE 1M 2480MHz Ant1



Date: 17.FEB.2025 10:57:17

9.3 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
   RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
	result	limit	verdict	
2402	0.701	≥0.5	Pass	1.04
2440	0.694	≥0.5	Pass	1.039
2480	0.711	≥0.5	Pass	1.04

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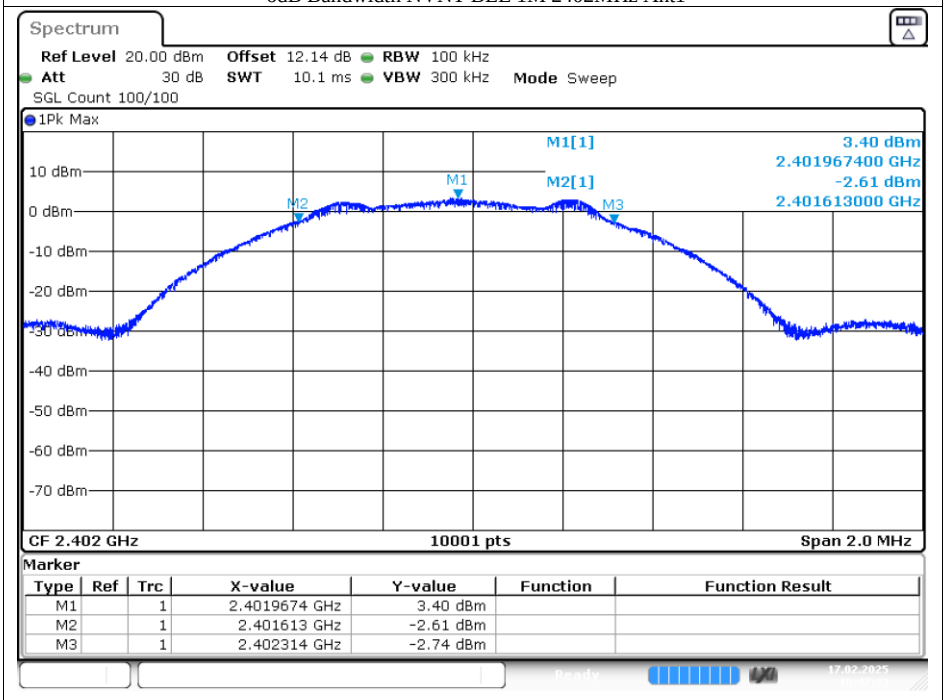
6dB Bandwidth

Test Graphs

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



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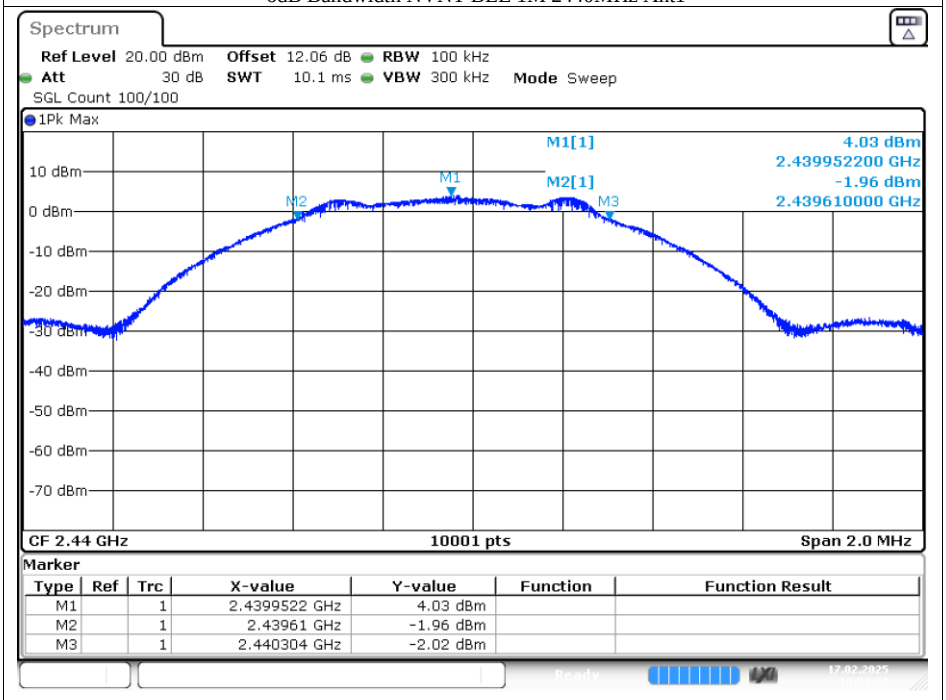
-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



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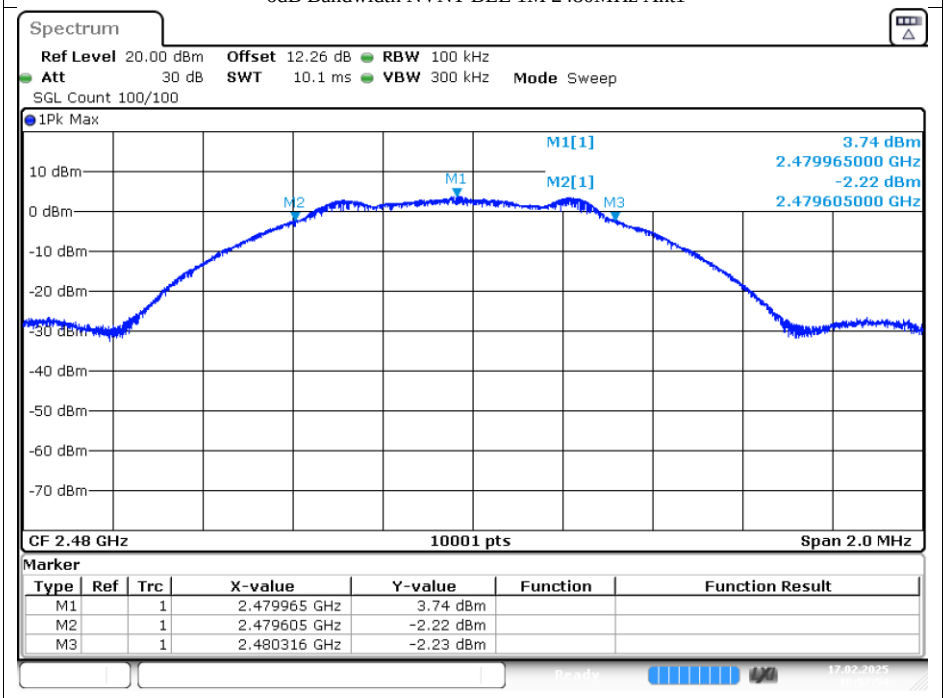
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



Date: 17.FEB.2025 10:57:55

9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3kHz]
⩽8

Test result

Data transmission rate	Frequency	Power spectral density	Result
1Mbps	MHz	dBm/3kHz	
	Top channel 2402MHz	-9.62	Pass
	Middle channel 2440MHz	-8.72	Pass
	Bottom channel 2480MHz	-9.62	Pass

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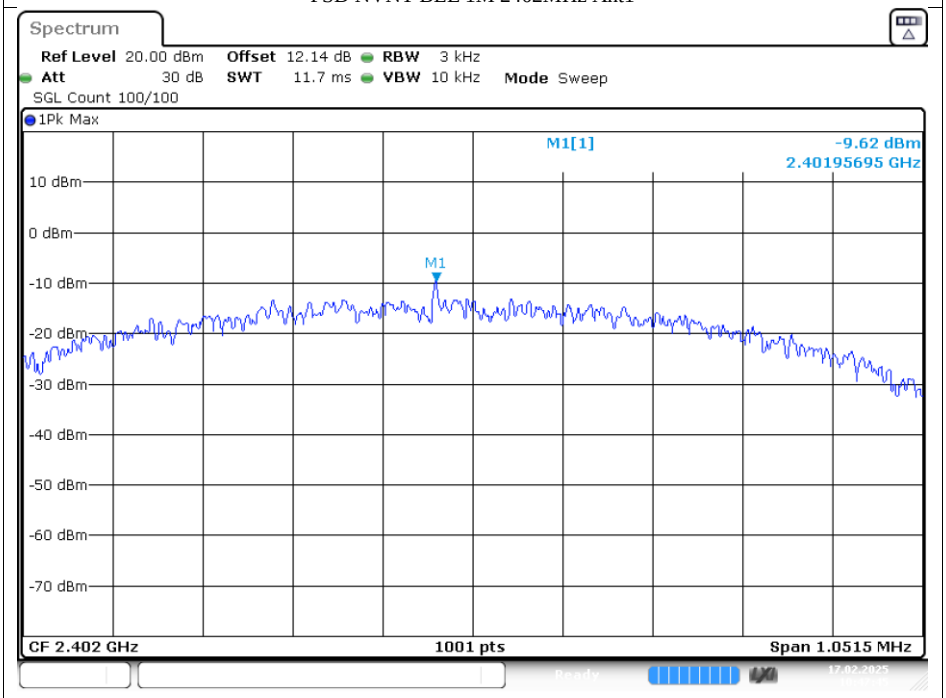
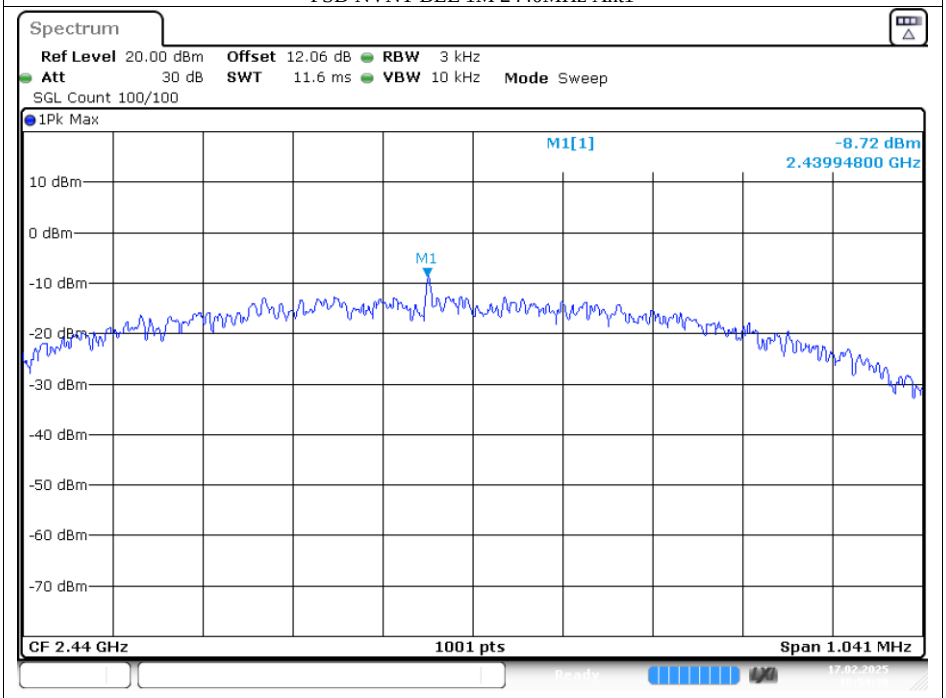
Test Graphs

PSD NVNT BLE 1M 2402MHz Ant1



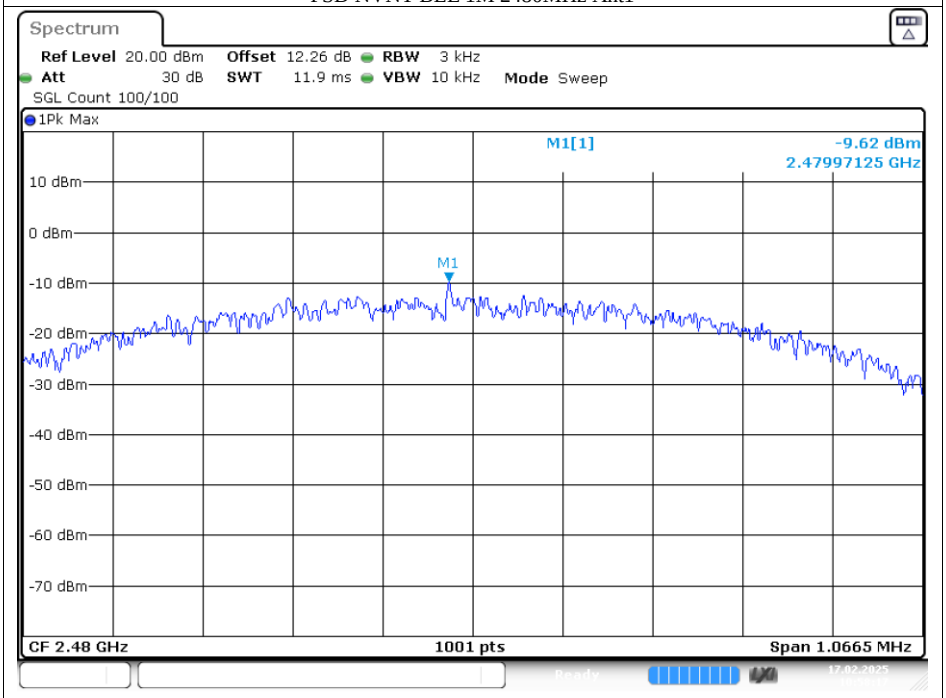
Date: 17.FEB.2025 10:47:45

PSD NVNT BLE 1M 2440MHz Ant1



Date: 17.FEB.2025 10:54:38

PSD NVNT BLE 1M 2480MHz Ant1



Date: 17.FEB.2025 10:58:17

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9.5 Spurious RF conducted emissions

Test Method

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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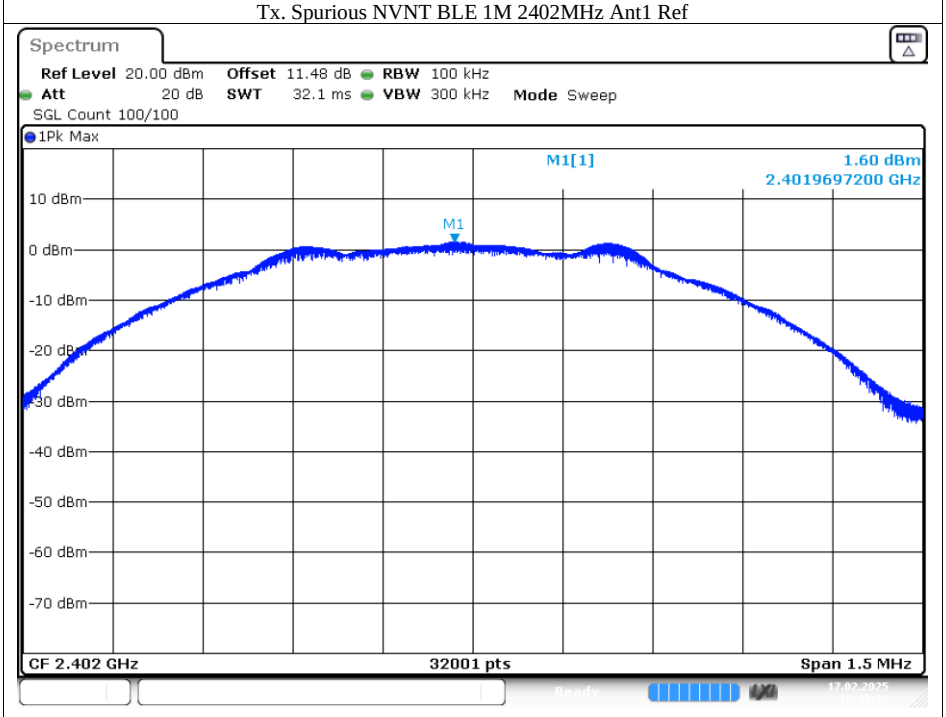
Spurious RF conducted emissions

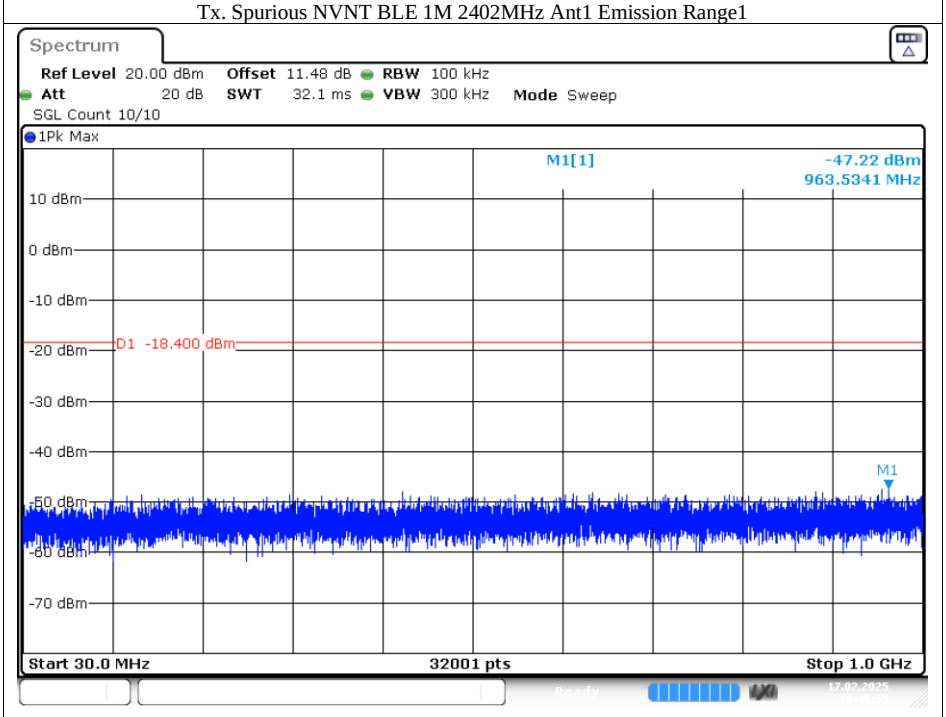
Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



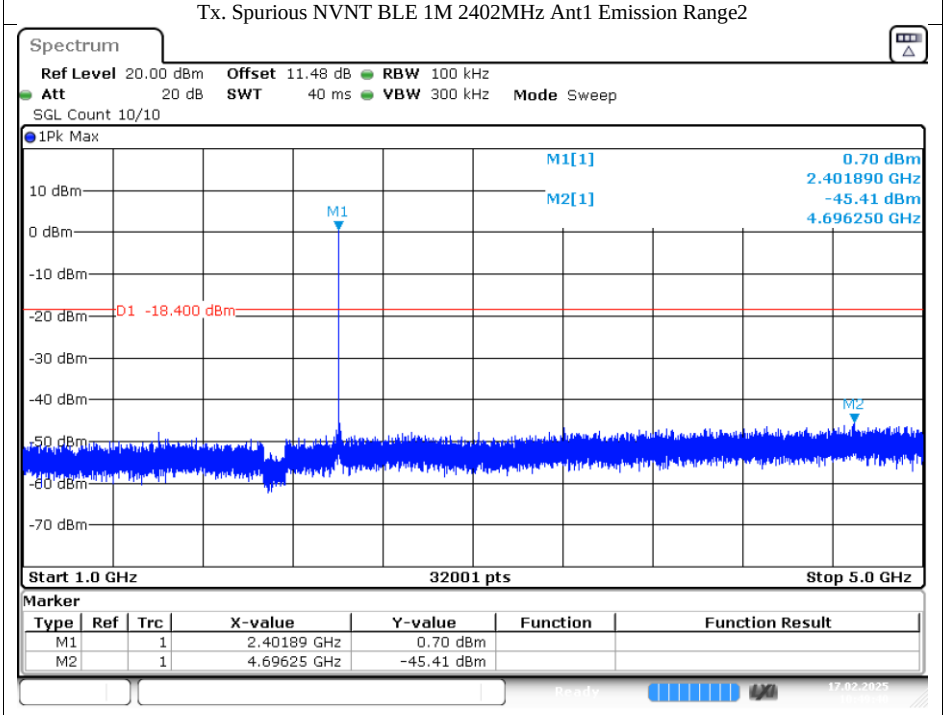
Date: 17.FEB.2025 10:49:31

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission Range1



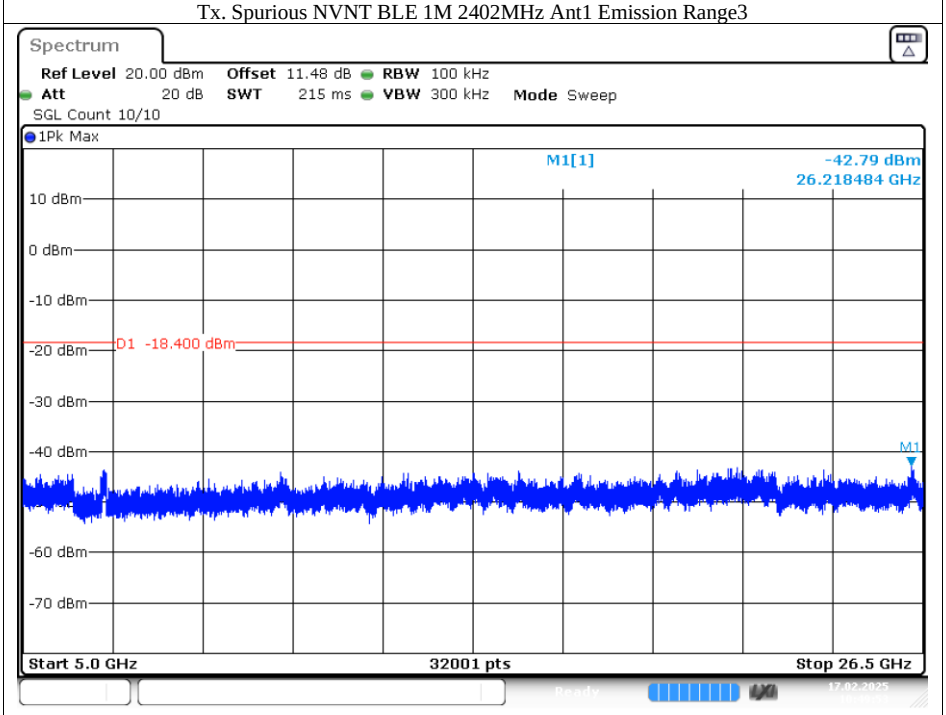
Date: 17.FEB.2025 10:49:35

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission Range2



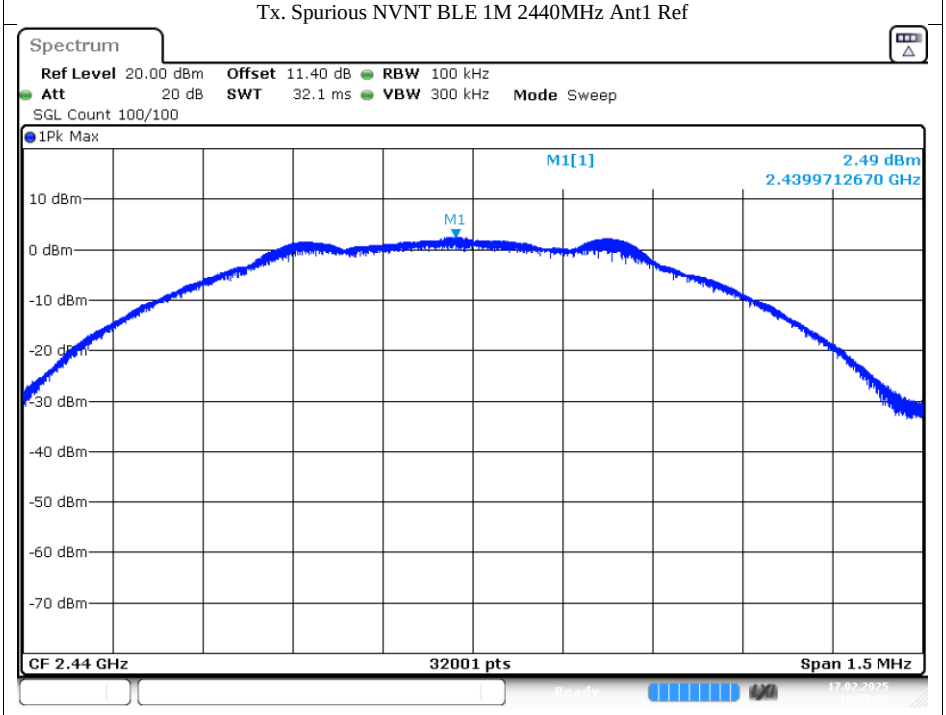
Date: 17.FEB.2025 10:49:40

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission Range3



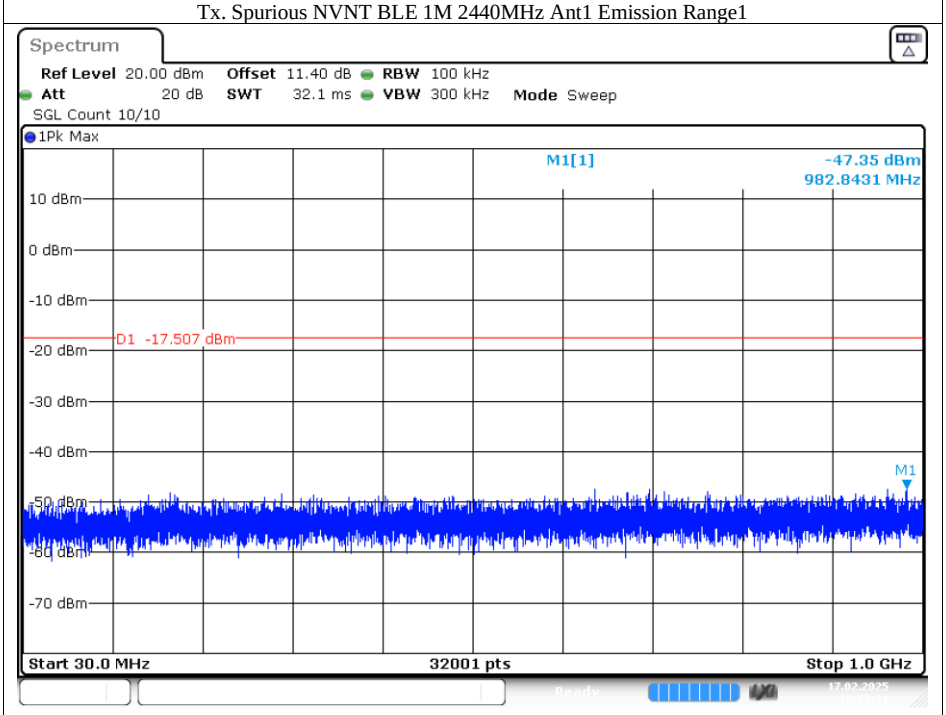
Date: 17.FEB.2025 10:49:53

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



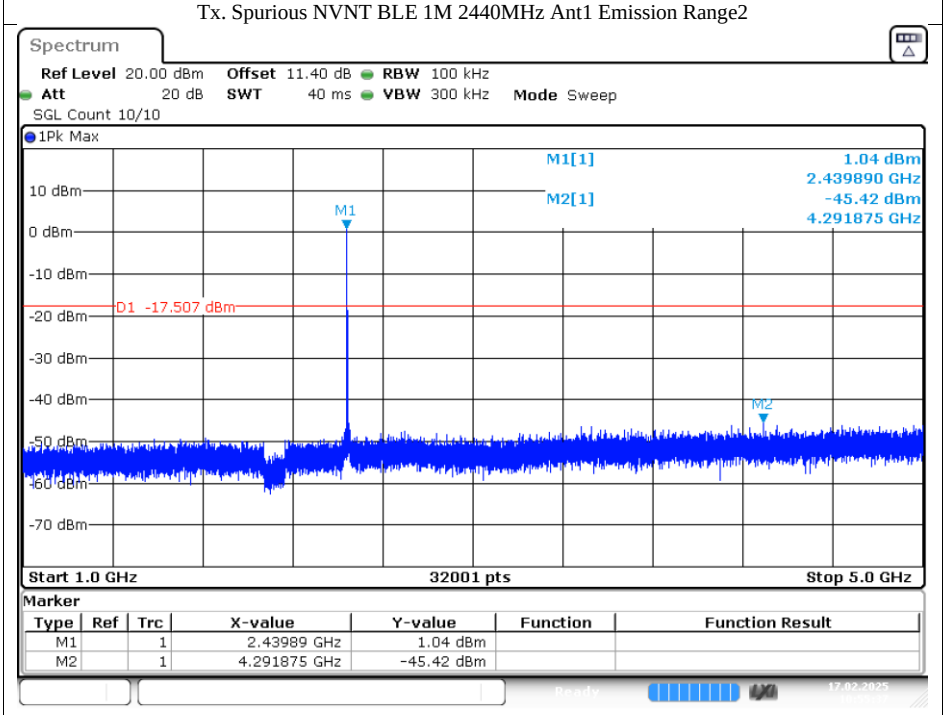
Date: 17.FEB.2025 10:55:28

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission Range1



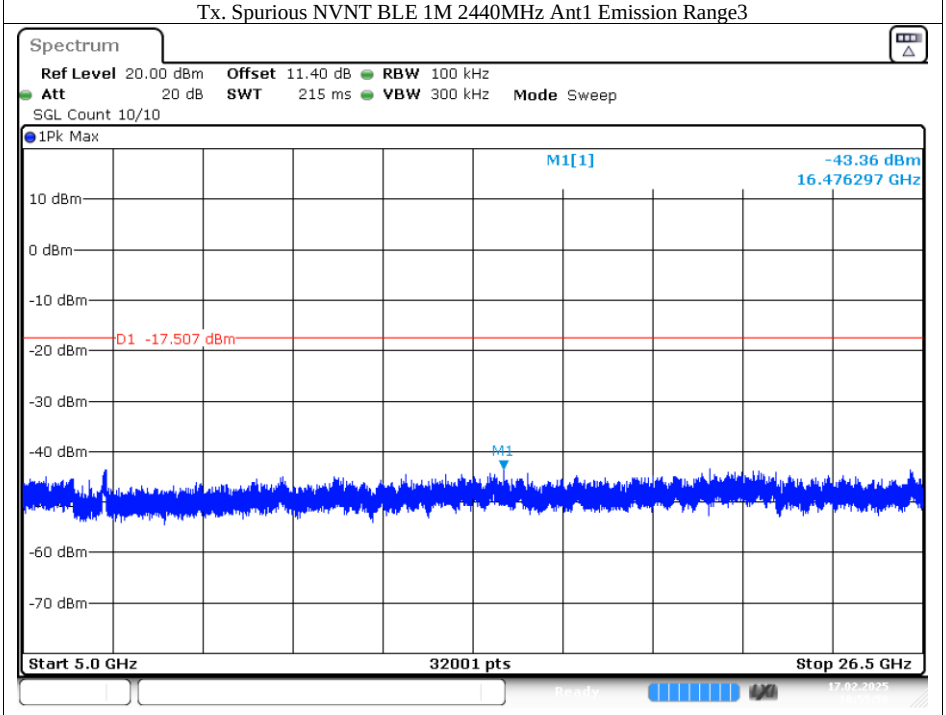
Date: 17.FEB.2025 10:55:32

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission Range2



Date: 17.FEB.2025 10:55:37

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission Range3



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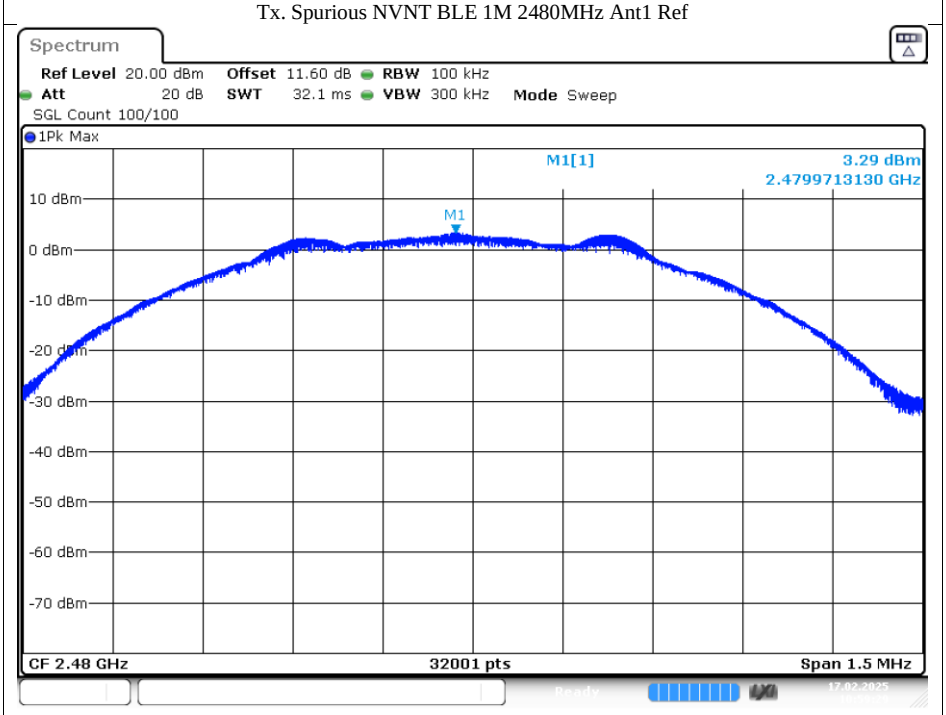
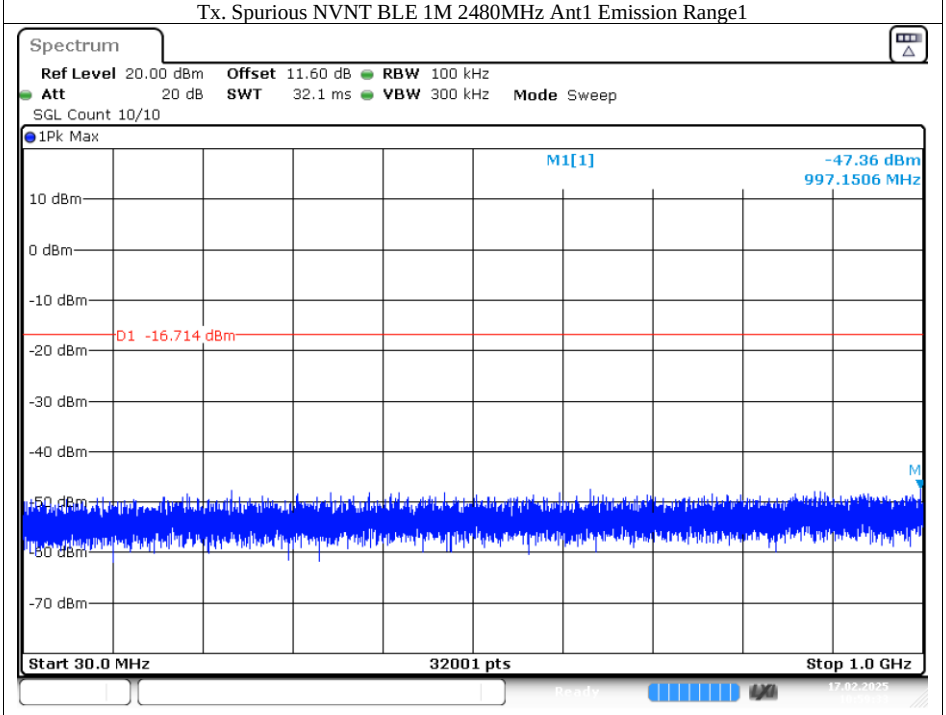
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



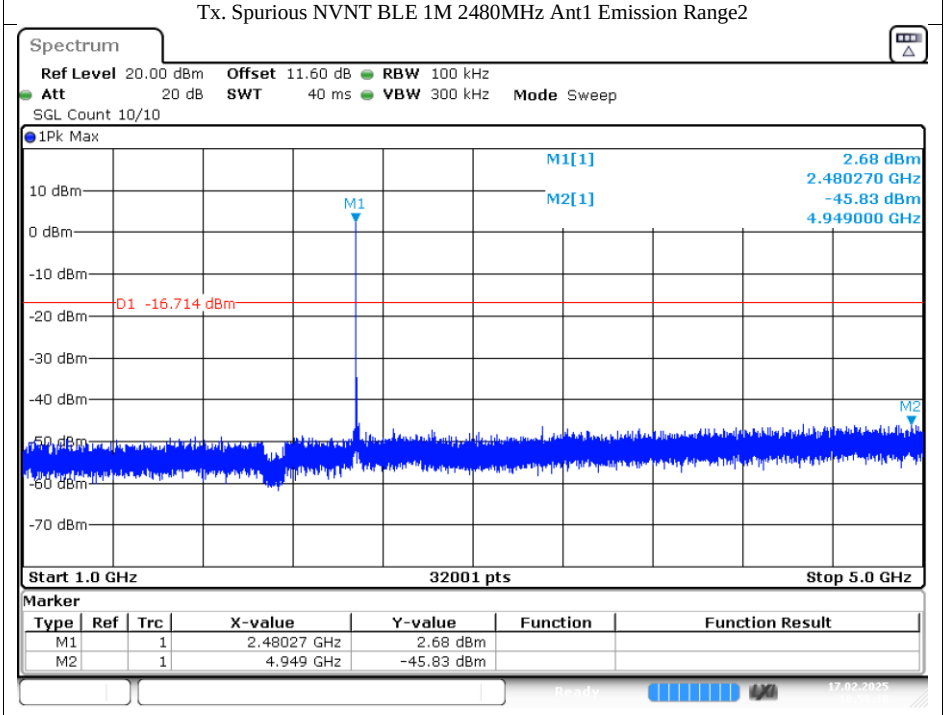
Date: 17.FEB.2025 10:59:29

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission Range1



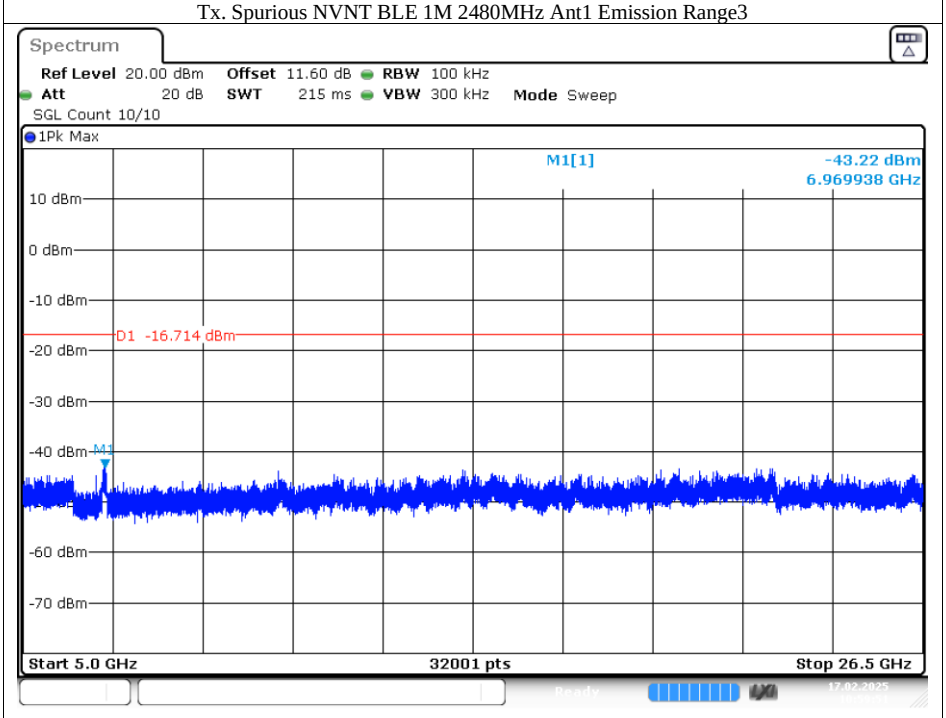
Date: 17.FEB.2025 10:59:33

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission Range2



Date: 17.FEB.2025 10:59:38

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission Range3



Date: 17.FEB.2025 10:59:51

9.6 Band edge

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold.
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section.

Limit

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

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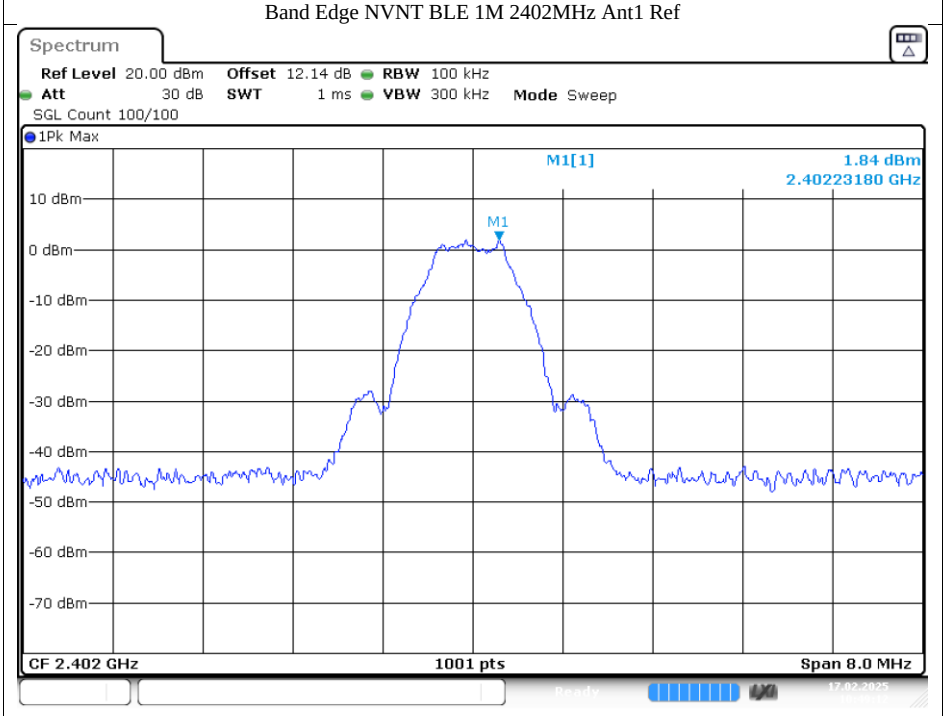
Test result

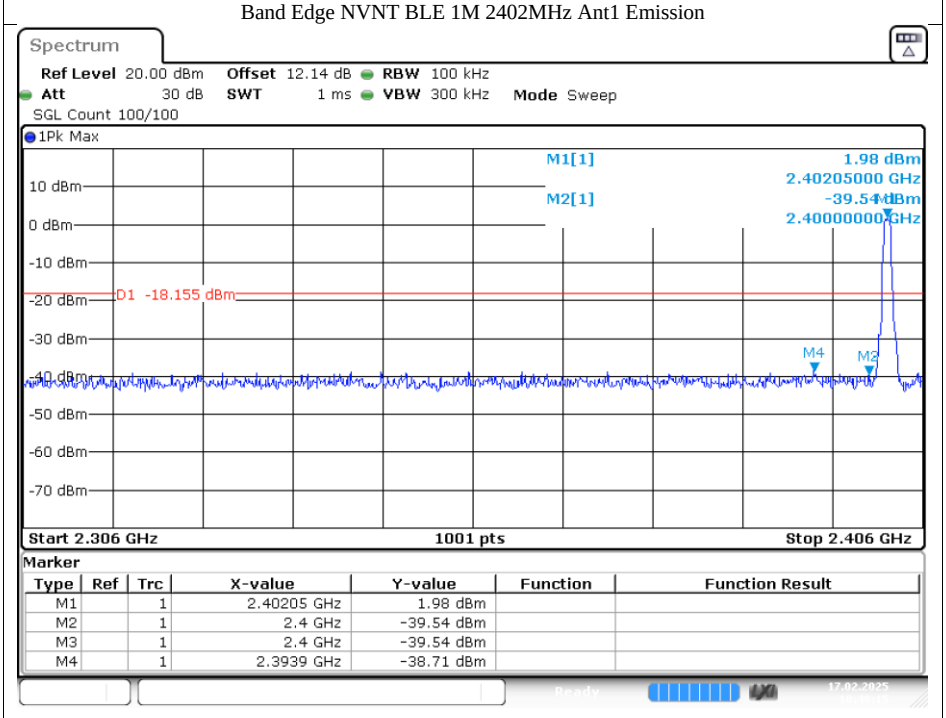
Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Date: 17.FEB.2025 10:49:12

Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40205 GHz	1.98 dBm		
M2		1	2.4 GHz	-39.54 dBm		
M3		1	2.4 GHz	-39.54 dBm		
M4		1	2.3939 GHz	-38.71 dBm		

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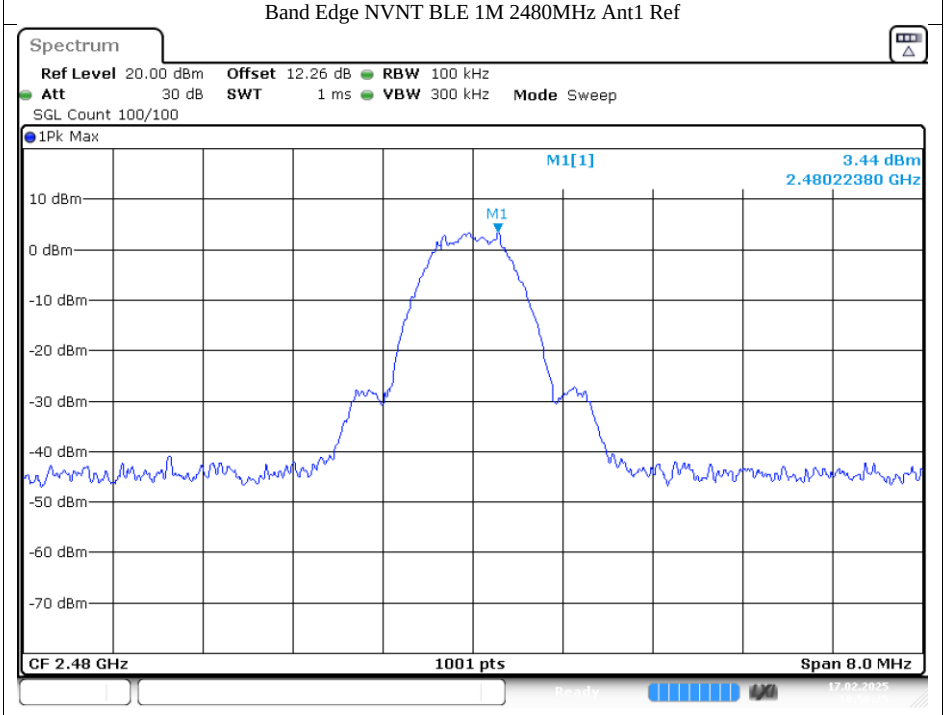
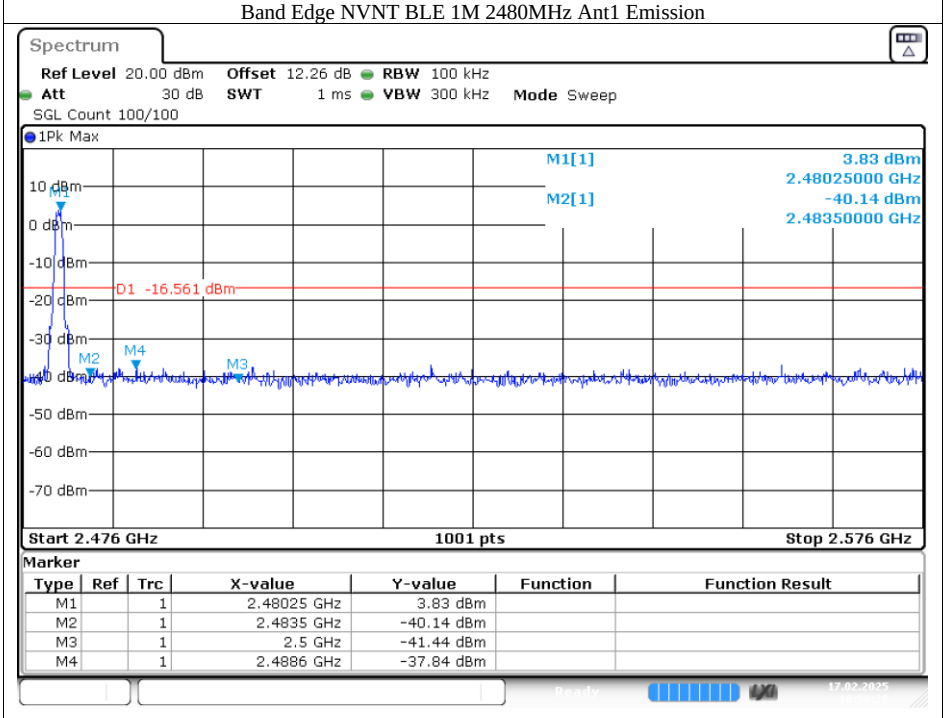
Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Date: 17.FEB.2025 10:58:25

Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48025 GHz	3.83 dBm		
M2		1	2.4835 GHz	-40.14 dBm		
M3		1	2.5 GHz	-41.44 dBm		
M4		1	2.4886 GHz	-37.84 dBm		

Date: 17.FEB.2025 10:58:28

9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz to 120 kHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1MHz.
b) VBW ≥ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

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1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section15.205 must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Measured Distance Meters
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30	30	30

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.The only worse case test result is listed in the report.

Report Number:4842025220300B

Test result:

0.009-30MHz Radiated Emission

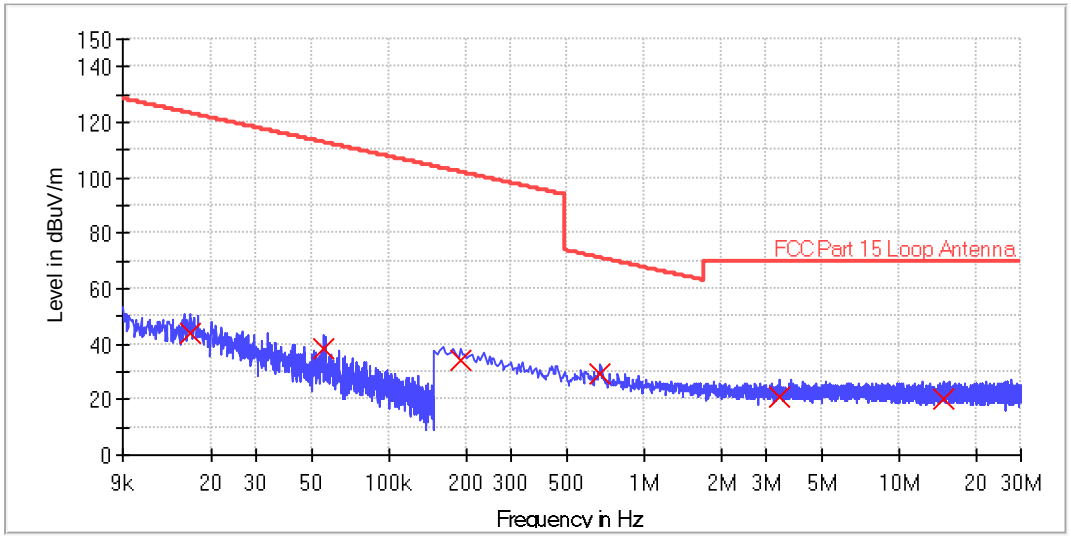
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	X
Comment:	T21.2℃, H51.7%, P100.1kPa

Scan Setup: FCC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated E Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.001 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.016440	43.7	1000.0	0.200	130.0	0.0	19.8	79.6	123.3
0.055560	38.5	1000.0	0.200	130.0	0.0	19.5	74.2	112.7
0.190000	34.4	1000.0	9.000	130.0	0.0	19.3	67.6	102.0
0.674000	29.3	1000.0	9.000	130.0	0.0	19.3	41.7	71.0
3.374000	20.7	1000.0	9.000	130.0	0.0	19.2	48.8	69.5
14.822000	20.5	1000.0	9.000	130.0	0.0	18.7	49.0	69.5

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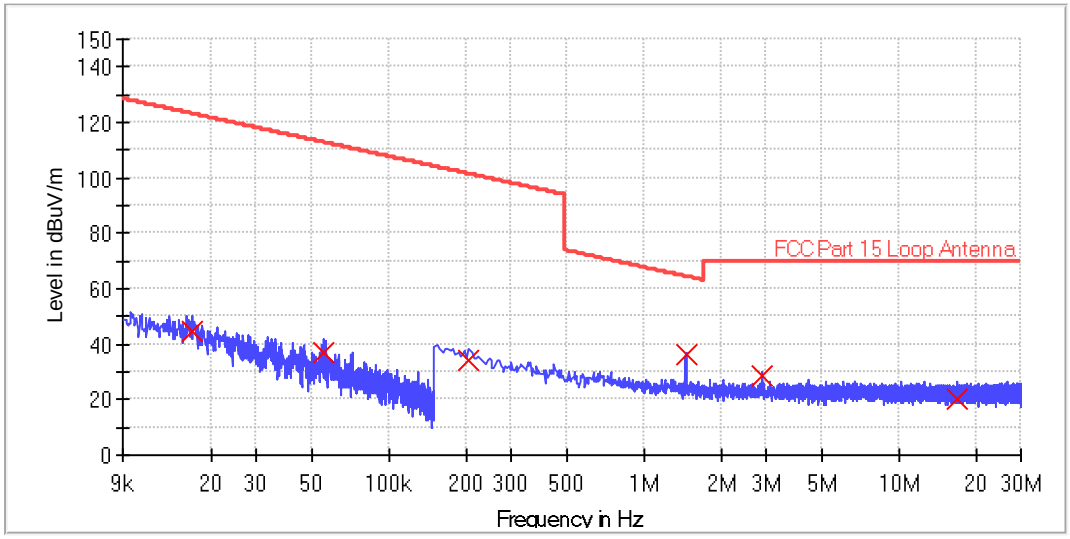
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	Y
Comment:	T21.2℃, H51.7%, P100.1kPa

Scan Setup: FCC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated E Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.001 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.016920	44.7	1000.0	0.200	130.0	0.0	19.8	78.3	123.0
0.055320	37.3	1000.0	0.200	130.0	0.0	19.5	75.5	112.7
0.206000	33.8	1000.0	9.000	130.0	0.0	19.3	67.5	101.3
1.458000	36.5	1000.0	9.000	130.0	0.0	19.3	27.9	64.4
2.914000	28.7	1000.0	9.000	130.0	0.0	19.3	40.8	69.5
16.850000	20.3	1000.0	9.000	130.0	0.0	18.7	49.2	69.5

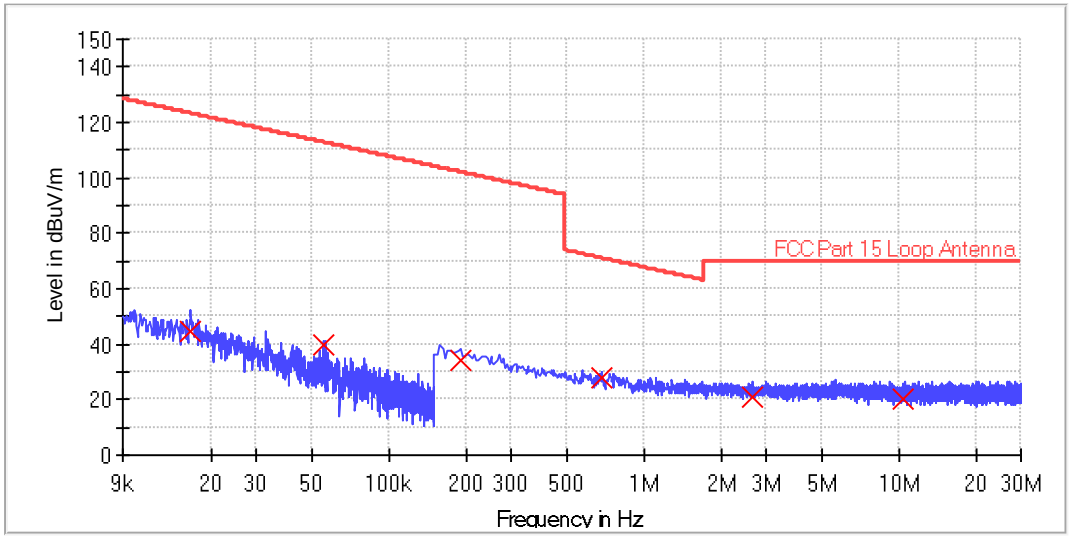
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	Z
Comment:	T21.2℃, H51.7%, P100.1kPa

Scan Setup: FCC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated E Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.001 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.016600	44.5	1000.0	0.200	130.0	0.0	19.8	78.7	123.2
0.055480	40.1	1000.0	0.200	130.0	0.0	19.5	72.7	112.7
0.190000	34.5	1000.0	9.000	130.0	0.0	19.3	67.5	102.0
0.682000	27.7	1000.0	9.000	130.0	0.0	19.3	43.2	70.9
2.642000	21.0	1000.0	9.000	130.0	0.0	19.3	48.5	69.5
10.414000	20.3	1000.0	9.000	130.0	0.0	18.8	49.2	69.5

30-1000MHz Radiated Emission Test

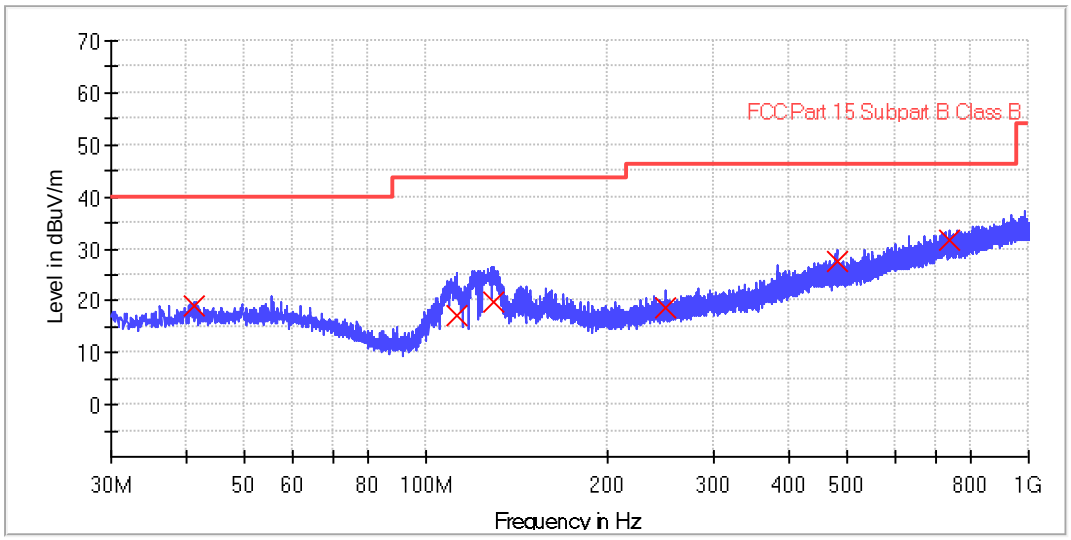
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	T21.2℃, H51.7%, P100.1kPa

Sweep Setup: RE_30M-1G_Sweep_3m [EMI radiated]

Hardware Setup:	Radiated E Field 30MHz-1GHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
41.120000	18.9	1000.0	120.000	142.7	121.0	20.4	21.1	40.0
112.160000	17.3	1000.0	120.000	182.1	180.0	18.2	26.2	43.5
129.440000	19.9	1000.0	120.000	206.6	91.0	19.9	23.6	43.5
249.320000	18.8	1000.0	120.000	358.7	288.0	20.5	27.3	46.0
479.840000	27.7	1000.0	120.000	268.7	168.0	27.4	18.4	46.0
736.640000	31.6	1000.0	120.000	256.8	62.0	32.7	14.4	46.0

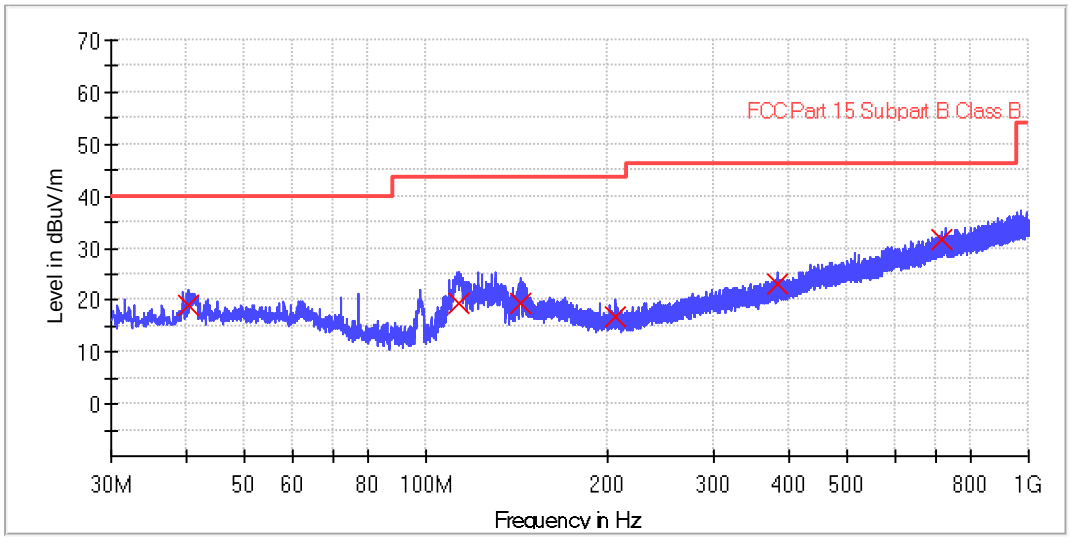
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	T21.2℃, H51.7%, P100.1kPa

Sweep Setup: RE_30M-1G_Sweep_3m [EMI radiated]

Hardware Setup:	Radiated E Field 30MHz-1GHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
40.360000	19.0	1000.0	120.000	162.7	172.0	20.3	21.0	40.0
112.920000	19.3	1000.0	120.000	227.1	37.0	18.2	24.2	43.5
143.840000	19.4	1000.0	120.000	241.1	238.0	21.1	24.1	43.5
206.480000	16.6	1000.0	120.000	251.3	114.0	18.2	26.9	43.5
383.840000	23.3	1000.0	120.000	189.0	45.0	24.9	22.7	46.0
717.640000	31.6	1000.0	120.000	240.4	69.0	32.1	14.4	46.0

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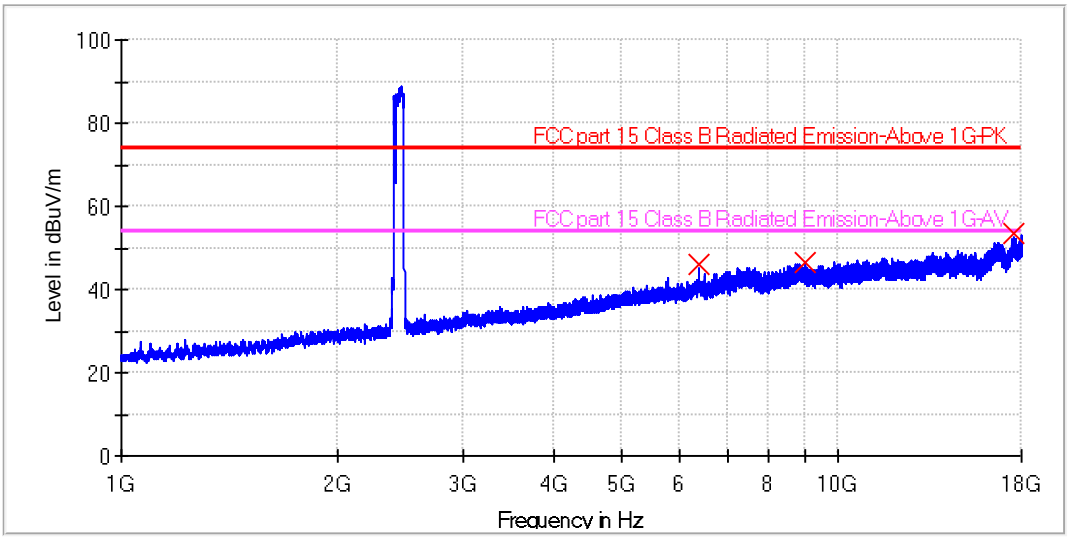
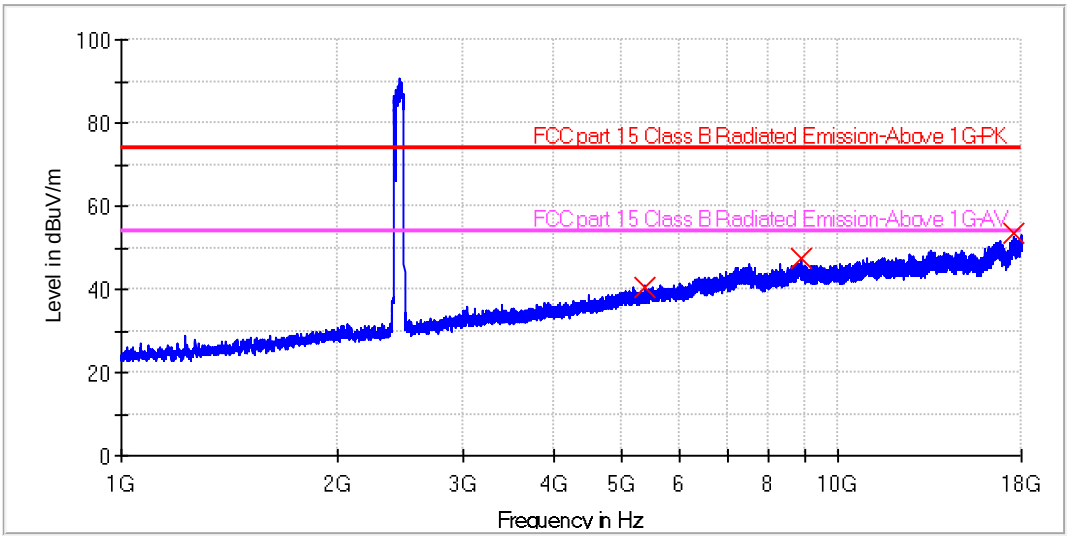
Radiated Emission 1-18 GHz

Frequency:2402MHz



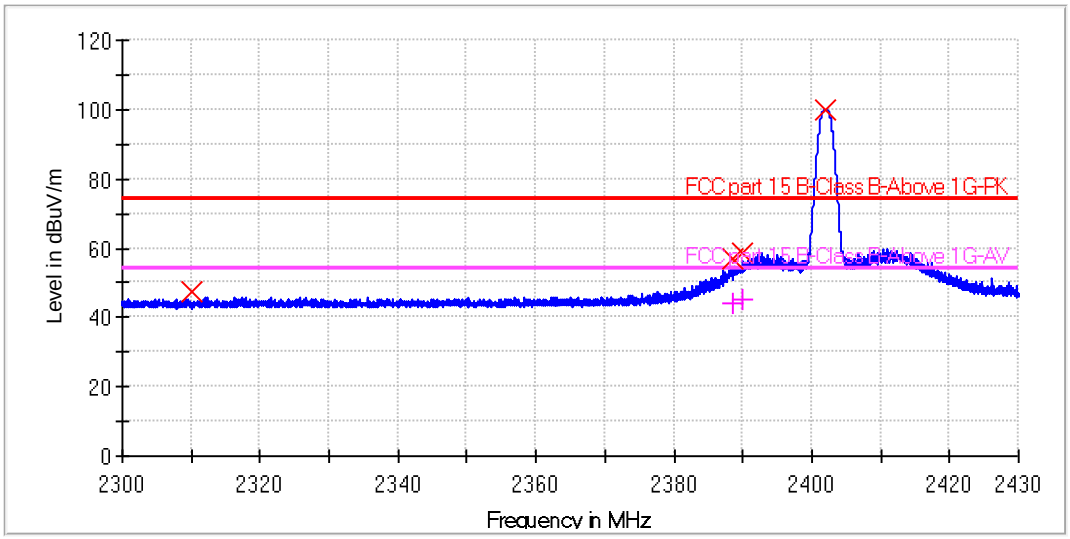
Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
6405.000000	45.8	1000.0	150.0	H	239.0	7.1	28.2	74.0
8961.500000	46.7	1000.0	150.0	H	185.0	11.8	27.3	74.0
17556.500000	53.4	1000.0	150.0	H	250.0	21.9	20.6	74.0



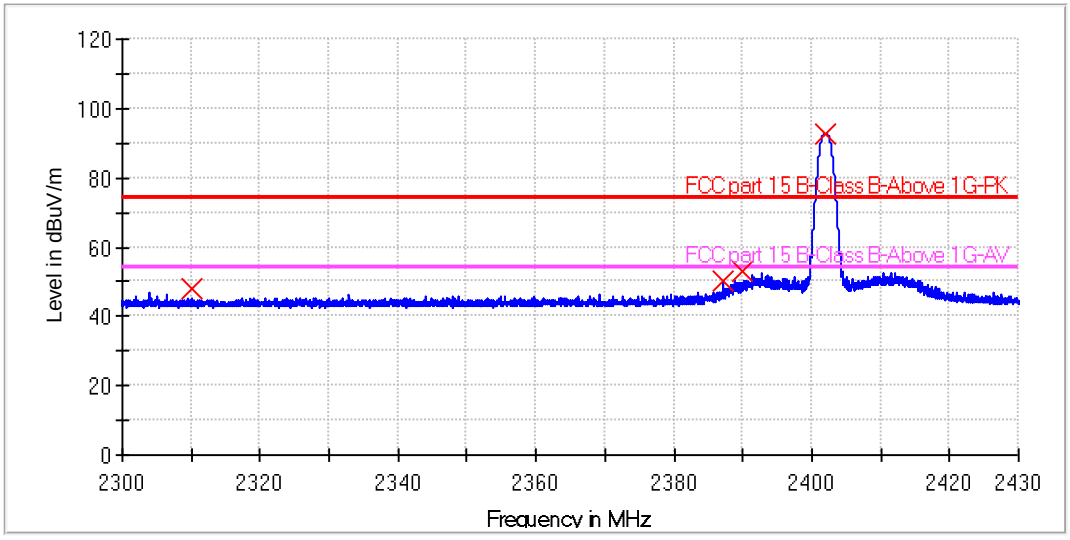
Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
5376.000000	40.4	1000.0	150.0	V	98.0	0.7	33.6	74.0
8876.500000	47.3	1000.0	150.0	V	148.0	11.9	26.8	74.0
17593.000000	53.7	1000.0	150.0	V	253.0	21.9	20.3	74.0



Limit and Margin

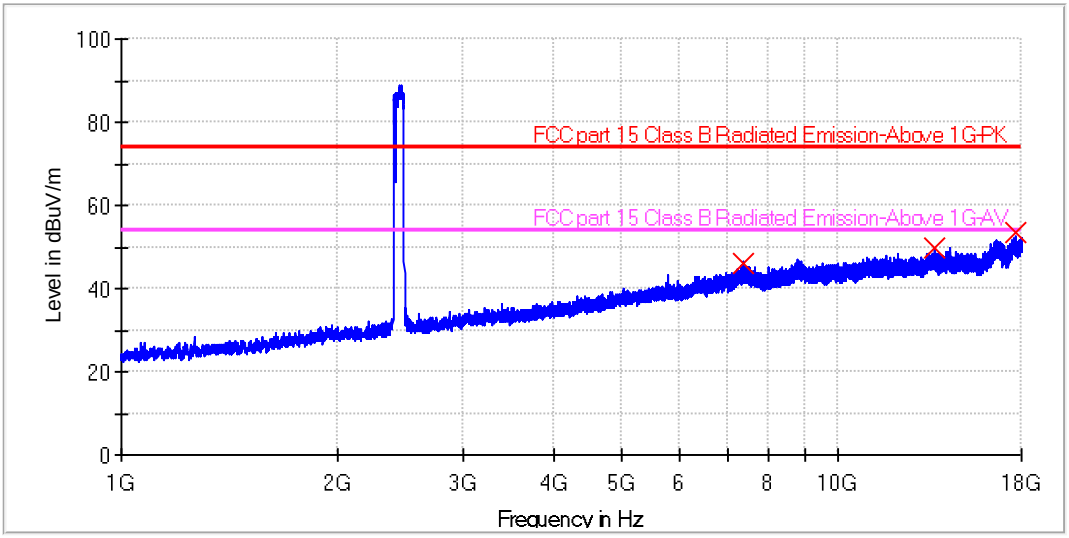
Frequency (MHz)	MaxPeak (dBuV/m)	RMS (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)
2310.000000	47.5	---	1000.0	150.0	H	162.0	34.1	26.5	74.0	---
2388.500000	57.1	44.0	1000.0	150.0	H	134.0	34.4	16.9	74.0	10.0
2390.000000	58.4	45.5	1000.0	150.0	H	254.0	34.4	15.6	74.0	8.6
2402.000000	100.1	---	1000.0	150.0	H	57.0	34.5			---



Limit and Margin

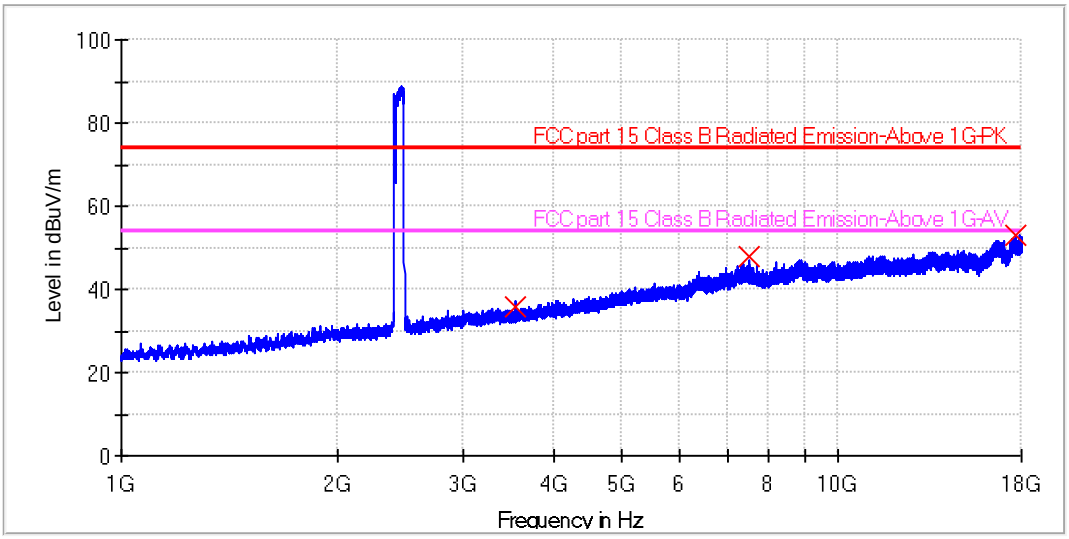
Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2310.000000	47.9	1000.0	150.0	V	218.0	34.1	26.1	74.0
2387.000000	50.5	1000.0	150.0	V	135.0	34.4	23.6	74.0
2390.000000	52.9	1000.0	150.0	V	71.0	34.4	21.1	74.0
2402.000000	92.9	1000.0	150.0	V	80.0	34.5		

Frequency:2440MHz



Limit and Margin

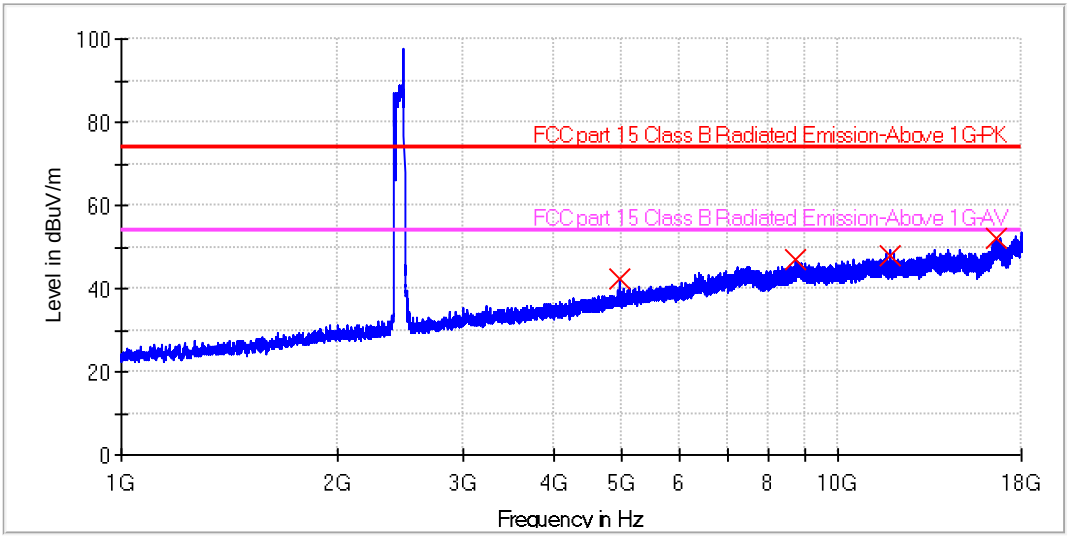
Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
7387.000000	46.0	1000.0	150.0	H	41.0	8.6	28.0	74.0
13592.000000	49.9	1000.0	150.0	H	314.0	17.1	24.1	74.0
17618.000000	53.5	1000.0	150.0	H	211.0	22.0	20.5	74.0



Limit and Margin

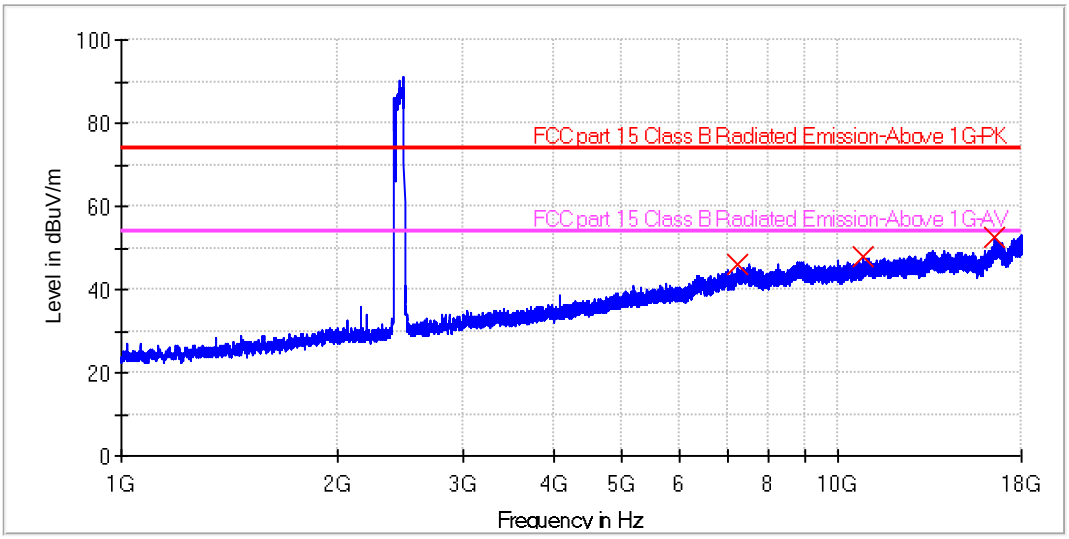
Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
3542.000000	36.0	1000.0	150.0	V	111.0	-5.2	38.0	74.0
7498.000000	47.8	1000.0	150.0	V	192.0	9.3	26.2	74.0
17705.000000	53.2	1000.0	150.0	V	129.0	22.0	20.8	74.0

Frequency:2480MHz



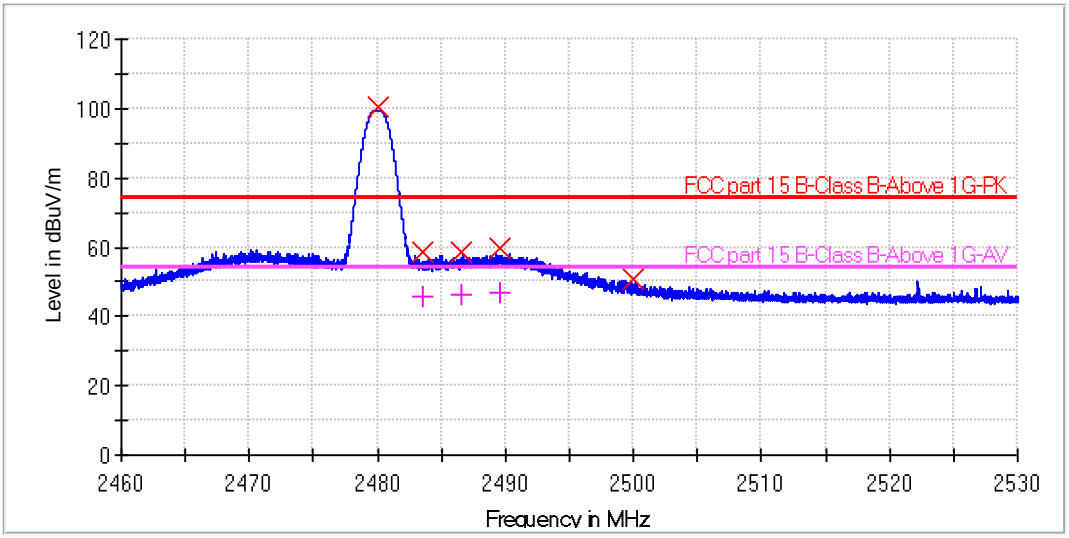
Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
4961.000000	42.4	1000.0	150.0	H	146.0	0.0	31.6	74.0
8686.000000	47.1	1000.0	150.0	H	64.0	11.2	26.9	74.0
11810.000000	47.8	1000.0	150.0	H	119.0	14.2	26.2	74.0
16627.000000	51.9	1000.0	150.0	H	162.0	19.0	22.1	74.0



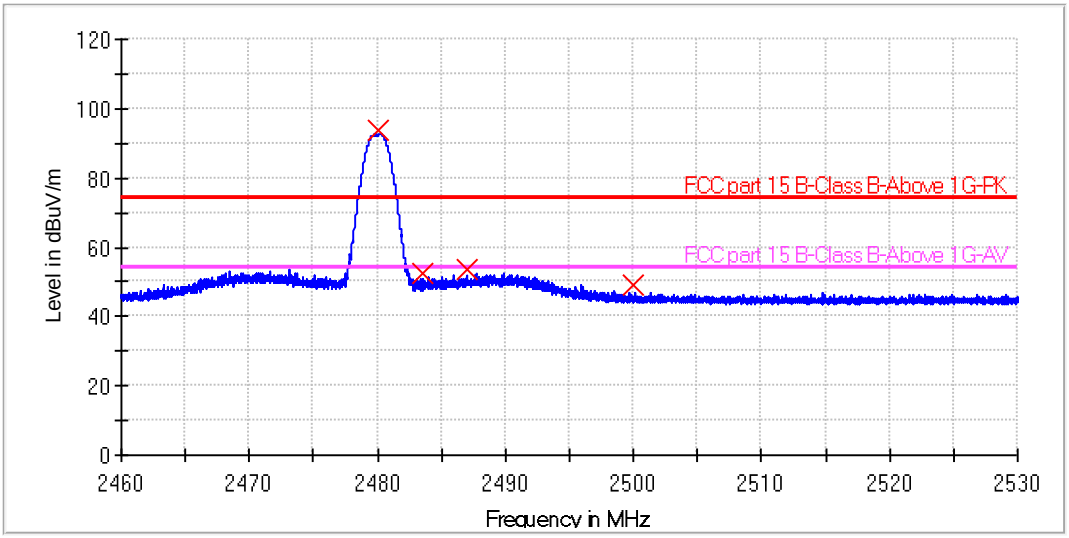
Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
7231.500000	46.1	1000.0	150.0	V	196.0	8.7	27.9	74.0
10843.000000	47.8	1000.0	150.0	V	180.0	13.3	26.2	74.0
16540.500000	52.5	1000.0	150.0	V	107.0	18.6	21.5	74.0



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	RMS (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)
2480.000000	100.5	---	1000.0	150.0	H	106.0	34.8			---
2483.500000	58.5	46.0	1000.0	150.0	H	60.0	34.8	15.5	74.0	8.0
2486.500000	58.8	46.5	1000.0	150.0	H	225.0	34.8	15.2	74.0	7.5
2489.500000	59.8	47.2	1000.0	150.0	H	65.0	34.8	14.2	74.0	6.9
2500.000000	50.8	---	1000.0	150.0	H	108.0	34.8	23.2	74.0	---



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2480.000000	93.6	1000.0	150.0	V	38.0	34.8		
2483.500000	52.7	1000.0	150.0	V	78.0	34.8	21.3	74.0
2487.000000	53.3	1000.0	150.0	V	112.0	34.8	20.7	74.0
2500.000000	49.3	1000.0	150.0	V	214.0	34.8	24.7	74.0

Worst case Radiated Emission 18-25 GHz

18-25G Radiated Emission Test

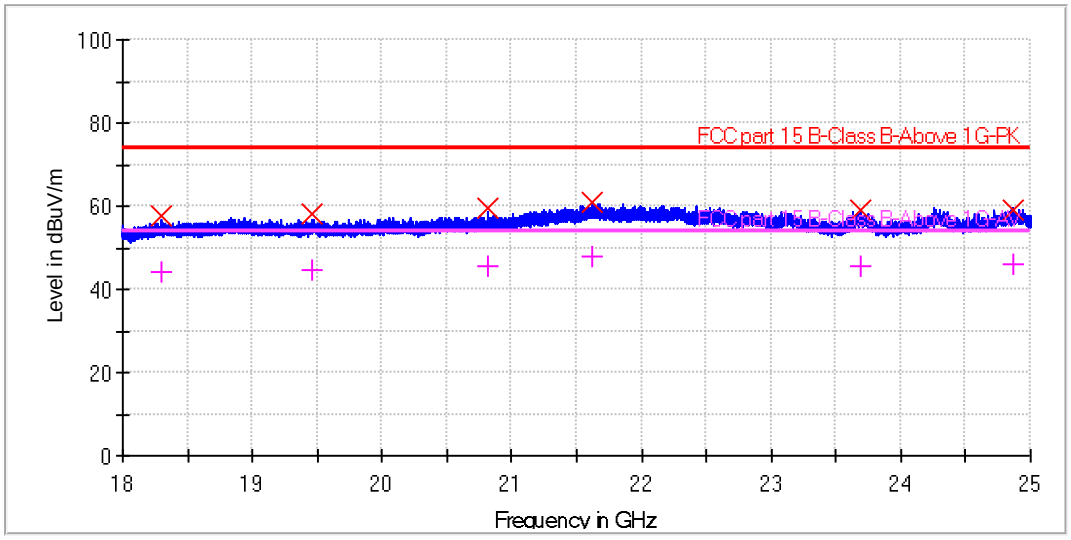
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	T21.2℃, H51.7%, P100.1kPa

Sweep Setup: FCC_RE_18-25G_Sweep_3m [EMI radiated]

Hardware Setup:	18-40GHz_3m
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
18 GHz - 25 GHz	500 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	RMS (dBuV/m)	Meas. Time (ms)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)
18300.500000	57.9	44.2	1000.0	180.8	175.0	13.7	16.1	74.0	9.8
19466.000000	58.3	44.6	1000.0	156.1	55.0	14.5	15.7	74.0	9.4
20817.000000	59.4	45.8	1000.0	292.1	182.0	15.6	14.6	74.0	8.2
21623.500000	61.1	48.0	1000.0	205.6	135.0	17.7	12.9	74.0	6.1
23692.500000	58.8	45.5	1000.0	183.3	282.0	15.8	15.2	74.0	8.5
24871.000000	58.9	46.0	1000.0	129.4	27.0	16.1	15.1	74.0	8.0

18-25G Radiated Emission Test

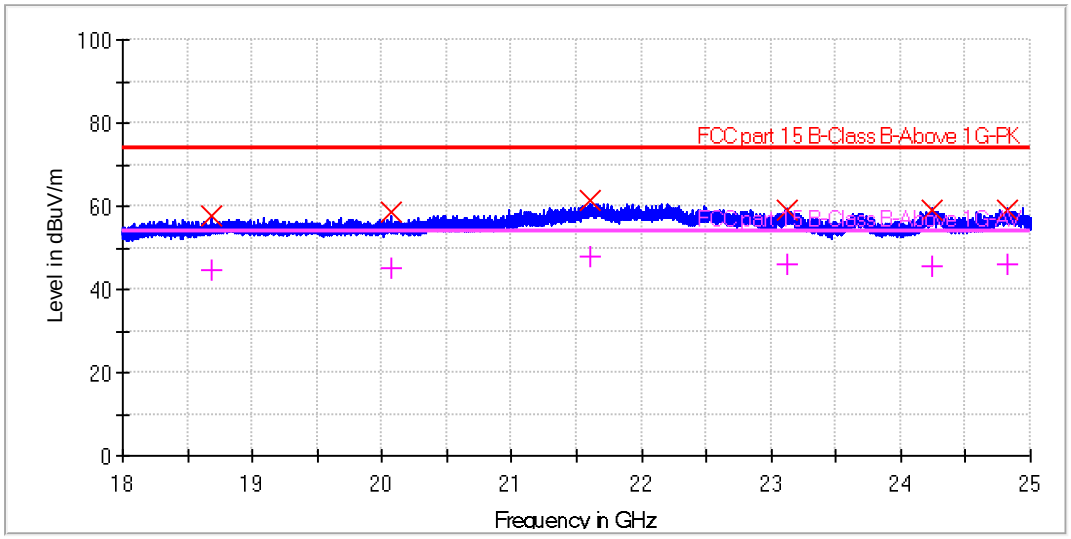
Common Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2480MHz
Operator name:	Zhihua Xia
Input:	3.3V DC
Sample No:	WUX-889391-2
Test standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	T21.2℃, H51.7%, P100.1kPa

Sweep Setup: FCC_RE_18-25G_Sweep_3m [EMI radiated]

Hardware Setup:	18-40GHz_3m
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
18 GHz - 25 GHz	500 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	RMS (dBuV/m)	Meas. Time (ms)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)
18684.500000	57.6	44.6	1000.0	160.7	38.0	14.2	16.4	74.0	9.4
20066.500000	58.6	44.9	1000.0	364.0	213.0	15.0	15.4	74.0	9.1
21609.000000	61.5	47.9	1000.0	195.6	101.0	17.7	12.5	74.0	6.1
23116.000000	59.2	46.1	1000.0	315.8	245.0	16.4	14.8	74.0	7.9
24234.500000	59.0	45.8	1000.0	105.1	120.0	16.1	15.1	74.0	8.2
24825.000000	59.2	46.2	1000.0	275.3	85.0	16.1	14.8	74.0	7.8

10 Test Equipment List

List of Test Instruments
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	487/641405	2024-04-08	2025-04-07
	Power Probe	Rohde & Schwarz	NRP-Z81	487/431819	2024-11-23	2025-11-22
	RF Test System	Rohde & Schwarz	TS8997	487/391835	2024-11-23	2025-11-22
	Coaxial Cable	Rohde & Schwarz	RF03	/	2024-07-27	2025-07-26
RE	EMI Test Receiver	Rohde & Schwarz	ESR7	487/632315	2024-04-08	2025-04-07
	EMI Test Receiver	Rohde & Schwarz	ESR7	487/632316	2024-04-08	2025-04-07
	Spectrum analyzer	Rohde & Schwarz	FSV3044	487/642307	2024-04-08	2025-04-07
	Broadband Test Antenna	Schwarzbeck	VULB 9168	487/622345	2024-03-15	2025-03-14
	Horn Antenna	Rohde & Schwarz	3115PB	487/622346	2025-01-08	2026-01-08
	Pre-amplifier	Rohde & Schwarz	SCU-18D	487/402318	2024-04-08	2025-04-07
	Pre-amplifier	Rohde & Schwarz	BLMA0118-1M	487/401411	2024-04-08	2025-04-07
	Loop antenna	Rohde & Schwarz	HFH2-Z2	487/621128	2024-11-23	2025-11-22
	DOUBLE-RIDGED WAVEGUIDE HORN WITH PRE-AMPLIFIER (18 GHZ - 40 GHZ)	ETS-Lindgren	3116C-PA	487/622347	2024-08-19	2025-08-18
	3m Semi-anechoic chamber	TDK	9.2mx6.2mx6.2m	487/772307	2023-02-24	2026-02-23
	3m Fully anechoic chamber	TDK	9.2mx6.2mx6.2m	487/772304	2023-03-30	2026-03-29
	Coaxial Cable	Rohde & Schwarz	RF02	/	2024-07-27	2025-07-26
CE	EMI Test Receiver	Rohde & Schwarz	ESW8	487/631911	2024-04-08	2025-04-07
	LISN	Rohde & Schwarz	NSLK8127	487/601428	2024-09-02	2025-09-01

Measurement Software Information			
Test Item	Software	Manufacturer	Version
C	MTS 8310	MAXWELL	2.0.0.0
RE	EMC 32	Rohde & Schwarz	V10.50.40
CE	EMC 32	Rohde & Schwarz	V9.15.03

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, 3.07dB
Radiated Disturbance	9kHz to 30MHz, 2.83dB 30MHz to 1GHz, 4.12dB (Horizontal) 4.30dB (Vertical) 1GHz to 18GHz, 5.04dB 18GHz to 40GHz, 5.42dB
RF Conducted Measurement	Power related： 1.32dB Frequency related：5.6x10-6 or 1%

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3.

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12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.

13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

----------End of Test Report----------

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