Radio Test Report

Report No.:STS2511269W02

Issued for

NINGBO YIHAO BLINDS CO.,LTD

601 1# BUILDING NO.1958 JIANGNAN ROAD HI-TECH PARK NINGBO CHINA

Product Name:	BLINDS CONTROLLER
Brand Name:	N/A
Model Name:	YH002-A
Series Model(s):	YH001, YH002, YH002-BLE, YH002-ZB, YH002-RF, YH002-B, YH002-C, YH002-D
FCC ID:	2BTFZ-YH002-A
Test Standards:	FCC Part15.247

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

TEST REPORT

Applicant's Name.....: NINGBO YIHAO BLINDS CO.,LTD

Address .....: 601 1# BUILDING NO.1958 JIANGNAN ROAD HI-TECH PARK NINGBO CHINA

Manufacturer's Name .....: NINGBO YIHAO BLINDS CO.,LTD

Address .....: NO.237-3 JIUSHUFANG ROAD LUOTUO INDUSTRIAL ZONE NINGBO CITY ZHEJIANG PROVINCE CHINA

Product Description

Product Name.....: BLINDS CONTROLLER

Brand Name .....: N/A

Model Name .....: YH002-A

Series Model(s) .....: YH001, YH002, YH002-BLE, YH002-ZB, YH002-RF, YH002-B, YH002-C, YH002-D

Standards .....: FCC Part15.247

Test Procedure .....: ANSI C63.10-2020

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

Date of Test .....:

Date of receipt of test item .....: 28 Nov. 2025

Date (s) of performance of tests .....: 28 Nov. 2025~10 Dec. 2025

Date of Issue.....: 10 Dec. 2025

Test Result.....: **Pass**

Testing Engineer : Aaron Bu

(Aaron Bu)

Technical Manager : Skylar. Li

(Skylar Li)

Authorized Signatory : Bovey Yang

(Bovey Yang)

SHENZHEN STS TEST SERVICES CO., LTD. TESTING APPROVAL

Table of Contents Page

1. SUMMARY OF TEST RESULTS 6
1.1 TEST FACTORY 7
1.2 MEASUREMENT UNCERTAINTY 7
2. GENERAL INFORMATION 8
2.1 GENERAL DESCRIPTION OF THE EUT 8
2.2 DESCRIPTION OF THE TEST MODES 9
2.3 TEST SOFTWARE AND POWER LEVEL 9
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 10
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS 11
2.6 EQUIPMENTS LIST 12
3. EMC EMISSION TEST 13
3.1 CONDUCTED EMISSION MEASUREMENT 13
3.2 TEST PROCEDURE 14
3.3 TEST SETUP 14
3.4 EUT OPERATING CONDITIONS 14
3.5 TEST RESULTS 15
4. RADIATED EMISSION MEASUREMENT 17
4.1 RADIATED EMISSION LIMITS 17
4.2 TEST PROCEDURE 19
4.3 TEST SETUP 20
4.4 EUT OPERATING CONDITIONS 20
4.5 FIELD STRENGTH CALCULATION 21
4.6 TEST RESULTS 22
5. CONDUCTED SPURIOUS & BAND EDGE EMISSION 29
5.1 LIMIT 29
5.2 TEST PROCEDURE 29
5.3 TEST SETUP 29
5.4 EUT OPERATION CONDITIONS 29
5.5 TEST RESULTS 29
6. POWER SPECTRAL DENSITY TEST 30
6.1 LIMIT 30
6.2 TEST PROCEDURE 30
6.3 TEST SETUP 30

Table of Contents Page

6.4 EUT OPERATION CONDITIONS 30
6.5 TEST RESULTS 30
7. BANDWIDTH TEST 31
7.1 LIMIT 31
7.2 TEST PROCEDURE 31
7.3 TEST SETUP 31
7.4 EUT OPERATION CONDITIONS 31
7.5 TEST RESULTS 31
8. PEAK OUTPUT POWER TEST 32
8.1 LIMIT 32
8.2 TEST PROCEDURE 32
8.3 TEST SETUP 33
8.4 EUT OPERATION CONDITIONS 33
8.5 TEST RESULTS 33
9. ANTENNA REQUIREMENT 34
9.1 STANDARD REQUIREMENT 34
9.2 EUT ANTENNA 34
APPENDIX 1-TEST DATA 35
DUTY CYCLE 35
MAXIMUM PEAK CONDUCTED OUTPUT POWER 38
-6DB BANDWIDTH 41
MAXIMUM POWER SPECTRAL DENSITY LEVEL 44
BAND EDGE 47
CONDUCTED RF SPURIOUS EMISSION 50
APPENDIX 2- EUT TEST PHOTO 54

Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	10 Dec. 2025	STS2511269W02	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part 15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247 (a)(2)	6dB Bandwidth	PASS	--
15.247 (b)(3)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247 (d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e)	Power Spectral Density	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/ Part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

Note:

(1) 'N/A' denotes test is not applicable in this Test Report.

(2) All tests are according to ANSI C63.10-2020.

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

No.	Item	Uncertainty
1	RF output power, conducted	±0.751dB
2	Unwanted Emissions, conducted	±2.888dB
3	All emissions, radiated 9K-30MHz	±2.48dB
4	All emissions, radiated 30M-1GHz	±2.52dB
5	All emissions, radiated 1G-18GHz	±3.48dB
6	All emissions, radiated>18GHz	±4.18dB
7	Conducted Emission (9KHz-150KHz)	±2.48dB
8	Conducted Emission (150KHz-30MHz)	±2.52dB
9	Occupied Channel Bandwidth	±3.6%
10	Power Spectral Density, conducted	±1.214dB
11	Duty Cycle	±3.2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	BLINDS CONTROLLER
Brand Name	N/A
Model Name	YH002-A
Series Model(s)	YH001, YH002, YH002-BLE, YH002-ZB, YH002-RF, YH002-B, YH002-C, YH002-D
Model Difference	Only difference in model name.
Product Description	The EUT is a BLINDS CONTROLLER Operation Frequency: 2402~2480 MHz Modulation Type: GFSK Radio Technology: BLE Bluetooth Configuration: LE(Support 1M PHY) Number Of Channel: 40 Antenna Type: PCB Antenna Gain (dBi) 2.54
Channel List	Please refer to the Note 3.
Power Rating	Input: DC 12.6V 1.2A
Adapter	Model: BSG025W-US1261000A Input: AC 100-240V 0.6A 50/60Hz Output: DC 12.6V 1.2A
Battery	N/A
Hardware version number	N/A
Software version number	N/A
Connecting I/O Port(s)	Please refer to the Note 1.

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2. The antenna details in this report are based on the manufacturer provided antenna specification documents and apply only to the tested sample identified herein.
   Any discrepancies in the antenna information may affect the accuracy of the test results, and the customer assumes responsibility for any related issues.

3.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequenc y (MHz)
00	2402	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	19	2440	29	2460	39	2480

2.2 DESCRIPTION OF THE TEST MODES

For conducted test items and radiated spurious emissions
Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

Worst Mode	Description	Data/Modulation
Mode 1	TX CH00(2402MHz)	1 Mbps/GFSK
Mode 2	TX CH19(2440MHz)	1 Mbps/GFSK
Mode 3	TX CH39(2480MHz)	1 Mbps/GFSK

Note:

(1) We tested for all available U.S. voltage and frequencies (For 120V, 50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/ 60Hz is shown in the report.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 4 : Keeping BT TX

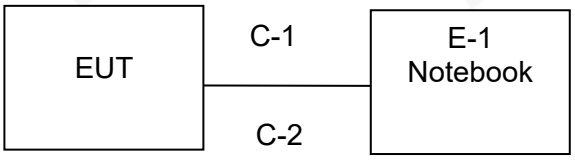
2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

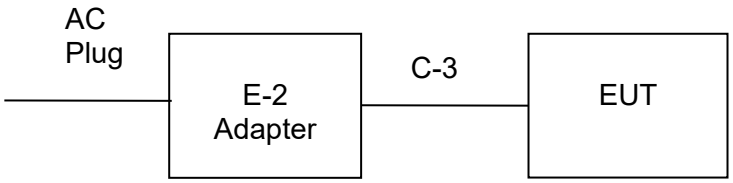
RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
BLE	BLE	GFSK	2.54	Default	RTLBTAPP

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

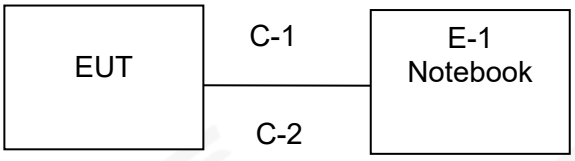
Radiated Spurious Emission Test



AC Conducted Emission Test



RF Conducted Test



2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	Notebook	DELL	Inspiron 3501	N/A
E-2	Adapter	N/A	BSG025W-US1261000A	N/A
C-1	Serial port board	XES	WTYZK	N/A
C-2	USB Cable	MI	RYEW3A	N/A
C-3	USB Cable	ZTC	NB-A515A	N/A

Item	Equipment	Mfr/Brand	Length	Note
C-2	Shielded	NO	150cm	N/A
C-3	Shielded	NO	100cm	N/A

Note:

(1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

(2) “YES” is means “with core”; “NO” is means “without core”.

2.6 EQUIPMENTS LIST

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Pre-Amplifier(0.1M -3GHz)	EM	EM330	060665	2025.02.22	2026.02.21
Pre-Amplifier(1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2025.09.25	2026.09.24
Pre-Amplifier(18G-40GHz)	SKET	LNPA_1840-50	SK2018101801	2025.02.22	2026.02.21
Active loop Antenna	ZHINAN	ZN30900C	16035	2025.02.25	2027.02.24
Bilog Antenna	TESEQ	CBL6111D	34678	2025.09.27	2027.09.26
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2025.09.27	2027.09.26
Horn Antenna	A-INFOMW	LB-180400-KF	J211020657	2025.09.27	2027.09.26
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2025.09.26	2026.09.25
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	SC100_1	60531	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC power supply	HONGSHENGFENG	DPS-305AF	17064939	2025.09.22	2026.09.21
Test SW	EZ-EMC	Ver.STSLAB-03A1 RE			
Conduction Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2025.09.25	2026.09.24
Limiter	CYBERTEK	EM5010	N/A	2025.09.25	2026.09.24
LISN	R&S	ENV216	101242	2025.09.25	2026.09.24
LISN	EMCO	3810/2NM	23625	2025.09.25	2026.09.24
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Test SW	EZ-EMC	Ver.STSLAB-03A1 CE			
RF Connected Test					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY51510623	2025.02.22	2026.02.21
Power detector group	Keysight	NW2021031	N/A	2025.09.23	2026.09.22
Switch control box	MW	MW100-RFCB	N/A	N/A	N/A
Temperature& Humidity test chamber	Safety test	AG80L	171200018	2025.02.22	2026.02.21
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Test SW	MW	MTS 8310_2.0.0.0			

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

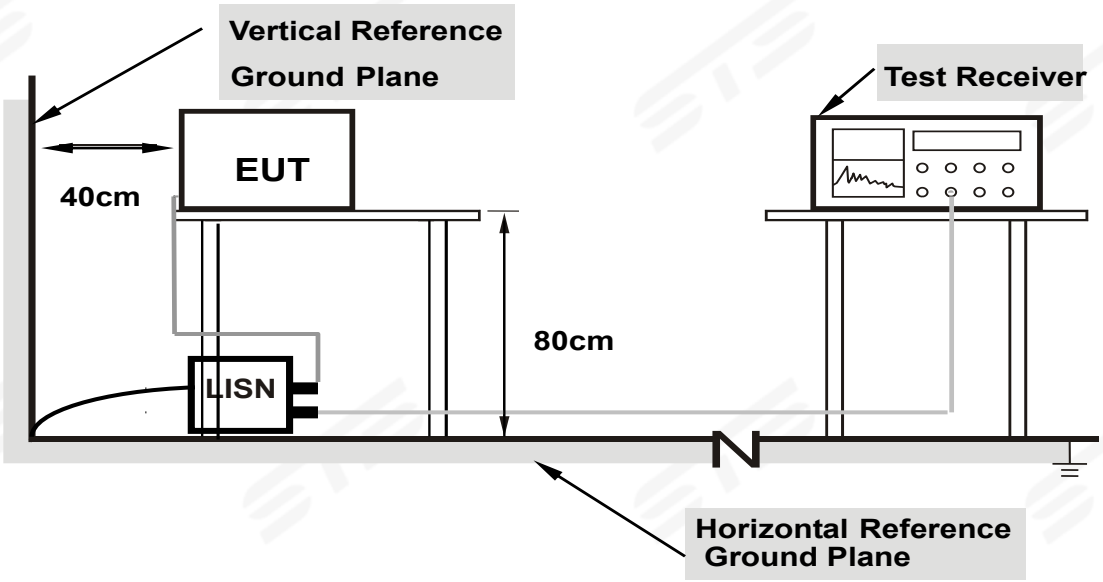
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.2 TEST PROCEDURE

a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.4 EUT OPERATING CONDITIONS

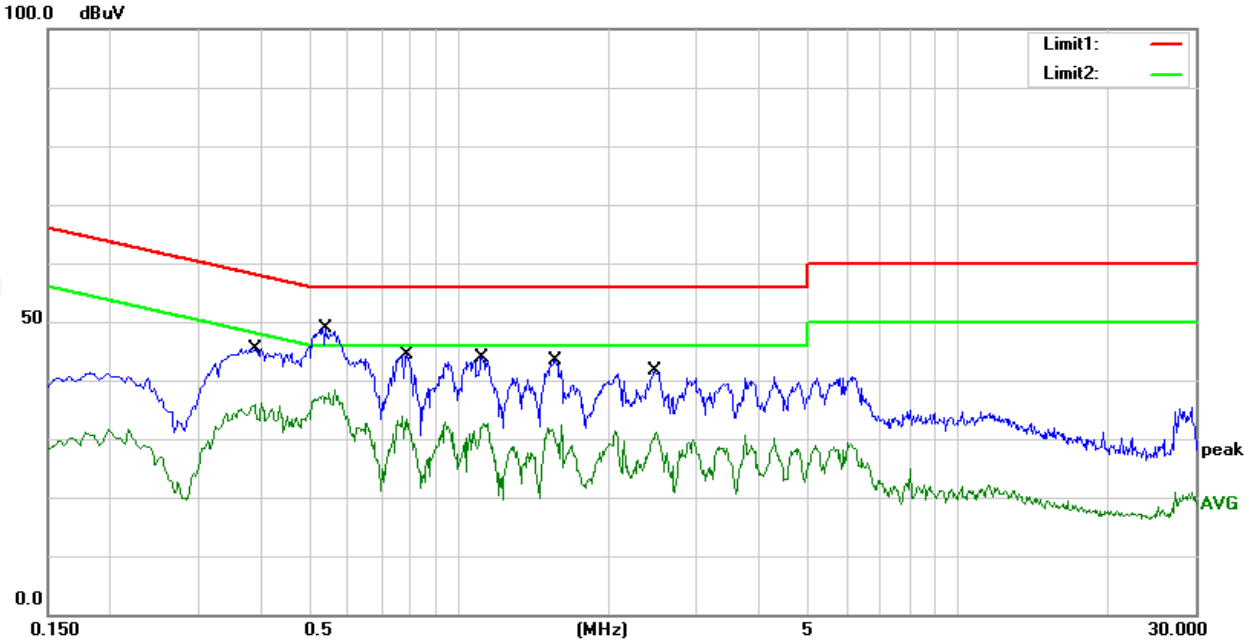
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.5 TEST RESULTS

Temperature:	25.1℃	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.3900	26.01	19.38	45.39	58.06	-12.67	QP
2	0.3900	16.65	19.38	36.03	48.06	-12.03	AVG
3	0.5420	29.46	19.39	48.85	56.00	-7.15	QP
4	0.5420	18.96	19.39	38.35	46.00	-7.65	AVG
5	0.7860	25.10	19.36	44.46	56.00	-11.54	QP
6	0.7860	14.40	19.36	33.76	46.00	-12.24	AVG
7	1.1140	24.48	19.35	43.83	56.00	-12.17	QP
8	1.1140	13.55	19.35	32.90	46.00	-13.10	AVG
9	1.5660	24.10	19.35	43.45	56.00	-12.55	QP
10	1.5660	13.13	19.35	32.48	46.00	-13.52	AVG
11	2.4620	22.26	19.37	41.63	56.00	-14.37	QP
12	2.4620	11.99	19.37	31.36	46.00	-14.64	AVG

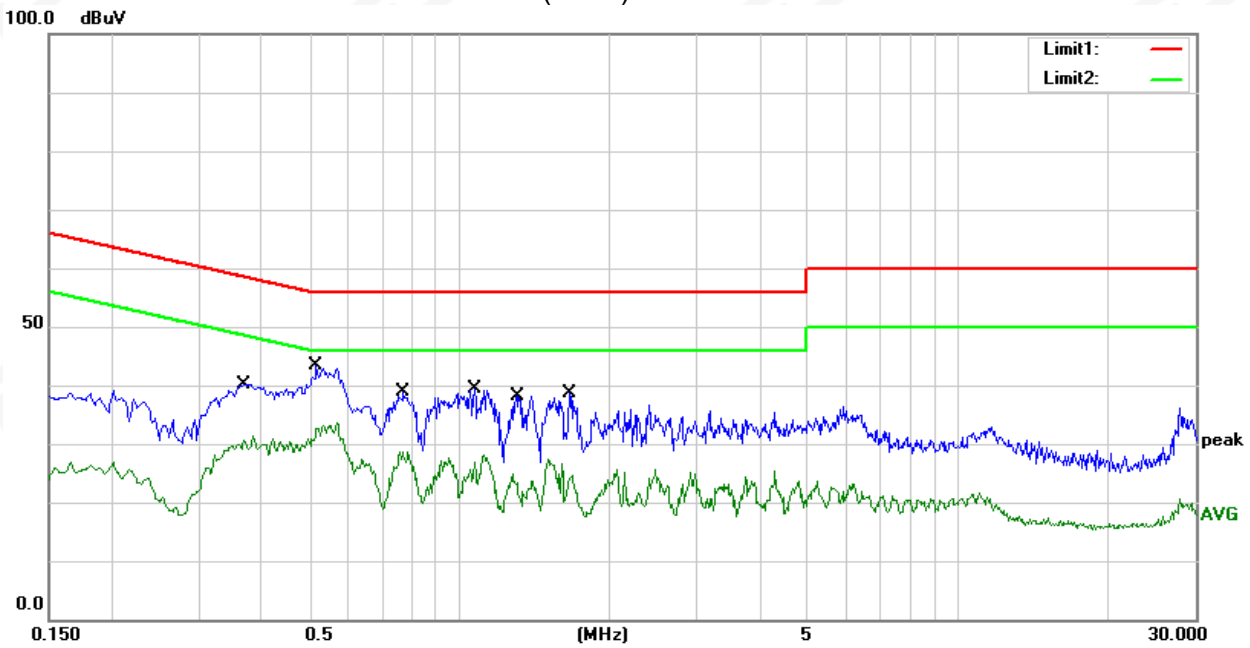
Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



Temperature:	25.1℃	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.3700	20.73	19.36	40.09	58.50	-18.41	QP
2	0.3700	11.89	19.36	31.25	48.50	-17.25	AVG
3	0.5180	24.13	19.35	43.48	56.00	-12.52	QP
4	0.5180	14.17	19.35	33.52	46.00	-12.48	AVG
5	0.7740	19.42	19.41	38.83	56.00	-17.17	QP
6	0.7740	9.17	19.41	28.58	46.00	-17.42	AVG
7	1.0740	19.93	19.39	39.32	56.00	-16.68	QP
8	1.0740	8.75	19.39	28.14	46.00	-17.86	AVG
9	1.3060	18.74	19.39	38.13	56.00	-17.87	QP
10	1.3060	7.95	19.39	27.34	46.00	-18.66	AVG
11	1.6700	19.33	19.38	38.71	56.00	-17.29	QP
12	1.6700	7.33	19.38	26.71	46.00	-19.29	AVG

Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2020 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (Frequency Range 9kHz-1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AV
Start Frequency	9 KHz/150KHz(Peak/QP/AV)
Stop Frequency	150KHz/30MHz(Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

For Restricted band

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz Upper Band Edge: 2475 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

Receiver Parameter	Setting
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2 TEST PROCEDURE

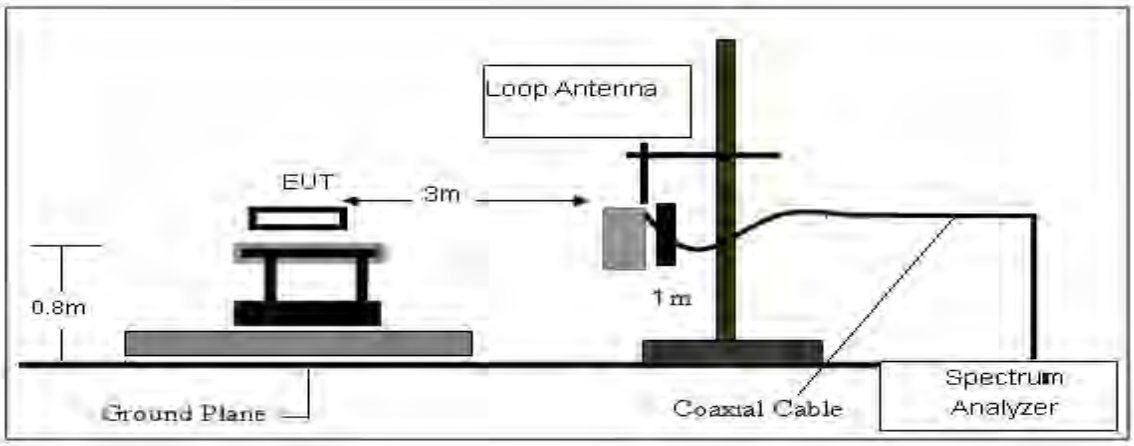
a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and QuasiPeak detector mode will be re-measured.
e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

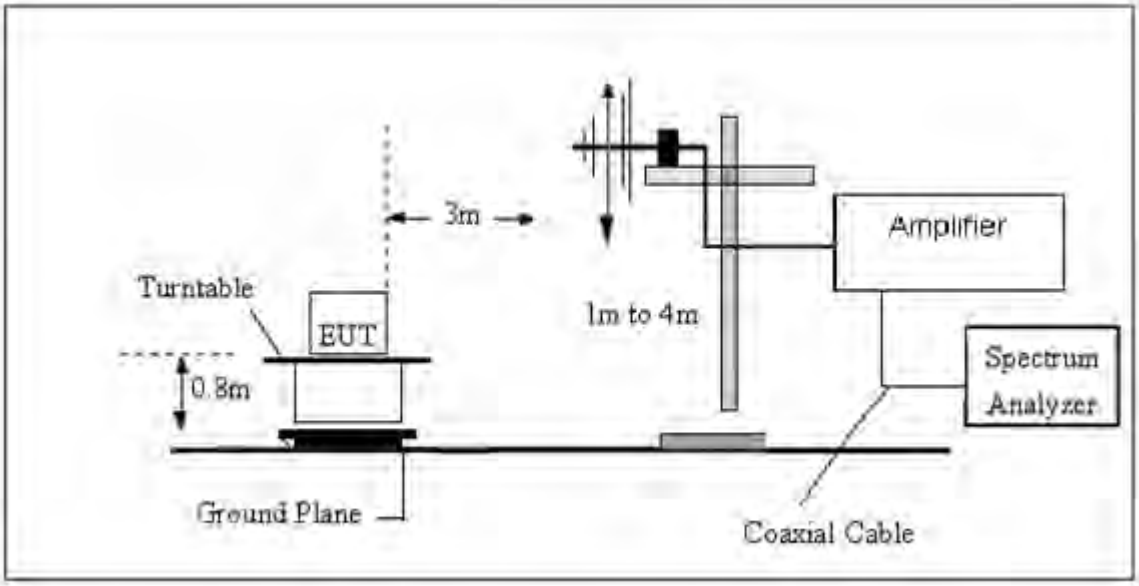
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

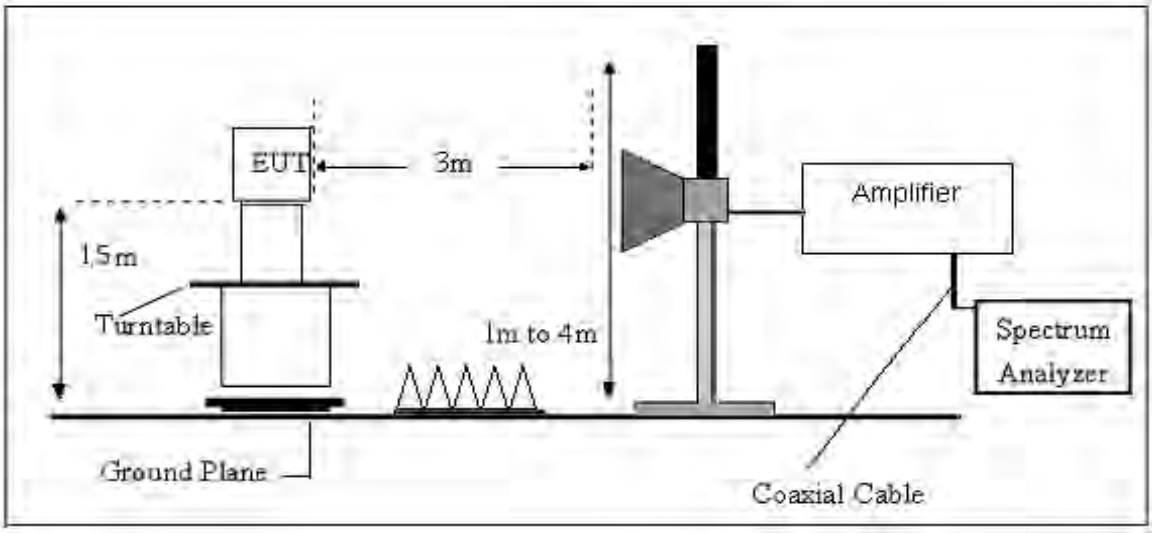
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



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



4.4 EUT OPERATING CONDITIONS

Please refer to section 3.4 of this report.

4.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG

4.6 TEST RESULTS

(Between 9KHz – 30 MHz)

Temperature:	23.4℃	Relative Humidtity:	60%
Test Voltage:	AC120V/60Hz	Polarization:	--
Test Mode:	TX Mode		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

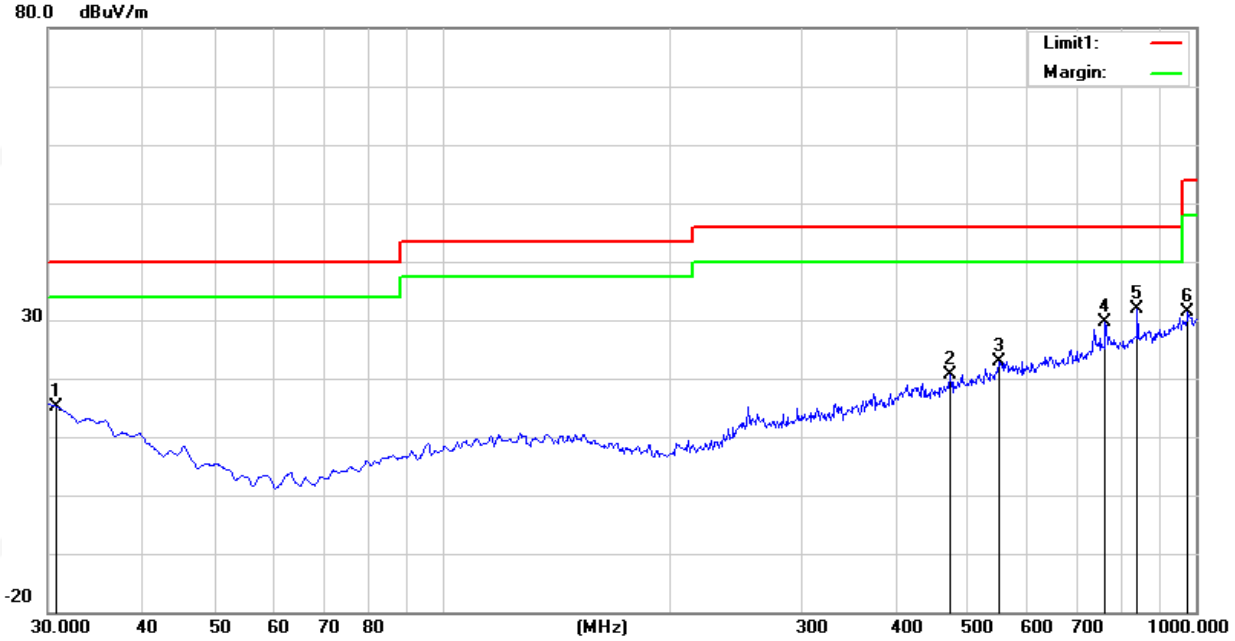
Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

(30MHz -1000MHz)

Temperature:	23.4℃	Relative Humidity:	60%
Test Voltage:	AC120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3 (Mode 3 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.7455	28.44	-13.24	15.20	40.00	-24.80	peak
2	473.2900	29.60	-8.89	20.71	46.00	-25.29	peak
3	547.9800	28.94	-5.99	22.95	46.00	-23.05	peak
4	760.4100	31.76	-2.18	29.58	46.00	-16.42	peak
5	837.0400	32.34	-0.46	31.88	46.00	-14.12	peak
6	976.7200	28.86	2.45	31.31	54.00	-22.69	peak

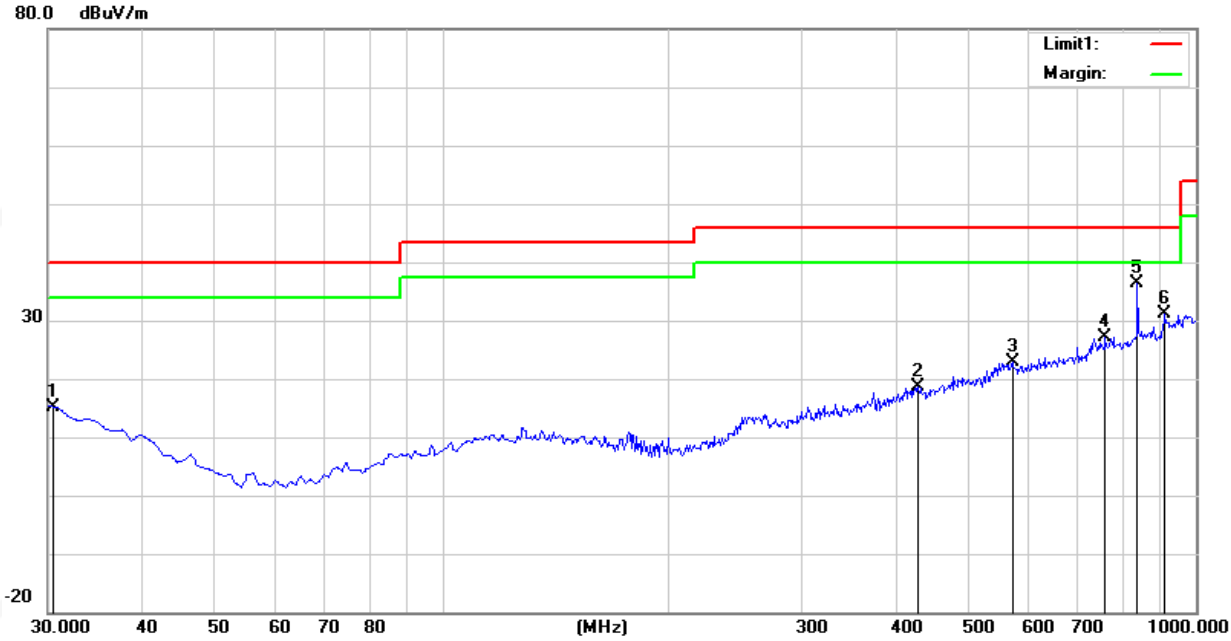
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All modes have been tested,only show the worst case.



Temperature:	23.4℃	Relative Humidtity:	60%
Test Voltage:	AC120V/60Hz	Phase:	Vertical
Test Mode:	Mode 1/2/3 (Mode 3 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.5306	28.32	-13.12	15.20	40.00	-24.80	peak
2	428.6700	28.84	-10.14	18.70	46.00	-27.30	peak
3	572.2300	28.60	-5.63	22.97	46.00	-23.03	peak
4	758.4700	29.24	-2.17	27.07	46.00	-18.93	peak
5	837.0400	36.72	-0.46	36.26	46.00	-9.74	peak
6	910.7600	31.39	-0.17	31.22	46.00	-14.78	peak

Remark:
1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All modes have been tested,only show the worst case.



(1GHz-25GHz) Spurious emission Requirements

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Low Channel (GFSK/2402 MHz)										
3264.87	60.84	44.70	6.70	28.20	-9.80	51.04	74.00	-22.96	PK	Vertical
3264.87	51.36	44.70	6.70	28.20	-9.80	41.56	54.00	-12.44	AV	Vertical
3264.80	62.06	44.70	6.70	28.20	-9.80	52.26	74.00	-21.74	PK	Horizontal
3264.80	50.41	44.70	6.70	28.20	-9.80	40.61	54.00	-13.39	AV	Horizontal
4804.47	58.82	44.20	9.04	31.60	-3.56	55.26	74.00	-18.74	PK	Vertical
4804.47	49.30	44.20	9.04	31.60	-3.56	45.74	54.00	-8.26	AV	Vertical
4804.53	58.49	44.20	9.04	31.60	-3.56	54.93	74.00	-19.07	PK	Horizontal
4804.53	50.58	44.20	9.04	31.60	-3.56	47.02	54.00	-6.98	AV	Horizontal
5359.84	48.55	44.20	9.86	32.00	-2.34	46.21	74.00	-27.79	PK	Vertical
5359.84	40.42	44.20	9.86	32.00	-2.34	38.08	54.00	-15.92	AV	Vertical
5359.81	47.65	44.20	9.86	32.00	-2.34	45.31	74.00	-28.69	PK	Horizontal
5359.81	38.78	44.20	9.86	32.00	-2.34	36.44	54.00	-17.56	AV	Horizontal
7205.96	53.59	43.50	11.40	35.50	3.40	56.99	74.00	-17.01	PK	Vertical
7205.96	44.46	43.50	11.40	35.50	3.40	47.86	54.00	-6.14	AV	Vertical
7205.66	54.97	43.50	11.40	35.50	3.40	58.37	74.00	-15.63	PK	Horizontal
7205.66	44.65	43.50	11.40	35.50	3.40	48.05	54.00	-5.95	AV	Horizontal
Middle Channel (GFSK/2440 MHz)										
3263.08	61.86	44.70	6.70	28.20	-9.80	52.06	74.00	-21.94	PK	Vertical
3263.08	50.19	44.70	6.70	28.20	-9.80	40.39	54.00	-13.61	AV	Vertical
3263.05	62.04	44.70	6.70	28.20	-9.80	52.24	74.00	-21.76	PK	Horizontal
3263.05	51.25	44.70	6.70	28.20	-9.80	41.45	54.00	-12.55	AV	Horizontal
4880.05	59.46	44.20	9.04	31.60	-3.56	55.90	74.00	-18.10	PK	Vertical
4880.05	50.02	44.20	9.04	31.60	-3.56	46.46	54.00	-7.54	AV	Vertical
4880.20	58.18	44.20	9.04	31.60	-3.56	54.62	74.00	-19.38	PK	Horizontal
4880.20	49.65	44.20	9.04	31.60	-3.56	46.09	54.00	-7.91	AV	Horizontal
5357.10	48.69	44.20	9.86	32.00	-2.34	46.35	74.00	-27.65	PK	Vertical
5357.10	39.21	44.20	9.86	32.00	-2.34	36.87	54.00	-17.13	AV	Vertical
5357.39	48.09	44.20	9.86	32.00	-2.34	45.75	74.00	-28.25	PK	Horizontal
5357.01	38.69	44.20	9.86	32.00	-2.34	36.35	54.00	-17.65	AV	Horizontal
7320.85	53.98	43.50	11.40	35.50	3.40	57.38	74.00	-16.62	PK	Vertical
7320.85	44.71	43.50	11.40	35.50	3.40	48.11	54.00	-5.89	AV	Vertical
7320.55	54.36	43.50	11.40	35.50	3.40	57.76	74.00	-16.24	PK	Horizontal
7320.55	44.89	43.50	11.40	35.50	3.40	48.29	54.00	-5.71	AV	Horizontal

High Channel (GFSK/2480 MHz)										
3264.86	61.30	44.70	6.70	28.20	-9.80	51.50	74.00	-22.50	PK	Vertical
3264.86	51.05	44.70	6.70	28.20	-9.80	41.25	54.00	-12.75	AV	Vertical
3264.74	61.39	44.70	6.70	28.20	-9.80	51.59	74.00	-22.41	PK	Horizontal
3264.74	50.66	44.70	6.70	28.20	-9.80	40.86	54.00	-13.14	AV	Horizontal
4960.44	59.01	44.20	9.04	31.60	-3.56	55.45	74.00	-18.55	PK	Vertical
4960.44	49.65	44.20	9.04	31.60	-3.56	46.09	54.00	-7.91	AV	Vertical
4960.49	58.76	44.20	9.04	31.60	-3.56	55.20	74.00	-18.80	PK	Horizontal
4960.49	49.43	44.20	9.04	31.60	-3.56	45.87	54.00	-8.13	AV	Horizontal
5359.77	47.97	44.20	9.86	32.00	-2.34	45.63	74.00	-28.37	PK	Vertical
5359.77	39.11	44.20	9.86	32.00	-2.34	36.77	54.00	-17.23	AV	Vertical
5359.60	47.34	44.20	9.86	32.00	-2.34	45.00	74.00	-29.00	PK	Horizontal
5359.60	38.30	44.20	9.86	32.00	-2.34	35.96	54.00	-18.04	AV	Horizontal
7439.73	54.06	43.50	11.40	35.50	3.40	57.46	74.00	-16.54	PK	Vertical
7439.73	44.18	43.50	11.40	35.50	3.40	47.58	54.00	-6.42	AV	Vertical
7439.87	54.71	43.50	11.40	35.50	3.40	58.11	74.00	-15.89	PK	Horizontal
7439.87	44.10	43.50	11.40	35.50	3.40	47.50	54.00	-6.50	AV	Horizontal

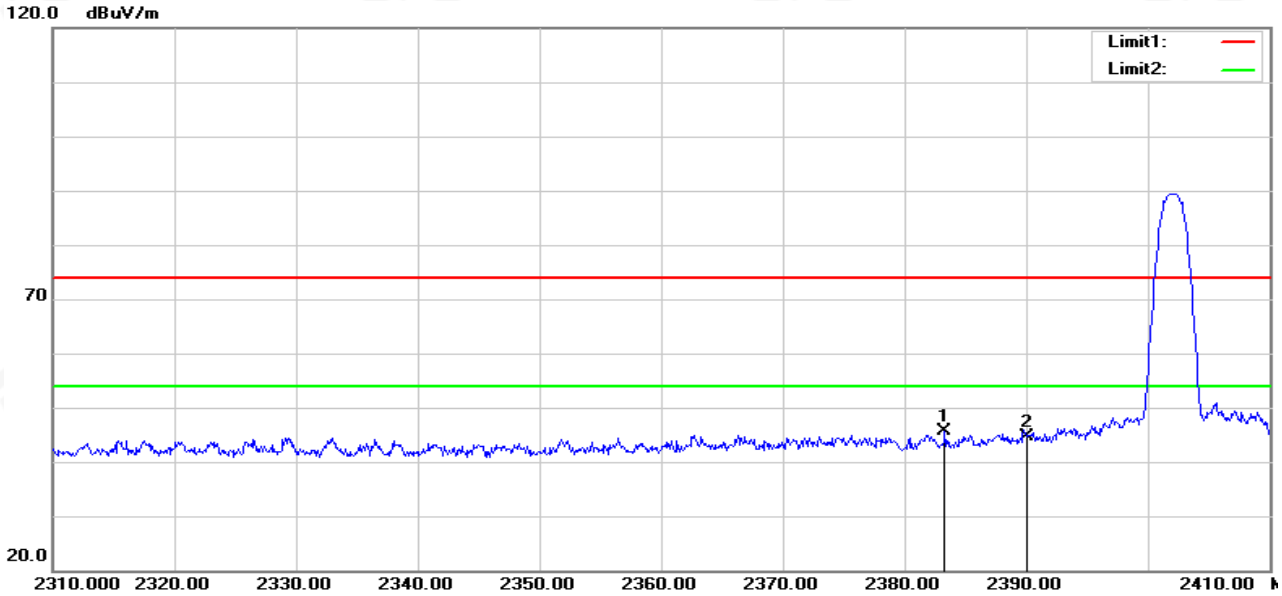
Note:

1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
2) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

4.6 TEST RESULTS (Restricted Bands Requirements)

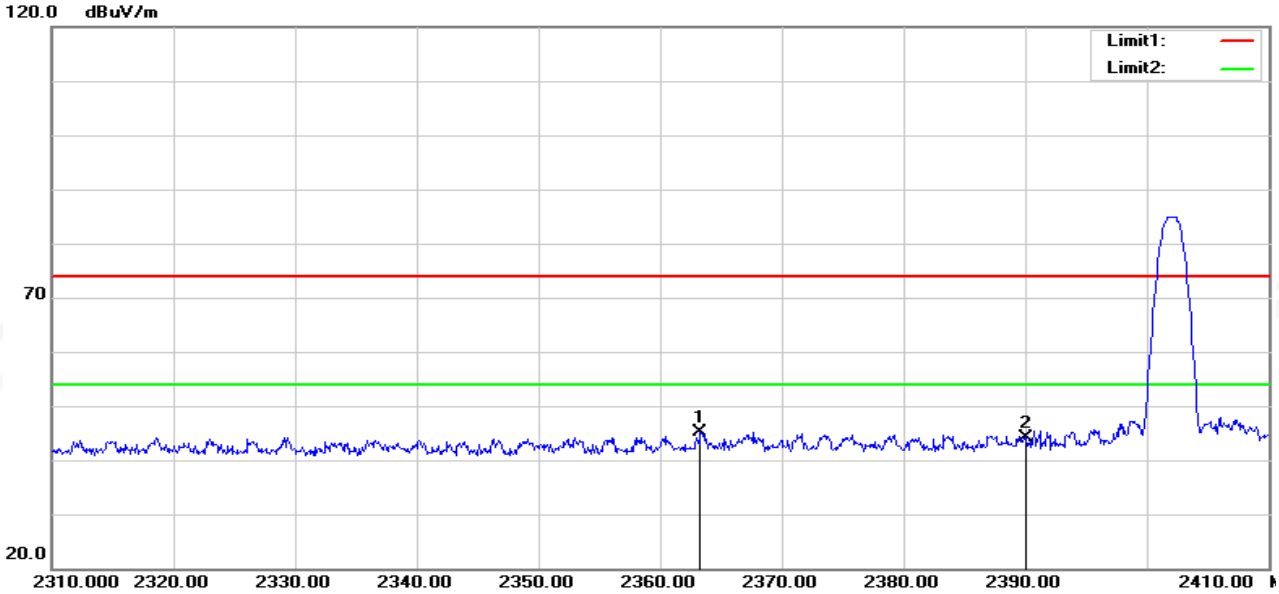
GFSK-Low

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2383.300	41.38	4.24	45.62	54.00	-8.38	peak
2	2390.000	40.39	4.34	44.73	54.00	-9.27	peak

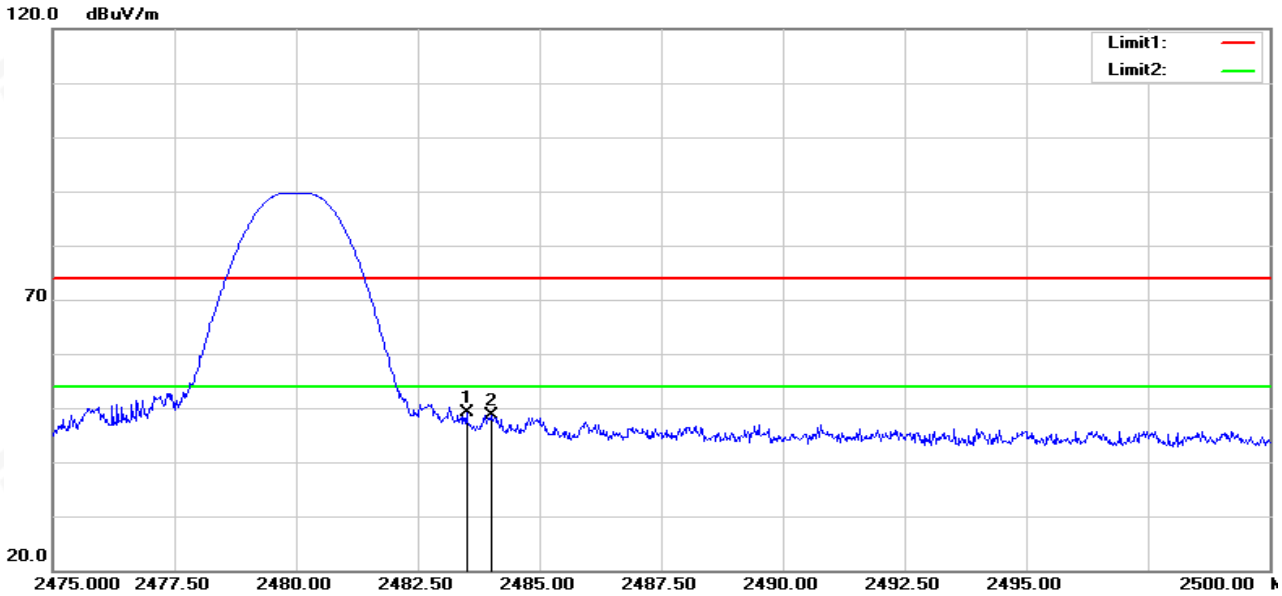
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2363.300	41.30	3.94	45.24	54.00	-8.76	peak
2	2390.000	39.91	4.34	44.25	54.00	-9.75	peak

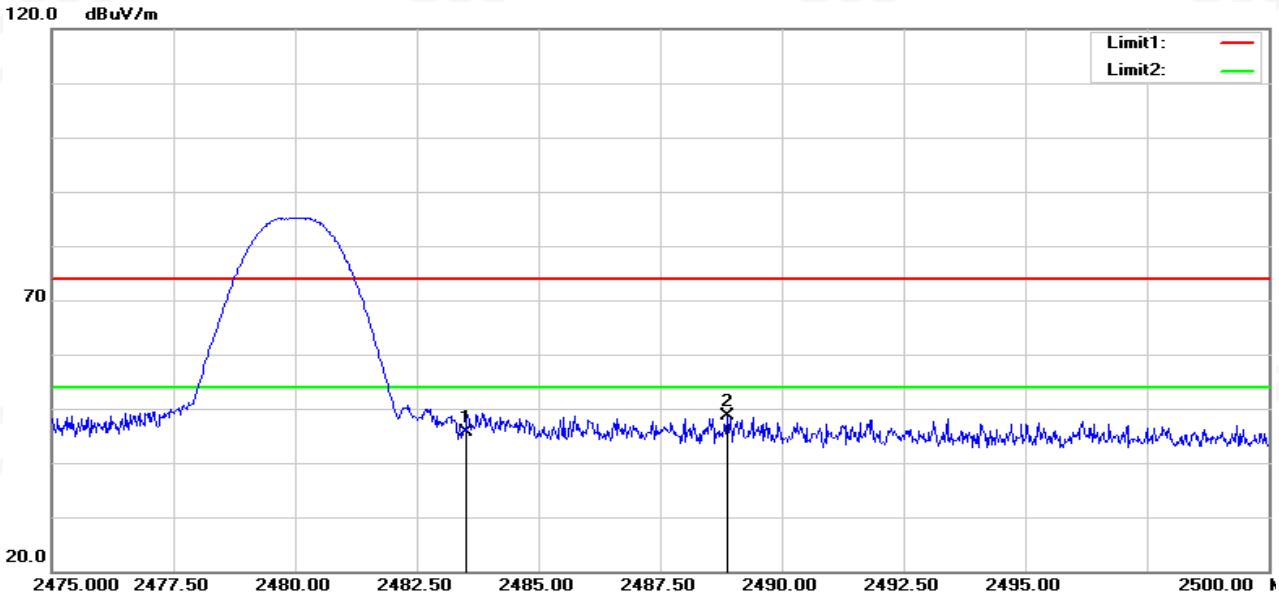
GFSK-High

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	44.58	4.60	49.18	54.00	-4.82	peak
2	2484.000	44.12	4.61	48.73	54.00	-5.27	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	41.07	4.60	45.67	54.00	-8.33	peak
2	2488.875	44.09	4.62	48.71	54.00	-5.29	peak

5. CONDUCTED SPURIOUS & BAND EDGE EMISSION

5.1 LIMIT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

5.3 TEST SETUP

The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna termina is 50 Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

5.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

5.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

6. POWER SPECTRAL DENSITY TEST

6.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	≤8 dBm (RBW≥3KHz)	2400-2483.5	PASS

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 100 kHz ≥ RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 TEST SETUP

6.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

6.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

7. BANDWIDTH TEST

7.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

7.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, 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.

7.3 TEST SETUP

7.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

7.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

8. PEAK OUTPUT POWER TEST

8.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 TEST PROCEDURE

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

RBW ≥ DTS bandwidth

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

8.3 TEST SETUP

8.4 EUT OPERATION CONDITIONS
Please refer to section 3.4 of this report.

8.5 TEST RESULTS
Note: The test data please refer to APPENDIX 1.

9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

9.2 EUT ANTENNA

The EUT antenna is PCB Antenna. It comply with the standard requirement.

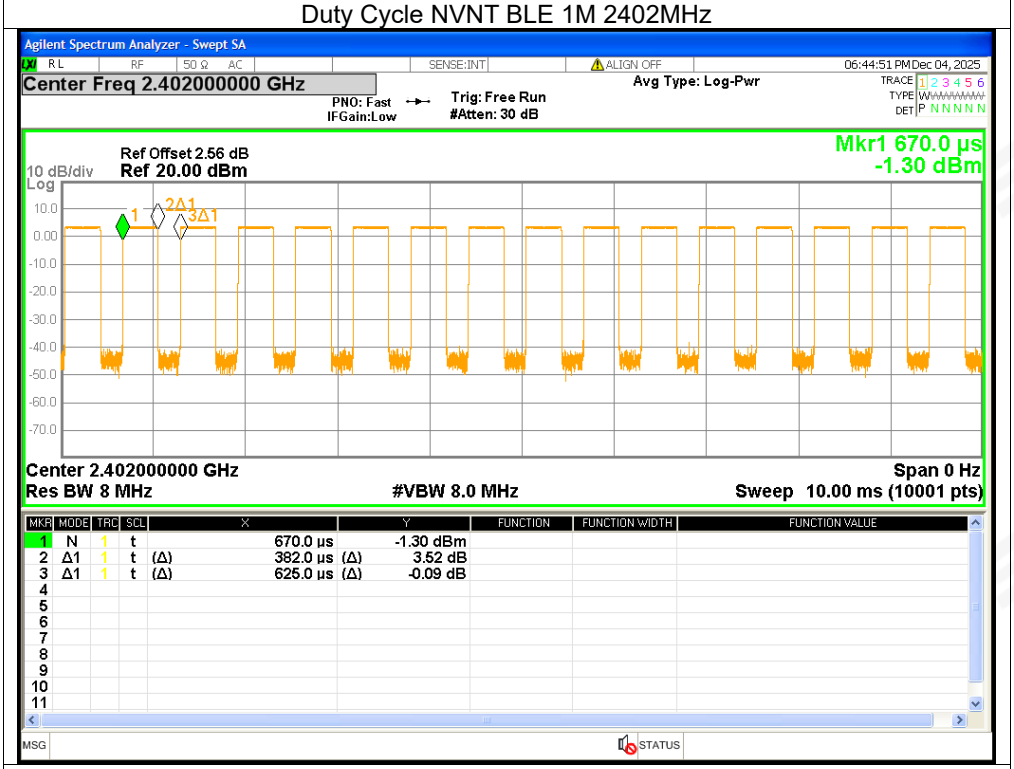
APPENDIX 1-TEST DATA

Duty Cycle

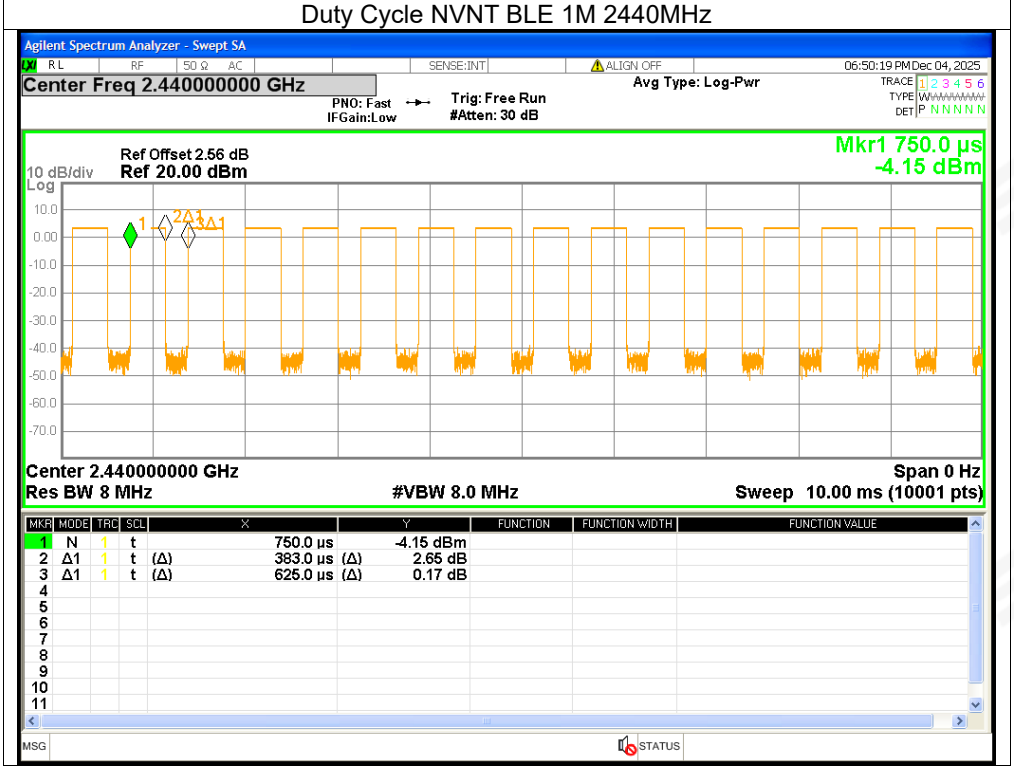
Condition	Mode	Frequency (MHz)	On Time (ms)	Period (ms)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	0.382	0.625	61.12	2.14	2.62
NVNT	BLE 1M	2440	0.383	0.625	61.28	2.13	2.61
NVNT	BLE 1M	2480	0.383	0.625	61.28	2.13	2.61

Test Graphs

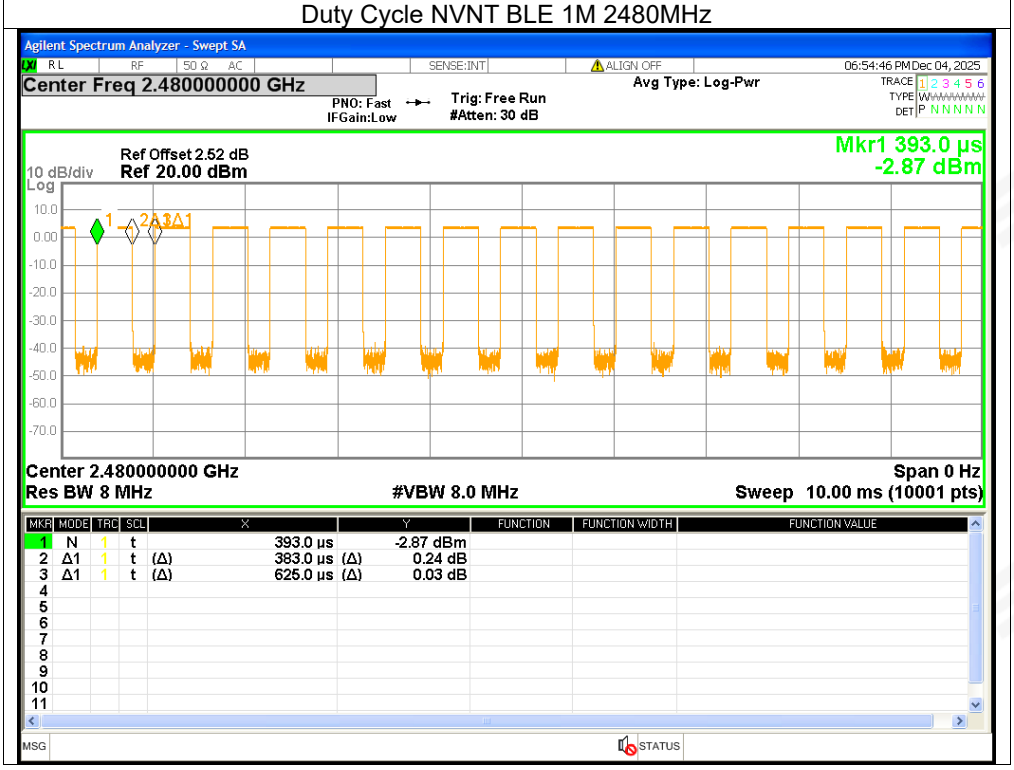
Duty Cycle NVNT BLE 1M 2402MHz



Duty Cycle NVNT BLE 1M 2440MHz



Duty Cycle NVNT BLE 1M 2480MHz

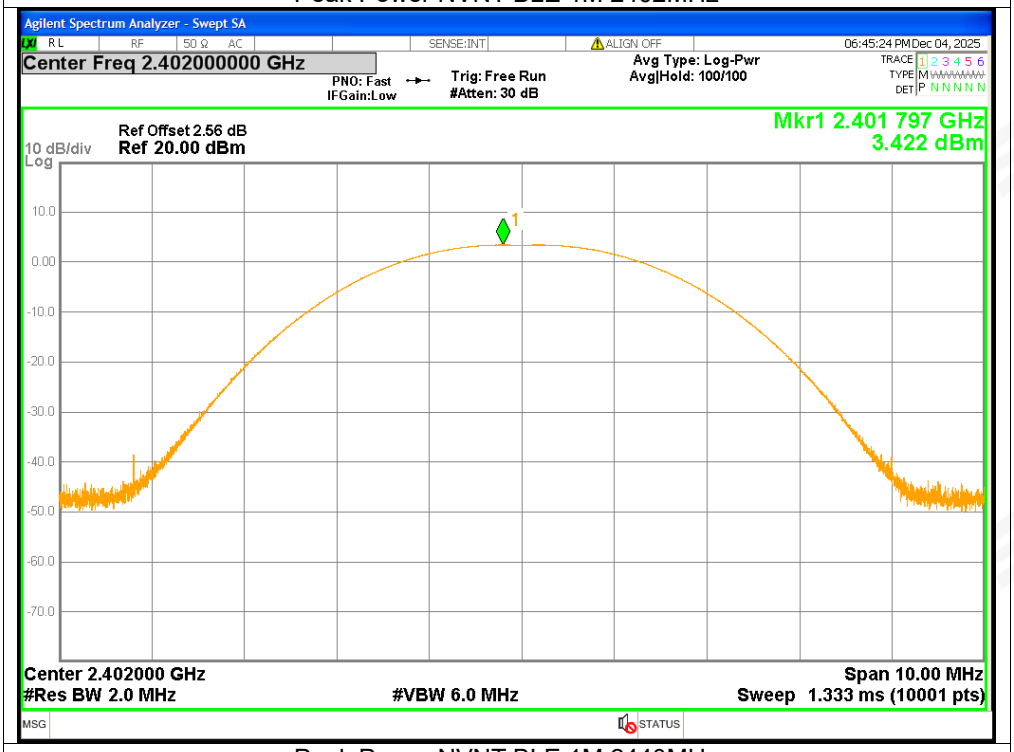


Maximum Peak Conducted Output Power

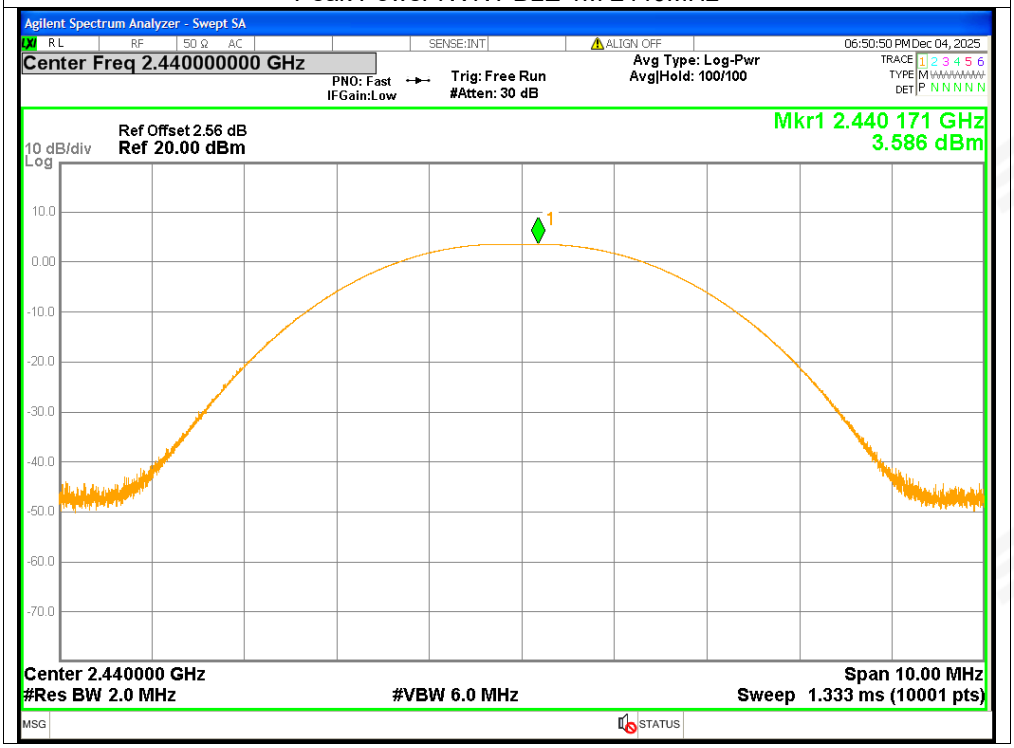
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	3.42	<=30	Pass
NVNT	BLE 1M	2440	3.59	<=30	Pass
NVNT	BLE 1M	2480	3.77	<=30	Pass

Test Graphs

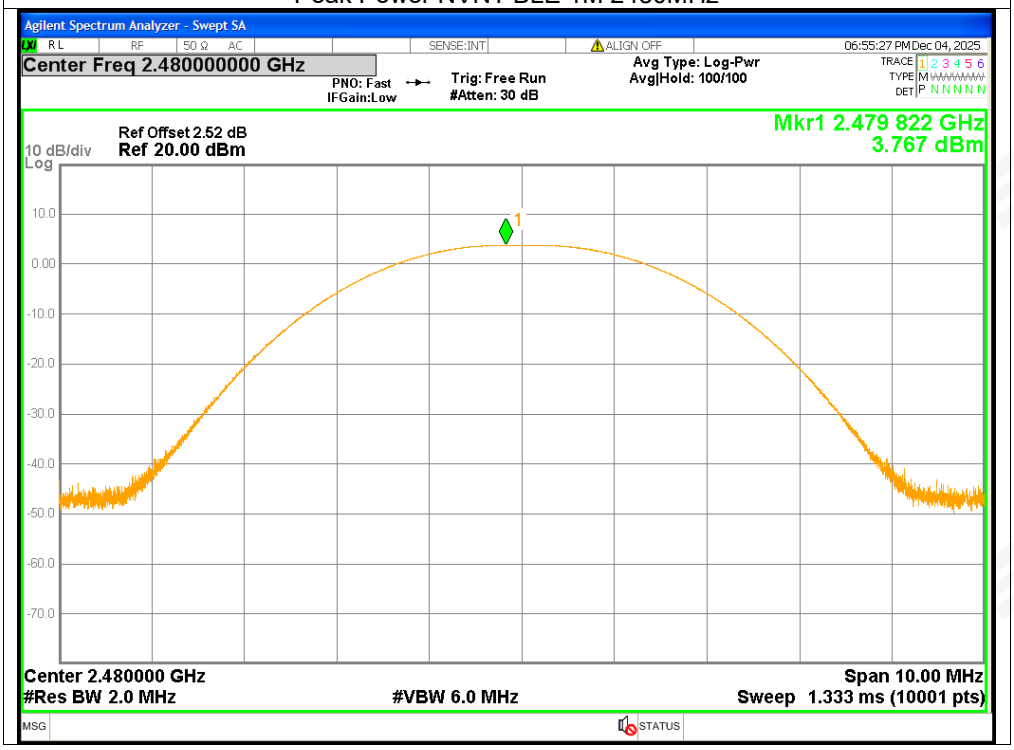
Peak Power NVNT BLE 1M 2402MHz



Peak Power NVNT BLE 1M 2440MHz



Peak Power NVNT BLE 1M 2480MHz

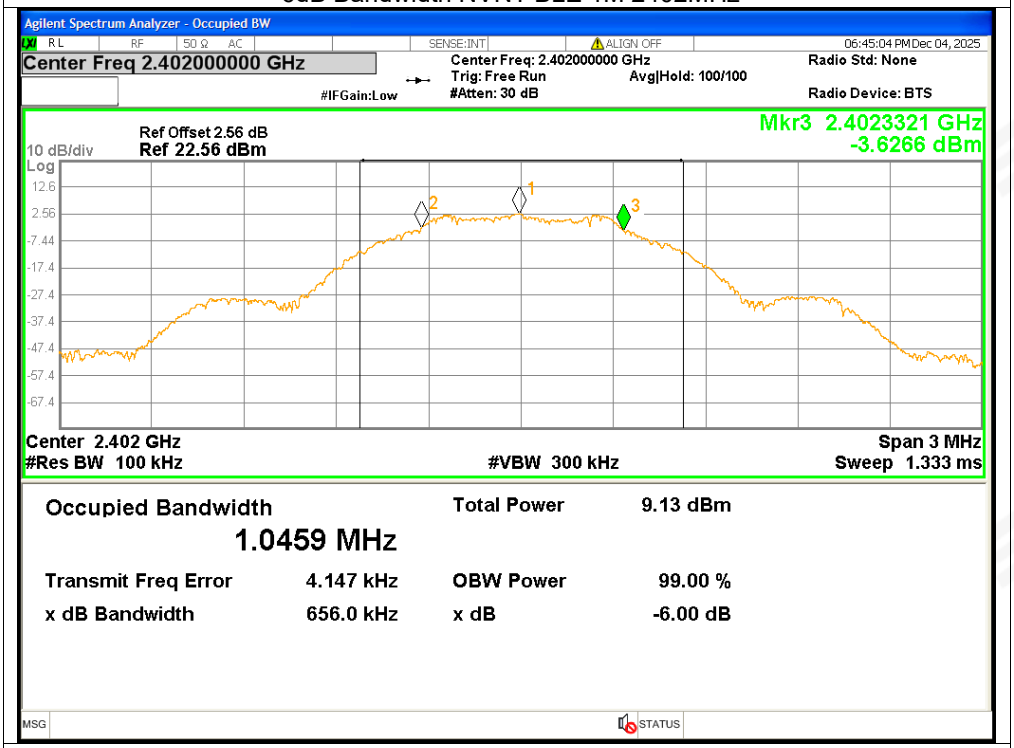


-6dB Bandwidth

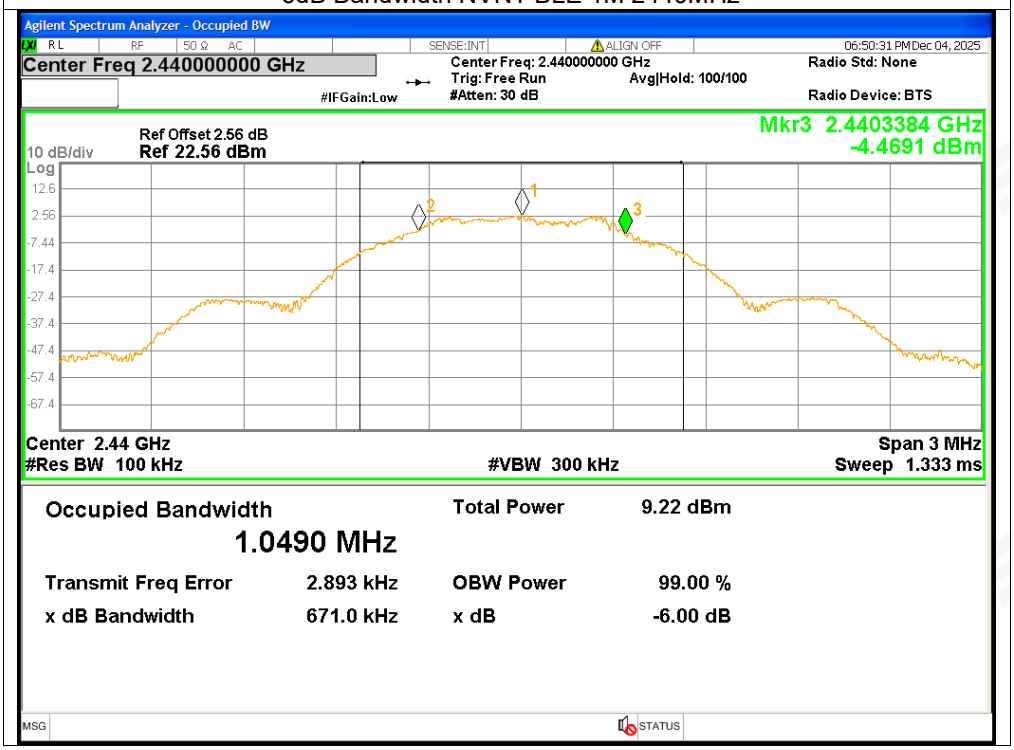
Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	0.656	>=0.5	Pass
NVNT	BLE 1M	2440	0.671	>=0.5	Pass
NVNT	BLE 1M	2480	0.6802	>=0.5	Pass

Test Graphs

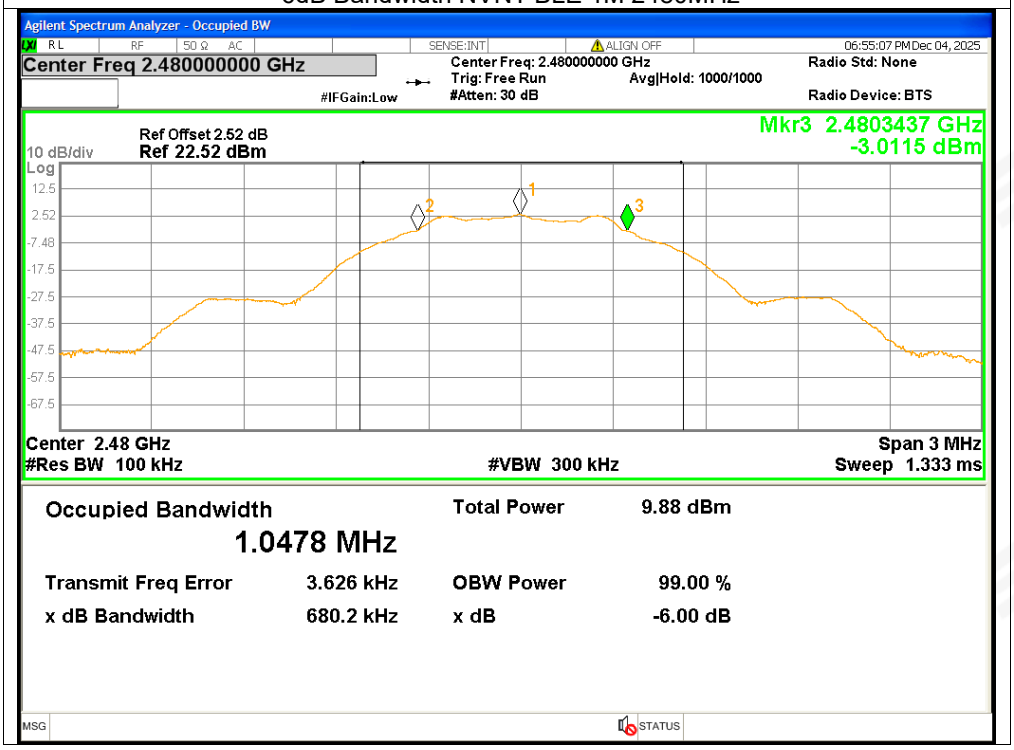
-6dB Bandwidth NVNT BLE 1M 2402MHz



-6dB Bandwidth NVNT BLE 1M 2440MHz



-6dB Bandwidth NVNT BLE 1M 2480MHz

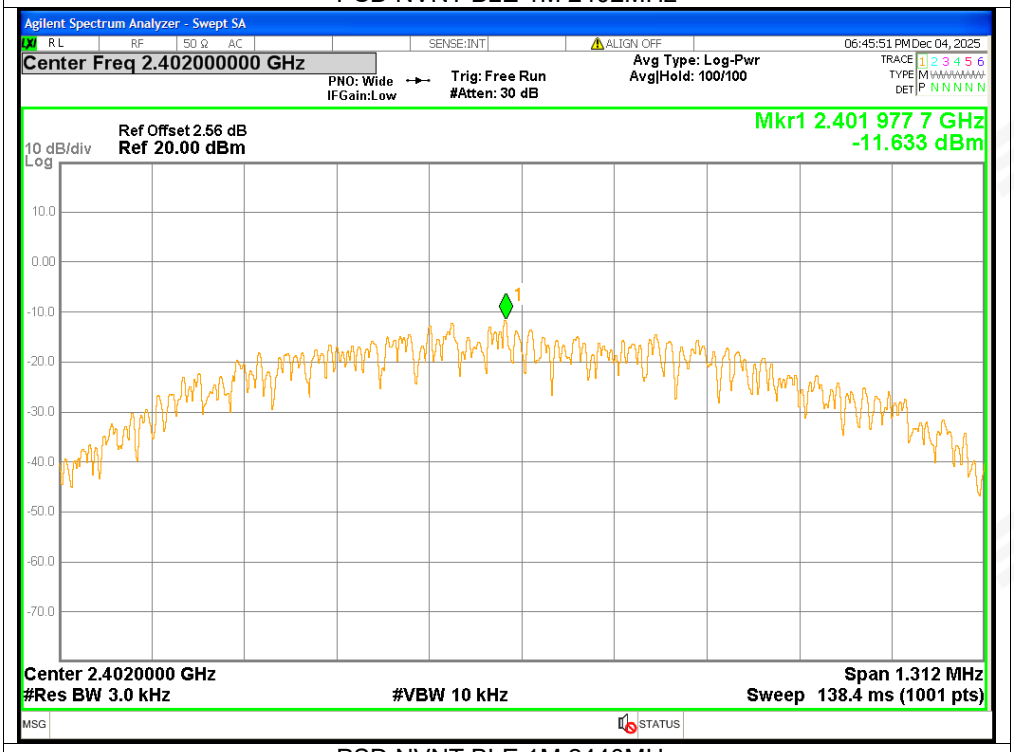


Maximum Power Spectral Density Level

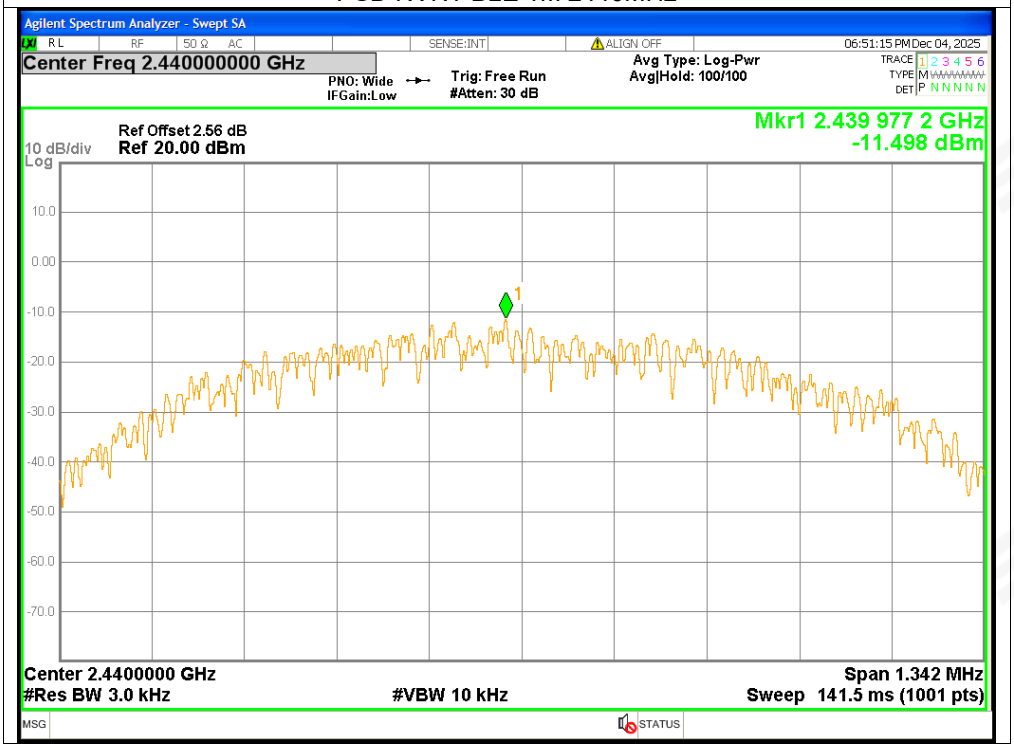
Condition	Mode	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	-11.63	<=8	Pass
NVNT	BLE 1M	2440	-11.5	<=8	Pass
NVNT	BLE 1M	2480	-11.32	<=8	Pass

Test Graphs

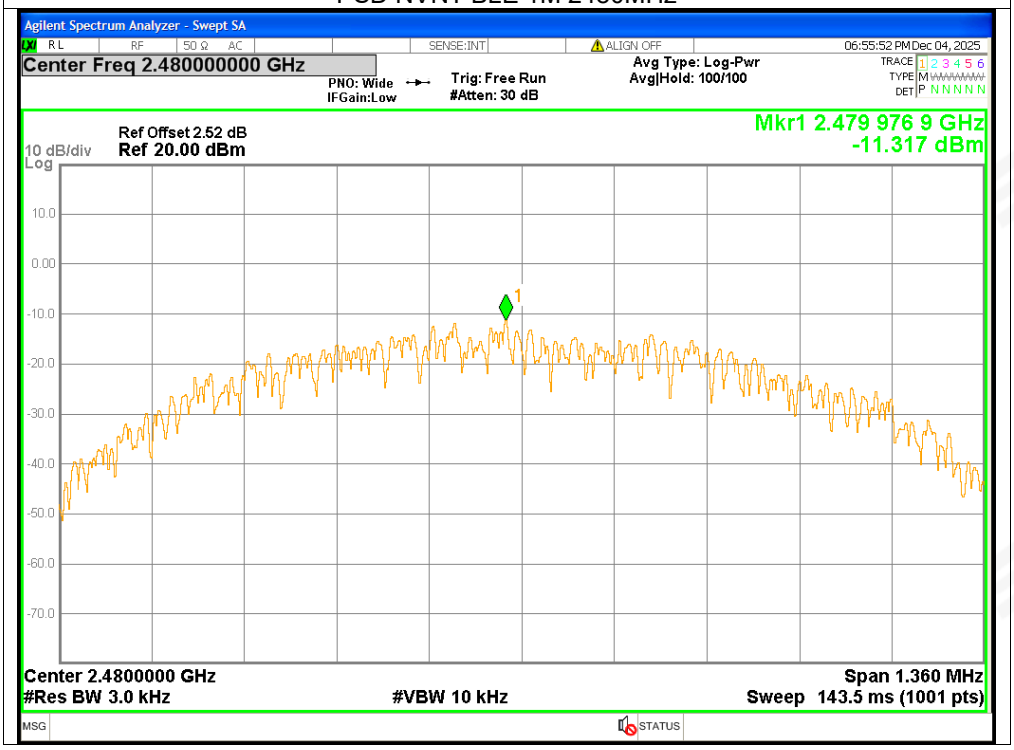
PSD NVNT BLE 1M 2402MHz



PSD NVNT BLE 1M 2440MHz



PSD NVNT BLE 1M 2480MHz

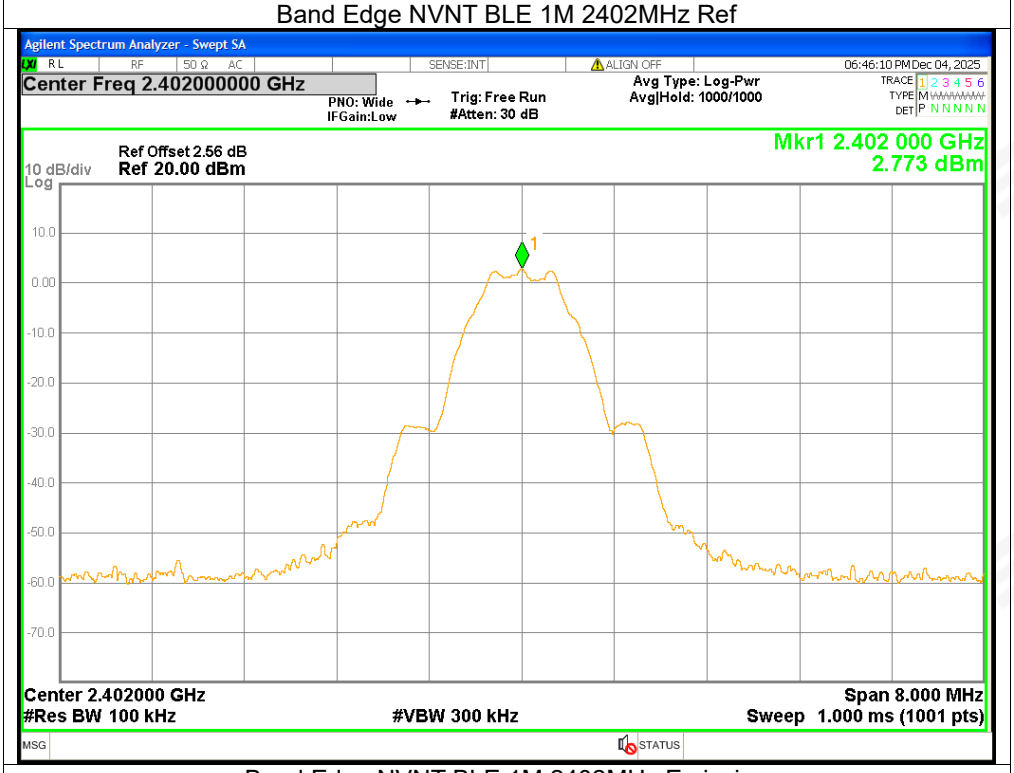


Band Edge

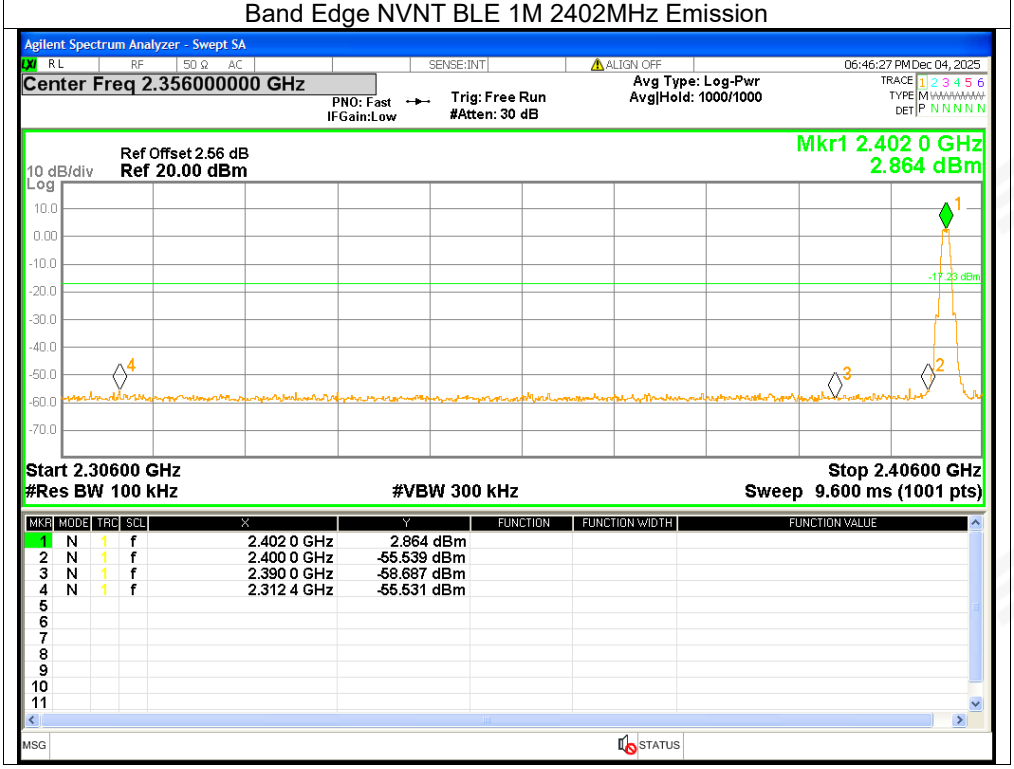
Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	-58.3	<=-20	Pass
NVNT	BLE 1M	2480	-59.16	<=-20	Pass

Test Graphs

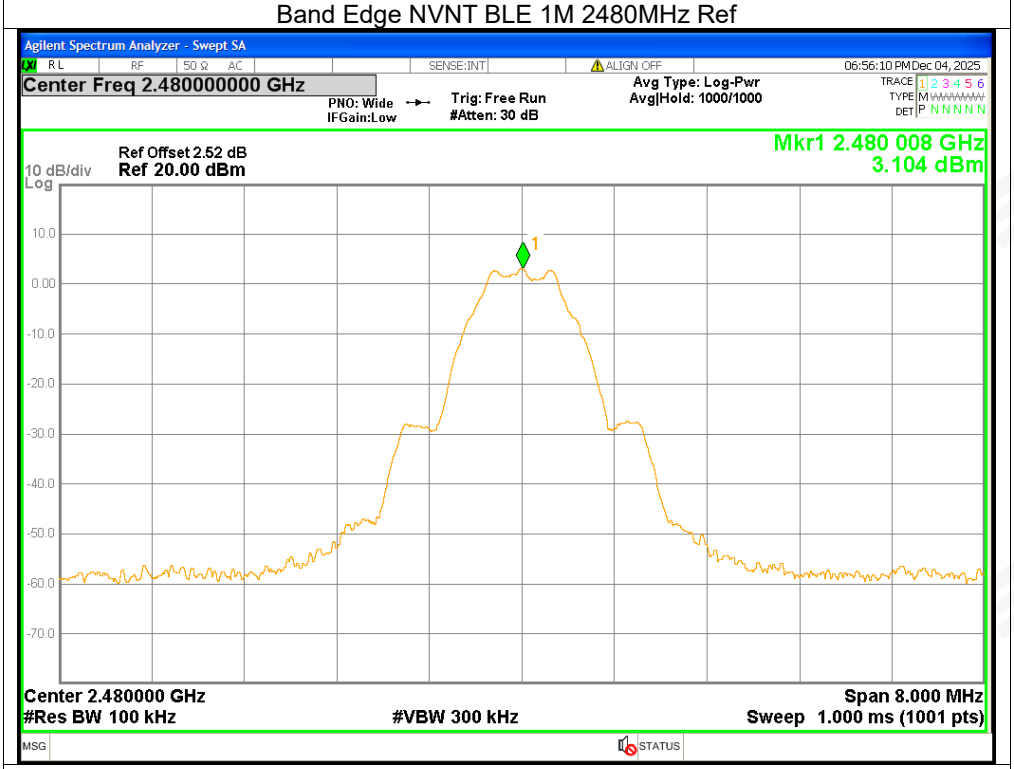
Band Edge NVNT BLE 1M 2402MHz Ref



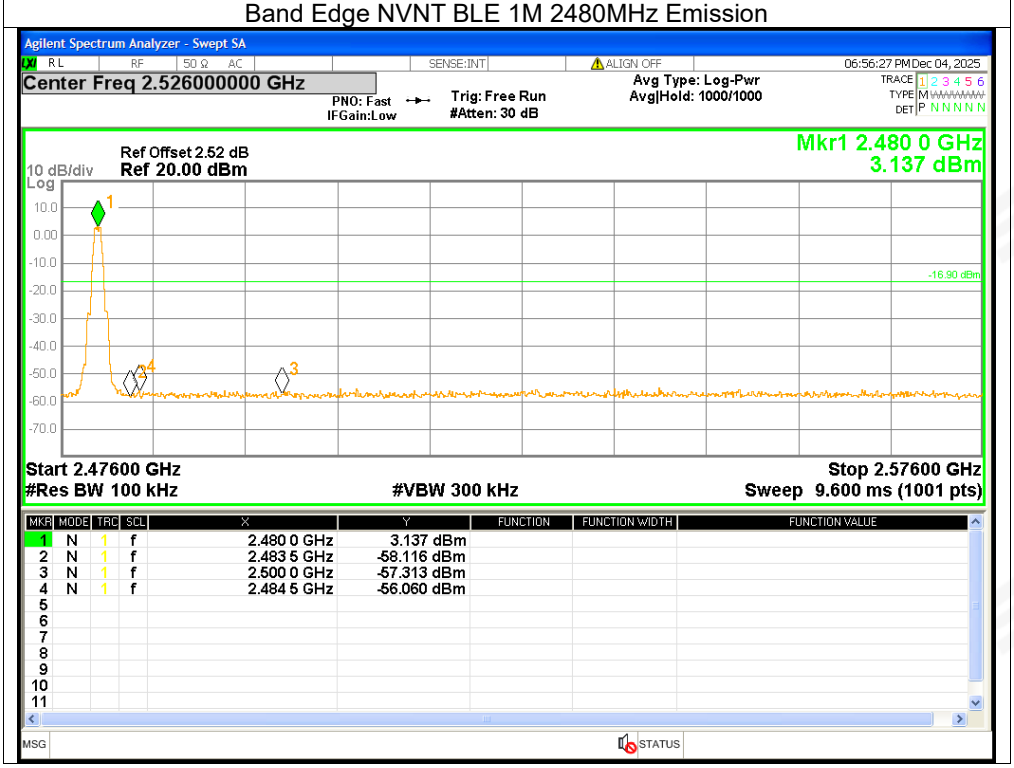
Band Edge NVNT BLE 1M 2402MHz Emission



Band Edge NVNT BLE 1M 2480MHz Ref



Band Edge NVNT BLE 1M 2480MHz Emission

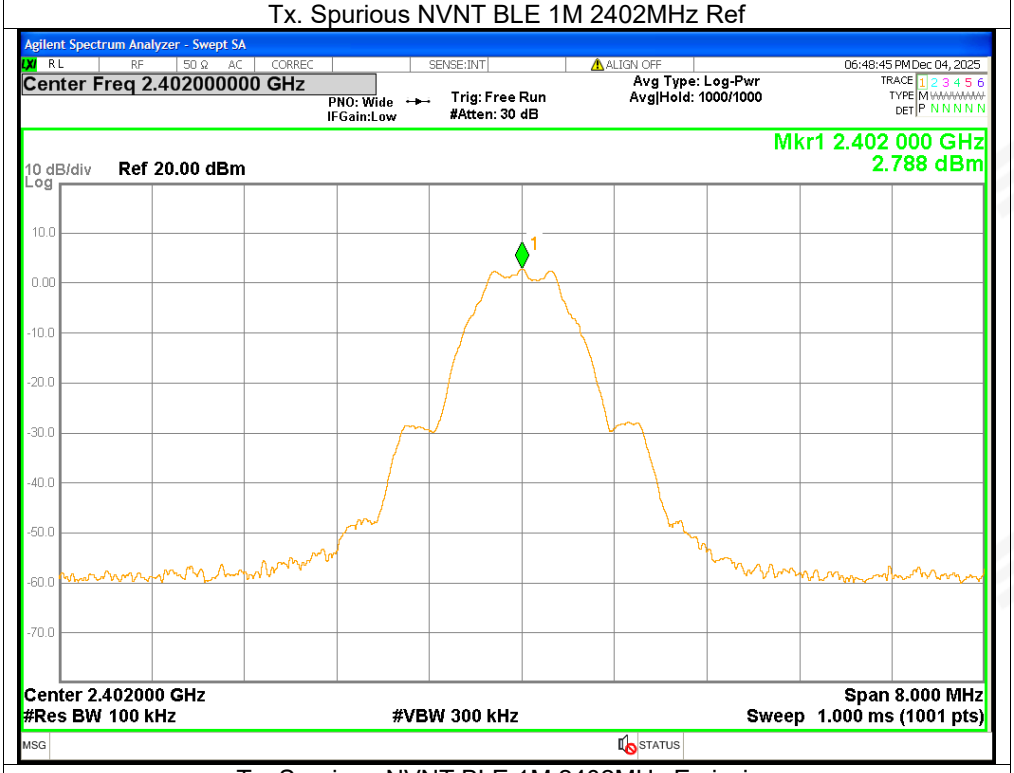


Conducted RF Spurious Emission

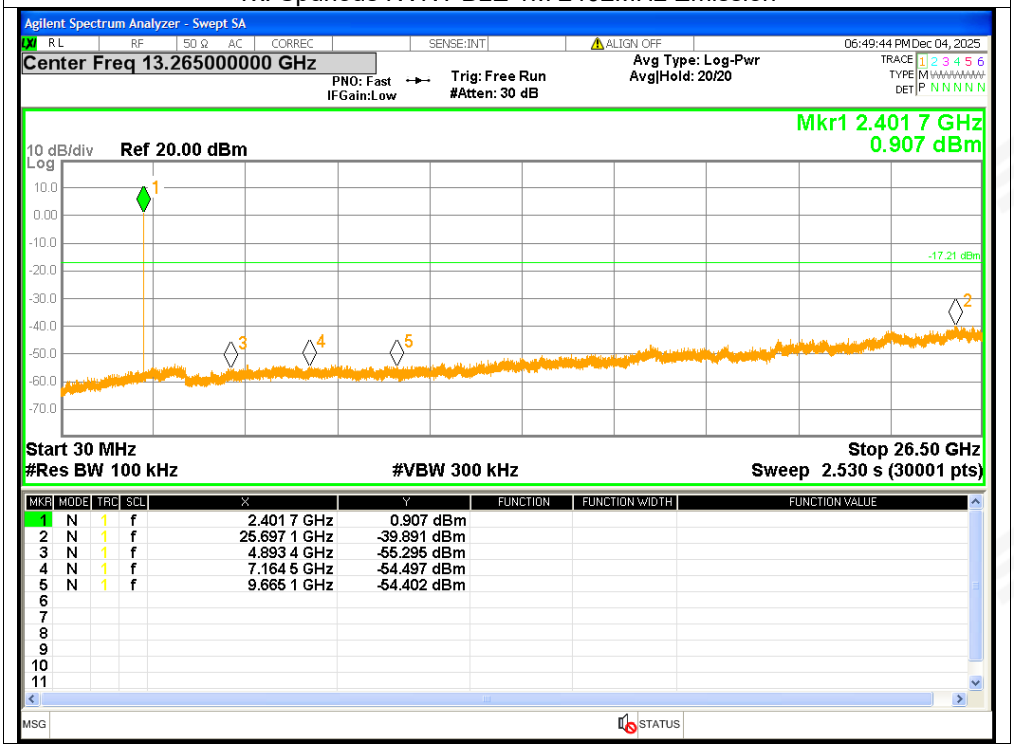
Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	-42.68	<=-20	Pass
NVNT	BLE 1M	2440	-41.52	<=-20	Pass
NVNT	BLE 1M	2480	-42.88	<=-20	Pass

Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ref

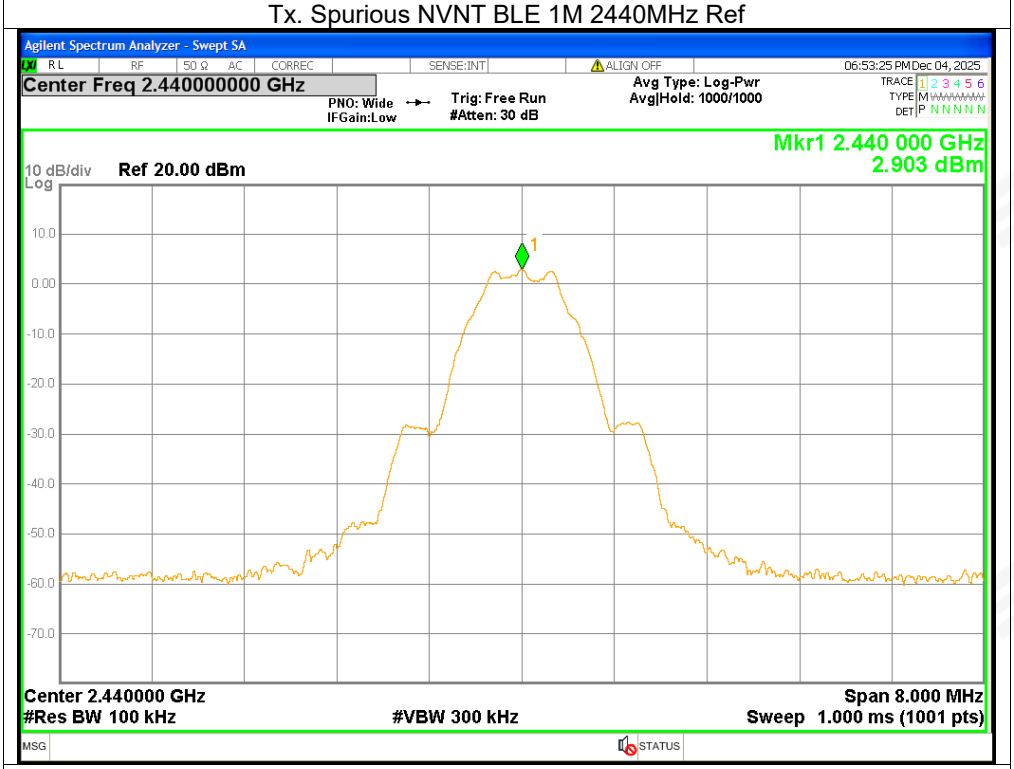


Tx. Spurious NVNT BLE 1M 2402MHz Emission

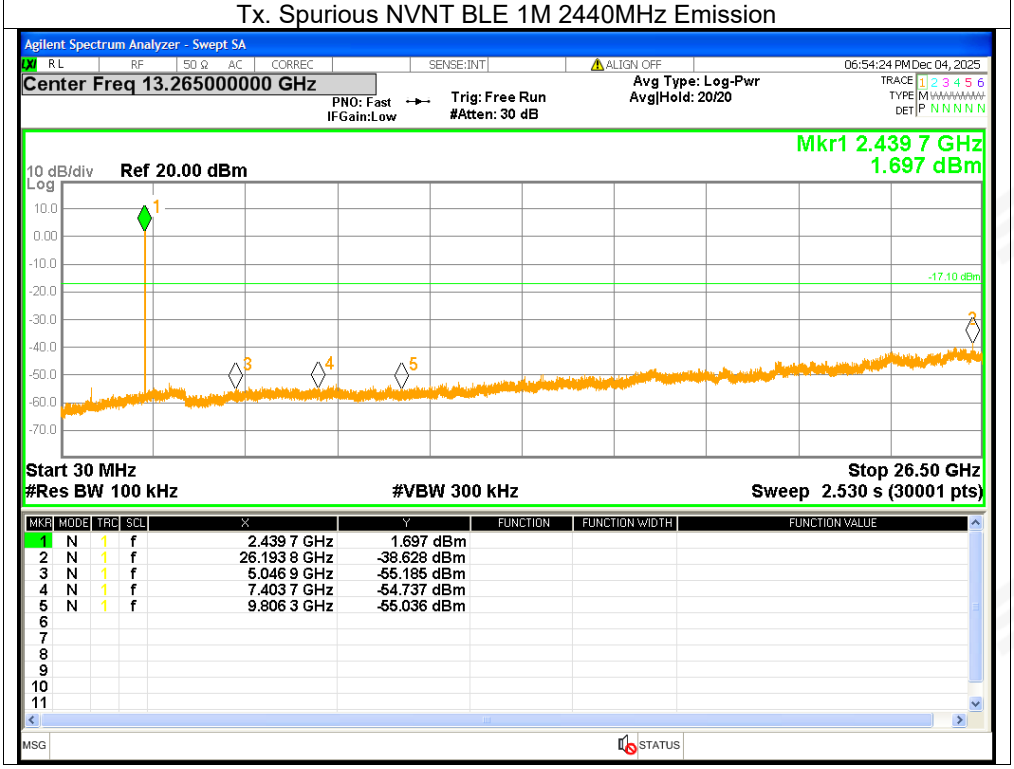


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401 7 GHz	0.907 dBm			
2	N	1	f	25.697 1 GHz	-39.891 dBm			
3	N	1	f	4.893 4 GHz	-55.295 dBm			
4	N	1	f	7.164 5 GHz	-54.497 dBm			
5	N	1	f	9.665 1 GHz	-54.402 dBm			
6								
7								
8								
9								
10								
11								

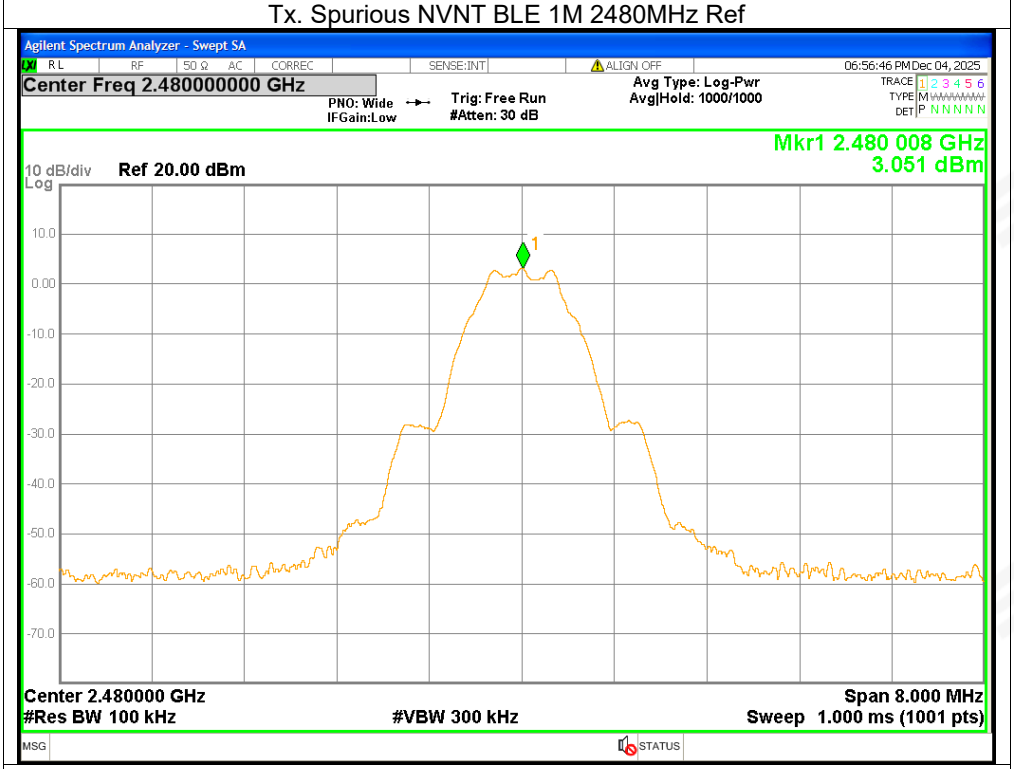
Tx. Spurious NVNT BLE 1M 2440MHz Ref



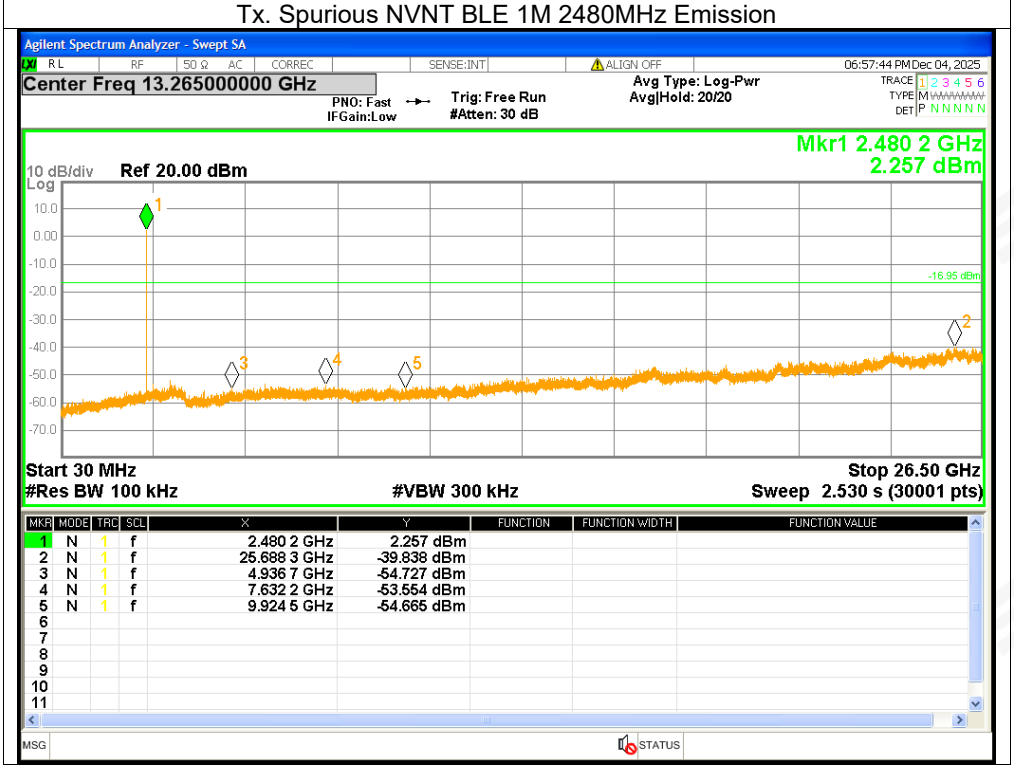
Tx. Spurious NVNT BLE 1M 2440MHz Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ref



Tx. Spurious NVNT BLE 1M 2480MHz Emission



APPENDIX 2- EUT TEST PHOTO

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※