FCC Test Report

Report No: FCS202503309W01

Issued for

Applicant:	Shantou City Chenghai District new dream toy technology Co., LTD
Address:	7th Floor, No. 2, 7th Alley, Longtian Xingu Road, Guangyi Street, Chenghai District, Shantou City, China.
Product Name:	Building block accessories series
Brand Name:	N/A
Model Name:	G33
Series Model:	N/A
FCC ID:	2BOFQ-G33
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.FCS-lab.com	

TEST RESULT CERTIFICATION

Applicant's Name .....:	Shantou City Chenghai District new dream toy technology Co., LTD
Address .....:	7th Floor, No. 2, 7th Alley, Longtian Xingu Road, Guangyi Street, Chenghai District, Shantou City, China.
Manufacture's Name .....:	Shantou City Chenghai District new dream toy technology Co., LTD
Address .....:	7th Floor, No. 2, 7th Alley, Longtian Xingu Road, Guangyi Street, Chenghai District, Shantou City, China.

Product Description

Product Name .....:	Building block accessories series
Brand Name .....:	N/A
Model Name .....:	G33
Series Model .....:	N/A
Test Standards .....:	FCC Rules and Regulations Part 15 Subpart C, Section 247
Test Procedure .....:	ANSI C63.10:2013

This device described above has been tested by Flux Compliance Service Laboratory, 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.
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Date of Test ..... :

Date (s) of performance of tests :	Mar. 06, 2025 ~ Mar. 14, 2025
Date of Issue..... :	Mar. 14, 2025
Test Result..... :	Pass

Tested by : Scott Shen

(Scott Shen)

Reviewed by : Duke Qian

(Duke Qian)

Approved by : Jack Wang

(Jack Wang)

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Revision History

Rev.	Issue Date	Contents
00	Mar. 14, 2025	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	N/A	--
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 Band Edge Emission	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 C63.10-2013.

1.1 TEST FACTORY

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901

FCC Test Firm Registration Number: 514908
Designation number: CN0127
A2LA accreditation number：5545.01
ISED Number：25801
CAB ID ：CN0097

Organization	CAB identifier	Scope / Recognition Date (yyyy-mm-dd)	Expiration (yyyy-mm-dd)
FLUX COMPLIANCE SERVICE LABORATORY Baohao Technology Building 1 No. 15 Gongye West Road Hi-Tech Industrial Park Songsham Lake Dongguan, Guangdong. 523808 PRC. **ISED#: 25801** Contact: Andy Yue andy-vue@fcs-lab.com	CN0097	RSS-102(RFExp) (2020-01-09) RSS-GEN (2020-01-09) RSS-210 (2020-01-09) RSS-247 (2020-01-09)	**RECOGNIZED UNTIL: 2023-12-31** A2LA ISO/IEC 17025: 2017 Expires: 2023-12-31

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	±0.71dB
2	PSD	±0.72dB
3	AC_Conducted Emission (150KHz-30MHz)	±4.74 dB
4	All emissions radiated (9KHz -30MHz)	±3.1 dB
5	All emissions radiated (150KHz-30MHz)	±4.23 dB
6	All emissions,radiated(<1G) 30MHz-1000MHz	±5.2 dB
7	All emissions,radiated 1GHz -18GHz	±4.66 dB
8	All emissions,radiated 18GHz -40GHz	±4.31 dB
9	Bandwidth	±2.5 %

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Building block accessories series
Trade Mark	N/A
Model Name	G33
Series Model	N/A
Model Difference	N/A
Product Description	The EUT is a Building block accessories series Operation Frequency: 2407~2457 MHz Modulation Type: GFSK Radio Technology: 2.4G Number Of Channel: 3 Antenna Designation: Please refer to the Note 3. Antenna Gain (dBi) 0.2 dBi
Channel List	Please refer to the Note 2.
Power Supply	4.5V(AAA Battery 1.5V*3)
Battery	4.5V(AAA Battery 1.5V*3)
Hardware version number	V1.0
Software version number	V1.0
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.

Channel List	
Channel	Frequency (MHz)
00	2407
01	2441
02	2457

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	G33	PCB	N/A	0.2	2.4G ANT

Note: The antenna information refere the manufacturer provide report, applicable only to the tested sample identified in the report.

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(2407MHz)	1 MHz/GFSK
Mode 2	TX CH01(2441MHz)	1 MHz/GFSK
Mode 3	TX CH02(2457MHz)	1 MHz/GFSK

Note:
(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.
(2) We have be tested for all avaiable 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.
(3) The battery is fully-charged during the radited and RF conducted test.

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	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
2.4G	GFSK	0.2	0	RFTest_V1.1

2.4 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.

Accessories Equipment

Description	Manufacturer	Model	S/N	Rating
N/A	N/A	N/A	N/A	N/A

Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	Air 14	N/A	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”.

2.5 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2024.08.28	2025.08.27
Signal Analyzer	R&S	FSV40-N	FCS-E012	2024.08.28	2025.08.27
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2024.08.28	2025.08.27
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2024.08.28	2025.08.27
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2024.08.28	2025.08.27
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2024.08.28	2025.08.27
Pre-Amplifier(0.1M-3GHz)	EMCI	EM330N	FCS-E004	2024.08.28	2025.08.27
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2024.08.28	2025.08.27
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2024.08.28	2025.08.27
Temperature & Humidity	HTC-1	victor	FCS-E005	2024.08.28	2025.08.27
Low frequency cable（9k-1GHz)	Gemma Technology	R03	FCS-E031	2024.08.28	2025.08.27
Low frequency cable（1-18GHz)	Gemma Technology	R04	FCS-E032	2024.08.28	2025.08.27
Low frequency cable（18-40GHz)	Gemma Technology	R05	FCS-E033	2024.08.28	2025.08.27
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2024.08.28	2025.08.27
LISN	R&S	ENV216	FCS-E007	2024.08.28	2025.08.27
LISN	ETS	3810/2NM	FCS-E009	2024.08.28	2025.08.27
Temperature & Humidity	HTC-1	victor	FCS-E008	2024.08.28	2025.08.27
Testing Software	EZ-EMC(Ver.EMC-CON 3A1.1)				

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2024.08.28	2025.08.27
Spectrum Analyzer	Agilent	E4447A	MY50180039	2024.08.28	2025.08.27
Spectrum Analyzer	R&S	FSV-40	101499	2024.08.28	2025.08.27
Power Sensor	Agilent	UX2021XA	FCS-E021	2024.08.28	2025.08.27
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

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.

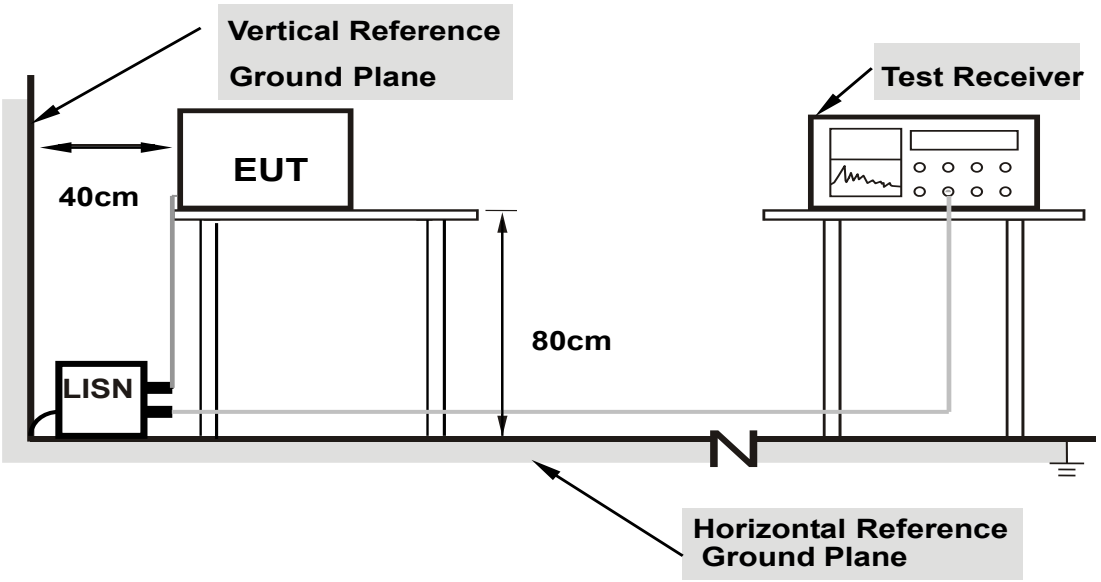
The following table is the setting of the receiver

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

Not applicabe. The product does not support AC power supply, Use DC 4.5V(AAA Battery 1.5V*3) power supply to get the product working.

4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMITS

In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 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 (1GHz-25 GHz)

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

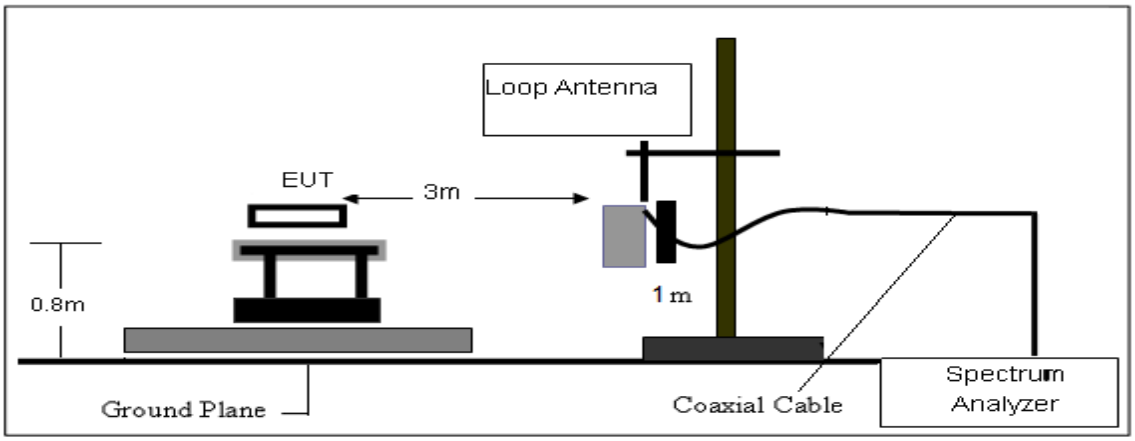
a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position 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:

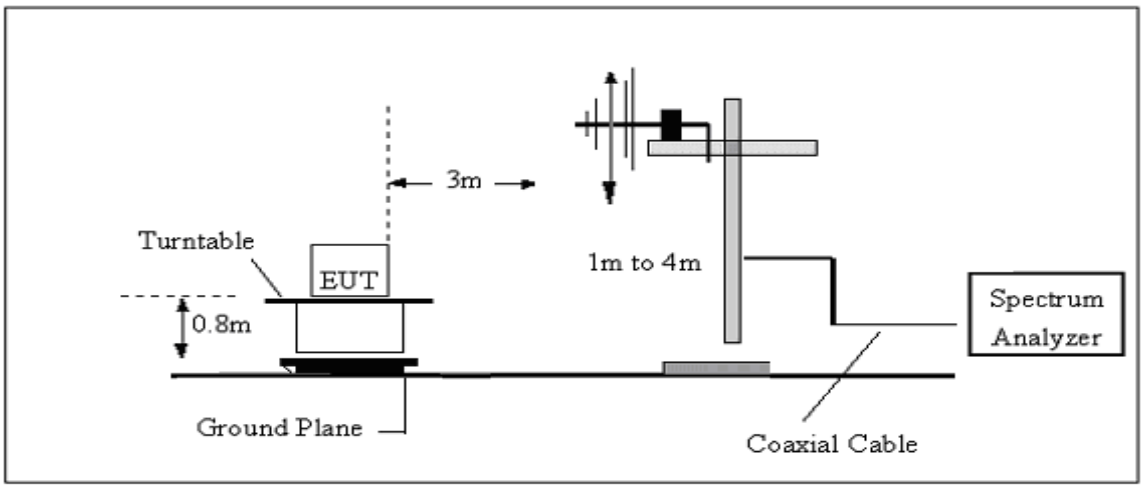
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

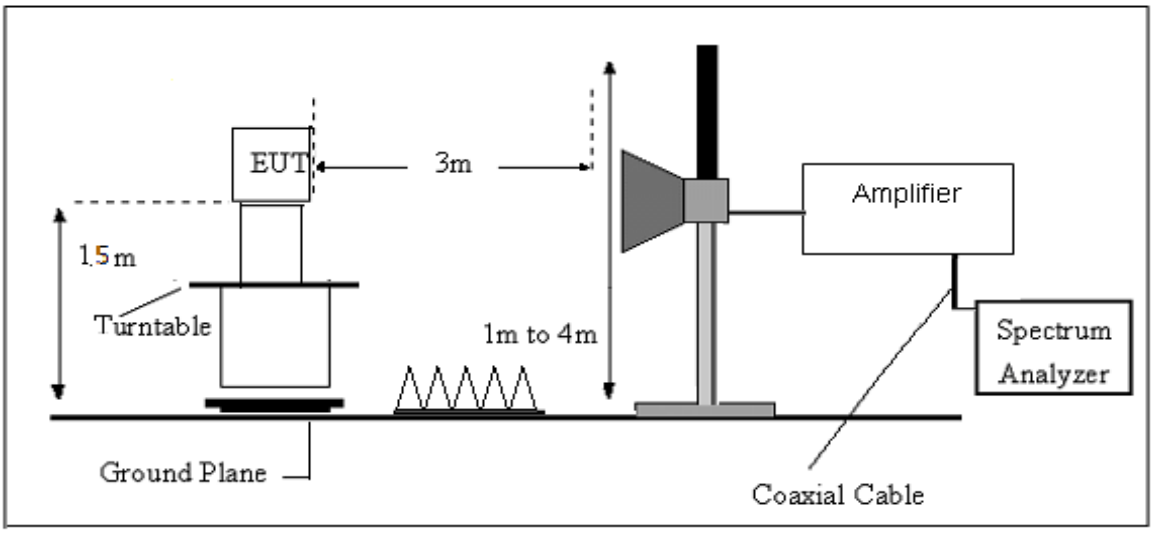
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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

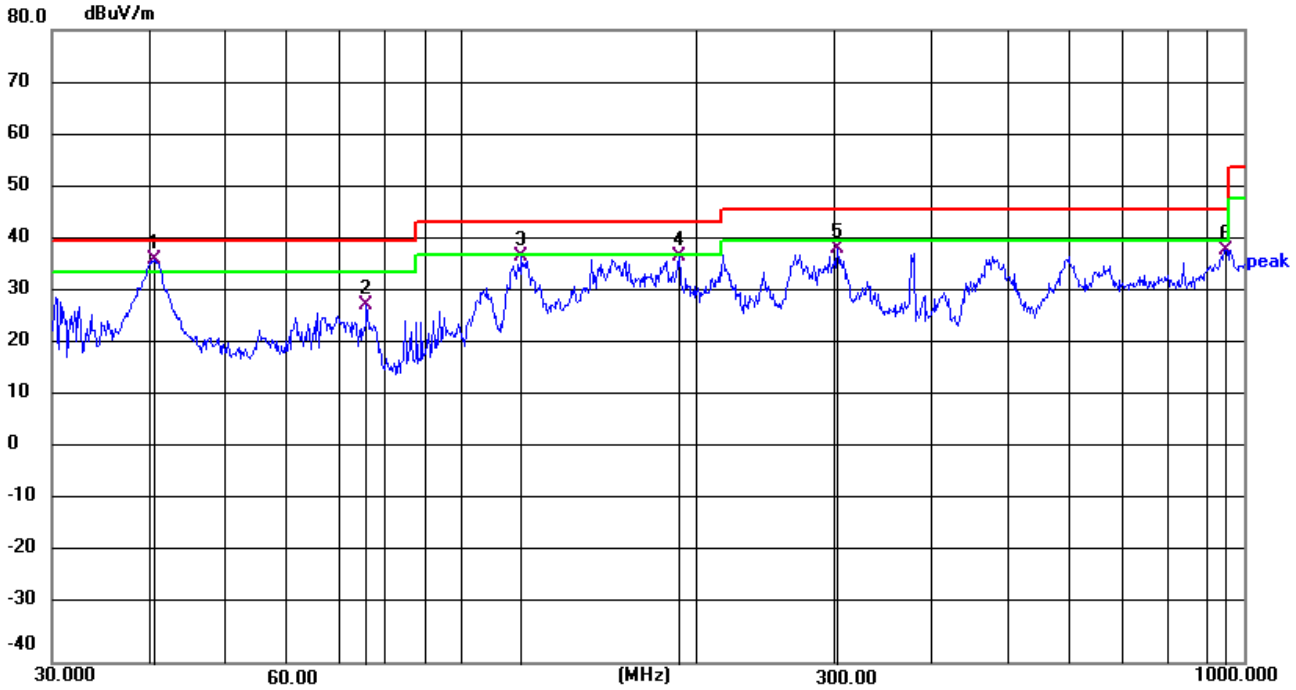
For example

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

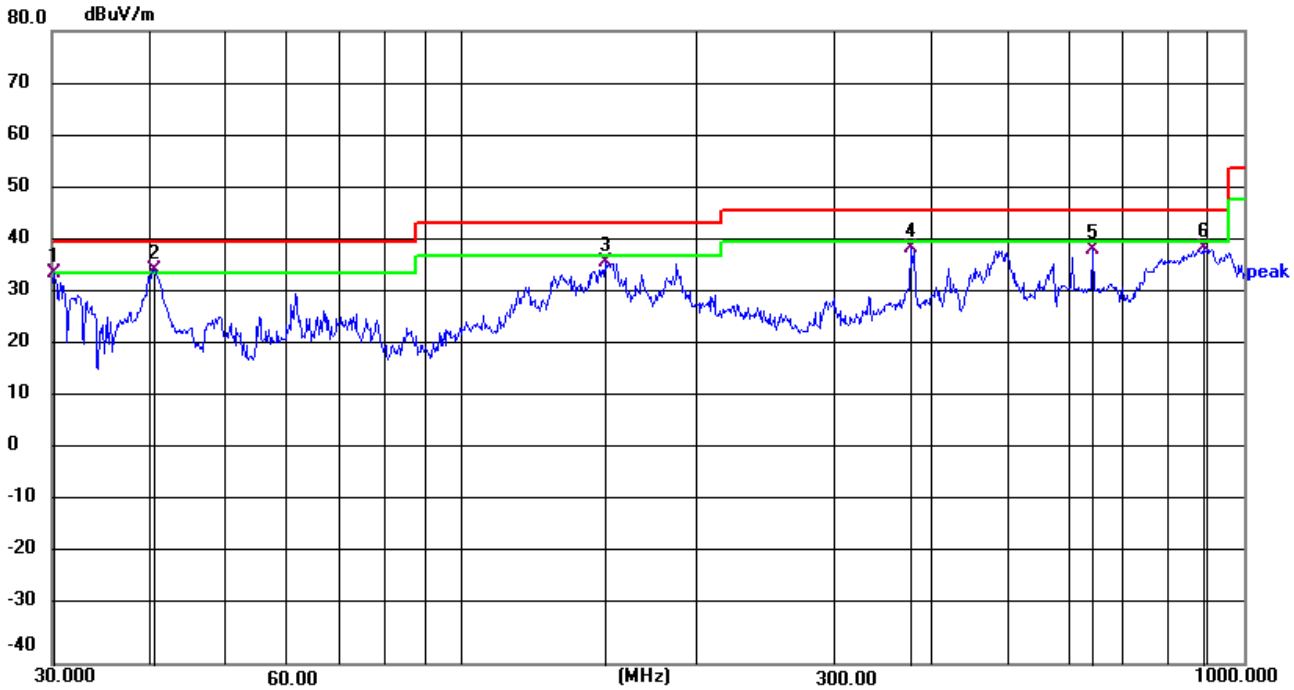
4.6 TEST RESULTS

M/N: G33	Temperature: 23.5°C
Phase: H	Humidity: 54%RH
Test Mode: Mode 1/2/3 (Mode 1 worst mode)	Test Voltage: DC 4.5V(AAA battery 1.5v*3)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1 *	40.5591	52.95	-16.46	36.49	40.00	-3.51	QP
2	75.7112	48.06	-20.06	28.00	40.00	-12.00	QP
3	119.4360	55.42	-18.45	36.97	43.50	-6.53	QP
4	189.7384	56.52	-19.43	37.09	43.50	-6.41	QP
5	302.4811	55.35	-16.88	38.47	46.00	-7.53	QP
6	948.7610	41.94	-3.55	38.39	46.00	-7.61	QP

M/N: G33	Temperature: 23.5℃
Phase: V	Humidity: 54%RH
Test Mode: Mode 1/2/3 (Mode 1 worst mode)	Test Voltage: DC 4.5V(AAA battery 1.5v*3)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1 !	30.2110	51.80	-17.56	34.24	40.00	-5.76	QP
2 *	40.5591	51.17	-16.46	34.71	40.00	-5.29	QP
3	152.6640	52.64	-16.51	36.13	43.50	-7.37	QP
4	375.9384	54.07	-15.08	38.99	46.00	-7.01	QP
5	640.6110	47.59	-8.98	38.61	46.00	-7.39	QP
6	887.6096	43.75	-4.96	38.79	46.00	-7.21	QP

(1GHz-25GHz) Spurious emission Requirements

GFSK

Frequency (MHz)	Meter Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (GFSK/2407 MHz)										
3271.64	61.92	44.70	6.70	28.20	-9.80	52.12	74.00	-21.88	PK	Vertical
3271.64	51.09	44.70	6.70	28.20	-9.80	41.29	54.00	-12.71	AV	Vertical
3271.52	61.57	44.70	6.70	28.20	-9.80	51.77	74.00	-22.23	PK	Horizontal
3271.52	51.06	44.70	6.70	28.20	-9.80	41.26	54.00	-12.74	AV	Horizontal
4814.49	58.86	44.20	9.04	31.60	-3.56	55.30	74.00	-18.70	PK	Vertical
4814.49	49.38	44.20	9.04	31.60	-3.56	45.82	54.00	-8.18	AV	Vertical
4814.33	59.26	44.20	9.04	31.60	-3.56	55.70	74.00	-18.30	PK	Horizontal
4814.33	50.12	44.20	9.04	31.60	-3.56	46.56	54.00	-7.44	AV	Horizontal
5370.81	48.60	44.20	9.86	32.00	-2.34	46.26	74.00	-27.74	PK	Vertical
5370.81	40.19	44.20	9.86	32.00	-2.34	37.85	54.00	-16.15	AV	Vertical
5371.02	47.72	44.20	9.86	32.00	-2.34	45.38	74.00	-28.62	PK	Horizontal
5371.02	39.35	44.20	9.86	32.00	-2.34	37.01	54.00	-16.99	AV	Horizontal
7220.77	53.99	43.50	11.40	35.50	3.40	57.39	74.00	-16.61	PK	Vertical
7220.77	43.82	43.50	11.40	35.50	3.40	47.22	54.00	-6.78	AV	Vertical
7220.78	54.26	43.50	11.40	35.50	3.40	57.66	74.00	-16.34	PK	Horizontal
7220.78	43.70	43.50	11.40	35.50	3.40	47.10	54.00	-6.90	AV	Horizontal
Middle Channel (GFSK/2441 MHz)										
3265.98	61.69	44.70	6.70	28.20	-9.80	51.89	74.00	-22.11	PK	Vertical
3265.98	51.24	44.70	6.70	28.20	-9.80	41.44	54.00	-12.56	AV	Vertical
3266.01	61.20	44.70	6.70	28.20	-9.80	51.40	74.00	-22.60	PK	Horizontal
3266.01	50.65	44.70	6.70	28.20	-9.80	40.85	54.00	-13.15	AV	Horizontal
4884.43	58.68	44.20	9.04	31.60	-3.56	55.12	74.00	-18.88	PK	Vertical
4884.43	50.49	44.20	9.04	31.60	-3.56	46.93	54.00	-7.07	AV	Vertical
4884.53	58.49	44.20	9.04	31.60	-3.56	54.93	74.00	-19.07	PK	Horizontal
4884.53	50.34	44.20	9.04	31.60	-3.56	46.78	54.00	-7.22	AV	Horizontal
5362.06	48.15	44.20	9.86	32.00	-2.34	45.81	74.00	-28.19	PK	Vertical
5362.06	40.42	44.20	9.86	32.00	-2.34	38.08	54.00	-15.92	AV	Vertical
5361.94	47.25	44.20	9.86	32.00	-2.34	44.91	74.00	-29.09	PK	Horizontal
5361.94	38.25	44.20	9.86	32.00	-2.34	35.91	54.00	-18.09	AV	Horizontal
7326.90	53.64	43.50	11.40	35.50	3.40	57.04	74.00	-16.96	PK	Vertical
7326.90	44.17	43.50	11.40	35.50	3.40	47.57	54.00	-6.43	AV	Vertical
7326.70	53.91	43.50	11.40	35.50	3.40	57.31	74.00	-16.69	PK	Horizontal
7326.70	44.63	43.50	11.40	35.50	3.40	48.03	54.00	-5.97	AV	Horizontal

High Channel (GFSK/2457 MHz)										
3234.44	61.11	44.70	6.70	28.20	-9.80	51.31	74.00	-22.69	PK	Vertical
3234.44	50.57	44.70	6.70	28.20	-9.80	40.77	54.00	-13.23	AV	Vertical
3234.30	62.23	44.70	6.70	28.20	-9.80	52.43	74.00	-21.57	PK	Horizontal
3234.30	51.05	44.70	6.70	28.20	-9.80	41.25	54.00	-12.75	AV	Horizontal
4914.36	58.22	44.20	9.04	31.60	-3.56	54.66	74.00	-19.34	PK	Vertical
4914.36	49.67	44.20	9.04	31.60	-3.56	46.11	54.00	-7.89	AV	Vertical
4914.55	59.34	44.20	9.04	31.60	-3.56	55.78	74.00	-18.22	PK	Horizontal
4914.55	49.71	44.20	9.04	31.60	-3.56	46.15	54.00	-7.85	AV	Horizontal
5310.01	48.95	44.20	9.86	32.00	-2.34	46.61	74.00	-27.39	PK	Vertical
5310.01	39.87	44.20	9.86	32.00	-2.34	37.53	54.00	-16.47	AV	Vertical
5309.87	48.21	44.20	9.86	32.00	-2.34	45.87	74.00	-28.13	PK	Horizontal
5309.87	39.24	44.20	9.86	32.00	-2.34	36.90	54.00	-17.10	AV	Horizontal
7370.88	54.20	43.50	11.40	35.50	3.40	57.60	74.00	-16.40	PK	Vertical
7370.88	43.75	43.50	11.40	35.50	3.40	47.15	54.00	-6.85	AV	Vertical
7370.78	54.05	43.50	11.40	35.50	3.40	57.45	74.00	-16.55	PK	Horizontal
7370.78	44.62	43.50	11.40	35.50	3.40	48.02	54.00	-5.98	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.

Restricted Bands Requirements

2.4G_Low_2407MHz

H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	2385.32	38.81	-6.42	32.39	74	-41.61	peak	100	360
2	2390	39.10	-5.72	33.38	74	-40.62	peak	100	360
3	2400	38.51	-5.61	32.90	74	-41.10	peak	100	360

V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	2384.50	41.35	-5.33	36.02	74	-37.98	peak	100	360
2	2390	38.82	-5.72	33.10	74	-40.90	peak	100	360
3	2400	41.47	-5.61	35.86	74	-38.14	peak	100	360

2.4G_High_2457MHz

H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	2483.5	38.55	-5.09	33.46	74	-40.54	peak	100	360
2	2486.45	37.08	-5.32	31.76	74	-42.24	peak	100	360

V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	2483.5	35.24	-5.09	30.15	74	-43.85	peak	100	360
2	2482.39	36.55	-4.71	31.84	74	-42.16	peak	100	360

Note:

1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
2) Only show the worst case.
3) The peak volue is less than AV limit, so AV measure is not need.

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
Start/Stop Frequency	Lower Band Edge: 2300 – 2407 MHz Upper Band Edge: 2475 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

5.3 TEST SETUP

The EUT which is powered by the DC 5V, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal 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

For the measurement records，refer to the appendix I.

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

For the measurement records，refer to the appendix I.

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

For the measurement records，refer to the appendix I.

8. PEAK OUTPUT POWER TEST

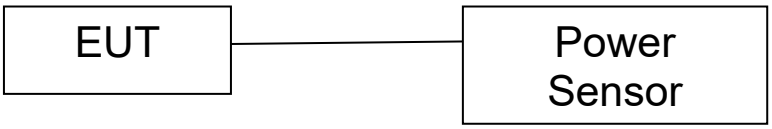
8.1 LIMIT

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.
Integrated band power method:
The following procedure can be used when the maximum available RBW of the instrument is less than the
DTS bandwidth:
a) Set the RBW = 1 MHz.
b) Set the VBW ≥ [3 × RBW].
c) Set the span ≥ [1.5 × DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.
PKPM1 Peak power meter method:
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

8.3 TEST SETUP



8.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

8.5 TEST RESULTS

For the measurement records，refer to the appendix I.

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 I:TEST RESULTS

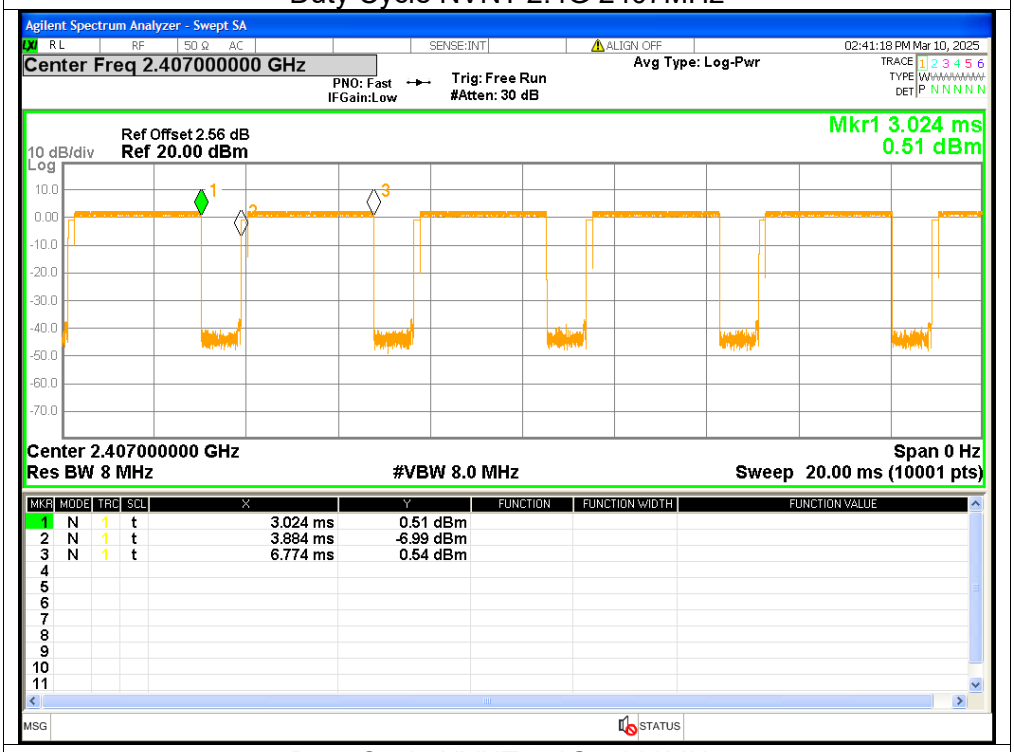
1. Duty Cycle

Condition	Mode	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	2.4G	2407	2.89	3.75	77.07	1.13	0.35
NVNT	2.4G	2441	2.884	3.75	76.91	1.14	0.35
NVNT	2.4G	2457	2.89	3.75	77.07	1.13	0.35

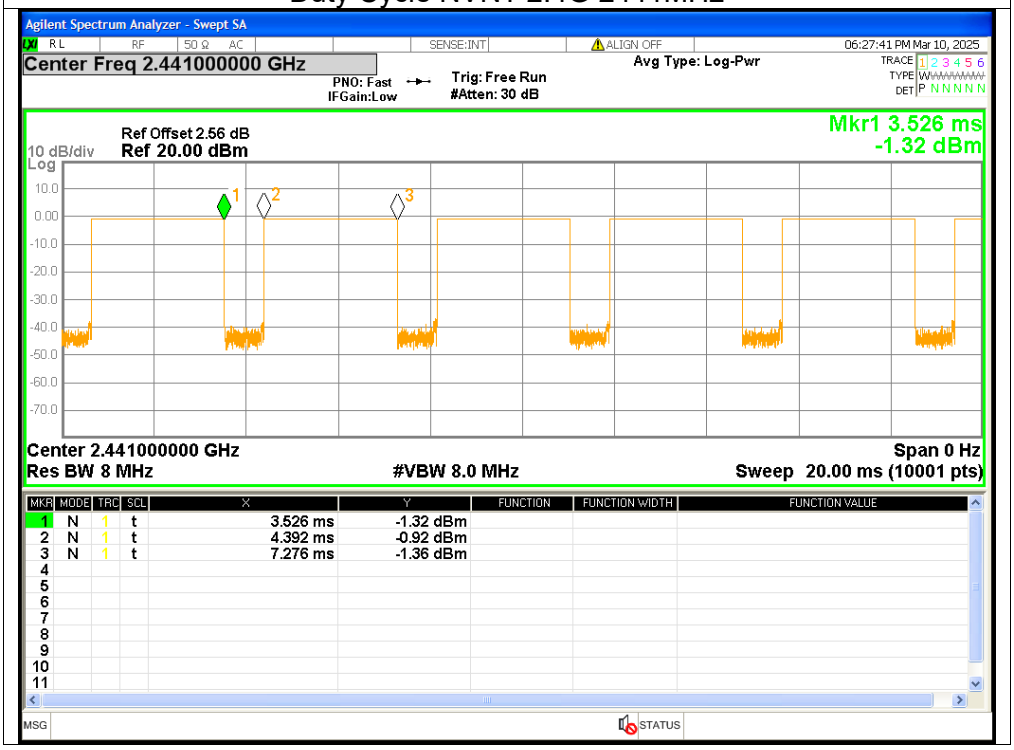
Note:
1. Duty Cycle = T_on / Period
2. Correction Factor = 10 log (1 / Duty Cycle)
3. 1 / T = 1 / T_on

Test Graphs

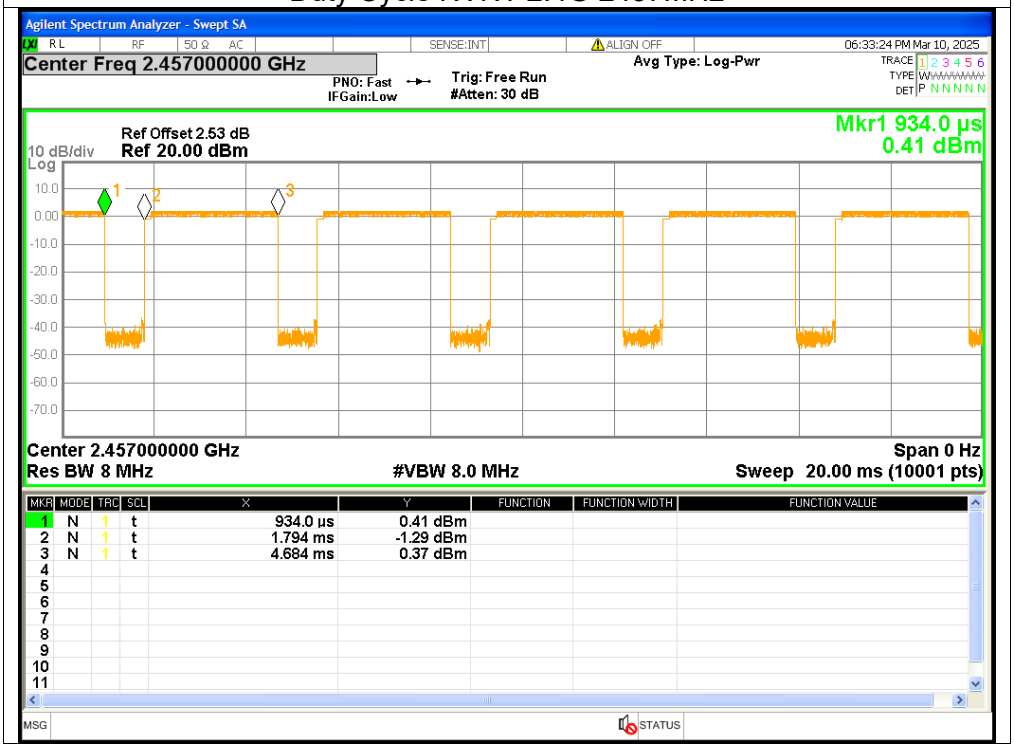
Duty Cycle NVNT 2.4G 2407MHz



Duty Cycle NVNT 2.4G 2441MHz



Duty Cycle NVNT 2.4G 2457MHz

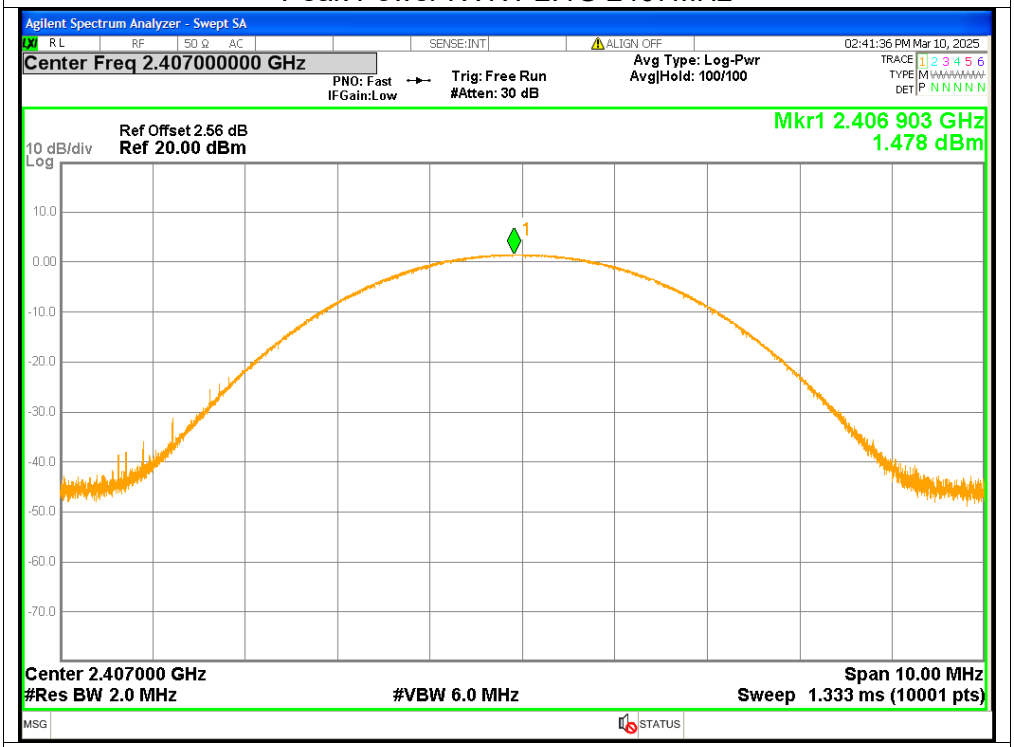


2. Maximum Peak Conducted Output Power

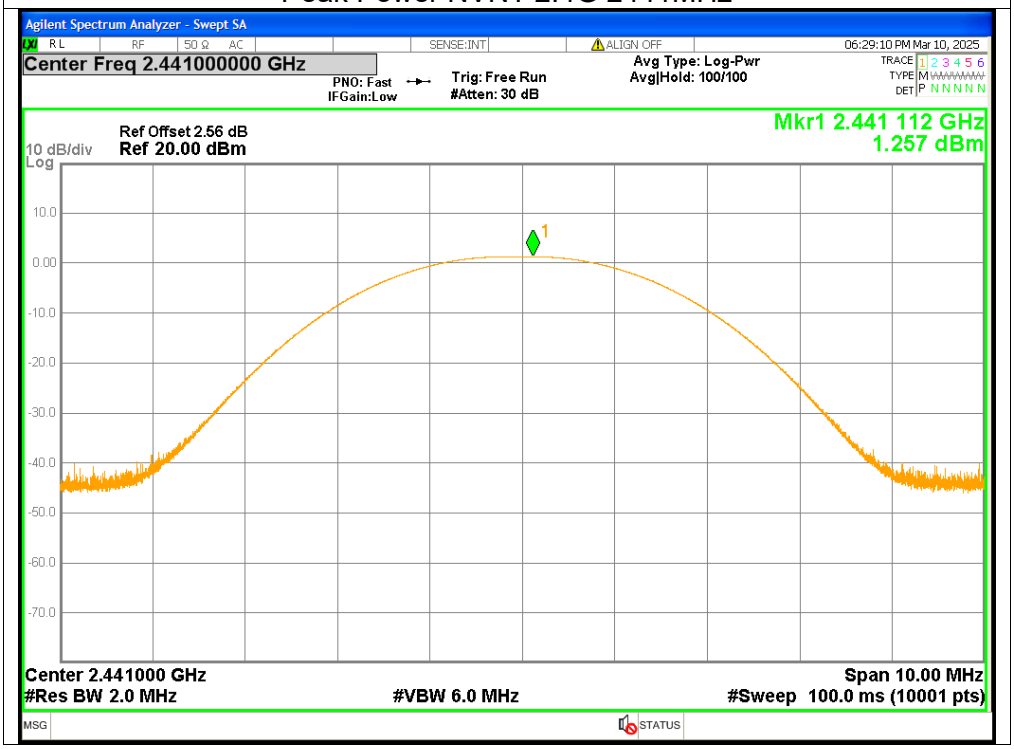
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2407	1.48	<=30	Pass
NVNT	2.4G	2441	1.26	<=30	Pass
NVNT	2.4G	2457	1.28	<=30	Pass

Test Graphs

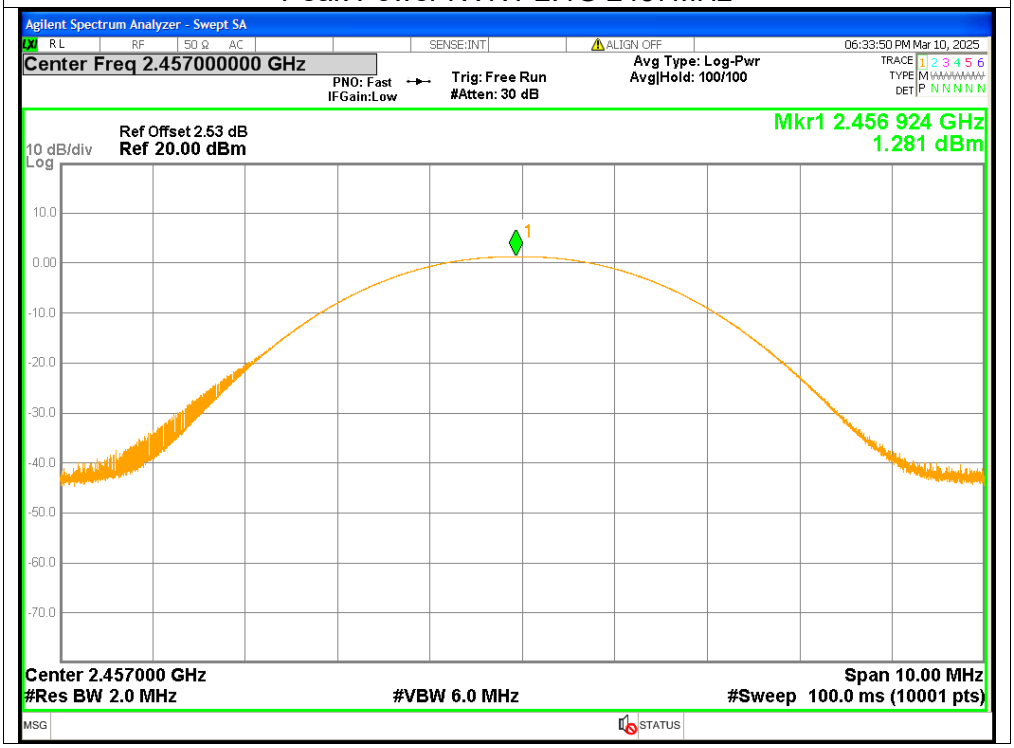
Peak Power NVNT 2.4G 2407MHz



Peak Power NVNT 2.4G 2441MHz



Peak Power NVNT 2.4G 2457MHz

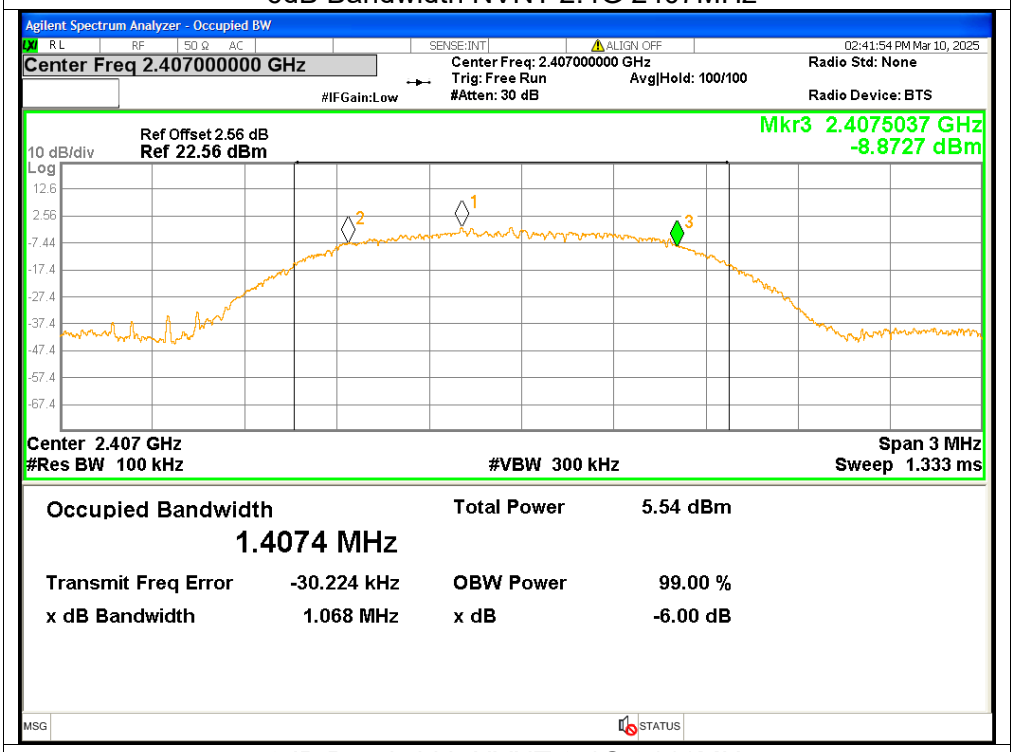


3. -6dB Bandwidth

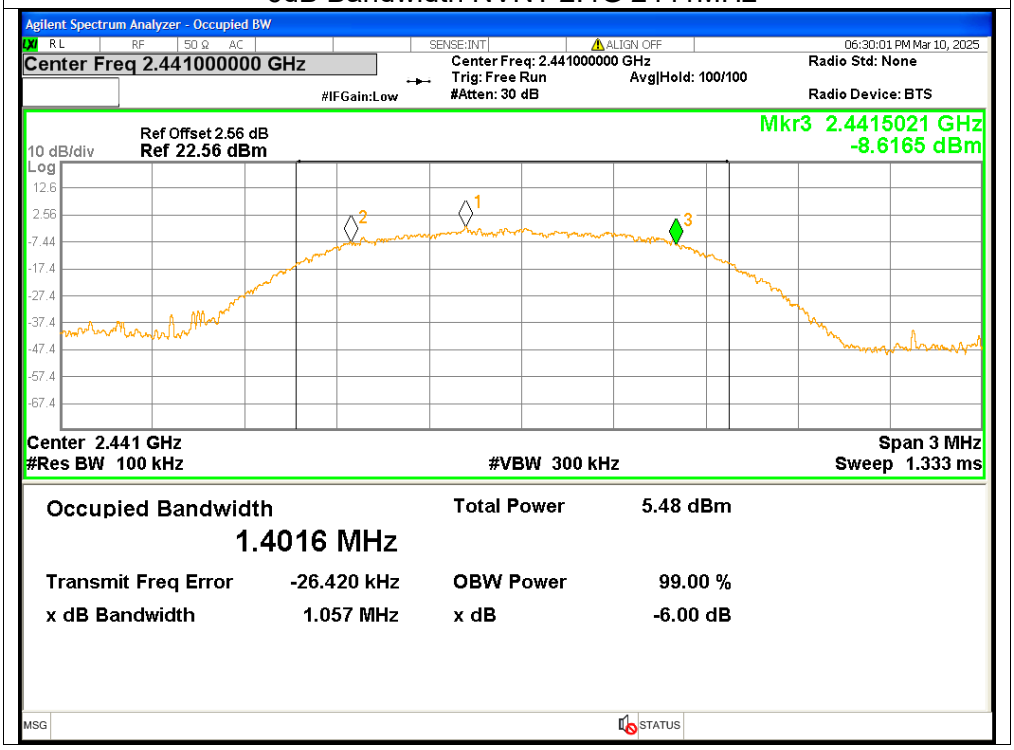
Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	2.4G	2407	1.068	>=0.5	Pass
NVNT	2.4G	2441	1.057	>=0.5	Pass
NVNT	2.4G	2457	0.9837	>=0.5	Pass

Test Graphs

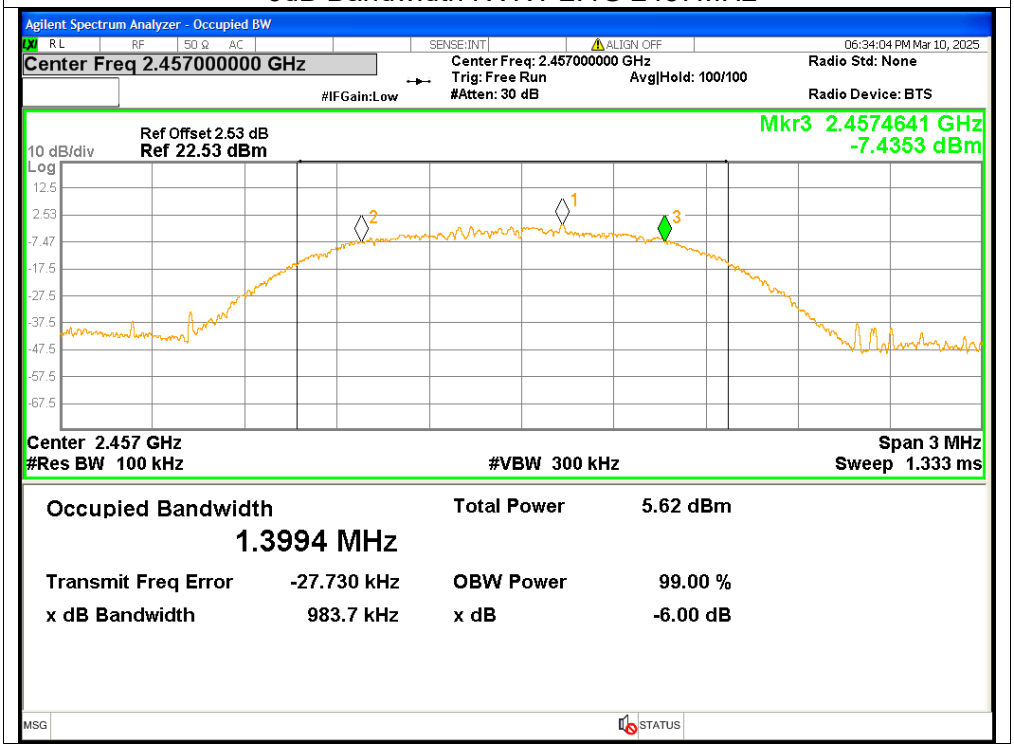
-6dB Bandwidth NVNT 2.4G 2407MHz



-6dB Bandwidth NVNT 2.4G 2441MHz



-6dB Bandwidth NVNT 2.4G 2457MHz

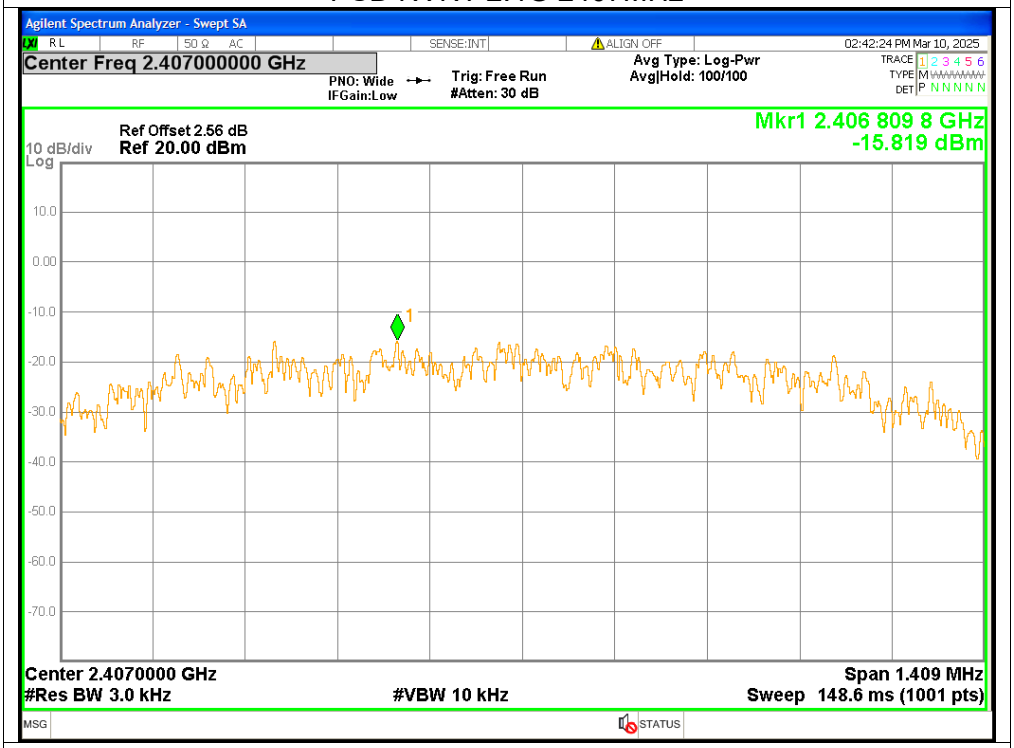


4. Maximum Power Spectral Density Level

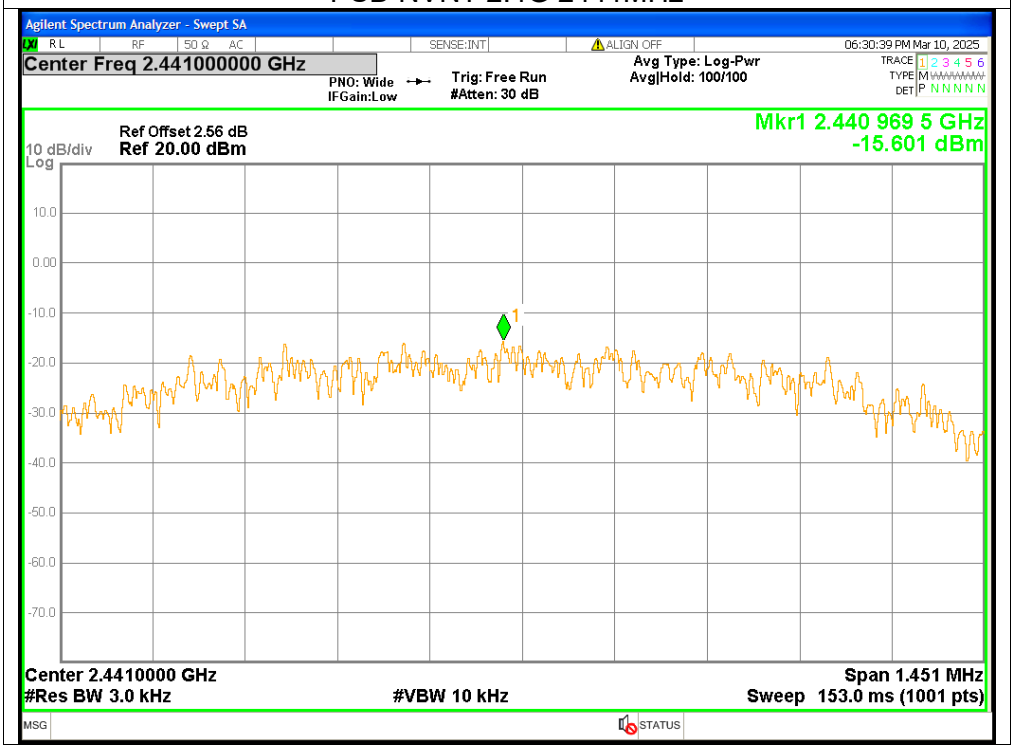
Condition	Mode	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	2.4G	2407	-15.82	<=8	Pass
NVNT	2.4G	2441	-15.6	<=8	Pass
NVNT	2.4G	2457	-15.92	<=8	Pass

Test Graphs

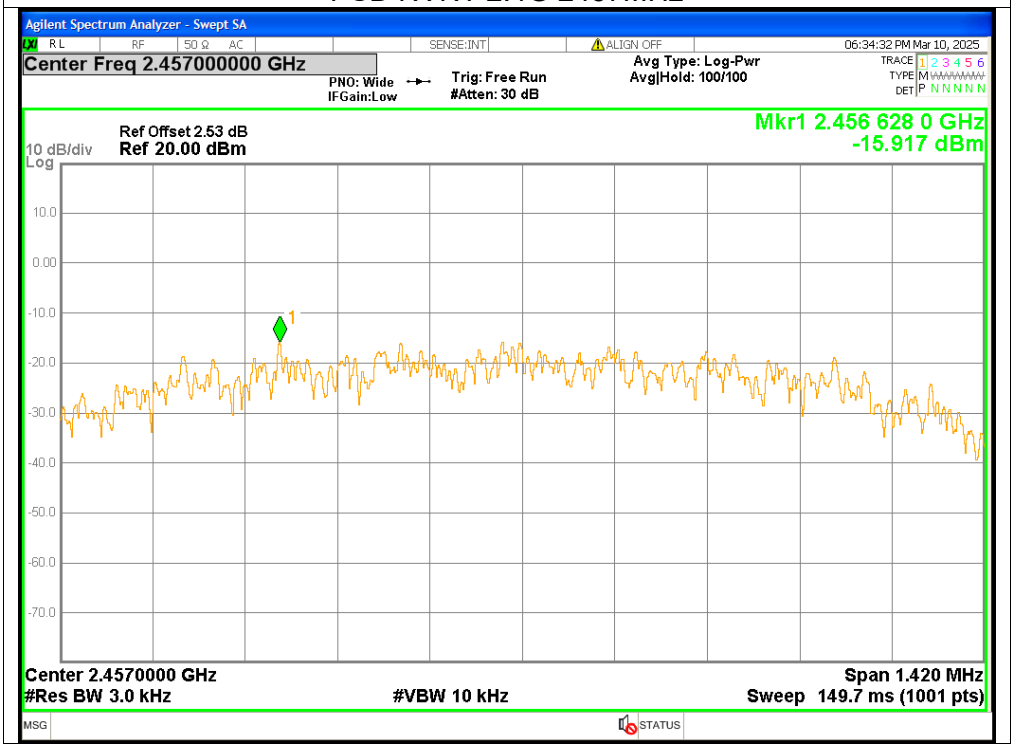
PSD NVNT 2.4G 2407MHz



PSD NVNT 2.4G 2441MHz



PSD NVNT 2.4G 2457MHz

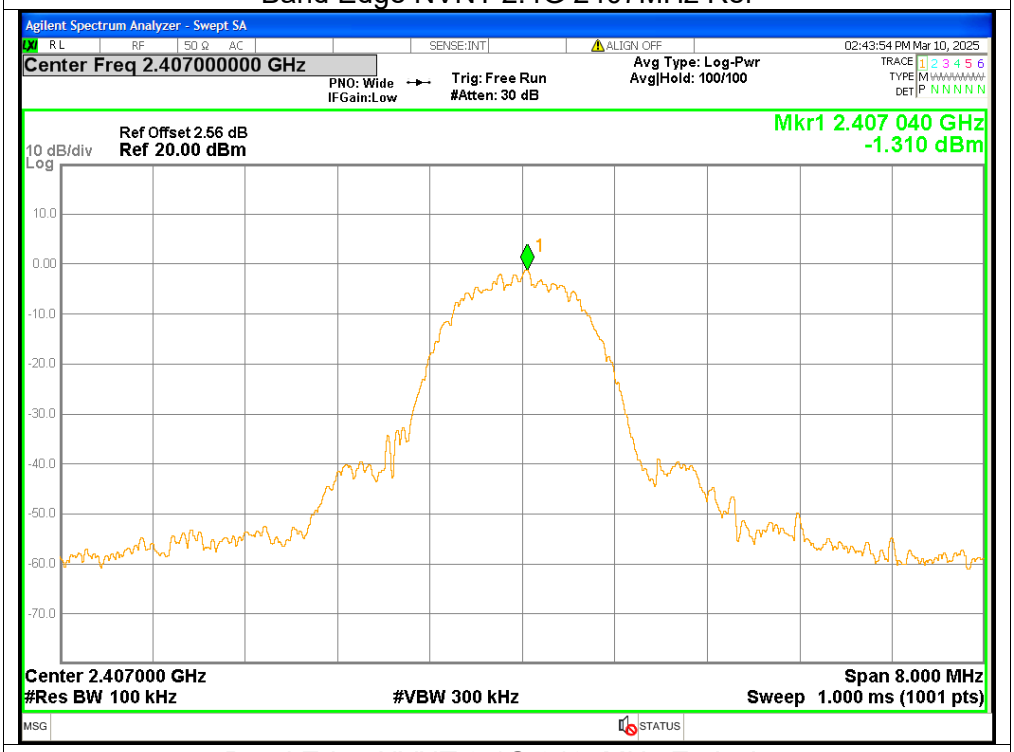


5. Band Edge

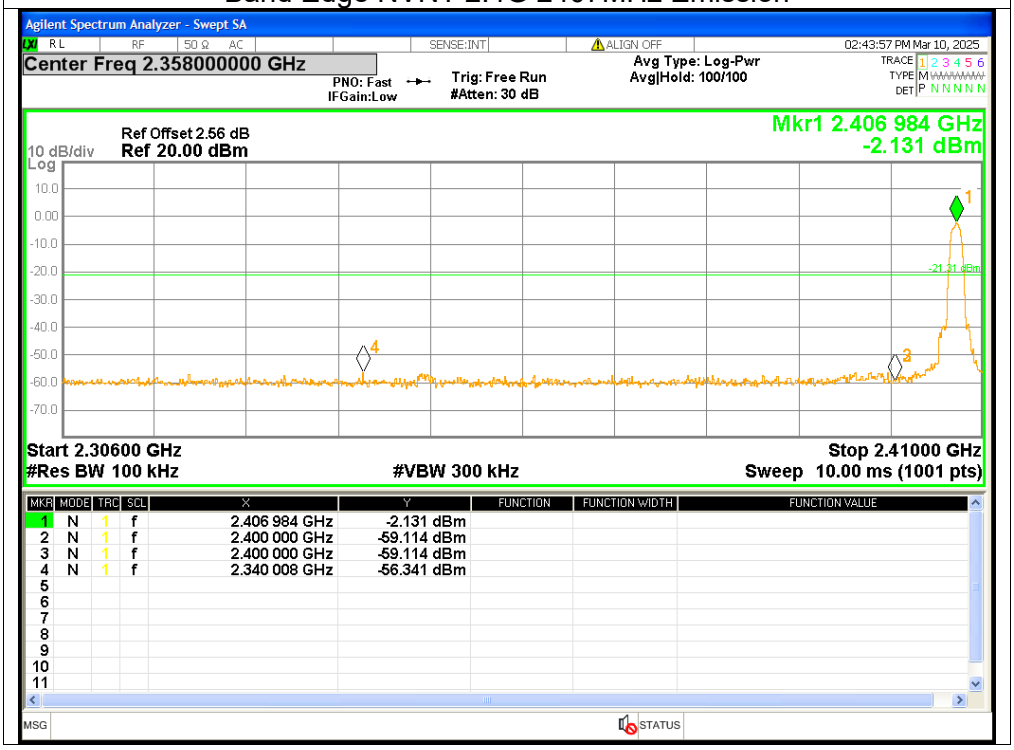
Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2.4G	2407	-55.03	<=-20	Pass
NVNT	2.4G	2457	-53.7	<=-20	Pass

Test Graphs

Band Edge NVNT 2.4G 2407MHz Ref

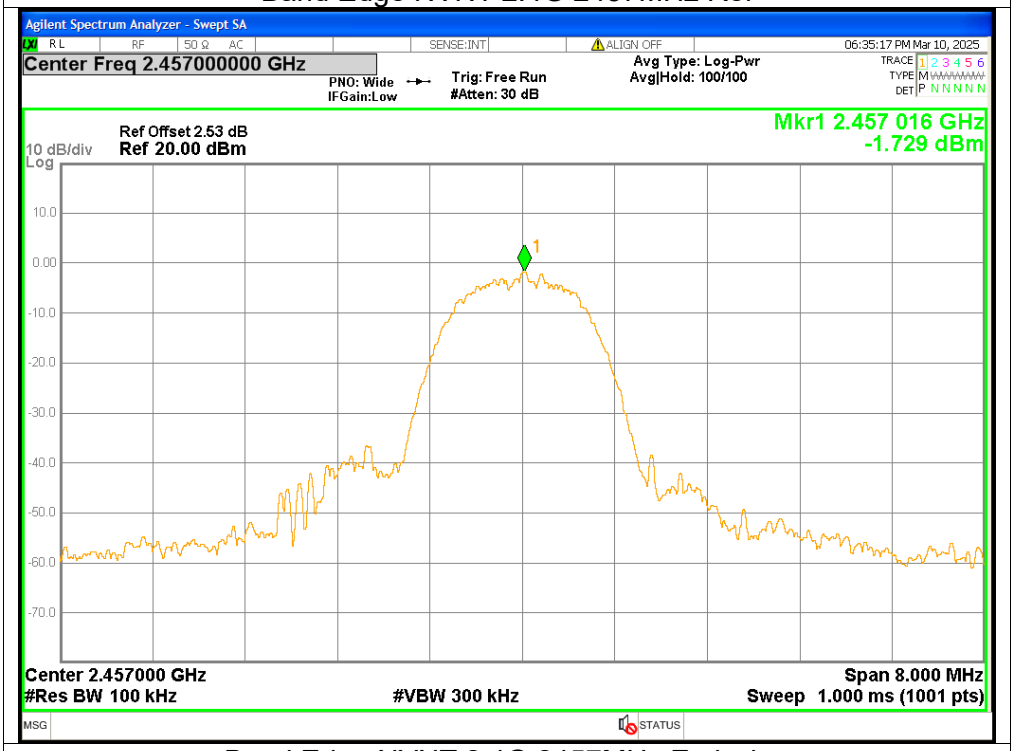


Band Edge NVNT 2.4G 2407MHz Emission

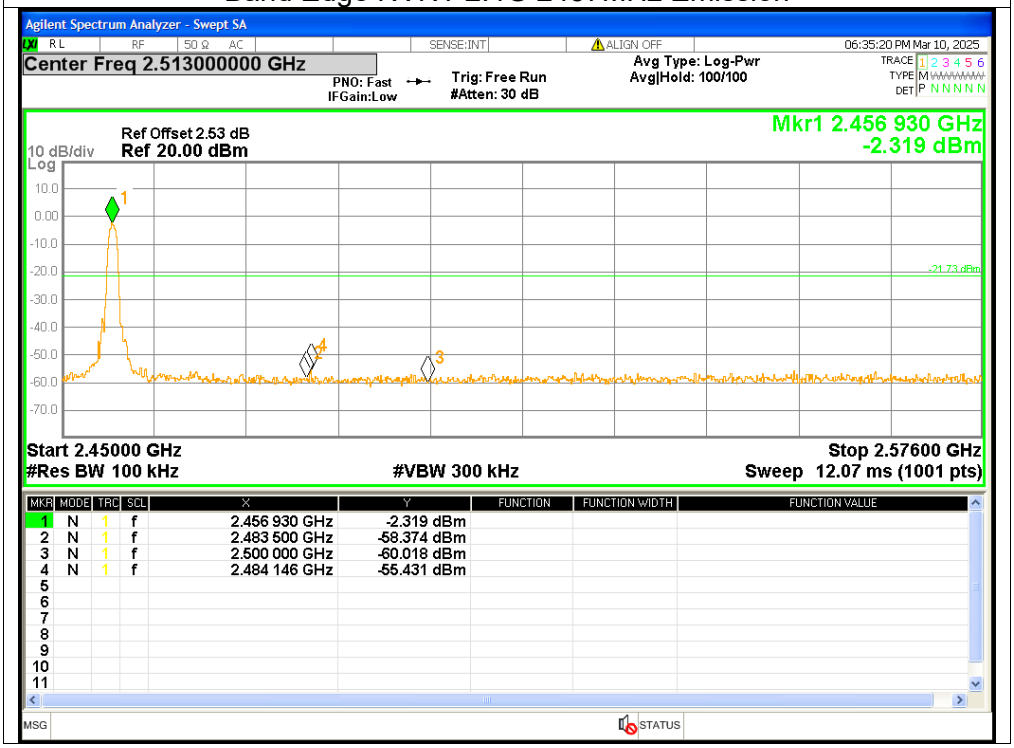


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.406 984 GHz	-2.131 dBm			
2	N	1	f	2.400 000 GHz	-59.114 dBm			
3	N	1	f	2.400 000 GHz	-59.114 dBm			
4	N	1	f	2.340 008 GHz	-56.341 dBm			
5								
6								
7								
8								
9								
10								
11								

Band Edge NVNT 2.4G 2457MHz Ref



Band Edge NVNT 2.4G 2457MHz Emission

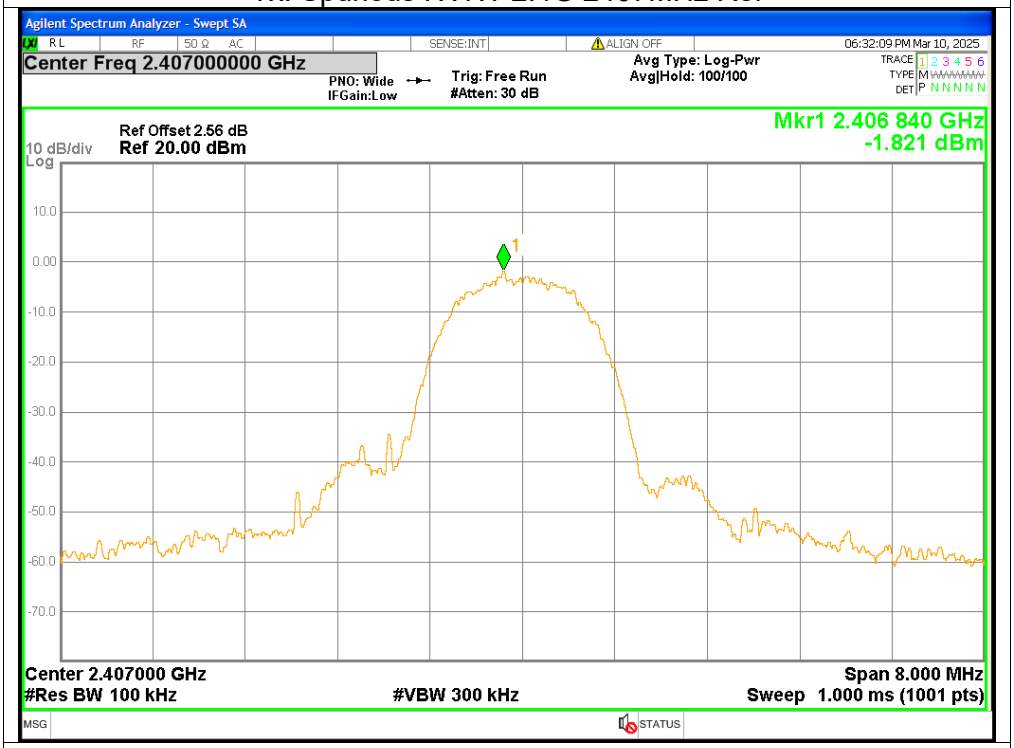


6. Conducted RF Spurious Emission

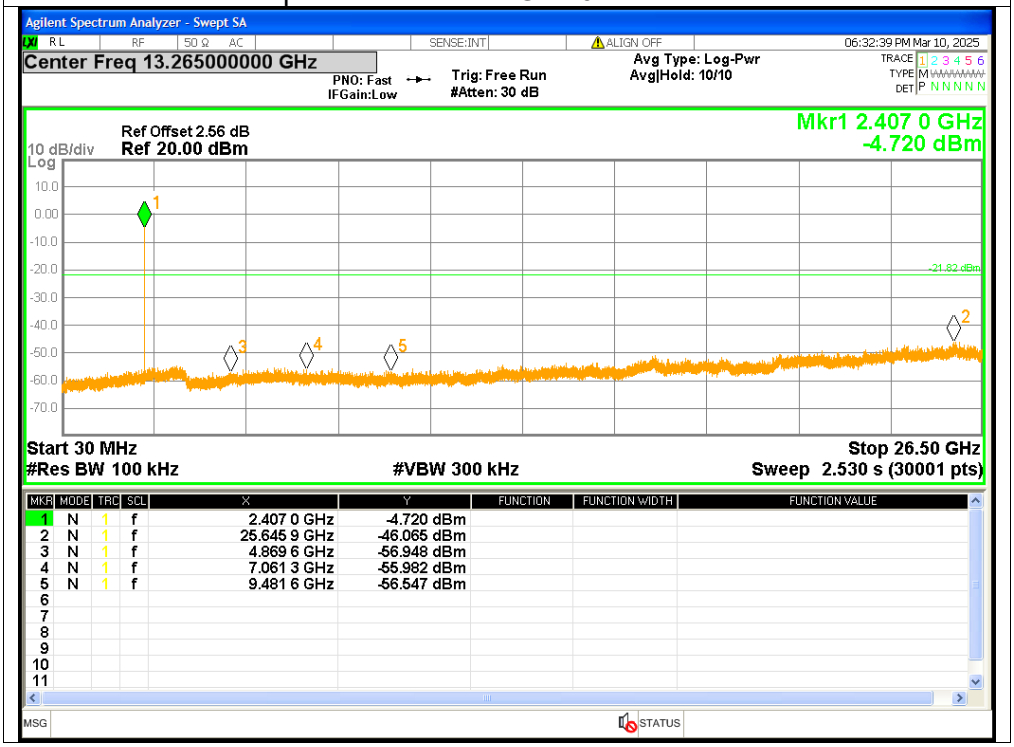
Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2.4G	2407	-44.24	<=-20	Pass
NVNT	2.4G	2441	-44.99	<=-20	Pass
NVNT	2.4G	2457	-45.19	<=-20	Pass

Test Graphs

Tx. Spurious NVNT 2.4G 2407MHz Ref

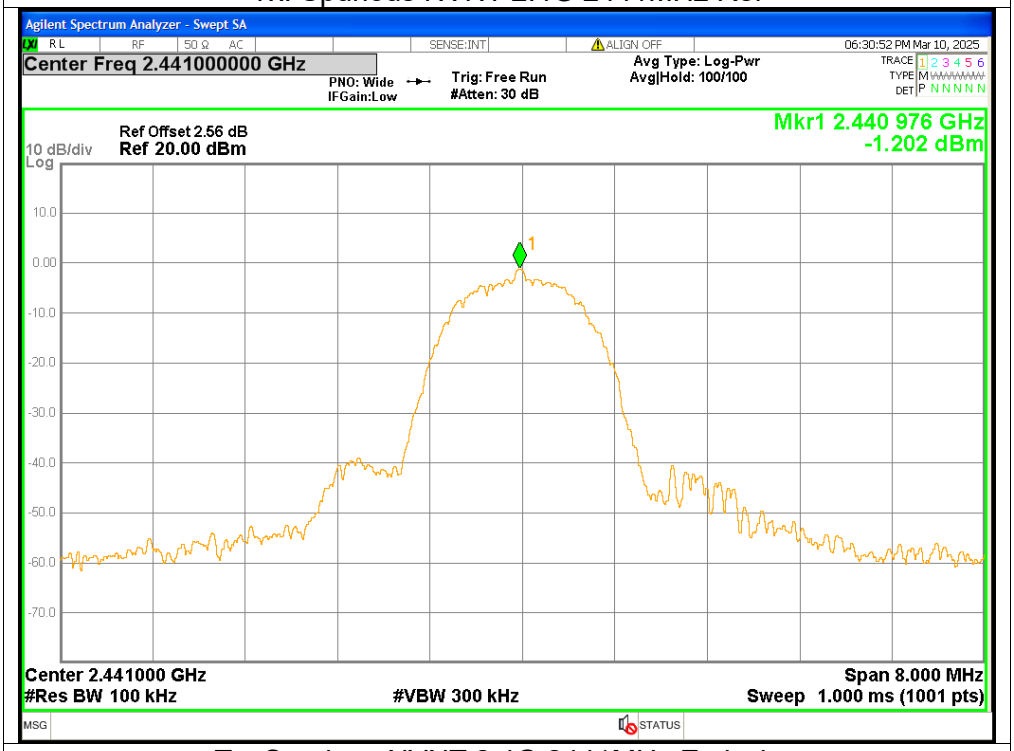


Tx. Spurious NVNT 2.4G 2407MHz Emission

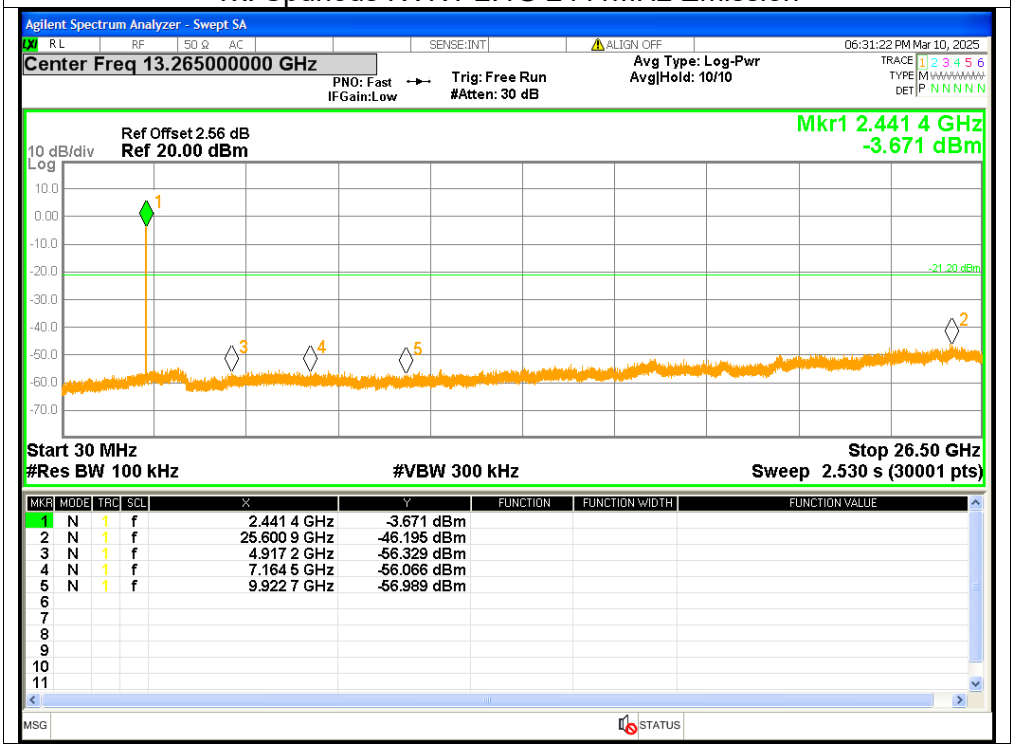


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.407 0 GHz	-4.720 dBm			
2	N	1	f	25.645 9 GHz	-46.065 dBm			
3	N	1	f	4.869 6 GHz	-56.948 dBm			
4	N	1	f	7.061 3 GHz	-55.982 dBm			
5	N	1	f	9.481 6 GHz	-56.547 dBm			
6								
7								
8								
9								
10								
11								

Tx. Spurious NVNT 2.4G 2441MHz Ref

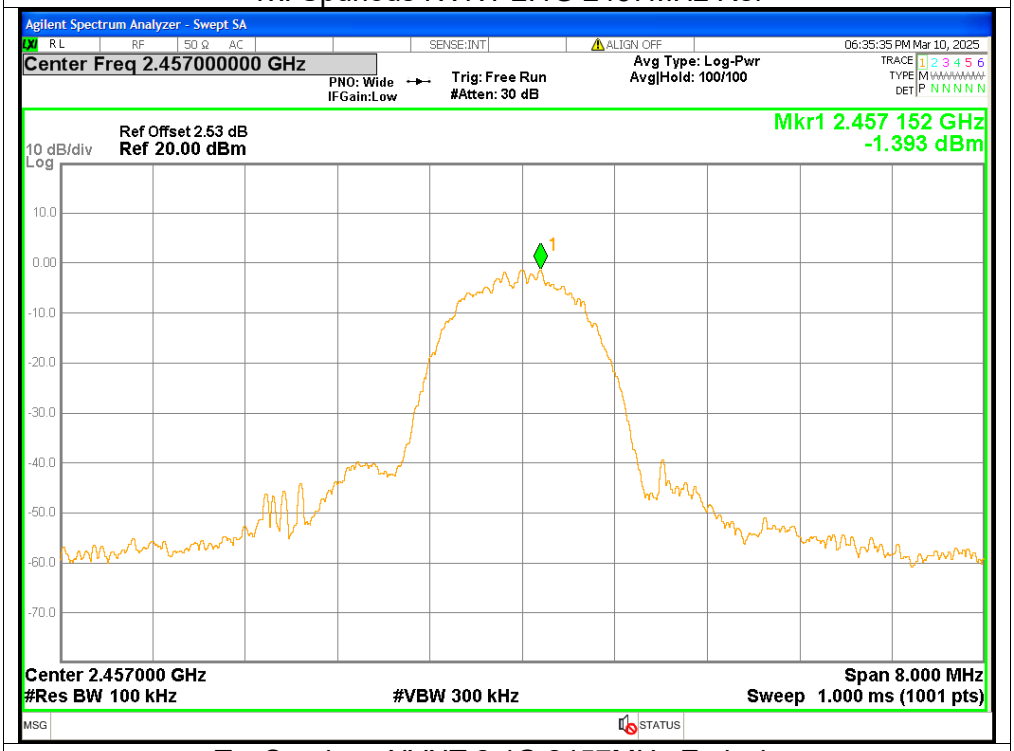


Tx. Spurious NVNT 2.4G 2441MHz Emission

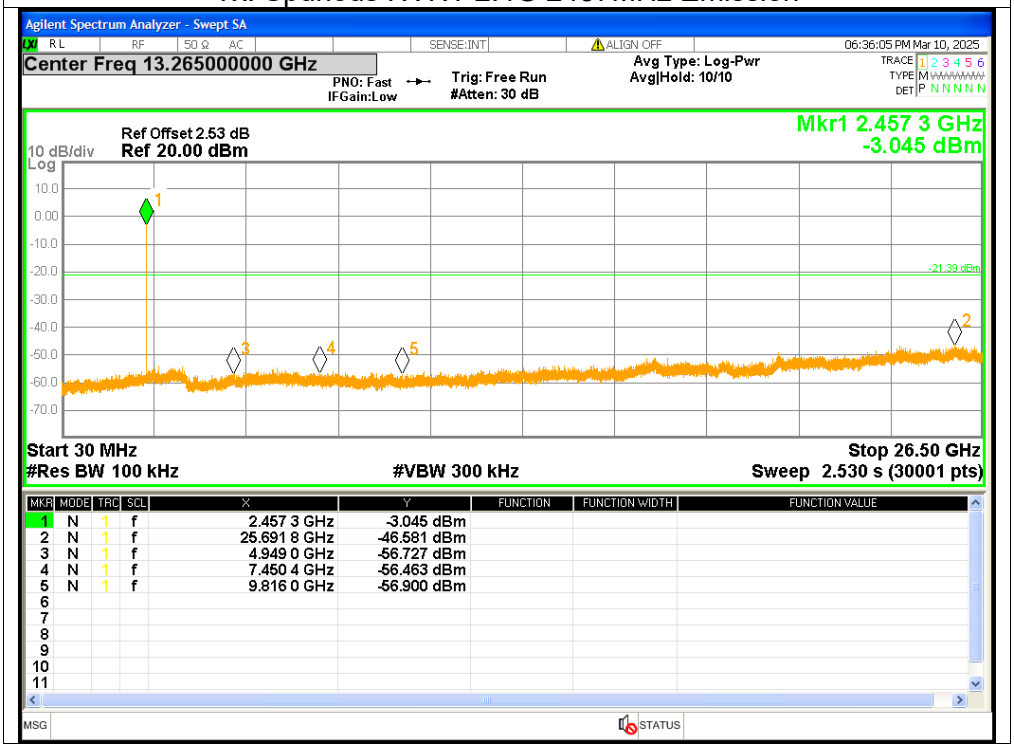


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.441 4 GHz	-3.671 dBm			
2	N	1	f	25.600 9 GHz	-46.195 dBm			
3	N	1	f	4.917 2 GHz	-56.329 dBm			
4	N	1	f	7.164 5 GHz	-56.066 dBm			
5	N	1	f	9.922 7 GHz	-56.989 dBm			
6								
7								
8								
9								
10								
11								

Tx. Spurious NVNT 2.4G 2457MHz Ref



Tx. Spurious NVNT 2.4G 2457MHz Emission



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.457 3 GHz	-3.045 dBm			
2	N	1	f	25.691 8 GHz	-46.581 dBm			
3	N	1	f	4.949 0 GHz	-56.727 dBm			
4	N	1	f	7.450 4 GHz	-56.463 dBm			
5	N	1	f	9.816 0 GHz	-56.900 dBm			
6								
7								
8								
9								
10								
11								