



FCC TEST REPORT

FCC ID:2BE9U-AP01

Report Number.....: ZKT-260810L0535E-2

Date of Test.....: July 28, 2026 to Aug. 12, 2026

Date of issue.....: Aug. 12, 2026

Total number of pages.....: 66

Test Result: PASS

Testing Laboratory.....: Shenzhen ZKT Technology Co., Ltd.

Address: 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name: Shenzhen Huadai Technology Co., Ltd

Address: A308, Fuji Industrial Park, No.33 Liuhe Road, Henggang Street, Longgang District, Shenzhen, China

Manufacturer's name: Shenzhen Huadai Technology Co., Ltd

Address: A308, Fuji Industrial Park, No.33 Liuhe Road, Henggang Street, Longgang District, Shenzhen, China

Test specification:

Standard.....: FCC CFR Title 47 Part 15 Subpart C Section 15.247
ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Erratato
C63.10a-2024

Test procedure.....: /

Non-standard test method: N/A

Test Report Form No.....: TRF-EL-111_V0

Test Report Form(s) Originator.....: ZKT Testing

Master TRF: Dated: 2020-01-06

This device described above has been tested by ZKT, and 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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Product name.....: Smart Watch

Trademark: N/A

Model/Type reference.....: AP01

Ratings.....: Input: DC 5V,0.5A
Output: DC 3.8V,0.2A



Testing procedure and testing location:

Testing Laboratory.....: Shenzhen ZKT Technology Co., Ltd.

Address.....: 1/F, No. 101, Building B, No. 6, Tangwei Community
Industrial Avenue, Fuhai Street, Bao'an District,
Shenzhen, China

Tested by (name + signature).....: Jim Liu

Reviewer (name + signature).....: Jackson Fang

Approved (name + signature).....: Lake Xie





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1. VERSION

Report No.	Version	Description	Approved
ZKT-260810L0535E-2	Rev.01	Initial issue of report	Aug. 12, 2026



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
FCC part 15.203/15.247(c)	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.247 (b)(3)	Conducted Peak Output Power	PASS	
FCC part 15.247 (a)(2)	6DB Occupied Bandwidth	PASS	
FCC part 15.247 (e)	Power Spectral Density	PASS	
FCC part 15.247 (d)	Conducted Band Edge & Unwanted Spurious Emission	PASS	
FCC part 15.205/15.209	Radiated Band Edge & Unwanted Spurious Emission	PASS	
ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Erratato C63.10a-2024	Duty Cycle	PASS	

NOTE:

- 1) "N/A" denotes test is not applicable in this Test Report



2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.

Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 927491

Designation Number: CN1431

IC Registered No.: 27033

CAB identifier: CN0110

Designation Number: CN0110

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded 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	3m camber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.93dB
7	RF power conducted	U=1.93dB
8	RF conducted Spurious Emission	U=1.96dB
9	RF Occupied Bandwidth	U=3.11kHz
10	RF Power Spectral Density	U=1.93dB
11	humidity uncertainty	U=2.3%
12	Temperature uncertainty	U=0.3℃
13	Duty Cycle	U=1.3dB



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Smart Watch
Trade Mark:	N/A
Model No.:	AP01
Serial No.:	N/A
Model Different.:	N/A
Hardware Version:	V1.0
Software Version:	V1.04
Sample(s) Status:	Engineer sample
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	40 Channels
Channel Spacing:	2MHz
Modulation Technology:	GFSK
Antenna Type:	Internal Antenna
Antenna Gain:	-0.76dBi
Power Supply:	DC 5V,0.5A
Battery Capacity:	Model: 551820 Brand: N/A Rated Voltage: 3.8V Charge Limit Voltage: 4.35V Capacity: 210mAh Manufacturer: SHENZHEN AB TECHNOLOGY CO.,LTD.

Note1: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

Note2: The EUT's all information provided by client.



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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

3.2 DESCRIPTION OF TEST MODES

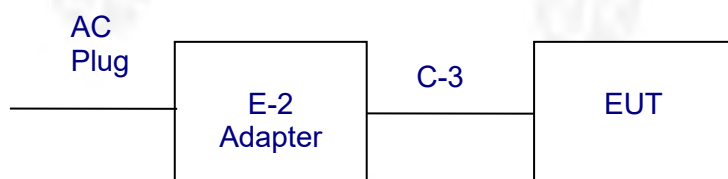
Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data. For battery operated equipment, the equipment tests shall be performed using a new battery.	

Test Software & Version	bt_tool_v1.1.2
Mode	Power setting
BLE 1M – GFSK BLE 2M – GFSK	7

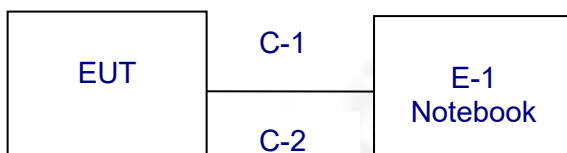


3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

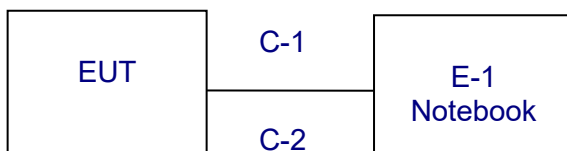
Conducted Emission



Radiated Emission



Conducted Spurious



3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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	HP	ST2	N/A
E-2	Adapter	UGREEN	X569	N/A
C-1	Serial port board	WAVGAT	CH340G	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) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Conduction Emissions Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	N/A	Sep. 23, 2025	Sep. 22, 2026
2	LISN	CYBERTEK	EM5040A	E1850400149	N/A	Sep. 19, 2025	Sep. 18, 2026
3	Test Cable	N/A	C-01	N/A	N/A	May 22, 2026	May 21, 2027
4	EMI Test Receiver	R&S	ESCI3	101393	4.42 SP3	Oct. 24, 2025	Oct. 23, 2026
5	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	N/A	\	\

Radiation Emissions & Radiation Spurious Emissions Test

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	N9020A	MY55370835	A.17.05	Sep. 20, 2025	Sep. 19, 2026
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Sep. 20, 2025	Sep. 19, 2026
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	100969	4.32	Oct. 24, 2025	Oct. 23, 2026
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	00877	N/A	Sep. 20, 2025	Sep. 19, 2026
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	N/A	Sep. 20, 2025	Sep. 19, 2026
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	N/A	Sep. 30, 2025	Sep. 29, 2026
7	Loop Antenna	TESEQ	HLA6121	58357	N/A	Sep. 20, 2025	Sep. 19, 2026
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	60747	N/A	Sep. 19, 2025	Sep. 18, 2026
9	Amplifier (1GHz-26.5GHz)	HuiPu	8449B	3008A00315	N/A	Sep. 19, 2025	Sep. 18, 2026
10	Amplifier (500MHz-40GHz)	QuanJuDa	DLE-161	097	N/A	Oct. 24, 2025	Oct. 23, 2026
11	Test Cable	N/A	R-01	N/A	N/A	May 25, 2026	May 24, 2027
12	Test Cable	N/A	R-02	N/A	N/A	May 25, 2026	May 24, 2027
13	Test Cable	N/A	R-03	N/A	N/A	May 25, 2026	May 24, 2027
14	D.C. Power Supply	LongWei	TPR-6405D	N/A	N/A	\	\
15	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	N/A	\	\
16	Turntable	MF	MF-7802BS	N/A	N/A	\	\
17	Antenna tower	MF	MF-7802BS	N/A	N/A	\	\



RF Conducted Test

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	N9020A	MY55370835	A.17.05	Sep. 20, 2025	Sep. 19, 2026
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Sep. 20, 2025	Sep. 19, 2026
3	Test Cable	N/A	RF-01	N/A	N/A	May 25, 2026	May 24, 2027
4	Test Cable	N/A	RF-02	N/A	N/A	May 25, 2026	May 24, 2027
5	Test Cable	N/A	RF-03	N/A	N/A	May 25, 2026	May 24, 2027
6	ESG Signal Generator	Agilent	E4421B	N/A	B.03.84	Sep. 19, 2025	Sep. 18, 2026
7	Signal Generator	Agilent	N5182A	N/A	A.01.87	Sep. 20, 2025	Sep. 19, 2026
8	Magnetic Field Probe Tester	Narda	ELT-400	0-0344/M-1752	N/A	Sep. 25, 2025	Sep. 24, 2026
9	SHIELD BOX	TESCOM	TC-5970C	5970C015553	N/A	Dec. 18, 2025	Dec. 17, 2026
10	Wideband Radio Communication Test	R&S	CMW500	106504	V 3.7.22	Sep. 28, 2025	Sep. 27, 2026
11	MWRF Power Meter Test system	MW	MW100-RF CB	N/A	N/A	Sep. 19, 2025	Sep. 18, 2026
12	D.C. Power Supply	LongWei	TPR-6405 D	N/A	N/A	\	\
13	RF Software	MW	MTS8310	V2.0.0.0	N/A	\	\



4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Erratato C63.10a-2024
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quas-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) *Decreases with the logarithm of the frequency.

4.1.2 TEST PROCEDURE

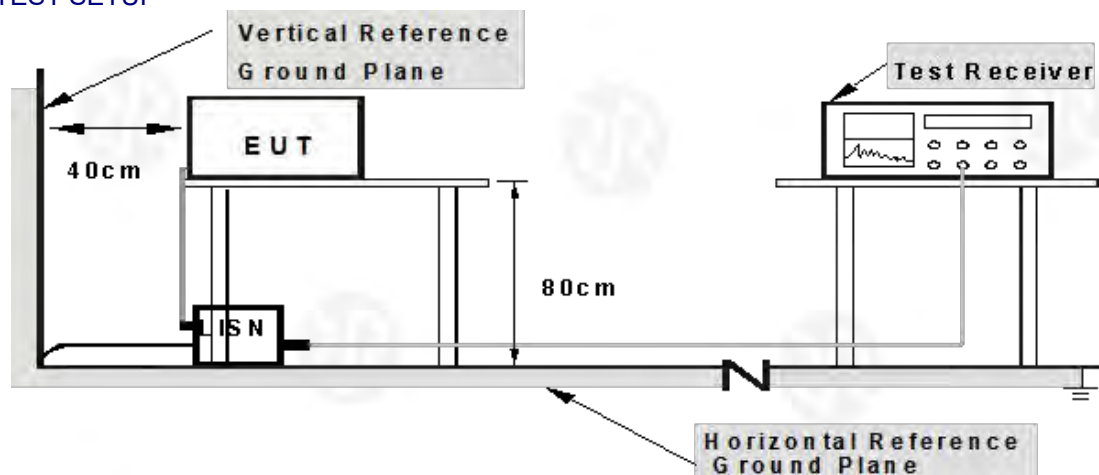
- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation



4.1.4 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 from other units and other metal planes

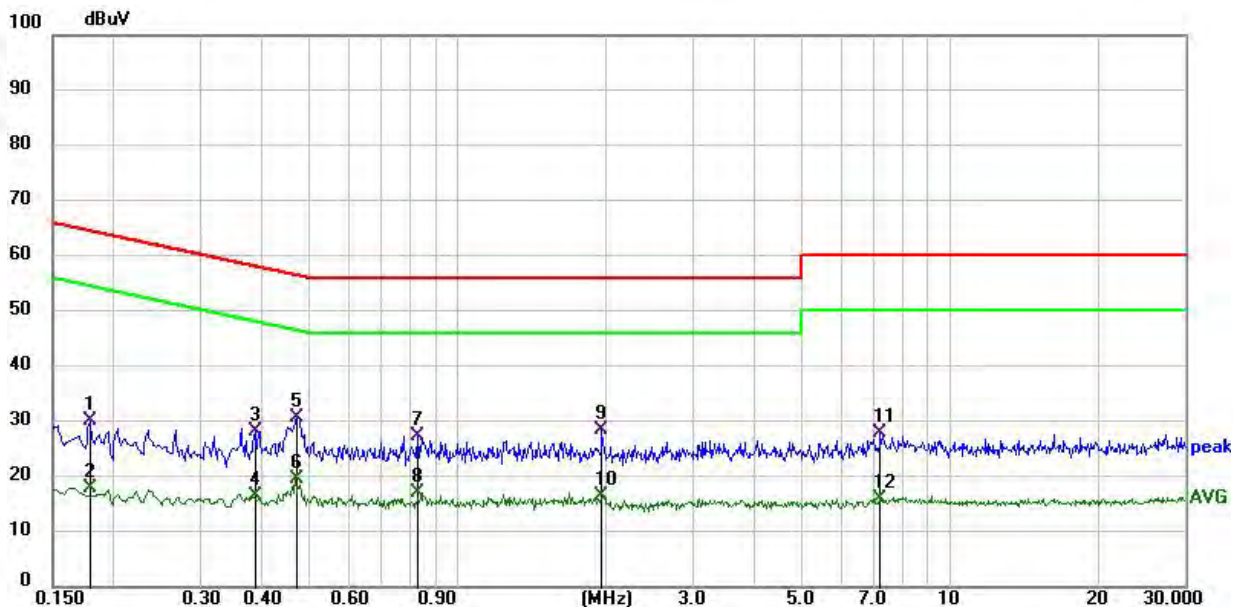
4.1.5 EUT OPERATING CONDITIONS

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.



4.1.6 TEST RESULT

Temperature:	25.8°C	Relative Humidity:	48.9%
Pressure:	101 kPa	Polarization:	L
Test Voltage:	AC 120V/60Hz	Test Mode:	TX GFSK - 2480MHz



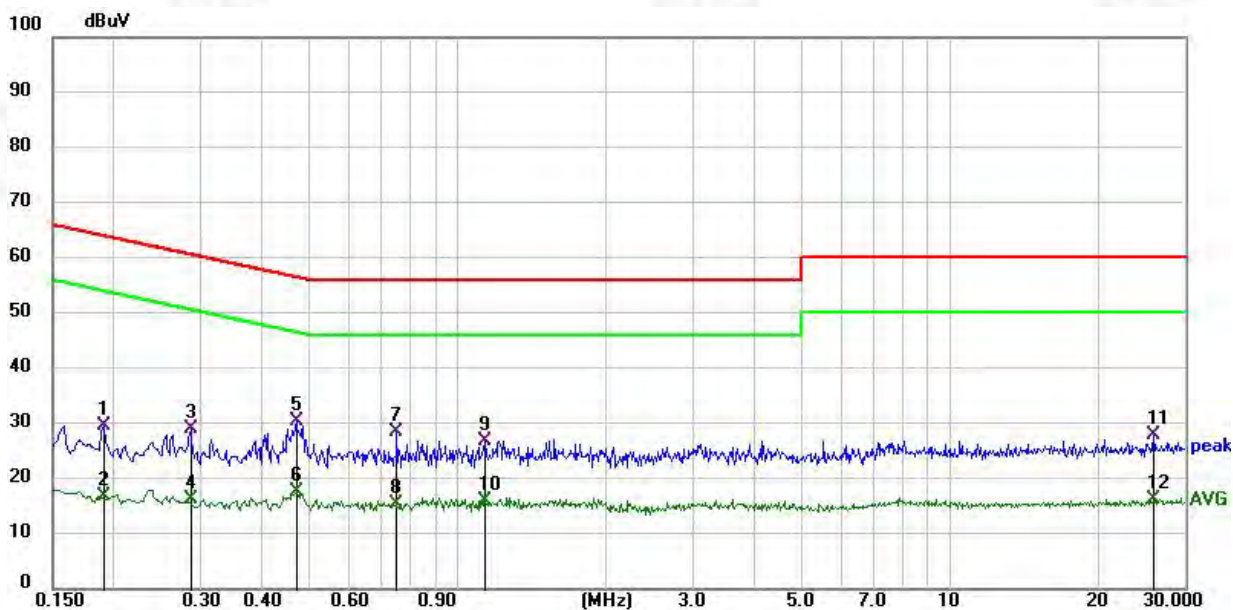
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1780	10.74	19.38	30.12	64.58	-34.46	QP
2	0.1780	-1.37	19.38	18.01	54.58	-36.57	AVG
3	0.3860	8.94	19.38	28.32	58.15	-29.83	QP
4	0.3860	-2.84	19.38	16.54	48.15	-31.61	AVG
5	0.4700	11.42	19.39	30.81	56.51	-25.70	QP
6	0.4700	0.33	19.39	19.72	46.51	-26.79	AVG
7	0.8260	8.02	19.36	27.38	56.00	-28.62	QP
8	0.8260	-2.38	19.36	16.98	46.00	-29.02	AVG
9	1.9540	9.13	19.35	28.48	56.00	-27.52	QP
10	1.9540	-2.80	19.35	16.55	46.00	-29.45	AVG
11	7.2100	8.43	19.47	27.90	60.00	-32.10	QP
12	7.2100	-3.37	19.47	16.10	50.00	-33.90	AVG

Notes:

- 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2.Quasi - Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3.Final Level = Reading level + Correct Factor.
- 4.Correct Factor = Liss factor+ Cable loss factor + limiter factor.
- 5.Margin = Measurement Level-Limit.
- 6.The test data shows only the worst case TX GFSK - 2480MHz.



Temperature:	25.8°C	Relative Humidity:	48.9%
Pressure:	101 kPa	Polarization:	N
Test Voltage:	AC 120V/60Hz	Test Mode:	TX GFSK - 2480MHz



	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1900	10.16	19.38	29.54	64.04	-34.50	QP
2	0.1900	-2.49	19.38	16.89	54.04	-37.15	AVG
3	0.2860	9.51	19.38	28.89	60.64	-31.75	QP
4	0.2860	-3.16	19.38	16.22	50.64	-34.42	AVG
5	0.4700	11.12	19.34	30.46	56.51	-26.05	QP
6	0.4700	-1.67	19.34	17.67	46.51	-28.84	AVG
7	0.7500	8.93	19.41	28.34	56.00	-27.66	QP
8	0.7500	-3.87	19.41	15.54	46.00	-30.46	AVG
9	1.1340	7.48	19.39	26.87	56.00	-29.13	QP
10	1.1340	-3.28	19.39	16.11	46.00	-29.89	AVG
11	25.7660	8.08	19.71	27.79	60.00	-32.21	QP
12	25.7660	-3.48	19.71	16.23	50.00	-33.77	AVG

Notes:

- 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2.Quasi - Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3.Final Level = Reading level + Correct Factor.
- 4.Correct Factor = Lissn factor+ Cable loss factor + limiter factor.
- 5.Margin = Measurement Level-Limit.
- 6.The test data shows only the worst case TX GFSK - 2480MHz.



4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Erratato C63.10a-2024				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Average	1MHz	3MHz	Average

4.2.1 RADIATED EMISSION LIMITS

Frequencies (MHz)	Field Strength (micровolts/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

Frequency (MHz)	Limit (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).



4.2.2 TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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 then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Note:

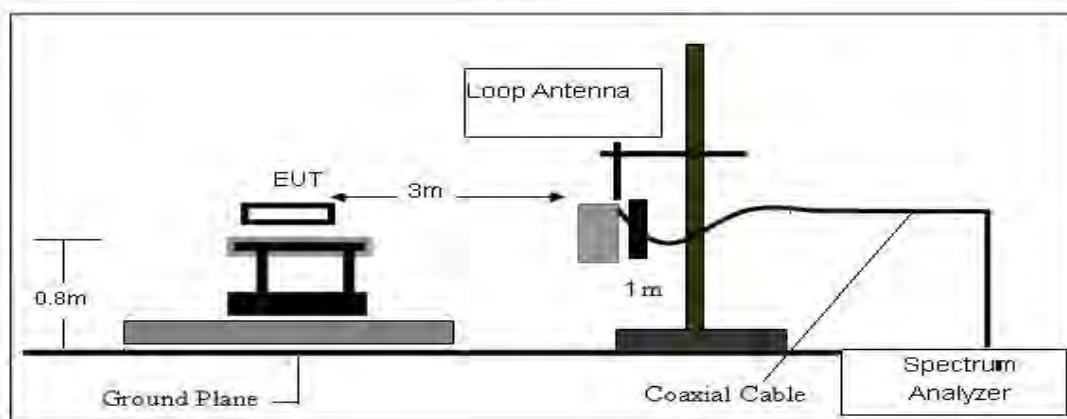
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

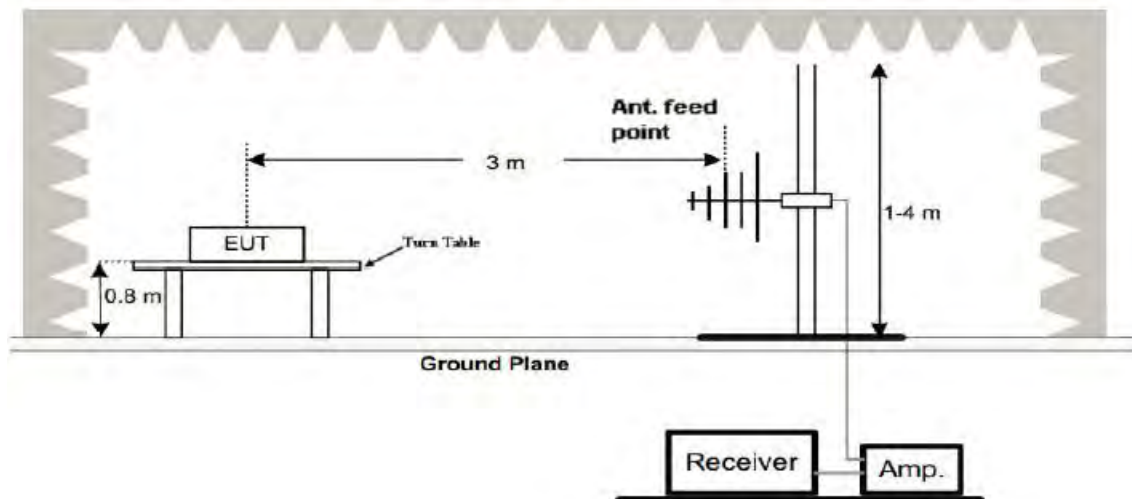
4.2.4 TEST SETUP

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

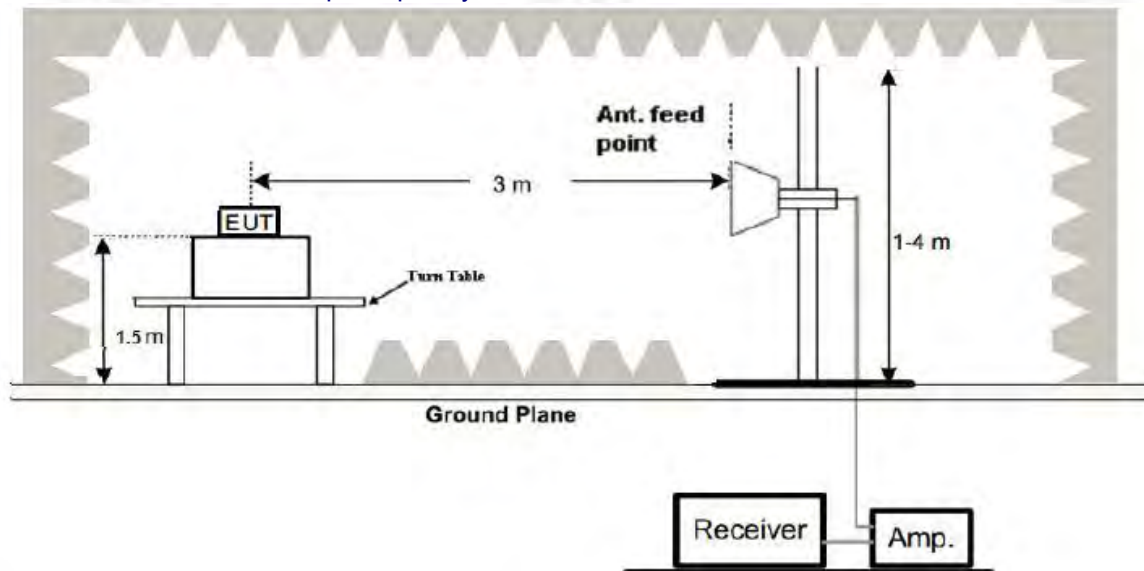




(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



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



4.2.5 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.

4.2.6 TEST RESULTS

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.



Between 30MHz – 1GHz

1M PHY

Temperature:	23.7°C	Relative Humidity:	60%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz	Test Mode :	TX GFSK - 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	199.7500	60.84	-21.11	39.73	43.50	-3.77	QP
2	276.3800	47.49	-15.49	32.00	46.00	-14.00	QP
3	292.8700	55.02	-15.06	39.96	46.00	-6.04	QP
4	399.5700	44.23	-11.16	33.07	46.00	-12.93	QP
5	533.4300	45.28	-7.25	38.03	46.00	-7.97	QP
6	732.2800	45.59	-2.39	43.20	46.00	-2.80	QP

Remarks:

1. An initial pre-scan was performed on the peak detector.
2. Quasi - Peak measurement were performed at the frequencies with maximized peak emission.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Final Level = Reading level + Correct Factor.
5. Correct Factor = Antenna factor+ Cable loss factor - Amplifier factor.
6. Margin = Measurement Level-Limit.
7. The test data shows only the worst case TX GFSK - 2480MHz.



Temperature:	23.7°C	Relative Humidity:	60%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz	Test Mode :	TX GFSK - 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.2893	35.51	-13.51	22.00	40.00	-18.00	QP
2	38.8878	38.88	-17.44	21.44	40.00	-18.56	QP
3	198.5880	56.07	-21.12	34.95	43.50	-8.55	QP
4	230.7900	46.10	-19.05	27.05	46.00	-18.95	QP
5	377.2600	44.96	-12.33	32.63	46.00	-13.37	QP
6	798.2400	37.04	-2.03	35.01	46.00	-10.99	QP

- Remarks:
1. An initial pre-scan was performed on the peak detector.
 2. Quasi - Peak measurement were performed at the frequencies with maximized peak emission.
 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
 4. Final Level = Reading level + Correct Factor.
 5. Correct Factor= Antenna factor+ Cable loss factor - Amplifier factor.
 6. Margin= Measurement Level-Limit.
 7. The test data shows only the worst case TX GFSK - 2480MHz.



2M PHY

Temperature:	23.7°C	Relative Humidity:	60%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz	Test Mode :	TX GFSK - 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	198.5880	55.90	-21.12	34.78	43.50	-8.72	QP
2	243.3772	51.95	-17.32	34.63	46.00	-11.37	QP
3	288.0200	47.88	-15.26	32.62	46.00	-13.38	QP
4	399.5700	46.26	-11.16	35.10	46.00	-10.90	QP
5	531.4900	43.34	-7.37	35.97	46.00	-10.03	QP
6	730.3400	43.77	-2.46	41.31	46.00	-4.69	QP

Remarks:

1. An initial pre-scan was performed on the peak detector.
2. Quasi - Peak measurement were performed at the frequencies with maximized peak emission.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Final Level = Reading level + Correct Factor.
5. Correct Factor = Antenna factor+ Cable loss factor - Amplifier factor.
6. Margin = Measurement Level-Limit.
7. The test data shows only the worst case TX GFSK - 2480MHz.



Temperature:	23.7°C	Relative Humidity:	60%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz	Test Mode :	TX GFSK - 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.2892	34.98	-13.51	21.47	40.00	-18.53	QP
2	199.7500	51.77	-21.11	30.66	43.50	-12.84	QP
3	237.4760	48.95	-18.37	30.58	46.00	-15.42	QP
4	398.6000	43.35	-11.20	32.15	46.00	-13.85	QP
5	565.4400	33.73	-5.55	28.18	46.00	-17.82	QP
6	799.2100	38.23	-2.04	36.19	46.00	-9.81	QP

Remarks:

1. An initial pre-scan was performed on the peak detector.
2. Quasi - Peak measurement were performed at the frequencies with maximized peak emission.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Final Level = Reading level + Correct Factor.
5. Correct Factor= Antenna factor+ Cable loss factor - Amplifier factor.
6. Margin= Measurement Level-Limit.
7. The test data shows only the worst case TX GFSK - 2480MHz.



1GHz~25GHz

BLE 1M

Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type	Polar
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)		(H/V)

GFSK Low Channel:2402MHz

4804.00	54.76	30.55	5.77	24.66	54.64	74.00	-19.36	Pk	V
4804.00	43.15	30.55	5.77	24.66	43.03	54.00	-10.97	AV	V
7206.00	50.70	30.33	6.32	24.55	51.24	74.00	-22.76	Pk	V
7206.00	43.25	30.33	6.32	24.55	43.79	54.00	-10.21	AV	V
9608.00	52.42	30.85	7.45	24.69	53.71	74.00	-20.29	Pk	V
9608.00	43.92	30.85	7.45	24.69	45.21	54.00	-8.79	AV	V
12010.00	53.62	31.02	8.99	25.57	57.16	74.00	-16.84	Pk	V
12010.00	43.55	31.02	8.99	25.57	47.09	54.00	-6.91	AV	V
4804.00	53.05	30.55	5.77	24.66	52.93	74.00	-21.07	Pk	H
4804.00	43.24	30.55	5.77	24.66	43.12	54.00	-10.88	AV	H
7206.00	51.95	30.33	6.32	24.55	52.49	74.00	-21.51	Pk	H
7206.00	43.06	30.33	6.32	24.55	43.60	54.00	-10.40	AV	H
9608.00	50.65	30.85	7.45	24.69	51.94	74.00	-22.06	Pk	H
9608.00	43.84	30.85	7.45	24.69	45.13	54.00	-8.87	AV	H
12010.00	53.77	31.02	8.99	25.57	57.31	74.00	-16.69	Pk	H
12010.00	43.49	31.02	8.99	25.57	47.03	54.00	-6.97	AV	H

GFSK Hid Channel:2440MHz

4880.00	50.61	30.55	5.77	24.66	50.49	74.00	-23.51	Pk	V
4880.00	43.79	30.55	5.77	24.66	43.67	54.00	-10.33	AV	V
7320.00	51.67	30.33	6.32	24.55	52.21	74.00	-21.79	Pk	V
7320.00	43.71	30.33	6.32	24.55	44.25	54.00	-9.75	AV	V
9760.00	53.98	30.85	7.45	24.69	55.27	74.00	-18.73	Pk	V
9760.00	43.75	30.85	7.45	24.69	45.04	54.00	-8.96	AV	V
12200.00	51.68	31.02	8.99	25.57	55.22	74.00	-18.78	Pk	V
12200.00	43.06	31.02	8.99	25.57	46.60	54.00	-7.40	AV	V
4880.00	50.22	30.55	5.77	24.66	50.10	74.00	-23.90	Pk	H
4880.00	43.64	30.55	5.77	24.66	43.52	54.00	-10.48	AV	H
7320.00	51.05	30.33	6.32	24.55	51.59	74.00	-22.41	Pk	H
7320.00	43.65	30.33	6.32	24.55	44.19	54.00	-9.81	AV	H
9760.00	53.19	30.85	7.45	24.69	54.48	74.00	-19.52	Pk	H
9760.00	43.81	30.85	7.45	24.69	45.10	54.00	-8.90	AV	H
12200.00	50.64	31.02	8.99	25.57	54.18	74.00	-19.82	Pk	H



12200.00	43.86	31.02	8.99	25.57	47.40	54.00	-6.60	AV	H
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GFSK High Channel:2480MHz

4960.00	54.11	30.55	5.77	24.66	53.99	74.00	-20.01	Pk	V
4960.00	43.46	30.55	5.77	24.66	43.34	54.00	-10.66	AV	V
7440.00	51.45	30.33	6.32	24.55	51.99	74.00	-22.01	Pk	V
7440.00	43.20	30.33	6.32	24.55	43.74	54.00	-10.26	AV	V
9920.00	51.96	30.85	7.45	24.69	53.25	74.00	-20.75	Pk	V
9920.00	43.47	30.85	7.45	24.69	44.76	54.00	-9.24	AV	V
12400.00	52.65	31.02	8.99	25.57	56.19	74.00	-17.81	Pk	V
12400.00	43.79	31.02	8.99	25.57	47.33	54.00	-6.67	AV	V
4960.00	54.11	30.55	5.77	24.66	53.99	74.00	-20.01	Pk	H
4960.00	43.30	30.55	5.77	24.66	43.18	54.00	-10.82	AV	H
7440.00	52.25	30.33	6.32	24.55	52.79	74.00	-21.21	Pk	H
7440.00	43.64	30.33	6.32	24.55	44.18	54.00	-9.82	AV	H
9920.00	51.97	30.85	7.45	24.69	53.26	74.00	-20.74	Pk	H
9920.00	43.59	30.85	7.45	24.69	44.88	54.00	-9.12	AV	H
12400.00	53.27	31.02	8.99	25.57	56.81	74.00	-17.19	Pk	H
12400.00	43.40	31.02	8.99	25.57	46.94	54.00	-7.06	AV	H

BLE 2M

Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type	Polar
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)		(H/V)

GFSK Low Channel:2402MHz

4804.00	54.08	30.55	5.77	24.66	53.96	74.00	-20.04	Pk	V
4804.00	43.49	30.55	5.77	24.66	43.37	54.00	-10.63	AV	V
7206.00	52.06	30.33	6.32	24.55	52.60	74.00	-21.40	Pk	V
7206.00	43.32	30.33	6.32	24.55	43.86	54.00	-10.14	AV	V
9608.00	51.11	30.85	7.45	24.69	52.40	74.00	-21.60	Pk	V
9608.00	43.51	30.85	7.45	24.69	44.80	54.00	-9.20	AV	V
12010.00	52.72	31.02	8.99	25.57	56.26	74.00	-17.74	Pk	V
12010.00	43.03	31.02	8.99	25.57	46.57	54.00	-7.43	AV	V
4804.00	52.27	30.55	5.77	24.66	52.15	74.00	-21.85	Pk	H
4804.00	43.76	30.55	5.77	24.66	43.64	54.00	-10.36	AV	H
7206.00	52.15	30.33	6.32	24.55	52.69	74.00	-21.31	Pk	H
7206.00	43.17	30.33	6.32	24.55	43.71	54.00	-10.29	AV	H
9608.00	51.85	30.85	7.45	24.69	53.14	74.00	-20.86	Pk	H
9608.00	43.36	30.85	7.45	24.69	44.65	54.00	-9.35	AV	H
12010.00	50.69	31.02	8.99	25.57	54.23	74.00	-19.77	Pk	H
12010.00	43.43	31.02	8.99	25.57	46.97	54.00	-7.03	AV	H



GFSK Hid Channel:2440MHz

4880.00	51.81	30.55	5.77	24.66	51.69	74.00	-22.31	Pk	V
4880.00	43.71	30.55	5.77	24.66	43.59	54.00	-10.41	AV	V
7320.00	52.75	30.33	6.32	24.55	53.29	74.00	-20.71	Pk	V
7320.00	43.03	30.33	6.32	24.55	43.57	54.00	-10.43	AV	V
9760.00	52.65	30.85	7.45	24.69	53.94	74.00	-20.06	Pk	V
9760.00	43.53	30.85	7.45	24.69	44.82	54.00	-9.18	AV	V
12200.00	52.49	31.02	8.99	25.57	56.03	74.00	-17.97	Pk	V
12200.00	43.68	31.02	8.99	25.57	47.22	54.00	-6.78	AV	V
4880.00	50.51	30.55	5.77	24.66	50.39	74.00	-23.61	Pk	H
4880.00	43.77	30.55	5.77	24.66	43.65	54.00	-10.35	AV	H
7320.00	54.00	30.33	6.32	24.55	54.54	74.00	-19.46	Pk	H
7320.00	43.99	30.33	6.32	24.55	44.53	54.00	-9.47	AV	H
9760.00	51.63	30.85	7.45	24.69	52.92	74.00	-21.08	Pk	H
9760.00	43.16	30.85	7.45	24.69	44.45	54.00	-9.55	AV	H
12200.00	50.23	31.02	8.99	25.57	53.77	74.00	-20.23	Pk	H
12200.00	43.45	31.02	8.99	25.57	46.99	54.00	-7.01	AV	H

GFSK High Channel:2480MHz

4960.00	52.88	30.55	5.77	24.66	52.76	74.00	-21.24	Pk	V
4960.00	43.63	30.55	5.77	24.66	43.51	54.00	-10.49	AV	V
7440.00	52.73	30.33	6.32	24.55	53.27	74.00	-20.73	Pk	V
7440.00	43.34	30.33	6.32	24.55	43.88	54.00	-10.12	AV	V
9920.00	52.62	30.85	7.45	24.69	53.91	74.00	-20.09	Pk	V
9920.00	43.44	30.85	7.45	24.69	44.73	54.00	-9.27	AV	V
12400.00	51.38	31.02	8.99	25.57	54.92	74.00	-19.08	Pk	V
12400.00	43.81	31.02	8.99	25.57	47.35	54.00	-6.65	AV	V
4960.00	54.92	30.55	5.77	24.66	54.80	74.00	-19.20	Pk	H
4960.00	43.21	30.55	5.77	24.66	43.09	54.00	-10.91	AV	H
7440.00	52.17	30.33	6.32	24.55	52.71	74.00	-21.29	Pk	H
7440.00	43.15	30.33	6.32	24.55	43.69	54.00	-10.31	AV	H
9920.00	52.76	30.85	7.45	24.69	54.05	74.00	-19.95	Pk	H
9920.00	43.76	30.85	7.45	24.69	45.05	54.00	-8.95	AV	H
12400.00	54.56	31.02	8.99	25.57	58.10	74.00	-15.90	Pk	H
12400.00	43.49	31.02	8.99	25.57	47.03	54.00	-6.97	AV	H

Note:

- 1) All modes have been measured, only worst mode was reported.
- 2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Emission Level = Reading + Factor
- 3) 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.



5.EMISSIONS AT RESTRICTED BAND

5.1 Test Requirement:

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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			

5.2 TEST PROCEDURE

According to ANSI C63.10 Field Strength Approach (linear terms):

$$E = \text{EIRP} - 20 \log d + 104.8:$$

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to an EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=3 MHz for AVG detector, Max Hold=Average, Trace=100times for AV test.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.
- Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)

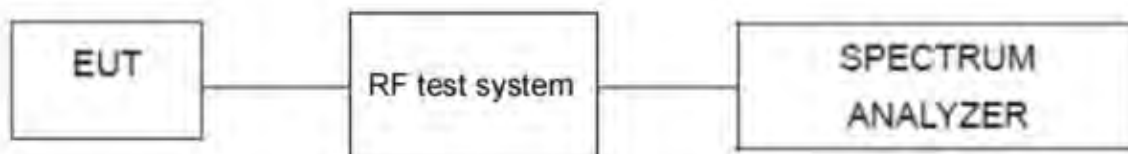


- h. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
- i. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
- j. Compare the resultant electric field strength level to the applicable regulatory limit.
- k. Perform radiated spurious emission test duress until all measured frequencies were complete.

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP



5.5 TEST RESULT

Note: The test data please refer to APPENDIX 1.

Remark:

1. test results including cable loss;
2. Measured at difference Packet Type for each mode and recorded worst case for each mode.
3. “---“means that the fundamental frequency not for 15.209 limits requirement.
4. Measured at Non-Hopping mode, recorded worst at Non-Hopping mode.
5. The other emission levels were very low against the limit.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=3MHz/Sweep time=Auto/Detector=RMS, Max Hold=Average, Trace=100times.
8. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.



6. POWER SPECTRAL DENSITY TEST

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB558074 D01 15.247 Meas Guidance v05r02

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range	Result
15.247 (e)	Power Spectral Density	8dBm/3kHz	2400-2483.5(MHz)	PASS

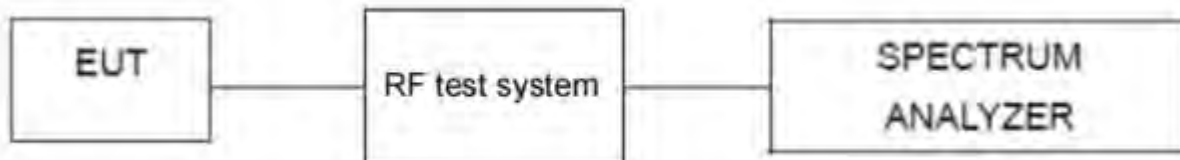
6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
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 within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of chapter 3, Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULT

Note: The test data please refer to APPENDIX 1.



7. 6DB Occupied Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB558074 D01 15.247 Meas Guidance v05r02

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{kHz}$ (6dB Occupied Bandwidth)	2400-2483.5 (MHz)	PASS

7.2 TEST PROCEDURE

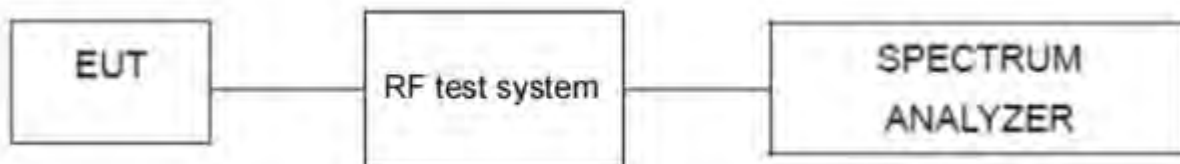
The steps for 6dB Bandwidth are as follows:

- Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Trace mode = max-hold.
- Sweep = No faster than coupled (auto) time.
- Allow the trace to stabilize.
- Measure the maximum width with SA automatic 6dB bandwidth down setting, Record the final DTS bandwidth (6dB down bandwidth) result.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of chapter 3, Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULT

Note: The test data please refer to APPENDIX 1.



8. PEAK OUTPUT POWER TEST

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	KDB558074 D01 15.247 Meas Guidance v05r02

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5 (MHz)	PASS

8.2 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of chapter 3, Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULT

Note: The test data please refer to APPENDIX 1.



9. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074 D01 15.247 Meas Guidance v05r02

9.1 APPLICABLE STANDARD

Typical regulatory requirements specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions⁸⁹:

The maximum peak conducted output power procedure was used to determine compliance as described in 11.9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

9.2 TEST PROCEDURE

A. Reference level measurement, establish a reference level by using the following procedure:

- Set instrument center frequency to DTS channel center frequency.
- Set the span to ≥ 1.5 times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

B. Emission level measurement, establish an emission level by using the following procedure:

- Set the center frequency and span to encompass frequency range to be measured.
- Set the RBW = 100 kHz.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

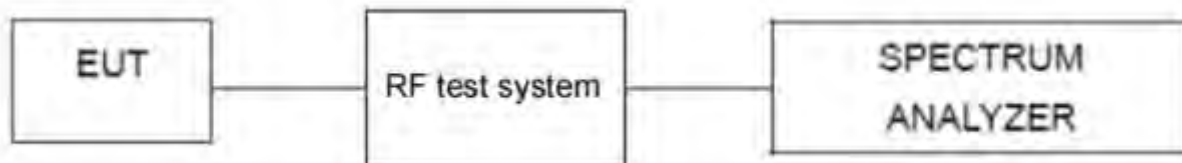
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.



9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP



9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of chapter 3, Unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

Input compensation coefficient (dB) = Cable Loss (dB)

For Conducted spurious emissions plots from 30MHz to 26.5GHz, the worst cable loss and attenuator factors have been set in the 'Input Correction' of the Spectrum Analyzer during the test



10. DUTY CYCLE

Test Method:	ANSI C63.10-2020 +Cor. 1-2023+ C63.10a-2024+ Errata to C63.10a-2024
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10.1 APPLIED PROCEDURES / LIMIT

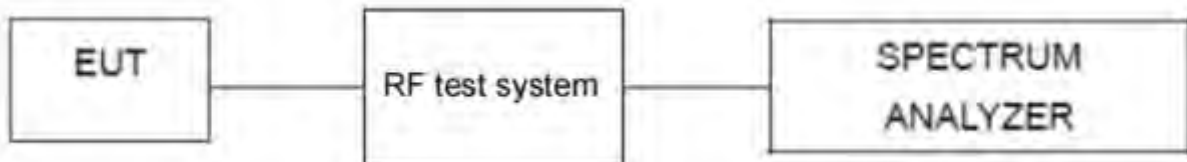
Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

- a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.
- b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
 - 1) Set the center frequency of the instrument to the center frequency of the transmission.
 - 2) Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.
 - 3) Set $VBW \geq RBW$. Set detector = peak or average.
 - 4) The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7 \mu s$.)

10.2 DEVIATION FROM STANDARD

No deviation.

10.3 TEST SETUP



10.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of chapter 3, Unless otherwise a special operating condition is specified in the follows during the testing.

10.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.



11. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antenna is Internal Antenna, the best case gain of the antennas is -0.76dBi, reference to the appendix II for details.	



12. APPENDIX 1-TEST DATA

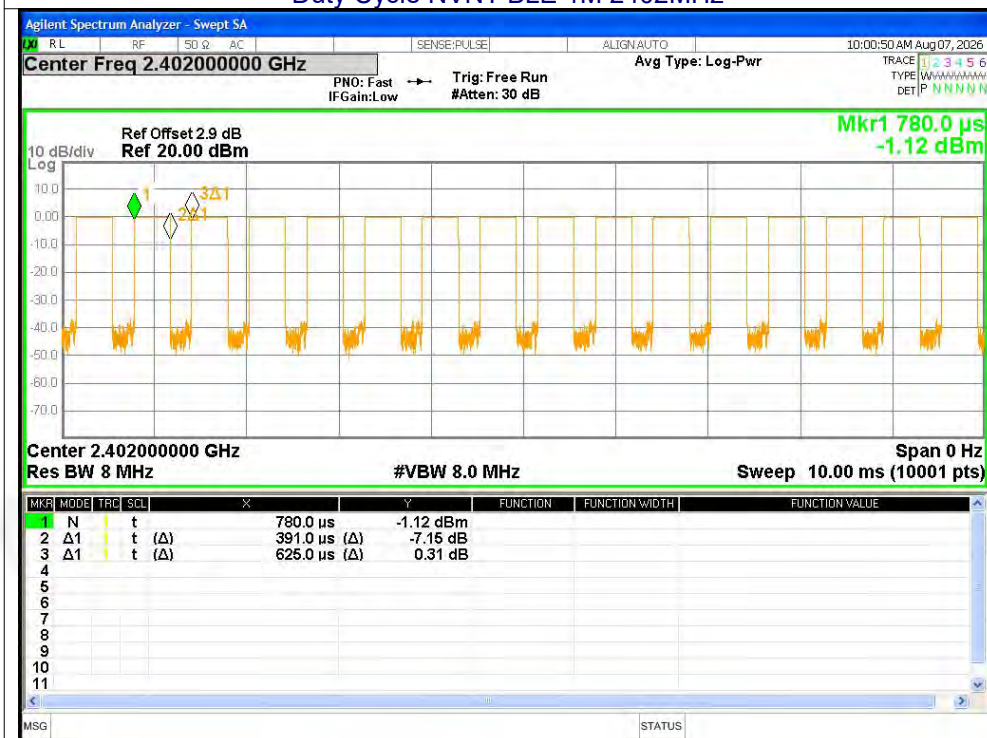
Duty Cycle

Condition	Mode	Frequency (MHz)	On Time (ms)	Period (ms)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	0.391	0.625	62.56	2.04	2.56
NVNT	BLE 1M	2440	0.392	0.625	62.72	2.03	2.55
NVNT	BLE 1M	2480	0.391	0.625	62.56	2.04	2.56
NVNT	BLE 2M	2402	0.207	0.625	33.12	4.8	4.83
NVNT	BLE 2M	2440	0.208	0.625	33.28	4.78	4.81
NVNT	BLE 2M	2480	0.208	0.625	33.28	4.78	4.81

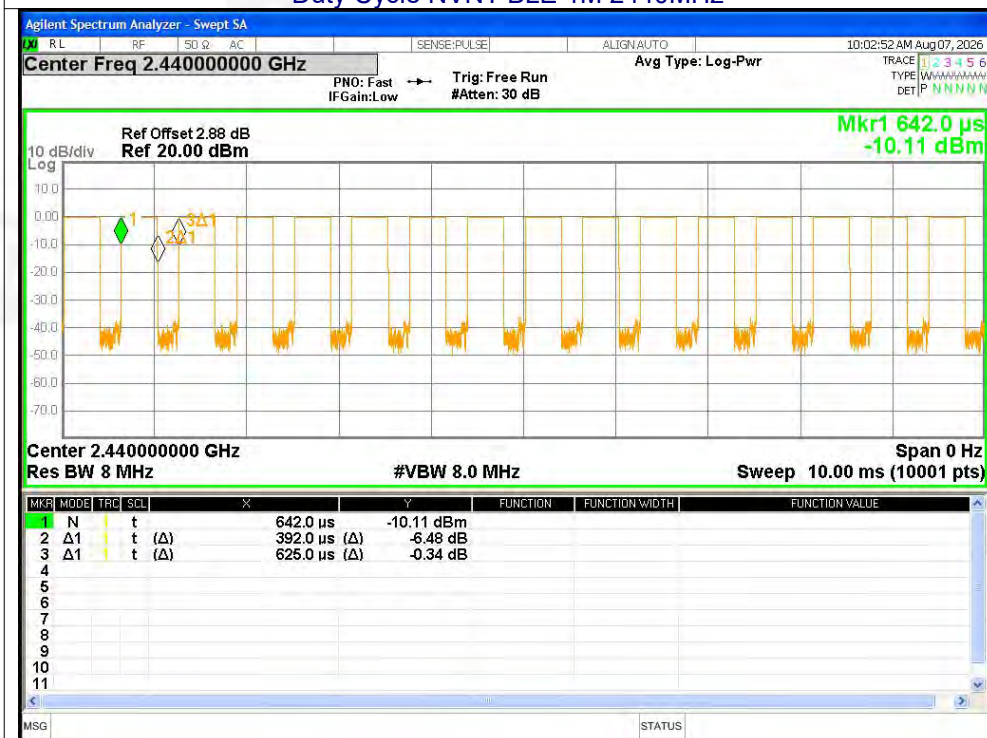


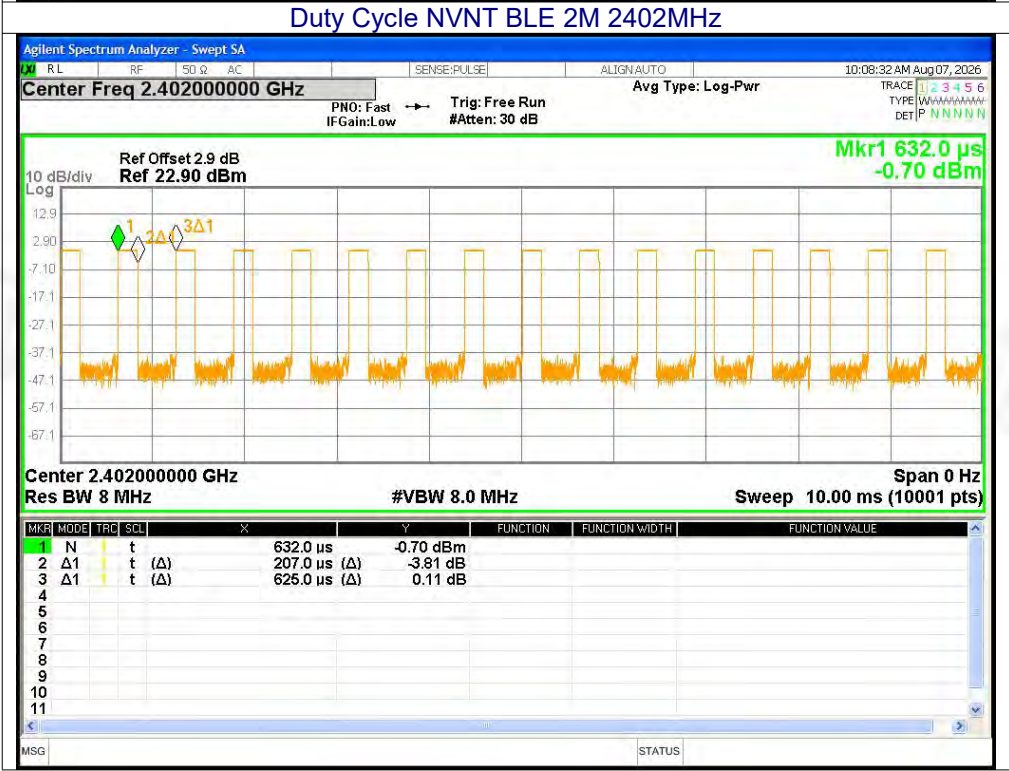
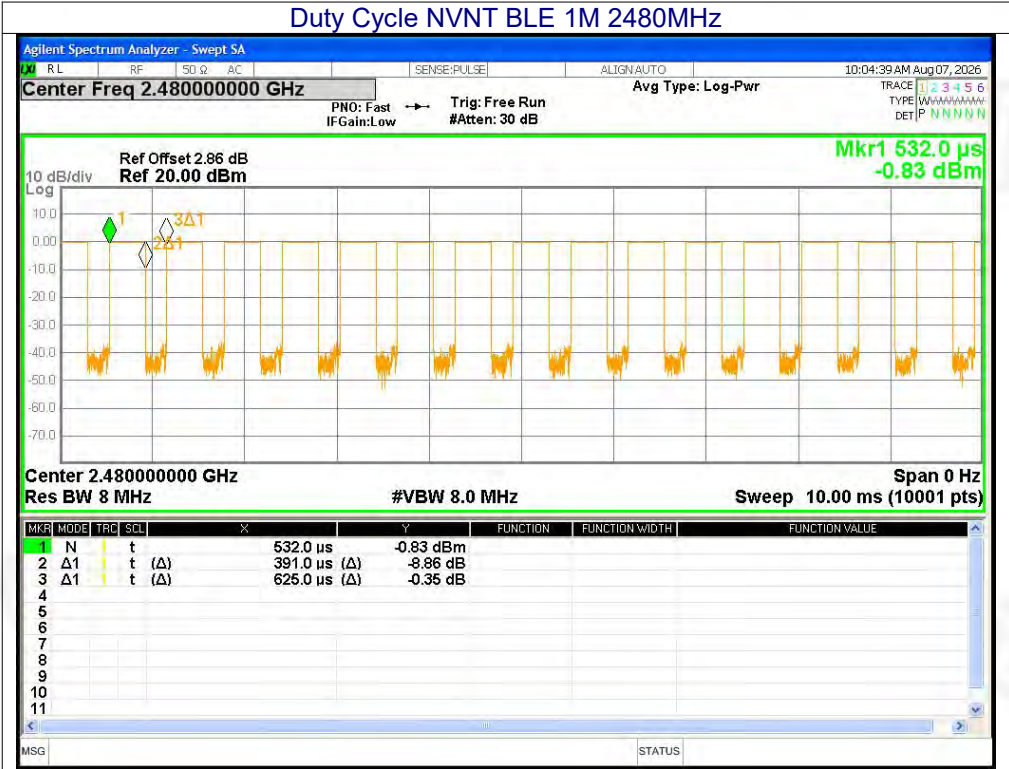
Test Graphs

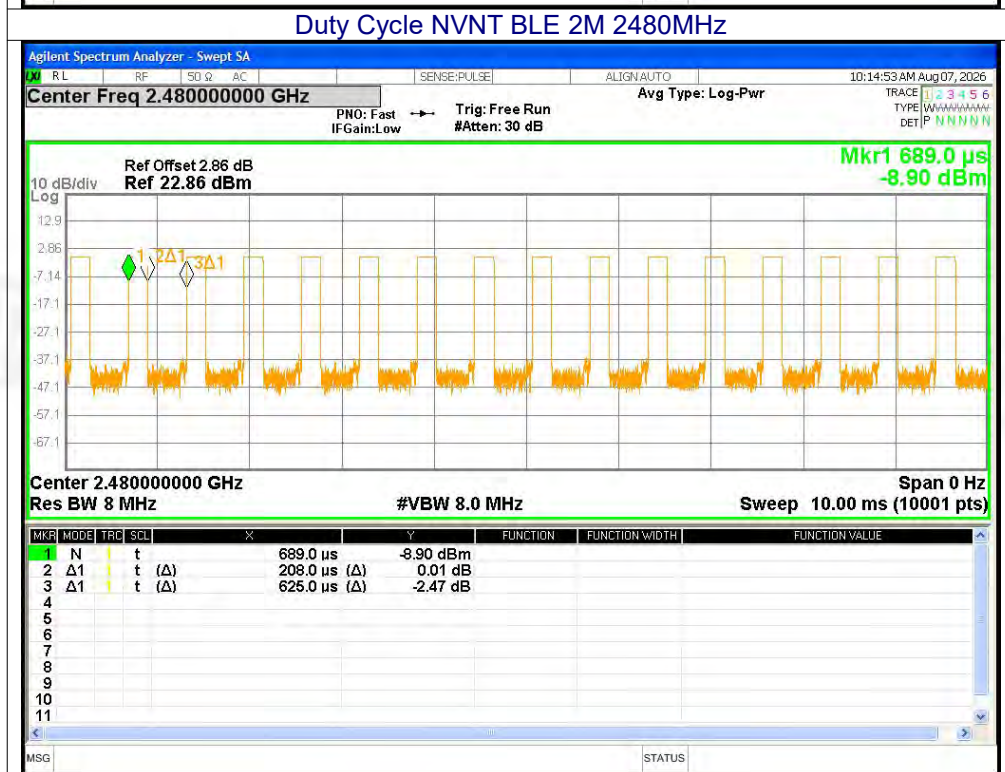
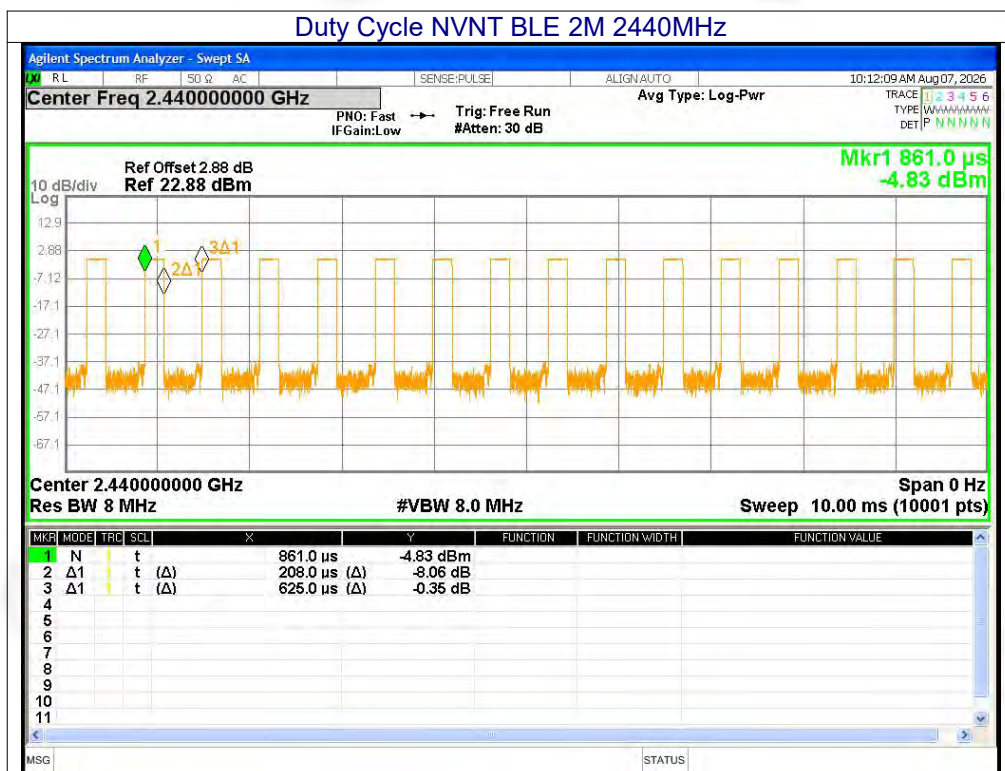
Duty Cycle NVNT BLE 1M 2402MHz



Duty Cycle NVNT BLE 1M 2440MHz









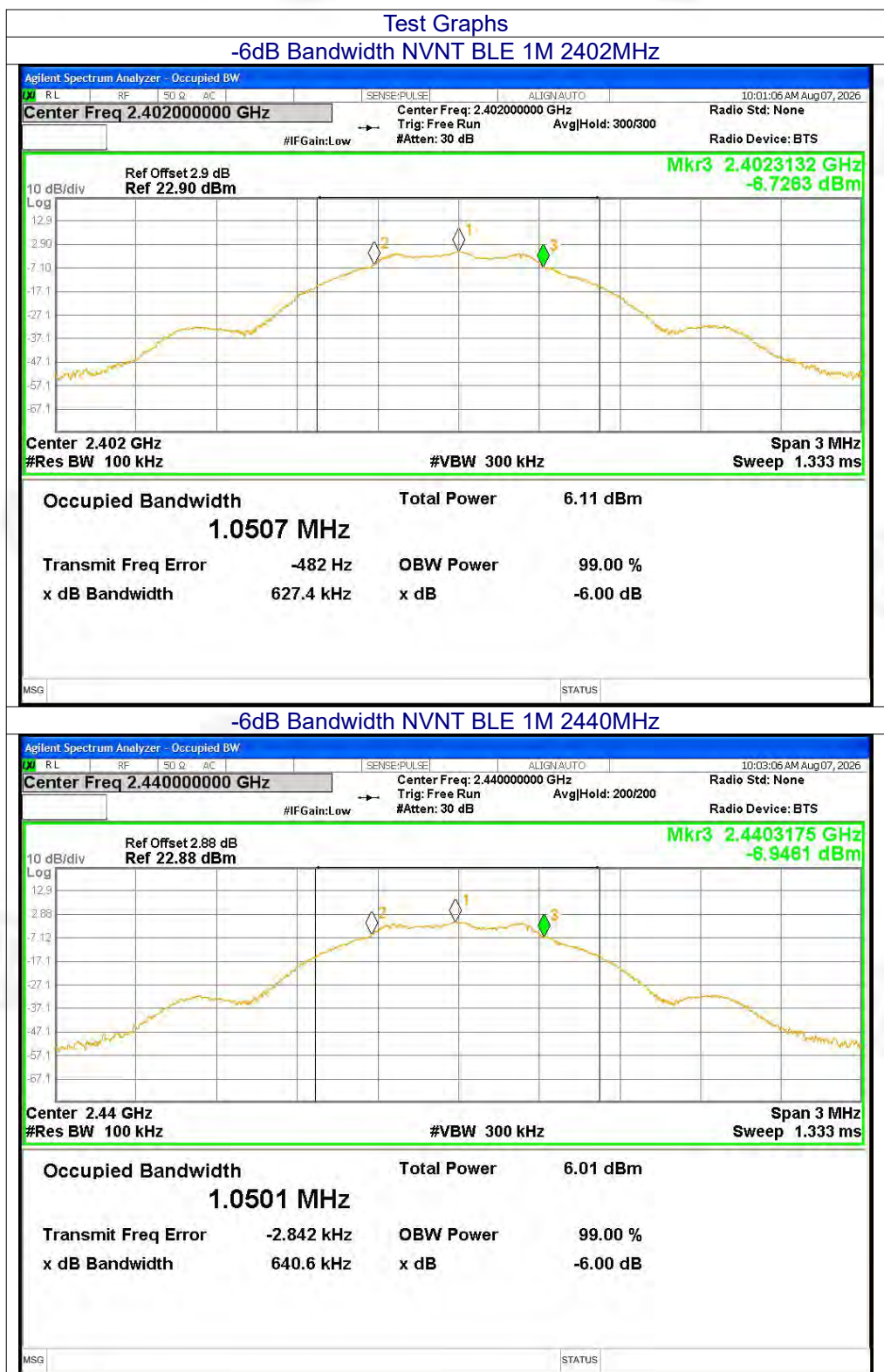
Maximum Peak Conducted Output Power

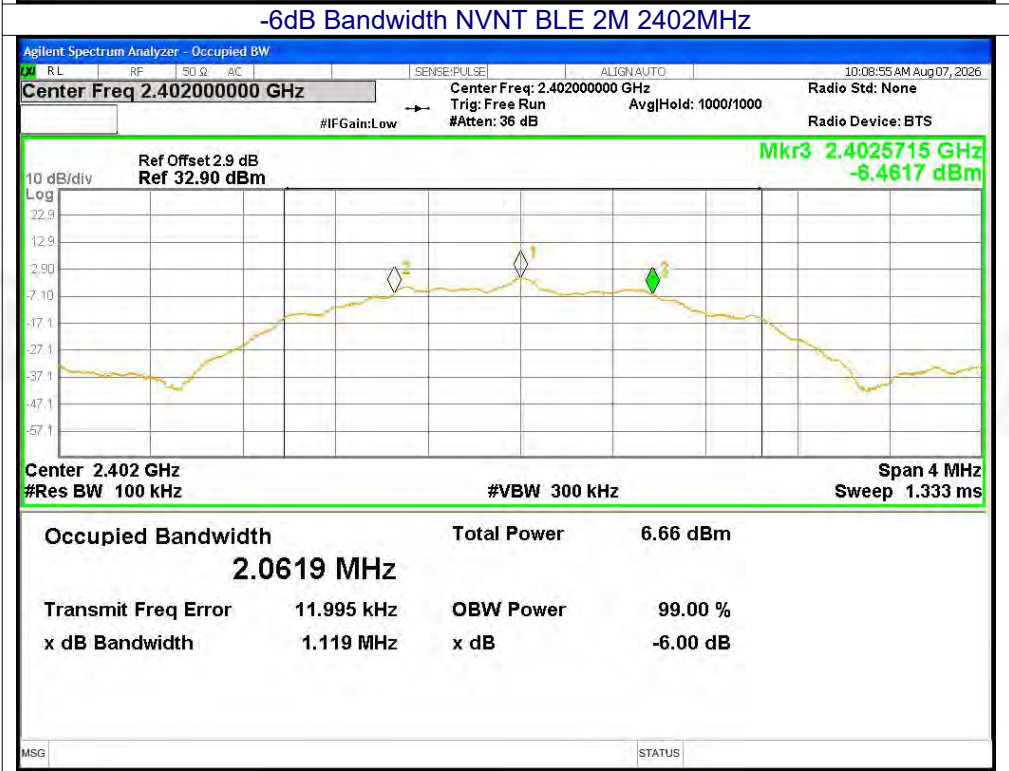
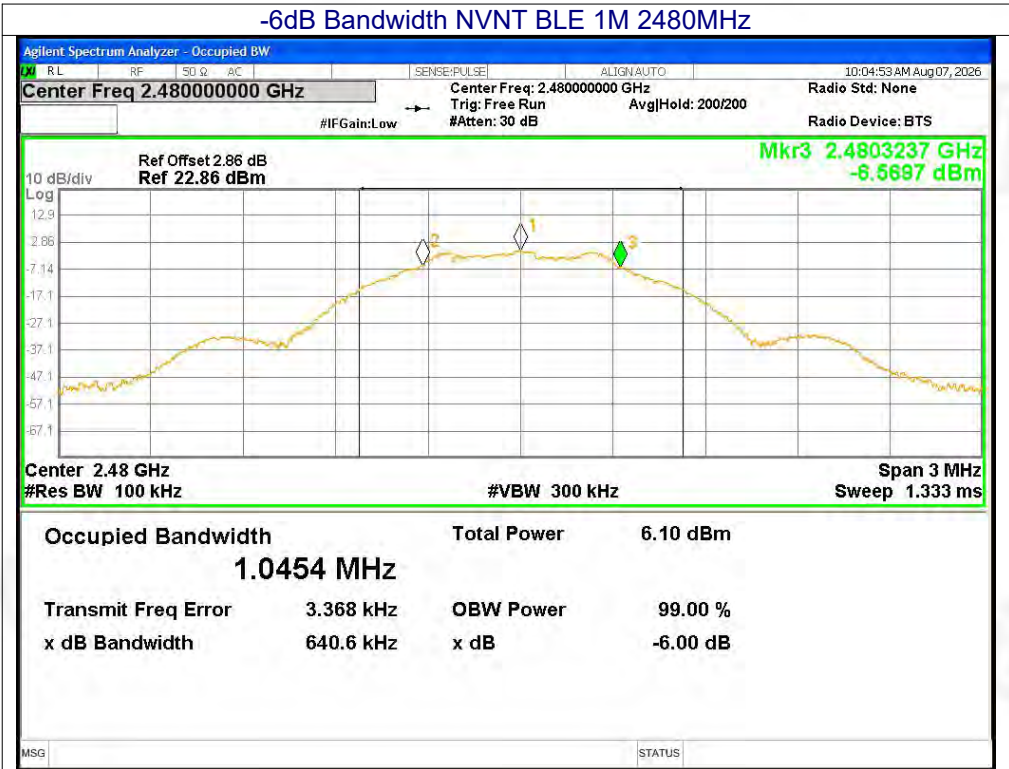
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	-0.17	<=30	Pass
NVNT	BLE 1M	2440	-0.19	<=30	Pass
NVNT	BLE 1M	2480	-0.09	<=30	Pass
NVNT	BLE 2M	2402	-0.25	<=30	Pass
NVNT	BLE 2M	2440	-0.21	<=30	Pass
NVNT	BLE 2M	2480	-0.08	<=30	Pass

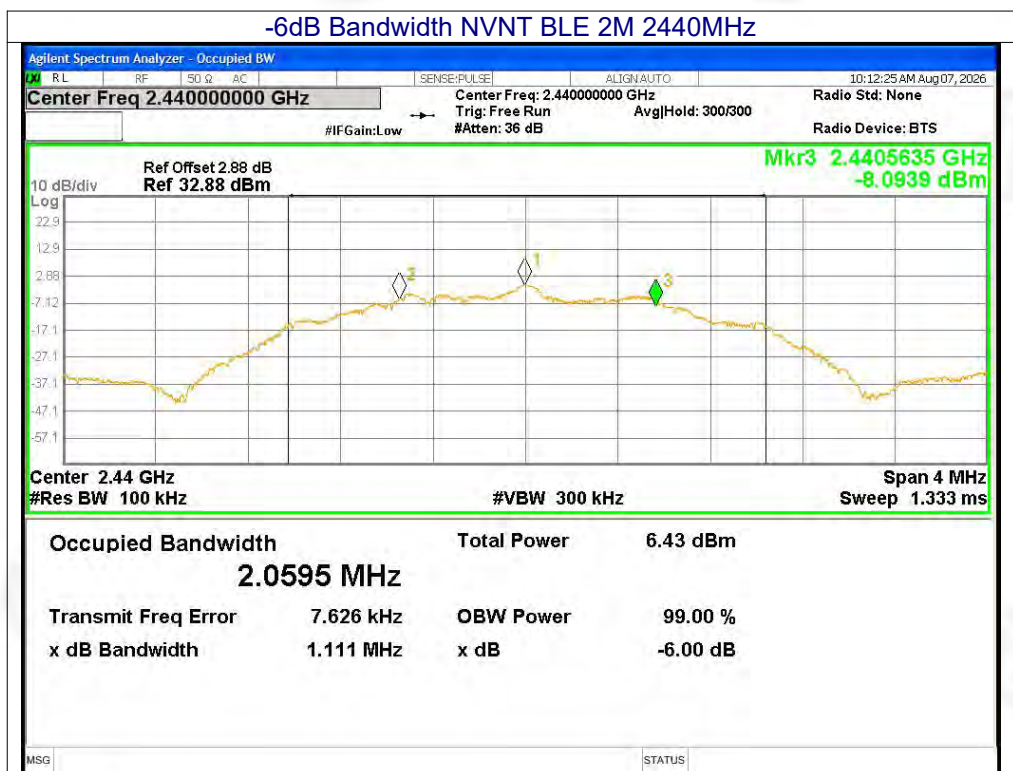


-6dB Bandwidth

Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	0.6274	≥ 0.5	Pass
NVNT	BLE 1M	2440	0.6406	≥ 0.5	Pass
NVNT	BLE 1M	2480	0.6406	≥ 0.5	Pass
NVNT	BLE 2M	2402	1.119	≥ 0.5	Pass
NVNT	BLE 2M	2440	1.111	≥ 0.5	Pass
NVNT	BLE 2M	2480	1.079	≥ 0.5	Pass



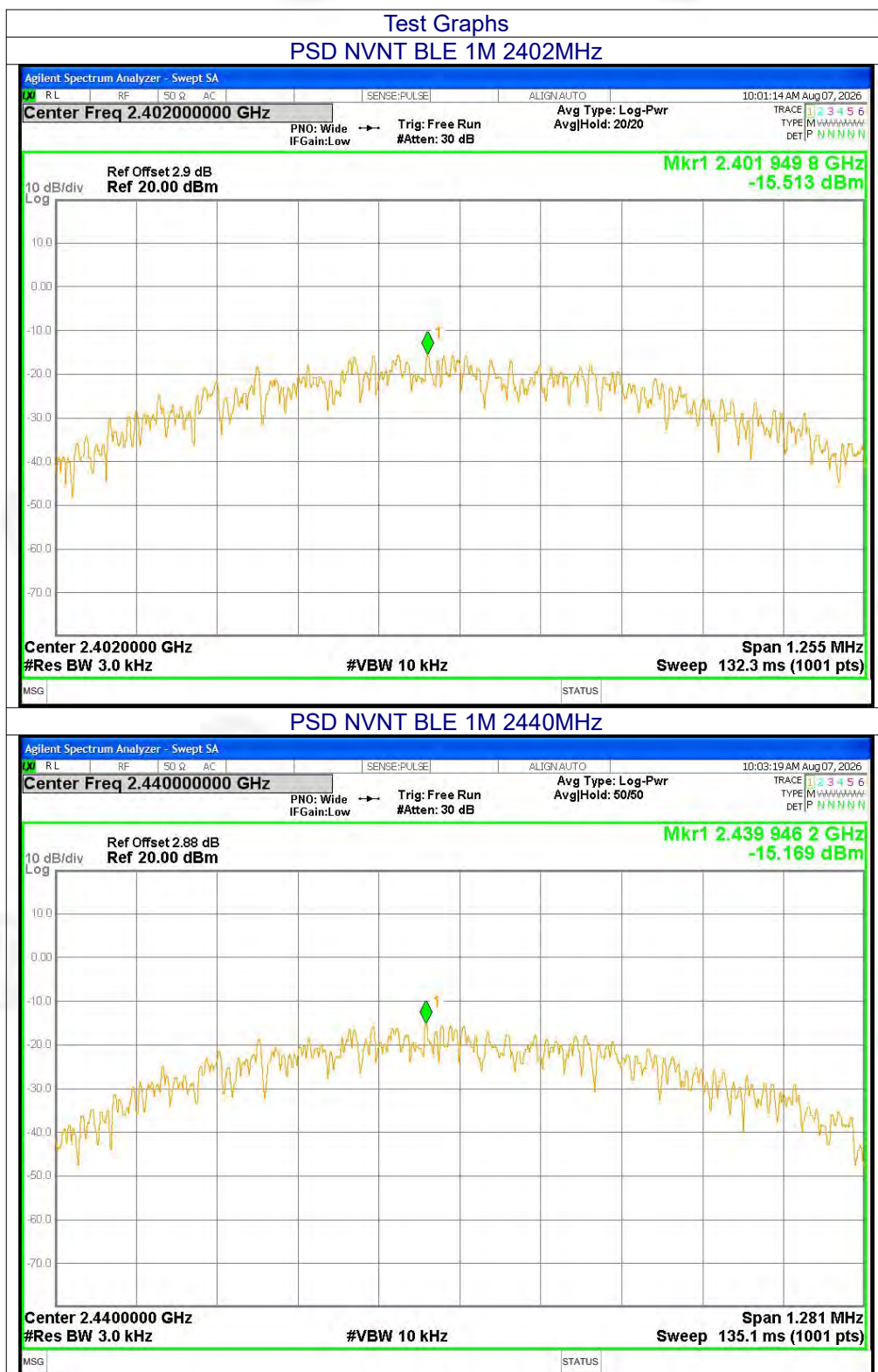


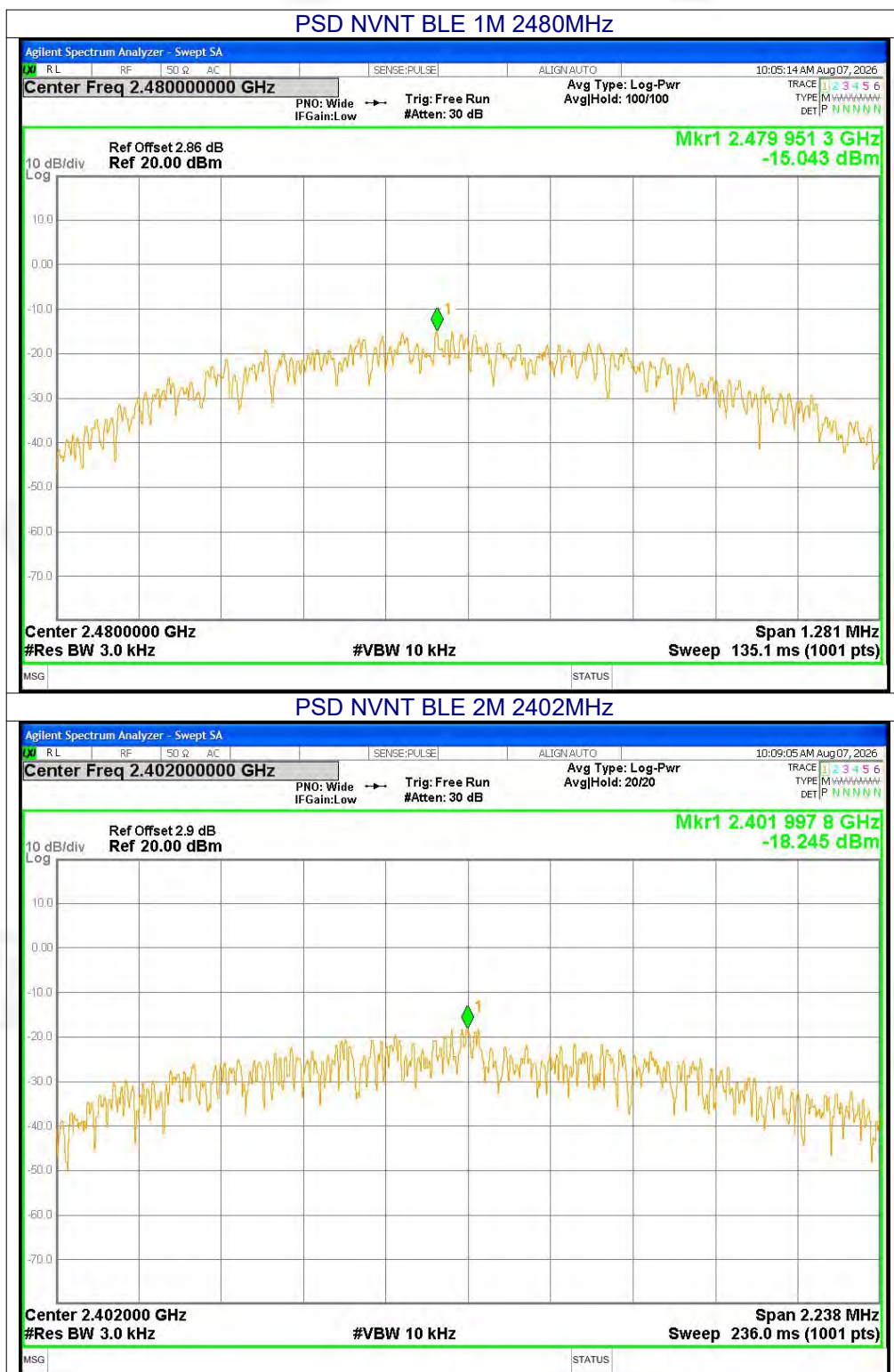


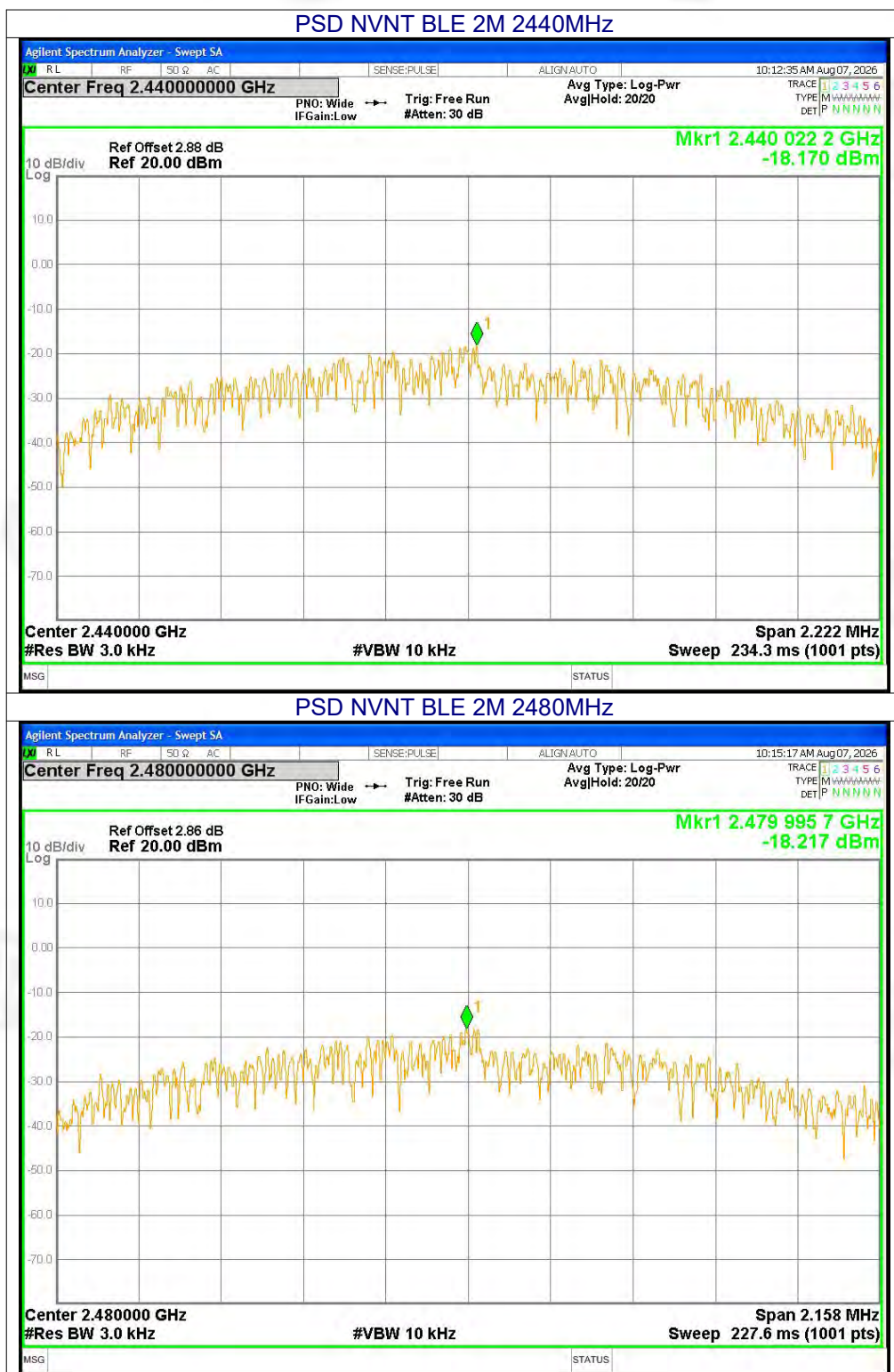


Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	-15.51	<=8	Pass
NVNT	BLE 1M	2440	-15.17	<=8	Pass
NVNT	BLE 1M	2480	-15.04	<=8	Pass
NVNT	BLE 2M	2402	-18.25	<=8	Pass
NVNT	BLE 2M	2440	-18.17	<=8	Pass
NVNT	BLE 2M	2480	-18.22	<=8	Pass



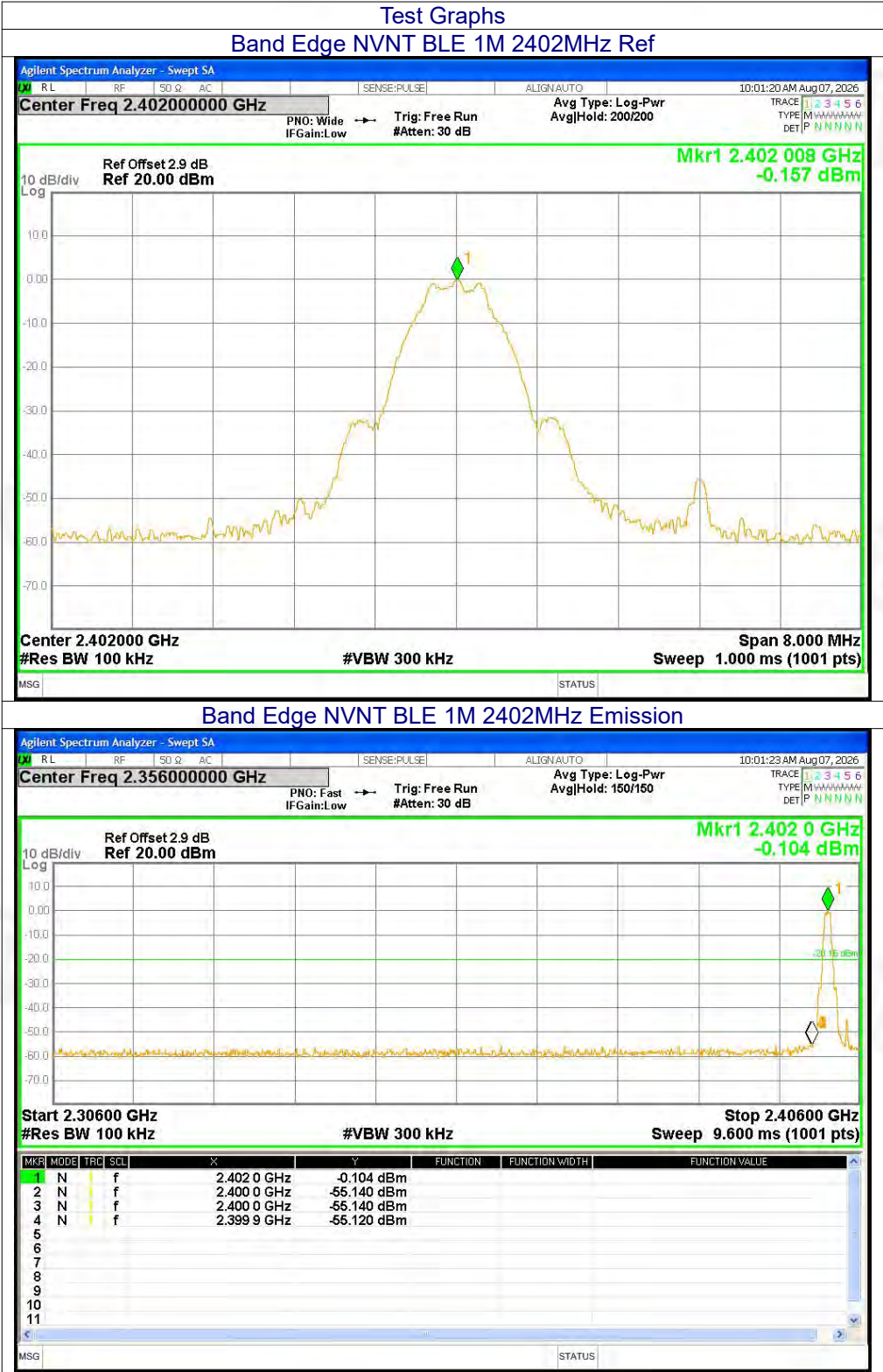


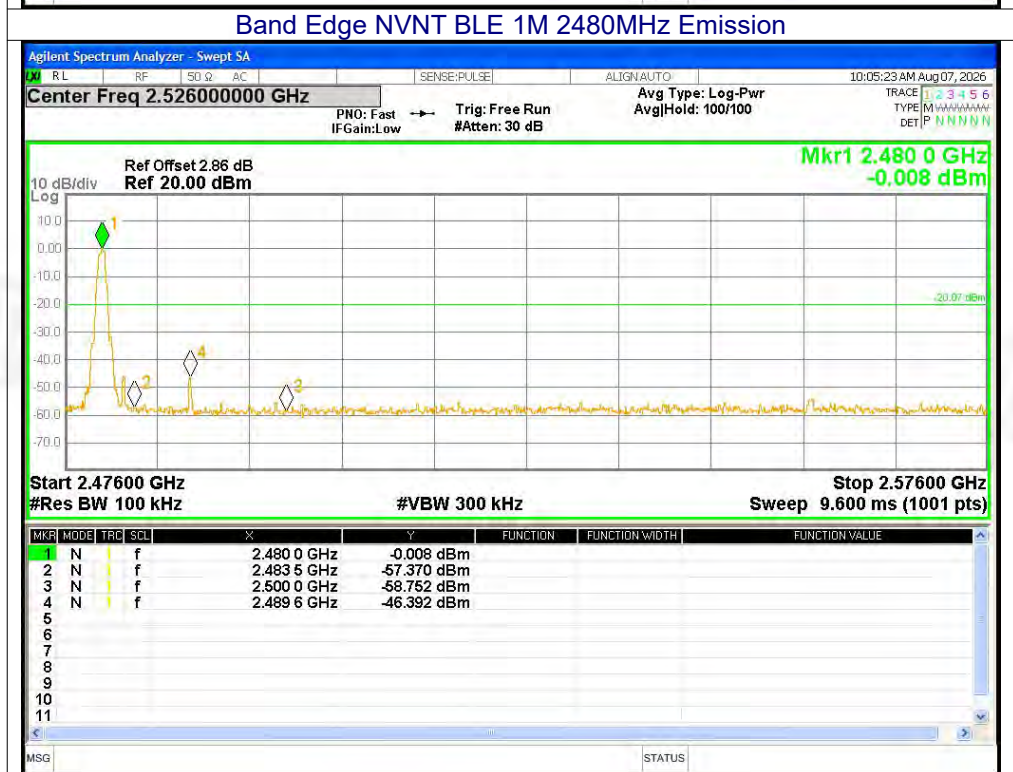
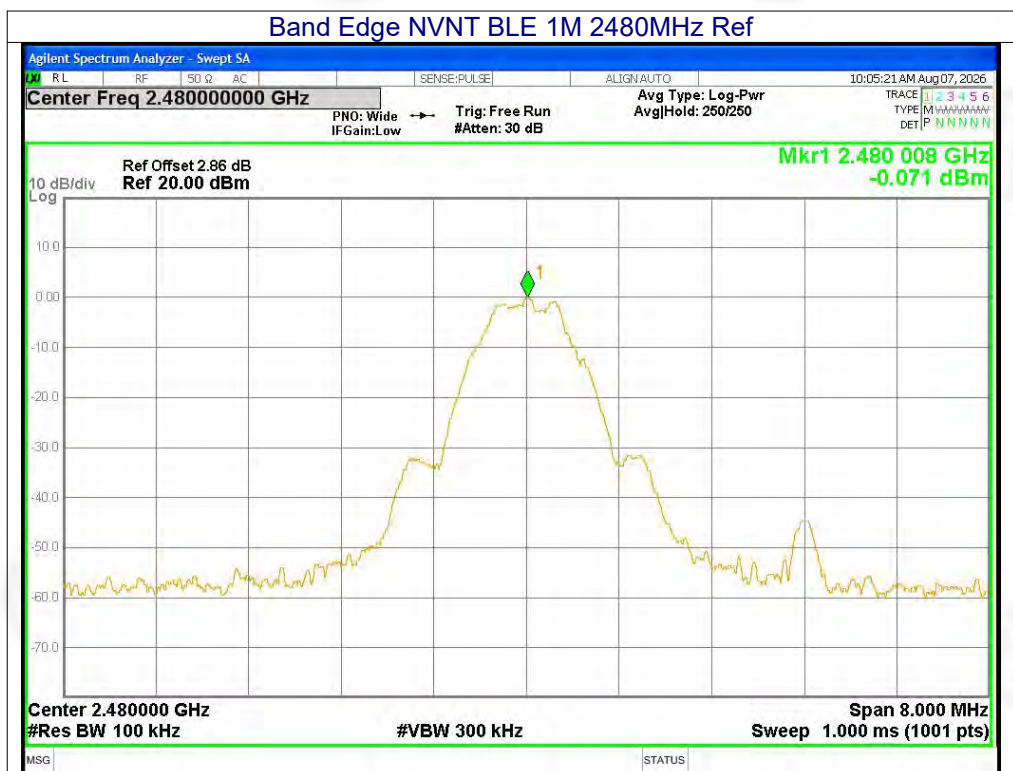


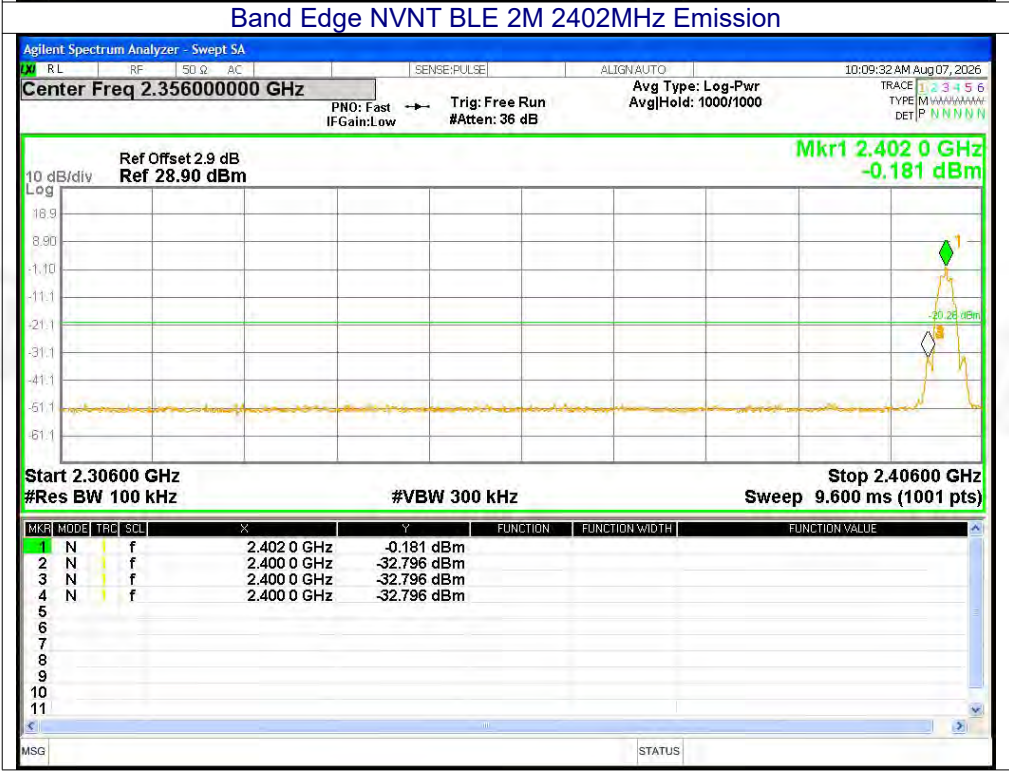
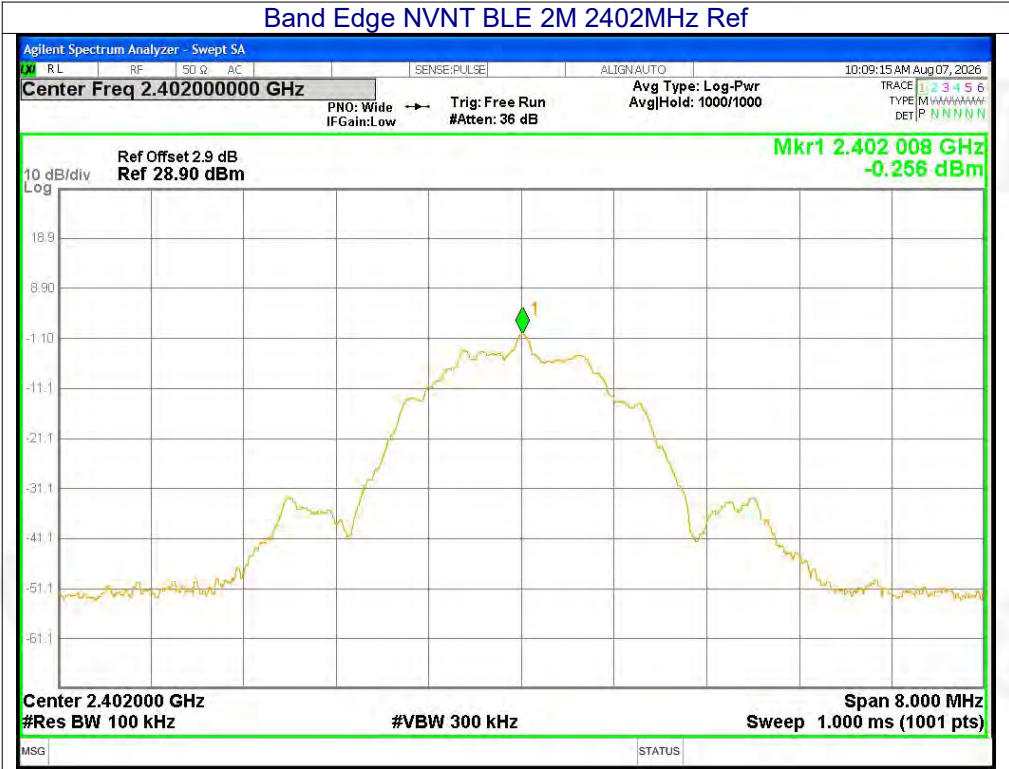


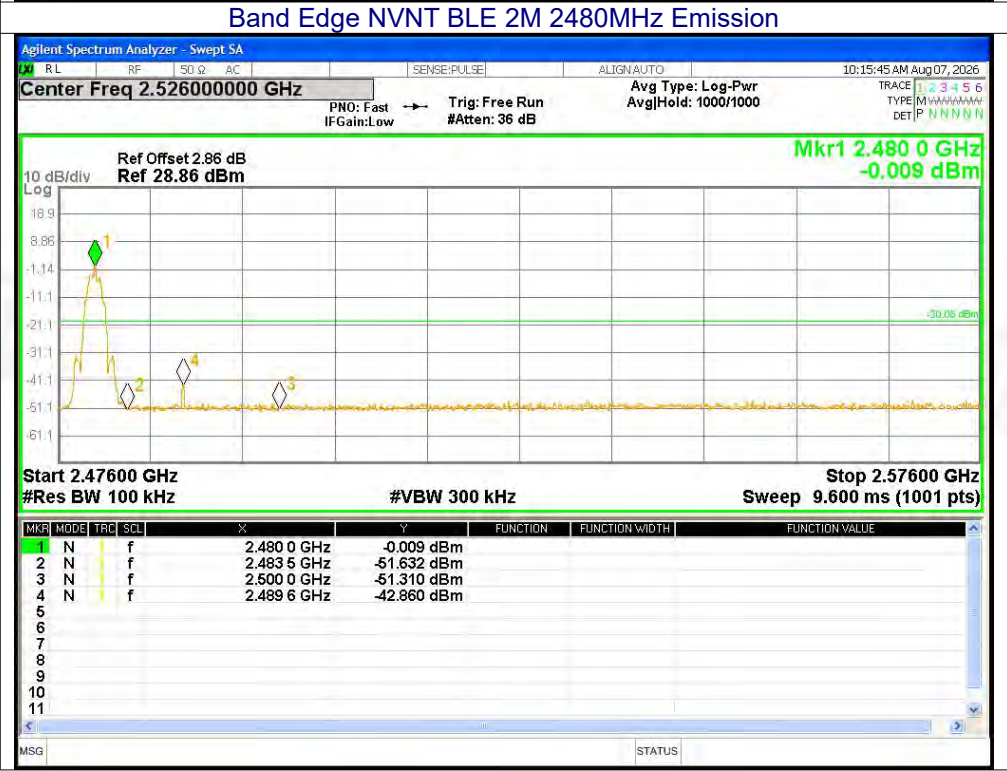
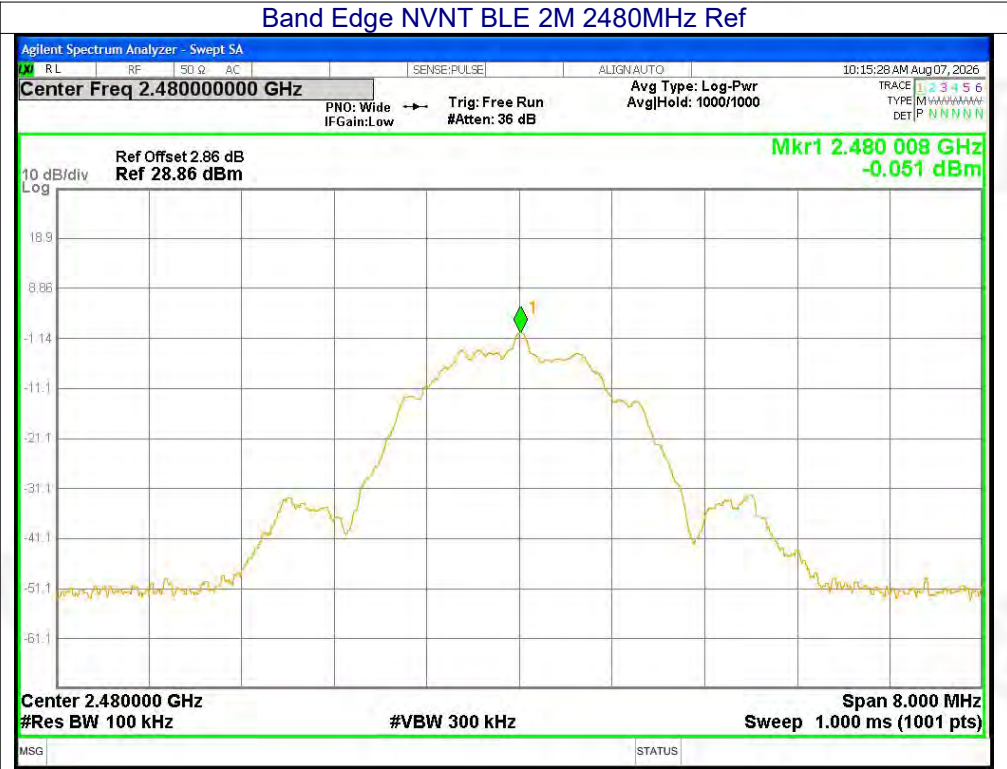
Band Edge

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	-54.96	<=-20	Pass
NVNT	BLE 1M	2480	-46.32	<=-20	Pass
NVNT	BLE 2M	2402	-32.53	<=-20	Pass
NVNT	BLE 2M	2480	-42.81	<=-20	Pass





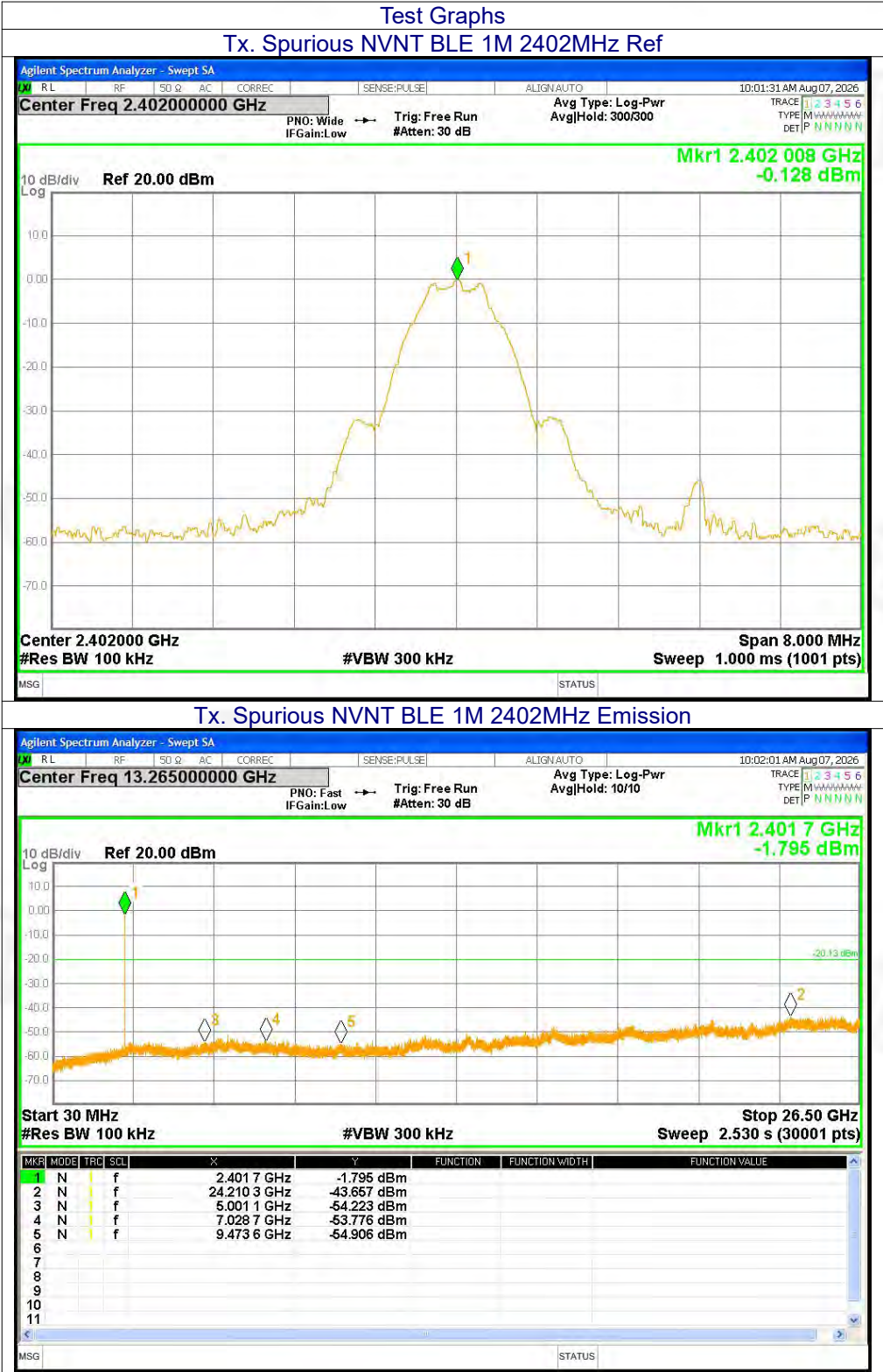


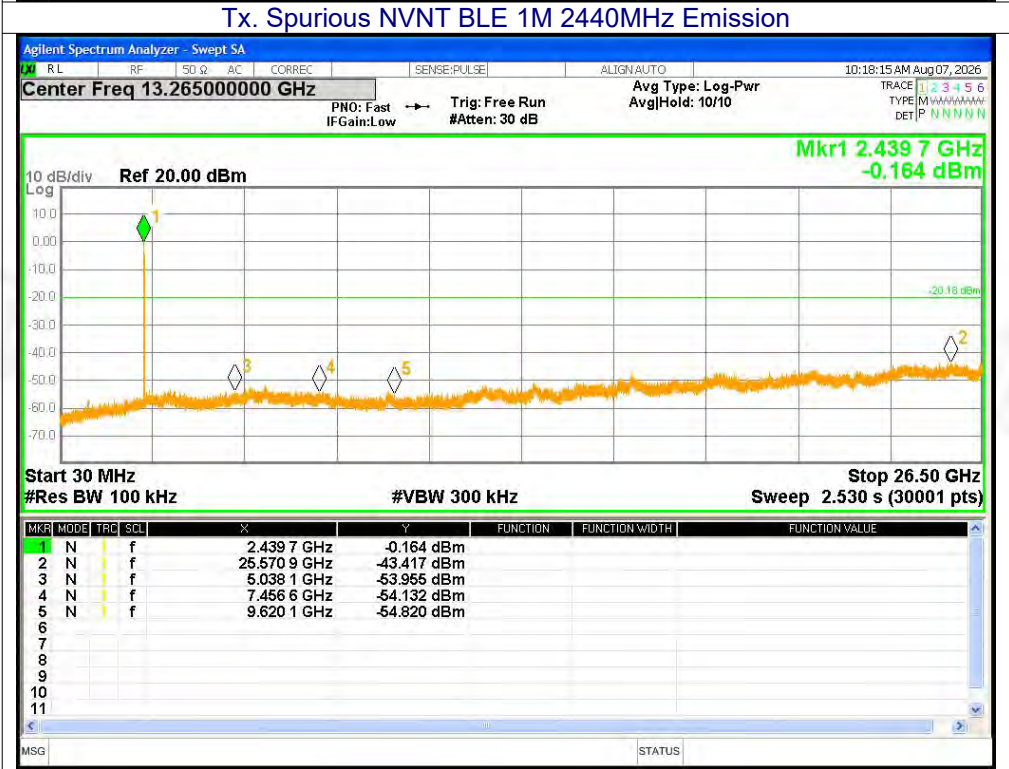
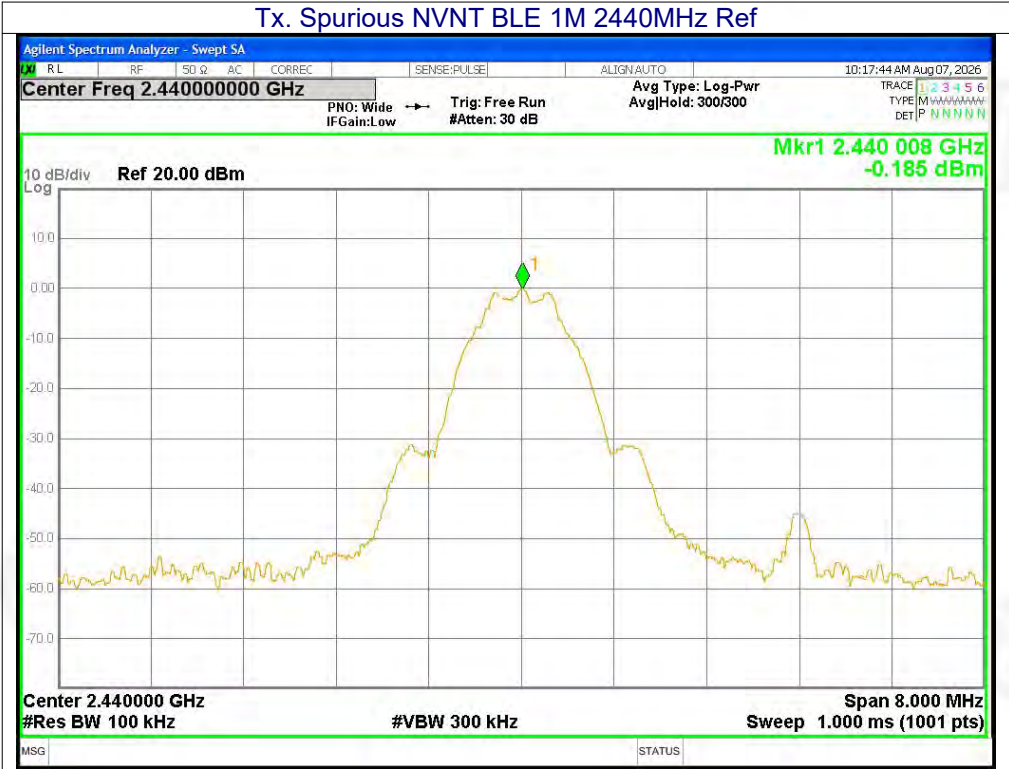


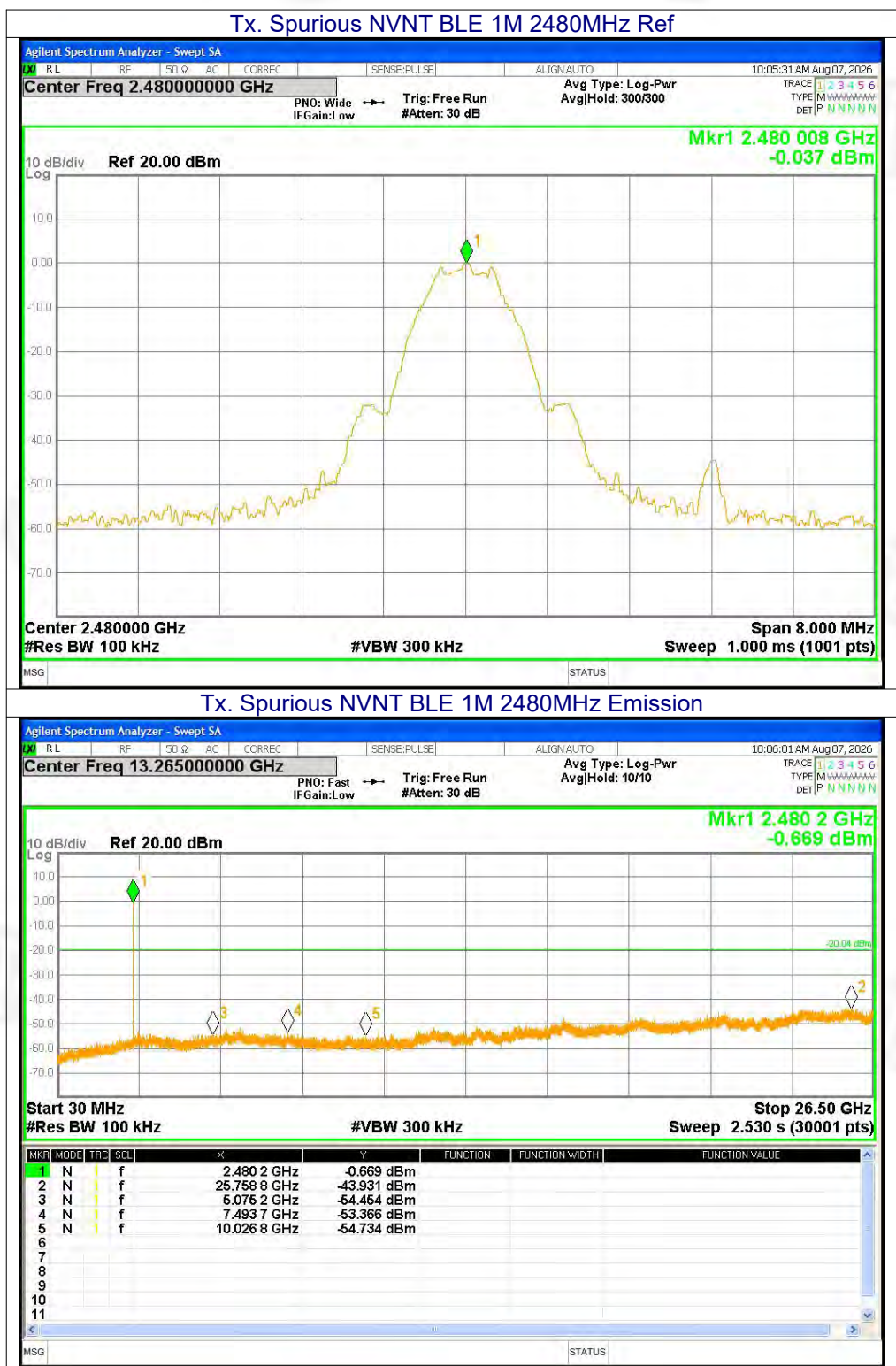


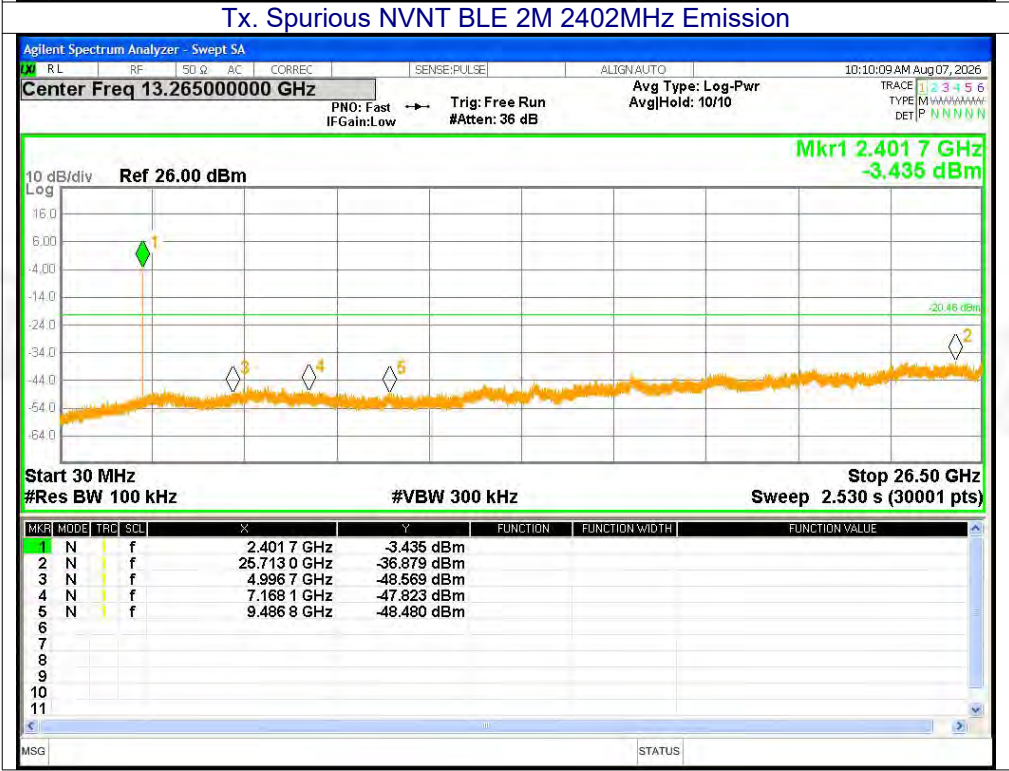
Conducted RF Spurious Emission

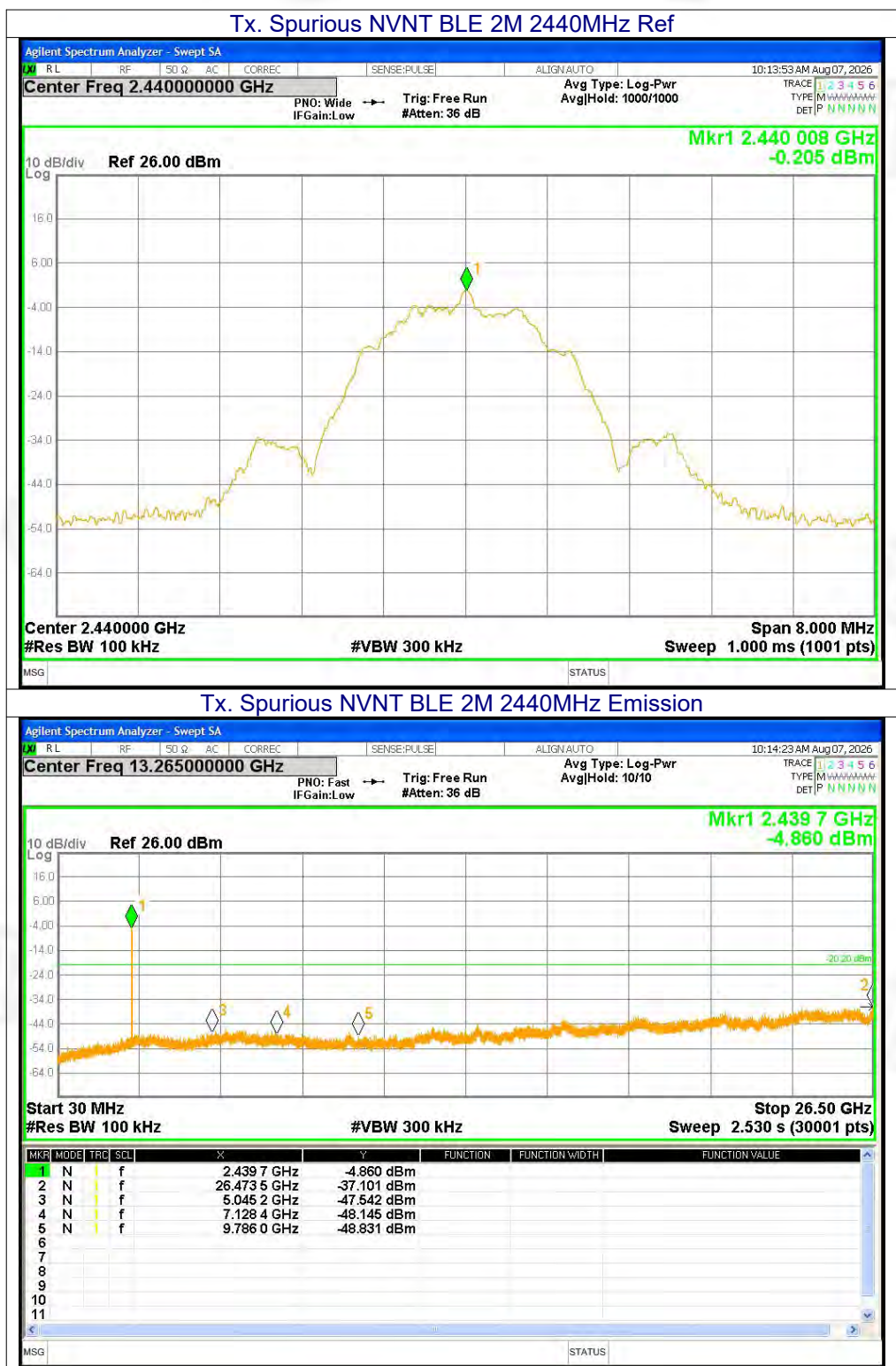
Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	-43.52	<=-20	Pass
NVNT	BLE 1M	2440	-43.23	<=-20	Pass
NVNT	BLE 1M	2480	-43.89	<=-20	Pass
NVNT	BLE 2M	2402	-36.41	<=-20	Pass
NVNT	BLE 2M	2440	-36.9	<=-20	Pass
NVNT	BLE 2M	2480	-37	<=-20	Pass

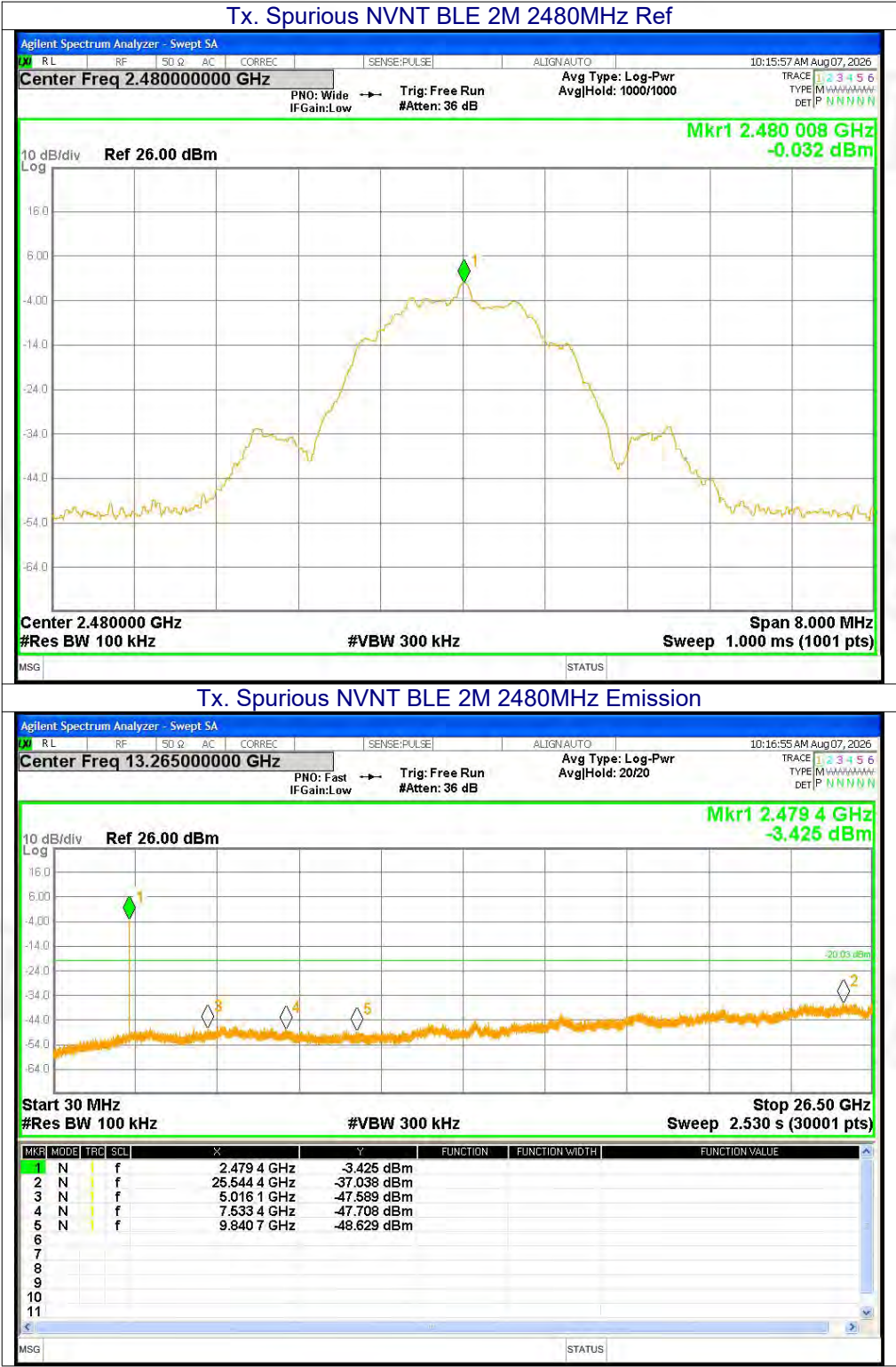








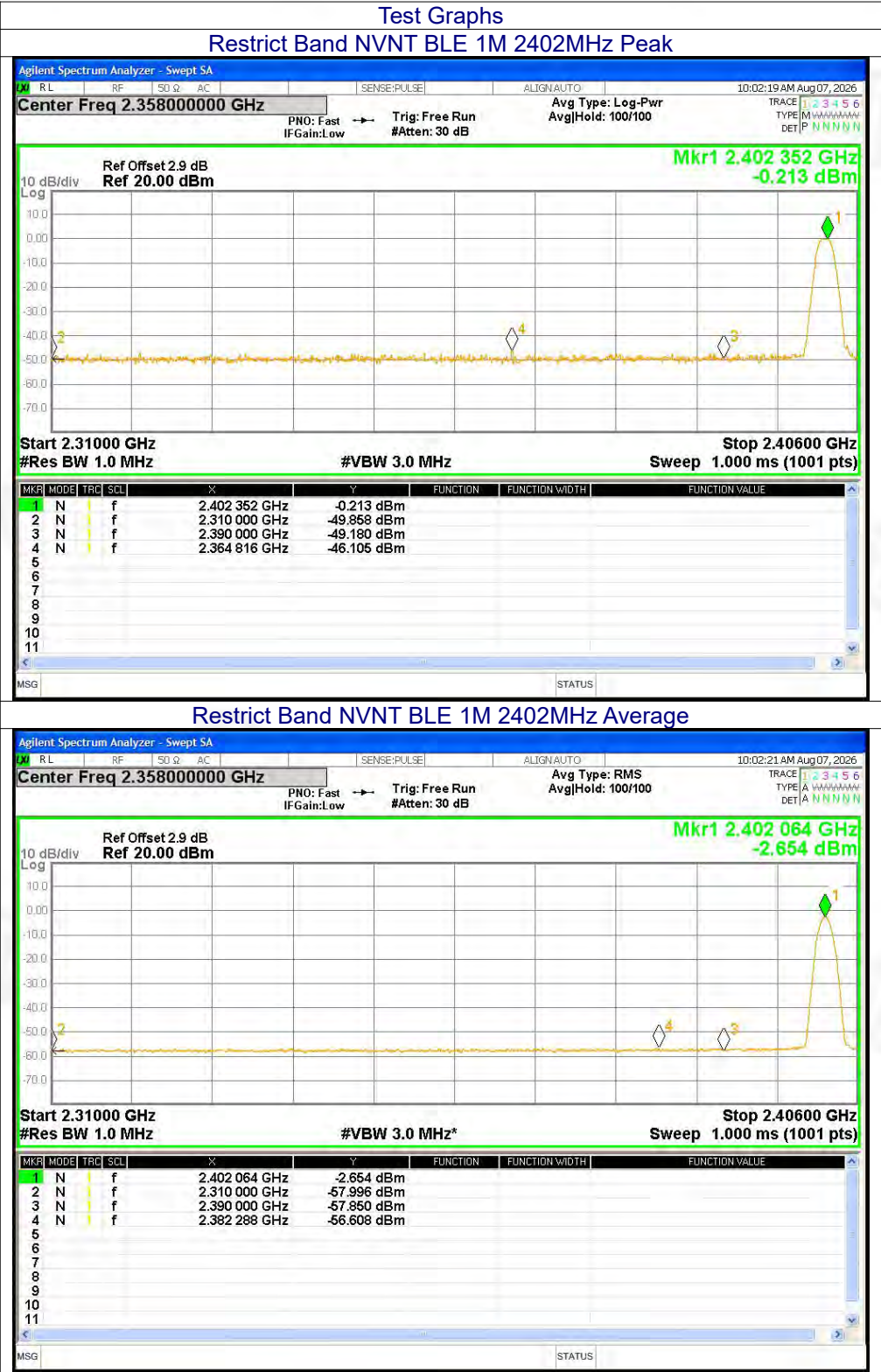


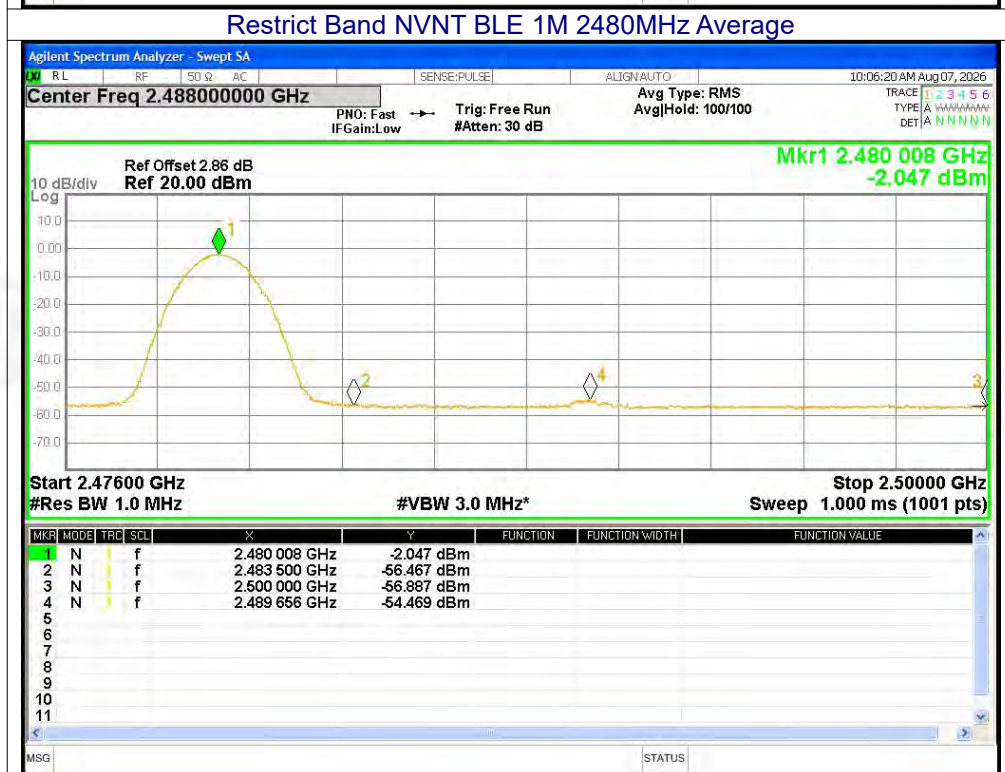
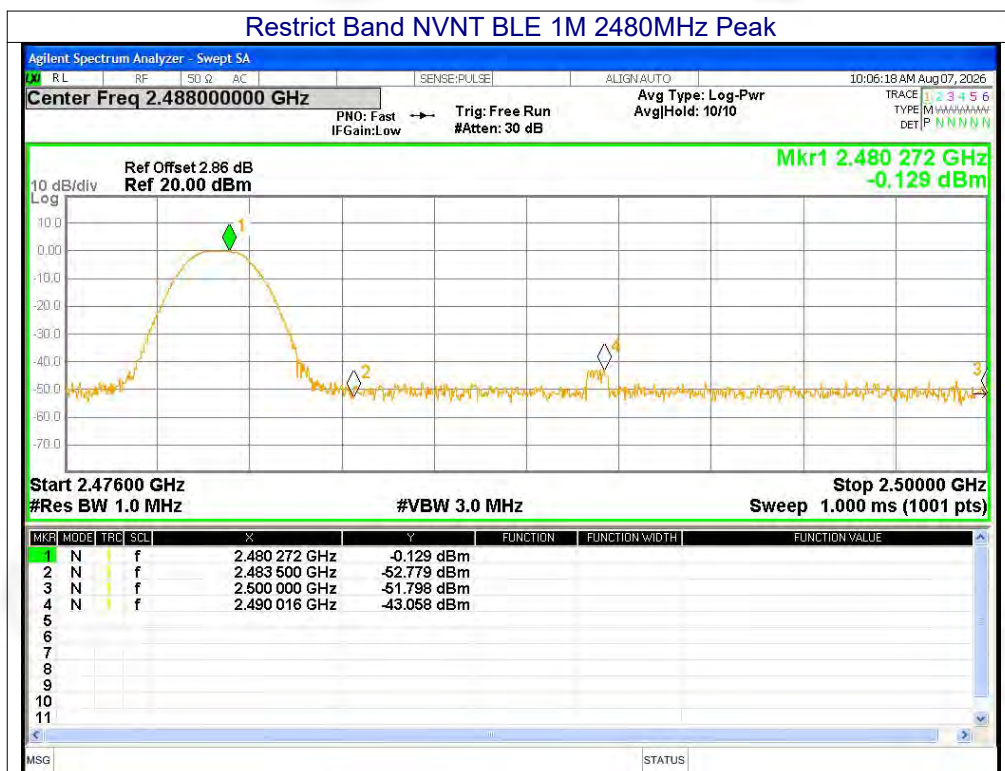


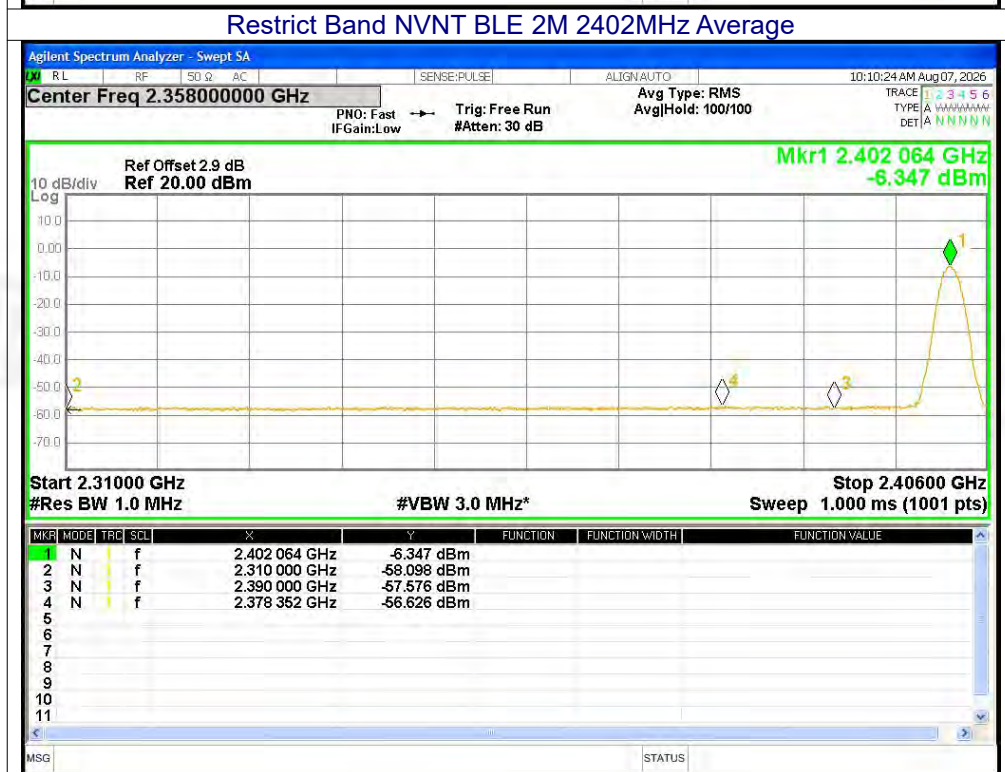
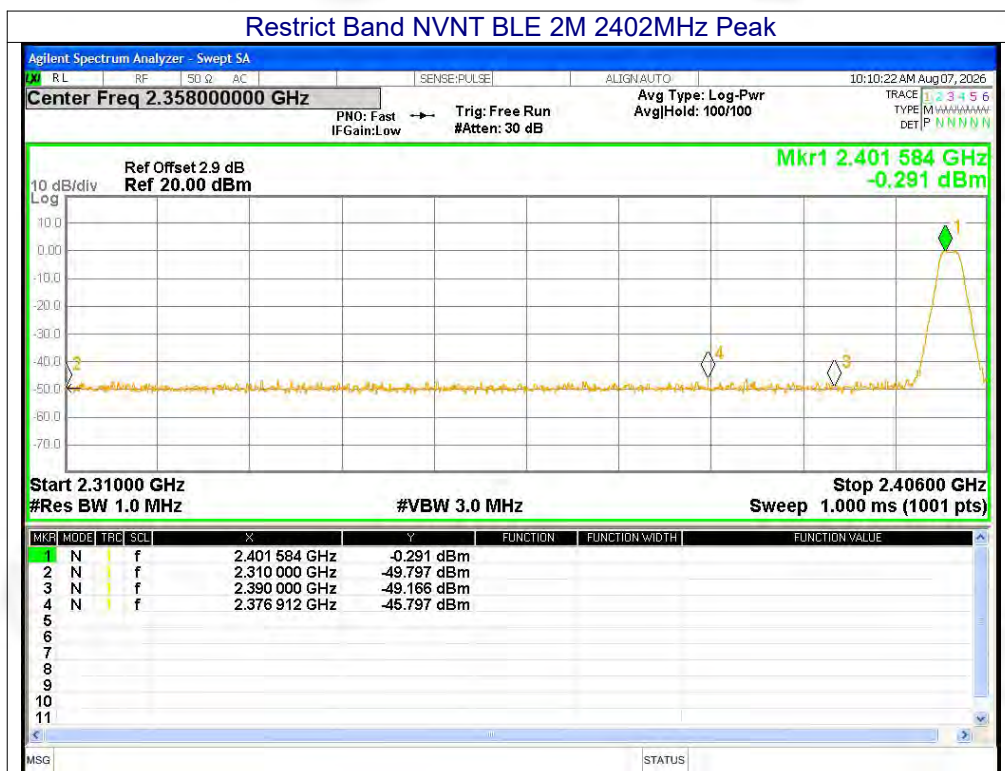


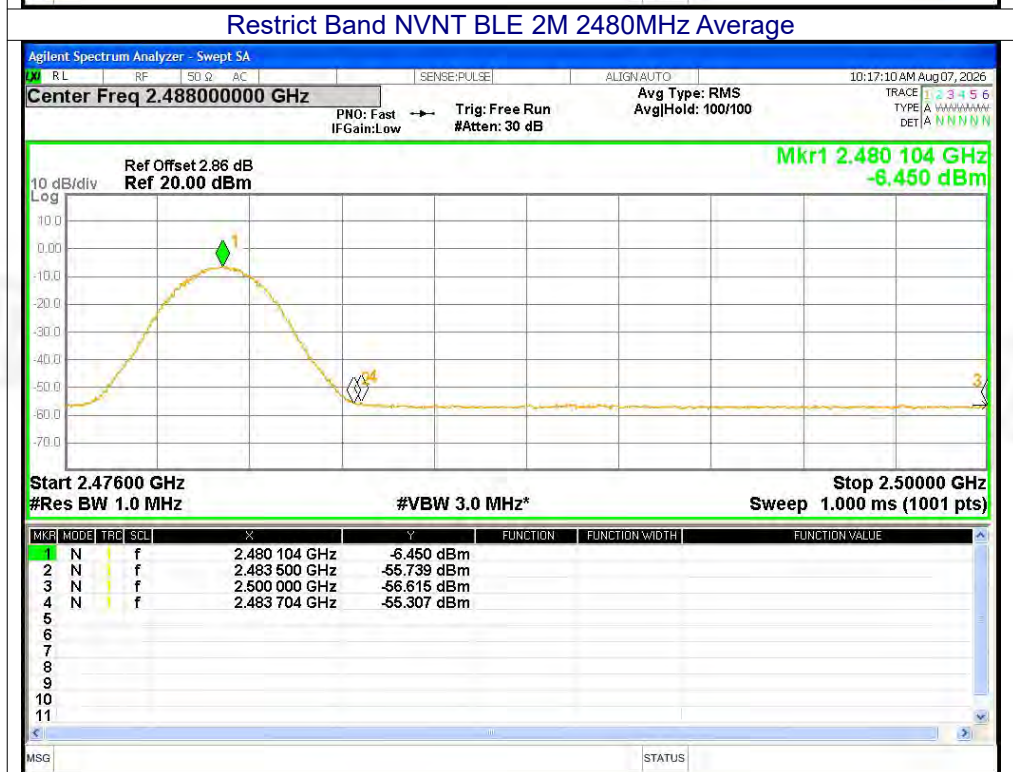
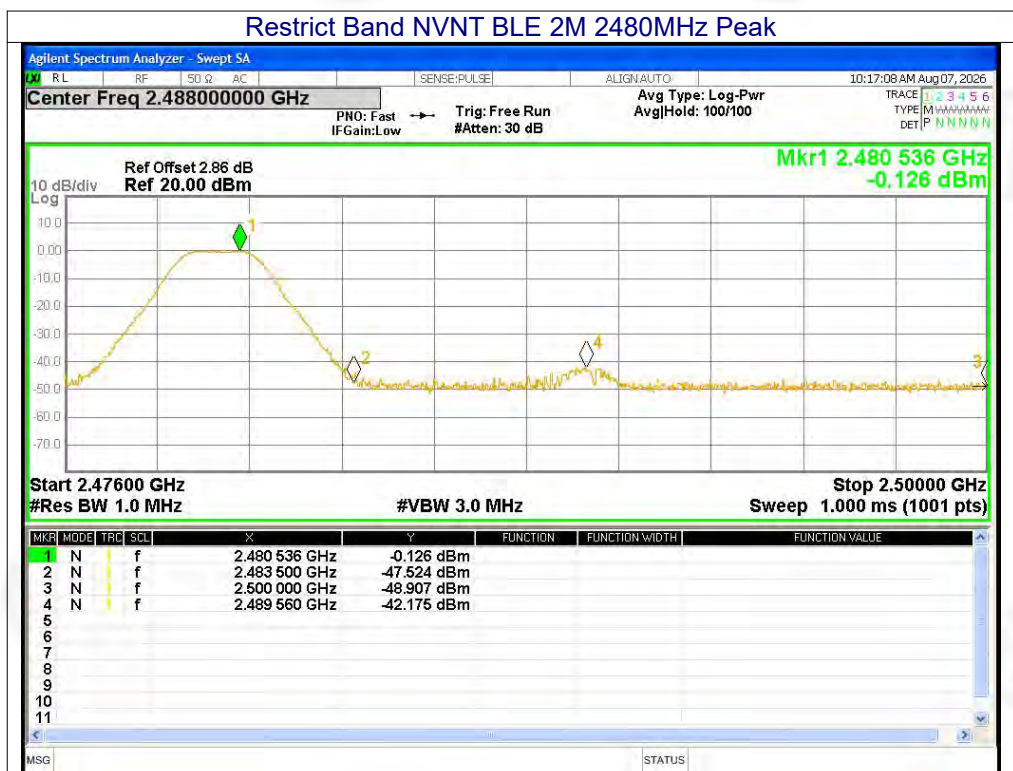
Restrict Band

Condition	Mode	Frequency (MHz)	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	Duty Factor (dB)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
NVNT	BLE 1M	2402	2310	-49.85	2	0	47.41	Peak	<=74	Pass
NVNT	BLE 1M	2402	2310	-57.99	2	2.04	41.31	Average	<=54	Pass
NVNT	BLE 1M	2402	2364.816	-46.1	2	0	51.16	Peak	<=74	Pass
NVNT	BLE 1M	2402	2382.288	-56.6	2	2.04	42.7	Average	<=54	Pass
NVNT	BLE 1M	2402	2390	-49.4	2	0	47.86	Peak	<=74	Pass
NVNT	BLE 1M	2402	2390	-57.05	2	2.04	42.25	Average	<=54	Pass
NVNT	BLE 1M	2480	2483.5	-52.77	2	0	44.49	Peak	<=74	Pass
NVNT	BLE 1M	2480	2483.5	-56.46	2	2.04	42.84	Average	<=54	Pass
NVNT	BLE 1M	2480	2490.016	-43.05	2	0	54.21	Peak	<=74	Pass
NVNT	BLE 1M	2480	2489.656	-54.46	2	2.04	44.84	Average	<=54	Pass
NVNT	BLE 1M	2480	2500	-51.79	2	0	45.47	Peak	<=74	Pass
NVNT	BLE 1M	2480	2500	-56.88	2	2.04	42.42	Average	<=54	Pass
NVNT	BLE 2M	2402	2310	-49.79	2	0	47.47	Peak	<=74	Pass
NVNT	BLE 2M	2402	2310	-58.09	2	4.8	43.97	Average	<=54	Pass
NVNT	BLE 2M	2402	2376.912	-45.79	2	0	51.47	Peak	<=74	Pass
NVNT	BLE 2M	2402	2378.352	-56.62	2	4.8	45.44	Average	<=54	Pass
NVNT	BLE 2M	2402	2390	-49.07	2	0	48.19	Peak	<=74	Pass
NVNT	BLE 2M	2402	2390	-56.86	2	4.8	45.2	Average	<=54	Pass
NVNT	BLE 2M	2480	2483.5	-47.52	2	0	49.74	Peak	<=74	Pass
NVNT	BLE 2M	2480	2483.5	-55.73	2	4.78	46.31	Average	<=54	Pass
NVNT	BLE 2M	2480	2489.56	-42.17	2	0	55.09	Peak	<=74	Pass
NVNT	BLE 2M	2480	2483.704	-55.3	2	4.78	46.74	Average	<=54	Pass
NVNT	BLE 2M	2480	2500	-48.9	2	0	48.36	Peak	<=74	Pass
NVNT	BLE 2M	2480	2500	-56.61	2	4.78	45.43	Average	<=54	Pass











13. TEST SETUP PHOTO

Reference to the appendix I for details.

14. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

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