



Radio Test Report

Report No.: STS2604427W07

Issued for

Andover Audio LLC

55 Chase St., Methuen, MA 01844 USA

Product Name: Portable Stereo Hi-Fi Speaker

Brand Name:  andover

Model Name: FreePlay

Series Model(s): NOMAD, RONIN, WAYFARER, GOPLAY

FCC ID: 2AQL4-AAFP1

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**.....: Andover Audio LLC

Address: 55 Chase St., Methuen, MA 01844 USA

Manufacturer's Name: HUIZHOU CITY SOUNDTOUCH ELECTRONICS CO.,LTDAddress: 4#01, Liandong U Valley, No.1 Shuiqing Road, Shuikou Street,
Huicheng District, Huizhou City, Guangdong Province, P.R.China**Product Description**

Product Name.....: Portable Stereo Hi-Fi Speaker

Brand Name:  andover

Model Name: FreePlay

Series Model(s): NOMAD, RONIN, WAYFARER, GOPLAY

Test Standards: FCC Part15.247

Test Procedure: ANSI C63.10-2020+Cor 1-2023

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

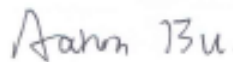
Date of receipt of test item: 28 Apr. 2026

Date (s) of performance of tests: 28 Apr. 2026~21 May 2026

Date of Issue.....: 21 May 2026

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

Testing Engineer : _____



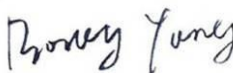
(Aaron Bu)

Technical Manager : _____



(Skylar Li)

Authorized Signatory : _____



(Bovey Yang)





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	10
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	21
4.5 FIELD STRENGTH CALCULATION	21
4.6 TEST RESULTS	22
5. DUTY CYCLE	55
5.1 TEST STANDARD	55
5.2 TEST PROCEDURE	55
5.3 DEVIATION FROM STANDARD	55
5.4 TEST SETUP	55
5.6 TEST RESULTS	55
6. CONDUCTED SPURIOUS & BAND EDGE EMISSION	56
6.1 LIMIT	56
6.2 TEST PROCEDURE	56
6.3 TEST SETUP	56



Table of Contents	Page
6.4 EUT OPERATION CONDITIONS	56
6.5 TEST RESULTS	56
7. POWER SPECTRAL DENSITY TEST	57
7.1 LIMIT	57
7.2 TEST PROCEDURE	57
7.3 TEST SETUP	57
7.4 EUT OPERATION CONDITIONS	57
7.5 TEST RESULTS	57
8. BANDWIDTH TEST	58
8.1 LIMIT	58
8.2 TEST PROCEDURE	58
8.3 TEST SETUP	58
8.4 EUT OPERATION CONDITIONS	58
8.5 TEST RESULTS	58
9. PEAK OUTPUT POWER TEST	59
9.1 LIMIT	59
9.2 TEST PROCEDURE	59
9.3 TEST SETUP	59
9.4 EUT OPERATION CONDITIONS	59
9.5 TEST RESULTS	59
10. ANTENNA REQUIREMENT	60
10.1 STANDARD REQUIREMENT	60
10.2 EUT ANTENNA	60
APPENDIX 1-TEST DATA	61
DUTY CYCLE	61
MAXIMUM PEAK CONDUCTED OUTPUT POWER	65
-6DB BANDWIDTH	69
MAXIMUM POWER SPECTRAL DENSITY LEVEL	73
BAND EDGE	77
CONDUCTED RF SPURIOUS EMISSION	82
APPENDIX 2- EUT TEST PHOTO	89

**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	21 May 2026	STS2604427W07	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+Cor 1-2023.



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 $y \pm U$, 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	$\pm 0.751\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.888\text{dB}$
3	All emissions, radiated 9K-30MHz	$\pm 2.48\text{dB}$
4	All emissions, radiated 30M-1GHz	$\pm 2.52\text{dB}$
5	All emissions, radiated 1G-18GHz	$\pm 3.48\text{dB}$
6	All emissions, radiated >18GHz	$\pm 4.18\text{dB}$
7	Conducted Emission (9KHz-150KHz)	$\pm 2.48\text{dB}$
8	Conducted Emission (150KHz-30MHz)	$\pm 2.52\text{dB}$
9	Occupied Channel Bandwidth	$\pm 3.6\%$
10	Power Spectral Density, conducted	$\pm 1.214\text{dB}$
11	Duty Cycle	$\pm 3.2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Portable Stereo Hi-Fi Speaker	
Brand Name	 andover	
Model Name	FreePlay	
Series Model(s)	NOMAD, RONIN, WAYFARER, GOPLAY	
Model Difference	Only the model and appearance color are different	
Product Description	The EUT is a Portable Stereo Hi-Fi Speaker	
	Operation Frequency:	2402~2480 MHz
	Modulation Type:	GFSK
	Radio Technology:	BLE
	Bluetooth Configuration:	LE(Support 1M PHY, 2M PHY)
	Number Of Channel:	40
	Antenna Type:	FPC
	Antenna Gain:	2.94dBi
Channel List	Please refer to the Note 3.	
Power Rating	Input: 5V---3A,9V---3A,12V---3A,15V---3A,20V---2.25A 45W Max Output: Type-C 5V---3A,9V---3A,12V---3A,15V---3A,20V---2.25A 45W Max Wireless charging 5V---1A 5W	
Adapter	Model: YM-PD045EX Brand: N/A Input: 100V-240V~ 50/60Hz 1.2A Output: USB-C 5V---3A 9V---3A,12V---3A,15V---3A,20V---2.25A	
Battery	Model: ANDOVER 18650 3S3P 7800mAh 11.1V Brand:ZECA Rated Voltage: 11.1V Charge Limit Voltage: 12.6V Capacity: 7800mAh	
Hardware version number	Rev:1.04	
Software version number	V2.00	
Sample Number	260427002-7	
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 information refer the manufacturer provide report, applicable only to the tested sample identified in the report. Due to the incorrect antenna information, a series of



problems such as the accuracy of the test results will be borne by the customer.

3.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (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)	1M PHY /GFSK
Mode 2	TX CH19(2440MHz)	1M PHY /GFSK
Mode 3	TX CH39(2480MHz)	1M PHY /GFSK

Worst Mode	Description	Data/Modulation
Mode 4	TX CH00(2402MHz)	2M PHY /GFSK
Mode 5	TX CH19(2440MHz)	2M PHY /GFSK
Mode 6	TX CH39(2480MHz)	2M PHY /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.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 7 : Keeping BT TX



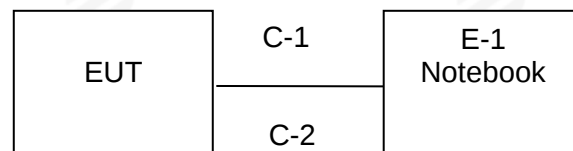
2.3 TEST SOFTWARE AND POWER LEVEL

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

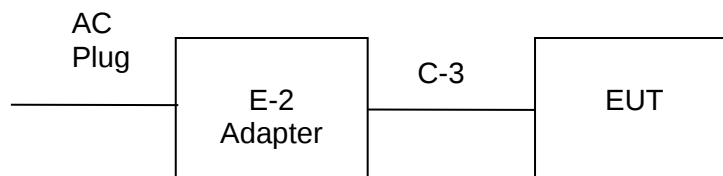
RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
BLE(With 2M PHY)	BLE_1M PHY	GFSK	2.94	default	FCC_Tool_V3.01 (ZS283L2-ATS2835P2)
	BLE_2M PHY	GFSK	2.94	default	

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

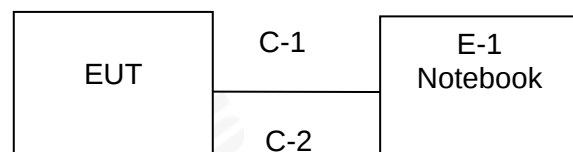
Radiated Spurious Emission Test



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	YM-PD045EX	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
966 chamber	CHENYU	966 Room	966	2025.08.13	2028.08.12
Temperature & Humidity	TORIE	TP502V4-P	6700000124280	2025.10.13	2026.10.12
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2026.02.05	2027.02.04
Pre-Amplifier(1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2025.09.25	2026.09.24
Pre-Amplifier(18G-40GHz)	SKET	LNPA_1840-50	SK2018101801	2026.03.04	2027.03.03
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	SKET	SU319E	51409043	2025.09.26	2026.09.25
Band 2.4G-2.5G Filter	HX MICROWAVE	HXLBQ-DZA61	5410025	2025.09.23	2026.09.22
Antenna Mast	MF	MFA-440H	1308023	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	HONGSHENG FENG	DPS-305AF	17064939	2025.09.22	2026.09.21
RF Coaxial Cable	LEITAI M-WAVE	CA360	DC-18G	2025.09.26	2026.09.25
RF Coaxial Cable	LEITAI M-WAVE	CA360	DC-18G	2025.09.26	2026.09.25
RF Coaxial Cable	LEITAI M-WAVE	CA3507	DC-40G	2025.09.26	2026.09.25
RF Coaxial Cable	LEITAI M-WAVE	CA3507	DC-40G	2025.09.26	2026.09.25
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	2025.09.26	2026.09.25
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
CE Cable	EASTSHEEP	C01	010057	2025.09.25	2026.09.24
Temperature & Humidity	TORIE	TP502V4-P	6700000422137	2025.08.26	2026.08.25
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	2026.02.04	2027.02.03
Pulse Power Sensor	Anritsu	MA2411B	917389	2025.09.23	2026.09.22
Power Meter	Anritsu	ML2480	1005127	2025.09.23	2026.09.22
Switch control box	MW	MW100-RFCB	52206001	2025.09.23	2026.09.22
RF Coaxial Cable	XINQY	CT40PE	DC-40G	2026.02.04	2027.02.03
Temperature& Humidity test chamber	Safety test	AG80L	171200018	2026.02.04	2027.02.03
Temperature & Humidity	TORIE	TP502V4-P	6700000124211	2025.10.09	2026.10.08
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.

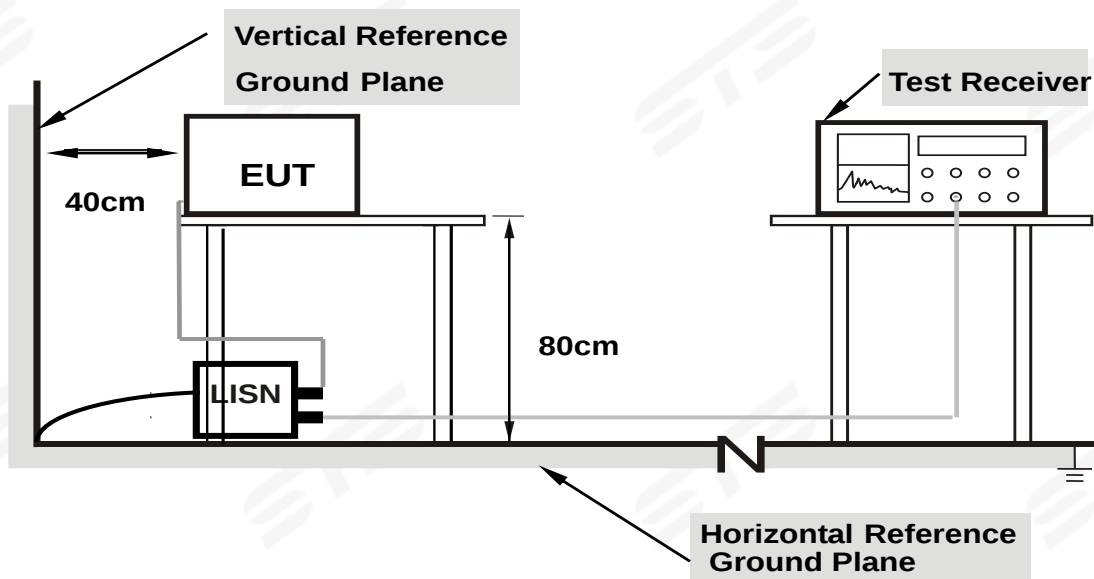
The following table is the setting of the receiver

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

3.2 TEST PROCEDURE

- 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.
- 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 is at least 80 cm from the nearest part of EUT chassis.
- 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

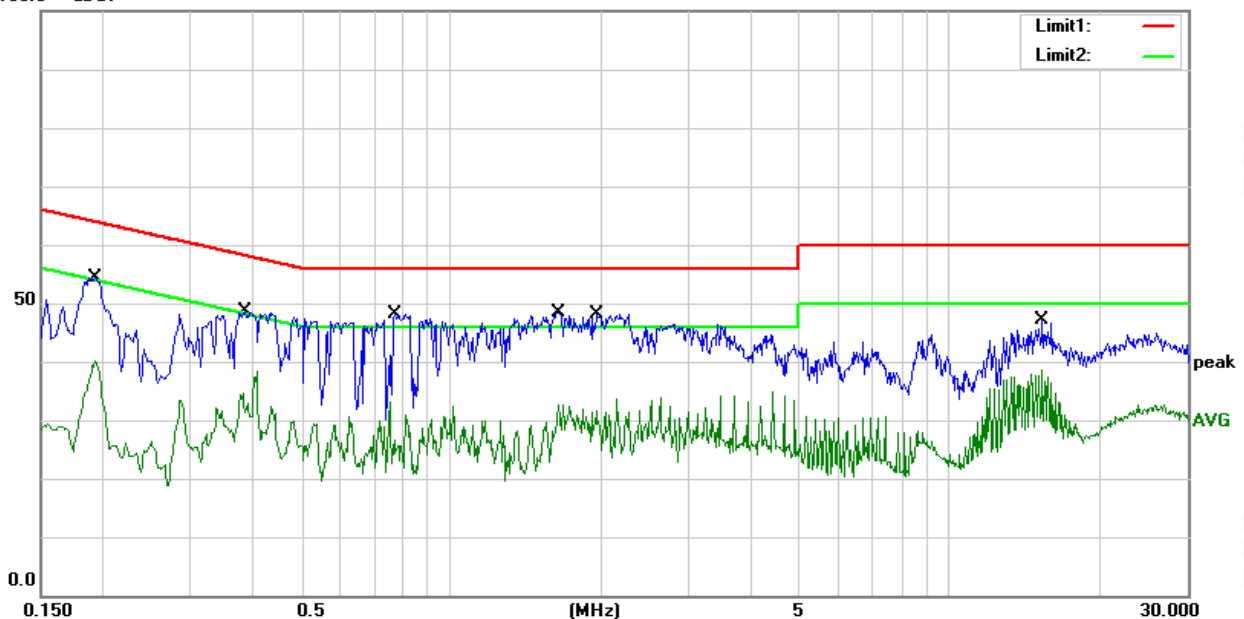
Temperature:	25.1°C	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 7		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1922	35.08	19.39	54.47	63.94	-9.47	QP
2	0.1922	20.65	19.39	40.04	53.94	-13.90	AVG
3	0.3860	29.31	19.38	48.69	58.15	-9.46	QP
4	0.3860	17.88	19.38	37.26	48.15	-10.89	AVG
5	0.7740	28.84	19.37	48.21	56.00	-7.79	QP
6	0.7740	10.33	19.37	29.70	46.00	-16.30	AVG
7	1.6420	29.05	19.35	48.40	56.00	-7.60	QP
8	1.6420	10.68	19.35	30.03	46.00	-15.97	AVG
9	1.9660	28.88	19.35	48.23	56.00	-7.77	QP
10	1.9660	14.22	19.35	33.57	46.00	-12.43	AVG
11	15.3140	27.34	19.72	47.06	60.00	-12.94	QP
12	15.3140	18.97	19.72	38.69	50.00	-11.31	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)

100.0 dBuV





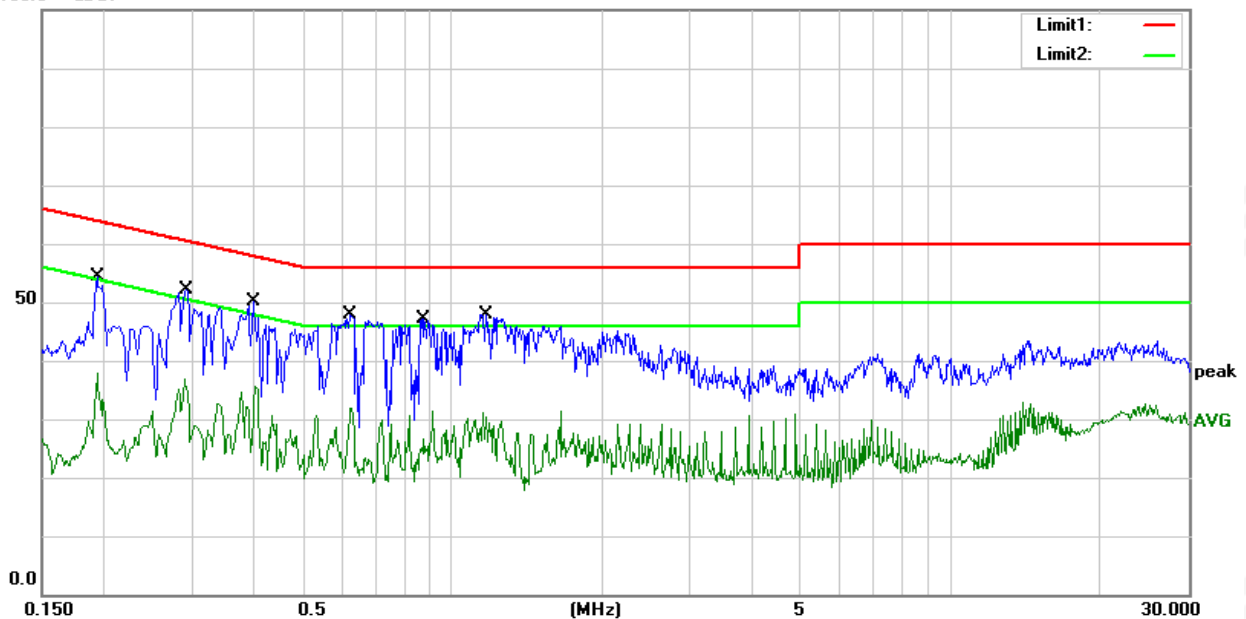
Temperature:	25.1℃	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 7		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1940	35.08	19.39	54.47	63.86	-9.39	QP
2	0.1940	18.59	19.39	37.98	53.86	-15.88	AVG
3	0.2923	32.84	19.37	52.21	60.46	-8.25	QP
4	0.2923	13.35	19.37	32.72	50.46	-17.74	AVG
5	0.3980	30.70	19.38	50.08	57.90	-7.82	QP
6	0.3980	16.27	19.38	35.65	47.90	-12.25	AVG
7	0.6220	28.43	19.38	47.81	56.00	-8.19	QP
8	0.6220	10.54	19.38	29.92	46.00	-16.08	AVG
9	0.8780	27.83	19.36	47.19	56.00	-8.81	QP
10	0.8780	12.04	19.36	31.40	46.00	-14.60	AVG
11	1.1660	28.50	19.35	47.85	56.00	-8.15	QP
12	1.1660	8.32	19.35	27.67	46.00	-18.33	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)

100.0 dBuV





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+Cor 1-2023 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 (1000MHz-25GHz)

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 / 360 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

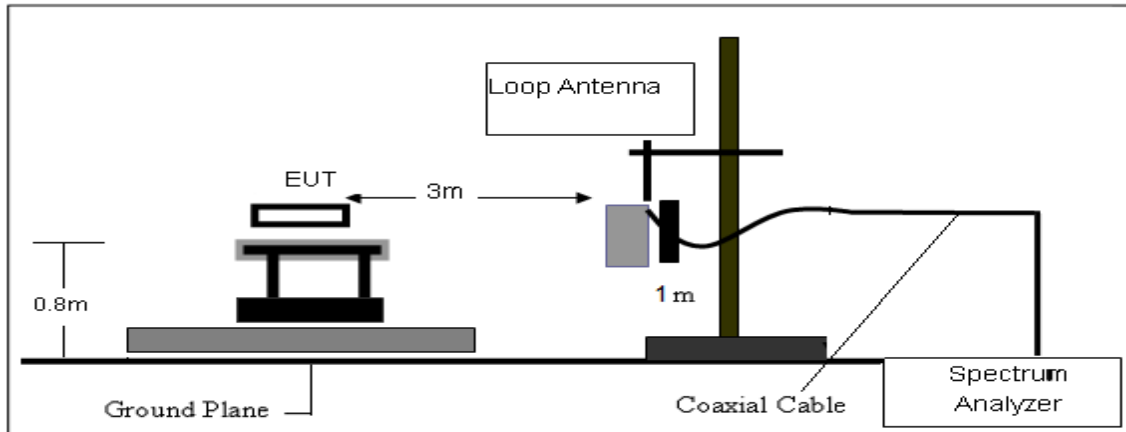
- The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- 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.
- 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

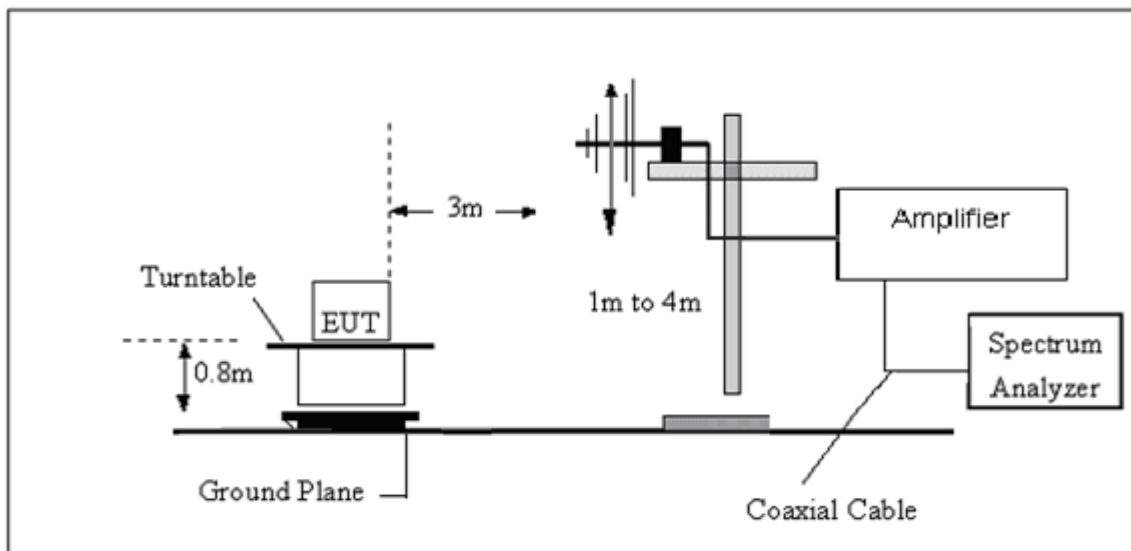
Both horizontal and vertical antenna polarities were tested with a band-stop filter and performed pretest to three orthogonal axis. The worst-case emissions were reported.

4.3 TEST SETUP

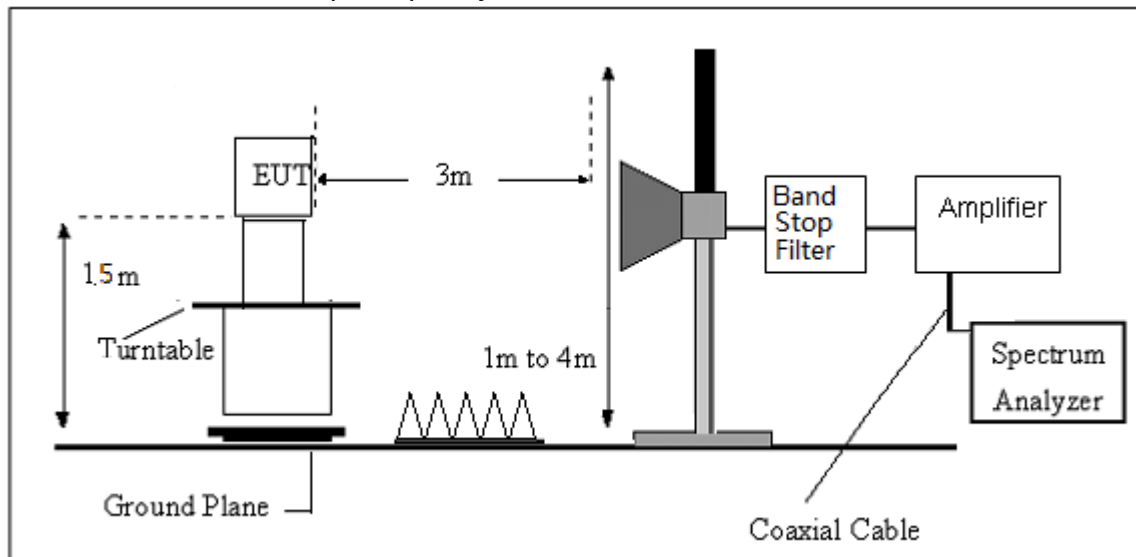
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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

$$\text{Factor} = \text{AF} + \text{CL} - \text{AG}$$



4.6 TEST RESULTS

(Between 9KHz – 30 MHz)

Temperature:	23.4℃	Relative Humidity:	60%
Test Voltage:	DC 11.1V	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 = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



(30MHz -1000MHz)

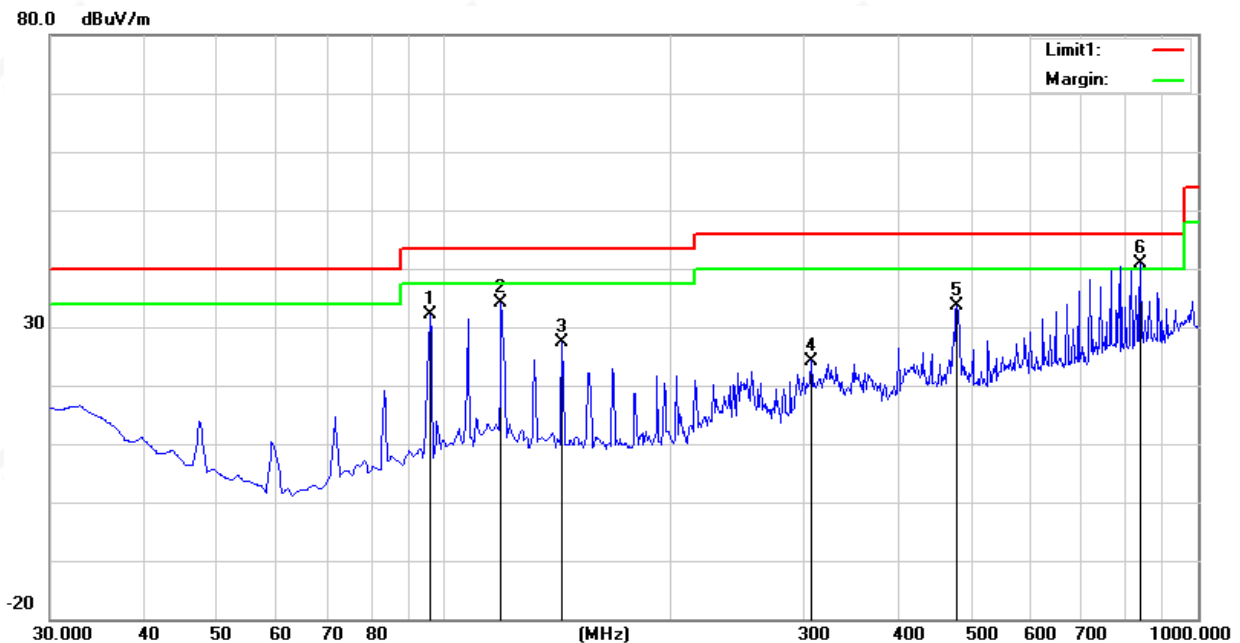
1M PHY

Temperature:	23.4℃	Relative Humidity:	60%
Test Voltage:	DC 11.1V	Phase:	Horizontal
Test Mode:	Mode 1/2/3 (Mode 1 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	95.9600	52.69	-20.67	32.02	43.50	-11.48	peak
2	119.2400	52.50	-18.38	34.12	43.50	-9.38	peak
3	143.4900	45.56	-18.23	27.33	43.50	-16.17	peak
4	307.4200	38.80	-14.55	24.25	46.00	-21.75	peak
5	480.0800	42.36	-8.65	33.71	46.00	-12.29	peak
6	839.9500	41.19	-0.34	40.85	46.00	-5.15	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.



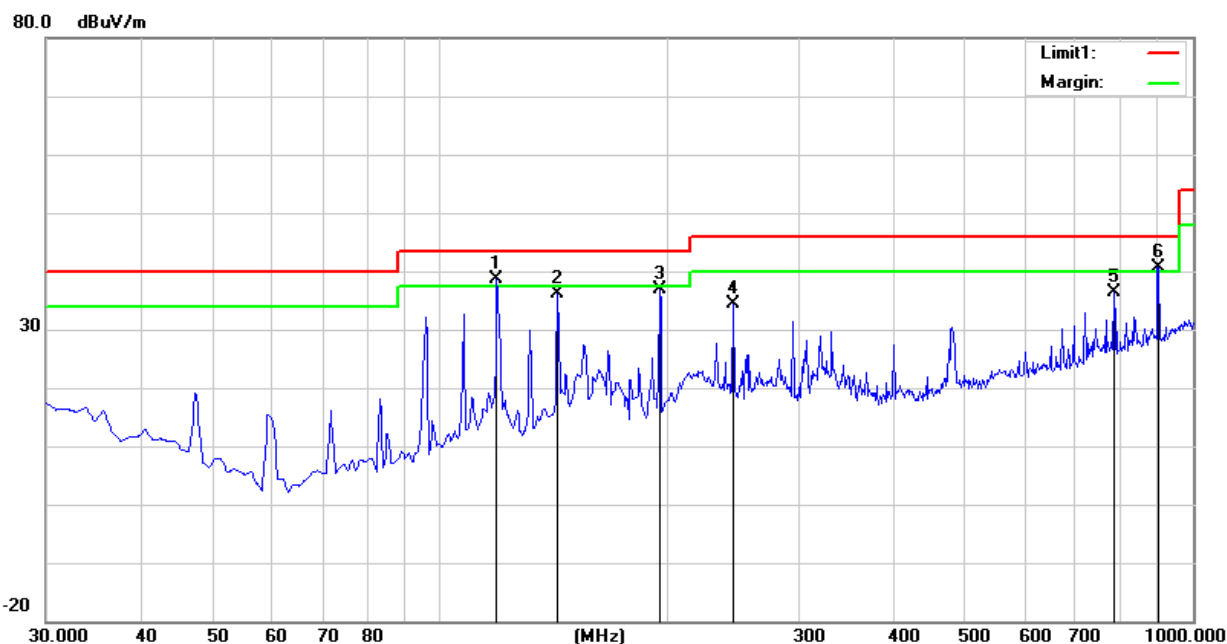


Temperature:	23.4℃	Relative Humidity:	60%
Test Voltage:	DC 11.1V	Phase:	Vertical
Test Mode:	Mode 1/2/3 (Mode 1 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	119.2400	56.92	-18.38	38.54	43.50	-4.96	peak
2	143.4900	54.33	-18.23	36.10	43.50	-7.40	peak
3	195.8700	58.05	-21.14	36.91	43.50	-6.59	peak
4	245.3400	51.25	-16.92	34.33	46.00	-11.67	peak
5	786.6000	38.33	-2.05	36.28	46.00	-9.72	peak
6	901.0600	41.06	-0.43	40.63	46.00	-5.37	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.





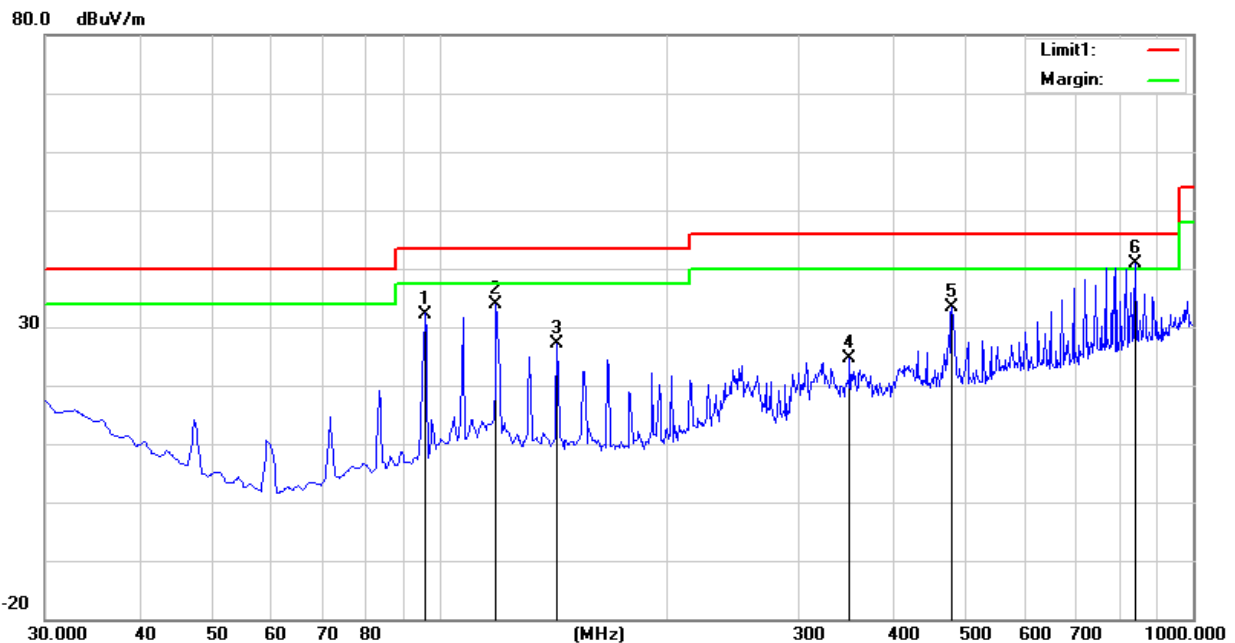
2M PHY

Temperature:	23.4℃	Relative Humidity:	60%
Test Voltage:	DC 11.1V	Phase:	Horizontal
Test Mode:	Mode 4/5/6 (Mode 4 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	95.9600	52.92	-20.67	32.25	43.50	-11.25	peak
2	119.2400	52.22	-18.38	33.84	43.50	-9.66	peak
3	143.4900	45.33	-18.23	27.10	43.50	-16.40	peak
4	351.0700	37.66	-13.04	24.62	46.00	-21.38	peak
5	480.0800	41.96	-8.65	33.31	46.00	-12.69	peak
6	839.9500	41.29	-0.34	40.95	46.00	-5.05	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.



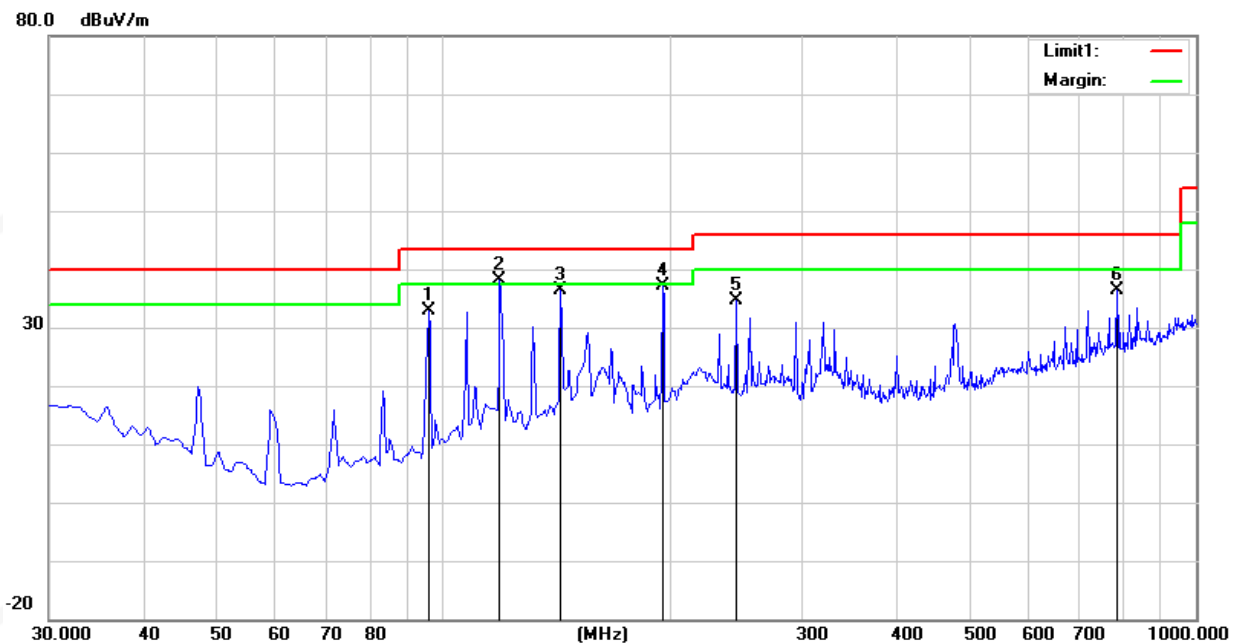


Temperature:	23.4℃	Relative Humidity:	60%
Test Voltage:	DC 11.1V	Phase:	Vertical
Test Mode:	Mode 4/5/6 (Mode 4 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	95.9600	53.65	-20.67	32.98	43.50	-10.52	peak
2	119.2400	56.55	-18.38	38.17	43.50	-5.33	peak
3	143.4900	54.67	-18.23	36.44	43.50	-7.06	peak
4	195.8700	58.36	-21.14	37.22	43.50	-6.28	peak
5	245.3400	51.44	-16.92	34.52	46.00	-11.48	peak
6	786.6000	38.31	-2.05	36.26	46.00	-9.74	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

1M PHY- GFSK

Low Channel

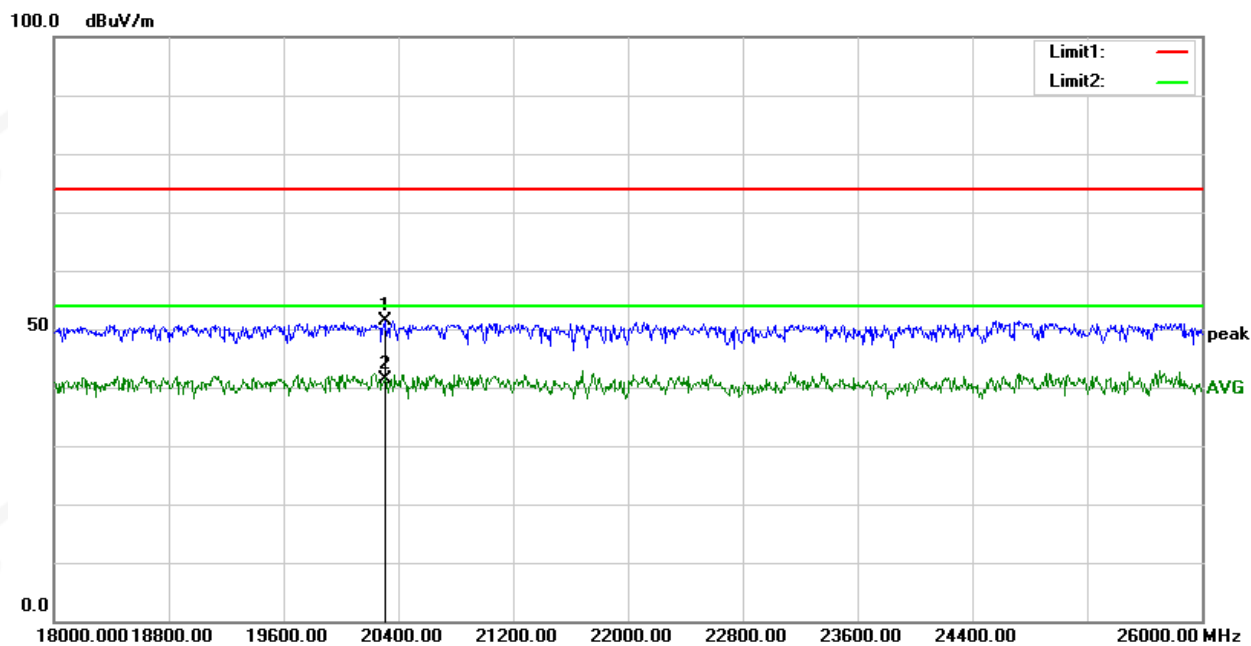
Horizontal



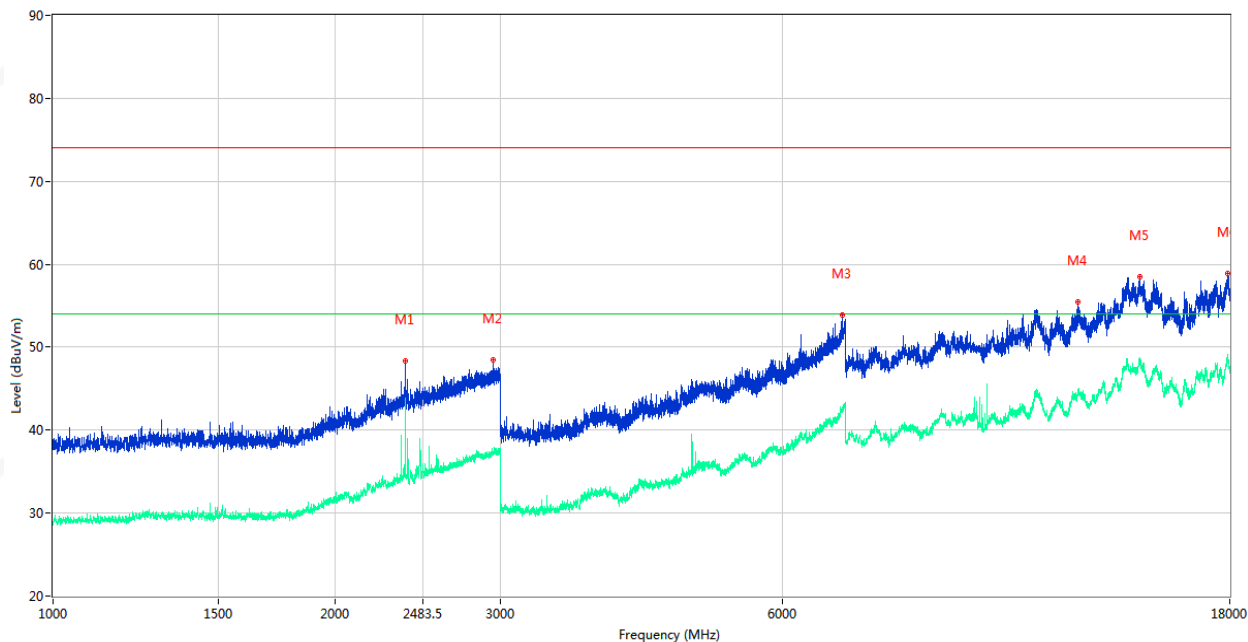
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2029.500	42.81	0.64	74.0	-31.19	Peak	219.70	Horizontal	Pass
1**	2029.500	31.69	0.64	54.0	-22.31	AV	219.70	Horizontal	Pass
2	2853.500	48.71	4.99	74.0	-25.29	Peak	282.50	Horizontal	Pass
2**	2853.500	36.97	4.99	54.0	-17.03	AV	282.50	Horizontal	Pass
3	6937.000	53.43	0.81	74.0	-20.57	Peak	335.10	Horizontal	Pass
3**	6937.000	42.38	0.81	54.0	-11.62	AV	335.10	Horizontal	Pass
4	9607.000	54.78	0.57	74.0	-19.22	Peak	327.30	Horizontal	Pass
4**	9607.000	47.32	0.57	54.0	-6.68	AV	327.30	Horizontal	Pass
5	11174.500	55.15	2.48	74.0	-18.85	Peak	353.80	Horizontal	Pass
5**	11174.500	44.51	2.48	54.0	-9.49	AV	353.80	Horizontal	Pass
6	14012.500	59.14	8.25	74.0	-14.86	Peak	167.70	Horizontal	Pass
6**	14012.500	47.72	8.25	54.0	-6.28	AV	167.70	Horizontal	Pass



18GHz-26GHz



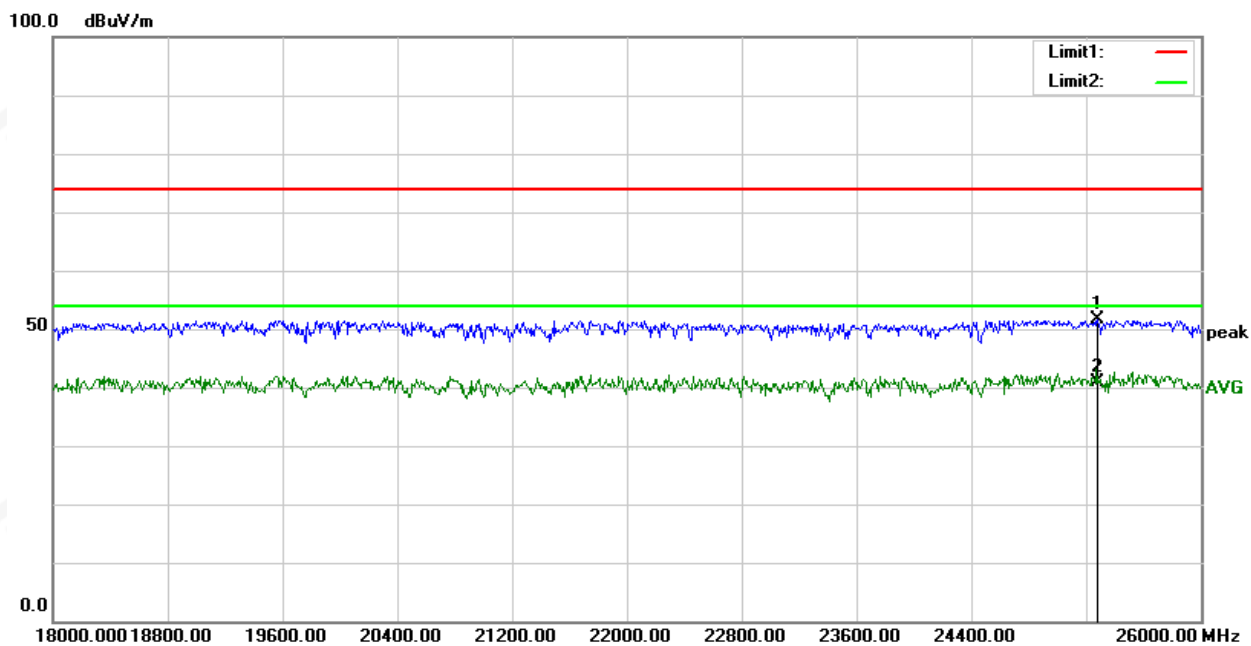
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/ m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	20312.000	49.34	2.06	51.40	74.00	-22.60	peak
2	20312.000	39.32	2.06	41.38	54.00	-12.62	AVG

Vertical
1GHz-18GHz

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2377.000	48.39	2.93	74.0	-25.61	Peak	356.20	Vertical	Pass
1**	2377.000	43.90	2.93	54.0	-10.10	AV	356.20	Vertical	Pass
2	2951.000	48.43	5.22	74.0	-25.57	Peak	24.80	Vertical	Pass
2**	2951.000	37.01	5.22	54.0	-16.99	AV	24.80	Vertical	Pass
3	6949.000	53.88	0.91	74.0	-20.12	Peak	318.20	Vertical	Pass
3**	6949.000	42.42	0.91	54.0	-11.58	AV	318.20	Vertical	Pass
4	12409.250	55.44	3.09	74.0	-18.56	Peak	223.40	Vertical	Pass
4**	12409.250	44.62	3.09	54.0	-9.38	AV	223.40	Vertical	Pass
5	14441.500	58.51	6.70	74.0	-15.49	Peak	186.60	Vertical	Pass
5**	14441.500	48.17	6.70	54.0	-5.83	AV	186.60	Vertical	Pass
6	17920.250	58.94	7.08	74.0	-15.06	Peak	48.50	Vertical	Pass
6**	17920.250	48.30	7.08	54.0	-5.70	AV	48.50	Vertical	Pass



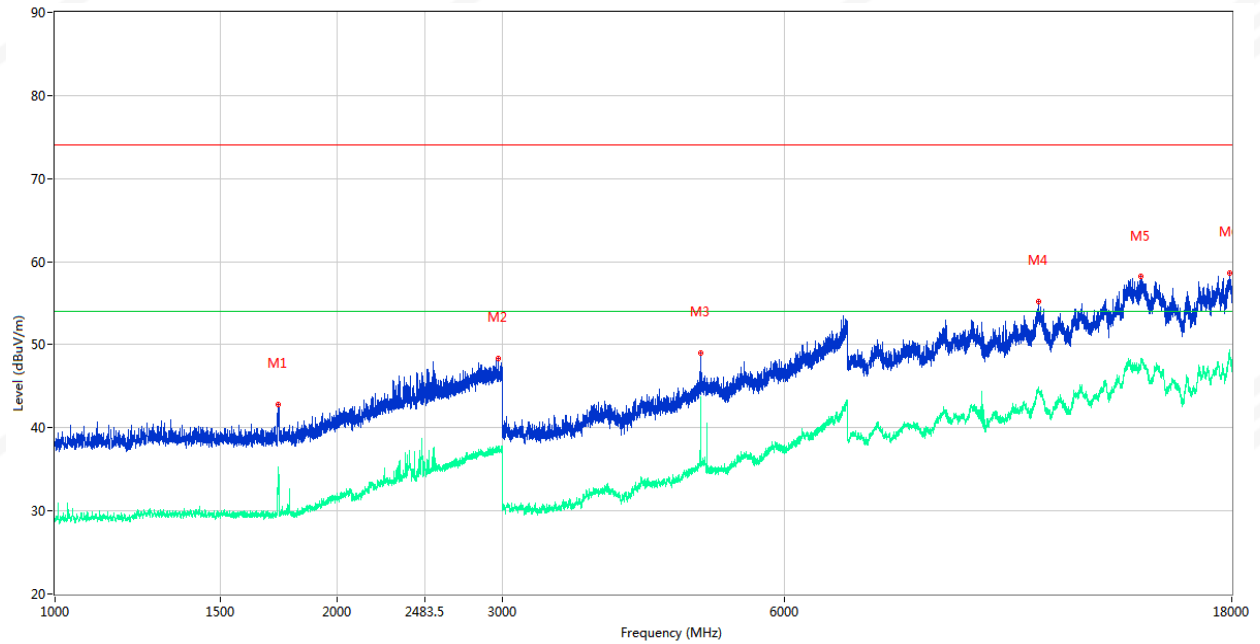
18GHz-26GHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	25280.000	46.16	5.51	51.67	74.00	-22.33	peak
2	25280.000	35.29	5.51	40.80	54.00	-13.20	AVG



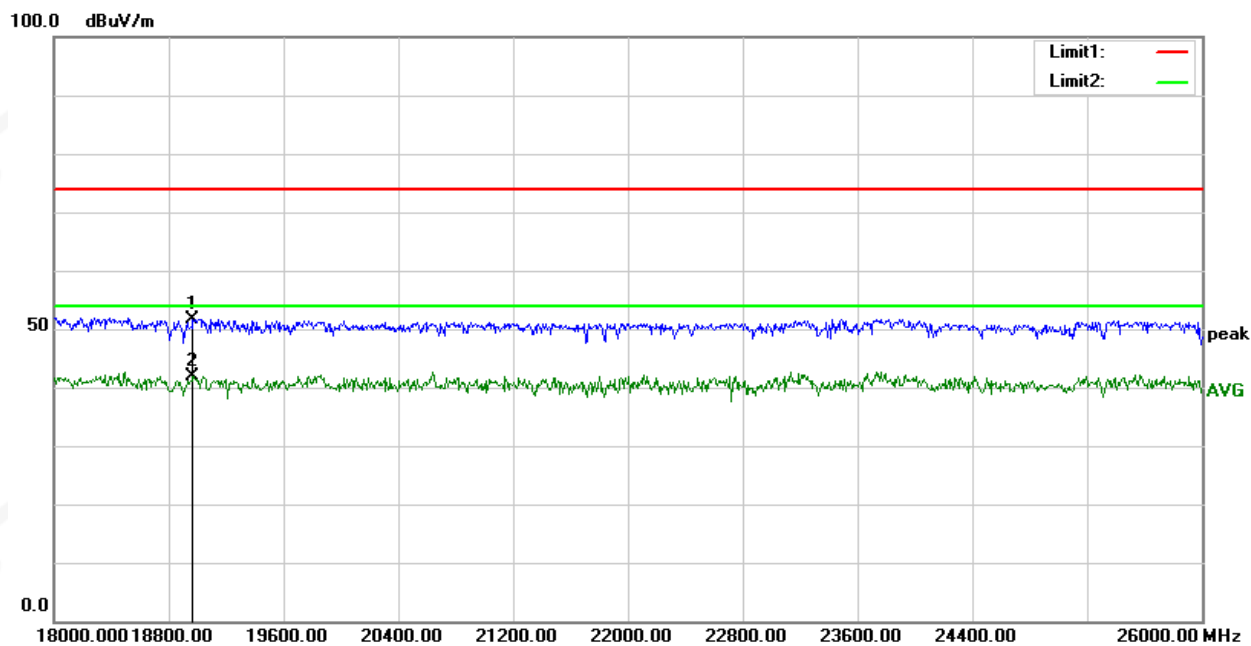
Mid Channel
Horizontal
1GHz-18GHz



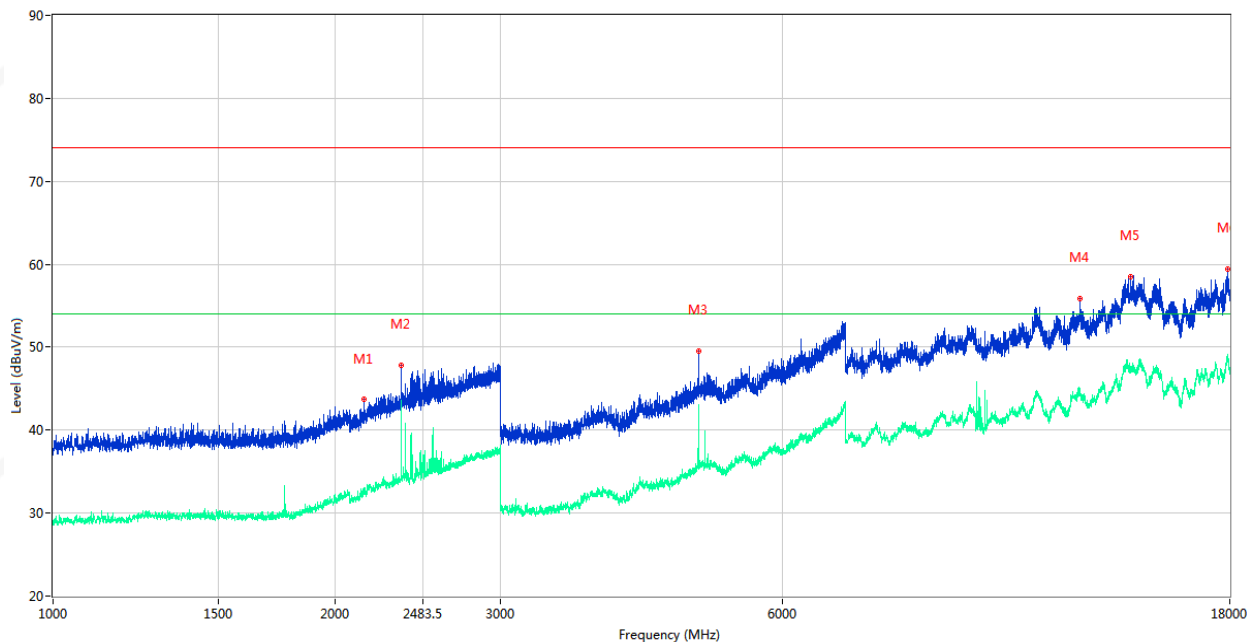
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	1731.500	42.81	-0.69	74.0	-31.19	Peak	0.10	Horizontal	Pass
1**	1731.500	35.26	-0.69	54.0	-18.74	AV	0.10	Horizontal	Pass
2	2970.000	48.39	5.31	74.0	-25.61	Peak	267.70	Horizontal	Pass
2**	2970.000	37.16	5.31	54.0	-16.84	AV	267.70	Horizontal	Pass
3	4881.000	48.97	-6.28	74.0	-25.03	Peak	227.20	Horizontal	Pass
3**	4881.000	41.75	-6.28	54.0	-12.25	AV	227.20	Horizontal	Pass
4	11185.500	55.25	2.54	74.0	-18.75	Peak	10.40	Horizontal	Pass
4**	11185.500	44.29	2.54	54.0	-9.71	AV	10.40	Horizontal	Pass
5	14400.250	58.17	6.99	74.0	-15.83	Peak	90.40	Horizontal	Pass
5**	14400.250	48.24	6.99	54.0	-5.76	AV	90.40	Horizontal	Pass
6	17906.500	58.60	7.19	74.0	-15.40	Peak	158.10	Horizontal	Pass
6**	17906.500	48.89	7.19	54.0	-5.11	AV	158.10	Horizontal	Pass



18GHz-26GHz



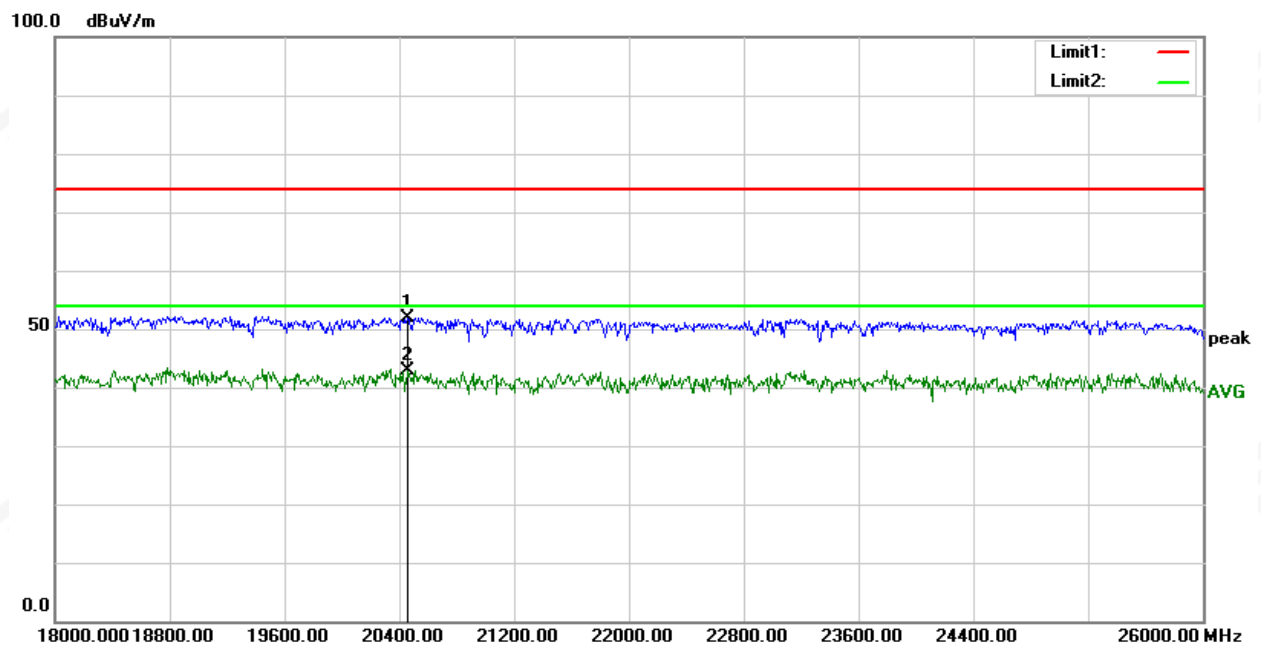
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18968.000	49.93	1.79	51.72	74.00	-22.28	peak
2	18968.000	40.02	1.79	41.81	54.00	-12.19	AVG

Vertical
1GHz-18GHz

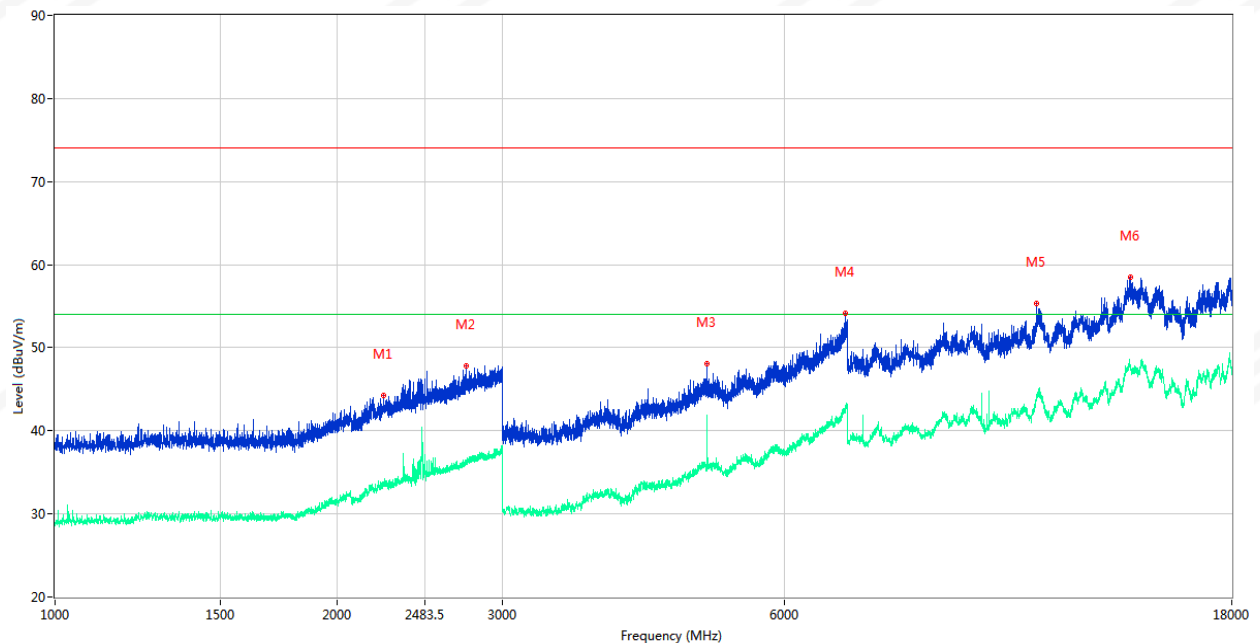
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2147.500	43.66	1.82	74.0	-30.34	Peak	360.00	Vertical	Pass
1**	2147.500	32.89	1.82	54.0	-21.11	AV	360.00	Vertical	Pass
2	2353.000	47.78	2.78	74.0	-26.22	Peak	311.60	Vertical	Pass
2**	2353.000	43.55	2.78	54.0	-10.45	AV	311.60	Vertical	Pass
3	4880.000	49.57	-6.29	74.0	-24.43	Peak	301.20	Vertical	Pass
3**	4880.000	43.12	-6.29	54.0	-10.88	AV	301.20	Vertical	Pass
4	12464.250	55.87	2.53	74.0	-18.13	Peak	353.90	Vertical	Pass
4**	12464.250	44.31	2.53	54.0	-9.69	AV	353.90	Vertical	Pass
5	14103.250	58.44	6.85	74.0	-15.56	Peak	269.20	Vertical	Pass
5**	14103.250	47.07	6.85	54.0	-6.93	AV	269.20	Vertical	Pass
6	17909.250	59.37	7.17	74.0	-14.63	Peak	68.70	Vertical	Pass
6**	17909.250	48.74	7.17	54.0	-5.26	AV	68.70	Vertical	Pass



18GHz-26GHz



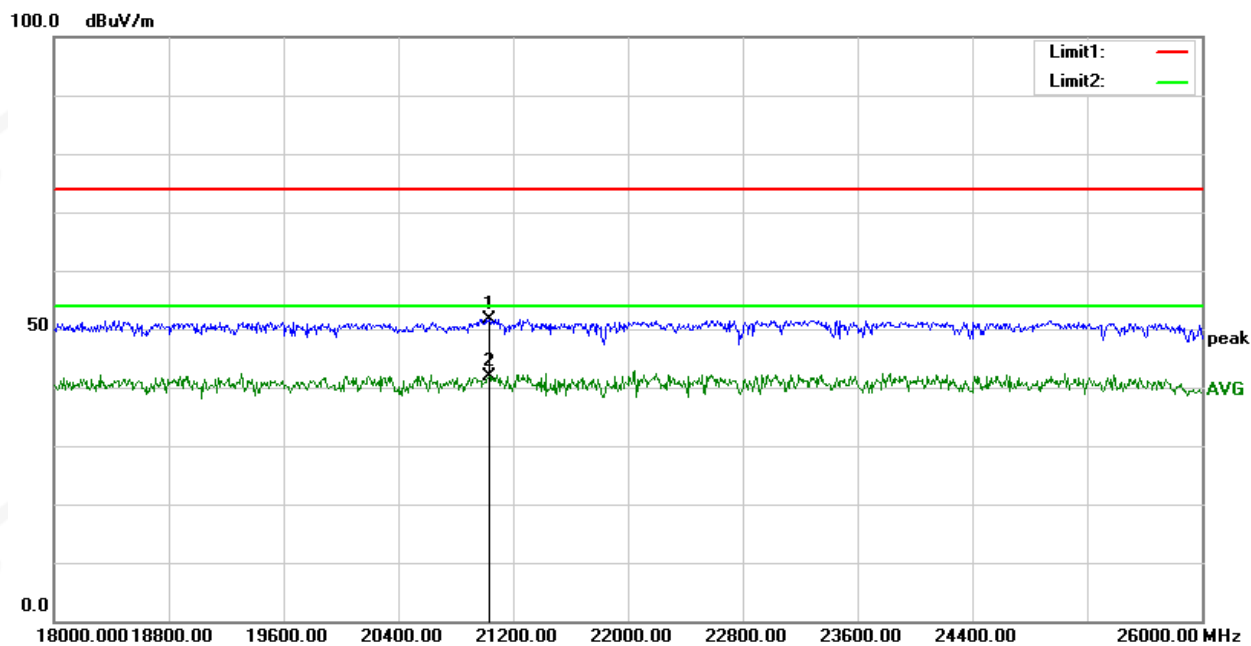
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	20456.000	49.79	2.19	51.98	74.00	-22.02	peak
2	20456.000	40.62	2.19	42.81	54.00	-11.19	AVG

High Channel
Horizontal
1GHz-18GHz

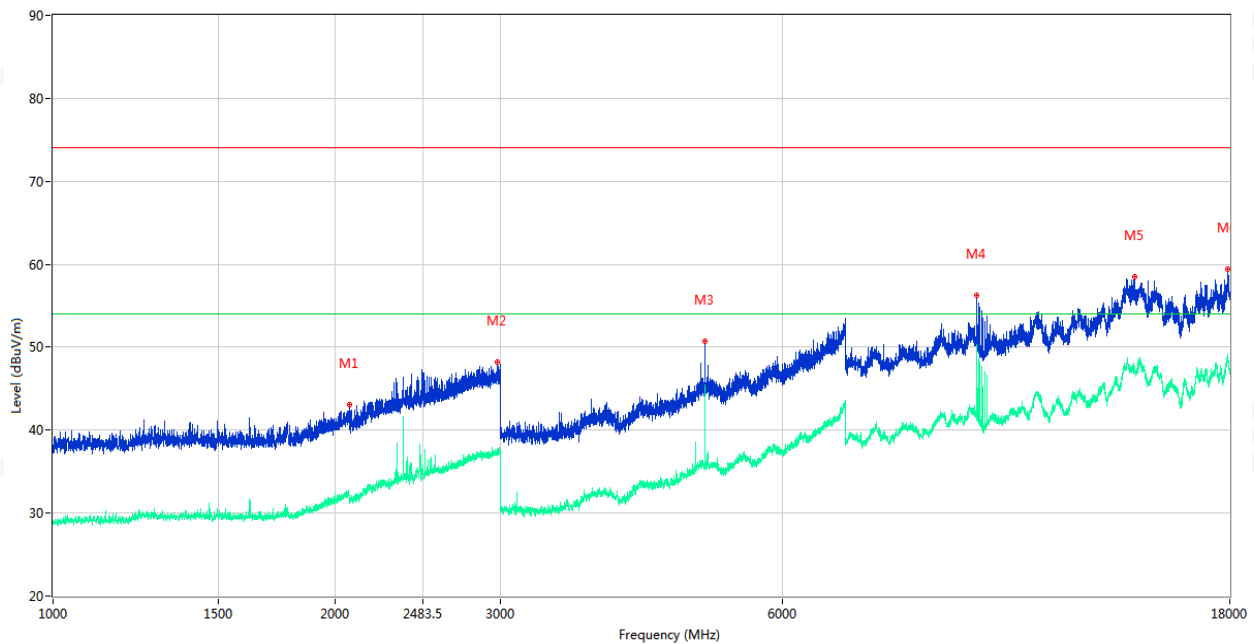
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2239.500	44.31	2.02	74.0	-29.69	Peak	180.20	Horizontal	Pass
1**	2239.500	33.35	2.02	54.0	-20.65	AV	180.20	Horizontal	Pass
2	2744.000	47.85	4.38	74.0	-26.15	Peak	44.60	Horizontal	Pass
2**	2744.000	36.45	4.38	54.0	-17.55	AV	44.60	Horizontal	Pass
3	4961.000	48.04	-5.99	74.0	-25.96	Peak	155.30	Horizontal	Pass
3**	4961.000	39.75	-5.99	54.0	-14.25	AV	155.30	Horizontal	Pass
4	6975.000	54.14	1.12	74.0	-19.86	Peak	7.80	Horizontal	Pass
4**	6975.000	42.82	1.12	54.0	-11.18	AV	7.80	Horizontal	Pass
5	11152.500	55.35	2.36	74.0	-18.65	Peak	274.20	Horizontal	Pass
5**	11152.500	44.09	2.36	54.0	-9.91	AV	274.20	Horizontal	Pass
6	14053.750	58.52	7.59	74.0	-15.48	Peak	234.80	Horizontal	Pass
6**	14053.750	47.27	7.59	54.0	-6.73	AV	234.80	Horizontal	Pass



18GHz-26GHz



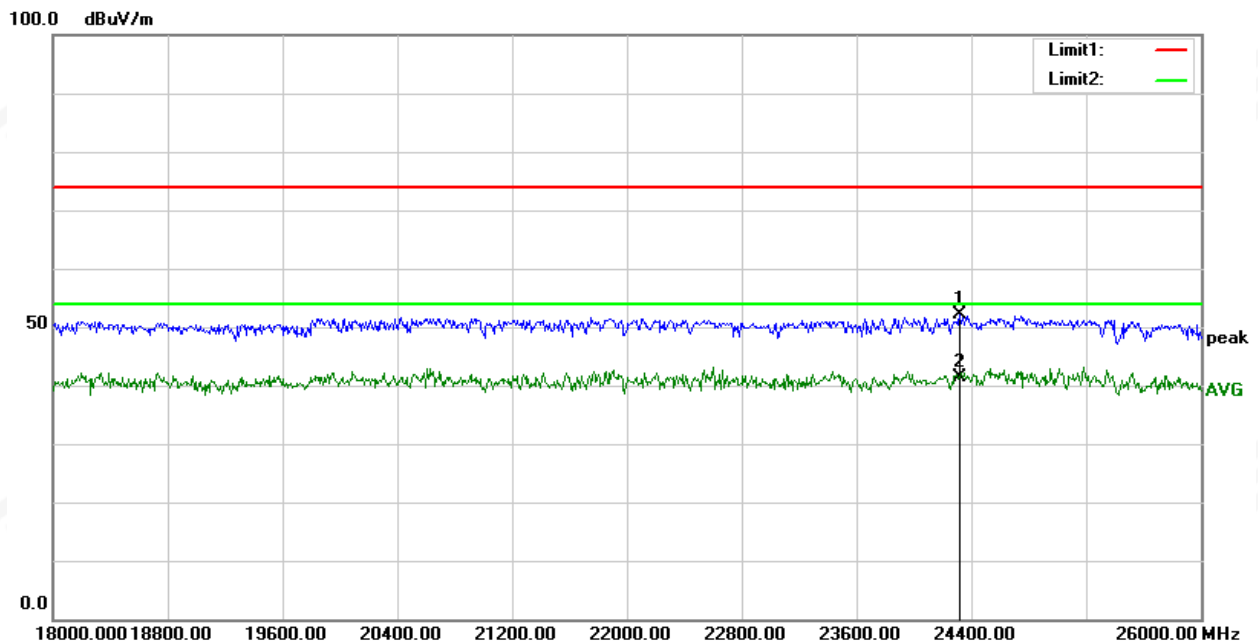
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21032.000	49.05	2.68	51.73	74.00	-22.27	peak
2	21032.000	39.16	2.68	41.84	54.00	-12.16	AVG

Vertical
1GHz-18GHz

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2073.500	43.02	0.84	74.0	-30.98	Peak	64.50	Vertical	Pass
1**	2073.500	31.48	0.84	54.0	-22.52	AV	64.50	Vertical	Pass
2	2977.500	48.20	5.35	74.0	-25.80	Peak	178.80	Vertical	Pass
2**	2977.500	37.32	5.35	54.0	-16.68	AV	178.80	Vertical	Pass
3	4960.000	50.71	-5.99	74.0	-23.29	Peak	312.70	Vertical	Pass
3**	4960.000	45.45	-5.99	54.0	-8.55	AV	312.70	Vertical	Pass
4	9673.000	56.20	0.58	74.0	-17.80	Peak	147.20	Vertical	Pass
4**	9673.000	50.36	0.58	54.0	-3.64	AV	147.20	Vertical	Pass
5	14243.500	58.54	6.93	74.0	-15.46	Peak	250.20	Vertical	Pass
5**	14243.500	47.71	6.93	54.0	-6.29	AV	250.20	Vertical	Pass
6	17920.250	59.40	7.08	74.0	-14.60	Peak	72.70	Vertical	Pass
6**	17920.250	48.53	7.08	54.0	-5.47	AV	72.70	Vertical	Pass



18GHz-26GHz



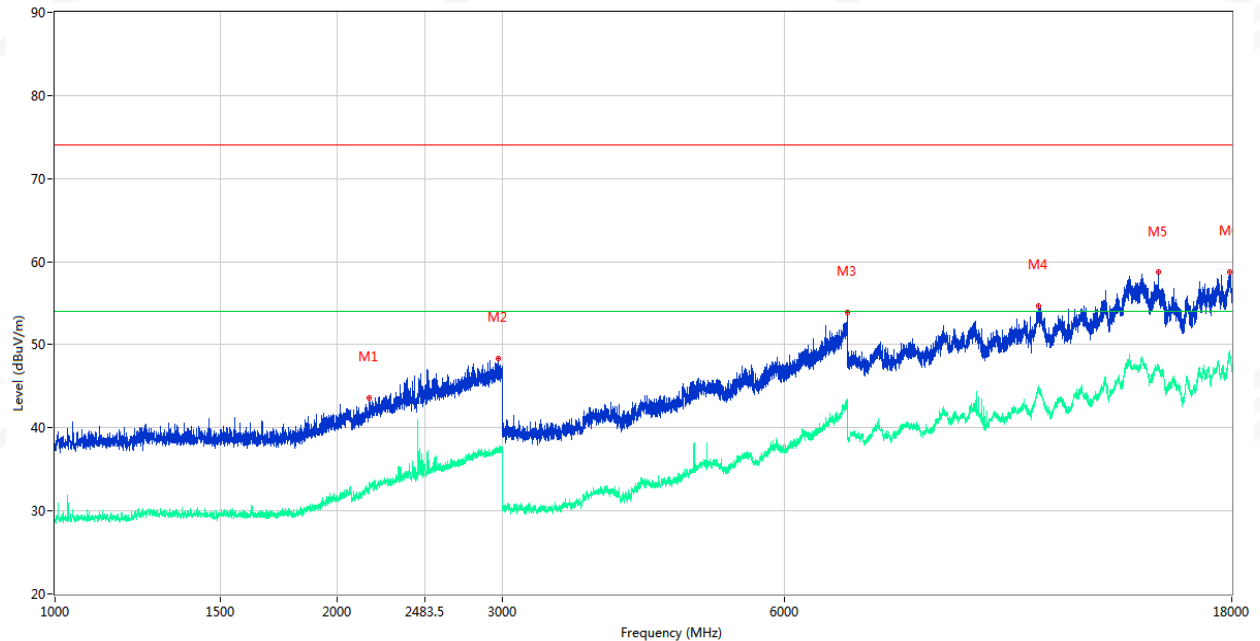
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	24320.000	47.34	4.68	52.02	74.00	-21.98	peak
2	24320.000	36.71	4.68	41.39	54.00	-12.61	AVG

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.



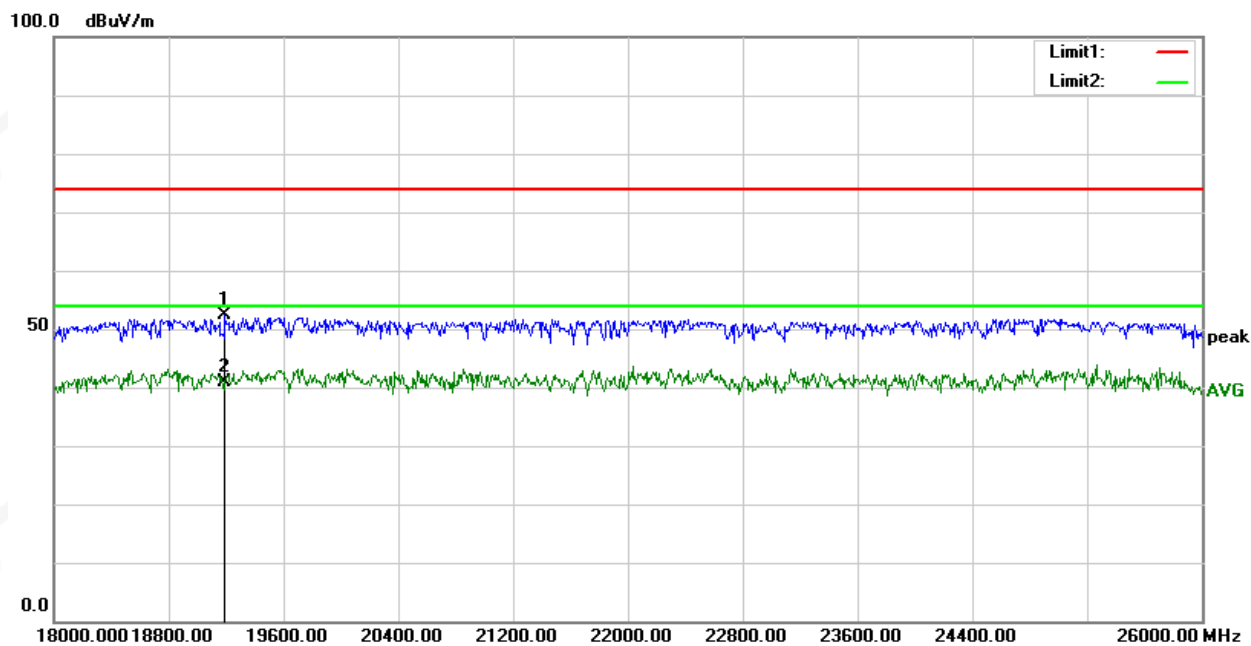
2M PHY
Low Channel
Horizontal



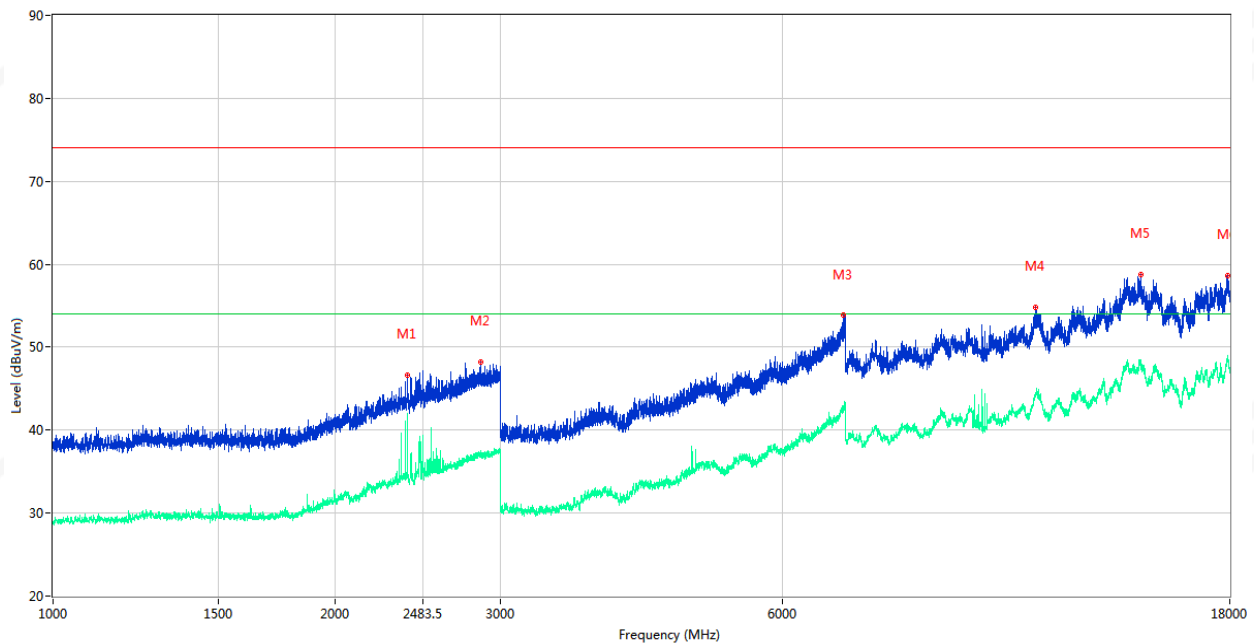
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2164.500	43.58	1.76	74.0	-30.42	Peak	82.10	Horizontal	Pass
1**	2164.500	33.48	1.76	54.0	-20.52	AV	82.10	Horizontal	Pass
2	2971.500	48.31	5.32	74.0	-25.69	Peak	303.40	Horizontal	Pass
2**	2971.500	37.34	5.32	54.0	-16.66	AV	303.40	Horizontal	Pass
3	6998.000	53.94	1.30	74.0	-20.06	Peak	348.50	Horizontal	Pass
3**	6998.000	43.46	1.30	54.0	-10.54	AV	348.50	Horizontal	Pass
4	11210.250	54.72	2.59	74.0	-19.28	Peak	140.60	Horizontal	Pass
4**	11210.250	44.53	2.59	54.0	-9.47	AV	140.60	Horizontal	Pass
5	15016.250	58.69	5.39	74.0	-15.31	Peak	143.20	Horizontal	Pass
5**	15016.250	47.59	5.39	54.0	-6.41	AV	143.20	Horizontal	Pass
6	17895.500	58.74	7.20	74.0	-15.26	Peak	221.60	Horizontal	Pass
6**	17895.500	48.80	7.20	54.0	-5.20	AV	221.60	Horizontal	Pass



18GHz-26GHz



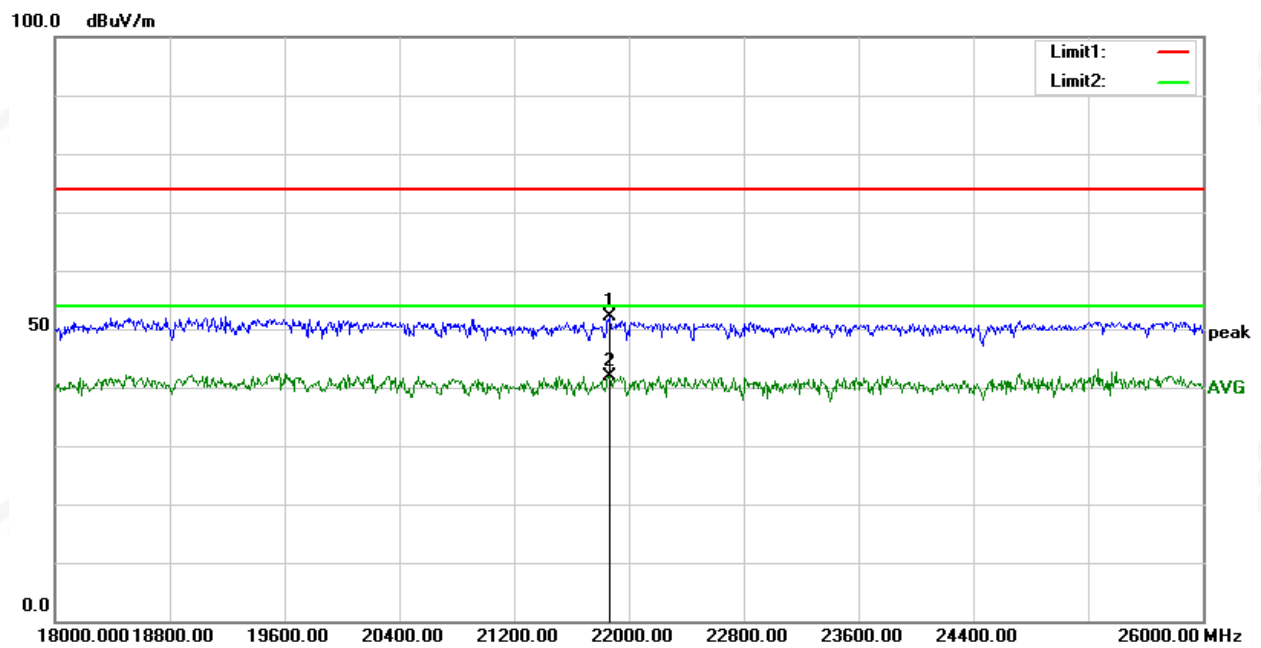
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/ m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	19192.000	50.78	1.64	52.42	74.00	-21.58	peak
2	19192.000	39.20	1.64	40.84	54.00	-13.16	AVG

Vertical
1GHz-18GHz

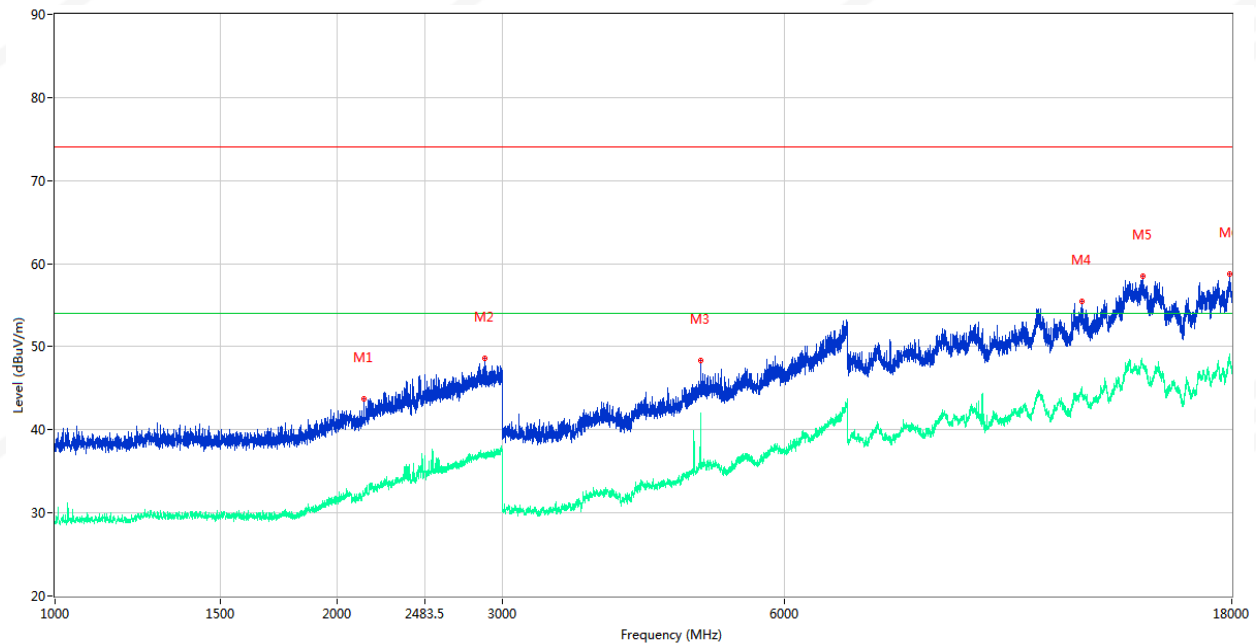
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2389.500	46.67	3.01	74.0	-27.33	Peak	279.60	Vertical	Pass
1**	2389.500	41.71	3.01	54.0	-12.29	AV	279.60	Vertical	Pass
2	2860.000	48.15	4.98	74.0	-25.85	Peak	58.90	Vertical	Pass
2**	2860.000	36.92	4.98	54.0	-17.08	AV	58.90	Vertical	Pass
3	6975.000	53.83	1.12	74.0	-20.17	Peak	312.30	Vertical	Pass
3**	6975.000	42.87	1.12	54.0	-11.13	AV	312.30	Vertical	Pass
4	11158.000	54.79	2.39	74.0	-19.21	Peak	8.80	Vertical	Pass
4**	11158.000	44.56	2.39	54.0	-9.44	AV	8.80	Vertical	Pass
5	14482.750	58.81	6.40	74.0	-15.19	Peak	360.70	Vertical	Pass
5**	14482.750	47.59	6.40	54.0	-6.41	AV	360.70	Vertical	Pass
6	17923.000	58.60	7.06	74.0	-15.40	Peak	70.50	Vertical	Pass
6**	17923.000	48.36	7.06	54.0	-5.64	AV	70.50	Vertical	Pass



18GHz-26GHz



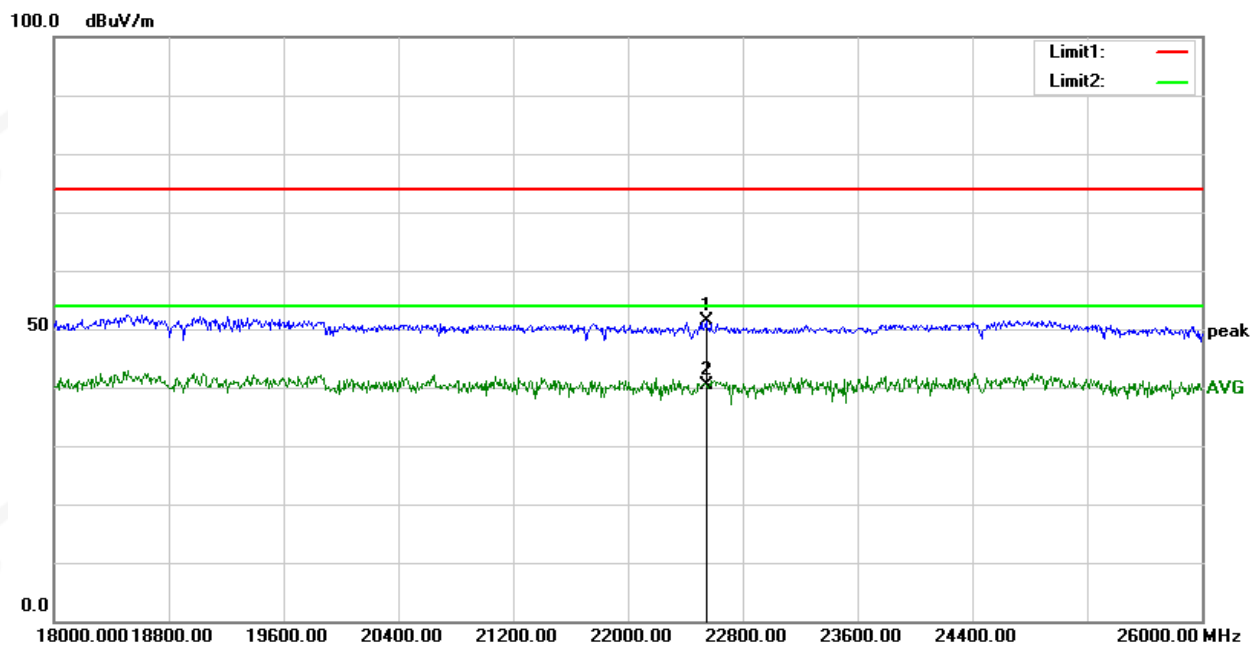
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	21864.000	48.87	3.29	52.16	74.00	-21.84	peak
2	21864.000	38.63	3.29	41.92	54.00	-12.08	AVG

Mid Channel
Horizontal
1GHz-18GHz

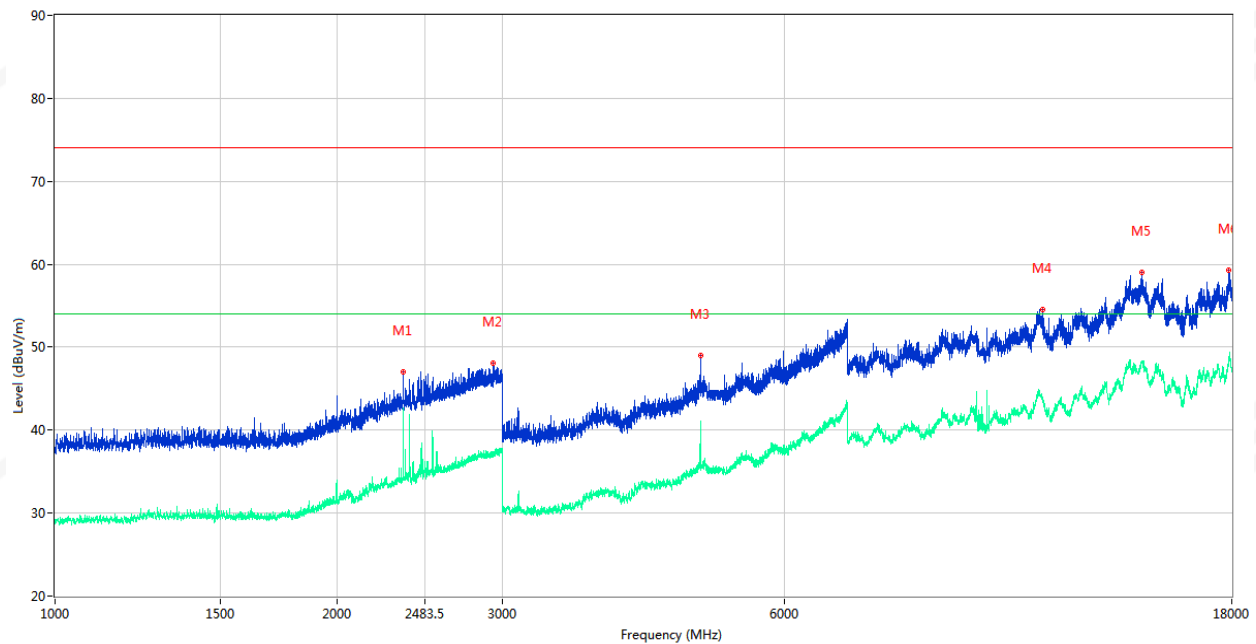
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2135.500	43.77	1.58	74.0	-30.23	Peak	82.10	Horizontal	Pass
1**	2135.500	32.44	1.58	54.0	-21.56	AV	82.10	Horizontal	Pass
2	2872.000	48.62	4.95	74.0	-25.38	Peak	268.70	Horizontal	Pass
2**	2872.000	36.70	4.95	54.0	-17.30	AV	268.70	Horizontal	Pass
3	4880.000	48.31	-6.29	74.0	-25.69	Peak	215.30	Horizontal	Pass
3**	4880.000	41.96	-6.29	54.0	-12.04	AV	215.30	Horizontal	Pass
4	12450.500	55.43	2.67	74.0	-18.57	Peak	0.00	Horizontal	Pass
4**	12450.500	44.61	2.67	54.0	-9.39	AV	0.00	Horizontal	Pass
5	14466.250	58.46	6.52	74.0	-15.54	Peak	6.10	Horizontal	Pass
5**	14466.250	47.66	6.52	54.0	-6.34	AV	6.10	Horizontal	Pass
6	17901.001	58.74	7.23	74.0	-15.26	Peak	356.30	Horizontal	Pass
6**	17901.001	48.87	7.23	54.0	-5.13	AV	356.30	Horizontal	Pass



18GHz-26GHz



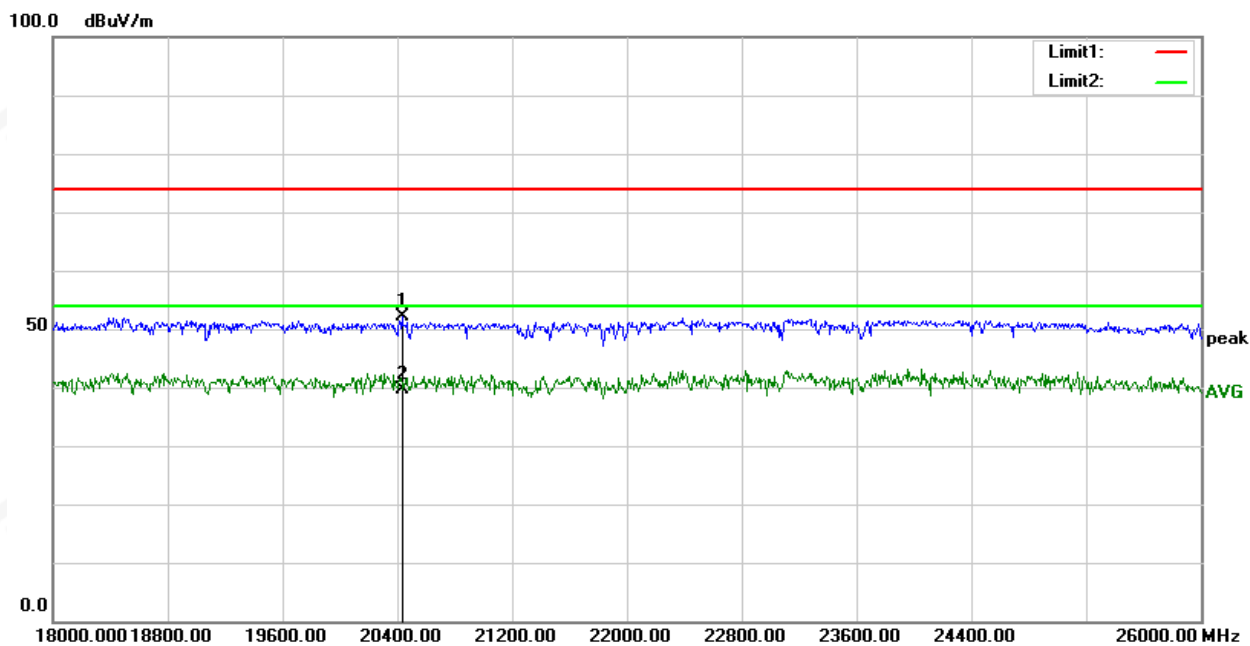
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	22544.000	47.54	3.90	51.44	74.00	-22.56	peak
2	22544.000	36.42	3.90	40.32	54.00	-13.68	AVG

Vertical
1GHz-18GHz

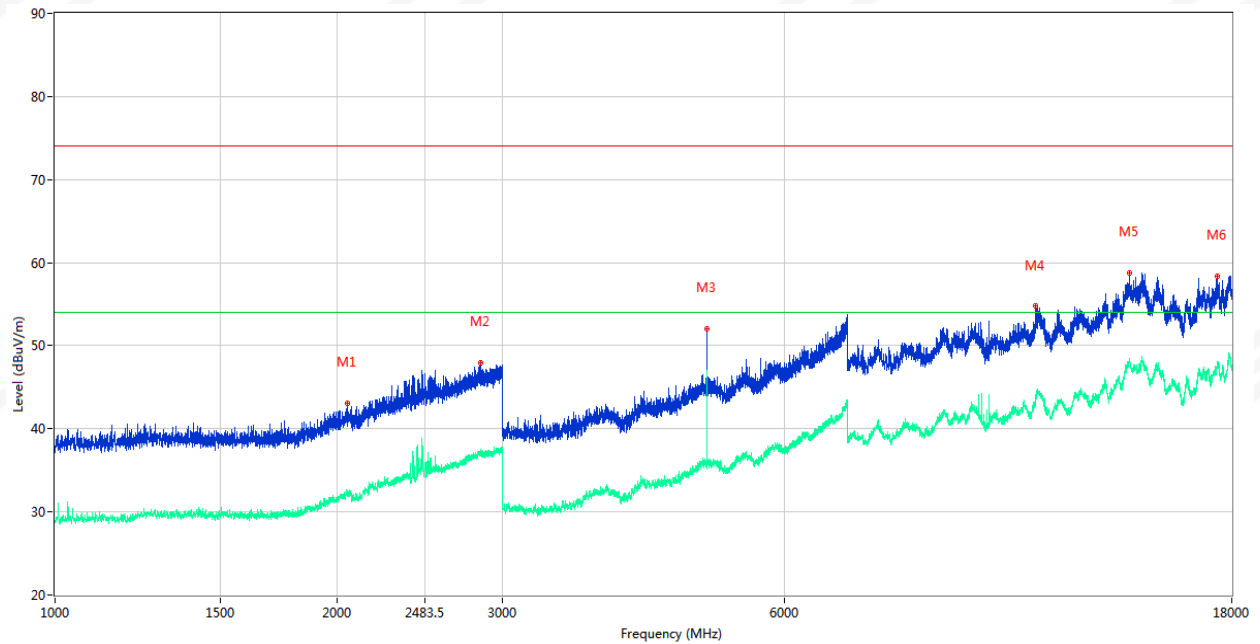
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2353.000	47.05	2.78	74.0	-26.95	Peak	19.20	Vertical	Pass
1**	2353.000	42.69	2.78	54.0	-11.31	AV	19.20	Vertical	Pass
2	2936.500	48.04	5.13	74.0	-25.96	Peak	52.70	Vertical	Pass
2**	2936.500	37.41	5.13	54.0	-16.59	AV	52.70	Vertical	Pass
3	4880.000	49.03	-6.29	74.0	-24.97	Peak	213.80	Vertical	Pass
3**	4880.000	41.06	-6.29	54.0	-12.94	AV	213.80	Vertical	Pass
4	11320.250	54.50	2.21	74.0	-19.50	Peak	26.90	Vertical	Pass
4**	11320.250	43.65	2.21	54.0	-10.35	AV	26.90	Vertical	Pass
5	14416.750	59.07	6.87	74.0	-14.93	Peak	251.70	Vertical	Pass
5**	14416.750	48.16	6.87	54.0	-5.84	AV	251.70	Vertical	Pass
6	17881.750	59.24	7.08	74.0	-14.76	Peak	359.70	Vertical	Pass
6**	17881.750	48.85	7.08	54.0	-5.15	AV	359.70	Vertical	Pass



18GHz-26GHz



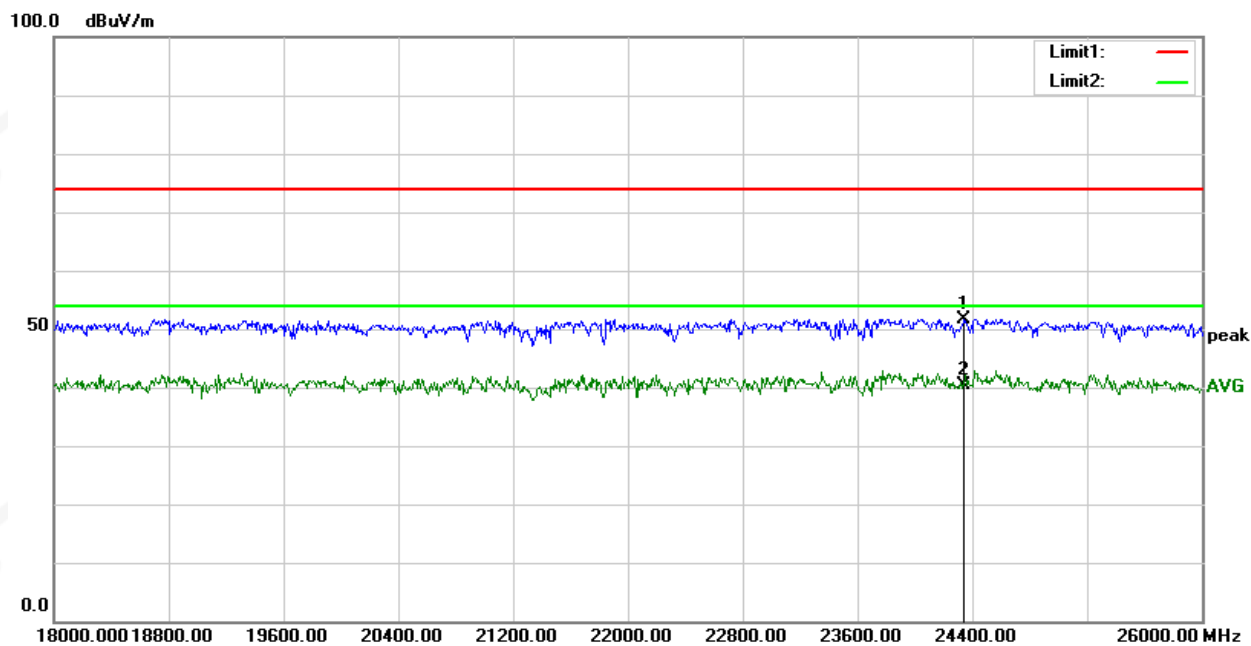
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	20432.000	50.07	2.18	52.25	74.00	-21.75	peak
2	20432.000	37.47	2.18	39.65	54.00	-14.35	AVG

High Channel
Horizontal
1GHz-18GHz

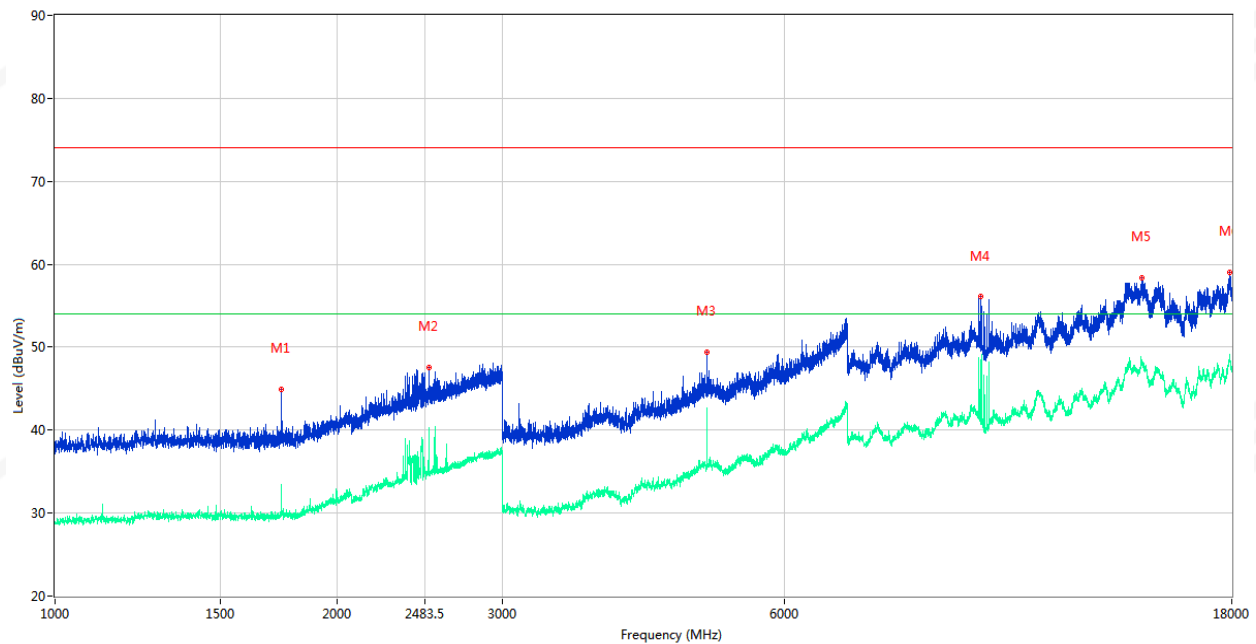
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	2049.500	43.11	0.81	74.0	-30.89	Peak	227.90	Horizontal	Pass
1**	2049.500	32.41	0.81	54.0	-21.59	AV	227.90	Horizontal	Pass
2	2846.000	47.91	4.98	74.0	-26.09	Peak	120.40	Horizontal	Pass
2**	2846.000	37.52	4.98	54.0	-16.48	AV	120.40	Horizontal	Pass
3	4960.000	51.99	-5.99	74.0	-22.01	Peak	51.30	Horizontal	Pass
3**	4960.000	47.03	-5.99	54.0	-6.97	AV	51.30	Horizontal	Pass
4	11116.750	54.74	2.17	74.0	-19.26	Peak	104.80	Horizontal	Pass
4**	11116.750	43.44	2.17	54.0	-10.56	AV	104.80	Horizontal	Pass
5	13998.750	58.75	8.43	74.0	-15.25	Peak	329.50	Horizontal	Pass
5**	13998.750	47.97	8.43	54.0	-6.03	AV	329.50	Horizontal	Pass
6	17373.000	58.40	6.75	74.0	-15.60	Peak	227.60	Horizontal	Pass
6**	17373.000	48.08	6.75	54.0	-5.92	AV	227.60	Horizontal	Pass



18GHz-26GHz



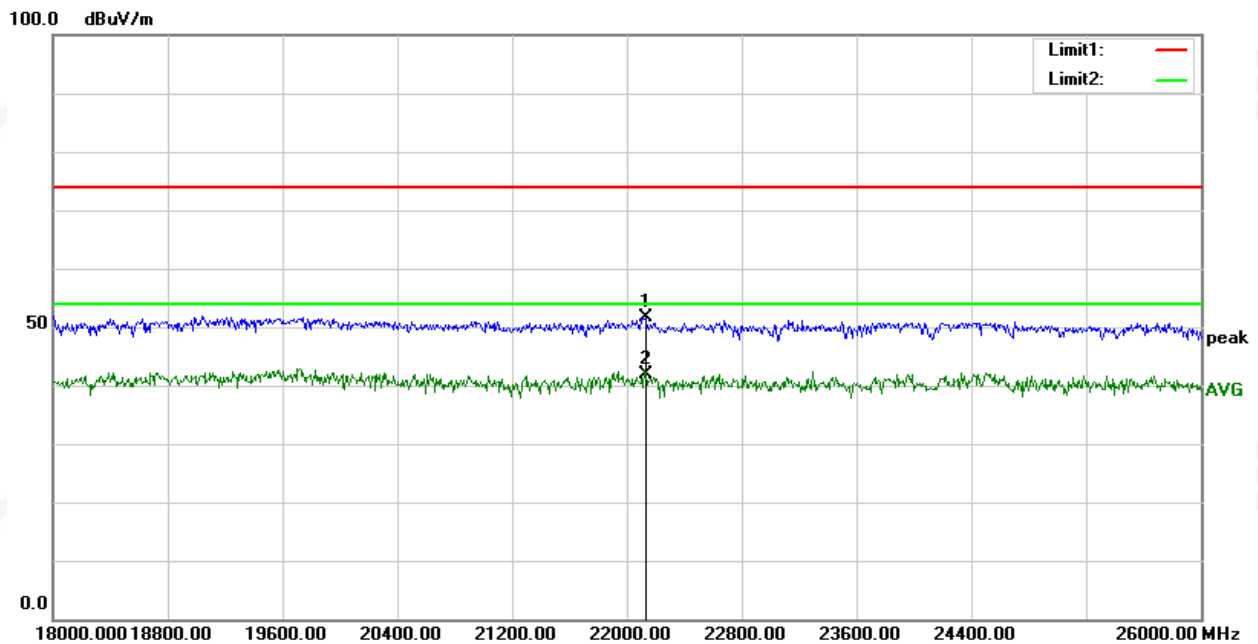
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	24344.000	47.04	4.69	51.73	74.00	-22.27	peak
2	24344.000	35.69	4.69	40.38	54.00	-13.62	AVG

Vertical
1GHz-18GHz

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Antenna	Verdict
1	1744.000	44.89	-0.58	74.0	-29.11	Peak	140.20	Vertical	Pass
1**	1744.000	33.43	-0.58	54.0	-20.57	AV	140.20	Vertical	Pass
2	2505.000	47.58	3.18	74.0	-26.42	Peak	182.20	Vertical	Pass
2**	2505.000	40.32	3.18	54.0	-13.68	AV	182.20	Vertical	Pass
3	4961.000	49.35	-5.99	74.0	-24.65	Peak	320.20	Vertical	Pass
3**	4961.000	42.50	-5.99	54.0	-11.50	AV	320.20	Vertical	Pass
4	9703.250	56.06	0.57	74.0	-17.94	Peak	360.00	Vertical	Pass
4**	9703.250	48.42	0.57	54.0	-5.58	AV	360.00	Vertical	Pass
5	14427.750	58.34	6.79	74.0	-15.66	Peak	27.30	Vertical	Pass
5**	14427.750	48.21	6.79	54.0	-5.79	AV	27.30	Vertical	Pass
6	17892.749	59.03	7.18	74.0	-14.97	Peak	1.70	Vertical	Pass
6**	17892.749	48.90	7.18	54.0	-5.10	AV	1.70	Vertical	Pass



18GHz-26GHz



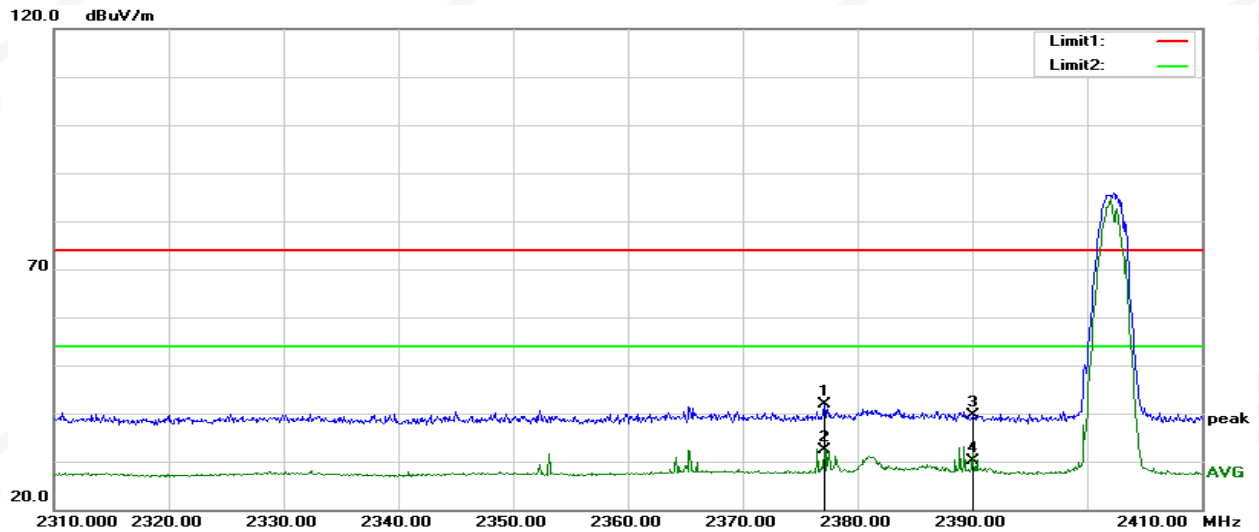
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	22128.000	48.03	3.54	51.57	74.00	-22.43	peak
2	22128.000	38.25	3.54	41.79	54.00	-12.21	AVG

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.

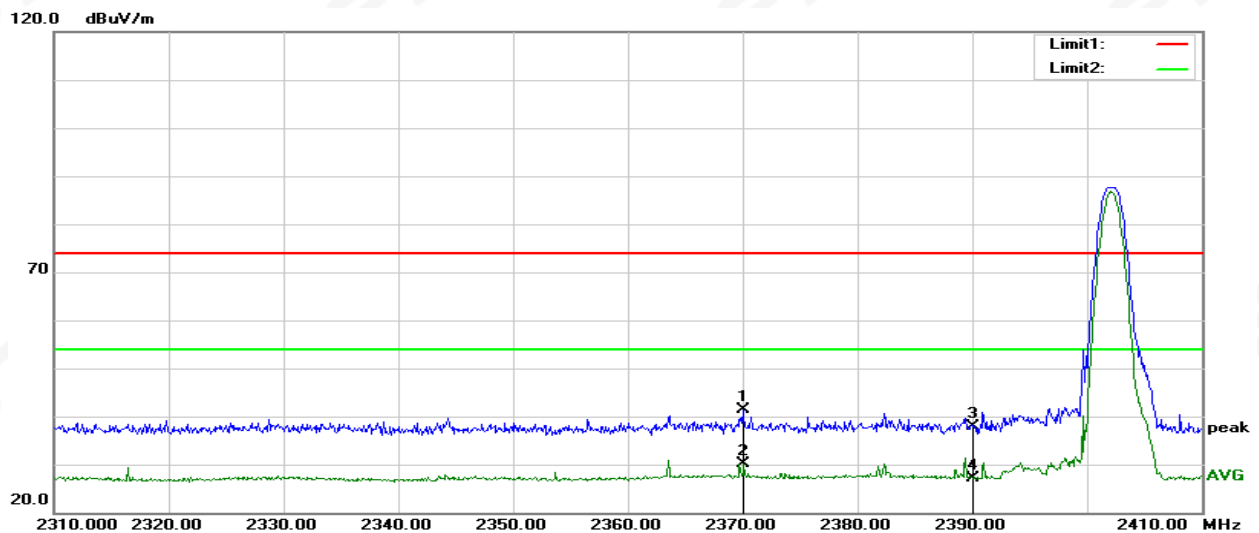


4.6 TEST RESULTS (Restricted Bands Requirements)

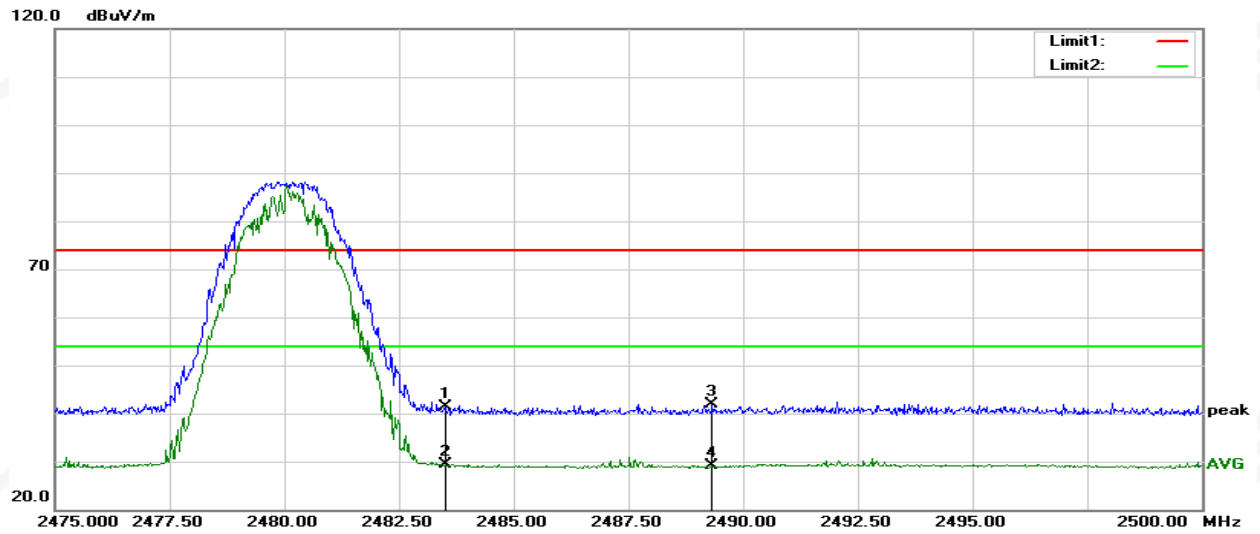
1M PHY-LOW
Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2377.100	41.05	0.71	41.76	74.00	-32.24	peak
2	2377.100	31.75	0.71	32.46	54.00	-21.54	AVG
3	2390.000	38.82	0.81	39.63	74.00	-34.37	peak
4	2390.000	29.24	0.81	30.05	54.00	-23.95	AVG

Vertical

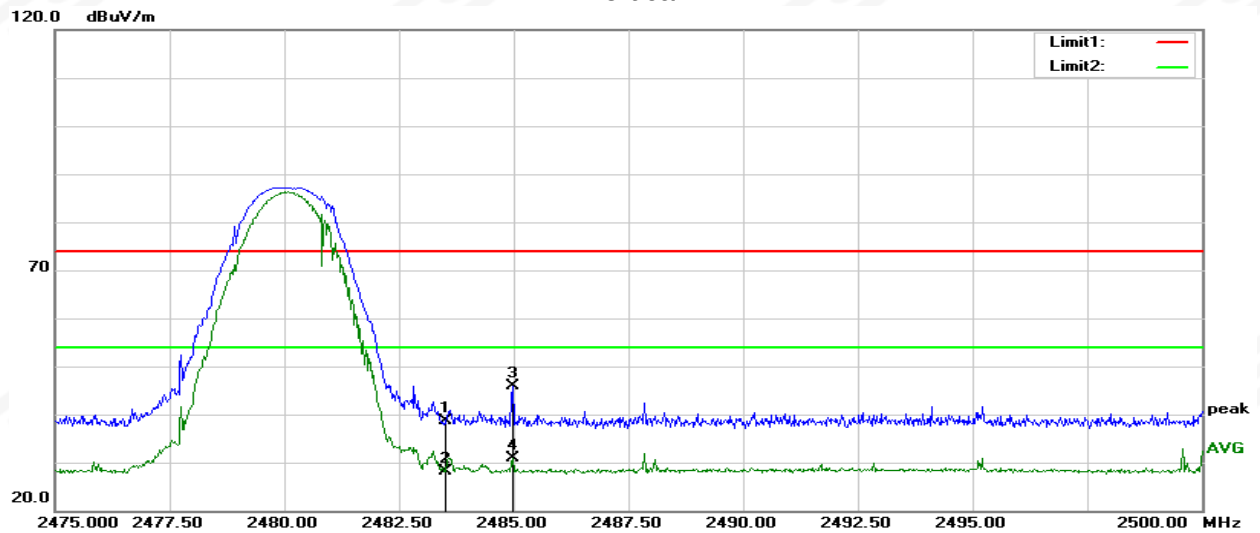


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2370.000	40.67	0.66	41.33	74.00	-32.67	peak
2	2370.000	29.42	0.66	30.08	54.00	-23.92	AVG
3	2390.000	37.18	0.81	37.99	74.00	-36.01	peak
4	2390.000	26.35	0.81	27.16	54.00	-26.84	AVG

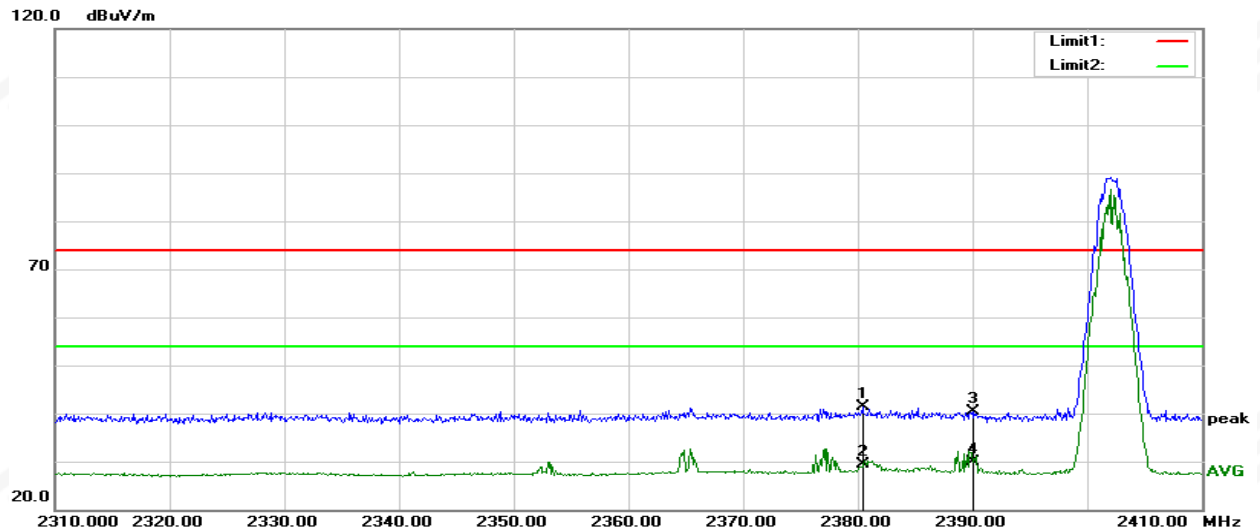
1M PHY-HIGH
Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	40.25	1.02	41.27	74.00	-32.73	peak
2	2483.500	28.34	1.02	29.36	54.00	-24.64	AVG
3	2489.325	40.87	1.03	41.90	74.00	-32.10	peak
4	2489.325	28.04	1.03	29.07	54.00	-24.93	AVG

Vertical

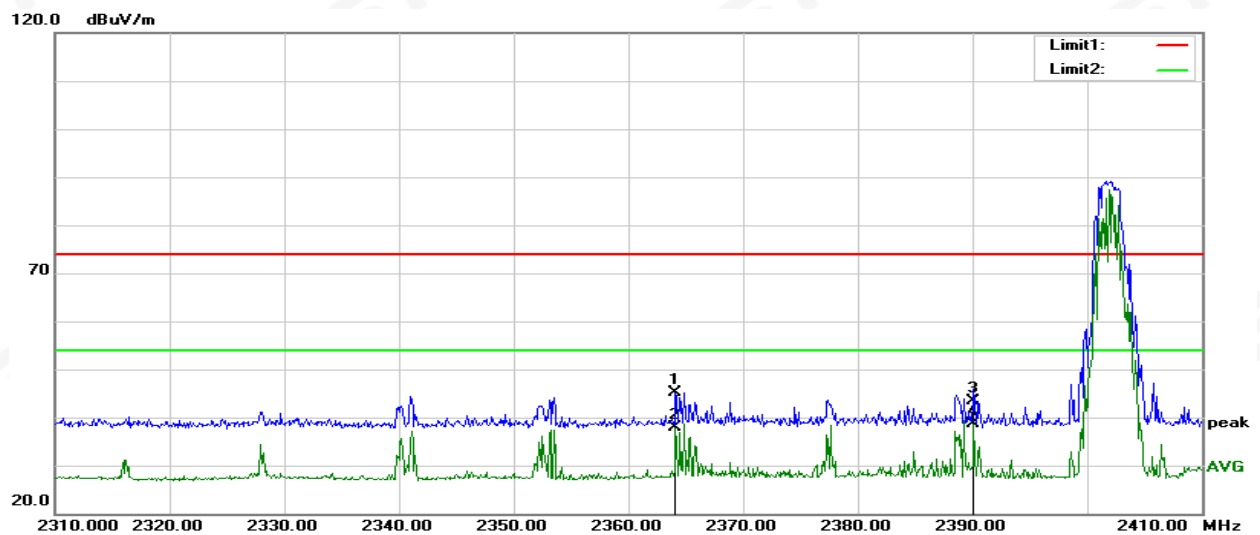


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	37.53	1.02	38.55	74.00	-35.45	peak
2	2483.500	27.12	1.02	28.14	54.00	-25.86	AVG
3	2484.975	44.79	1.03	45.82	74.00	-28.18	peak
4	2484.975	29.80	1.03	30.83	54.00	-23.17	AVG

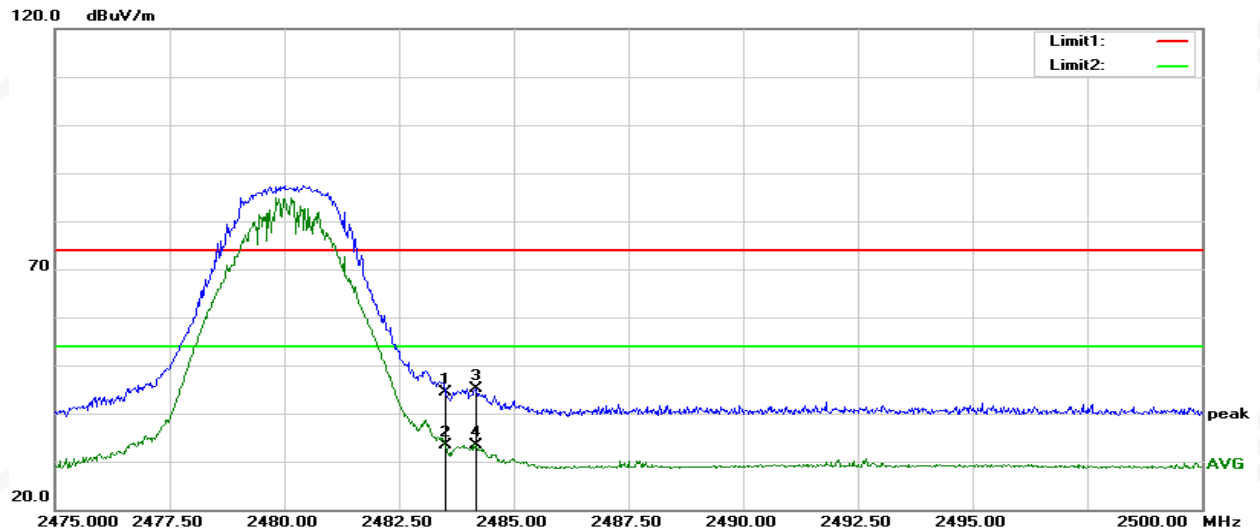
2M PHY-LOW
Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2380.400	40.64	0.73	41.37	74.00	-32.63	peak
2	2380.400	28.74	0.73	29.47	54.00	-24.53	AVG
3	2390.000	39.54	0.81	40.35	74.00	-33.65	peak
4	2390.000	29.07	0.81	29.88	54.00	-24.12	AVG

Vertical

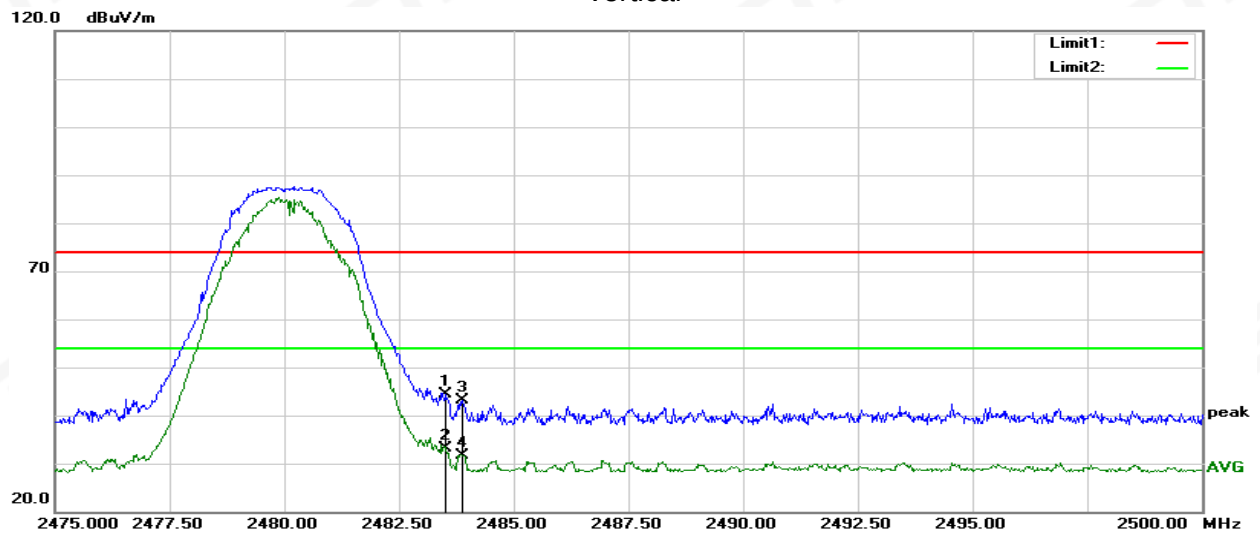


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2364.100	44.41	0.62	45.03	74.00	-28.97	peak
2	2364.100	37.25	0.62	37.87	54.00	-16.13	AVG
3	2390.000	42.66	0.81	43.47	74.00	-30.53	peak
4	2390.000	37.85	0.81	38.66	54.00	-15.34	AVG

2M PHY-HIGH
Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	43.48	1.02	44.50	74.00	-29.50	peak
2	2483.500	32.25	1.02	33.27	54.00	-20.73	AVG
3	2484.175	44.08	1.03	45.11	74.00	-28.89	peak
4	2484.175	32.31	1.03	33.34	54.00	-20.66	AVG

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	43.35	1.02	44.37	74.00	-29.63	peak
2	2483.500	32.16	1.02	33.18	54.00	-20.82	AVG
3	2483.875	42.11	1.03	43.14	74.00	-30.86	peak
4	2483.875	30.70	1.03	31.73	54.00	-22.27	AVG

5. DUTY CYCLE

5.1 TEST STANDARD

Please refer to ANSI C63.10-2020+Cor 1-2023 Section 11.6

5.2 TEST PROCEDURE

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Zero
RB	set RBW to the largest available value
VB	$VBW \geq RBW$.
Detector	Peak
Trace	Clear Write
Sweep Time	Auto

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 5 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

6. CONDUCTED SPURIOUS & BAND EDGE EMISSION

6.1 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.

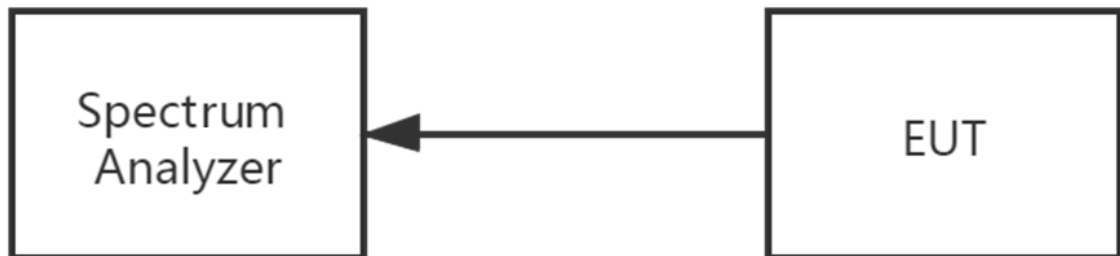
6.2 TEST PROCEDURE

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

6.3 TEST SETUP



The EUT 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.

6.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

6.5 TEST RESULTS

Note:

1. The test data please refer to APPENDIX 1.
2. 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.



7. POWER SPECTRAL DENSITY TEST

7.1 LIMIT

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

7.2 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: $100 \text{ kHz} \geq \text{RBW} \geq 3 \text{ kHz}$.
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.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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. BANDWIDTH TEST

8.1 LIMIT

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

8.2 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 ≥ 3 RBW, 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.

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. PEAK OUTPUT POWER TEST

9.1 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

9.2 TEST PROCEDURE

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

$RBW \geq DTS \text{ bandwidth}$

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:

- Set the $RBW \geq DTS \text{ bandwidth}$.
- Set $VBW \geq [3 \times RBW]$.
- Set $\text{span} \geq [3 \times RBW]$.
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

9.3 TEST SETUP



9.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

9.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.



10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

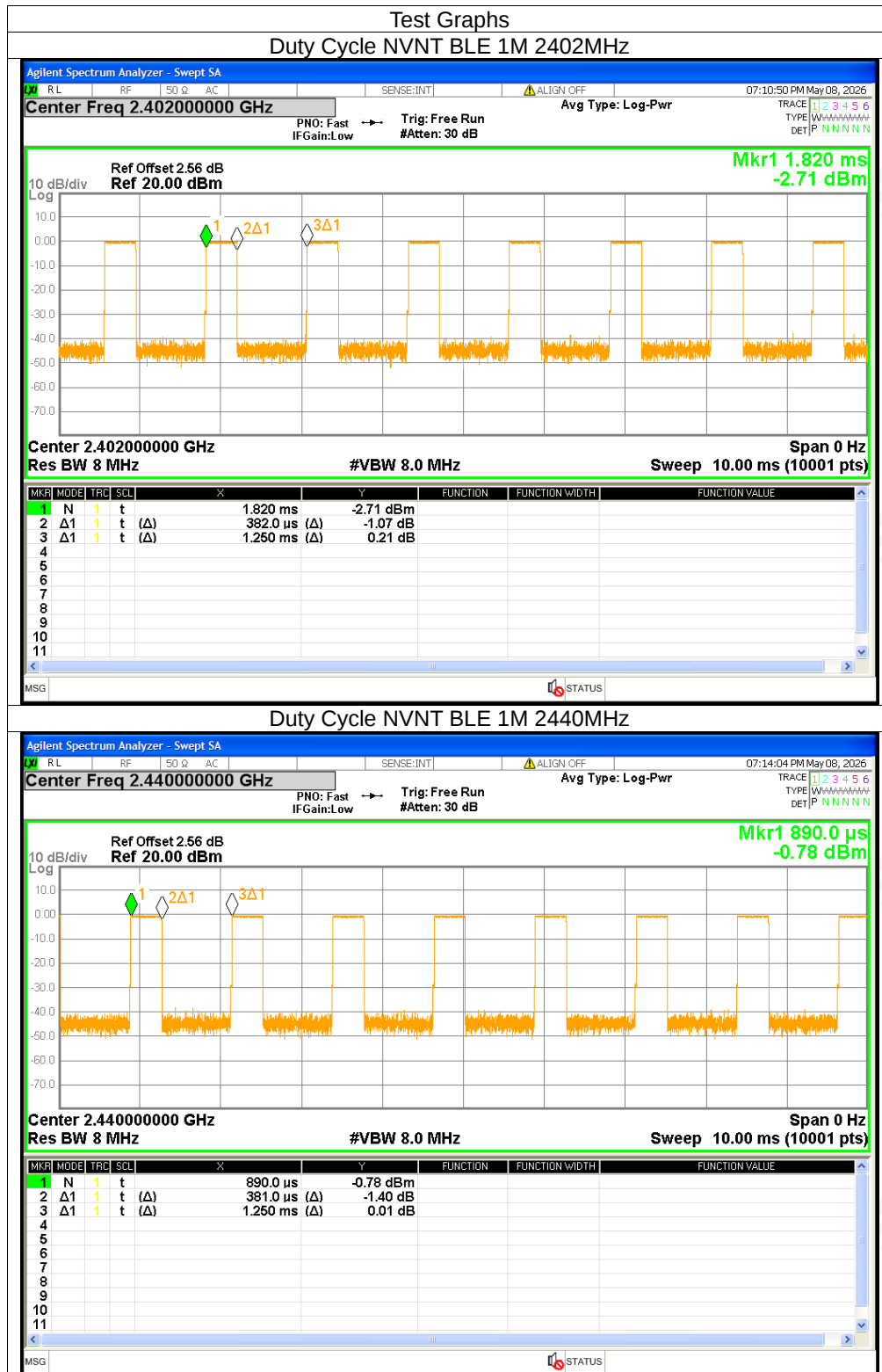
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 EUT ANTENNA

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

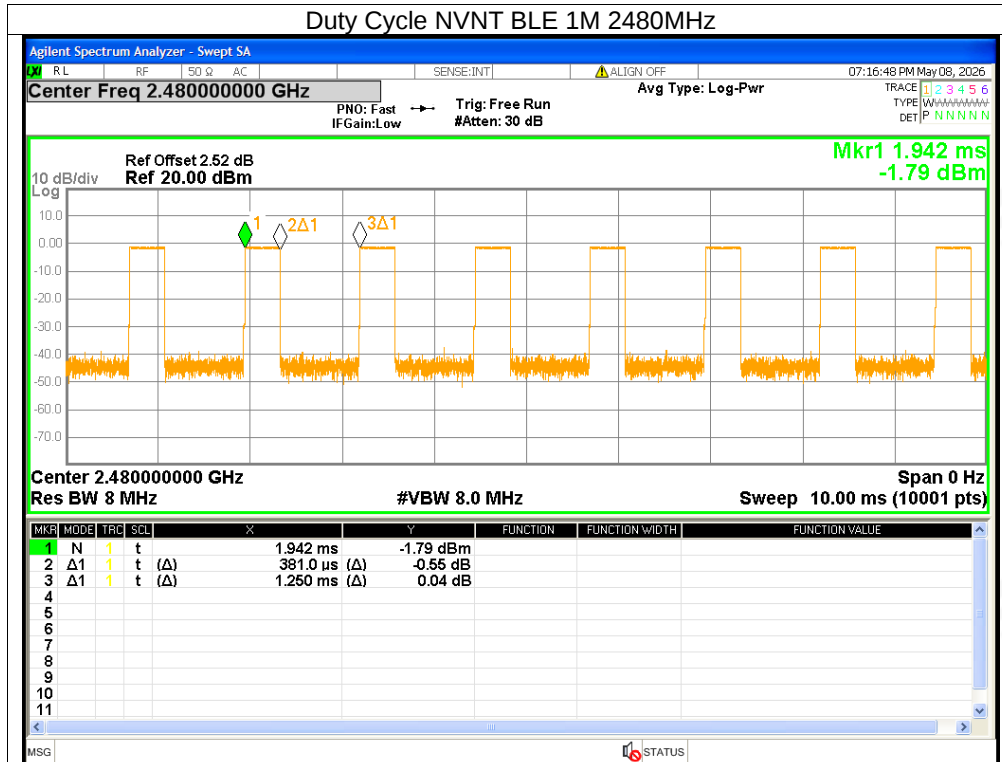
**APPENDIX 1-TEST DATA****Duty Cycle**

Condition	Mode	Frequency (MHz)	On Time (ms)	Period (ms)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	0.382	1.25	30.56	5.15	2.62
NVNT	BLE 1M	2440	0.381	1.25	30.48	5.16	2.62
NVNT	BLE 1M	2480	0.381	1.25	30.48	5.16	2.62
NVNT	BLE 2M	2402	0.201	1.25	16.08	7.94	4.98
NVNT	BLE 2M	2440	0.201	1.25	16.08	7.94	4.98
NVNT	BLE 2M	2480	0.201	1.25	16.08	7.94	4.98

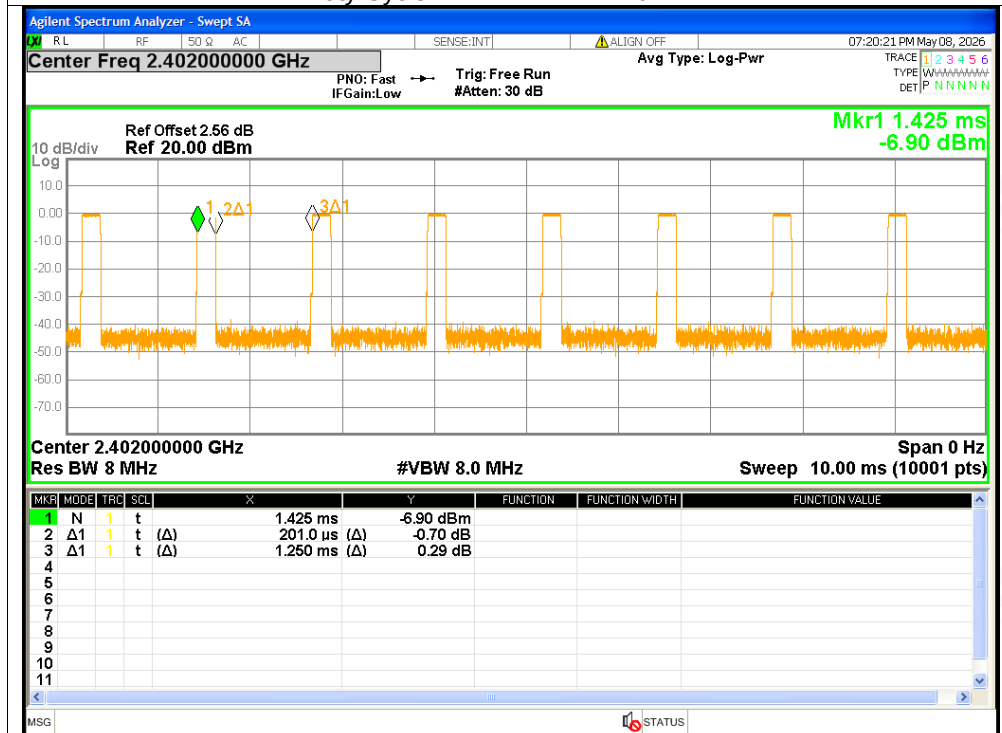




Duty Cycle NVNT BLE 1M 2480MHz

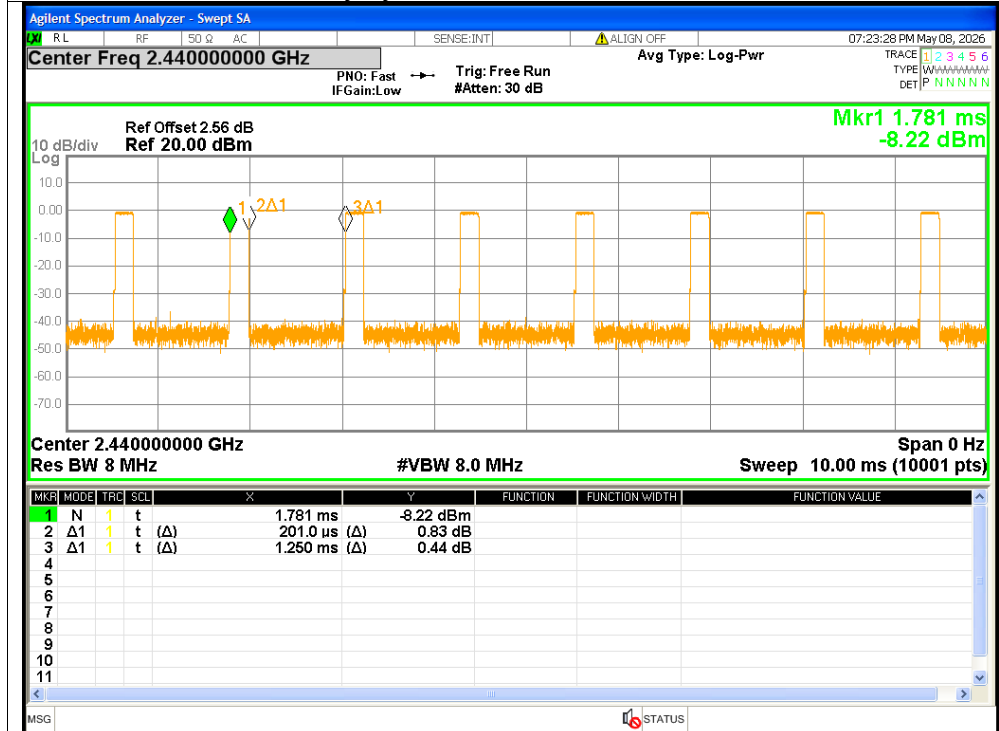


Duty Cycle NVNT BLE 2M 2402MHz

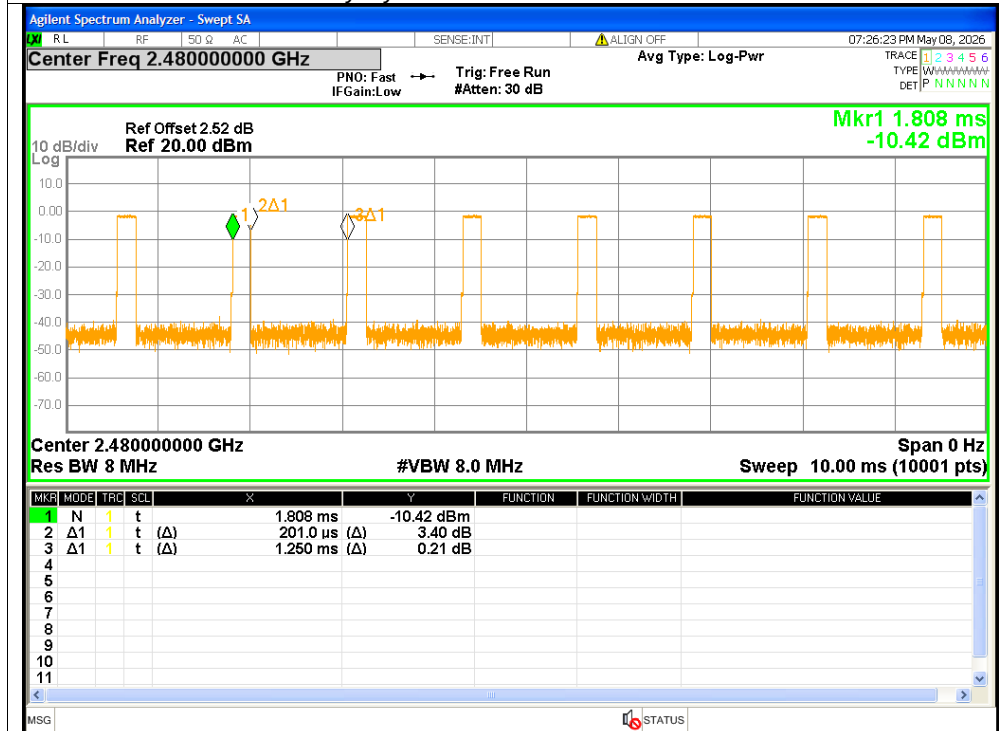




Duty Cycle NVNT BLE 2M 2440MHz



Duty Cycle NVNT BLE 2M 2480MHz

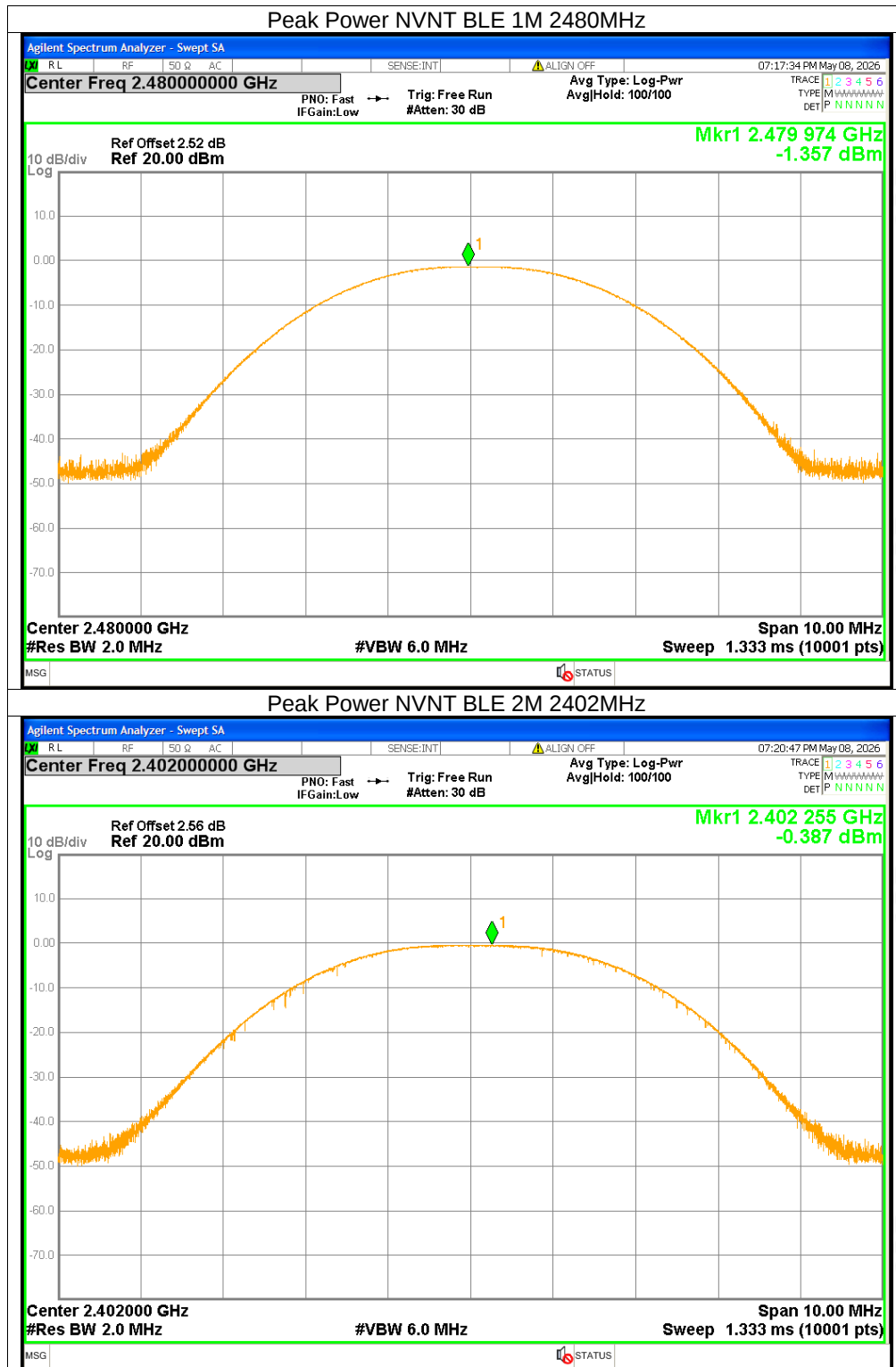


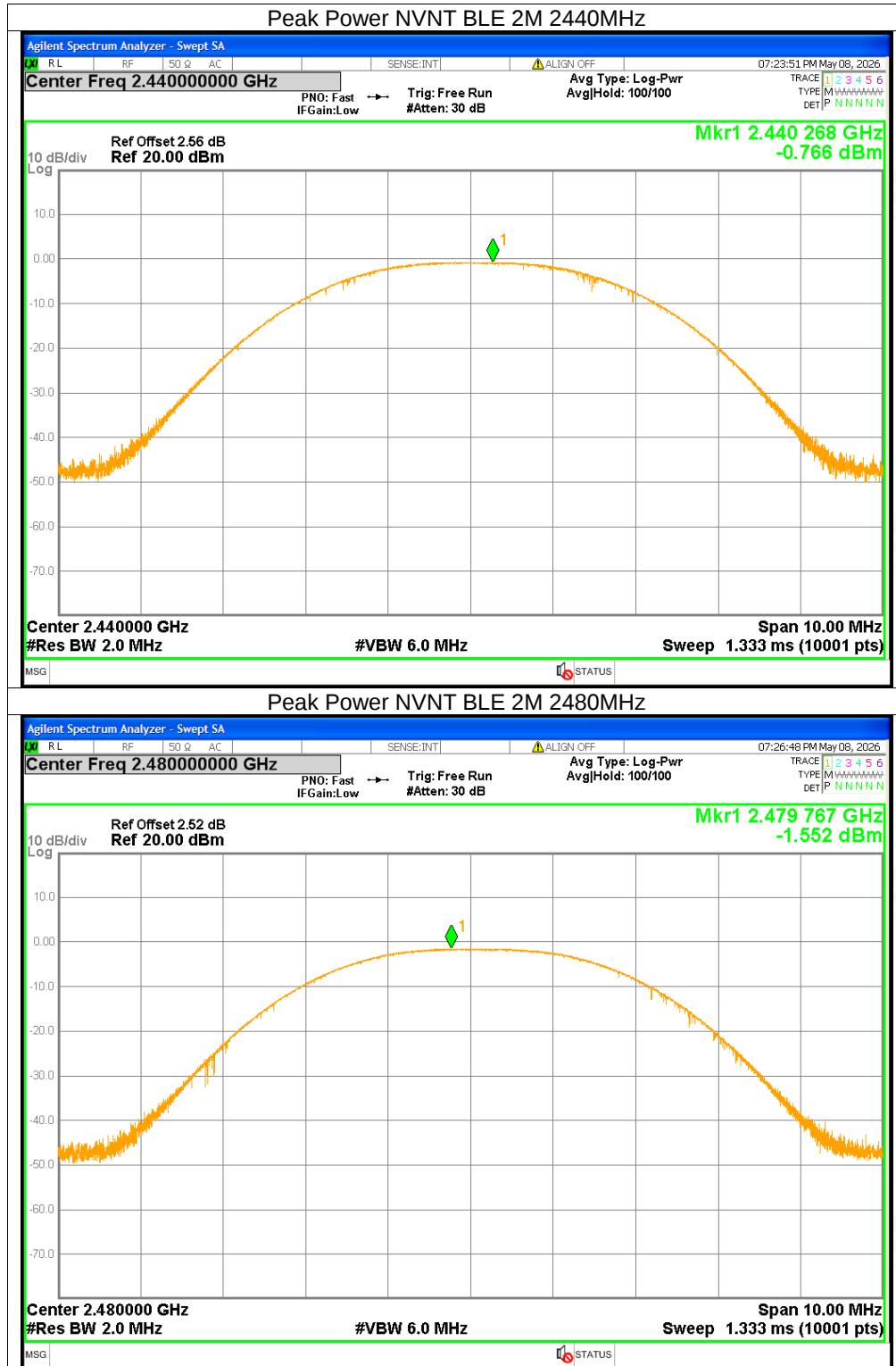


Maximum Peak Conducted Output Power

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	-0.2	<=30	Pass
NVNT	BLE 1M	2440	-0.53	<=30	Pass
NVNT	BLE 1M	2480	-1.36	<=30	Pass
NVNT	BLE 2M	2402	-0.39	<=30	Pass
NVNT	BLE 2M	2440	-0.77	<=30	Pass
NVNT	BLE 2M	2480	-1.55	<=30	Pass





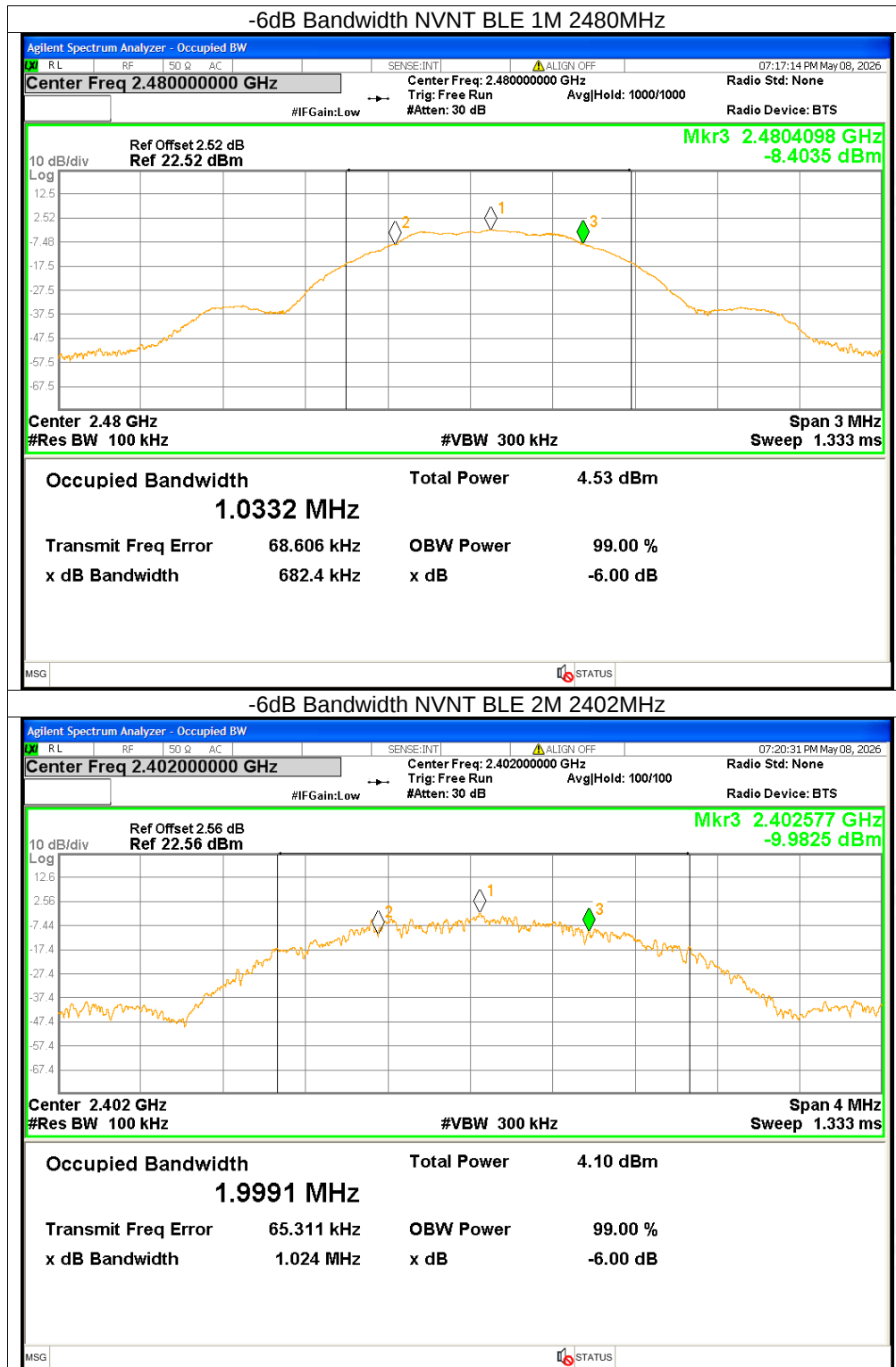


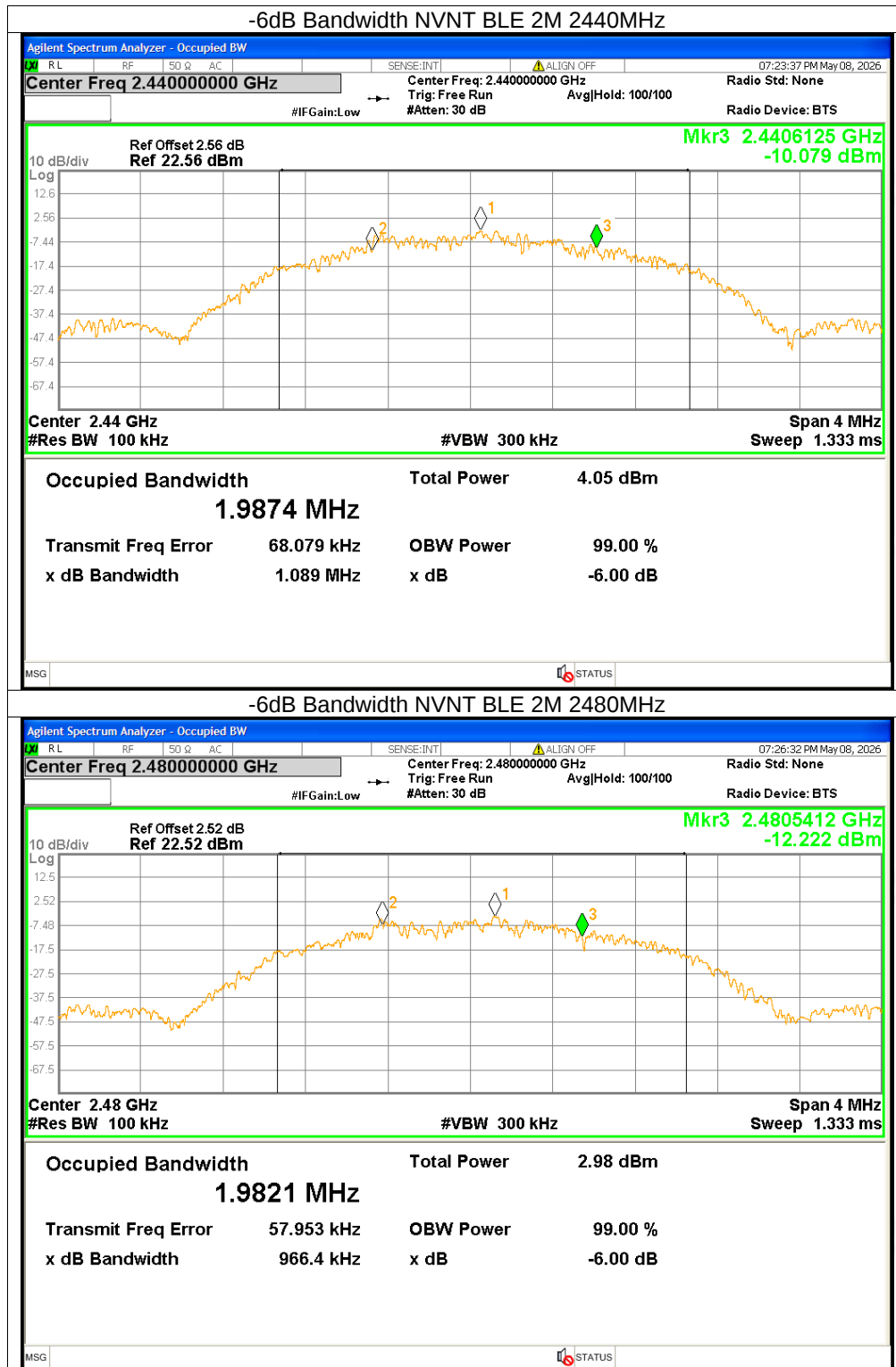


-6dB Bandwidth

Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	0.6797	≥ 0.5	Pass
NVNT	BLE 1M	2440	0.6932	≥ 0.5	Pass
NVNT	BLE 1M	2480	0.6824	≥ 0.5	Pass
NVNT	BLE 2M	2402	1.024	≥ 0.5	Pass
NVNT	BLE 2M	2440	1.089	≥ 0.5	Pass
NVNT	BLE 2M	2480	0.9664	≥ 0.5	Pass



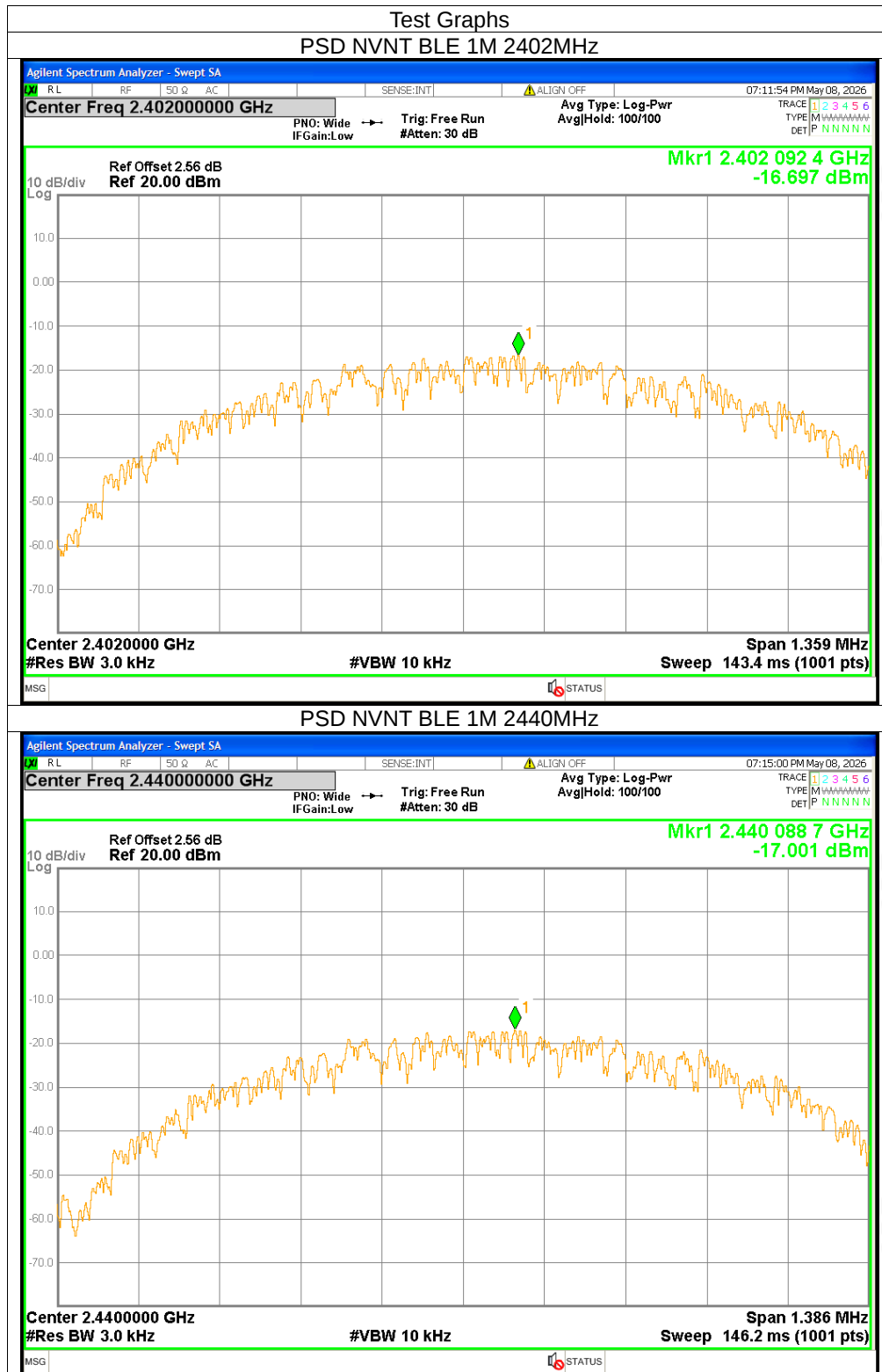


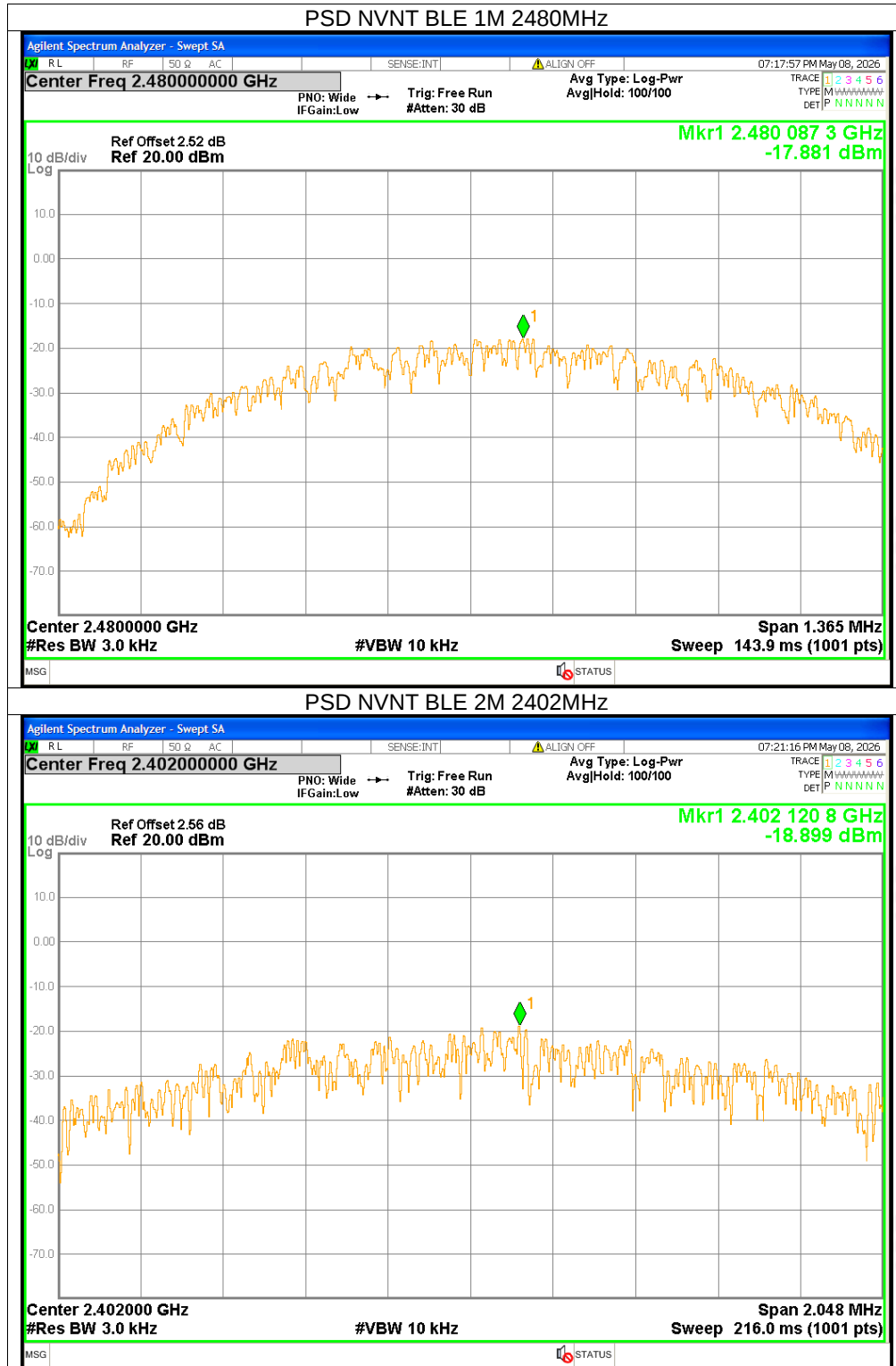


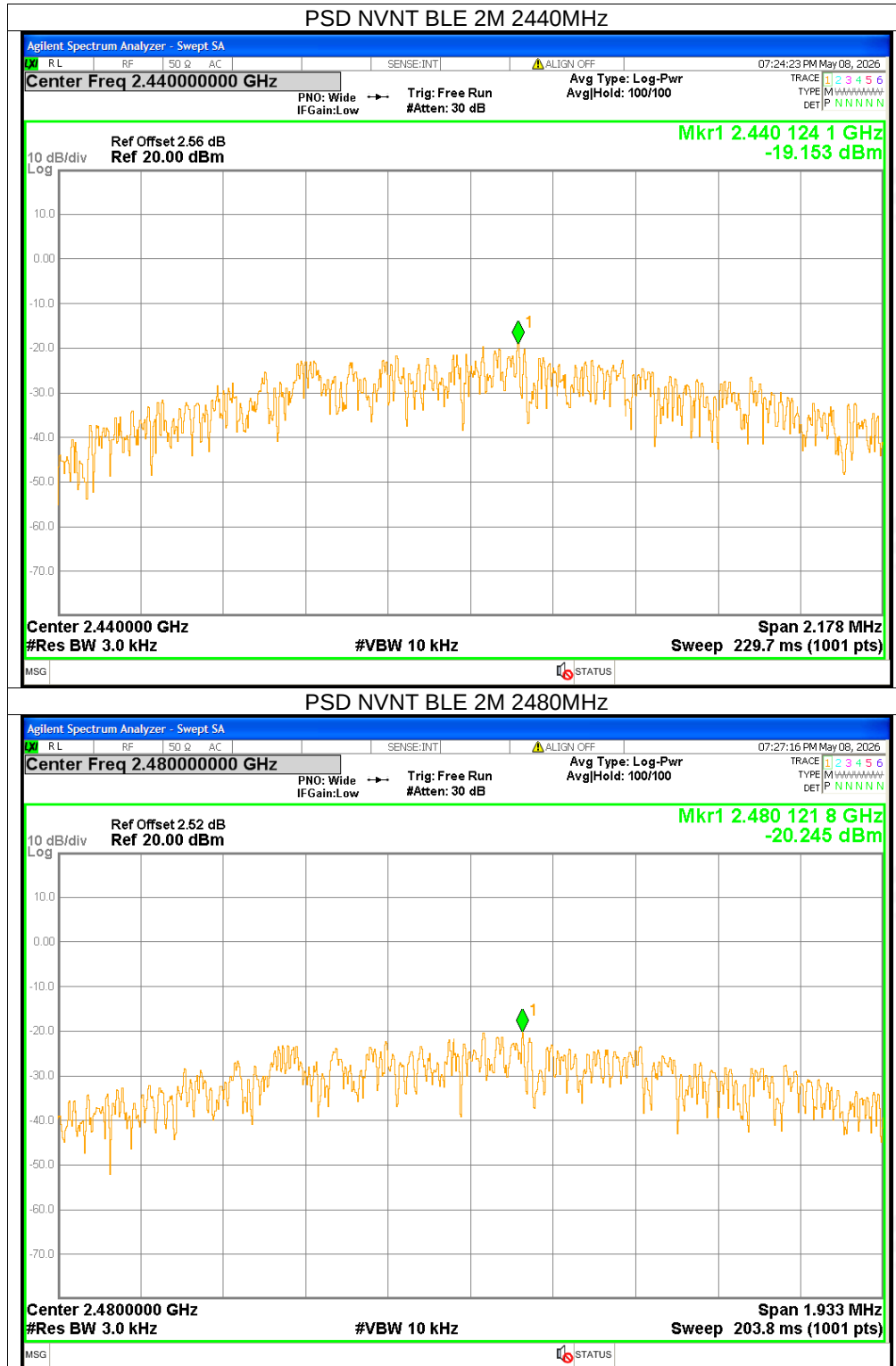


Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	-16.7	≤ 8	Pass
NVNT	BLE 1M	2440	-17	≤ 8	Pass
NVNT	BLE 1M	2480	-17.88	≤ 8	Pass
NVNT	BLE 2M	2402	-18.9	≤ 8	Pass
NVNT	BLE 2M	2440	-19.15	≤ 8	Pass
NVNT	BLE 2M	2480	-20.25	≤ 8	Pass



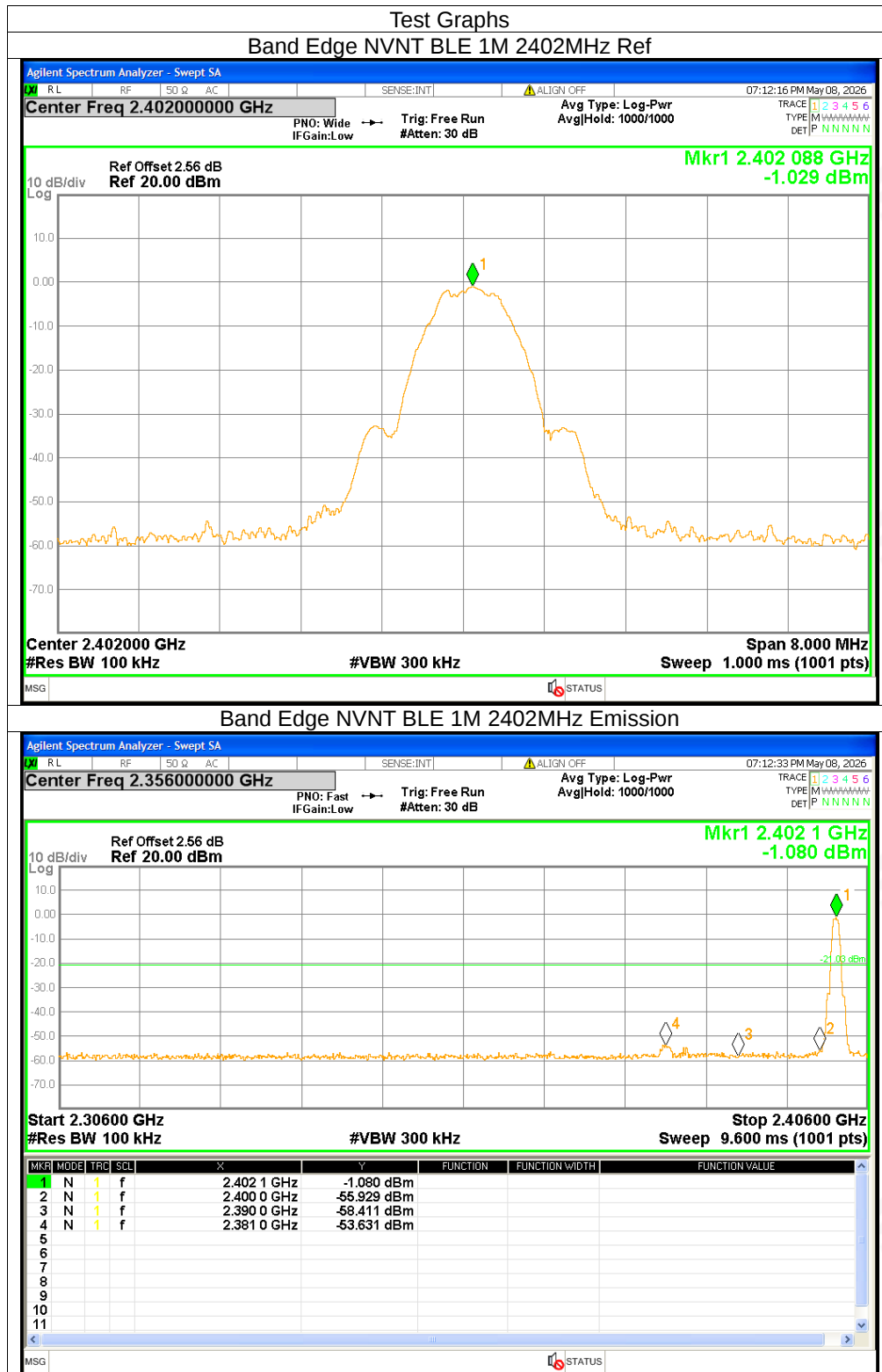


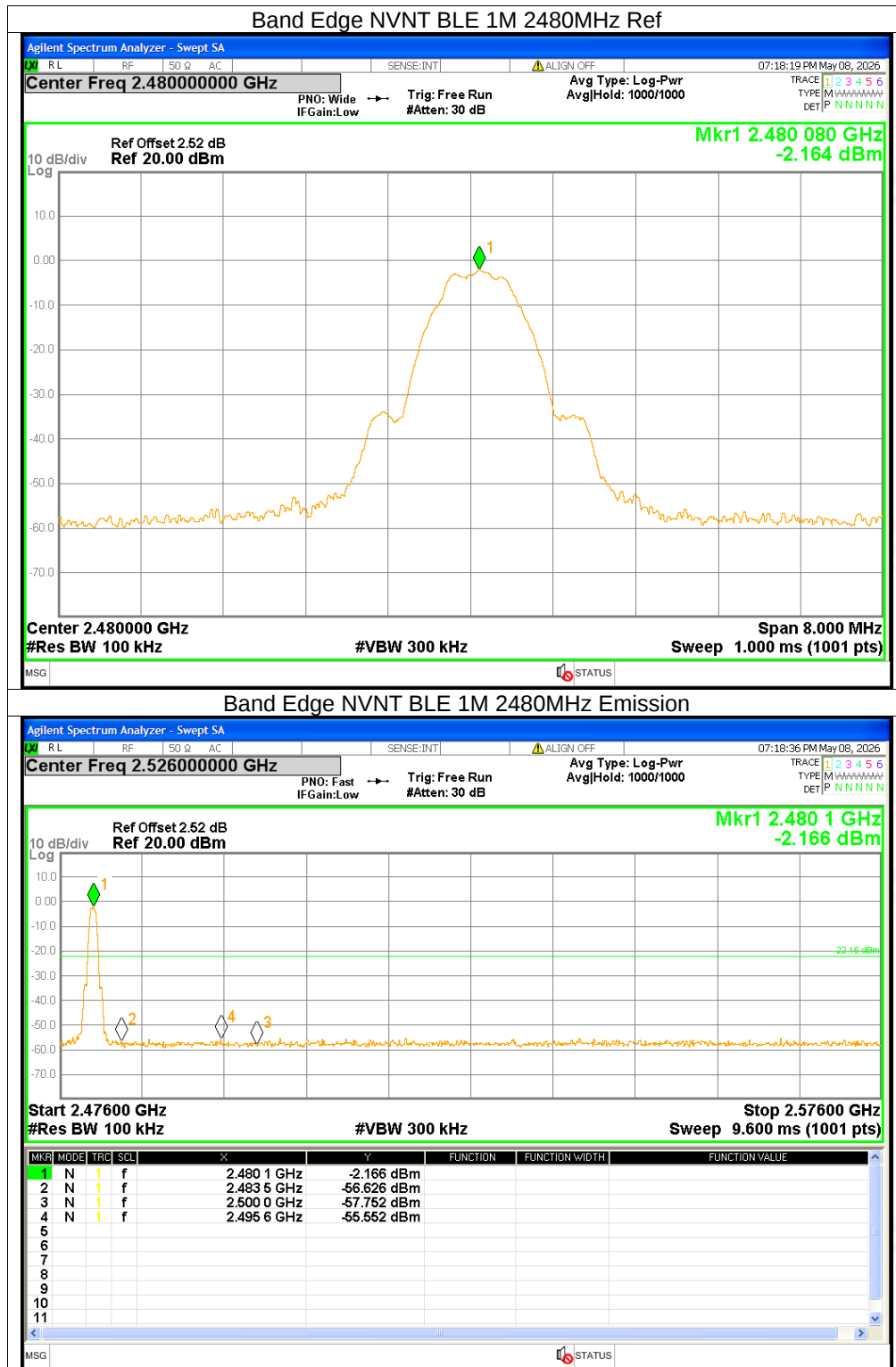


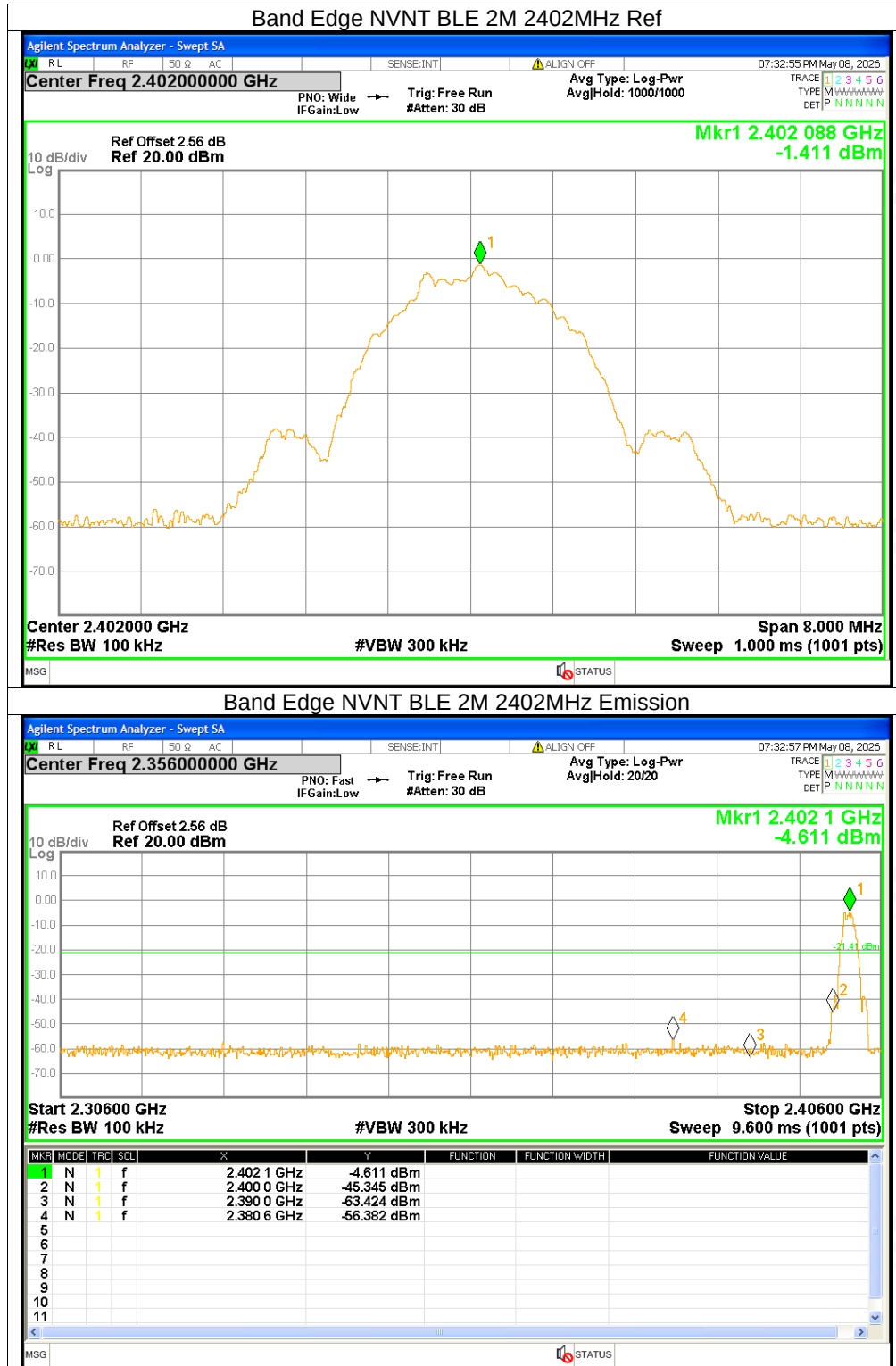


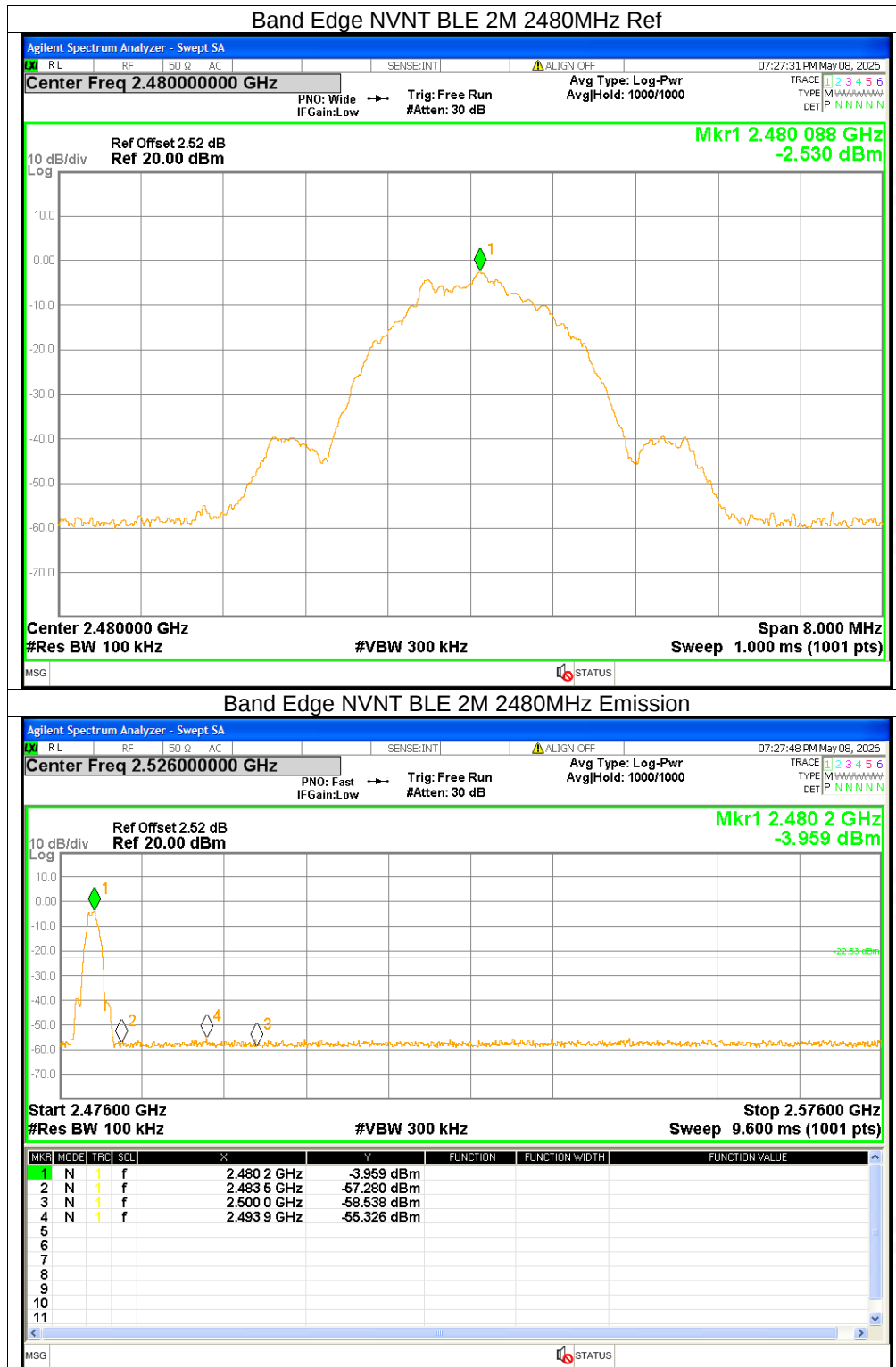
Band Edge

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	-52.6	≤ -20	Pass
NVNT	BLE 1M	2480	-53.39	≤ -20	Pass
NVNT	BLE 2M	2402	-54.97	≤ -20	Pass
NVNT	BLE 2M	2480	-52.79	≤ -20	Pass





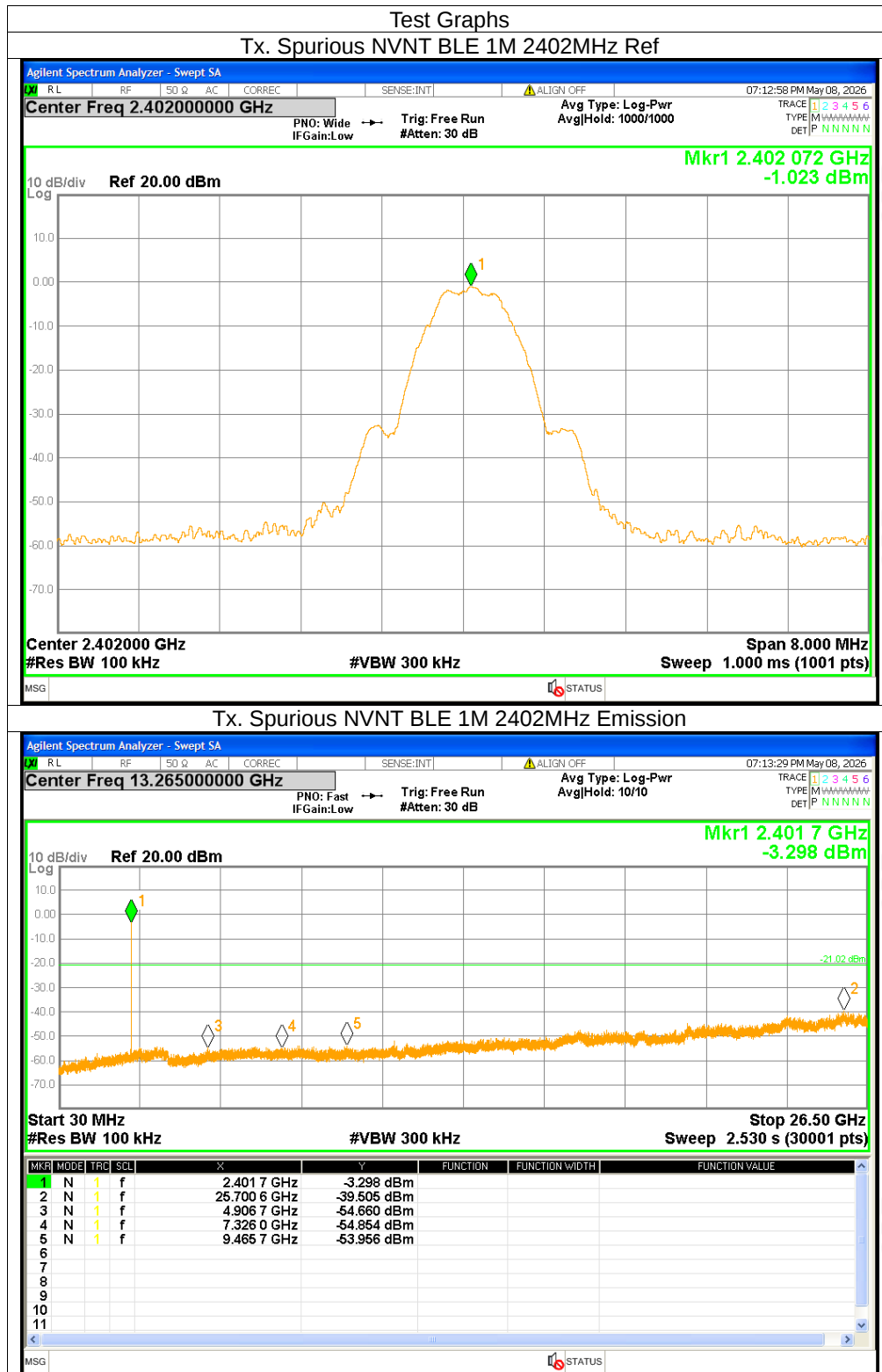


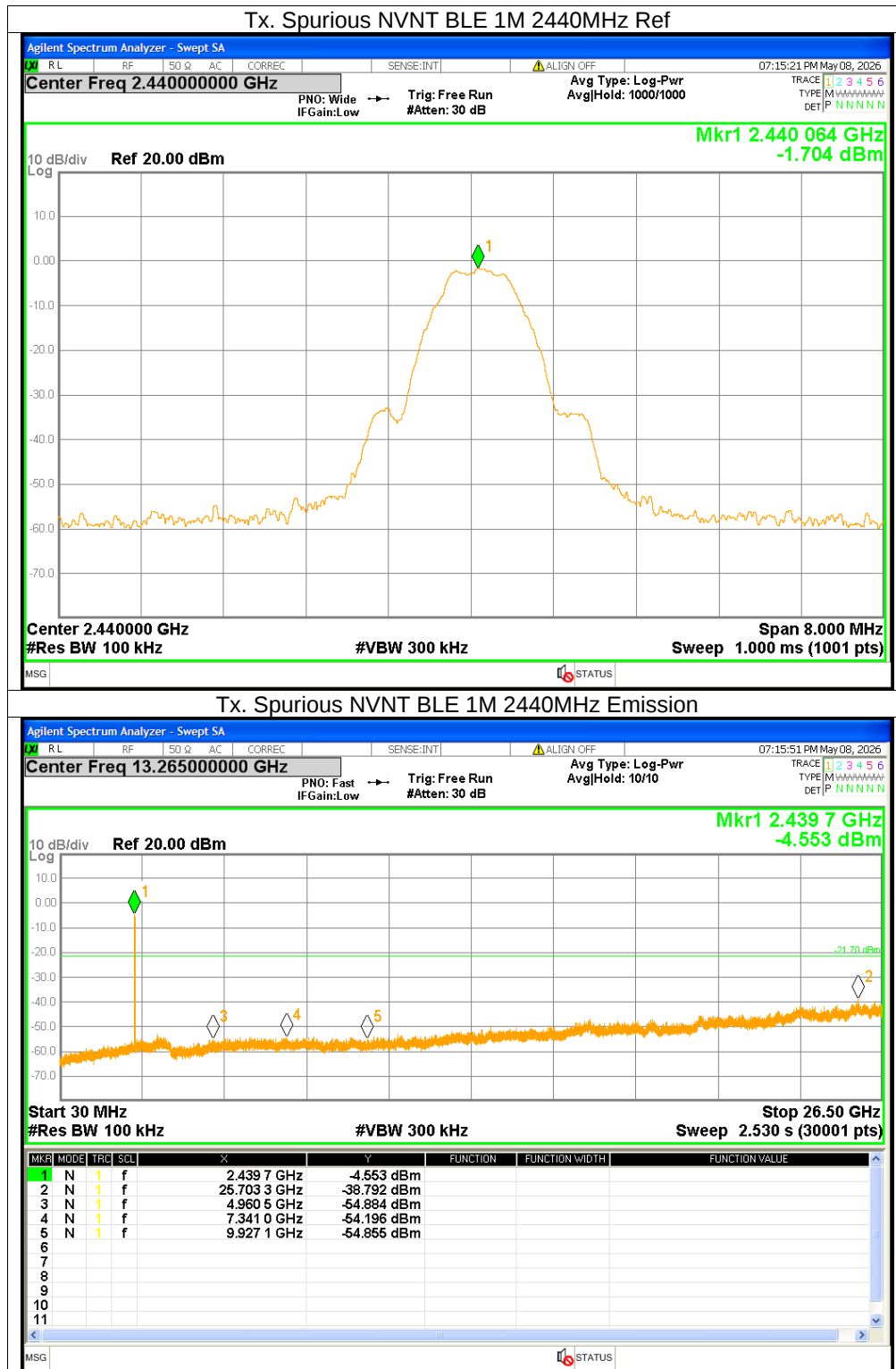


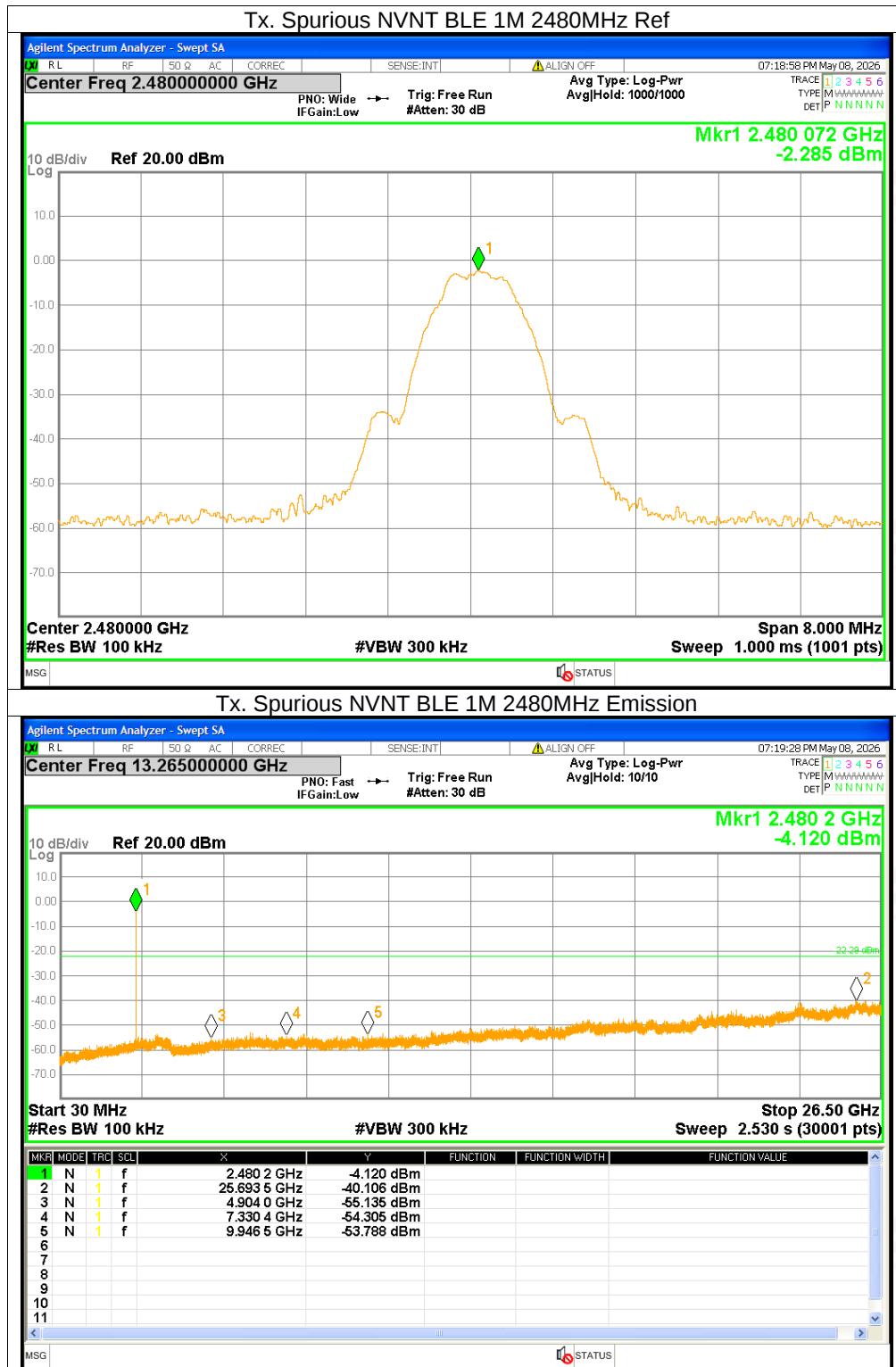


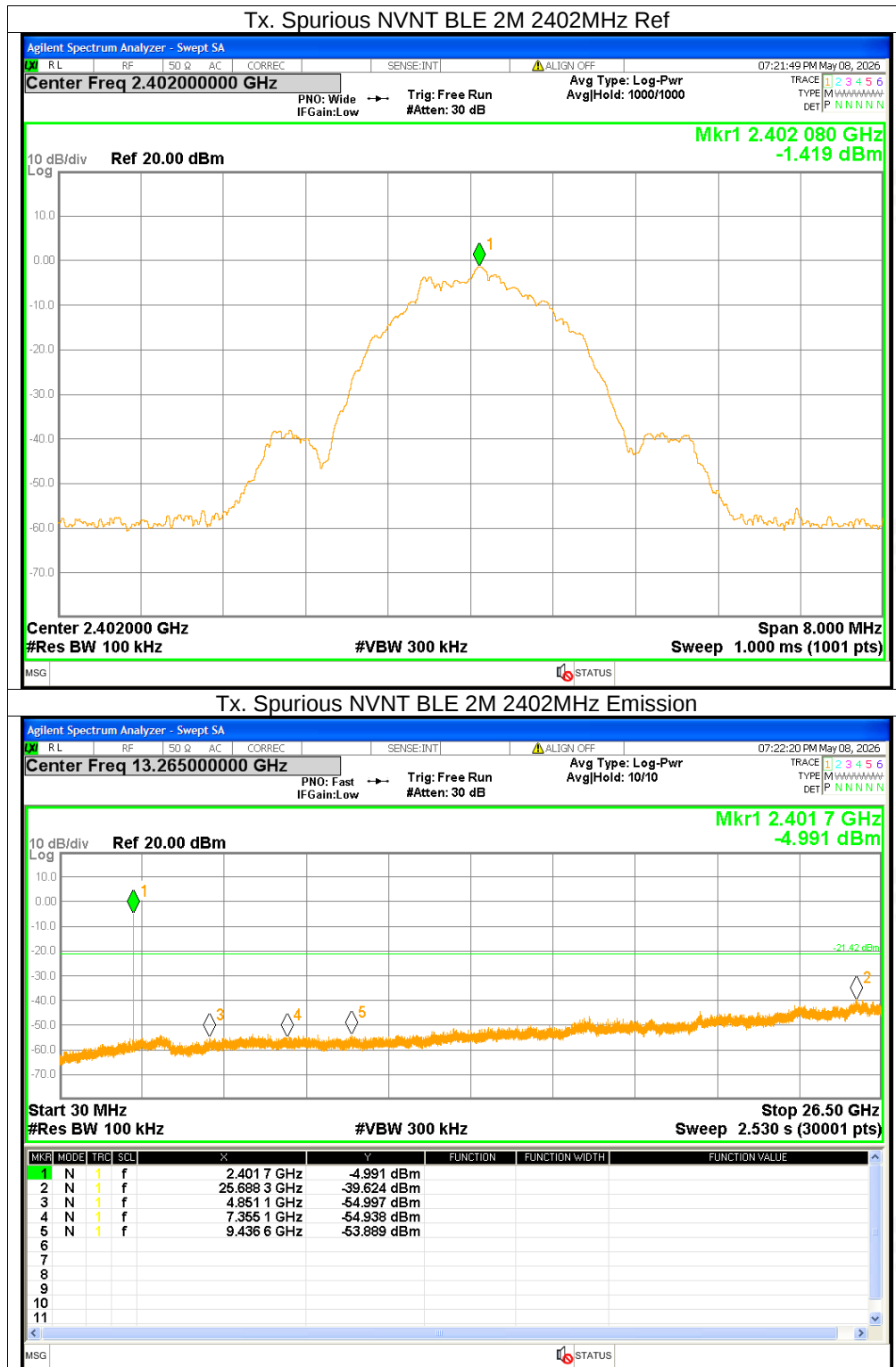
Conducted RF Spurious Emission

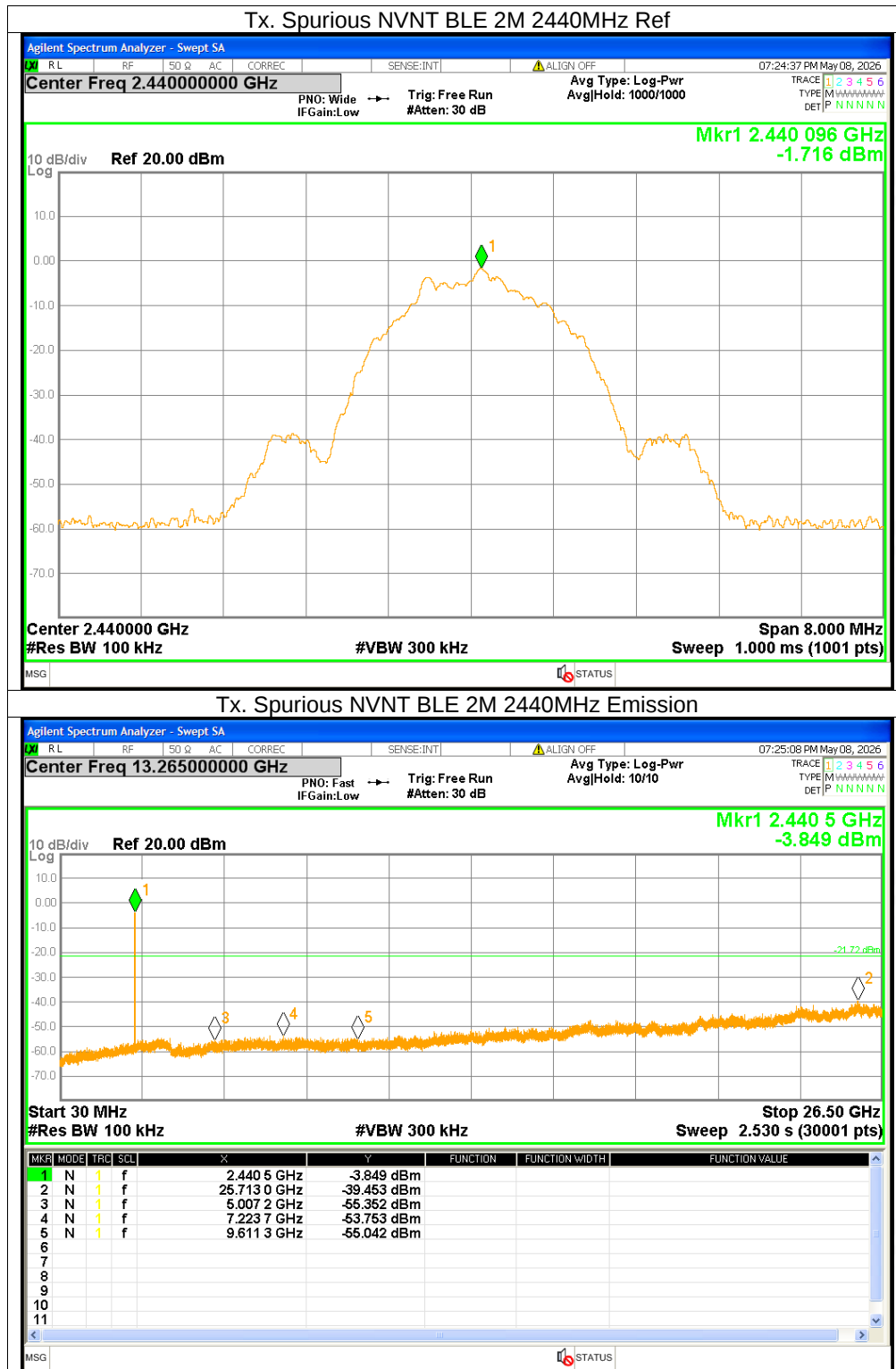
Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	-38.48	<=-20	Pass
NVNT	BLE 1M	2440	-37.09	<=-20	Pass
NVNT	BLE 1M	2480	-37.82	<=-20	Pass
NVNT	BLE 2M	2402	-38.2	<=-20	Pass
NVNT	BLE 2M	2440	-37.73	<=-20	Pass
NVNT	BLE 2M	2480	-37.35	<=-20	Pass

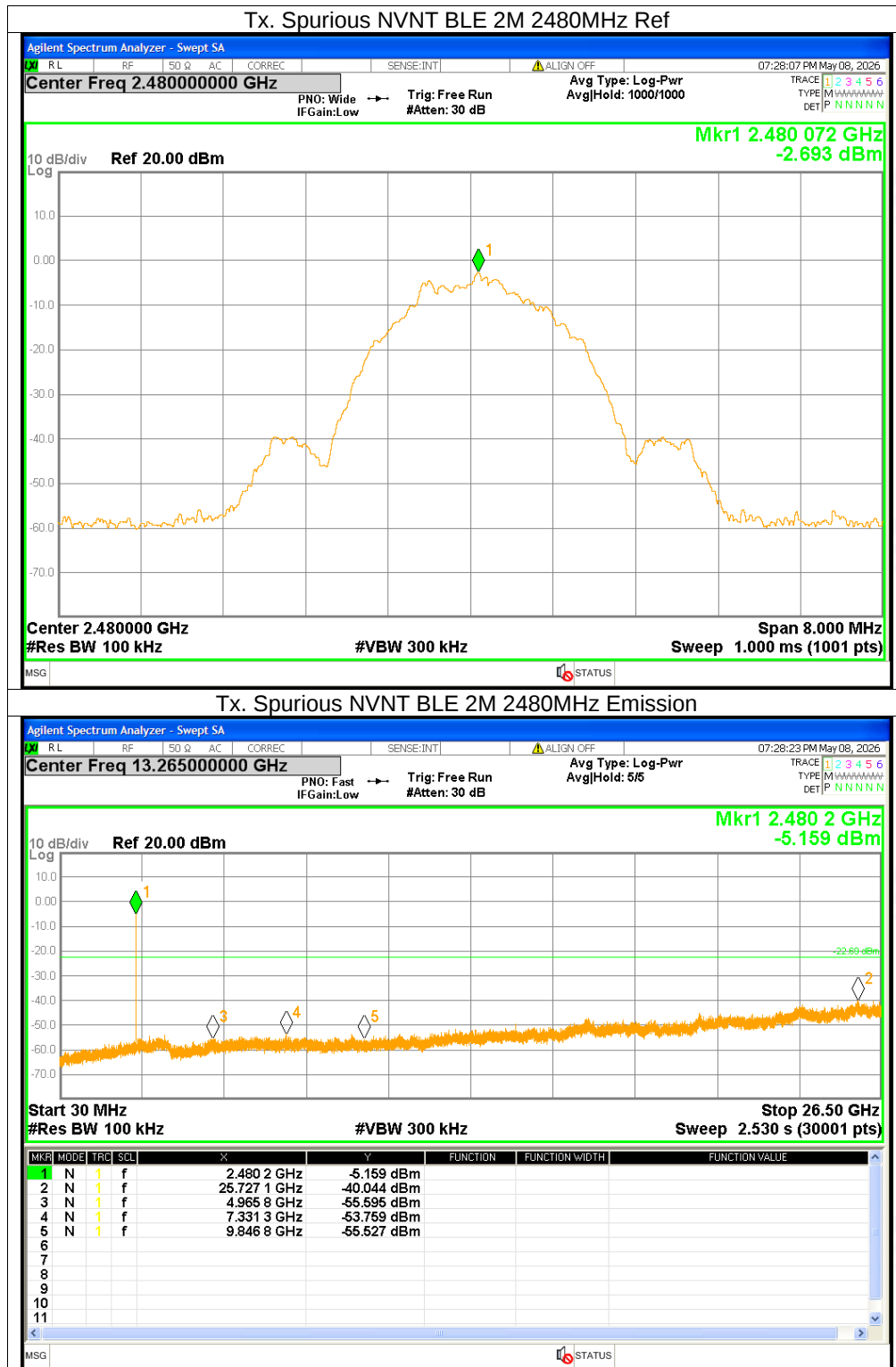














APPENDIX 2- EUT TEST PHOTO

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

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