RADIO TEST REPORT

Report No.: SHATBL2110016W03

Applicant:
SBOT Technologies LLC

Address:
230 W 39th St, 8th FL, New York, NY, USA, 10018

Product Name	:	Smart shopping cart model 2
Brand Name	:	Caper
Model Name	:	Caper-V011.0
Series Model	:	N/A
Test Standard	:	FCC Part15.247
FCC ID	:	2A3Q4CAPER-V011

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TEST RESULT CERTIFICATION

Applicant's Name..... : SBOT Technologies LLC

Address..... : 230 W 39th St, 8th FL, New York, NY, USA, 10018

Manufacturer's Name..... : SBOT Technologies LLC

Address..... : 230 W 39th St, 8th FL, New York, NY, USA, 10018

Product Description

Product Name..... : Smart shopping cart model 2

Brand Name..... : Caper

Model Name..... : Caper-V011.0

Series Model..... : N/A

Test Standards..... : FCC Part15.247

Test Procedure..... : ANSI C63.10-2013

This device described above has been tested by ATBL, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of Test..... :

Date of receipt of test item..... : 01 Nov. 2021

Date (s) of performance of tests..... : 01 Nov. 2021 ~ 12 Nov. 2021

Date of Issue..... : 13 Nov. 2021

Test Result..... : Pass

Report Prepared by : yongqiang.liu
(yongqiang.liu)

Report Approved by : Ghost Li.
(Ghost.Li)

Authorized Signatory : Terry yang
(Terry yang)

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	13 Nov. 2021	SHATBL2110016W03	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			
Standard Section	Test Item	Judgment	Remark
15.207 RSS-GEN 8.8	Conducted Emission	PASS	--
15.247 (a)(2) RSS-247 Clause 5.2(a)	6dB&99% Bandwidth	PASS	--
15.247 (b)(3) RSS-247 Clause 5.4(d)	Output Power	PASS	--
15.247(d) & 15.209 & 15.205 RSS-247 Clause 5.5 & RSS-GEN 6.13 RSS-GEN 8.9 RSS-GEN 8.10	Radiated Spurious Emission	PASS	--
§15.247(d) & 15.205 RSS-247 Clause 5.5 RSS-GEN 8.10	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e) RSS-247 Clause 5.2(b)	Power Spectral Density	PASS	--
15.205 RSS-Gen 8.9/8.10	Restricted bands of operation	PASS	--
15.203 RSS-Gen 6.8	Antenna Requirement	PASS	--

NOTE:

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

(2) All tests are according to ANSI C63.10-2013.

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>Smart shopping cart model 2</td></tr>
<tr><td>Trade Name</td><td>Caper</td></tr>
<tr><td>Model Name</td><td>Caper-V011.0</td></tr>
<tr><td>Series Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Smart shopping cart model 2
<table>
<tr><td>Operation Frequency:</td><td>802.11b/g/n 20: 2412~2462 MHz</td></tr>
<tr><td>Modulation Type:</td><td>802.11b(DSSS):CCK,DQPSK,DBPSK
802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM
802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM</td></tr>
<tr><td>Bit Rate of Transmitter:</td><td>802.11b:11/5.5/2/1 Mbps
802.11g:54/48/36/24/18/12/9/6Mbps
802.11n(20MHz):
65/58.5/52/39/26/19.5/13/6.5Mbps</td></tr>
<tr><td>Number of Channel:</td><td>802.11b/g/n20: 11CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please refer to the Note 3.</td></tr>
<tr><td>Antenna Gain (dBi):</td><td>2 dBi</td></tr>
<tr><td>Duty Cycle:</td><td>>98%</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Adapter</td><td>Input:100-240V,50-60Hz,2.5A
Output:24V,6.25A</td></tr>
<tr><td>Battery</td><td>Rated Voltage:18 V
Charge Limit:8A
Capacity:57600mAh</td></tr>
<tr><td>Hardware version number</td><td>V1.2</td></tr>
<tr><td>Software version number</td><td>7.1.2</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

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

2.

Operation Frequency of channel			
802.11b/g/n(20MHz)		Channel List for 802.11n(40MHz)	
Channel	Frequency	Channel	Frequency
01	2412	03	2422
02	2417	04	2427
03	2422	05	2432
04	2427	06	2437
05	2432	07	2442
06	2437	08	2447
07	2442	09	2452
08	2447		
09	2452		
10	2457		
11	2462		

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

2.4GHz Test Frequency:

For 802.11b/g/n (HT20)	
Channel	Freq.(MHz)
01	2412
06	2437
11	2462

3.

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	Caper	Caper-V011.0	FPC	N/A	2 dBi	WLAN ANT

2.2 DESCRIPTION OF THE TEST MODES

Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	TX IEEE 802.11b CH1	1 Mbps
Mode 2	TX IEEE 802.11b CH6	1 Mbps
Mode 3	TX IEEE 802.11 b CH11	1 Mbps
Mode 4	TX IEEE 802.11g CH1	6 Mbps
Mode 5	TX IEEE 802.11g CH6	6 Mbps
Mode 6	TX IEEE 802.11g CH11	6 Mbps
Mode 7	TX IEEE 802.11n HT20 CH1	MCS 0
Mode 8	TX IEEE 802.11n HT20 CH6	MCS 0
Mode 9	TX IEEE 802.11n HT20 CH11	MCS 0

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.

Conducted Emission

Test Case	
Conducted Emission	Mode10: Keeping WIFI TX

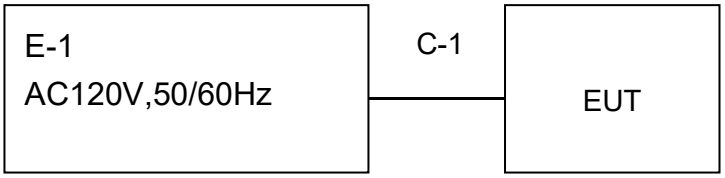
2.3 TEST SOFTWARE AND POWER LEVEL

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

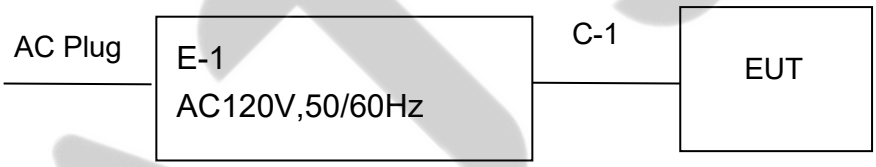
RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
WIFI(2.4G)	2.4G WIFI	802.11b	2	default	RF test tool
		802.11g		default	
		802.11n(HT20)		default	

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiation Test Set



Conduction Test Set



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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Type No.	Note
E-2	Notebook	Lenovo	DESKTOP-USDEO09	00326-10000-00000-AA636	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A

Note:

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

2.6 LABORATORY INFORMATION

Company Name:	Shanghai ATBL Technology Co., Ltd.
Address:	Building 8, No. 160, Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai
Telephone:	+86(0)21-51298625
The FCC Registration Number (FRN):	0031025281
A2LA Number:	6184.01
CNAS Number:	CNAS L14531

2.7 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	RF output power, conducted	±0.958dB
2	Conducted spurious emissions	±2.988dB
3	All emissions, radiated 30MHz-1GHz	±2.50dB
4	All emissions, radiated 1GHz-18GHz	±3.51dB
5	Occupied bandwidth	±23.20dB
6	Power spectral density	±0.886dB

2.8 EQUIPMENTS LIST

2.8.1 Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Management number	Calibrated until
Test Receiver	R&S	ESCI	100469	SHATBL-E003	2022.07.13
Spectrum Analyzer	Agilent	N9020A	MY50200811	SHATBL-E017	2022.07.13
Bilog Antenna	SCHWARZBECK	VLUB 9168	01174	SHATBL-E008	2023.09.27
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	SHATBL-E009	2023.09.27
Pre-Amplifier (0.1M-3GHz)	JPT	JPA-10M1G35	21010100035001	SHATBL-E005	2022.10.08
Pre-Amplifier (1G-18GHz)	JPT	JPA0118-55-303A	1910001800055000	SHATBL-E006	2022.07.13
Temperature & Humidity	DeLi	DeLi	N/A	SHATBL-E016	2022.10.08
Antenna/Turntable Controller	Brilliant	N/A	N/A	SHATBL-E007	N/A
Test SW	FALA	EMC-RI(Ver.4A2)		SHATBL-E046	N/A

2.8.2 RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	equipment number	Calibrated until
MIMO Power measurement test Set	DARE	RPR3006W	16I00054SN016	SHATBL-W006	2022.10.07
			RPR6W-20001005	SHATBL-W013	2022.10.07
Signal Analyzer	Agilent	N9020A	MY57300196	SHATBL-W004	2022.10.07
Signal Generator	Agilent	N5182B	MY46240556	SHATBL-W005	2022.10.07
Wireless Communications Test Set	R&S	CMW500	101331	SHATBL-W007	2022.10.07
Temperature & Humidity	Deli	deli	N/A	SHATBL-W011	2022.10.07
Attenuator	Agilent	8494B	DC-18G	SHATBL-W009	2022.10.07
Attenuator	Agilent	8496B	DC-18G	SHATBL-W010	2022.10.07
power splitter	MNK	MPD-DC/6-2S	62315 G51	SHATBL-W015	2022.10.07
			62315 G52	SHATBL-W016	2022.10.07
Filter	Chengdu kangmaiwei	ZBSF-C2400-2483.5-T3	N/A	SHATBL-W021	N/A
Constant temperature and humidity box	KSON	THS-B6C-150	6159K	SHATBL-W019	2022.01.26
Test SW	FALA	LZ-RF(Ver.LzRF-03A3.1)		SHATBL-W020	N/A

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 Emissionlimit (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.

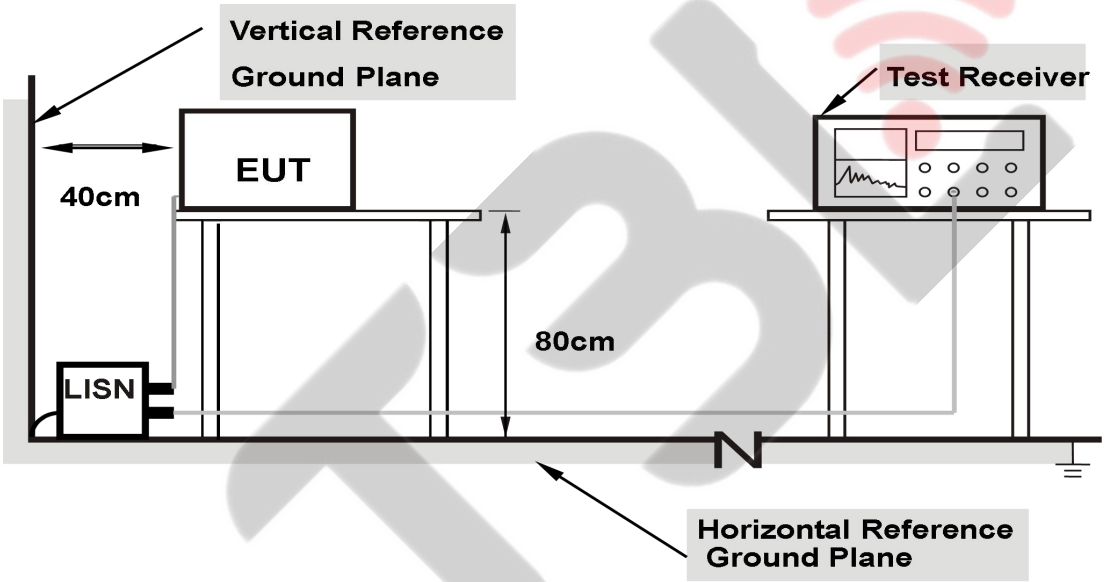
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

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

3.1.3 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.

3.1.4 EUT OPERATING CONDITIONS

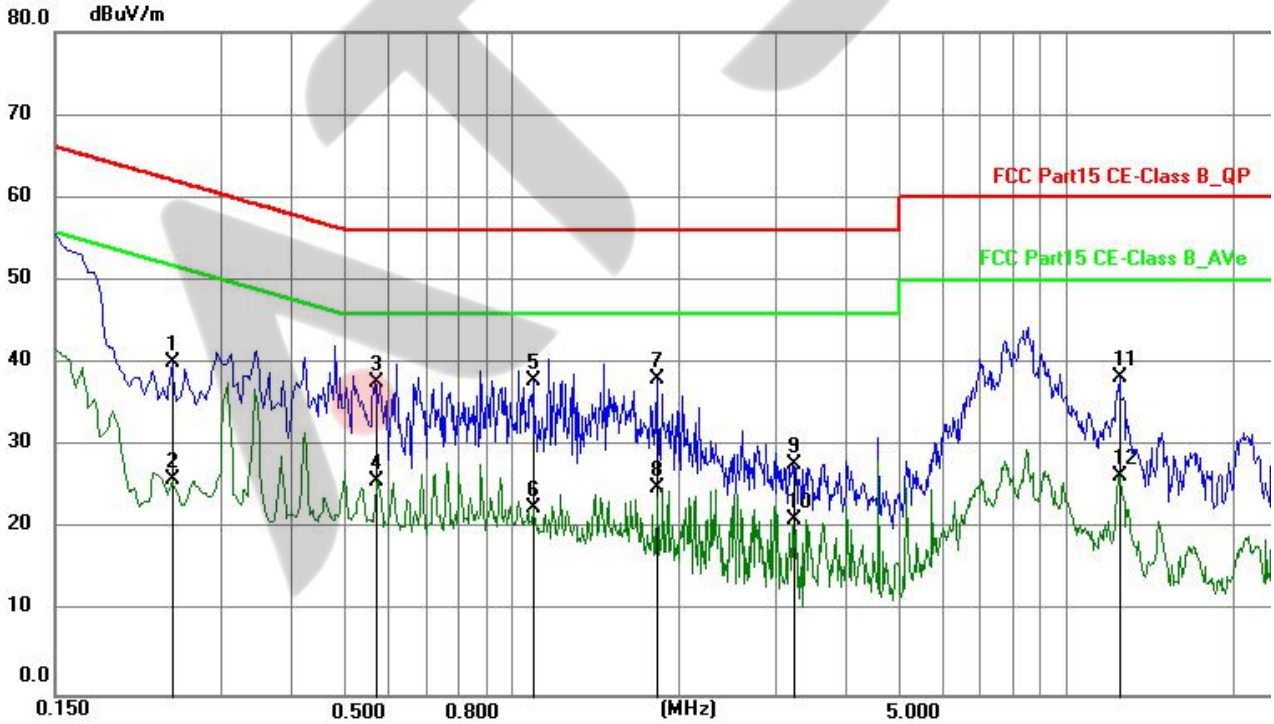
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULT

Temperature:	26.2℃	Relative Humidity:	53%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	TX Mode		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2444	30.06	10.08	40.14	61.95	-21.81	QP
2	0.2444	15.99	10.08	26.07	51.95	-25.88	AVG
3	0.5684	27.84	9.97	37.81	56.00	-18.19	QP
4	0.5684	16.01	9.97	25.98	46.00	-20.02	AVG
5	1.0987	27.95	9.94	37.89	56.00	-18.11	QP
6	1.0987	12.64	9.94	22.58	46.00	-23.42	AVG
7	1.8366	28.15	9.97	38.12	56.00	-17.88	QP
8	1.8366	15.17	9.97	25.14	46.00	-20.86	AVG
9	3.2280	18.01	10.00	28.01	56.00	-27.99	QP
10	3.2280	11.30	10.00	21.30	46.00	-24.70	AVG
11	12.5340	27.86	10.53	38.39	60.00	-21.61	QP
12	12.5340	15.96	10.53	26.49	50.00	-23.51	AVG

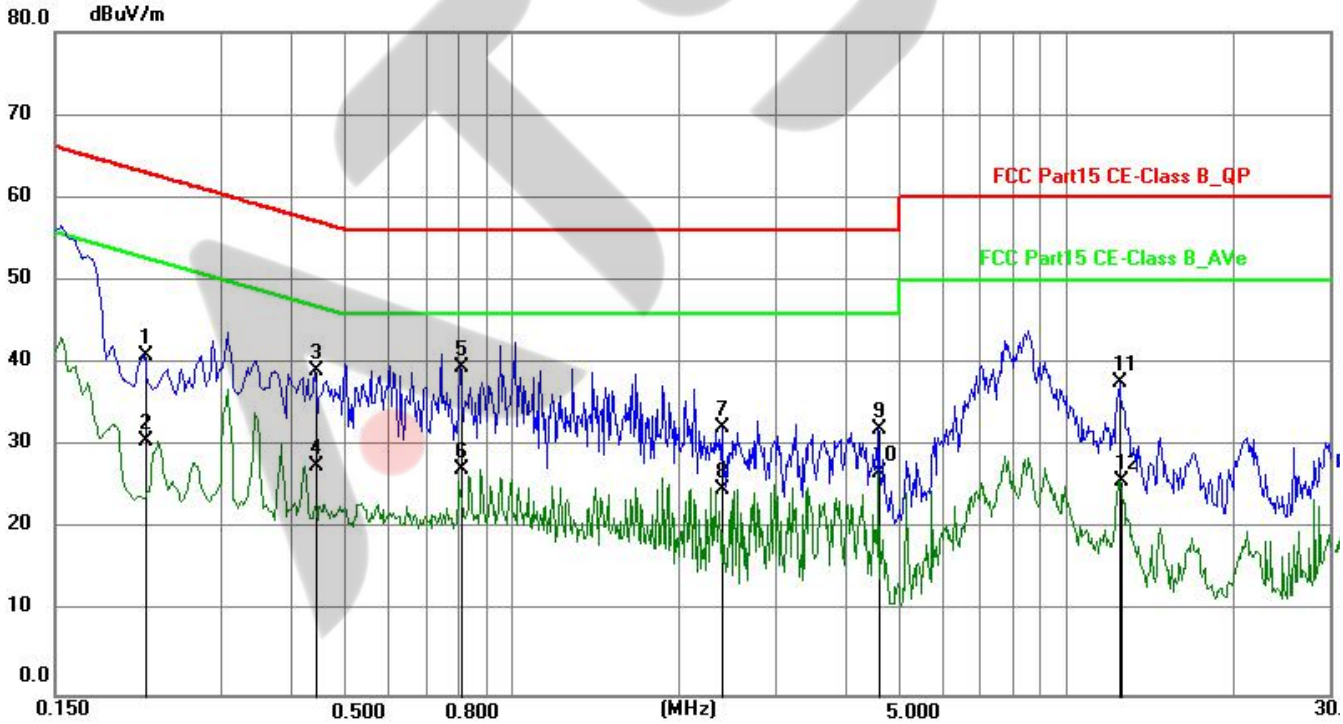
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit.
3. Factor=LISN factor+Cable loss+Limiter (10dB)



Temperature:	26.2℃	Relative Humidity:	53%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	TX Mode		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
0.2174	30.65	10.36	41.01	62.92	-21.91	QP	0.2174
0.2174	20.44	10.36	30.80	52.92	-22.12	AVG	0.2174
0.4425	28.95	10.23	39.18	57.01	-17.83	QP	0.4425
0.4425	17.44	10.23	27.67	47.01	-19.34	AVG	0.4425
0.8114	29.52	10.14	39.66	56.00	-16.34	QP	0.8114
0.8114	17.20	10.14	27.34	46.00	-18.66	AVG	0.8114
2.4043	22.12	10.24	32.36	56.00	-23.64	QP	2.4043
2.4043	14.58	10.24	24.82	46.00	-21.18	AVG	2.4043
4.6093	22.02	10.19	32.21	56.00	-23.79	QP	4.6093
4.6093	16.79	10.19	26.98	46.00	-19.02	AVG	4.6093
12.5385	27.55	10.24	37.79	60.00	-22.21	QP	12.5385
12.5834	15.64	10.24	25.88	50.00	-24.12	AVG	12.5834

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)



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 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 C63.10-2013 below has to be followed.

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

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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

Notes:

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

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

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

LIMITS OF RESTRICTED FREQUENCY BANDS

FCC:

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			

IC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

For Radiated Emission

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

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

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

For Restricted band

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2310 to 2430 MHz Upper Band Edge: 2445 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

3.2.2 TEST PROCEDURE

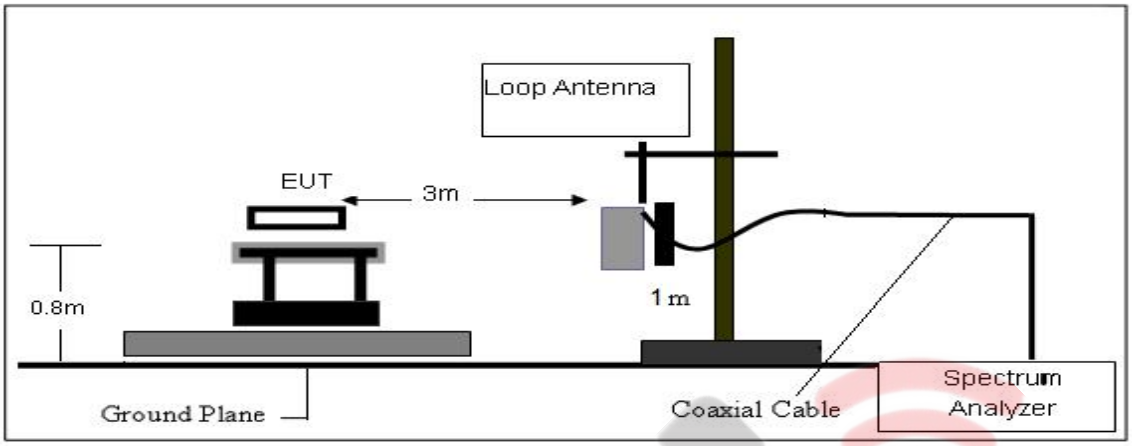
a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position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

Note:

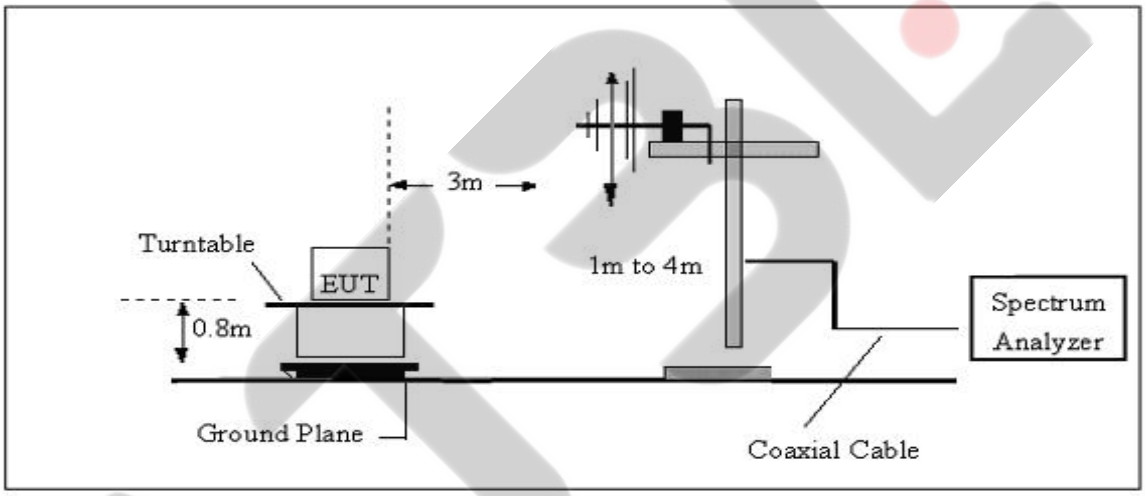
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 TEST SETUP

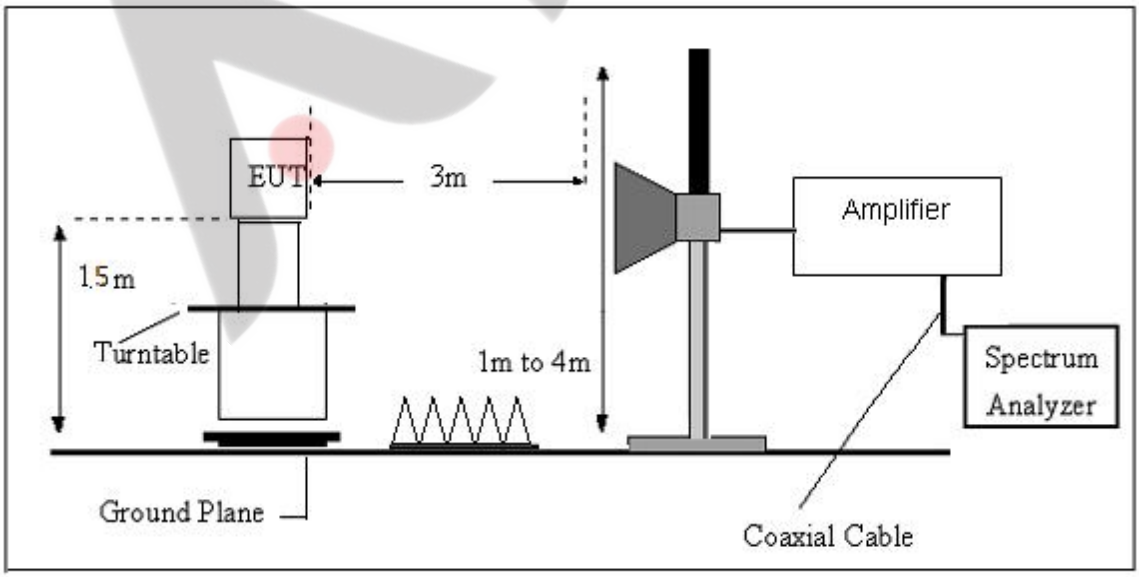
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.4 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.

3.2.5 FIELD STRENGTH CALCULATION

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

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

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

Factor=AF+CL-AG

3.2.6 TEST RESULTS(RADIATED SPURIOUS EMISSIONS)

Temperature:	26.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC 120V/60Hz	Polarization:	--
Test Mode:	TX Mode		

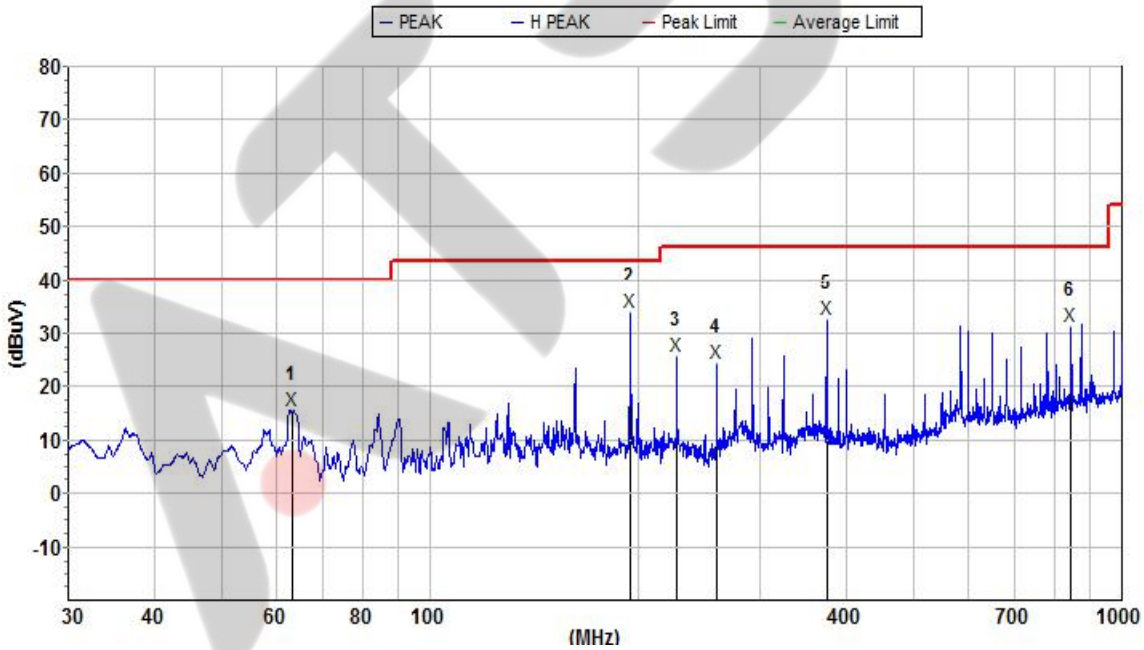
Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

30MHz - 1000MHz

Temperature:	26.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 1/2/3 worst mode)		

30MHz~1GHz

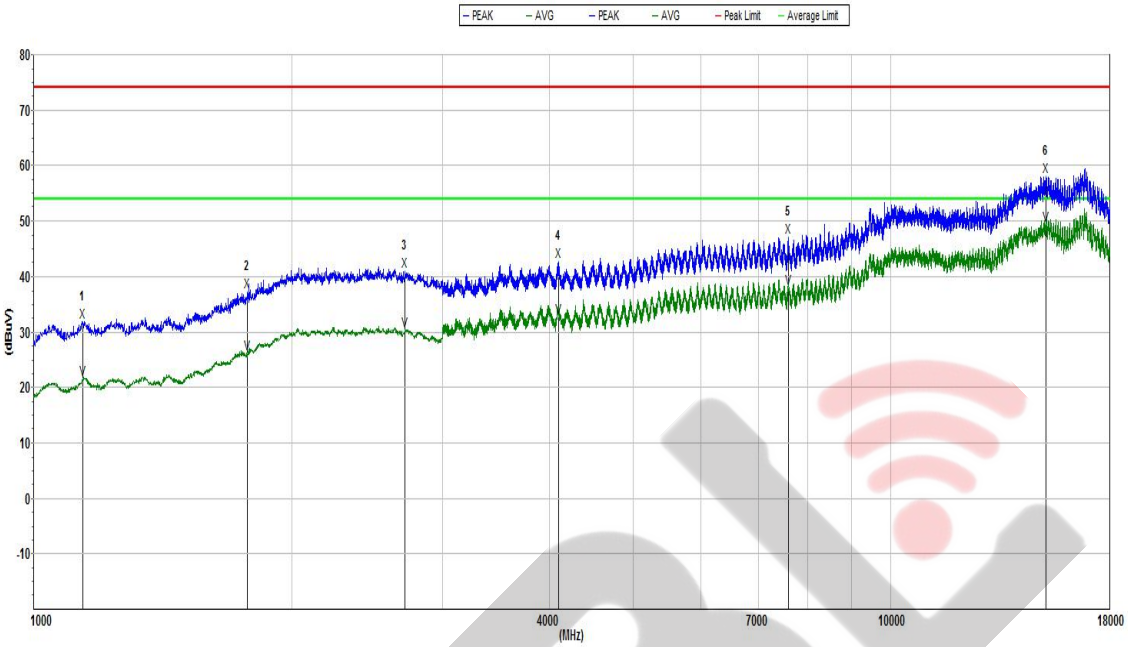
Mode 1 Horizontal



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Cbl.L.(dB)	Pol.
1	63.424327	15.5	40.0	24.5	12.1	32.8	0.8	H
2	194.794668	33.8	43.5	9.7	10.2	32.8	2.2	H
3	227.291780	25.6	46.0	20.4	10.9	32.8	2.5	H
4	259.688742	24.4	46.0	21.6	11.8	32.8	2.6	H
5	374.622581	32.5	46.0	13.5	13.6	32.4	2.7	H
6	843.607400	31.4	46.0	14.6	19.3	31.9	3.6	H

1GHz~18GHz

Mode 1 Horizontal

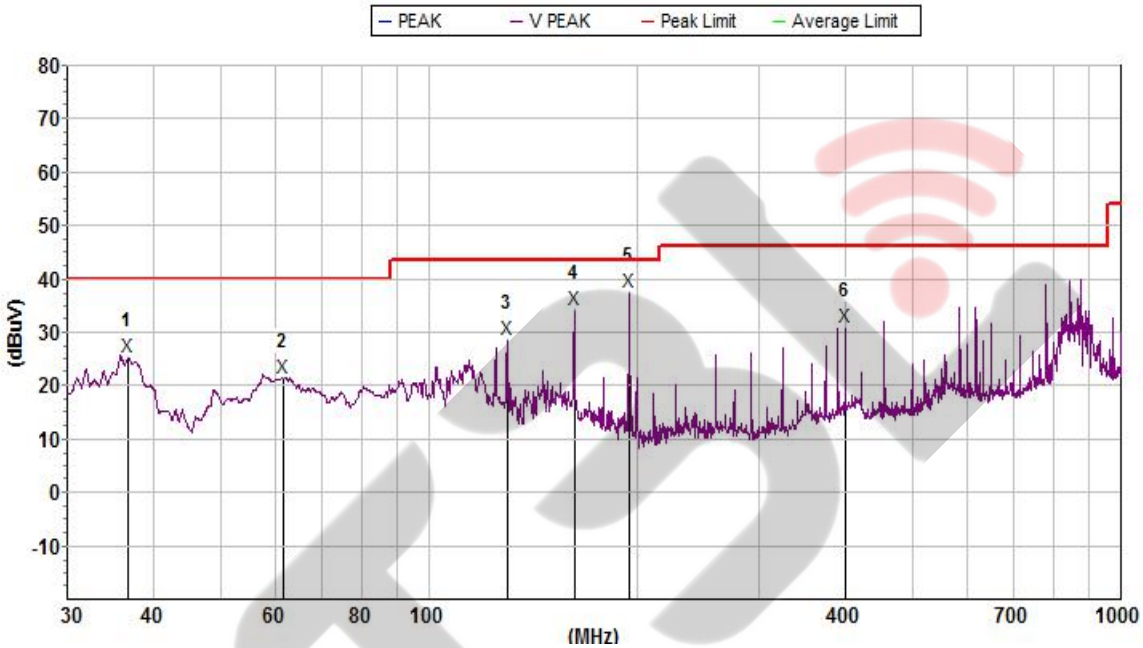


Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1142.000000	31.9	74.0	42.1	20.7	57.3	2.2	H
2	1777.000000	37.4	74.0	36.6	21.6	53.3	2.6	H
3	2711.000000	41.0	74.0	33.0	23.4	50.9	2.9	H
4	4096.500000	42.9	74.0	31.1	24.4	50.1	3.3	H
5	7591.500000	47.1	74.0	26.9	25.8	48.7	4.7	H
6	15180.000000	58.2	74.0	15.8	30.5	47.1	6.4	H
AVG								
1	1142.000000	21.5	54.0	32.5	20.7	57.3	2.2	H
2	1777.000000	26.2	54.0	27.8	21.6	53.3	2.6	H
3	2711.000000	30.4	54.0	23.6	23.4	50.9	2.9	H
4	4096.500000	32.8	54.0	21.2	24.4	50.1	3.3	H
5	7591.500000	37.9	54.0	16.1	25.8	48.7	4.7	H
6	15180.000000	49.3	54.0	4.7	30.5	47.1	6.4	H

Temperature:	23.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC120V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 1/2/3 worst mode)		

30MHz~1GHz

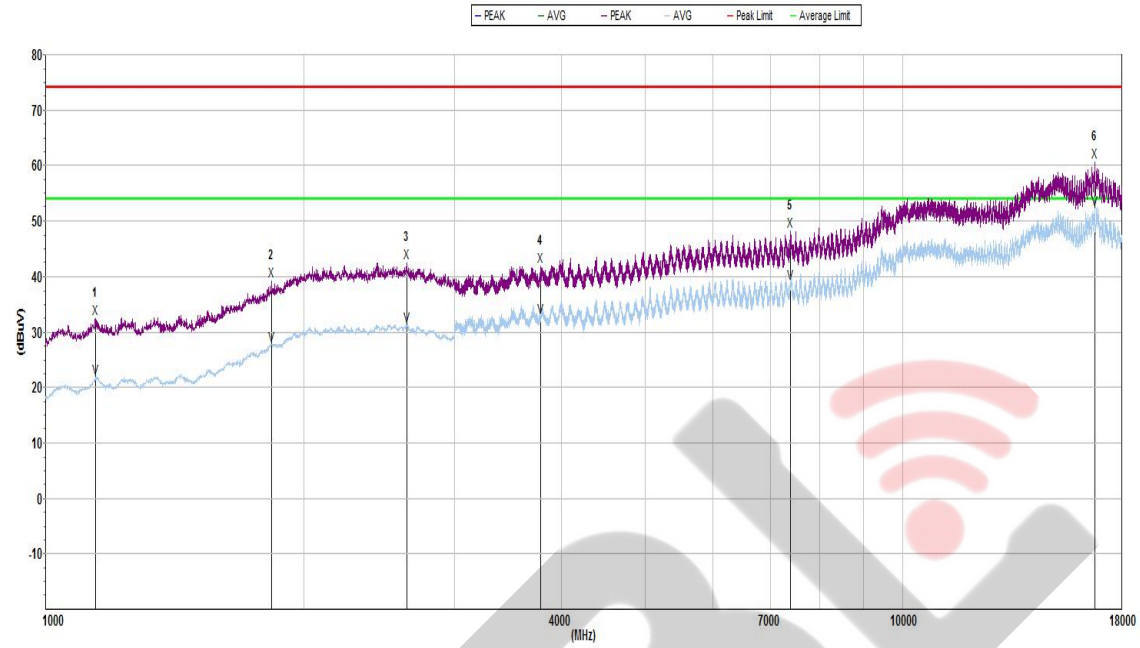
Mode 1 Vertical



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	36.766156	25.5	40.0	14.5	13.6	32.3	0.8	V
2	61.453972	21.6	40.0	18.4	12.5	32.7	0.8	V
3	129.694969	28.6	43.5	14.9	12.8	32.9	1.4	V
4	162.325732	34.3	43.5	9.2	13.9	32.9	1.6	V
5	194.794668	37.7	43.5	5.8	10.2	32.8	2.2	V
6	399.730428	31.0	46.0	15.0	14.7	32.3	2.7	V

1GHz~18GHz

Mode 1 Vertical



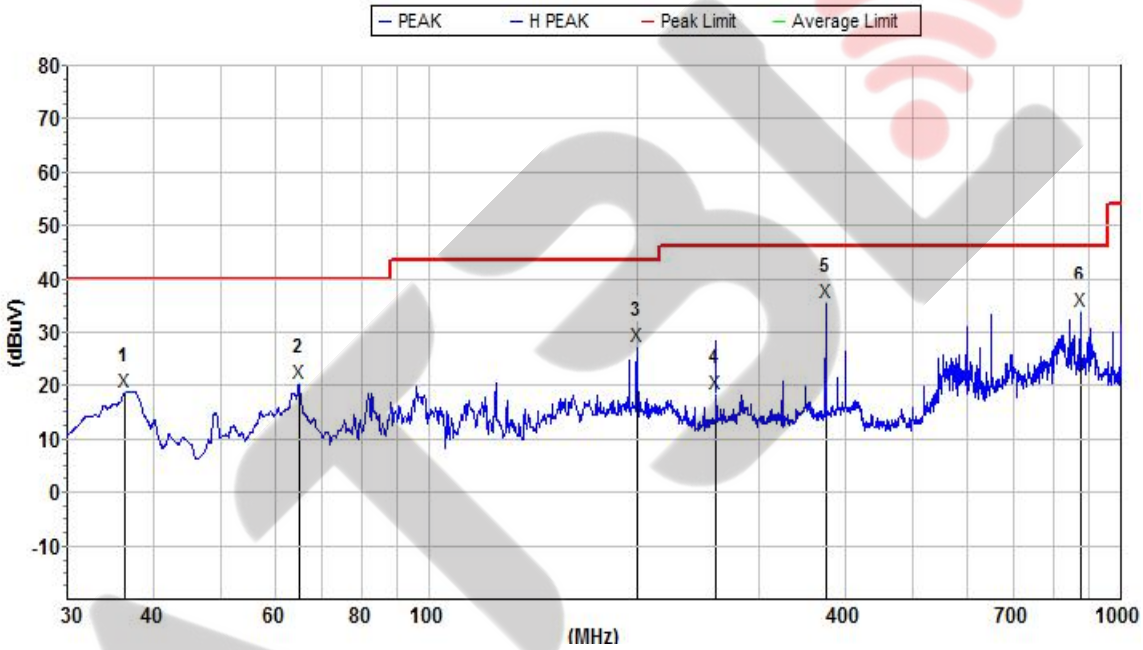
Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1143.000000	32.6	74.0	41.4	20.7	57.3	2.2	V
2	1835.000000	39.3	74.0	34.7	21.7	52.5	2.6	V
3	2637.000000	42.5	74.0	31.5	23.7	50.6	2.9	V
4	3779.250000	42.0	74.0	32.0	24.7	50.3	3.2	V
5	7398.750000	48.2	74.0	25.8	26.5	48.8	4.6	V
6	16731.750000	60.8	74.0	13.2	31.4	47.5	6.8	V
AVG								
1	1143.000000	21.7	54.0	32.3	20.7	57.3	2.2	V
2	1835.000000	27.6	54.0	26.4	21.7	52.5	2.6	V
3	2637.000000	31.2	54.0	22.8	23.7	50.6	2.9	V
4	3779.250000	32.8	54.0	21.2	24.7	50.3	3.2	V
5	7398.750000	38.8	54.0	15.2	26.5	48.8	4.6	V
6	16731.750000	52.2	54.0	1.8	31.4	47.5	6.8	V

30MHz - 1000MHz

Temperature:	26.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 1/2/3 worst mode)		

30MHz~1GHz

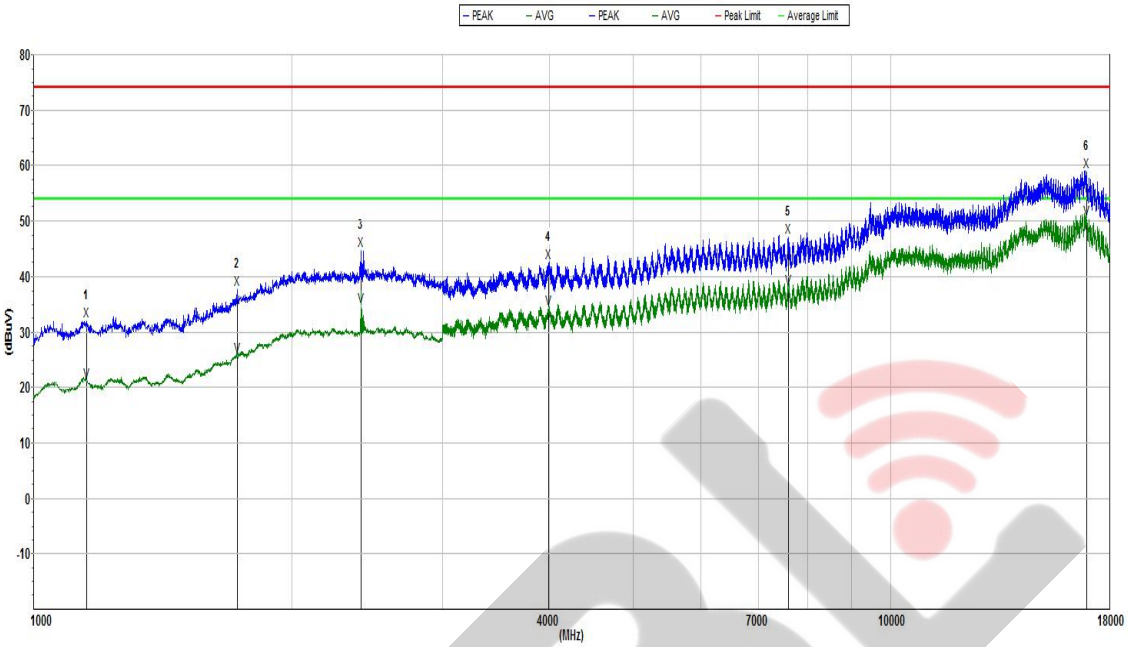
Mode 2 Horizontal



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	36.381415	18.9	40.0	21.1	13.6	32.3	0.8	H
2	64.886534	20.4	40.0	19.6	11.8	32.8	0.8	H
3	199.635245	27.5	43.5	16.0	9.9	32.8	2.3	H
4	260.144448	18.4	46.0	27.6	11.8	32.8	2.6	H
5	374.622581	35.5	46.0	10.5	13.6	32.4	2.7	H
6	873.713746	34.0	46.0	12.0	19.6	31.8	3.6	H

1GHz~18GHz

Mode 2 Horizontal

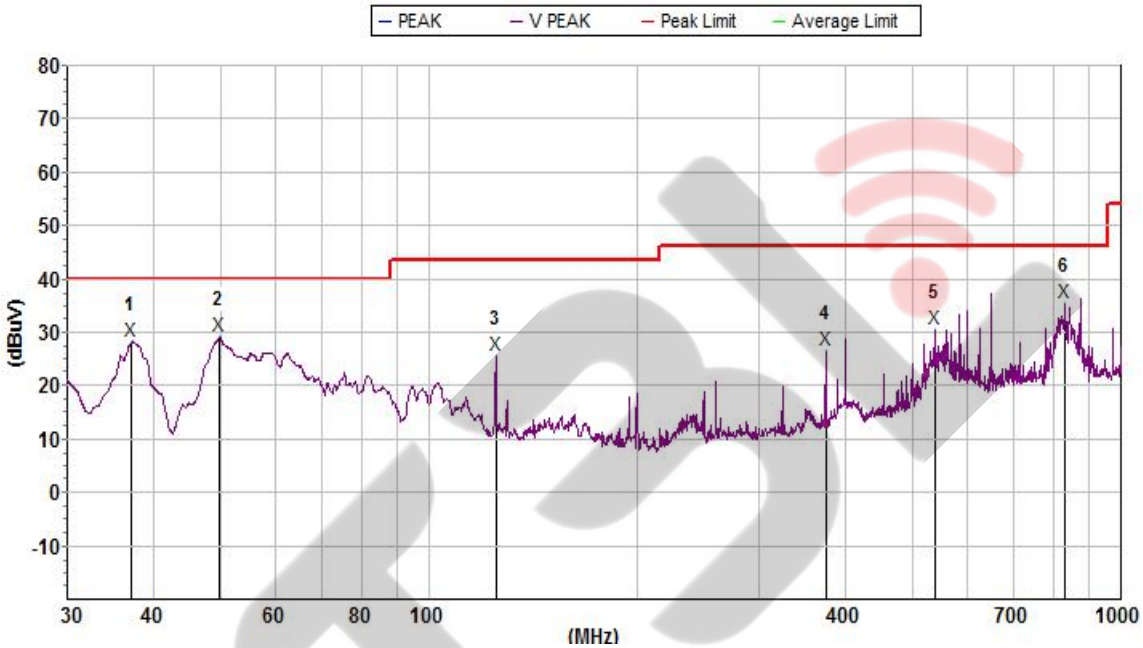


Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1154.000000	32.0	74.0	42.0	20.8	57.3	2.2	H
2	1727.000000	37.8	74.0	36.2	21.5	54.0	2.6	H
3	2408.000000	44.7	74.0	29.3	22.8	50.2	2.8	H
4	3989.250000	42.6	74.0	31.4	24.3	50.1	3.3	H
5	7599.000000	47.2	74.0	26.8	25.8	48.7	4.7	H
6	16911.000000	59.1	74.0	14.9	31.0	47.3	6.8	H
AVG								
1	1154.000000	21.1	54.0	32.9	20.8	57.3	2.2	H
2	1727.000000	25.7	54.0	28.3	21.5	54.0	2.6	H
3	2408.000000	34.6	54.0	19.4	22.8	50.2	2.8	H
4	3989.250000	34.3	54.0	19.7	24.3	50.1	3.3	H
5	7599.000000	37.9	54.0	16.1	25.8	48.7	4.7	H
6	16911.000000	50.5	54.0	3.5	31.0	47.3	6.8	H

Temperature:	23.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC120V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 1/2/3 worst mode)		

30MHz~1GHz

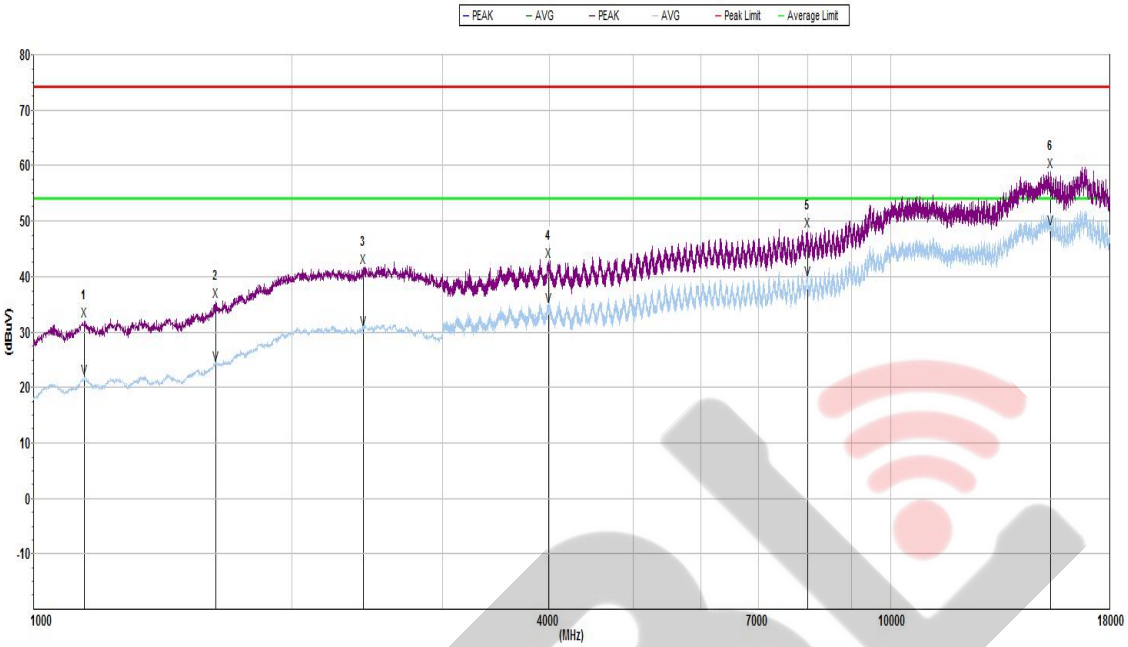
Mode 2 Vertical



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	37.220165	28.3	40.0	11.7	13.7	32.3	0.8	V
2	49.881404	29.3	40.0	10.7	13.5	32.6	0.8	V
3	125.006589	25.7	43.5	17.8	12.5	32.9	1.4	V
4	374.622581	26.6	46.0	19.4	14.3	32.4	2.7	V
5	537.589109	30.6	46.0	15.4	17.2	32.4	3.0	V
6	831.857365	35.5	46.0	10.5	20.9	32.0	3.6	V

1GHz~18GHz

Mode 1 Vertical



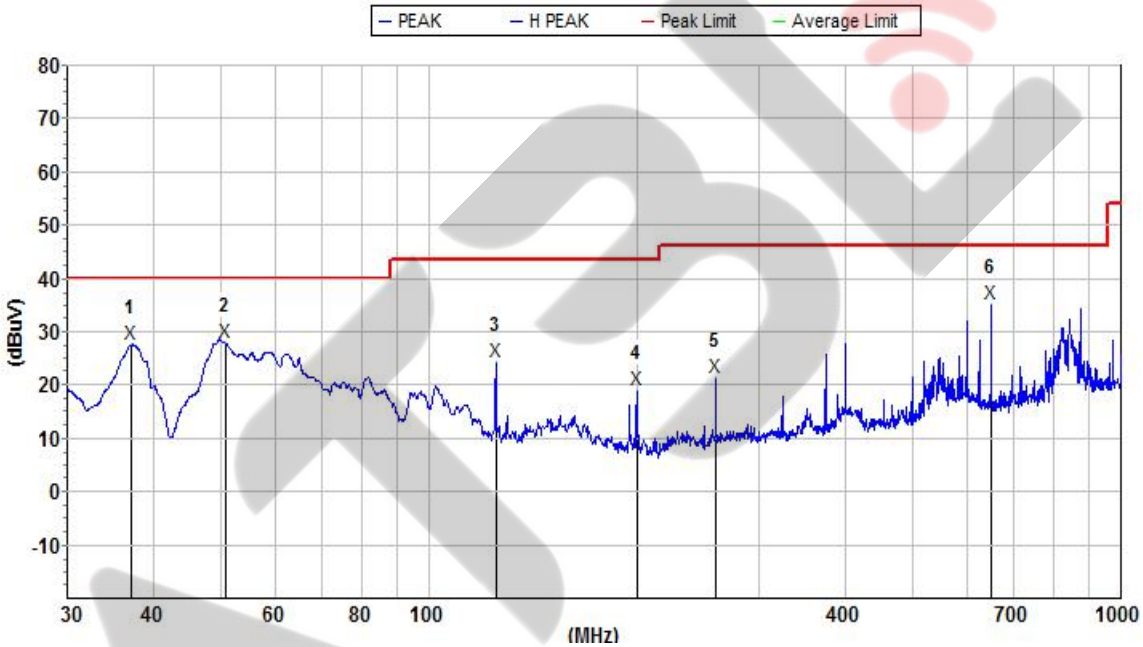
Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1147.000000	32.0	74.0	42.0	20.7	57.3	2.2	V
2	1630.000000	35.5	74.0	38.5	21.3	55.4	2.5	V
3	2424.000000	41.8	74.0	32.2	23.2	50.2	2.8	V
4	3985.500000	42.8	74.0	31.2	24.8	50.1	3.3	V
5	7989.000000	48.3	74.0	25.7	26.9	48.6	4.9	V
6	15342.000000	59.1	74.0	14.9	31.1	47.4	6.4	V
AVG								
1	1147.000000	21.8	54.0	32.2	20.7	57.3	2.2	V
2	1630.000000	24.3	54.0	29.7	21.3	55.4	2.5	V
3	2424.000000	30.5	54.0	23.5	23.2	50.2	2.8	V
4	3985.500000	34.7	54.0	19.3	24.8	50.1	3.3	V
5	7989.000000	39.6	54.0	14.4	26.9	48.6	4.9	V
6	15342.000000	48.6	54.0	5.4	31.1	47.4	6.4	V

30MHz - 1000MHz

Temperature:	26.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 1/2/3 worst mode)		

30MHz~1GHz

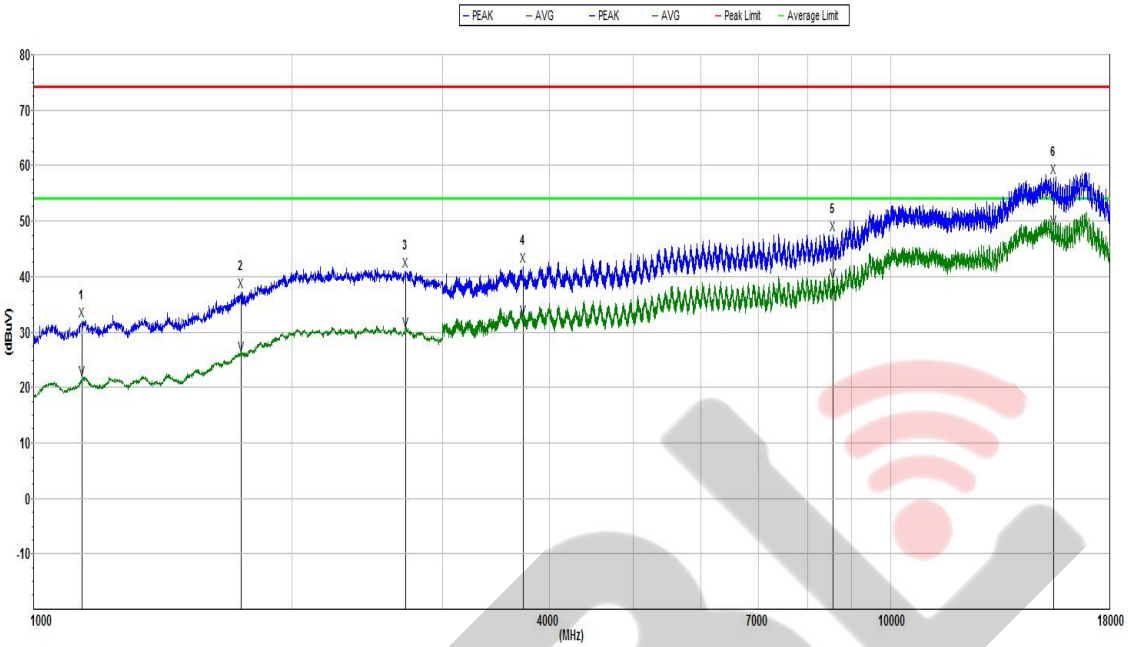
Mode 3 Horizontal



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	37.220165	27.6	40.0	12.4	13.7	32.3	0.8	H
2	50.763676	28.0	40.0	12.0	13.5	32.6	0.8	H
3	125.006589	24.4	43.5	19.1	12.5	32.9	1.4	H
4	199.635245	19.2	43.5	24.3	9.9	32.8	2.3	H
5	259.688742	21.4	46.0	24.6	11.8	32.8	2.6	H
6	649.659681	35.1	46.0	10.9	16.2	32.3	3.4	H

1GHz~18GHz

Mode 3 Horizontal

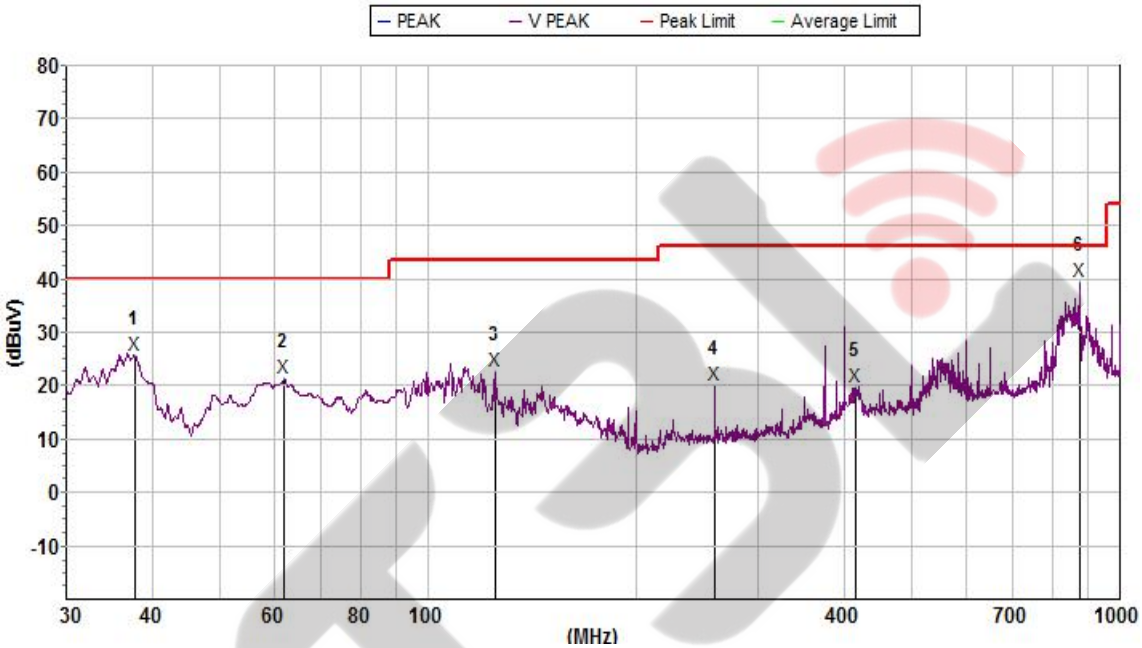


Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/ m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1140.000000	32.0	74.0	42.0	20.7	57.3	2.2	H
2	1745.000000	37.3	74.0	36.7	21.6	53.8	2.6	H
3	2717.000000	41.0	74.0	33.0	23.4	50.9	2.9	H
4	3723.750000	41.9	74.0	32.1	24.3	50.3	3.2	H
5	8560.500000	47.7	74.0	26.3	26.5	48.6	5.1	H
6	15466.500000	57.9	74.0	16.1	30.6	47.6	6.4	H
AVG								
1	1140.000000	21.6	54.0	32.4	20.7	57.3	2.2	H
2	1745.000000	25.9	54.0	28.1	21.6	53.8	2.6	H
3	2717.000000	30.3	54.0	23.7	23.4	50.9	2.9	H
4	3723.750000	32.5	54.0	21.5	24.3	50.3	3.2	H
5	8560.500000	39.0	54.0	15.0	26.5	48.6	5.1	H
6	15466.500000	48.7	54.0	5.3	30.6	47.6	6.4	H

Temperature:	23.0℃	Relative Humidtity:	59%RH
Test Voltage:	AC120V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9 (Mode 1/2/3 worst mode)		

30MHz~1GHz

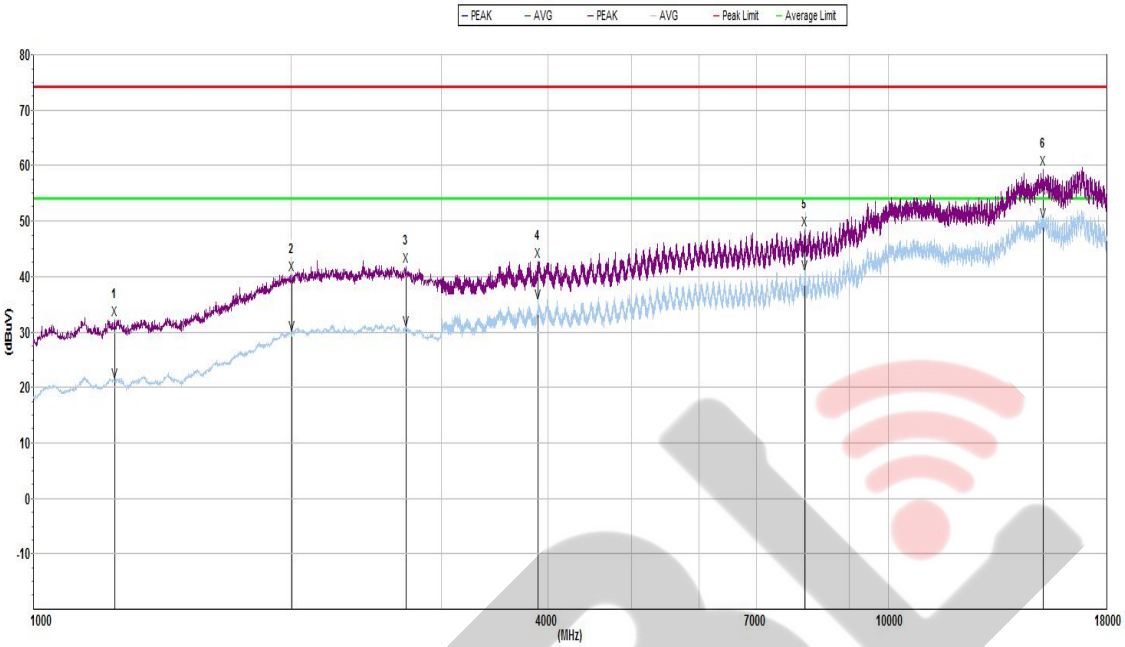
Mode 3 Vertical



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	37.745902	25.8	40.0	14.2	13.8	32.3	0.8	V
2	61.995070	21.3	40.0	18.7	12.4	32.7	0.8	V
3	125.006589	22.6	43.5	20.9	12.5	32.9	1.4	V
4	259.688742	20.0	46.0	26.0	11.8	32.7	2.6	V
5	416.179145	19.8	46.0	26.2	15.1	32.3	2.7	V
6	873.713746	39.7	46.0	6.3	21.3	31.7	3.6	V

1GHz~18GHz

Mode 3 Vertical



Mk.	Freq.(MHz)	Level (dBu V/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1244.000000	32.4	74.0	41.6	20.7	57.3	2.3	V
2	2005.000000	40.3	74.0	33.7	22.1	50.1	2.7	V
3	2728.000000	42.0	74.0	32.0	23.9	50.9	2.9	V
4	3892.500000	42.7	74.0	31.3	24.8	50.2	3.3	V
5	7986.000000	48.5	74.0	25.5	26.9	48.6	4.9	V
6	15153.750000	59.5	74.0	14.5	31.1	47.1	6.3	V
AVG								
1	1244.000000	21.2	54.0	32.8	20.7	57.3	2.3	V
2	2005.000000	29.7	54.0	24.3	22.1	50.1	2.7	V
3	2728.000000	30.5	54.0	23.5	23.9	50.9	2.9	V
4	3892.500000	35.3	54.0	18.7	24.8	50.2	3.3	V
5	7986.000000	40.6	54.0	13.4	26.9	48.6	4.9	V
6	15153.750000	50.1	54.0	3.9	31.1	47.1	6.3	V

Note:

1. Factor=Ant.Factor+cable loss-Amp.Gain .
2. Level contains the factor; Margin=Limit-Level.

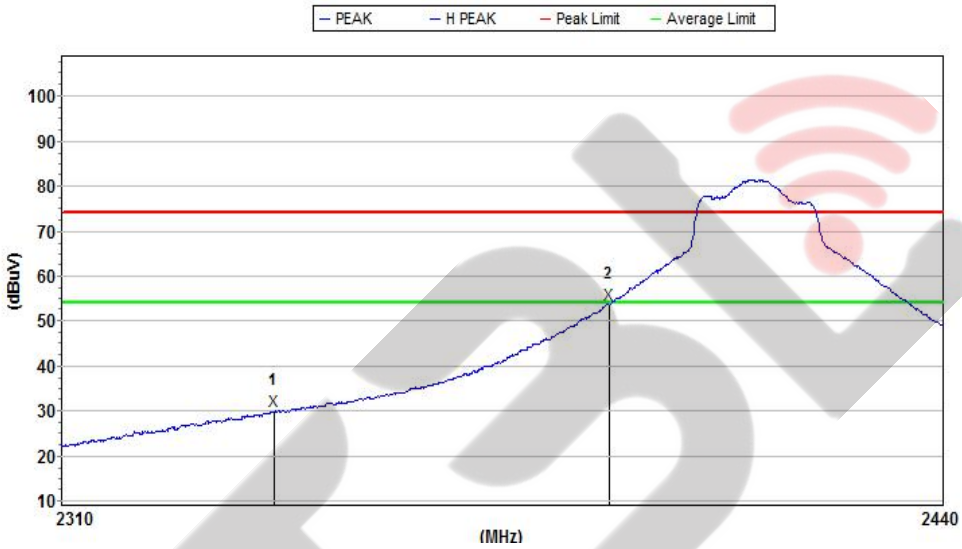
3. 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40) mode all have been tested, the worst case is 802.11b, only show the worst case.

4. Other 18G-25G Emission detected are more than 20dB below the limit.

3.2.6 TEST RESULTS (BAND EDGE REQUIREMENTS)

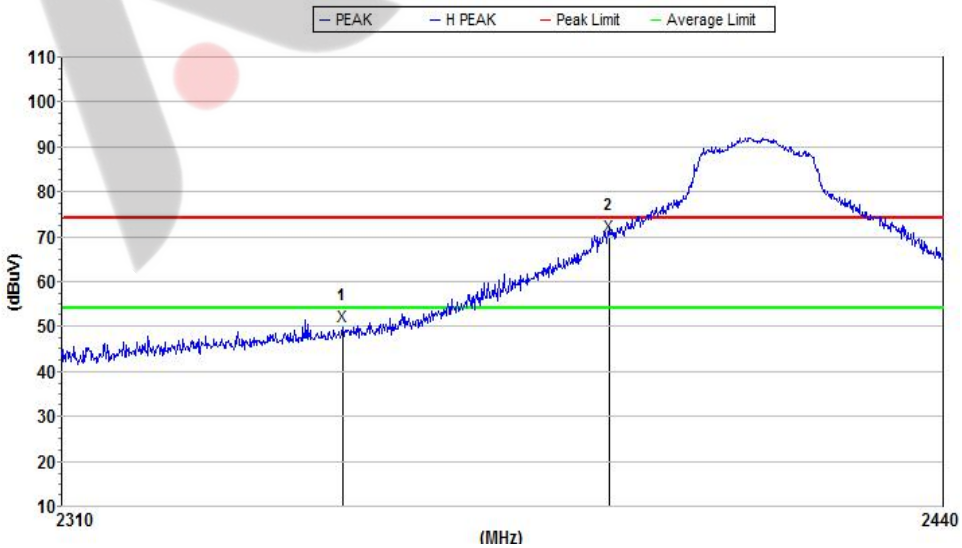
802.11n20-Low

Horizontal



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2340.682137	30.0	54.0	24.0	22.7	50.2	2.8	H
2	2390.000000	53.7	54.0	0.3	22.8	50.2	2.8	H

Horizontal

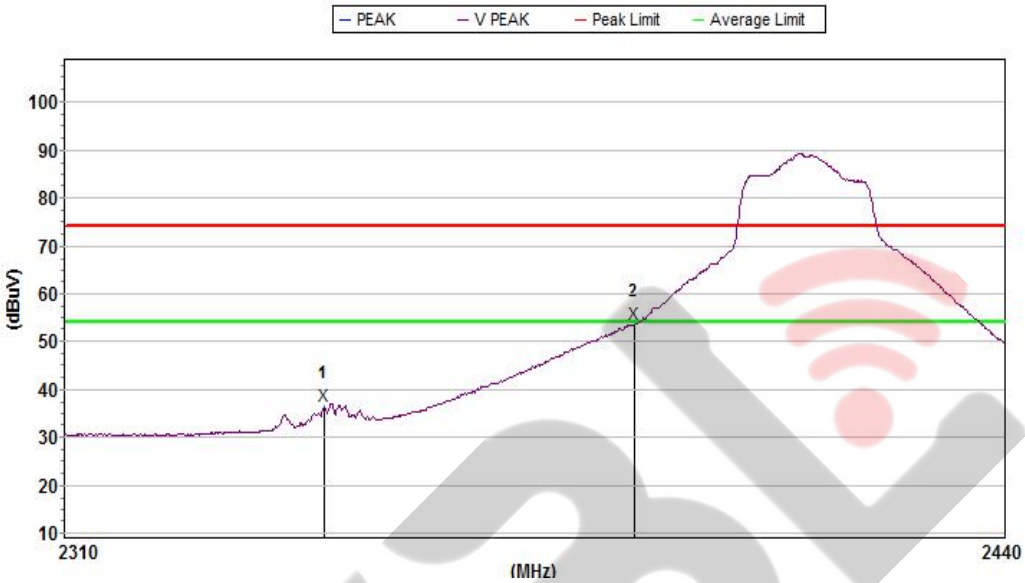


Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								

1	2350.699489	50.1	74.0	23.9	22.8	50.2	2.8	H
2	2390.000000	70.3	74.0	3.7	22.8	50.2	2.8	H

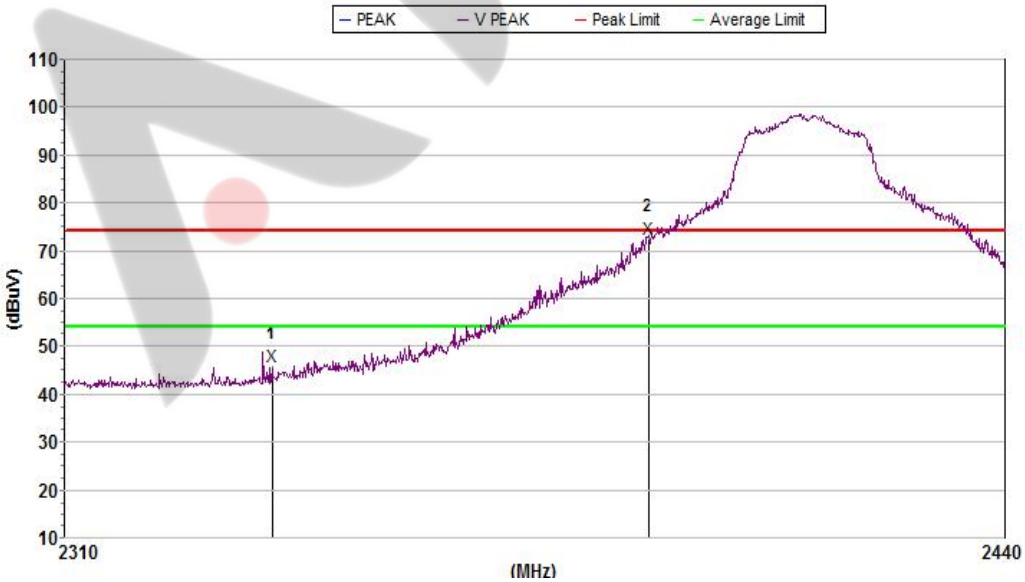
802.11n20-Low

Vertical



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2345.300215	36.6	54.0	17.4	23.0	50.2	2.8	V
2	2390.000000	53.7	54.0	0.3	23.1	50.2	2.8	V

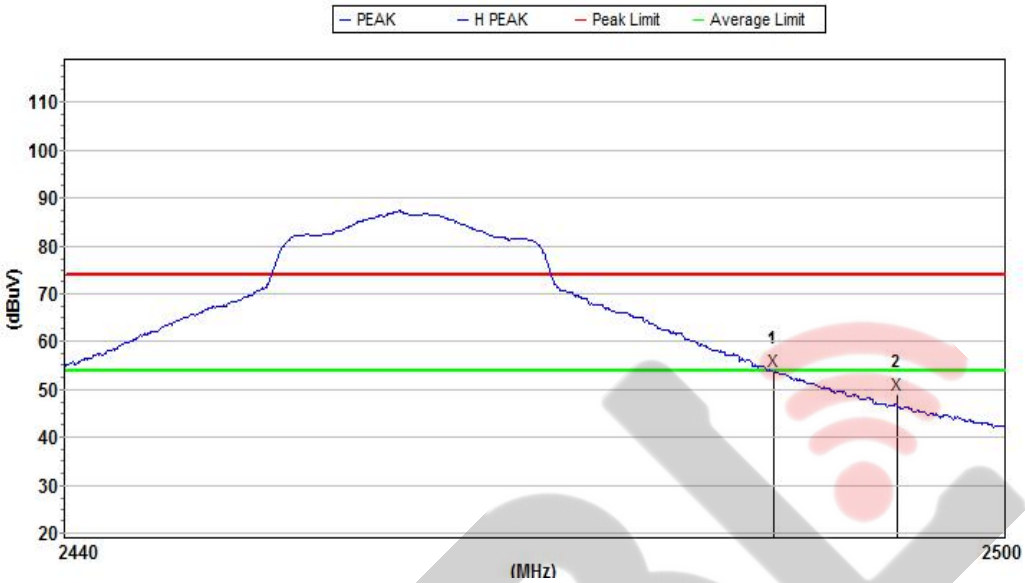
Vertical



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2338.120469	45.7	74.0	28.3	23.0	50.2	2.8	V
2	2390.000000	72.5	74.0	1.5	23.1	50.2	2.8	V

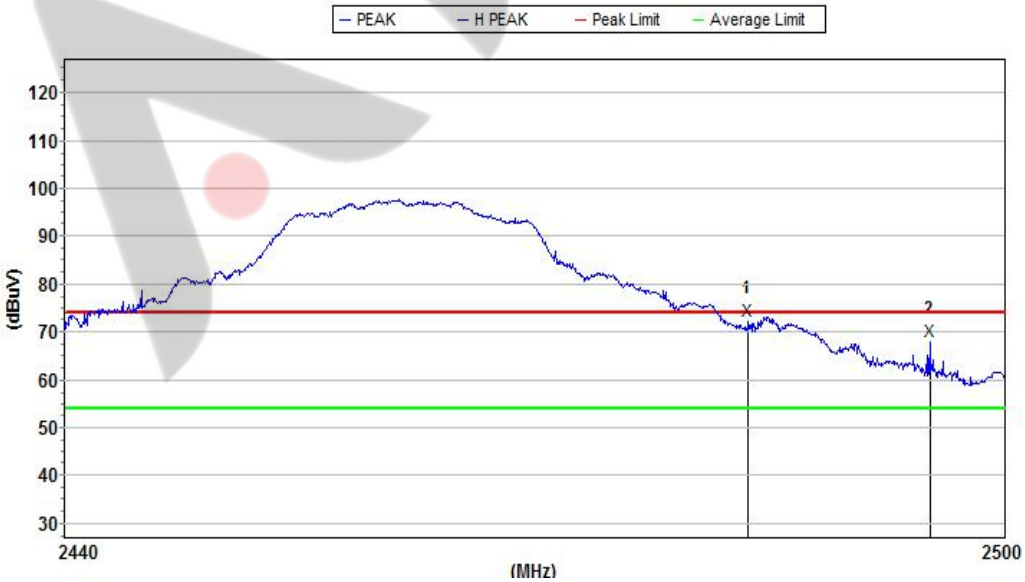
802.11n20-High

Horizontal



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2483.500000	53.8	54.0	0.2	22.9	50.2	2.8	H
2	2493.025597	48.9	54.0	5.1	22.9	50.2	2.8	H

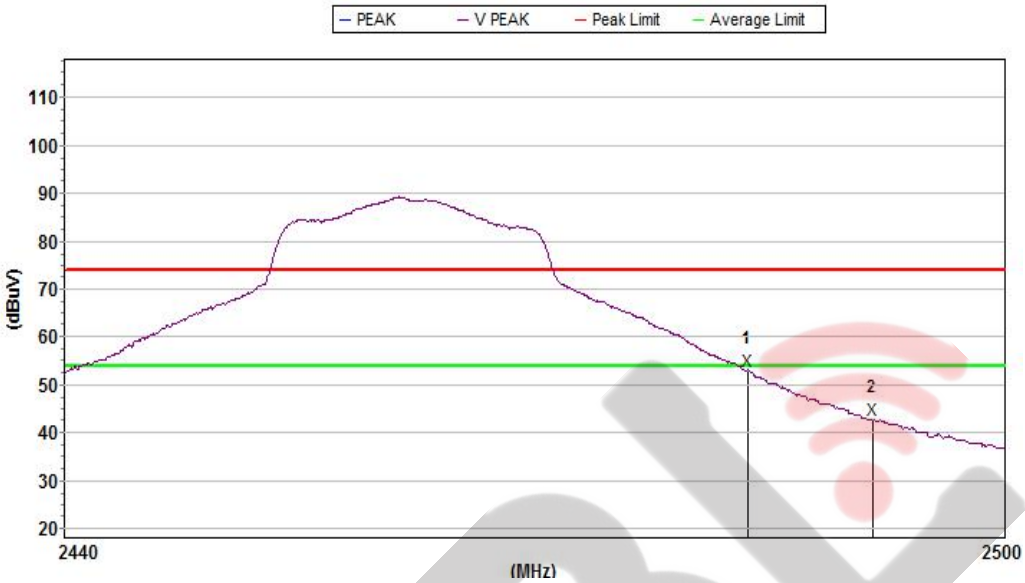
Horizontal



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2483.500000	72.3	74.0	1.7	22.9	50.2	2.8	H
2	2495.146180	68.1	74.0	5.9	22.9	50.2	2.8	H

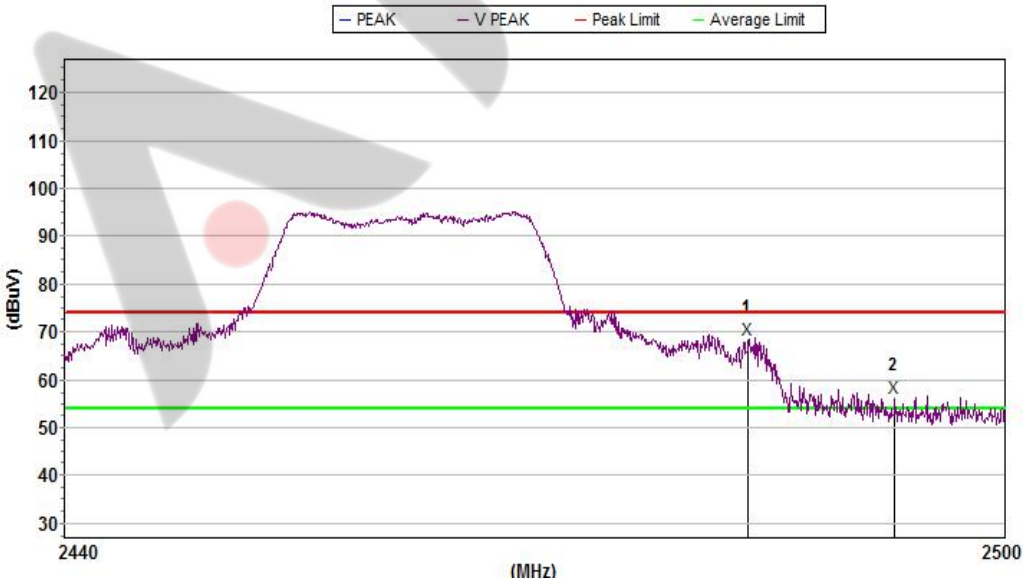
802.11n20-Low

Vertical



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2483.500000	52.9	54.0	1.1	23.3	50.2	2.8	V
2	2491.451475	42.8	54.0	11.2	23.3	50.2	2.8	V

Vertical



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2483.500000	68.3	74.0	5.7	23.4	50.2	2.8	V
2	2484.681993	56.4	74.0	17.6	23.4	50.2	2.8	V

Note: 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40) mode all have been tested, the worst case is 802.11n20, only show the worst case.

4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 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.

4.2 TEST PROCEDURE

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

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 to 2432 MHz Upper Band Edge: 2442 to 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP

The EUT which is powered by the Battery, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; 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.

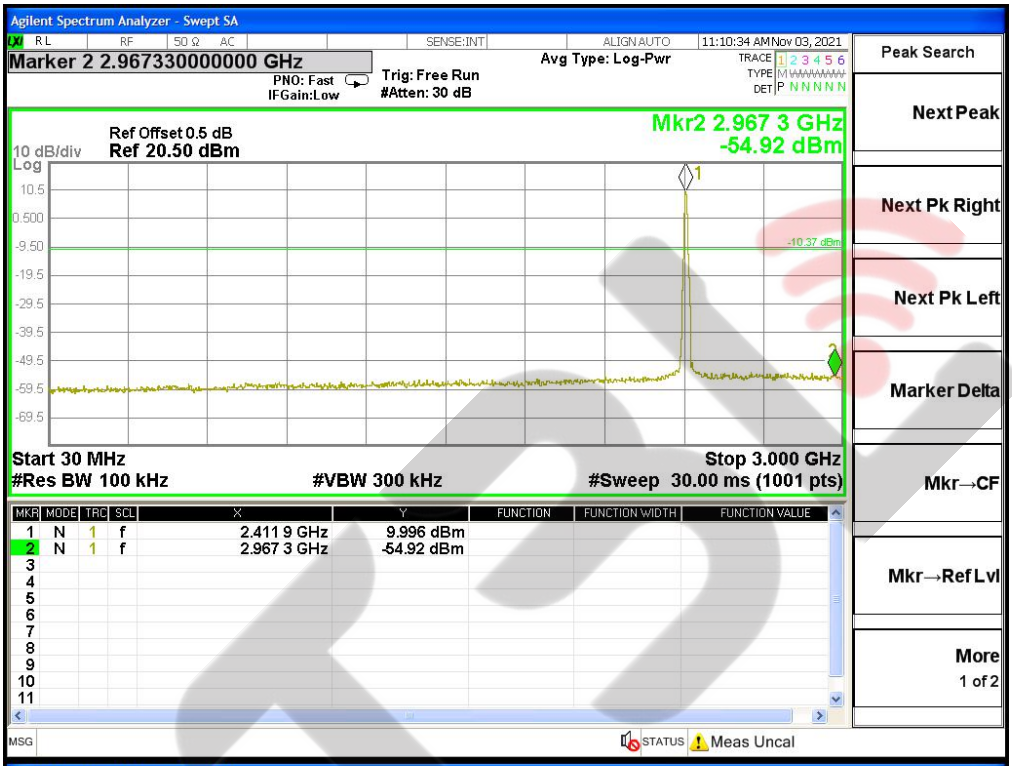
4.5 EUT OPERATION CONDITIONS

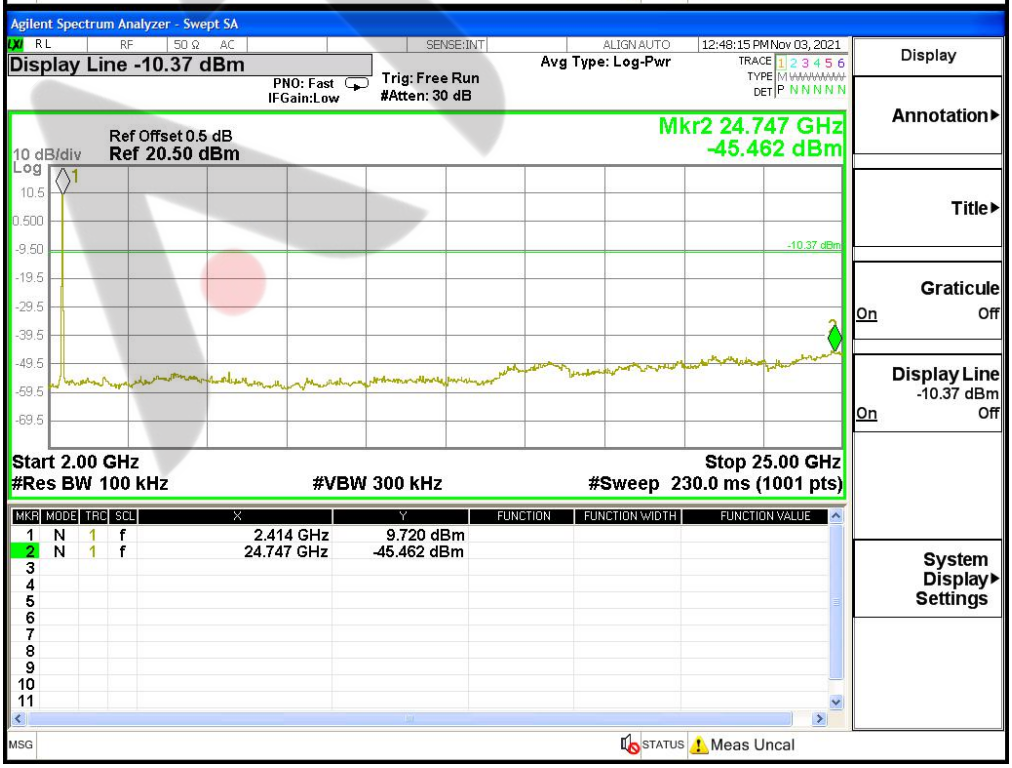
Please refer to section 3.1.4 of this report.

4.6 TEST RESULTS

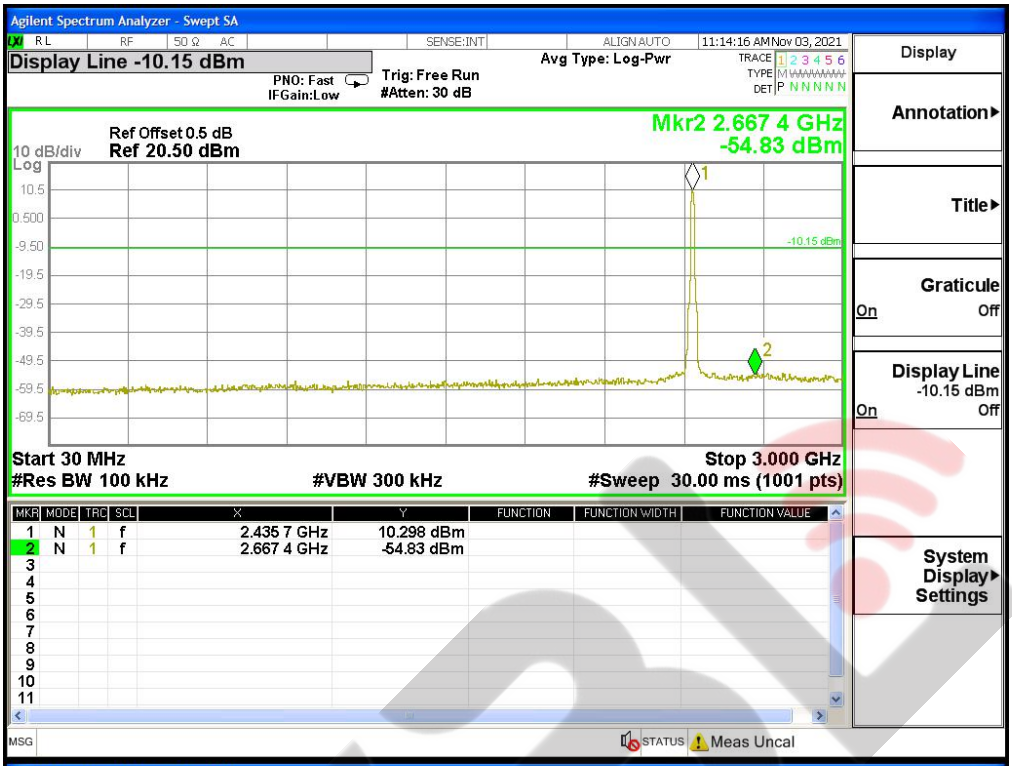
Temperature:	25℃	Relative Humidity:	60%RH
Test Voltage:	AC 120V	Test Mode:	TX Mode1/2/3/4/5/6/7/8/9

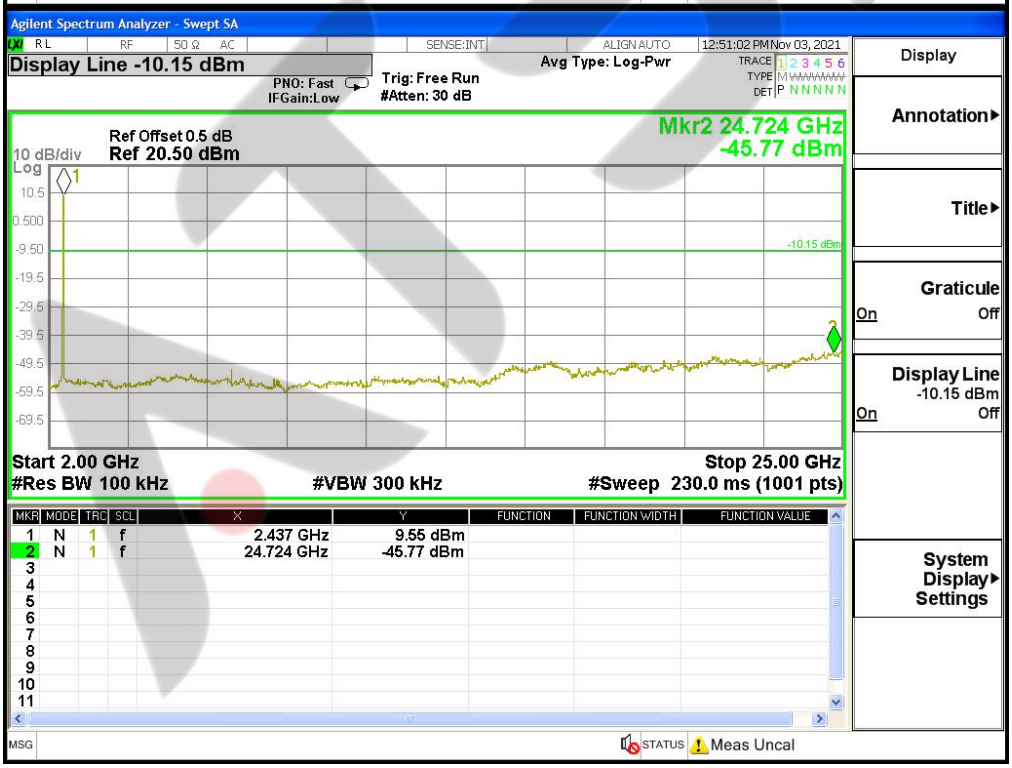
TX Mode1 channel 1



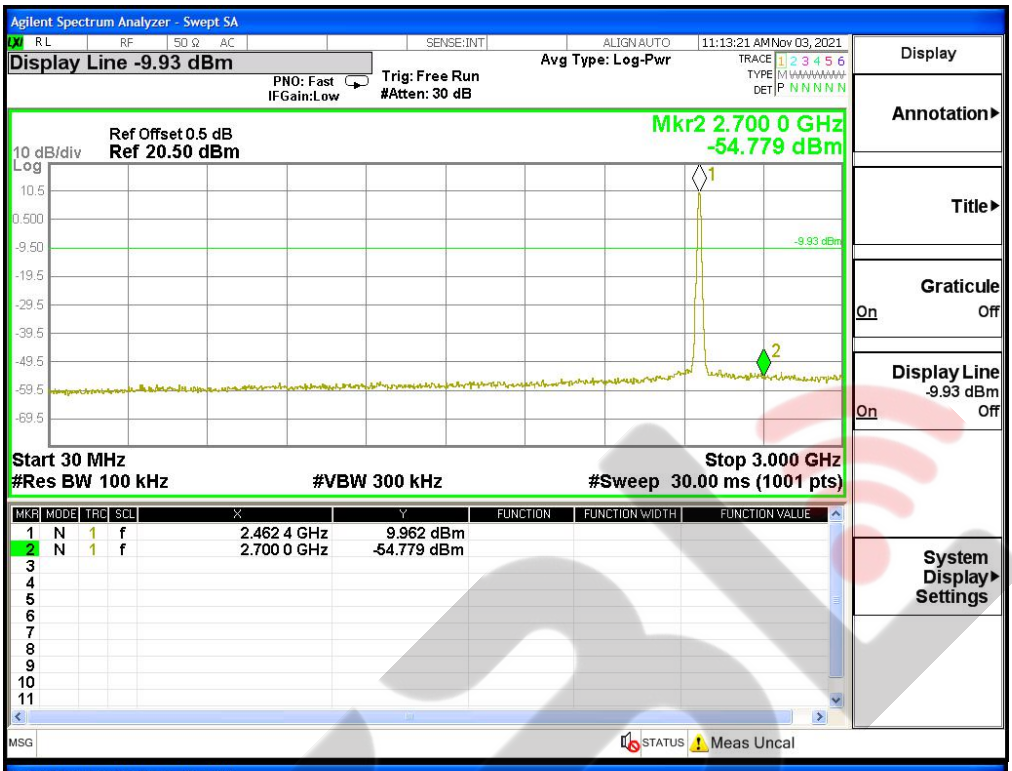


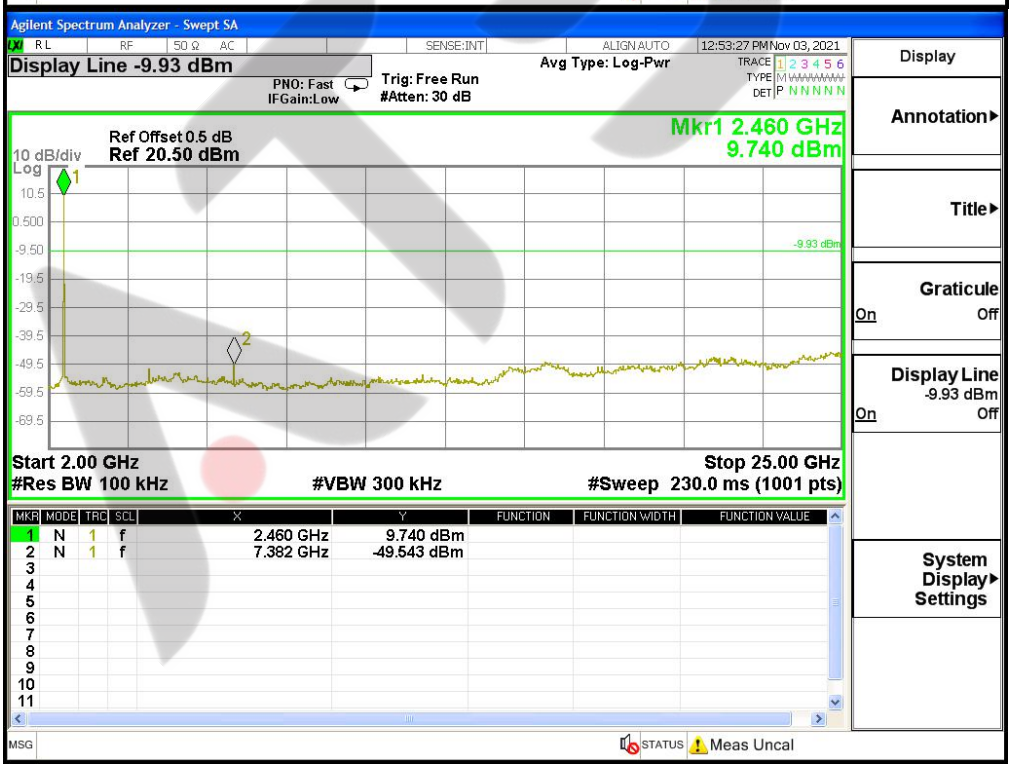
TX Mode2 channel 6



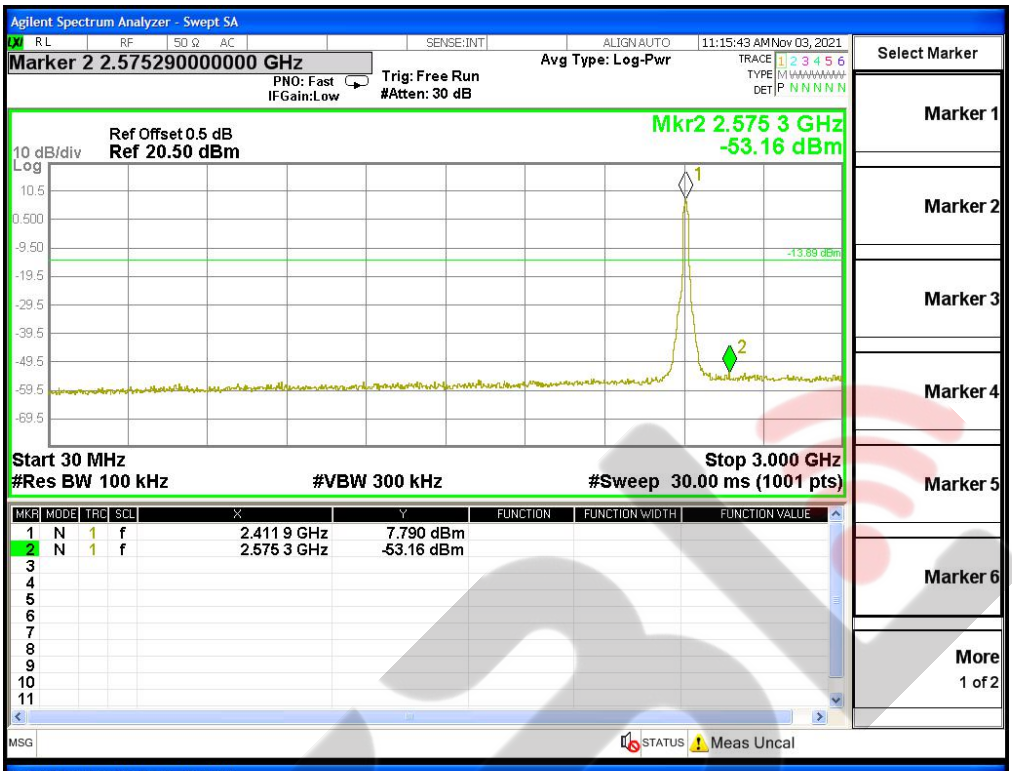


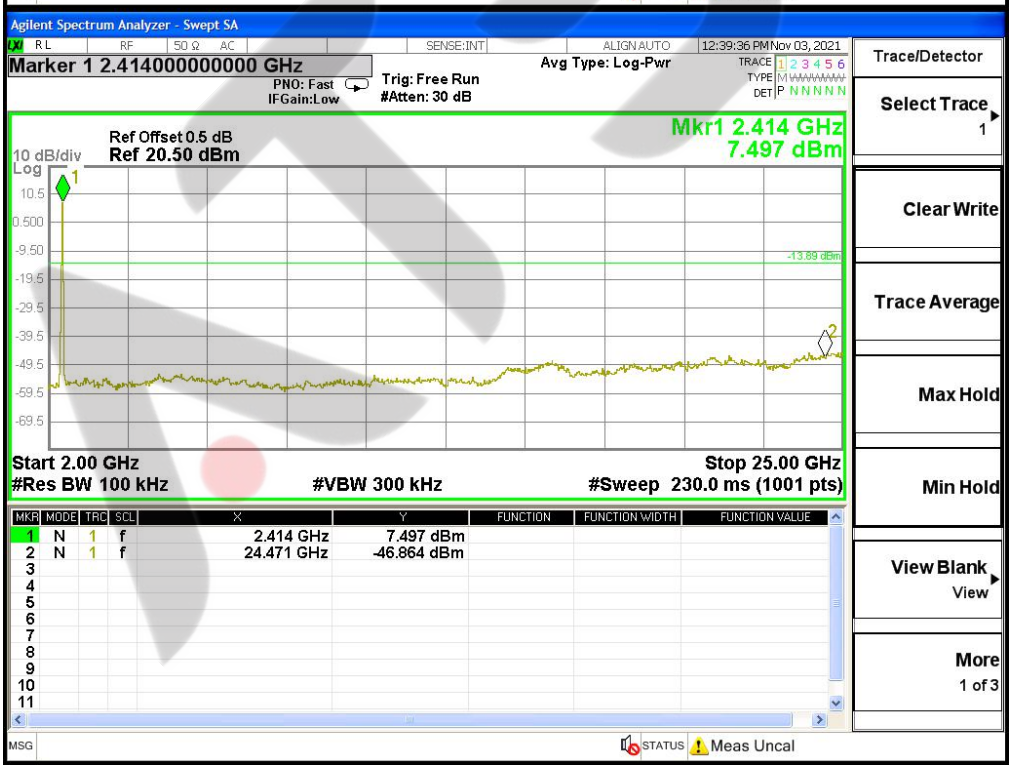
TX Mode3 channel 11



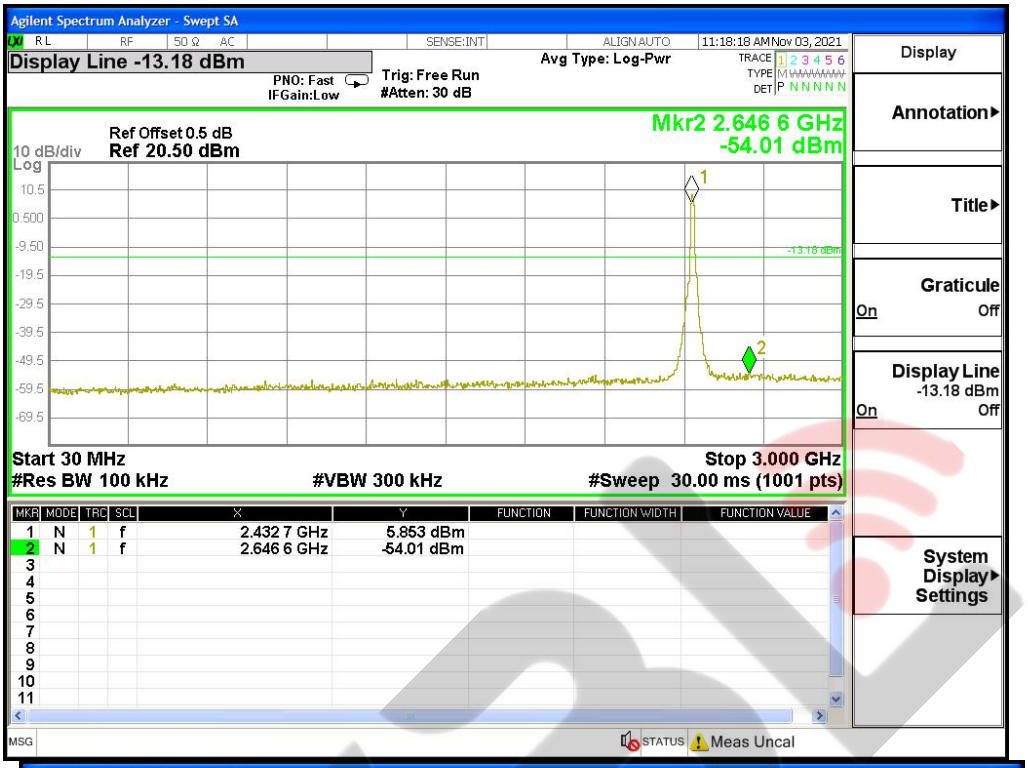


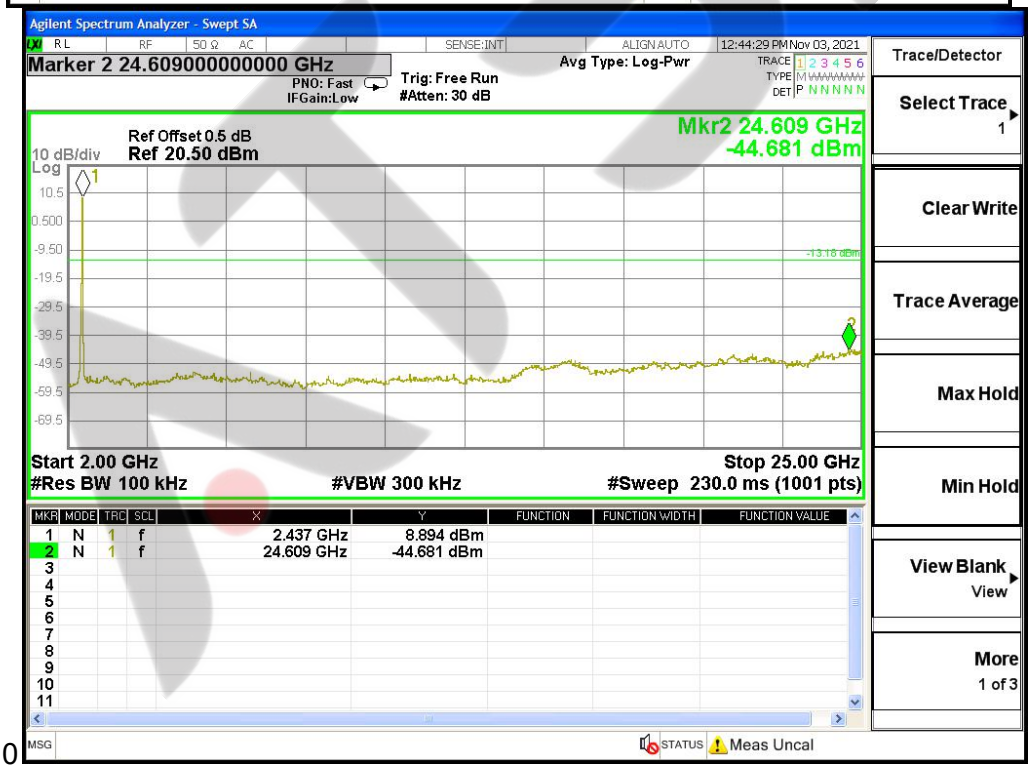
TX Mode4 Channel 1



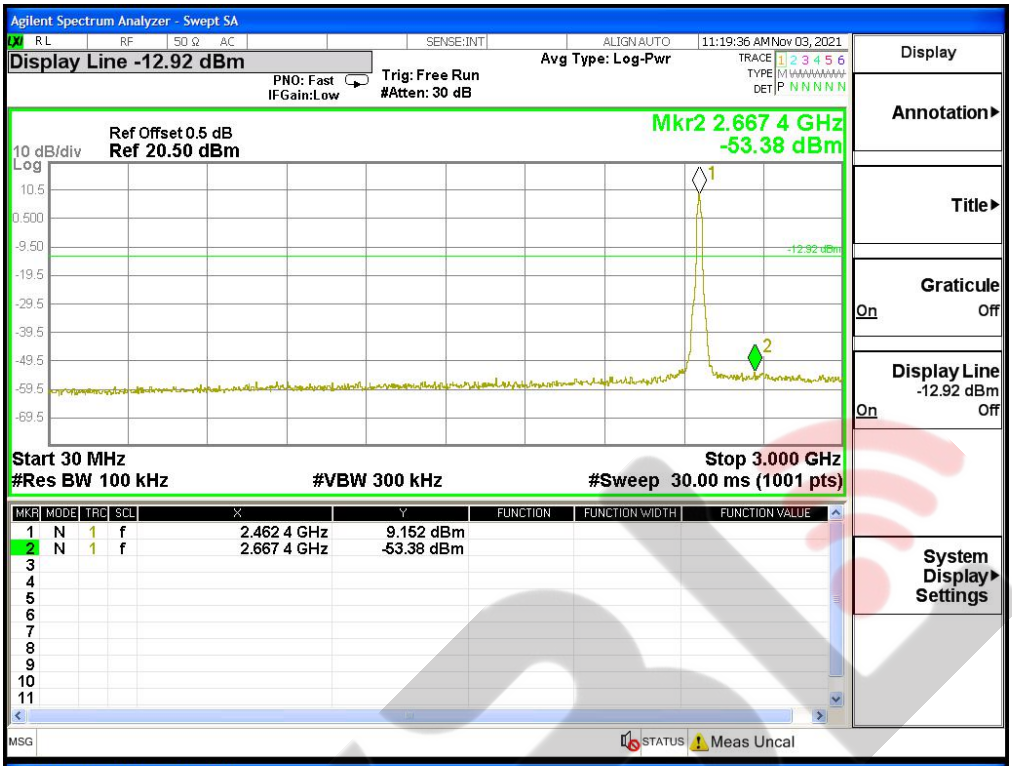


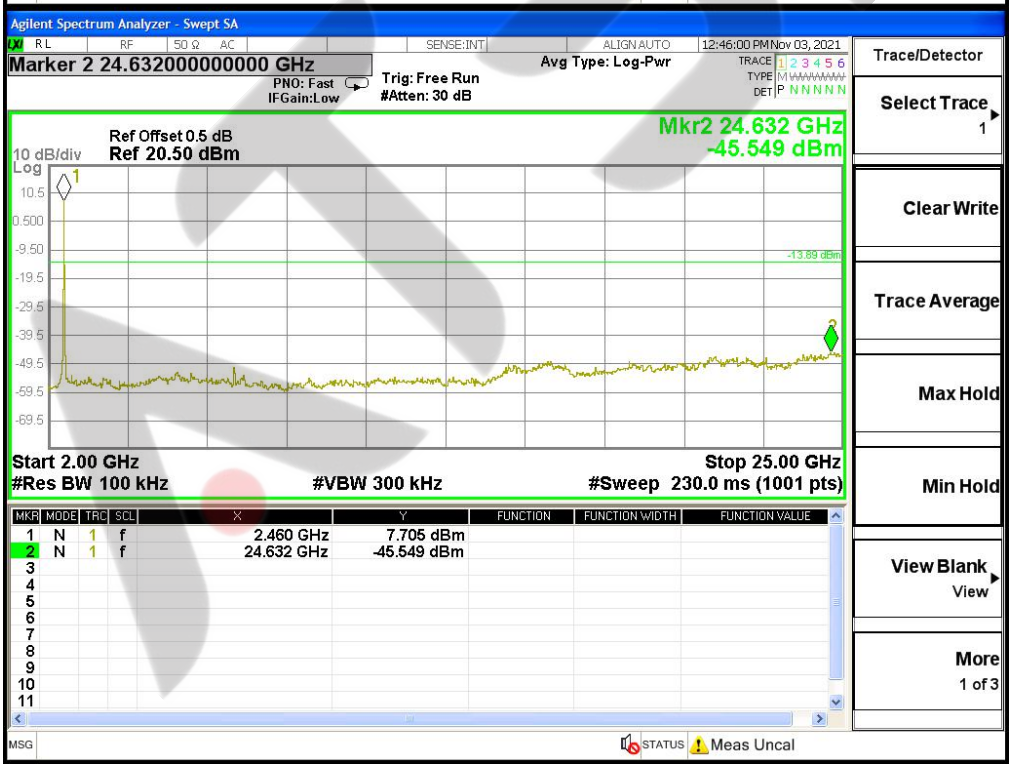
TX Mode5 channel 6



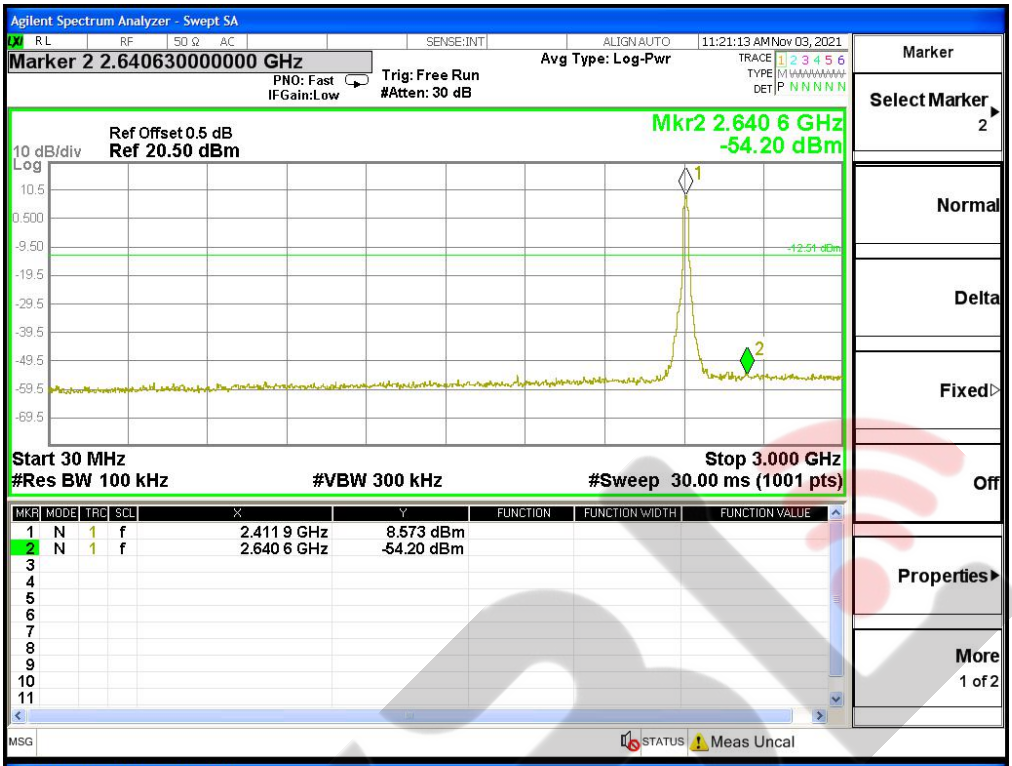


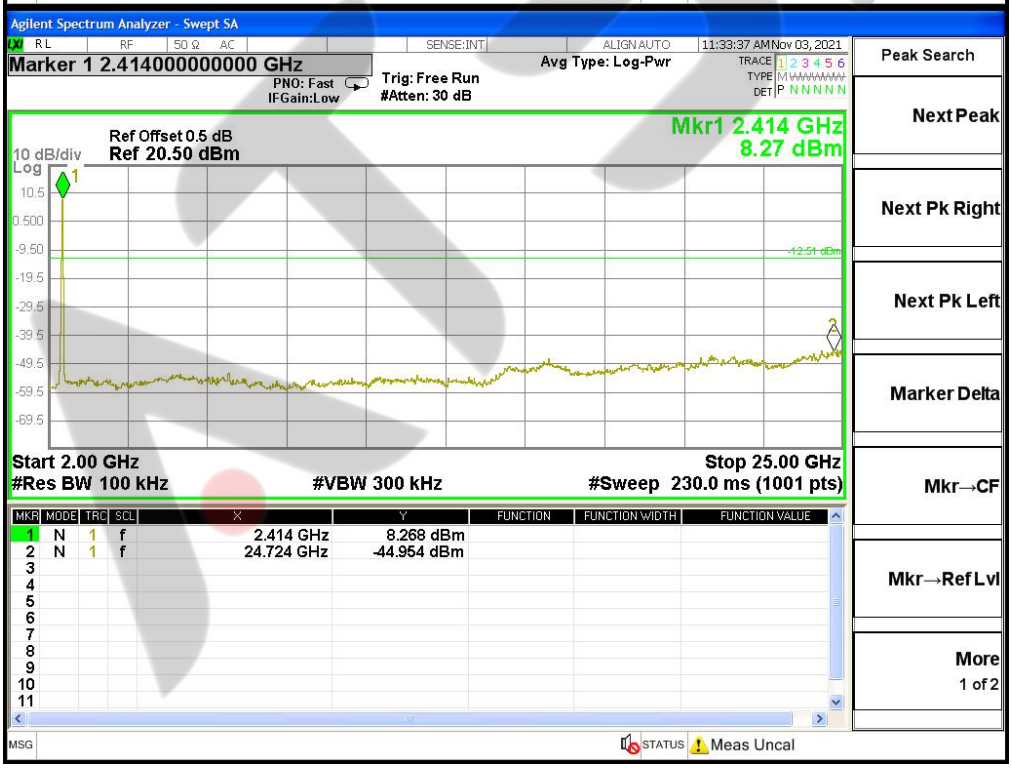
TX Mode6 Channel 11



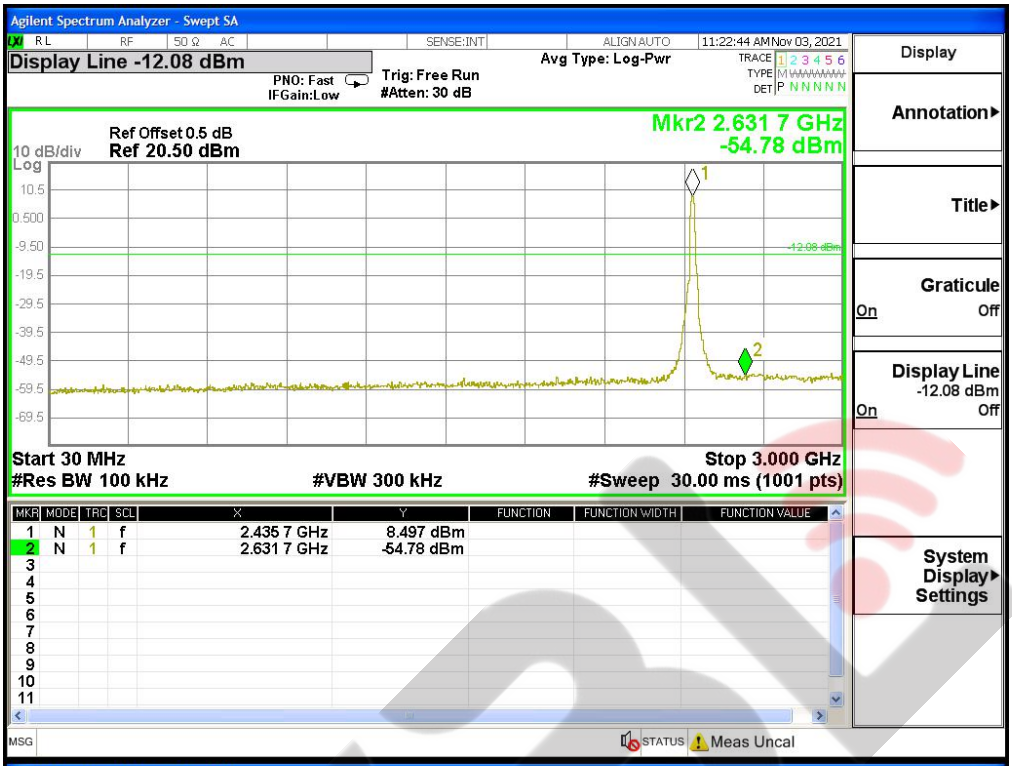


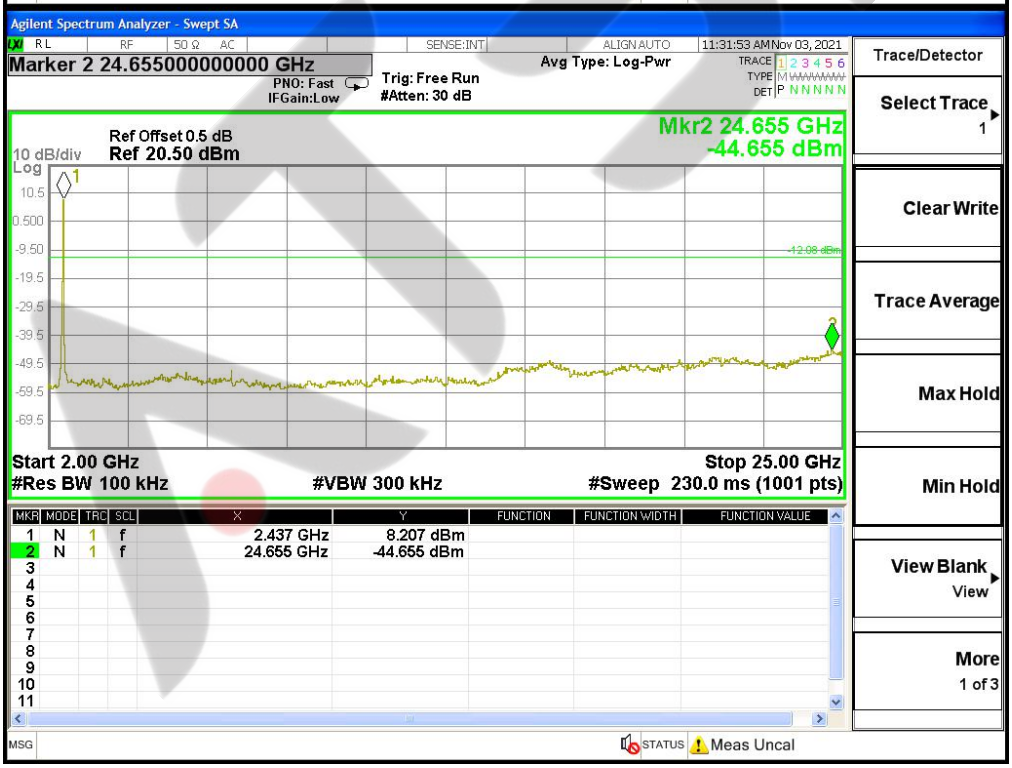
TX Mode7 Channel 1



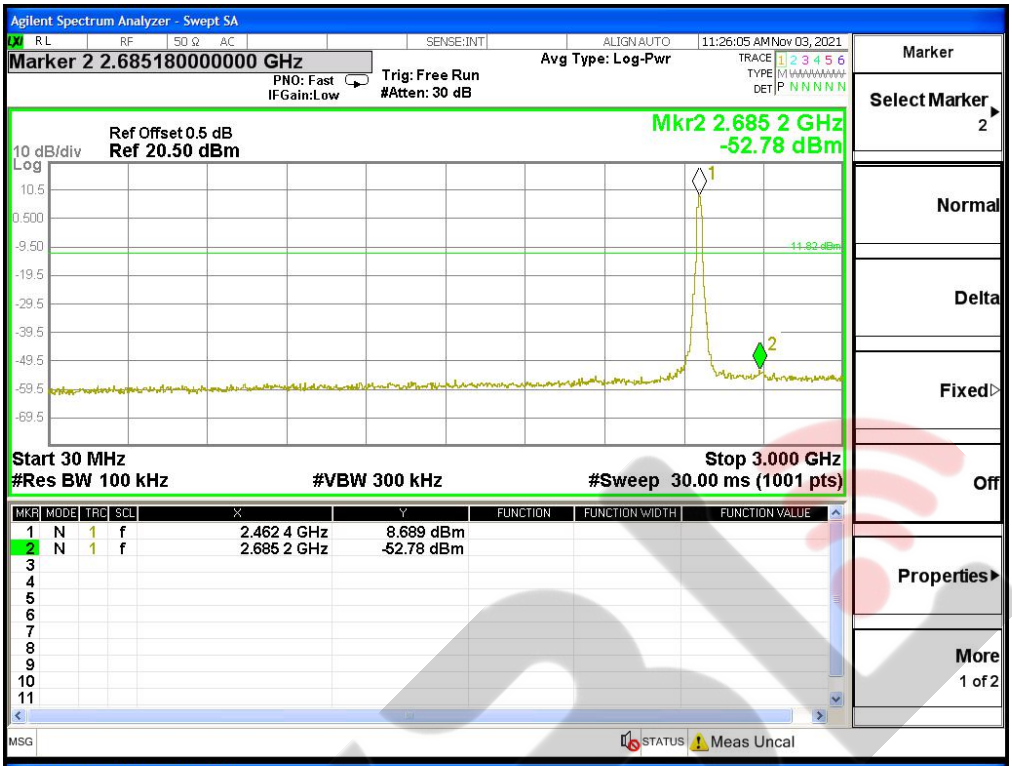


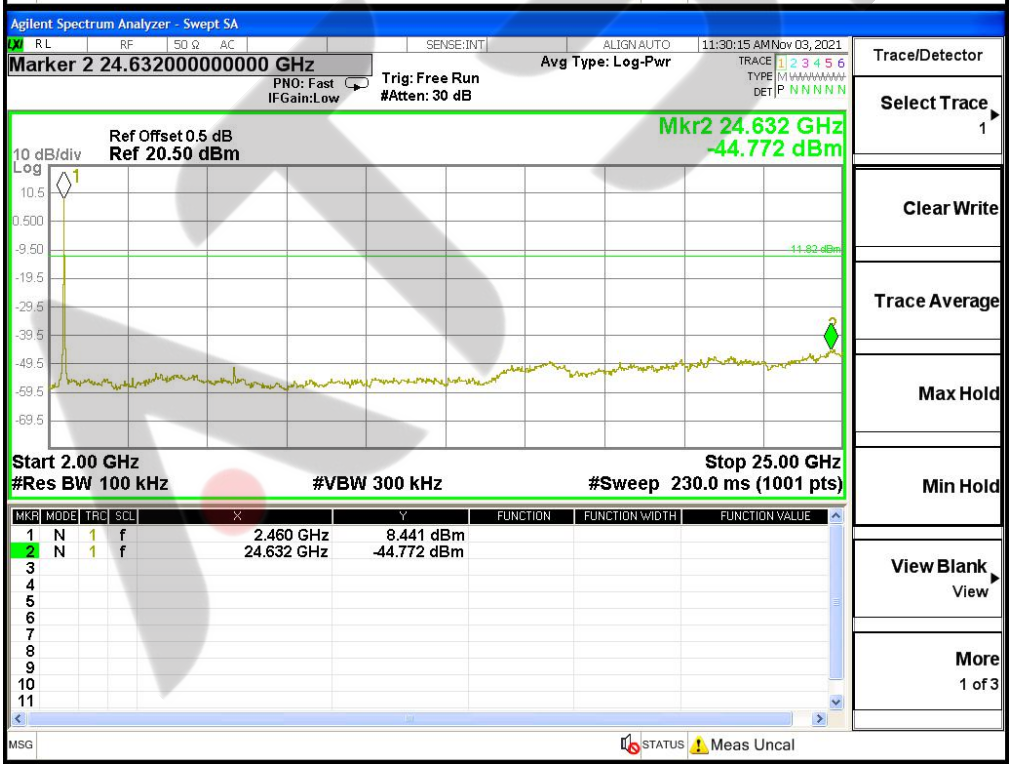
TX Mode8 channel 6





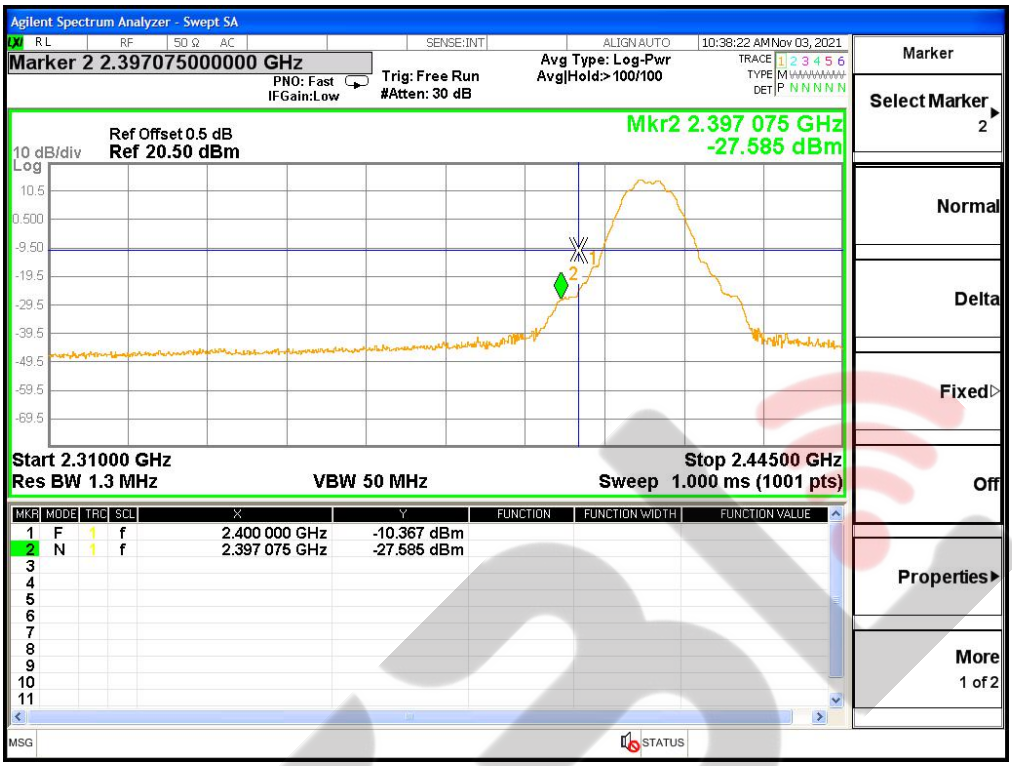
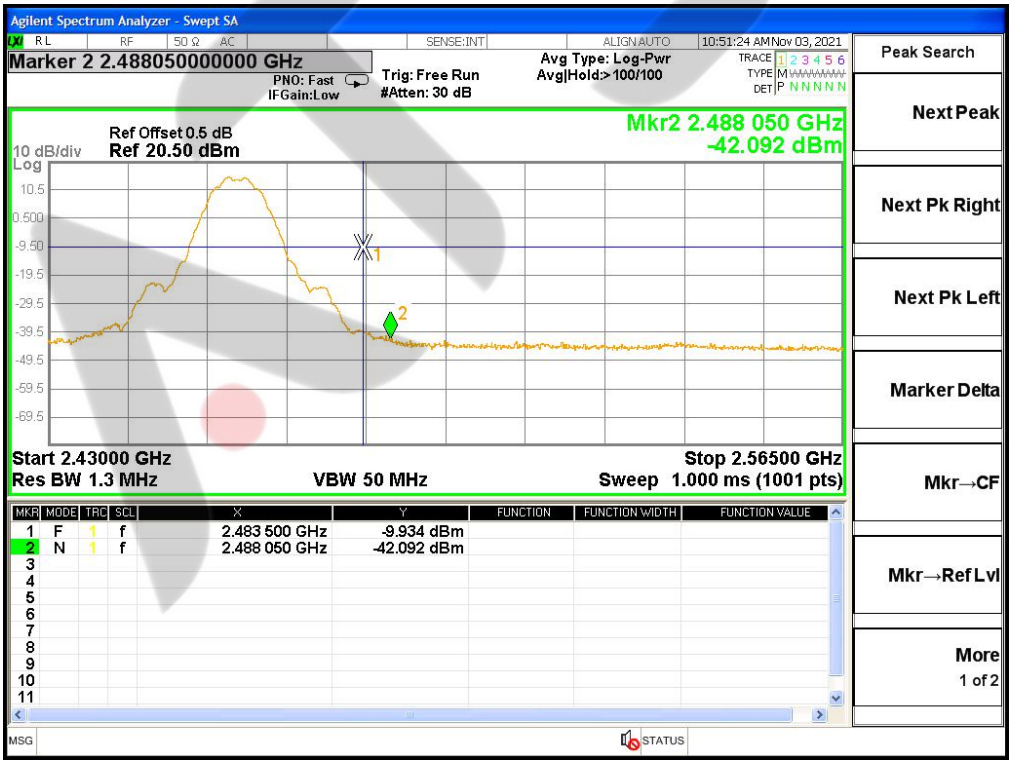
TX Mode9 Channel 11





For Band edge(it's also the reference level for conducted spurious emission)

TX Mode1 Channel 1



TX Mode3 Channel 11