



RADIO TEST REPORT

Report No.: SHATBL2210015W07

Applicant:

Optelec Nederland B.V.

Address:

Pesetastraat 5^a 2991 XT Barendrecht The Netherlands

Product Name : Compact 8

Brand Name : Optelec

Model Name : CP8

Series Model : CP8-xyyy

Test Standard : FCC Part 15.247

FCC ID : 2AMNB-CP8

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TEST RESULT CERTIFICATION

Applicant's Name..... : Optelec Nederland B.V.
Address..... : Pesetastraat 5^a 2991 XT Barendrecht The Netherlands
Manufacturer's Name..... : Optelec Nederland B.V.
Address..... : Pesetastraat 5^a 2991 XT Barendrecht The Netherlands
Product Description
Product Name..... : Compact 8
Brand Name..... : Optelec
Model Name..... : CP8
Series Model..... : CP8-xyyy
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..... : 17 Oct. 2022
Date (s) of performance of tests..... : 24 Oct. 2022
Date of Issue..... : 16 Nov. 2022
Test Result..... : Pass

Report Prepared by :

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
SHATBL2210015W03	Rev. 01	Initial issue of report	Nov. 16, 2022

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

Product Name	Compact 8	
Trade Name	Optelec	
Model Name	CP8	
Series Model	CP8-xyyy	
Model Difference	CP8-UMME = EU Medical Device CP8-UMCC = Commercial Device CP8-UMUK= UK Medical Device	
Product Description	The EUT is a Compact 8	
	Operation Frequency:	802.11b: 2412~2462 MHz
	Modulation Type:	802.11b(DSSS):CCK,DQPSK,DBPSK
	Bit Rate of Transmitter:	802.11b:11/5.5/2/1 Mbps
	Number of Channel:	802.11b: 11CH
	Antenna Designation:	Please refer to the Note 3.
	Antenna Gain (dBi):	-2.8 dBi
	Duty Cycle:	>98%
Channel List	Please refer to the Note 2.	
Adapter	Model: ATM012T-W052VU Brand: Adapter Technology Co, LTD Input: 110-240VAC 50/60Hz Output:5V / 2.4A	
Battery	Model: NLI-488471-1S2P01/7600mAh Brand:Nexcell Battery Rated Voltage: 3.7V Charge Limit Voltage: 4.2V Capacity: 7600mAh	
Hardware version number	A	
Software version number	APK 2.4.18 BSP 20220726	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

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

2.

802.11b	
Channel	Frequency
01	2412
02	2417
03	2422
04	2427
05	2432
06	2437
07	2442
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, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Carrier Frequency Channel

2.4GHz Test Frequency:

For 802.11b	
Channel	Freq.(MHz)
01	2412
06	2437
11	2462

3.

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	N/A	N/A	PCB Trace	N/A	-2.8 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

Note:

- (1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.
- (2) We have be tested for all available U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V /60Hz is shown in the report.

Conducted Emission

Test Case	
Conducted Emission	Mode4: 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.

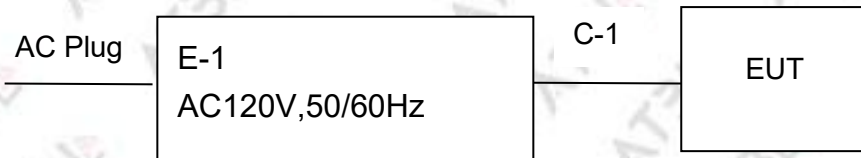
RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
WIFI(2.4G)	2.4G WIFI	802.11b	-2.8	default	QRCT

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 $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.958\text{dB}$
2	Conducted spurious emissions	$\pm 2.988\text{dB}$
3	All emissions, radiated 30MHz-1GHz	$\pm 2.50\text{dB}$
4	All emissions, radiated 1GHz-18GHz	$\pm 3.51\text{dB}$
5	Occupied bandwidth	$\pm 2.320\text{Hz}$
6	Power spectral density	$\pm 0.886\text{dB}$

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	2023.09.27
Spectrum Analyzer	Agilent	N9020A	MY50200811	SHATBL-E017	2023.09.27
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	2023.09.27
Pre-Amplifier (1G-18GHz)	JPT	JPA0118-55-303A	1910001800055000	SHATBL-E006	2023.09.27
Temperature & Humidity	DeLi	DeLi	N/A	SHATBL-E016	2023.09.27
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	2023.09.27
			RPR6W-20001005	SHATBL-W013	2023.09.27
Signal Analyzer	Agilent	N9020A	MY57300196	SHATBL-W004	2023.09.27
Signal Generator	Agilent	N5182B	MY46240556	SHATBL-W005	2023.09.27
Wireless Communications Test Set	R&S	CMW500	101331	SHATBL-W007	2023.09.27
Temperature & Humidity	Deli	deli	N/A	SHATBL-W011	2023.09.27
Attenuator	Agilent	8494B	DC-18G	SHATBL-W009	2023.09.27
Attenuator	Agilent	8496B	DC-18G	SHATBL-W010	2023.09.27
power splitter	MNK	MPD-DC/6-2S	62315 G51	SHATBL-W015	2023.09.27
			62315 G52	SHATBL-W016	2023.09.27
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	2023.09.27
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.

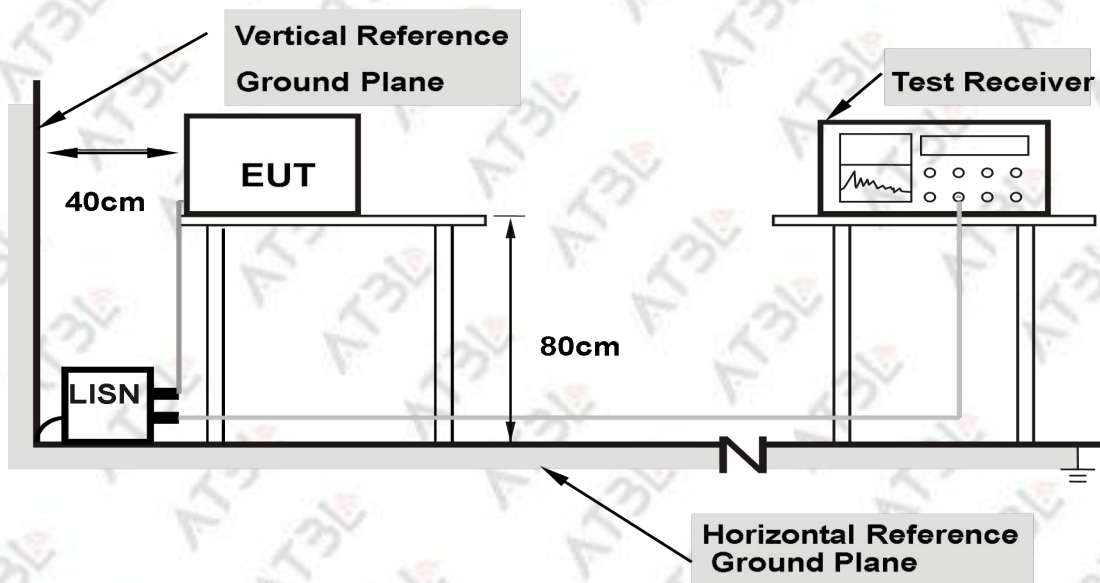
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

- 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.

3.1.3 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

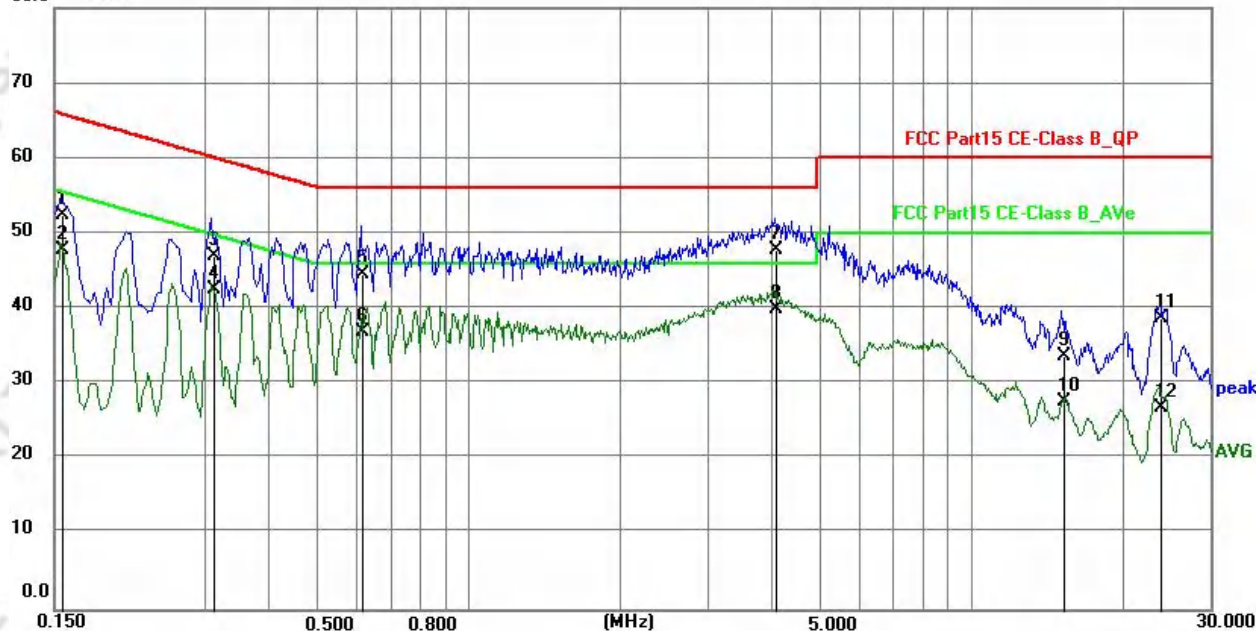
Temperature:	25℃	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	TX Mode		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1550	42.32	10.14	52.46	65.73	-13.27	QP
2	0.1550	37.81	10.14	47.95	55.73	-7.78	AVG
3	0.3100	37.07	10.08	47.15	59.97	-12.82	QP
4	0.3100	32.50	10.08	42.58	49.97	-7.39	AVG
5	0.6140	34.63	10.01	44.64	56.00	-11.36	QP
6	0.6140	27.05	10.01	37.06	46.00	-8.94	AVG
7	4.0910	37.77	10.04	47.81	56.00	-8.19	QP
8	4.0910	29.93	10.04	39.97	46.00	-6.03	AVG
9	15.2400	23.17	10.66	33.83	60.00	-26.17	QP
10	15.2400	17.10	10.66	27.76	50.00	-22.24	AVG
11	23.8349	27.88	11.01	38.89	60.00	-21.11	QP
12	23.8349	15.98	11.01	26.99	50.00	-23.01	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)

80.0 dBuV

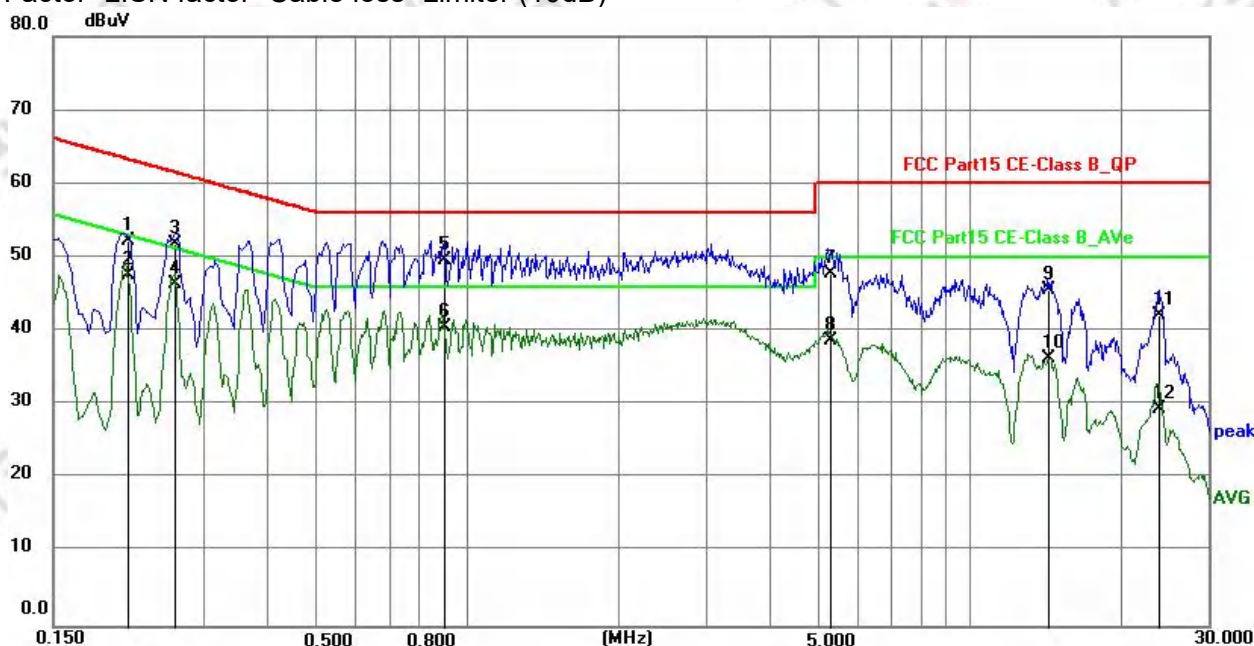


Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	TX Mode		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2110	41.92	10.36	52.28	63.17	-10.89	QP
2	0.2110	37.38	10.36	47.74	53.17	-5.43	AVG
3	0.2630	41.49	10.34	51.83	61.34	-9.51	QP
4	0.2630	36.12	10.34	46.46	51.34	-4.88	AVG
5	0.9030	39.58	10.15	49.73	56.00	-6.27	QP
6	0.9030	30.47	10.15	40.62	46.00	-5.38	AVG
7	5.2770	37.79	10.16	47.95	60.00	-12.05	QP
8	5.2770	28.70	10.16	38.86	50.00	-11.14	AVG
9	14.3800	35.28	10.27	45.55	60.00	-14.45	QP
10	14.3800	26.13	10.27	36.40	50.00	-13.60	AVG
11	23.9490	31.27	10.88	42.15	60.00	-17.85	QP
12	23.9490	18.66	10.88	29.54	50.00	-20.46	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)



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			

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

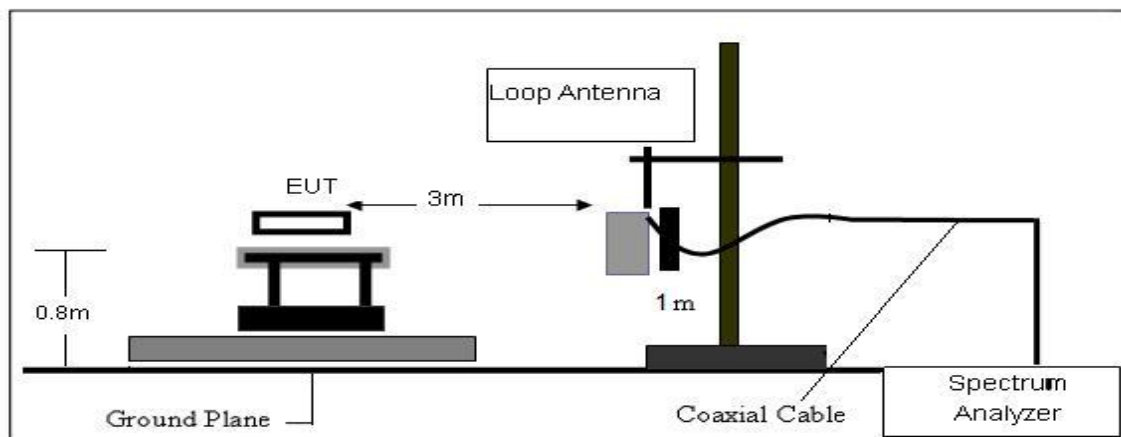
- The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position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

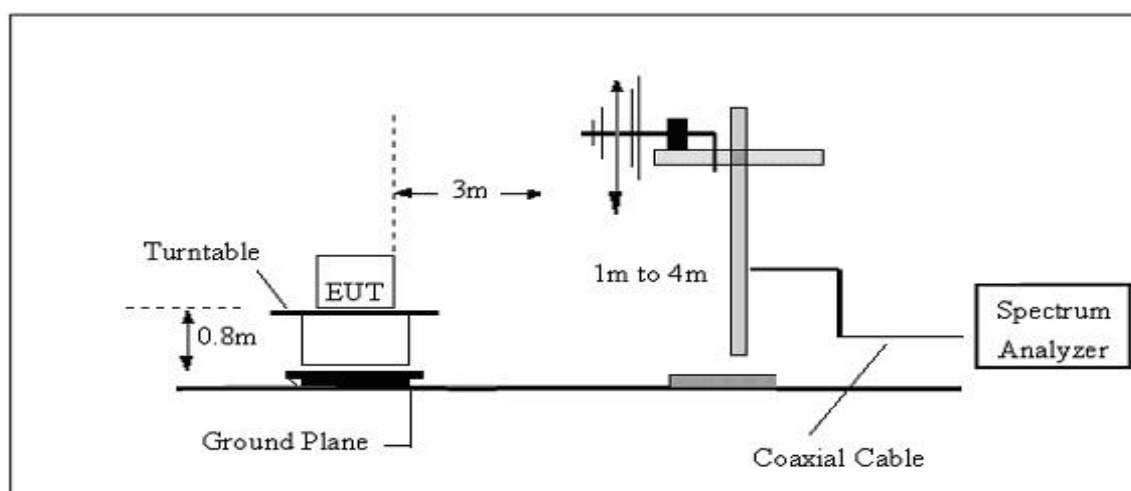
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 TEST SETUP

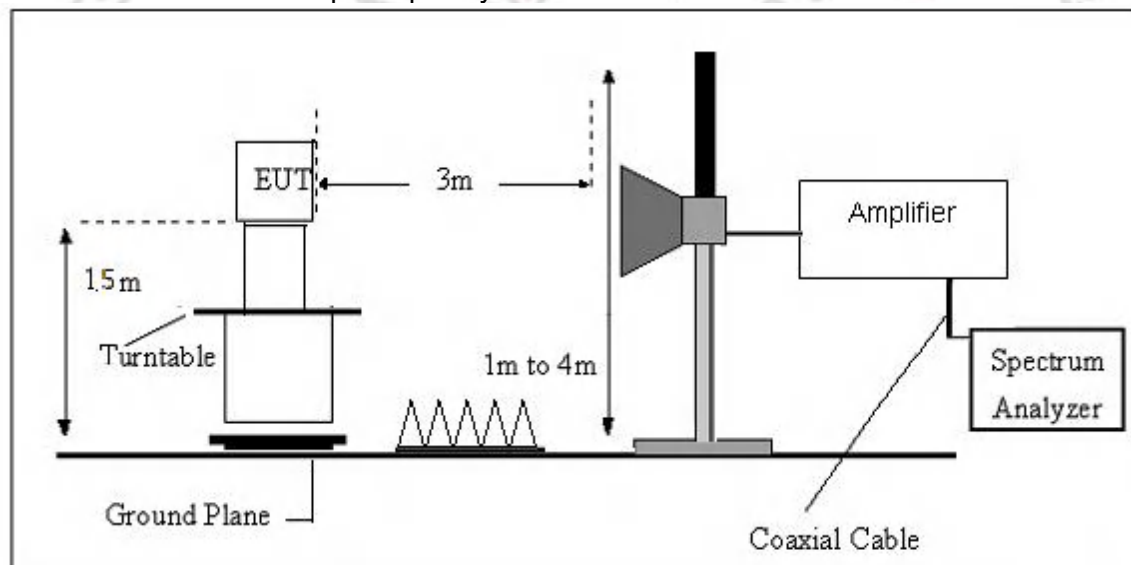
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 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

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

3.2.6 TEST RESULTS(RADIATED SPURIOUS EMISSIONS)

Temperature:	25.0℃	Relative Humidity:	50%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.

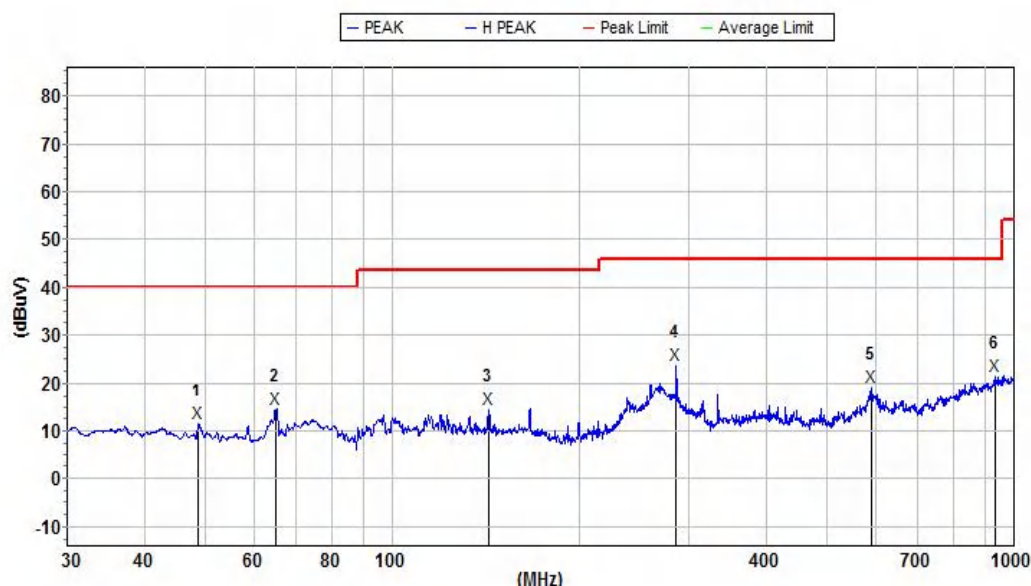
Distance extrapolation factor =40 log (specific distance/test distance)(dB);

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

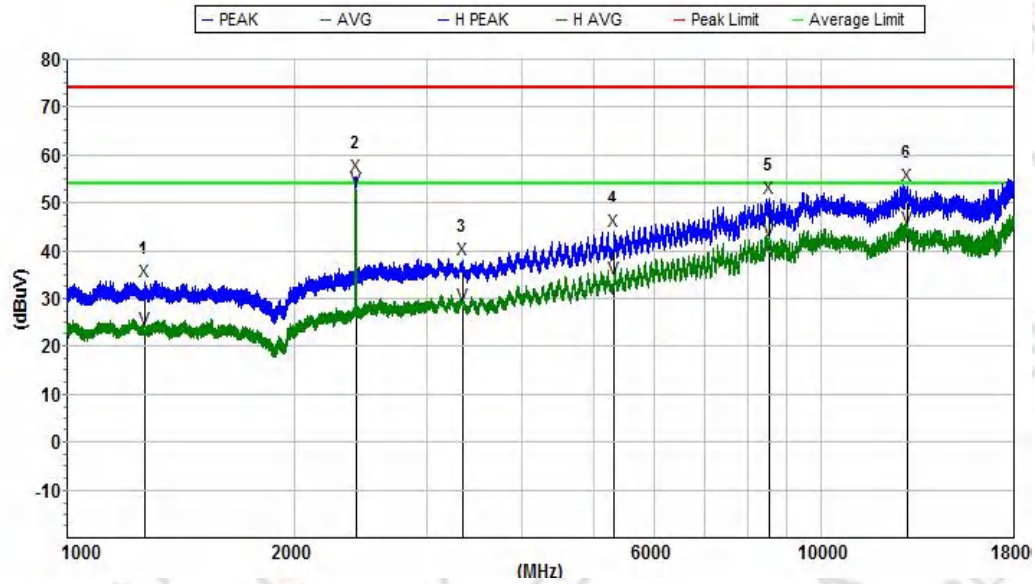
30MHz - 1000MHz

Temperature:	25.0℃	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3		

30MHz~1GHz
Mode 1 Horizontal



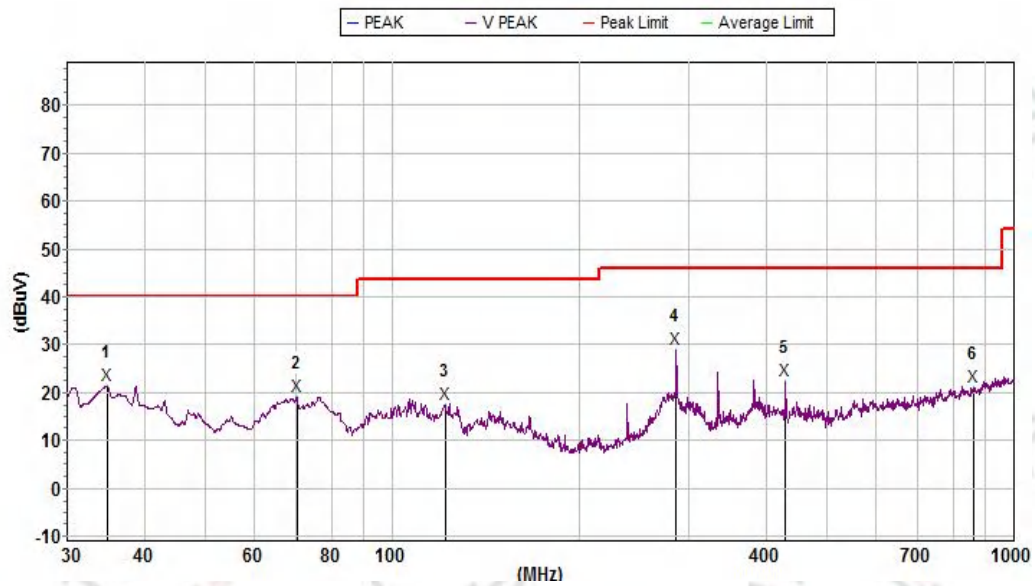
Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Cbl.L.(dB)	Pol.
1	48.842895	11.5	40.0	28.5	13.6	32.6	0.8	H
2	64.886534	14.6	40.0	25.4	11.8	32.8	0.8	H
3	143.326064	14.7	43.5	28.8	13.7	32.9	1.3	H
4	286.479617	23.7	46.0	22.3	12.5	32.7	2.6	H
5	590.973747	19.2	46.0	26.8	15.9	32.4	3.3	H
6	930.638437	21.6	46.0	24.4	20.0	31.4	3.7	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	1268.800000	33.7	74.0	40.3	25.8	61.0	2.3	H
2	2413.000000	55.6	74.0	18.4	27.4	59.4	2.8	H
3	3347.250000	38.1	74.0	35.9	29.5	58.2	3.1	H
4	5313.750000	44.0	74.0	30.0	32.8	57.8	3.9	H
5	8523.000000	51.1	74.0	22.9	37.7	56.0	5.1	H
6	13010.250000	53.7	74.0	20.3	39.8	57.8	6.2	H
Avg								
1	1268.800000	23.6	54.0	30.4	25.8	61.0	2.3	H
2	2413.000000	52.9	54.0	1.1	27.4	59.4	2.8	H
3	3347.250000	28.6	54.0	25.4	29.5	58.2	3.1	H
4	5313.750000	34.2	54.0	19.8	32.8	57.8	3.9	H
5	8523.000000	42.1	54.0	11.9	37.7	56.0	5.1	H
6	13010.250000	44.8	54.0	9.2	39.8	57.8	6.2	H

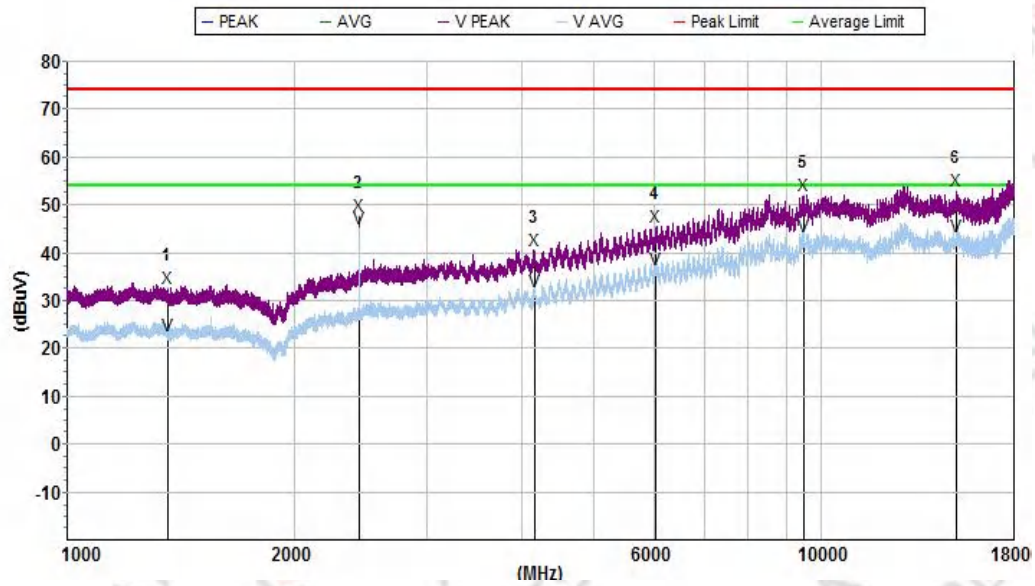
Temperature:	25.0℃	Relative Humidity:	50%RH
Test Voltage:	AC120V	Phase:	Vertical
Test Mode:	Mode 1/2/3		

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	34.821189	21.5	40.0	18.5	13.4	32.2	0.8	V
2	70.213294	19.1	40.0	20.9	10.8	32.8	0.8	V
3	121.548576	17.6	43.5	25.9	12.3	32.9	1.4	V
4	286.479617	29.0	46.0	17.0	12.5	32.7	2.6	V
5	429.522800	22.6	46.0	23.4	15.5	32.4	2.7	V
6	863.056232	21.3	46.0	24.7	21.2	31.8	3.6	V

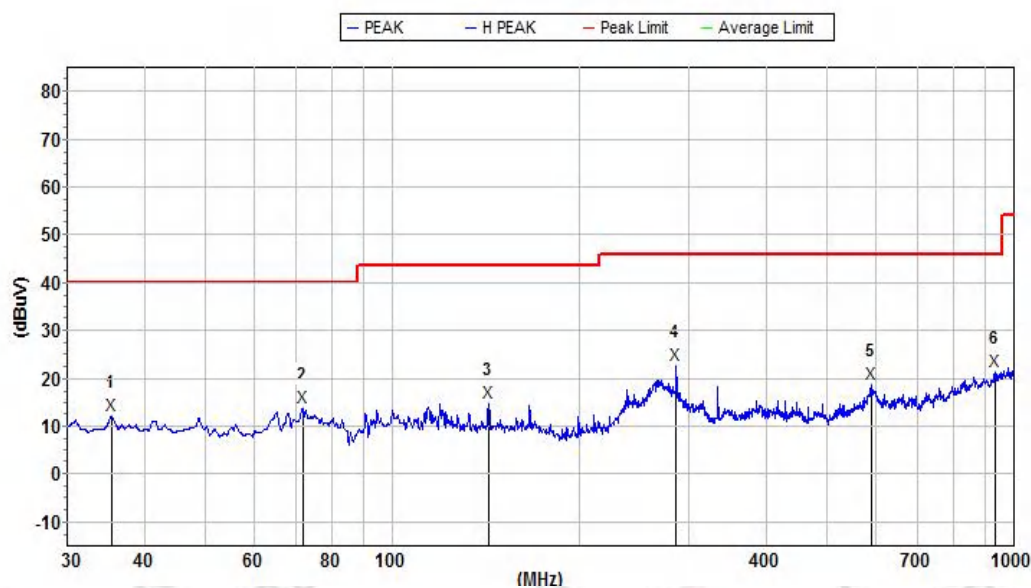
1GHz~18GHz
Mode 1 Vertical



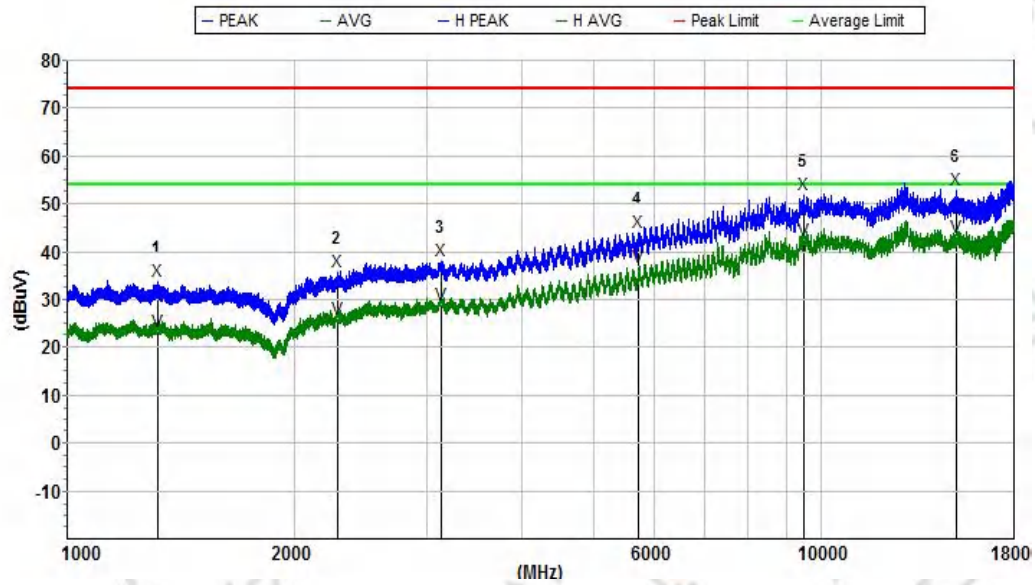
Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1358.600000	32.6	74.0	41.4	25.7	61.2	2.3	V
2	2439.500000	47.9	74.0	26.1	27.5	59.2	2.8	V
3	4159.642844	40.5	74.0	33.5	30.9	58.2	3.4	V
4	6025.500000	45.6	74.0	28.4	34.0	58.0	4.1	V
5	9459.000000	52.0	74.0	22.0	38.6	59.6	5.4	V
6	15087.000000	52.9	74.0	21.1	39.1	61.1	6.3	V
Avg								
1	1358.600000	22.6	54.0	31.4	25.7	61.2	2.3	V
2	2439.500000	45.0	54.0	9.0	27.5	59.2	2.8	V
3	4159.642844	31.9	54.0	22.1	30.9	58.2	3.4	V
4	6025.500000	36.6	54.0	17.4	34.0	58.0	4.1	V
5	9459.000000	43.6	54.0	10.4	38.6	59.6	5.4	V
6	15087.000000	43.6	54.0	10.4	39.1	61.1	6.3	V

30MHz - 1000MHz

Temperature:	25.0℃	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3		

30MHz~1GHz
Mode 2 Horizontal


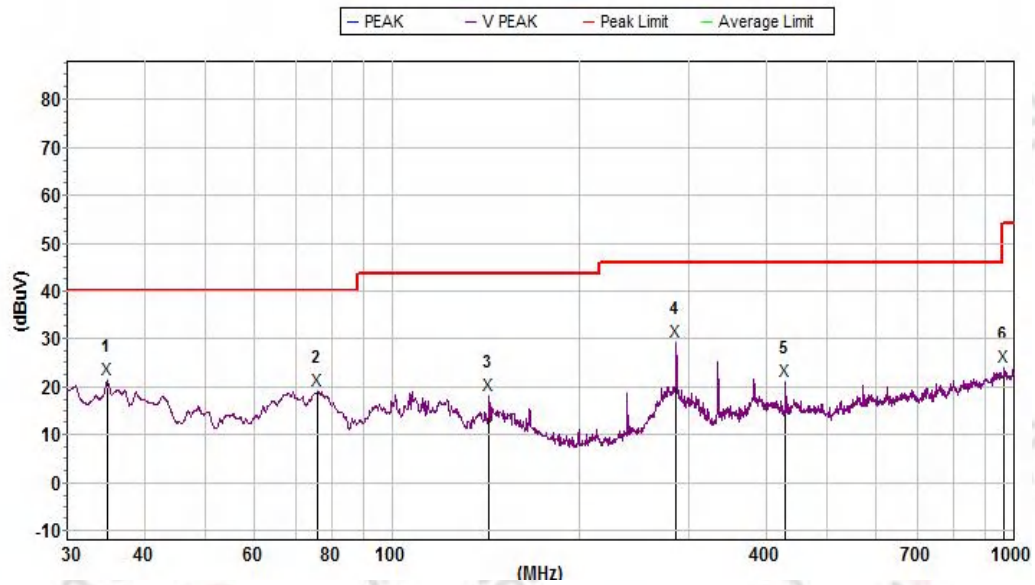
Mk.	Freq.(MHz)	Level (dBuV/ m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	35.313041	12.3	40.0	27.7	13.4	32.3	0.8	H
2	71.706186	13.9	40.0	26.1	10.6	32.8	0.8	H
3	142.824363	14.8	43.5	28.7	13.7	32.9	1.3	H
4	286.479617	22.9	46.0	23.1	12.5	32.7	2.6	H
5	588.905092	18.8	46.0	27.2	15.8	32.4	3.3	H
6	930.638437	21.4	46.0	24.6	20.0	31.4	3.7	H

1GHz~18GHz
Mode 2 Horizontal


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	1318.500000	34.1	74.0	39.9	25.8	61.1	2.3	H
2	2287.100000	35.8	74.0	38.2	27.2	60.0	2.8	H
3	3139.500000	38.3	74.0	35.7	29.7	58.6	3.0	H
4	5730.750000	44.2	74.0	29.8	33.5	58.1	4.0	H
5	9463.500000	52.0	74.0	22.0	38.6	59.7	5.4	H
6	15096.000000	53.1	74.0	20.9	39.1	61.1	6.4	H
Avg								
1	1318.500000	23.5	54.0	30.5	25.8	61.1	2.3	H
2	2287.100000	26.2	54.0	27.8	27.2	60.0	2.8	H
3	3139.500000	29.0	54.0	25.0	29.7	58.6	3.0	H
4	5730.750000	36.9	54.0	17.1	33.5	58.1	4.0	H
5	9463.500000	42.6	54.0	11.4	38.6	59.7	5.4	H
6	15096.000000	43.2	54.0	10.8	39.1	61.1	6.4	H

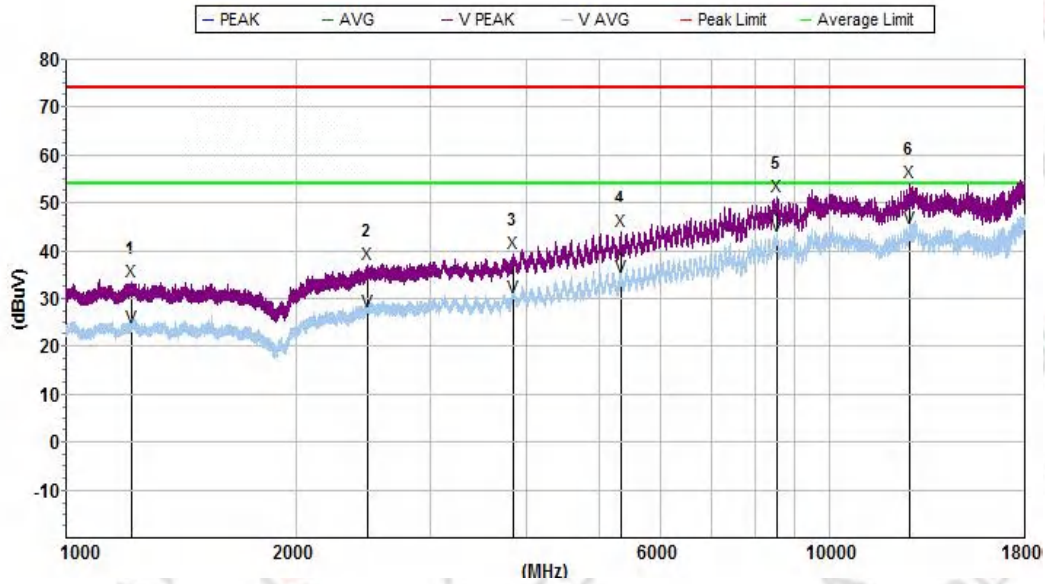
Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	AC120V	Phase:	Vertical
Test Mode:	Mode 1/2/3		

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	34.821189	21.5	40.0	18.5	13.4	32.2	0.8	V
2	75.977347	19.1	40.0	20.9	9.9	32.9	0.9	V
3	143.326064	18.3	43.5	25.2	13.7	32.9	1.3	V
4	286.479617	29.3	46.0	16.7	12.5	32.7	2.6	V
5	429.522800	21.2	46.0	24.8	15.5	32.4	2.7	V
6	965.542095	24.3	54.0	29.7	22.2	31.2	3.8	V

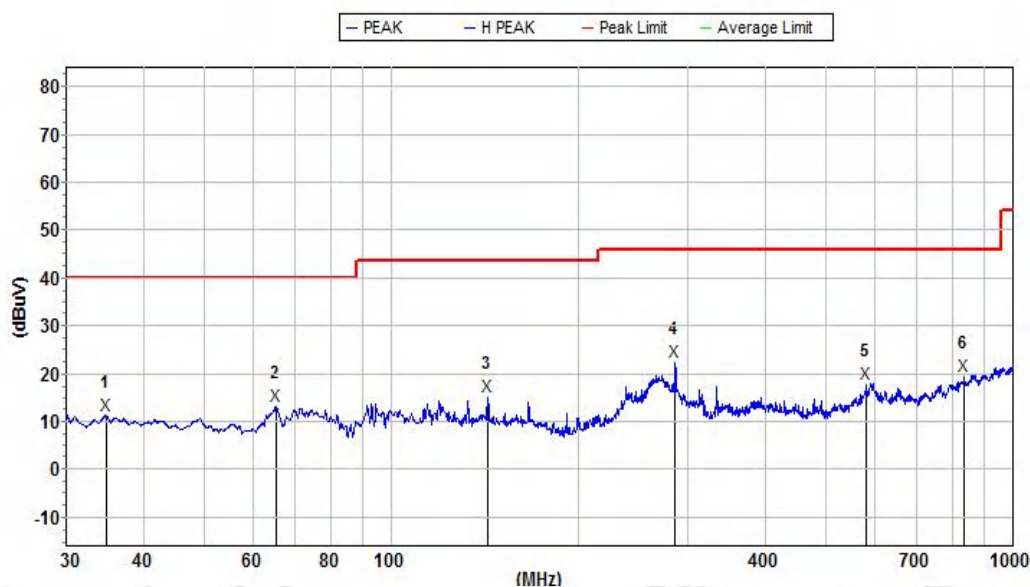
1GHz~18GHz
Mode 1 Vertical



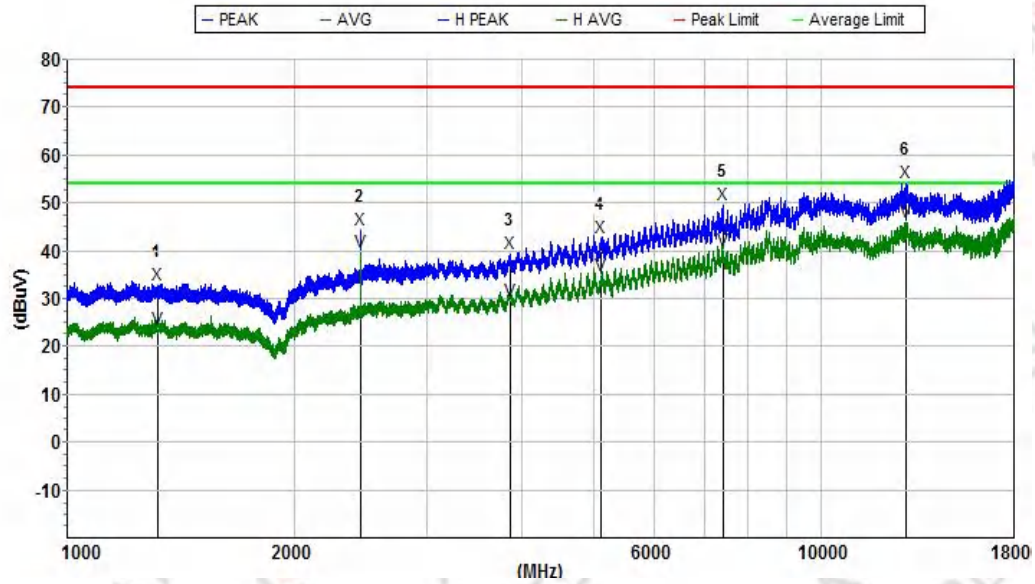
Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1219.800000	33.5	74.0	40.5	25.7	60.9	2.3	V
2	2484.600000	37.4	74.0	36.6	27.7	58.9	2.8	V
3	3852.000000	39.7	74.0	34.3	30.6	58.8	3.2	V
4	5322.000000	44.2	74.0	29.8	32.8	57.8	3.9	V
5	8530.500000	51.3	74.0	22.7	37.7	56.1	5.1	V
6	12709.500000	54.2	74.0	19.8	39.4	58.0	6.1	V
Avg								
1	1219.800000	24.2	54.0	29.8	25.7	60.9	2.3	V
2	2484.600000	27.3	54.0	26.7	27.7	58.9	2.8	V
3	3852.000000	30.4	54.0	23.6	30.6	58.8	3.2	V
4	5322.000000	34.7	54.0	19.3	32.8	57.8	3.9	V
5	8530.500000	43.1	54.0	10.9	37.7	56.1	5.1	V
6	12709.500000	44.9	54.0	9.1	39.4	58.0	6.1	V

30MHz - 1000MHz

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal
Test Mode:	Mode 1/2/3		

30MHz~1GHz
Mode 3 Horizontal


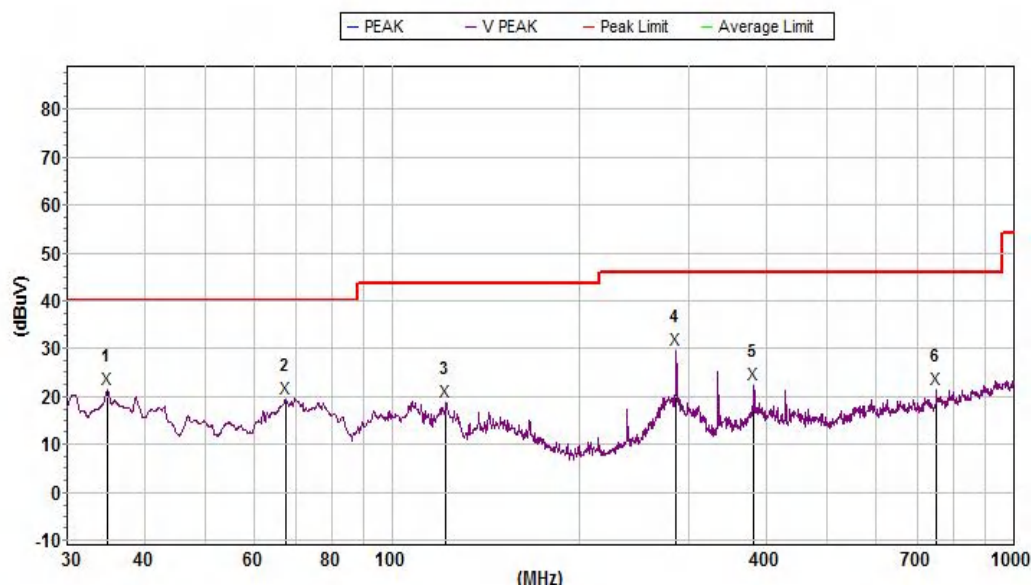
Mk.	Freq.(MHz)	Level (dBuV/ m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	34.821189	11.4	40.0	28.6	13.4	32.2	0.8	H
2	65.343191	13.4	40.0	26.6	11.7	32.8	0.8	H
3	143.326064	15.3	43.5	28.2	13.7	32.9	1.3	H
4	286.479617	22.5	46.0	23.5	12.5	32.7	2.6	H
5	580.702632	17.8	46.0	28.2	15.7	32.4	3.3	H
6	834.779441	19.5	46.0	26.5	19.1	32.0	3.6	H

1GHz~18GHz
Mode 3 Horizontal


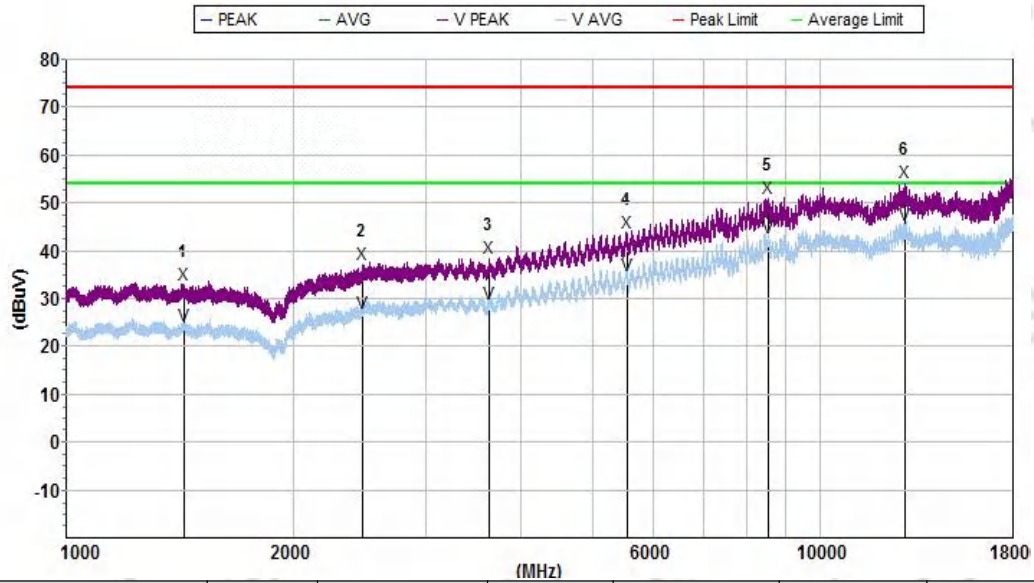
Mk.	Freq.(MHz)	Level (dBuV /m)	Limit (dBuV/ m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	1321.500000	33.0	74.0	41.0	25.8	61.1	2.3	H
2	2451.800000	44.5	74.0	29.5	27.5	59.1	2.8	H
3	3867.750000	39.7	74.0	34.3	30.6	58.7	3.2	H
4	5102.250000	42.9	74.0	31.1	33.1	57.5	3.7	H
5	7398.000000	49.6	74.0	24.4	36.5	57.5	4.6	H
6	12920.250000	54.3	74.0	19.7	39.7	57.8	6.1	H
Avg								
1	1321.500000	23.8	54.0	30.2	25.8	61.1	2.3	H
2	2451.800000	40.0	54.0	14.0	27.5	59.1	2.8	H
3	3867.750000	29.7	54.0	24.3	30.6	58.7	3.2	H
4	5102.250000	35.0	54.0	19.0	33.1	57.5	3.7	H
5	7398.000000	40.3	54.0	13.7	36.5	57.5	4.6	H
6	12920.250000	46.0	54.0	8.0	39.7	57.8	6.1	H

Temperature:	25℃	Relative Humidity:	50%RH
Test Voltage:	AC120V	Phase:	Vertical
Test Mode:	Mode 1/2/3		

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	34.821189	21.6	40.0	18.4	13.4	32.2	0.8	V
2	67.320108	19.5	40.0	20.5	11.3	32.8	0.8	V
3	121.975541	18.9	43.5	24.6	12.3	32.9	1.4	V
4	286.479617	29.9	46.0	16.1	12.5	32.7	2.6	V
5	381.917698	22.5	46.0	23.5	14.4	32.4	2.7	V
6	750.108251	21.5	46.0	24.5	20.3	32.2	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	1430.600000	33.1	74.0	40.9	25.5	61.4	2.4	V
2	2470.400000	37.2	74.0	36.8	27.6	59.0	2.8	V
3	3637.500000	38.5	74.0	35.5	29.7	59.0	3.2	V
4	5535.000000	43.8	74.0	30.2	32.8	58.1	4.0	V
5	8522.250000	50.9	74.0	23.1	37.7	55.9	5.1	V
6	12921.750000	54.4	74.0	19.6	39.7	57.8	6.1	V
Avg								
1	1430.600000	24.3	54.0	29.7	25.5	61.4	2.4	V
2	2470.400000	27.2	54.0	26.8	27.6	59.0	2.8	V
3	3637.500000	29.0	54.0	25.0	29.7	59.0	3.2	V
4	5535.000000	34.9	54.0	19.1	32.8	58.1	4.0	V
5	8522.250000	42.8	54.0	11.2	37.7	55.9	5.1	V
6	12921.750000	45.6	54.0	8.4	39.7	57.8	6.1	V

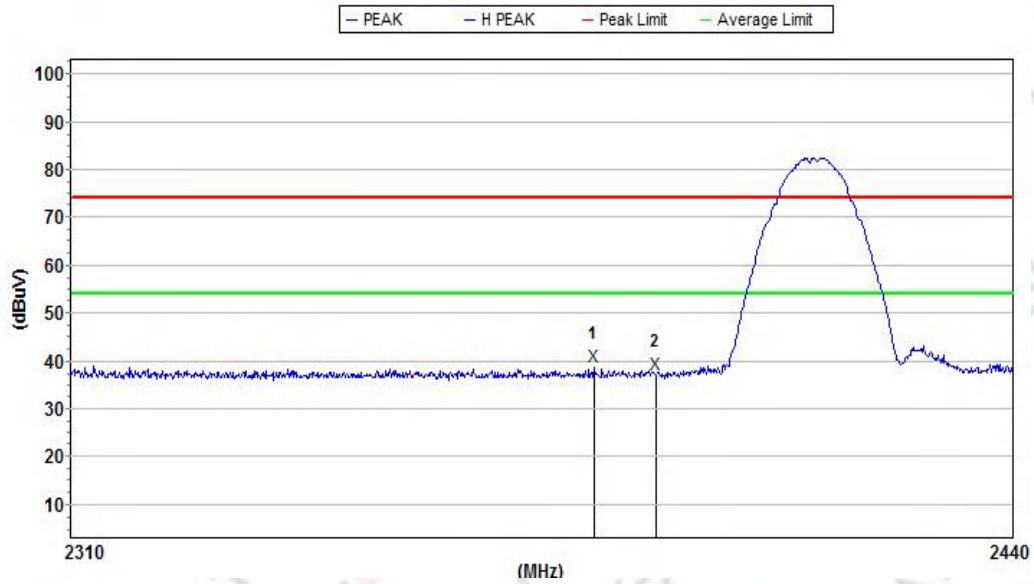
Note:

- Factor=Ant.Factor+cable loss-Amp.Gain .
- Level contains the factor; Margin=Limit-Level.
- Other 18G-25G Emission detected are more than 20dB below the limit.

3.2.6 TEST RESULTS (BAND EDGE REQUIREMENTS)

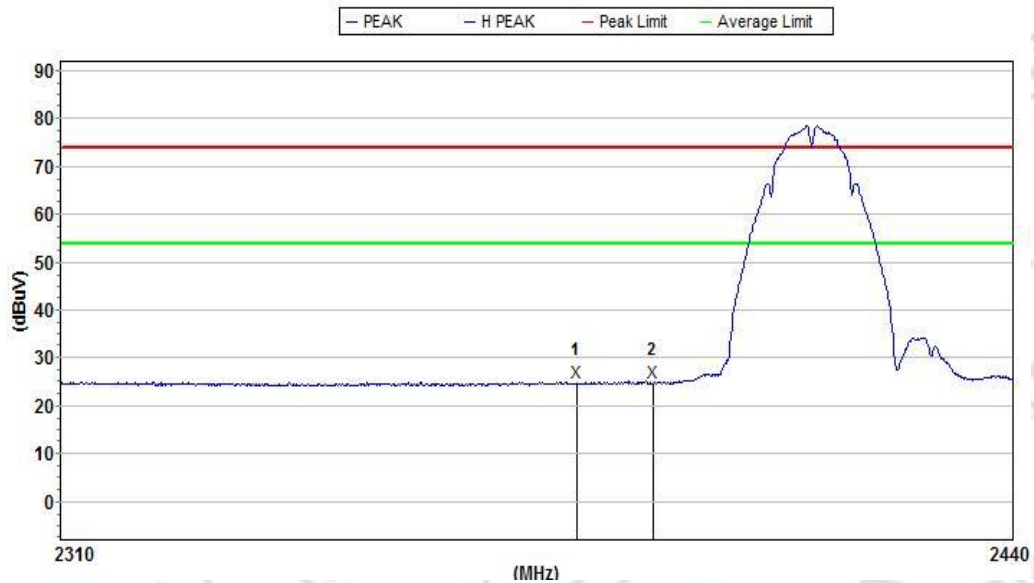
802.11b-Low

Horizontal



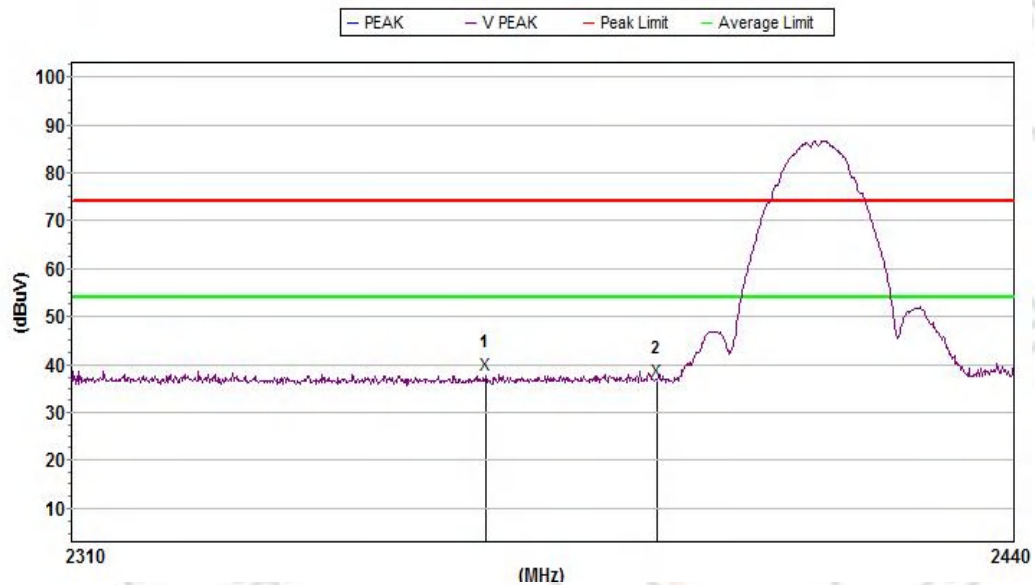
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2381.270242	38.8	74.0	35.2	27.3	59.6	2.8	H
2	2390.000000	37.3	74.0	36.7	27.3	59.6	2.8	H

Horizontal



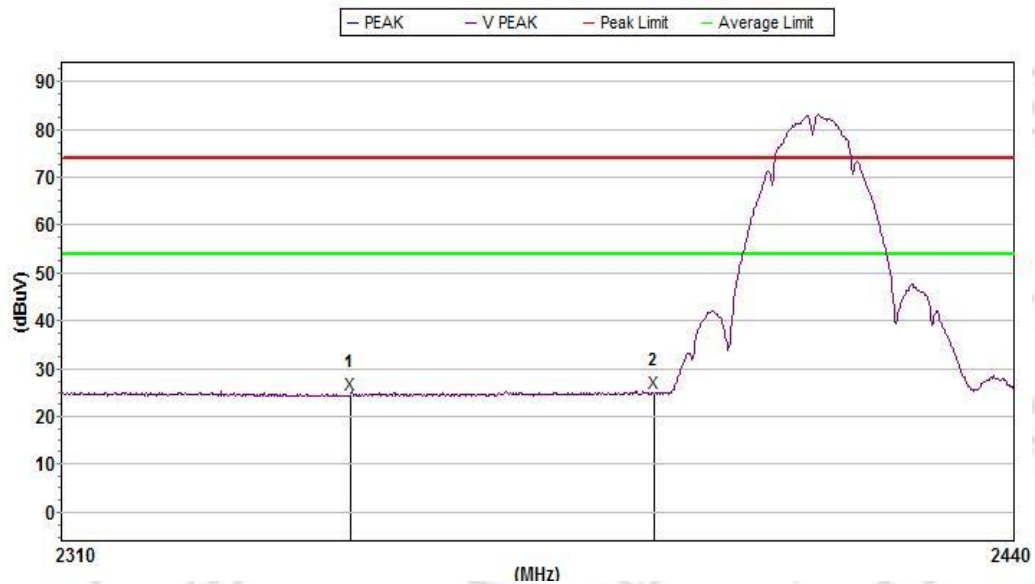
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2379.706246	25.0	74.0	49.0	27.3	59.6	2.8	H
2	2390.000000	24.8	74.0	49.2	27.3	59.6	2.8	H

802.11b-Low Vertical



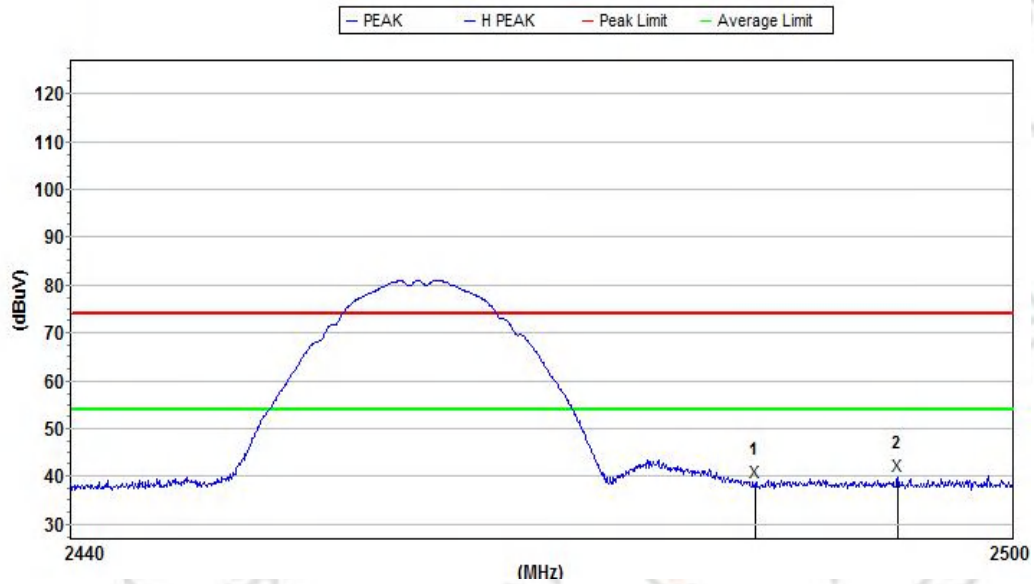
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2366.324130	37.8	74.0	36.2	27.3	59.7	2.8	V
2	2390.000000	36.4	74.0	37.6	27.3	59.6	2.8	V

Vertical



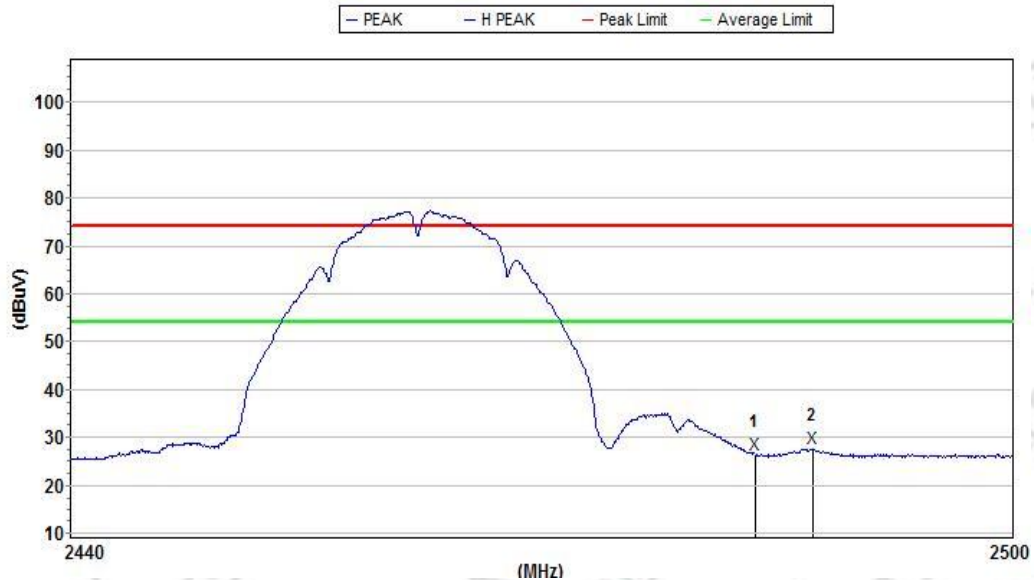
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2348.769751	24.7	74.0	49.3	27.2	59.7	2.8	V
2	2390.000000	24.8	74.0	49.2	27.3	59.6	2.8	V

802.11b-High Horizontal



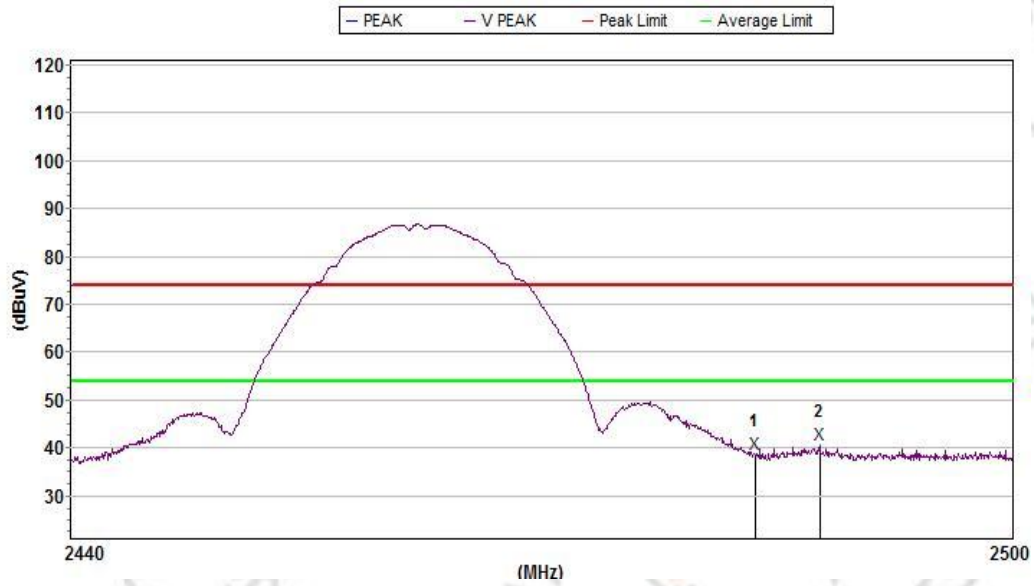
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2483.500000	38.9	74.0	35.1	27.6	58.9	2.8	H
2	2492.601697	40.0	74.0	34.0	27.7	58.9	2.8	H

Horizontal



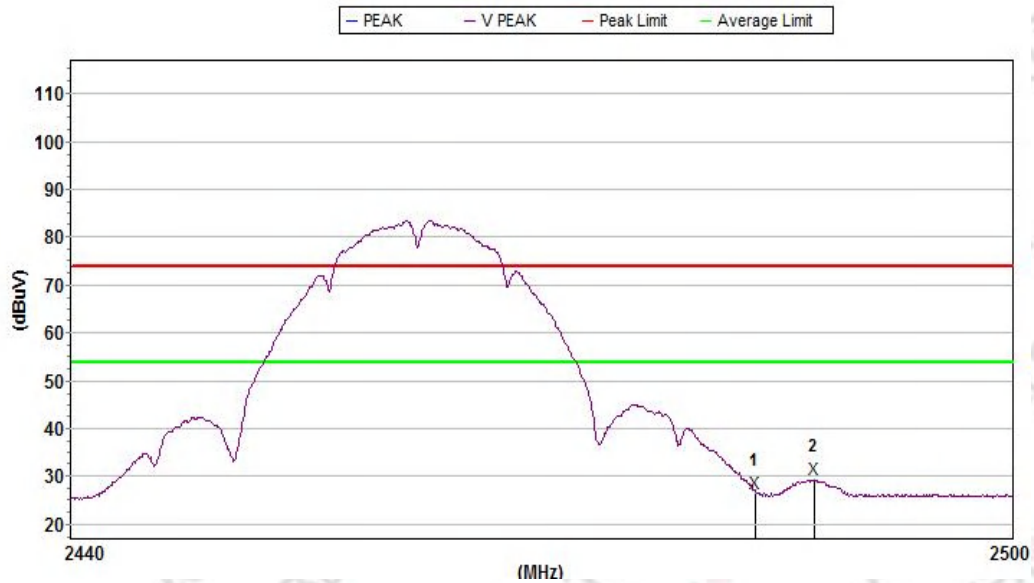
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2483.500000	26.4	74.0	47.6	27.7	58.9	2.8	H
2	2487.157970	27.6	74.0	46.4	27.7	58.9	2.8	H

802.11b-High 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	38.6	74.0	35.4	27.7	58.9	2.8	V
2	2487.580944	40.6	74.0	33.4	27.7	58.9	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	26.6	74.0	47.4	27.7	58.9	2.8	V
2	2487.218390	29.4	74.0	44.6	27.7	58.9	2.8	V

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 AC power, 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.

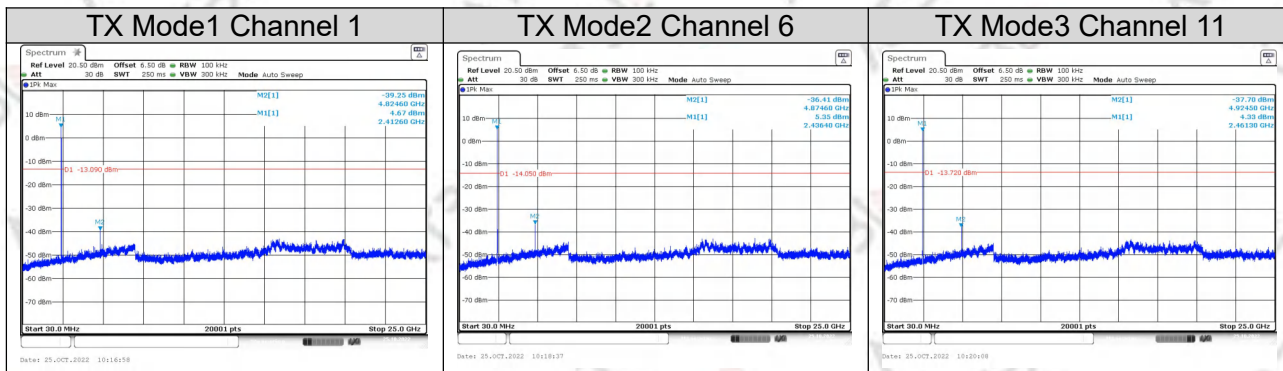
4.5 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

4.6 TEST RESULTS

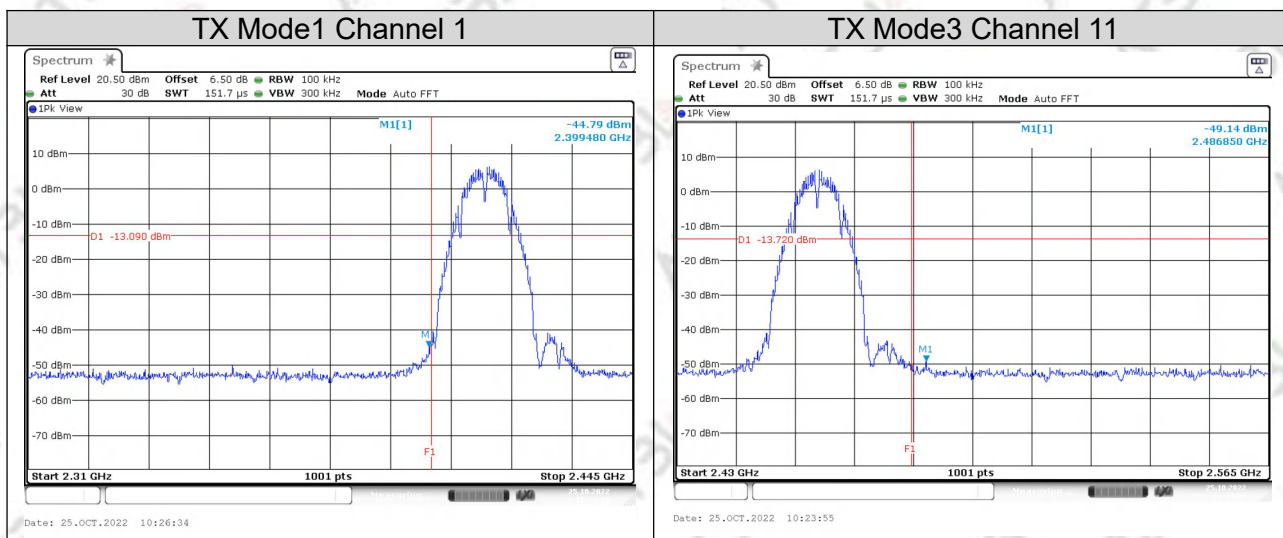
Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 3.7V	Test Mode:	TX Mode1/2/3

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

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5. POWER SPECTRAL DENSITY TEST

5.1 LIMIT

FCC Part15.247 , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e) RSS-247 Clause 5.2(b)	Power Spectral Density	≤ 8 dBm (RBW ≥ 3 kHz)	2400-2483.5	PASS

5.2 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 $100 \text{ kHz} \geq \text{RBW} \geq 3 \text{ kHz}$.
4. Set the $\text{VBW} \geq 3 \times \text{RBW}$.
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.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

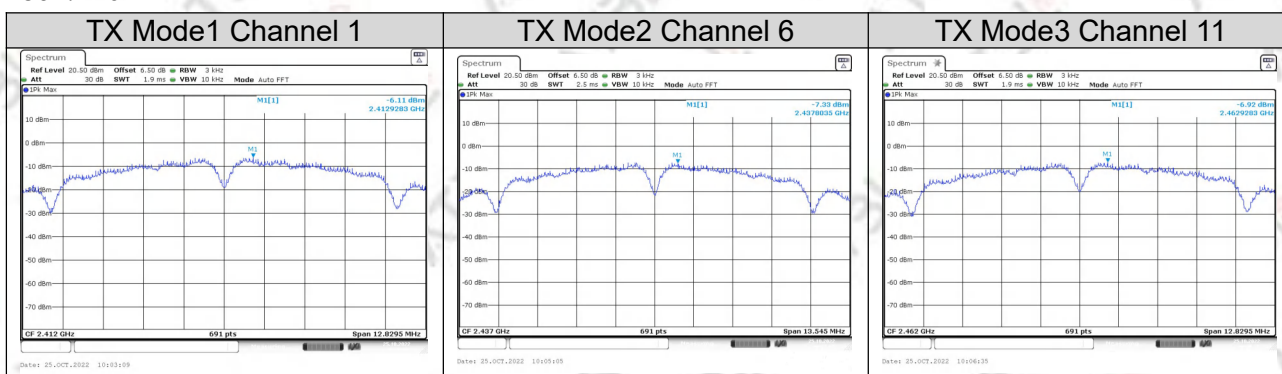
Please refer to section 3.1.4 of this report.

5.6 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 3.7V	Test Mode:	TX Mode1/2/3

Test mode	Frequency	Power Density	Limit (3kHz/dBm)	Result
		(dBm/3kHz)		
Mode1	2412 MHz	-6.11	≤8	PASS
Mode2	2437 MHz	-7.33	≤8	PASS
Mode3	2462 MHz	-6.92	≤8	PASS

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6. BANDWIDTH TEST

6.1 LIMIT

FCC Part15.247,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
15.247	99% Bandwidth	For reporting purposes only.	2400-2483.5	PASS

6.2 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 $\geq$ 3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq$ 6 dB.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

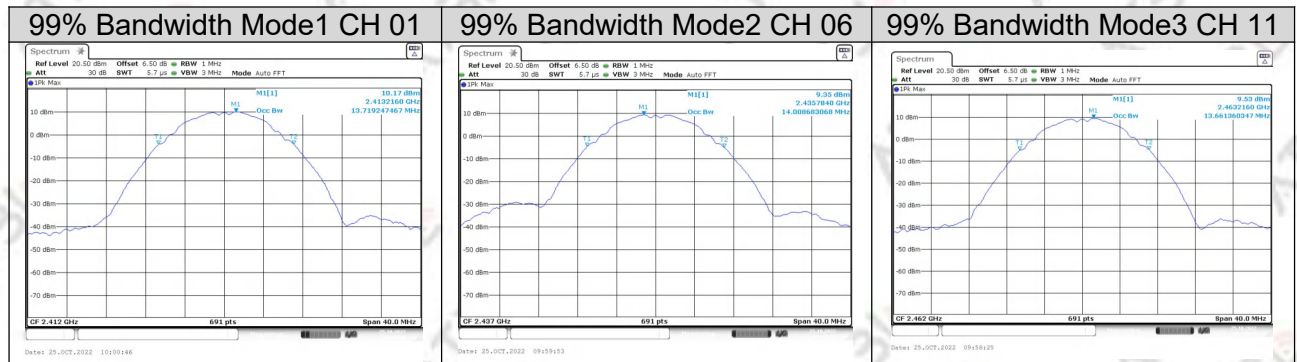
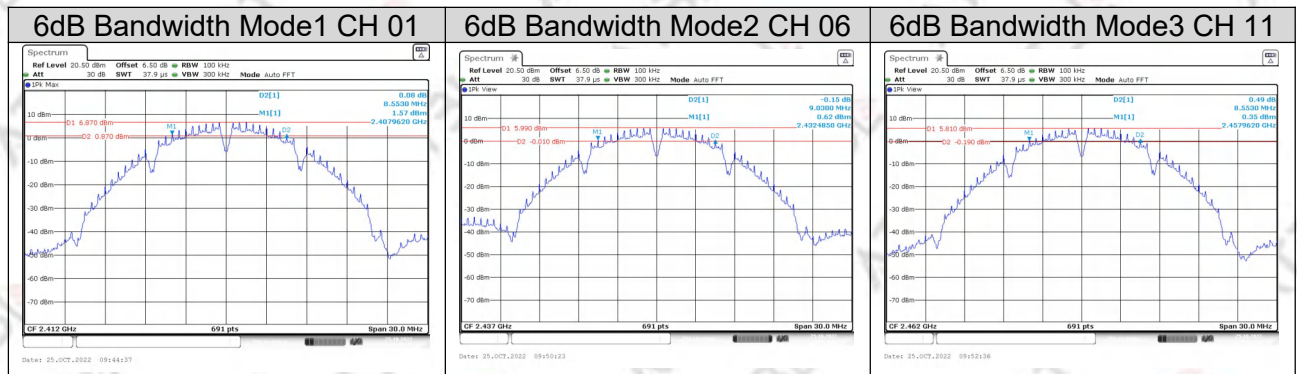
Please refer to section 3.1.4 of this report.

6.6 TEST RESULTS

Temperature:	25°C	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Test Mode:	TX Mode1/2/3

Test mode	Frequency	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth Limit(kHz)	Result
Mode1	2412 MHz	8.5530	13.719247467	$\geq 500\text{kHz}$	PASS
Mode2	2437 MHz	9.0300	14.008683068	$\geq 500\text{kHz}$	PASS
Mode3	2462 MHz	8.5530	13.661360347	$\geq 500\text{kHz}$	PASS

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7. PEAK OUTPUT POWER TEST

7.1 LIMIT

FCC Part15.247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3) RSS-247 Clause 5.4(d)	Output Power	1 watt or 30dBm	2400-2483.5	PASS

7.2 TEST PROCEDURE

PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

7.6 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 3.7V	Test Mode:	TX Mode1/2/3

Test mode	Test Channel	Frequency	Peak Conducted Output Power	Average Conducted Output Power	LIMIT
		(MHz)	(dBm)	(dBm)	dBm
Mode1	CH01	2412	16.74	14.67	30
Mode2	CH06	2437	16.16	14.07	30
Mode3	CH11	2462	16.07	14.01	30

Test Mode	Frequency	Peak Conducted Output Power	Antenna Gain	EIRP Power	LIMIT
	(MHz)	(dBm)	(dBi)	(dBm)	dBm
Mode1	2412	16.74	-2.8	13.94	36
Mode2	2437	16.16	-2.8	13.36	36
Mode3	2462	16.07	-2.8	13.27	36

Note: Our power sensor test AVG power has no duty cycle display. The power sensor measures AVG power is Burst power. The software has considered the factor of the duty cycle factor, so it is unnecessary to add it again.

8. ANTENNA REQUIREMENT

8.1 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.

8.2 EUT ANTENNA

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

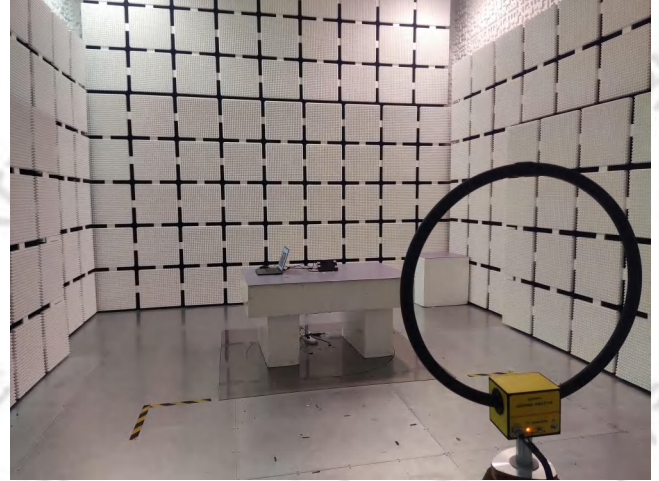
APPENDIX-PHOTOS OF TEST SETUP

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

AC Power Line Conducted Emissions



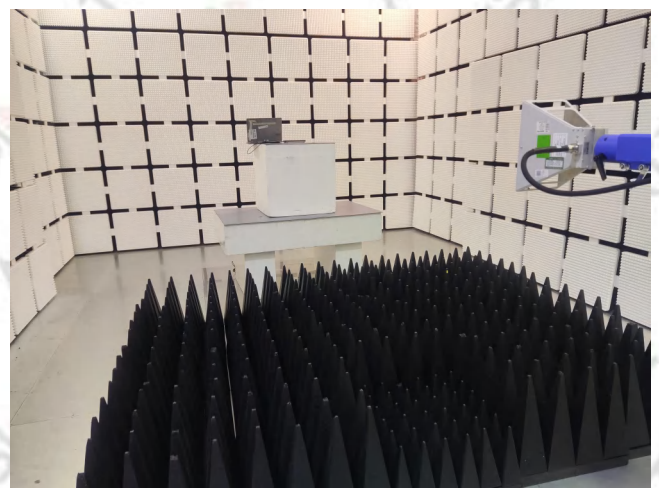
Radiated Emissions for 9kHz~30MHz



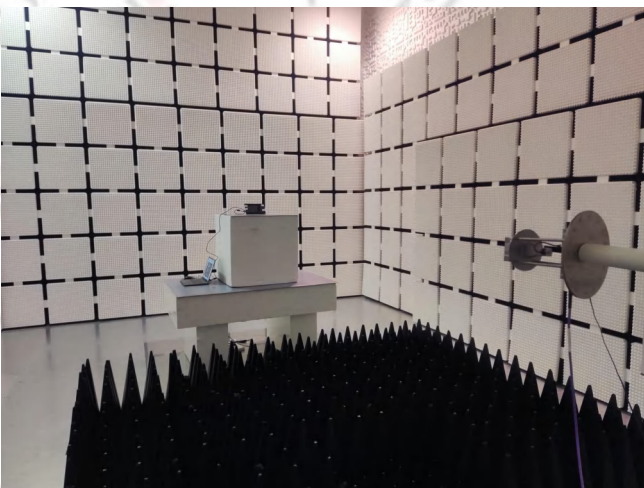
Radiated Emissions for 30MHz~1GHz



Radiated Emissions for 1GHz~18GHz



Radiated Emissions for above 18GHz



Conducted for RF



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