

FCC Radio Test Report

FCC ID: 2A4G9-005

The report concerns: Original Grant

Report Reference No..... : 22EFS06096 06371
Date Sample(s) Received..... : 2022-07-18
Date of Tested..... : From 2022-07-19 to 2022-08-02
Date of issue..... : 2022-08-02
Testing Laboratory..... : DongGuanShuoXin Electronic Technology Co., Ltd.
Address..... : Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China

Applicant's name..... : ZHENGZHOU DI YUN WANG LUO KE JI YOU XIAN GONG SI
Address..... : No.2602, 26th Floor, Block B, Dongfang Building No. 198-19 Songshan South Road, Erqi District,Zhengzhou, Henan, China
Manufacturer..... : TDC Power Products Co., Ltd.

Equipment..... : Wi-Fi Low Voltage Landscape Transformer
Trade Mark..... : 1)  ; 2) 
Model..... : TLA-120-12W-1 WiFi 2Gen; TLA-200-12W-1 WiFi 2Gen; TLA-300-12WA2-1 WiFi 2Gen.
Ratings..... : Input: 120V~60Hz 1.2A For TLA-120-12W-1 WiFi 2Gen; 120V~60Hz 2A For TLA-200-12W-1 WiFi 2Gen; 120V~60Hz 3A For TLA-300-12WA2-1 WiFi 2Gen.
Output: 12V~ 120W max For TLA-120-12W-1 WiFi 2Gen; 12V~ 200W max For TLA-200-12W-1 WiFi 2Gen; 12V~ or 14V~ 300W max For TLA-300-12WA2-1 WiFi 2Gen.

Test Engineer:


Blue Qiu

Responsible Engineer :


Smile Wang

Authorized Signatory:

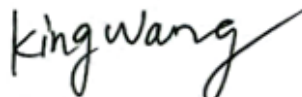

King Wang

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1TEST REPORT DECLARE

Applicant	ZHENGZHOU DI YUN WANG LUO KE JI YOU XIAN GONG SI
Address	No.2602, 26th Floor, Block B, Dongfang Building No. 198-19 Songshan South Road, Erqi District,Zhengzhou, Henan, China
Manufacturer	TDC Power Products Co., Ltd.
Address	Dong Hang 3rd. Industrial District, Dong Hang, Dong Guan City, Guang dong Province, China
Factory	TDC Power Products Co., Ltd.
Address	Dong Hang 3rd. Industrial District, Dong Hang, Dong Guan City, Guang dong Province, China
Equipment	Wi-Fi Low Voltage Landscape Transformer
Model No.	TLA-120-12W-1 WiFi 2Gen; TLA-200-12W-1 WiFi 2Gen; TLA-300-12WA2-1 WiFi 2Gen.
Trade Mark	1)  ; 2) 
Standard	FCC Part15, Subpart C (15.247) ANSI C63.10-2013

We Declare:

The equipment described above is tested by DongGuan ShuoXin Electronic Technology Co., Ltd(ATT). and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and DongGuan ShuoXin Electronic Technology Co., Ltd.(ATT) is assumed of full responsibility for the accuracy and completeness of these tests.

ATT is not responsible for the sampling stage, so the results only apply to the sample as received.

ATT's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. ATT shall have no liability for any declarations, inferences or generalizations drawn by the client or others from ATT issued reports.

2 SUMMARY OF TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below:

Standard(s) Section		Test Item	Judgment	Remark
FCC	ISED			
15.207	-	AC Power Line Conducted Emissions	PASS	-----
15.247(d) 15.205(a) 15.209(a)	-	Radiated Emissions	PASS	-----
15.247(a)(2)	-	Bandwidth	PASS	-----
15.247(b)(3)	-	Maximum Output Power	PASS	-----
15.247(d)	-	Conducted Spurious Emission	PASS	-----
15.247(e)	-	Power Spectral Density	PASS	-----
15.203	-	Antenna Requirement	PASS	Note(2)

Note:

- (1) "N/A" denotes test is not applicable to this device.
- (2) The device that use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

2.1 MEASUREMENT UNCERTAINTY

Test Item	Uncertainty
Uncertainty for Conduction emission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	$\pm 0.048\text{kHz}$
Uncertainty for conducted RF Power	$\pm 0.32\text{dB}$

Note:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Test Facility:

The Test site used by DongGuan ShuoXin Electronic Technology Co., Ltd. to collect test data is located on the Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China

The test facility is recognized, certified, or accredited by the following organizations:

Item	Registration No.	Expiration Date
CNAS	L3098	2024-08-27
A2LA	4893.01	2022-08-31
Innovation, Science and Economic Development Canada (ISED)	11033A CAB identifier: CN0083	2022-08-31
Federal Communications Commission (FCC)	171688 Designation No.: CN1235	2022-08-31

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Wi-Fi Low Voltage Landscape Transformer	
Brand Name	1)  ; 2) 	
Test Model	TLA-120-12W-1 WiFi 2Gen	
Series Model	TLA-120-12W-1 WiFi 2Gen; TLA-200-12W-1 WiFi 2Gen; TLA-300-12WA2-1 WiFi 2Gen.	
Model Difference(s)	The differences between models are the same except for the differences in model name and output rating.	
Hardware Version	V1.0	
Software Version	V1.0	
Power Source	Supplied from AC power network.	
Power Rating	120V~60Hz 1.2A For TLA-120-12W-1 WiFi 2Gen; 120V~60Hz 2A For TLA-200-12W-1 WiFi 2Gen; 120V~60Hz 3A For TLA-300-12WA2-1 WiFi 2Gen.	
Operation Frequency	2402 MHz ~ 2480 MHz	
Modulation Technology	GFSK	
Bit Rate of Transmitter	1Mbps	
Antenna Information	Antenna Type: Dipole Antenna	Maximum Peak Gain: 1.5dBi
Max. Output Power	-0.497dBm(0.000892W)1Mbps	

Note:

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

2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	BLE 1M TX Mode NOTE (1)
Mode 2	BLE 1M TX Mode Channel 00

Following mode(s) as (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test	
Final Test Mode	Description
Mode 2	BLE 1M TX Mode Channel 00

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	BLE 1M TX Mode Channel 00

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	BLE 1M TX Mode NOTE (1)

Conducted test	
Final Test Mode	Description
Mode 1	BLE 1M TX Mode NOTE (1)

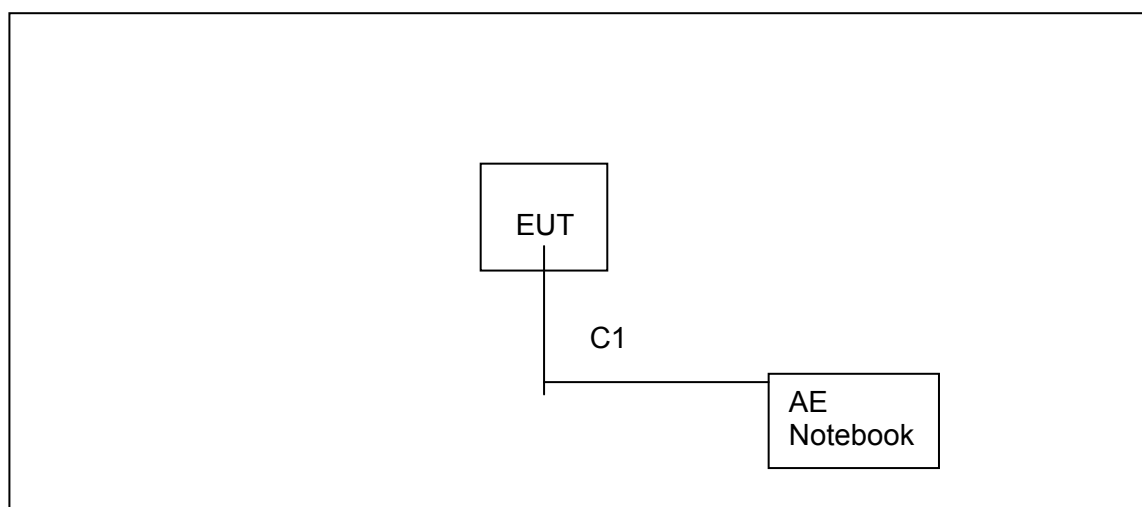
Note:

(1) The measurements are performed at the high, middle, low available channels.

3.3 PARAMETERS OF TEST SOFTWARE

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of BT LE

Test Software	Beken Wi-Fi Test Tool V1.9.0		
Frequency (MHz)	2402	2440	2480
Parameters-1Mbps	Default	Default	Default

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**3.5 SUPPORT UNITS**

Item	Equipment	Brand	Model No.	Series No.
AE	Notebook	Lenovo	/	/

Item	Cable Type	Shielded Type	Ferrite Core	Length
C1	DC Cable	NO	NO	0.8m

3.6 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage
AC Power Line Conducted Emissions	22.6°C	53%	AC 120V/60Hz
Radiated Emissions-9K-30MHz	23.5°C	61%	AC 120V/60Hz
Radiated Emissions-30 MHz to 1GHz	23.6°C	62%	AC 120V/60Hz
Radiated Emissions-Above 1000 MHz	23.6°C	62%	AC 120V/60Hz
Bandwidth	23.6°C	61%	AC 120V/60Hz
Maximum Output Power	23.6°C	61%	AC 120V/60Hz
Conducted Spurious Emission	23.6°C	61%	AC 120V/60Hz
Power Spectral Density	23.6°C	61%	AC 120V/60Hz

4AC POWER LINE CONDUCTED EMISSIONS TEST

4.1LIMIT

Frequency of Emission (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15 -0.50	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	50

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

4.2TEST PROCEDURE

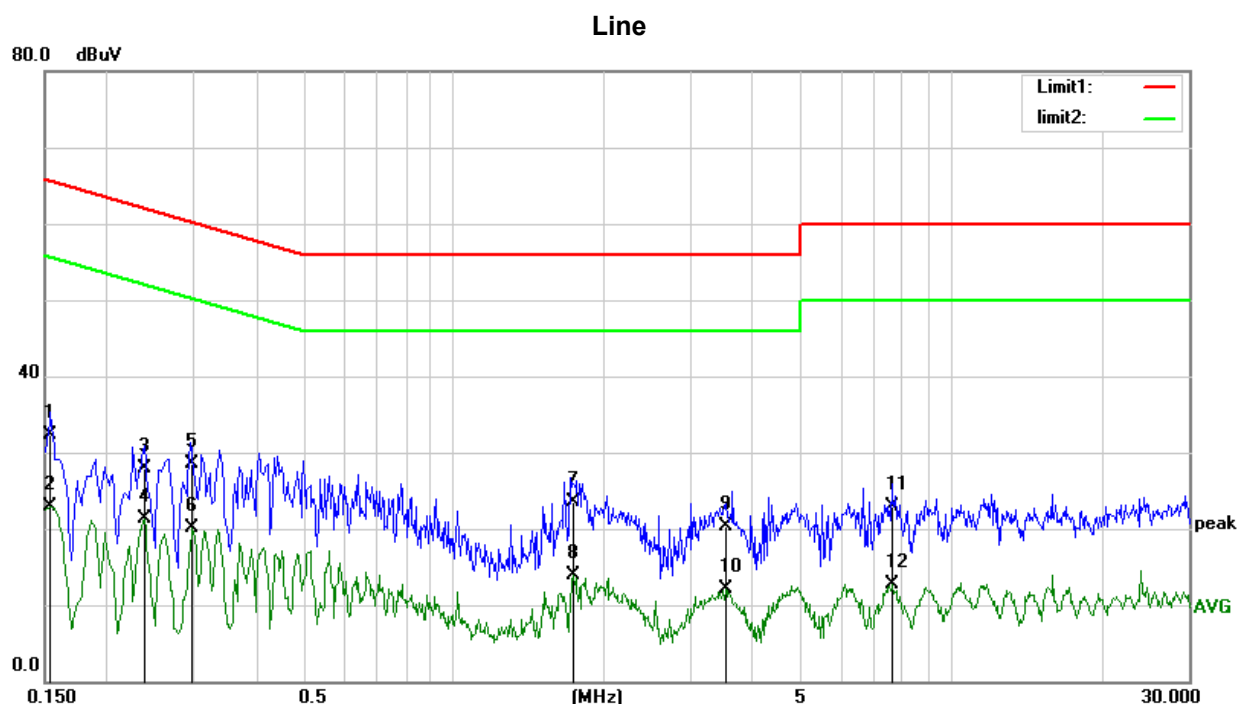
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the groundplane 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 at least 80 cm from nearest part of EUT chassis.

4.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	12/19/2022
2	EMI Test Receiver	R&S	ESCI	101308	12/17/2022
3	LISN	AFJ	LS16	16011103219	05/26/2023
4	LISN	Schwarzbeck	NSLK 8127	8127-432	12/17/2022
5	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

4.6 TEST RESULTS

Test Mode: BLE 1Mbps TX Mode Channel 00, AC 120V/60Hz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dB	Over dB	Detector	Comment
1		0.1539	23.06	9.17	32.23	65.78	-33.55	QP	
2		0.1539	13.78	9.17	22.95	55.78	-32.83	AVG	
3		0.2380	18.24	9.59	27.83	62.16	-34.33	QP	
4		0.2380	11.80	9.59	21.39	52.16	-30.77	AVG	
5		0.2980	19.04	9.55	28.59	60.30	-31.71	QP	
6	*	0.2980	10.53	9.55	20.08	50.30	-30.22	AVG	
7		1.7420	13.84	9.62	23.46	56.00	-32.54	QP	
8		1.7420	4.34	9.62	13.96	46.00	-32.04	AVG	
9		3.5140	10.63	9.77	20.40	56.00	-35.60	QP	
10		3.5140	2.27	9.77	12.04	46.00	-33.96	AVG	
11		7.6219	13.19	9.75	22.94	60.00	-37.06	QP	
12		7.6219	2.87	9.75	12.62	50.00	-37.38	AVG	

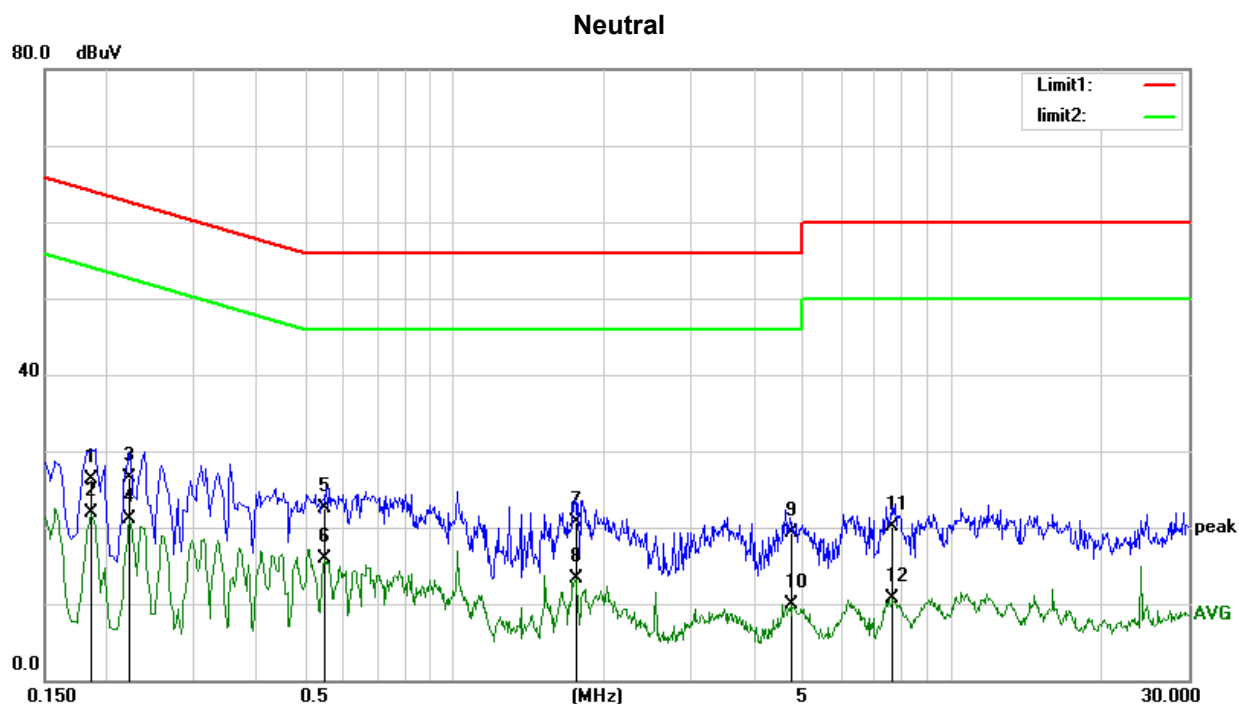
*:Maximum data x:Over limit !:over margin

Remarks:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode: BLE 1Mbps TX Mode Channel 00, AC 120V/60Hz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dB	Over dB	Detector	Comment
1		0.1860	16.81	9.41	26.22	64.21	-37.99	QP	
2		0.1860	12.45	9.41	21.86	54.21	-32.35	AVG	
3		0.2220	16.98	9.58	26.56	62.74	-36.18	QP	
4		0.2220	11.60	9.58	21.18	52.74	-31.56	AVG	
5		0.5500	12.86	9.64	22.50	56.00	-33.50	QP	
6	*	0.5500	6.30	9.64	15.94	46.00	-30.06	AVG	
7		1.7580	11.02	9.63	20.65	56.00	-35.35	QP	
8		1.7580	3.72	9.63	13.35	46.00	-32.65	AVG	
9		4.7738	9.71	9.69	19.40	56.00	-36.60	QP	
10		4.7738	0.14	9.69	9.83	46.00	-36.17	AVG	
11		7.6219	10.28	9.75	20.03	60.00	-39.97	QP	
12		7.6219	0.87	9.75	10.62	50.00	-39.38	AVG	

*:Maximum data x:Over limit !:over margin

Remarks:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

5 RADIATED EMISSION TEST

5.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a) and RSS-Gen 8.10, then the 15.209(a) and RSS-Gen 8.9 limit in the table below has to be followed.

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

Frequency (MHz)	Field Strength (microvolts/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 (9 kHz-30 MHz)

Frequency (MHz)	Magnetic field strength (H-Field) (μ A/m)	Measurement Distance (meters)
0.009-0.490	6.37/F(kHz)	300
0.490-1.705	6.37/F(kHz)	30
1.705-30.0	0.08	30

LIMITS OF RADIATED EMISSION MEASUREMENT (30 MHz-1000MHz)

Frequency (MHz)	Field Strength (μ V/m at 3m)
30-88	100
88-216	150
216-960	200
Above 960	500

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C and RSS-247.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (μ V/m).

5.2 TEST PROCEDURE

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m or 1.5m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
(below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. The test result is calculated as the following:
 - (1) Result = Reading + Correct Factor
 - (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
 - (3) Margin = Result - Limit

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1MHz VBW 3MHz peak detector for Pk value RMS detector for AV value

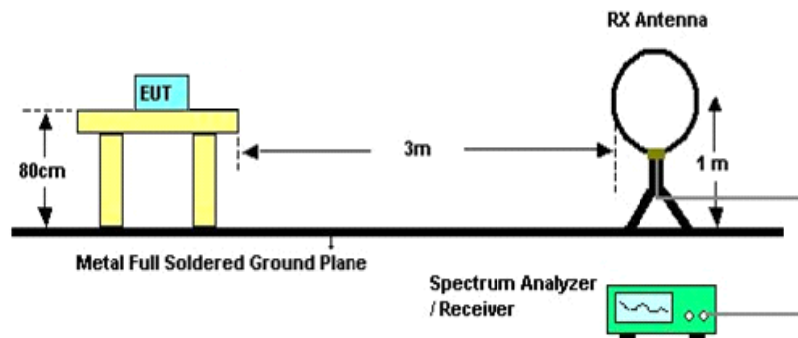
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

5.3 MEASUREMENT INSTRUMENTS LIST

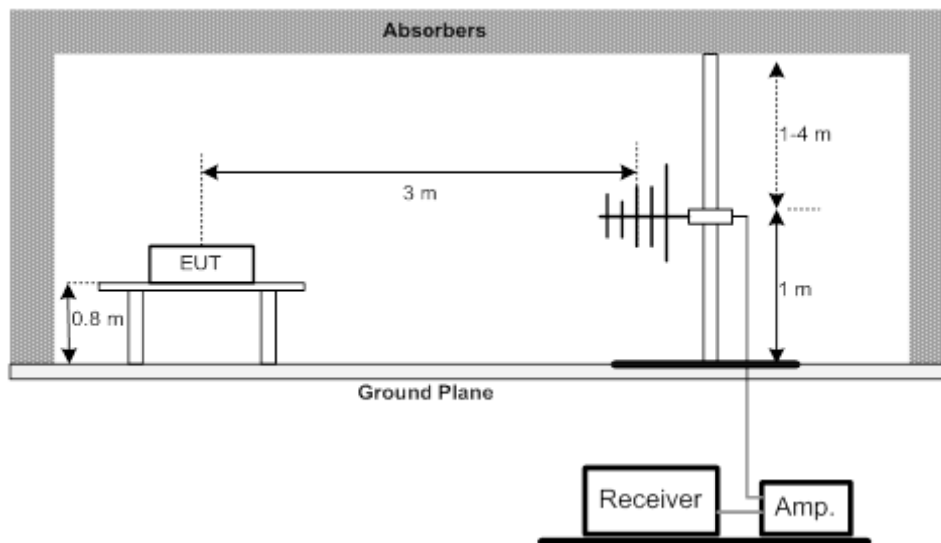
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	101307	12/17/2022
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/16/2022
3	Loop antenna	SCHWARZBECK	FMZB1519	1519-062	12/17/2022
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	08/05/2022
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	9120D 1065	04/18/2023
6	Preamplifier Amplifier	HP	8447F	3113A05680	12/19/2022
7	Pre-Amplifier	EMEC	EM01G26G	60679	04/18/2023
8	RF Cable	R&S	Test Cable 4	4	12/19/2022
9	RF Cable	R&S	Test Cable 5	5	12/19/2022
10	RF Cable	R&S	Test Cable 9	9	04/18/2023
11	RF Cable	R&S	Test Cable 10	10	12/19/2022
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

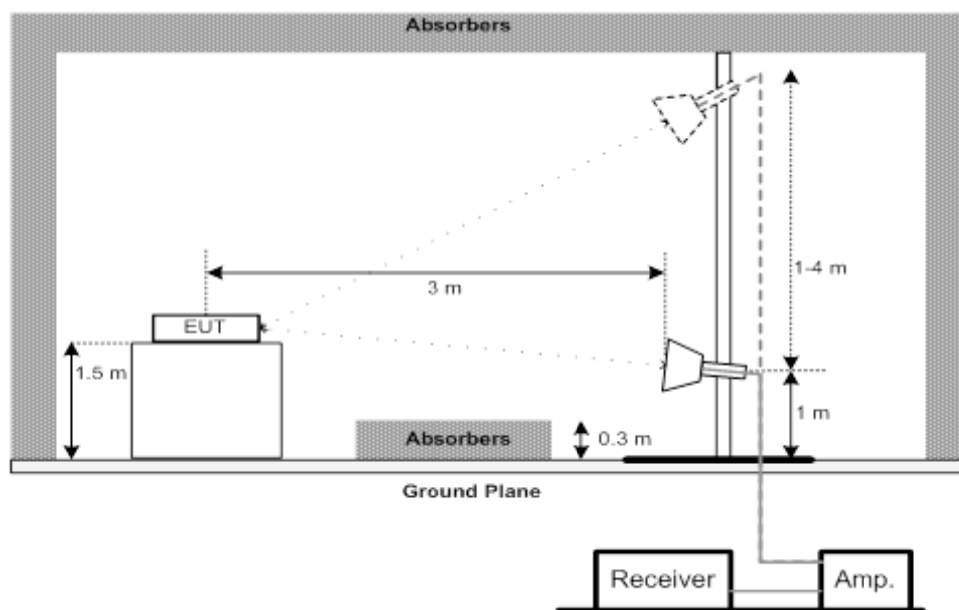
5.4 TEST SETUP

9 kHz-30 MHz



30 MHz to 1 GHz



Above 1 GHz**5.5 EUT OPERATING CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

5.6 TEST RESULT- 9kHz TO 30MHz

Test Mode:	BLE 1M TX Mode Channel 00
------------	---------------------------

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

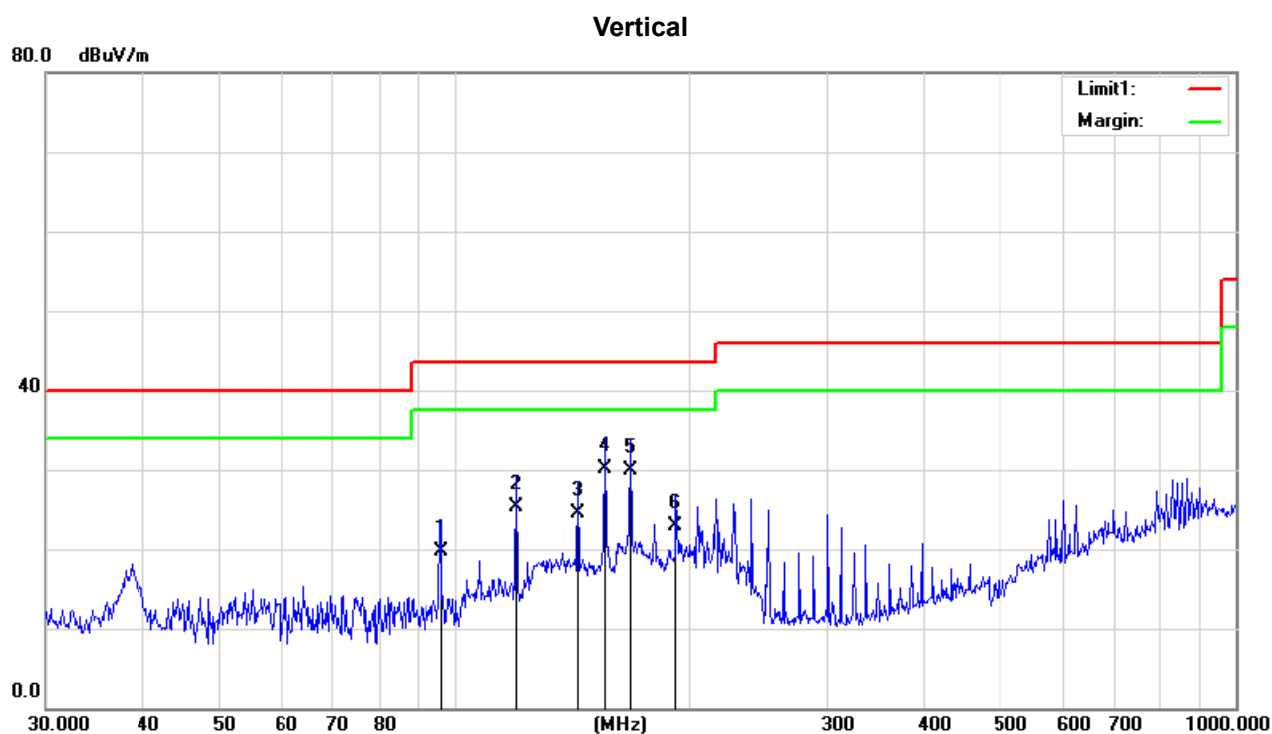
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance/test distance})$ (dB);

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

5.7 TEST RESULT- 30MHz TO 1000MHz

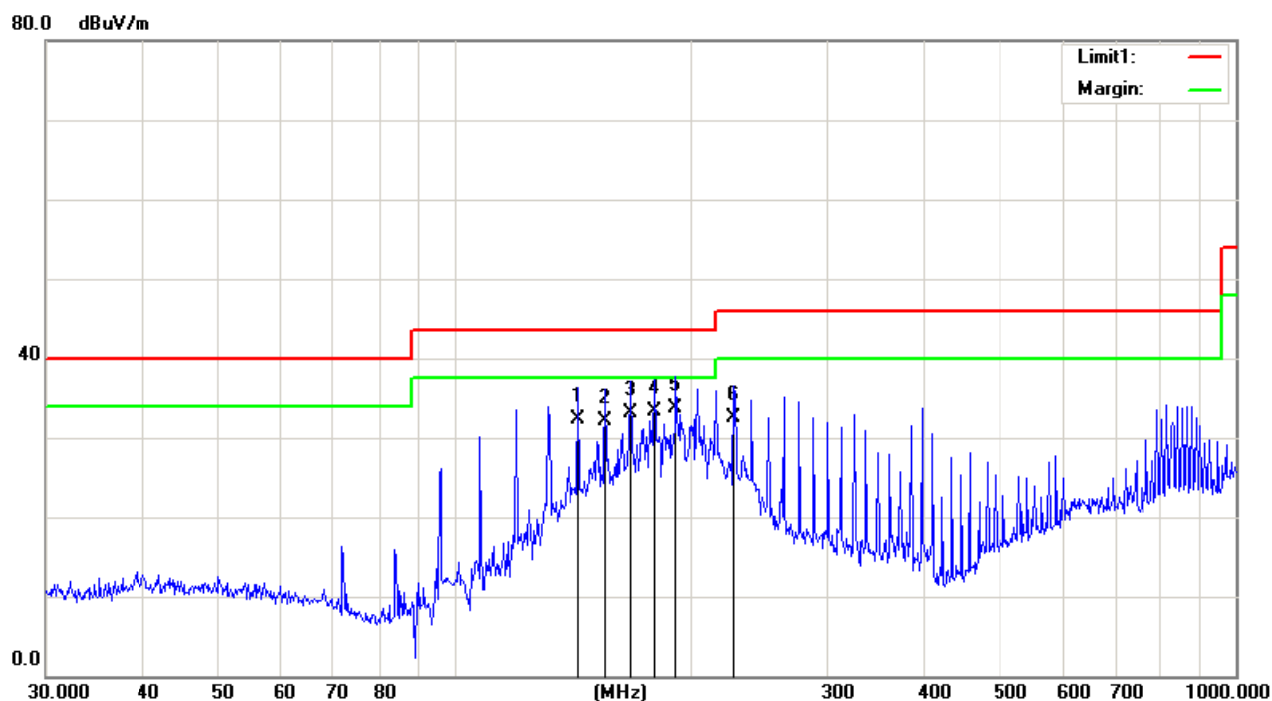
Test Mode : BLE 2M TX Mode Channel 19



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	96.0986	36.68	-17.05	19.63	43.50	-23.87	QP
2	119.8555	39.69	-14.38	25.31	43.50	-18.19	QP
3	143.8291	37.68	-13.16	24.52	43.50	-18.98	QP
4	155.9096	43.48	-13.31	30.17	43.50	-13.33	QP
5	167.8240	43.72	-13.85	29.87	43.50	-13.63	QP
6	191.7450	38.42	-15.46	22.96	43.50	-20.54	QP

Test Mode : BLE 2M TX Mode Channel 19

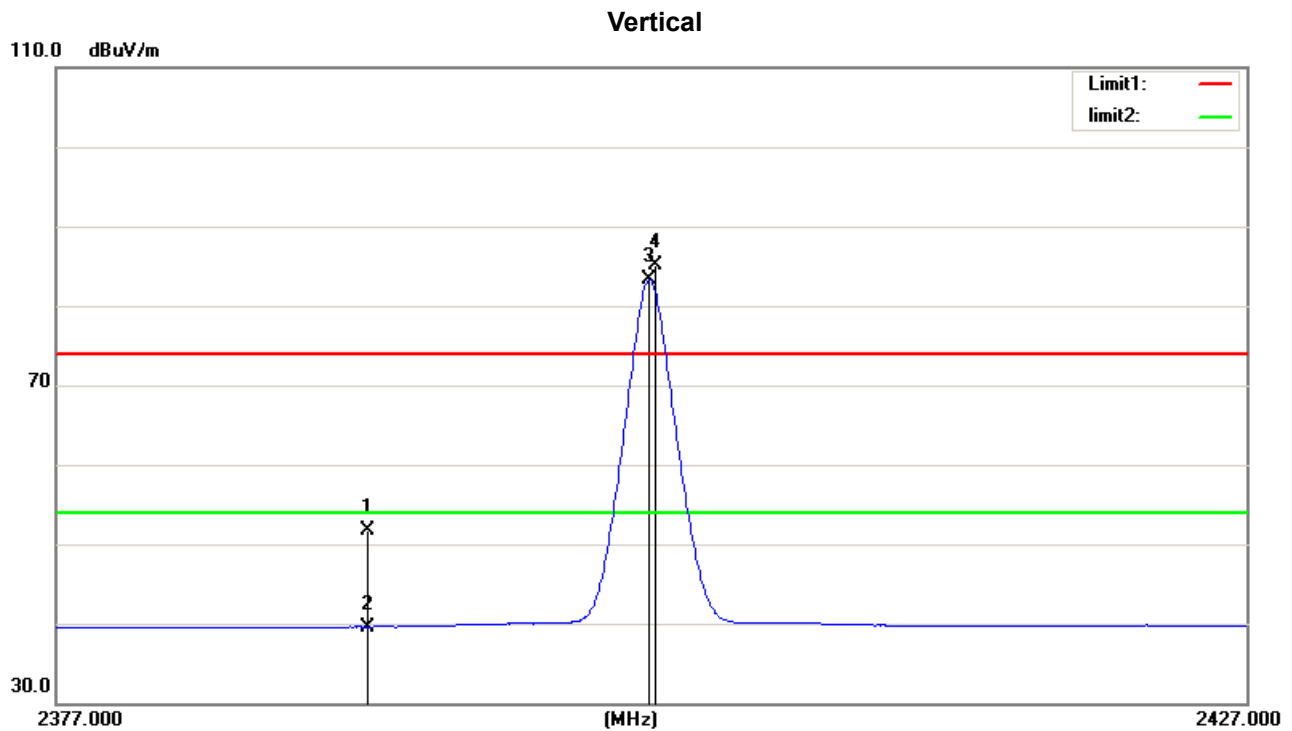
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	143.8291	45.50	-13.16	32.34	43.50	-11.16	QP
2	155.9096	45.37	-13.31	32.06	43.50	-11.44	QP
3	167.8240	47.00	-13.85	33.15	43.50	-10.35	QP
4	180.0165	47.85	-14.62	33.23	43.50	-10.27	QP
5	191.7450	49.10	-15.46	33.64	43.50	-9.86	QP
6	227.6904	47.53	-15.06	32.47	46.00	-13.53	QP

5.8 TEST RESULT- ABOVE 1000MHz(BAND EDGE)

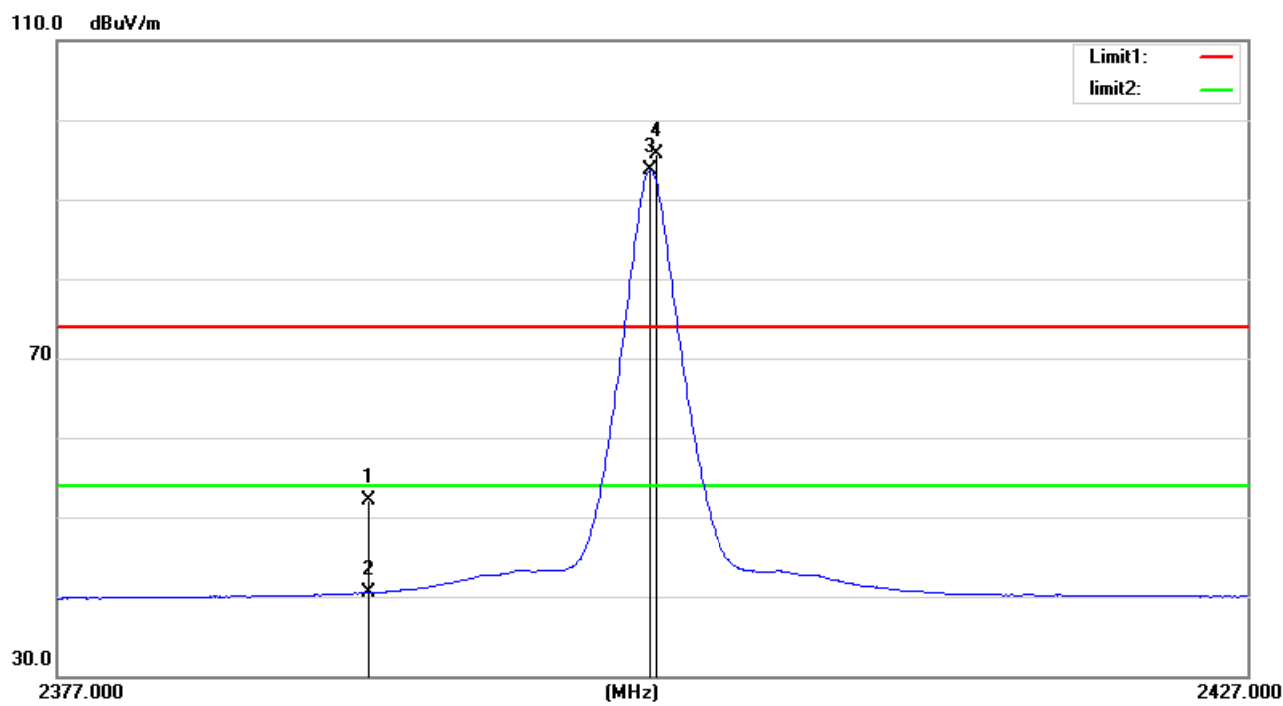
Test Mode: TX 2402 MHz_CH00_1Mbps



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	2390.000	22.29	29.47	51.76	74.00	-22.24	peak	150	190
2	2390.000	10.11	29.47	39.58	54.00	-14.42	AVG	150	190
3	2401.800	53.76	29.50	83.26	/	/	AVG	150	190
4	2402.050	55.65	29.51	85.16	/	/	peak	150	190

Test Mode: TX 2402 MHz_CH00_1Mbps

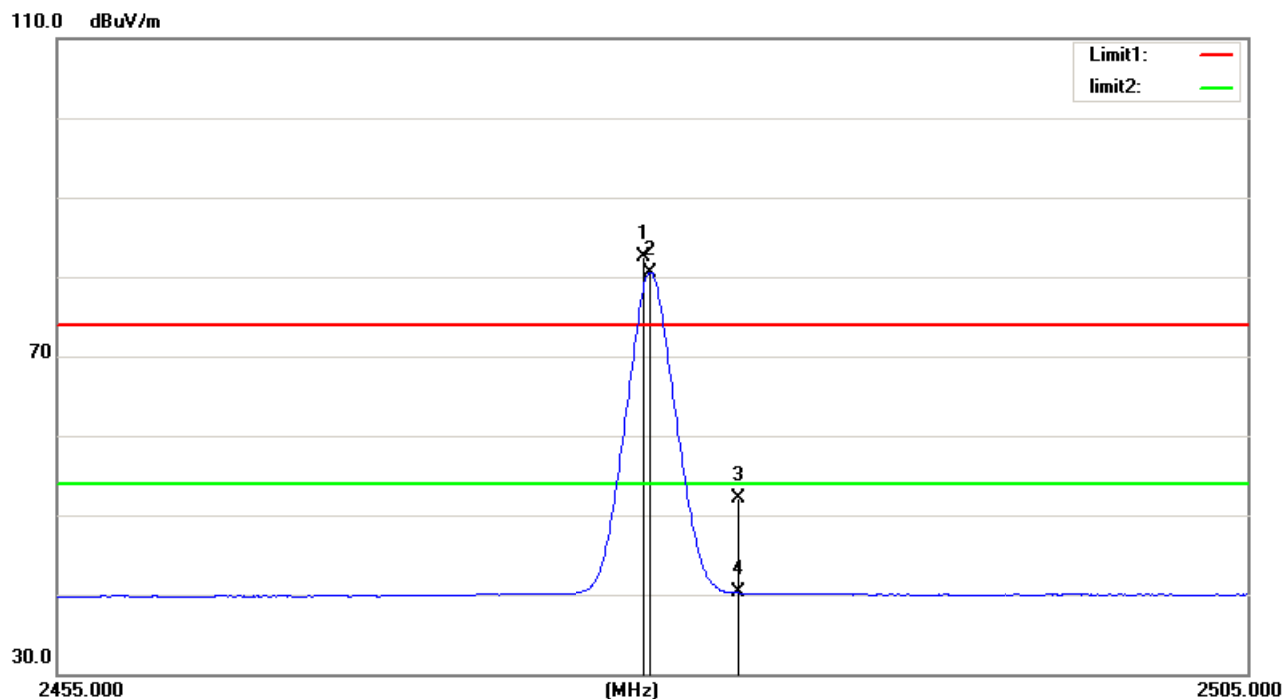
Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	2390.000	22.56	29.47	52.03	74.00	-21.97	peak	150	280
2	2390.000	10.98	29.47	40.45	54.00	-13.55	AVG	150	280
3	2401.800	64.18	29.50	93.68	/	/	AVG	150	280
4	2402.050	66.16	29.51	95.67	/	/	peak	150	280

Test Mode: TX 2480 MHz_CH39_1Mbps

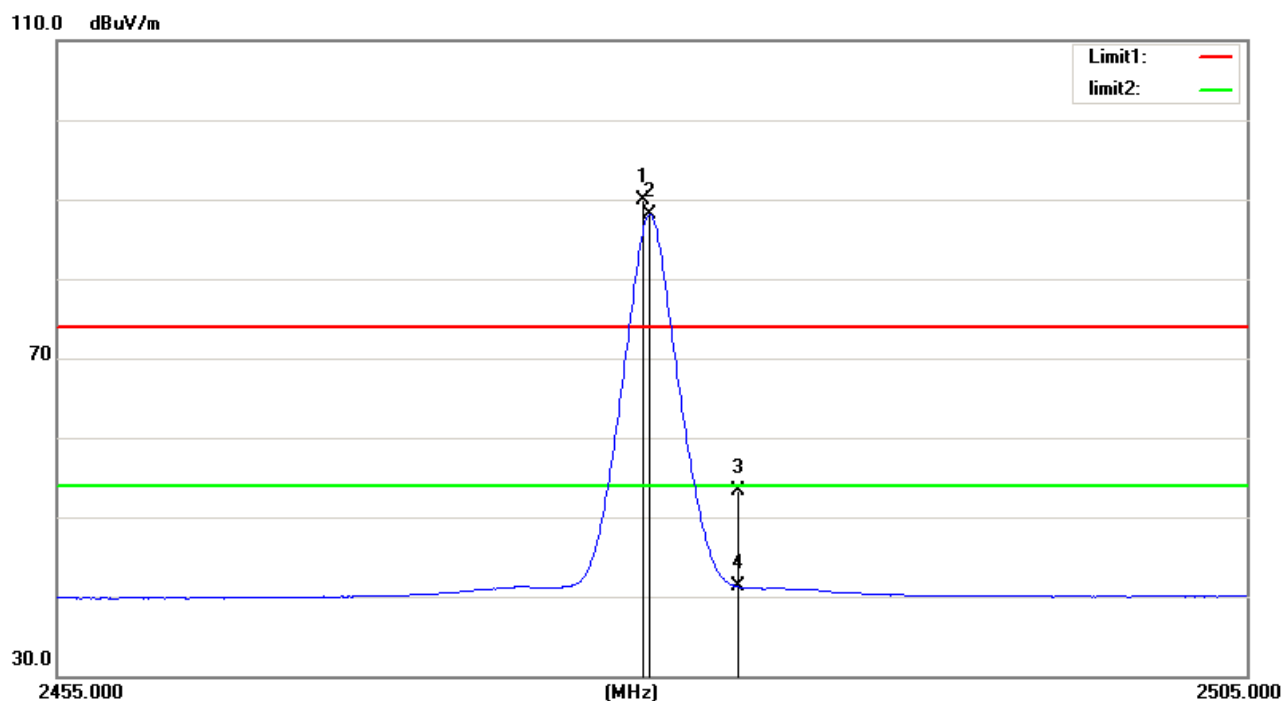
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	2479.550	52.88	29.72	82.60	/	/	peak	150	196
2	2479.800	50.87	29.72	80.59	/	/	AVG	150	196
3	2483.500	22.32	29.73	52.05	74.00	-21.95	peak	150	196
4	2483.500	10.48	29.73	40.21	54.00	-13.79	AVG	150	196

Test Mode: TX 2480 MHz_CH39_1Mbps

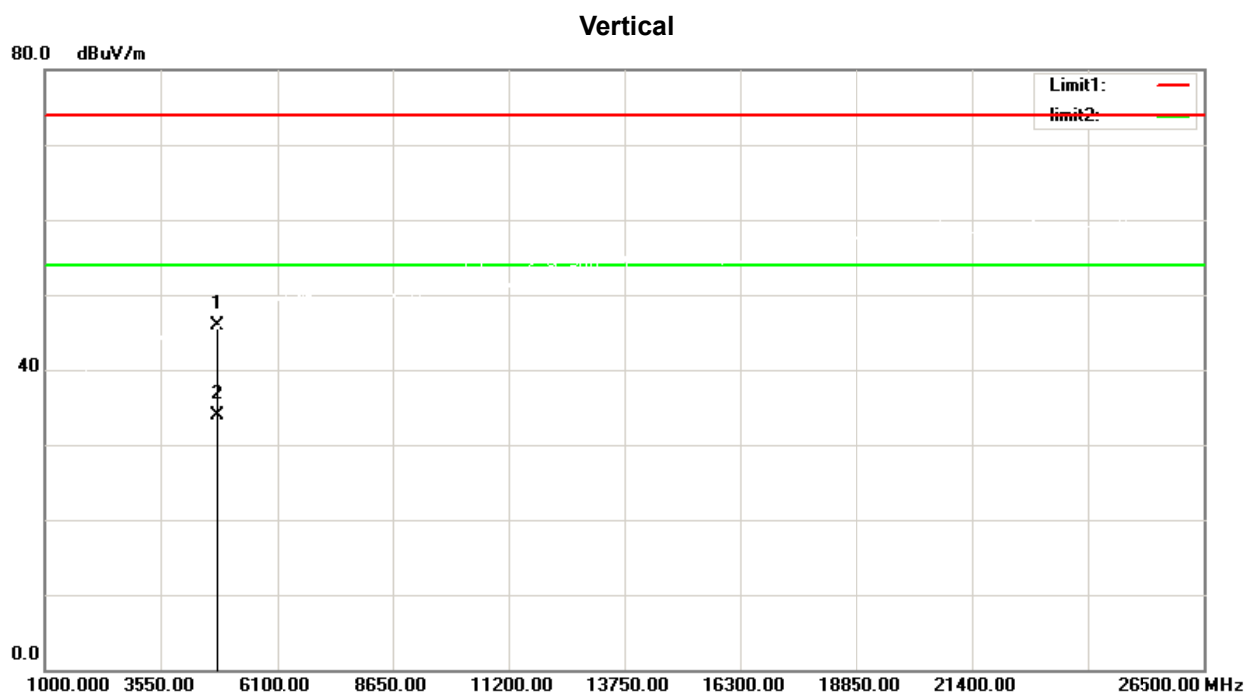
Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	2479.550	60.21	29.72	89.93	/	/	peak	150	275
2	2479.800	58.34	29.72	88.06	/	/	AVG	150	275
3	2483.500	23.47	29.73	53.20	74.00	-20.80	peak	150	275
4	2483.500	11.50	29.73	41.23	54.00	-12.77	AVG	150	275

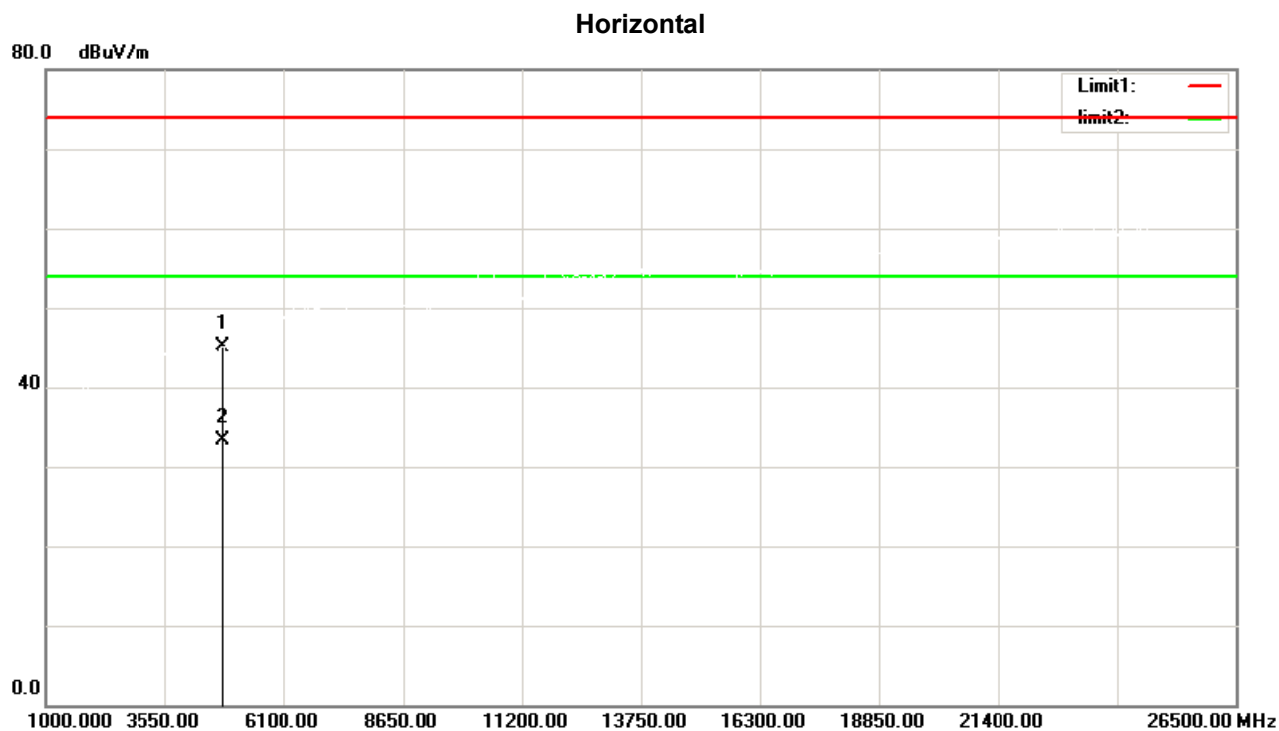
5.9TEST RESULTS - ABOVE 1000MHz(HARMONIC)

Test Mode: TX 2402 MHz_CH00_1Mbps



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	4804.000	53.88	-8.03	45.85	74.00	-28.15	peak	150	191
2	4804.000	42.00	-8.03	33.97	54.00	-20.03	AVG	150	191

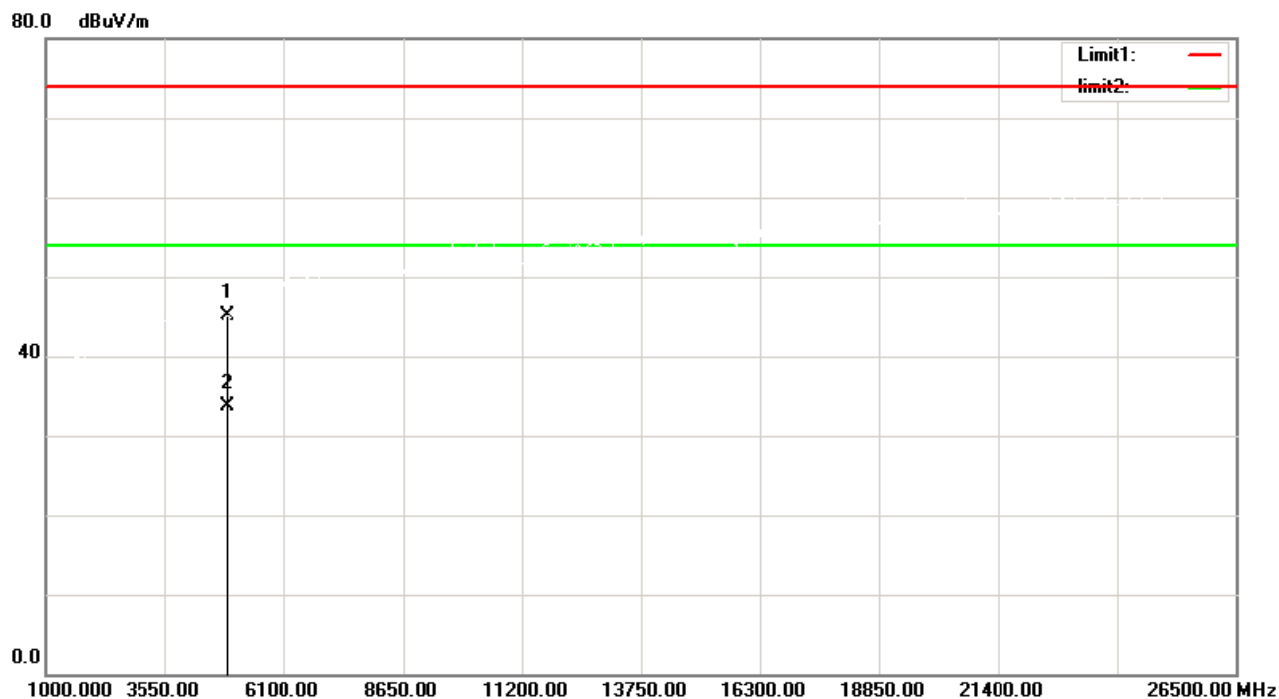
Test Mode: TX 2402 MHz_CH00_1Mbps



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	4804.000	53.06	-8.03	45.03	74.00	-28.97	peak	150	284
2	4804.000	41.40	-8.03	33.37	54.00	-20.63	AVG	150	284

Test Mode: TX 2440 MHz_CH19_1Mbps

Vertical

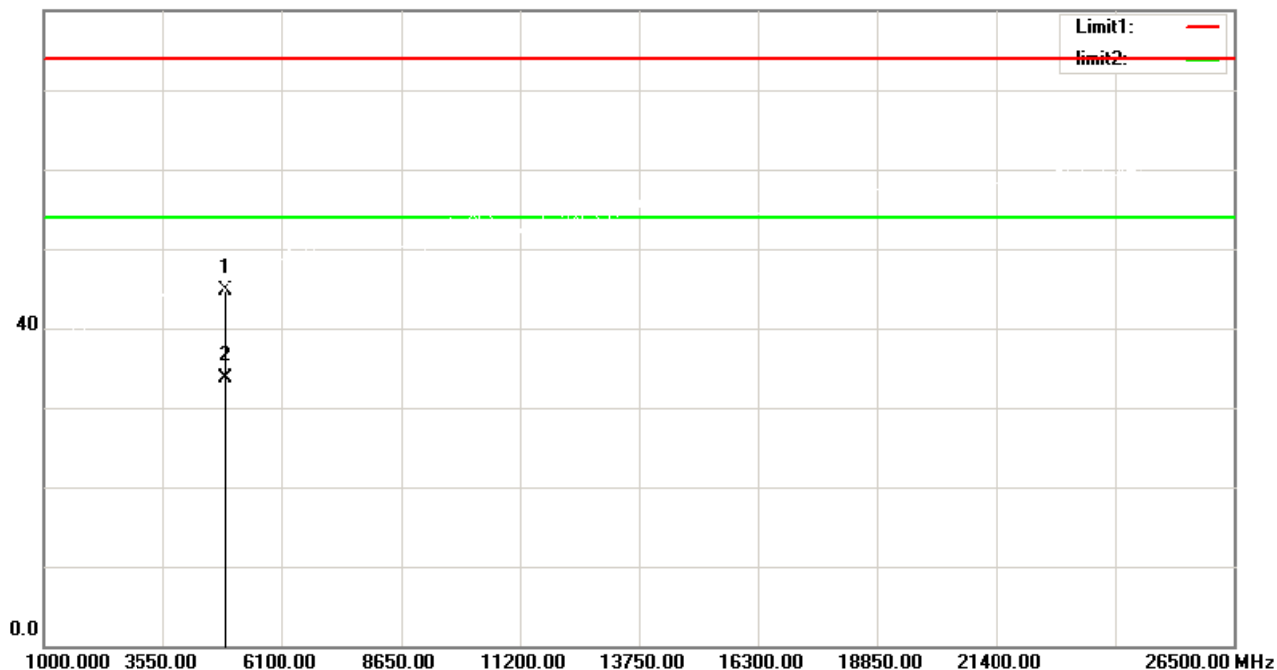


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	4880.000	52.89	-7.87	45.02	74.00	-28.98	peak	150	193
2	4880.000	41.56	-7.87	33.69	54.00	-20.31	AVG	150	193

Test Mode: TX 2440 MHz_CH19_1Mbps

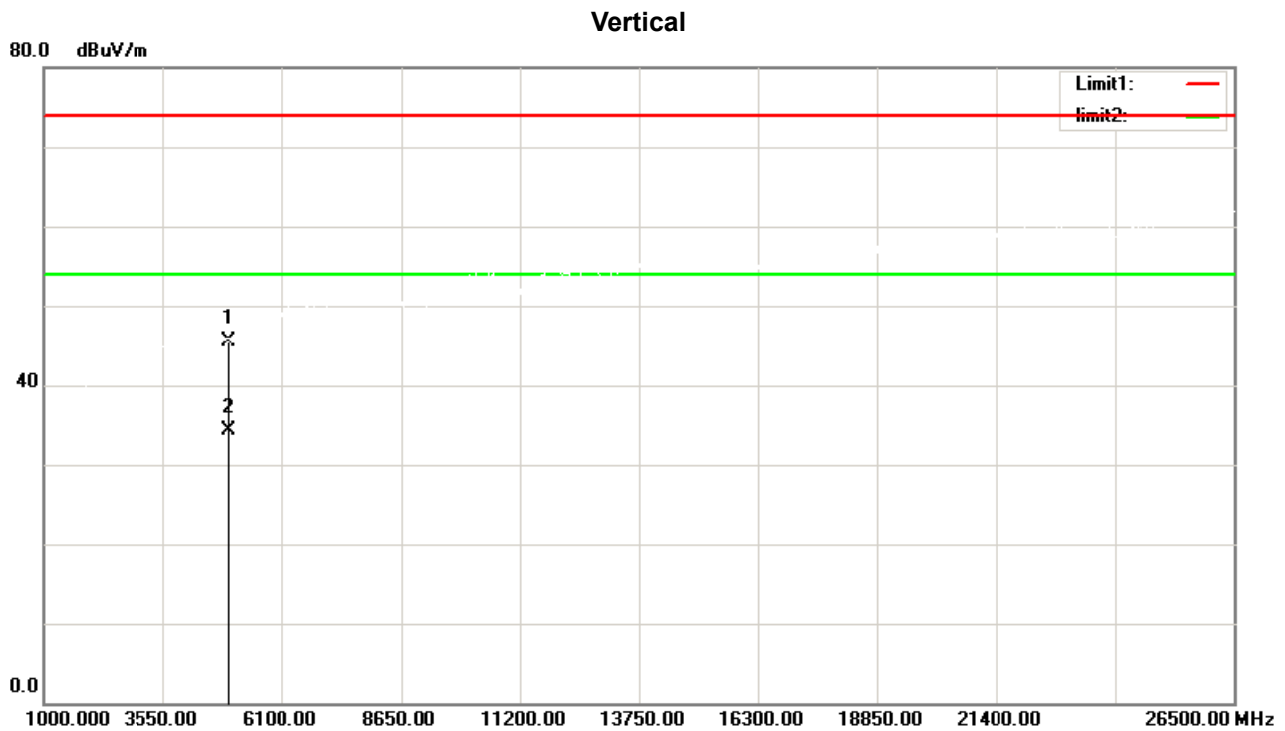
Horizontal

80.0 dBuV/m



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	4880.000	52.66	-7.87	44.79	74.00	-29.21	peak	150	274
2	4880.000	41.52	-7.87	33.65	54.00	-20.35	AVG	150	274

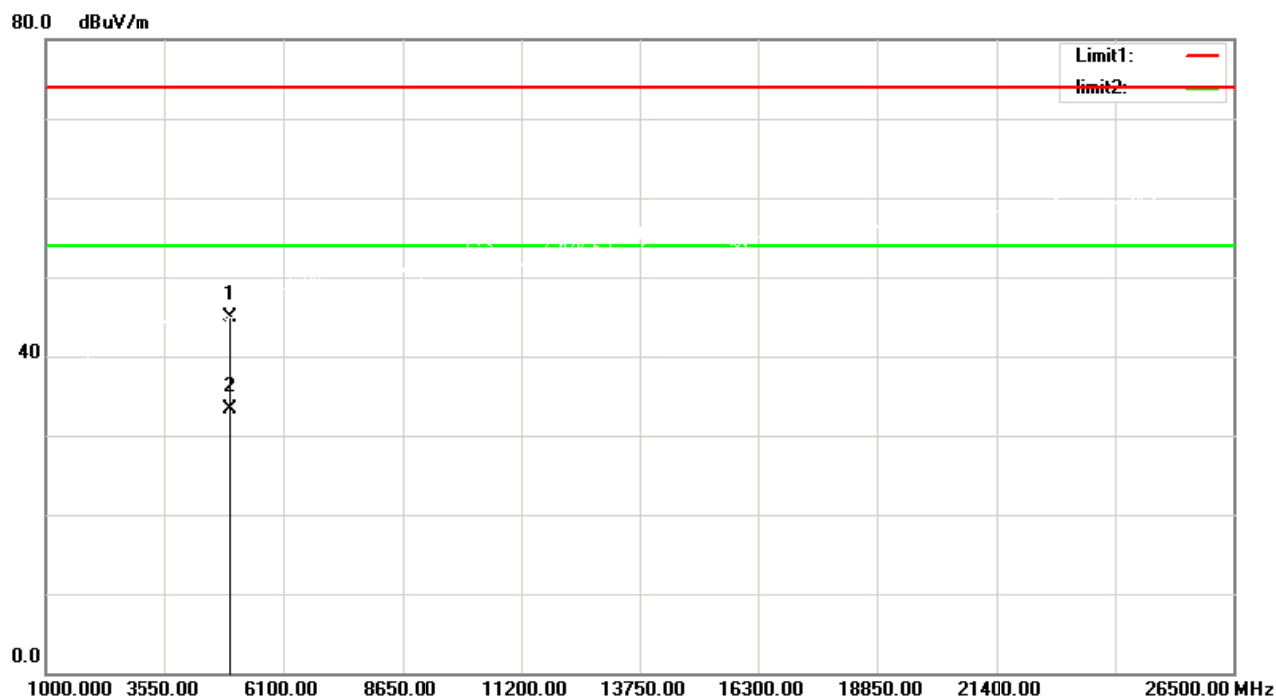
Test Mode: TX 2480 MHz_CH39_1Mbps



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	4960.000	53.31	-7.71	45.60	74.00	-28.40	peak	150	185
2	4960.000	41.97	-7.71	34.26	54.00	-19.74	AVG	150	185

Test Mode:	TX 2480 MHz_CH39_1Mbps
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Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark	Antenna Height	Table Degree
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		cm	Degree
1	4960.000	52.65	-7.71	44.94	74.00	-29.06	peak	150	277
2	4960.000	40.98	-7.71	33.27	54.00	-20.73	AVG	150	277

6BANDWIDTH TEST**6.1LIMIT**

FCC Part15, Subpart C (15.247)& RSS-Gen/ RSS-247		
Section	Test Item	Limit
15.247(a)(2) RSS-Gen6.7 RSS-247 5.2 (a)	Bandwidth	≥ 500 kHz (6dB bandwidth)

6.2TEST PROCEDURE AND SETTING

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting:
 For 6dB Bandwidth RBW= 100 kHz, VBW=300 kHz, Sweep time =Auto.
 For 99% Bandwidth RBW=30kHz, VBW=100kHz, Sweep time =Auto for 1Mbps.
 RBW=100kHz, VBW=300kHz, Sweep time =Auto for 2Mbps.

6.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2023/05/26
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

6.4TEST SETUP**6.5EUT OPERATION CONDITIONS**

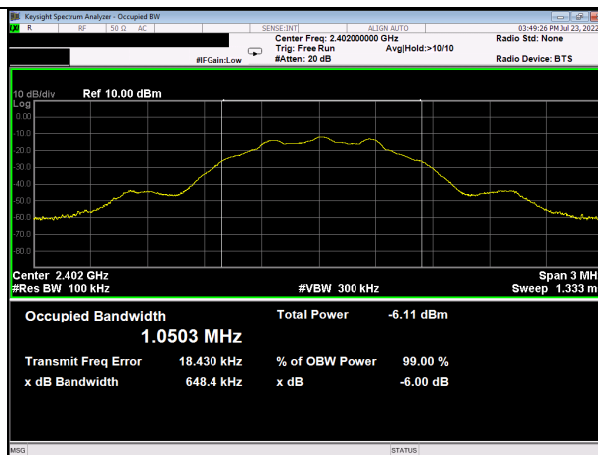
The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

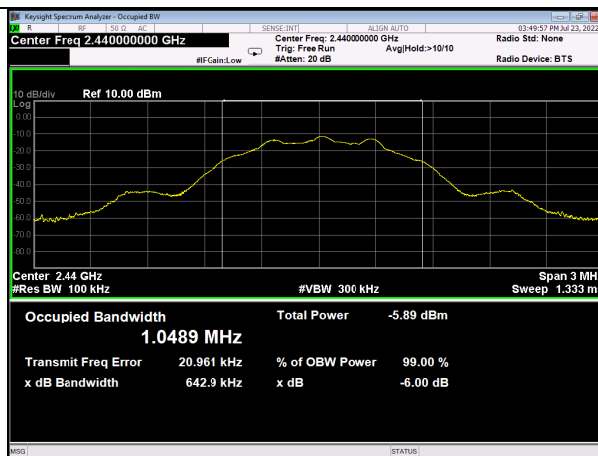
TX Mode_1Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	0.6484	1.0148	PASS
CH19	2440	0.6429	1.0128	PASS
CH39	2480	0.6450	1.0155	PASS

6dB

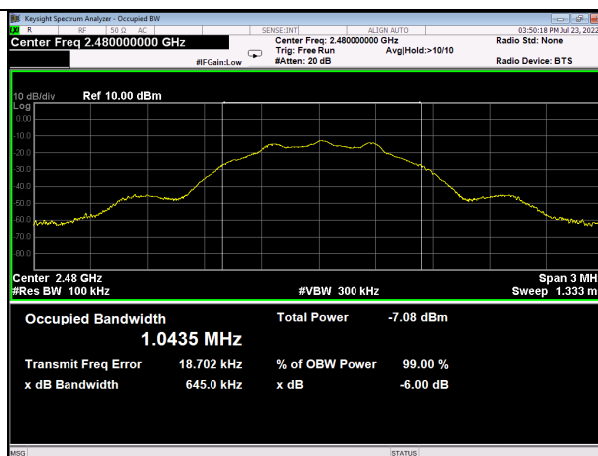
2402MHz



2440MHz

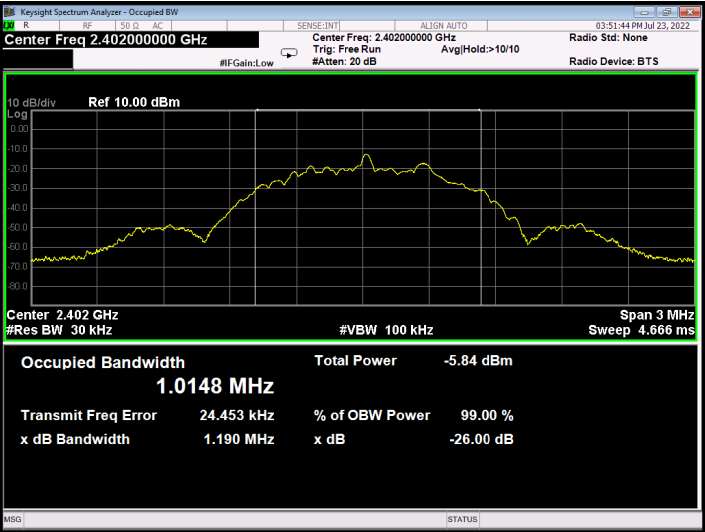


2480MHz

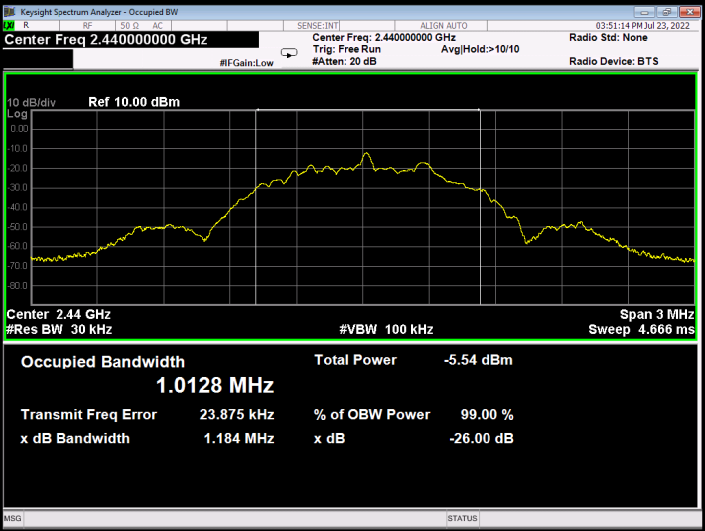


99%

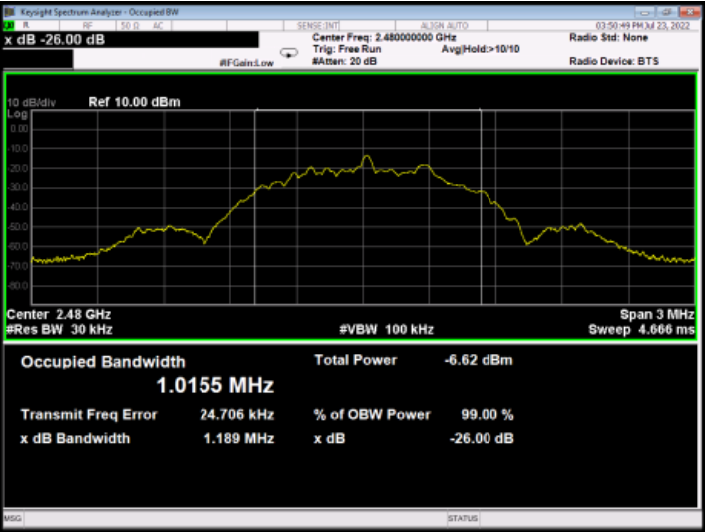
2402MHz



2440MHz



2480MHz



7.1 MAXIMUM OUTPUT POWER**7.1.1 LIMIT**

FCC Part15, Subpart C (15.247)&RSS-247		
Section	Test Item	Limit
15.247(b)(3) RSS-247.4 (d)	Maximum Output Power	1 watt or 30dBm

7.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The maximum conducted output power was performed in accordance with method 11.9.1.3(for peak power)ofANSI C63.10-2013.

7.3 MEASUREMENT INSTRUMENTS LIST

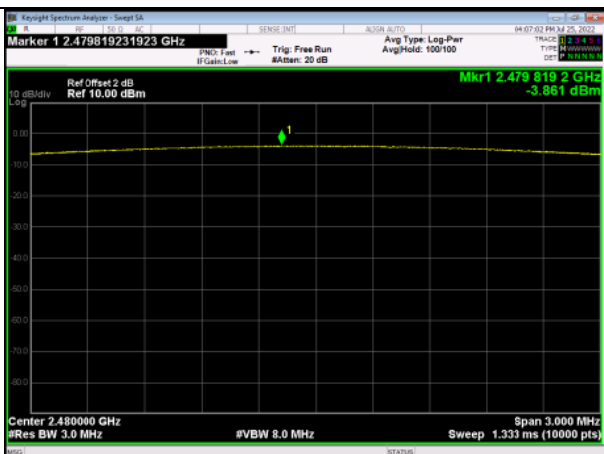
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2023/05/26
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

7.4 TEST SETUP**7.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	-0.497	0.000892	PASS
CH19	2440	-1.290	0.000743	PASS
CH39	2480	-3.861	0.000411	PASS
Limit	30dBm / 1W			

2402MHz	
2440MHz	
2480MHz	

8 CONDUCTED SPURIOUS EMISSION

8.1 LIMIT

For FCC

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

For ISCED

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting : RBW= 100 kHz, VBW=300 kHz, Sweep time = Auto.

8.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2023/05/26
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

8.4 TEST SETUP



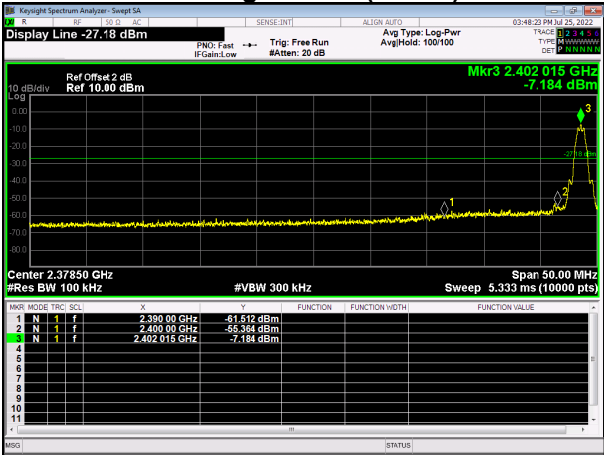
8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

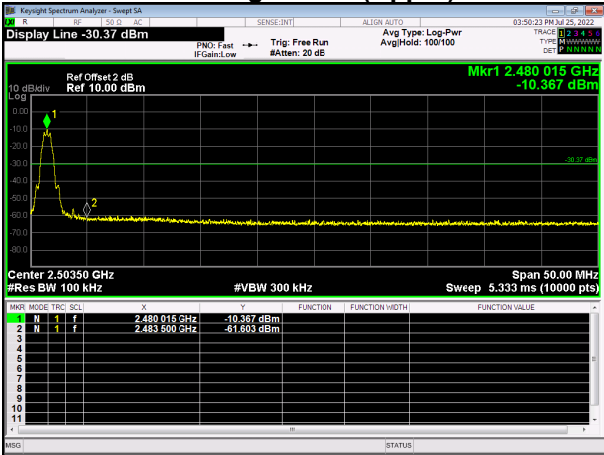
8.6 TEST RESULTS

TX Mode_1Mbps

Bandedge- CH00 (Lower)

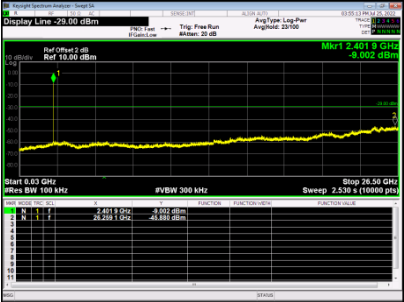


Bandedge CH39 (Upper)

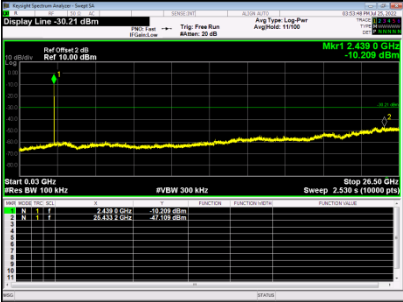


CH00 – 10th Harmonic of the fundamental frequency

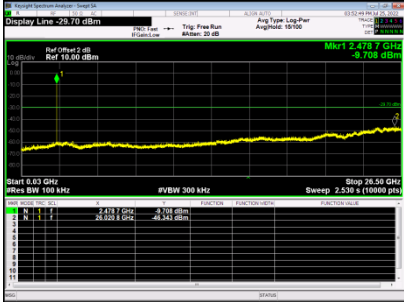
2402MHz



2440MHz



2480MHz



9. POWER SPECTRAL DENSITY TEST**9.1 LIMIT**

FCC Part15, Subpart C (15.247)&RSS-247		
Section	Test Item	Limit
15.247(e) RSS-247.2 (b)	Power Spectral Density	8 dBm (in any 3 kHz)

9.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting: RBW=3 kHz, VBW=10kHz, Sweep time = auto.

9.3 MEASUREMENT INSTRUMENTS LIST

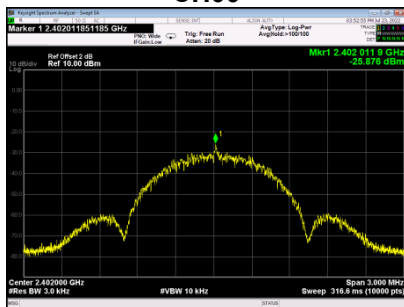
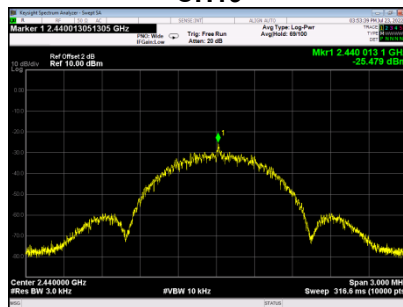
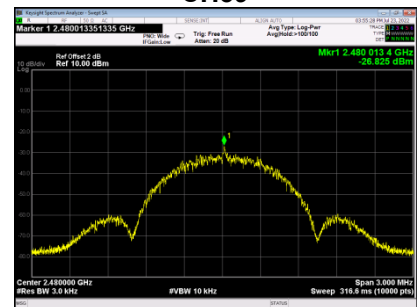
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2023/05/26
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

9.4 TEST SETUP**9.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3KHz	Result
CH00	2402	-25.876	8	PASS
CH19	2440	-25.479	8	PASS
CH39	2480	-26.825	8	PASS

CH00**CH19****CH39****END OF TEST REPORT**