FCC RADIO TEST REPORT
FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.249**
Trade name	**CubTEK**
Product name	**24GHz 6PIN BSD SYSTEM**
Model No.	**B122-030, B122-030XXX, B122-030XXX-XXX { Where X may be any alpha character “a”-“z”, ”A”-“Z”, or numeric character “0”-“9”,or -, (,) , or blank or combination of alpha and numeric characters.}**
Test Result	**Pass**
Statements of Conformity	**Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:

Kevin Tsai
Deputy Manager

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	December 1, 2020	Initial Issue	ALL	Allison Chen
01	December 11, 2020	See the following Note Rev.(01)	P.4, P.28-30	Allison Chen

Note:
Rev.(01)
1. Revised applicant address.
2. Added remark description for 40G-110GHz limit.

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	CUBTEK INC Rm. 7, 6F., No.38, Taiyuan St., Zhubei City, Hsinchu County, Taiwan, 30265
Manufacturer	CUB ELECPARTS INC No. 6, Lane 546, Sec. 6, Changlu Road, Fuhsin Township, Changhua County, Taiwan
Equipment	24GHz 6PIN BSD SYSTEM
Model Name	B122-030, B122-030XXX, B122-030XXX-XXX { Where X may be any alpha character “a”-“z”, ”A”-“Z”, or numeric character “0”-“9”,or -, (,) , or blank or combination of alpha and numeric characters.}
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of {Where X may be any alpha character “a”-“z”, ”A”-“Z”, or numeric character “0”-“9”,or -, (,) , or blank or combination of alpha and numeric characters.} on model number is just for marketing purpose only.
Trade Name	CubTEK
EUT Functions	24G Radar
Received Date	September 24, 2020
Date of Test	October 27 ~ November 3, 2020
Output Power	Peak : 115.57 dBuV/m @1m Average : 53.38 dBuV/m @1m
Power Operation	Power by power supply. (DC 12V)

Note:

1. Disclaimer: The variant model numbers / trademarks are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.2 EUT CHANNEL INFORMATION

Frequency Range	24.0 ~ 24.25 GHz
Modulation Type	FMCW
Number of channel	1

1.3 ANTENNA INFORMATION

Antenna Type	Array antenna
Antenna Gain	7 dBi
Antenna Connector	N/A

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87
3M Semi Anechoic Chamber / 40G~60G	+/- 1.8509
3M Semi Anechoic Chamber / 60G~90G	+/- 3.43
3M Semi Anechoic Chamber / 90G~140G	+/- 3.52

Remark:
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	-	Not applicable, because EUT doesn't connect to AC Main Source direct.
Radiation	Jerry Chang	-
RF Conducted	Dally Hong	-

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6 INSTRUMENT CALIBRATION

Conducted Emissions Test Site					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Cal Due**
Horn Antenna	ETS LINDGREN	3116	00026370	12/18/2019	12/17/2020
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	12/17/2019	12/16/2020
K Type Cable	Huber+Suhner	SUCOFLEX 102	22470/2	12/17/2019	12/16/2020
Pre-Amplifier	EMEC	EM01G26G	060570	06/29/2020	06/28/2021
Signal Analyzer	R&S	FSV 40	101073	09/17/2020	09/16/2021
Software	N/A				

Below 40GHz

3M 966A Chamber Test Site					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Cal Due**
Bilog Antenna	Sunol Sciences	JB3	A030105	07/24/2020	07/23/2021
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/25/2020	02/24/2021
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/19/2020	09/18/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/15/2020	01/14/2021
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021
High Pass Filters	MICRO TRONICS	HPM13195	003	02/25/2020	02/24/2021
Horn Antenna	ETS LINDGREN	3116	00026370	12/18/2019	12/17/2020
Loop Ant	COM-POWER	AL-130	121051	03/27/2020	03/26/2021
Pre-Amplifier	EMEC	EM330	060609	02/25/2020	02/24/2021
Pre-Amplifier	HP	8449B	3008A00965	02/25/2020	02/24/2021
Pre-Amplifier	MITEQ	AMF-6F-18004000-37-8P	985646	09/02/2020	09/01/2021
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	07/24/2020	07/23/2021
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

Above 40GHz

3M 966A Chamber Test Site					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Cal Due**
Coaxial Cable	Woken	WC12	CC001	06/29/2020	06/28/2021
Coaxial Cable	Woken	WC12	CC003	06/29/2020	06/28/2021
Horn Antenna / Harmonic Mixer	ROHDE&SCHWARZ	FH-PP-110 / FS-Z110	10003 / 100096	12/09/2019	12/08/2021
Horn Antenna / Harmonic Mixer	A-INFOMW / ROHDE&SCHWARZ	LB-19-20-A / FS-Z60	J202020872 / 100142	12/09/2019	12/08/2021
Horn Antenna / Harmonic Mixer	ROHDE&SCHWARZ	FH-PP-75 / FS-Z75	10001 / 100162	12/09/2019	12/08/2021
Signal Analyzer	R&S	FSV 40	101073	09/17/2020	09/16/2021
Coaxial Cable	Woken	WC12	CC001	06/29/2020	06/28/2021
Coaxial Cable	Woken	WC12	CC003	06/29/2020	06/28/2021
Software	e3 6.11-20180413				

Remark: Each piece of equipment is scheduled for calibration once a year.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 15.249.

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2. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	4.1	AC Conducted Emission	N/A
15.215	4.2	20dB Bandwidth and Occupied Bandwidth (99%)	Pass
15.249(a)	4.3	Filed strength of fundamental	Pass
15.249(a)	4.3	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	**Radiated Emission Above 1G**
Power supply Mode	**Mode 1: EUT power by Power supply**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Worst Position	☒ **Placed in fixed position at Y-Plane (E1-Plane)**

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT power by Power supply**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in axis Y and two polarity, for radiated measurement. The worst case(Y-Plane) were recorded in this report

4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.

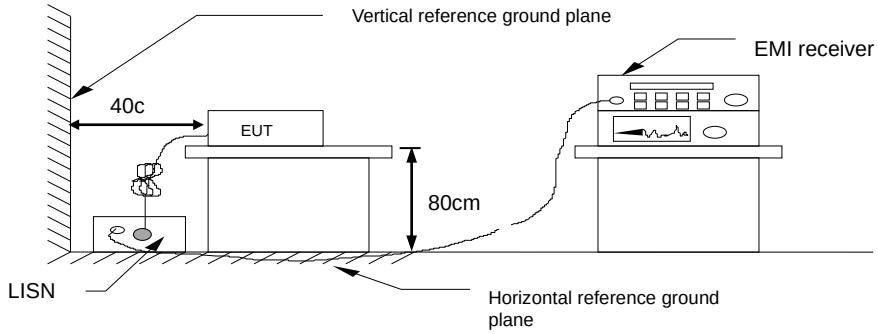
2. EUT connected to the line impedance stabilization network (LISN)

3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.

4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

5. Recorded Line for Neutral and Line.

4.1.3 Test Setup

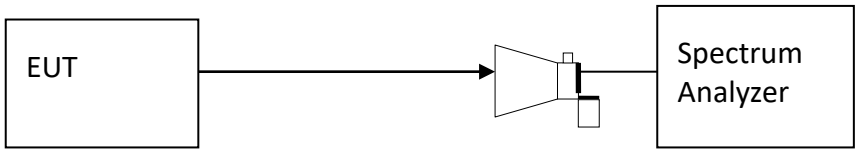


4.1.4 Test Result

Not applicable, because EUT doesn't connect to AC Main Source direct.

4.2 20dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

TEST CONFIGURATION



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth and 20dB Bandwidth
3. Measure and record the result of 20 dB Bandwidth and 99% Bandwidth. in the test report.

TEST RESULTS

No non-compliance noted

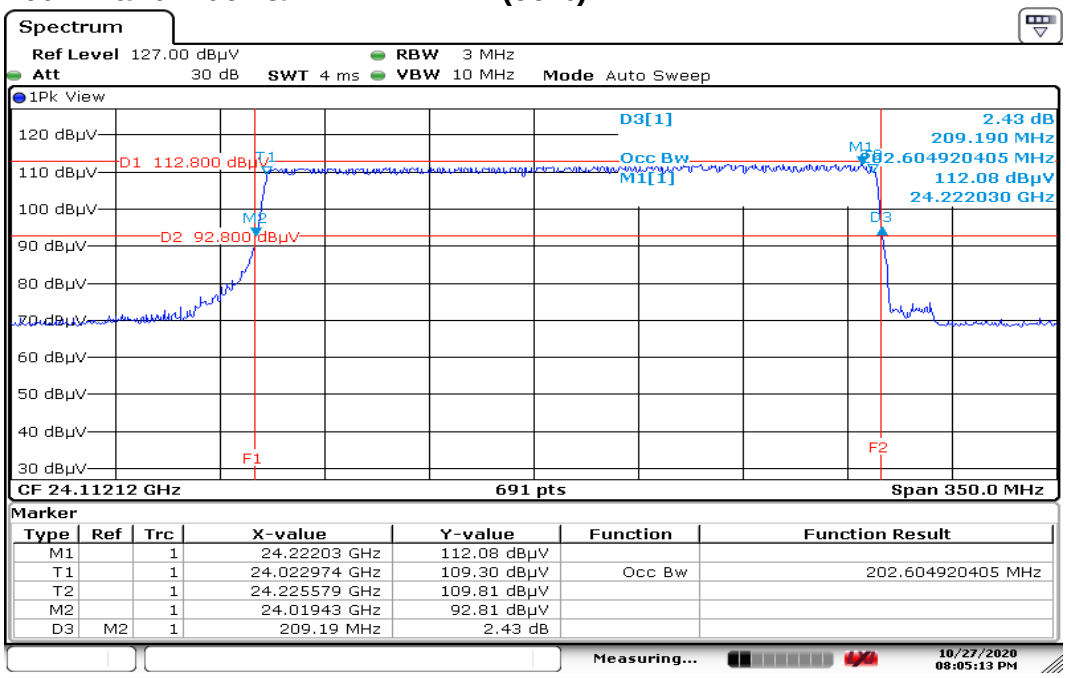
Temperature: 25℃ **Humidity:** 50% RH

Tested by: Dally Hong

Test Condition	Frequency(GHz)	Occupied Bandwidth 99% (MHz)	20 dB Bandwidth (MHz)
24G Radar	24.0 ~ 24.25	202.6049	209.19

Test Plot

20dB Bandwidth & BANDWIDTH (99%)



Date: 27.OCT.2020 20:05:11

4.3 FIELD STRENGTH OF FUNDAMENTAL AND RADIATION SPURIOUS EMISSION

4.3.1 Test Limit

FCC according to §15.249(a).

(1) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

* Field strength limits are specified at a distance of 3 meters

Fundamental Limit Conversion			
Average (mV/m) at 3M	Average (dBuV/m) at 3M	Average (dBuV/m) at 1M	Peak (dBuV/m) at 1M
250	107.9588	117.50	137.50

*(Limit=107.9588+20LOG(3/1)=117.50 dBuV/m)

Harmonic Limit Conversion			
Average (uV/m) at 3M	Average (dBuV/m) at 3M	Average (dBuV/m) at 1M	Peak (dBuV/m) at 1M
2500	67.9588	77.50	97.50

*(Limit=67.9588+20LOG(3/1)=77.50 dBuV/m)

(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209(follow the table), whichever is the lesser attenuation

Below 30 MHz

Frequency	Field Strength (μA/m)	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

4.3.2 Test Procedure

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m, below 1 GHz and above 40G is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.

3. The measurement distance above 40 GHz is set 15cm away from the receiving antenna.

4. The SA setting following：

(1) Below 1G：RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak,

(2) Above 1G：

(2.1) For Peak measurement：RBW = 1MHz, VBW ≥ 3 RBW.

(2.2) For Average measurement：RBW = 1MHz, VBW = 10Hz.

Note: the measurement distance of the Fundamental frequency is 1m.

The measurement distance 30 MHz to 1 GHz is set 3m away from the receiving antenna.
The measurement distance 1 GHz to 40 GHz is set 1m away from the receiving antenna.

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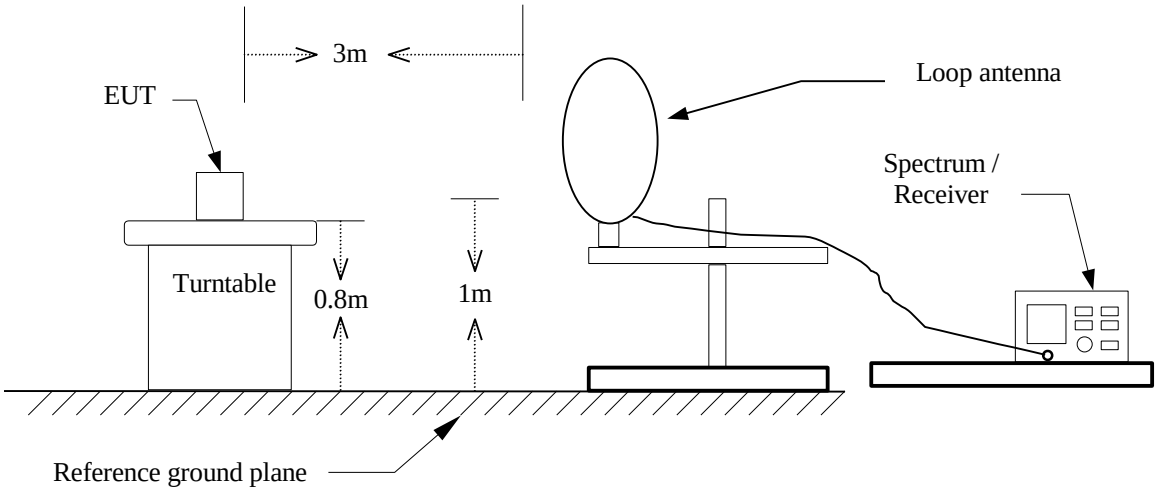
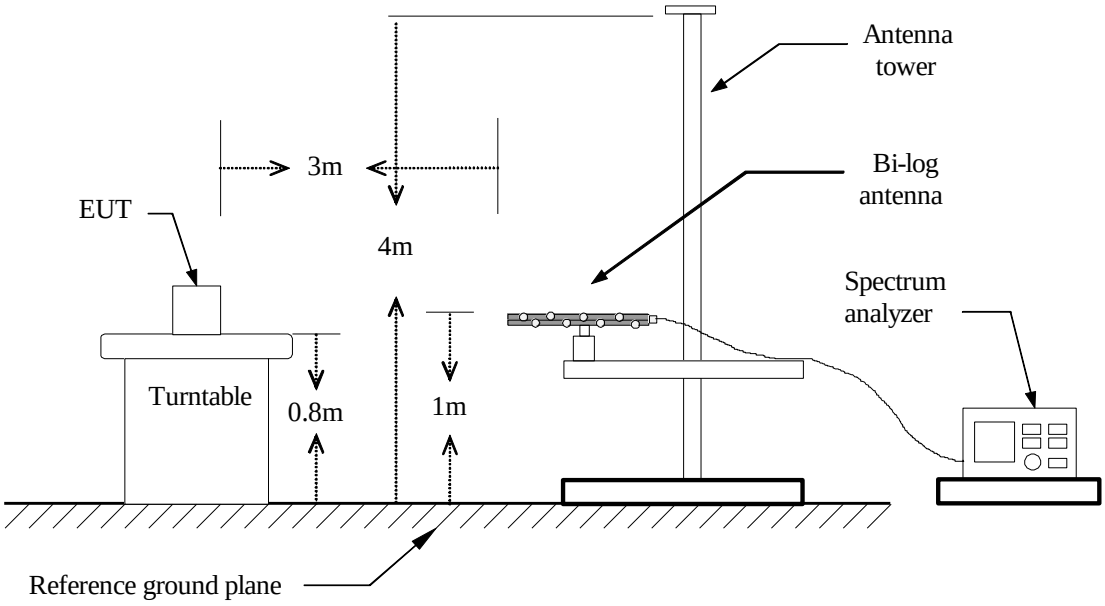
4.3.3 Test Setup

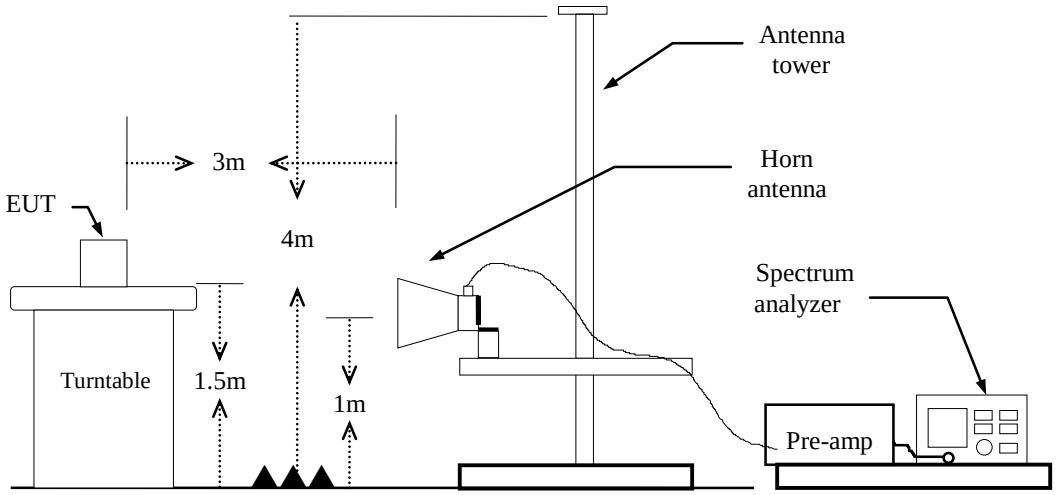
9kHz ~ 30MHz



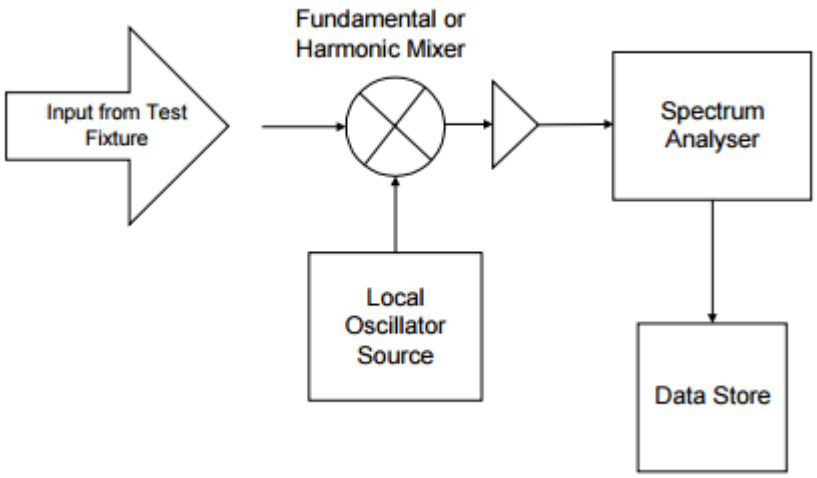
30MHz ~ 1GHz



Above 1 GHz



Above 40 GHz



4.3.4 Test Result

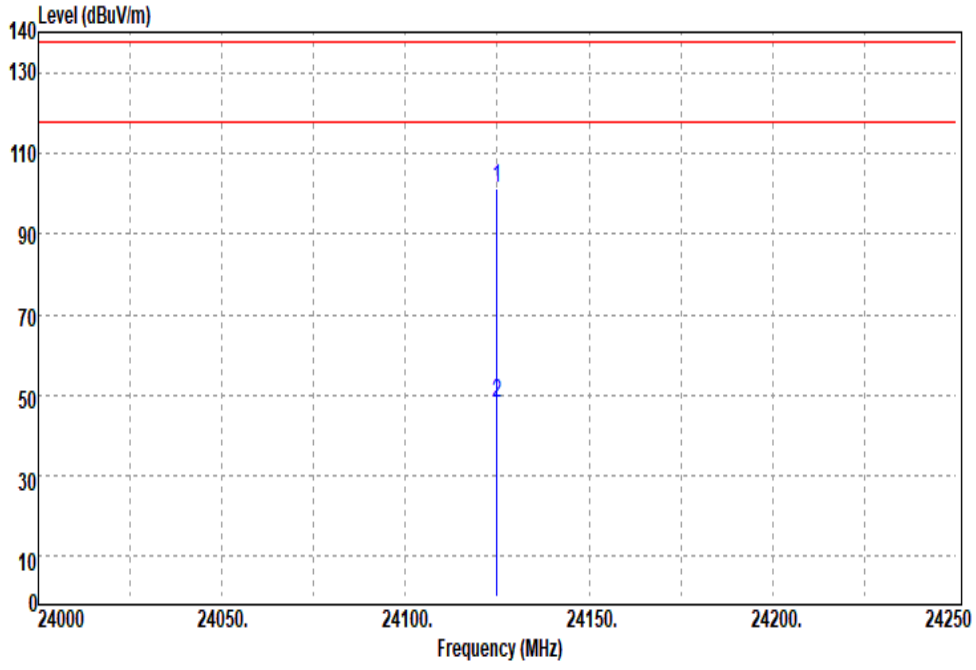
24.125GHz

Freq. (MHz)	Peak Value (dBuV/m)	Average Value (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result	Antenna Polarization (V/H)
24125.00	101.25	48.06	137.49	117.49	Pass	V
24125.00	115.57	53.38	137.49	117.49	Pass	H

Test Data

(1) Filed strength of fundamental :

Test Mode:	TX-24GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	Fundamental	Test Date	October 27, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak & Average		



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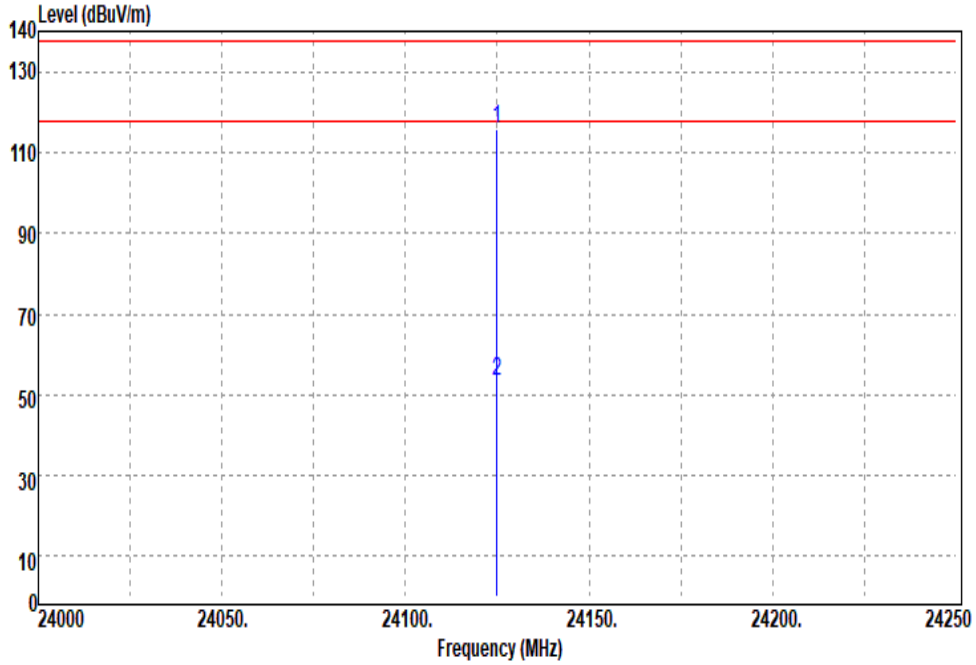
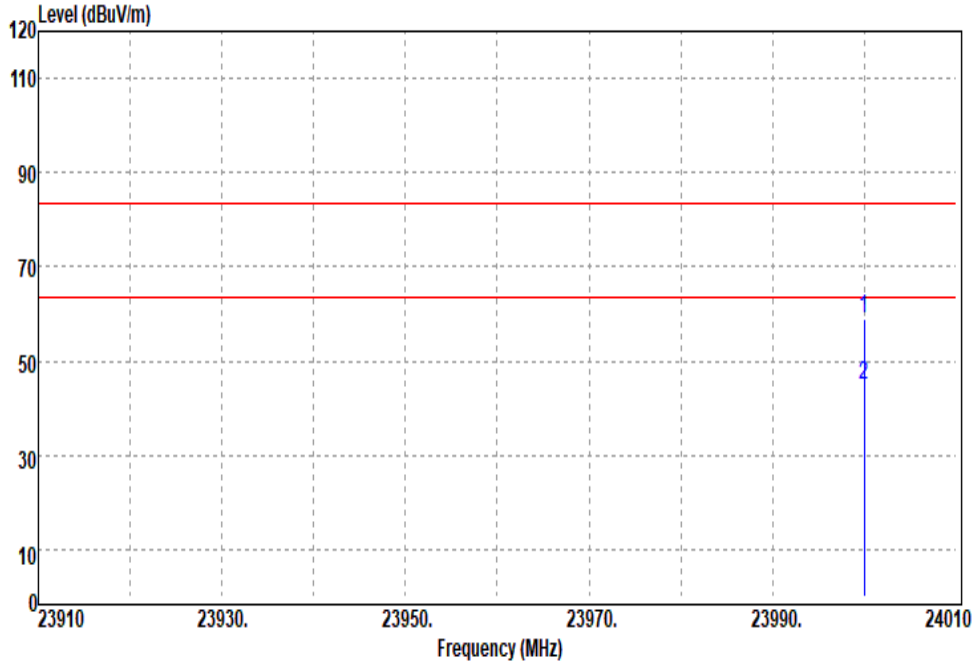
Test Mode:	TX-24GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	Fundamental	Test Date	October 27, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak & Average		



(2) Band Edge Test Data

24.125GHz

Test Mode:	24 GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	Band Edge	Test Date	October 27, 2020
Polarize	Vertical	Test Engineer	Jerry Chang



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	24000.00	44.47	14.29	58.76	83.54	-24.78	Peak
2	24000.00	30.38	14.29	44.67	63.54	-18.87	Average

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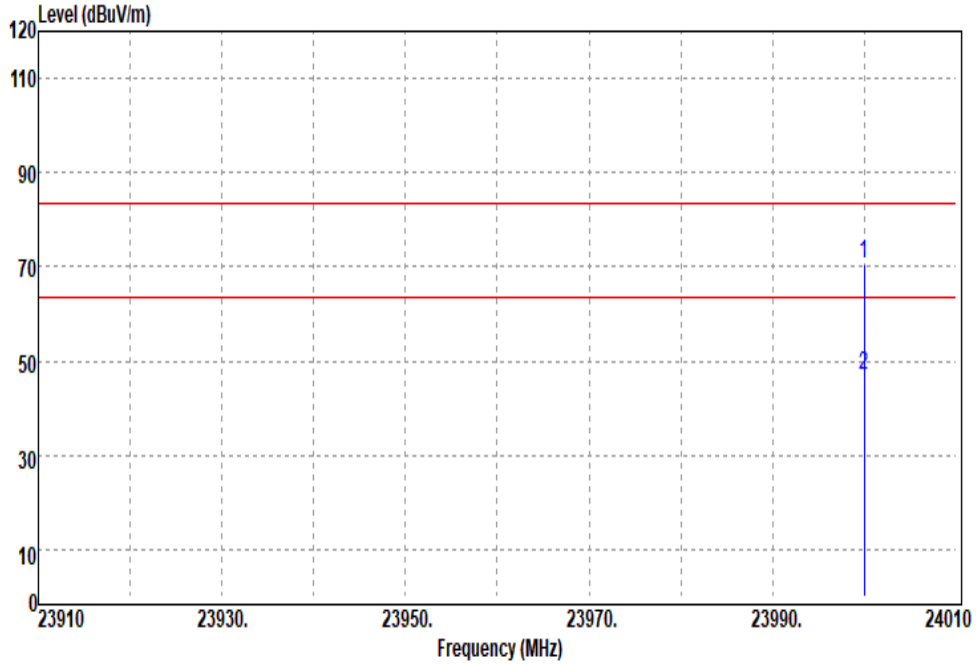
Test Mode:	24 GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	Band Edge	Test Date	October 27, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang

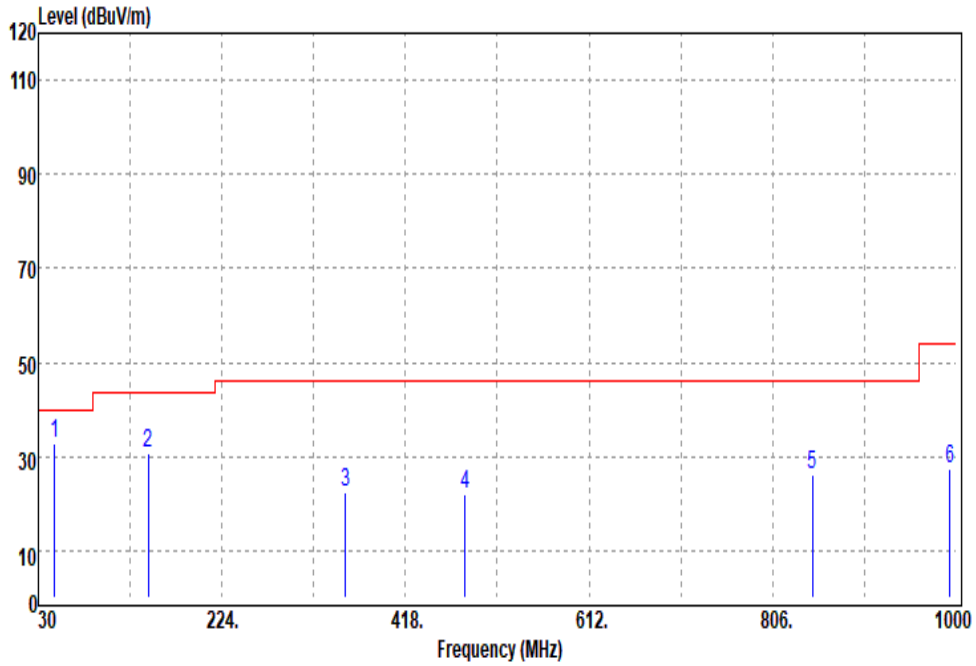


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	24000.00	56.42	14.29	70.71	83.54	-12.83	Peak
2	24000.00	32.61	14.29	46.90	63.54	-16.64	Average

(3) Below 1G:

24.125GHz

Test Mode:	TX-24GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	30MHz-1GHz	Test Date	October 27, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak and Quasi-peak		



Frequency (MHz)	Remark (PK/QP/AV)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
47.46	Peak	47.29	-14.32	32.97	40.00	-7.03
146.40	Peak	41.03	-10.35	30.68	43.50	-12.82
354.95	Peak	29.28	-7.03	22.25	46.00	-23.75
481.05	Peak	25.46	-3.37	22.09	46.00	-23.91
847.71	Peak	23.68	2.49	26.17	46.00	-19.83
993.21	Peak	22.73	4.50	27.23	54.00	-26.77

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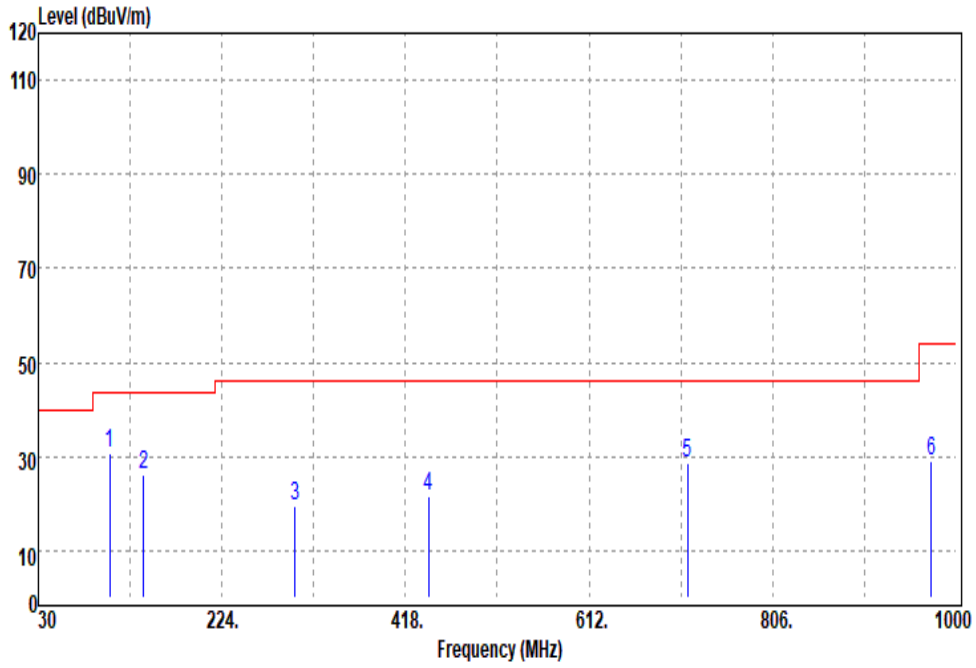
Test Mode:	TX-24GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	30MHz-1GHz	Test Date	October 27, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak and Qusi-peak		



Frequency (MHz)	Remark (PK/QP/AV)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
105.66	Peak	42.11	-11.23	30.88	43.50	-12.62
141.55	Peak	36.03	-10.00	26.03	43.50	-17.47
301.60	Peak	27.98	-8.55	19.43	46.00	-26.57
442.25	Peak	26.17	-4.53	21.64	46.00	-24.36
715.79	Peak	28.09	0.38	28.47	46.00	-17.53
973.81	Peak	25.10	4.12	29.22	54.00	-24.78

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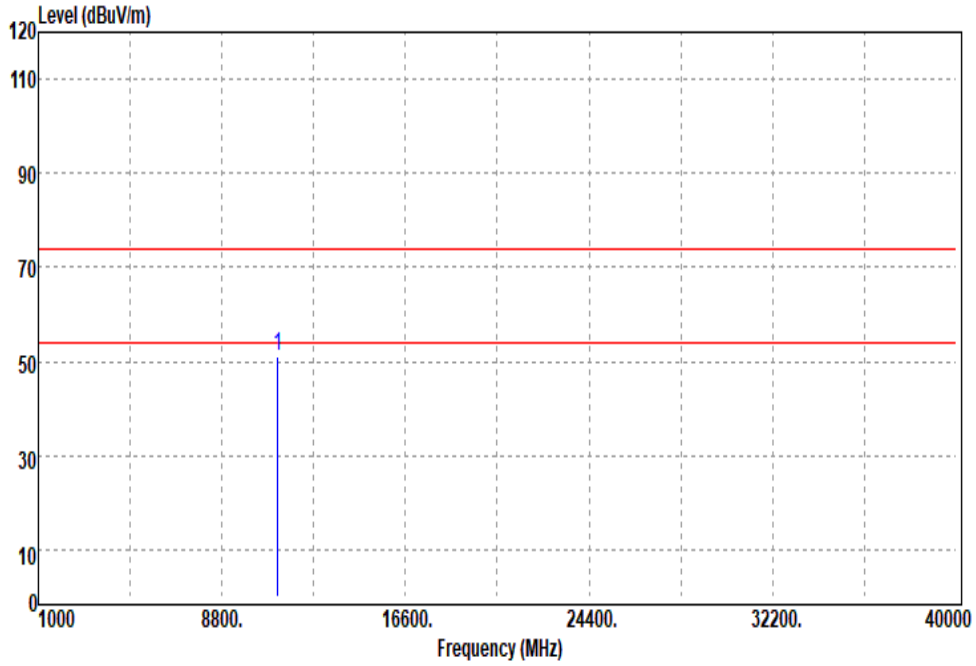
(4) Above 1G :

Test Mode:	TX-24GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	1GHz-40GHz	Test Date	October 27, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Frequency (MHz)	Remark (PK/QP/AV)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11181.50	Peak	34.61	16.30	50.91	74.00	-23.09
N/A						

Remark:

1. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

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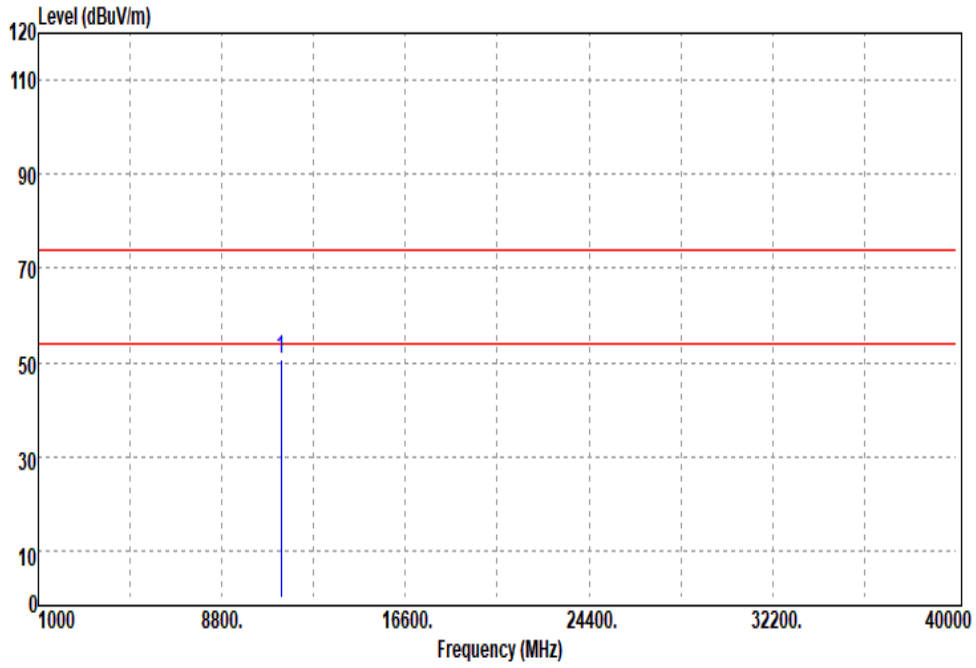
Test Mode:	TX-24GHz	Temp/Hum	23.1(℃)/ 57%RH
Test Item	1GHz-40GHz	Test Date	October 27, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



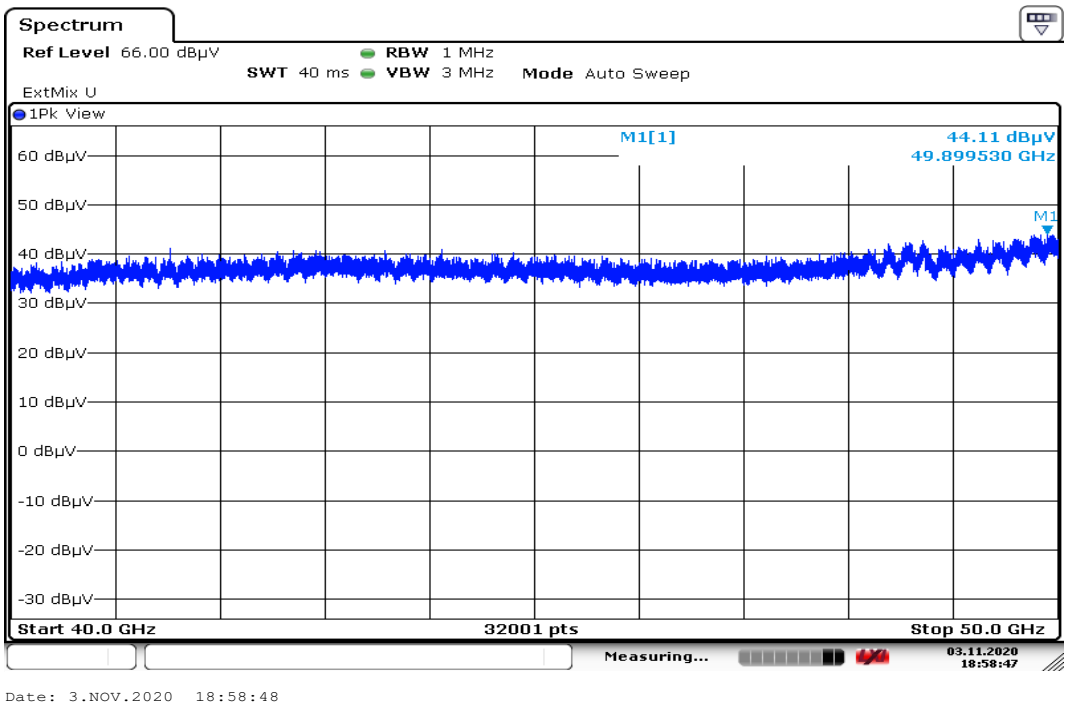
Frequency (MHz)	Remark (PK/QP/AV)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11302.70	Peak	34.45	16.41	50.86	74.00	-23.14
N/A						

Remark:

1. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Report No.: T200924W01-RP

Test Mode:	TX-24GHz	Temp/Hum	25(℃)/ 50%RH
Test Item	40GHz-50GHz	Test Date	November 3, 2020
Polarize	Vertical/Horizontal	Test Engineer	Dally Hong
Detector	Peak		



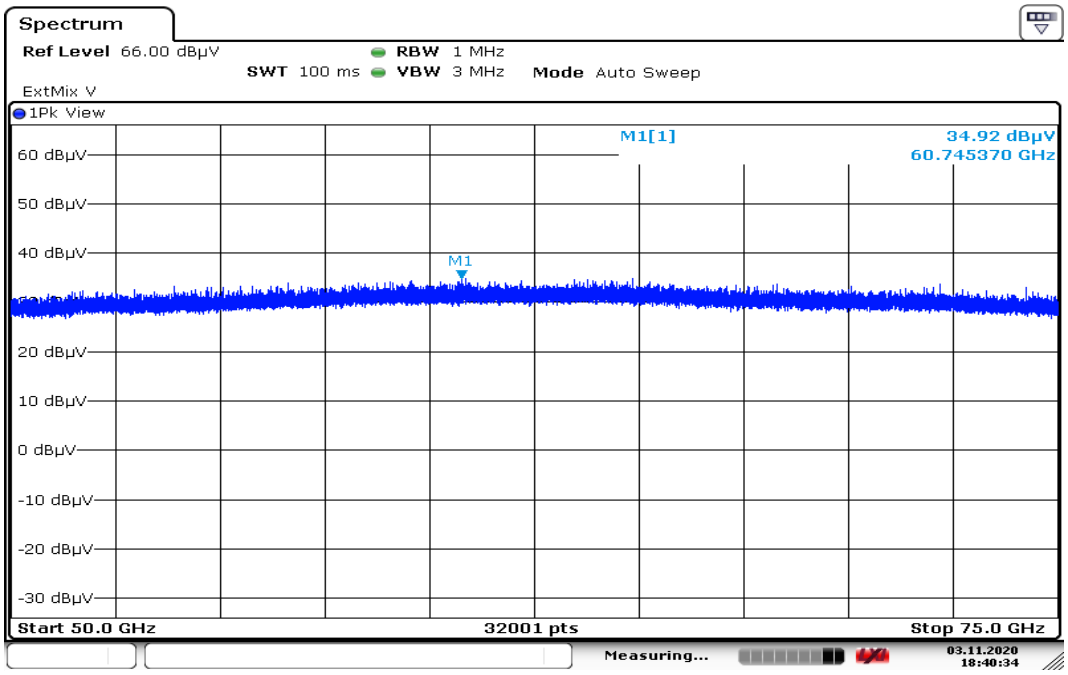
Unwanted Emission 40GHz~50GHz					
Frequency (GHz)	Spectrum Reading (dBuV)	Antenna Factor (dB/m)	Distance (m)	dBuV/m	Limit (dBuV/m)
49.89953	44.11	42.89	0.5	87	90
dBuV/m = Spectrum Reading (dBuV) + Antenna Factor (dB/m)					

Remark:

1. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit
2. Limit (Distance 0.5m)
   Average = 20*Log(500)+20*LOG(3/0.5)=70 (dBuV/m)
   Peak = 70+20 =90 (dBuV/m)

Report No.: T200924W01-RP

Test Mode:	TX-24GHz	Temp/Hum	25(℃)/ 50%RH
Test Item	50GHz-75GHz	Test Date	November 3, 2020
Polarize	Vertical/Horizontal	Test Engineer	Dally Hong
Detector	Peak		



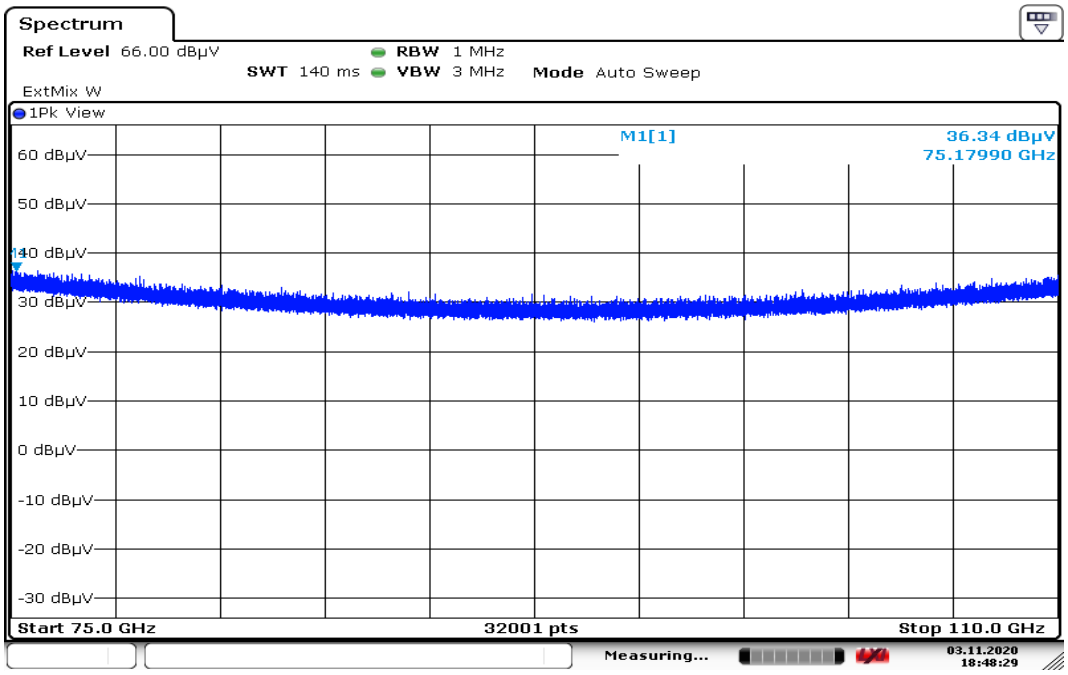
Unwanted Emission 50GHz~75GHz					
Frequency (GHz)	Spectrum Reading (dBuV)	Antenna Factor (dB/m)	Distance (m)	dBuV/m	Limit (dBuV/m)
60.74537	34.92	43.62	1	78.54	84
dBuV/m = Spectrum Reading (dBuV) + Antenna Factor (dB/m)					

Remark:

1. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit
2. Limit (Distance 1m)
   Average = 20*Log(500)+20*LOG(3/1)=64 (dBuV/m)
   Peak = 70+20 =84 (dBuV/m)

Report No.: T200924W01-RP

Test Mode:	TX-24GHz	Temp/Hum	25(℃)/ 50%RH
Test Item	75GHz-110GHz	Test Date	November 3, 2020
Polarize	Vertical/Horizontal	Test Engineer	Dally Hong
Detector	Peak		



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Unwanted Emission 75GHz~90GHz					
Frequency (GHz)	Spectrum Reading (dBuV)	Antenna Factor (dB/m)	Distance (m)	dBuV/m	Limit (dBuV/m)
75.1799	36.34	46.01	1	82.35	84
dBuV/m = Spectrum Reading (dBuV) + Antenna Factor (dB/m)					

Remark:

1. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit
2. Limit (Distance 1m)
   Average = 20*Log(500)+20*LOG(3/1)=64 (dBuV/m)
   Peak = 70+20 =84 (dBuV/m)

--End of Report--