

NCC RADIO TEST REPORT

Test Standard	NCC LP0002 (2018-01-10)
Trade name	Axis
Product name	Network Radar Detector
Model No.	D2050-VE
Test Result	Pass

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)

The sample selected for test was production product and was provided by manufacturer.



Approved by:

Reviewed by:

A handwritten signature in black ink, appearing to read "Sam Chuang". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Sam Chuang
Manager

A handwritten signature in black ink, appearing to read "Jerry Chuang". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Jerry Chuang
Engineer

Revision History

Rev.	Issue Date	Revisions	Revised By
00	February 12, 2018	Initial Issue	Allison Chen
01	March 6, 2018	Revised test data for UNWANTED SPURIOUS EMISSION in Page.23 & 24.	Allison Chen

Table of contents

1. GENERAL INFORMATION	4
1.1 EUT INFORMATION	4
1.2 EUT CHANNEL INFORMATION	5
1.3 ANTENNA INFORMATION	5
1.4 MEASUREMENT UNCERTAINTY.....	6
1.5 FACILITIES AND TEST LOCATION.....	7
1.6 INSTRUMENT CALIBRATION	7
1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT	8
1.8 TEST METHODOLOGY AND APPLIED STANDARDS	8
1.9 LP0002 SECTION 2.7 RESTRICTED BANDS OF OPERATIONS.....	9
2. TEST SUMMERY	10
3. DESCRIPTION OF TEST MODES	11
3.1 THE WORST MODE OF MEASUREMENT	11
4. TEST RESULT	12
4.1 AC POWER LINE CONDUCTED EMISSION	12
5. TEST RESULT	15
5.1 UNWANTED SPURIOUS EMISSION	15
5.2 RADIATION EMISSION FOR RECEIVER	31
APPENDIX 1 - PHOTOGRAPHS OF EUT	

1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Axis Communications AB Emdalavägen 14, SE-223 69 Lund, Sweden
Manufacturer	Axis Communications AB
Equipment	Network Radar Detector
Model Name	D2050-VE
Model Discrepancy	N/A
EUT Functions	24G Radar
Received Date	January 22, 2018
Date of Test	February 1 ~ February 12, 2018; March 6, 2018
Output Power	Peak : 80.41dBuV/m AVG: 60.28dBuV/m
Power Operation	Powered from POE. (DC 24V)

1.2 EUT CHANNEL INFORMATION

Frequency Range	24.05GHz-24.25GHz
Modulation Type	FMCW
Number of channel	1

1.3 ANTENNA INFORMATION

Antenna Type	Internal Antenna
Antenna Gain	10dBi
Antenna Brand	iSYS
Antenna Model	iSYS-5010

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 1.4003
RF output power, conducted	+/- 1.1372
Power density, conducted	+/- 1.4003
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683
3M Semi Anechoic Chamber / 40G~60G	+/- 1.8509
3M Semi Anechoic Chamber / 60G~75G	+/- 1.9869
3M Semi Anechoic Chamber / 75G~110G	+/- 2.9651
3M Semi Anechoic Chamber / 110G~170G	+/- 2.7807
3M Semi Anechoic Chamber / 170G~220G	+/- 3.6437
3M Semi Anechoic Chamber / 220G~325G	+/- 4.2982

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 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	Eric Lee	-
Radiation	Jerry Chuang	-
RF Conducted	-	-

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

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Bilog Antenna	Sunol Sciences	JB3	A030105	06/20/2017	06/19/2018
Horn Antenna	ETS LINDGREN	3116	26370	01/04/2018	01/03/2019
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	01/02/2018	01/01/2019
K Type Cable	Huber+Suhner	SUCOFLEX 102	22470/2	01/02/2018	01/01/2019
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	985646	01/08/2018	01/07/2019
Pre-Amplifier	EMEC	EM330	60609	06/07/2017	06/06/2018
Spectrum Analyzer	Agilent	E4446A	US42510252	11/27/2017	11/26/2018
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
Pre-Amplifier	HP	8449B	3008A00965	06/27/2017	06/26/2018
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	07/31/2017	07/30/2018
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	07/31/2017	07/30/2018
Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/25/2017	08/24/2018

AC line Conduction Test Room					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
LISN	R&S	ENV216	101054	05/18/2017	05/17/2018
LISN	SCHWARZBECK	NSLK 8127	8127-541	02/14/2017	02/13/2018
EMI Test Receiver	R&S	ESCI	100064	05/17/2017	05/16/2018

Remark: Each piece of equipment is scheduled for calibration once a year and harmonic mixer twice 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, NCC LP0002 (2018-01-10)

1.9 LP0002 SECTION 2.7 RESTRICTED BANDS OF OPERATIONS

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
0.090 ~ 0.110	240.00 ~ 285.00	3332.0 ~ 3339.0
0.490 ~ 0.510	322.00 ~ 335.40	3345.8 ~ 3358.0
2.172 ~ 2.198	399.90 ~ 410.00	3500.0 ~ 4400.0
3.013 ~ 3.033	485.00 ~ 510.00	4500.0 ~ 5250.0
4.115 ~ 4.198	608.00 ~ 614.00	5350.0 ~ 5460.0
5.670 ~ 5.690	703.00 ~ 748.0	7250.0 ~ 7750.0
6.200 ~ 6.300	758.00 ~ 803.00	8025.0 ~ 8500.0
8.230 ~ 8.400	825.00 ~ 915.00	9000.0 ~ 9200.0
12.265 ~ 12.600	930.00 ~ 1240.0	9300.0 ~ 9500.0
13.340 ~ 13.430	1300.0 ~ 1427.0	10600 ~ 12700
14.965 ~ 15.020	1435.0 ~ 1626.5	13250 ~ 13400
16.700 ~ 16.755	1660.0 ~ 1785.0	14470 ~ 14500
19.965 ~ 20.020	1805.0 ~ 1880.0	15350 ~ 16200
25.500 ~ 25.700	1885.0 ~ 1900.0	17700 ~ 21400
37.475 ~ 38.275	1905.0 ~ 1985.0	22010 ~ 23120
73.500 ~ 75.400	2010.0 ~ 2025.0	23600 ~ 24000
108.00 ~ 138.00	2110.0 ~ 2170.0	31200 ~ 31800
149.90 ~ 150.05	2200.0 ~ 2300.0	36430 ~ 36500
156.70 ~ 156.90	2310.0 ~ 2390.0	38600 以上
162.01 ~ 167.17	2483.5 ~ 2900.0	---
167.72 ~ 173.20	3260.0 ~ 3267.0	---

2. TEST SUMMERY

NCC Standard Section	Report Section	Test Item	Result
2.2	1.3	Antenna Requirement	Pass
2.3	4.1	AC Conducted Emission	Pass
2.8	5.1	Filed strength of fundamental	Pass
2.8	5.1	Radiation Spurious Emission	Pass
2.8	5.2	Receiver	-

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Voltage/Hz	DC 24V
Test Mode	Mode 1:EUT power by POE.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Voltage/Hz	DC 24V
Test Mode	Mode 1:EUT power by POE.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)
Worst Polarity	☐ Horizontal ☒ Vertical

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Voltage/Hz	DC 24V
Test Mode	Mode 1:EUT power by POE.
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 three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case(X-Plane and Vertical) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to LP0002 Section 2.3,

Frequency Range (MHz)	Limits(dB μ V)	
	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

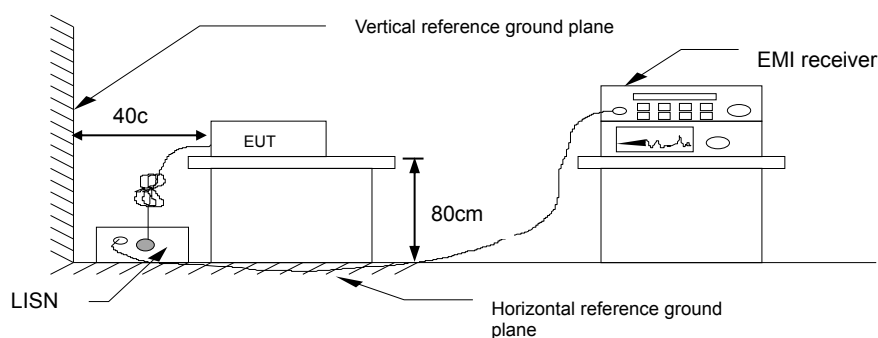
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

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

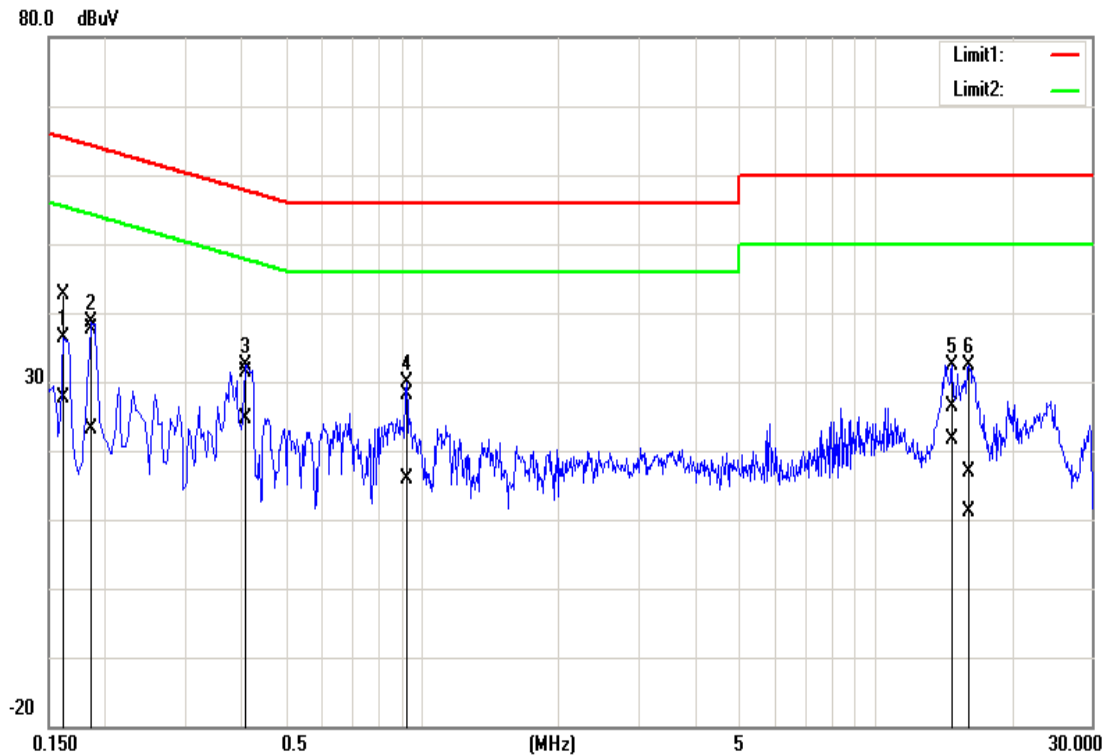


4.1.4 Test Result

Pass.

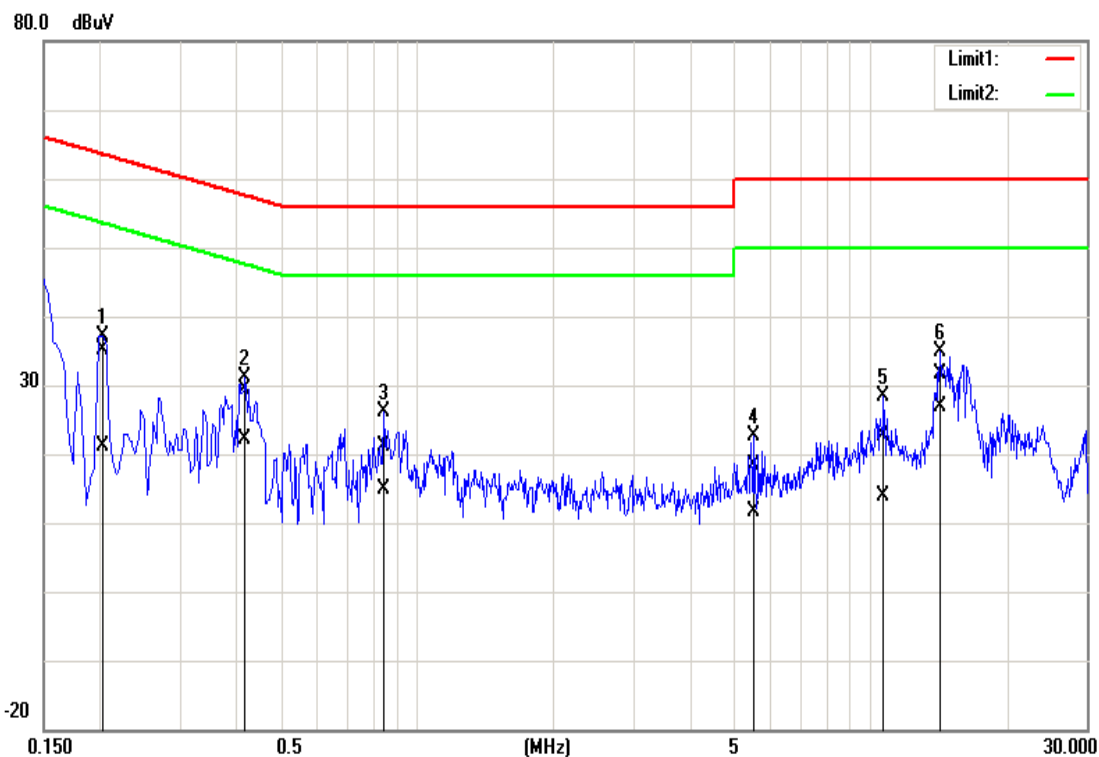
Test Data

Test Mode:	Mode 1	Temp/Hum	24(°C)/ 50%RH
Test Voltage:	110Vac / 60Hz	Test Date	February 12, 2018
Phase:	Line	Test Engineer	Eric Lee



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1620	42.47	27.60	0.05	42.52	27.65	65.36	55.36	-22.84	-27.71	Pass
0.1860	37.65	23.07	0.05	37.70	23.12	64.21	54.21	-26.51	-31.09	Pass
0.4100	31.39	24.47	0.05	31.44	24.52	57.65	47.65	-26.21	-23.13	Pass
0.9260	28.04	15.80	0.07	28.11	15.87	56.00	46.00	-27.89	-30.13	Pass
14.7780	26.27	21.55	0.19	26.46	21.74	60.00	50.00	-33.54	-28.26	Pass
16.0940	16.67	10.94	0.26	16.93	11.20	60.00	50.00	-43.07	-38.80	Pass

Test Mode:	Mode 1	Temp/Hum	24(°C)/ 50%RH
Test Voltage:	110Vac / 60Hz	Test Date	February 12, 2018
Phase:	Line	Test Engineer	Eric Lee



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.2020	35.13	20.91	0.12	35.25	21.03	63.53	53.53	-28.28	-32.50	Pass
0.4180	29.30	21.89	0.13	29.43	22.02	57.49	47.49	-28.06	-25.47	Pass
0.8460	20.97	14.86	0.14	21.11	15.00	56.00	46.00	-34.89	-31.00	Pass
5.5620	18.22	11.40	0.24	18.46	11.64	60.00	50.00	-41.54	-38.36	Pass
10.6820	22.39	13.46	0.35	22.74	13.81	60.00	50.00	-37.26	-36.19	Pass
14.2460	31.29	26.45	0.40	31.69	26.85	60.00	50.00	-28.31	-23.15	Pass

5. TEST RESULT

5.1 UNWANTED SPURIOUS EMISSION

(1) 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 LP0002 section 2.8 (follow the table), whichever is the lesser attenuation

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/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)

5.1.1 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, 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 SA setting following :

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

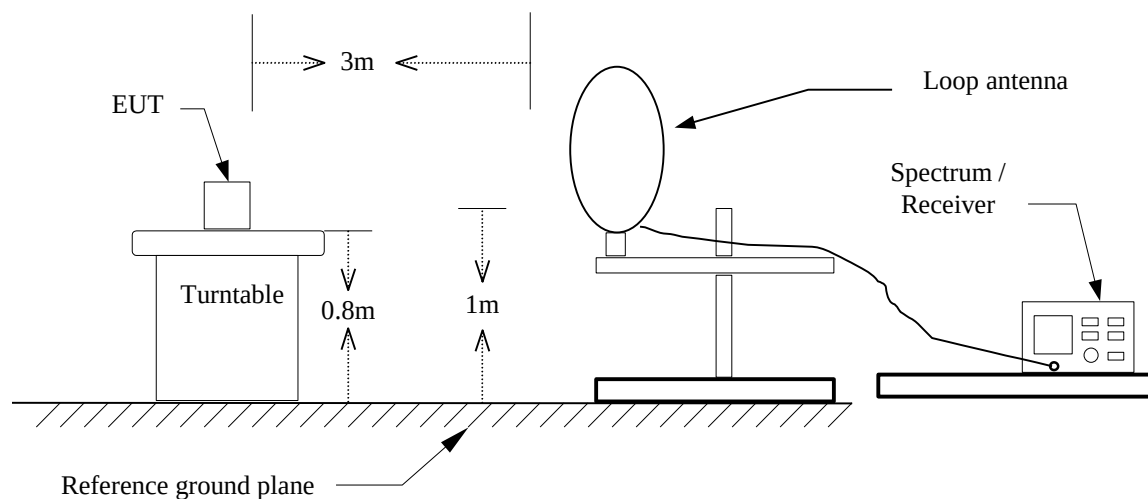
(2) Above 1G :

(2.1) For Peak measurement : RBW = 1MHz, VBW $\geq$ 3 RBW.

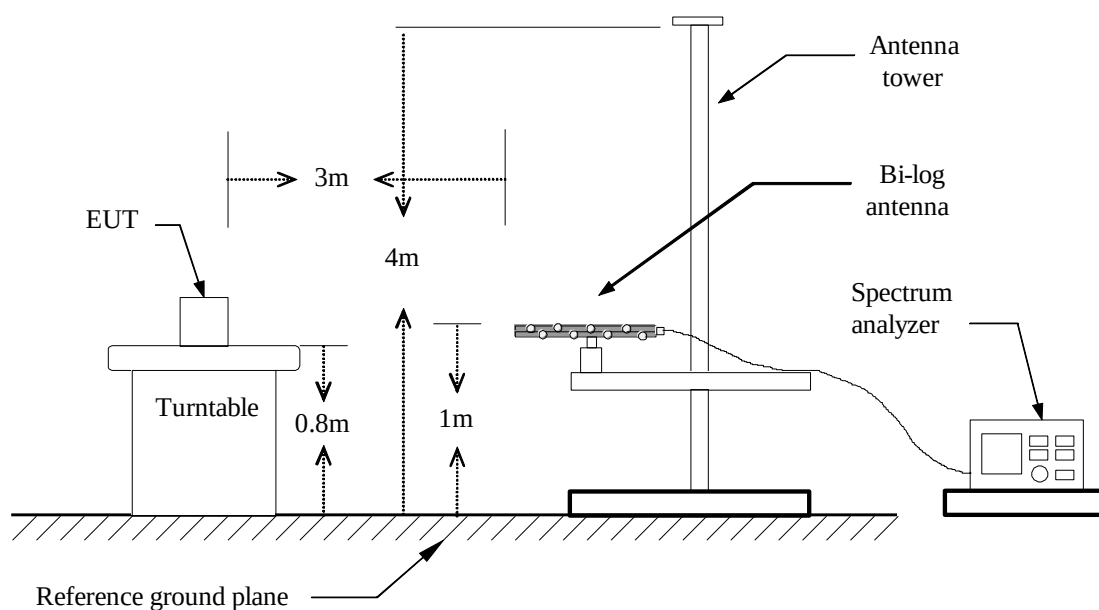
(2.2) For Average measurement : RBW = 1MHz, VBW = 10Hz.

5.1.2 Test Setup

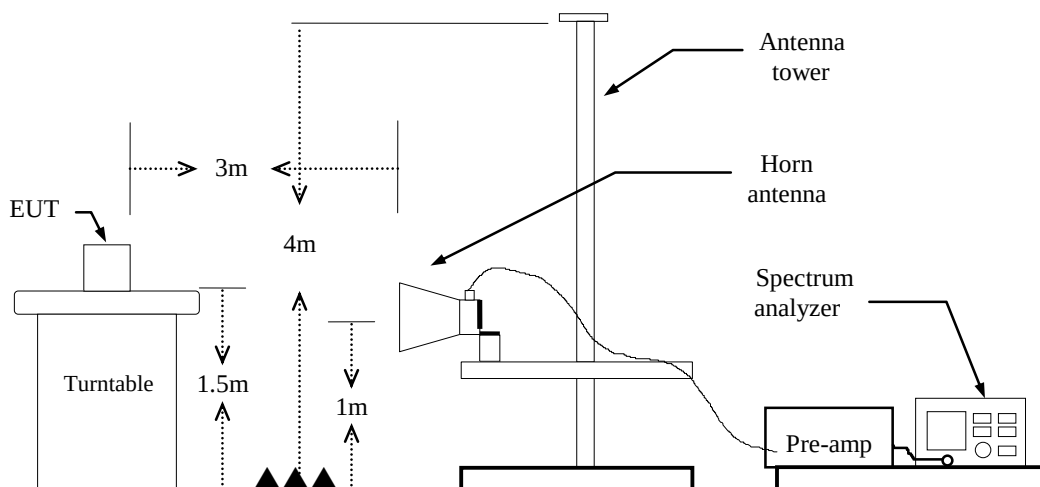
9kHz ~ 30MHz



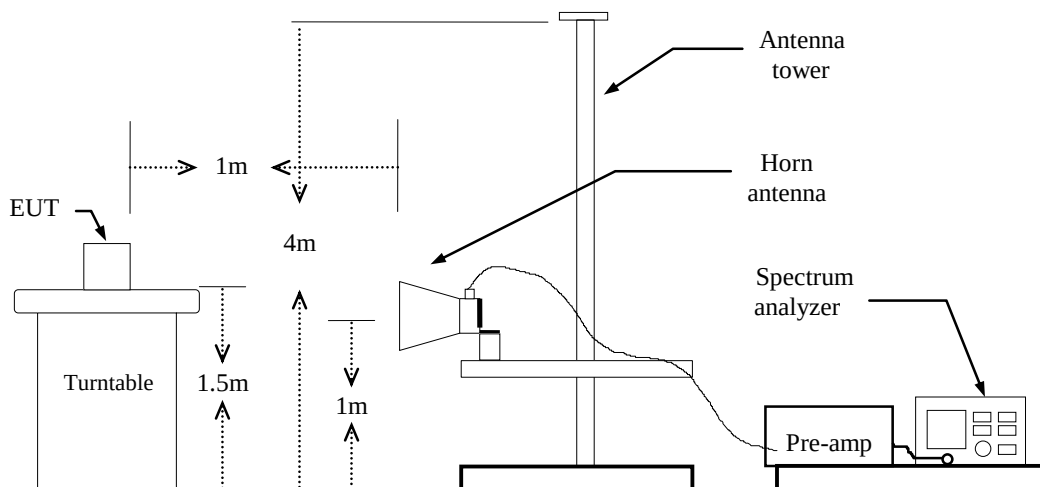
30MHz ~ 1GHz

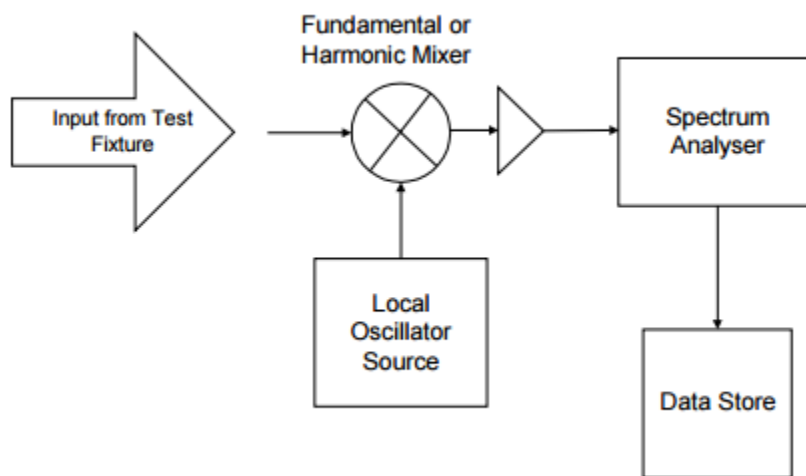


Above 1GHz



18GHz ~ 40GHz

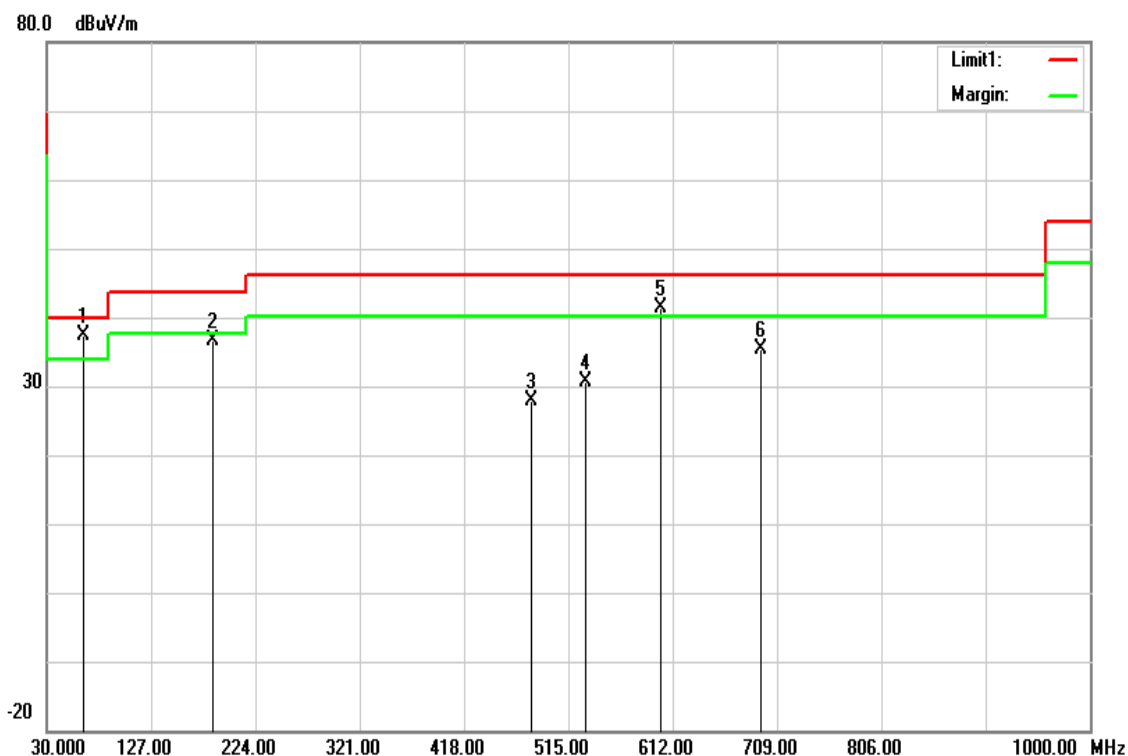


Above 40 GHz

5.1.3 Test Result

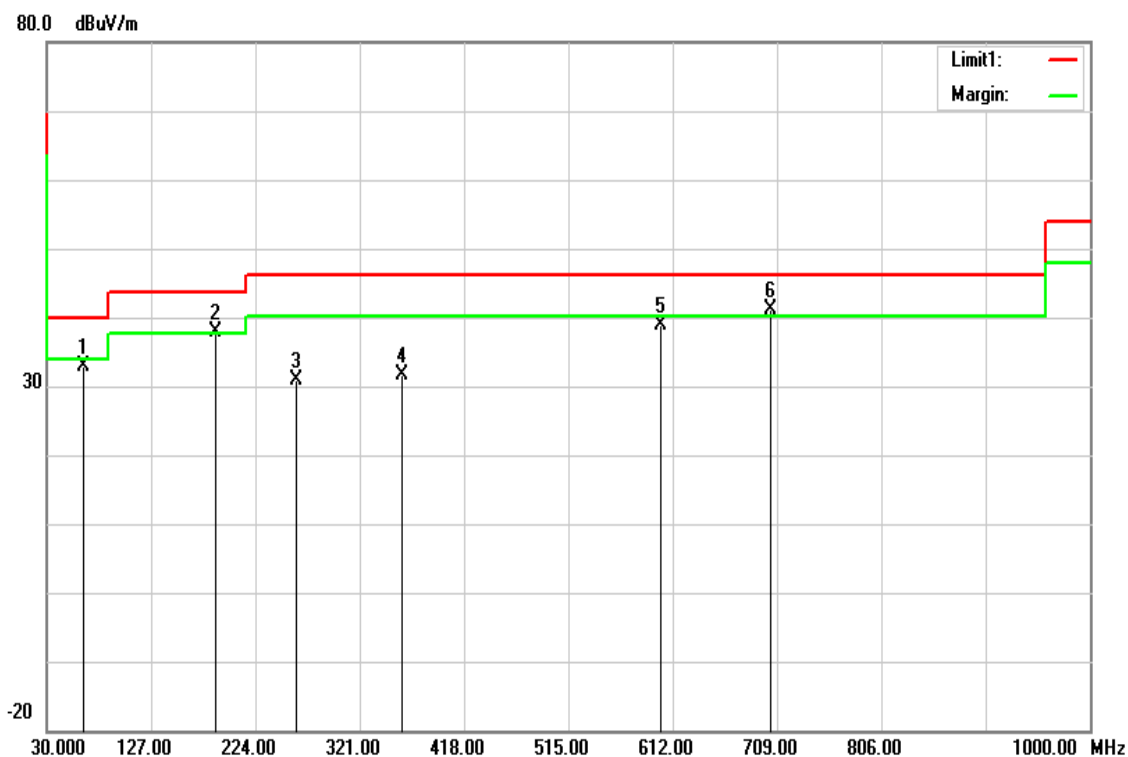
(1) Below 1G :

Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	30MHz-1GHz	Test Date	February 1, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Quasi-peak	Test Voltage:	24Vdc



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
63.9500	58.87	-21.60	37.27	40.00	-2.73	QP
184.2300	53.32	-16.75	36.57	43.52	-6.95	QP
480.0800	36.70	-8.94	27.76	46.02	-18.26	peak
531.4900	38.47	-7.90	30.57	46.02	-15.45	peak
600.3600	48.41	-6.92	41.49	46.02	-4.53	QP
693.4800	40.45	-4.97	35.48	46.02	-10.54	peak

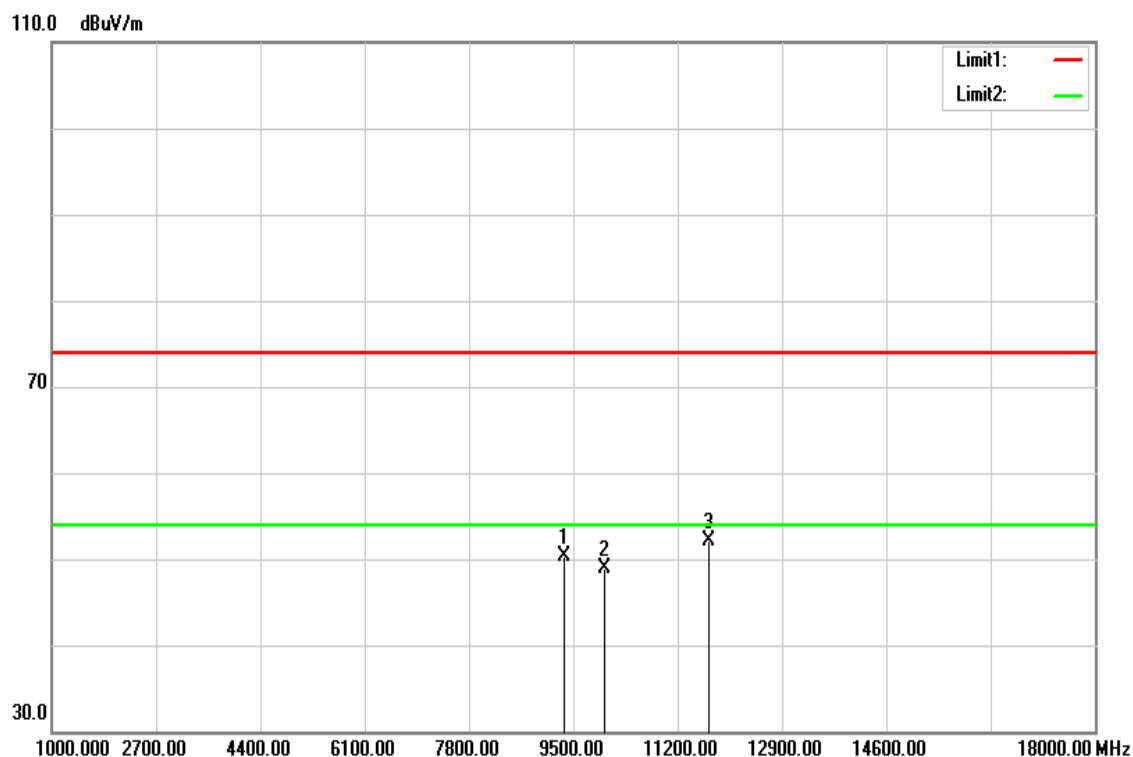
Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	30MHz-1GHz	Test Date	February 1, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Quasi-peak	Test Voltage:	24Vdc



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
63.9500	54.54	-21.60	32.94	40.00	-7.06	QP
187.1400	54.33	-16.49	37.84	43.52	-5.68	QP
261.8300	46.30	-15.42	30.88	46.02	-15.14	peak
359.8000	44.28	-12.67	31.61	46.02	-14.41	peak
600.3600	45.78	-6.92	38.86	46.02	-7.16	peak
703.1800	45.96	-4.85	41.11	46.02	-4.91	QP

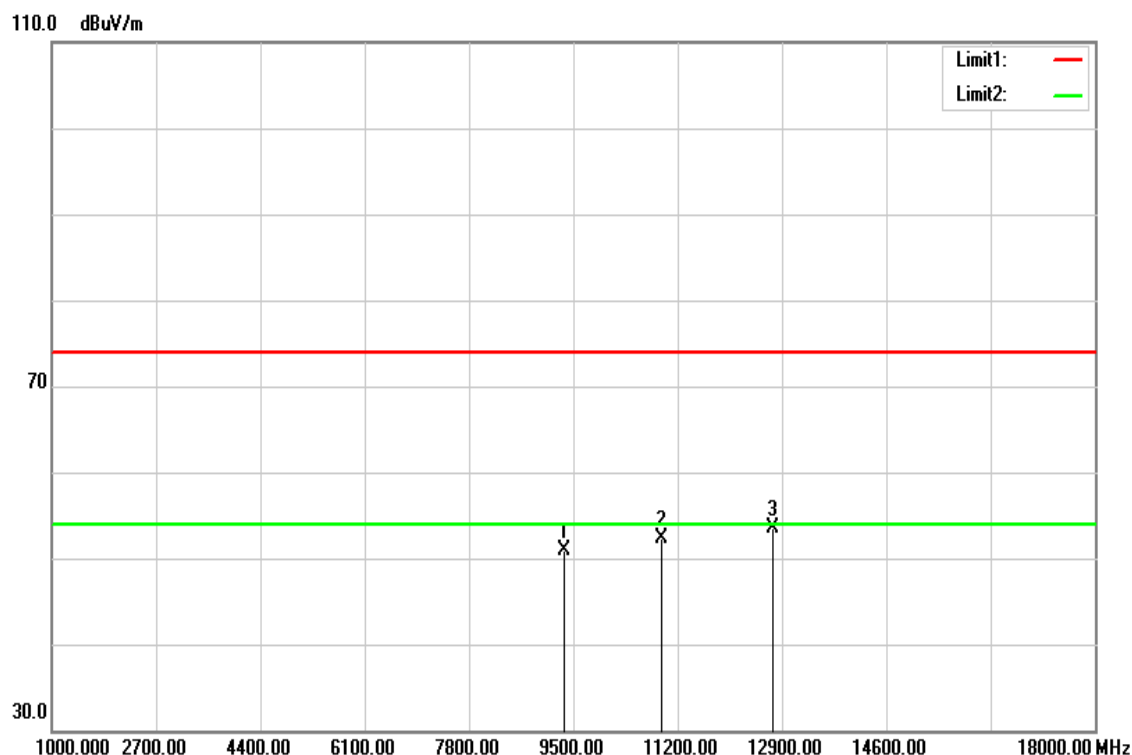
(2) Above 1G :

Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	1GHz-18GHz	Test Date	February 1, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage:	24Vdc



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
9350.000	37.37	12.98	50.35	74.00	-23.65	peak
10010.000	35.58	13.26	48.84	74.00	-25.16	peak
11710.000	36.26	15.87	52.13	74.00	-21.87	peak
N/A						

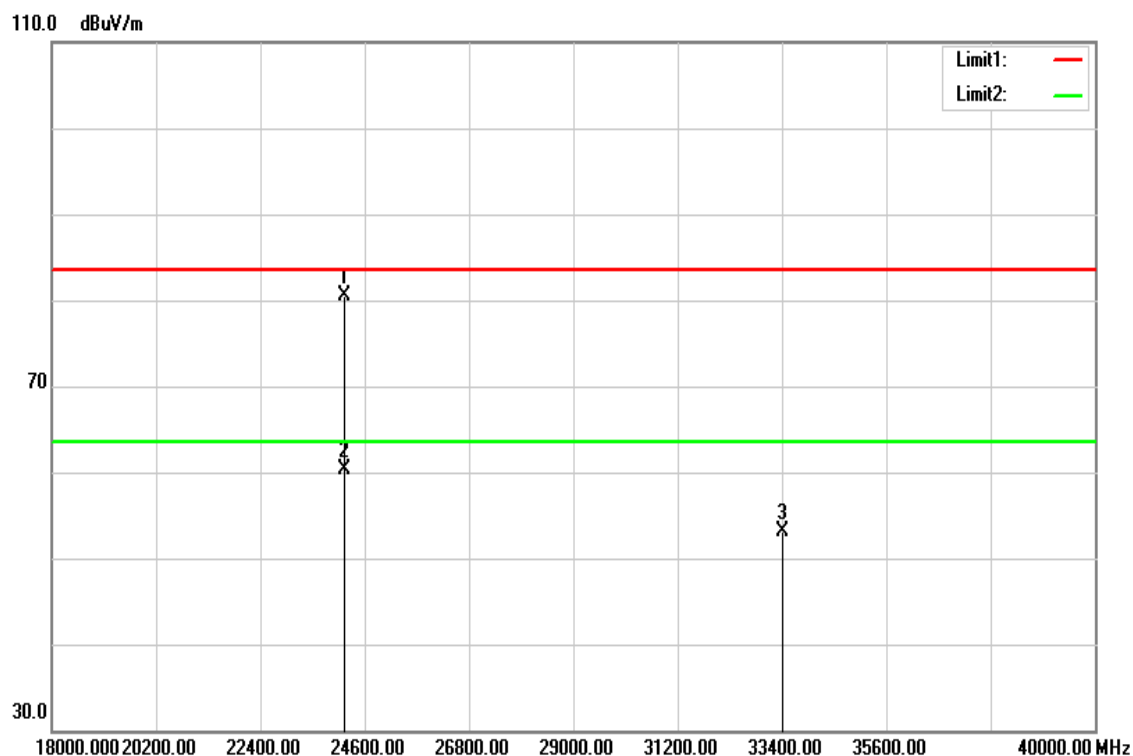
Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	1GHz-18GHz	Test Date	February 1, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage:	24Vdc



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
9360.000	37.85	12.98	50.83	74.00	-23.17	peak
10930.000	36.39	15.89	52.28	74.00	-21.72	peak
12750.000	35.88	17.61	53.49	74.00	-20.51	peak
N/A						

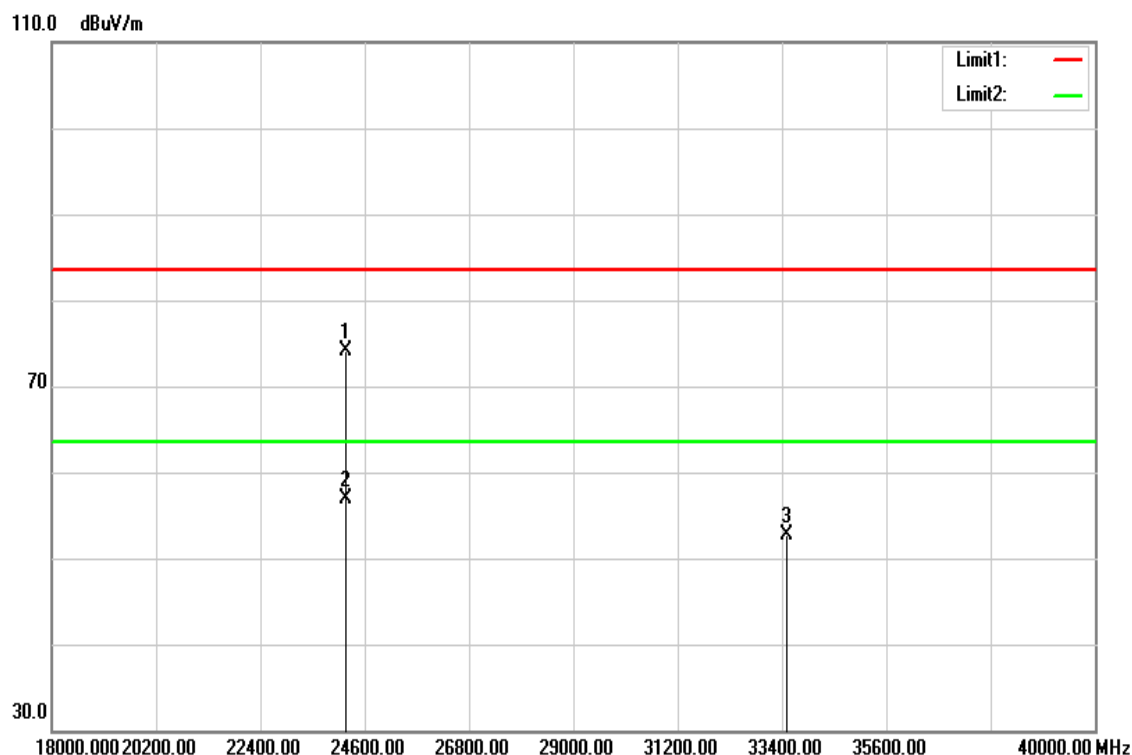
18GHz ~ 40GHz

Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	18GHz-40GHz	Test Date	March 6, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage:	24Vdc

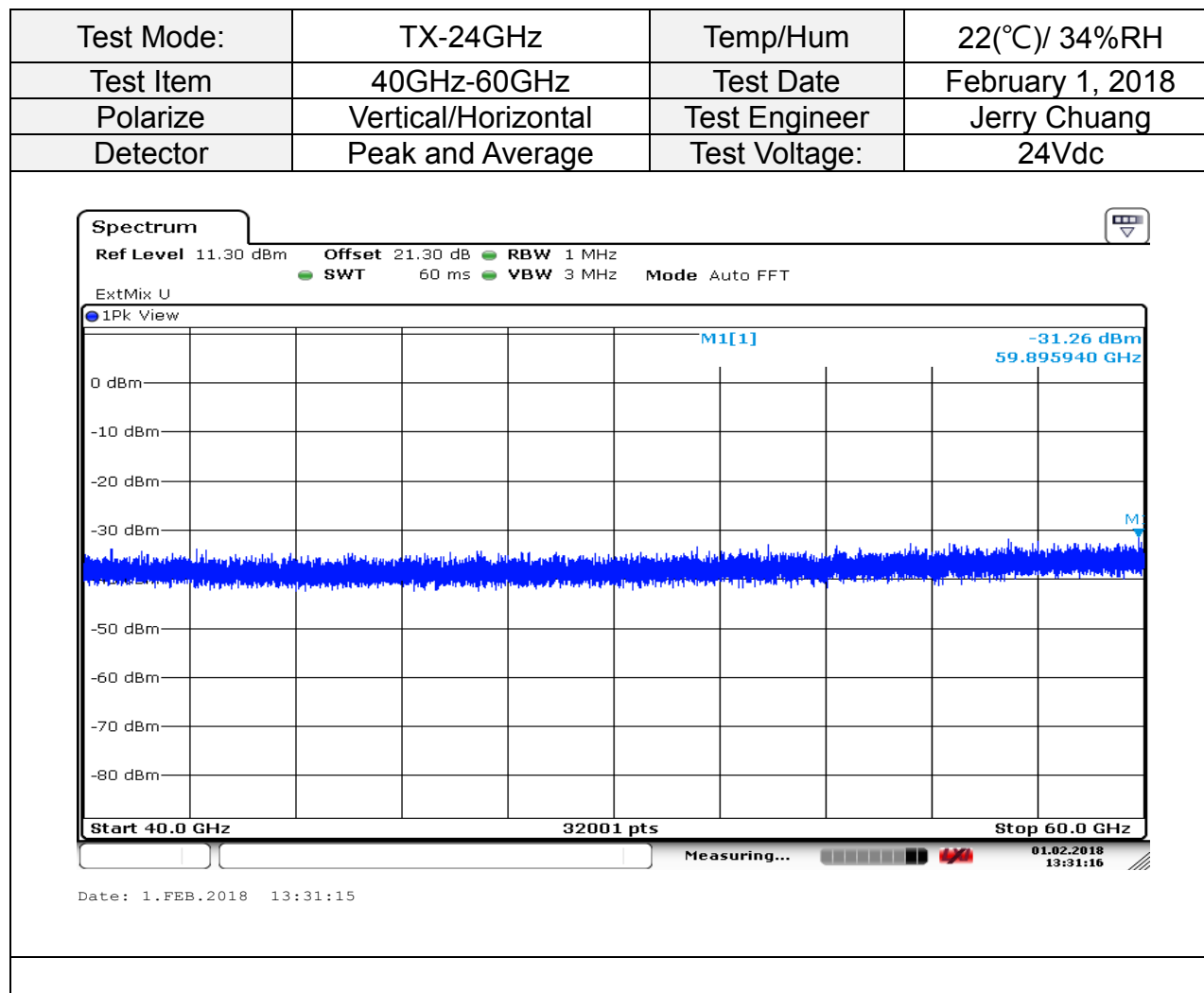


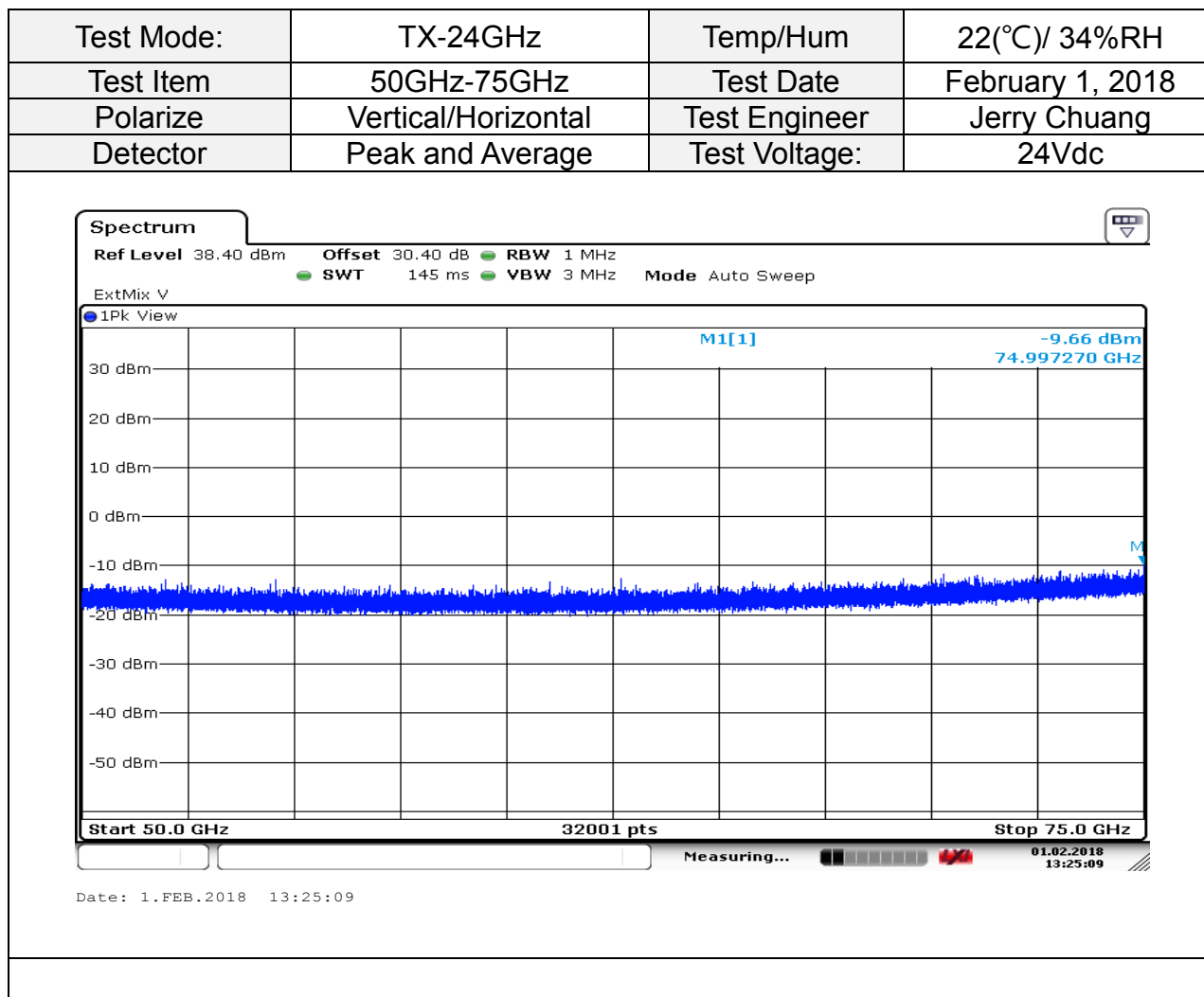
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
24179.500	67.79	12.62	80.41	83.54	-3.13	peak
24179.500	47.66	12.62	60.28	63.54	-3.26	AVG
33420.000	43.33	9.75	53.08	83.54	-30.46	peak
N/A						

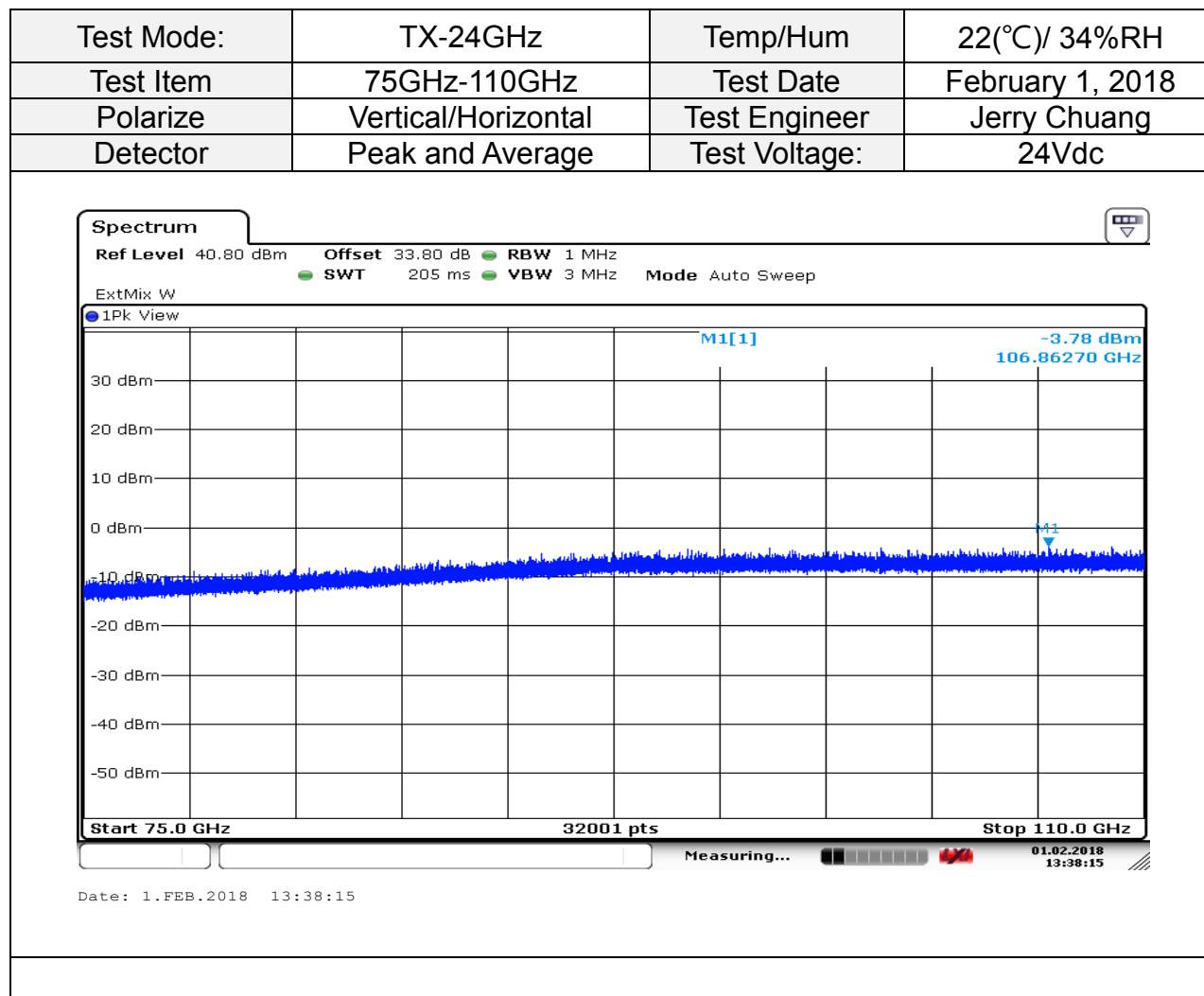
Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	18GHz-40GHz	Test Date	March 6, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage:	24Vdc



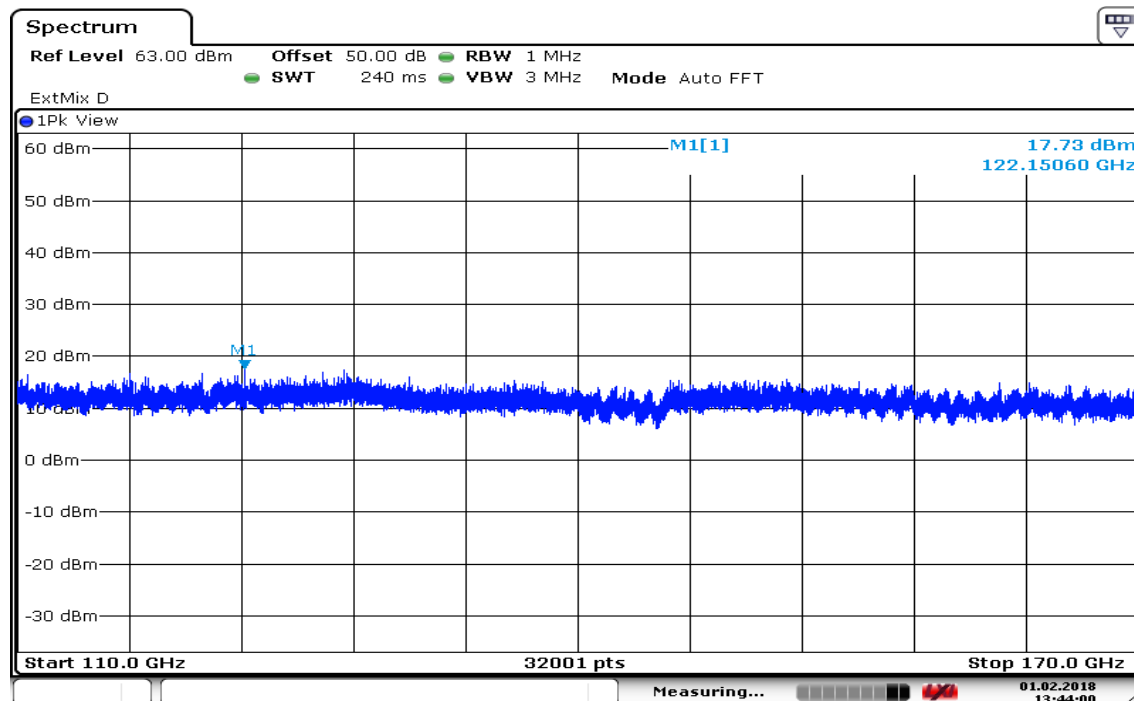
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
24213.500	61.50	12.56	74.06	83.54	-9.48	peak
24213.500	44.33	12.56	56.89	63.54	-6.65	AVG
33510.000	42.78	9.83	52.61	83.54	-30.93	peak
N/A						



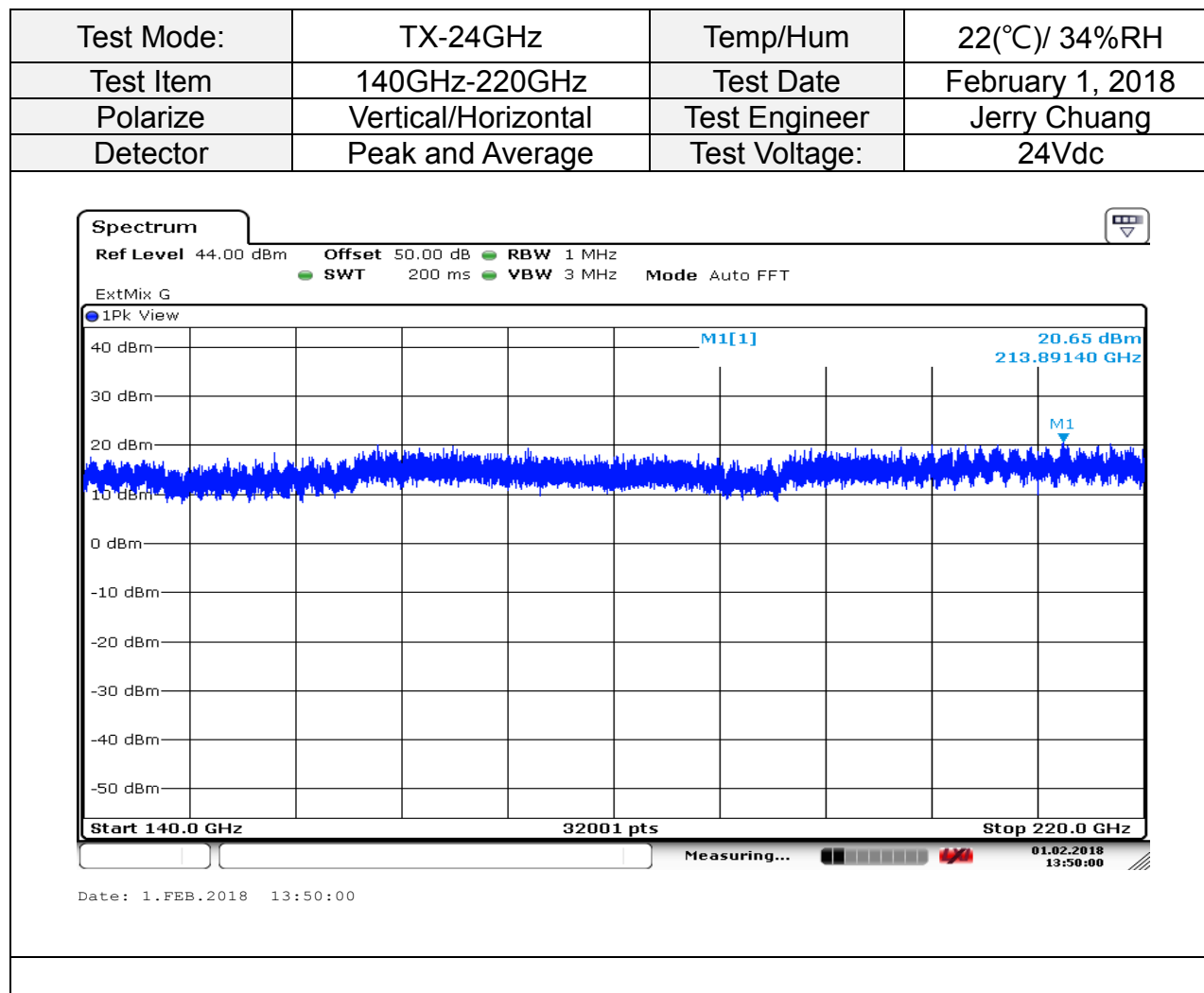




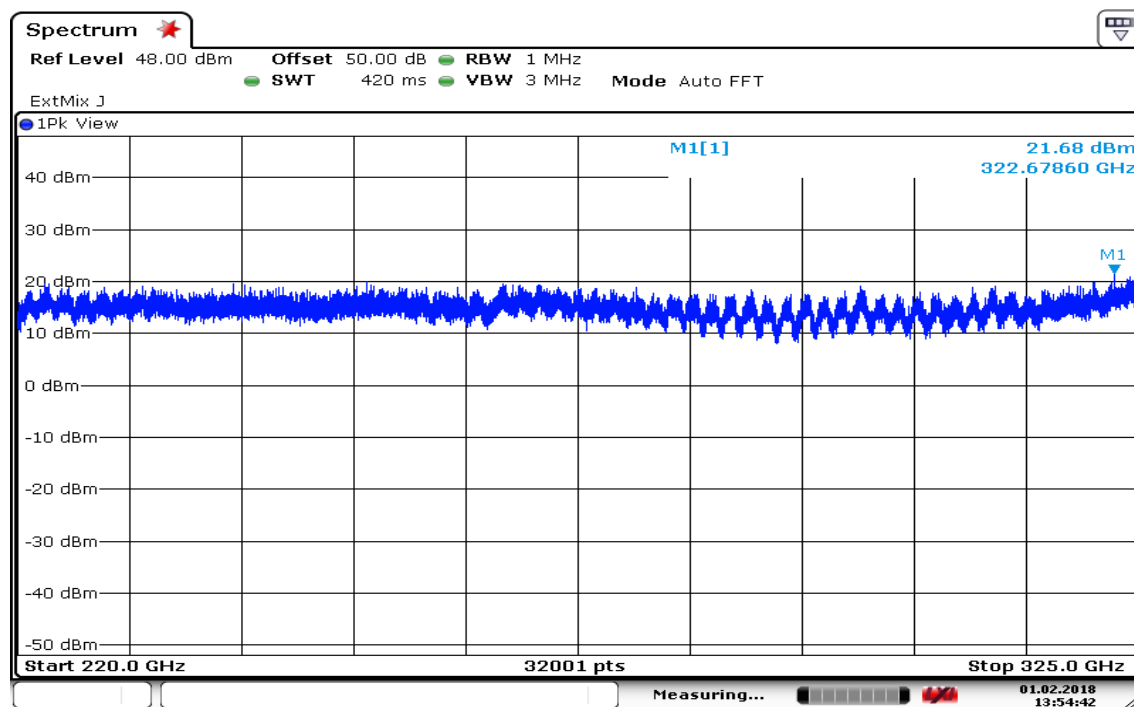
Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	110GHz-170GHz	Test Date	February 1, 2018
Polarize	Vertical/Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage:	24Vdc



Date: 1.FEB.2018 13:43:59



Test Mode:	TX-24GHz	Temp/Hum	22(°C)/ 34%RH
Test Item	220GHz-325GHz	Test Date	February 1, 2018
Polarize	Vertical/Horizontal	Test Engineer	Jerry Chuang
Detector	Peak and Average	Test Voltage:	24Vdc



Date: 1.FEB.2018 13:54:42

5.2 RADIATION EMISSION FOR RECEIVER

5.2.1 Test Limit

According to LP0002 section 2.8,

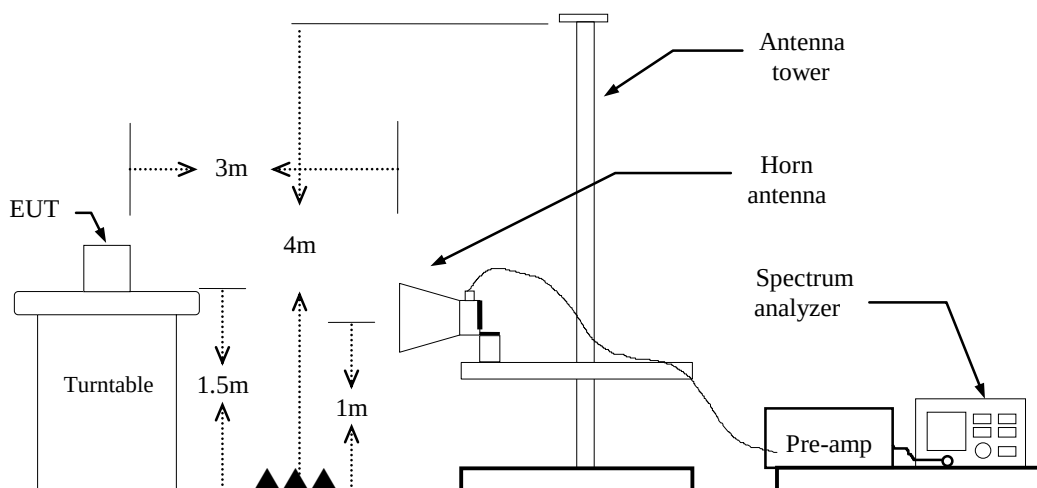
Above 30 MHz

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)

5.2.2 Test Procedure

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m above ground plane. The EUT Configured un accordance with ANSI C63.10, 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. Span shall wide enough to full capture the emission measured. The SA from 1GHz to 26.5GHz set the Highest Output power channels with the EUT transmit.
4. The SA setting following : RBW = 1MHz, VBW = 3MHz, Sweep Time = 500ms

5.2.3 Test Setup



5.2.4 Test Result

Not applicable, because the EUT has radiation emission for transmitter only.