



RF MEASUREMENT REPORT

FCC ID: 2A46G-RD24912
Applicant: Guangzhou Xaircraft Technology CO., LTD.
Product: 4D Imaging Radar
Model No.: RD24912
Brand Name: XAG
FCC Classification: Part 15 Low Power Communication Device Transmitter (DXX)
FCC Rule Part(s): Part 15.249
Test Procedure(s): ANSI C63.10 - 2013
Result: Complies
Received Date: 2023-04-13
Test Date: 2023-04-15 ~ 2023-05-03

Reviewed By:

Vincent Yu

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2304RSU030-U1	V01	Initial Report	2023-05-29	Valid

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1. General Information

1.1. Applicant

Guangzhou Xaircraft Technology CO., LTD.

Block C, No.115, Gaopu Road, Tianhe District, GuangzhouCity, Guangdong,P.R.China

1.2. Manufacturer

Guangzhou Xaircraft Technology CO., LTD.

Block C, No.115, Gaopu Road, Tianhe District, GuangzhouCity, Guangdong,P.R.China

1.3. Testing Facility

<input checked="" type="checkbox"/>	Test Site – MRT Suzhou Laboratory
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
	Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	Laboratory Accreditations
	A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: <input type="checkbox"/> R-20025 <input type="checkbox"/> G-20034 <input type="checkbox"/> C-20020 <input type="checkbox"/> T-20020 <input type="checkbox"/>R-20141 <input type="checkbox"/>G-20134 <input type="checkbox"/>C-20103 <input type="checkbox"/>T-20104
<input type="checkbox"/>	Test Site – MRT Shenzhen Laboratory
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	Laboratory Accreditations
	A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
<input type="checkbox"/>	Test Site – MRT Taiwan Laboratory
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	4D Imaging Radar
Model No.	RD24912
EUT Identification No.	20230413Sample#02
Frequency Range	24.05 ~ 24.25GHz
Temperature	-20°C ~ 85°C
Power Supply	DC 24V~56V (Normal 48V)
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification

Frequency Range	24.05 ~ 24.25GHz
Type of Modulation	FMCW
Antenna Type	Integrated Antenna
Antenna Gain	19.8 dBi

2. Test Configuration

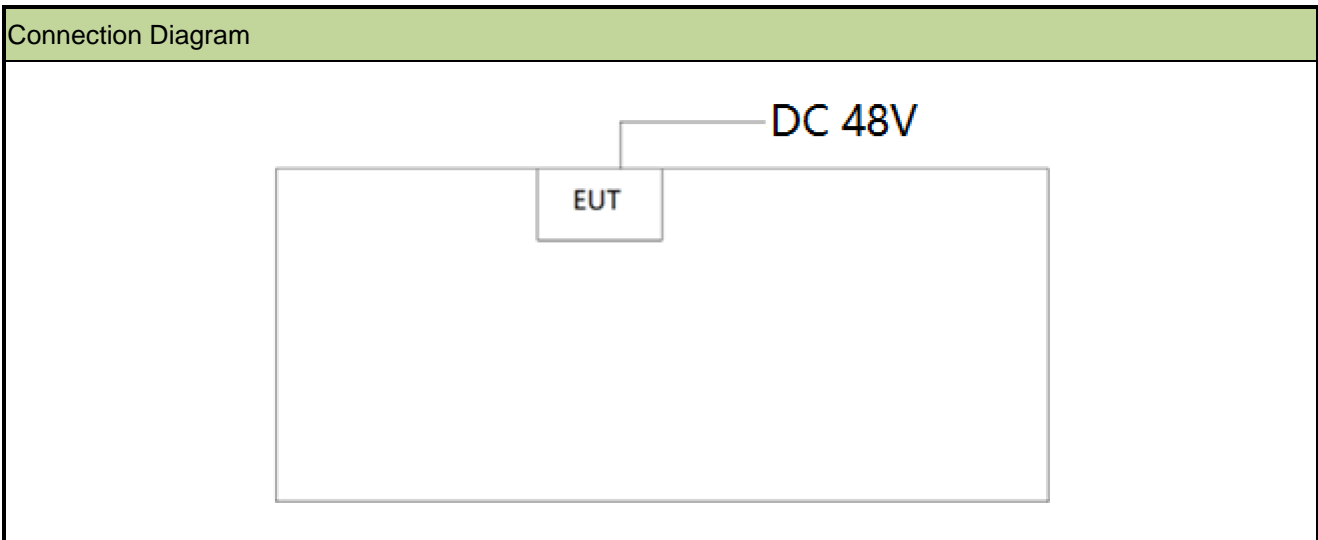
2.1. Test Mode

Mode 1: Transmitter (Tx) and Receiver (Rx) Work Simultaneously at 24GHz

Note: The test sample was provided by the manufacturer, which was configured into Collocated Tx/Rx mode after power on.

2.2. Test Configuration

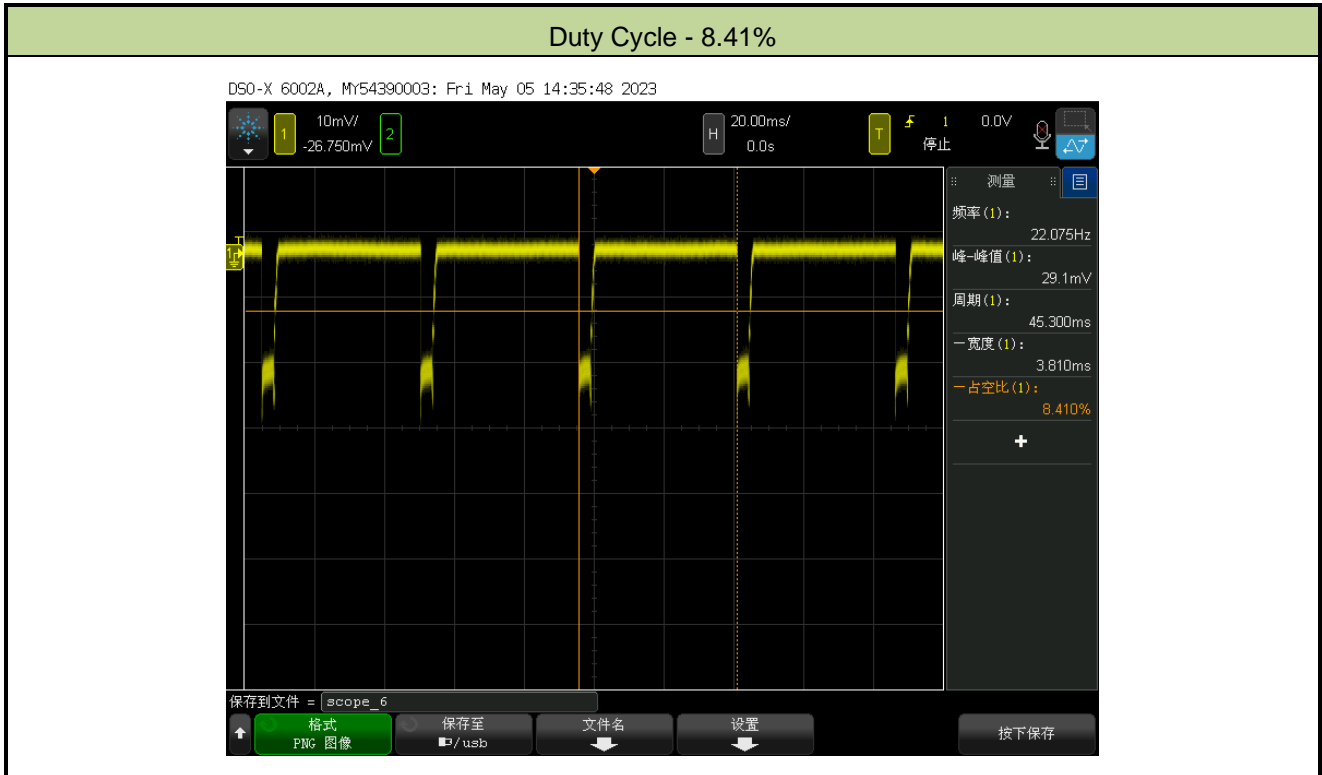
This device was tested per the guidance ANSI C63.10:2013 was used to reference the appropriate EUT setup for radiated emissions testing.



2.3. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

2.4. Duty Cycle



3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

This unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2023-12-28	SIP-AC1
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2023-12-22	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2023-11-01	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06620	1 year	2023-11-27	SIP-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06645	1 year	2023-07-30	SIP-AC1
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2024-02-26	SIP-AC1
Waveguide Harmonic Mixer	Keysight	M1970V	MRTSUE06271	3 years	2025-09-22	SIP-AC1
Waveguide Harmonic Mixer	Keysight	M1970W	MRTSUE06272	3 years	2025-09-29	SIP-AC1
mmWave Antenna	MI-WWAVE	261U-25/383	MRTSUE06273	N/A ^{Note1}	N/A	SIP-AC1
mmWave Antenna	A-INFO	LB-15-25-A	MRTSUE06409	N/A ^{Note1}	N/A	SIP-AC1
mmWave Antenna	A-INFO	LB-10-25-A	MRTSUE06410	N/A ^{Note1}	N/A	SIP-AC1
Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2023-07-08	SIP-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2023-10-13	SIP-AC1
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2023-11-07	SIP-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2023-10-10	SIP-AC1
Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2023-07-13	SIP-AC1

Note 1: Standard gain horns need not be periodically calibrated. Antenna appearance and connector were checked and no damage.

Software	Version	Function
EMI V3	V 3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & turntable

5. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement	
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
9kHz~150kHz:	3.58dB
150kHz~30MHz:	3.20dB
Radiated Emission Measurement	
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
Coaxial:	9kHz~30MHz: 2.59dB
Coplanar:	9kHz~30MHz: 2.60dB
Horizontal:	30MHz~200MHz: 3.85dB
	200MHz~1GHz: 4.36dB
	1GHz~40GHz: 4.98dB
Vertical:	30MHz~200MHz: 4.06dB
	200MHz~1GHz: 5.28dB
	1GHz~40GHz: 4.91dB

6. Test Result

6.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Verdict
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	N/A
15.209 15.249	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Radiated	Pass
15.215(c)	20dB Spectrum Bandwidth	Radiated	Pass

Notes:

1. The radiation measurements are performed in X, Y, Z axis positioning. The test results shown in the following sections represent the worst-case emissions.
2. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3. "N/A" means that this item is not applicable, and the detail information refer to relevant section.

6.2. AC Conducted Emissions Measurement

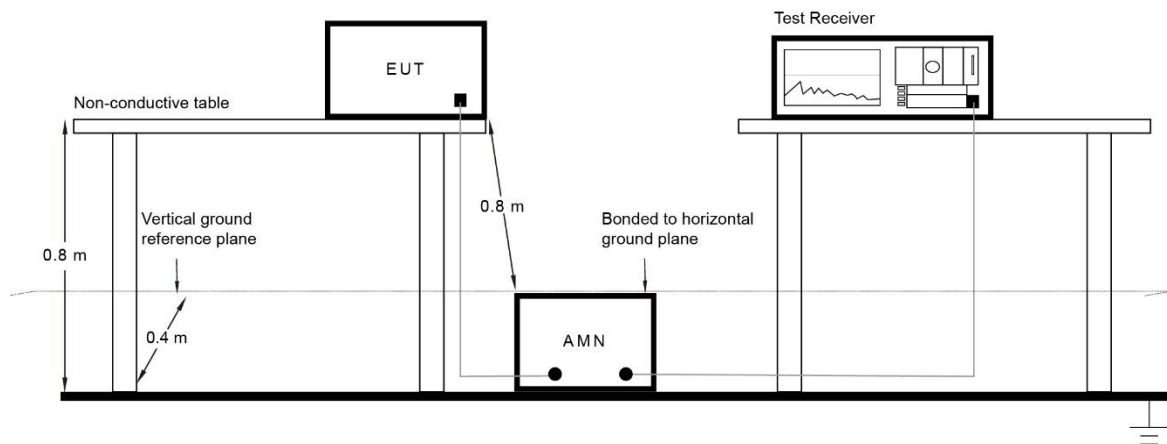
6.2.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	Average (dB μ V)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result

The EUT is powered by DC power supply, so this requirement does not apply.

6.3. Radiated Emission

6.3.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μ V/m)
902 ~ 928	50	500
2400 ~ 2483.5	50	500
5725 ~ 5875	50	500
24000 ~ 24250	250	2500

Note: FCC Part 15.249 (d), 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, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
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

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dB μ V/m) = 20 log E field strength (μ V/m).

6.3.2. Test Procedure

ANSI C63.10-2013 Section 6.3

ANSI C63.10-2013 Section 6.4

ANSI C63.10-2013 Section 6.5

ANSI C63.10-2013 Section 6.6

ANSI C63.10-2013 Section 9.10

Note: Far-field boundary calculation as below.

According to ANSI C63.10-2013, Clause 9, All measurements shall be made in the far-field of the measurement antenna. The far-field boundary for mm-wave antennas is $2D^2/\lambda$.

- For spurious and harmonic emissions testing, D is the largest antenna dimension of the measurement antenna in m;
For fundamental or out-of-band emissions, D is the largest antenna dimension of the EUT antenna or measurement antenna, whichever is largest.
- λ is the wavelength in m.

Far-field boundary calculation			
Frequency Range (GHz)	λ (m)	D (m)	$R_{(\text{Far Field})}$ (m)
24.00 ~ 24.25	0.012	0.096	1.536
40.00 ~ 50.00	0.006	0.046	0.705
50.00 ~ 75.00	0.004	0.036	0.648
75.00 ~ 100.00	0.003	0.026	0.451

For 24.00 ~ 24.25GHz, Our measurement is performed at a minimum distance of 3.0m $> R_{(\text{Far Field})}$.

For 40.00 ~ 100.00GHz, Our measurement is performed at a minimum distance of 1.0m $> R_{(\text{Far Field})}$.

6.3.3. Test Setting

Measurement of harmonic and spurious emissions above 40 GHz

1. Connect the test antenna covering the appropriate frequency range to a spectrum analyzer via an external mixer.
2. Set spectrum analyzer RBW = 1MHz, VBW = 3MHz, peak & average detector.
3. Maximize all observed emissions. Note the maximum power indicated on the spectrum analyzer. Adjust this reading, if necessary, by the conversion loss of the external mixer used at the frequency under investigation and the external mixer IF cable loss.
4. Calculate the maximum field strength of the emission at the measurement distance.

5. Calculate the power density at the distance specified by the limit from the field strength at the distance specified by the limit.
6. Repeat the preceding sequence for every emission observed in the frequency band under investigation.

Measurement of harmonic and spurious emissions below 40 GHz

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3 x RBW
4. Detector = Peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

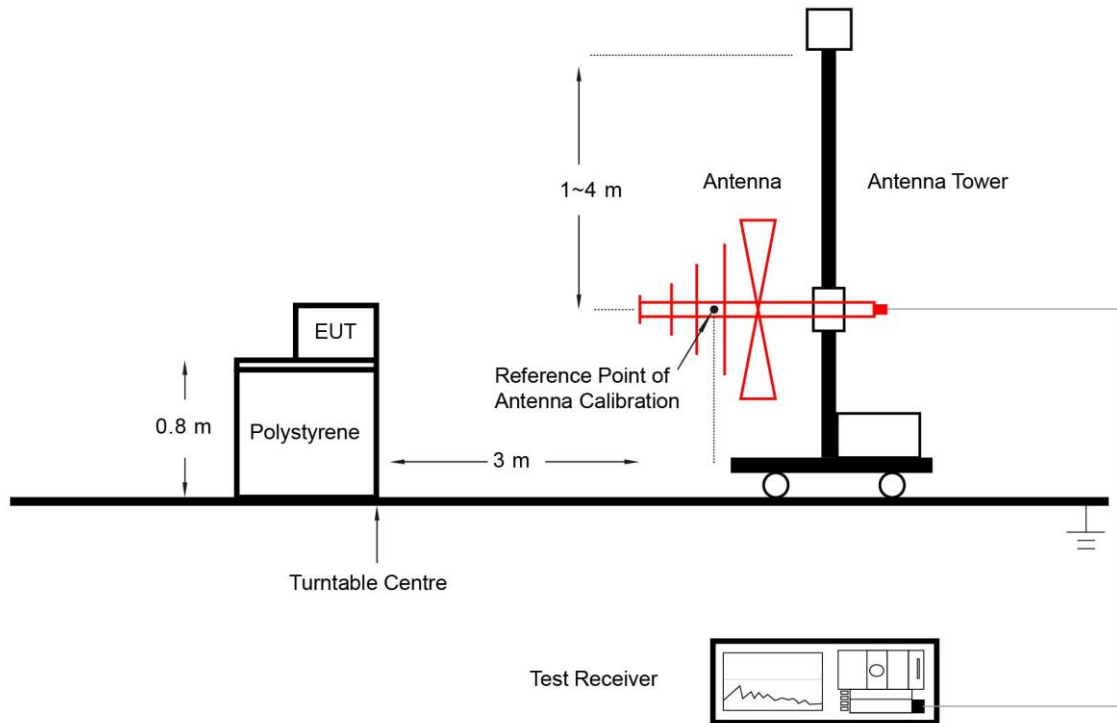
Frequency	RBW
9 ~ 150 kHz	200 Hz
0.15 ~ 30 MHz	9 kHz
30 ~ 1000 MHz	120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

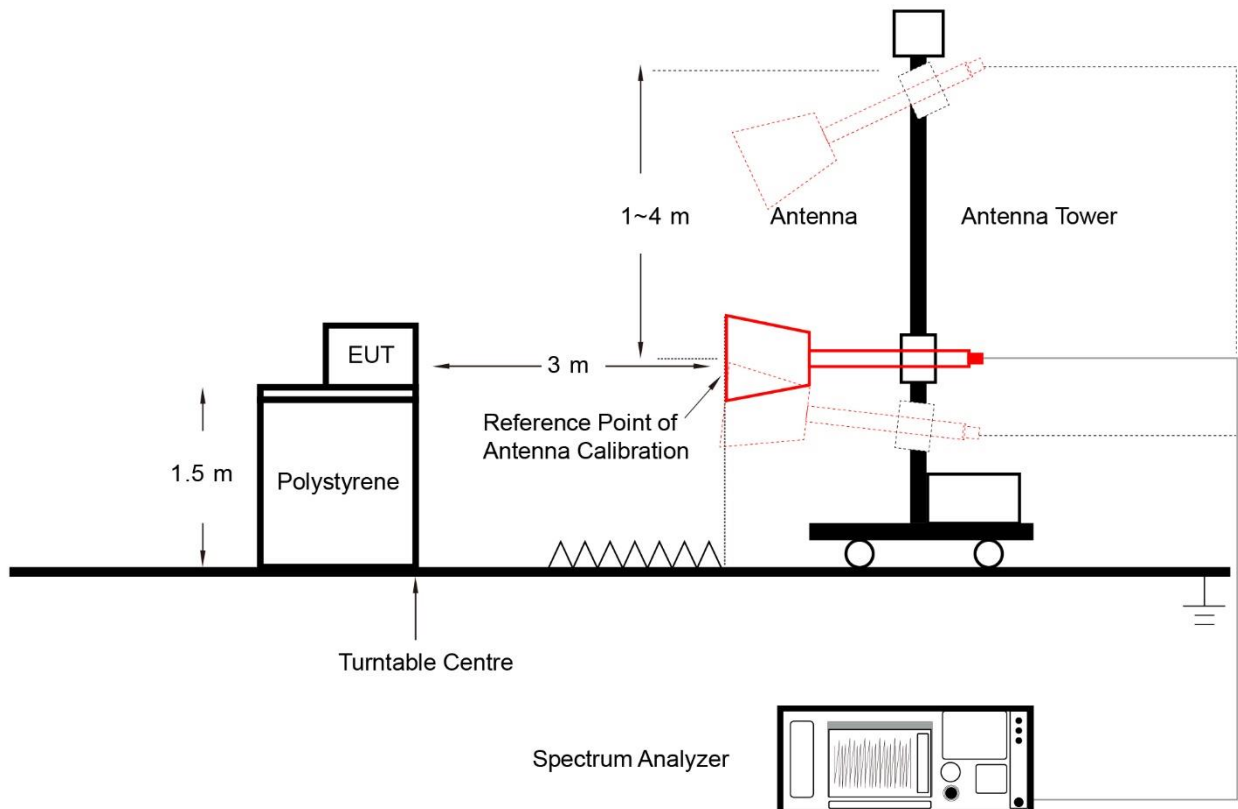
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. Set the VBW $\geq 3 \times$ RBW
4. Detector function = Average
5. Sweep time \geq (number of points in sweep) \times (transmission symbol period).
6. Trace mode = Average
7. Allow max hold to run for suitable traces until the trace tend to stabilize.

6.3.4. Test Setup

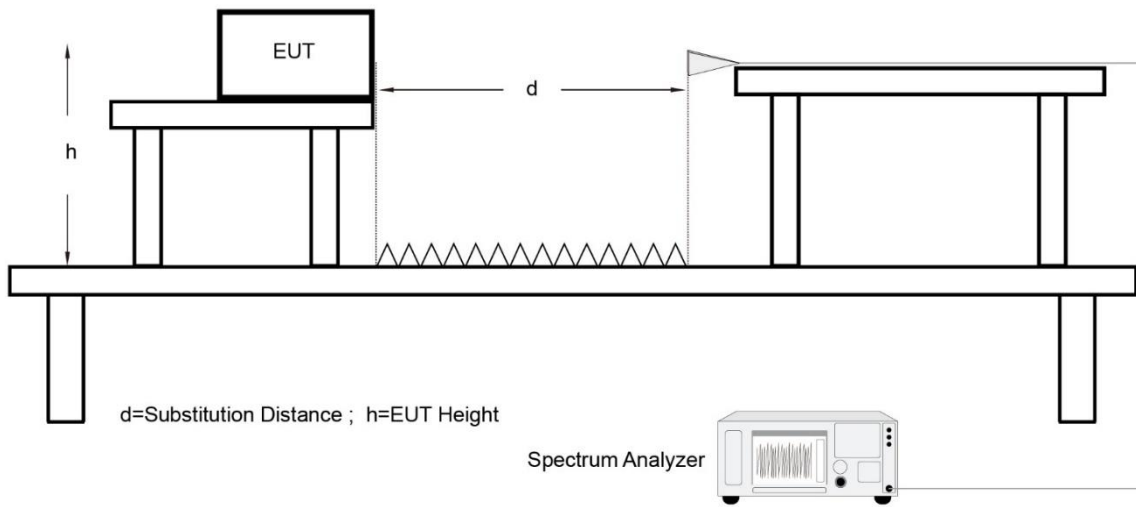
Below 1GHz Test Setup:



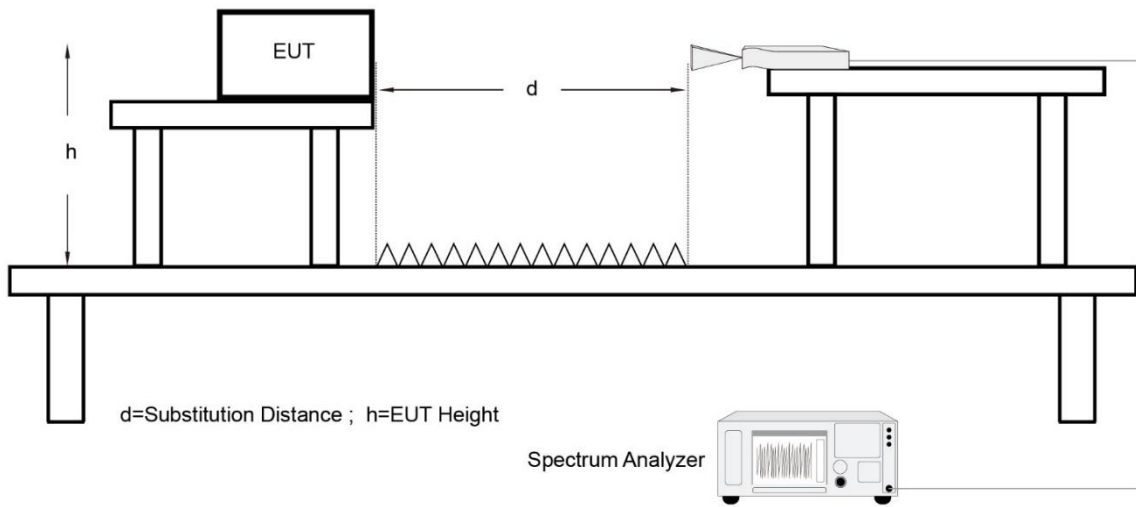
1GHz ~ 40GHz Test Setup:



40GHz ~ 50GHz Test Setup:



Above 50GHz Test Setup:



6.3.5. Test Result

Test Site	SIP-AC1	Test Date	2023-05-03
Test Engineer	Arvin Ding	Test Mode	Mode 1

Frequency Band (GHz)	FMCW Chirp Width (MHz)	FMCW Chirp Time (μ s)	Chirp Rate (MHz/ μ s)	RBW (MHz)	Normalized Sweep Rate	Desensitization Factor (dB)
FMCW desensitization factor						
24.00 ~ 24.25	180	1000	0.18	1	0.18	0

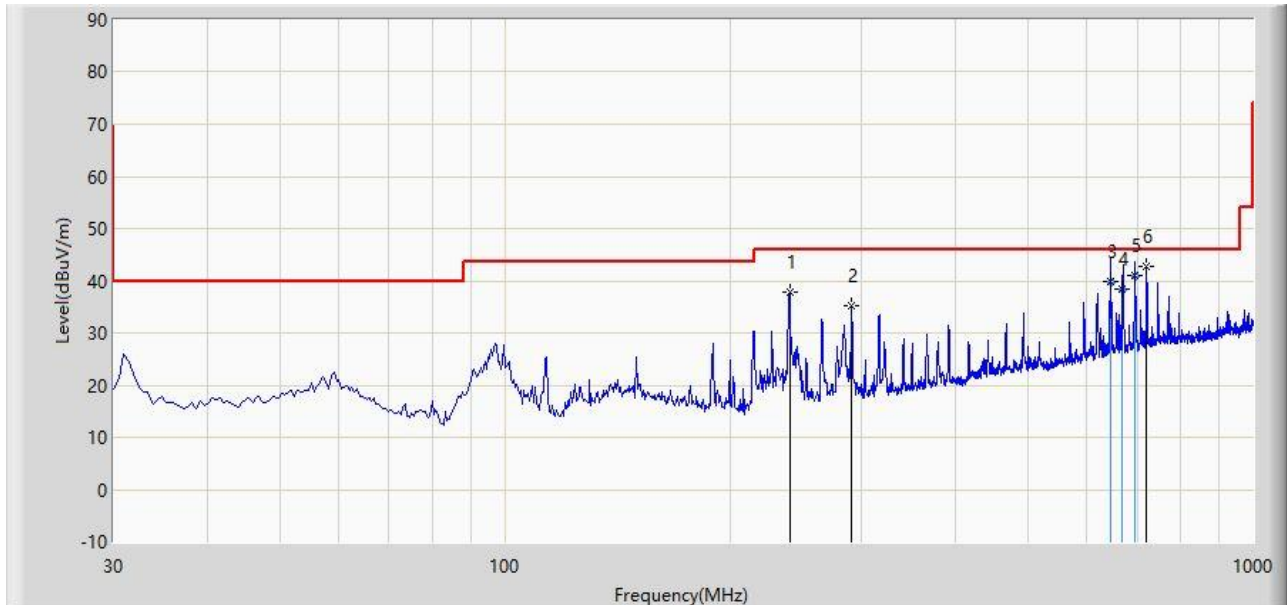
Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

Frequency Band (GHz)	Reading Level (dB μ V)	Factor (dB/m)	Measure Level @3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Result
Fundamental Radiated Emission (Horizontal)							
24.05 ~ 24.25	119.624	-9.414	110.210	128	-17.790	Peak	Pass
	68.362	-9.236	59.126	108	-48.874	Average	Pass
Fundamental Radiated Emission (Vertical)							
24.05 ~ 24.25	103.706	-9.423	94.283	128	-33.717	Peak	Pass
	57.830	-9.230	48.600	108	-59.400	Average	Pass

Notes:

- Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m)
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
- The data were derived from the fundamental frequency results of radiated restricted band edge measurement (Refer to the clause 6.4.5).

Site: SIP-AC1	Test Date: 2023-04-15
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: VULB 9168_00998_25-2000MHz	Polarity: Horizontal
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		240.490	37.744	21.626	-8.256	46.000	16.118	PK
2		290.445	35.342	17.108	-10.658	46.000	18.234	PK
3		644.130	39.839	13.600	-6.161	46.000	26.239	QP
4		669.306	38.452	11.900	-7.548	46.000	26.552	QP
5		694.326	40.992	14.300	-5.008	46.000	26.691	QP
6	*	720.640	42.884	15.910	-3.116	46.000	26.974	PK

Note 1: " * ", means this data is the worst emission level.

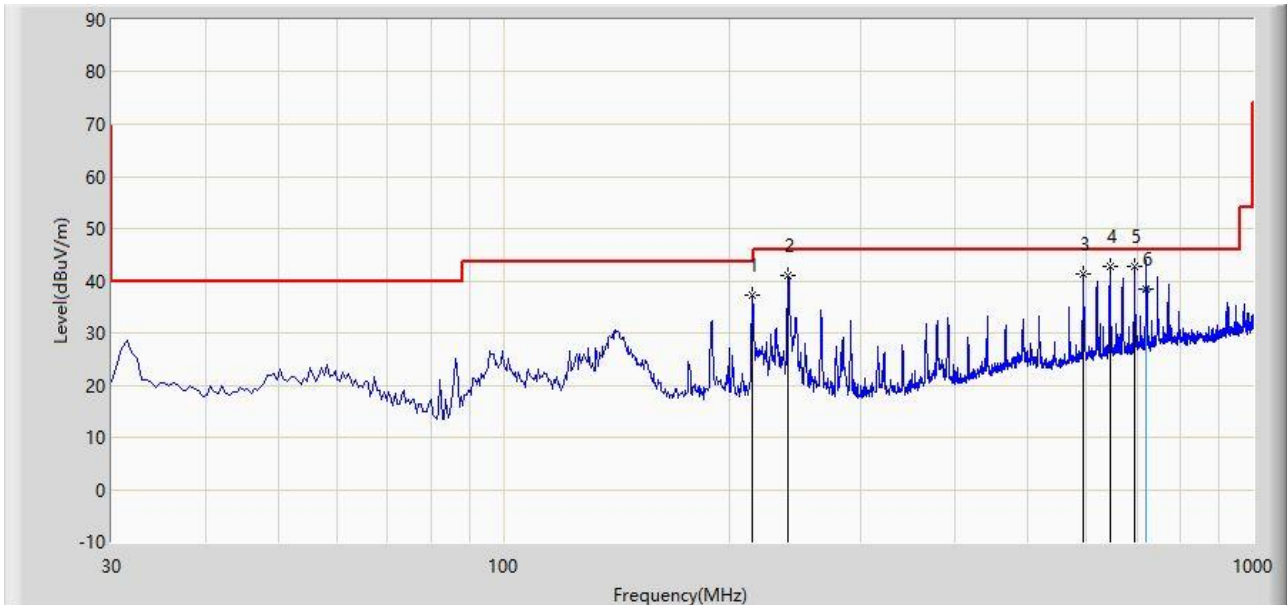
Note 2: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Note 5: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Site: SIP-AC1	Test Date: 2023-04-15
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: VULB 9168_00998_25-2000MHz	Polarity: Vertical
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		214.300	37.158	22.584	-6.342	43.500	14.574	PK
2		240.005	41.103	25.007	-4.897	46.000	16.096	PK
3		593.570	41.215	16.026	-4.785	46.000	25.189	PK
4		644.495	42.872	16.607	-3.128	46.000	26.265	PK
5	*	694.935	42.898	16.200	-3.102	46.000	26.698	PK
6		720.412	38.462	11.500	-7.538	46.000	26.962	QP

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Note 5: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

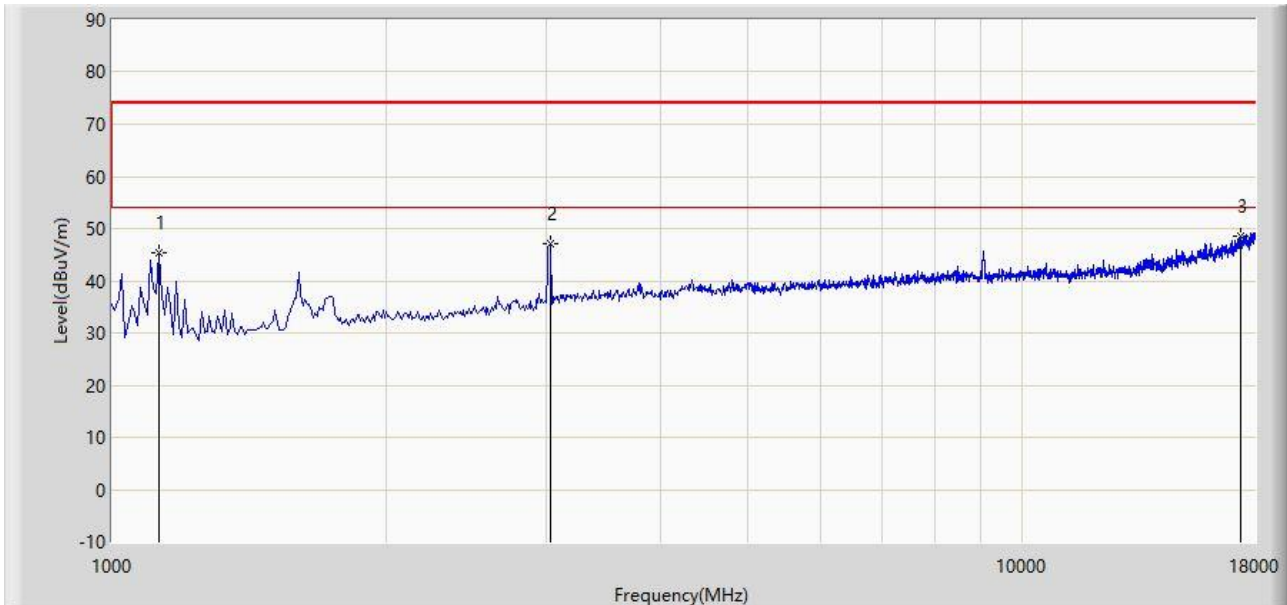
Test Site	SIP-AC1	Test Date	2023-04-15
Test Engineer	Arvin Ding	Test Mode	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Between 1GHz ~ 40GHz							
1127.5	68.3	-22.9	45.4	74.0	-28.6	Peak	Horizontal
3031.5	61.4	-14.2	47.2	74.0	-26.8	Peak	Horizontal
17337.0	41.9	6.5	48.4	74.0	-25.6	Peak	Horizontal
1076.5	66.8	-22.8	44.0	74.0	-30.0	Peak	Vertical
3031.5	61.0	-14.2	46.8	74.0	-27.2	Peak	Vertical
17337.0	42.4	6.5	48.9	74.0	-25.1	Peak	Vertical
30463.0	56.3	-8.3	48.0	74.0	-26.0	Peak	Horizontal
33730.0	58.4	-9.3	49.1	74.0	-24.9	Peak	Horizontal
39186.0	53.8	-0.5	53.3	74.0	-20.7	Peak	Horizontal
39186.0	42.8	-0.5	42.3	54.0	-11.7	Average	Horizontal
30122.0	55.8	-8.6	47.2	74.0	-26.8	Peak	Vertical
34874.0	56.6	-7.3	49.3	74.0	-24.7	Peak	Vertical
39208.0	52.9	-0.6	52.3	74.0	-21.7	Peak	Vertical
39208.0	43.1	-0.6	42.5	54.0	-11.5	Average	Vertical

Notes:

- Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)
 Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre-Amplifier Gain (dB)
- Average measurement was not performed when the peak level lower than average limit.

Site: SIP-AC1	Test Date: 2023-04-15
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: HF907_102862_1-18GHz	Polarity: Horizontal
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		1127.500	45.478	68.339	-28.522	74.000	-22.861	PK
2		3031.500	47.119	61.359	-26.881	74.000	-14.240	PK
3	*	17337.000	48.435	41.901	-25.565	74.000	6.534	PK

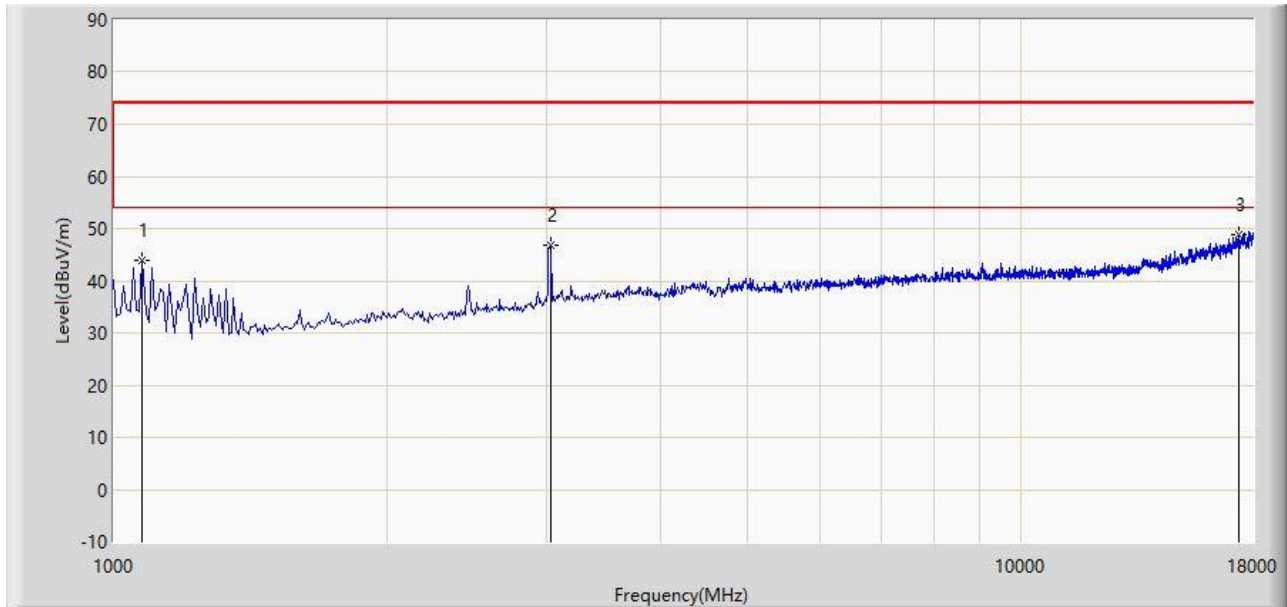
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 4: Average measurement was not performed when peak measure level was lower than the average limit.

Site: SIP-AC1	Test Date: 2023-04-15
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: HF907_102862_1-18GHz	Polarity: Vertical
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		1076.500	43.904	66.752	-30.096	74.000	-22.847	PK
2		3031.500	46.766	61.006	-27.234	74.000	-14.240	PK
3	*	17337.000	48.966	42.432	-25.034	74.000	6.534	PK

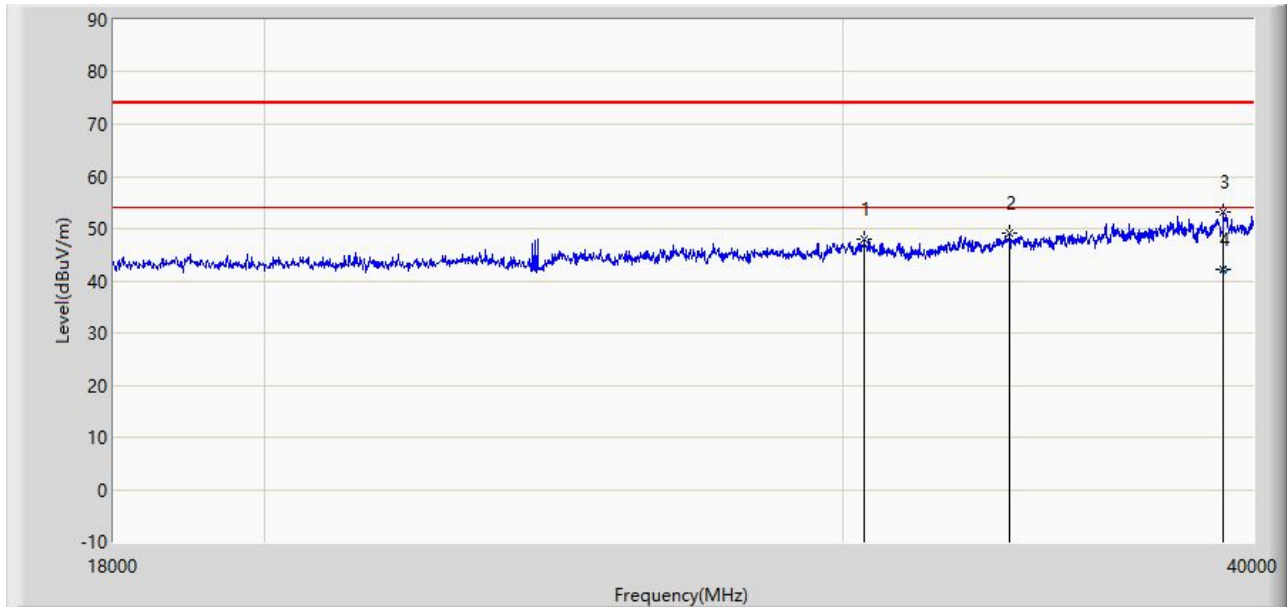
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 4: Average measurement was not performed when peak measure level was lower than the average limit.

Site: SIP-AC1	Test Date: 2023-04-15
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: BBHA 9170_00935_18-40GHz	Polarity: Horizontal
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		30463.000	48.053	56.316	-25.947	74.000	-8.263	PK
2		33730.000	49.104	58.384	-24.896	74.000	-9.280	PK
3		39186.000	53.310	53.787	-20.690	74.000	-0.477	PK
4	*	39186.000	42.283	42.760	-11.717	54.000	-0.477	AV

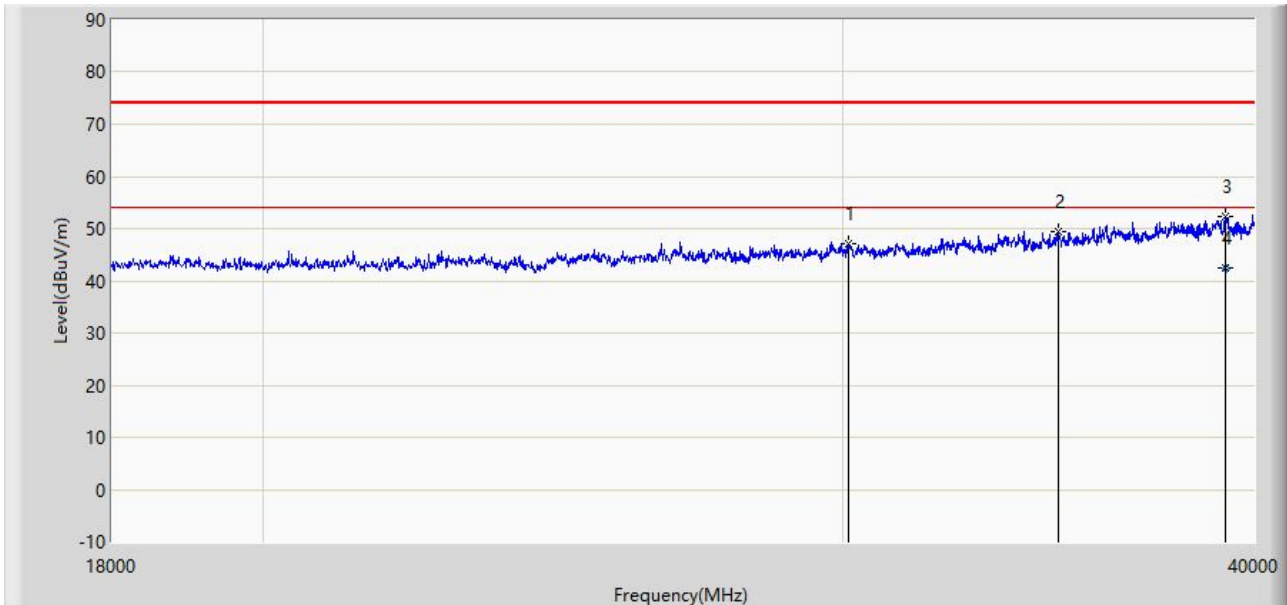
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 4: Average measurement was not performed when peak measure level was lower than the average limit.

Site: SIP-AC1	Test Date: 2023-04-15
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: BBHA 9170_00935_18-40GHz	Polarity: Vertical
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		30122.000	47.190	55.762	-26.810	74.000	-8.572	PK
2		34874.000	49.338	56.608	-24.662	74.000	-7.270	PK
3		39208.000	52.285	52.854	-21.715	74.000	-0.569	PK
4	*	39208.000	42.481	43.050	-11.519	54.000	-0.569	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 4: Average measurement was not performed when peak measure level was lower than the average limit.

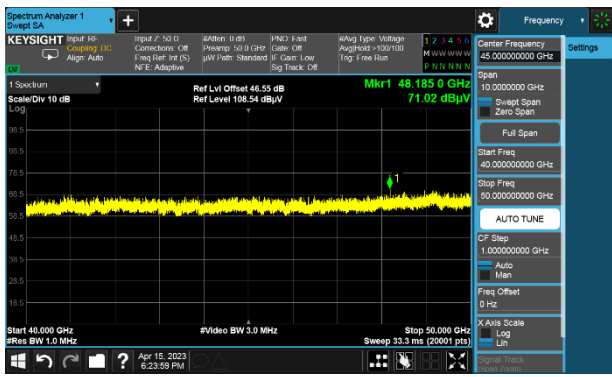
Test Site	SIP-AC1	Test Date	2023-04-15
Test Engineer	Arvin Ding	Test Mode	Mode 1

Frequency (GHz)	Measure Level @1m (dBμV/m)	Measure Level @3m (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Detector	Result	Polarity
Above 40GHz							
48.185	71.020	61.478	74.000	-12.522	Peak	Pass	Horizontal
49.168	50.826	41.284	54.000	-12.716	Average	Pass	Horizontal
49.917	68.480	58.938	74.000	-15.062	Peak	Pass	Vertical
49.148	51.152	41.610	54.000	-12.390	Average	Pass	Vertical
61.651	77.230	67.688	74.000	-6.312	Peak	Pass	Horizontal
72.450	62.604	53.062	54.000	-0.938	Average	Pass	Horizontal
60.851	76.910	67.368	74.000	-6.632	Peak	Pass	Vertical
72.450	62.560	53.018	54.000	-0.982	Average	Pass	Vertical
96.600	74.940	65.398	88.000	-22.602	Peak	Pass	Horizontal
96.600	67.120	57.578	68.000	-10.422	Average	Pass	Horizontal
96.600	74.020	64.478	88.000	-23.522	Peak	Pass	Vertical
96.600	67.881	58.339	68.000	-9.661	Average	Pass	Vertical

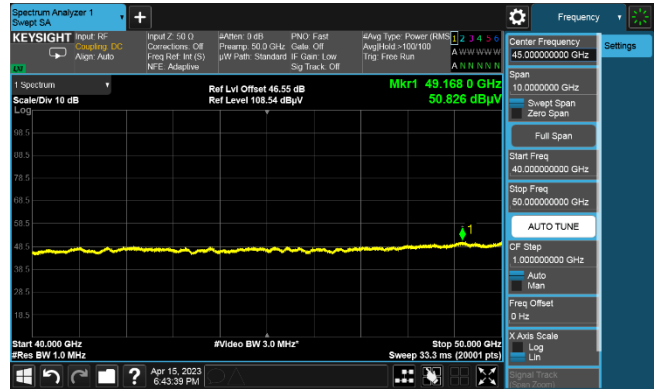
Notes:

1. Measure Level @3m = Measure Level @1.0m + 20 * log(1.0m / 3m)
2. The distance of testing is 1m.

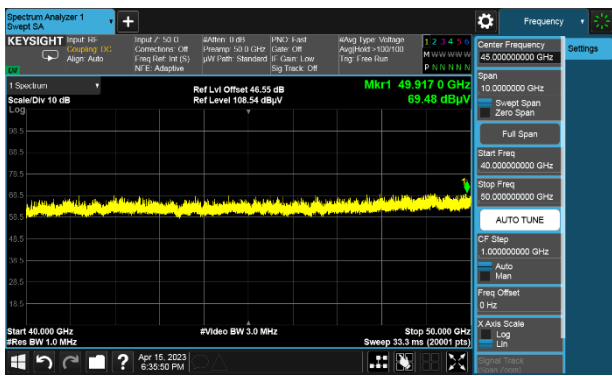
Emission between 40 ~ 50GHz – PK - Horizontal



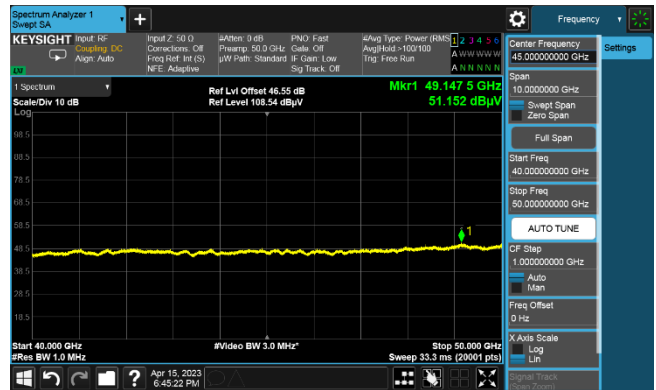
Emission between 40 ~ 50GHz – AV - Horizontal



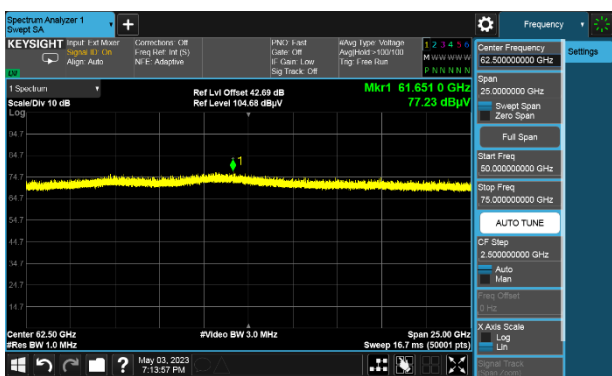
Emission between 40 ~ 50GHz – PK - Vertical



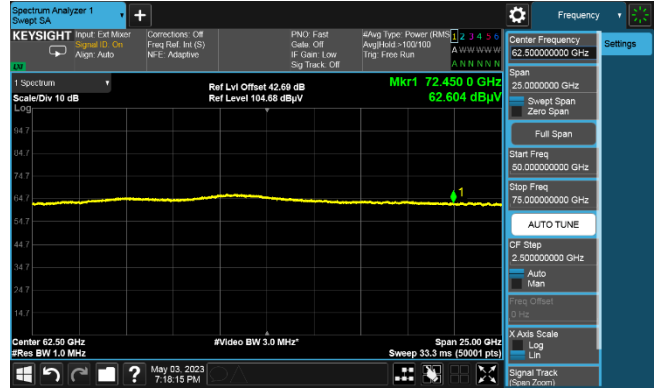
Emission between 40 ~ 50GHz – AV - Vertical



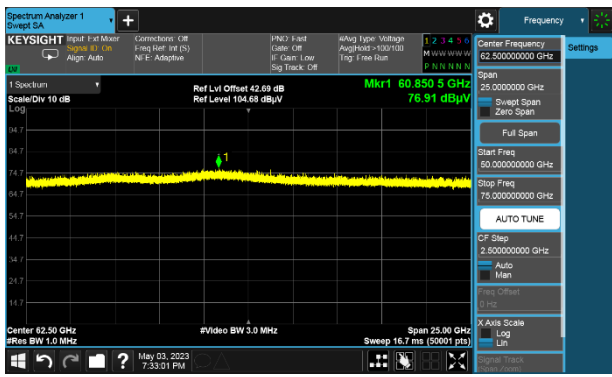
Emission between 50 ~ 75GHz – PK - Horizontal



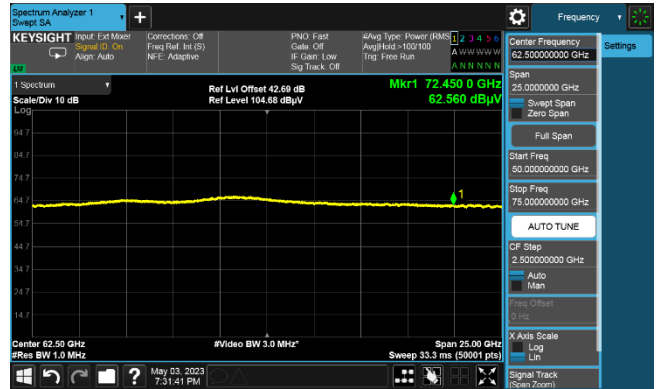
Emission between 50 ~ 75GHz – AV - Horizontal



Emission between 50 ~ 75GHz – PK - Vertical



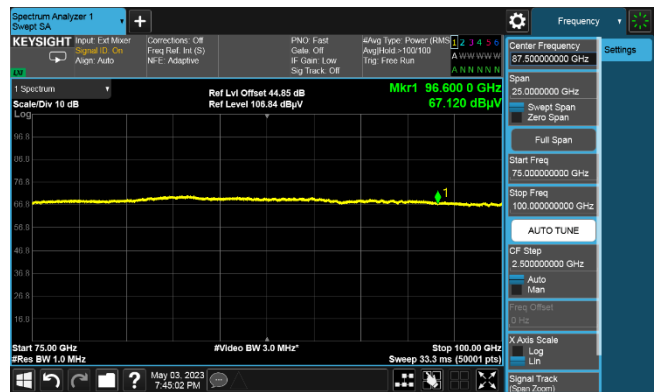
Emission between 50 ~ 75GHz – AV - Vertical



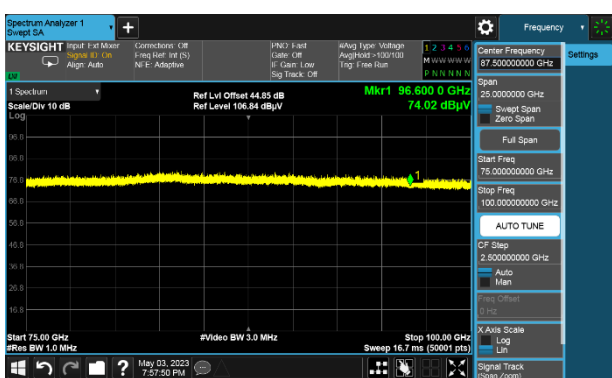
Emission between 75 ~ 100GHz – PK - Horizontal



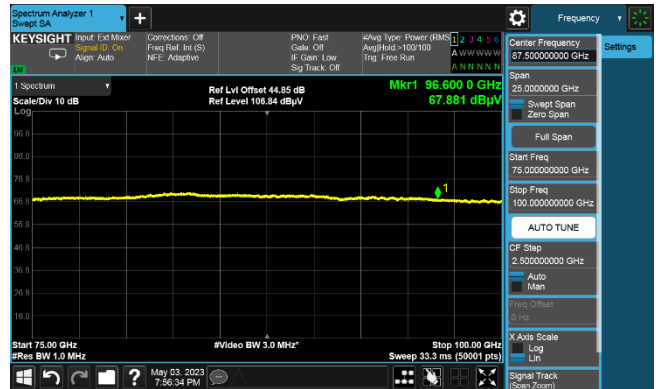
Emission between 75 ~ 100GHz – AV - Horizontal



Emission between 75 ~ 100GHz – PK - Vertical



Emission between 75 ~ 100GHz – AV - Vertical



6.4. Radiated Restricted Band Edge Measurement

6.4.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 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	(²)
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [$\mu\text{V}/\text{m}$]	Measured Distance [Meter]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

6.4.2. Test Procedure

ANSI C63.10-2013 Section 6.3

ANSI C63.10-2013 Section 6.6

ANSI C63.10-2013 Section 6.10

6.4.3. Test Setting

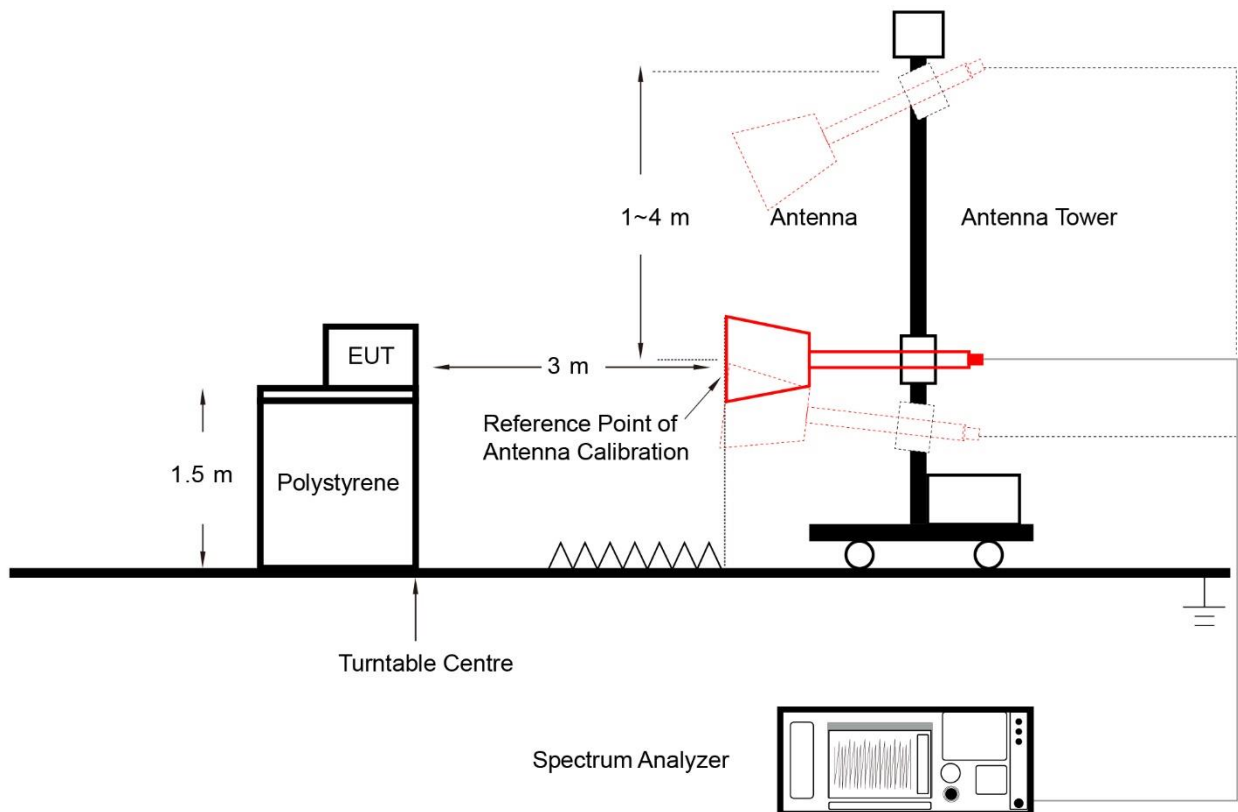
Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

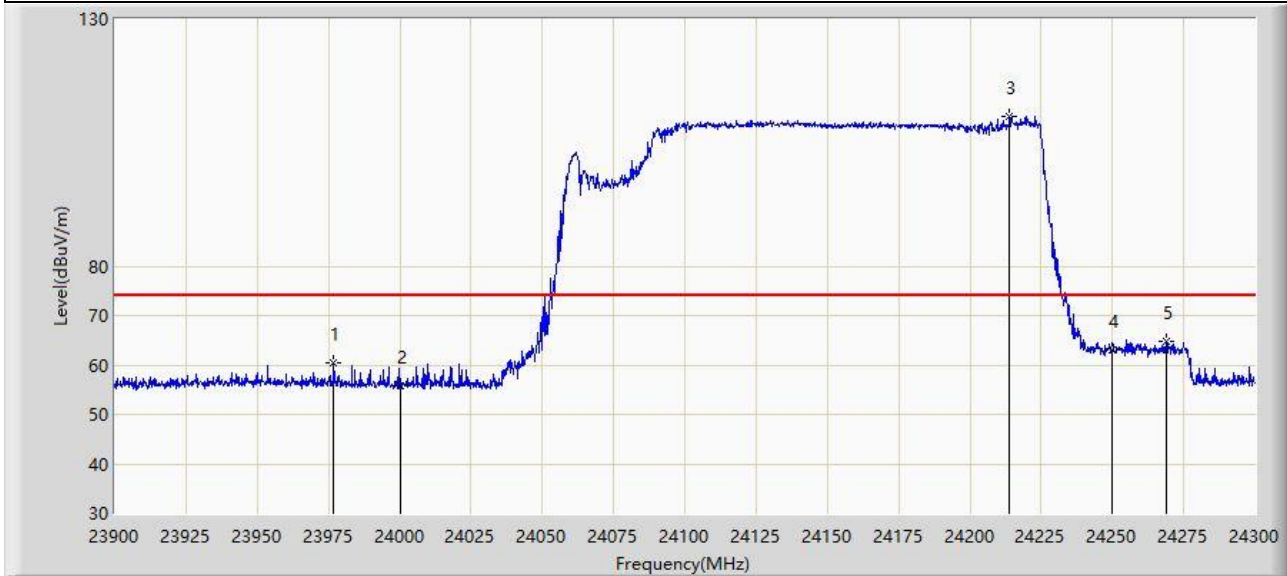
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. Set the VBW $\geq 3 \times$ RBW
4. Detector function = Average
5. Sweep time \geq (number of points in sweep) \times (transmission symbol period).
6. Trace mode = Average
7. Allow max hold to run for suitable traces until the trace tend to stabilize.

6.4.4. Test Setup



6.4.5. Test Result

Site: SIP-AC1	Test Date: 2023-05-03
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: BBHA 9170_00935_18-40GHz	Polarity: Horizontal
EUT: 4D Imaging Radar	Power: DC 48V
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		23976.801	60.319	69.548	-13.681	74.000	-9.229	PK
2		24000.000	55.705	65.156	-18.295	74.000	-9.451	PK
3		24214.000	110.210	119.624	N/A	N/A	-9.414	PK
4		24250.000	63.186	72.455	-10.814	74.000	-9.269	PK
5	*	24269.000	64.914	74.329	-9.086	74.000	-9.414	PK

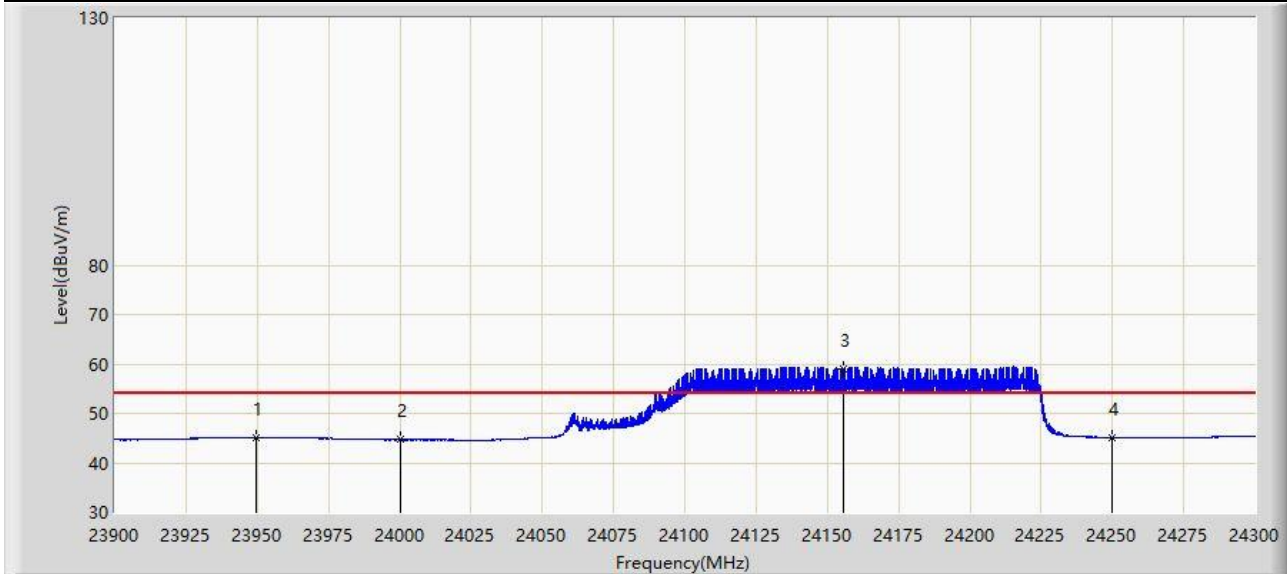
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: SIP-AC1	Test Date: 2023-05-03
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: BBHA 9170_00935_18-40GHz	Polarity: Horizontal
EUT: 4D Imaging Radar	Power: DC 48V

Test Mode 1



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		23949.600	45.081	54.110	-8.919	54.000	-9.029	AV
2		24000.000	44.669	54.120	-9.331	54.000	-9.451	AV
3		24155.600	59.126	68.362	N/A	N/A	-9.236	AV
4	*	24250.000	45.137	54.406	-8.863	54.000	-9.269	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: SIP-AC1	Test Date: 2023-05-03
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: BBHA 9170_00935_18-40GHz	Polarity: Vertical
EUT: 4D Imaging Radar	Power: DC 48V

Test Mode 1



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	23970.199	58.102	67.262	-15.898	74.000	-9.160	PK
2		24000.000	55.567	65.018	-18.433	74.000	-9.451	PK
3		24213.400	94.283	103.706	N/A	N/A	-9.423	PK
4		24250.000	56.871	66.140	-17.129	74.000	-9.269	PK
5		24277.400	57.966	67.261	-16.034	74.000	-9.295	PK

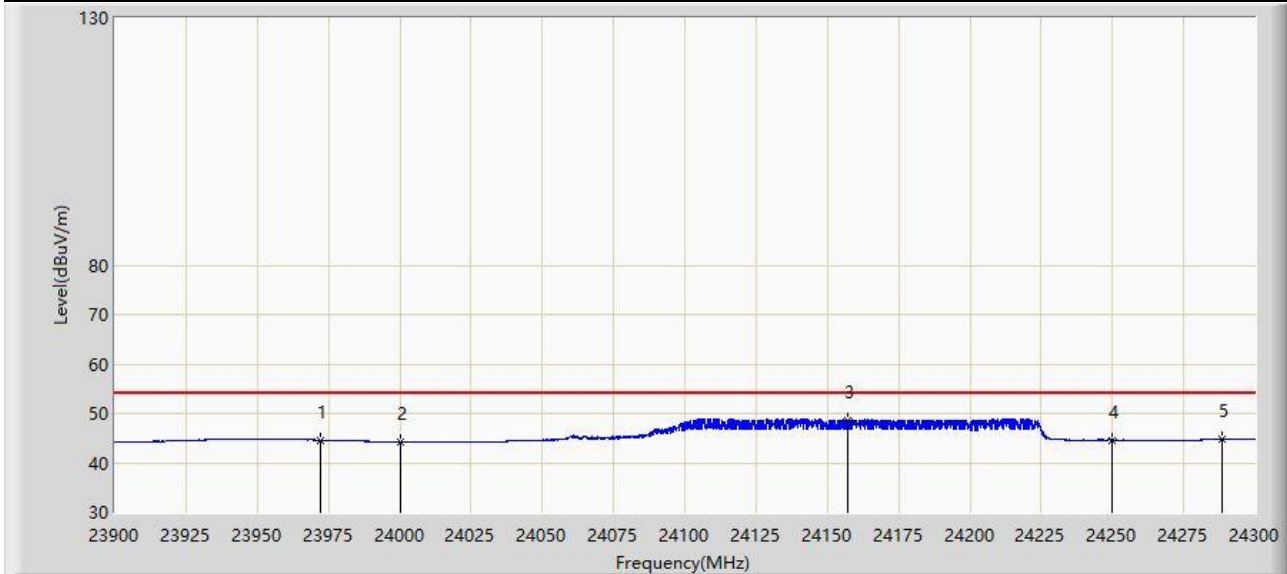
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: SIP-AC1	Test Date: 2023-05-03
Limit: FCC_Part15.249_RSE(3m)	Engineer: Arvin Ding
Probe: BBHA 9170_00935_18-40GHz	Polarity: Vertical
EUT: 4D Imaging Radar	Power: DC 48V

Test Mode 1



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		23972.000	44.593	53.771	-9.407	54.000	-9.178	AV
2		24000.000	44.275	53.726	-9.725	54.000	-9.451	AV
3		24157.000	48.600	57.830	N/A	N/A	-9.230	AV
4		24250.000	44.636	53.905	-9.364	54.000	-9.269	AV
5	*	24288.600	44.799	53.901	-9.201	54.000	-9.103	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

6.5. 20dB Spectrum Bandwidth Measurement

6.5.1. Test Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission in the specific band.

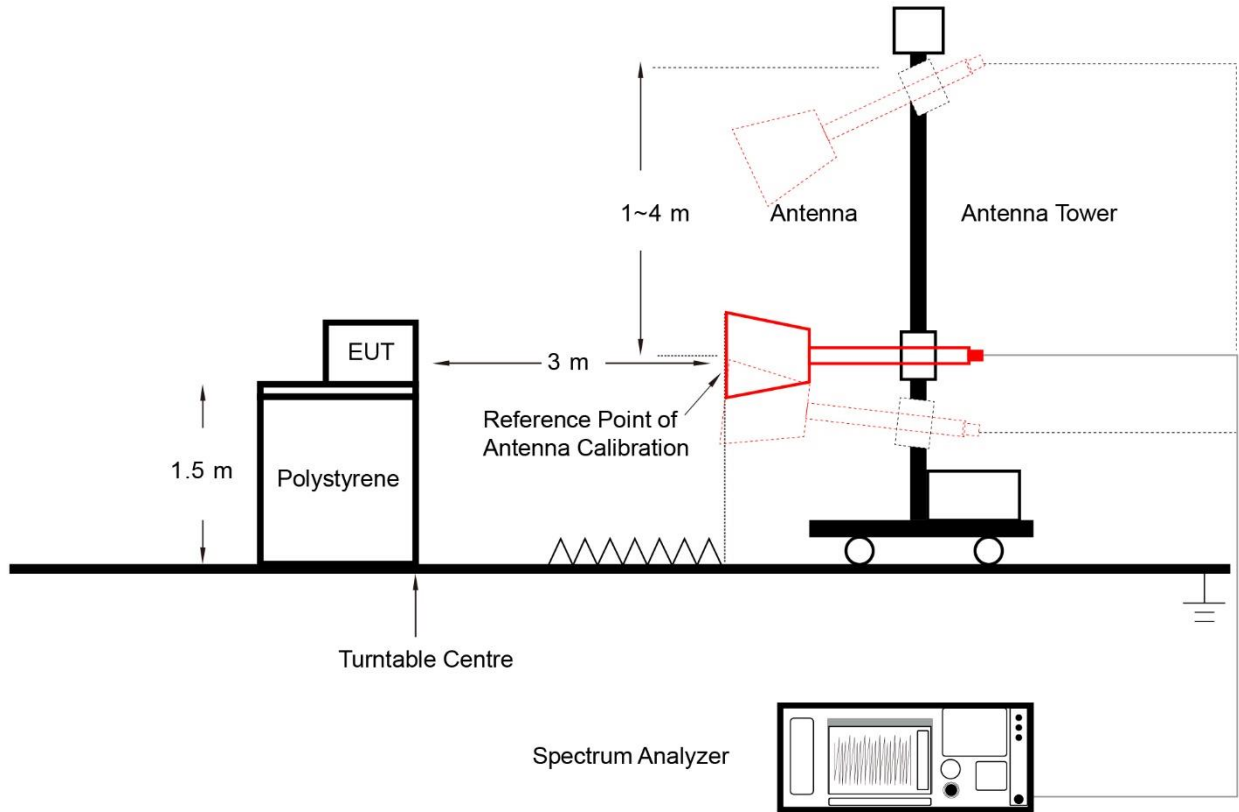
6.5.2. Test Procedure

ANSI C63.10-2013 Clause 6.9.2

6.5.3. Test Setting

1. Set the spectrum span range to overlap the nominal center frequency
2. Set RBW = 1% ~ 5% of the OBW
3. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize and marker the highest level
8. Use Occupied BW function to determine two frequencies, one at the lowest frequency and the other at the highest frequency

6.5.4. Test Setup



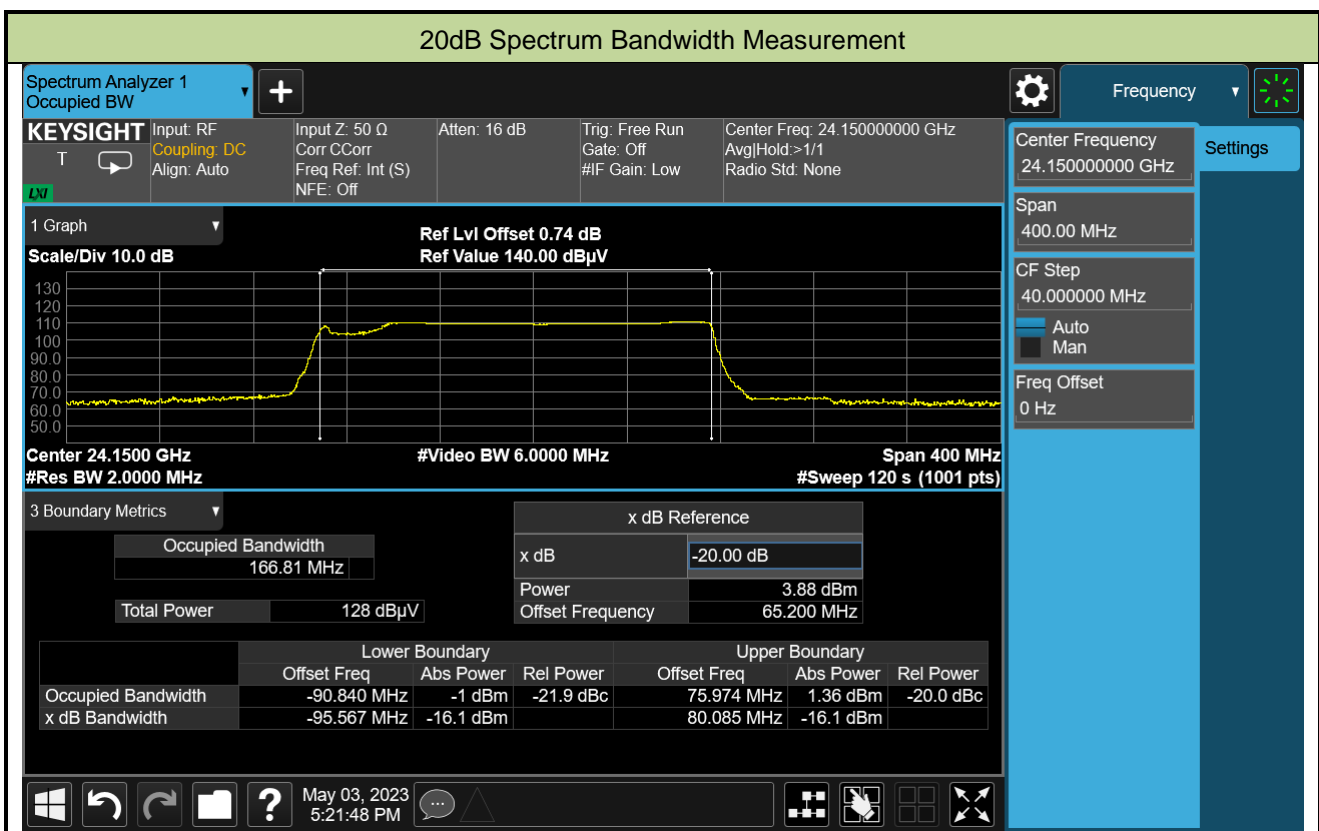
6.5.5. Test Result

Test Site	SIP-AC1	Test Date	2023-05-03
Test Engineer	Mero Zhou		

20dB Bandwidth (MHz)	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)	Result
175.652	24054.43	≥ 24000	24230.09	≤ 24250	Pass

Note: Low Frequency (F_L) = Center Frequency + Lower Boundary;

High Frequency (F_H) = Center Frequency + Upper Boundary.



Appendix A - Test Setup Photograph

Refer to "2304RSU030-UT" file.

Appendix B - EUT Photograph

Refer to "2304RSU030-UE" file.