NVLAP TESTING
NVLAP LAB CODE 600341-0

BACL Bay Area Compliance Labs Corp.

TEST REPORT

Applicant:	**Autel Robotics Co., Ltd.**
Address:	**601,701,801,901, Block B1, Nanshan iPark, No. 1001 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, 518055, China**
Product Name:	**EVO Max 4T V2, EVO Max 4N V2, EVO Max 4NZ V2**
FCC ID:	**2AGNTMDX1600958A**
IC:	**20910-MDX1600958A**
HVIN:	**MDX-1**
Standard(s):	**47 CFR Part 15, Subpart C(15.255) ANSI C63.10-2020 +Cor.1-2023 RSS-210 Issue 11, June 25, 2024 RSS-Gen, Issue 5, February 2021 Amendment 2**
Report Number:	**2402A43113E-RF-00E**
Report Date:	**2025/1/13**

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Reviewed By: Pedro Yun	**Approved By:** Gavin Xu
Title: Project Engineer	Title: RF Supervisor

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402A43113E-RF-00E	Original Report	2025/1/13

1. GENERAL INFORMATION

1.1 General Description of Equipment under Test

EUT Name:	EVO Max 4T V2, EVO Max 4N V2, EVO Max 4NZ V2
EUT Model:	MDX-1
Operation Frequency Range:	60.98-61.84 GHz
Maximum Peak EIRP:	19.54 dBm
Modulation Type:	FMCW
Chirp Time▲:	93.6 μs
Emission Designator:	N0N
Rated Input Voltage:	DC 14.76V from battery
Serial Number:	2RQM-2 (For Radiated Spurious Emissions Above 1G Test) 2RQM-4 (For Radiated Spurious Emissions Below 1G Test)
EUT Received Date:	2024/11/5
EUT Received Status:	Good
Note: The device can install difference Gimbal camera, per 15B report, test with Gimbal camera 2#(Fusion 4NZ) was the worst, so test was only performed with Gimbal camera 2#(Fusion 4NZ) this report.	

1.2 Accessory Information

Accessory Description	Manufacturer	Model	Parameters
Adapter	Shenzhen Esun Power Technology Co.,Ltd	MDX120W	Input:100-240Vac,50/60Hz,3.0 A Output: Main:17Vdc.7.06A;USB-C:5.0V, 3.0A;9.0V,3.0A;12.0V,2.5A Total Output Power:120.0W Max
Battery	Xiamen Ampace Technology Limited	ABX41-D	DC 14.76V

1.3 Antenna Information Detail▲

Antenna Type	input impedance (Ohm)	Antenna Gain	Frequency Range
Array Antenna	Unknown	9.6dBi	60-64GHz
The design of compliance with §15.203:			
☒ Unit uses a permanently attached antenna.			
☐ Unit uses a unique coupling to the intentional radiator.			
☐ Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.			

1.4 Equipment Modifications

No modifications are made to the EUT during all test items.

2. SUMMARY OF TEST RESULTS

Standard(s)/Rule(s)	Description of Test	Result
§15.207(a) RSS-Gen Clause 8.8	AC Line Conducted Emissions	Not Applicable
§15.255(b)(3) RSS-210 Annex J.3.2 (d)	Peak EIRP and Transmitter Off-times	Compliant
§15.215, §15.255 (e) RSS-Gen Clause 6.7	Occupied Bandwidth	Compliant
§15.205, §15.209, §15.255(d) RSS-Gen Clause 8.10 RSS-210 Annex J.4	Radiated Spurious Emissions	Compliant
§15.255 (f) RSS-210 Annex J.6	Frequency Stability	Compliant
§15.255 (a),(b),(h)	Operation Restriction And Group Installation	Compliant
RSS-210 Annex J.7	Group Installation	Compliant
§15.203 RSS-Gen Clause 6.8	Antenna Requirement	Compliant
Note: Not Applicable, the device was powered by battery when operating.		

3. DESCRIPTION OF TEST CONFIGURATION

3.1 EUT Operation Condition

The system was configured for testing in production version with highest transmitter activity (on time), which was provided by the manufacturer. According to 15.31(c) and KDB 364244 D01 Meas 15.255 Radars v01, the device tested at Swept mode for FMCW modulation. The device was built in 6 radar modules, each module was tested separately except radiation emissions below 40GHz test simultaneously.

3.2 EUT Exercise Software

No software was used in test. The EUT transmit when EUT was power up.

3.3 Support Equipment List and Details

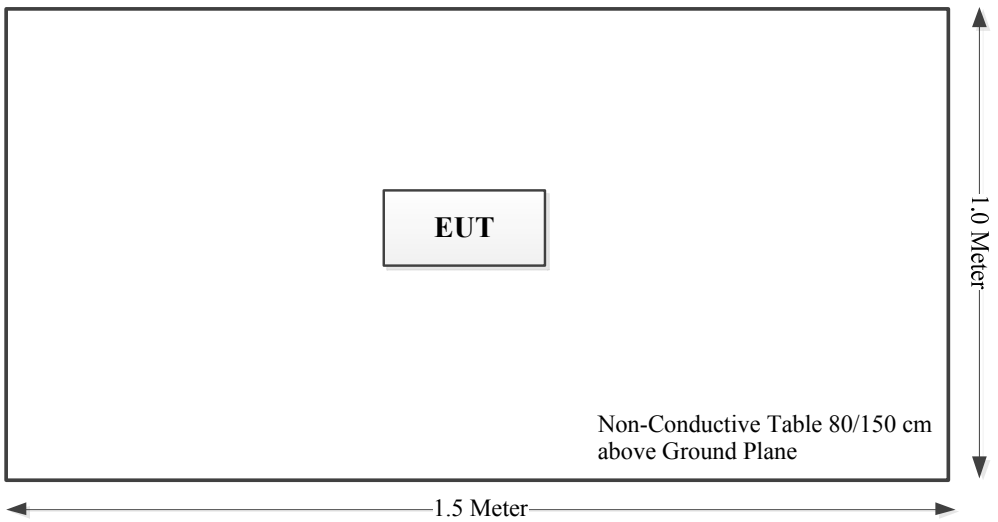
Manufacturer	Description	Model	Serial Number
/	/	/	/

3.4 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

3.5 Block Diagram of Test Setup

Radiated Spurious Emission:



3.6 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 829273, the FCC Designation No. : CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

3.7 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	9kHz~30MHz: 3.3dB, 30MHz~200MHz: 4.55 dB, 200MHz~1GHz: 5.92 dB, 1GHz~6GHz: 4.98 dB, 6GHz~18GHz: 5.89 dB, 18GHz~26.5GHz:5.47 dB, 26.5GHz~40GHz:5.63 dB 40~60G: 4.83dB, 60G~90G: 4.94dB, 90G-140G: 5.46dB, 140G-220G: 6.00dB, 220G-325G: 7.35dB
EIRP	4.94dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.11 dB (150 kHz to 30 MHz)

4. REQUIREMENTS TEST RESULTS

4.1 AC Line Conducted Emissions

Not Applicable, the device was powered by battery when operating.

4.2 Peak EIRP And Transmitter Off-times

4.2.1 Applicable Standard

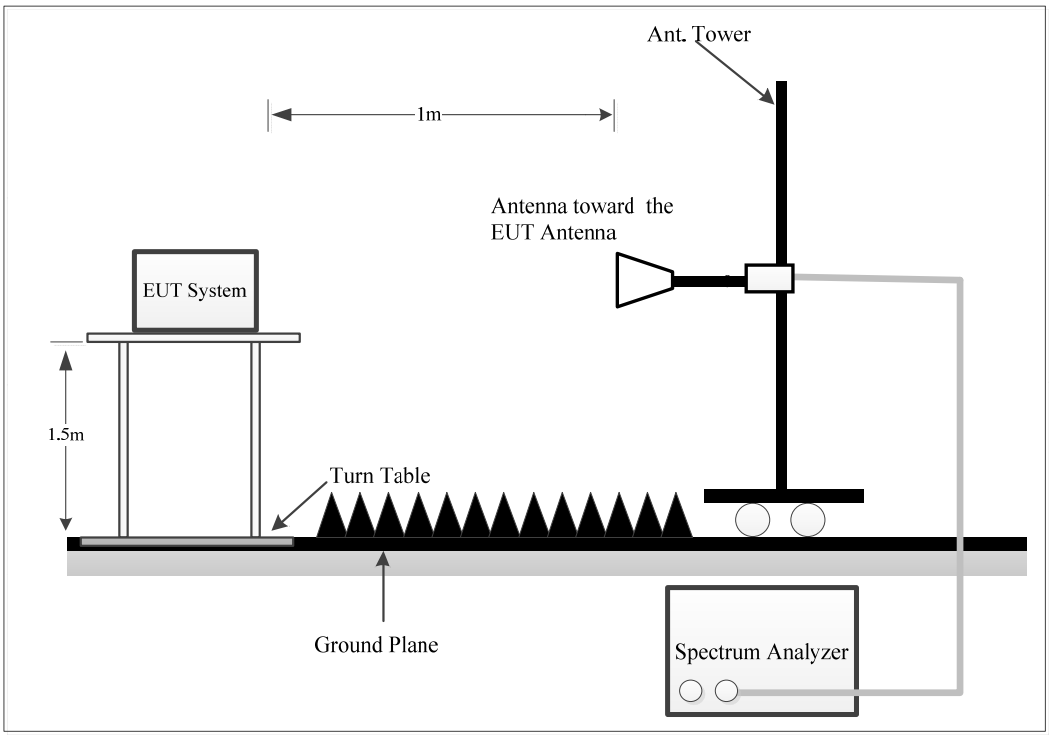
FCC §15.255(b)(3)

Field disturbance sensors/radar devices deployed on unmanned aircraft may operate within the frequency band 60 – 64 GHz, provided that the transmitter not exceed 20 dBm peak EIRP. The sum of continuous transmitter off-times of at least two milliseconds shall equal at least 16.5 milliseconds within any contiguous interval of 33 milliseconds. Operation shall be limited to a maximum of 121.92 meters (400 feet) above ground level.

RSS-210, Annex J.3.2(d)

For FDS devices installed on UAVs, their peak e.i.r.p. shall not exceed 20 dBm and the sum of continuous transmitter off-times of at least 2 ms shall equal at least 16.5 ms within any contiguous interval of 33 ms. See also J.2(d).

4.2.2 EUT Setup



Place the measurement antenna at a measurement distance that is in the far-field of the measurement antenna, in the far-field of the EUT antenna. The EIRP test was performed at 1m distance, which was larger than the minimum test distance, please refer to section 4.4.4 for more detail.

4.2.3 Test Procedure

Refer to ANSI C63.10-2020 Clause 9.8

For radiated measurements:
1) Place the measurement antenna at a measurement distance that is in the far-field of the measurement antenna, in the far-field of the EUT antenna, and meets the measurement distance requirements for final radiated measurements as specified in 9.1.4.
2) Place the measurement antenna in the main beam of the EUT then maximize the fundamental emission using the procedures of 9.7, noting that multiple peaks can be found at different beam orientations and/or polarizations.
3) Correct the power reading from the spectrum analyzer for any external gain and/or attenuation between the measurement antenna and the spectrum analyzer. This is the power at the output of the measurement antenna
4) Calculate the EIRP from the power at the output of the measurement antenna using Equation (22), and then convert to linear form using Equation (24).

$$EIRP = 21.98 - 20\log(\lambda) + 20\log(d_{Meas}) + P - G \quad (22)$$

where

$EIRP$	is the equivalent isotropic radiated power, in dBm
λ	is the wavelength of the emission under investigation [300/f(MHz)], in m
d_{Meas}	is the measurement distance, in m
P	is the power measured at the output of the measurement antenna, in dBm
G	is the gain of the measurement antenna, in dBi

NOTE—The measured power P includes all applicable instrument correction factors up to the connection to the measurement antenna.

5) Where applicable, calculate conducted output power from the EIRP using Equation (27).

For FMCW emissions, the procedures in 4.1.5.2.8 and Annex L shall be used.

4.2.4 Test Result

Serial Number:	2RQM-2	Test Date:	2024/12/17
Test Site:	Chamber B	Test Mode:	Transmitting
Tester:	Bill Yang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	19.5	Relative Humidity: (%)	30	ATM Pressure: (kPa)	102.2

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Waveguide Mixer	11970V	2521A011767	2023/2/16	2026/2/15
Flann Micowave	Horn Antenna	861V/385	736	2023/2/27	2026/2/26
Resenberger	Coaxial Cable	LU7-022-1000	0031	2024/3/1	2025/2/28
Resenberger	Coaxial Cable	LU7-022-1000	0032	2024/3/1	2025/2/28
Agilent	Spectrum Analyzer	E4440A	MY44303352	2024/10/22	2025/10/21

** Statement of Traceability: Bay Area Compliance Laboratories Corp.(Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Chirps Correction Factor

Radar	Chirps Time (μs)	BW_{chirp} (MHz)	RBW (MHz)	Chirps Correction Factor (dB)
Front	93.6	847.92	1	6.15
Rear	93.6	847.92	1	6.15
Left	93.6	843.26	1	6.13
Right	93.6	847.92	1	6.15
Top	93.6	843.26	1	6.13
Bottom	93.6	845.59	1	6.14

Refer to ANSI C63.10-2020/cor 1-2023Annex L.1. The chirps correction factor was calculated using the formula:

$$\alpha = \frac{1}{\left(1+\left[\left(\frac{2\times\ln(2)}{\pi}\right)^2\times\left(\frac{BW_{Chirp}}{T_{Chirp}\times RBW^2}\right)^2\right]\right)^{0.25}}$$

where

α	is the reduction in amplitude
BW_{Chirp}	is the FMCW Chirp Bandwidth
T_{Chirp}	is the FMCW Chirp Time

Radar	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)	E-Field@1m (dBμV/m)	Chirps Correction Factor (dB)	EIRP (dBm)	Limit (dBm)
Front	74.16	PK	V	42.13	116.29	6.15	17.64	20.00
Rear	71.27	PK	V	42.13	113.40	6.15	14.75	20.00
Left	75.56	PK	V	42.13	117.69	6.13	19.02	20.00
Right	76.06	PK	V	42.13	118.19	6.15	19.54	20.00
Top	73.43	PK	V	42.13	115.56	6.13	16.89	20.00
bottom	74.00	PK	V	42.13	116.13	6.14	17.47	20.00

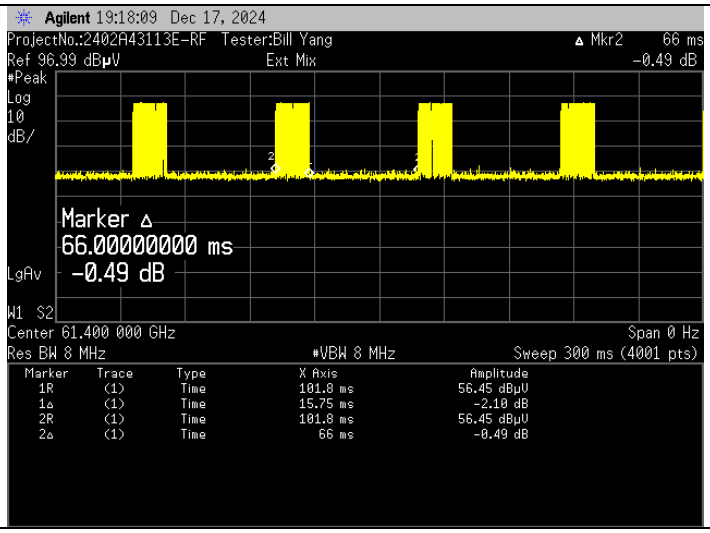
Factor = Antenna Factor
EIRP = Reading + Factor + 20log(Measurement distance) - 104.8
Measurement distance = 1m
The Mixers and it`s RF cables is compose a system for calibration.
The test data recorded was the maximum polarization.

Transmitter Off-times

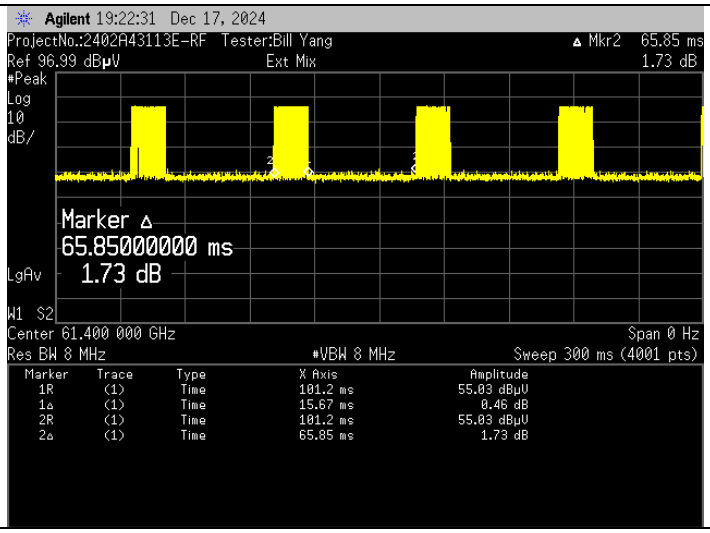
Radar	Transmitter On (ms)	Observation Time (ms)	Sum of continuous transmitter off-times (ms)	Limit (ms)
Front	15.75	33	17.25	⩾16.5
Rear	15.67	33	17.33	⩾16.5
Left	14.85	33	18.15	⩾16.5
Right	15.82	33	17.18	⩾16.5
Top	15.98	33	17.02	⩾16.5
bottom	15.45	33	17.55	⩾16.5

Note: Sum of Continuous Transmitter Off-times= Observation Time(33ms) - Ton

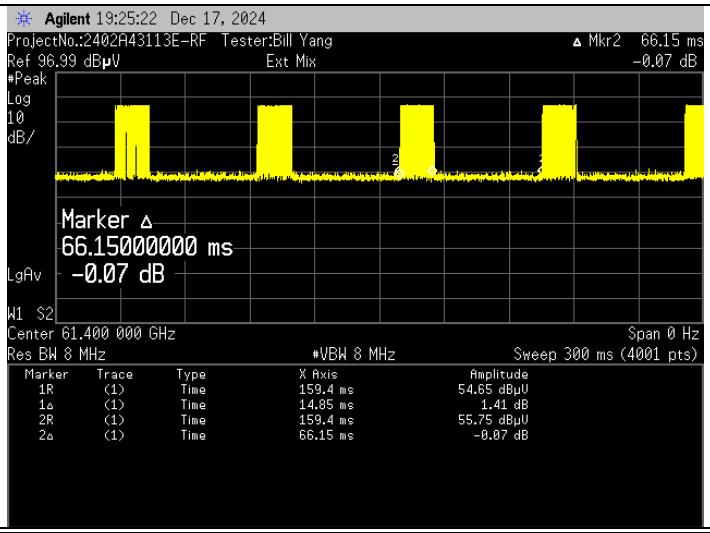
Front Radar



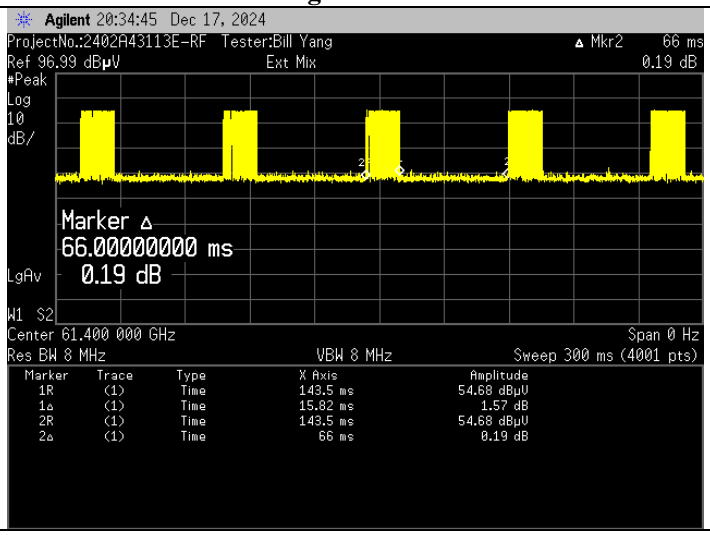
Rear Radar



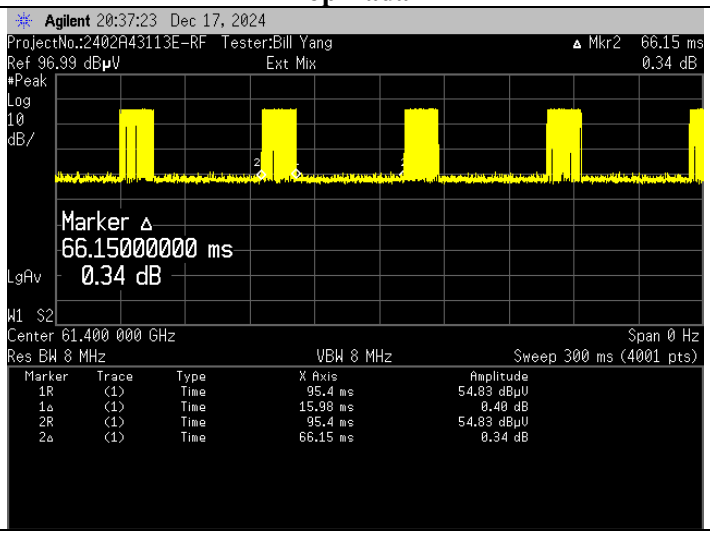
Left Radar



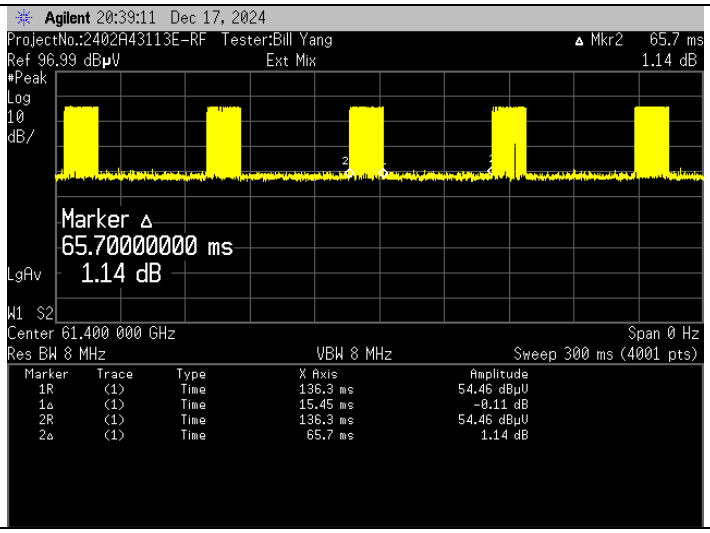
Right Radar



Top Radar



Bottom Radar



4.3 Occupied Bandwidth

4.3.1 Applicable Standard

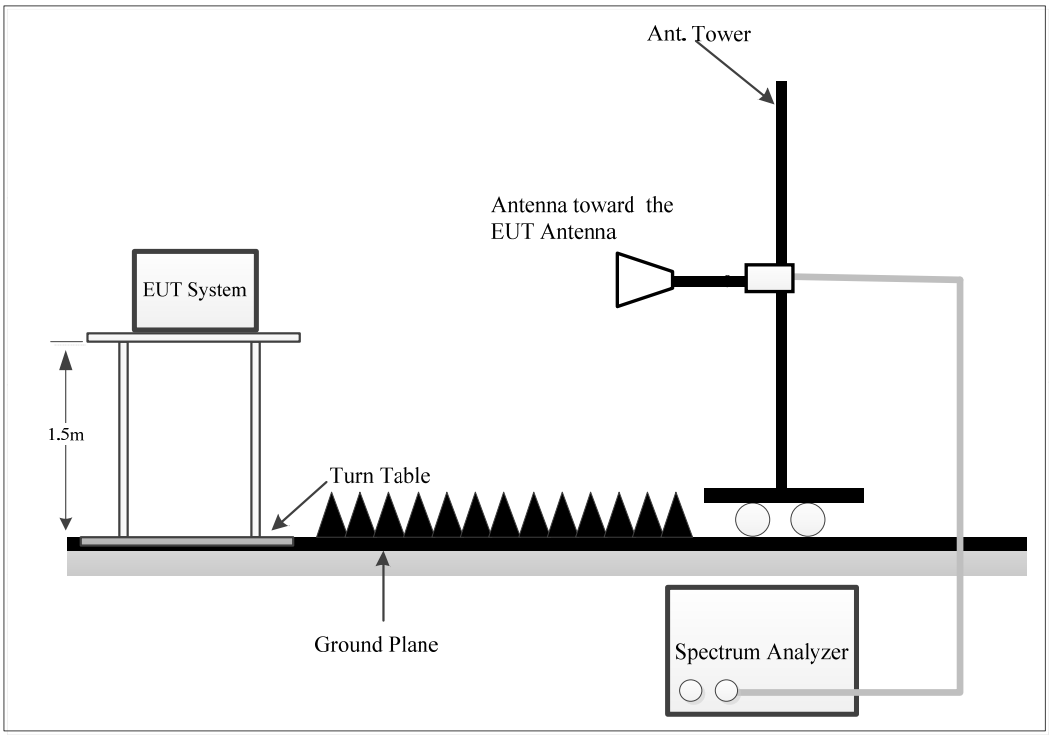
KDB 364244 D01 Meas 15.255 Radars v01

For other than pulsed radar transmitters, the fundamental emission bandwidth is presumed to be "…*the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage β/2 of the total mean power of a given emission. Unless otherwise specified in an ITU–R Recommendation for the appropriate class of emission, the value of β/2 should be taken as 0.5%,"* as defined in §2.1(c) of the FCC rules. This is also known as the 99% occupied bandwidth (OBW).

RSS-Gen Clause 6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

4.3.2 EUT Setup



Place the measurement antenna in the main beam of the EUT then maximize the fundamental emission, noting that multiple peaks can be found at different beam orientations and/or polarizations.

4.3.3 Test Procedure

KDB 364244 D01 Meas 15.255 Radars v01

Clauses 9.3 and 9.4 of C63.10-2020 provide standardized procedures recognized by the FCC for measuring both the relative (-10 dB) bandwidth and the 99% OBW.

The occupied bandwidth (OBW) is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
a) The following procedure shall be used for measuring 99% power bandwidth: Use the following spectrum analyzer settings:
1) Span equal to approximately 1.5 times the OBW, centered on the carrier frequency
2) RBW, prefer 1% to 5% of OBW, or a minimum of 1 MHz if this is not possible due to a large OBW
3) VBW approximately 3 × RBW
4) Set the reference level of the instrument as required to reduce the chance of the signal amplitude exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.1.6.
5) Sweep = No faster than coupled (auto) time.
6) Detector function = peak.
7) Trace = max-hold.
b) The EUT shall be transmitting at its maximum data rate. Allow the trace to stabilize.
c) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
d) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).
e) Repeat this test for each modulation scheme using the guidance of 5.6.2.1.

ANSI C63.10-2020 Clause 9.4 Occupied bandwidth—Power bandwidth (99%) measurement procedure

The occupied bandwidth (OBW) is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

a) The following procedure shall be used for measuring 99% power bandwidth: Use the following spectrum analyzer settings:
1) Span equal to approximately 1.5 times the OBW, centered on the carrier frequency
2) RBW, prefer 1% to 5% of OBW, or a minimum of 1 MHz if this is not possible due to a large OBW
3) VBW approximately 3 × RBW
4) Set the reference level of the instrument as required to reduce the chance of the signal amplitude exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.1.6.
5) Sweep = No faster than coupled (auto) time.
6) Detector function = peak.
7) Trace = max-hold.
b) The EUT shall be transmitting at its maximum data rate. Allow the trace to stabilize.

c) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
d) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).
e) Repeat this test for each modulation scheme using the guidance of 5.6.2.1.

4.3.4 Test Data

Serial Number:	2RQM-2	Test Date:	2024/12/17
Test Site:	Chamber B	Test Mode:	Transmitting
Tester:	Bill Yang	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	19.5	Relative Humidity: (%)	30	ATM Pressure: (kPa)	102.2

Test Equipment List and Details:

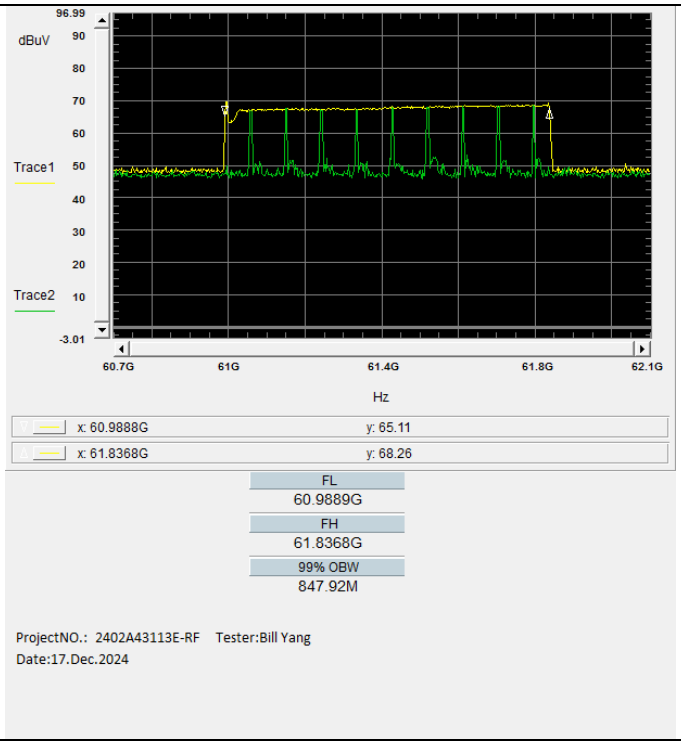
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Waveguide Mixer	11970V	2521A011767	2023/2/16	2026/2/15
Flann Micowave	Horn Antenna	861V/385	736	2023/2/27	2026/2/26
Agilent	Spectrum Analyzer	E4440A	MY44303352	2024/10/22	2025/10/21
Resenberger	Coaxial Cable	LU7-022-1000	0031	2024/3/1	2025/2/28
Resenberger	Coaxial Cable	LU7-022-1000	0032	2024/3/1	2025/2/28

** Statement of Traceability: Bay Area Compliance Laboratories Corp.(Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Radar	99% Occupied Bandwidth (MHz)	F_L (GHz)	Limit F_L (GHz)	F_H (GHz)	Limit F_H (GHz)
Front	847.920	60.9889	60	61.8368	64
Rear	847.920	60.9889	60	61.8368	64
Left	843.261	60.9912	60	61.8344	64
Right	847.920	60.9889	60	61.8368	64
Top	843.261	60.9912	60	61.8344	64
bottom	845.591	60.9912	60	61.8368	64

front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Trace2
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x: 60.9888G
y: 65.11
x: 61.8368G
y: 68.26
FL
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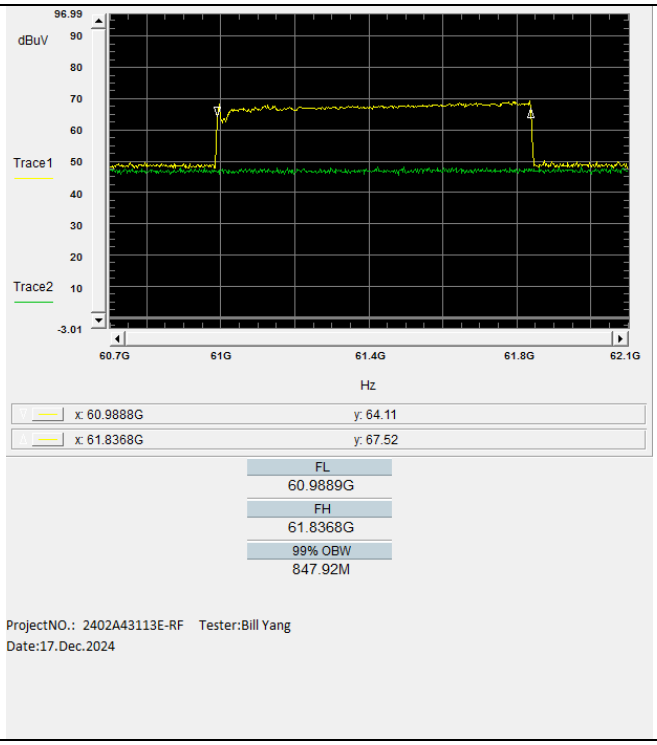
99% OBW
847.92M
ProjectNO.: 2402A43113E-RF Tester:Bill Yang
Date:17.Dec.2024

Rear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x: 60.9888G
y: 64.11
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y: 67.52
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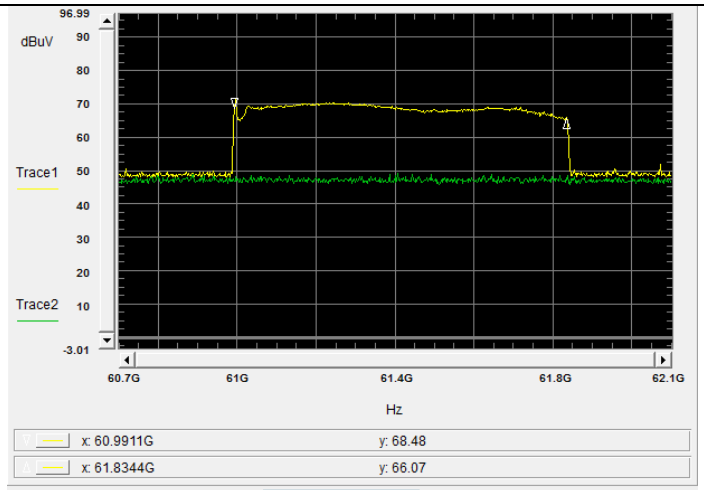
ProjectNO.: 2402A43113E-RF Tester:Bill Yang
Date:17.Dec.2024

Left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y: 66.07
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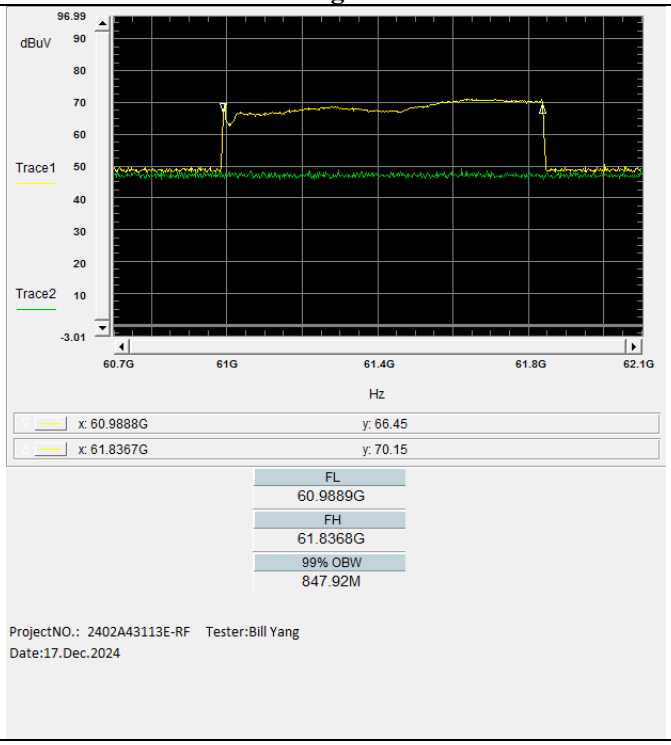
Date:17.Dec.2024

Right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y: 70.15
FL
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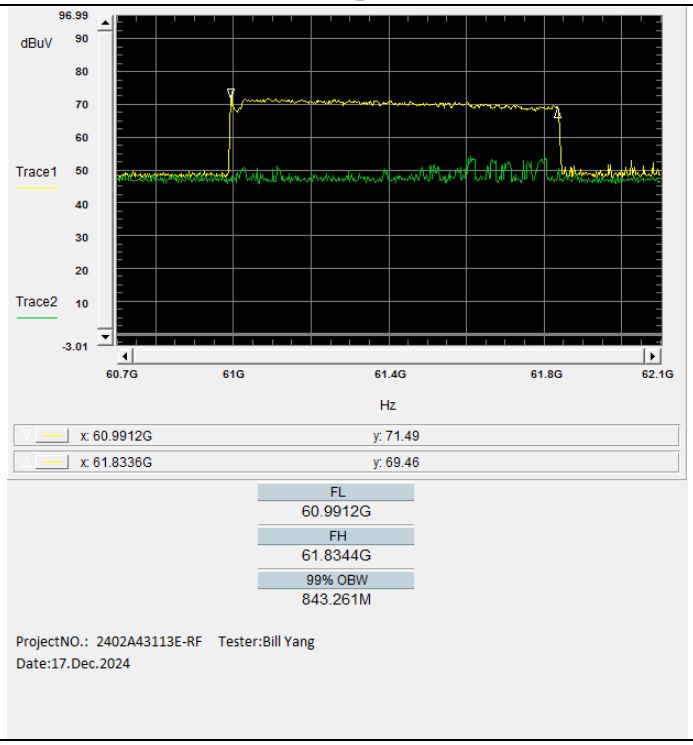
99% OBW
847.92M
ProjectNO.: 2402A43113E-RF Tester:Bill Yang
Date:17.Dec.2024

Top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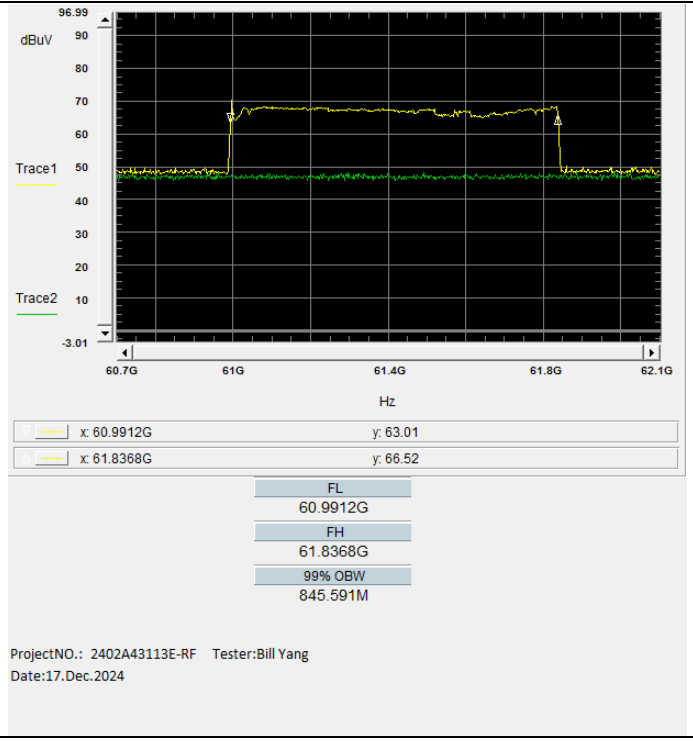
10
-3.01
60.7G
61G
61.4G
61.8G
62.1G
Hz
x: 60.9912G
y: 71.49
x: 61.8336G
y: 69.46
FL
60.9912G
FH
61.8344G
99% OBW
843.261M
ProjectNO.: 2402A43113E-RF Tester:Bill Yang
Date:17.Dec.2024

Bottom


96.99
dBuV
90
80
70
60
Trace1
50
40
30
20
Trace2
10
-3.01
60.7G
61G
61.4G
61.8G
62.1G
Hz
x: 60.9912G
y: 63.01
x: 61.8368G
y: 66.52
FL
60.9912G
FH
61.8368G
99% OBW
845.591M
ProjectNO.: 2402A43113E-RF Tester:Bill Yang
Date:17.Dec.2024

4.4 Radiated Spurious Emissions

4.4.1 Applicable Standard

FCC §15.255(d)
Limits on spurious emissions:

(1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.

(2) Radiated emissions below 40 GHz shall not exceed the general limits in § 15.209.

(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.

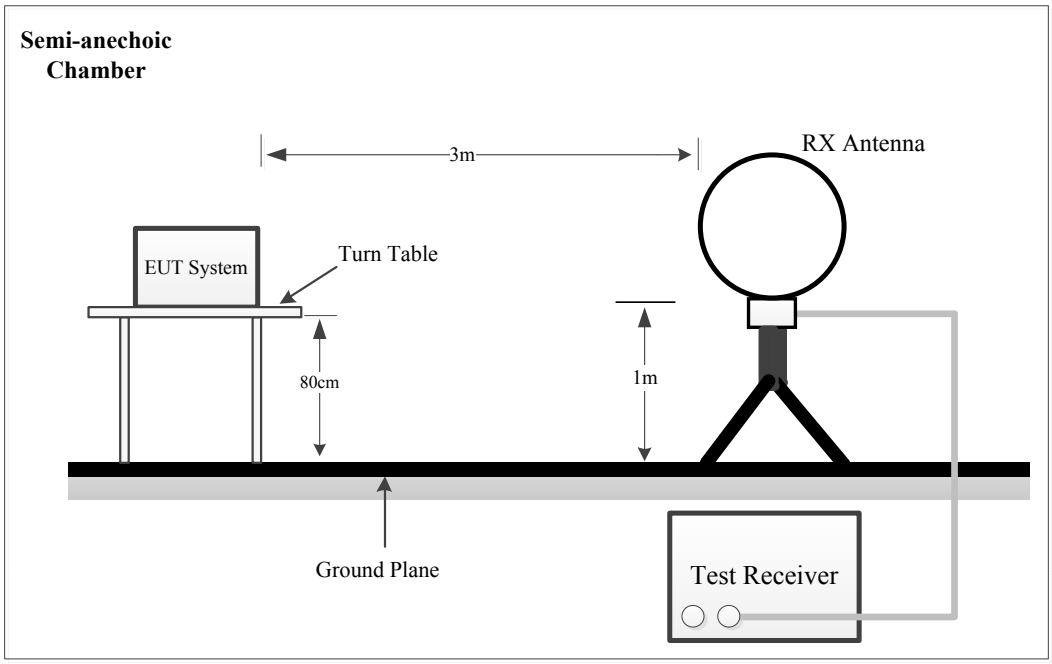
(4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

RSS-210, J.4 Spurious emissions

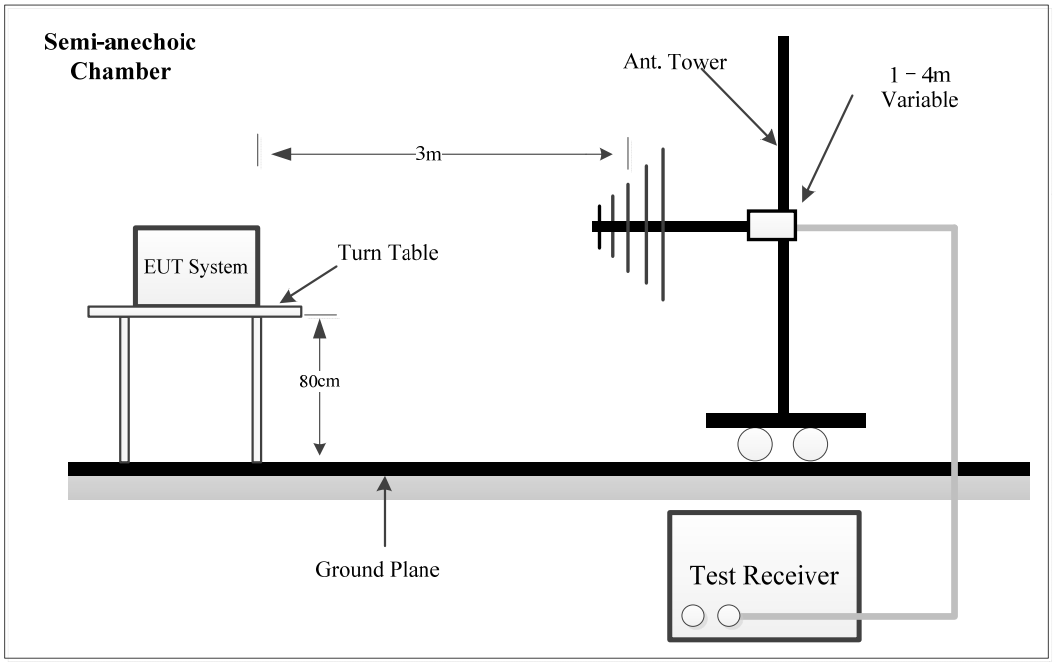
Any emissions outside the band 57-71 GHz shall consist solely of spurious emissions and shall not exceed:
(a) the fundamental emission levels
(b) the general field strength limits specified in RSS-Gen, General Requirements for Compliance of Radio Apparatus, for emissions below 40 GHz
(c) 90 pW/cm^2 peak at a distance of 3 m for emissions between 40 GHz and 200 GHz

4.4.2 EUT Setup

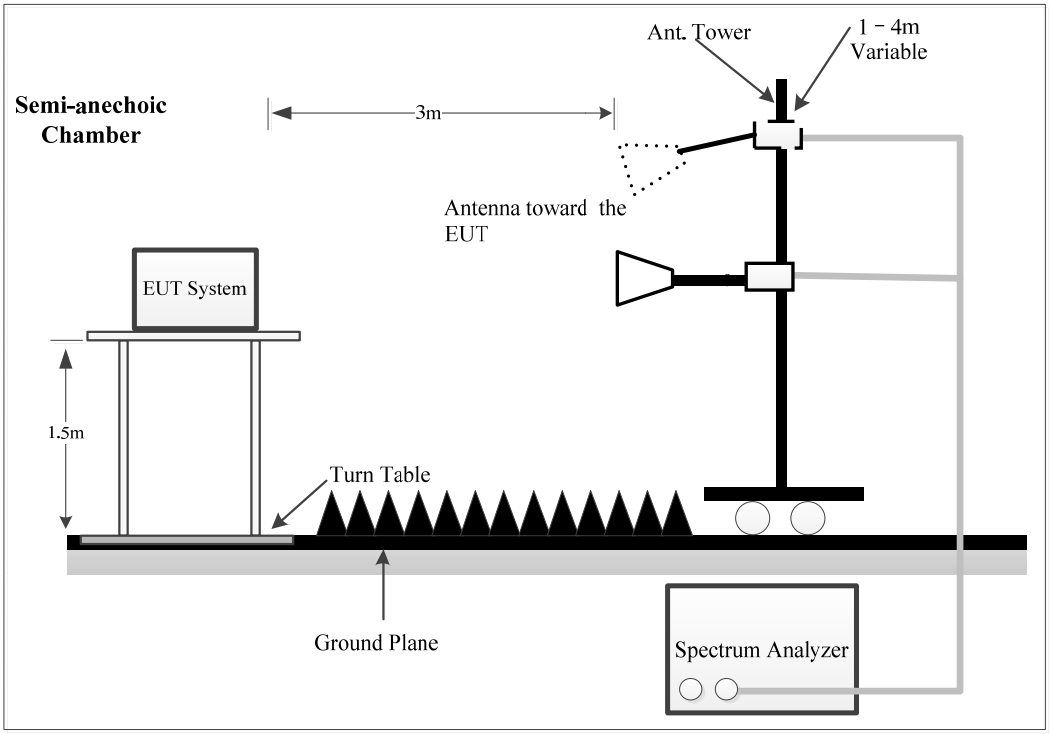
9kHz-30MHz:



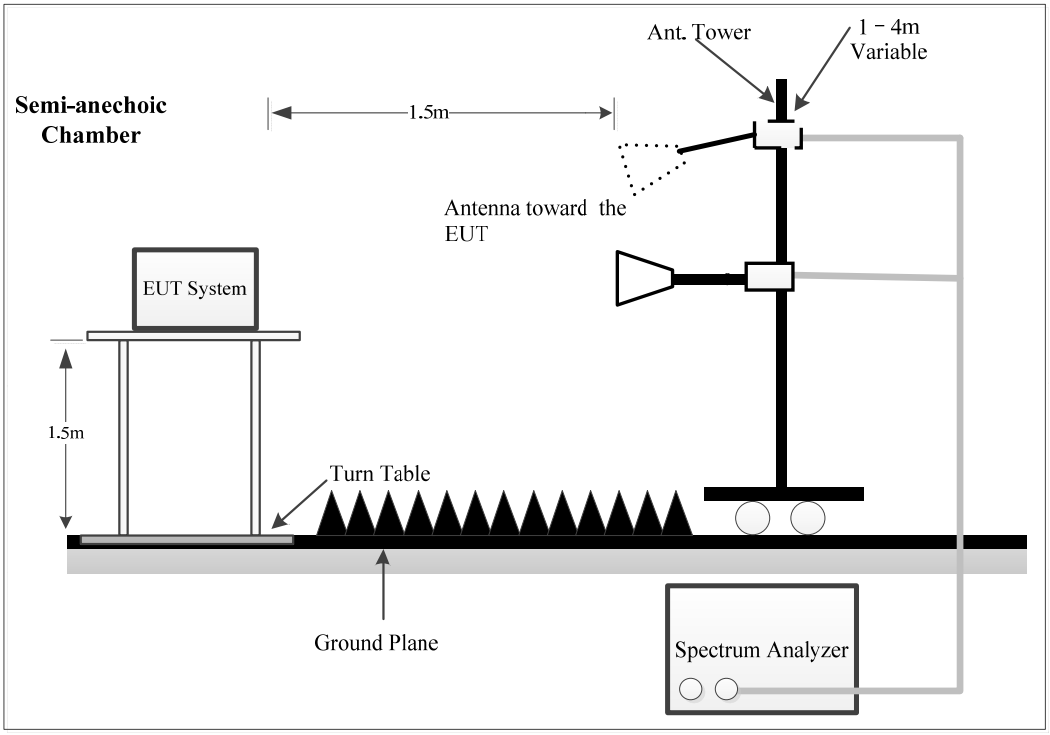
30MHz~1GHz:



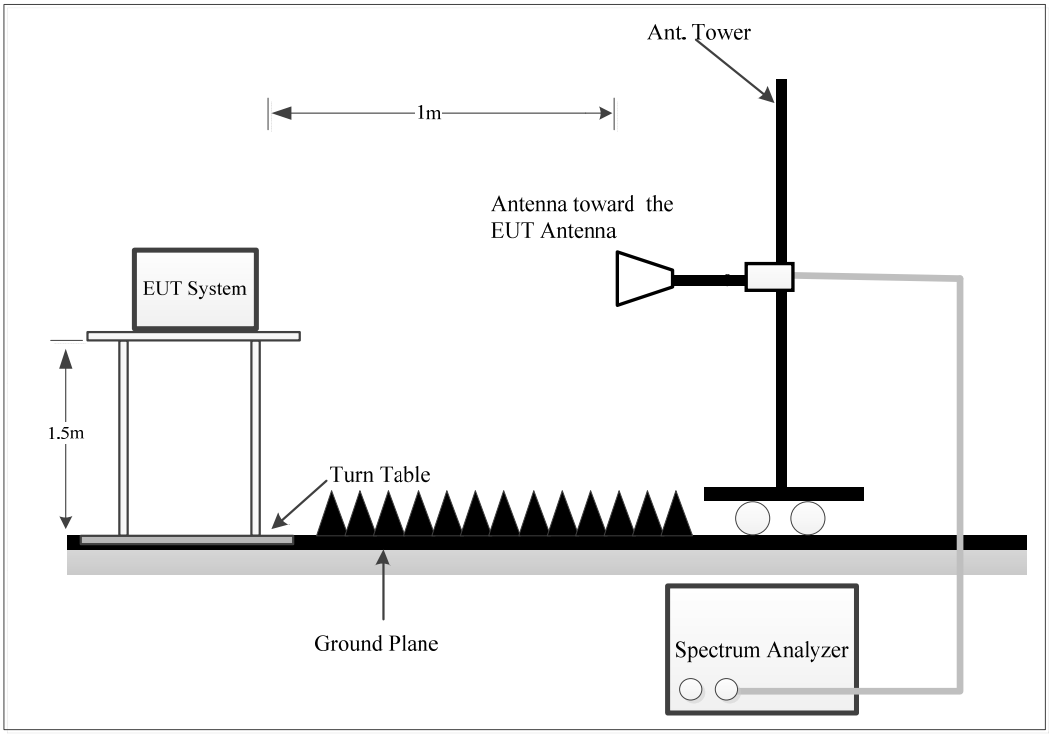
1~26.5 GHz:



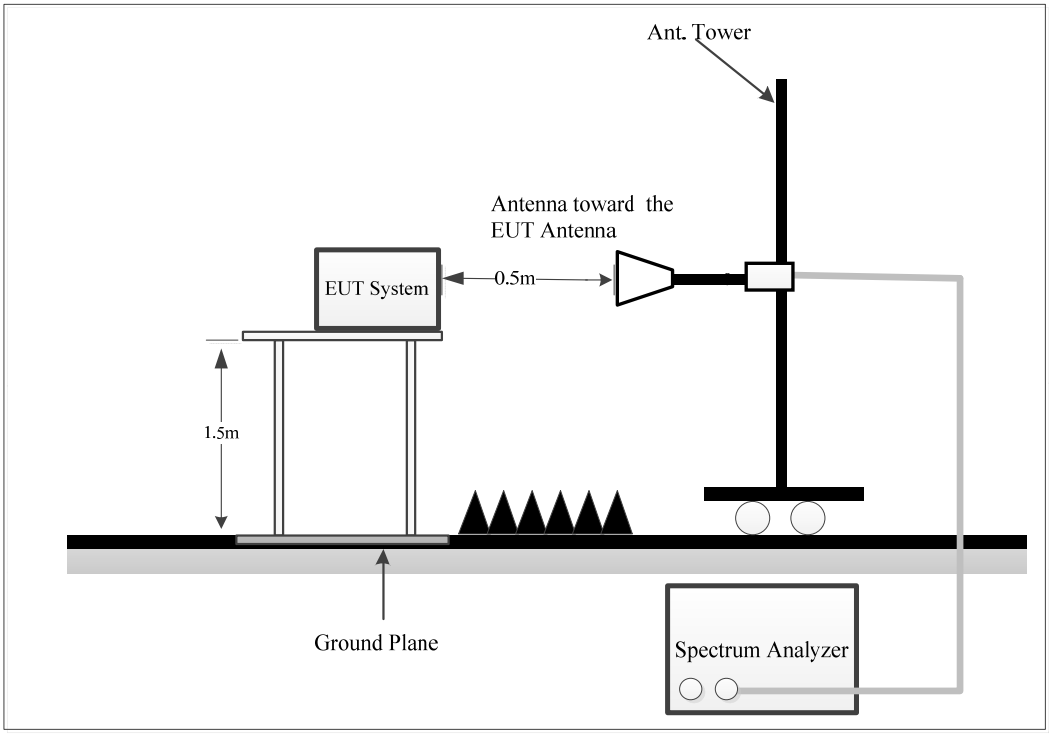
26.5~40 GHz:



40~90 GHz:



90~200 GHz:



Above 40GHz:

The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations, at the distance of 1.0 m from 40 GHz to 90 GHz, and 0.5 m from 90 GHz to 200 GHz.

The radiated emission and out of band emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.10-2020 The specification used was the FCC 15.209/15.205/15.255, RSS-210 and RSS-Gen limits.

4.4.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9kHz to 200 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement	Detector
9 kHz – 150 kHz	300 Hz	1 kHz	200 Hz	QP/Average	QP/Average
150 kHz – 30 MHz	10 kHz	30 kHz	9 kHz	QP/Average	QP/Average
30 MHz – 1000 MHz	/	/	120 kHz	QP	QP
	100 kHz	300 kHz	/	PK	PK

1-40GHz:
Pre-scan:

Frequency Range	Measurement	RBW	Video B/W	Detector
1-40 GHz	Peak	1MHz	3 MHz	PK
	AV	1MHz	5kHz	PK

Final measurement for emission identified during the pre-scan:

Frequency Range	Measurement	RBW	Video B/W	Detector
1-40 GHz	Peak	1MHz	3 MHz	PK
	AV	1MHz	10Hz	PK

Above 40GHz:

Frequency Range	Measurement	RBW	Video B/W	Detector
Above 40GHz	AV	1MHz	3MHz	AV

Note: Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-30MHz except 9 – 90 kHz, 110 – 490 kHz, employing an average detector.

4.4.4 Test Procedure

Refer to ANSI C63.10-2020 Clauses 9.10, and 9.11.

A Maximizing procedure was performed to ensure that the highest emissions from the EUT were actually measured in all of the Test Arrangements of the EUT and Local Support Equipment.

All emissions under the average limit and under the noise floor have not recorded in the report.
According to C63.10, the 26.5-40GHz test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.0 dB

For above 40GHz:

External harmonic mixers are utilized. The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations. The Mixers and it`s RF cables is compose a system for calibration, the conversion factor was added into the test Spectrum Analyzer in testing.

The far-field boundary is given in ANSI C63.10-2020:

$$R_m = 2D^2 / \lambda$$

Where:
D is the largest dimension of the antenna aperture in m and
λ is the free-space wavelength in m at the frequency of measurement.

The minimum test distance for the frequency range 40GHz-200GHz determine as below:

Model	Frequency Range (GHz)	Largest Dimension of the Horn Antenna (mm)	Minimum Test Distance R_m (m)
M19RH	40-60	46.3	0.86
861/385	50-75	43.7	0.95
M12RH	60-90	30.02	0.54
M08RH	90-140	19.7	0.36
M05RH	140-220	12.5	0.23

Note: the test distances used were 1.0 m from 40 GHz to 90 GHz, and 0.5 m from 90 GHz to 200GHz, it can be seen that the EUT was always in the Far-field of the Receive Antenna during all Radiated Emissions Tests.

4.4.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

For 9kHz-26.5GHz:
Result = Reading + Factor

For 26.5GHz-40GHz
Result = Reading + Factor-Distance extrapolation Factor

Note: the antenna JB3 was calibrated with 6dB Attenuator, the antenna factor includes the insertion loss of the Attenuator.

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

4.4.6 Test Data

Serial Number:	2RQM-2, 2RQM-4	Test Date:	Below 1GHz:2024/12/4 Above 1GHz: 2024/12/17~2024/12/20
Test Site:	Chamber10m, Chamber B	Test Mode:	Transmitting
Tester:	Zoo Zou, Bill Yang, Nat Zhou	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	19.5~23.6	Relative Humidity: (%)	26~52	ATM Pressure: (kPa)	101.7~102.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
9kHz~1000MHz					
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/25	2026/10/24
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2026/9/5
Narda	Coaxial Attenuator	779-6dB	04269	2023/9/6	2026/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2024/7/1	2025/6/30
Sonoma	Amplifier	310N	185914	2024/8/26	2025/8/25
R&S	EMI Test Receiver	ESCI	100224	2024/8/26	2025/8/25
Audix	Test Software	E3	191218 V9	N/A	N/A
Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2023/9/7	2026/9/6
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2023/2/22	2026/2/21
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2023/2/22	2026/2/21
Xinhang Macrowave	Coaxial Cable	XH750A-N/J-SMA/J-10M	20231117004 #0001	2024/11/17	2025/11/16
Xinhang Macrowave	Coaxial Cable	XH360A-2.92/J-2.92/J-6M-A	20231208001 #0001	2024/12/9	2025/12/8
AH	Preamplifier	PAM-0118P	469	2024/4/15	2025/4/14
AH	Preamplifier	PAM-1840VH	191	2024/9/5	2025/9/4
R&S	Spectrum Analyzer	FSV40	101944	2024/9/6	2025/9/5
Audix	Test Software	E3	191218 (V9)	N/A	N/A
OML	Waveguide Mixer	WR19/M19HWD	U60313-1	2023/2/16	2026/2/15
OML	Horn Antenna	M19RH	11648-01	2023/2/27	2026/2/26
OML	Waveguide Mixer	WR12/M12HWD	E60120-1	2023/2/16	2026/2/15
OML	Horn Antenna	M12RH	E60120-2	2023/2/27	2026/2/26
OML	Waveguide Mixer	WR08/M08HWD	F60313-1	2023/2/16	2026/2/15
OML	Horn Antenna	M08RH	F60313-2	2023/2/27	2026/2/26

OML	Waveguide Mixer	WR05/M05HWD	G60106-1	2023/2/16	2026/2/15
OML	Horn Antenna	M05RH	G60106-2	2023/2/27	2026/2/26
Resenberger	Coaxial Cable	LU7-022-1000	0031	2024/3/1	2025/2/28

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

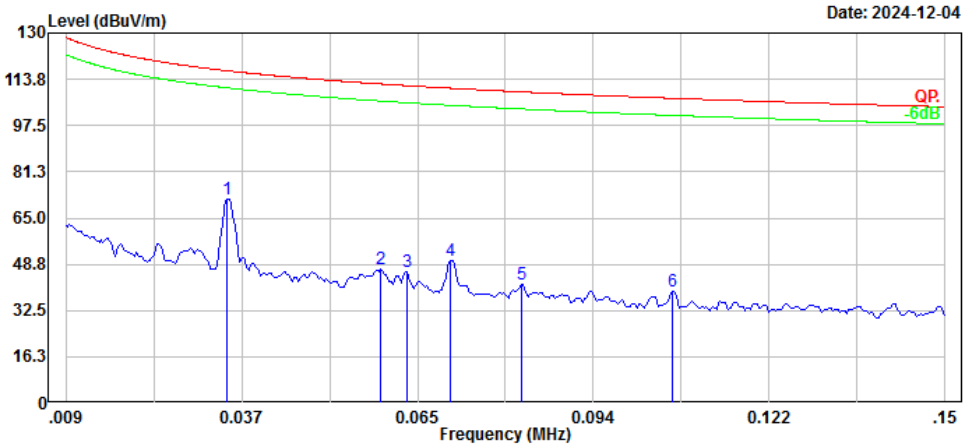
Please refer to the below table and plots.

After pre-scan in the X, Y and Z axes of orientation, the worst case is refer to table and plots.

1) 9kHz~30MHz(All Radar Modules transmit simultaneously)

Three antenna orientations (parallel, perpendicular, and ground-parallel) was measured, the worst orientations was below:

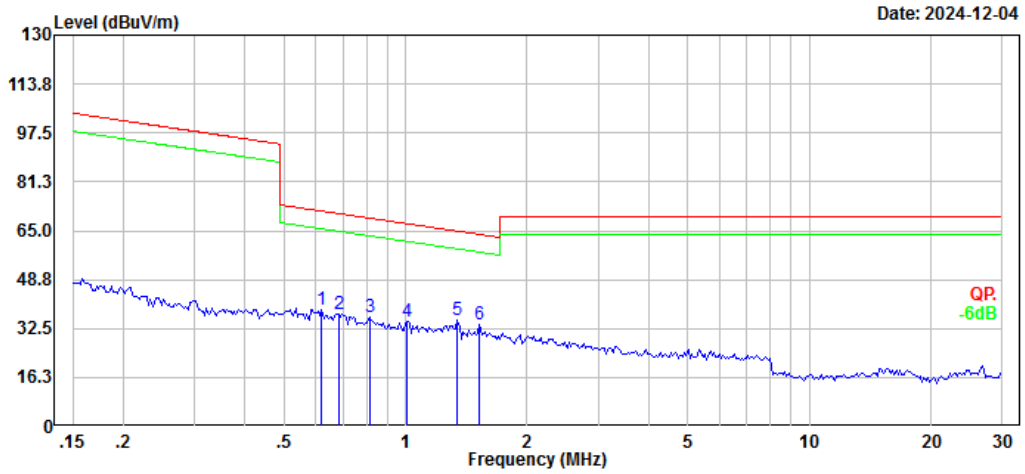
Project No.: 2402A43113E-RF Serial No.: 2RQM-4
Polarization: Parallel Tester: Zoo Zou
Test Mode: Transmitting
Note: M2
RBW:300Hz VBW:1kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.035	25.19	46.67	71.86	116.74	44.88	Peak
2	0.059	4.47	42.43	46.90	112.12	65.22	Peak
3	0.064	4.35	41.69	46.04	111.52	65.48	Peak
4	0.071	9.47	40.46	49.93	110.61	60.68	Peak
5	0.082	3.03	38.56	41.59	109.32	67.73	Peak
6	0.106	4.42	35.05	39.47	107.07	67.60	Peak

Project No.: 2402A43113E-RF
Polarization: Parallel
Test Mode: Transmitting
Note: M2
RBW:10kHz VBW:30kHz

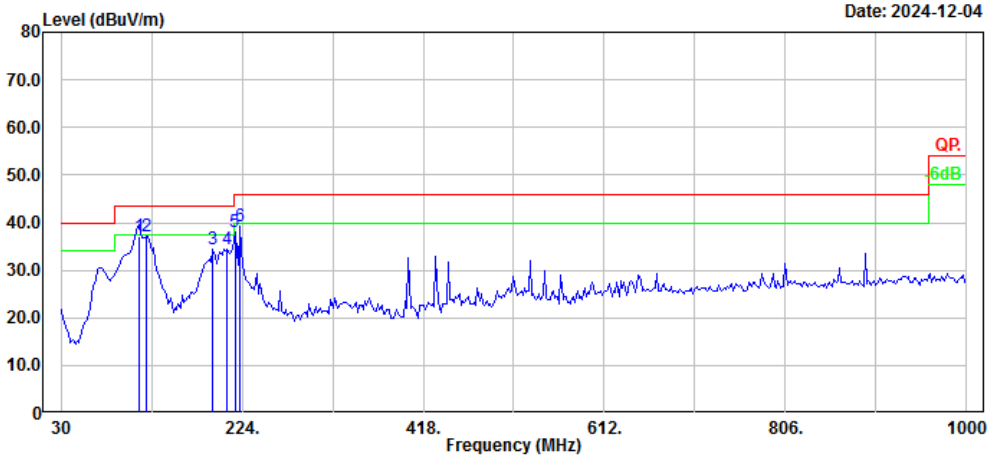
Serial No.: 2RQM-4
Tester: Zoo Zou



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.621	16.45	22.25	38.70	71.71	33.01	Peak
2	0.683	15.72	21.64	37.36	70.86	33.50	Peak
3	0.817	16.08	20.21	36.29	69.26	32.97	Peak
4	1.010	18.11	16.51	34.62	67.38	32.76	Peak
5	1.345	20.11	15.03	35.14	64.84	29.70	Peak
6	1.527	19.49	14.22	33.71	63.72	30.01	Peak

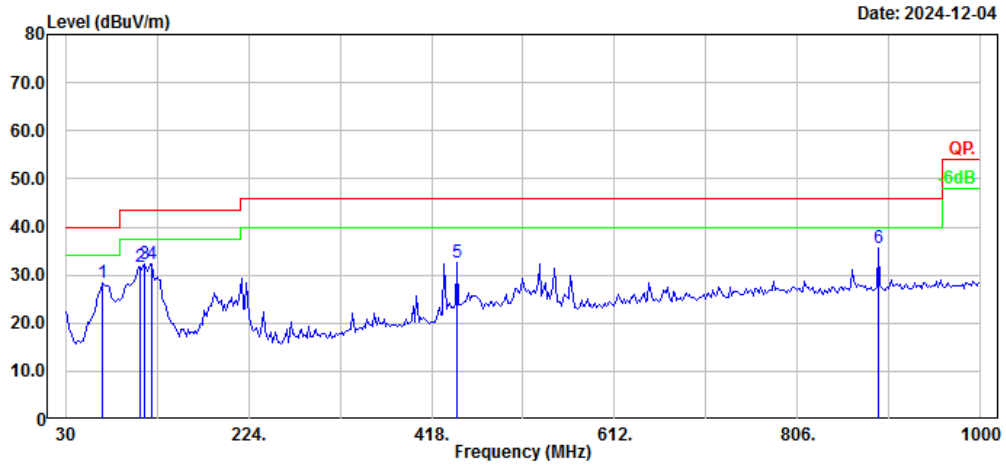
2) 30MHz-1GHz(All Radar Modules transmit simultaneously)

Project No.: 2402A43113E-RF Serial No.: 2RQM-4
Polarization: Horizontal Tester: Zoo Zou
Test Mode: Transmitting
Note: M2
RBW:100kHz VBW:300kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	113.42	48.10	-10.87	37.23	43.50	6.27	QP
2	121.18	47.06	-9.94	37.12	43.50	6.38	Peak
3	192.96	46.29	-11.94	34.35	43.50	9.15	Peak
4	208.48	46.90	-12.40	34.50	43.50	9.00	Peak
5	216.24	50.62	-12.52	38.10	46.00	7.90	Peak
6	222.06	51.84	-12.45	39.39	46.00	6.61	Peak

Project No.: 2402A43113E-RF Serial No.: 2RQM-4
Polarization: Vertical Tester: Zoo Zou
Test Mode: Transmitting
Note: M2
RBW:100kHz VBW:300kHz

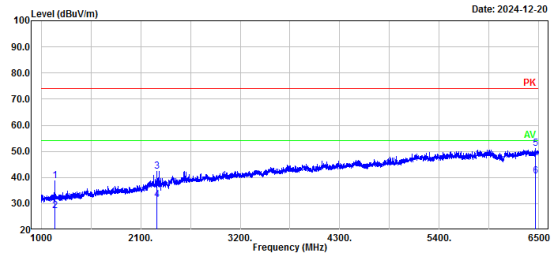


No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	68.80	44.62	-16.33	28.29	40.00	11.71	Peak
2	109.54	43.21	-11.49	31.72	43.50	11.78	Peak
3	113.42	43.03	-10.87	32.16	43.50	11.34	Peak
4	121.18	42.35	-9.94	32.41	43.50	11.09	Peak
5	445.16	38.22	-5.65	32.57	46.00	13.43	Peak
6	891.36	34.31	1.32	35.63	46.00	10.37	Peak

2) 1GHz-40GHz(All Radar Modules transmit simultaneously):

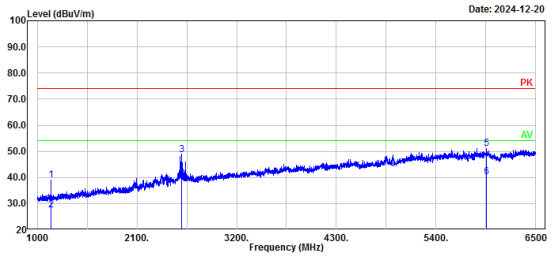
Horizontal	Vertical

Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Horizontal Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz



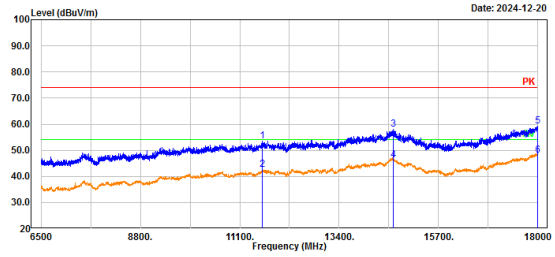
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	1151.80	53.71	-14.91	38.80	74.00	35.20	Peak
2	1151.80	42.28	-14.91	27.37	54.00	26.63	Average
3	2277.10	53.54	-11.14	42.40	74.00	31.60	Peak
4	2277.10	42.51	-11.14	31.37	54.00	22.63	Average
5	6465.90	51.29	-0.19	51.10	74.00	22.90	Peak
6	6465.90	40.58	-0.19	40.39	54.00	13.61	Average

Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Vertical Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz



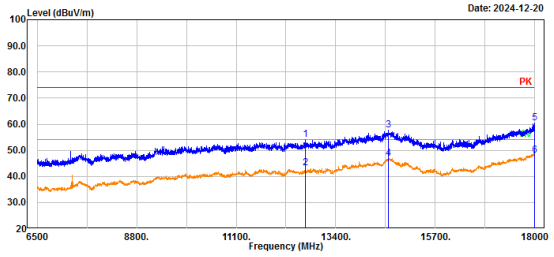
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	1150.70	53.79	-14.91	38.88	74.00	35.12	Peak
2	1150.70	42.31	-14.91	27.40	54.00	26.60	Average
3	2590.60	58.11	-9.28	48.83	74.00	25.17	Peak
4	2590.60	49.33	-9.28	40.05	54.00	13.95	Average
5	5954.40	51.55	-0.39	51.16	74.00	22.84	Peak
6	5954.40	40.75	-0.39	40.36	54.00	13.64	Average

Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Horizontal Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	11617.50	49.61	4.03	53.64	74.00	20.36	Peak
2	11617.50	38.53	4.03	42.56	54.00	11.44	Average
3	14655.80	50.30	7.75	58.05	74.00	15.95	Peak
4	14655.80	38.51	7.75	46.26	54.00	7.74	Average
5	17995.40	47.82	11.49	59.31	74.00	14.69	Peak
6	17995.40	36.44	11.49	47.93	54.00	6.07	Average

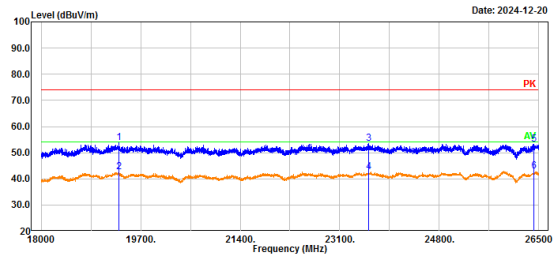
Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Vertical Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	12705.40	49.38	4.81	54.19	74.00	19.81	Peak
2	12705.40	38.34	4.81	43.15	54.00	10.85	Average
3	14616.70	49.69	7.99	57.68	74.00	16.32	Peak
4	14616.70	38.84	7.99	46.83	54.00	7.17	Average
5	17995.40	49.09	11.49	60.58	74.00	13.42	Peak
6	17995.40	36.48	11.49	47.97	54.00	6.03	Average

Horizontal

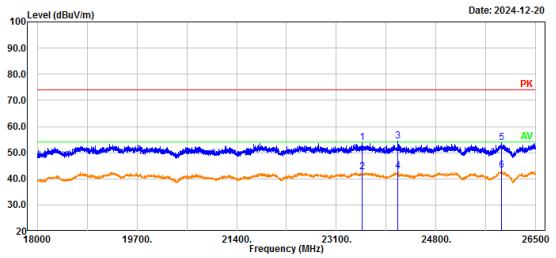
Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Horizontal Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	19324.30	47.71	5.98	53.69	74.00	20.31	Peak
2	19324.30	36.67	5.98	42.65	54.00	11.35	Average
3	23589.60	44.78	8.72	53.50	74.00	20.50	Peak
4	23589.60	33.94	8.72	42.66	54.00	11.34	Average
5	26420.10	42.16	11.05	53.21	74.00	20.79	Peak
6	26420.10	31.80	11.05	42.85	54.00	11.15	Average

Vertical

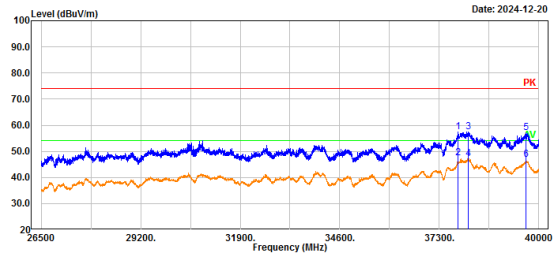
Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Vertical Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	23542.00	45.13	8.72	53.85	74.00	20.15	Peak
2	23542.00	33.83	8.72	42.55	54.00	11.45	Average
3	24145.50	45.66	8.85	54.51	74.00	19.49	Peak
4	24145.50	34.04	8.85	42.89	54.00	11.11	Average
5	25915.20	43.09	10.70	53.79	74.00	20.21	Peak
6	25915.20	32.59	10.70	43.29	54.00	10.71	Average

Horizontal

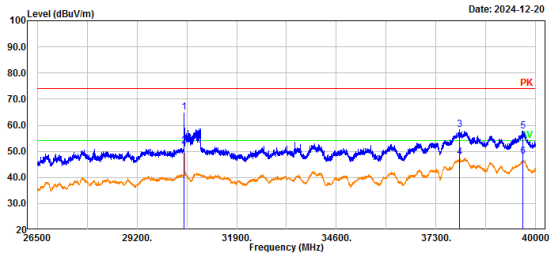
Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Horizontal Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	37807.60	46.47	11.00	57.47	74.00	16.53	Peak
2	37807.60	36.53	11.00	47.53	54.00	6.47	Average
3	38074.90	45.56	11.82	57.38	74.00	16.62	Peak
4	38074.90	35.39	11.82	47.21	54.00	6.79	Average
5	39640.90	45.83	11.26	57.09	74.00	16.91	Peak
6	39640.90	35.61	11.26	46.87	54.00	7.13	Average

Vertical

Project No.: 2402A43113E-RF Serial No.: 2RQM-2
Polarization: Vertical Tester: Nat Zhou
Test Mode: Transmitting
Note:
Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30479.80	58.26	6.86	65.12	74.00	8.88	Peak
2	30479.80	45.05	6.86	51.91	54.00	2.09	Average
3	37937.20	46.56	11.63	58.19	74.00	15.81	Peak
4	37937.20	36.02	11.63	47.65	54.00	6.35	Average
5	39657.10	46.55	11.27	57.82	74.00	16.18	Peak
6	39657.10	36.70	11.27	47.97	54.00	6.03	Average

3) 40GHz-200GHz:

Front Radar: **61.4 GHz**

Frequency (GHz)	Receiver Reading (dBμV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBμV/m)	Power Density (pW/cm^2)	Limit (pW/cm^2)
40.350	52.32	H	38.84	81.62	38.52	90.00
40.150	54.26	V	38.81	83.53	59.79	90.00
90.600	53.44	H	45.18	83.06	53.66	90.00
90.870	55.19	V	45.21	84.84	80.85	90.00

Rear Radar: **61.4 GHz**

Frequency (GHz)	Receiver Reading (dBμV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBμV/m)	Power Density (pW/cm^2)	Limit (pW/cm^2)
40.870	53.26	H	38.93	82.65	48.83	90.00
40.660	52.41	V	38.89	81.76	39.78	90.00
90.500	55.26	H	45.17	84.87	81.41	90.00
90.480	54.87	V	45.17	84.48	74.41	90.00

Left Radar: **61.4 GHz**

Frequency (GHz)	Receiver Reading (dBμV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBμV/m)	Power Density (pW/cm^2)	Limit (pW/cm^2)
40.740	53.26	H	38.91	82.63	48.60	90.00
40.320	54.16	V	38.84	83.46	58.84	90.00
90.280	55.08	H	45.14	84.66	77.56	90.00
90.140	55.12	V	45.12	84.68	77.92	90.00

Right Radar: **61.4 GHz**

Frequency (GHz)	Receiver Reading (dBμV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBμV/m)	Power Density (pW/cm^2)	Limit (pW/cm^2)
40.870	53.27	H	38.93	82.66	48.94	90.00
40.990	53.18	V	38.94	82.58	48.05	90.00
90.480	54.65	H	45.17	84.26	70.74	90.00
90.320	54.87	V	45.15	84.46	74.07	90.00

Top Radar: **61.4 GHz**

Frequency (GHz)	Receiver Reading (dBµV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBµV/m)	Power Density (pW/cm^2)	Limit (pW/cm^2)
40.190	52.34	H	38.82	81.62	38.50	90.00
40.680	53.74	V	38.90	83.10	54.16	90.00
90.870	54.68	H	45.21	84.33	71.89	90.00
90.330	55.29	V	45.15	84.88	81.59	90.00

Bottom Radar: **61.4 GHz**

Frequency (GHz)	Receiver Reading (dBµV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBµV/m)	Power Density (pW/cm^2)	Limit (pW/cm^2)
40.650	53.62	H	38.89	82.97	52.56	90.00
40.590	54.18	V	38.88	83.52	59.66	90.00
90.350	53.22	H	45.15	82.81	50.66	90.00
90.850	54.18	V	45.21	83.83	64.07	90.00

Note:
Factor = Antenna Factor
Field Strength = Reading + Factor + 20log(d_{Meas}/$d_{SpecLimit}$)
d_{Meas} is the measurement distance, in m
$d_{SpecLimit}$ is the distance specified by the limit, in m

$$PD = \frac{E_{SpecLimit}^2}{377}$$

where

PD is the power density at the distance specified by the limit, in W/m^2
$E_{SpecLimit}$ is the field strength at the distance specified by the limit, in V/m

The Specified distance is 3m.

4.5 Frequency Stability

4.5.1 Applicable Standard

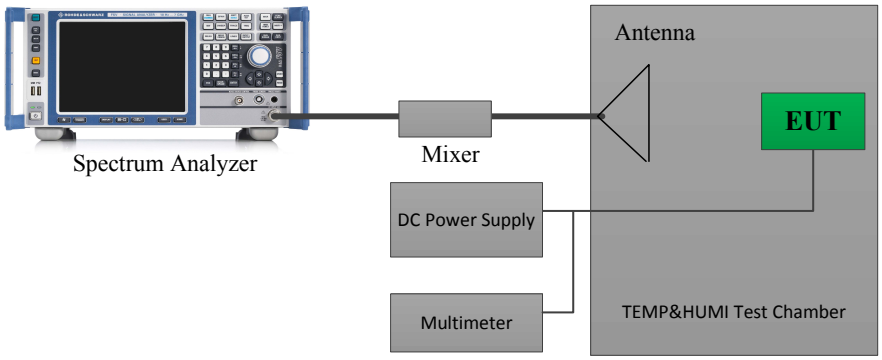
FCC §15.255(f)

(f) Frequency stability. Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range −20 to + 50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

RSS-210, Annex J.6

Fundamental emissions shall be contained within the frequency bands specified in this annex during all conditions of operation when tested at the temperature and voltage variations specified for the frequency stability measurement in RSS-Gen.

4.5.2 EUT Setup Block Diagram



4.5.3 Test Procedure

Refer to ANSI C63.10-2020 Clauses 9.5.

The following procedure shall be used for determining frequency stability of millimeter-wave systems:

a) Arrange EUT and test equipment as shown in Figure 21. Some temperature chambers have a window or other opening that permits locating the receive antenna outside the chamber.
b) With the EUT at ambient temperature (approximately 25 °C) and voltage source set to the EUT nominal operating voltage (100%), record the spectrum mask of the EUT emission on the spectrum analyzer.
c) Vary EUT power supply between 85% and 115% of nominal, and record the frequency excursion of the EUT emission mask.
d) Set the power supply to 100% nominal setting, and raise EUT operating temperature to 50 °C. Record the frequency excursion of the EUT emission mask.
e) Repeat step d) at each 10 °C increment down to −20 °C.

4.5.4 Test Result

Serial Number:	2RQM-2	Test Date:	2024/12/17
Test Site:	RF	Test Mode:	Transmitting
Tester:	Bill Yang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	20.5	Relative Humidity: (%)	36	ATM Pressure: (kPa)	102.2

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Waveguide Mixer	11970V	2521A011767	2023/2/16	2026/2/15
Flann Micowave	Horn Antenna	861V/385	736	2023/2/27	2026/2/26
Agilent	Spectrum Analyzer	E4440A	MY44303352	2024/10/22	2025/10/21
Resenberger	Coaxial Cable	LU7-022-1000	0031	2024/3/1	2025/2/28
Resenberger	Coaxial Cable	LU7-022-1000	0032	2024/3/1	2025/2/28
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30173	2024/9/6	2025/9/5
All-sun	Clamp Meter	EM305A	8348897	2024/8/16	2025/8/15
TDK-Lambda	DC Power Supply	Z+60-14	F-08-EM038-1	N/A	N/A

** Statement of Traceability: Bay Area Compliance Laboratories Corp.(Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Front Radar

Temperature	Voltage	Frequency (GHz)			
℃	V_{DC}	f_L	f_H	f_L Limit	f_H Limit
-20	14.76	60.9884	61.8364	60	64
-10	14.76	60.9881	61.8365	60	64
0	14.76	60.9886	61.8363	60	64
10	14.76	60.9884	61.8364	60	64
20	14.76	60.9889	61.8368	60	64
30	14.76	60.9888	61.8363	60	64
40	14.76	60.9887	61.8361	60	64
50	14.76	60.9884	61.8362	60	64
20	12	60.9889	61.8366	60	64
20	17	60.9888	61.8364	60	64

Rear Radar

Temperature	Voltage	Frequency (GHz)			
℃	V_{DC}	f_L	f_H	f_L Limit	f_H Limit
-20	14.76	60.9888	61.8364	60	64
-10	14.76	60.9885	61.8361	60	64
0	14.76	60.9887	61.8366	60	64
10	14.76	60.9889	61.8366	60	64
20	14.76	60.9889	61.8368	60	64
30	14.76	60.9885	61.8367	60	64
40	14.76	60.9887	61.8363	60	64
50	14.76	60.9886	61.8365	60	64
20	12	60.9887	61.8367	60	64
20	17	60.9889	61.8364	60	64

Left Radar

Temperature	Voltage	Frequency (GHz)			
℃	V_{DC}	f_L	f_H	f_L Limit	f_H Limit
-20	14.76	60.9914	61.8342	60	64
-10	14.76	60.9913	61.8344	60	64
0	14.76	60.9913	61.8343	60	64
10	14.76	60.9911	61.8344	60	64
20	14.76	60.9912	61.8344	60	64
30	14.76	60.9913	61.8343	60	64
40	14.76	60.9916	61.8343	60	64
50	14.76	60.9914	61.8341	60	64
20	12	60.9913	61.8342	60	64
20	17	60.9914	61.8346	60	64

Right Radar

Temperature	Voltage	Frequency (GHz)			
℃	V_{DC}	f_L	f_H	f_L Limit	f_H Limit
-20	14.76	60.9881	61.8365	60	64
-10	14.76	60.9882	61.8364	60	64
0	14.76	60.9883	61.8364	60	64
10	14.76	60.9888	61.8363	60	64
20	14.76	60.9889	61.8368	60	64
30	14.76	60.9884	61.8364	60	64
40	14.76	60.9886	61.8367	60	64
50	14.76	60.9883	61.8368	60	64
20	12	60.9884	61.8366	60	64
20	17	60.9887	61.8369	60	64

Top Radar

Temperature	Voltage	Frequency (GHz)			
℃	V_{DC}	f_L	f_H	f_L Limit	f_H Limit
-20	14.76	60.9913	61.8344	60	64
-10	14.76	60.9912	61.8343	60	64
0	14.76	60.9914	61.8342	60	64
10	14.76	60.9911	61.8343	60	64
20	14.76	60.9912	61.8344	60	64
30	14.76	60.9911	61.8344	60	64
40	14.76	60.9912	61.8343	60	64
50	14.76	60.9913	61.8341	60	64
20	12	60.9910	61.8342	60	64
20	17	60.9911	61.8341	60	64

Bottom Radar

Temperature	Voltage	Frequency (GHz)			
℃	V_{DC}	f_L	f_H	f_L Limit	f_H Limit
-20	14.76	60.9912	61.8365	60	64
-10	14.76	60.9913	61.8364	60	64
0	14.76	60.9914	61.8366	60	64
10	14.76	60.9912	61.8368	60	64
20	14.76	60.9912	61.8368	60	64
30	14.76	60.9913	61.8365	60	64
40	14.76	60.9911	61.8367	60	64
50	14.76	60.9912	61.8365	60	64
20	12	60.9912	61.8363	60	64
20	17	60.9913	61.8364	60	64

Note: the operation voltage is declared by manufacturer▲.

4.6 Operation Restriction and Group Installation

4.6.1 Applicable Standard

§15.255 (a) General. Operation under the provisions of this section is not permitted for equipment used on satellites.

§15.255 (b) Operation on aircraft. Operation on aircraft is permitted under the following conditions:

(1) When the aircraft is on the ground.

(2) While airborne, only in closed exclusive on-board communication networks within the aircraft, with the following exceptions:

(i) Equipment shall not be used in wireless avionics intra-communication (WAIC) applications where external structural sensors or external cameras are mounted on the outside of the aircraft structure.

(ii) Except as permitted in paragraph (b)(3) of this section, equipment shall not be used on aircraft where there is little attenuation of RF signals by the body/fuselage of the aircraft.

(iii) Field disturbance sensor/radar devices may only operate in the frequency band 59.3–71.0 GHz while installed in passengers' personal portable electronic equipment (e.g., smartphones, tablets) and shall comply with paragraph (b)(2)(i) of this section, and relevant requirements of paragraphs (c)(2) through (c)(4) of this section.

(3) Field disturbance sensors/radar devices deployed on unmanned aircraft may operate within the frequency band 60–64 GHz, provided that the transmitter not exceed 20 dBm peak EIRP. The sum of continuous transmitter off-times of at least two milliseconds shall equal at least 16.5 milliseconds within any contiguous interval of 33 milliseconds. Operation shall be limited to a maximum of 121.92 meters (400 feet) above ground level.

§15.255 (h) Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

4.6.2 Result

15.255(a), the device is a unmanned aircraft. Not used on satellites.

15.255(b)(1), the Radar Operation on aircraft when the aircraft is on the ground.

15.255(b)(2), not applicable, the device is a unmanned aircraft.

15.255(b)(3), Operation be limited to a maximum of 121.92 meters (400 feet) above ground level. Please refer to the user manual.

§15.255 (h), No equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

4.7 Restrictions

4.7.1 Applicable Standard

RSS-210, Annex J.2 Restrictions

The devices certified under this annex are not permitted to be used on satellites. Devices used on aircraft are permitted under the following conditions:

(a) Except as allowed in J.2(b), devices are only to be used when the aircraft is on the ground.

(b) Devices used in-flight are subject to the following restrictions:
- (i) they shall be used within closed, exclusive on-board, communication networks within the aircraft
- (ii) they shall not be used in wireless avionics intra-communication (WAIC) applications where external structural sensors or external cameras are mounted on the outside of the aircraft structure
- (iii) they shall not be used on aircraft equipped with a body/fuselage that provides little or no RF attenuation except when installed on unmanned air vehicles (UAVs) and complying with J.2(d)
- (iv) devices operating in the 59.3-71.0 GHz band shall not be used except if they meet all of the following conditions:

  (1) they are FDS
  (2) they are installed within personal portable electronic devices
  (3) they comply with the relevant requirements in J.3.2(a), J.3.2(b) and J.3.2(c)

(c) Devices' user manuals shall include text indicating restrictions shown in J.2(a) and J.2(b).

(d) FDS devices deployed on UAVs shall comply with all of the following conditions:
- (i) they operate in the 60-64 GHz band
- (ii) the UAVs limit their altitude operation to the regulations established by Transport Canada (e.g. altitudes below 122 metres above ground)
- (iii) they comply with J.3.2(d)

4.7.2 Result of Restriction

The devices are only to be used when the aircraft is on the ground.

Devices' user manuals includes text indicating restrictions shown in J.2(a) and J.2(b).

The devices operate in the 60-64 GHz band.

The UAVs limit their altitude operation to the regulations established by Transport Canada (e.g. altitudes below 122 metres above ground).

They comply with J.3.2(d).

4.8 Antenna Requirement

4.8.1 Applicable Standard

FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

RSS-Gen Clause 6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).
When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.
The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:
This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.8.2 Judgment

Please refer to the Antenna Information detail in Section 1.3.

EXHIBIT A - EUT PHOTOGRAPHS

Please refer to the attachment 2402A43113E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2402A43113E-RF-INP EUT INTERNAL PHOTOGRAPHS.

EXHIBIT B - TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2402A43113E-RF-00E-TSP test setup photographs.

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