



# **TEST REPORT**

Applicant:Autel Robotics Co., LtdAddress:601,701,801,901, Block B1, Nanshan iPark, No. 1001 Xueyuan<br/>Avenue, Nanshan District, Shenzhen, Guangdong, 518055, ChinaProduct Name:EVO Max 4T, EVO Max 4N, EVO Max 4T XE,<br/>EVO Max 4T Pro

FCC ID: 2AGNTMDX600958C

47 CFR Part 15, Subpart C(15.247) Standard(s): ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02 Report Number: 2402A23350E-RF-00D

**Report Date: 2025/2/18** 

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

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# CONTENTS

DOCUMENT REVISION HISTORY ·······4
1. GENERAL INFORMATION
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)······5
1.2 ACCESSORY INFORMATION
1.3 ANTENNA INFORMATION DETAIL
1.4 Equipment Modifications ······6
2. SUMMARY OF TEST RESULTS ······7
3. DESCRIPTION OF TEST CONFIGURATION
3.1 OPERATION FREQUENCY DETAIL ·····8
3.2 EUT OPERATION CONDITION 10
3.3 SUPPORT EQUIPMENT LIST AND DETAILS ······ 10
3.4 SUPPORT CABLE LIST AND DETAILS ······ 10
3.5 BLOCK DIAGRAM OF TEST SETUP ······ 11
3.6 TEST FACILITY ······ 12
3.7 MEASUREMENT UNCERTAINTY ····· 12
4. REQUIREMENTS AND TEST PROCEDURES
4.1 AC LINE CONDUCTED EMISSIONS ······ 13
4.1 AC LINE CONDUCTED EMISSIONS 13
4.1.1 Applicable Standard
4.1.1 Applicable Standard 13 4.1.2 EUT Setup 14
4.1.1 Applicable Standard134.1.2 EUT Setup144.1.3 EMI Test Receiver Setup14
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15
4.1.1 Applicable Standard134.1.2 EUT Setup144.1.3 EMI Test Receiver Setup144.1.4 Test Procedure154.1.5 Corrected Amplitude & Margin Calculation154.1.6 Test Result15
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16
4.1.1 Applicable Standard134.1.2 EUT Setup144.1.3 EMI Test Receiver Setup144.1.4 Test Procedure154.1.5 Corrected Amplitude & Margin Calculation154.1.6 Test Result154.1.6 Test Result154.2 RADIATION SPURIOUS EMISSIONS164.2.1 Applicable Standard164.2.2 EUT Setup164.2.3 EMI Test Receiver & Spectrum Analyzer Setup184.2.4 Test Procedure184.2.5 Corrected Result & Margin Calculation18
4.1.1 Applicable Standard134.1.2 EUT Setup144.1.3 EMI Test Receiver Setup144.1.4 Test Procedure154.1.5 Corrected Amplitude & Margin Calculation154.1.6 Test Result154.1.6 Test Result154.2 RADIATION SPURIOUS EMISSIONS164.2.1 Applicable Standard164.2.2 EUT Setup164.2.3 EMI Test Receiver & Spectrum Analyzer Setup184.2.4 Test Procedure184.2.5 Corrected Result & Margin Calculation184.2.6 Test Result19
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3.1 Applicable Standard       20         4.3.1 Applicable Standard       20
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.1.7 Test Procedure       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20         4.3.1 Applicable Standard       20         4.3.2 EUT Setup       20
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.6 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20         4.3.1 Applicable Standard       20         4.3.2 EUT Setup       20         4.3.3 Test Procedure       20
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.1.7 Test Procedure       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20         4.3.1 Applicable Standard       20         4.3.2 EUT Setup       20
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.1.6 Test Result       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20         4.3.1 Applicable Standard       20         4.3.2 EUT Setup       20         4.3.3 Test Procedure       20         4.3.4 Test Result       20
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.1.7 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       18         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20         4.3.1 Applicable Standard       20         4.3.2 EUT Setup       20         4.3.3 Test Procedure       20         4.3.4 Test Result       20         4.3.5 Test Procedure       20         4.4 Test Result       20         4.3.4 Test Result       20         4.4.1 EUT Setup       21         4.4.1 EUT Setup       21         4.4.2 Test Procedure
4.1.1 Applicable Standard       13         4.1.2 EUT Setup       14         4.1.3 EMI Test Receiver Setup       14         4.1.4 Test Procedure       15         4.1.5 Corrected Amplitude & Margin Calculation       15         4.1.6 Test Result       15         4.1.6 Test Result       15         4.2 RADIATION SPURIOUS EMISSIONS       16         4.2.1 Applicable Standard       16         4.2.2 EUT Setup       16         4.2.3 EMI Test Receiver & Spectrum Analyzer Setup       16         4.2.4 Test Procedure       18         4.2.5 Corrected Result & Margin Calculation       18         4.2.6 Test Result       19         4.3 MINIMUM 6 DB EMISSION BANDWIDTH       20         4.3.1 Applicable Standard       20         4.3.2 EUT Setup       20         4.3.1 Applicable Standard       20         4.3.1 Applicable Standard       20         4.3.3 Test Procedure       20         4.3.4 Test Result       20         4.3.4 Test Result       20         4.3.4 Test Result       20         4.4 Test Procedure       20         4.3.4 Test Result       20         4.3.4 Test Result       20         4.4 1eUT Setup

4.5.1 Applicable Standard
4.5.2 EUT Setup 22
4.5.3 Test Procedure 22
4.5.4 Test Result 22
4.6 MAXIMUM POWER SPECTRAL DENSITY 23
4.6.1 Applicable Standard 23
4.6.2 EUT Setup
4.6.3 Test Procedure       23         4.6.4 Test Result       23
4.7 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE ······24
4.7.1 Applicable Standard       24         4.7.2 EUT Setup       24
4.7.2 EOT Setup 4.7.3 Test Procedure ······ 24
4.7.4 Test Result
4.8 DUTY CYCLE
4.8.1 EUT Setup
4.8.2 Test Procedure ······ 25
4.8.3 Judgment
4.9 ANTENNA REQUIREMENT ······ 26
4.9.1 Applicable Standard 26
4.9.2 Judgment
5. Test DATA AND RESULTS ······ 27
5.1 AC LINE CONDUCTED EMISSIONS ······ 27
5.2 RADIATION SPURIOUS EMISSIONS ····································
5.3 MINIMUM 6 DB EMISSION BANDWIDTH ····· 59
5.4 99% Occupied Bandwidth······ 64
5.5 MAXIMUM CONDUCTED OUTPUT POWER ······69
5.6 MAXIMUM POWER SPECTRAL DENSITY ······ 70
5.7 100 kHz Bandwidth of Frequency Band Edge: ····· 79
5.8 DUTY CYCLE:
EXHIBIT A - EUT PHOTOGRAPHS ······ 86
EXHIBIT B - TEST SETUP PHOTOGRAPHS ······ 87

Page 3 of 87

# **DOCUMENT REVISION HISTORY**

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402A23350E-RF-00D	Original Report	2025/2/18

Report Template Version: FCC-SRD-V1.3

## **1. GENERAL INFORMATION**

## **1.1 Product Description for Equipment under Test (EUT)**

EUT Name:	EVO Max 4T, EVO Max 4N, EVO Max 4T XE, EVO Max 4T Pro		
EUT Model:	MDX		
<b>Operation Frequency:</b>	900M SRD SRD 1.4MHz:904-926 MHz SRD 10MHz:909-921MHz SRD 20MHz:914-916MHz 2.4G SRD SRD 1.4MHz:2403.5-2475.5MHz SRD 10MHz:2407.5-2471.5MHz SRD 20MHz:2412.5-2462.5MHz		
Maximum Average Output Power	20.84dBm(900M SRD)		
(Conducted):	26.12dBm(2.4G SRD)		
Modulation Type:	OFDM(QPSK, 16QAM)		
Rated Input Voltage:	DC 14.76V from battery or DC 14.88V from battery		
Serial Number:	2WN8-1(For RF Conducted Test) 2WN8-2(For Radiated Spurious Emissions Test)		
EUT Received Date:	2024/12/28		
EUT Received Status:	Good		
Note: The device can install difference Gimbal camera, test was only performed with Gimbal camera 3#(4T).			

## **1.2 Accessory Information**

Accessory Description	Manufacturer	Model	Parameters
Adapter	Shenzhen Esun Power Technology Co.,Ltd	MDX120W	Input:100-240Vac,50/60Hz,3.0A Output:Main:17Vdc.7.06A; USB-C:5.0V,3.0A;9.0V,3.0A;12.0V,2.5A Total Output Power:120.02W Max
Battery 1#	Xiamen Ampace Technology Limited	ABX40	DC 14.88V
Battery 2#	Xiamen Ampace Technology Limited	ABX41	DC 14.76V
Battery 3#	Xiamen Ampace Technology Limited	MDX_8070_1488	DC 14.88V

Note: Per 15B report, Powered by Battery 2# was the worst, so only performed it.

## **1.3 Antenna Information Detail**

Antenna	Antenna Manufacturer	Antenna Type	input impedance (Ohm)	Frequency Range	Antenna Gain
Chain 0		РСВ	50	902-928MHz	0.3dBi
(Tx&Rx)	Dongguan YiJia Electronics Communication Technology Co.,Ltd	РСВ	50	2400-2500MHz	1.7dBi
Chain 1		PCB	50	902-928MHz	-0.8dBi
(Tx&Rx)		PCB	50	2400-2500MHz	1.9dBi
Chain 2		PCB	50	902-928MHz	1.8dBi
(Rx Only)		РСВ	50	2400-2500MHz	1.3dBi
Chain 3		РСВ	50	902-928MHz	1.1dBi
(Rx Only)		РСВ	50	2400-2500MHz	1.5dBi

#### Note:

The system supports 2T4R.

Per KDB 662911 D01 Multiple Transmitter Output v02r01:

#### SRD-900MHz:

For power measurements: CDD Mode: Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \le 4$  directional gain=0.3 +0dB =0.3dBi

For power spectral density (PSD) measurements: Array Gain =  $10 \log(N_{ANT}/N_{SS}) dB$ . directional gain=0.3 dBi + 3 dB = 3.3 dBi

#### SRD-2.4GHz:

For power measurements: CDD Mode: Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \le 4$ directional gain=1.9dBi +0dB =1.9dBi

For power spectral density (PSD) measurements: Array Gain =  $10 \log(N_{ANT}/N_{SS}) dB$ .

directional gain=1.9dBi +3dB =4.9dBi

#### The design of compliance with §15.203:

 $\boxtimes$  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) Section	Test Items	Result	
§15.207(a)	AC Line Conducted Emissions	Not applicable	
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions	Compliant	
§15.247 (a)(2)	Minimum 6 dB Bandwidth	Compliant	
§15.247(b)(3)	Maximum Conducted Output Power	Compliant	
§15.247(d)	100 kHz Bandwidth Of Frequency Band Edge Compliant		
§15.247(e)	Power Spectral Density	Compliant	
§15.203 Antenna Requirement Compliant			
Note 1: Not Applicable, the device was powered by battery when operating. Note 2: For Radiated Spurious Emissions 9kHz~1GHz and 18~25GHz, the maximum output power mode and channel was tested.			

# **3. DESCRIPTION OF TEST CONFIGURATION**

### **3.1 Operation Frequency Detail** For SRD-900MHz band 1.4MHz Bandwidth Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	904	13	916
2	905	14	917
3	906	15	918
			•••
		22	925
11	914	23	926
12	915	/	/
Per section 15.31(m), the	below frequencies were perfor	med the test as below:	
Test Channel			equency MHz)
Lowest		904	
Middle		916	
Highest		926	

#### For SRD-900MHz band 10MHz Bandwidth Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	909	8	916
2	910	9	917
3	911	10	918
4	912	11	919
5	913	12	920
6	914	13	921
7	915	/	/
Per section 15.31(m), the	below frequencies were perform	med the test as below:	
Test Channel			equency MHz)
Lowest		909	
Middle		915	
Highest		921	

#### For SRD-900MHz band 20MHz Bandwidth Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)		
1	914	3	916		
2	915	/	/		
Per section 15.31(m), the	Per section 15.31(m), the below frequencies were performed the test as below:				
Test Channel		Frequency (MHz)			
Lowest		914			
Middle		915			
Highest		916			

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403.5	38	2440.5
2	2404.5	39	2441.5
3	2405.5	40	2442.5
	•••		
		72	2474.5
36	2438.5	73	2475.5
37	2439.5	/	/
Per section 15.31(m), the	below frequencies were perform	med the test as below:	
Test Channel			equency MHz)
Lowest		2403.5	
Middle		2439.5	
Highest		2475.5	

## For SRD-2.4GHz band 1.4MHz Bandwidth Mode:

#### For SRD-2.4GHz band 10MHz Bandwidth Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2407.5	34	2440.5
2	2408.5	35	2441.5
3	2409.5	36	2442.5
•••			
		64	2470.5
32	2438.5	65	2471.5
33	2439.5	/	/
Per section 15.31(m), the	below frequencies were perfor	med the test as below:	-
Test Channel			equency MHz)
Lowest		2407.5	
Middle		2439.5	
Highest		2471.5	

#### For SRD-2.4GHz band 20MHz Bandwidth Mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	
1	2412.5	27	2438.5	
2	2413.5	28	2439.5	
3	2414.5	29	2440.5	
		50	2461.5	
25	2436.5	51	2462.5	
26	2437.5	/	/	
Per section 15.31(m), the	below frequencies were perform	med the test as below:		
Test Channel			equency MHz)	
L	lowest	2412.5		
Ν	Aiddle	2437.5		
Н	lighest	2462.5		

## **3.2 EUT Operation Condition**

The system was configured for testing in Engineering Mode, which was provided by the manufacturer. The EUT configuration as below:

<b>EUT Exercise Software:</b>	RRTL6.0.0_VCOM
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The software was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer  $\blacktriangle$ :

			Power Level Setting					
Test Modes		Data rate	Lowest Channel		Middle Channel		Highest Channel	
			Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1
	1.4M	120kbps	80	80	86	86	86	86
900MHz Band	10M	19Mbps	70	70	75	75	75	75
QPSK	20M	38Mbps	65	65	65	65	65	65
	1.4M	120kbps	35	35	35	35	60	60
2.4GHz Band	10M	19Mbps	50	50	50	50	50	50
QPSK	20M	38Mbps	62	62	57	57	57	57

Note:

1. The above are the worst-case data rates, which are determined for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.

2. The device supports SISO in all BW modes, and MIMO 2TX in all BW modes, per pretest, 2TX mode was the worst mode and reported for all BW modes.

3. For 2.4G SRD QPSK, the power level from channel 38 to channel 72 is 60.

## **3.3 Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
/	/	/	/

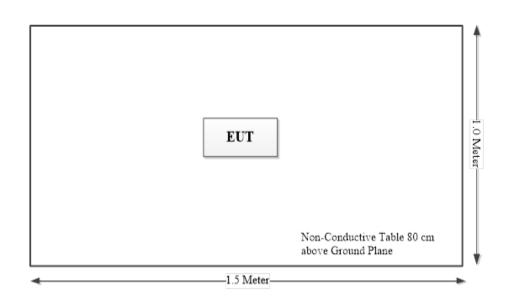
### 3.4 Support Cable List and Details

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

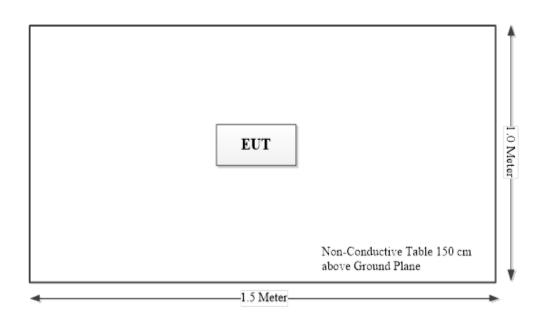
#### Report No.: 2402A23350E-RF-00D

## 3.5 Block Diagram of Test Setup

Radiated Spurious Emissions: Below 1GHz:



Above 1GHz:



## **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 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
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
Unwanted Emissions, conducted	±2.47 dB
Temperature	±1°C
Humidity	$\pm 5\%$
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 AND TEST PROCEDURES

## 4.1 AC Line Conducted Emissions

#### 4.1.1 Applicable Standard

#### FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBµV)		
Frequency of emission (MHz)	Quasi-peak	Average	
0.15-0.5	66 to 56*	56 to 46*	
0.5-5	56	46	
5-30	60	50	

\*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

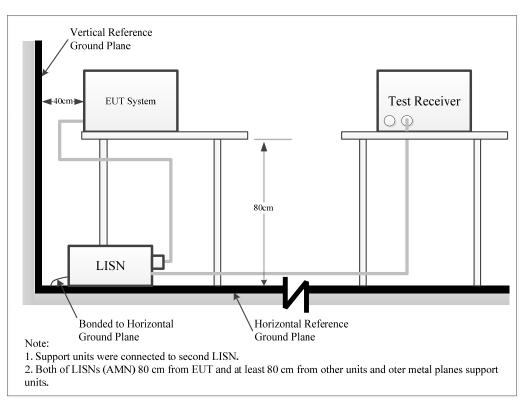
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000  $\mu$ V within the frequency band 535-1705 kHz, as measured using a 50  $\mu$ H/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

#### 4.1.2 EUT Setup



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

#### 4.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

#### 4.1.4 Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

#### 4.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor Factor = attenuation caused by cable loss + voltage division factor of AMN

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

#### 4.1.6 Test Result

Please refer to section 5.1.

## 4.2 Radiation Spurious Emissions

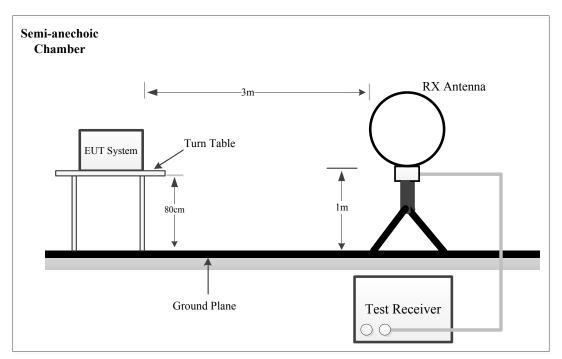
#### 4.2.1 Applicable Standard

#### FCC §15.247 (d);

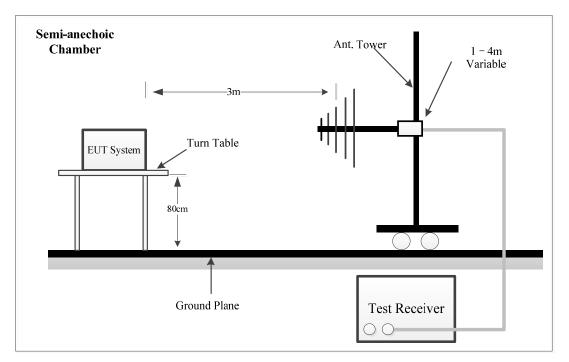
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### 4.2.2 EUT Setup

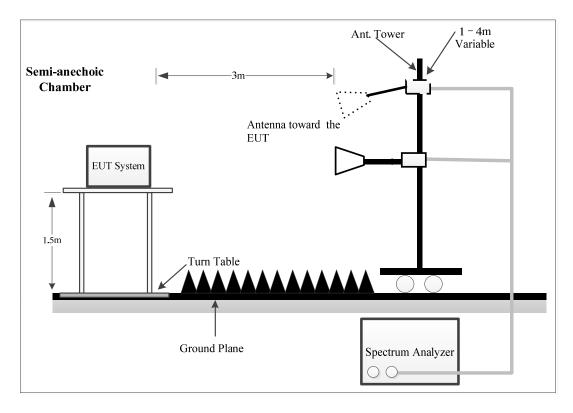
#### 9kHz~30MHz:



## 30MHz~1GHz:



#### Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

Report Template Version: FCC-SRD-V1.3

The spacing between the peripherals was 10 cm.

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

#### 4.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

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

9kHz-1000MHz:

Frequency Range	Measurement	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	QP/AV	300Hz	1 kHz	200 Hz	QP/AV
150 kHz – 30 MHz	QP/AV	10 kHz	30 kHz	9 kHz	QP/AV
30MHz – 1000 MHz	PK	100 kHz	300 kHz	/	PK
301VIHZ - 1000 MHZ	QP	/	/	120kHz	QP

1GHz-25GHz:

Pre-scan:

Measurement	Detector	Duty cycle	RBW	Video B/W
РК	PK	Any	1MHz	3 MHz
<b>A</b> we	РК	>98%	1MHz	5kHz
Ave.	ΓK	<98%	1MHz	$\geq 1/T$ , not less than 5kHz

Final measurement for emission identified during the pre-scan:

Measurement	Detector	Duty cycle	RBW	Video B/W
РК	РК	Any	1MHz	3 MHz
Ave	PK	>98%	1MHz	10 Hz
Ave.	PK	<98%	1MHz	≥1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP limit more than 6dB, then it is unnecessary to perform an QP measurement.

If the maximized peak measured value complies with under the Average limit, then it is unnecessary to perform an Average measurement.

#### 4.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz -1 GHz, except 9-90 kHz, 110-490 kHz, employing an average detector, peak and Average detection modes for frequencies above 1 GHz.

#### 4.2.5 Corrected Result & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor Factor = Antenna Factor + Cable Loss- Amplifier Gain 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

#### 4.2.6 Test Result

Please refer to section 5.2.

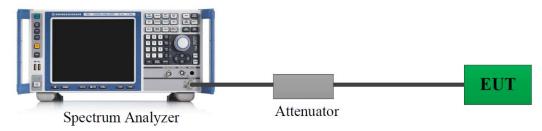
## 4.3 Minimum 6 dB Emission Bandwidth

#### 4.3.1 Applicable Standard

#### FCC §15.247 (a)(2)

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 4.3.2 EUT Setup



A short RF cable with low cable loss connected to the EUT antenna port, which was provided by manufacturer. The insert loss of this RF cable/attenuator was offset into the setting of test equipment.

#### 4.3.3 Test Procedure

According to ANSI C63.10-2013 Section 11.8

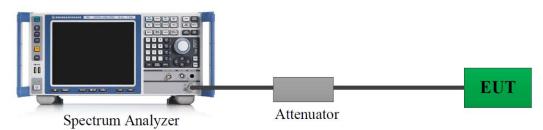
- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 \times RBW$ .
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 4.3.4 Test Result

Please refer to section 5.3.

## 4.4 99% Occupied Bandwidth

## 4.4.1 EUT Setup



A short RF cable with low cable loss connected to the EUT antenna port, which was provided by manufacturer. The insert loss of this RF cable/attenuator was offset into the setting of test equipment.

### 4.4.2 Test Procedure

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth 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. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range

d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

### 4.4.3 Test Result

Please refer to section 5.4.

## 4.5 Maximum Conducted Output Power

#### 4.5.1 Applicable Standard

#### FCC §15.247 (b)(3)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

#### 4.5.2 EUT Setup



A short RF cable with low cable loss connected to the EUT antenna port, which was provided by manufacturer. The insert loss of this RF cable/attenuator was offset into the setting of test equipment.

#### 4.5.3 Test Procedure

According to ANSI C63.10-2013 Section 11.9.2.3.2

Method AVGPM-G is a measurement using a gated RF average power meter.

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

#### 4.5.4 Test Result

Please refer to section 5.5.

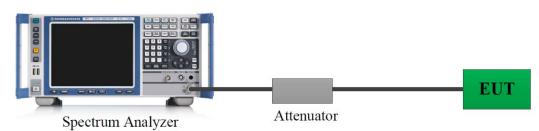
## 4.6 Maximum Power Spectral Density

## 4.6.1 Applicable Standard

### FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 4.6.2 EUT Setup



A short RF cable with low cable loss connected to the EUT antenna port, which was provided by manufacturer. The insert loss of this RF cable/attenuator was offset into the setting of test equipment.

#### 4.6.3 Test Procedure

#### Duty cycle $\geq$ 98%

According to ANSI C63.10-2013 Section 11.10.3

Duty cycle <98%, duty cycle variations are less than  $\pm 2\%$ 

According to ANSI C63.10-2013 Section 11.10.5

### Duty cycle <98%, duty cycle variations exceed $\pm 2\%$

According to ANSI C63.10-2013 Section 11.10.7

### 4.6.4 Test Result

Please refer to section 5.6.

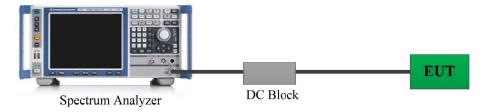
## 4.7 100 kHz Bandwidth of Frequency Band Edge

#### 4.7.1 Applicable Standard

#### FCC §15.247 (d);

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 4.7.2 EUT Setup



A short RF cable with low cable loss connected to the EUT antenna port, which was provided by manufacturer. The insert loss of this RF cable/attenuator was offset into the setting of test equipment.

#### 4.7.3 Test Procedure

According to ANSI C63.10-2013 Section 11.11

a) Set the center frequency and span to encompass frequency range to be measured.

b) Set the RBW = 100 kHz.

c) Set the VBW  $\geq$  [3  $\times$  RBW].

d) Detector = peak.

e) Sweep time = auto couple.

f) Trace mode = max hold.

g) Allow trace to fully stabilize.

h) Use the peak marker function to determine the maximum amplitude level.

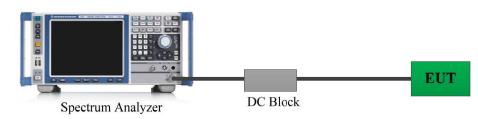
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

#### 4.7.4 Test Result

Please refer to section 5.7.

## 4.8 Duty Cycle

#### 4.8.1 EUT Setup



A short RF cable with low cable loss connected to the EUT antenna port, which was provided by manufacturer. The insert loss of this RF cable/attenuator was offset into the setting of test equipment.

#### 4.8.2 Test Procedure

According to ANSI C63.10-2013 Section 11.6

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set  $RBW \ge OBW$  if possible; otherwise, set RBW to the largest available value.

3) Set VBW  $\geq$  RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if  $T \le 16.7$  µs.)

#### 4.8.3 Judgment

Report Only. Please refer to section 5.8.

## 4.9 Antenna Requirement

#### 4.9.1 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 use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

#### 4.9.2 Judgment

**Compliant.** Please refer to the Antenna Information detail in Section 1.3.

# **5. Test DATA AND RESULTS**

## 5.1 AC Line Conducted Emissions

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

Report Template Version: FCC-SRD-V1.3

## **5.2 Radiation Spurious Emissions**

Serial Number:	2WN8-2		Below 1GHz: 2025/1/13~2025/1/14 Above 1GHz: 2025/1/21~2025/1/22
Test Site:	Chamber 10m, Chamber B	Test Mode:	Transmitting
Tester:	Leesin Xiang, Colin Yang, Leo Xiao	Test Result:	Pass

Environmental Conditions:								
Temperature:	Relative Humidity:	ATM Pressure:						
(°C) 19.4~20.3	(%)	(kPa) 101.0~101.8						

#### 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			
E-Microwave	Band Rejection Filter	OBF-ZP-902-928- SMAF	OE01902428	2024/6/11	2025/6/10			
		Above 1GH	z					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2023/9/7	2026/9/6			
Xinhang Macrowave	Coaxial Cable	XH750A-N/J- SMA/J-10M	20231117004 #0001	2024/11/17	2025/11/16			
AH	Preamplifier	PAM-0118P	469	2024/4/15	2025/4/14			
Audix	Test Software	E3	191218 V9	N/A	N/A			
R&S	Spectrum Analyzer	FSV40	101944	2024/9/6	2025/9/5			
R&S	Spectrum Analyzer	FSV40	101589	2024/9/5	2025/9/4			
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2023/2/22	2026/2/21			
Xinhang Macrowave	Coaxial Cable	XH360A-2.92/J- 2.92/J-6M-A	20231208001 #0001	2024/12/9	2025/12/8			
AH	Preamplifier	PAM-1840VH	191	2024/9/5	2025/9/4			
E-Microwave	Band Rejection Filter	OBF-ZP-902-928- SMAF	OE01902428	2024/6/11	2025/6/10			
Decentest	Multiplex Switch Test Control Set & Filter Switch Unit	DT7220SCU & DT7220FCU	DC79902 & DC79905	2024/8/27	2025/8/26			

\* 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).

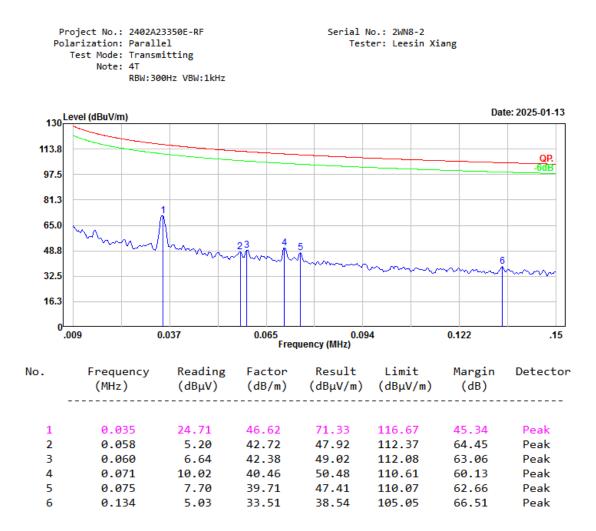
## **Test Data:**

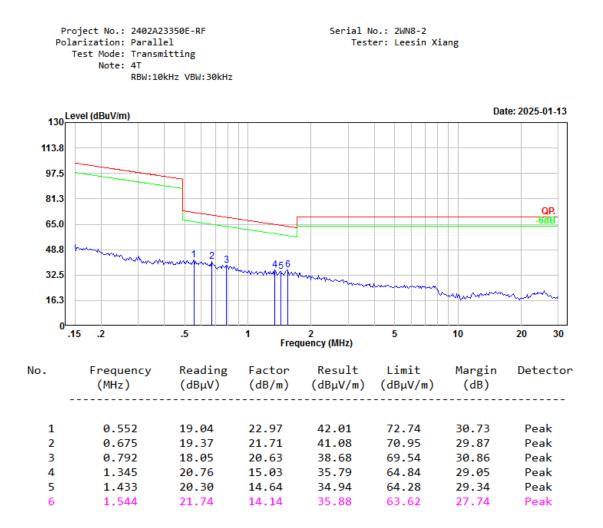
Please refer to the below table and plots.

#### 1) 9kHz~30MHz

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

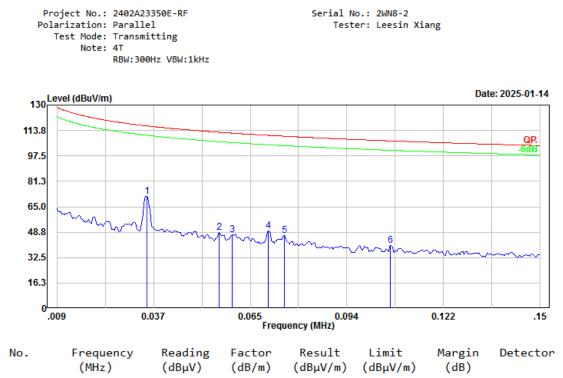
**2.4G SRD**(1.4M Low channel was tested):



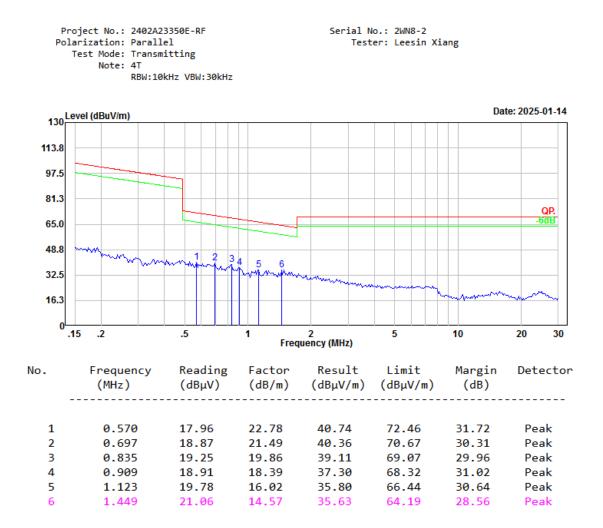


Page 30 of 87

#### **900MHz SRD**(20M High channel was tested):



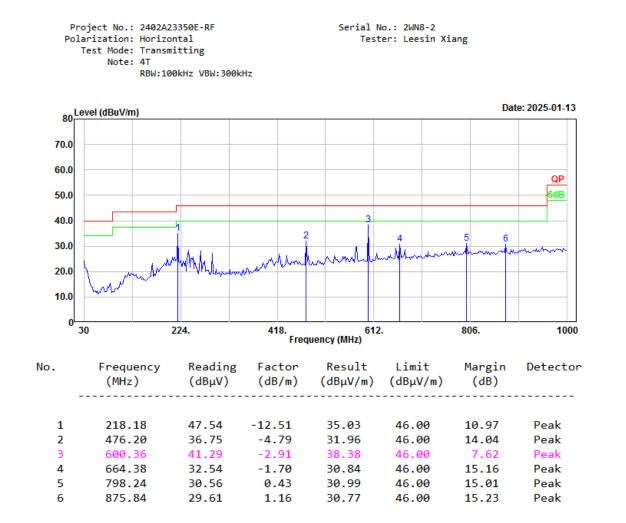
1	0.035	25.24	46.62	71.86	116.67	44.81	Peak
2	0.056	5.42	42.96	48.38	112.58	64.20	Peak
3	0.060	4.78	42.33	47.11	112.04	64.93	Peak
4	0.071	8.99	40.46	49.45	110.61	61.16	Peak
5	0.075	6.88	39.71	46.59	110.07	63.48	Peak
6	0.106	4.96	35.05	40.01	107.07	67.06	Peak

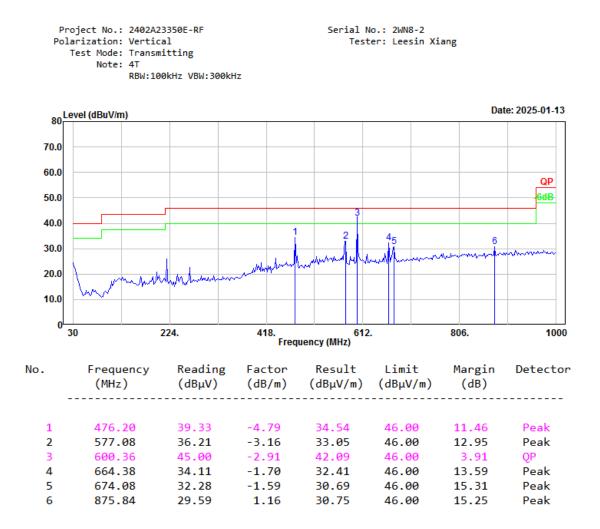


Page 32 of 87

## 2) 30MHz-1GHz

**2.4G SRD**(1.4M Low channel was tested):

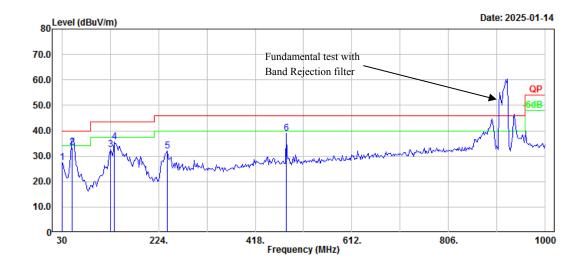




#### 900MHz SRD(20M High channel was tested):

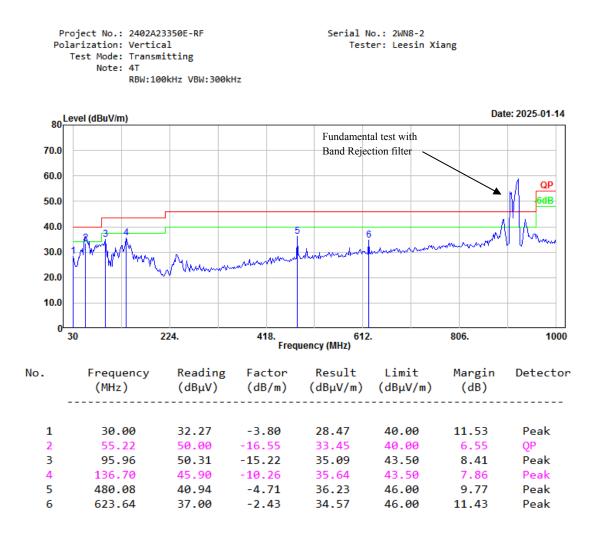


Serial No.: 2WN8-2 Tester: Leesin Xiang

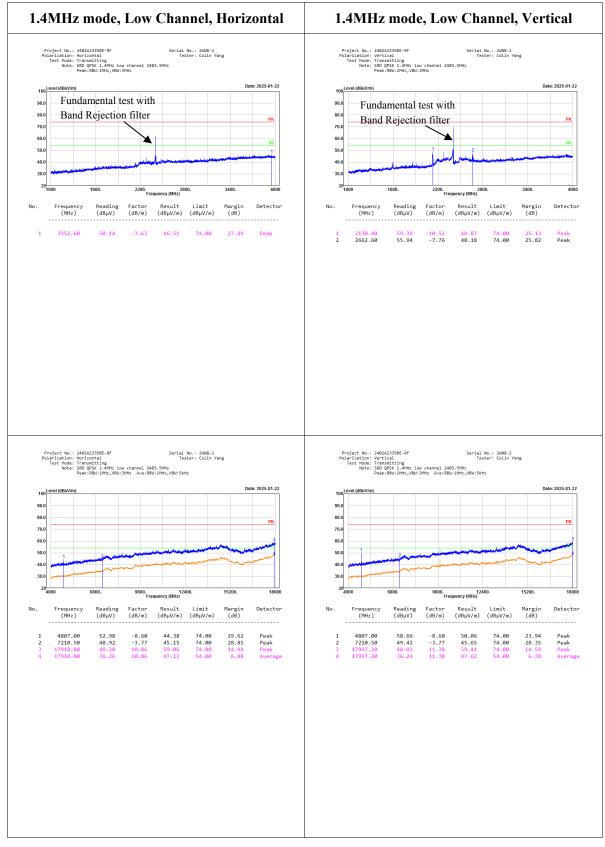


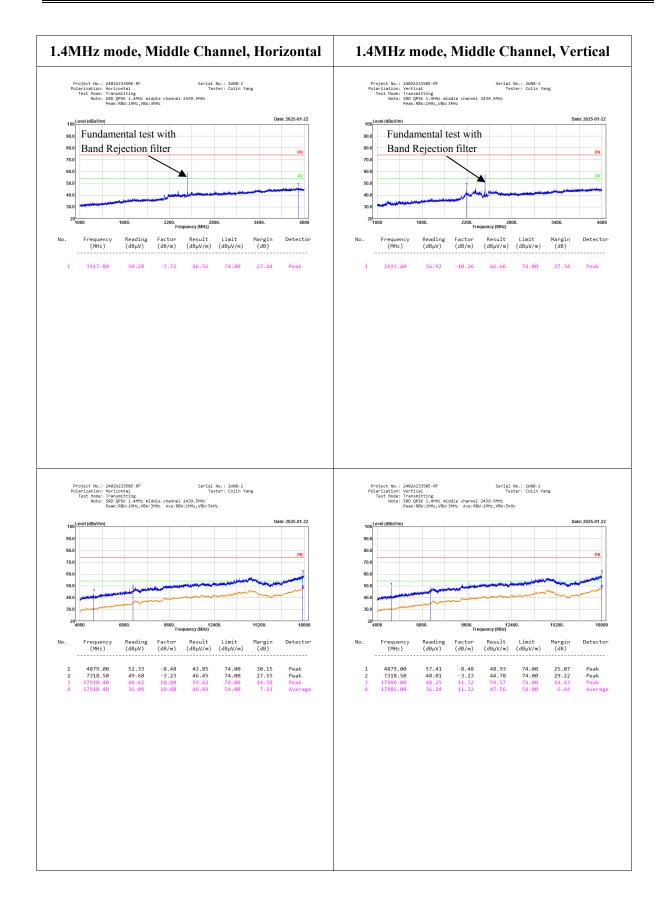
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30.00	31.31	-3.80	27.51	40.00	12.49	Peak
2	51.34	50.09	-16.49	33.60	40.00	6.40	QP
3	127.00	42.37	-9.89	32.48	43.50	11.02	Peak
4	134.76	45.74	-10.14	35.60	43.50	7.90	Peak
5	241.46	43.72	-11.71	32.01	46.00	13.99	Peak
6	480.08	43.67	-4.71	38.96	46.00	7.04	Peak

Bay Area Compliance Laboratories Corp. (Dongguan)



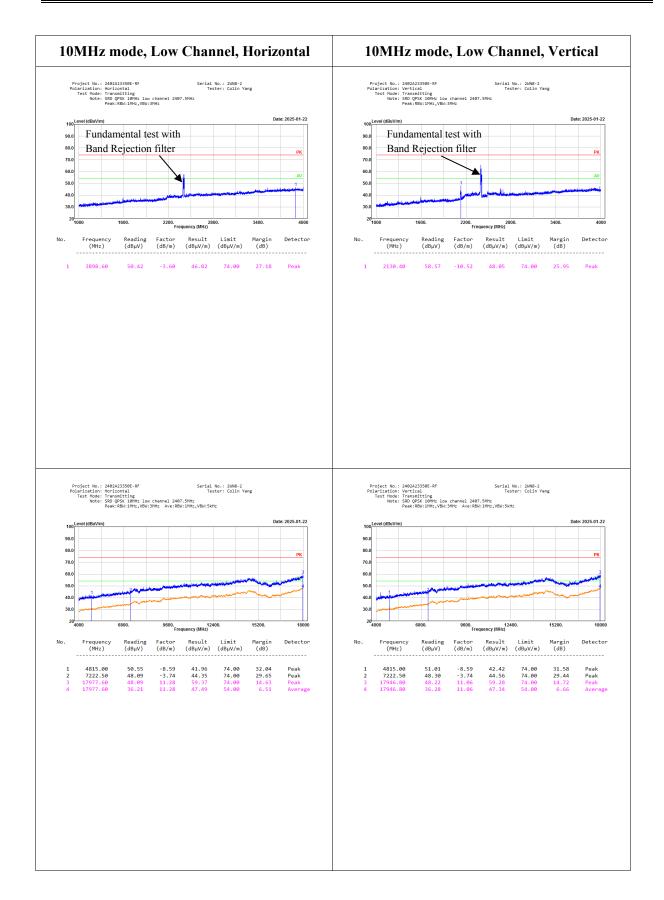
#### 3) 2.4G SRD 1-18GHz:



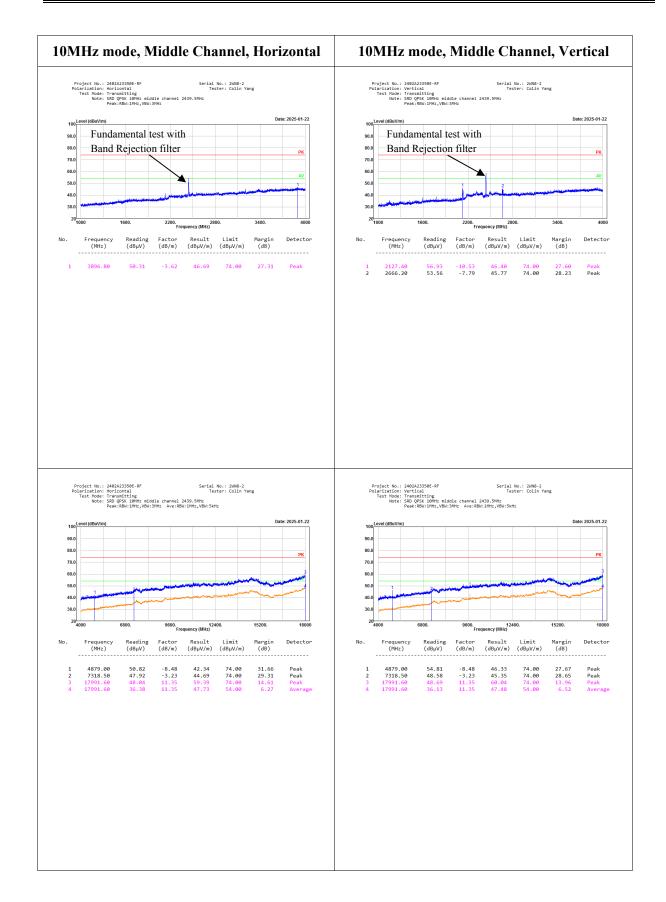


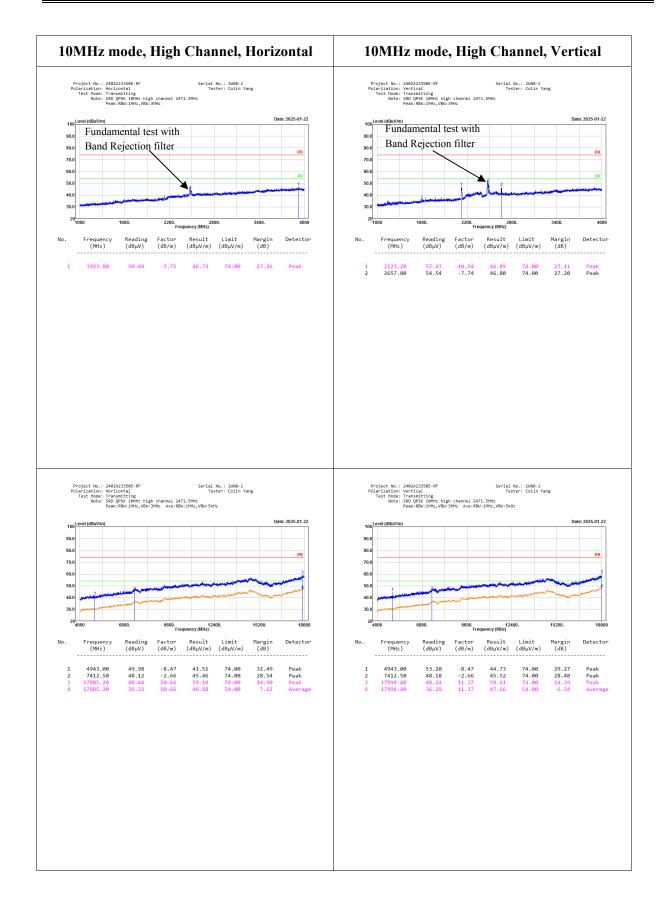


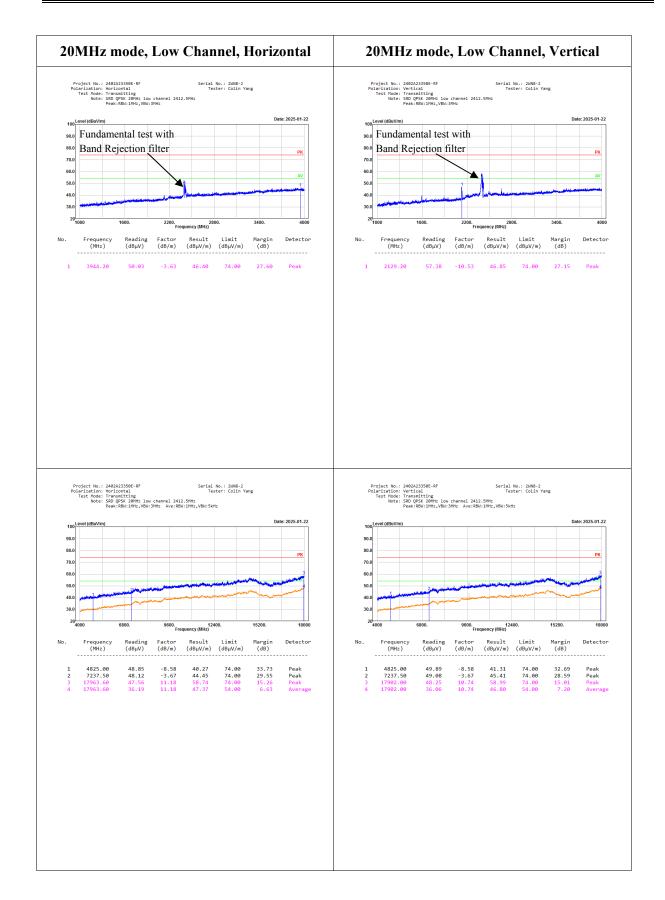
Page 39 of 87



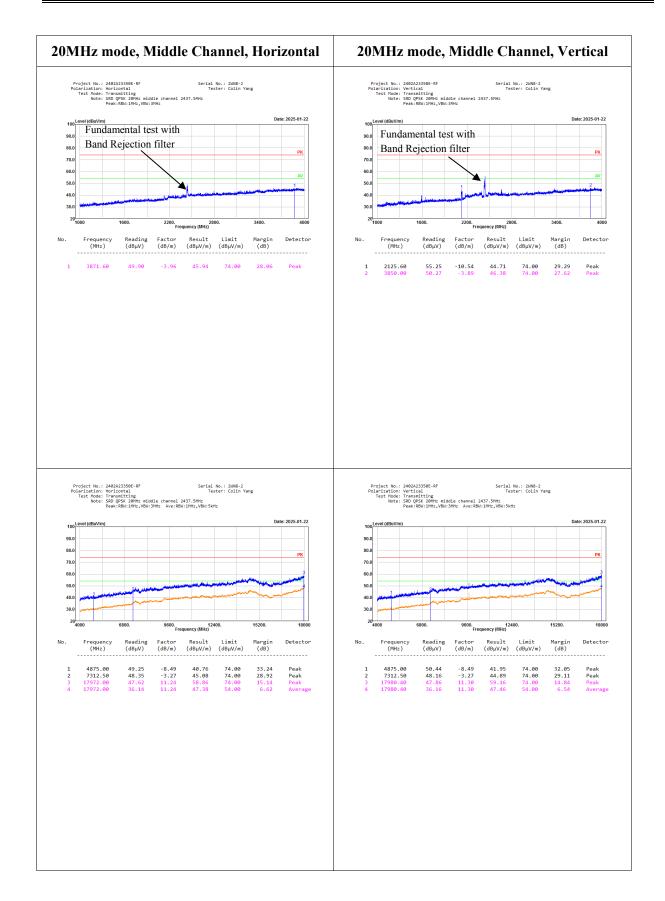
Page 40 of 87

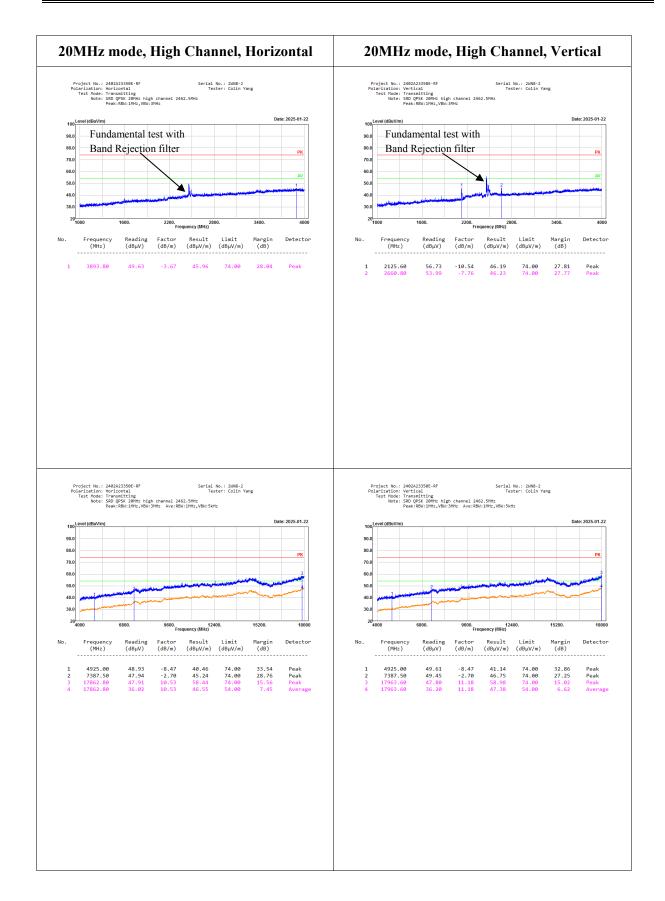






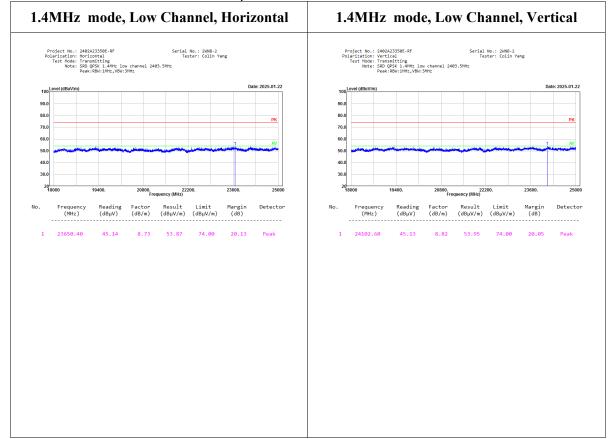
Page 43 of 87



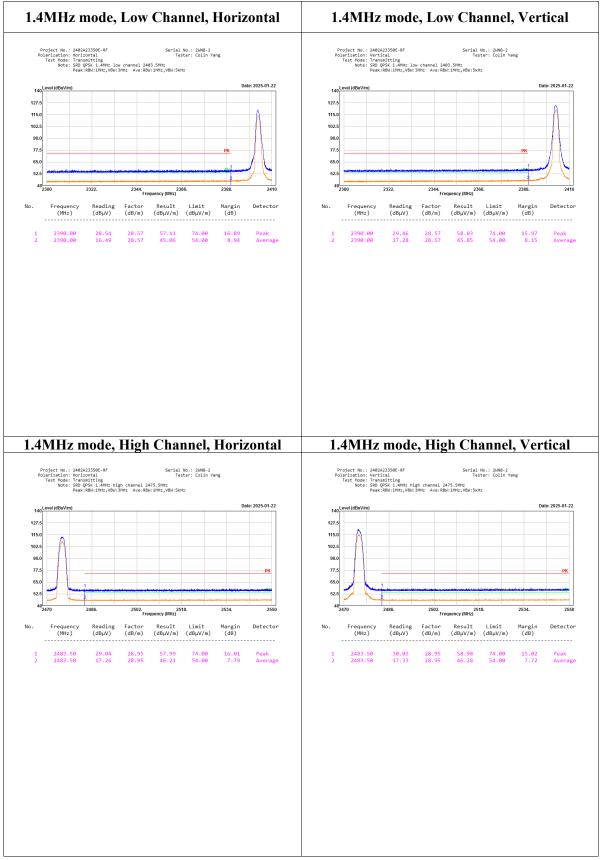


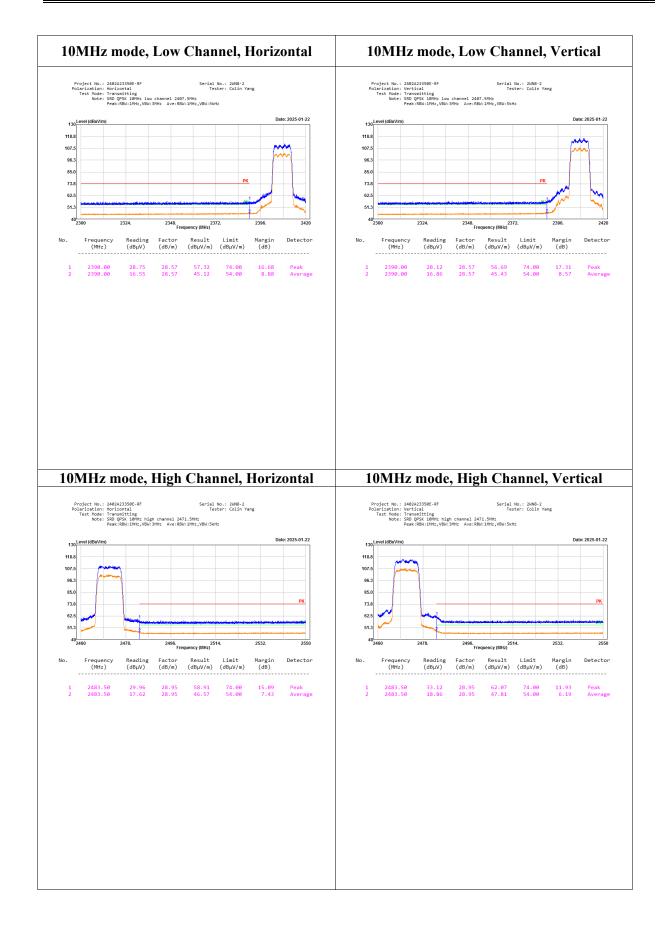
## 18-25GHz:

No Emission was detected in the range 18-25GHz,test was performed on the mode and channel which with the maximum power.

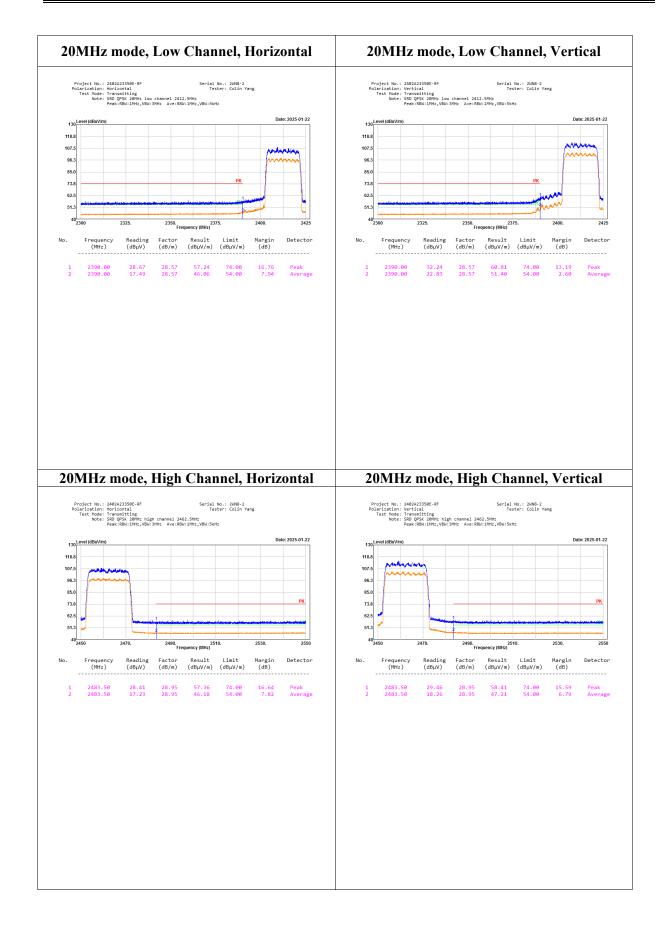


# Bandedge: 2.4G SRD

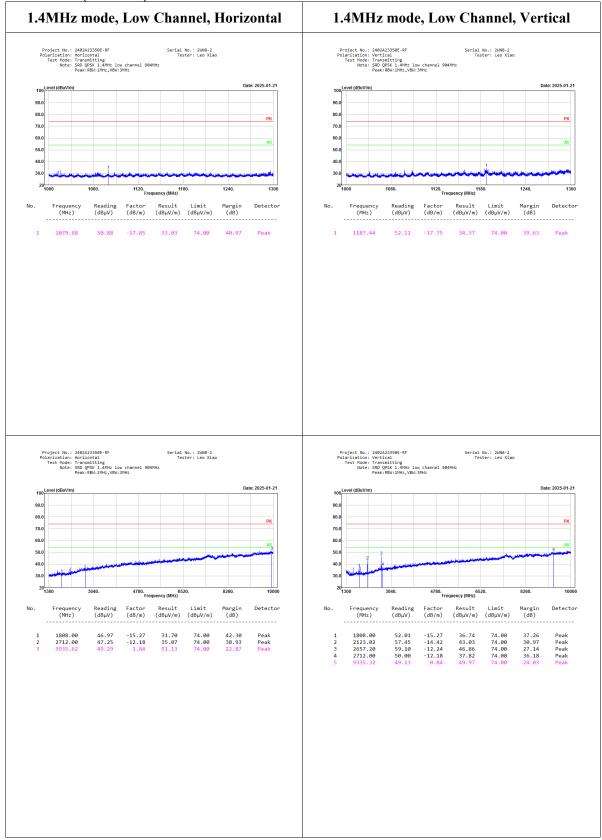




Page 48 of 87



#### 900M SRD(1-10GHz)



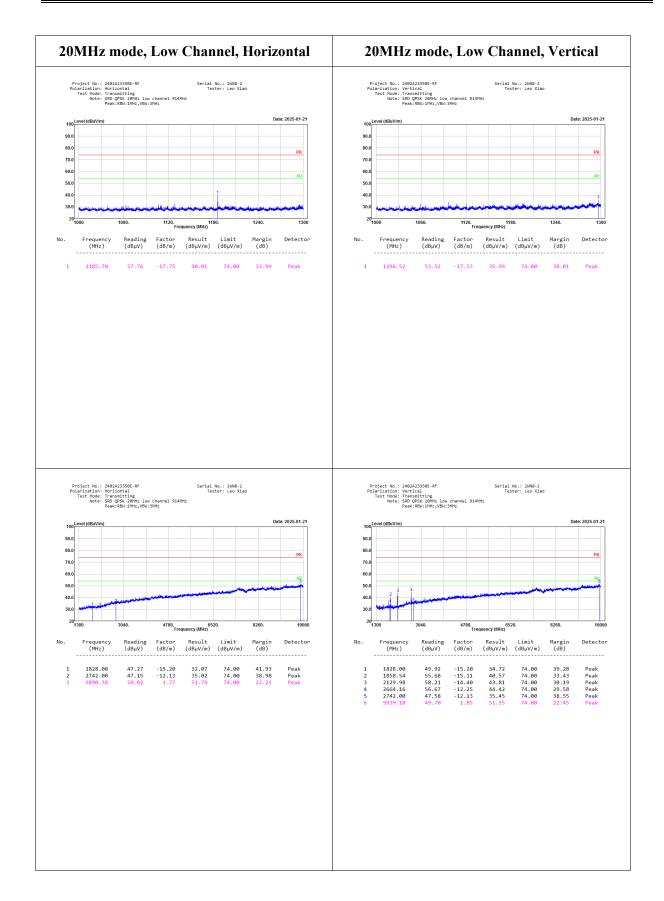




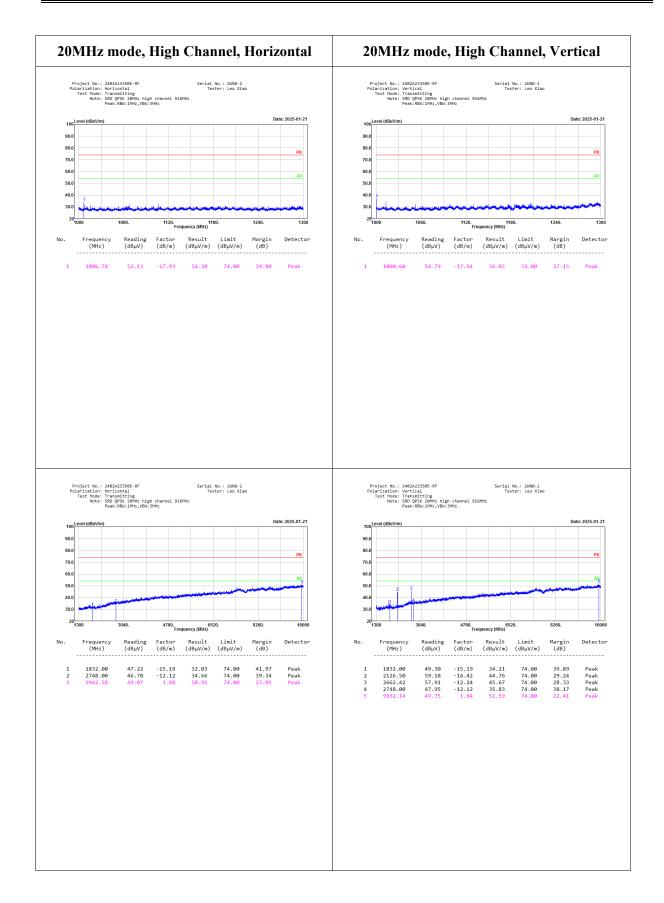












## 5.3 Minimum 6 dB Emission Bandwidth

Serial No.:	2WN8-1	Test Date:	2025/1/20~2025/2/8
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jojo Zhou	Test Result:	Pass

#### **Environmental Conditions:**

<b>Temperature:</b> (°C) 23.6~24.8	Relative Humidity: (%) 37~48	ATM Pressure: (kPa)	101.0~102.1
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### **Test Equipment List and Details:**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101461	2024/9/5	2025/9/4
Eastsheep	Coaxial Attenuator	5W-N-JK- 6G-10dB	F-08-EM503	2024/6/7	2025/6/6

\* 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:**

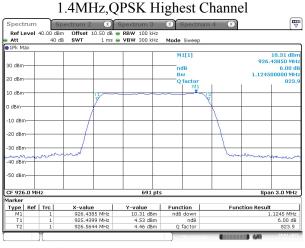
Operation Bands	Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
900MHz SRD	1.4M QPSK	904	1.129	≥0.5
		916	1.129	≥0.5
		926	1.125	≥0.5
	10M QPSK	909	9.001	≥0.5
		915	9.001	≥0.5
		921	9.001	≥0.5
	20M QPSK	914	18.061	≥0.5
		915	18.061	≥0.5
		916	18.061	≥0.5
2.4GHz SRD	1.4M QPSK	2403.5	1.133	≥0.5
		2439.5	1.133	≥0.5
		2475.5	1.125	≥0.5
	10M QPSK	2407.5	9.001	≥0.5
		2439.5	9.001	≥0.5
		2471.5	9.001	≥0.5
	20M QPSK	2412.5	18.061	≥0.5
		2437.5	18.061	≥0.5
		2462.5	18.061	≥0.5

Note: Test only was performed at Chain 0.

#### 900MHz SRD Band: 1.4MHz,QPSK Lowest Channel Spectrum × S Ref Level 40.0 Offset 10.50 dB RBW 100 kHz SWT 1 ms VBW 300 kHz 11.52 dBi 904.44280 MH 30 dBm 6.0 1.128800 00 MH 801. 20 dBn l0 dBn ) dBm -10 dBm 20 dBm 30 dBm 40 dBm 50 dBm CF 904.0 3.0 MHz Y-value 11.52 dBm X-value Type Ref Trc Function ndB down Function Result 904.4428 MH 903.4356 MH 904.5644 MH 8 MHz 00 dB ndE Q facto dBm dBm

ProjectNo.:2402A23350E=RF Tester:Jojo Zhou Date: 20.JAN.2025 15:32:51

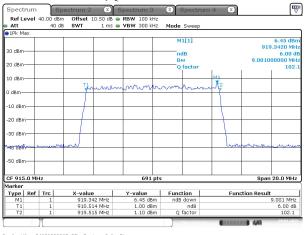




ProjectNo.:2402A23350E=RF Tester:Jojo Zhou

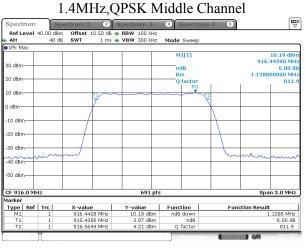
Date: 20.JAN.2025 15:39:44

10MHz,QPSK Middle Channel



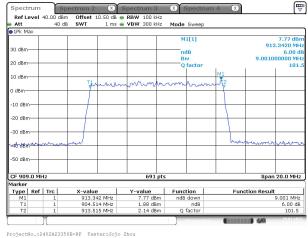
ProjectNo.:2402A23350E=RF Tester:Jojo Zhou Date: 20.JAN.2025 16:44:33





ProjectNo.:2402A23350E=RF Tester:Jojo Zhou Date: 20.JAN.2025 15:36:15

#### 10MHz,QPSK Lowest Channel

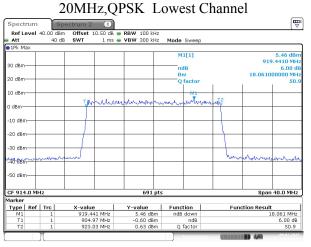


Date: 20.JAN.2025 15:44:56

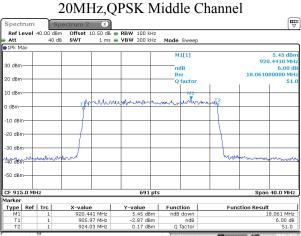
#### 10MHz,QPSK Highest Channel X St X Spectrum 3 Ref Level Att Offset 10.50 dB RBW 100 kHz SWT 1 ms VBW 300 kHz Mode M1F1 925.3420 MF 30 dBm 6.00 9.001000000 M ndB 20 dBn ) dBr 1 man ) dBm -10 dBm -20 dBr -30 dBm 40 dBm 50 dBr CF 921.0 20.0 MHz Type Ref Trc X-value 925.342 MHz 916.514 MHz 925.515 MHz Y-value Function ndB dow Function Result 6.50 dBm 0.95 dBm 1.10 dBm . 9.001 | 001 MHz 6.00 dB 102.8 ndB Q factor T1 T2

ProjectNo.:2402A23350E-RF Tester:Jojo Zhou

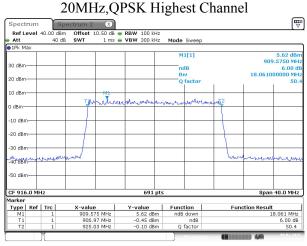
Date: 20.JAN.2025 16:47:53



ProjectNo.:2402A23350E-RF Tester:Jojo Zhou Date: 8.FEB.2025 10:28:36



ProjectNo.:2402A23350E-RF Tester:Jojo Zhou Date: 8.FEB.2025 10:27:37



ProjectNo.:2402A23350E-RF Tester:Jojo Zhou Date: 8.FEB.2025 10:26:35

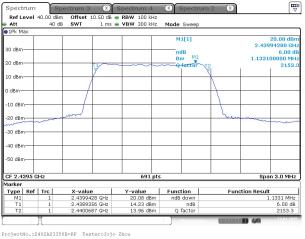
#### Report No.: 2402A23350E-RF-00D

Page 61 of 87

#### Report No.: 2402A23350E-RF-00D

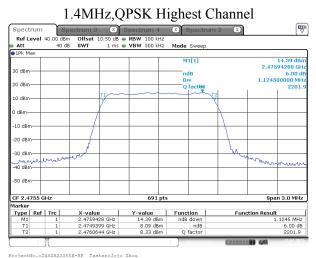
#### 1.4MHz,QPSK Lowest Channel Spectrum 3 Spectrum 4 Spectrum 2 Spectrum 2 0 dBm Offset 10.50 dB ● RBW 100 kHz 40 dB SWT 1 ms • VBW 300 kHz Mode Sweep Spectrum Ref Level 40.0 20.87 dB 2.40393850 cm M1[1] 30 dBm 2.40393830 GP 6.00 d 1.133100000 MF 2121 ndB Bw M1 Q factor 20 dBn 10 dBr ) dBm -10 dBm 0 dBm -30 dBm -40 dBm -50 dBm CF 2.4035 Function Result 1.1331 MHz 6.00 dB 2121.5 Span 3.0 MHz -value Y-value 20.87 dBm 15.02 dBm 14.87 dBm Type Ref Trc Function ndB down ndB Q factor

# 1.4MHz,QPSK Middle Channel



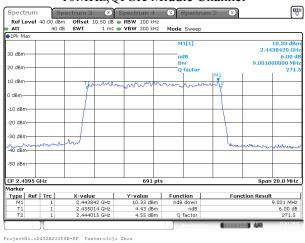
ProjectNo.:2402A23350E=RF Tester:Jojo Zhou Date: 21.JAN.2025 16:03:55

2.4GHz SRD Band:



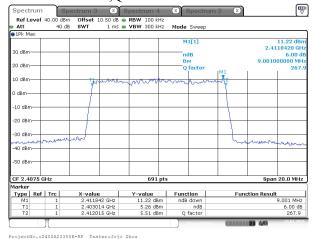
Date: 21.JAN.2025 16:19:23

10MHz,QPSK Middle Channel



Date: 21.JAN.2025 16:30:35

# 10MHz,QPSK Lowest Channel



Date: 21.JAN.2025 16:24:26

Date: 21.JAN.2025 16:15:51

X X Ref Level 40.00 Offset 10.50 SWT 1 Att IPk Ma M1[1] 8.78 dB 2.4758420 GF 30 dBm 9.001000000 M 27 ndB 20 dBm 10 dBm μ, man man ) dBm -10 dBm 20 dBm -30 dBm 40 dBm -50 dB CF 2.471 20.0 MHz Function Result 9.001 MHz 6.00 dB 275.0 Y-value 8.78 dBm 3.43 dBm 3.12 dBm X-value 2.475842 GHz 2.467014 GHz 2.476015 GHz Function ndB down Type Ref Trc Q factor T1 T2

#### 10MHz,QPSK Highest Channel

ProjectNo.:2402A23350E-RF Tester:Jojo Zhou Date: 21.JAN.2025 16:34:09

Report Template Version: FCC-SRD-V1.3