FCC 47 CFR Part 15.407

TEST REPORT

For

2.4G&5G Dual Band WIFI Module

MODEL NUMBER: HPYKE24

REPORT NUMBER: E04A24080233F00101

ISSUE DATE: September 10, 2024

FCC ID: 2ASEO-HPYKE24

Prepared for

Shenzhen HOPE Microelectronics Co., Ltd

30th floor of 8th Building, C Zone Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, Guangdong, China

Prepared by

Guangdong Global Testing Technology Co., Ltd.

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	September 10, 2024	Initial Issue	

Summary of Test Results

Test Item	Clause	Limit/Requirement	Result
Duty Cycle	ANSI C63.10-2013, Clause 12.2	None; for reporting purposes only.	Pass
26 dB emission bandwidth	KDB 789033 D02 v02r01 Section C.1	FCC Part 15.407 (a)(2)(5)	Pass
6 dB bandwidth	KDB 789033 D02 v02r01 Section C.2	FCC Part 15.407 (e)	Pass
Maximum conducted output power	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	FCC Part 15.407 (a)(1)(2)(3)	Pass
Peak Power Spectral Density	KDB 789033 D02 v02r01 Section F	FCC Part 15.407 (a)(1)(2)(3)	Pass
Radiated Emissions and Band Edge Measurement	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	FCC Part 15.407 (b)(1)(2)(3)(4)(6), FCC Part 15.209/205	Pass
FREQUENCY STABILITY	N/A	FCC 15.407 (g),RSS-247 Issue 2 Clause6	Pass
AC Power Line Conducted Emission	ANSI C63.10-2013, Clause 6.2.	FCC Part 15.407 (b)(6), FCC Part 15.207	Pass
Antenna Requirement	N/A	FCC Part 15.203, FCC Part 15.407(a)(1) (2)	Compliance

*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
*The measurement result for the sample received is <Pass> according to <FCC 47 CFR Part 15.407> when <Accuracy Method> decision rule is applied.

CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Shenzhen HOPE Microelectronics Co., Ltd
Address:	30th floor of 8th Building, C Zone Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, Guangdong, China

Manufacturer Information

Company Name:	Shenzhen HOPE Microelectronics Co., Ltd
Address:	30th floor of 8th Building, C Zone Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, Guangdong, China

EUT Information

Product Description:	2.4G&5G Dual Band WIFI Module
Model:	HPYKE24
Series Model:	/
Brand:	HOPERF
Sample Received Date:	August 14, 2024
Sample Status:	Normal
Sample ID:	A24080233 001
Date of Tested:	August 14, 2024 to September 10, 2024

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC 47 CFR Part 15.407	**Pass**

Prepared By:

Win Huang

Win Huang

Project Engineer

Checked By:

Alan He

Alan He

Laboratory Leader

Approved By:

Shawn Wen

Shawn Wen

Laboratory Manager

2. TEST METHODOLOGY

All tests were performed in accordance with the standard FCC 47 CFR Part 15.407

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 6947.01)** Guangdong Global Testing Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1343)** Guangdong Global Testing Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules **ISED (Company No.: 30714)** Guangdong Global Testing Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 30714 and the test lab Conformity Assessment Body Identifier (CABID) is CN0148.

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Items	k	Uncertainty
Emission Bandwidth	1.96	±9.0 PPM
Conduct Output Power	1.96	± 1.12 dB
Power Spectral Density	1.96	± 2.1 dB
Conducted Spurious Emission	1.96	9 kHz-30 MHz: ± 0.95 dB 30 MHz-1 GHz: ± 1.5 dB 1GHz-12.75GHz: ± 1.8 dB 12.75 GHz-26.5 GHz: ± 2.1dB 26.5 GHz-40 GHz: ± 2.6 dB
Frequency Stability	1.96	±9.0 PPM
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.		

Test Item	Frequency Range	k	U(dB)
Conducted emissions from the AC mains power ports (AMN)	150 kHz ~ 30 MHz	2	3.37
Radiated emissions	9 kHz ~ 30 MHz	2	4.16
Radiated emissions	30 MHz ~ 1 GHz	2	3.79
Radiated emissions	1 GHz ~ 18 GHz	2	5.62
Radiated emissions	18 GHz ~ 40 GHz	2	5.54
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		2.4G&5G Dual Band WIFI Module
Model		HPYKE24
Series Model		/
Model Difference		/
Hardware Version		V1.0
Software Version		V0.0.6
Ratings		DC 3.3V
Power Supply	DC	3.3V

Frequency Band:	5150 MHz to 5250 MHz (U-NII-1) 5725 MHz to 5850 MHz (U-NII-3)
Frequency Range:	5180 MHz to 5240 MHz 5745 MHz to 5825 MHz
Support Standards:	IEEE 802.11a/n
TPC Function:	Not Support
DFS Operational mode:	Not Support
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)
Channel Spacing:	IEEE 802.11a/n-HT20: 20 MHz IEEE 802.11n-HT40: 40 MHz
Data Rate:	IEEE 802.11a: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7 IEEE 802.11n-HT40: Up to MCS7
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20 2 for IEEE 802.11n-HT40) 5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20 2 for IEEE 802.11n-HT40
Maximum conducted output power:	5180 MHz to 5240 MHz: 14.92 dBm 5745 MHz to 5825 MHz: 14.70 dBm
Antenna Type:	PCB Antenna
Antenna Gain:	4 dBi
Normal Test Voltage:	3.3 Vdc
EUT Test software:	UI_mptool
Note:	The Antenna Gain was provided by customer, and this information may affect the validity of the results, customer should be responsible for this.

5.2. CHANNEL LIST

UNII-1 (For Bandwidth=20MHz)		UNII-1 (For Bandwidth=40MHz)		UNII-1 (For Bandwidth=80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)

36	5180	38	5190		
40	5200	46	5230		
44	5220				
48	5240				

UNII-3 (For Bandwidth=20MHz)		UNII-3 (For Bandwidth=40MHz)		UNII-3 (For Bandwidth=80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755		
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

5.3. MAXIMUM CONDUCTED OUTPUT POWER

UNII-1 BAND(FCC)

IEEE Std. 802.11	Frequency (MHz)	Maximum Conducted Power (dBm)	Max EIRP (dBm)
a	5150 ~ 5250	14.12	/
n HT20		14.83	/
n HT40		14.92	/

UNII-3 BAND(FCC)

IEEE Std. 802.11	Frequency (MHz)	Maximum Conducted Power (dBm)	Max EIRP (dBm)
a	5725 ~ 5850	13.13	/
n HT20		14.70	/
n HT40		14.10	/

5.4. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter	
Test Software	UI_mptool

UNII-1

Mode	Rate	Channel	Soft set value
			ANT 1
11a	6M	36	120
		40	115
		48	110
11n HT20	MCS0	36	118
		40	117
		48	117
11n HT40	MCS0	38	120
		46	117

UNII-3

Mode	Rate	Channel	Soft set value

			ANT 1
11a	6M	149	127
		157	127
		165	127
11n HT20	MCS0	149	127
		157	127
		165	127
11n HT40	MCS0	151	127
		159	127

THE WORSE CASE CONFIGURATIONS

The EUT was tested in the following configuration(s):

Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

Test channels referring to section 5.4.

Maximum power setting referring to section 5.6.

Worst case Data Rates declared by the customer:

802.11a 20 mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna No.	Frequency Band	Antenna Type	Max Antenna Gain (dBi)
1	5150-5850	PCB	4

IEE Std. 802.11	Transmit and Receive Mode	Description
802.11a	☒TX, RX	ANT 1 can be used as transmitting/receiving antenna.
802.11n HT20	☒TX, RX	ANT 1 can be used as transmitting/receiving antenna.
802.11n HT40	☒TX, RX	ANT 1 can be used as transmitting/receiving antenna.
Note:		

5.6. SUPPORT UNITS FOR SYSTEM TEST

The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note

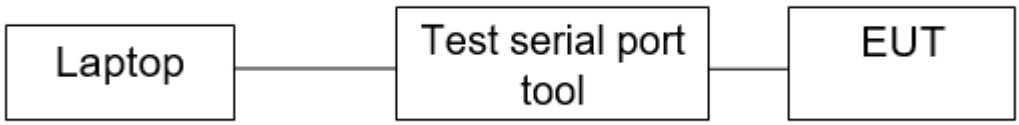
E-1	PC	Lenovo	T430	N/A	GTG Support
E-2	Serial Port Tool	N/A	USB TO TTL	N/A	GTG Support

The following cables were used to form a representative test configuration during the tests.

Item	Type of cable	Shielded Type	Ferrite Core	Length
C-1	Dupont cable	Unshielded	without ferrite	0.2m
C-2	USB extension cable	Unshielded	without ferrite	1.5m

5.7. SETUP DIAGRAM

Radiated emissions & AC Power Line Conducted Emission:



6. MEASURING EQUIPMENT AND SOFTWARE USED

Test Equipment of Conducted RF					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Spectrum Analyzer	Rohde & Schwarz	FSV40	102257	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51285127	2023/09/18	2024/09/17
EXG Analog Signal Generator	KEYSIGHT	N5173B	MY61253075	2023/09/18	2024/09/17
Vector Signal Generator	Rohde & Schwarz	SMM100A	101899	2023/09/18	2024/09/17
RF Control box	MWRF-test	MW100-RFCB	MW220926GTG	2023/09/18	2024/09/17
Wideband Radio Communication Tester	Rohde & Schwarz	CMW270	102792	2023/09/18	2024/09/17
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	103235	2023/09/18	2024/09/17
temperature humidity chamber	Espec	SH-241	SH-241-2014	2023/09/18	2024/09/17
RF Test Software	MWRF-test	MTS8310E (Ver. V2/0)	N/A	N/A	N/A

Test Equipment of Radiated emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2146	2022/08/30	2025/08/29
EMI Test Receiver	Rohde & Schwarz	ESCI3	101409	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2023/09/18	2024/09/17
Biconilog Antenna	Schwarzbeck	VULB 9168	01315	2022/10/10	2025/10/09
Biconilog Antenna	ETS	3142E	00243646	2022/03/23	2025/03/22
Loop Antenna	ETS	6502	243668	2022/03/30	2025/03/29
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A

Test Equipment of Radiated emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2149	2022/08/30	2025/08/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101413	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	A-INFO	HPA-1G1850	HYPA21003	2023/09/18	2024/09/17
Horn antenna	A-INFO	3117	246069	2022/03/11	2025/03/10
Pre-Amplifier	ZKJC	HPA-184057	HYPA21004	2023/09/18	2024/09/17

Horn antenna	ZKJC	3116C	246265	2022/03/29	2025/03/28
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE+)	N/A	N/A	N/A

Test Equipment of Conducted emissions					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Shielded Room	CHENG YU	8m*5m*4m	N/A	2022/10/29	2025/10/28
EMI Test Receiver	Rohde & Schwarz	ESR3	102647	2023/09/18	2024/09/17
LISN/AMN	Rohde & Schwarz	ENV216	102843	2023/09/18	2024/09/17
NNLK 8129 RC	Schwarzbeck	NNLK 8129 RC	5046	2023/09/18	2024/09/17
Test Software	Farad	EZ-EMC (Ver. EMC-con-3A1 1+)	N/A	N/A	N/A

7. ANTENNA PORT TEST RESULTS

7.1. DUTY CYCLE

LIMITS

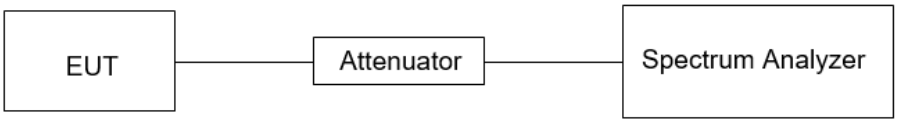
None; for reporting purposes only.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.B.

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. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in II.B.1.a), 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 duty cycle shall not be used if T ≤ 16.7 microseconds.)

TEST SETUP



TEST ENVIRONMENT

Temperature	21.4℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.2. 26 DB EMISSION BANDWIDTH

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
26 dB Emission Bandwidth	For reporting purposes only.	5150 ~ 5250
26 dB Emission Bandwidth	For reporting purposes only.	5250 ~ 5350
26 dB Emission Bandwidth	For reporting purposes only.	5470 ~ 5725

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.C1. for 26 dB Emission Bandwidth; section II.C2. for 6 dB Emission Bandwidth; section II.D. for 99 % Occupied Bandwidth.
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Emission Bandwidth: RBW=100 kHz For 26 dB Emission bandwidth: approximately 1 % of the EBW.
VBW	For 6 dB Bandwidth: ≥ 3*RBW For 26 dB Bandwidth: >3*RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.
b) Allow the trace to stabilize and 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 6/26 dB relative to the maximum level measured in the fundamental emission.

Calculation for 26 dB Bandwidth of UNII-2C Straddle Channel:

For Example: Fundamental frequency: 5720 MHz

26 dB BW: 20.00 MHz

FL: 5710.16 MHz

FH: 5730.16 MHz

Turning Frequency: 5725 MHz

26 dB Bandwidth of UNII-2C Band Portion = 5725-5710.16=14.84 MHz

Calculation for 6dB Bandwidth of UNII-3 Straddle Channel:

For Example: Fundamental frequency: 5720 MHz

6 dB BW: 16.44 MHz

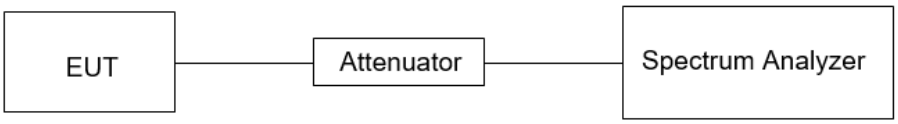
FL: 5711.76 MHz

FH: 5728.2 MHz

Turning Frequency: 5725 MHz

6 dB Bandwidth of UNII-3 band Portion = 5728.2-5725=3.2 MHz

TEST SETUP



TEST ENVIRONMENT

Temperature	21.4℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.3. 6 DB BANDWIDTH

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
6 dB Emission Bandwidth	The minimum 6 dB emission bandwidth shall be 500 kHz.	5725 ~ 5850

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.C2. for 6 dB Emission Bandwidth.
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Emission Bandwidth: RBW=100 kHz
VBW	For 6 dB Bandwidth: ≥ 3*RBW
Trace	Max hold
Sweep	Auto couple

b) Allow the trace to stabilize and 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.

Calculation for 6dB Bandwidth of UNII-3 Straddle Channel:

For Example: Fundamental frequency: 5720 MHz

6 dB BW: 16.44 MHz

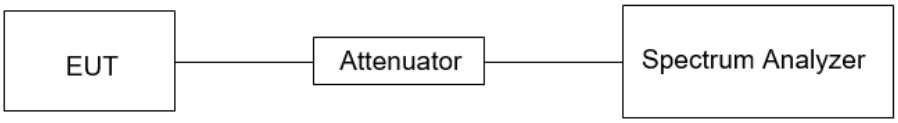
FL: 5711.76 MHz

FH: 5728.2 MHz

Turning Frequency: 5725 MHz

6 dB Bandwidth of UNII-3 band Portion = 5728.2-5725=3.2 MHz

TEST SETUP



TEST ENVIRONMENT

Temperature	21.4℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.4. MAXIMUM CONDUCTED OUTPUT POWER

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
Conducted Output Power	☐ Outdoor Access Point: 1 W (30 dBm) ☐ Indoor Access Point: 1 W (30 dBm) ☐ Fixed Point-To-Point Access Points: 1 W (30 dBm) ☒ Client Devices: 250 mW (24 dBm)	5150 ~ 5250
	Shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.	5250 ~ 5350 5470 ~ 5725
	Shall not exceed 1 Watt (30 dBm).	5725 ~ 5850

Note:
The above limits are based upon the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.E.

Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep):
(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 %, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
(viii) Trace average at least 100 traces in power averaging (rms) mode.
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

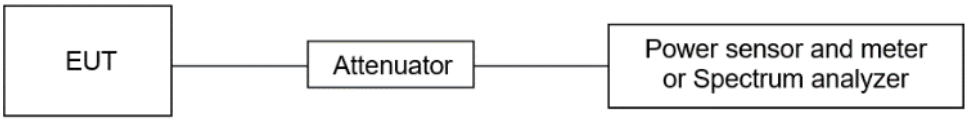
Method PM (Measurement using an RF average power meter):
(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
a. The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
b. At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.

c. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in II.B.
(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
(iv) Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25 %).

Method PM-G (Measurement using a gated RF average power meter):
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. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power was measured using spectrum analyzer.

TEST SETUP



TEST ENVIRONMENT

Temperature	21.4℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.5. PEAK POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
Power Spectral Density	☐ Outdoor Access Point: 17 dBm/MHz ☐ Indoor Access Point: 17 dBm/MHz ☐ Fixed Point-To-Point Access Points: 17 dBm/MHz ☒ Client Devices: 11 dBm/MHz	5150 ~ 5250
	11 dBm/MHz	5250 ~ 5350 5470 ~ 5725
	30 dBm/500kHz	5725 ~ 5850

Note:
The above limits are based upon the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.F.

Connect the EUT to the spectrum analyser and use the following settings:

For U-NII-1, U-NII-2A and U-NII-2C band:

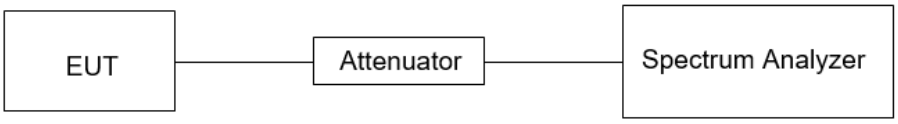
Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	1 MHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

For U-NII-3:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	500 kHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Allow trace to fully stabilize and Use the peak search function on the instrument to find the peak of the spectrum and record its value.
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum, the result is the Maximum PSD over 1 MHz / 500 kHz reference bandwidth.

TEST SETUP



TEST ENVIRONMENT

Temperature	21.4℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.6. FREQUENCY STABILITY

LIMITS

The frequency of the carrier signal shall be maintained within band of operation.

TEST PROCEDURE

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between 0 °C ~ 40 °C (declared by customer).

2. The temperature was incremented by 10 °C intervals and the unit allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

3. The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

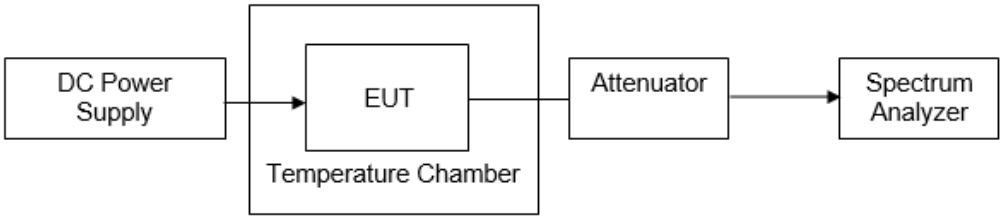
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	10 kHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

4. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5minutes, and 10 minutes after the EUT is energized.

5. Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

TEST SETUP



TEST ENVIRONMENT

Temperature	21.4℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

8. RADIATED TEST RESULTS

LIMITS

Refer to CFR 47 FCC §15.205, §15.209 and §15.407 (b).

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6c

Limits of unwanted/undesirable emission out of the restricted bands refer to CFR 47 FCC §15.407 (b).

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1GHz)		
Frequency Range (MHz)	EIRP Limit	Field Strength Limit (dBuV/m) at 3 m
5150~5250 MHz	PK: -27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz		
5470~5725 MHz		
5725~5850 MHz	PK: -27 (dBm/MHz) *1 PK: 10 (dBm/MHz) *2 PK: 15.6 (dBm/MHz) *3 PK: 27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK: 105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK: 122.2 (dBμV/m) *4
Note: *1 beyond 75 MHz or more above of the band edge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

TEST PROCEDURE

Below 30 MHz

The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made

to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz

The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1 GHz

The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.G.3 ~ II.G.6.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

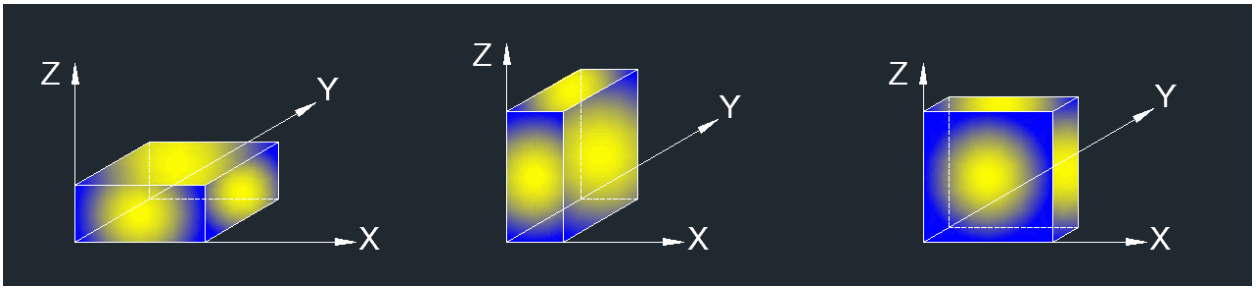
3. The EUT was placed on a turntable with 1.5 m above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

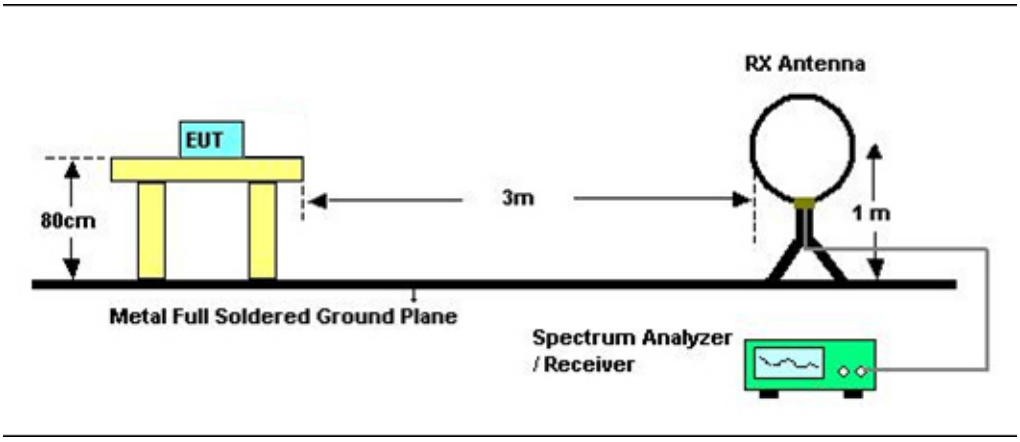
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

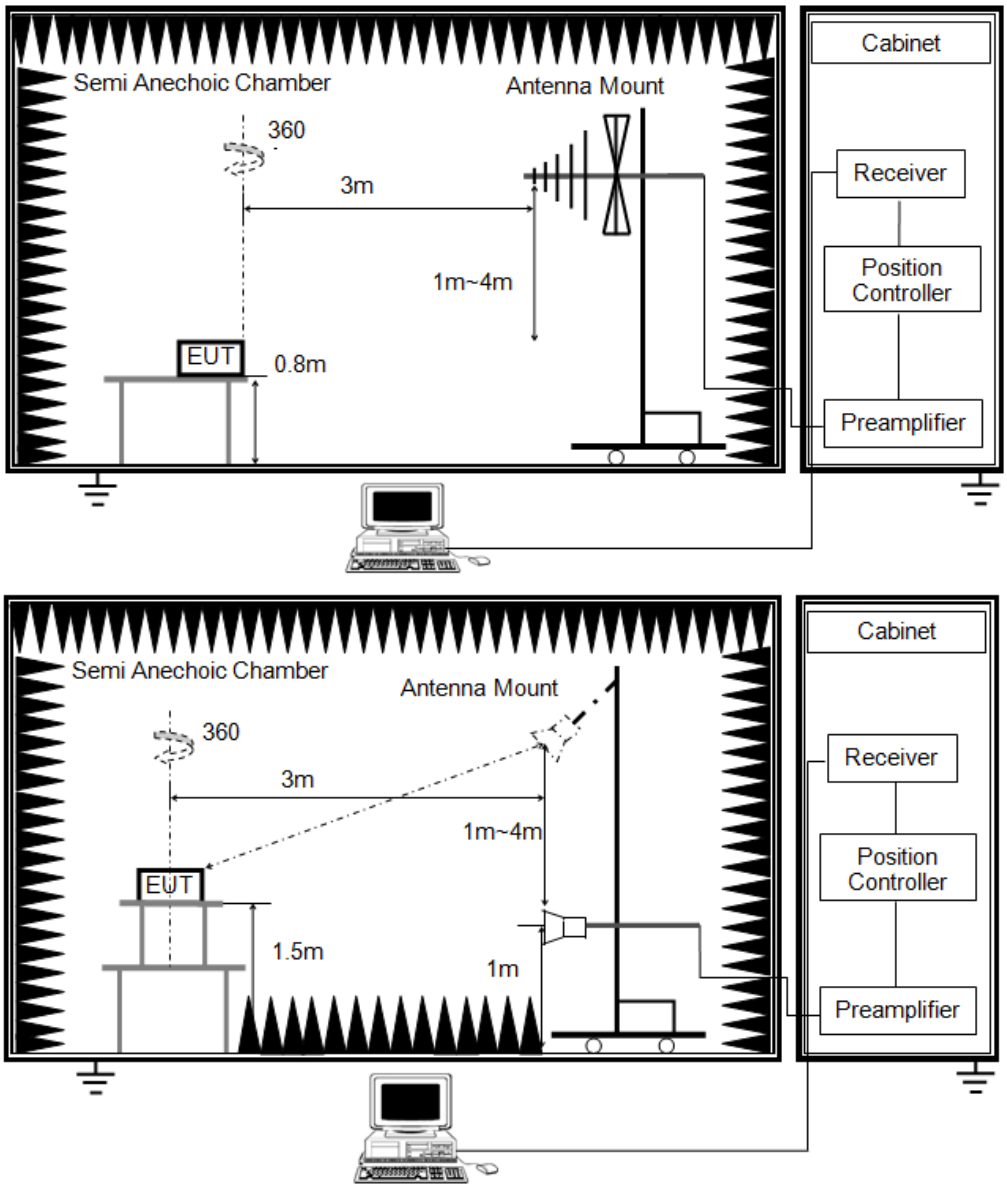
X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

TEST SETUP





TEST ENVIRONMENT

Temperature	22.5℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

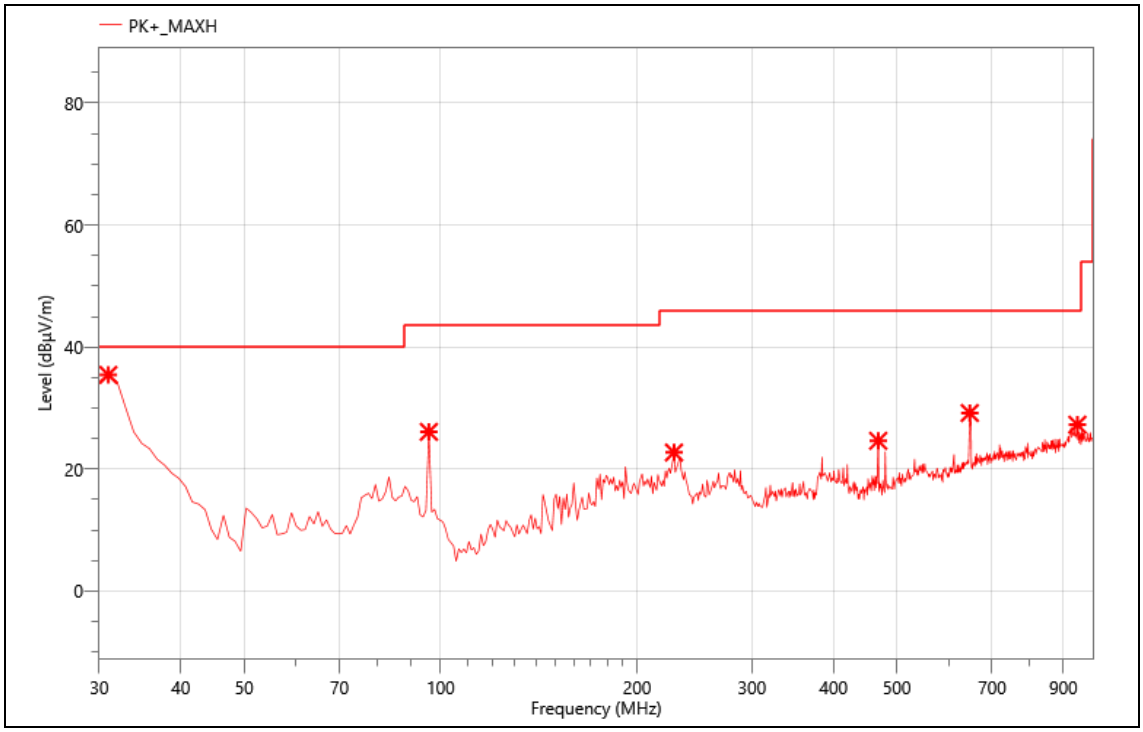
TEST RESULTS

8.1. RADIATED EMISSIONS AND BAND EDGE MEASUREMENT

- Undesirable radiated Spurious Emission below 1GHz (30MHz to 1GHz)

All modes have been tested and the worst result as bellow:

Mode:	N40 5190MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

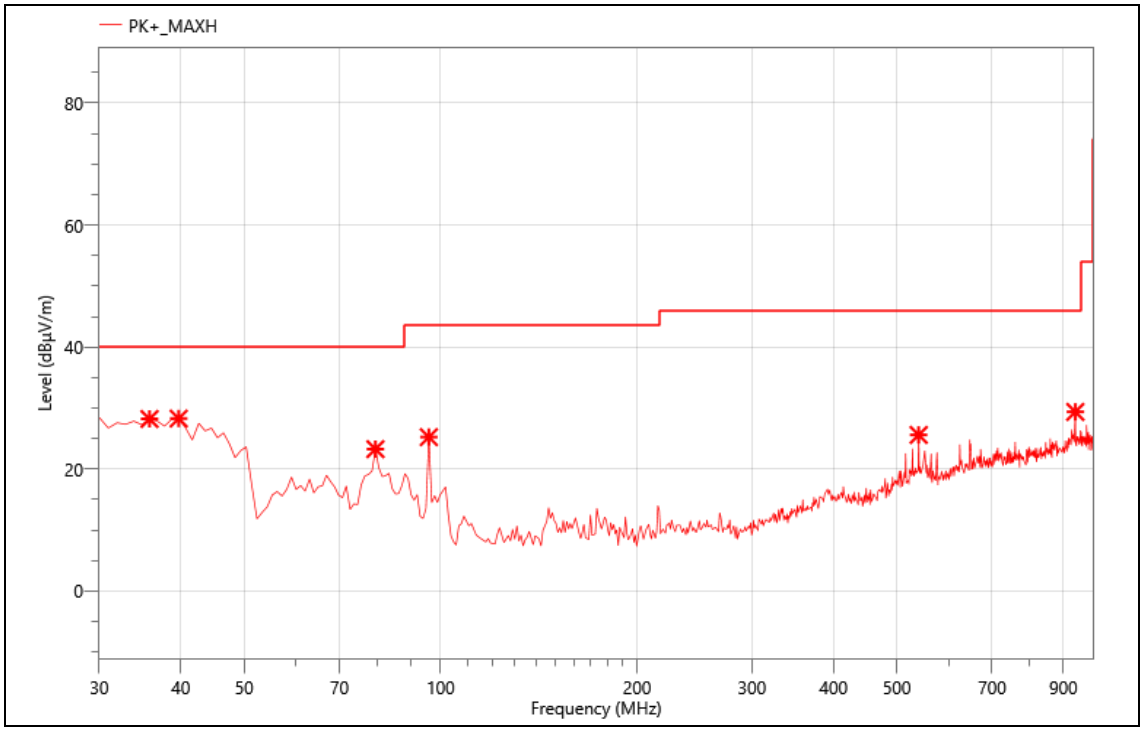


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	30.970	50.23	-14.8	35.43	40.00	4.57	PK+	H
2	95.960	50.58	-24.49	26.09	43.50	17.41	PK+	H
3	227.880	43.11	-20.4	22.71	46.00	23.29	PK+	H
4	468.440	38.06	-13.44	24.62	46.00	21.38	PK+	H
5	646.920	37.68	-8.5	29.18	46.00	16.82	PK+	H
6	945.680	30.60	-3.33	27.27	46.00	18.73	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	N40 5190MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa



Critical_Freqs

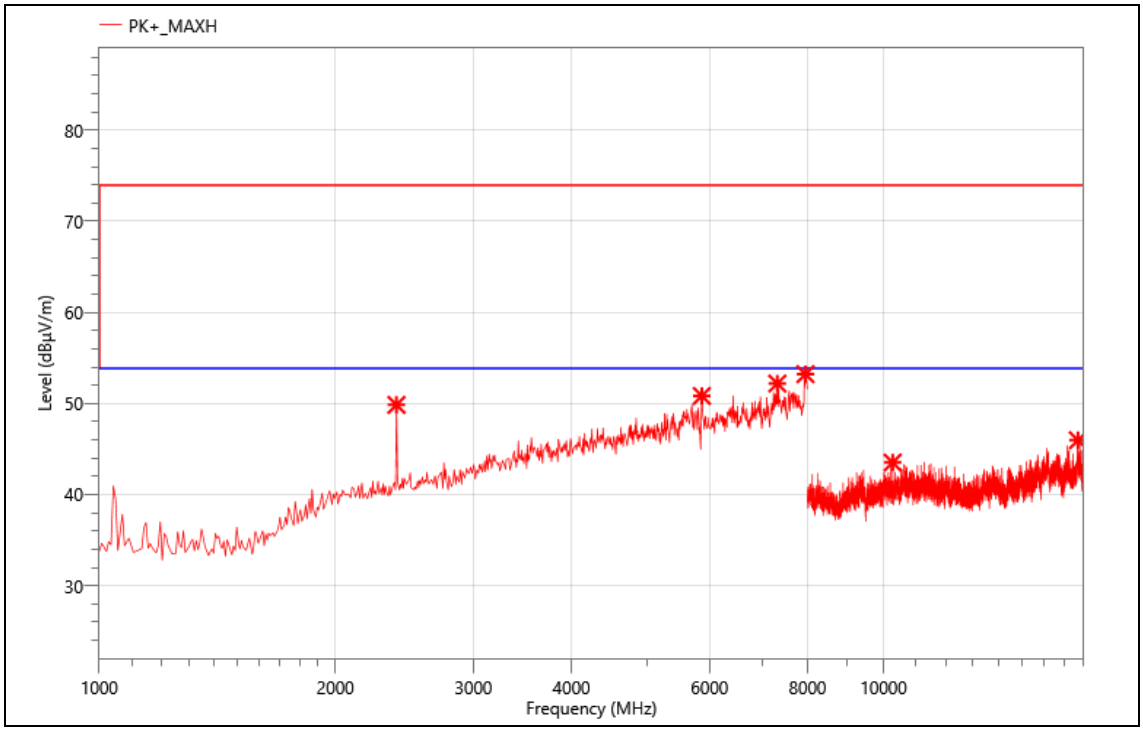
No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	35.820	45.86	-17.65	28.21	40.00	11.79	PK+	V
2	39.700	48.13	-19.86	28.27	40.00	11.73	PK+	V
3	79.470	48.61	-25.36	23.25	40.00	16.75	PK+	V
4	95.960	49.72	-24.49	25.23	43.50	18.27	PK+	V
5	540.220	35.84	-10.25	25.59	46.00	20.41	PK+	V
6	938.890	32.55	-3.19	29.36	46.00	16.64	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

- Undesirable radiated Spurious Emission Above 1GHz (1GHz to 40GHz)

All modes have been tested and the worst result as bellow:

Mode:	N40 5190MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

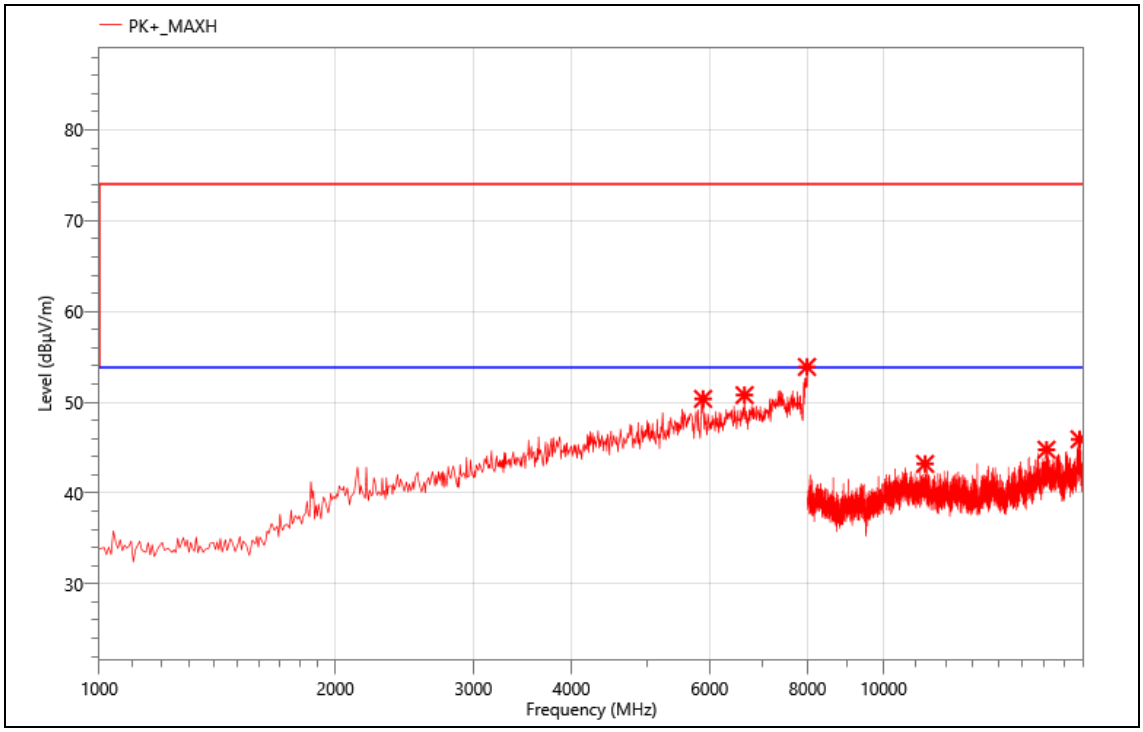


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	2393.000	58.49	-8.64	49.85	74.00	24.15	PK+	H
2	5865.000	50.68	0.15	50.83	74.00	23.17	PK+	H
3	7321.000	43.21	8.98	52.19	74.00	21.81	PK+	H
4	7951.000	36.34	16.88	53.22	74.00	20.78	PK+	H
5	10270.000	49.34	-5.82	43.52	74.00	30.48	PK+	H
6	17695.000	46.38	-0.41	45.97	74.00	28.03	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	N40 5190MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

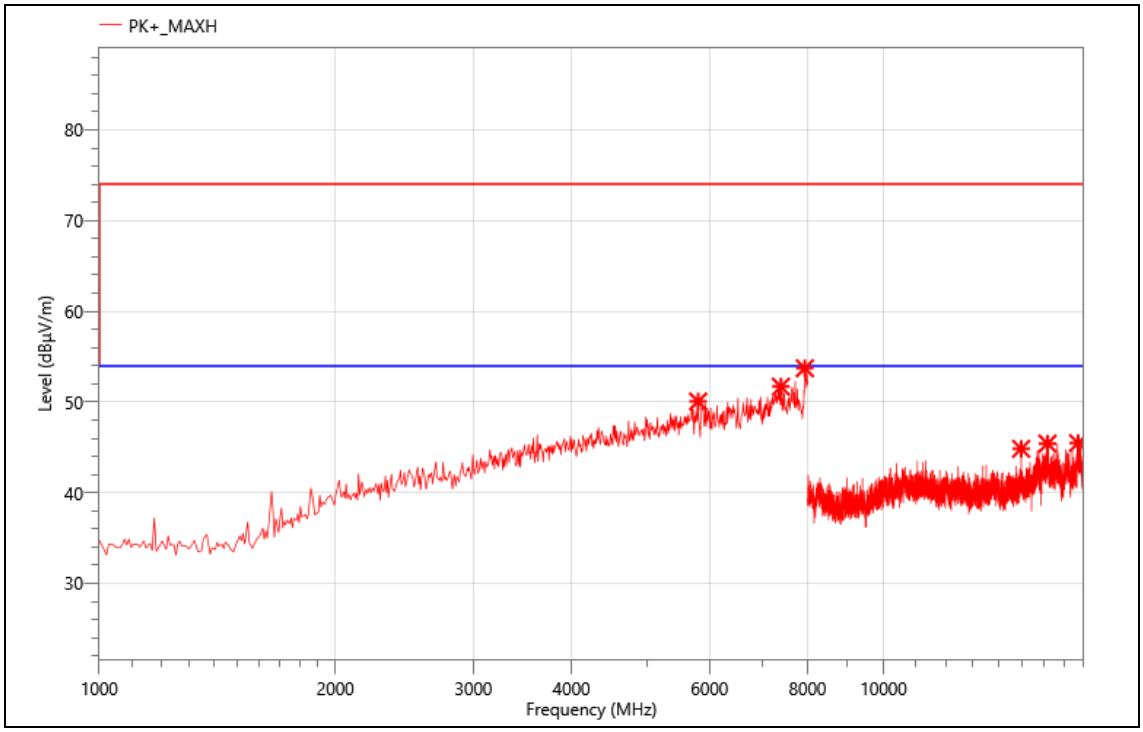


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5886.000	51.07	-0.7	50.37	74.00	23.63	PK+	V
2	6649.000	45.03	5.75	50.78	74.00	23.22	PK+	V
3	7986.000	38.61	15.28	53.89	74.00	20.11	PK+	V
4	11297.000	47.49	-4.29	43.20	74.00	30.80	PK+	V
5	16135.000	45.37	-0.6	44.77	74.00	29.23	PK+	V
6	17781.000	46.03	-0.11	45.92	74.00	28.08	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	N20 5200MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

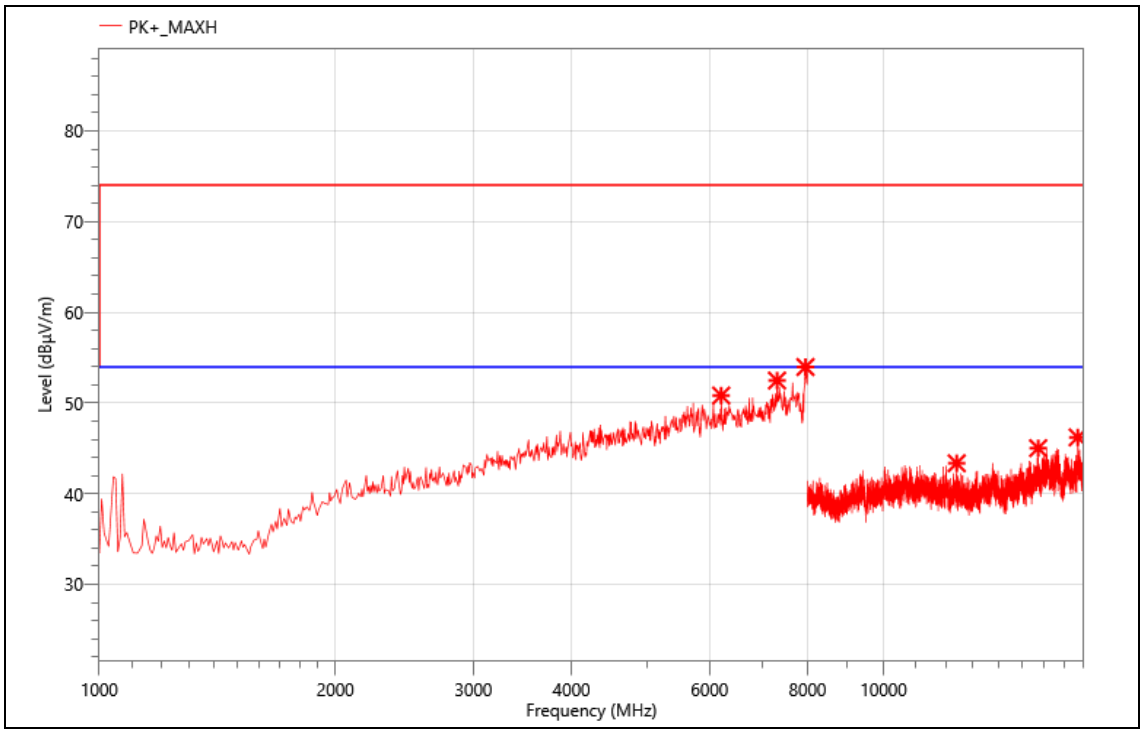


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5802.000	51.30	-1.24	50.06	74.00	23.94	PK+	V
2	7398.000	41.33	10.36	51.69	74.00	22.31	PK+	V
3	7937.000	37.30	16.42	53.72	74.00	20.28	PK+	V
4	14979.000	47.32	-2.48	44.84	74.00	29.16	PK+	V
5	16183.000	45.76	-0.34	45.42	74.00	28.58	PK+	V
6	17703.000	45.92	-0.45	45.47	74.00	28.53	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	N20 5200MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

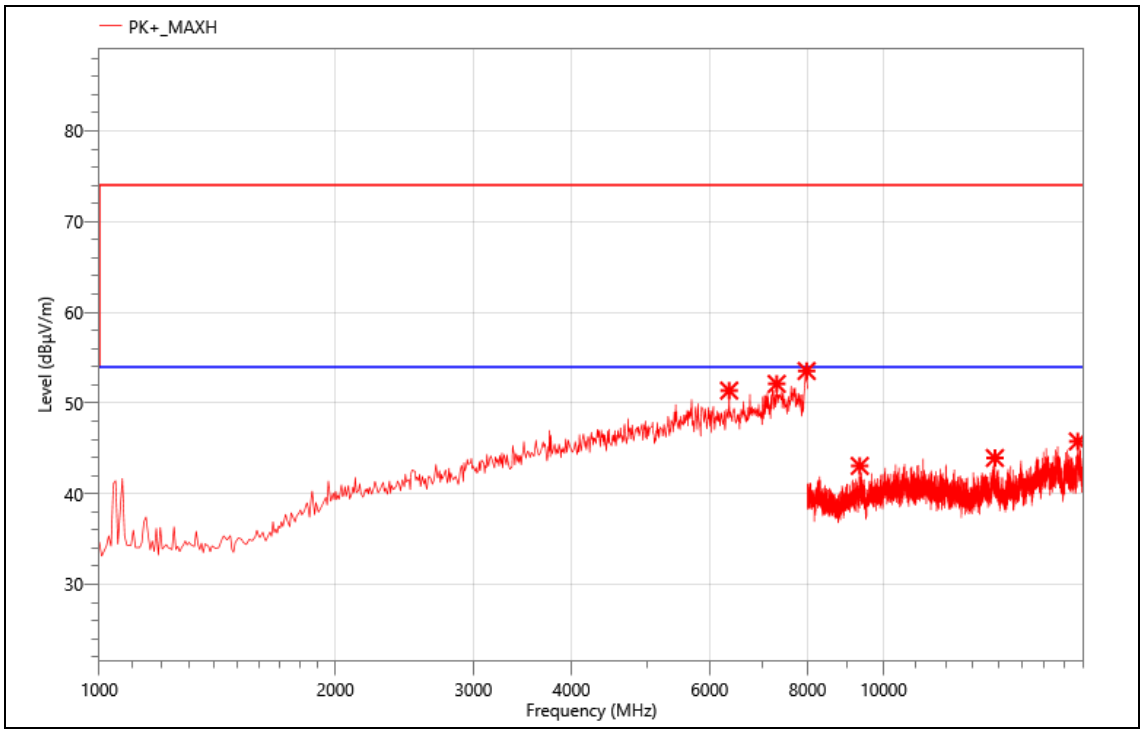


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	6208.000	49.61	1.22	50.83	74.00	23.17	PK+	H
2	7314.000	43.57	8.91	52.48	74.00	21.52	PK+	H
3	7951.000	37.09	16.88	53.97	74.00	20.03	PK+	H
4	12394.000	47.90	-4.54	43.36	74.00	30.64	PK+	H
5	15745.000	47.00	-1.98	45.02	74.00	28.98	PK+	H
6	17683.000	46.61	-0.4	46.21	74.00	27.79	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	N40 5230MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

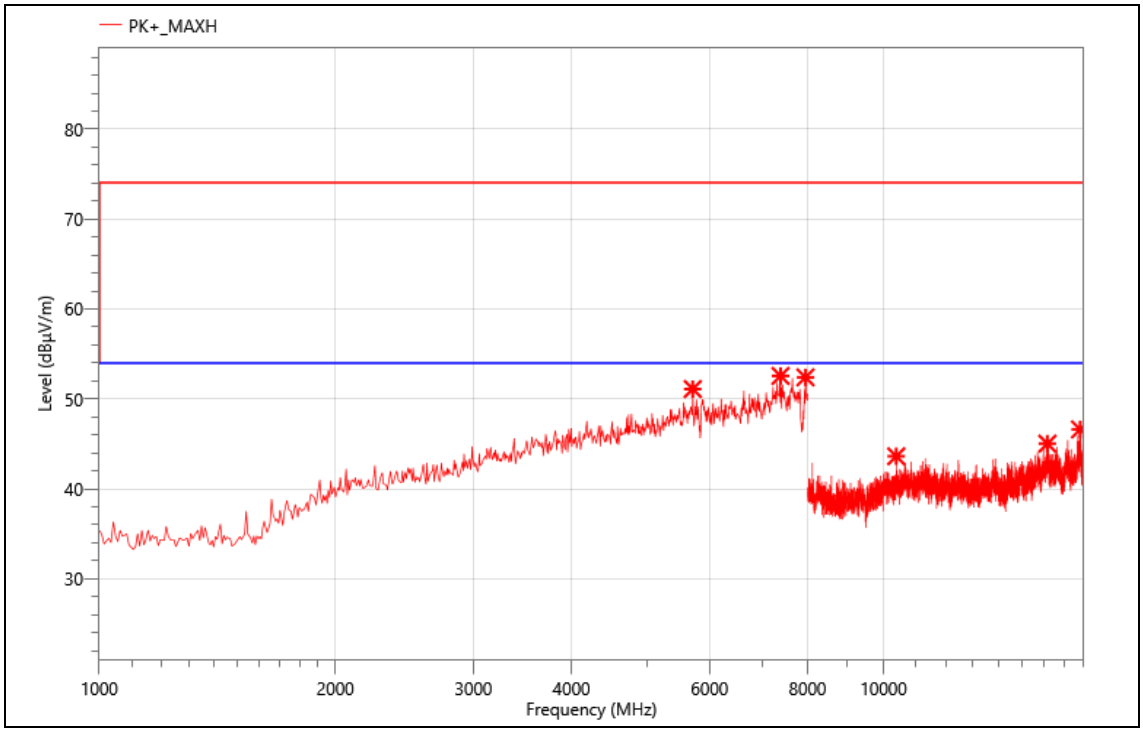


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	6355.000	48.25	3.12	51.37	74.00	22.63	PK+	H
2	7307.000	43.27	8.84	52.11	74.00	21.89	PK+	H
3	7979.000	37.94	15.59	53.53	74.00	20.47	PK+	H
4	9325.000	49.98	-6.92	43.06	74.00	30.94	PK+	H
5	13867.000	47.83	-3.89	43.94	74.00	30.06	PK+	H
6	17690.000	46.17	-0.41	45.76	74.00	28.24	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	N40 5230MHz
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5711.000	52.14	-1.04	51.10	74.00	22.90	PK+	V
2	7391.000	42.35	10.21	52.56	74.00	21.44	PK+	V
3	7951.000	35.52	16.88	52.40	74.00	21.60	PK+	V
4	10380.000	49.16	-5.54	43.62	74.00	30.38	PK+	V
5	16177.000	45.26	-0.23	45.03	74.00	28.97	PK+	V
6	17811.000	46.47	0.14	46.61	74.00	27.39	PK+	V

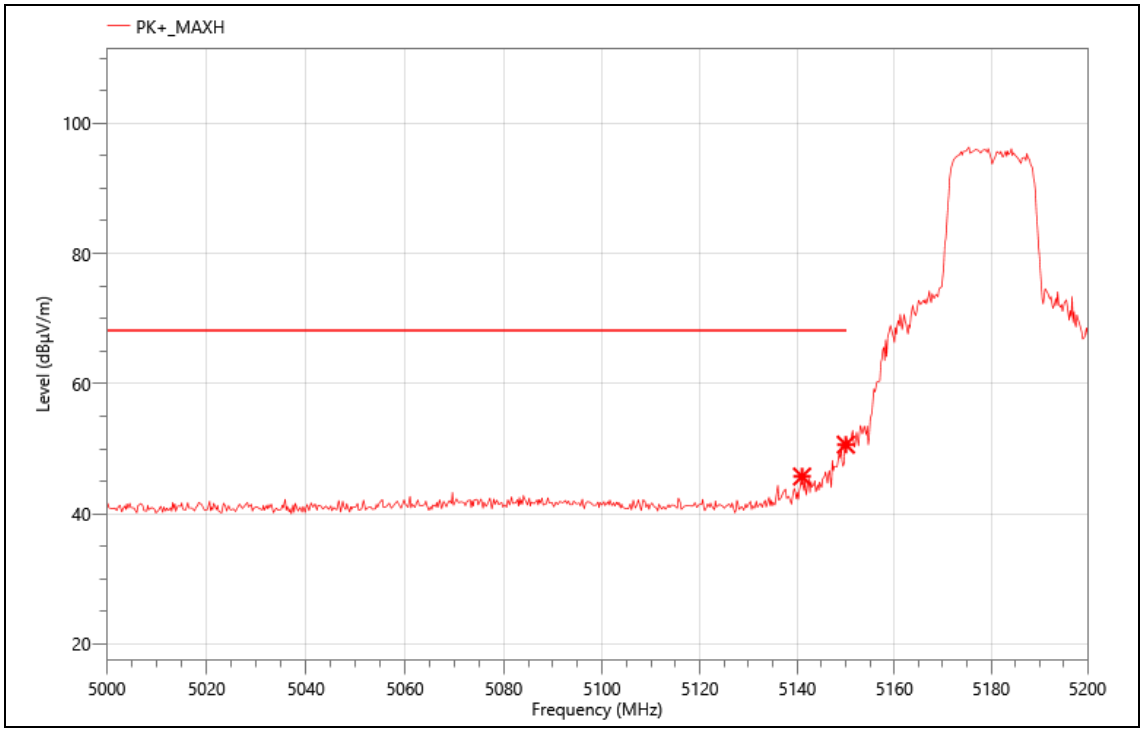
Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

For the frequency above 18 GHz, a pre-scan was performed, and the result was 20 dB lower than the limit line, the test data was not shown in the report.

- Band Edge

All modes have been tested and the worst result as bellow:

Mode:	11A-5180
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

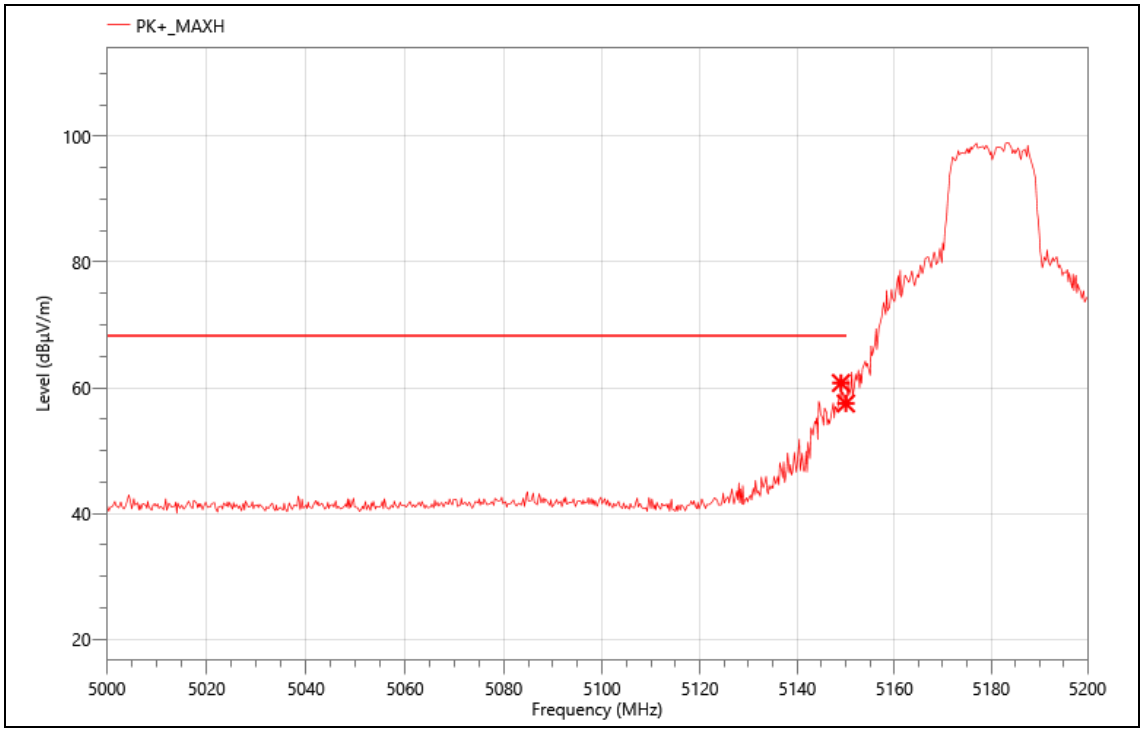


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5141.000	56.69	-10.95	45.74	68.20	22.46	PK+	V
2	5150.000	61.47	-10.84	50.63	68.20	17.57	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11A-5180
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

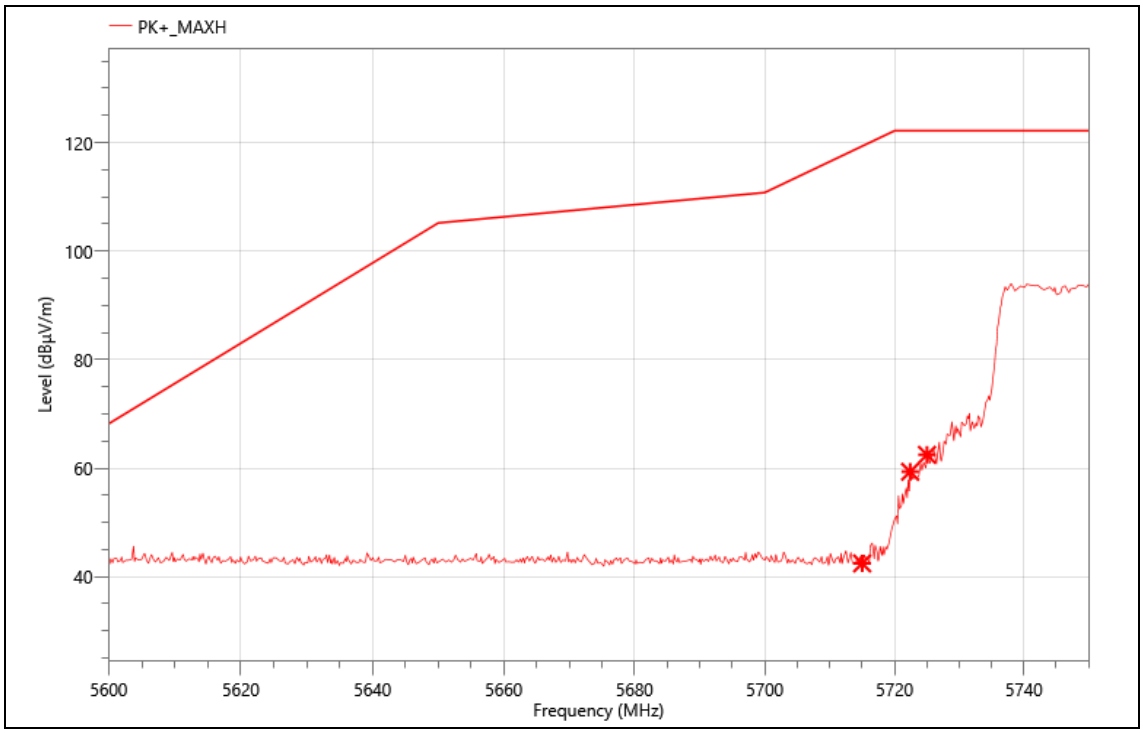


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5149.000	71.62	-10.85	60.77	68.20	7.43	PK+	H
2	5150.000	68.35	-10.84	57.51	68.20	10.69	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11A-5745
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

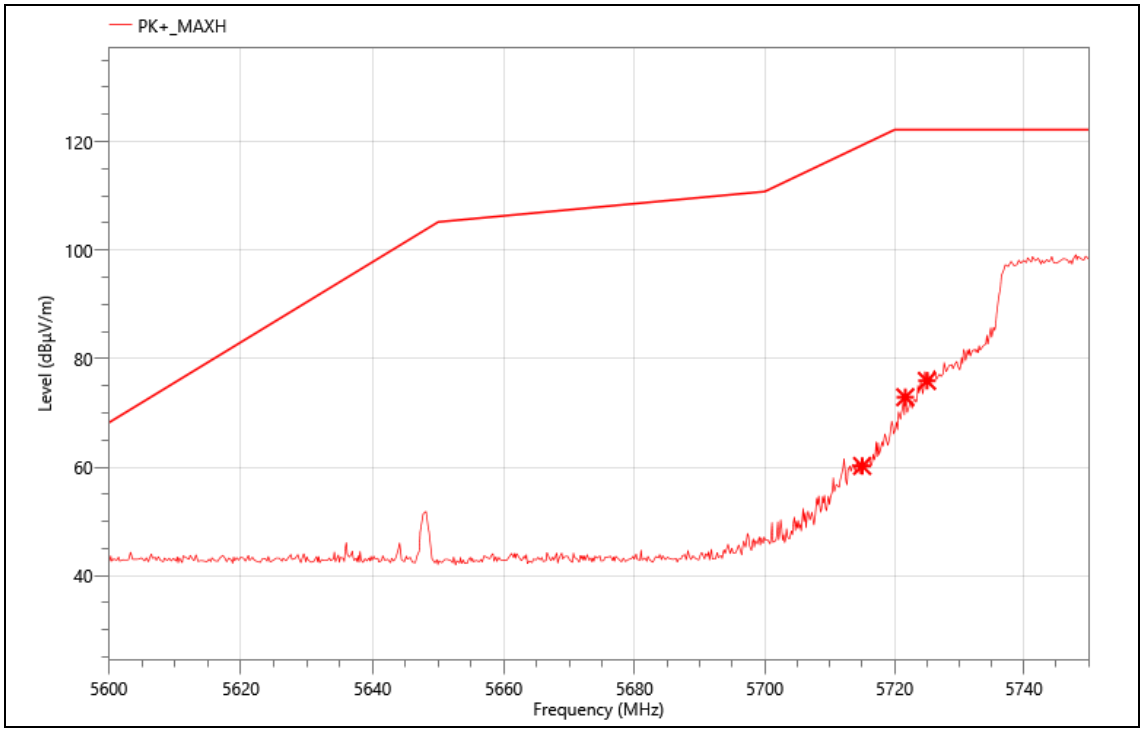


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5715.000	52.16	-9.71	42.45	119.35	76.90	PK+	V
2	5722.400	69.15	-9.81	59.34	122.20	62.86	PK+	V
3	5725.000	72.32	-9.85	62.47	122.20	59.73	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11A-5745
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

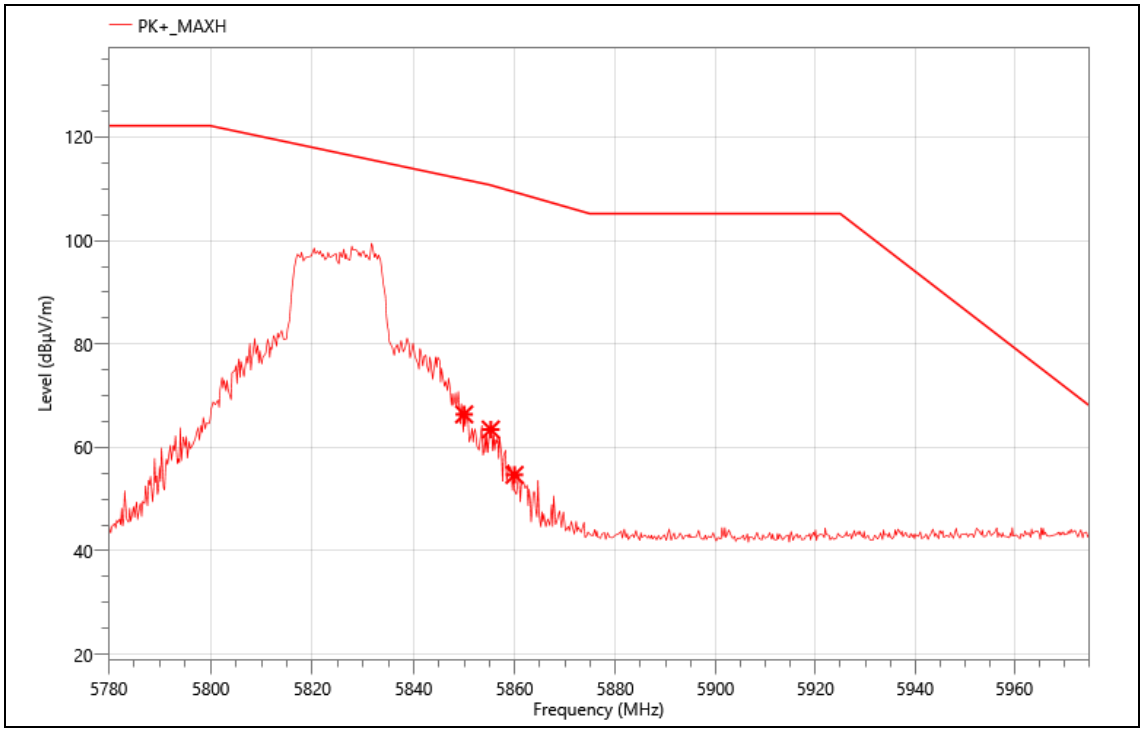


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5715.000	69.93	-9.71	60.22	119.35	59.13	PK+	H
2	5721.650	82.70	-9.8	72.90	122.20	49.30	PK+	H
3	5725.000	85.75	-9.85	75.90	122.20	46.30	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11A-5825
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

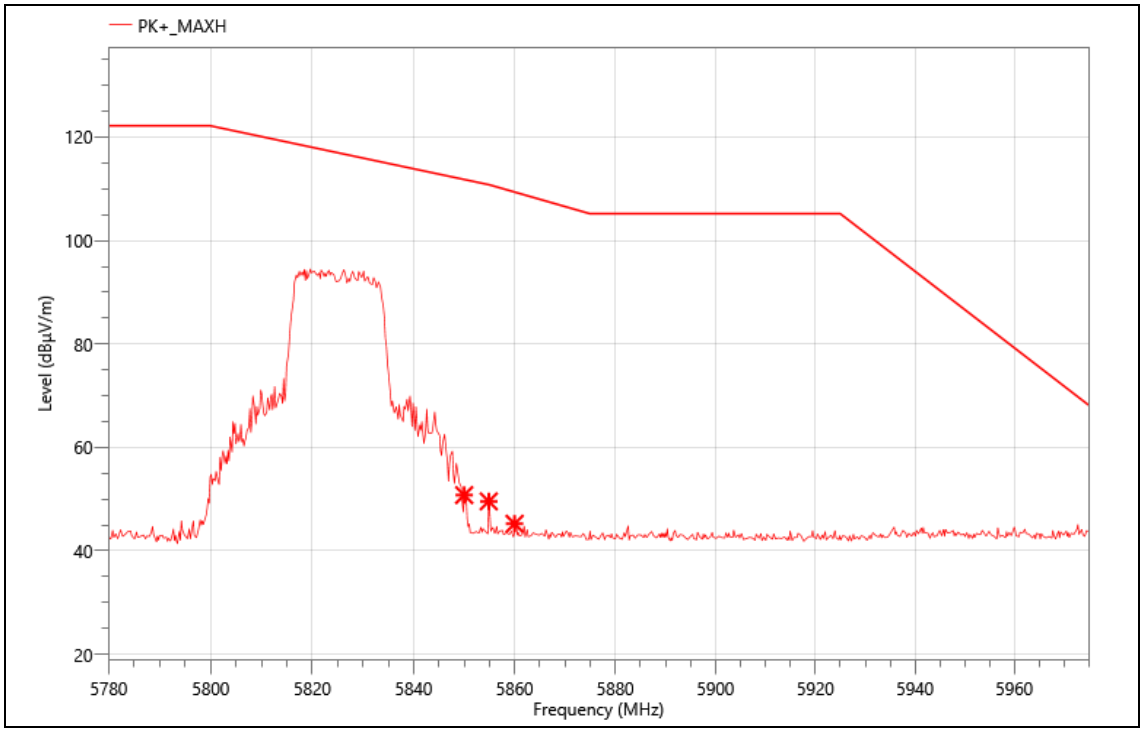


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5850.000	75.84	-9.45	66.39	111.83	45.44	PK+	H
2	5855.270	72.87	-9.4	63.47	110.72	47.25	PK+	H
3	5860.000	64.08	-9.39	54.69	109.40	54.71	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11A-5825
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

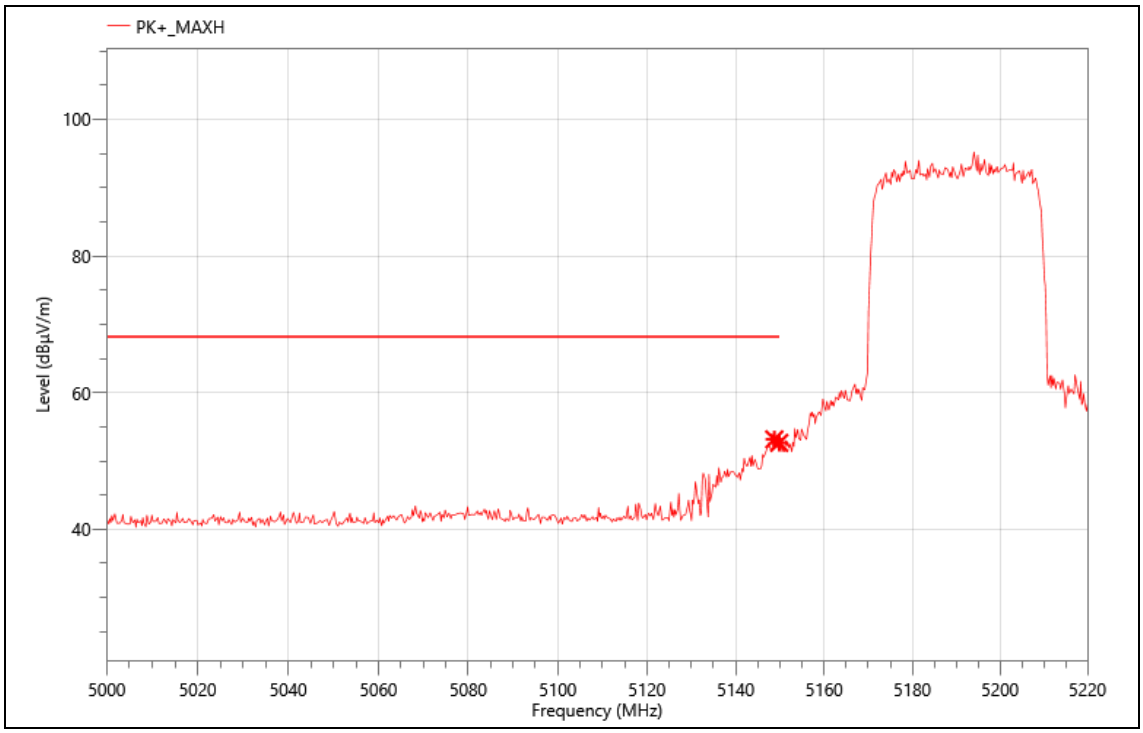


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5850.000	60.24	-9.45	50.79	111.83	61.04	PK+	V
2	5854.880	58.97	-9.4	49.57	110.82	61.25	PK+	V
3	5860.000	54.63	-9.39	45.24	109.40	64.16	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11N40-5190
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

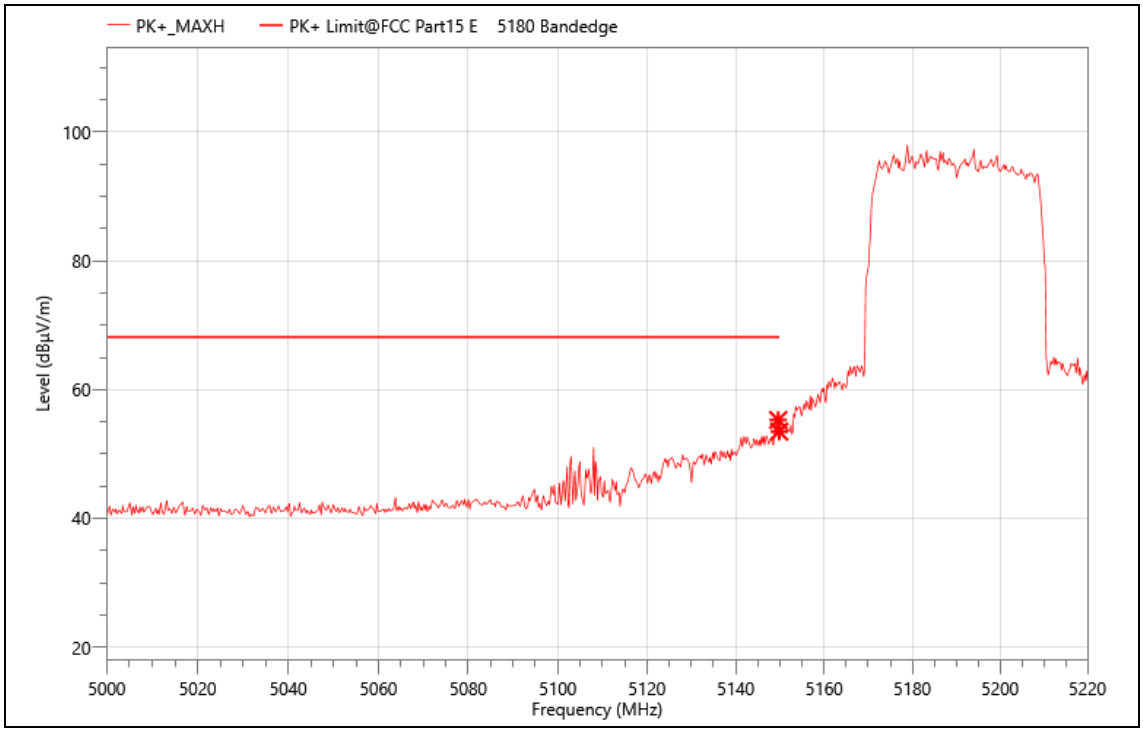


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5148.720	64.02	-10.85	53.17	68.20	15.03	PK+	V
2	5149.820	63.49	-10.84	52.65	68.20	15.55	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11N40-5190
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

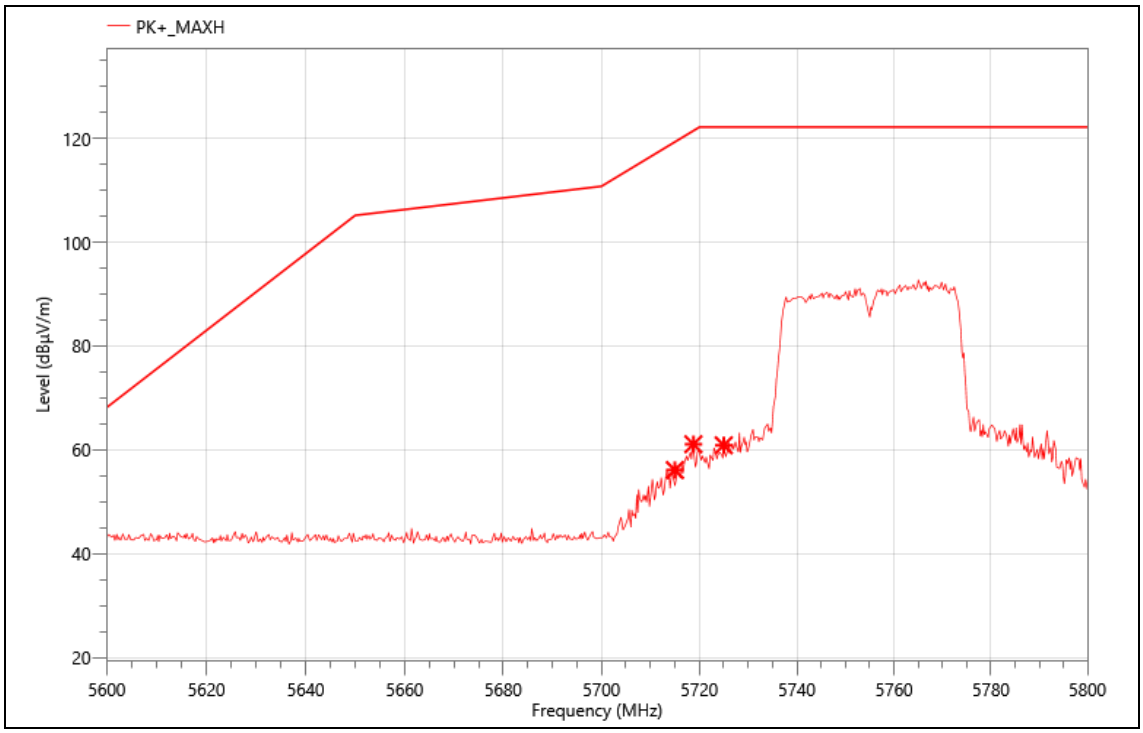


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5149.600	66.13	-10.84	55.29	68.20	12.91	PK+	H
2	5149.820	64.32	-10.84	53.48	68.20	14.72	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11N40-5755
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

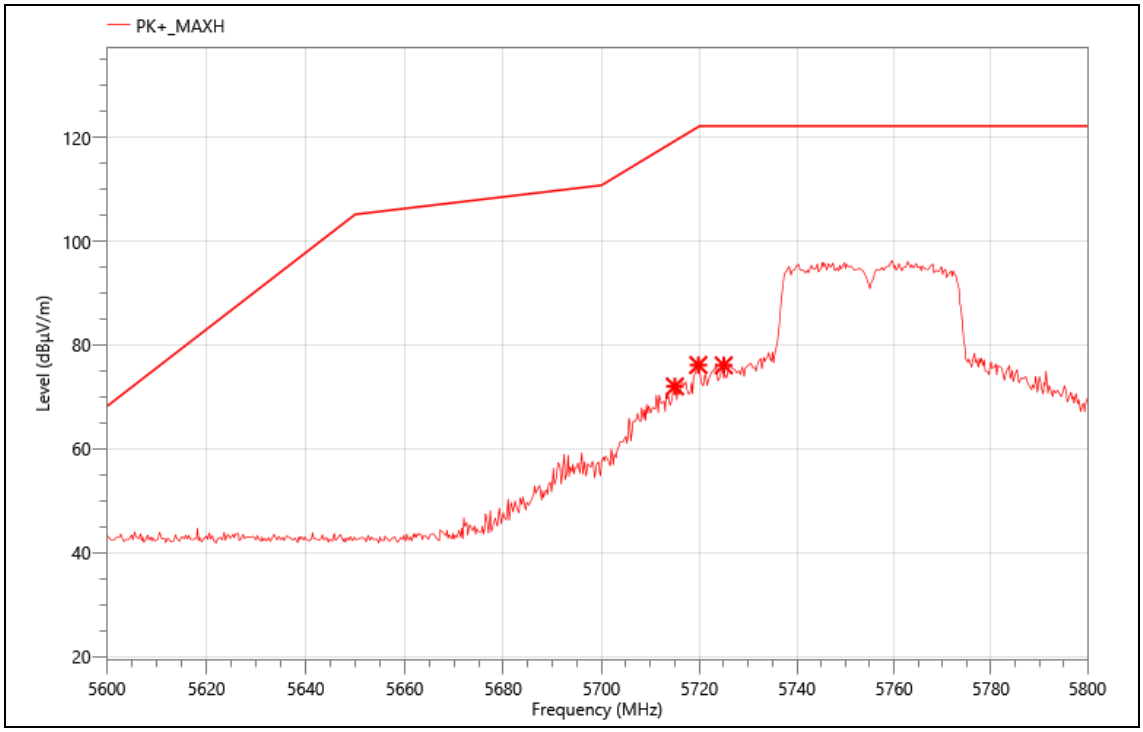


Critical_Freqs

1	5715.000	65.83	-9.71	56.12	119.35	63.23	PK+	V
2	5718.800	70.86	-9.77	61.09	121.52	60.43	PK+	V
3	5725.000	70.74	-9.85	60.89	122.20	61.31	PK+	V

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11N40-5755
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa

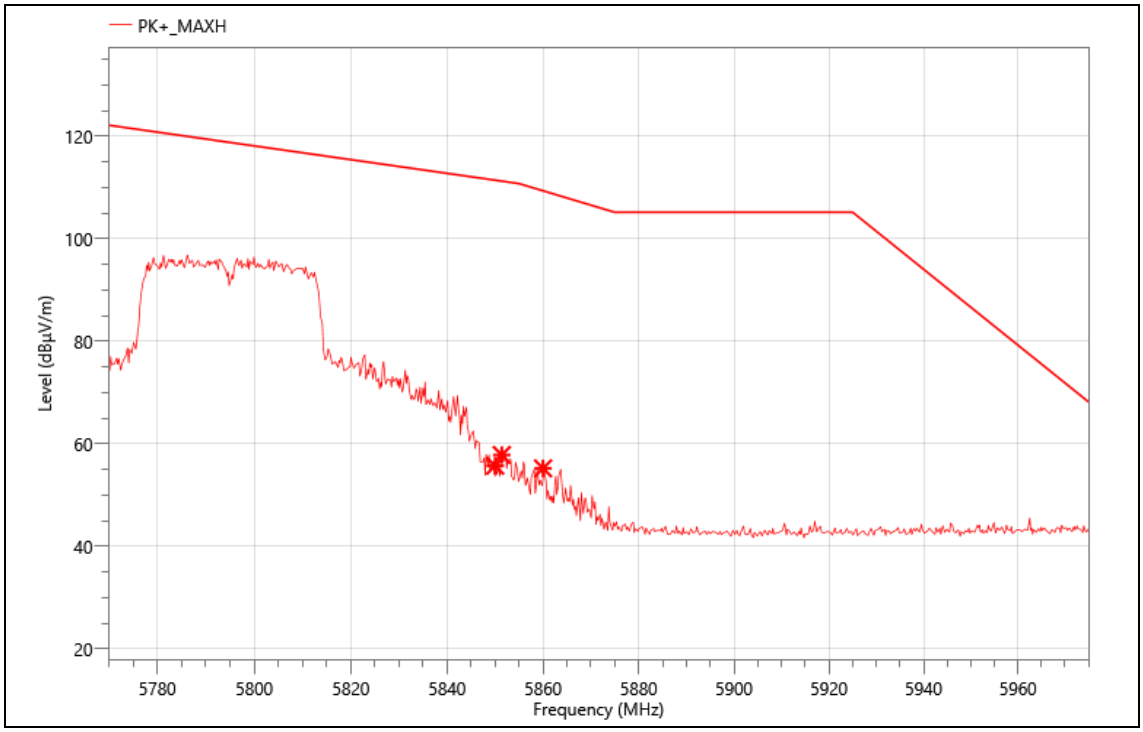


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	5715.000	81.75	-9.71	72.04	119.35	47.31	PK+	H
2	5719.800	85.94	-9.78	76.16	122.09	45.93	PK+	H
3	5725.000	85.96	-9.85	76.11	122.20	46.09	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

Mode:	11N40-5795
Power:	DC 3.3V
TE:	Big
Date	2024/9/02
T/A/P	22.5℃/52%/101Kpa



Critical_Freqs

1	5850.000	65.18	-9.45	55.73	111.47	55.74	PK+	H
2	5851.385	67.29	-9.44	57.85	111.28	53.43	PK+	H
3	5860.000	64.63	-9.39	55.24	109.40	54.16	PK+	H

Note：[Margin=Limit-Meas.]; [Meas.=Reading+Corr.]

9. AC POWER LINE CONDUCTED EMISSION

LIMITS

Please refer to CFR 47 FCC §15.207 (a)

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

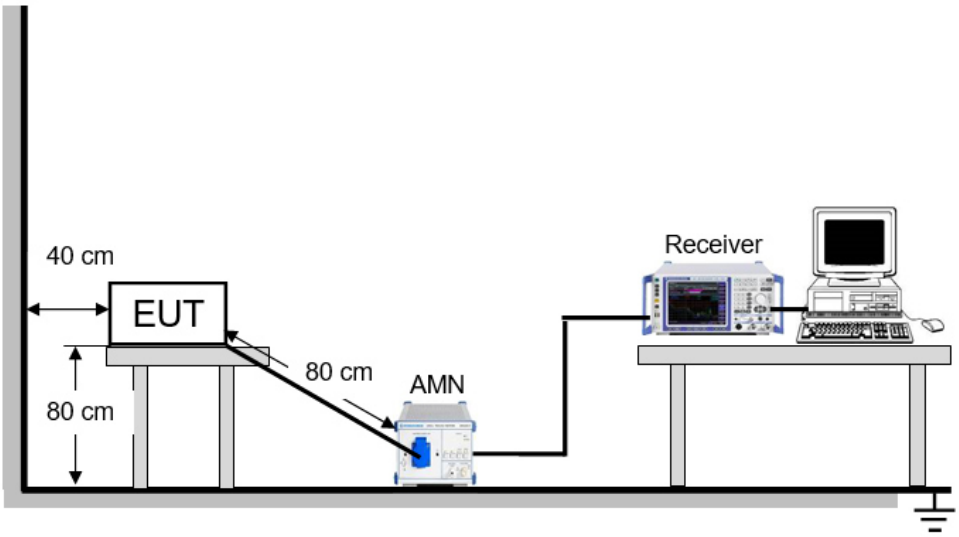
TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 6.2.

The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

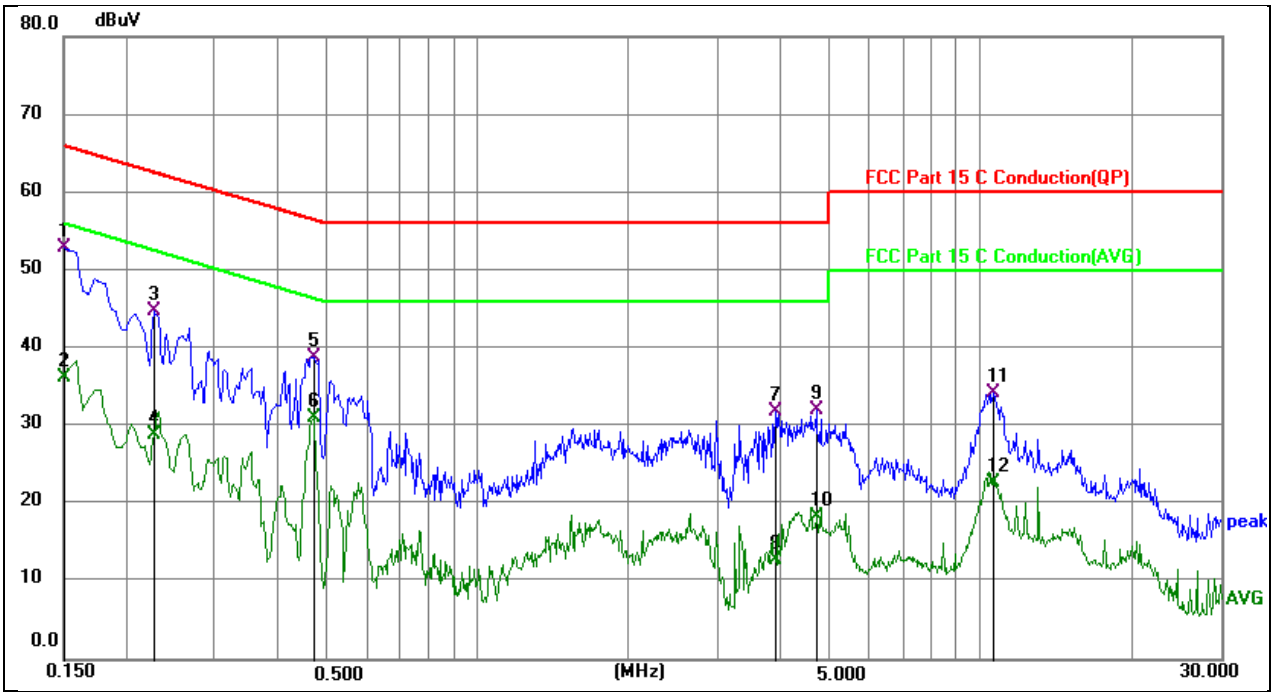
TEST SETUP



TEST ENVIRONMENT

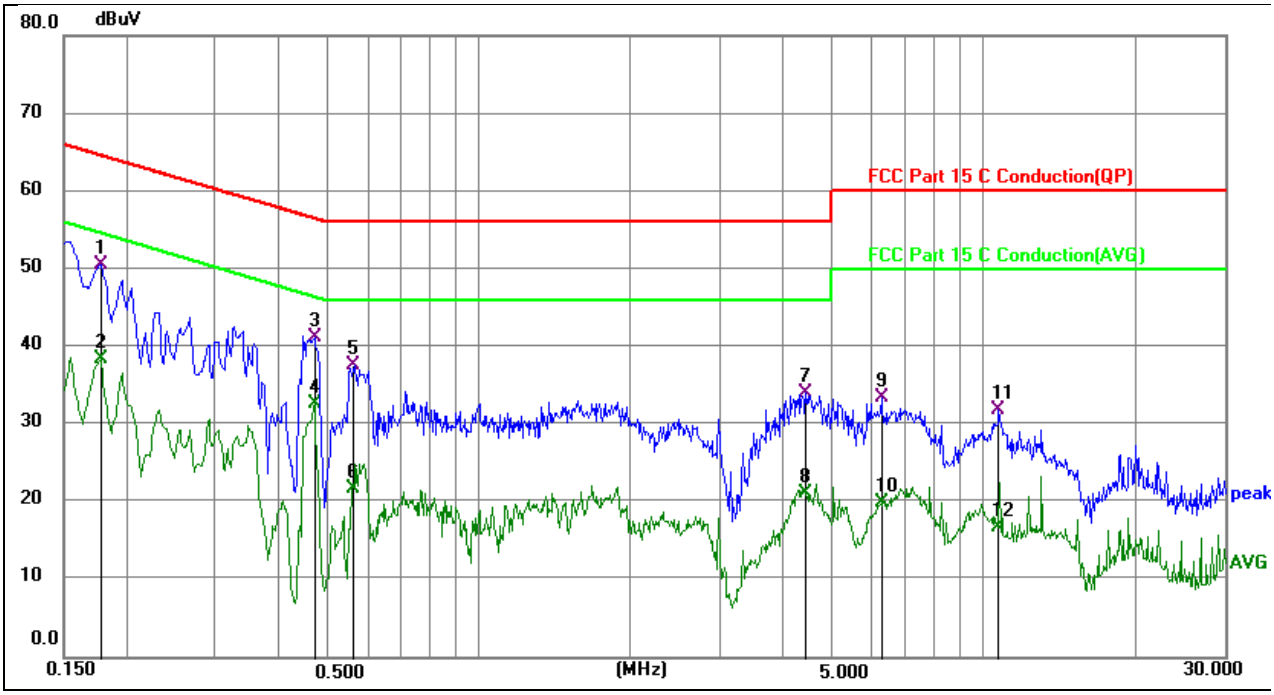
Temperature	26℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

TEST RESULTS



Phase: L1	Mode: N40 5190MHz

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	43.03	9.86	52.89	66.00	-13.11	QP
2	0.1500	26.34	9.86	36.20	56.00	-19.80	AVG
3	0.2265	34.87	9.82	44.69	62.58	-17.89	QP
4	0.2265	19.04	9.82	28.86	52.58	-23.72	AVG
5	0.4695	29.02	9.82	38.84	56.52	-17.68	QP
6	0.4695	21.17	9.82	30.99	46.52	-15.53	AVG
7	3.9210	22.00	9.81	31.81	56.00	-24.19	QP
8	3.9210	3.06	9.81	12.87	46.00	-33.13	AVG
9	4.7130	22.30	9.81	32.11	56.00	-23.89	QP
10	4.7130	8.55	9.81	18.36	46.00	-27.64	AVG
11	10.5990	24.52	9.79	34.31	60.00	-25.69	QP
12	10.5990	12.90	9.79	22.69	50.00	-27.31	AVG



Phase: N	Mode: N40 5190MHz

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1770	40.70	9.89	50.59	64.63	-14.04	QP
2	0.1770	28.45	9.89	38.34	54.63	-16.29	AVG
3	0.4694	31.28	9.83	41.11	56.52	-15.41	QP
4	0.4694	22.80	9.83	32.63	46.52	-13.89	AVG
5	0.5639	27.71	9.85	37.56	56.00	-18.44	QP
6	0.5639	11.98	9.85	21.83	46.00	-24.17	AVG
7	4.4474	24.11	10.02	34.13	56.00	-21.87	QP
8	4.4474	11.03	10.02	21.05	46.00	-24.95	AVG
9	6.2790	23.29	10.12	33.41	60.00	-26.59	QP
10	6.2790	9.89	10.12	20.01	50.00	-29.99	AVG
11	10.6980	20.36	11.57	31.93	60.00	-28.07	QP
12	10.6980	5.27	11.57	16.84	50.00	-33.16	AVG

10. ANTENNA REQUIREMENT

REQUIREMENT

Please refer to 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.

Please refer to FCC §15.407(a)(1)(2)(3)
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DESCRIPTION

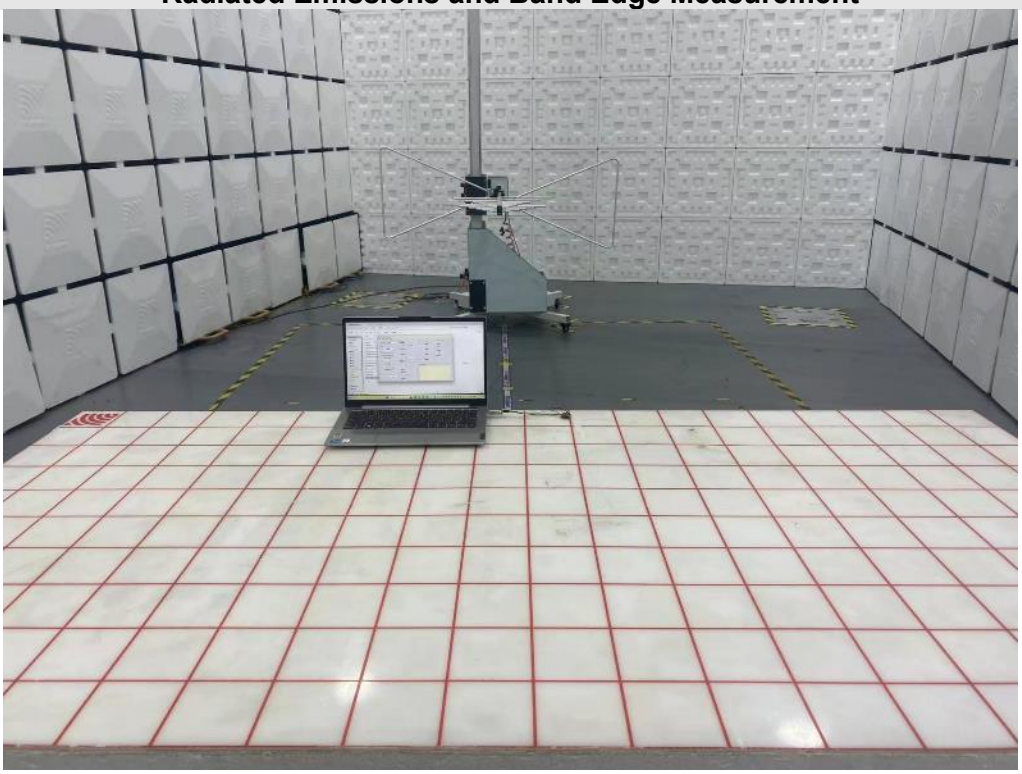
Compliance.

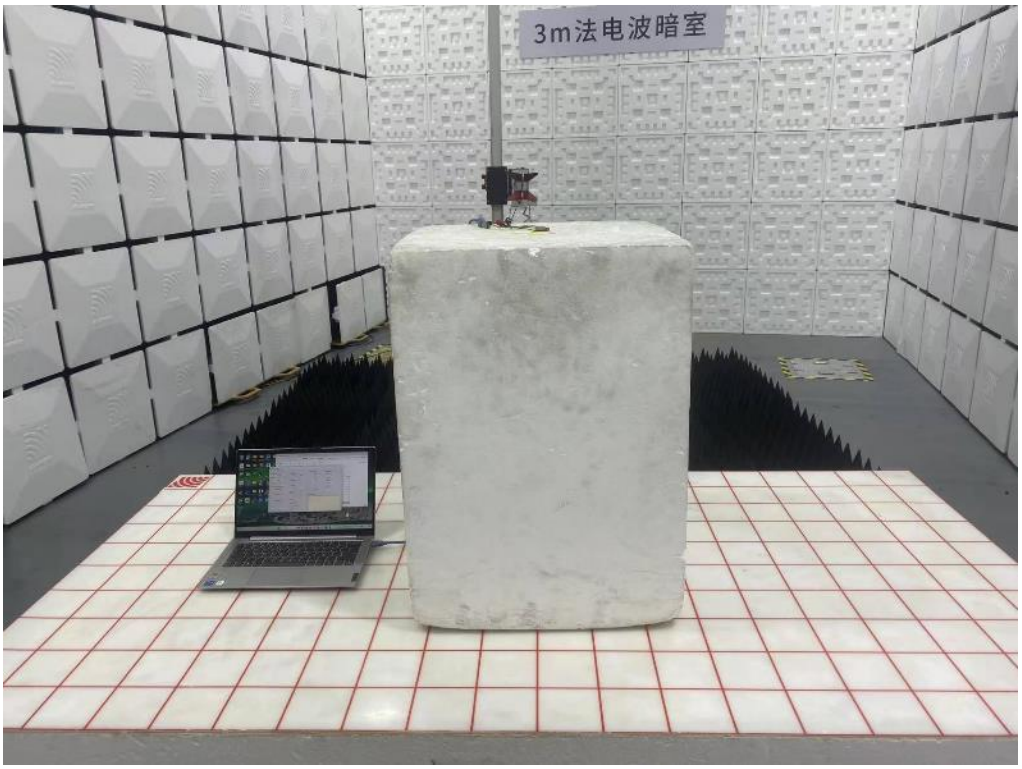
11. TEST DATA - Appendix A

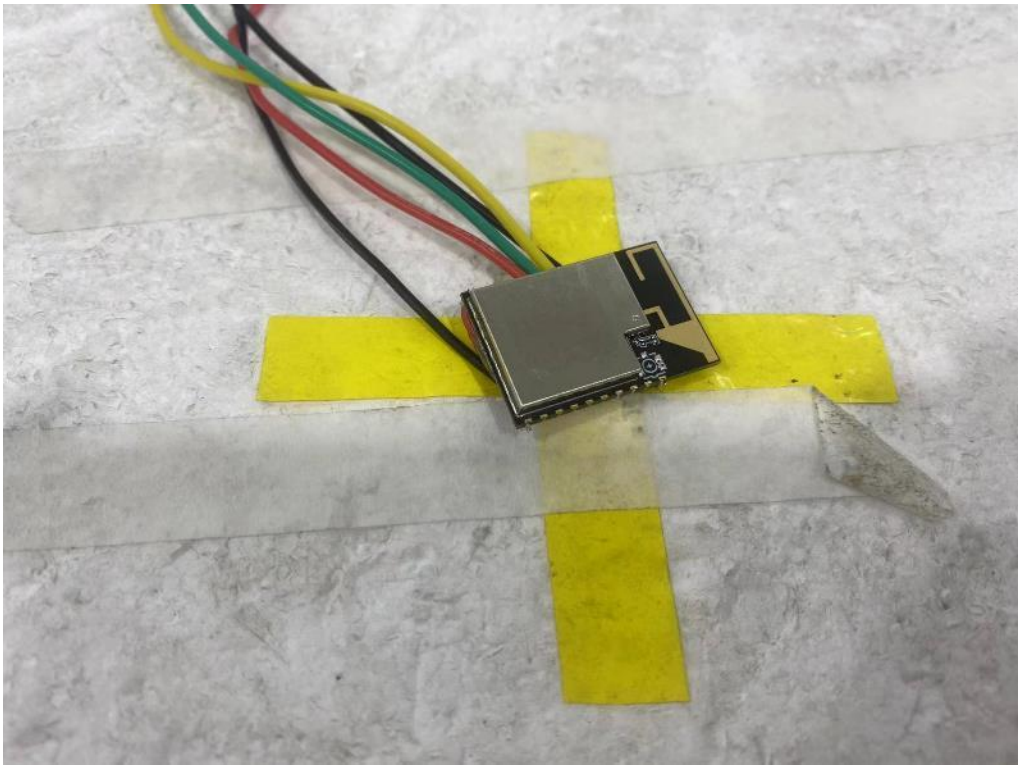
Please refer to section "Test Data" - Appendix A

APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

Radiated Emissions and Band Edge Measurement



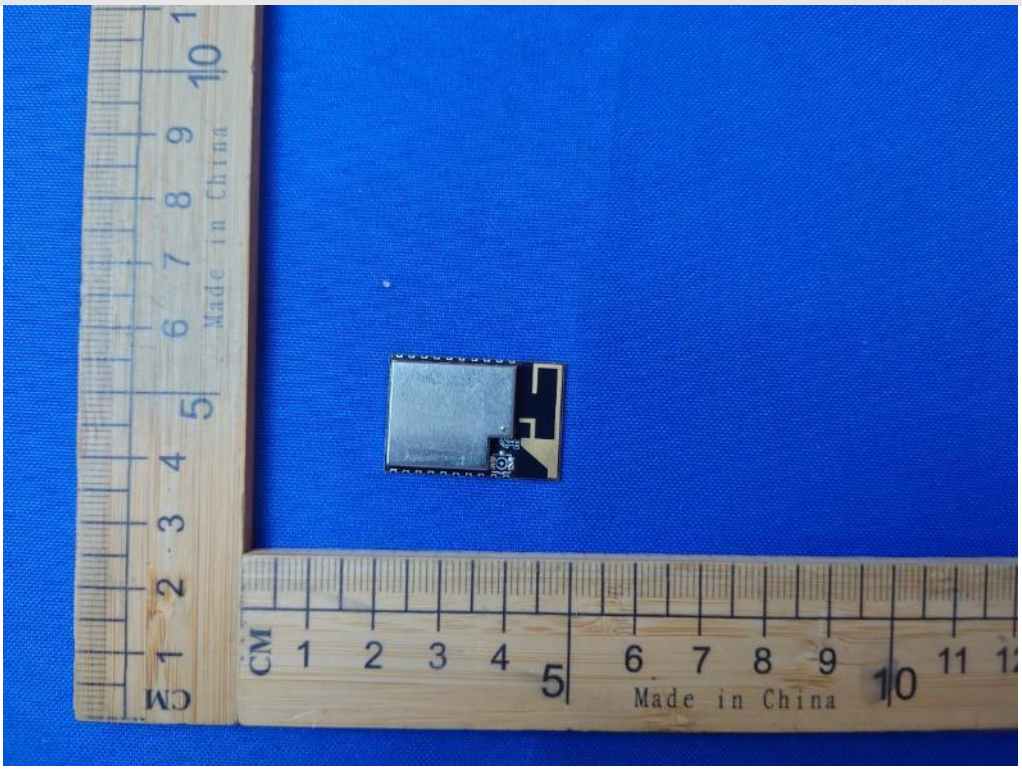


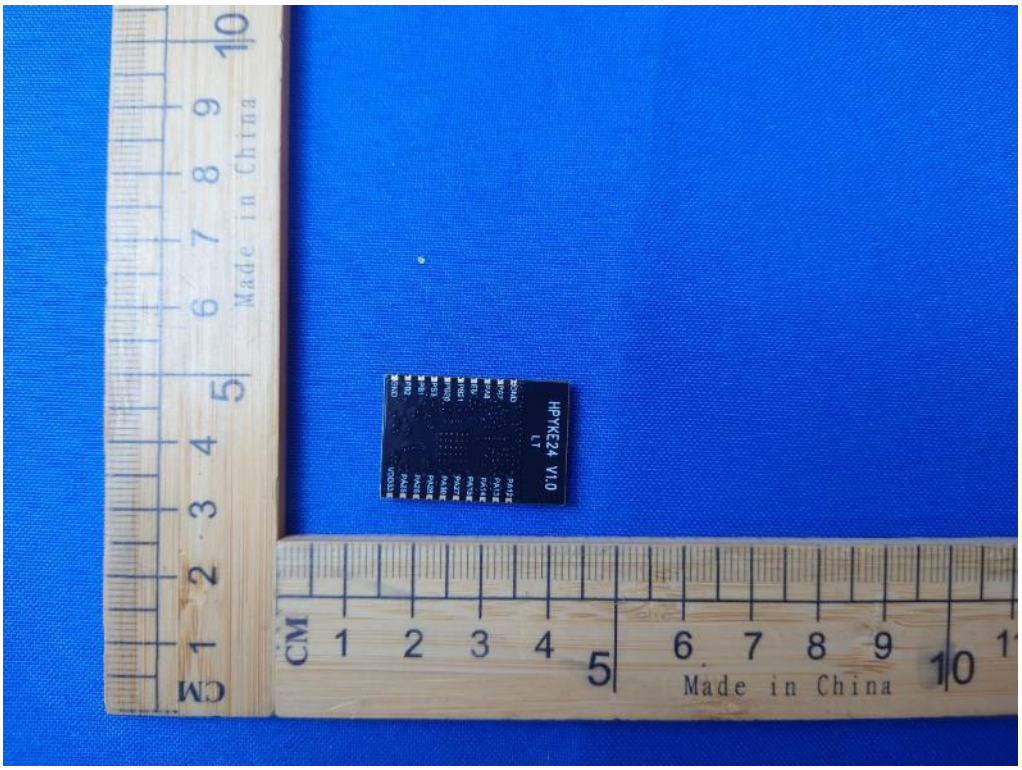


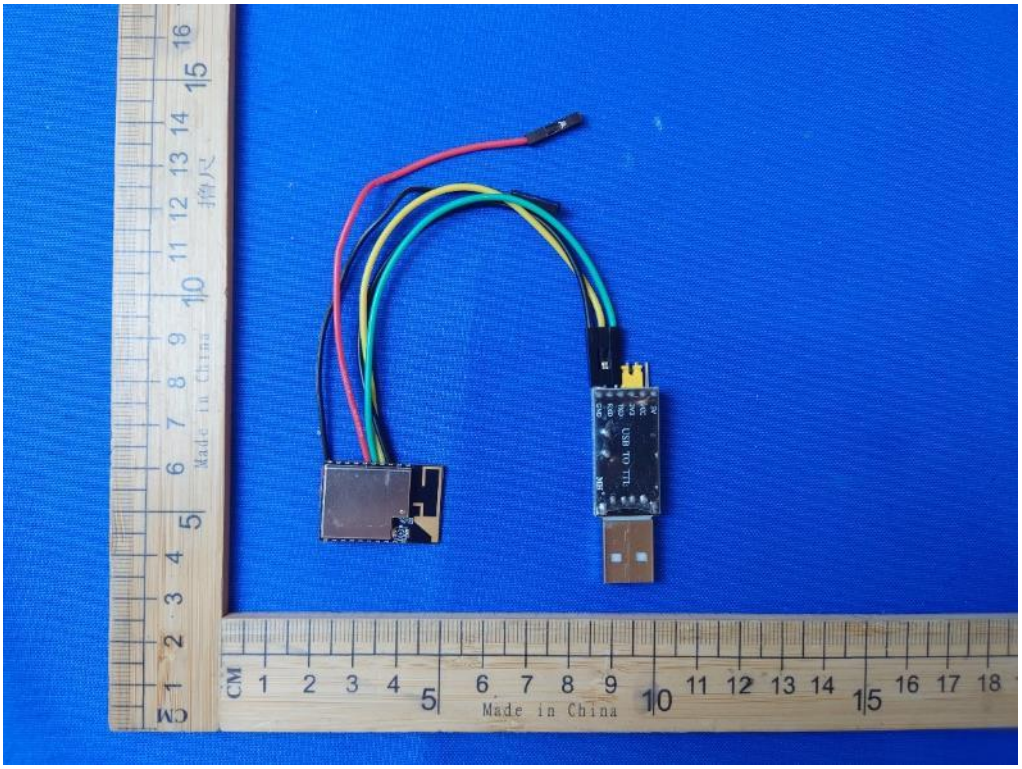
AC Power Line Conducted Emission

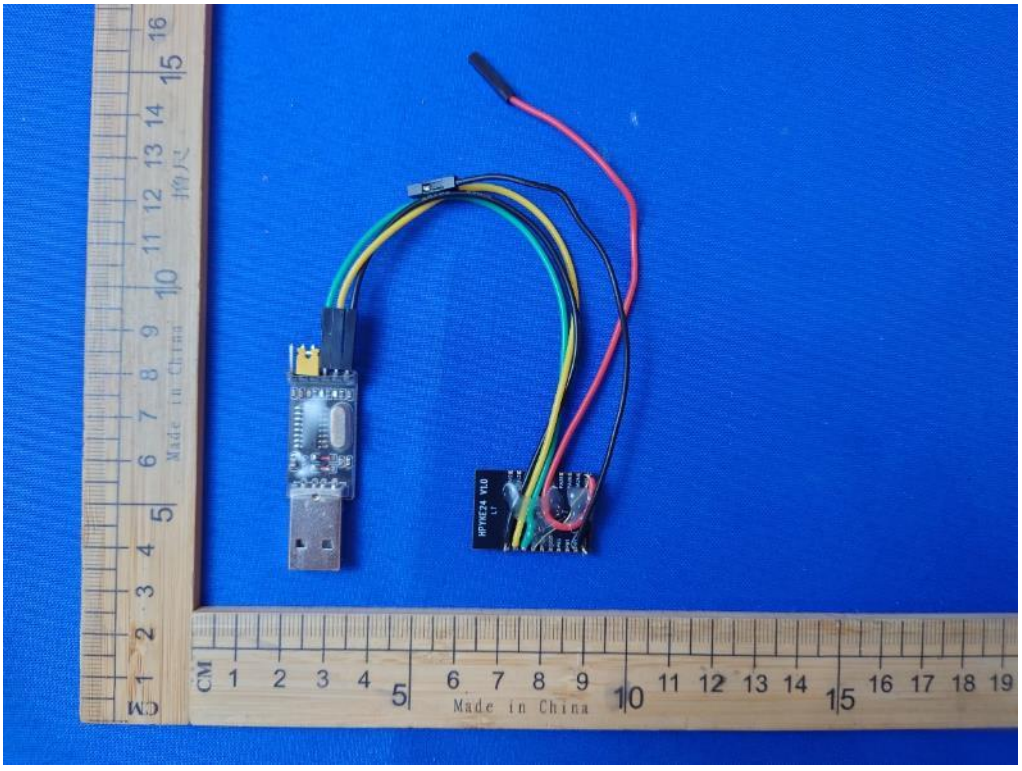
APPENDIX: PHOTOGRAPHS OF THE EUT

External






USB TO TTL
Made in China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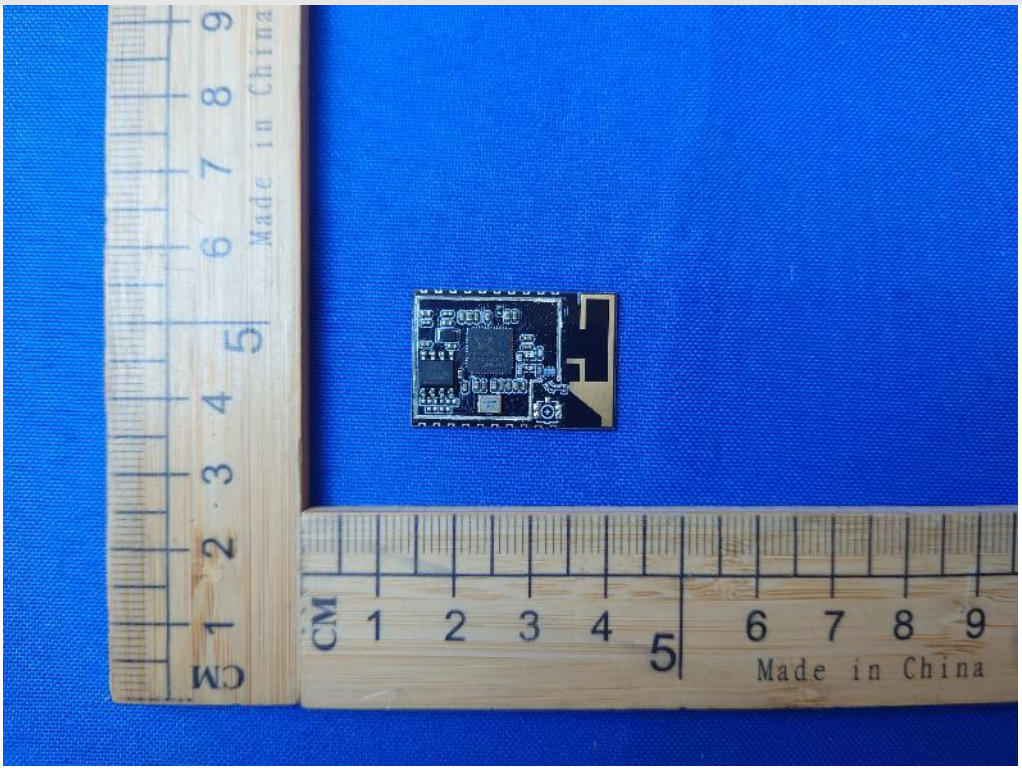
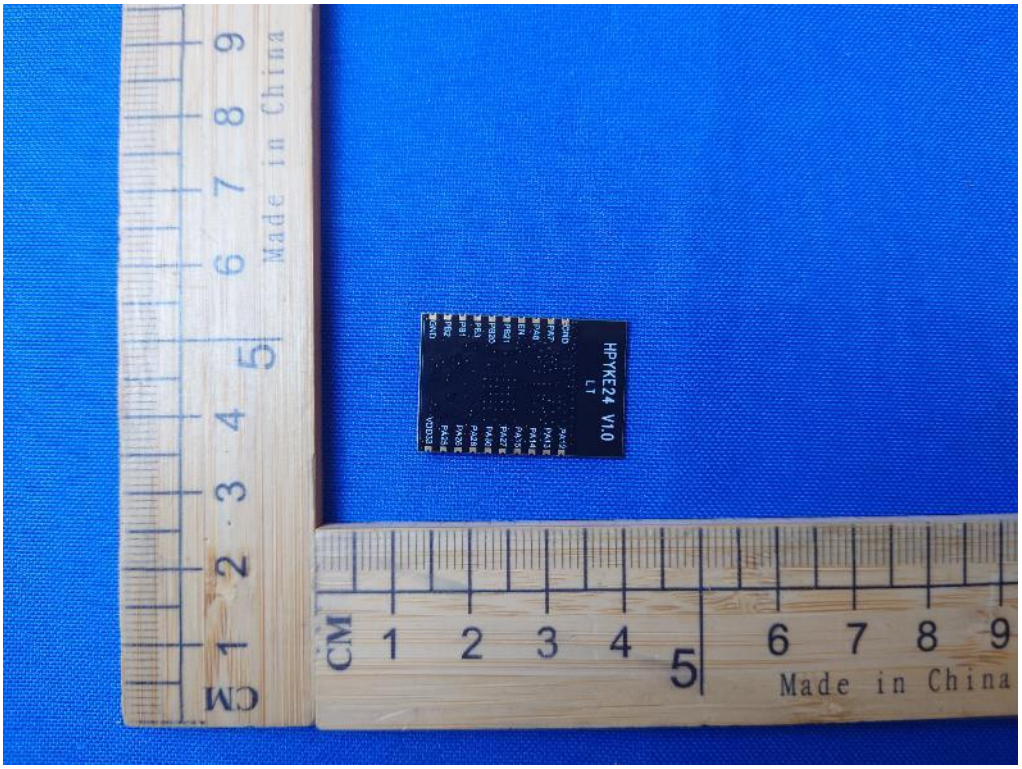
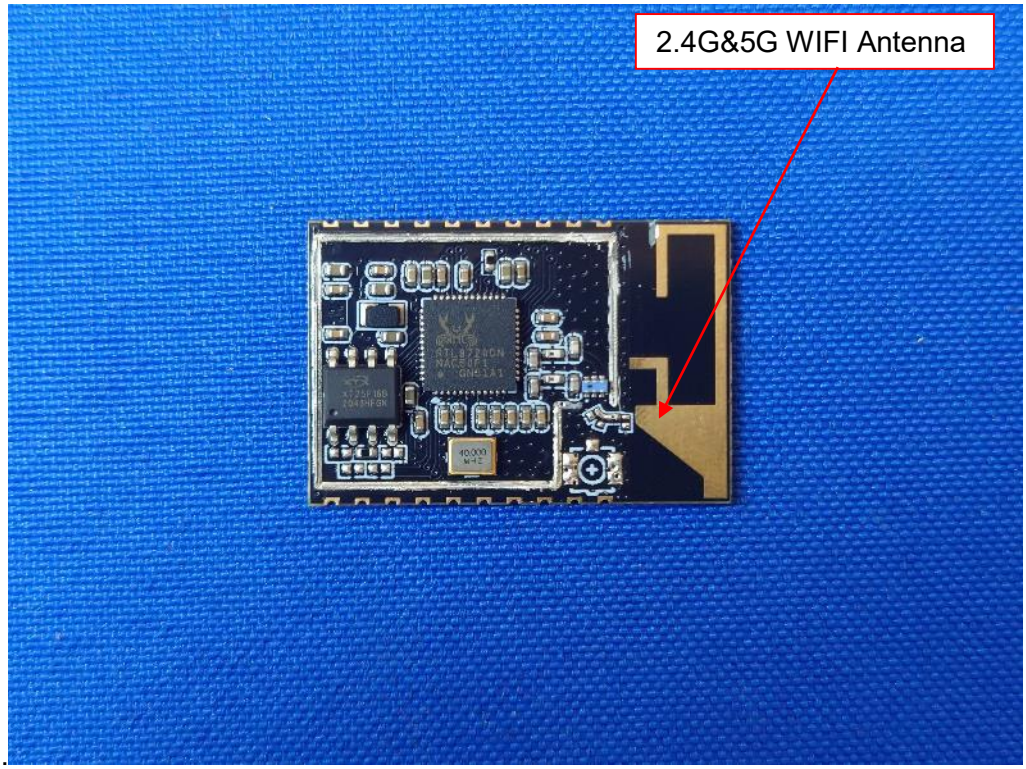
Internal


Made in China
CM
1 2 3 4 5 6 7 8 9
Made in China


HPYKE24 V1.0
Made in China
CM
1 2 3 4 5 6 7 8 9
Made in China



END OF REPORT