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CNAS L15527

JianYan Testing Group Shenzhen Co., Ltd.

Report No: JYTSZ-R12-2202429

DFS TEST REPORT

Applicant: Shenzhen Mindray Bio-Medical Electronics Co., Ltd.

Address of Applicant: Mindray Building, Keji 12th Road South, High-tech Industrial Park Nanshan, 518057 Shenzhen, PEOPLE'S REPUBLIC OF CHINA

Equipment Under Test (EUT)

Product Name: wireless module

Model No.: WL6PR1101

Trade Mark: mindray

FCC ID: ZLZ-WL6PR

Applicable standards: FCC CFR Title 47 Part 15 Subpart E Section 15.407

Date of sample receipt: 08 Dec., 2022

Date of Test: 09 Dec., to 23 Dec., 2022

Date of report issued: 04 Apr., 2023

Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above.

Tested by:

Mike.Ou

Test Engineer

Date:

04 Apr., 2023

Reviewed by:

Wenwen Zhang

Project Engineer

Date:

04 Apr., 2023

Approved by:

Manager

Date:

04 Apr., 2023

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

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2 Version

Version No.	Date	Description
00	26 Dec., 2022	Original
01	04 Apr., 2023	Update page 5

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4 Test Summary

Test Items	Limit	Result
Channel Availability Check	> 60 seconds	N/A
UNII Detection Bandwidth	> 100% of the UNII 99% transmission power bandwidth	N/A
Statistical Performance Check	Radar type 1,2,3,4 $\geq 60\%$ Aggregate Radar type 1~4 and 5 $\geq 80\%$ Radar type 6 $\geq 70\%$	N/A
Channel Move Time	< 10 seconds	Pass
Channel Closing Transmission Time	< 20ms + aggregate of 60ms over remaining 10 second period	Pass
Non-Occupancy Period	> 30 minutes	N/A
Remark: 1. Pass: means meet the requirements. 2. N/A: means not applicable. 3. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).		
Test Method:	ANSI C63.4-2014 ANSI C63.10-2013 KDB 789033 D02 General UNII Test Procedures New Rules v02r01	

5 General Information

5.1 Client Information

Applicant:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address:	Mindray Building, Keji 12th Road South, High-tech Industrial Park Nanshan, 518057 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Manufacturer:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address:	Mindray Building, Keji 12th Road South, High-tech Industrial Park Nanshan, 518057 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Factory:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address:	1203 Nanhuan Avenue, Guangming District, 518106 Shenzhen, PEOPLE'S REPUBLIC OF CHINA

5.2 General Description of E.U.T.

Product Name:	wireless module					
Model No.:	WL6PR1101					
Transmitter frequency range:	5250MHz~5350MHz 5470MHz~5725MHz					
Modulation type:	OFDM					
WLAN Function:	802.11a/802.11n					
Bandwidth:	20MHz/40MHz					
Antenna Type:	ANT1/2/3: FPC dipole antenna			ANT4/5: Copper pipe dipole antenna		
	ANT6: FPC PIFA antenna					
	5GWIFI Band 2					
	ANT1	0.98 dBi	ANT2	1.45 dBi	ANT3	1.07 dBi
	ANT4	1.60 dBi	ANT5	0.6 dBi	ANT6	3.76dBi
	5GWIFI Band 3					
	ANT1	2.59 dBi	ANT2	3.06 dBi	ANT3	2.12 dBi
	ANT4	2.75 dBi	ANT5	0.94 dBi	ANT6	3.67 dBi
DFS Operation Type:	☐ Master Device ☐ Slaver Device with Radar detection function ☒ Slaver Device without Radar detection function					
Test Sample Condition:	The test samples were provided in good working order with no visible defects.					

5.3 Test environment and mode

Data Load mode:	Keep the EUT in normal transmitting mode by WiFi
Temperature:	20 ~ 25 °C
Humidity:	60% ~ 65%
Atmospheric pressure:	1012 kPa

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number
LENOVO	Laptop	SL510	2847A65
ASUS	WiFi Router	GT-AXE11000	MSQ-RTAXJF00

5.5 Related Submittal(s) / Grant (s)

This is an original grant, no related submittals and grants.
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5.6 Additions to, deviations, or exclusions from the method

No

5.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

5.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

5.9 Test Instruments list

Conducted Method:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-17-2022	10-16-2023
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	03-19-2021	03-18-2023
Power Detector Box	MWRFTTEST	MW100-PSB	WXJ007-4	10-17-2022	10-16-2023
RF Control Unit	MWRFTTEST	MW100-RFCB	WXG006	N/A	
Test Software	MWRFTTEST	MTS 8310	Version: 2.0.0.0		

Conducted Method:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-17-2022	10-16-2023
Vector Signal Generator	Keysight	N5182B	WXJ006-6	10-17-2022	10-16-2023
Signal Generator	Keysight	N5173B	WXJ006-4	10-17-2022	10-16-2023
Wireless Connectivity Tester	Rohde & Schwarz	CMW270	WXJ008-7	10-17-2022	10-16-2023
DC Power Supply		Keysight	E3642A	WXJ025-2	N/A
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	03-19-2021	03-18-2023
Power Detector Box	MWRFTTEST	MW100-PSB	WXJ007-4	10-17-2022	10-16-2023
RF Control Unit	MWRFTTEST	MW100-RFCB	WXG006	N/A	
Test Software	MWRFTTEST	MTS 8310	Version: 2.0.0.0		

6 DFS Technical Requirements

6.1 DFS Parameters

Table D.1: Applicability of DFS Requirements Prior to Use of a Channel			
Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table D.2: Applicability of DFS requirements during normal operation		
Requirement	Operational Mode	
	Master	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Table D.3: DFS Detection Thresholds	
Maximum Transmit Power	Value (See Notes 1,2, and 3)
EIRP $\geq$ 200 mW	-64 dBm
EIRP < 200 mW and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 mW that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table D.4: DFS requirement values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1)
Channel Closing Transmission Time	200 ms + an aggregate of 60ms over remaining 10 second period (See Notes 1 and 2)
U-NII Detection Bandwidth	Minimum 100% of the UNII 99% transmission power bandwidth (See Note 3)
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step, the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

Table D.5: Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A Test B	Roundup $\left\{ \frac{1}{360} \right\}$ $\left\{ \frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right\}$	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

Table D.6: Long Pulse Radar Test Waveform

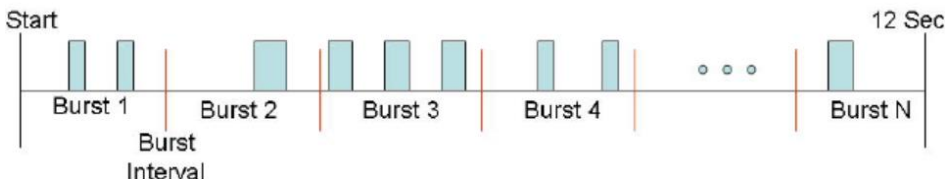
Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30
Long Pulse Radar Test Signal Wave form 12 second transmission							
							

Table D.7: Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	0	0.333	300	70%	30

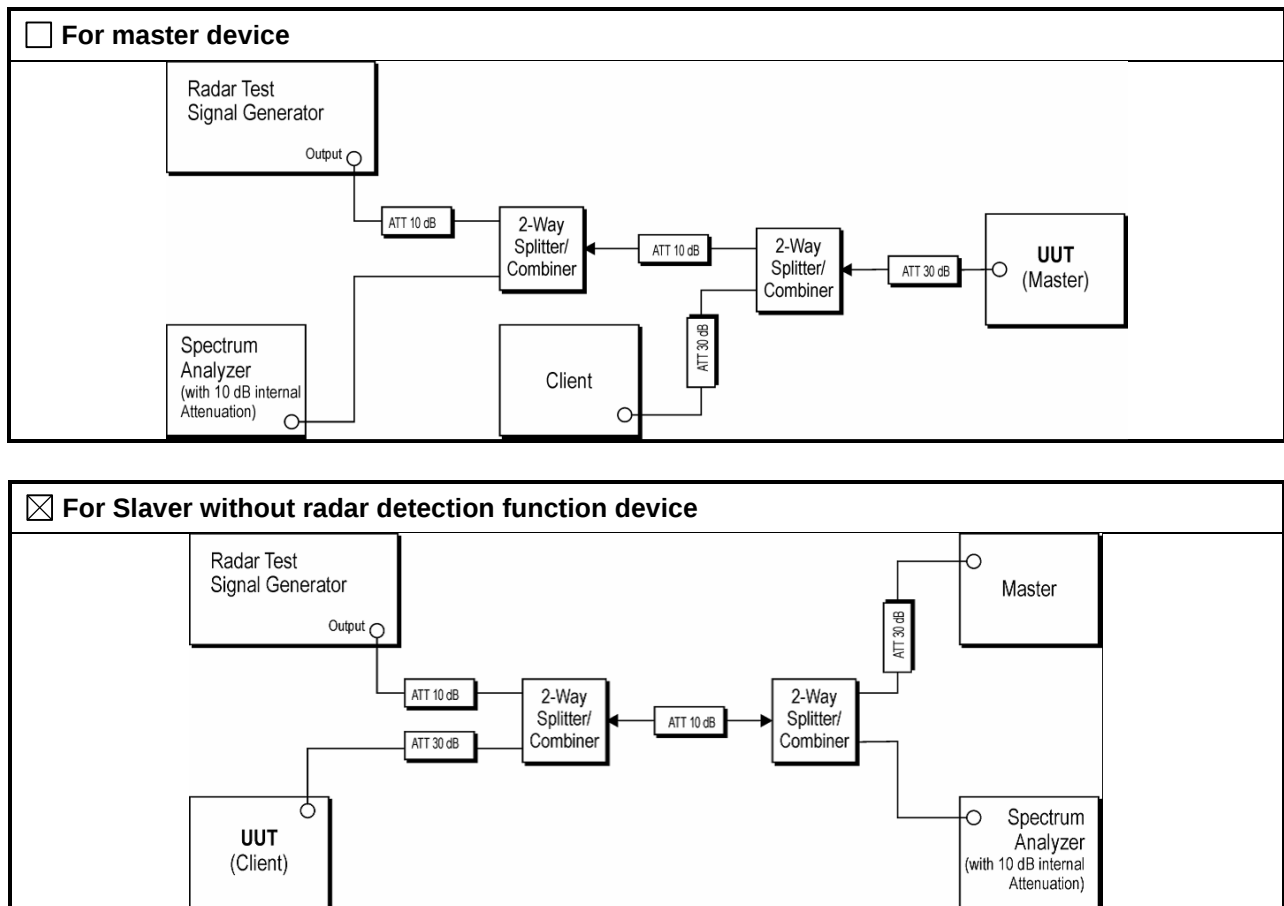
6.2 DFS Technical Requirements

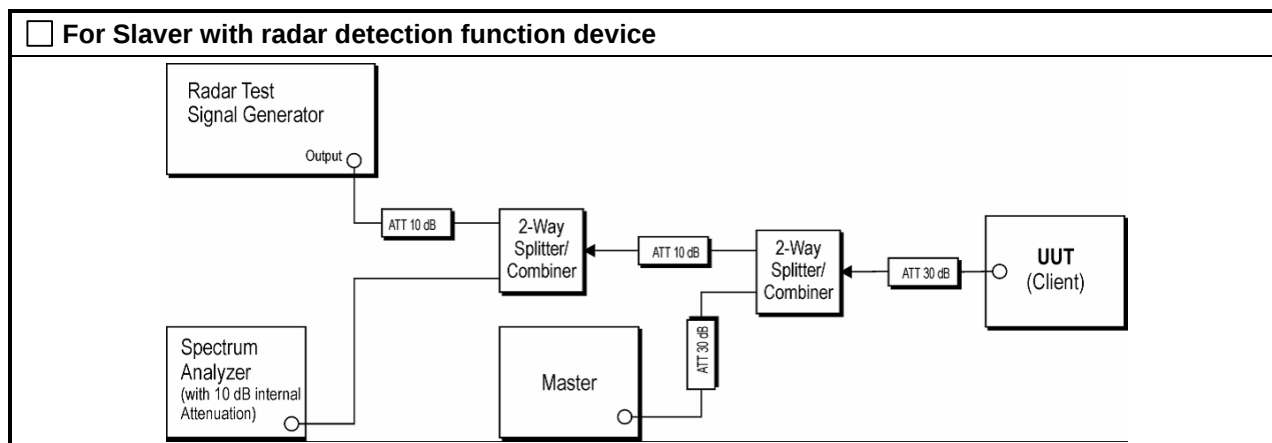
Requirement	DFS Operational mode		
	☐ Master	☒ Slave without Radar Detection	☐ Slave with Radar Detection
Channel Availability Check	√	Not Required	Not Required
UNII Detection Bandwidth	√	Not Required	√
Statistical Performance Check	√	Not Required	√
Channel Move Time	√	√	√
Channel Closing Transmission Time	√	√	√
Non-Occupancy Period	√	Not Required	√

6.3 DFS Threshold Level

DFS Threshold Level	
5250MHz ~ 5350MHz	-64 dBm @ antenna connector
5470MHz ~ 5725MHz	-64 dBm @ antenna connector
Note: The worst case level was selected to perform the test.	

6.4 Test Setup Block





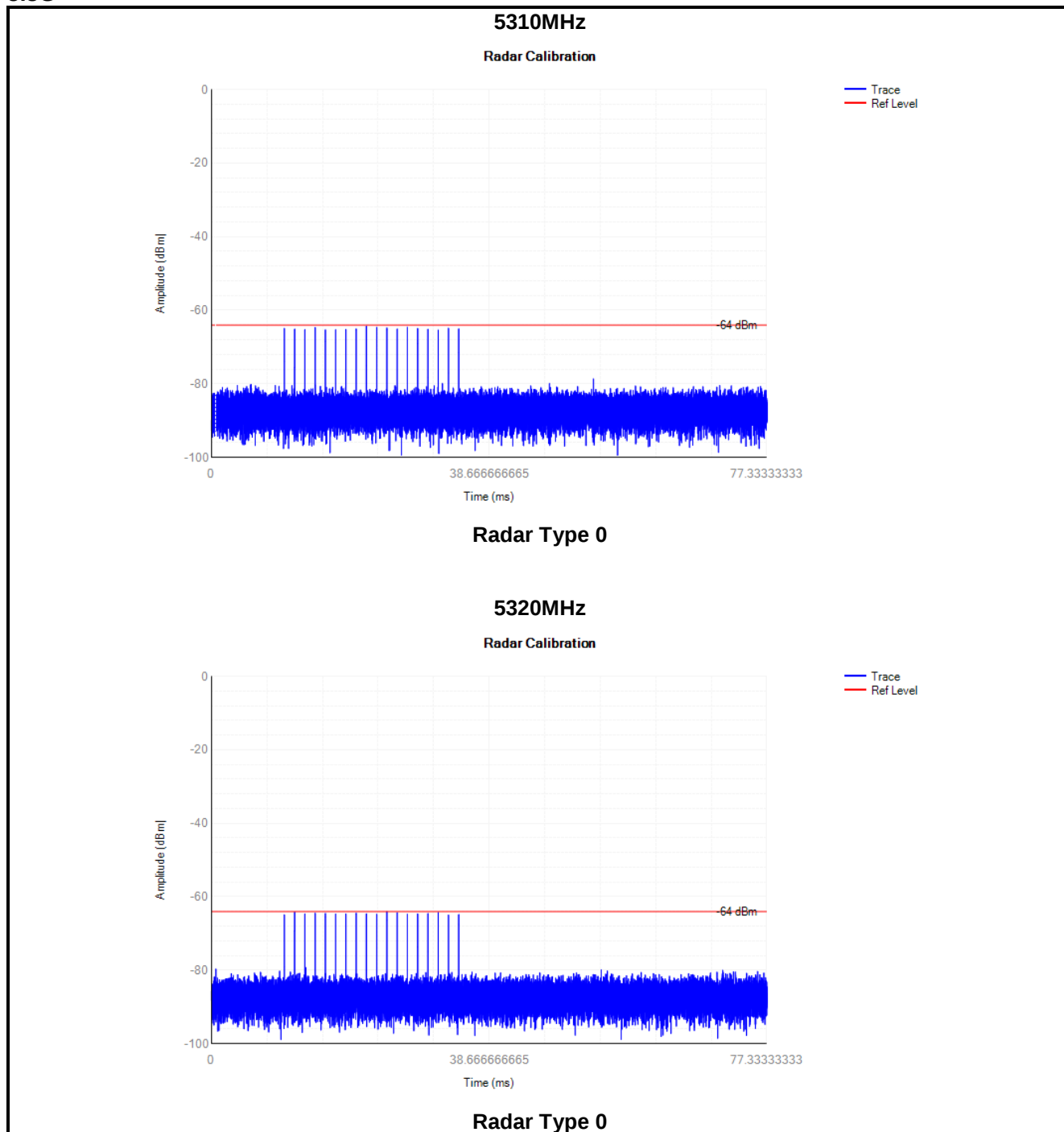
6.5 EUT Configuration for DFS Test

Test Items	Channel Frequency
Channel Move Time	5310MHz, 5320MHz
	5670MHz, 5700MHz
Channel Closing Transmission Time	5310MHz, 5320MHz
	5670MHz, 5700MHz

7 Test Result

7.1 Verification of Radar Type and Level

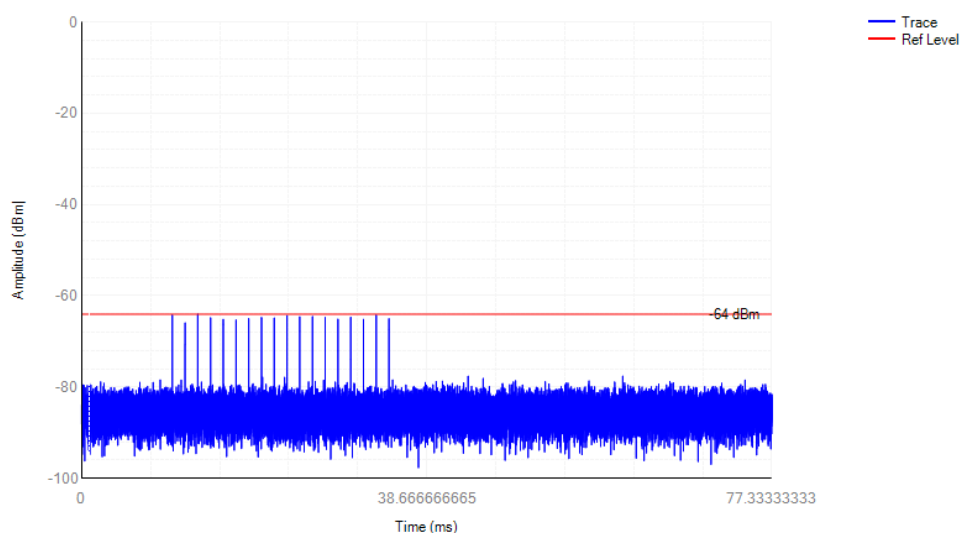
5.3G



5.6G

5670MHz

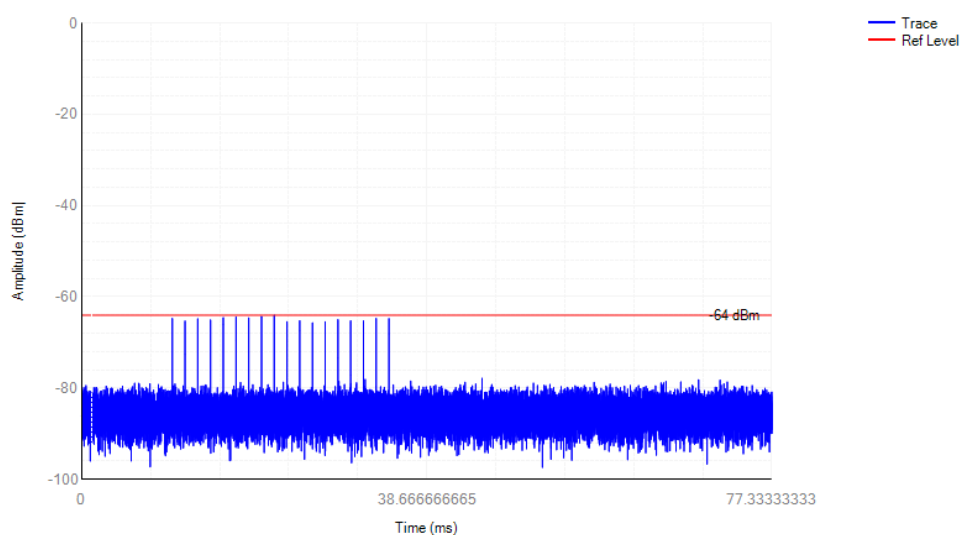
Radar Calibration



Radar Type 0

5700MHz

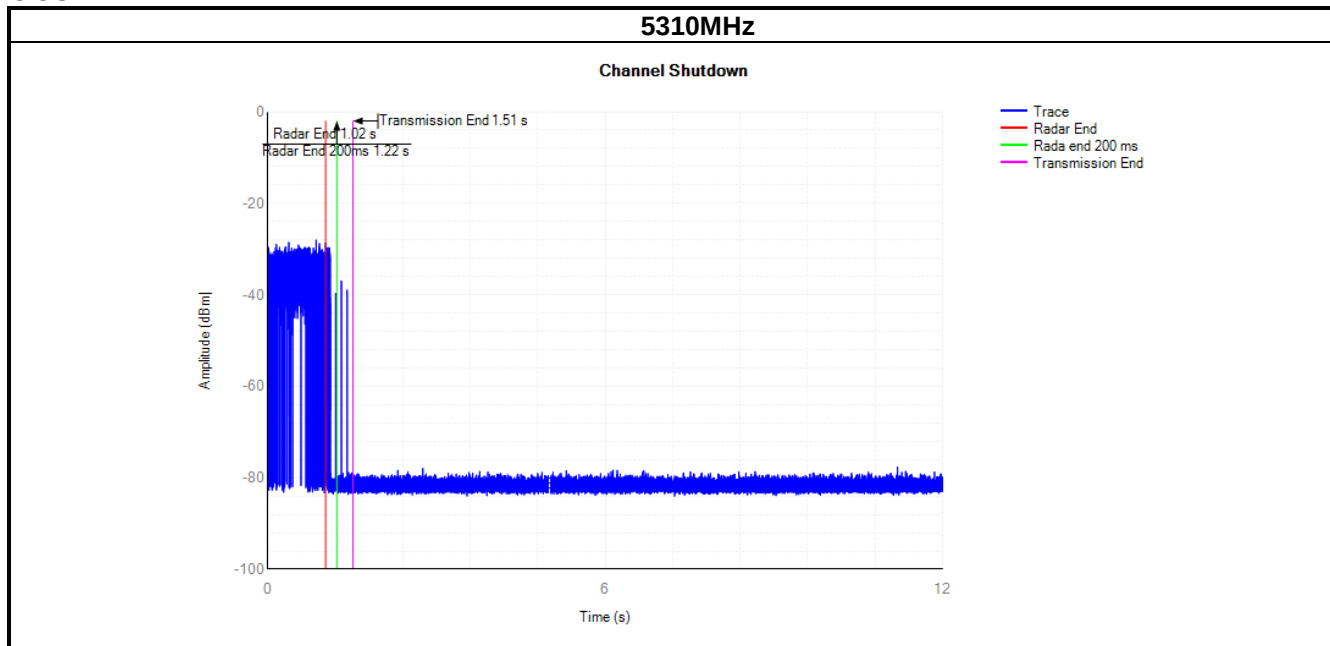
Radar Calibration



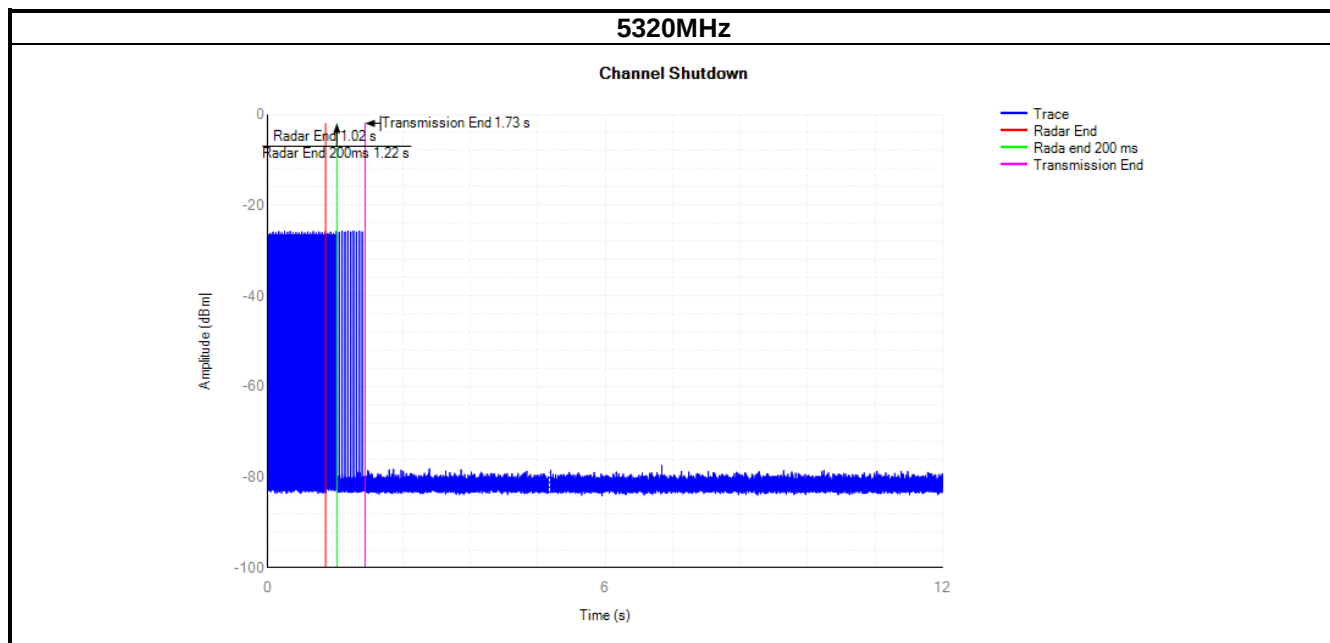
Radar Type 0

7.2 Channel Move Time and Channel Closing Transmission Time

5.3G

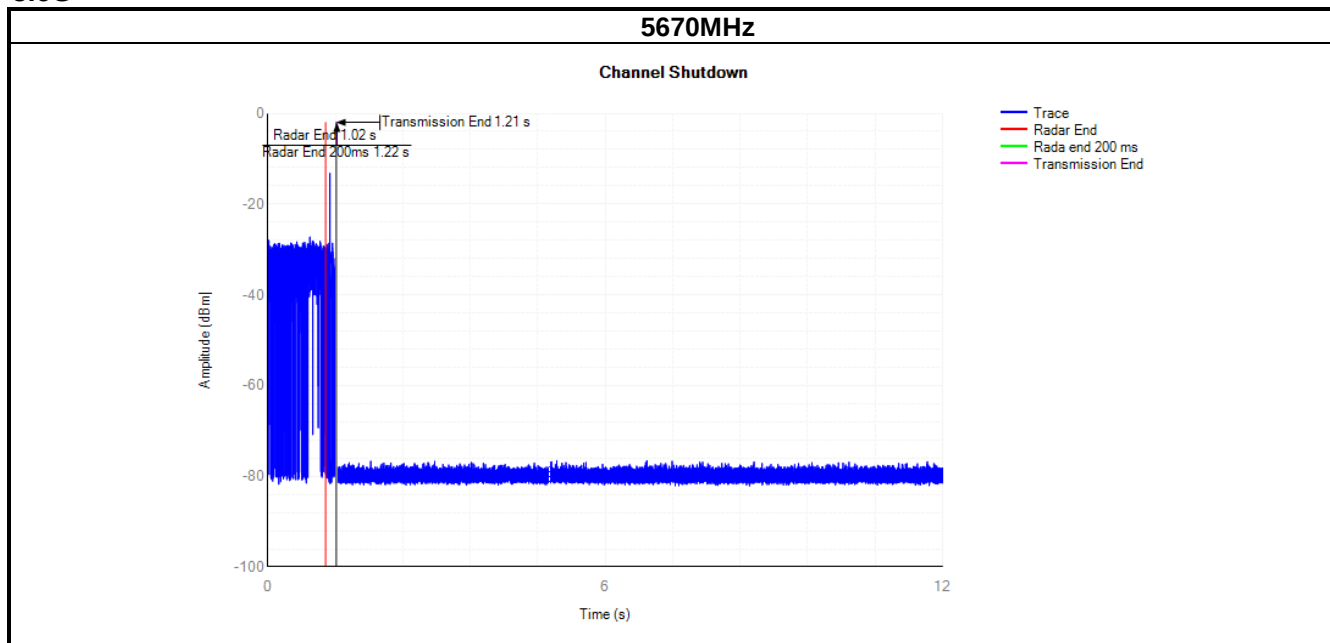


Test Items	Value	Limit
Channel Closing Transmission Time	0.0717s	260 ms
Channel Move Time	0.4859s	10 s

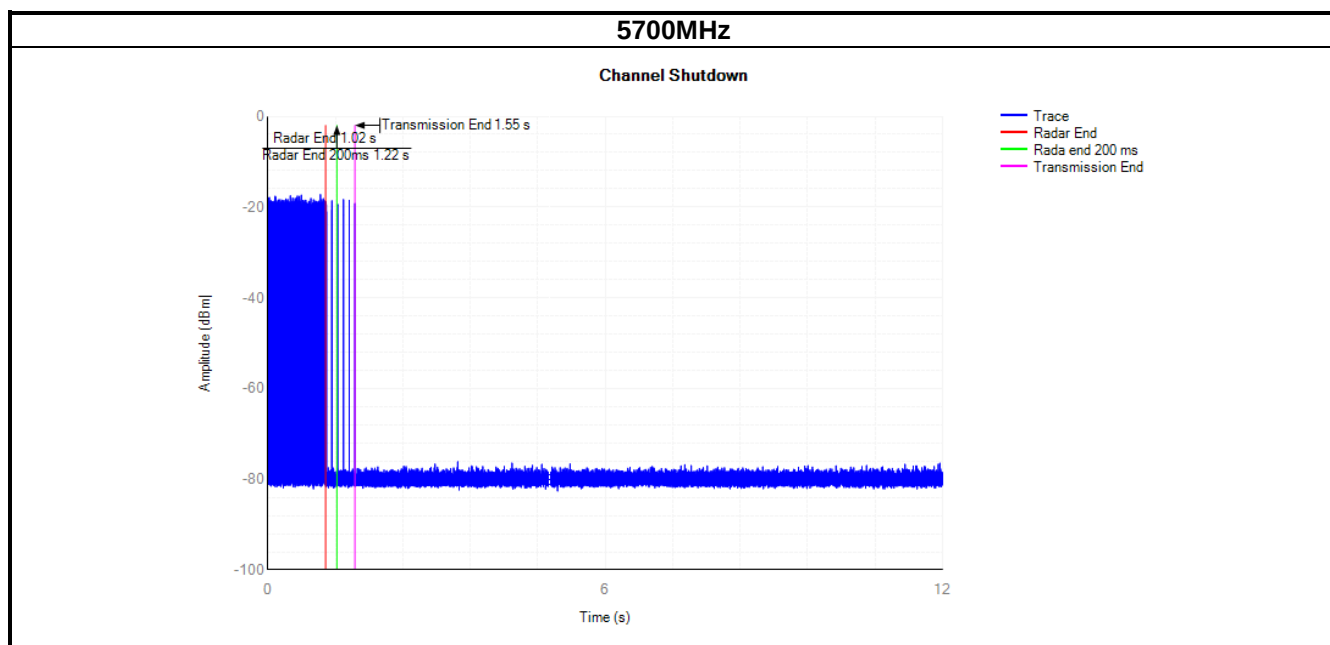


Test Items	Value	Limit
Channel Closing Transmission Time	0.1431s	260 ms
Channel Move Time	0.7028s	10 s

5.6G

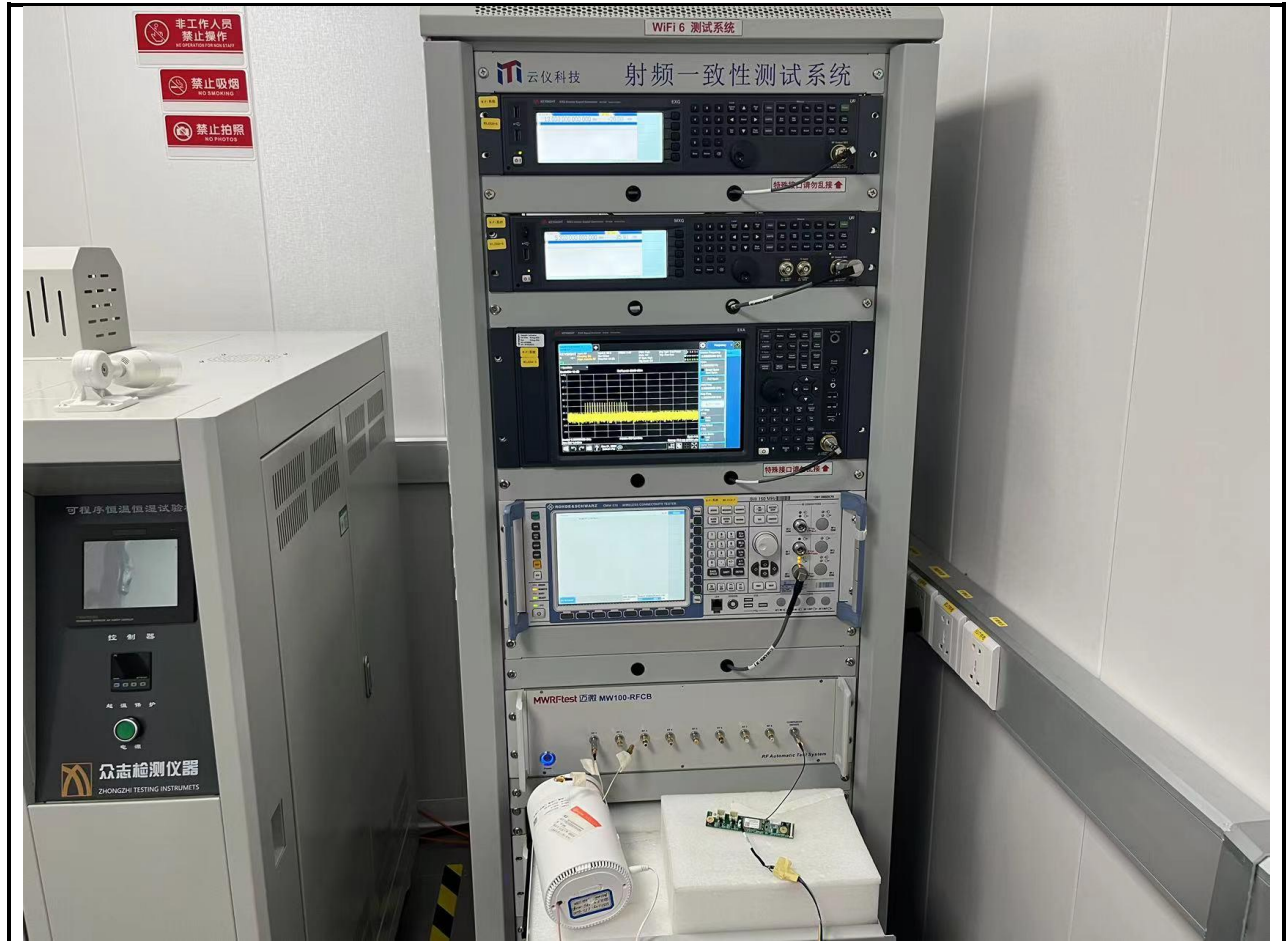


Test Items	Value	Limit
Channel Closing Transmission Time	0.1434s	260 ms
Channel Move Time	0.1829s	10 s



Test Items	Value	Limit
Channel Closing Transmission Time	0.009s	260 ms
Channel Move Time	0.5222s	10 s

8 Test Setup Photo



----- End of report -----