低功率射頻器材試驗報告

DYNAMIC FREQUENCY SELECTION

TEST REPORT

For

Renesas Design Korea Inc.

B-7 FL, Silicon Park, 35. Pangyo-ro 255beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

Brand: Renesas

Report Type:	**Product Type:**
Original Report	RRQ61001 Module

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Reviewed By: 許詔強

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RLK250801005	RLK250801005RF03	2026-1-22	Original Report	Cedric Xu

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

申 請 者	Renesas Design Korea Inc.
申請地址	B-7 FL, Silicon Park, 35. Pangyo-ro 255beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
廠牌	Renesas
產品名稱	RRQ61051 Module
主 型 號	RRQ61051-009
系列型號	N/A
差異說明	N/A
Operating mode	802.11a/n ht20/ac vht20/ax he20
Frequency Range	5250 MHz ~ 5350 MHz , 5470 MHz ~ 5725 MHz
EUT供電方式	3.3Vdc

Note:

*All measurement and test data in this report was gathered from production sample serial number: RLK250801005-1 (Assigned by BACL, Linkou Laboratory).

**802.11ax mode only support full RU

Antenna Specification	WIFI 5G Antenna
形式	PCB Antenna
廠牌	ARISTOTLE
型號	RFA-27-H60-U-GB70
增益	Band 2: 4.4 dBi Band 3: 4.4 dBi

1.2 Objective

本測試報告之所有項目皆依據國家通訊傳播委員會 LP0002 低功率射頻器材技術規範適用規範及條文。

1.3 Test Methodology

NCC LP0002 113年版, chapter 5.7.7

FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

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1.4 Statement

Decision Rule: No, (The test results do not include MU judgment)

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2. 未經授權不得對本報告的內容或外觀進行任何更改，違者將受到法律追訴。
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4. 本報告有本實驗室報告簽屬人簽名始生效。
5. 測試結果之判定，無需考量量測不確定度符合性，除非經由顧客約定、法規或標準文件規範才需要評估。
6. 本實驗室不對申請者所提供之影響測試結果的訊息真實性負責。

1.5 Measurement Uncertainty

Parameter	Uncertainty
Conducted Power Level	±3.73 dB
Time Domain	±0.21 ms
Temperature	±0.78 ℃
Humidity	±0.04 %
DFS_Level	±1.85 dBm
DFS_Time	±0.211 ms

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

1.6 Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	Test Engineer
DFS	2025/10/05	23.4	54	Cedric Xu

1.7 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Linkou Laboratory) to collect test data is located on

☒ No.6, Wende 2Rd., Guishan Dist., Taoyuan City 33382, Taiwan (R.O.C.).

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2 System Test Configuration

2.1 Description of Test Configuration

The EUT was configured for testing in normal mode which was provided by the Applicant.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 Support Equipment List and Details

隨貨附賣週邊設備名稱描述

N/A

未隨貨附賣，輔助測試週邊設備名稱描述

No.	Description	Manufacturer	Model
1	Notebook (Lab provided)	DELL	E6410
2	Notebook (Lab provided)	Acer	N16Q1
3	USB-A to C cable (Customer provided)	VENTION	COZ
4	Test Development Board (Customer provided)	RENESAS	EK-RQ61 565-11-C-0001 Ver 3.1
5	I-PEX to SMA Cable (Customer provided)	TAOGLAS	0.2m
6	Antenna (Customer provided)	ARISTOTLE	RFA-27-H60-U-GB70
7	Daughter Board (Customer provided)	RENESAS	RRQ610x1 565-16-B
8	GWN 802.11ax Tri-Band Wi-Fi 6E Access Point (Lab provided)	GRANDSTREAM	GWN7665

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3 Summary of Test Results

Items	Description of Test	Results
Detection Bandwidth	UNII Detection Bandwidth	Not applicable
Performance Requirements Check	Initial Channel Availability Check Time (CAC)	Not applicable
	Radar Burst at the Beginning of the CAC	Not applicable
	Radar Burst at the End of the CAC	Not applicable
In-Service Monitoring	Channel Move Time	Compliant
	Channel Closing Transmission Time	Compliant
	Non-Occupancy Period	Compliant
Radar Detection	Statistical Performance Check	Not applicable

Note:

Not applicable: the EUT is a client unit without radar detection

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4 Test Equipment List and Details

儀器名稱	廠商	型號	序號	校驗日期	下次校驗日期
Conducted Room					
MXG Vector Signal Generator	AGILENT	N5182B	MY53050038	2025/08/21	2026/08/21
Signal Analyzer 40GHz	Rohde & Schwarz	FSV40-N	102248	2025/09/12	2026/09/12
Microflex Cable	EMCI	EMC102-KM-KM-1000	180520	2025/04/07	2026/04/07
Microflex Cable	EMCI	EMC102-KM-KM-1000	180521	2025/04/07	2026/04/07
Microflex Cable	MTJ Cooperation	SFL402-105FLEX	1	2025/04/07	2026/04/07
Microflex Cable	EMCI	SS402	5	2025/04/07	2026/04/07
4 Way Power Divider	MTJ Cooperation	MTJ7284-M	180301-3-2	2025/04/07	2026/04/07
2 Way Power Divider	MTJ Cooperation	MTJ7282-M	180301-3-3	2025/04/07	2026/04/07
2 Way Power Divider	MTJ Cooperation	MTJ7282-M	180301-3-4	2025/04/07	2026/04/07
(-30dB) Attenuator	MTJ Cooperation	MVE2211	SN 001	2025/04/07	2026/04/07
(-10dB) Attenuator	MTJ Cooperation	MTJ604-10	4	2025/04/07	2026/04/07
(-10dB) Attenuator	MTJ Cooperation	MTJ604-10	7	2025/04/07	2026/04/07
GWN 802.11ax Tri-Band Wi-Fi 6E Access Point	GRANDSTREAM	GWN7665	33902627	N.C.R	N.C.R

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

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5 Applicable Standards

5.1 DFS Requirement

NCC LP0002 113年版, chapter 5.7.7

FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

Table 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 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	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	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.		

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Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt 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. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table 4: DFS Response 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 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 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.	

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Table 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: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A			
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 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

Table 7 – Frequency Hopping Radar Test Waveform

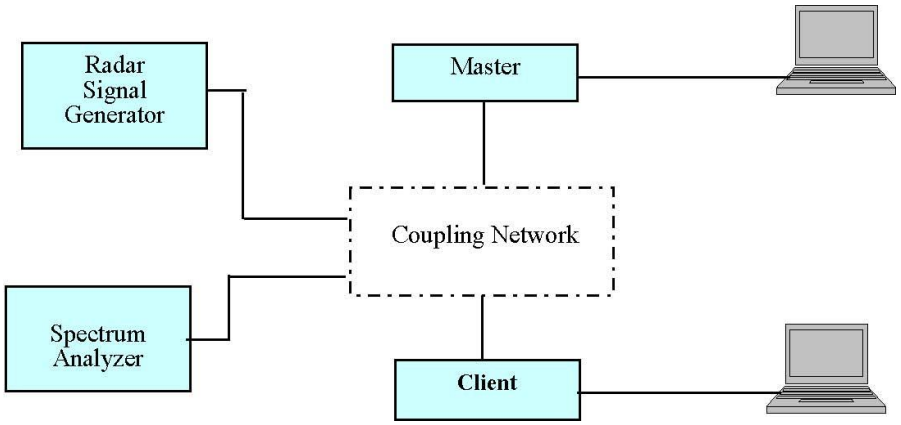
Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

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5.2 DFS Measurement System

BACL DFS measurement system consists of two subsystems: (1) The radar signal generating subsystem and (2) the traffic monitoring subsystem.

5.3 System Block Diagram



5.4 Test Procedure

A spectrum analyzer is used as a monitor verifies that the EUT status including Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the diction and Channel move. It is also used to monitor EUT transmissions during the Channel Availability Check Time.

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6 Test Result

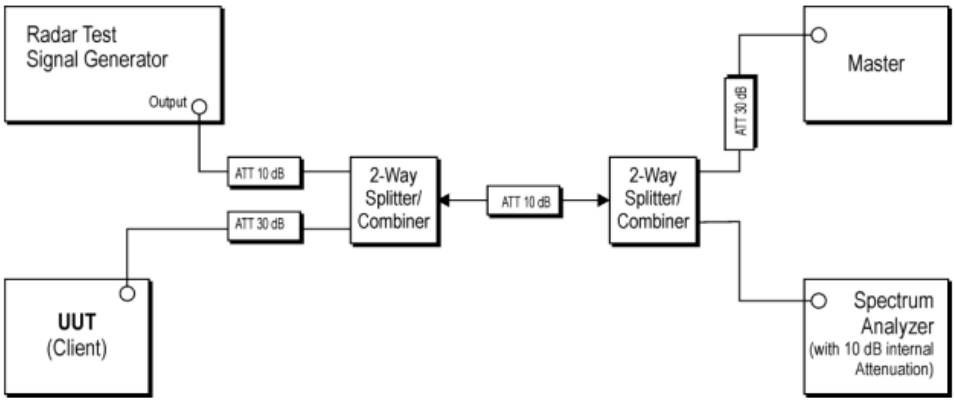
6.1 Description of EUT

The calibrated radiated DFS detection threshold level is set to -62 dBm.

6.2 Channel Loading

WLAN traffic is generated by software “Lan Test20”, software is used by IP and Frame based systems for loading the test channel during the In service compliance testing of the U-NII device. Data pakge streamed from the Access Point to the Client using the software “Lan Test20”.

6.3 Conducted Test Setup Configuration

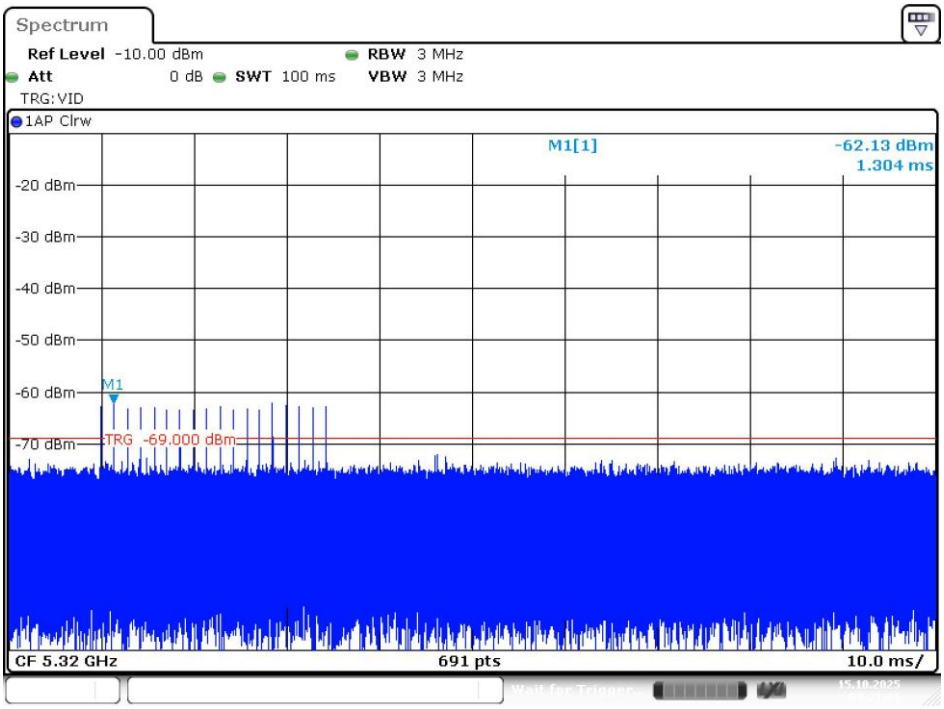


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6.4 Radar Waveform Calibration

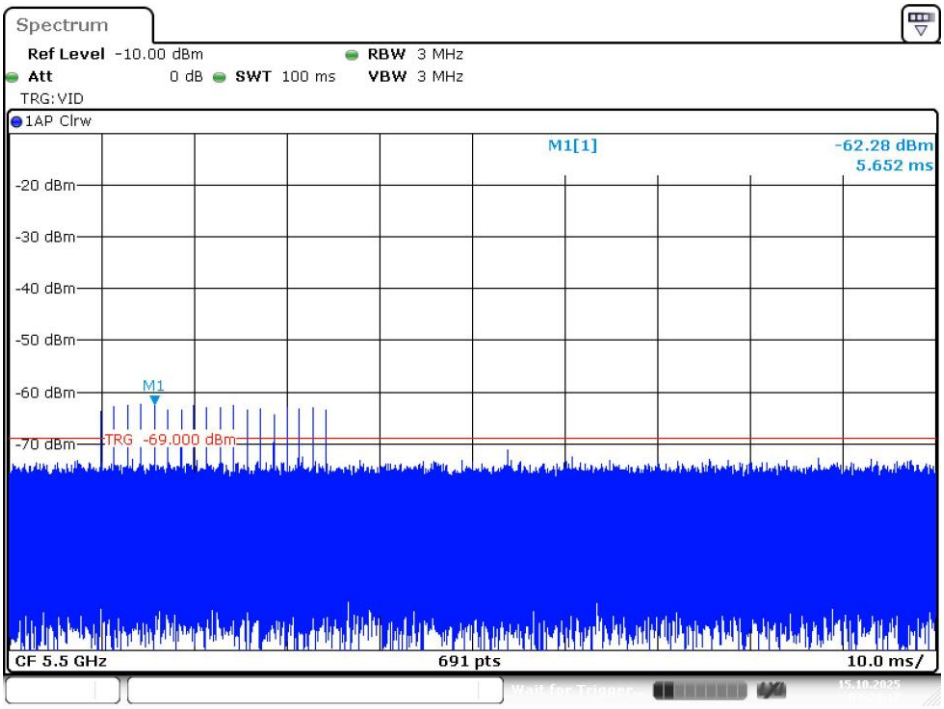
Radar Type 0

5320 MHz



Date: 15.OCT.2025 09:21:08

5500 MHz



Date: 15.OCT.2025 09:23:17

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7 Channel Move Time and Channel Closing Transmission Time

7.1 Test Procedure

Perform type 0 short pulse radar waveform. The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = N*Dwell Time

N is the number of spectrum analyzer bins showing a device transmission Dwell Time is the dwell time per bin (i.e. Dwell Time = S/B, S is the sweep time and B is the number of bin, i.e. 8001)

7.2 Test Results

Frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5320	20	Type 0	Compliant
5500	20	Type 0	Compliant

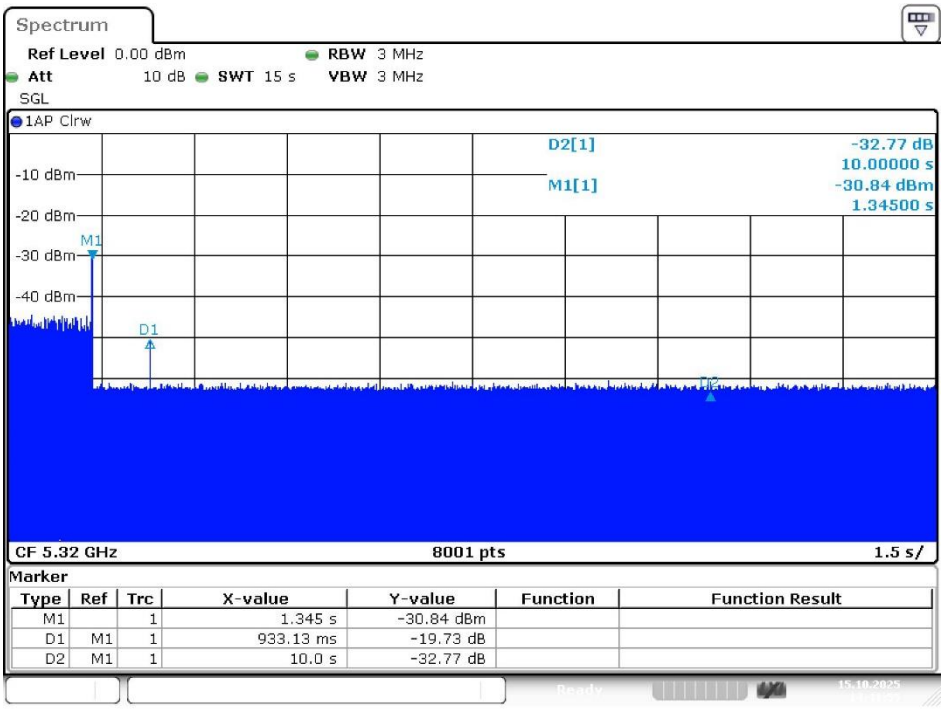
Please refer to the following tables and plots.

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5320 MHz

Type 0 radar channel move time result:

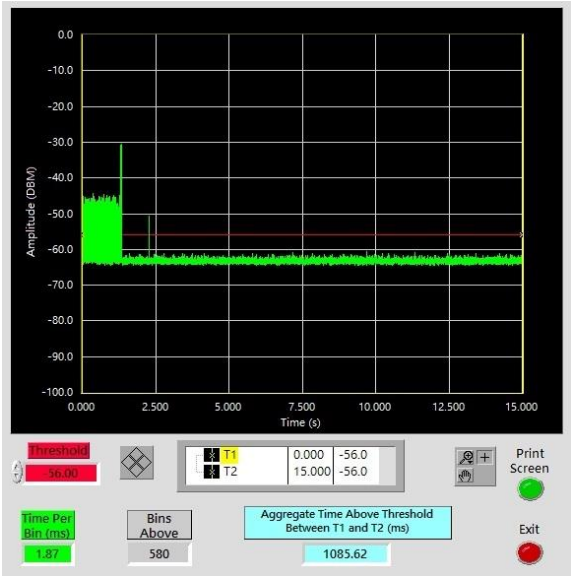
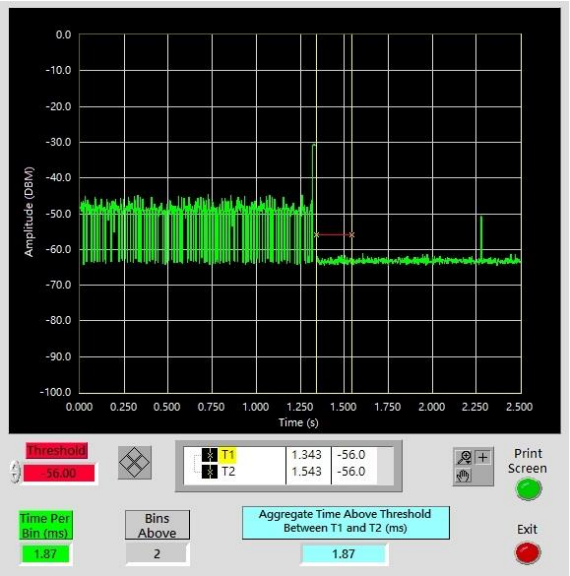
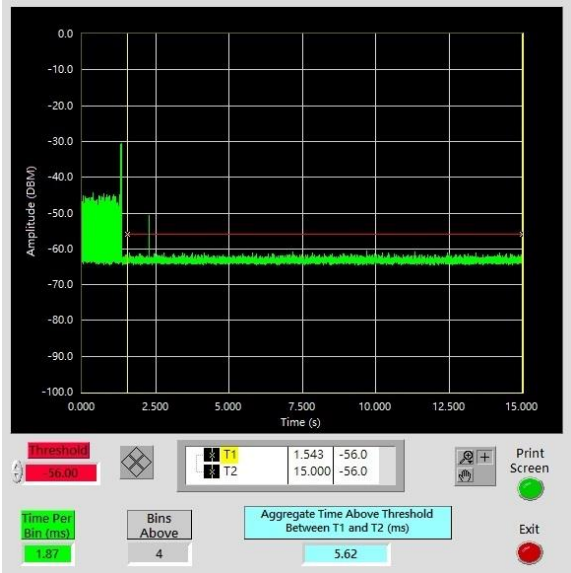
Item	Time (s)	Limit (s)
Channel move time	0.933	10



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Type0 radar channel closing transmission time result:

Item	Aggregate Transmission Time After 200ms Delay (ms)	Limit (ms)
Closing Transmission Time	5.62	60

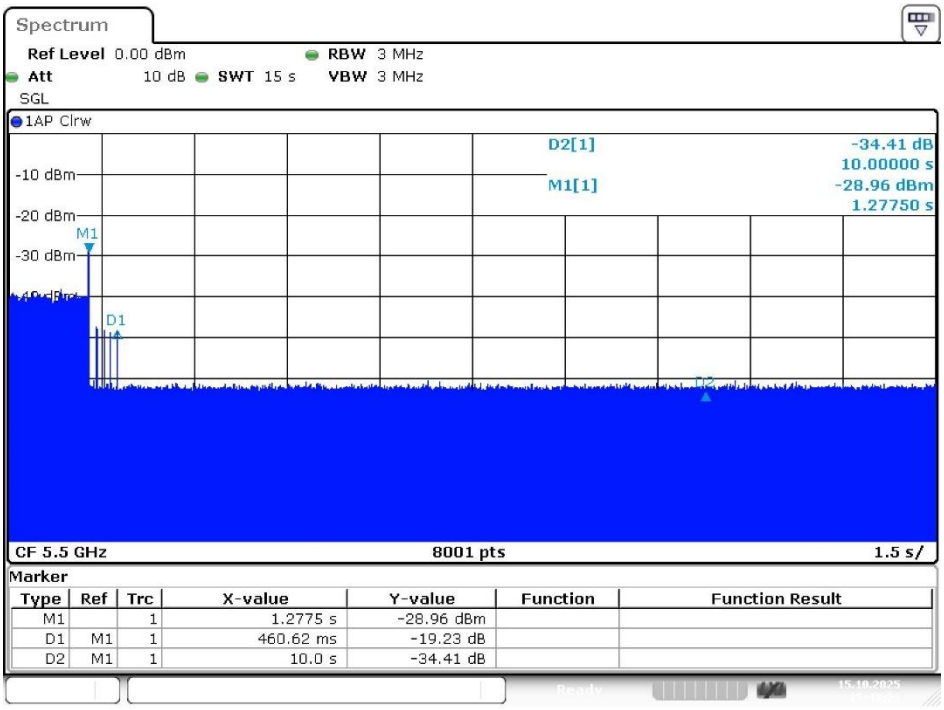
1	2
	
3	-
	-

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5500 MHz

Type 0 radar channel move time result:

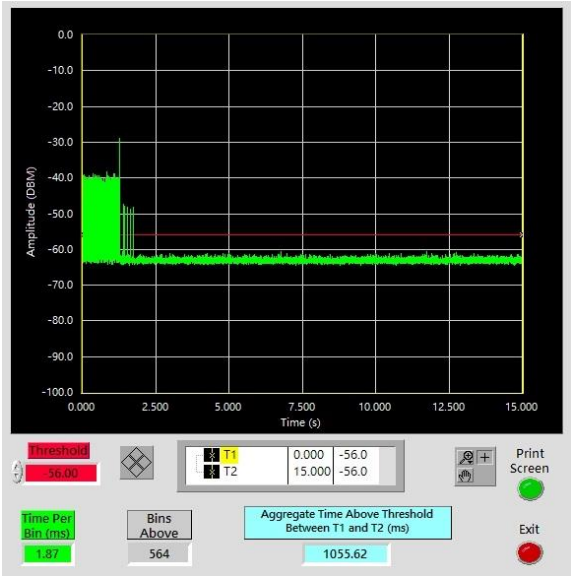
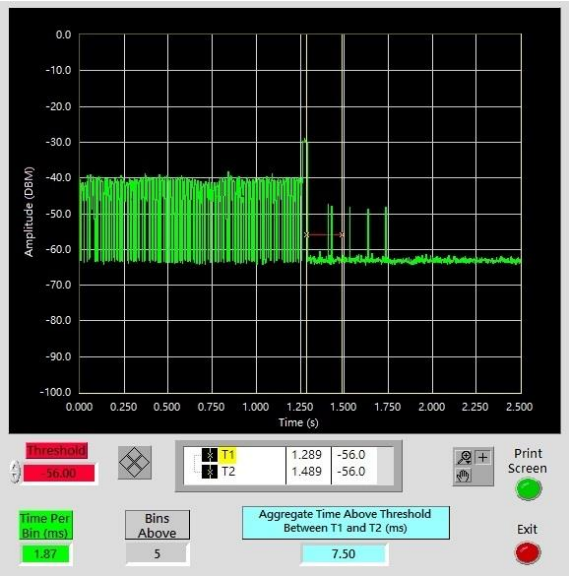
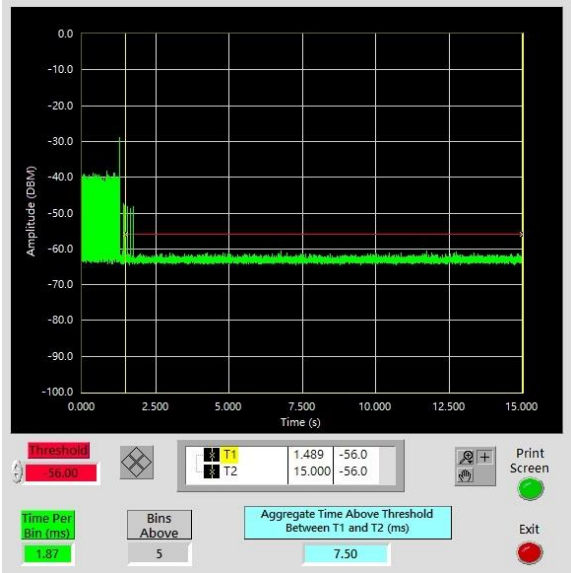
Item	Time (s)	Limit (s)
Channel move time	0.461	10



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Type0 radar channel closing transmission time result:

Item	Aggregate Transmission Time After 200ms Delay (ms)	Limit (ms)
Closing Transmission Time	7.50	60

1	2
	
3	-
	-

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8 Non-Occupancy Period

8.1 Test Procedure

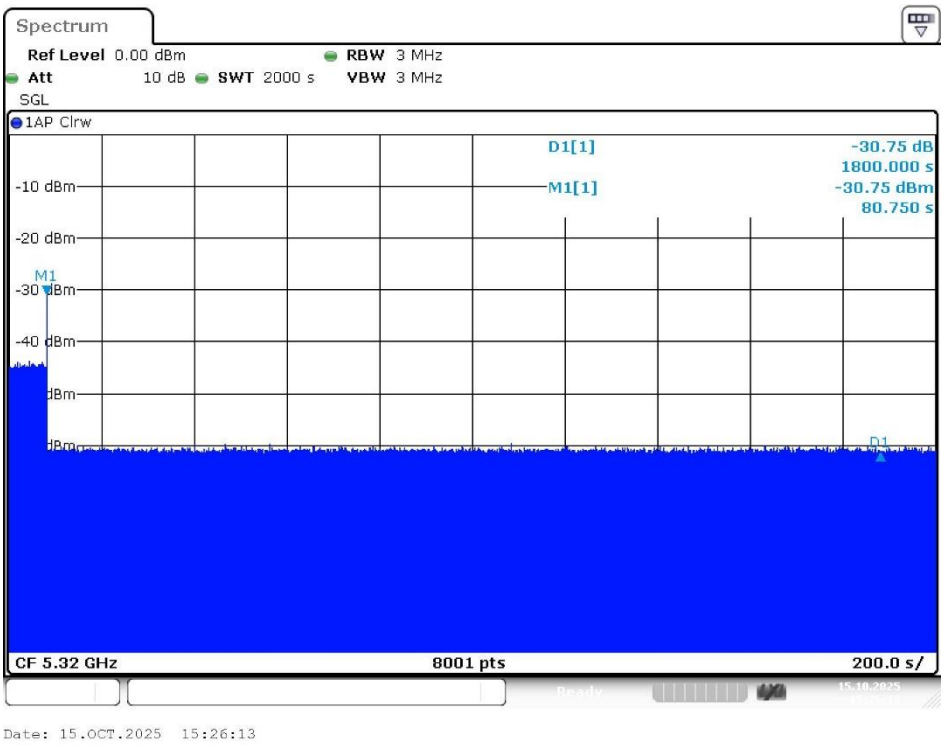
Measure the EUT for more than 30 minutes following the channel close/move time to very that the EUT does not resume any transmissions on this channel. Provide one plot to demonstrate no transmission on the channel for the non-occupancy period (30 minutes observation time)

8.2 Test Result

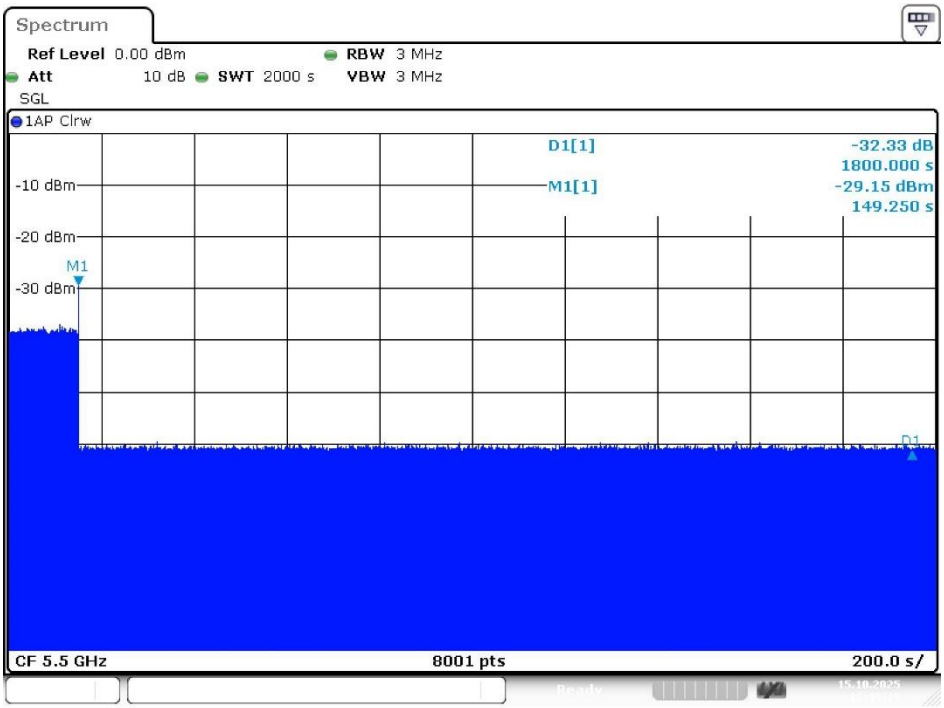
Frequency(MHz)	Bandwidth (MHz)	Spectrum Analyzer Display
5320	20	No transmission within 30 minutes
5500	20	No transmission within 30 minutes

Please refer to the following plots.

5320 MHz



5500 MHz



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

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