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FCC & IC EVALUATION REPORT FOR CERTIFICATION

Project No. : NK-24-R-410
Applicant : SOLUM CO., LTD.
4, 5, 6th F, 357, Guseong-ro, Giheung-gu, Yongin-si, Gyeonggi-do, South Korea

Dates of receipt : September 26, 2024
Dates of Issue : March 18, 2025
Test Site :
Nemko Korea Co., Ltd.

FCC ID :	**2AFWNWT10FACNDW0HSM**
IC :	**22800-WT10FACND**
Applicant :	**SOLUM CO., LTD.**
Brand Name :	**SOLUM**
Model:	**WT10FACNDW0HSM**
Additional Model(s):	**WT10FACNDU0HSM** **WT10FACNDW1HSM, WT10FACNDU1HSM** **WT10FACNDW2HSM, WT10FACNDU2HSM** **WT10FACNDW3HSM, WT10FACNDU3HSM**
EUT Type:	**Information Technology Audio Video**
Classification:	**Unlicensed National Information Infrastructure (NII)**
Date of Test:	**October 24, 2024 ~ December 27, 2024**
Applied Standard:	**FCC 47 CFR Part 15.407** **RSS-Gen Issue 5, RSS-247 Issue 3**

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By : Yonghwan Kim
Test Engineer

Reviewed By : Hoonpyo Lee
Technical Manager

Revision History

Rev.	Issue Date	Revisions	Revised By
00	March 18, 2025	Initial issue	Yonghwan Kim

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in determining radiated and conducted emissions emanating.

These measurement tests were conducted at **Nemko Korea Co., Ltd.**
The site address 165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Rep. of Korea.

1.2 Accreditation and listing

Accreditation type		Accreditation number
FC	CAB Accreditation for DOC	Designation No. KR0026
KOLAS	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. KT155
Industry Canada	Canada IC Registered site	Site No. 29506
VCCI	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
IECEE CB SCHEME	EMC CBTL	TL124
KC	KCC(RRL)Designated Lab.	Registration No. KR0026

2. EUT INFORMATION & TEST CONDITIONS

2.1 EUT Information

2.1.1 Specifications

EUT Type	Information Technology Audio Video
Model Name	WT10FACNDW0HSM
Frequency of Operation	For U-NII-2A Band 5 260 MHz to 5 320 MHz : 802.11a,n,ac (20 MHz) 5 270 MHz to 5 310 MHz : 802.11n,ac (40 MHz) For U-NII-2C Band 5 500 MHz to 5 700 MHz : 802.11a,n,ac (20 MHz) 5 510 MHz to 5 670 MHz : 802.11n,ac (40 MHz)
Maximum Conducted Output Power	802.11a : 12.22 dBm 802.11n (20 MHz) : 12.02 dBm 802.11n (40 MHz) : 12.08 dBm 802.11ac (20 MHz) : 12.06 dBm 802.11ac (40 MHz) : 12.12 dBm
Number of Channels	For U-NII-2A Band 802.11a,n,ac(20 MHz): 4ch 802.11n,ac(40 MHz): 2ch For U-NII-2C Band 802.11a,n,ac(20 MHz): 11ch 802.11n,ac(40 MHz): 5ch
Modulations	BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Gain (peak)	U-NII-2A : 0.65 dBi U-NII-2C : 2.89 dBi
Antenna Setup	1TX / 1RX
EUT Rated Voltage	DC 9 V ~ 24 V
EUT Test Voltage	DC 12 V
HVIN (Hardware Version Number)	WT10FACNDW0HSM
FVIN (Firmware Version Identification Number)	V1.1
Remarks	-

2.1.2 Operating Mode

□	Master
□	Client with radar detection
■	Client without radar detection

2.2 Support Equipment

EUT	SOLUM CO., LTD. Model : WT10FACNDW0HSM	S/N: N/A
Master device	KAONMEDIA Model : CG3000	FCC ID : WQTCG3000 S/N : N/A
Laptop Computer	HP Model : G62-355TU	FCC DOC S/N : CNF0489WDT
Laptop Computer	LG Model : 14Z970-GR30K	FCC ID: BEJNT-14Z970 S/N: 701NFQ065883

3. SUMMARY OF TEST RESULTS

U-NII-2C : 5550 MHz			
Parameter	**Measured value**	**Limit**	**Result**
Channel Move Time	0.848 seconds	10 seconds	PASS
Channel Closing Transmission Time	< 200 milliseconds + 18.7 milliseconds	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period	PASS
Non-Occupancy Period	Over 30 minutes	Minimum 30 minutes	PASS

Notes:

1. One frequency (widest BW) will be chosen from the operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.

4. TEST METHODOLOGY

1. FCC CFR 47 Part 15.
2. RSS-247 Issue 3
3. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

5. TECHNICAL REQUIREMENTS FOR DFS

5.1 DFS Overview

A U-NII network will employ a DFS function to:
1) detect signals from radar systems and to avoid co-channel operation with these systems.
2) This applies to the 5250-5350 MHz and/or 5470-5725 MHz bands.
Within the context of the operation of the DFS function, a U-NII device will operate in either Master Mode or Client Mode. U-NII devices operating in Client Mode can only operate in a network controlled by a U-NII device operating in Master Mode.

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.		

5.2 Master Devices

a) The Master Device will use DFS in order to detect Radar Waveforms with received signal strength above the DFS Detection Threshold in the 5250 - 5350 MHz and 5470 - 5725 MHz bands. DFS is not required in the 5150 - 5250 MHz or 5725 - 5825 MHz bands.

b) Before initiating a network on a Channel, the Master Device will perform a Channel Availability Check for a specified time duration (Channel Availability Check Time) to ensure that there is no radar system operating on the Channel, using DFS described under subsection a) above.

c) The Master Device initiates a U-NII network by transmitting control signals that will enable other U-NII devices to Associate with the Master Device.

d) During normal operation, the Master Device will monitor the Channel (In-Service Monitoring) to ensure that there is no radar system operating on the Channel, using DFS described under a).

e) If the Master Device has detected a Radar Waveform during In-Service Monitoring as described under d), the Operating Channel of the U-NII network is no longer an Available Channel. The Master Device will instruct all associated Client Device(s) to stop transmitting on this Channel within the Channel Move Time. The transmissions during the Channel Move Time will be limited to the Channel Closing Transmission Time.

f) Once the Master Device has detected a Radar Waveform it will not utilize the Channel for the duration of the Non-Occupancy Period. [1)]

g) If the Master Device delegates the In-Service Monitoring to a Client Device, then the combination will be tested to the requirements described under d) through f) above.

Note:

[1)] *Applies to detection during the Channel Availability Check or In-Service Monitoring.*

5.3 Client Devices

a) A Client Device will not transmit before having received appropriate control signals from a Master Device.

b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.

c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.2 apply.

d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.

e) The client test frequency must be monitored to ensure no transmission of any type has occurred for 30 minutes. Note: If the client moves with the master, the device is considered compliant if nothing appears in the client non-occupancy period test. For devices that shut down (rather than moving channels), no beacons should appear.

5.4 DFS Detection Thresholds

Table 3 below provides the DFS Detection Thresholds for Master Devices as well as Client Devices incorporating In-Service Monitoring.

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.	

5.5 Response Requirements

Table 4 provides the response requirements for Master and Client Devices incorporating DFS.

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.	

5.6 RADAR TEST WAVEFORMS

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

5.6.1 Short Pulse Radar Test Waveforms

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 Test B	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	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.					

Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a
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.

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4. For example, the following table indicates how to compute the aggregate of percentage of successful detections.

Radar Type	Number of Trials	Number of Successful Detections	Minimum Percentage of Successful Detection
1	35	29	82.9 %
2	30	18	60 %
3	30	27	90 %
4	50	44	88 %
Aggregate (82.9% + 60% + 90% + 88%)/4 = 80.2%			

5.6.2 Long Pulse Radar Test Waveform

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

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a transmission period will have the same chirp width. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen randomly.

5.6.3 Frequency Hopping Radar Test Waveform

Table 7 – Long Pulse 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

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm: [2)]

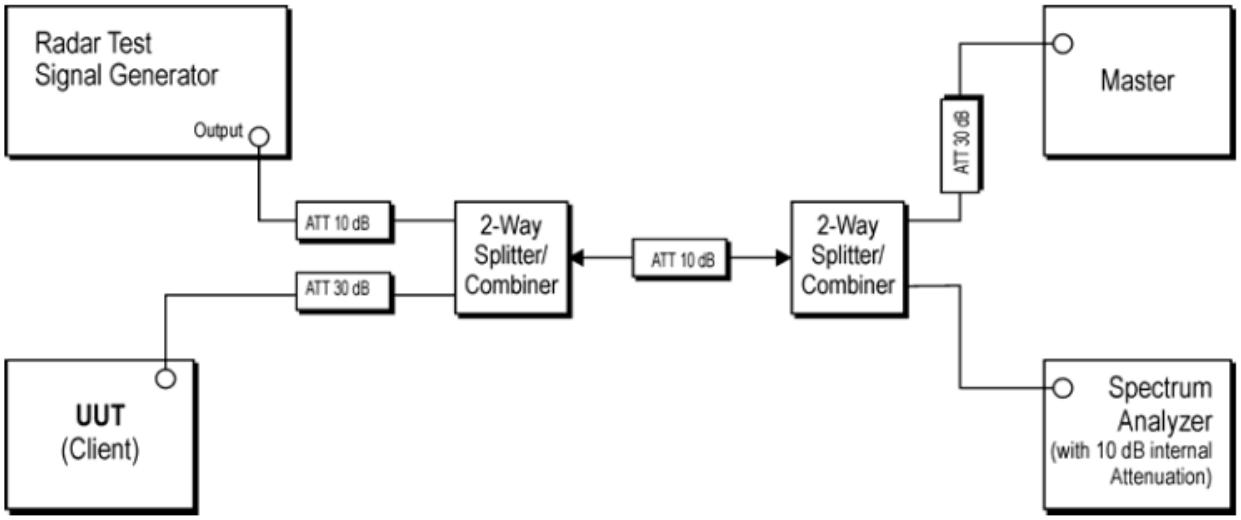
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

Note:

[2)] If a segment does not contain at least 1 frequency within the U-NII Detection Bandwidth of the UUT, then that segment is not used.

6. DESCRIPTION OF TESTS

6.1 Typical Test Setup for Conduction DFS test



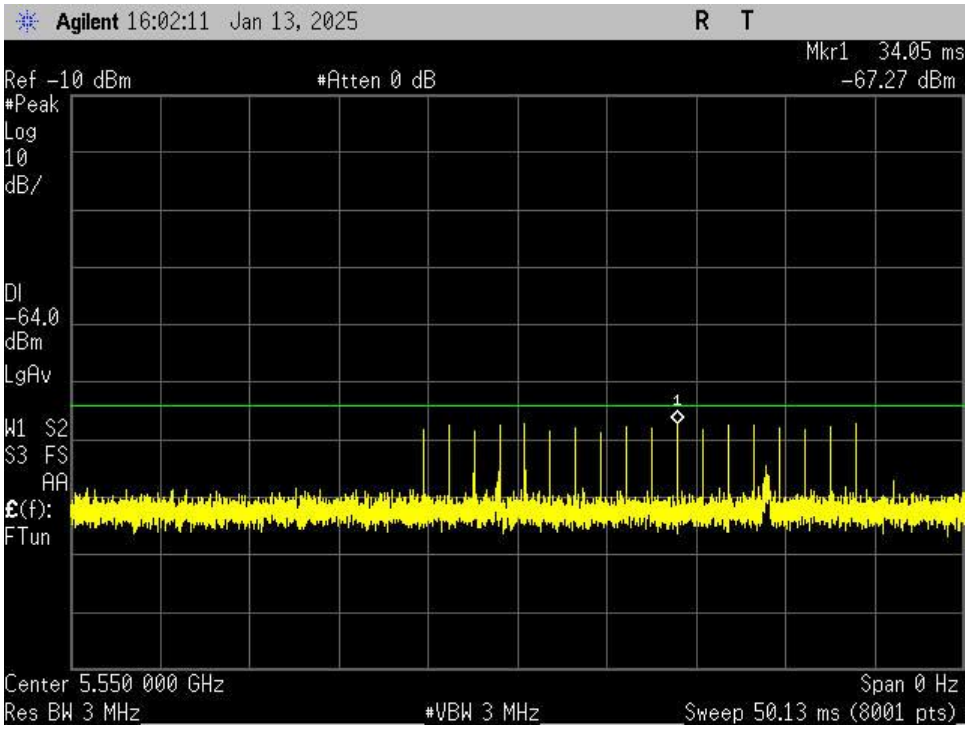
6.2 Test Procedure

1) The EUT is set up in accordance with “7.1 test setup for conduction DFS test in KDB905462 D02 v02” and communicated with Master device.
2) The Client Device (EUT) is set up the above diagram and communications between the Master device and the Client is established.
3) The vector signal generator is adjusted to provide the radar burst (type 0 radar pulse) at a level of approximately -64 dBm at the antenna of the Master device.
4) A trigger is provided from the pulse generator to the monitoring system in order to capture the traffic and occurrence of the radar pulse.
5) The monitoring system is set with 15 sec sweep time and 8001 sweep point to record the any transmissions occurring up to and after 10 sec.
6) The system again and the monitoring time is shortened in order to capture the Channel Closing Transmission Time. This time is measured to insure that the Client ceases transmission with 200 ms and the aggregate of emissions occurring after 200 ms up to 10 sec do not exceed 60 ms.
7) After the initial radar burst the channel is monitored for 30 minutes to insure no transmissions or beacons occur. A second monitoring setup is used to verify that the Master and Client have both moved to different channels.

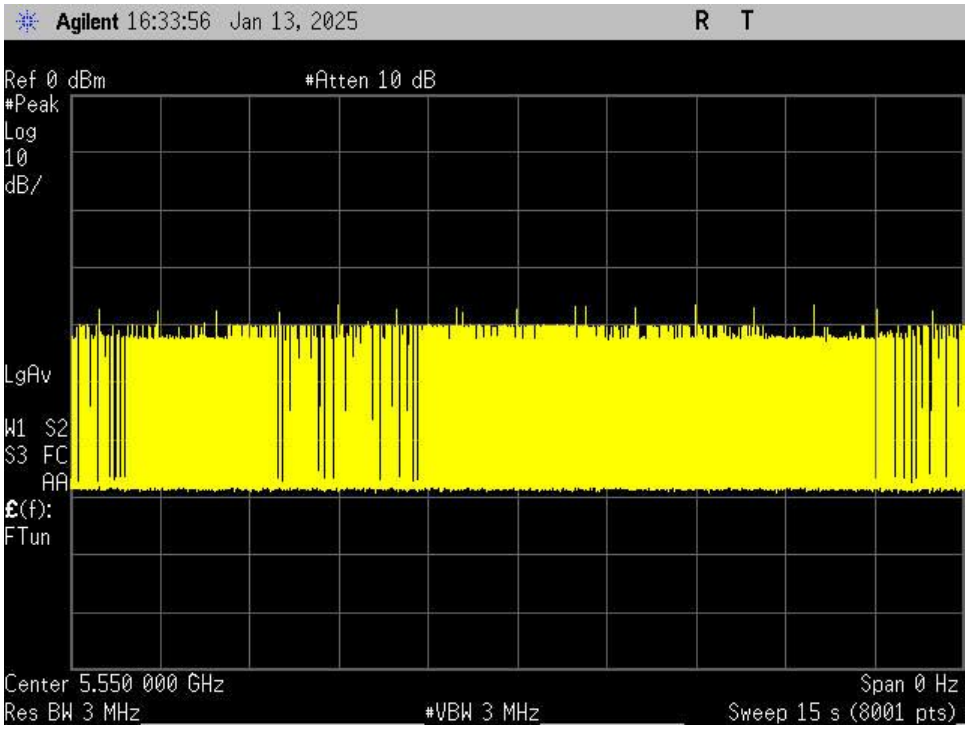
7. TEST DATA

7.1 Test data of UNII-2C Band

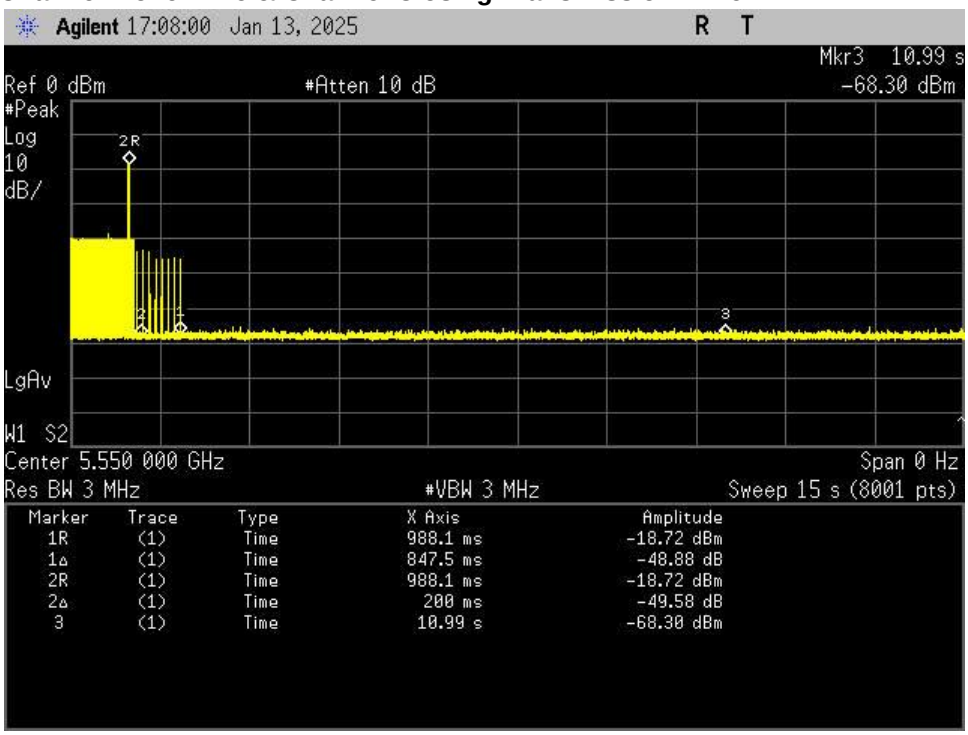
Radar test signal 0 threshold level at 5 550 MHz



Data Traffic Plot at 5 550 MHz



Channel Move Time & Channel Closing Transmission Time



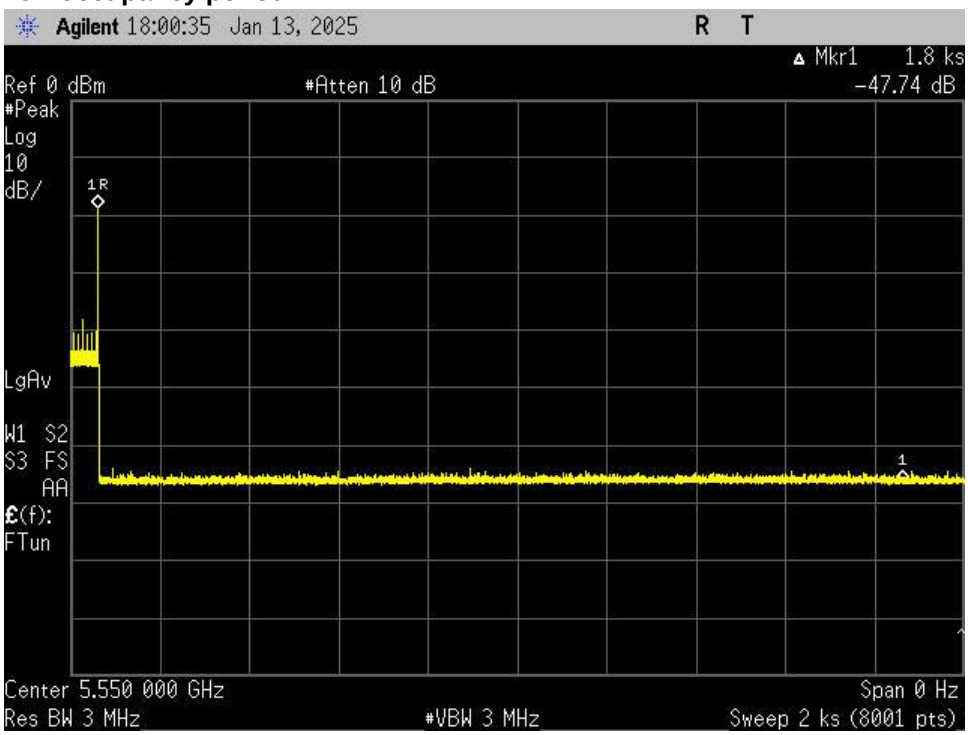
Test Item	Measured value	Limit	Result
Channel Move Time	0.848 seconds	10 seconds	Pass

Test Item	Measured value	Limit	Result
Channel Closing Transmission Time	< 200 milliseconds + 18.7 milliseconds	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period	Pass

Aggregate Transmission Time from 200 ms to 10 sec after Radar Burst
= Number of pulses from the Client occurring x (Sweep time(ms) / Total number of sweep points)
= 10 x (15000 / 8001) = 18.7 ms

Notes :
Marker 1R, 2R : End of Radar Burst
Delta 1△ : Channel Move Time
Delta 2△ : 200 ms from end of Burst
Marker 3 : 10 S from end of Burst

Non-occupancy period



Test Item	Measured value	Limit	Result
Non-occupancy period	Over 30 minutes	Minimum 30 minutes	Pass

Notes :

Marker 1R : End of Radar Burst

Delta 1△ : 1800 S from end of Burst

8. TEST EQUIPMENT

No.	Instrument	Manufacture	Model	Serial No.	Calibration Date	Next Calibration Date
1	DIGITAL MULTIMETER	EZ DIGITAL	DM-334	2111395	10/8/2024	10/8/2025
2	Humidity Temperature	Lutron	MHB-382SD	AK.26553	10/16/2024	10/16/2025
3	Spectrum Analyzer	Agilent	E4440A	MY44303257	10/7/2024	10/7/2025
4	10 dB Attenuator	API technologies corp	40A2W-10	1916	7/3/2024	7/3/2025
5	10 dB Attenuator	Fairview Microwave	SA26B-10	1643	7/5/2024	7/5/2025
6	10 dB Attenuator	Fairview Microwave	SA26B-10	1643-1	7/5/2024	7/5/2025
7	10 dB Attenuator	API technologies corp	40A2W-10	1912	3/29/2024	3/29/2025
8	10 dB Attenuator	API technologies corp	40A2W-10	1916	7/3/2024	7/3/2025
9	10 dB Attenuator	API technologies corp	40A2W-10	1917	1/8/2025	1/8/2026
10	30 dB Attenuator	API technologies corp	89-30-21	CK7023	3/29/2024	3/29/2025
11	Power Divider	H.P	11636B	50533	10/7/2024	10/7/2025
12	Power Divider	H.P	11636B	09331	10/7/2024	10/7/2025
13	Vector Signal Generator	R&S	SMBV100A	257152	10/7/2024	10/7/2025

END REPORT