



Test report No.: 2350034R-RFUSV18S-A

# **TEST REPORT**

Product Name	Mobile Computer
Trademark	CIPHERLAB
Model and /or type reference	RK26W6O
FCC ID	Q3N-RK26W6O
Applicant's name / address	CipherLab Co., Ltd. 12F, 333, Dunhua S.Rd., Sec.2, Taipei, Taiwan
Manufacturer's name	CIPHERLAB CO. LTD.
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart E 15.407 (h) KDB 905462
Verdict Summary	IN COMPLIANCE
Documented By (Supervisor / Jinn Chen)	Tim Chen
Tested By (Senior Engineer / Benjamin Pan)	Jim Chen Benjamin Pan Jack Hsu
Approved By (Senior Engineer / Jack Hsu)	Jack Hsu
Date of Receipt	2023/05/03
Date of Issue	2023/08/07
Report Version	V1.0



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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 2350034R-Product Photos-FCC, ISED



## **Competences and Guarantees**

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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#### General conditions

- 1. The test results relate only to the samples tested.
- 2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
- 3. This report must not be used to claim product endorsement by TAF or any agency of the government.
- 4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
- 5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.



# **Revision History**

Report No.	Version	Description	<b>Issued Date</b>
2350034R-RFUSV18S-A	V1.0	Initial issue of report.	2023/08/07



# 1. General Information

# 1.1. EUT Description

Mobile Computer
CIPHERLAB
RK26W6O
AC 100-240V, 50-60Hz or DC 3.8V (Power by Battery)
AC 120V/60Hz and DC 3.8V (Power by Battery)
802.11a/n/ac/ax-20 MHz:
5180-5320 MHz, 5500-5700 MHz, 5745-5825 MHz
802.11n/ac/ax-40 MHz:
5190-5310 MHz, 5510-5670MHz, 5755-5795 MHz
802.11ac/ax-80 MHz:
5210-5290 MHz, 5530-5610 MHz, 5775 MHz
802.11a/n/ac/ax-20 MHz: 24CH
802.11n/ac/ax-40 MHz: 11CH
802.11ac/ax-80 MHz: 5CH
802.11a: 6-54 Mbps
802.11n: up to 300 Mbps
802.11ac: up to 866.7 Mbps
802.11ax: up to 1201 Mbps
802.11a/n/ac/ax:
OFDM, OFDMA, BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Auto
☐ Master ■ Slave (Without Radar Detection)
■ $<500$ mW not required $\square \ge 500$ mW employ a TPC
■ IP Based Systems ☐ Frame Based System ☐ Other System
Non-shielded, 1.5m, with one ferrite core bonded.
MFR: Sunny, M/N: SYS1561-1005
Input: AC 100-240V~, 1.0A MAX, 50-60Hz
Output: +5.0V=2.0A, 10.0W MAX.
MFR: CWT, M/N: 2AEA010BC3D
Input: AC 100-240V~ 50/60Hz 0.35A
Output: 5.0V=2.0A, 10.0W



## Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Auden	BRK26REH00001 (Main)	PIFA	-1.5 dBi for 5150~5250 MHz
				-0.8dBi for 5250~5350 MHz
				2.3 dBi for 5470~5725 MHz
				2.3 dBi for 5725~5850 MHz
		BRK26REH00001 (Aux)	PIFA	0.6 dBi for 5150~5250 MHz
				1.4 dBi for 5250~5350 MHz
				0.8 dBi for 5470~5725 MHz
				1.5 dBi for 5725~5850 MHz

Note: The antenna gain as by the manufacturer provided.

## 802.11a/n/ac/ax-20 MHz Center Working Frequency of Each Channel:

	20 Mills Control Working Frequency of Each Chamier.						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)		(MHz)
36	5180	40	5200	44	5220	48	5240
52	5260	56	5280	60	5300	64	5320
100	5500	104	5520	108	5540	112	5560
116	5580	120	5600	124	5620	128	5640
132	5660	136	5680	140	5700	149	5745
153	5765	157	5785	161	5805	165	5825

## 802.11n/ac/ax-40 MHz Center Working Frequency of Each Channel:

502.1111 de da 10 mil 2 center working requency of Eden Chaimer.							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)		(MHz)
38	5190	46	5230	54	5270	62	5310
102	5510	110	5550	118	5590	126	5630
134	5670	151	5755	159	5795		

## 802.11ac/ax-80 MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)		(MHz)
42	5210	58	5290	106	5530	122	5610
155	5775		-				

г			
	Test Mode	Mode 1	Transmit (802.11ax-80 MHz)



## 1.2. Standard Requirement

FCC Part 15.407:

U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30dBm. A TPC mechanism is not required for systems with an E.I.R.P. of less than 500mW.

U-NII devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

## 1.3. UNII Device Description

- (1) The EUT operates in the following DFS band:
  - 1. 5250-5350 MHz
  - 2. 5470-5725 MHz
- (2) The maximum EIRP of the 5GHz equipment is 17.65 dBm.
  Below are the available 50 ohm antenna assemblies and their corresponding gains.
  0dBi gain was used to set the -63 dBm threshold level (-64dBm +1 dB) during calibration of the test setup.
- (3) DFS operation description:

WLAN traffic is generated by the data packet from the Master device to the Slave Device.

- (4) This device does not exceed 27dBm e.i.r.p., so no transmit power control is implemented.
- (5) The master device is an Access Point and FCC ID: MSQ-RTAXHP00



# 1.4. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
	Temperature (°C)	10~40 °C	22.0 °C
Conductive	Humidity (%RH)	10~90 %	55.0 %

USA	FCC Registration Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.					
	Linkou Laboratory					
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C					
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan, R.O.C.					
Phone Number	+886-3-275-7255					
Fax Number	+886-3-327-8031					



## 1.5. Test Equipment

Dynamic Frequency Selection (DFS) / HY-SR05

Instrument	Manufacturer	Type No.	Serial No	Cal. Date	Cue Date
MXA Signal Analyzer	Agilent	N9020A	MY48010570	2022/10/25	2023/10/24
Vector Signal Generator	KEYSIGHT	N5182B	MY59100310	2022/08/04	2023/08/03

Instrument	Manufacturer	Type No.	Serial No
Splitter/Combiner (Qty: 2)	Mini-Circuits	ZFRSC-123-S+	SN331000910
Notebook PC	Dell	N/A	N/A
АТТ	Mini-Circuits	15542	30912
АТТ	Mini-Circuits	15542	30909
4 WAY Divider	WOKEN	0120A04056002D	151101
Rotary ATT (Qty: 2)	WOKEN	00801A1GGAM02Y	SMA 0-121dB
Access Point	ASUS	RT-AX88U	JCITHP000040

Software	Manufacturer	Function
N7607C Signal Studio for	KEYSIGHT	Radar Signal Generation Software
DFS Radar Profile 2022		
Update 1.0 V 2.4.0.0		
Iperf v2.0.8	iperf/fr	Streaming Date

Note: All equipments are calibrated every one year.

## 1.6. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

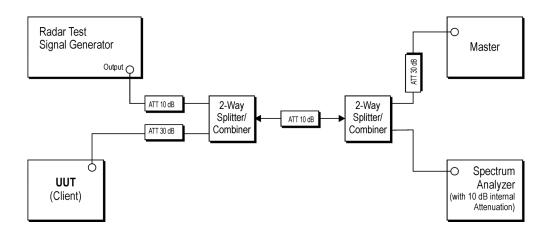
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty
Dynamic Frequency Selection (DFS)	±0.53 %



## 1.7. Test Setup



## 1.8. 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		



## 1.9. DFS requirements during normal operation

Requirement	Operational Mode				
	Master	Client	Client		
		Without Radar Detection	With Radar Detection		
DFS Detection Threshold	Yes	Not required	Yes		
Channel Closing Transmission Time	Yes	Yes	Yes		
Channel Move Time	Yes	Yes	Yes		
U-NII Detection Bandwidth	Yes	Not required	Yes		

#### 1.10. DFS Detection Thresholds

(1) Interference Threshold value, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥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.



## (2) DFS Response requirement values

Parameter	Value		
Non-Occupancy Period	30 Minutes		
Channel Availability Check Time	60 Seconds		
	10 seconds		
Channel Move Time	See Note 1.		
	200 milliseconds + an aggregate of 60		
Channel Closing Transmission Time	milliseconds over remaining 10 second period.		
	See Notes 1 and 2.		
	Minimum 100% of the U-NII 99% transmission		
U-NII Detection Bandwidth	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.

## 1.11. 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.



## (1) Short Pulse Radar Test Waveforms

Radar	Pulse	PRI	Number of Pulses	Minimum	Minimum			
Type	Width	(µsec)		Percentage of	Number			
	(µsec)			Successful	of			
				Detection	Trials			
0	1	1428	18	See Note 1	See Note			
					1			
1	1	Test A: 15 unique	((1))	60%	30			
		PRI values	$\left(\frac{360}{360}\right)$ .					
		randomly selected	Doundun					
		from the list of 23	19·10 <sup>6</sup>					
		PRI values in	PRI					
		Table 5a	(( µsec /)					
		Test B: 15 unique						
		PRI values						
		randomly selected						
		within the range						
		of 518-3066						
		$\mu$ sec, with a						
		minimum						
		increment of 1						
		$\mu$ sec,						
		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.

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 905462 D02 UNII DFS Compliance Procedures v01 Page 10 generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.



(2) Long Pulse Radar Test Signal

Radar Waveform	Bursts	Pulses Per Burst	Pulse Width (usec)	Chirp Width (MHz)	PRI (usec)	Successful	Minimum Trials
						Detection	
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the long pulse radar test signal. If more than 30 waveforms are used for the long pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

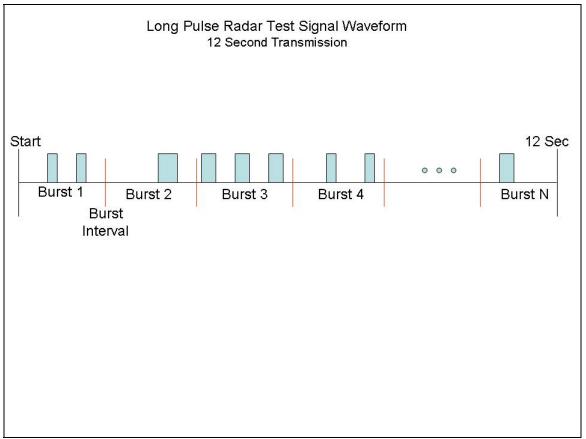
- 1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
- 2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst Count.
- 3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly 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.



A representative example of a Long Pulse radar test waveform:

- 1) The total test waveform length is 12 seconds.
- 2) Eight (8) Bursts are randomly generated for the Burst Count.
- 3) Burst 1 has 2 randomly generated pulses.
- 4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
- 5) The PRI is randomly selected to be at 1213 microseconds.
- 6) Bursts 2 through 8 are generated using steps 3 5.
- 7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 3,000,000 microsecond range).

Graphical Representation of a Long Pulse radar Test Waveform





(3) Frequency Hopping Radar Test Signal

Radar	Pulse	PRI	Hopping	Pulses	Hopping	Minimum	Minimum
Waveform	Width	$(\mu \sec)$	Sequence	Per Hop	Rate	Percentage	Trials
	$(\mu \sec)$		Length (msec)		(kHz)	of Successful	
						Detection	
6	1	333	300	9	0.333	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 1 from the hopping sequence defined by the following algorithm:

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.

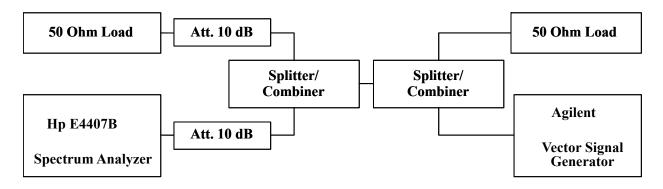


#### 1.12. Radar Waveform Calibration

The following equipment setup was used to calibrate the conducted radar waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were replace 50ohm terminal from master and client device and no transmissions by either the master or client device. The spectrum analyzer was switched to the zero span (time domain) at the frequency of the radar waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz and 3 MHz.

The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -64dBm due to the interference threshold level is not required.

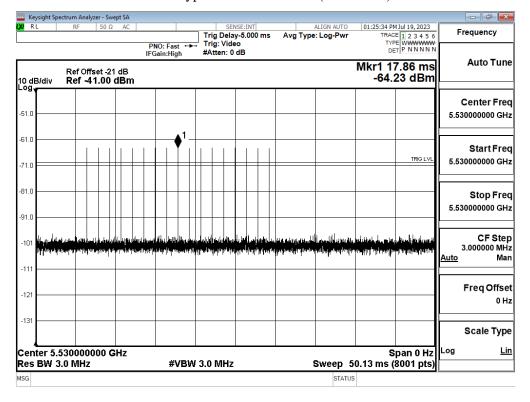
## Conducted Calibration Setup





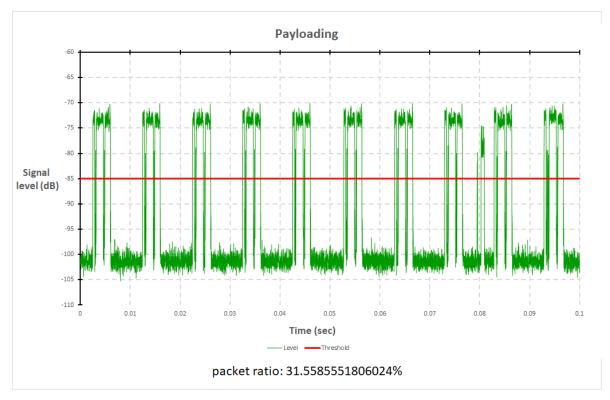
### 1.13. Radar Waveform Calibration Result

Radar Type 0 Calibration Plot (5530 MHz)



## 1.14. Slave Data Traffic Plot Result

## Plot of Slave Traffic at 5530 MHz



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# 2. In-Service Monitoring for Channel Move Time and Channel Closing Transmission Time and Non-Occupancy Period

#### 2.1. Test Procedure

These tests define how the following DFS parameters are verified during In-Service Monitoring;

Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.. The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB (-63dBm) is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Master Device will associate with the UUT (Client) at 5300 MHz and 5500MHz.

Stream the MPEG test file from the Client (TX) Device to the Master (RX) Device on the selected Channel for the entire period of the test.

At time T<sub>0</sub> the Radar Waveform generator sends a Burst of pulses for each of the radar types at -63dBm.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing

Transmission Time results to the limits defined in the DFS Response requirement values table.

Measure the UUT for more than 30 minutes following the channel close/move time to verify that the UUT does not resume any transmissions on this Channel.

### 2.2. Test Requirement

Parameter	Value
Channel Move Time	10 Seconds
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 seconds period
Non-Occupancy Period	Minimum 30 minutes

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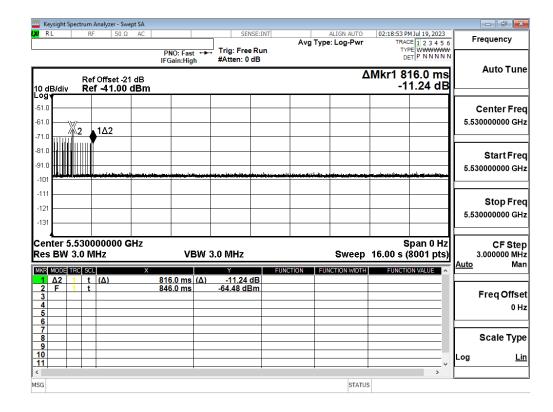
2.3. Test Result of Channel Move Time and Channel Closing Transmission Time and Non-Occupancy Period

Product : Mobile Computer

Test Item : Channel Move Time Test

Radar Type : Type 0

Test Mode : Transmit (802.11ax-80 MHz)-5530 MHz



Test Item	Test Result	Limit
	(Sec)	(Sec)
Channel Move Time	0.816	10

The results showed that after radar signal injected the channel move time was less than 10 seconds.

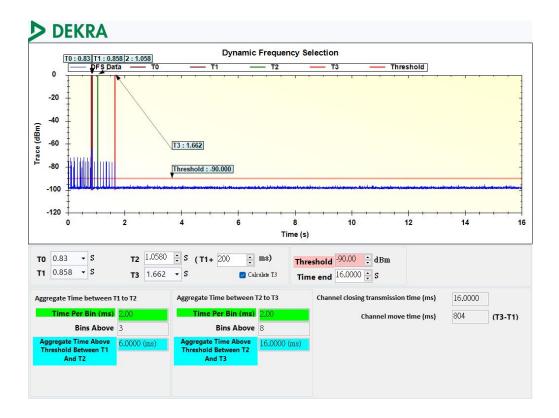


Product : Mobile Computer

Test Item : Channel Closing Transmission Time Test

Radar Type : Type 0

Test Mode : Transmit (802.11ax-80 MHz)-5530 MHz



Test Item	Test Result	Limit	
	(ms)	(ms)	
Channel Closing Transmission	16	200 milliseconds + approx. 60 milliseconds over	
		remaining 10 seconds period	

The results showed that after radar signal injected the channel transmission closing time less than 200 milliseconds and an aggregate of no more than 60 milliseconds.

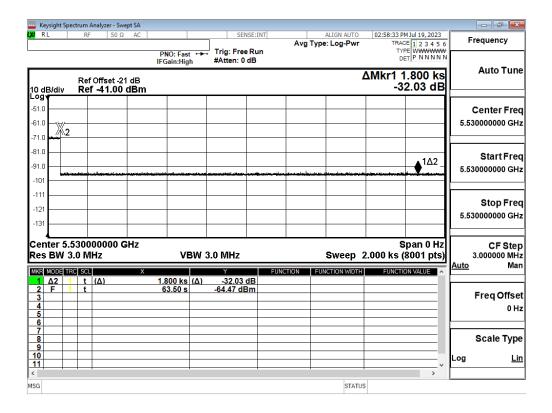


Product : Mobile Computer

Test Item : Non-Occupancy Period Test

Radar Type : Type 0

Test Mode : Transmit (802.11ax-80 MHz)-5530 MHz



Test Item	Test Result	Limit
	(minute)	(minute)
Non-Occupancy Period	>30	30