

低功率射頻電機試驗報告

產品名稱	Biometric Recognition Device
申請廠商	FaceSec Japan株式会社
製造商	FaceSec Japan株式会社
廠牌	FaceSec Japan株式会社
主型號	BRD-WS-BD
操作頻率	UNII-2a: 5250 - 5350MHz UNII-2c: 5470 - 5725MHz
該產品樣品試驗依據 之試驗標準	低功率射頻電機技術規範 (低功率 0002 (LP0002) 109.07.01 版本)
試驗結果	合格

試驗機構: 倍科檢驗科技有限公司(林口實驗室)

機構地址: 桃園市龜山區文德二路6號

案件受理日期: 109 年 11 月 23 日

報告發行日期: 109 年 12 月 28 日

報告編號: RDG201102003-07C



陳園儒 簽章

附註:

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報告發行紀錄:

版次	報告號碼	發行日期	說明
1.0	RDG201102003-07C	2020/12/28	報告發行

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1. 一般描述

1.1 待測設備樣品/特性

產品名稱	Biometric Recognition Device			
產品型號	BRD-WS-BD			
申請者	FaceSec Japan株式会社			
地址	東京都千代田区岩本町三丁目5番14号			
製造廠商	FaceSec Japan株式会社			
調變方式	OFDM			
天線資訊	天線型態	廠牌	型號	Gain
	PIFA Antenna	YJC	YJC-6N150-B27	1.60 dBi
測試日期	2020-12-12 – 2020-12-14			
供應電源	Adapter (FSP050-DIBAN2): I/P: 100-240Vac, 50/60Hz, 1.5A; O/P: 12Vdc, 4.16A			

1.2 測試實驗室資料

實驗室認可登錄	中華民國實驗室認證體系 認可編號：TAF: 3546 認證有效期間：108年05月03日至111年05月02日止 認可頻率範圍9kHz ~ 40GHz。
測試場地/實驗室地址	桃園市龜山區文德二路6號
實驗室名稱	倍科檢驗科技有限公司(林口實驗室)
電話/傳真	03-397-1072/03-397-1027

1.3 試驗室之測試不確定度

Parameter	Expanded Measurement uncertainty
RF Conducted test with Spectrum	± 2.77 dB

The test results with statement of conformity, the decision rules are based on the specifications and standards. The test results will not take the measurement uncertainty into account.

1.4 測試資訊與環境

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	Test Engineer
DFS (DFS-01)	2020-12-12 – 2020-12-14	22.7-23.3	55-61	Ethan Shao

2. 量測儀器一覽表

儀器名稱	廠商	型號	序號	校驗日期	下次校驗日期
DFS (DFS-01)					
MXG Vector Signal Generator	KEYSIGHT	N5182B	MY53051691	2020/01/06	2021/01/05
MXG X-Series Microwave Analog Signal Generator	KEYSIGHT	N5183B	MY53270771	2020/01/06	2021/01/05
EXA Signal Analyzer	Keysight	N9010A	MY55370253	2020/06/05	2021/06/04

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

3. 測試規範

A compliant test report to LP0002 section 5.7.2 shall be sufficient to show compliance of a transmitter or receiver with the requirement of this standard.

The following result table represents the list of measurements required under the LP0002 section 5.7.2, and KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02

Items	Description of Test	Results
Detection Bandwidth	UNII Detection Bandwidth	Not applicable
Channel Availability Check Time	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	Non-Occupancy Period	Not applicable
Radar Detection	Statistical Performance Check	Not applicable

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

4. DFS Requirement

4.1 適用標準

According LP0002 Section 5.7.2 and 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
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	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
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	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 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 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. Note 3: 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
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel move</i> (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 <i>U-NII Detection Bandwidth</i> 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 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 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	$\text{Roundup} \left(\left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{SEC}}} \right) \right)$	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.					

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.

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

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 $(82.9\% + 60\% + 90\% + 88\%)/4 = 80.2\%$			

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

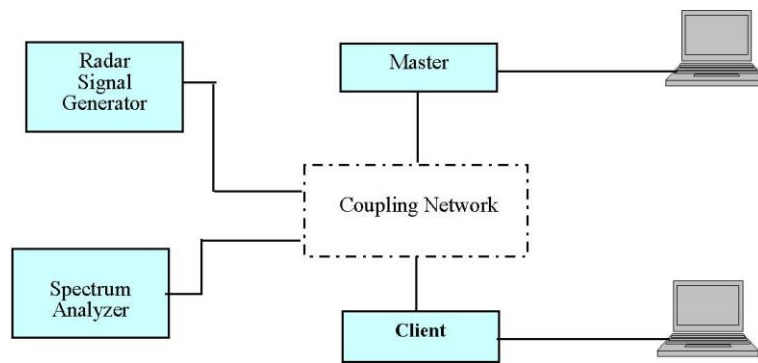
Table 7 – Frequency Hopping Radar Test Waveform

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

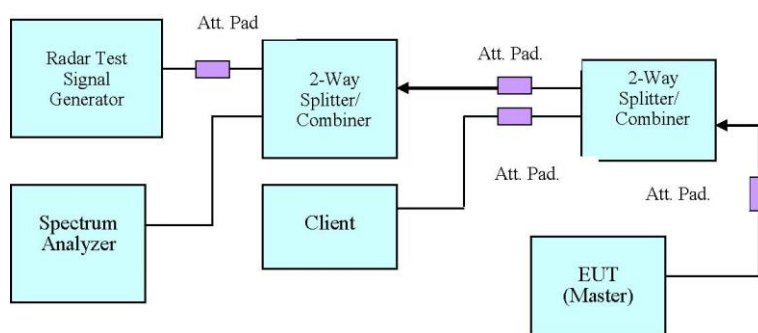
4.2 DFS Measurement System

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

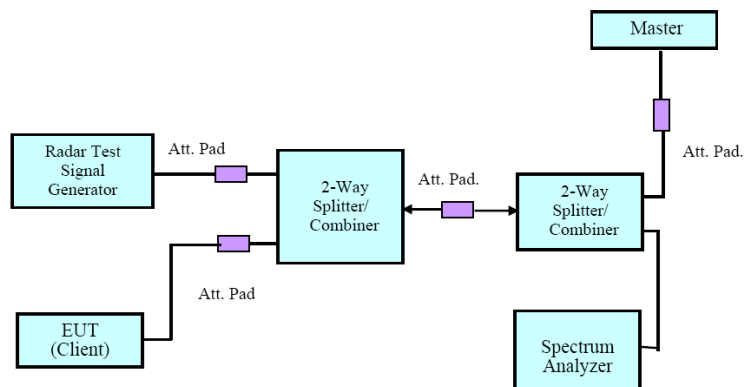
4.3 測試配置

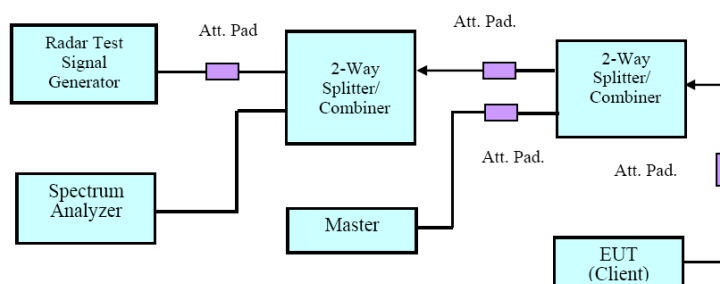
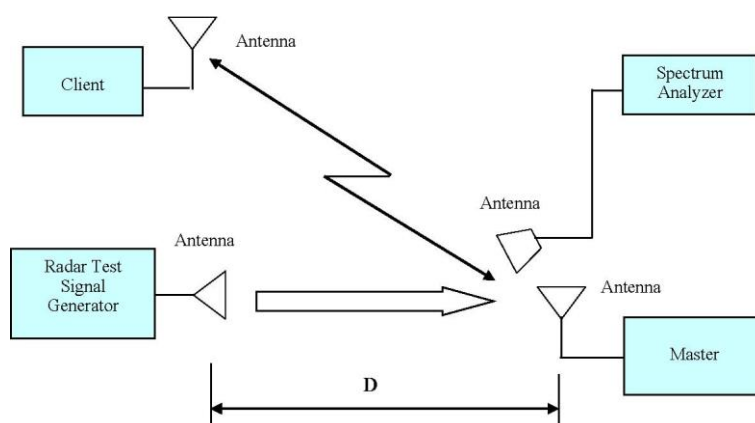


Conducted Method



Setup for Master with injection at the Master



Setup for Client with injection at the Master**Setup for Client with injection at the Client**

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.

5. 量測結果

5.1 Description of EUT

The EUT operates in 5250-5350 MHz and 5470-5725 MHz range. The rated output power of master device is >23 dBm (EIRP), therefore the required interference threshold level is -64 dBm, the required radiated threshold at antenna port is -64dBm. 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.

5.2 Channel Loading

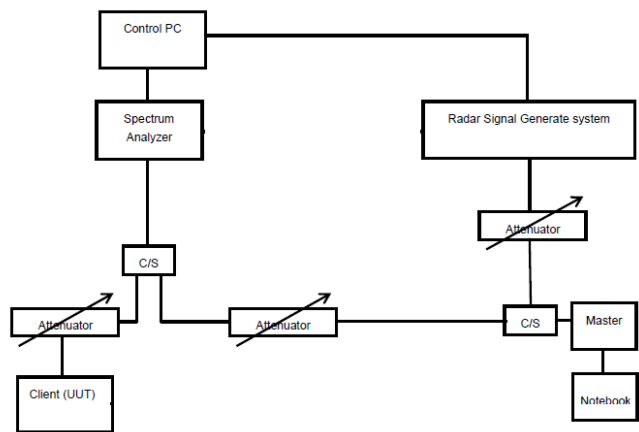
System testing will be performed with channel-loading using means appropriate to the data types that are used by the unlicensed device. The following requirements apply:

- a) The data file must be of a type that is typical for the device (i.e., MPEG-2, MPEG-4, WAV, MP3, MP4, AVI, etc.) and must generally be transmitting in a streaming mode.
- b) Software to ping the client is permitted to simulate data transfer but must have random ping intervals.
- c) Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the Time On/ (Time On + Off Time). This can be done with any appropriate channel BW and modulation type.
- d) Unicast or Multicast protocols are preferable but other protocols may be used. The appropriate protocol used must be described in the test procedures.

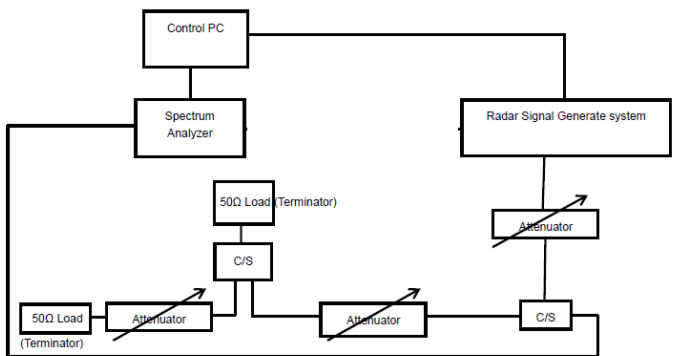
The sample is use method (C)

WLAN traffic is generated by streaming the video file TestFile.mpg, this file is used by IP and Frame based systems for loading the test channel during the In-service compliance testing of the U-NII device. The file is streamed from the Access Point to the Client in full motion video mode using the media player with the V2.61 Codec package.

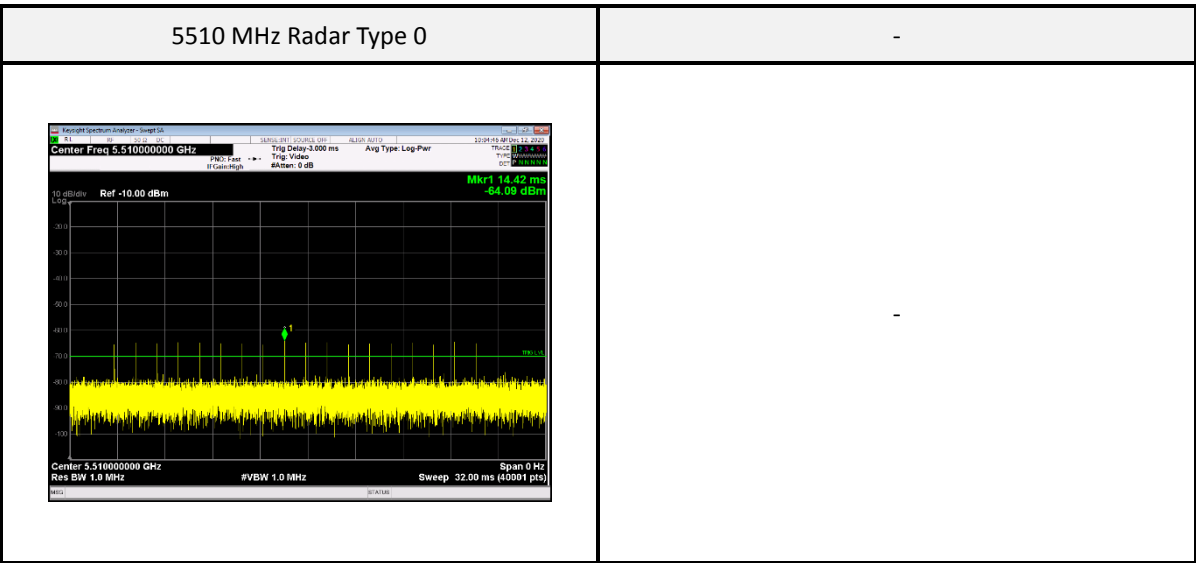
5.3 Test Setup Configuration



5.4 DFS Detection Threshold Level



5.5 量測結果



6. Channel Move Time and Channel Closing Transmission Time

6.1 Test Procedure

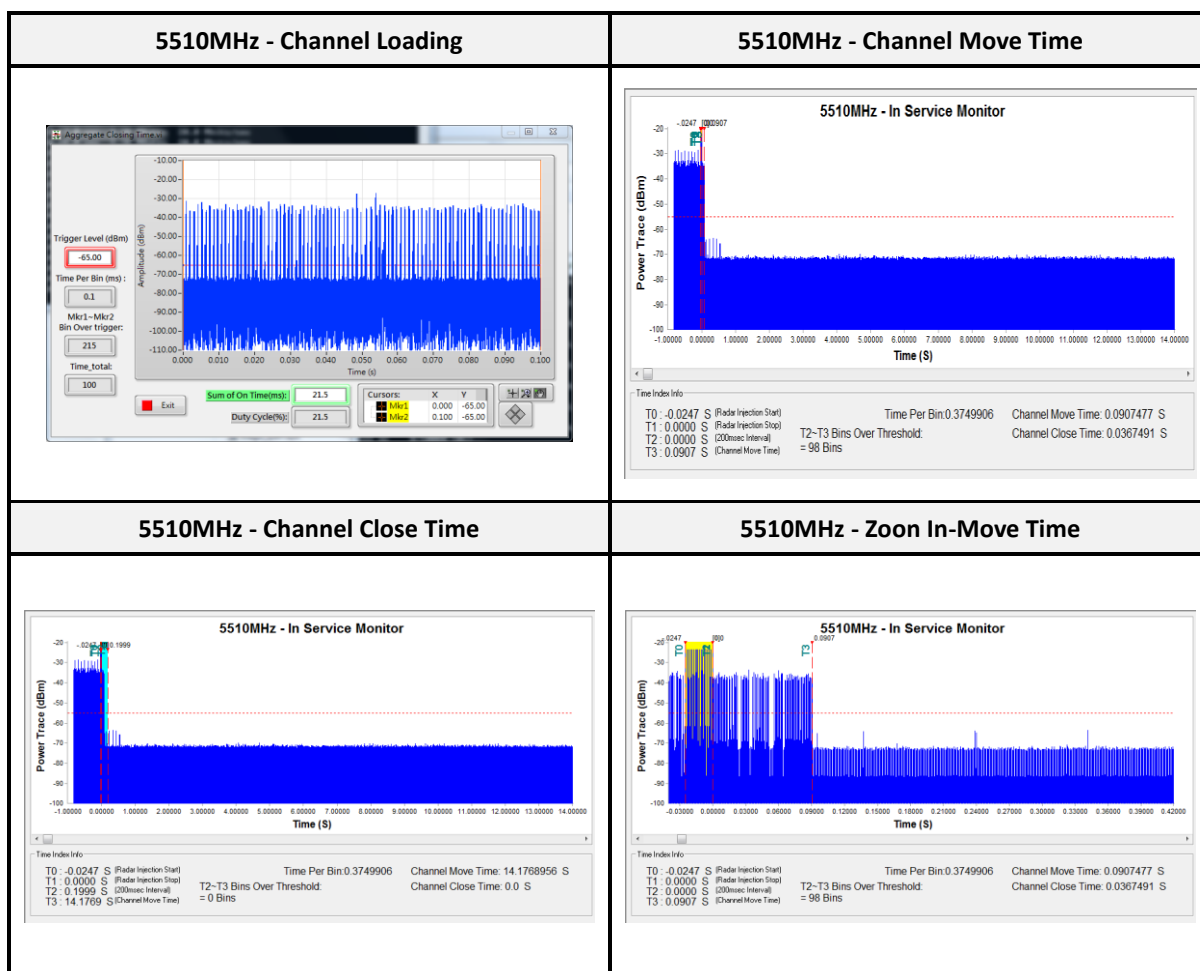
Perform type 0 short pulse radar waveform. The aggregate channel closing transmission time is calculated as follows: Aggregate Transmission Time = N*Dwell Time

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. 10000)

6.2 量測結果

frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5510	40	Type 0	Compliant

Please refer to the following tables and plots.



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