

TEST REPORT

Product : 10 inch WIFI Digital Photo Frame
Trade mark : N/A
Model/Type reference : Skylight 2, D104S
Serial Number : N/A
Report Number : EED32M00246403
FCC ID : 2AABK-SKYLIGHT2
Date of Issue : Sep. 08, 2020
Test Standards : 47 CFR Part 15 Subpart E
Test result : PASS

Prepared for:

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2 Version

Version No.	Date	Description
00	Dec. 19, 2018	Original
01	Aug.14, 2019	Add an adapter
02	Sep. 08, 2020	Change the new motherboard, adapter, and data line to change color.

3 Test Summary

Test Item	Test Requirement	Test method	Result
Non-Occupancy Period	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iv)	FCC Order, ET Docket No.03-122 (FCC 06-96)	N/A ¹⁾
DFS Detection Threshold	47 CFR Part 15 Subpart E Section 15.407 (h)(2)	FCC Order, ET Docket No.03-122 (FCC 06-96)	N/A ¹⁾
Channel Availability Check Time	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(ii)	FCC Order, ET Docket No.03-122 (FCC 06-96)	N/A ¹⁾
Uniform Spreading	47 CFR Part 15 Subpart E Section 15.407 (h)(2)	FCC Order, ET Docket No.03-122 (FCC 06-96)	N/A ¹⁾
U-NII Detection Bandwidth	47 CFR Part 15 Subpart E Section 15.407 (h)(2)	FCC Order, ET Docket No.03-122 (FCC 06-96)	N/A ¹⁾
Channel Closing Transmission Time	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	FCC Order, ET Docket No.03-122 (FCC 06-96)	PASS
Channel Move Time	47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	FCC Order, ET Docket No.03-122 (FCC 06-96)	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

N/A¹⁾: The operation mode of tested sample only is client without radar detection, therefore it is not required.

Model No.: Skylight 2, D104S

Only the model Skylight 2 was tested, Their electrical circuit design, layout, components used and internal writing are identical, Only the modes are different.

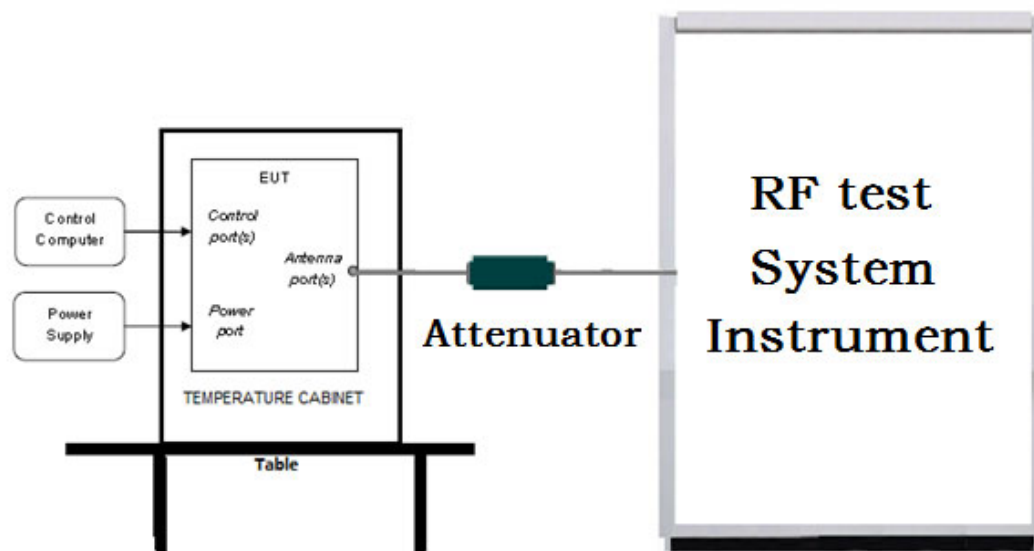
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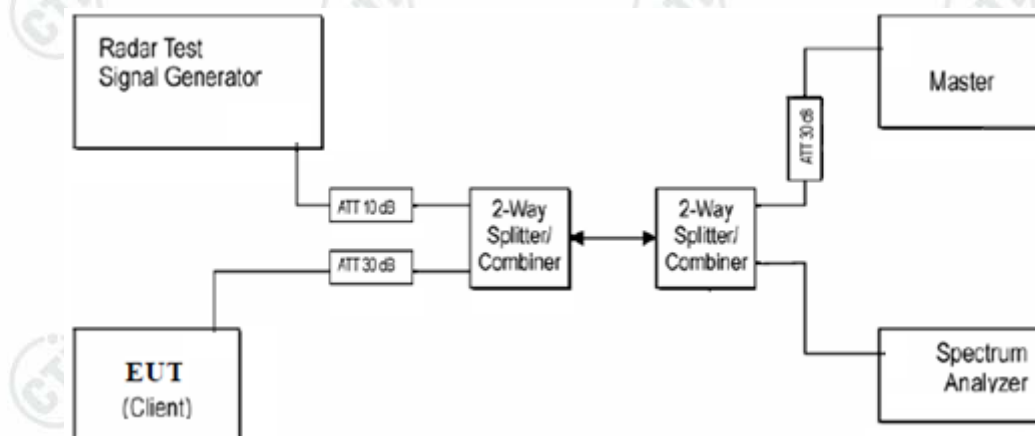
5 Test Requirement

5.1 Test setup

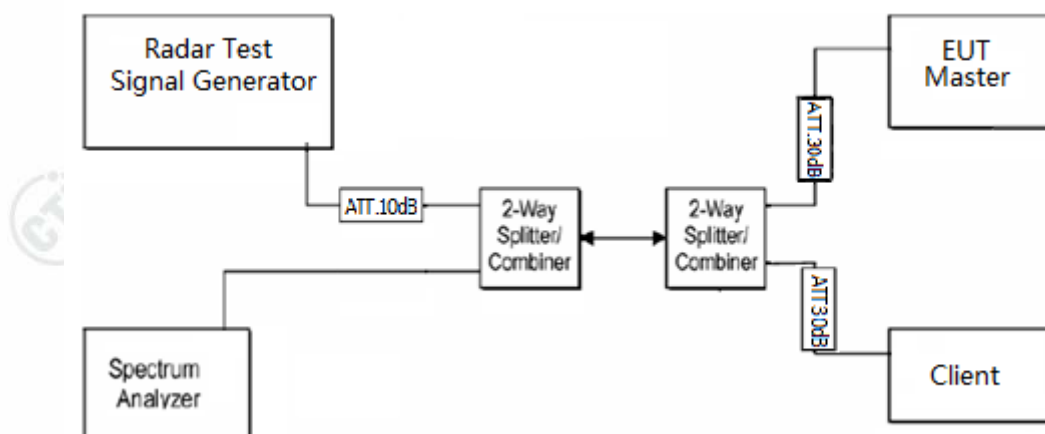
5.1.1 For Conducted test setup



5.1.2 Slave and Client device(EUT) block diagram of Test setup



5.1.3 Mast device(EUT) block diagram of Test setup



5.2 Test Environment

Operating Environment:	
Temperature:	20 °C
Humidity:	53 % RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

5.3.1 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.

a) Short Pulse Radar Test Waveforms

Radar Type	Pulse width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
1	1	1428	18	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

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. For Short Pulse Radar Type 1, the same waveform is used a minimum of 30 times. 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.

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4.

b) Long Pulse Radar Test Waveform

Radar Type	Pulse width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Burst	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.

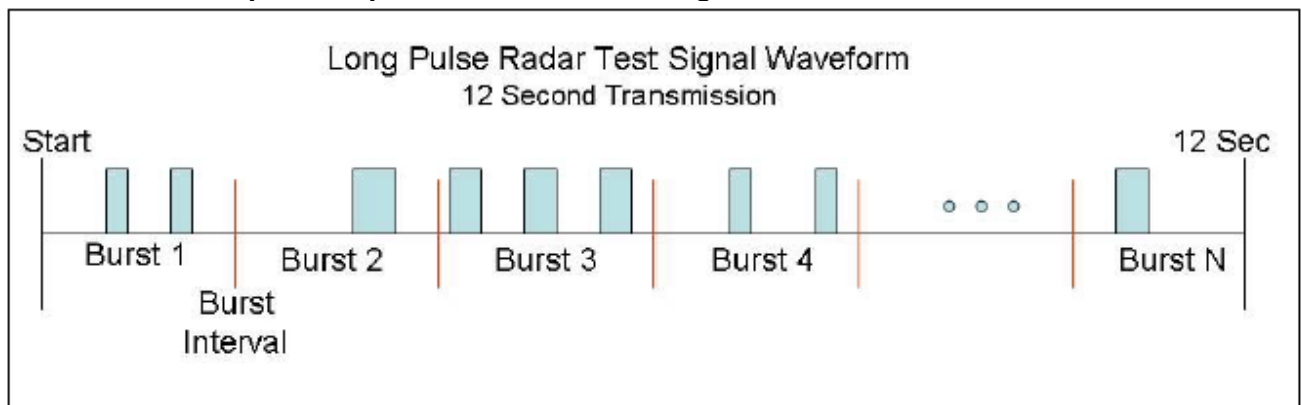
Each waveform is defined as follows:

- 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 Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. 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 $(12,000,000 / \text{Burst_Count})$ microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and $[(12,000,000 / \text{Burst_Count}) - (\text{Total Burst Length}) + (\text{One Random PRI Interval})]$ 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 Type 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 the Long Pulse Radar Test Waveform.



c) Frequency Hopping Radar Test Waveform

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

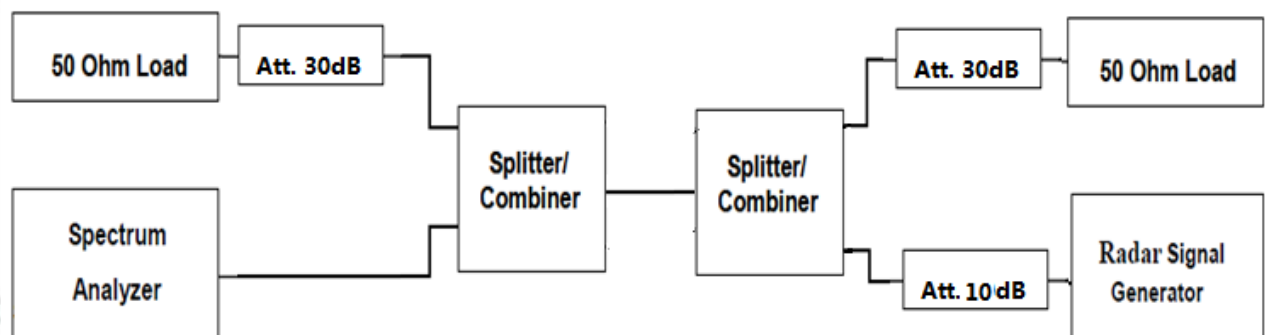
For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm.

d) 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 3MHz and 3 MHz.

The signal generator amplitude was set so that the power level measured at the spectrum analyzer was - 61dBm due to the interference threshold level is not required.

Conducted Calibration Setup



5.3.2 Technical requirement

a) Applicability of DFS Requirements

Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operation Mode		
	Master	Client without Radar Detection	Client with Radar Detection
Non-Occupancy Period	Yes	Not require	Yes
DFS Detection Threshold	Yes	Not require	Yes
Channel Availability Check Time	Yes	Not require	Not require
Uniform Spreading	Yes	Not require	Not require
U-NII Detection Bandwidth	Yes	Not require	Yes

Applicability of DFS requirements during normal operation

Requirement	Operation Mode		
	Master	Client without Radar Detection	Client with Radar Detection
DFS Detection Threshold	Yes	Not require	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not require	Yes

b) DFS Detection Thresholds and Response Requirement

DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value(See Notes 1 and 2)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 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.

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 60milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 80% of the UNII99% transmission power bandwidth See Note 3

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short Pulse Radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
- For the Long Pulse Radar Test Signal this instant is the end of the 12 second period defining the Radar Waveform.

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 10second 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 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

6 General Information

6.1 Client Information

Applicant:	Shenzhen Chuangwei Electronic Appliance Tech Co., Ltd.
Address of Applicant:	4F & 6F, Overseas plant south, Skyworth Industrial Park, Shiyan Street, Bao'an District, Shenzhen, P. R. China
Manufacturer:	Shenzhen Chuangwei Electronic Appliance Tech Co., Ltd.
Address of Manufacturer:	4F & 6F, Overseas plant south, Skyworth Industrial Park, Shiyan Street, Bao'an District, Shenzhen, P. R. China
Factory:	Shenzhen Chuangwei Electronic Appliance Tech Co., Ltd.
Address of Factory:	4F & 6F, Overseas plant south, Skyworth Industrial Park, Shiyan Street, Bao'an District, Shenzhen, P. R. China

6.2 General Description of EUT

Product Name:	10 inch WIFI Digital Photo Frame	
Model No.(EUT):	Skylight 2, D104S	
Test Model No.:	Skylight 2	
Trade Mark:	N/A	
EUT Supports Radios application:	5GHz Wi-Fi: U-NII-2A: 5.25-5.35GHz; U-NII-2C: 5.470-5.725GHz	
Power Supply:	AC Adapter	Model:S85A22 Input:100~240V~ 50/60Hz, 0.5A Output:5V---2A
Sample Received Date:	Aug. 14, 2020	
Sample tested Date:	Aug. 14, 2020 to Aug. 31, 2020	

6.3 Product Specification subjective to this standard

Operation Frequency:	U-NII-2A: 5260-5320MHz U-NII-2C:5500-5700MHz
Type of Modulation:	IEEE 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11n(HT20/HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11ac(VHT20/VHT40/VHT80): OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Test Power Grade:	Default
Test Software of EUT:	RFTTestTool
Integral antenna	Integral antenna
Antenna Gain:	2dBi
Test Voltage:	AC 120V, 60Hz

Operation Frequency each of channel

802.11a/802.11n/802.11ac(20MHz) Frequency/Channel Operations:

U-NII-2A		U-NII-2C	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
52	5260	100	5500
56	5280	104	5520
60	5300	108	5540
64	5320	112	5560
-	-	116	5580
-	-	120	5600
-	-	124	5620
-	-	128	5640
-	-	132	5660
-	-	136	5680
-	-	140	5700

802.11n/802.11ac(40MHz) Frequency/Channel Operations:

U-NII-2A		U-NII-2C	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
54	5270	102	5510
62	5310	110	5550
-	-	118	5590
-	-	126	5630
-	-	134	5670

802.11ac(80MHz) Frequency/Channel Operations:

U-NII-2A		U-NII-2C	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
58	5290	106	5530

6.4 Description of Support Units

The EUT has been tested with associated equipment below.

Associated equipment name		Manufacturer	Model	S/N serial number	Certification	Supplied by
AE1	Notebook	DELL	DELL 3490	D245DX2	CE & FCC	DELL

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

7 Equipment List

RF test system					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	Keysight	N9010A	MY54510339	02-17-2020	02-16-2021
Signal Generator	Keysight	N5182B	MY53051549	02-17-2020	02-16-2021
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	06-29-2020	06-28-2021
High-pass filter	Sinoscite	FL3CX03WG18N M12-0398-002	---	---	---
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	---	---
DC Power	Keysight	E3642A	MY56376072	02-17-2020	02-16-2021
PC-1	Lenovo	R4960d	---	---	---
BT&WI-FI Automatic control	R&S	OSP120	101374	02-17-2020	02-16-2021
RF control unit	JS Tonscend	JS0806-2	158060006	02-17-2020	02-16-2021
BT&WI-FI Automatic test software	JS Tonscend	JS1120-3	---	---	---

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15E	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB789033 D02 General UNII Test Procedures New Rules v01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15 subpart E

Test Results List:

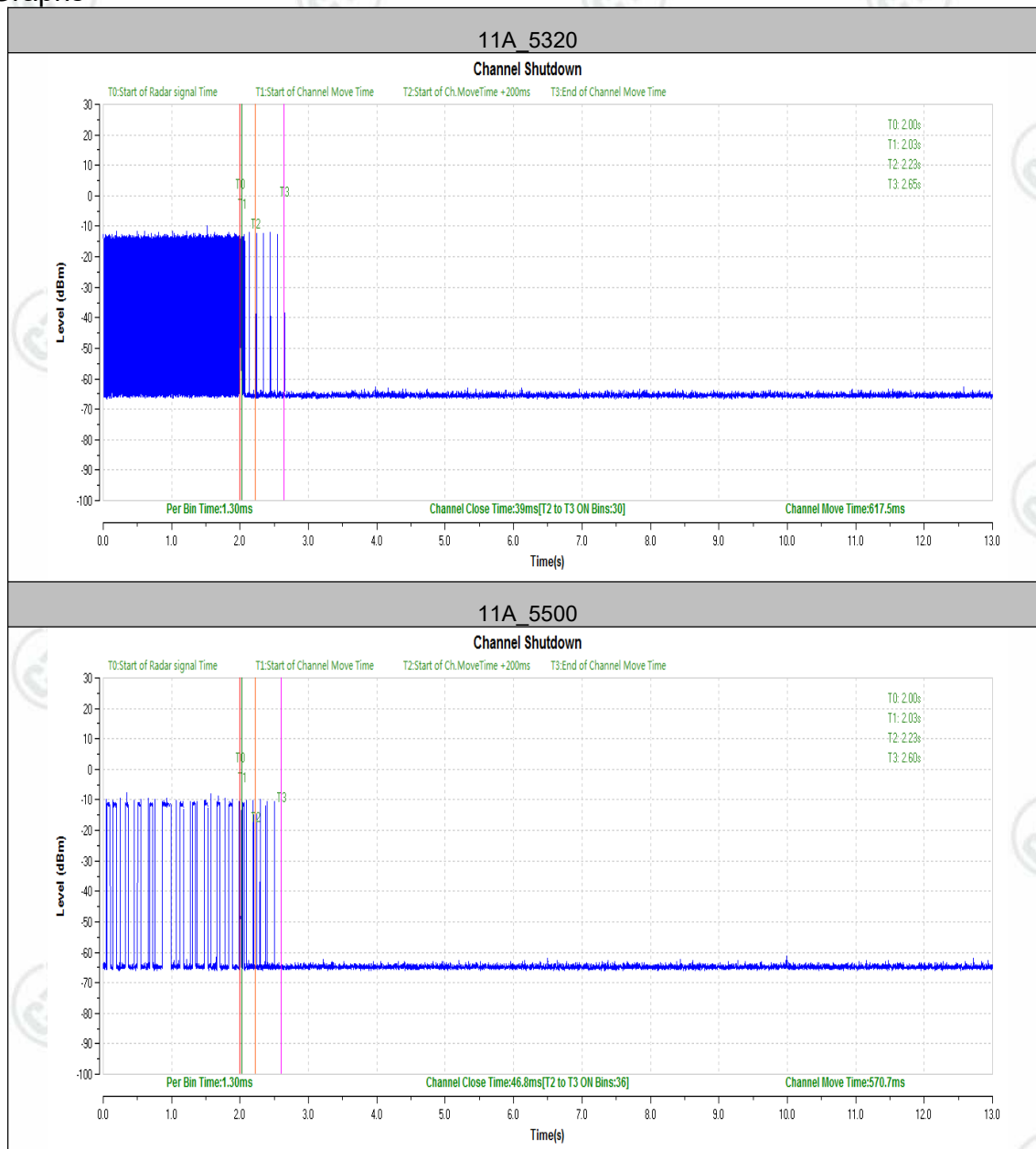
FCC Part15E	Test method	Test item	Operation Mode verdict	Note
			Client without Radar Detection	
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iv)	FCC 06-96	Non-Occupancy Period	Not require	N/A
47 CFR Part 15 Subpart E Section 15.407 (h)(2)	FCC 06-96	DFS Detection Threshold	Not require	N/A
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(ii)	FCC 06-96	Channel Availability Check Time	Not require	N/A
47 CFR Part 15 Subpart E Section 15.407 (h)(2)	FCC 06-96	U-NII Detection Bandwidth	Not require	N/A
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	FCC 06-96	Channel Closing Transmission Time	PASS	Appendix A)
47 CFR Part 15 Subpart E Section 15.407 (h)(2)(iii)	FCC 06-96	Channel Move Time	PASS	Appendix A)
47 CFR Part 15 Subpart E Section 15.407 (h)(2)	FCC 06-96	Uniform Spreading	Not require	N/A

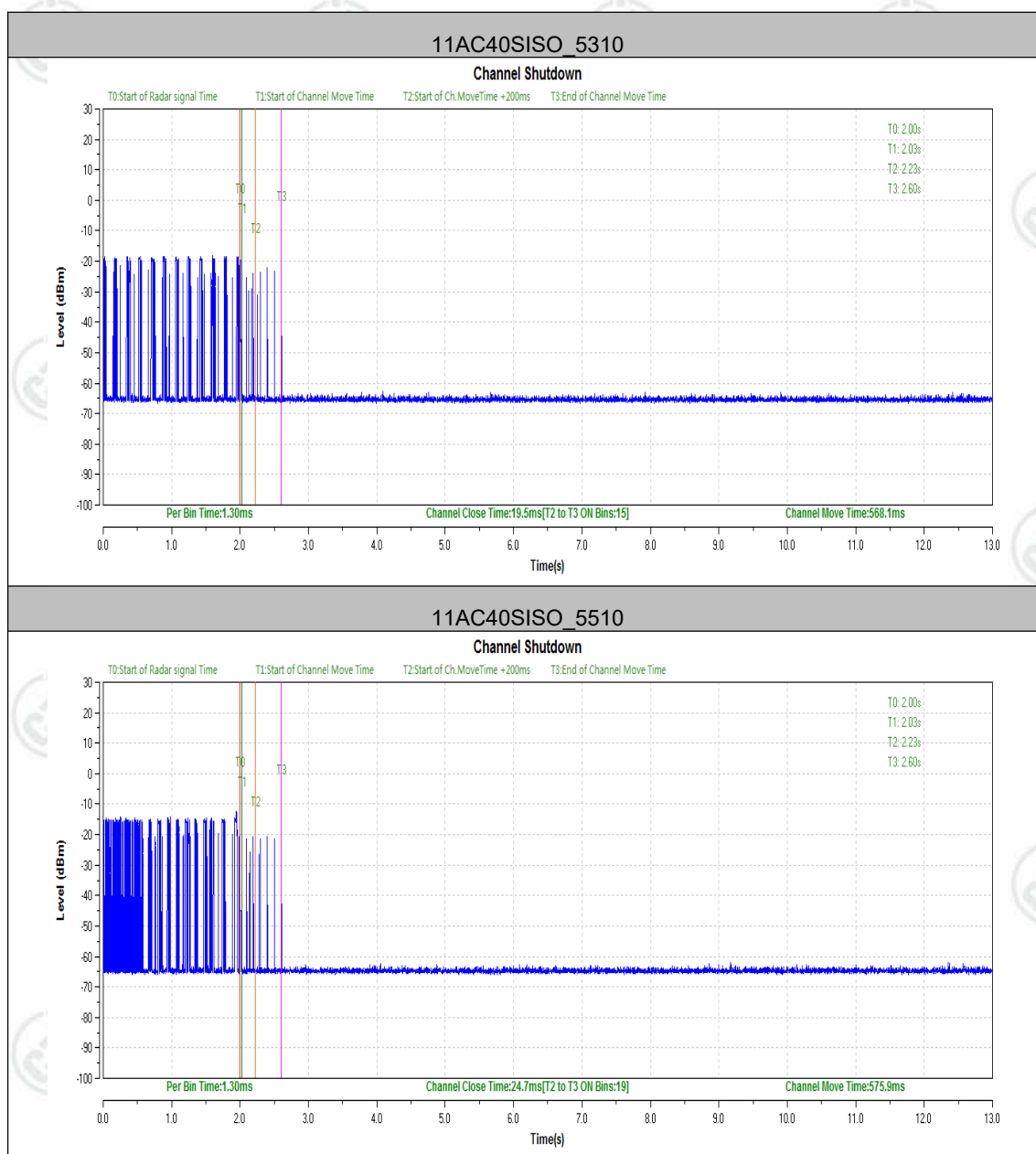
Appendix A: Channel Move Time and Channel Closing Transmission Time

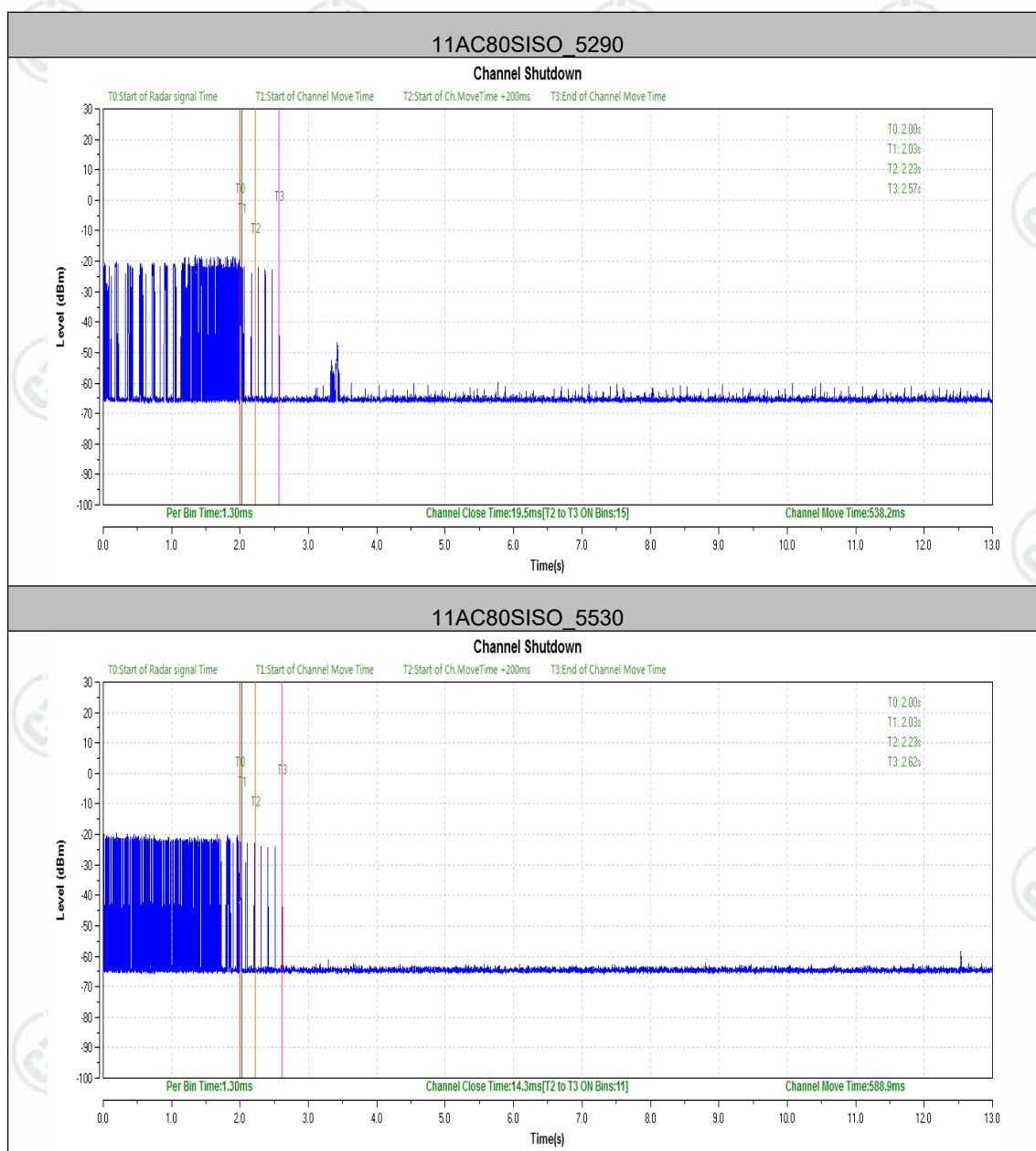
Test Result

TestMode	Channel	CCT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11A	5320	39	60	617.5	10000	PASS
	5500	46.8	60	568.1	10000	PASS
11AC40SISO	5310	19.5	60	568.1	10000	PASS
	5510	24.7	60	575.9	10000	PASS
11AC80SISO	5290	19.5	60	538.2	10000	PASS
	5530	14.3	60	588.9	10000	PASS

Test Graphs







PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No.EED32M00246401 for EUT external and internal photos.

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*** End of Report ***