

FCC Part 15E&RSS-247 TEST REPORT

FCC ID:2AY2I-2130XI

IC: 27035-2130XI

Product : Amplifier
Model Name : Connect 2130Xi
Brand : elipson
Report No. : NCT25010088-5

Prepared for

AV Industry

309 Avenue du Général De Gaulle, 94500 Champigny Sur Marne, France

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

**A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District,
Shenzhen, People's Republic of China**

TEL: 400-8868-419

FAX: 86-755-27790922

1 TEST RESULT CERTIFICATION

Applicant's name : AV Industry

Address : 309 Avenue du Général De Gaulle, 94500 Champigny Sur Marne, France

Manufacture's name : AV Industry

Address : 309 Avenue du Général De Gaulle, 94500 Champigny Sur Marne, France

Product name : Amplifier

Model name : Connect 2130Xi

Standards : FCC CFR Title 47 Part 15 Subpart E Section 15.407
ANSI C63.10:2013
KDB 905462 D02 v02
KDB 905462 D03 v01r02
RSS-247 Issue 3, August 2023
RSS-Gen Issue 5, Amendment 2, February, 2021

Test procedure : ANSI C63.10:2013

Test Date : Oct. 08, 2024 to Mar. 06, 2025

Date of Issue : Mar. 11, 2025

Test Result : Pass

This device described above has been tested by NCT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of NCT, this document may be altered or revised by NCT, personal only, and shall be noted in the revision of the document.

Test Engineer:

Keven Wu

Keven Wu / Engineer

Technical Manager:

Henry Wang

Henry Wang / Manager



Contents

	Page
1 TEST RESULT CERTIFICATION	2
2 TEST STANDARDS	4
3 TEST FACILITY	5
4 GENERAL INFORMATION	6
4.1 GENERAL DESCRIPTION OF E.U.T.	6
4.2 TEST SETUP CONFIGURATION	8
5 EQUIPMENT DURING TEST	9
5.1 EQUIPMENTS LIST	9
5.2 MEASUREMENT UNCERTAINTY	10
5.3 DESCRIPTION OF SUPPORT UNITS	10
6 DFS TEST INFORMATION	11
6.1 DFS TEST REQUIREMENT	11
6.2 DFS DETECTION THRESHOLDS	13
6.3 RADAR TEST WAVEFORMS	14
7 DFS TEST SETUP	17
7.1 SETUP FOR MASTER WITH INJECTION AT THE MASTER	17
7.2 SETUP FOR CLIENT WITH INJECTION AT THE MASTER	17
7.3 SETUP FOR CLIENT WITH INJECTION AT THE CLIENT	17
7.4 TEST RESULTS	18
8 TEST SETUP & EUT PHOTOGRAPH	26

2 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15 Subpart E Section 15.407	Unlicensed National Information Infrastructure Devices
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB905462 D02 v02	COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250- 5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION
4	KDB905462 D03 v01r02	U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY
5	KDB905462 D04 v01	OPERATIONAL MODES SUGGESTED FOR DFS TESTING
6	RSS-247 Issue 3	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE- LAN) Devices

Test Summary

No.	Description	FCC Part No.	RSS Part No.	Test Result	Verdict	Remark
1	Calibration of Radar Waveform	15.407(i)	RSS-247, 6.3	--	N/A	--
2	Channel Move Time, Channel Closing Transmission Time, Non- Occupancy	15.407(i)	RSS-247, 6.3	ANNEX A.2	Pass	--

Remark:

1. "N/A" denotes test is not applicable in this Test Report.

3 TEST FACILITY

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27

The certificate is valid until 2028.01.07

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)

The Certificate Registration Number is L8251

Designation Number: CN1347

Test Firm Registration Number: 894804

Accredited by A2LA, June 14, 2023

The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018

The Conformity Assessment Body Identifier is CN0150

Company Number: 30806

Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.

Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

4 General Information

4.1 General Description of E.U.T.

Product Name:	Amplifier
Model No.:	Connect 2130Xi
Sample ID:	241119082
HVIN:	Connect 2130Xi
Sample(s) Status:	Engineer sample
series model.:	N/A
Model Different.:	N/A
Operation Frequency:	U-NII-2A: 5250MHz~5350MHz U-NII-2C: 5470MHz~5725MHz
Modulation type:	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM for 802.11a/n/ac
Function	<input type="checkbox"/> Outdoor AP <input type="checkbox"/> Indoor AP <input type="checkbox"/> Fixed P2P <input checked="" type="checkbox"/> Client
DFS type	<input type="checkbox"/> Master <input type="checkbox"/> Slave with radar detection <input checked="" type="checkbox"/> Slave without radar detection
Antenna Type:	External Antenna
Antenna gain:	4.77dBi
Power supply	AC100-240V 50/60Hz
Hardware Version:	CONNECT2130XI_V1_L6A
Software Version:	CONNECT2130XI_1.0
Remark:	For a more detailed features description, please refer to the manufacturer's specifications or the User Manual, the antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

Channel List for 802.11a/n/ac (20MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	56	5280	60	5300	64	5320
Channel List for 802.11n/ac (40 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	62	5310				
Channel List for 802.11a/n/ac (20 MHz)							

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	104	5520	108	5540	112	5560
116	5580	120	5600	124	5620	128	5640
132	5660	136	5680	140	5700		
Channel List for 802.11 n/ac (40 MHz)							
Channel		Frequency (MHz)		Channel		Frequency (MHz)	
102		5510		110		5550	
134		5670					
For 802.11ac (80 MHz)							
Channel		Freq.(MHz)		Channel		Freq.(MHz)	
58		5290		106		5530	
				122		5610	

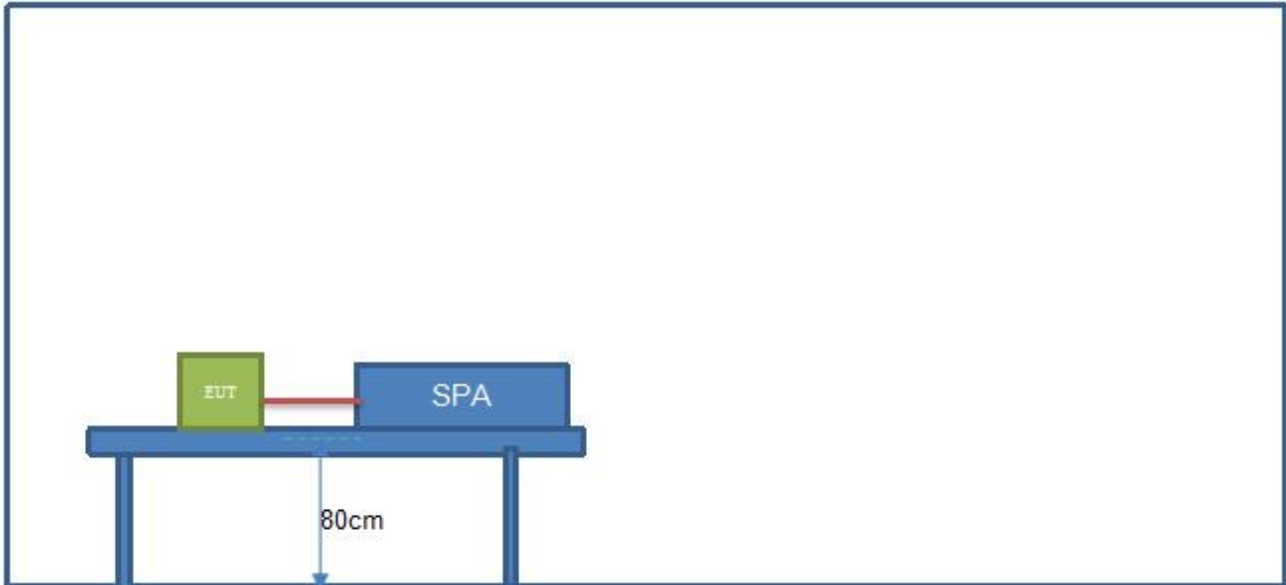
Remark: 1. The EUT not support TPC function, Radar detection and hotspot.

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, all channels have been tested, and only the highest frequencies of the worst channels are shown in the report. please see the below .

Channel List		
Band Frequency	EUT Channel	Test Frequency (MHz)
U-NII-2A	CH60	5300
	CH58	5290

Channel List		
Band Frequency	EUT Channel	Test Frequency (MHz)
U-NII-2C	CH116	5580
	CH106	5530

4.2 Test Setup Configuration



5 Equipment During Test

5.1 Equipments List

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2024/6/17	2025/6/16
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2024/6/17	2025/6/16
Power Sensor	TR1029-2	512364	Techoy	2024/6/17	2025/6/16
RF Swith	TR1029-1	512364	Techoy	2024/6/17	2025/6/16
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
Attenuator	eastsheep	90db	N/A	2024/6/17	2025/6/16

Other

Item	Name	Manufacturer	Model	Software version
1	RF test system	TACHOY	RFTest	V1.0.0
2	RF communication test system	TACHOY	RFTest	V1.0.0

5.2 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	DFS Threshold (radiated)	$\pm 1.50\text{dB}$
2	DFS Threshold (conducted)	$\pm 1.45\text{dB}$
3	Temperature	$\pm 0.5^{\circ}\text{C}$
4	Humidity	$\pm 2\%$

5.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Amplifier	elipson	Connect 2130Xi	N/A	EUT
E-2	Notebook	lenovo	B40-80	MP07F6JD	Auxiliary
E-3	Router	TP-LINK	TL-WR885N	FCC ID: Q87-WRT3200ACM	Auxiliary

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

6 DFS TEST INFORMATION

6.1 DFS test requirement

The following table from FCC KDB905462 D02 UNII DFS Compliance procedures new rules list the applicable requirements for the DFS testing.

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.

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.
- 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.

Client Devices

- h) A Client Device will not transmit before having received appropriate control signals from a Master Device.
- i) 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.
- j) 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 5.1.1 apply.
- k) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.
- l) 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.

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 facilitating 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.

6.2 DFS Detection Thresholds

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.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

6.3 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.

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

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.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μsec is selected, the number of

pulses would be Round up $\left\{ \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{3066} \right) \right\} = \text{Round up } \{17.2\} = 18$.

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

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 waveforms 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 wave forms, then each additional waveform must also be unique and not repeated from the previous waveforms.

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

For the Frequency Hopping Radar Type, the same Burst parameters are used for each wave form. The hopping sequence is different for each wave form and a 100-length segment is selected 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 5250–5724MHz. 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.

7 DFS TEST SETUP

7.1 Setup for Master with injection at the Master

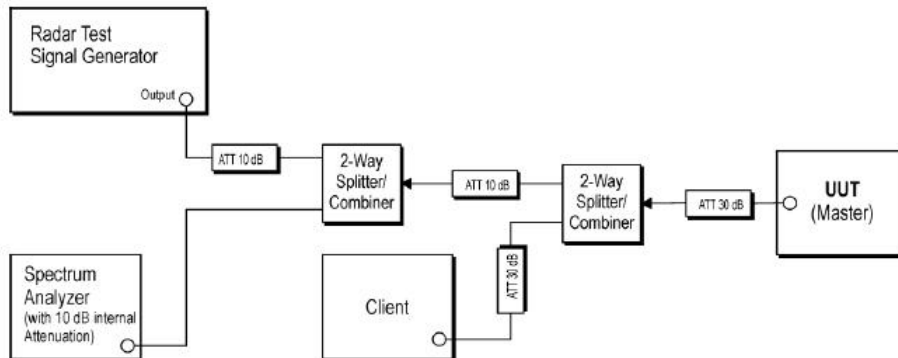


Figure 2: Example Conducted Setup where UUT is a Master and Radar Test Waveforms are injected into the Master

7.2 Setup for Client with injection at the Master

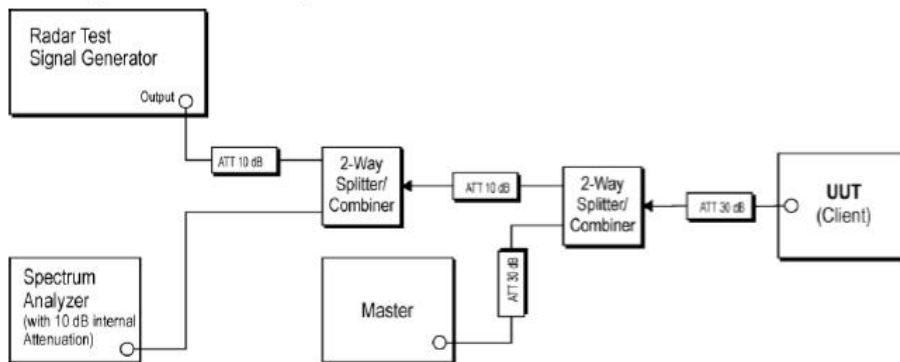


Figure 4: Example Conducted Setup where UUT is a Client and Radar Test Waveforms are injected into the Client

7.3 Setup for Client with injection at the Client

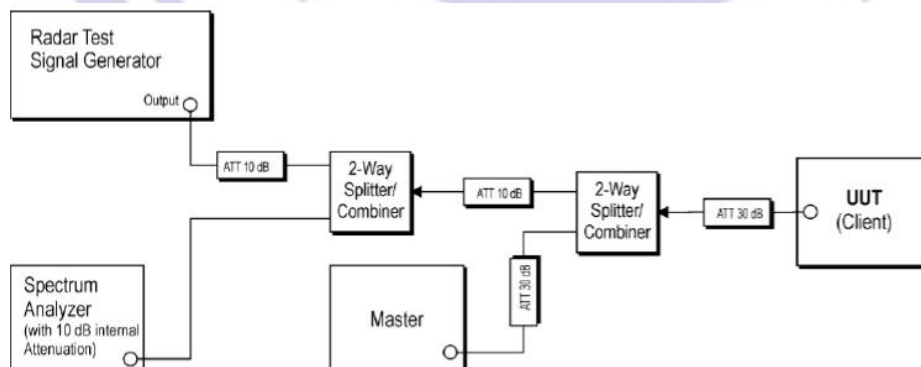


Figure 4: Example Conducted Setup where UUT is a Client and Radar Test Waveforms are injected into the Client

7.4 Test results

Shutdown Time

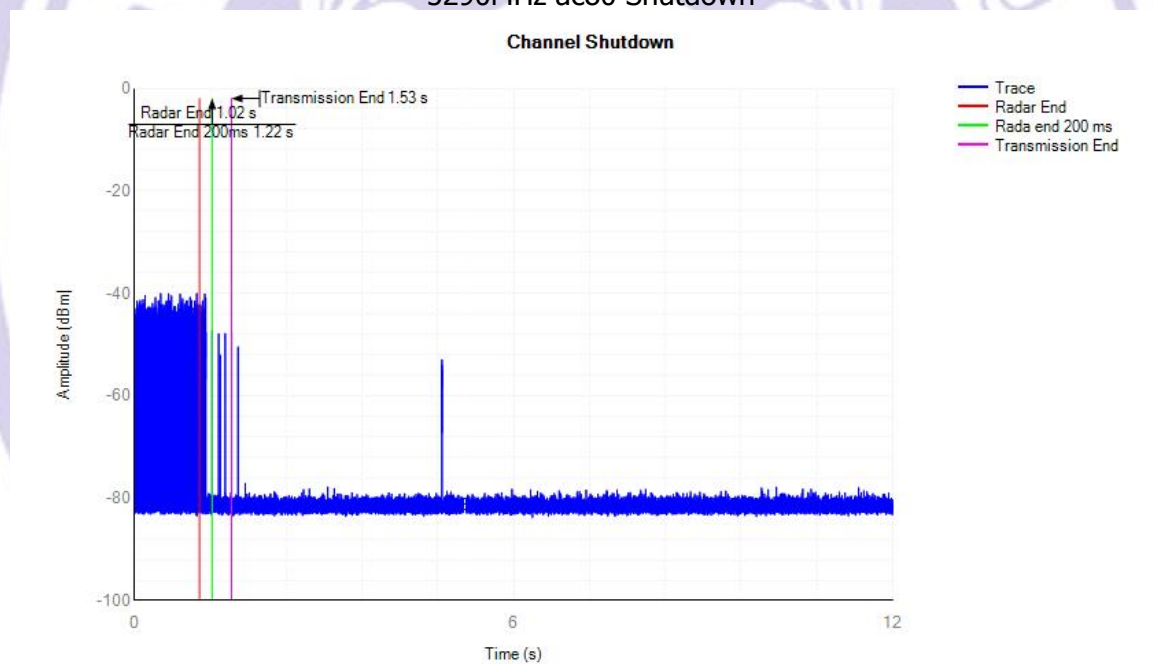
Notes:

- 1) Tests were performed using the conduction test method.
- 2) Channel availability check, detection threshold and non-occupancy period are not applicable to client devices.

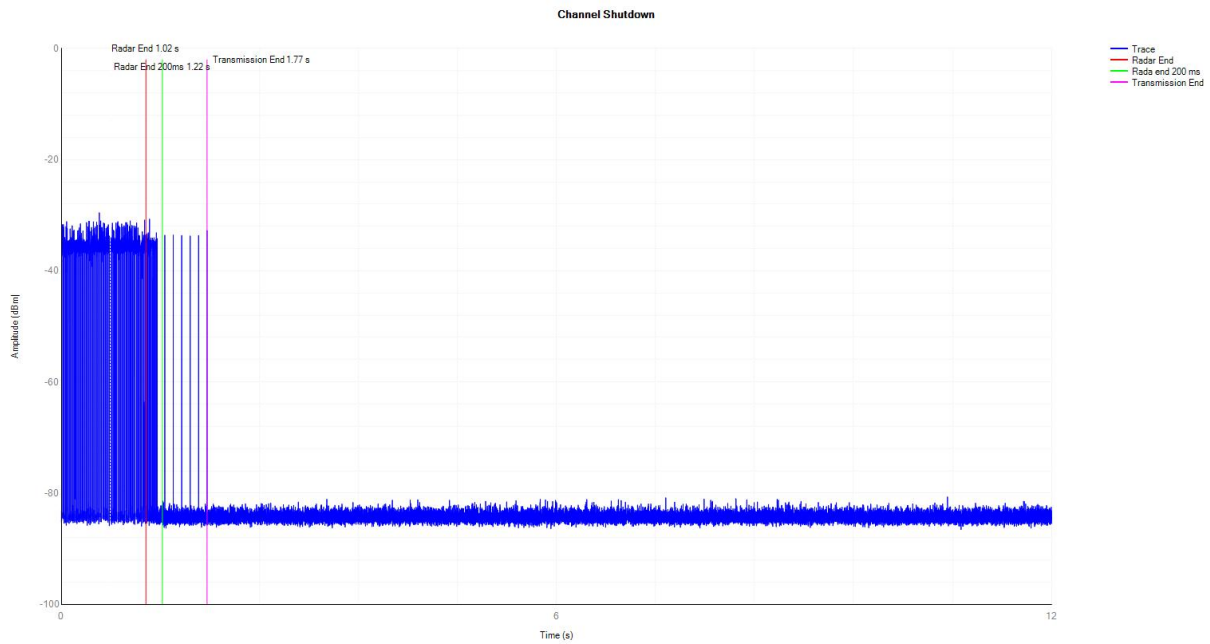
Mode	Channel Move Time (s)	Channel Move Time (s)	Limit Channel Move Time (s)	Close Transmission Time (s)	Limit Close Transmission Time (s)	Close Transmission Time after 200ms(s)	Limit Close Transmission Time after 200ms (s)	Verdict
ac80	5290	0.5089	10	0.0144	0.26	0.0024	0.06	Pass
ac80	5530	0.7413	10	0.0752	0.26	0.0024	0.06	Pass
a	5290	2.6253	10	0.0132	0.26	0.004	0.06	Pass
a	5580	8.7705	10	0.02	0.26	0.006	0.06	Pass

Shutdown Time

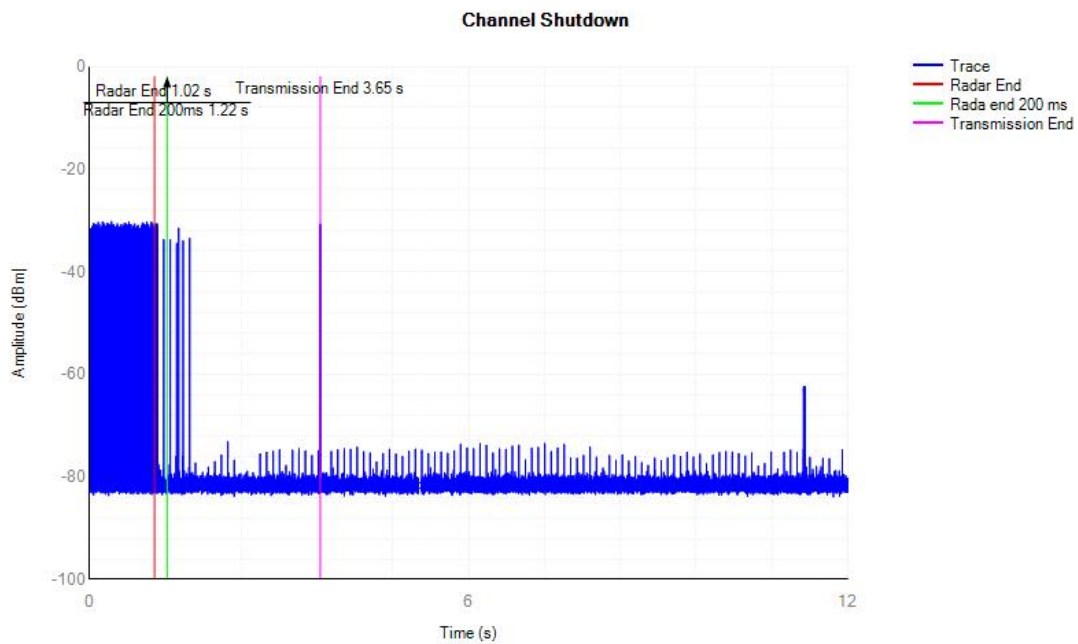
5290MHz ac80 Shutdown



5530MHz ac80 Shutdown

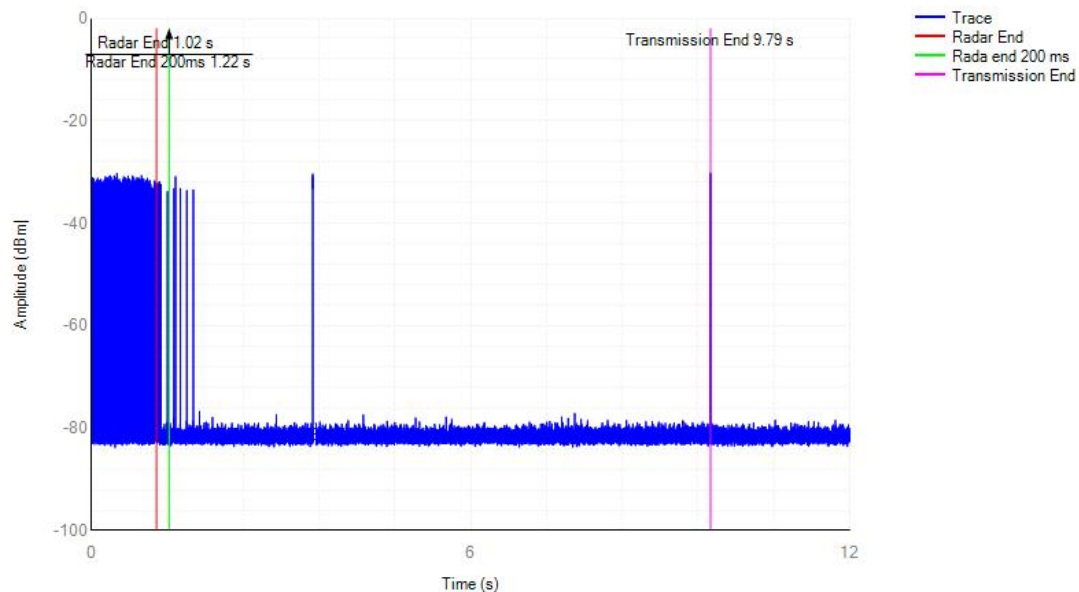


5300MHz a Shutdown



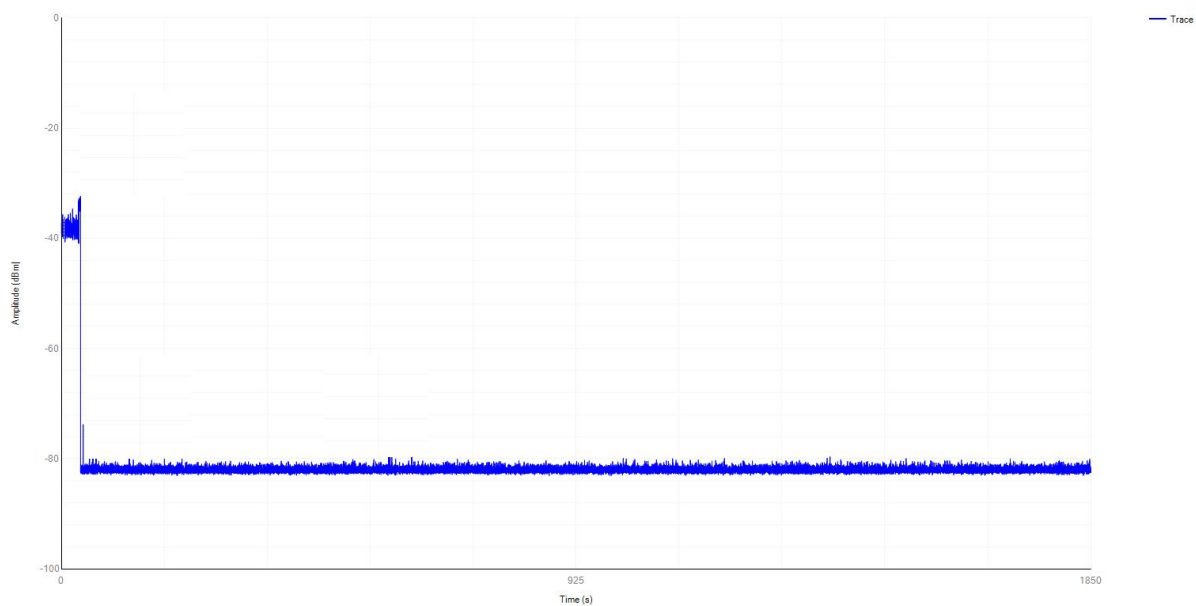
5580MHz a Shutdown

Channel Shutdown

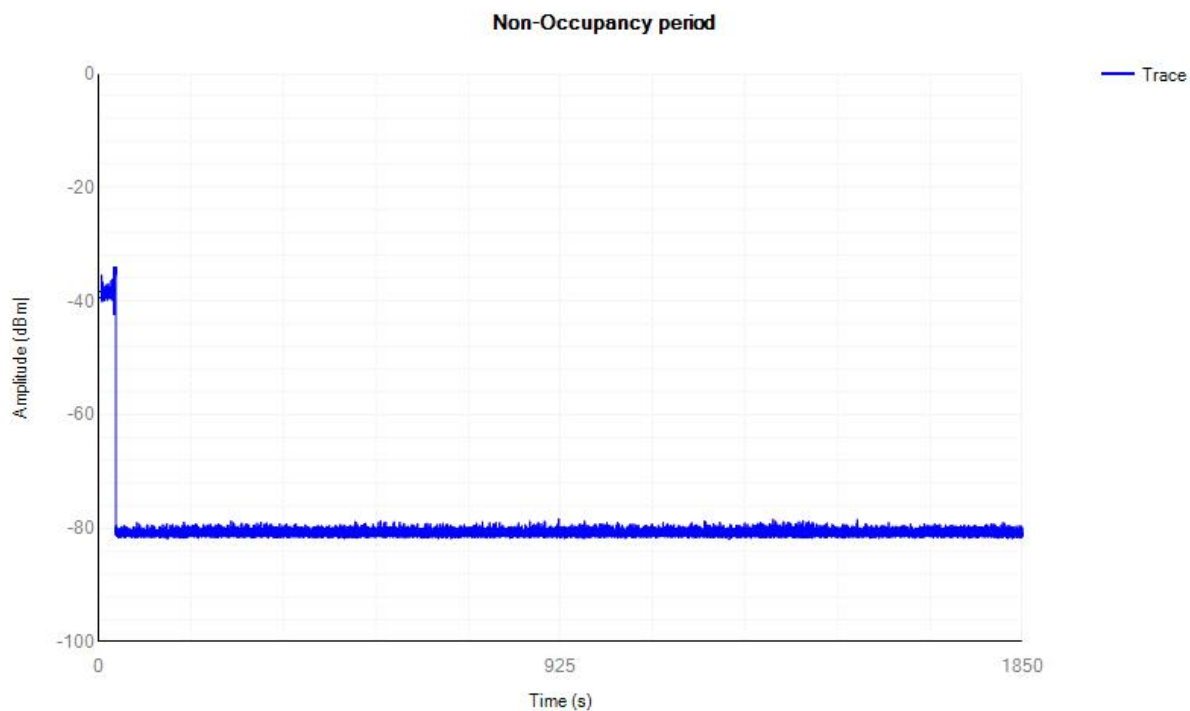


Non-Occupancy 5290MHz ac80 Non-Occupancy

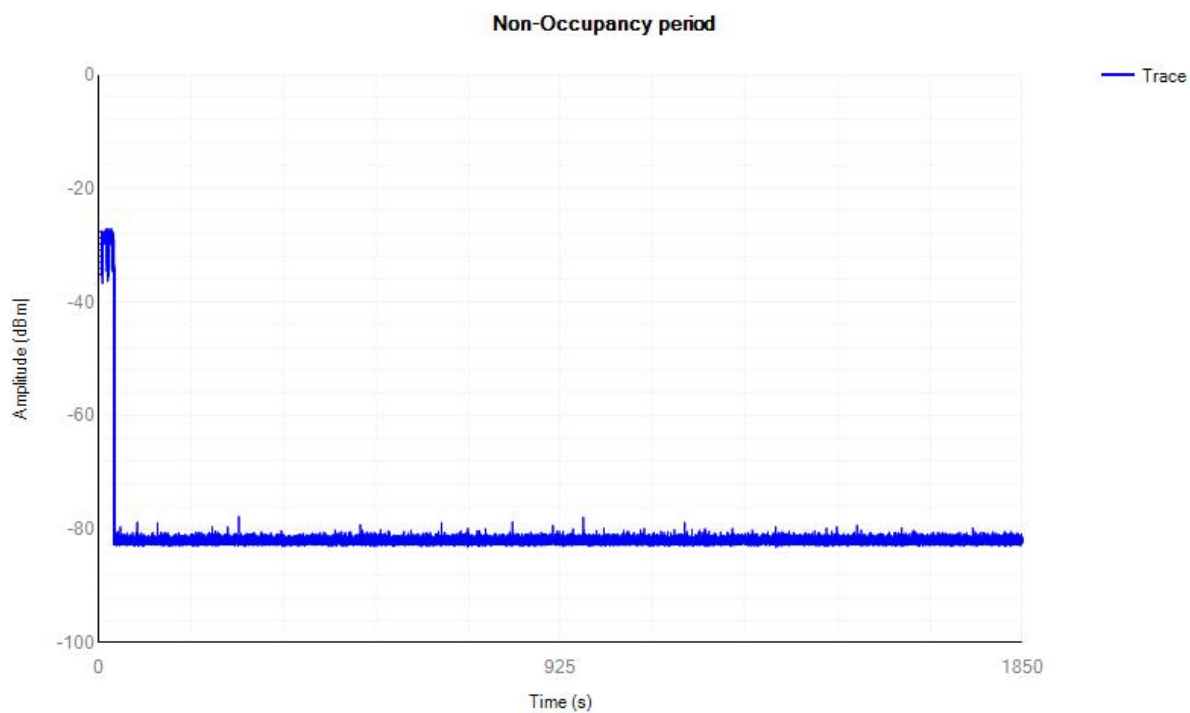
Non-Occupancy period



5530MHz ac80 Non-Occupancy

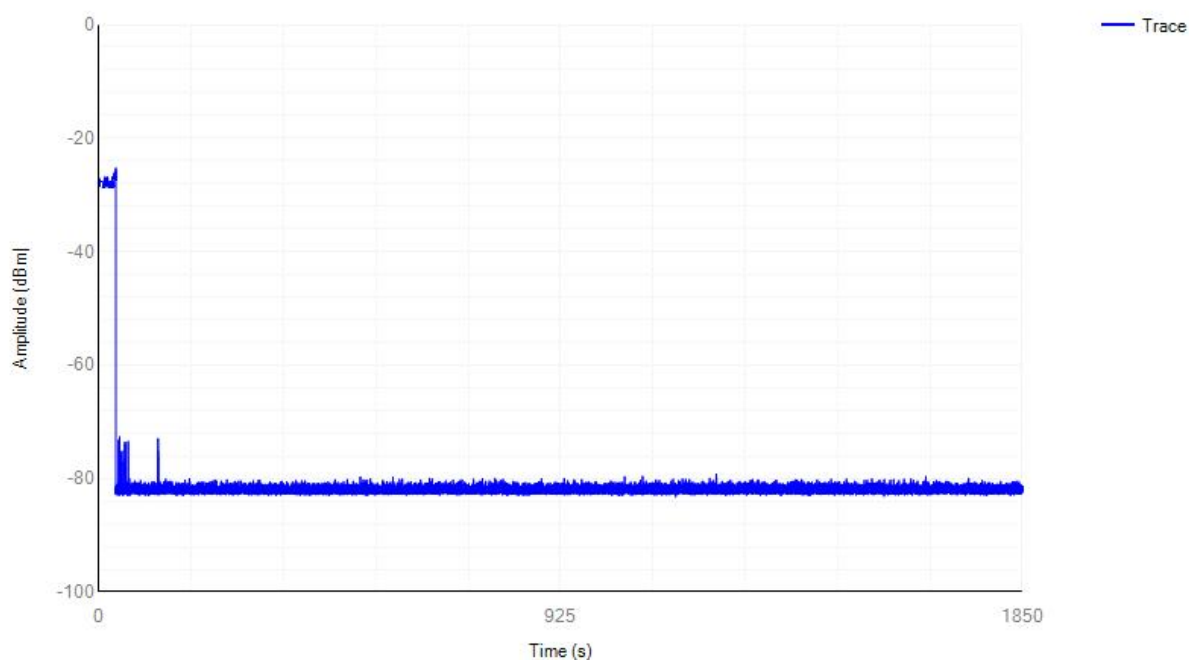


5300MHz a Non-Occupancy



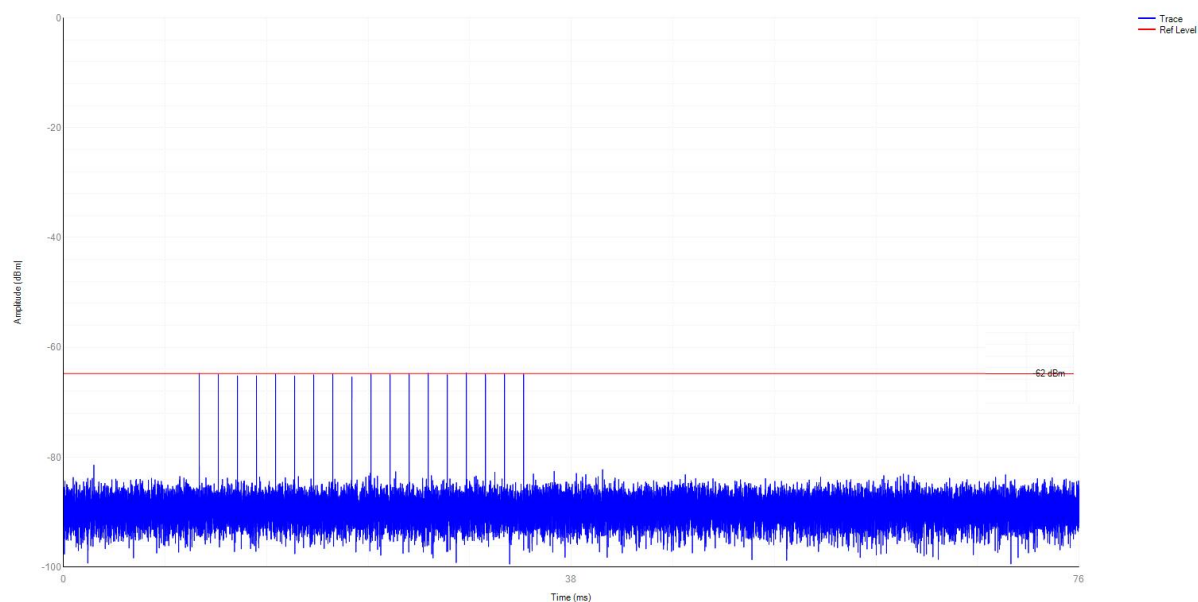
5580MHz a Non-Occupancy

Non-Occupancy period



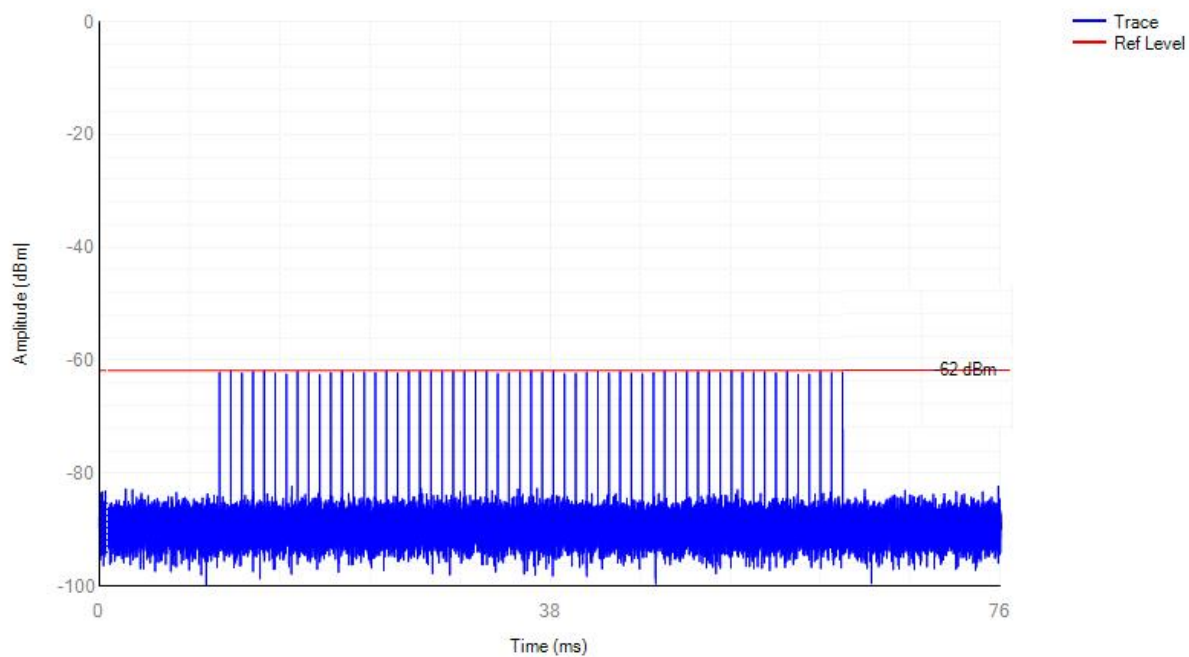
Radar Waveform Calibration Type 0

Radar Calibration



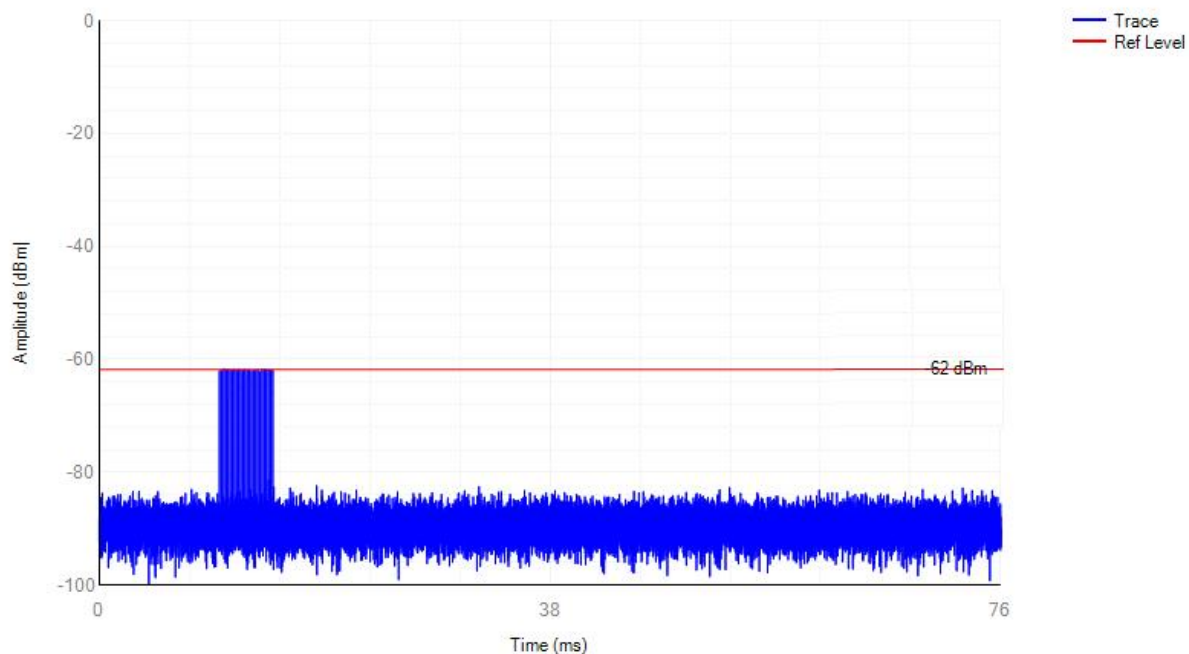
Type 1

Radar Calibration



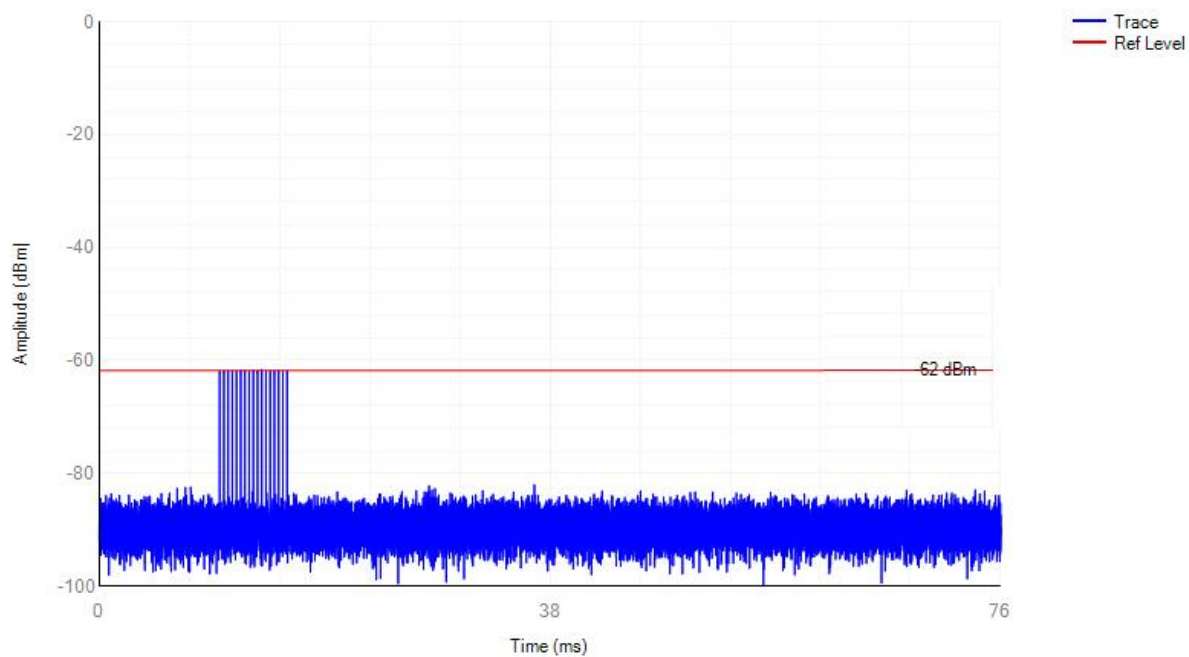
Type 2

Radar Calibration



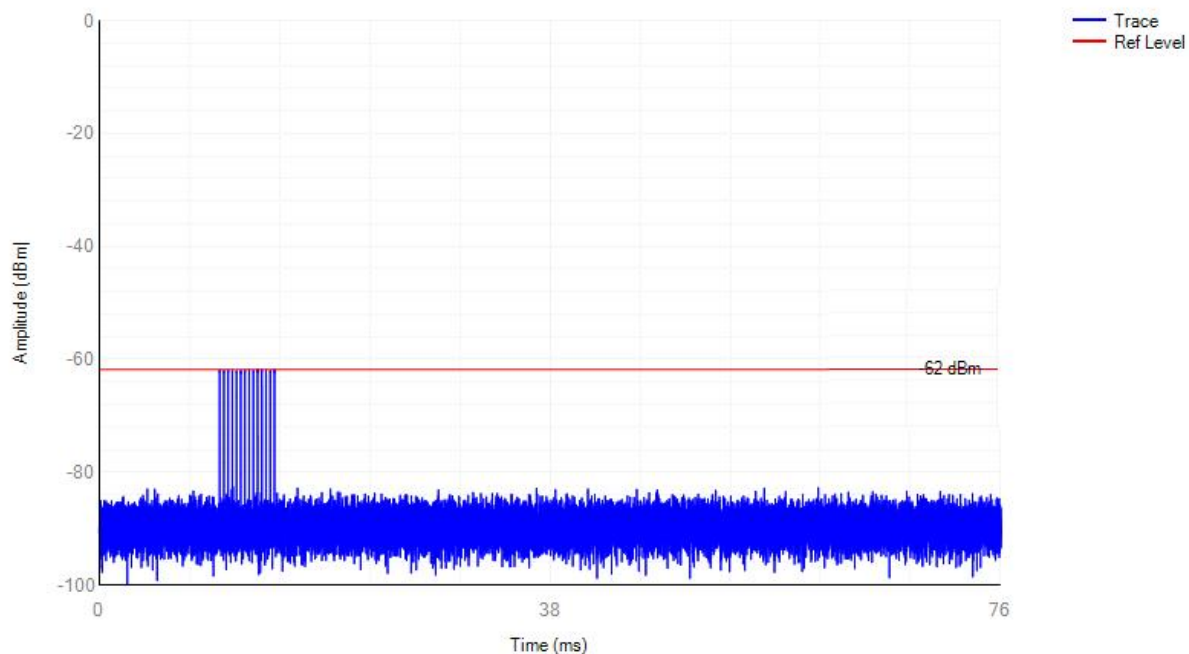
Type 3

Radar Calibration



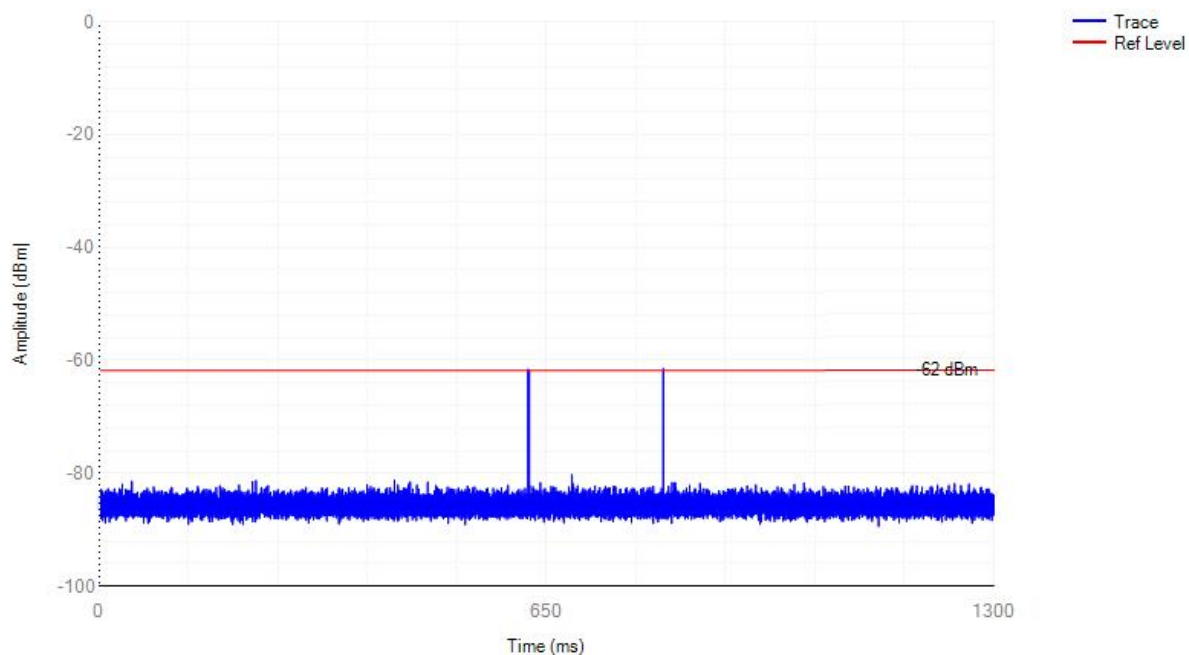
Type 4

Radar Calibration



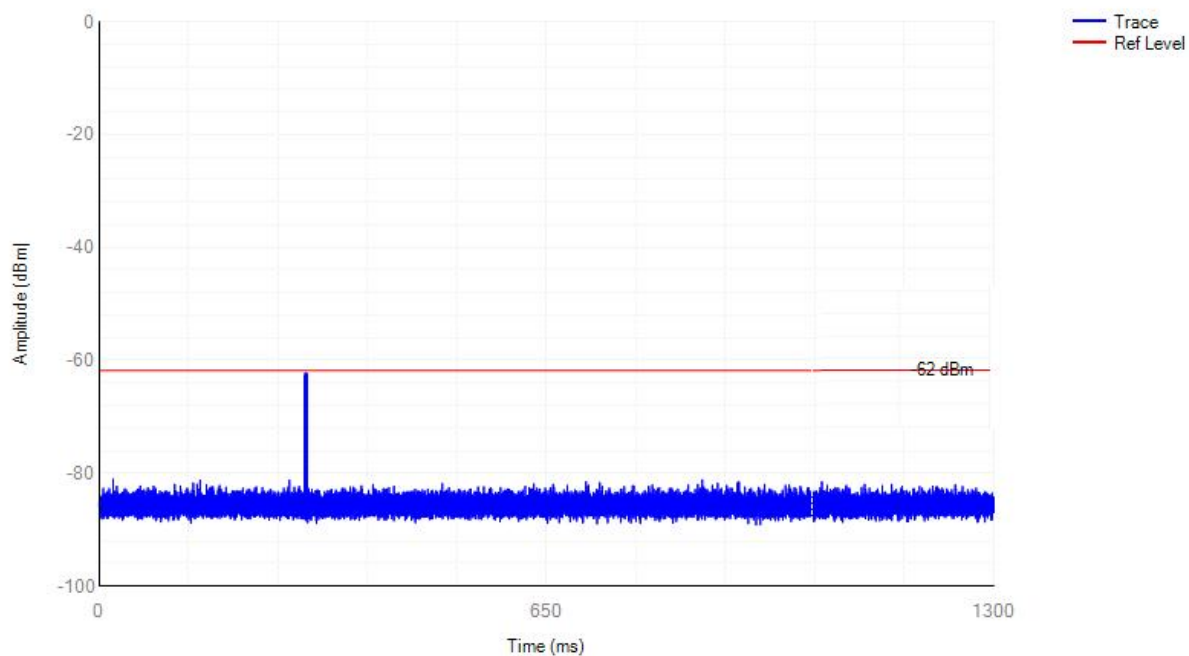
Type 5

Radar Calibration



Type 6

Radar Calibration



8 TEST SETUP & EUT PHOTOGRAPH

Please see the attachment for details.

----- End of Report -----

