FCC PART 15.407(H)
DYNAMIC FREQUENCY SELECTION
TEST AND MEASUREMENT REPORT

For

Amimon Ltd.

2 Maskit St. Herzlia, Israel

FCC ID: VQSCB890802120528
Model: AMN31200-IR

Report Type:	**Equipment Type:**
Original Report	Wireless Video Transmission System (TX)

Prepared By:	Ning Ma
Report No.:	R1207115-FCC DFS
Report Date:	2012-10-10
Reviewed By:	Victor Zhang EMC/RF Lead

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1207115-FCC DFS	Original Report	2012-10-10

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Amimon Ltd.*, and their product *FCC ID: VQSCB890802120528*, model: *AMN31200-IR*. The EUT is a HDMI Transmission Board (TX).

1.2 Mechanical Description of EUT

The EUT measures approximately 19.2 *cm* (L) X 15.4 *cm* (W) X 7.4 *cm* (H) and weighs approximately 819.5 *g.*

The data gathered are from a production sample provided by the manufacturer, serial number: R1207115 assigned by BACL.

1.3 Objective

This report is prepared on behalf of *Amimon Ltd.* in accordance with FCC CFR47 §15.407 (h) and FCC 06-96 Appendix.

The objective is to determine compliance with FCC rules for DFS Detection Threshold, Channel Availability Check Time, Uniform Spreading U-NII Detection Bandwidth, Channel Closing Transmission Time, and Channel Move time

1.4 Related Submittal(s)/Grant(s)

RX portion with FCC ID: VQSCB390802120528

1.5 Test Methodology

FCC CFR 47 Part2, Part15.407 (h)

FCC 06-96 Appendix "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION"

1.6 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to FCC Part 15.407(H) Standard.

2.2 EUT Exercise Software

The software version is MAC_4.x.24.2, was provided by customer and verified by Ning Ma to comply with the standard requirements being tested against.

2.3 Equipment Modifications

Includes reference to the location of the pictures

2.4 Special Equipment

N/A

2.5 Local Support Equipment

Manufacturers	Description	Models	Serial Number
Cypress HDMI Pattern Generator	video pattern signal generator	CPHD-1	N/A
Cypress HDMI to SDI Converter	converter	CLUX-H2SDIA	201111150025
Cypress SDI to HDMI Converter	converter	CLUX-SDI2HCA	201112060028

2.6 EUT Internal Configuration

Manufacturer	Objects/Parts	Model	Series Number
Amimon	Mother Board	AMN31200	-

2.7 External I/O Cabling List and AC Cord

Cable Description	Length (M)	From	To
RS232 x 2	< 1.0	Laptop	EUT

3 Summary of Test Results

The following result table represents the list of measurements required under the CFR47 §47 Part15.407 (h) and FCC 06-96.

Items	Description of Test	Result
Detection Bandwidth	UNII Detection Bandwidth	N/A
Performance Requirements Check	Initial Channel Availability Check Time (CAC)	N/A
	Radar Burst at the Beginning of the CAC	N/A
	Radar Burst at the End of the CAC	N/A
In-Service Monitoring	Channel Move Time	Compliant
	Channel Closing Transmission Time	Compliant
	Non-Occupancy Period	Compliant
Radar Detection	Statistical Performance Check	N/A

Note: N/A EUT is client only device without radar detection.

4 Applicable Standards & Test System

4.1 DFS Requirement

FCC CFR47 §15.407 (h) and FCC 06-96 Appendix.

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
Uniform Spreading	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	**Client** (Without DFS)	**Client** (With DFS)
DFS Detection Threshold	Yes	Not Required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

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.

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 80% of the UNII 99% 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 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 1 is used and 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 (Microseconds)	PRI (Microseconds)	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

Table 6: Long Pulse Radar Test Signal

Radar Type	Bursts	Chirp Width (MHz)	PRI (usec)	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

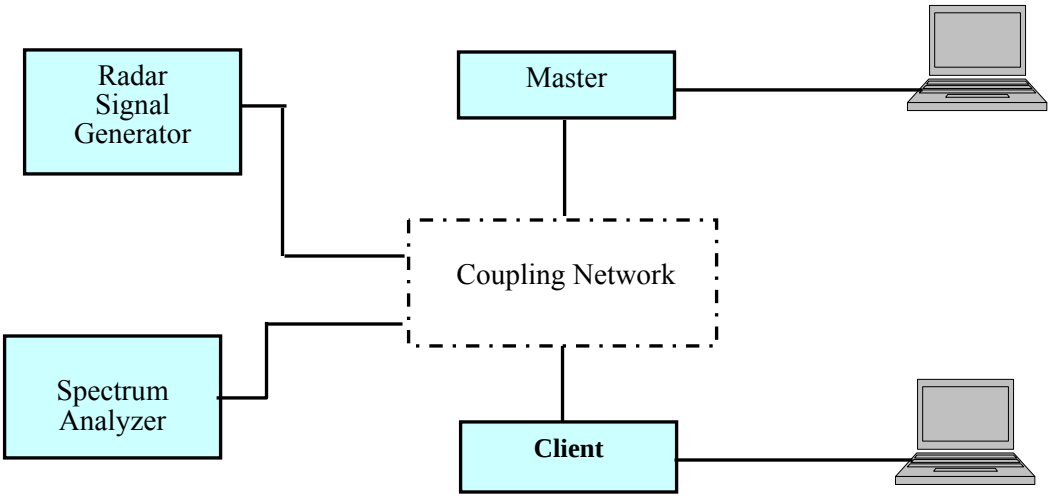
Table 7: Frequency Hopping Radar Test Signal

Radar Type	Pulse Width (usec)	PRI (usec)	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

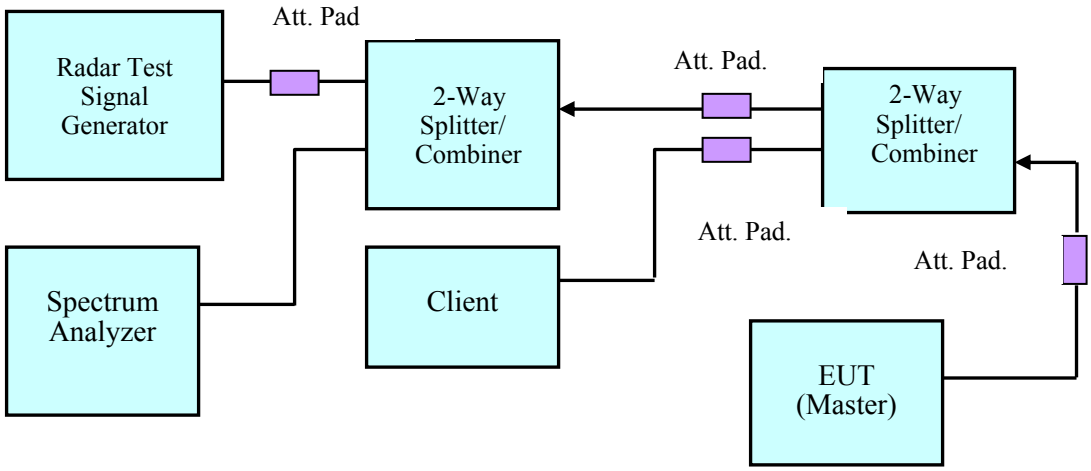
4.2 DFS Measurement System

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

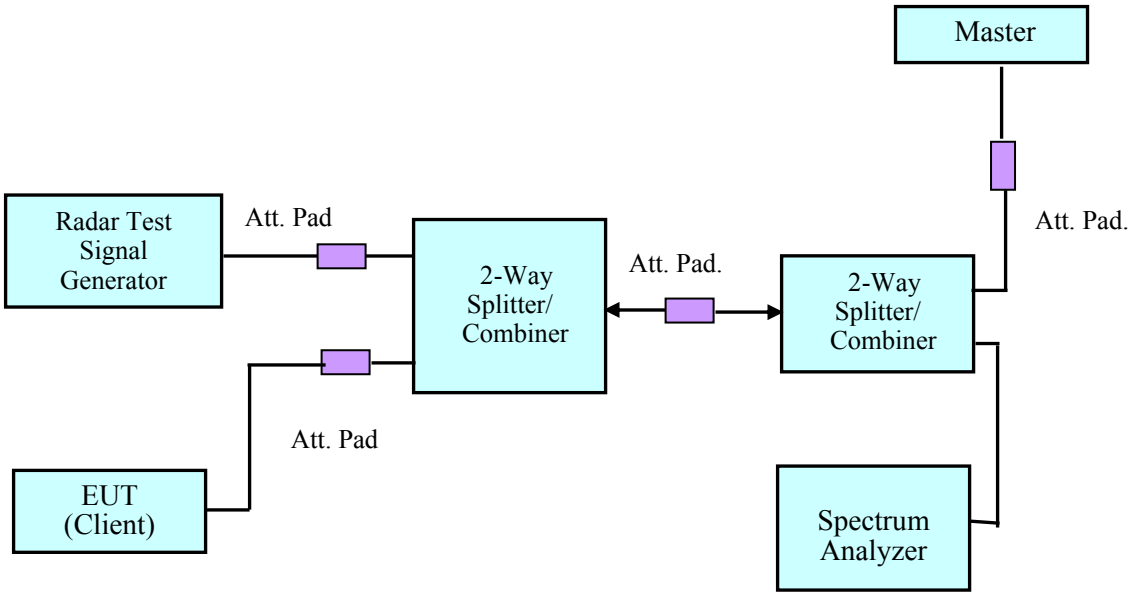
4.3 System Block Diagram



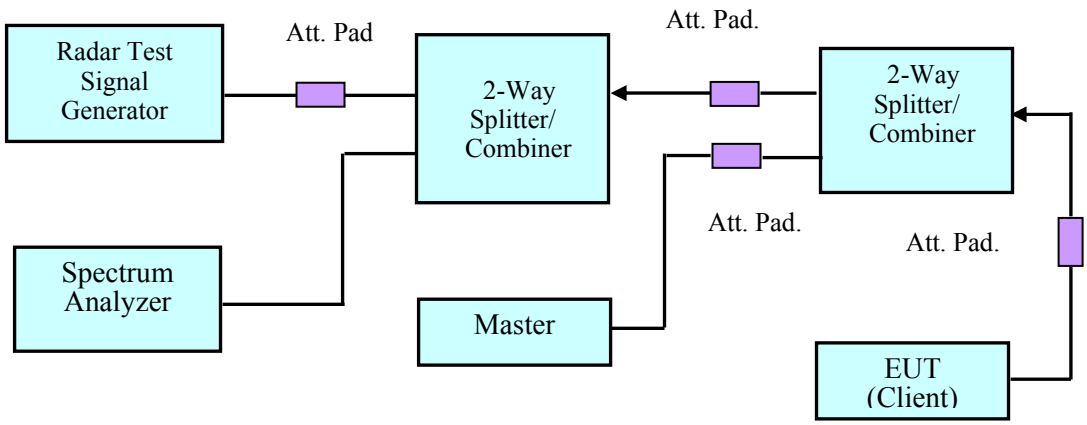
4.4 Conducted Method



Setup for Master with injection at the Master

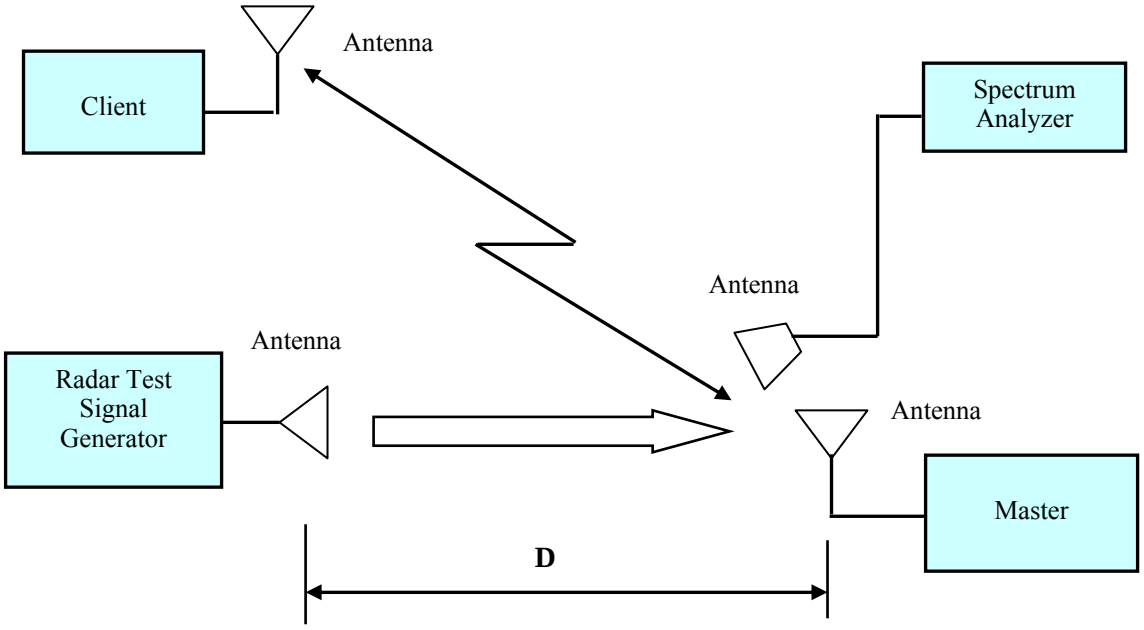


Setup for Client with injection at the Master



Setup for Client with injection at the Client

4.5 Radiated Method



4.6 Test Procedure

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 Radar Waveform Calibration

5.1 Description of EUT

The EUT operates in 5230-5350 MHz and 5470-5725 MHz range.

The rated output power of EUT is <23 dBm (EIRP), Therefore the required interference threshold level is -62 dBm, the required radiated threshold at antenna port is -62dBm.

The calibrated radiated DFS detection threshold level is set to -62 dBm.

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.

Test result show that the EUT requires 26 seconds to complete its initial power-up cycle.

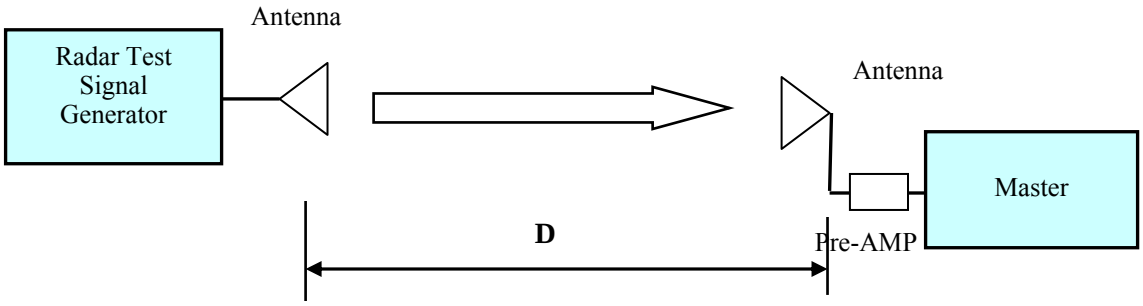
The EUT will not work on 5600-5650MHz band.

5.2 Test Equipment List and Details

Manufacturer	Equipment Description	Model Number	S/N	Calibration Date
National Instruments	NI PXI-1042 8-Slot chassis	PXI-1042	V08X01EE1	N/A
National Instruments	Arbitrary Waveform Generator	PXI-5421	N/A	N/A
National Instruments	RF Upconverter	PXI-5610	N/A	N/A
ASCOR	Upconverter	AS-7206	N/A	N/A
Agilent	Spectrum Analyzer	E4440A	US45303156	2012-08-22
Avantek	Pre-Amplifier	2-8 GHz Lab AMP	218	N/A
Ducommun Technologies	Pre-Amplifier	ALN-09173030-01	990297-02	N/A
Mini-Circuits	Splitter/Combiner	2FSC-2-10G	0349	N/A
Narda	Splitter/Combiner	4326B-2	03514	N/A
Midwest	Attenuator	290-30	N/A	N/A
Mini-Circuits	Attenuator	BW-S30W2	N/A	N/A

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

5.3 Radar Waveform Calibration



Radiated Calibration Setup Block Diagram

5.4 Test Environmental Conditions

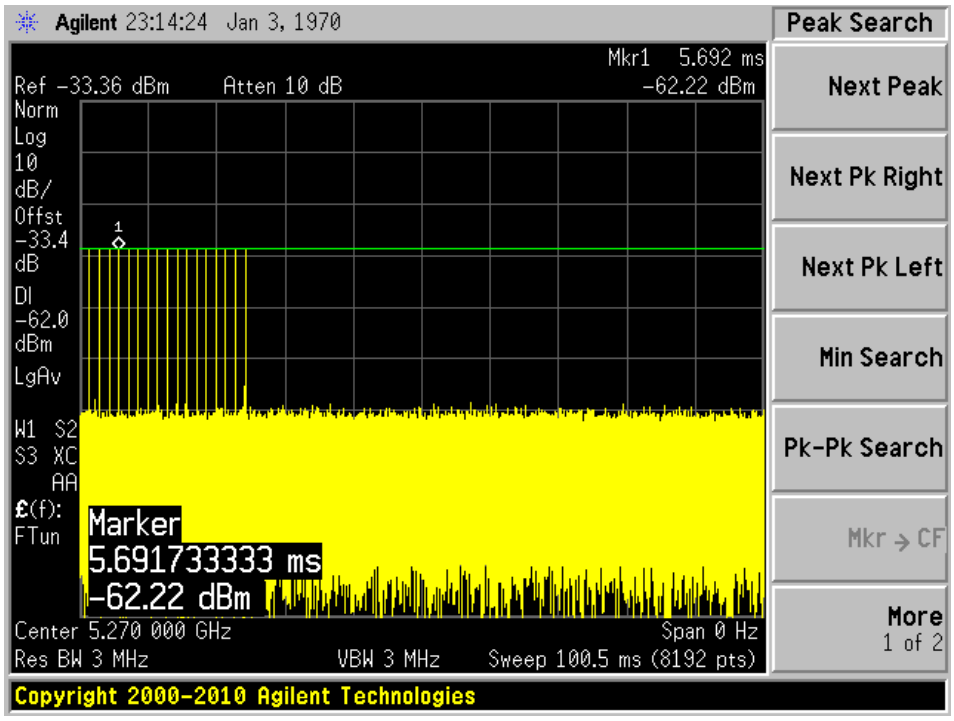
Temperature:	22 °C
Relative Humidity:	47 %
ATM Pressure:	101.5 kpar

Testing performed by Ning Ma on 2012-10-08 o DFS testing site.

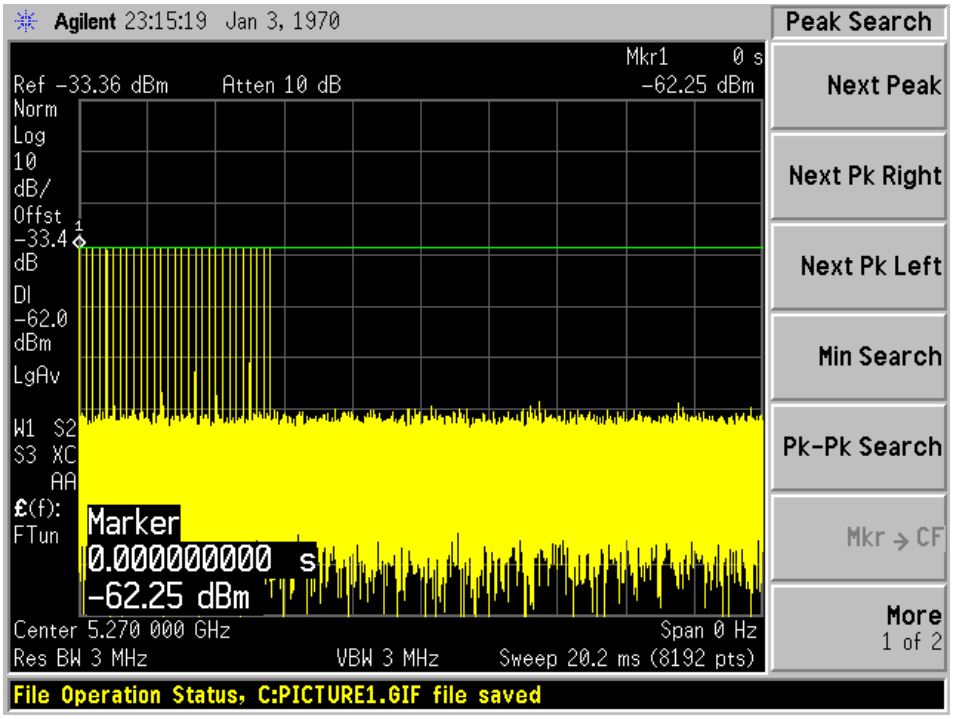
Plots of Radar Waveforms

5270 MHz

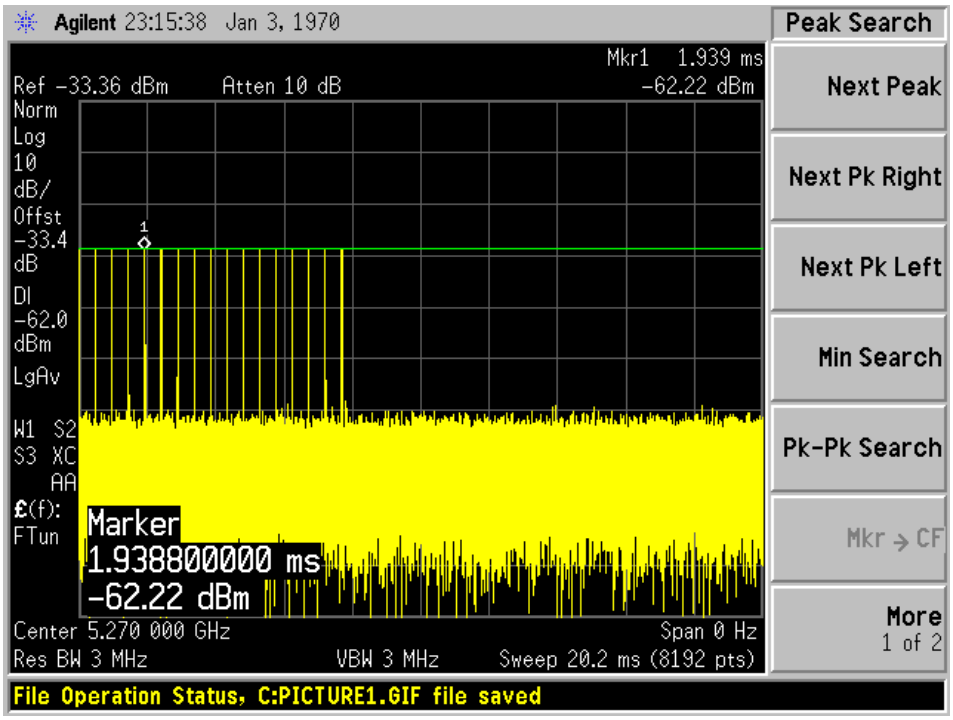
Radar Type 1



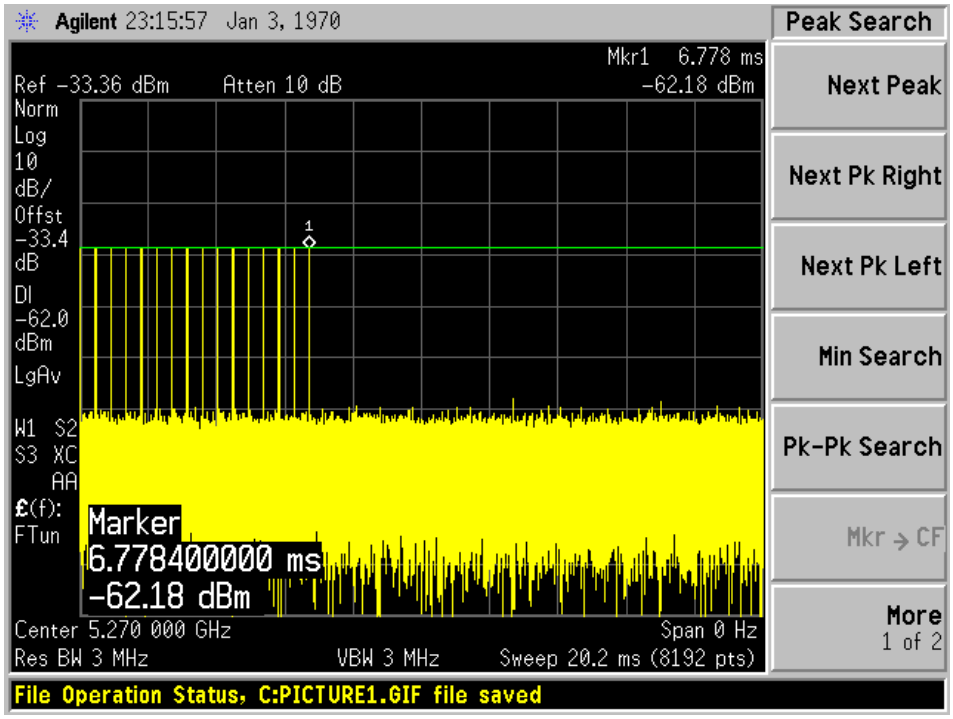
Radar Type 2



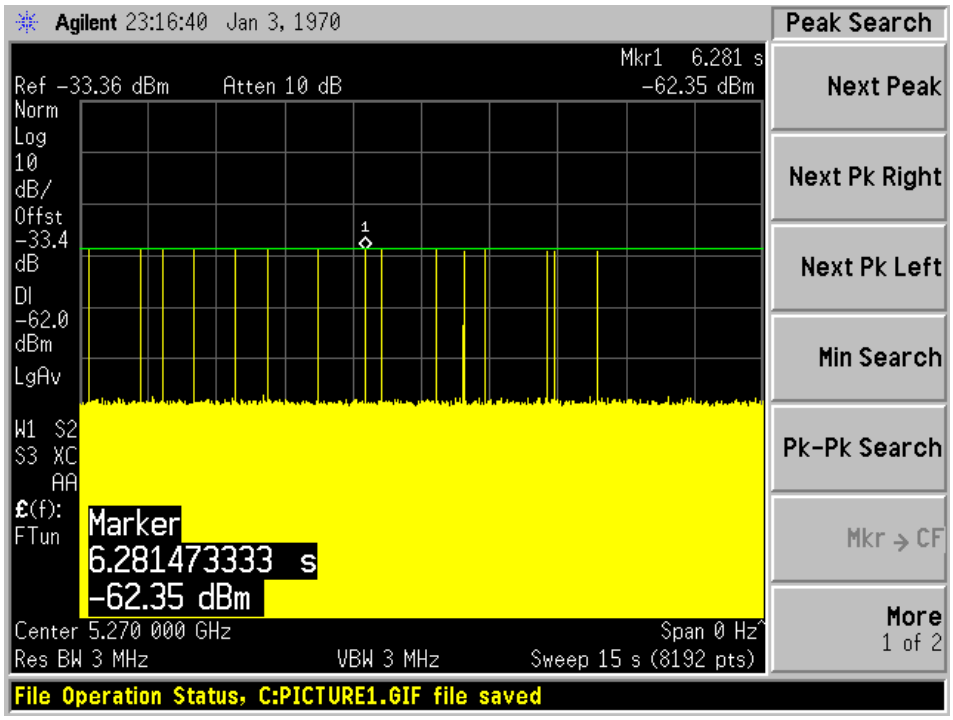
Radar Type 3



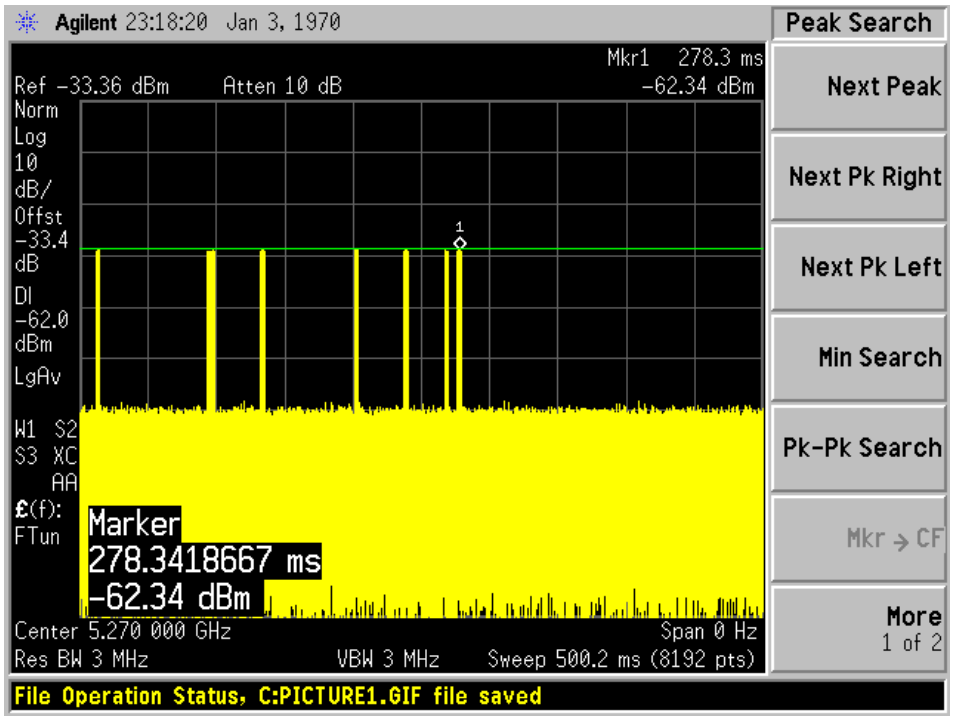
Radar Type 4



Radar Type 5

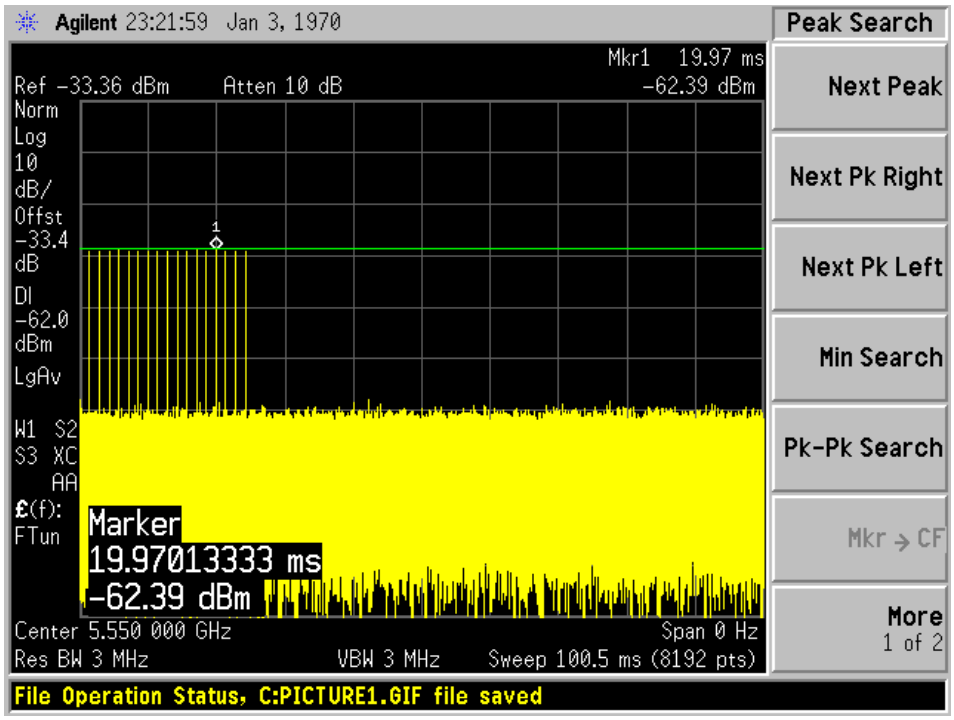


Radar Type 6

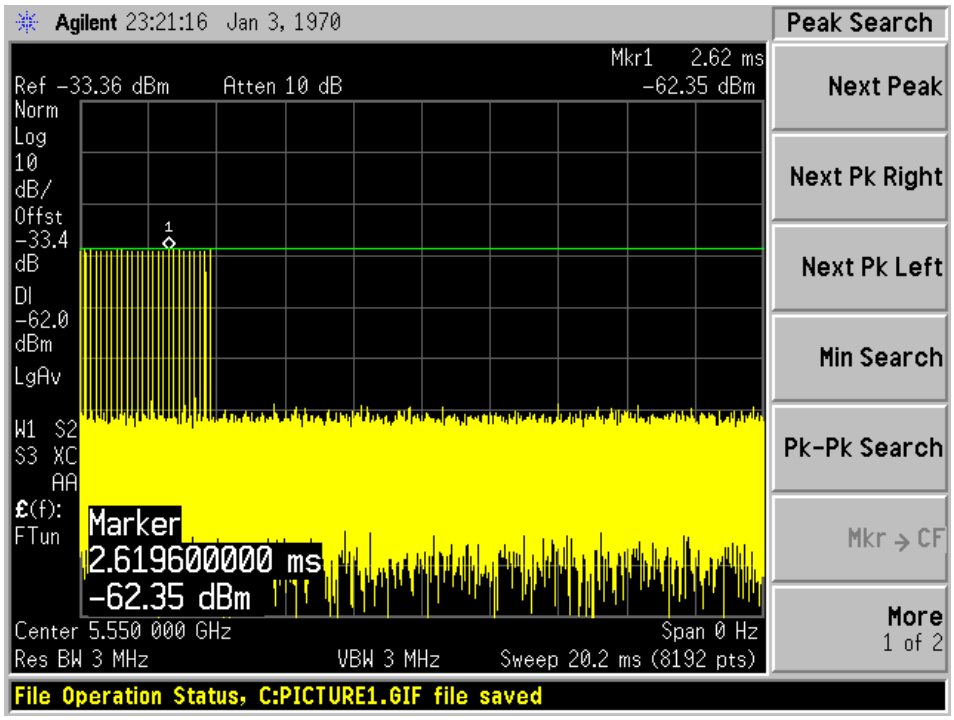


5550 MHz

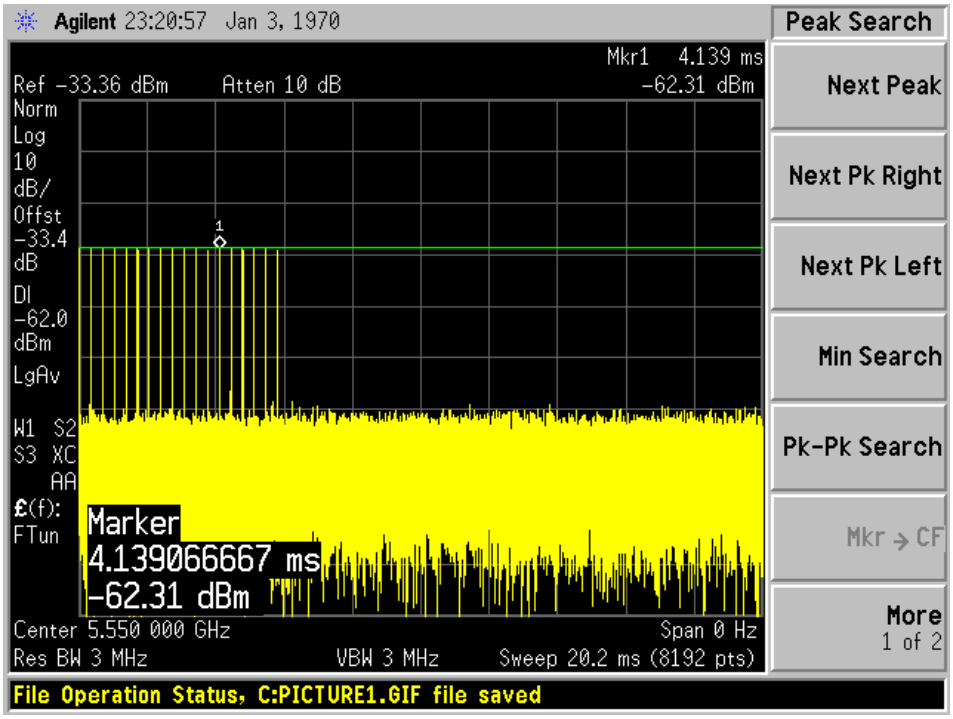
Radar Type 1



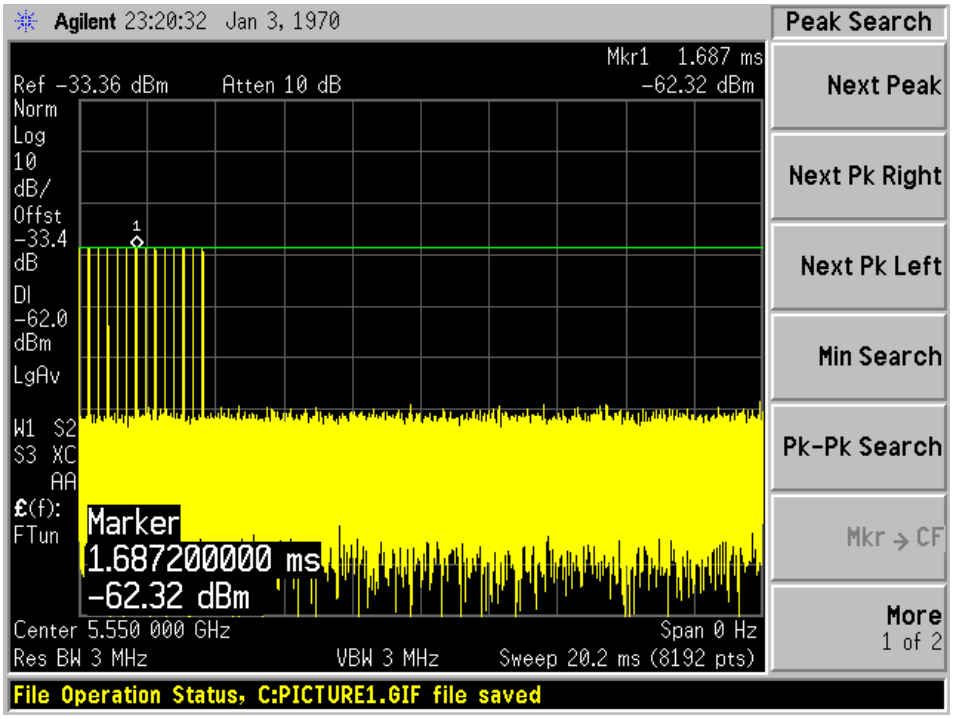
Radar Type 2



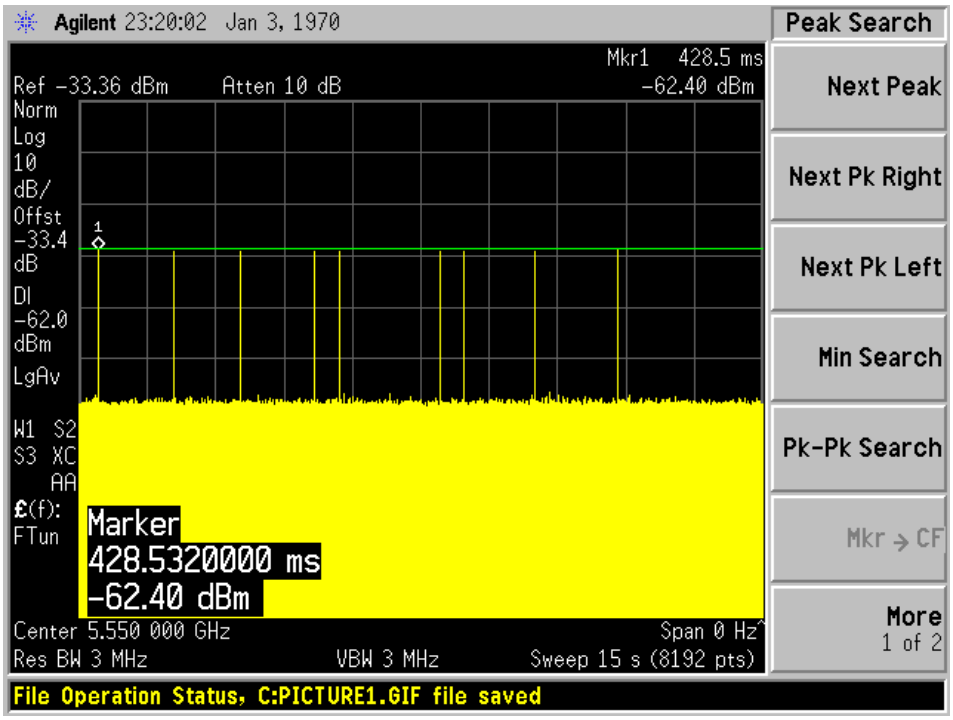
Radar Type 3



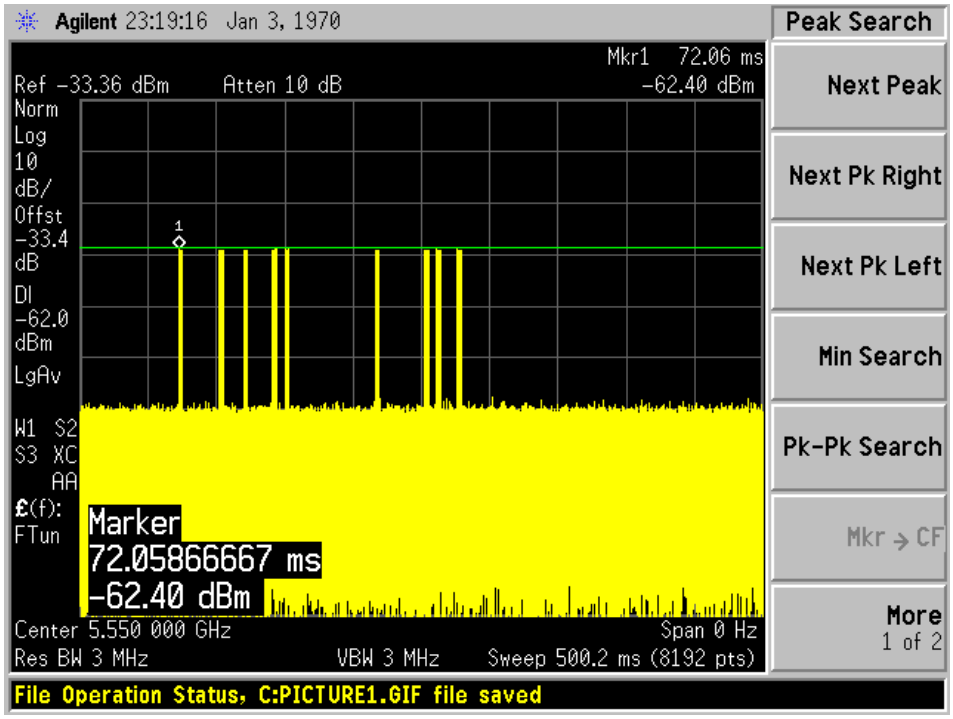
Radar Type 4



Radar Type 5



Radar Type 6



6 Channel Move Time and Channel Closing Transmission Time

6.1 Test Procedure

Perform one of the type1 to type 4 short pulse radar waveform, BACL use type 1 radar signal, repeat using a long pulse radar type5 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. 8192)

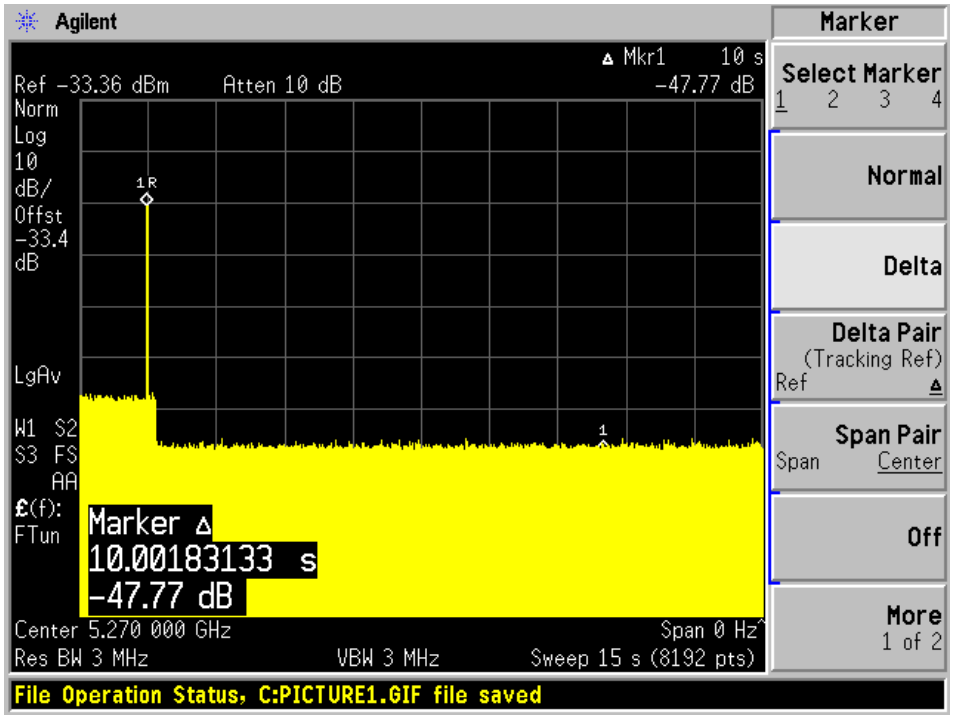
6.2 Test Results

Frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5270	40	Type 1	Compliant
		Type 5	Compliant
5550	40	Type 1	Compliant
		Type 5	Compliant

Please refer to the following tables and plots.

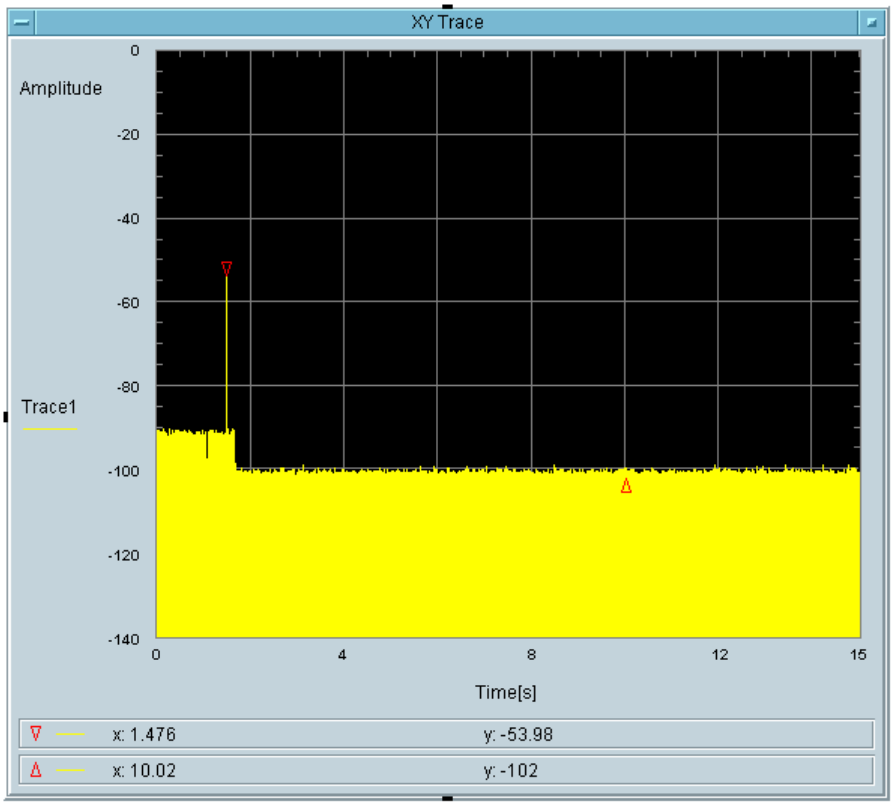
5270 MHz Bandwidth 40 MHz

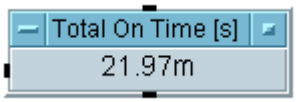
Type 1 radar channel move time result:

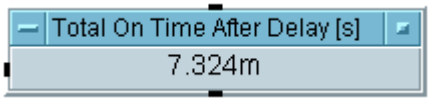


Type1 radar channel closing transmission time result:

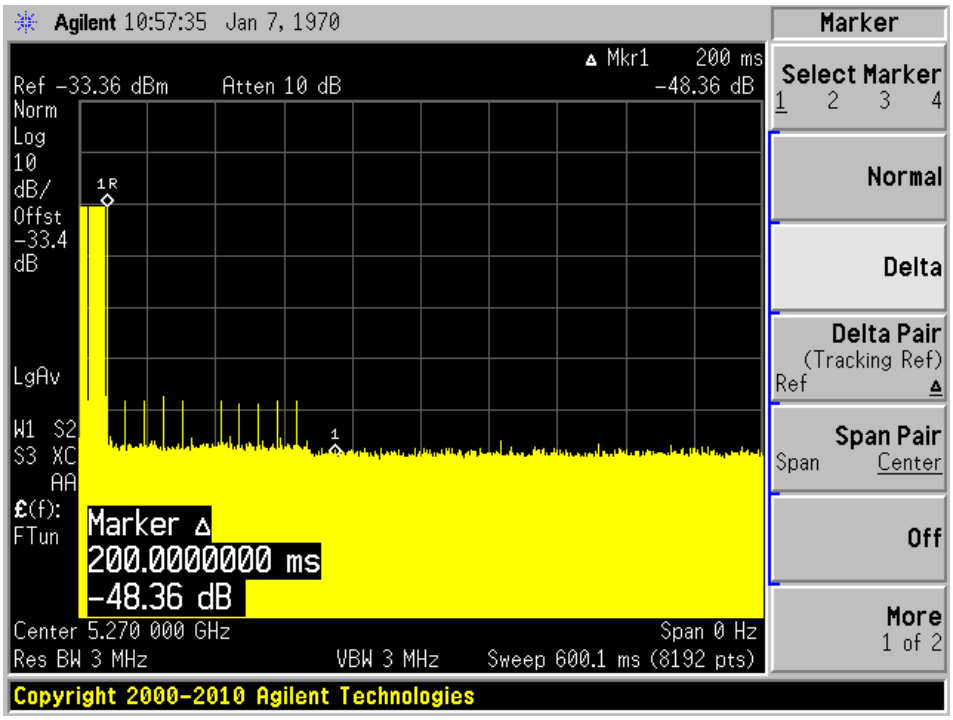
Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
7.324	60	52.676





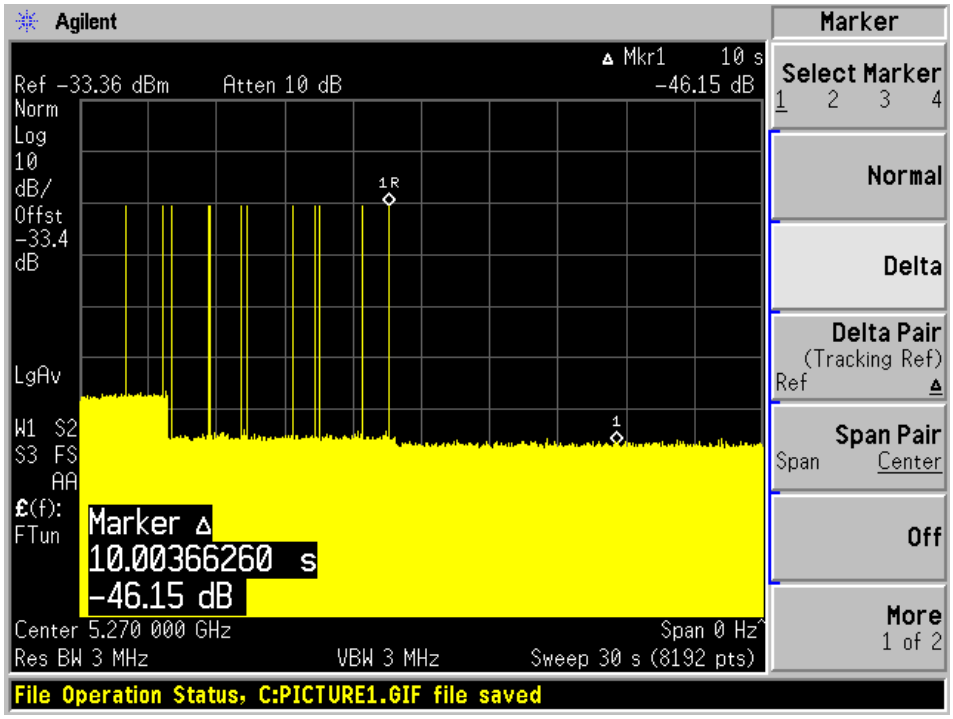


Type1 radar 600ms result:



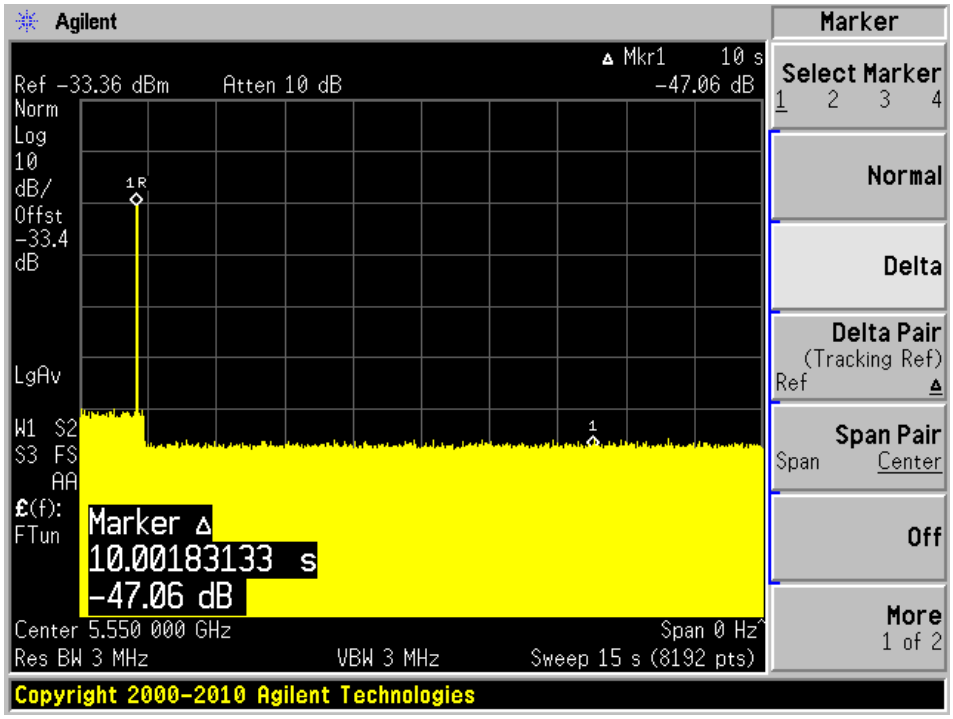
Type 5 radar channel move time result:

The traffic ceases period to the end of the radar waveform, therefore it also ceases period to 10 seconds after of the end of the radar waveform.



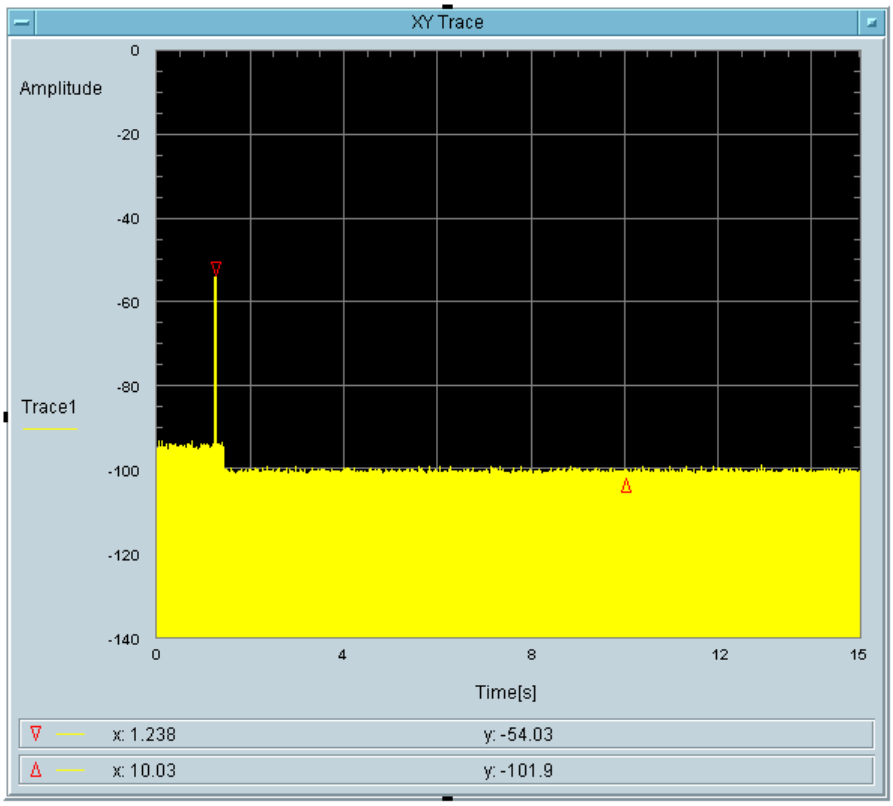
5550 MHz Bandwidth 40 MHz

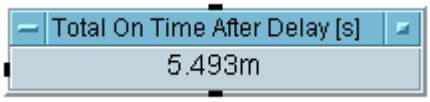
Type 1 radar channel move time result:



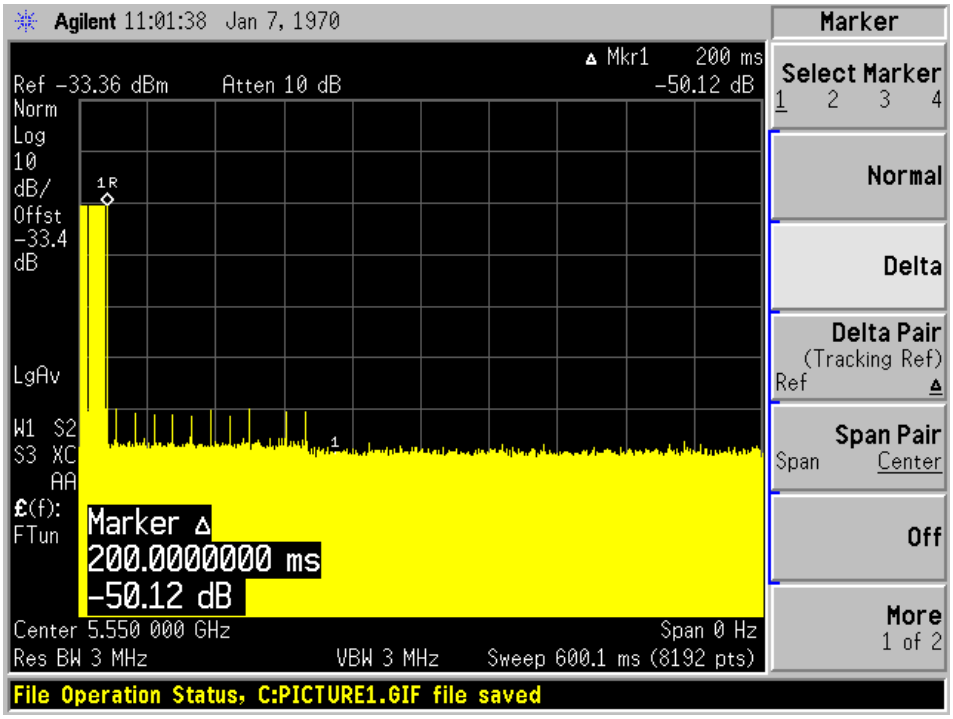
Type1 radar channel closing transmission time result:

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
5.493	60	54.507



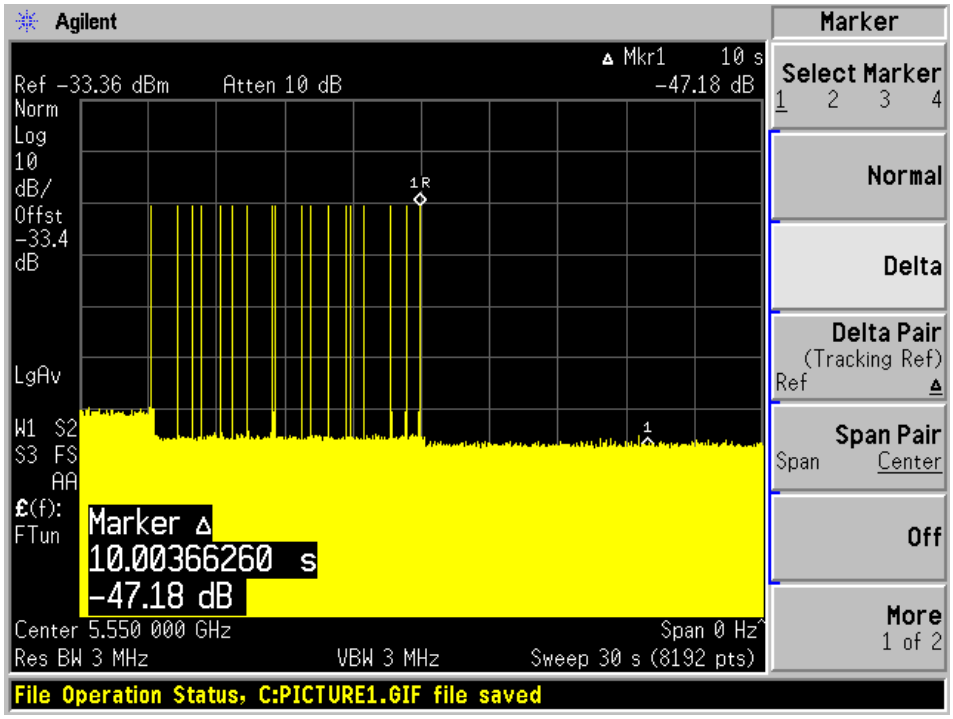


Type1 radar channel 600ms result:



Type 5 radar channel move time result:

The traffic ceases period to the end of the radar waveform, therefore it also ceases period to 10 seconds after of the end of the radar waveform.



7 Non-Occupancy Period

7.1 Test Procedure

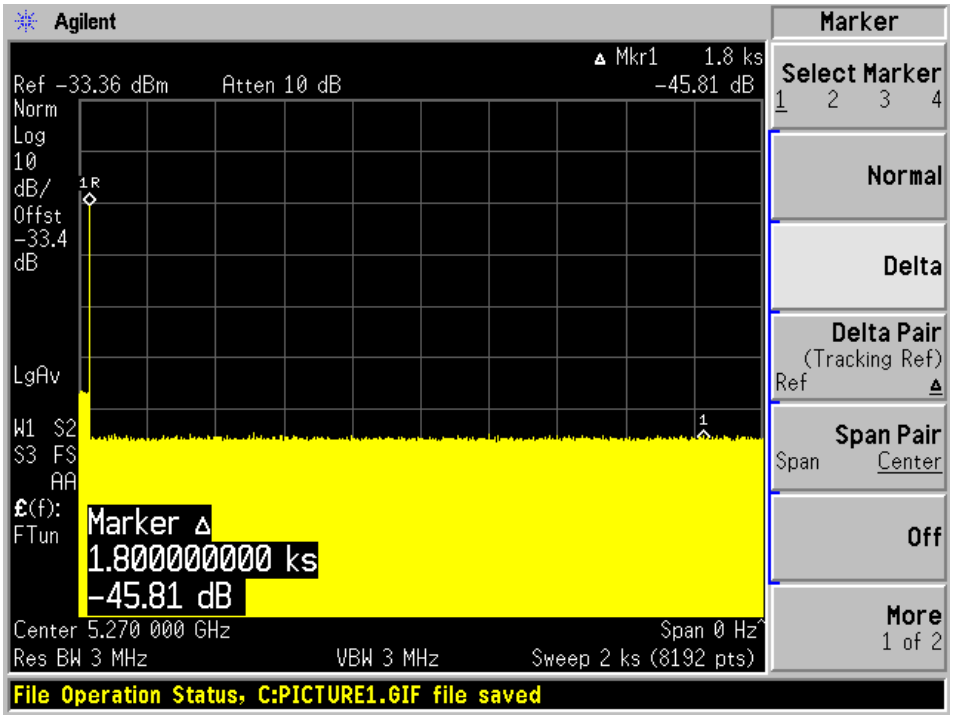
Measure the EUT for more than 30 minutes following the channel close/move time to very that the EUT does not resume any transmissions on this channel. Provide one plot to demonstrate no transmission on the channel for the non-occupancy period (30 minutes observation time)

7.2 Results

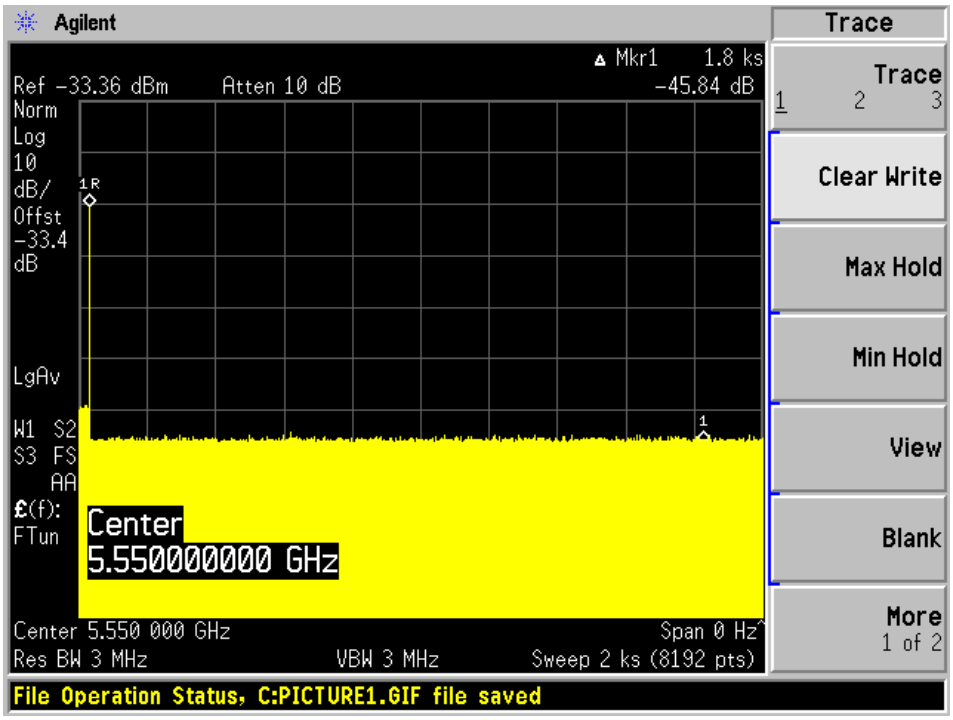
Frequency (MHz)	Bandwidth (MHz)	Spectrum Analyzer Display
5270	40	No transmission within 30 minutes
5550	40	No transmission within 30 minutes

Please refer to the following plots.

5270 MHz Bandwidth 40 MHz

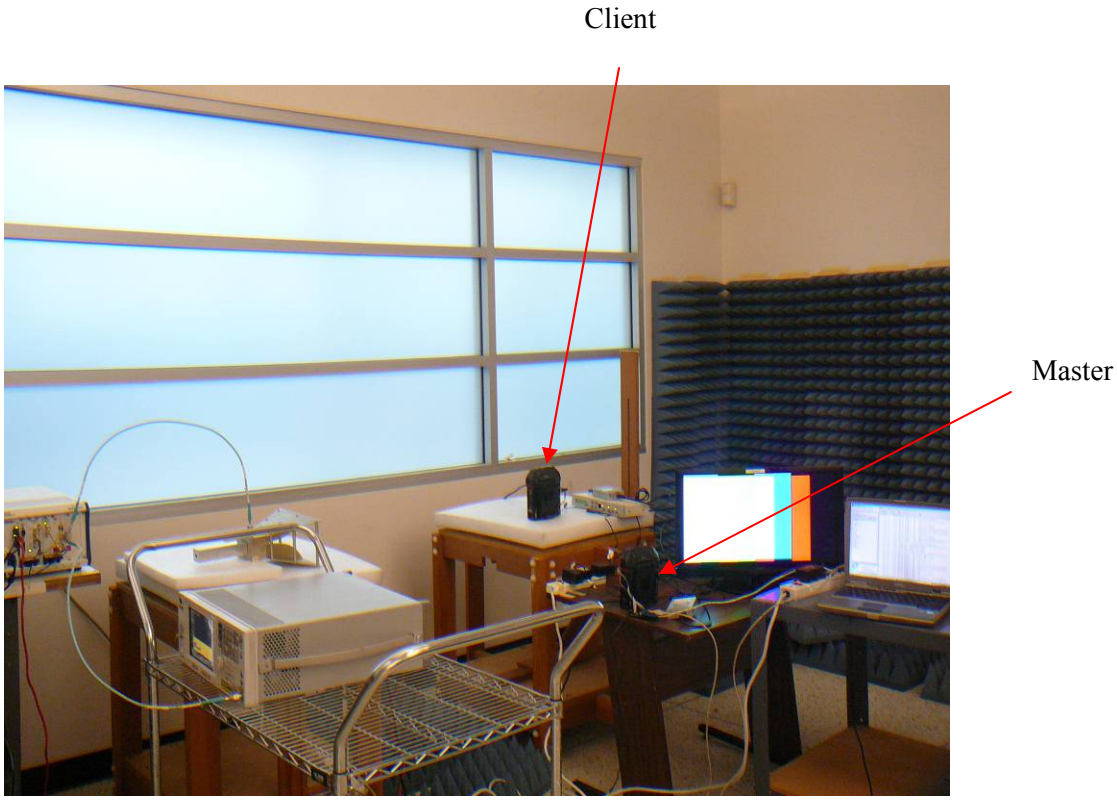


5550 MHz Bandwidth 40 MHz



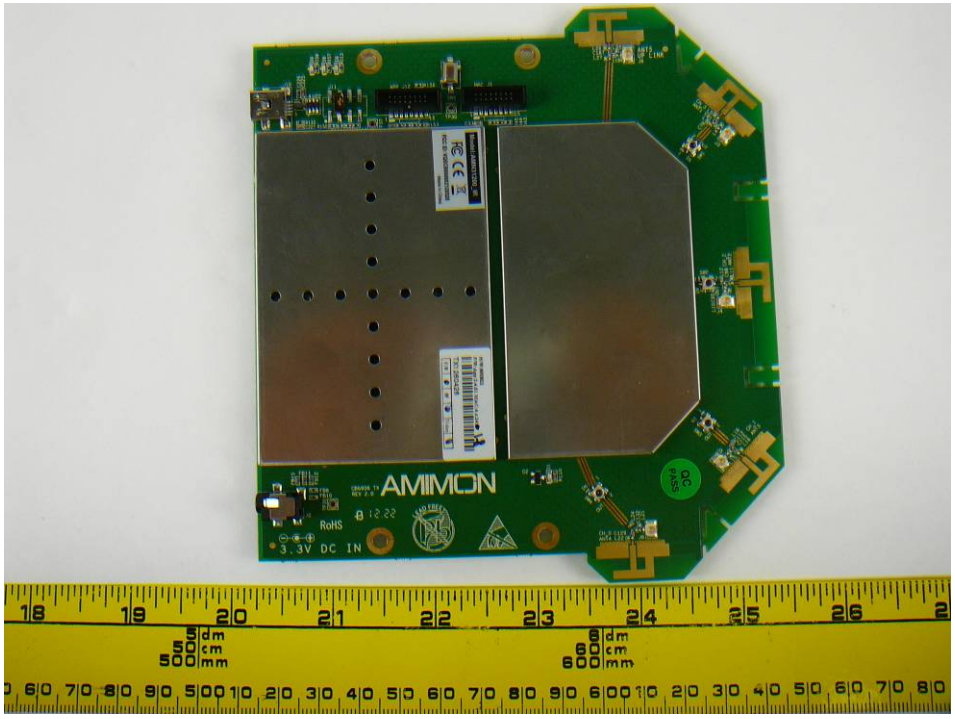
8 Appendix A - Test Setup Photographs

8.1 Setup View

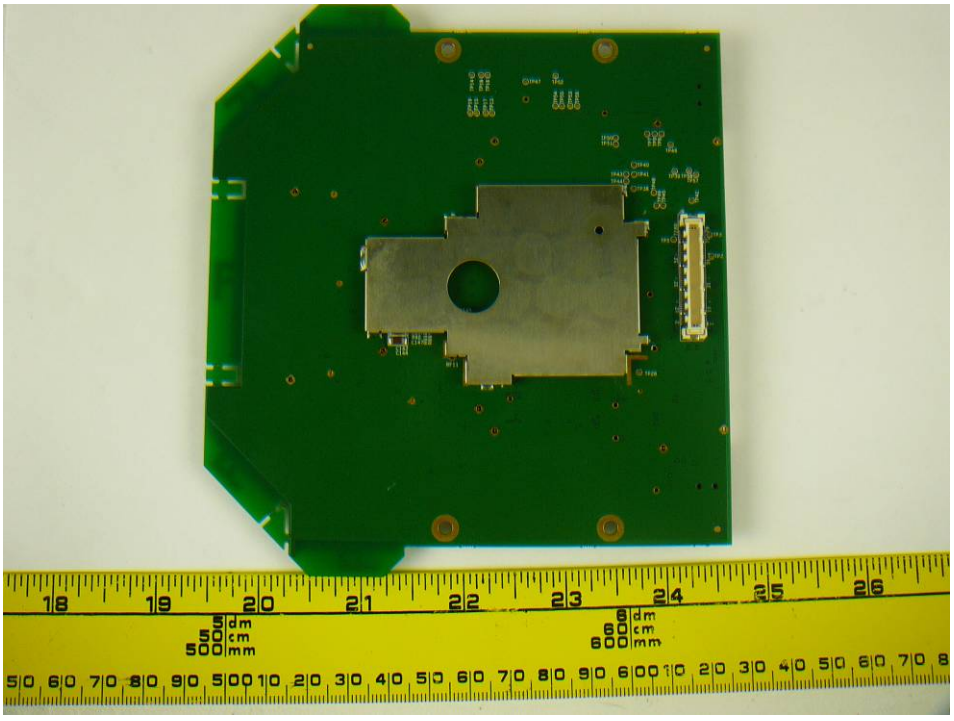


9 Appendix B - EUT Photographs

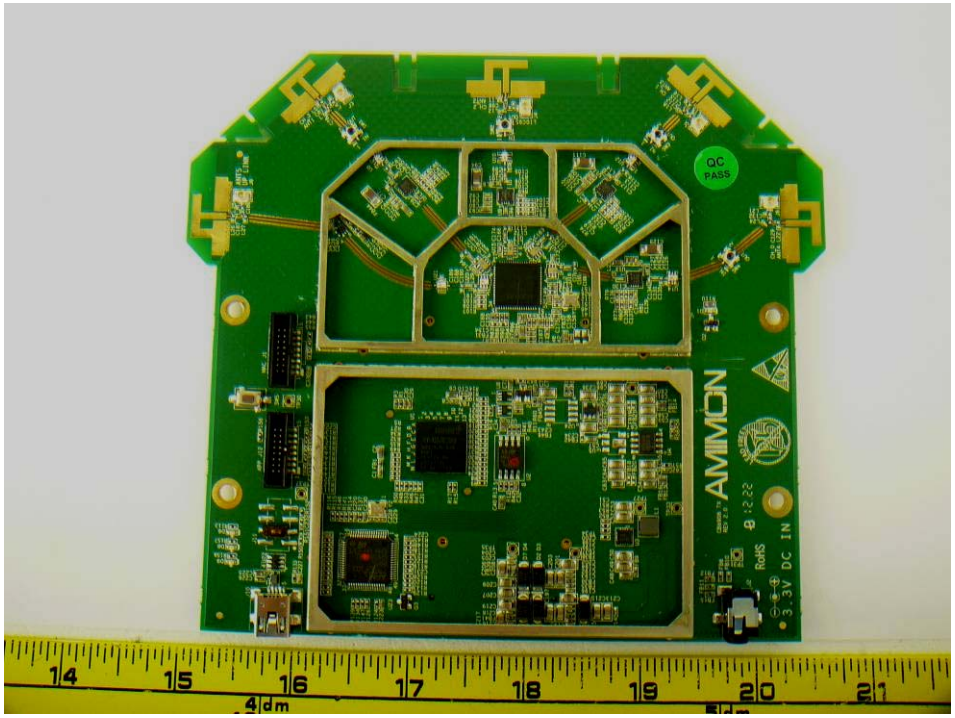
9.1 EUT Top View



9.2 EUT Bottom View

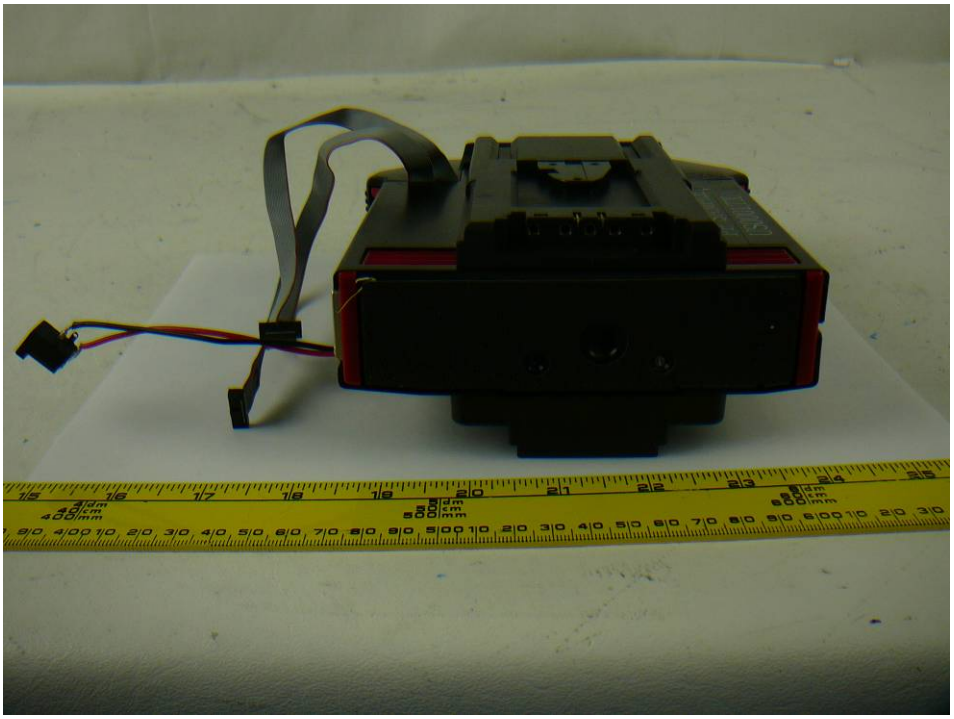


9.3 EUT without Shielding View

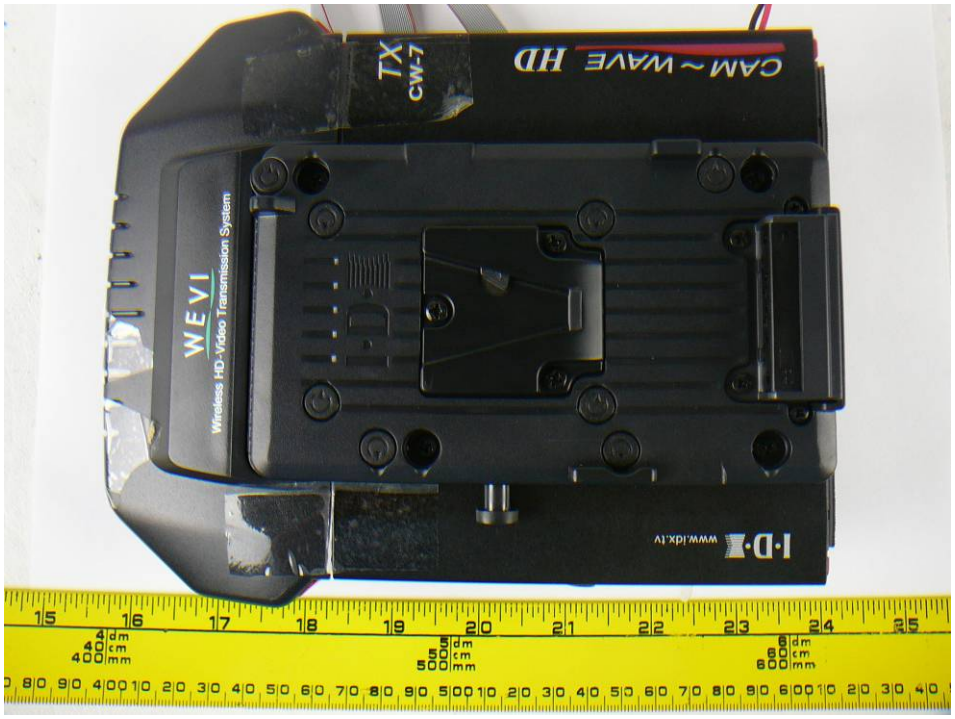


9.4 Host Unit (With EUT) Top View

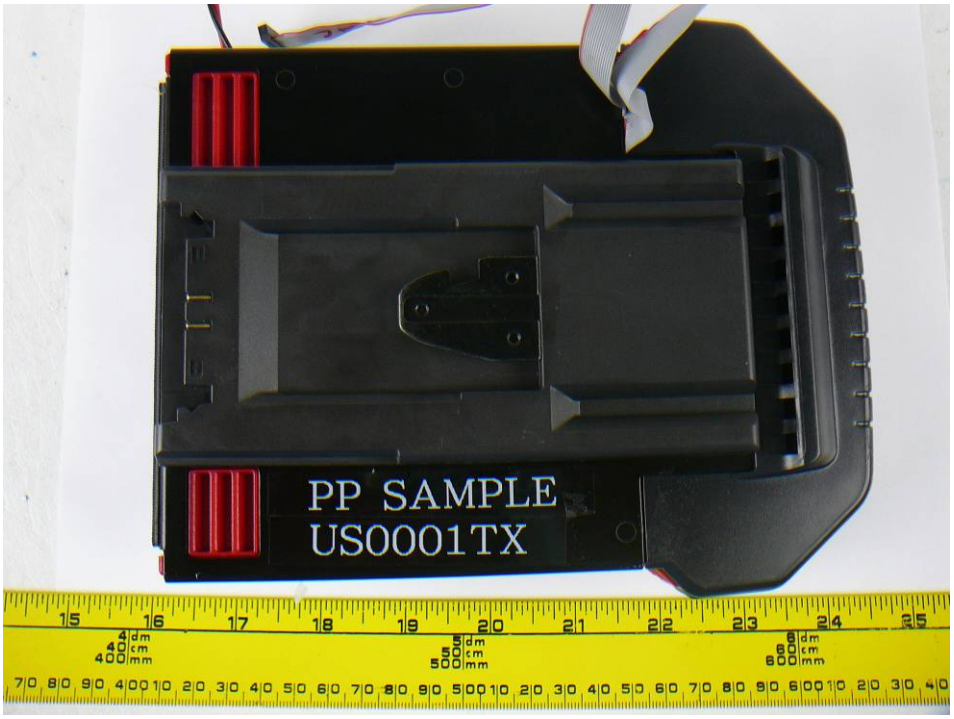
9.5 Host Unit (With EUT) Bottom View



9.6 Host Unit (With EUT) Side View 1

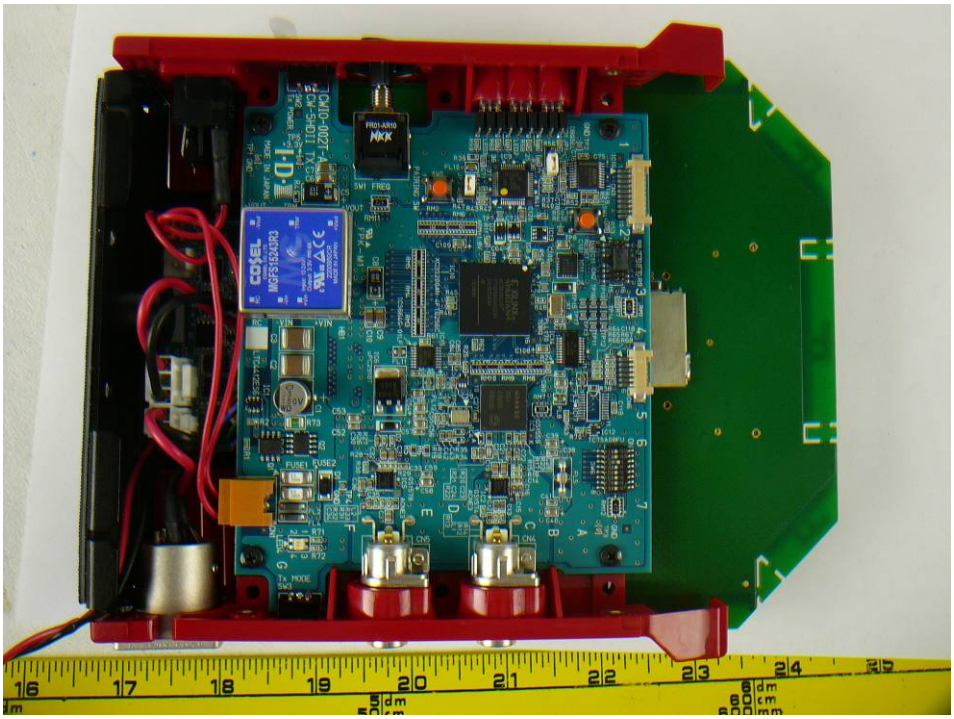


9.7 Host Unit (With EUT) Side View 2

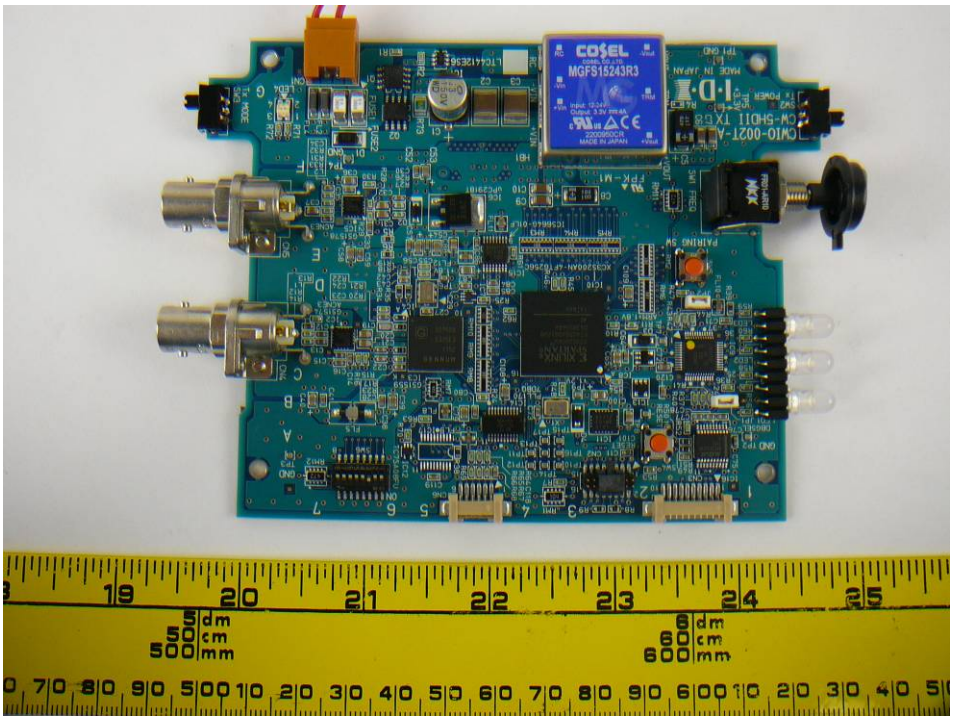


9.8 Host Unit (With EUT) Side View 3

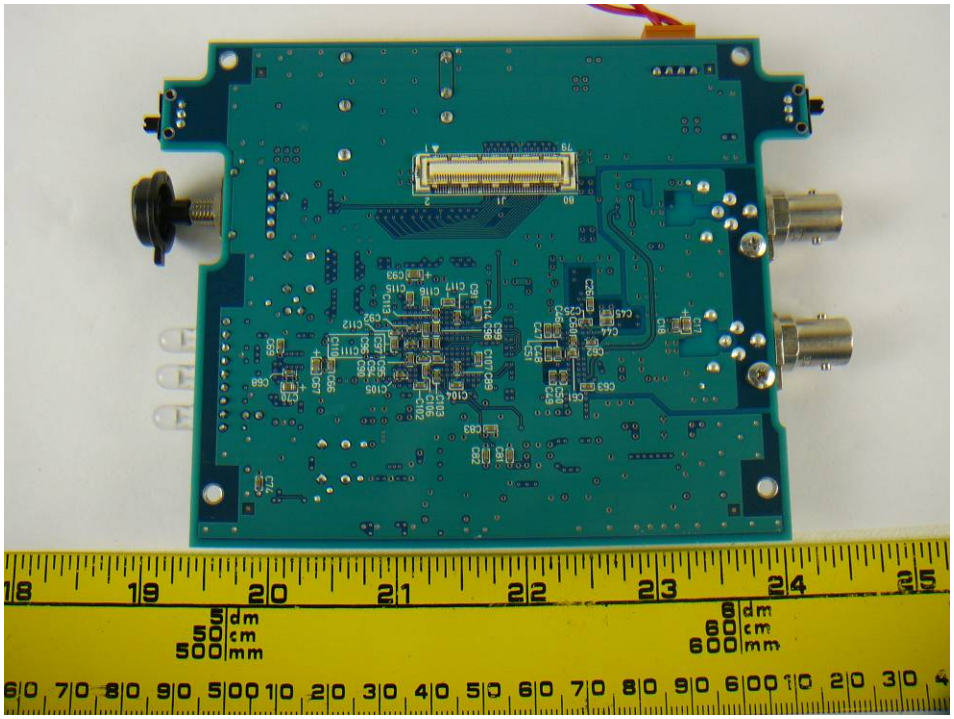
9.9 Host Unit Open Chassis



9.10 Host Unit Board Top View



9.11 Host Unit Board Bottom View



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