

Test Report # 317060 C

Equipment Under Test: PPD

Test Date(s): 8/22/17 – 9/21/17

Prepared for: GE Healthcare
Attn: Matt Pekarske
8200 West Tower Ave.
Milwaukee, WI 53223

Report Issued by: Shane Dock, EMC Engineer

Signature:



Date: 10/31/17

Report Reviewed by: Adam Alger, Quality Systems Engineer

Signature: 

Date: 10/27/2017

Report Constructed by: Shane Dock, EMC Engineer

Signature:



Date: 10/31/17

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| | | |
|------------------------|--------------|-------------------------|
| Company: GE Healthcare | Page 1 of 18 | Name: PPD |
| Report: 317085 C | | Model: See Section 2.1 |
| Job: C-2826 | | Serial: See Section 2.1 |

CONTENTS

| | |
|---|----|
| Contents | 2 |
| Laird Technologies Test Services in Review | 3 |
| 1 Test Report Summary | 4 |
| 2 Client Information | 5 |
| 2.1 Equipment Under Test (EUT) Information | 5 |
| 2.2 Product Description | 5 |
| 2.3 Modifications Incorporated for Compliance..... | 5 |
| 2.4 Deviations and Exclusions from Test Specifications | 5 |
| 2.5 Additional Information..... | 6 |
| 2.6 Power Plan | 6 |
| 2.7 Channel Plan | 6 |
| 2.8 KDB 905462 Information..... | 7 |
| 3 References | 11 |
| 4 Uncertainty Summary | 12 |
| 5 Test Data | 13 |
| 5.1 Antenna Port Conducted Emissions..... | 13 |
| 6 Revision History | 18 |

Laird Technologies Test Services in Review

The Laird Technologies, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

Scope of accreditation includes all test methods listed herein, unless otherwise noted.



Federal Communications Commission (FCC) – USA

Accredited recognition of two 3 meter Semi-Anechoic Chambers

Accredited Test Firm Registration Number: 953492



Innovation, Science and Economic Development Canada

ISED Site listing of two 3 meter Semi-Anechoic Chambers based on RSS-GEN – Issue 4

File Number: IC 3088A-2

File Number: IC 3088A-3

| | | |
|--|----------------------------|---|
| Company: GE Healthcare | Page 3 of 18 | Name: PPD |
| Report: 317085 C | | Model: See Section 2.1 |
| Job: C-2826 | | Serial: See Section 2.1 |

1 TEST REPORT SUMMARY

During **8/22/17 to 9/21/17** the Equipment Under Test (EUT), **PPD**, as provided by **GE Healthcare** was tested to the following requirements:

| FCC | ISED Canada | Test Description | Method | Result |
|-----------------------|------------------------|---------------------------------|--------------------|--------|
| 15.407 (h)(2) | RSS-247 Section 6.3 | Dynamic Frequency Selection | FCC KDB 905462 D02 | Pass* |
| 15.407 (h)(2)(ii) | RSS-247 Section 6.3 | Channel Availability Check Time | FCC KDB 905462 D02 | N/A* |
| 15.407 (h)(2)(iii) | RSS-247 Section 6.3 | Channel Move Time | FCC KDB 905462 D02 | Pass |
| 15.407 (h)(2)(iv) | RSS-247 Section 6.3 | Non-Occupancy period | FCC KDB 905462 D02 | Pass |

* The EUT is a client only device

Notice:

The results relate only to the item tested and described in this report. Any modifications made to the equipment under test after the specified test date(s) may invalidate the data herein.

If the resulting measurement margin is seen to be within the uncertainty value, as listed in this report, the possibility exists that this unit may not meet the required limit specification if subsequently tested.

2 CLIENT INFORMATION

| | |
|-----------------------|---------------------|
| Company Name | GE Healthcare |
| Contact Person | Matthew Pekarske |
| Address | 8200 West Tower Ave |

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

| | |
|----------------------|--|
| Product Name | PPD |
| Model Number | CARESCAPE ONE v1 |
| Serial Number | Conducted measurements: SNA 16260004SP Radiated measurements: SNA 16270022SP DFS testing: SNA 16260004SP |
| FCC/IC Number | FCC: OU5-CSONE01 IC: 4048B-CSONE01 |

2.2 Product Description

The PPD CARESCAPE ONE v1 is a transport bedside patient monitor used for measuring and displaying the physiologic data acquired from the connected patient. The wireless functionality will not be enabled in v1.

2.3 Modifications Incorporated for Compliance

None noted at time of test

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 Additional Information

Unit's Wifi functionality programmed via serial connection. Unit connected to 120V power with an adaptor as well as an internal battery.

FCC .ini file: GE_modified_FCC_930-0049-R1.2.ini

IC .ini file: GE_modified_IC_930-0049-R1.2.ini

Antenna used is a Pulse Electronics PIFA Antenna with a gain of 3.5 dBi in the 2.4-2.4835 GHz and a gain of 4.5 dBi.

2.6 Power Plan

| Band | UNII 1 | UNII 2A | UNII 2C | UNII 3 |
|---------------|--------|---------|---------|--------|
| Power Setting | Max | 15250 | 15250 | Max |

2.7 Channel Plan

| Channel | UNII 1 | UNII 2A | UNII 2C | UNII 3 |
|---------|-------------------------|---------|---------|--------|
| Low | 36 | 56 | 100 | 149 |
| Mid | 40 | 60 | 116 | 157 |
| High | 44 (ISED) / 48 (FCC) | 64 | 140 | 165 |

2.8 KDB 905462 Information

Section 8.1

| 8.1 Complete description of the U-NII device | |
|---|--|
| a) The operating frequency range(s) of the equipment. | 5180-5240 MHz, 5280-5320MHz, 5500-5700MHz, 5745-5825 Mhz |
| b) The operating modes (Master and/or Client) of the U-NII device. Bridge modes and MESH modes, as applicable, must be included in the description. | Client with no radar detection capability |
| c) For Client devices, indicate whether or not it has radar detection capability and indicate the FCC identifier for the Master U-NII Device that is used with it for DFS testing. | Client with no radar detection capability. Master used with testing, FCC ID: LDK102061, LDK102062 IC: 2461B-102061, 2461B-102062 |
| d) List the highest and the lowest possible power level (equivalent isotropic radiated power (EIRP)) of the equipment. | Highest EIRP = 16.1 dBm + 4.5dBi = 20.6 dBm Lowest EIRP = 11.6 dBm + 4.5dBi = 16.1 dBm |
| e) List all antenna assemblies and their corresponding gains. | Refer to section 2.5 of this report |
| 1) If radiated tests are to be performed, the U-NII Device should be tested with the lowest gain antenna assembly (regardless of antenna type). The report should indicate which antenna assembly was used for the tests. For devices with adjustable output power, list the output power range and the maximum EIRP for each antenna assembly. | Not Applicable |
| 2) If conducted tests are to be performed, indicate which antenna port/connection was used for the tests and the antenna assembly gain that was used to set the DFS Detection Threshold level during calibration of the test setup. | Not Applicable- EUT Client only |
| i) Indicate the calibrated conducted DFS Detection Threshold level. | Not Applicable- EUT Client only |
| ii) For devices with adjustable output power, list the output power range and the maximum EIRP for each antenna assembly. | No adjustable power. Maximum EIRP = 20.6 dBm |
| iii) Indicate the antenna connector impedance. Ensure that the measurement instruments match (usually 50 Ohms) or use a minimum loss pad and take into account the conversion loss. | 50 ohms |
| 3) Antenna gain measurement verification for tested antenna. | Not Applicable- EUT Client only |
| i) Describe procedure | Not Applicable- EUT Client only |
| ii) Describe the antenna configuration and how it is mounted | Not Applicable- EUT Client only |
| iii) If an antenna cable is supplied with the device, cable loss needs to be taken into account. Indicate the maximum cable length and either measure the gain with this cable or adjust the measured gain accordingly. State the cable loss. | Antenna cable was accounted in the gain measurement. |
| f) Test sequences or messages that should be used for communication between Master and Client | EUT and Master running 'lperf' to stream data |
| 1) Stream the test file from the Master Device to the Client Device for IP based systems or frame based systems which dynamically allocate the talk/listen ratio. | EUT and Master running 'lperf' to stream data |
| 2) For frame based systems with fixed talk/listen ratio, set the ratio to the worst case (maximum) that is user configurable during this test as specified by the manufacturer and stream the test file from the Master to the Client. | Not applicable |
| 3) For other system architectures, supply appropriate Channel loading methodology. | Not applicable |
| g) Transmit Power Control description—Provide a description. | Not Applicable |
| h) System architectures, data rates, U-NII Channel bandwidths — Indicate the type(s) of system architecture (e.g. IP based or Frame based) that the U-NII device employs. Each type of unique architecture must be tested. | Channel bandwidths: 20MHz Data rates: 6 MBPS - MCS7 |
| i) The time required for the Master Device and/or Client Device to complete its power-on cycle. | Client device takes less than 10 seconds to boot up |
| j) Manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user. | See Software security exhibit |
| k) The manufacturer is permitted to select the first channel either manually or randomly. The manufacturer may also block DFS channels from use. | Not applicable-EUT client device only |

Section 8.2

| 8.2 Complete description of the Radar Waveform calibration | |
|---|---|
| a) Description of calibration setup—Block diagram of equipment setup, clearly identifying if a radiated or conducted method was used. | Not Applicable- EUT client device only |
| b) Description of calibration procedure | Not Applicable- EUT client device only |
| 1) Verify DFS Detection Threshold levels | Not Applicable- EUT client device only |
| i) Indicate DFS Detection Threshold levels used. | Not Applicable- EUT client device only |
| ii) Consider output power range and antenna gain. | Not Applicable- EUT client device only |
| 2) For the Short Pulse Radar Types, spectrum analyzer plots of the burst of pulses on the Channel frequency should be provided. | Supplied in this report |
| 3) For the Long Pulse Radar Type, spectrum analyzer plot of a single burst (1-3 pulses) on the Channel frequency should be provided. | Not Applicable- EUT client device only |
| 4) Describe method used to generate frequency hopping signal. | Not Applicable- EUT client device only |
| 5) The U-NII Detection Bandwidth | Not Applicable- EUT client device only |
| 6) For the Frequency Hopping waveform, a spectrum analyzer plot showing 9 pulses on one frequency within the U-NII Detection Bandwidth should be provided. | Not Applicable- EUT client device only |
| 7) Verify use of vertical polarization for testing when using a radiated test method. | Not applicable- testing performed conducted |
| c) When testing a Client Device with radar detection capability, verify that the Client Device is responding independently based on the Client Device's self-detection rather than responding to the Master Device. If required, provide a description of the method used to isolate the client from the transmissions from the Master Device to ensure Client Device self-detection of the Radar Waveform. | Not Applicable- EUT client device only without radar detection capability |

Section 8.3

| 8.3 Complete description of test procedure | |
|--|--|
| a) Description of deviations to the procedures or equipment described in this document. | No deviations during test |
| b) Description of DFS test procedure and test setup used to monitor the U-NII device and Radar Waveform transmissions. Provide a block diagram of the signal monitoring equipment setup. | Provided in this report |
| 1) List of equipment | In report |
| 2) Test setup photos | Test setup photos exhibit |
| c) Description of DFS test procedure and test setup used to generate the Radar Waveforms. | In report |
| 1) Block diagram of equipment setup | In report |
| 2) List of equipment | In report |
| 3) Test setup photos | Test setup photos exhibit |
| 4) For each of the waveforms that were used for each signal type, supply the characteristics (pulse width, pulse repetition interval, number of pulses per burst, modulation). | Radar type 0 in KDB905462 D02 |
| 5) For selecting the waveform parameters from within the bounds of the signal type, describe how they were selected (i.e., manually or randomly). | Manually using arbitrary waveform generator and signal generator |
| 6) Channel loading description including data type, timing plots, percentage of channel loading calculation, and protocol. | In report |
| d) The DFS tests are to be performed on U-NII Channel(s). Refer to Table 2 for additional requirements for devices with multiple bandwidth modes. | Testing performed on UNII channel with 20MHz bandwidth |
| 1) List each Channel frequency that was used for the tests. | 5520, 5660, 5500, 5280 MHz |
| 2) Data Sheet showing the U-NII Detection Bandwidth for the Channel(s) used during the test. | Not Applicable-EUT client device only |
| 3) Plot of RF measurement system showing its nominal noise floor in the same bandwidth which is used to perform the Channel Availability Check, initial radar bursts, In-Service Monitoring, and 30 minute Non-Occupancy Period tests. | Not Applicable-EUT client device only |

| | |
|--|---------------------------------------|
| e) Timing plot(s) showing compliance with the Channel Availability Check Time requirement of 60 seconds at start up. | Not Applicable-EUT client device only |
| 1) The plot should show the Initial Tpower-up time. | Not Applicable-EUT client device only |
| 2) The plot should include the Initial Tpower-up period in addition to 60 second period. | Not Applicable-EUT client device only |
| f) Timing plot(s) showing compliance with the Initial DFS radar detection requirements during the 60 second initial Channel Availability Check at start up. | Not Applicable-EUT client device only |
| 1) Plot for DFS radar detection for Radar Waveforms applied 6 seconds after the Initial Tpower-up time period. The minimum length of the plot should be 1.5 minutes after the Tpower-up time period. The plot should show the radar burst at the appropriate time. This test is only required once and Radar Type 0 should be used for the test. | Not Applicable-EUT client device only |
| 2) Plot for DFS radar detection for Radar Waveforms applied 6 seconds before end of the 60 second Channel Availability Check Time. The minimum length of the plot should be 1.5 minutes after the Tpower-up time period. The plot should show the radar burst at the appropriate time. This test is only required once and Radar Types 0 should be used for the test. | Not Applicable-EUT client device only |
| 3) The minimum time resolution of the plots should be sufficient to show the Radar Waveform bursts (overall, not individual pulses within the burst). | In report |
| g) Verification that when the device is "off" that the RF energy emitted is below the FCC rules for unintentional radiators: | Verified |
| For the plots of U-NII RF activity versus time, the device is considered to be "off" or not transmitting when intentional U-NII signals (beacons, data packets or transmissions, or control signals) are below the FCC rules for unintentional radiation due to device leakage, oscillator noise, clocks, and other unintentional RF generators. | |
| h) Spectrum Analyzer, VSA, or some other data gathering Instrument plots showing compliance with the Channel Move Time requirements during in the In-Service Monitoring. The plots need to show U-NII device transmissions on the Channel in the form of RF activity on the vertical axis versus time on the horizontal axis. Only one 10 second plot needs to be reported for Radar Type 0. The plot for the Short Pulse Radar Types should start at the end of the radar burst. The Channel Move Time will be calculated based on the plot of Radar Type 0. The plots need to show U-NII device transmissions on the Channel in the form of RF activity on the vertical axis versus time on the horizontal axis. Sufficient resolution should be used. | In report |
| 1) The plots and/or data must show the U-NII Device's compliance with the 200 milliseconds limit on data transmission and compliance with the 60 millisecond aggregate limit found in Table 4. | In report |
| 2) Indicate the total number of times the test was performed. | Not Applicable-EUT client device only |
| 3) Indicate a detect/not detect for each waveform within a signal type and the number of failures and the number of successful radar detection times within the time limit. Sample data sheets are shown in Tables 8-11. | Not Applicable-EUT client device only |
| 4) Verify compliance with the minimum percentage of successful detection requirements found in Tables 5-7. | Not Applicable-EUT client device only |
| i) Spectrum Analyzer plot(s) showing compliance with the 30 minute Non-Occupancy Period requirement. Only one plot is required. This is a separate test that is performed in addition to the other In-Service Monitoring tests. | In report |

3 REFERENCES

| Publication | Edition | Date |
|---------------------------|---------|---------------|
| 47 CFR, Parts 0-15 (FCC) | | 2017 |
| RSS 247 | 2 | 2017 |
| RSS GEN | 4 | 2014 |
| ANSI C63.10 | | 2013 |
| FCC KDB 789033 D02 v01r04 | | 2016 |
| FCC KDB 905462 D02 v02 | - | April 8, 2016 |

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

| References | Version / Date |
|-----------------|------------------|
| CISPR 16-4-1 | Ed. 2 (2009-02) |
| CISPR 16-4-2 | Ed. 2 (2011-06) |
| CISPR 32 | Ed. 1 (2012-01) |
| ANSI C63.23 | 2012 |
| A2LA P103 | February 4, 2016 |
| A2LA P103c | August 10, 2015 |
| ETSI TR 100-028 | V1.3.1 (2001-03) |

| Measurement Type | Configuration | Uncertainty \pm |
|-----------------------------|-------------------------------|-------------------|
| Radiated Emissions | Biconical Antenna | 5.0 dB |
| Radiated Emissions | Log Periodic Antenna | 5.3 dB |
| Radiated Emissions | Horn Antenna | 4.7 dB |
| AC Line Conducted Emissions | Artificial Mains Network | 3.4 dB |
| Telecom Conducted Emissions | Asymmetric Artificial Network | 4.9 dB |
| Disturbance Power Emissions | Absorbing Clamp | 4.1 dB |
| Radiated Immunity | 3 Volts/meter | 2.2 dB |
| Conducted Immunity | CDN/EM/BCI | 2.4/3.5/3.4 dB |
| EFT Burst/Surge | Peak pulse voltage | 164 volts |
| ESD Immunity | 15 kV level | 1377 Volts |

| Parameter | ETSI U.C. \pm | U.C. \pm |
|--|--------------------|-----------------------|
| Radio Frequency, from F0 | 1×10^{-7} | 0.55×10^{-7} |
| Occupied Channel Bandwidth | 5 % | 2 % |
| RF conducted Power (Power Meter) | 1.5 dB | 1.2 dB |
| RF conducted emissions (Spectrum Analyzer) | 3.0 dB | 1.7 dB |
| All emissions, radiated | 6.0 dB | 5.3 dB |
| Temperature | 1° C | 0.65° C |
| Humidity | 5 % | 2.9 % |
| Supply voltages | 3 % | 1 % |

5 TEST DATA

5.1 Antenna Port Conducted Emissions

| | |
|-----------------------------------|---|
| Description of Measurement | <p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p> |
| Example Calculations | <p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p> |

Block Diagram

7.2.2 Setup for Client with injection at the Master

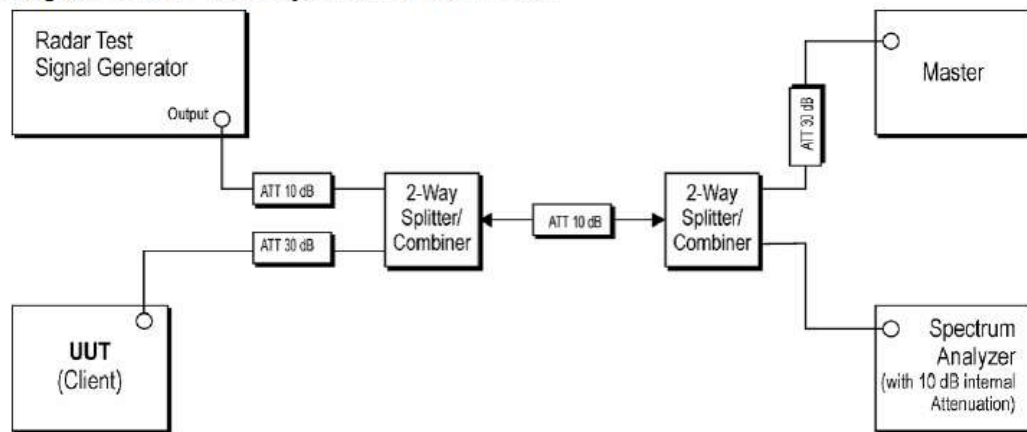


Figure 3: Example Conducted Setup where UUT is a Client and Radar Test Waveforms are injected into the Master

5.1.1 Antenna Port Conducted Emissions – DFS

| | |
|---------------------|-----------------------------------|
| Operator | Adam Alger |
| QA | Aidi Zainal |
| Test Date | 9/29/2017 |
| Location | Chamber 5 Aux room |
| Temp. / R.H. | 21°-22°C / 27%-53% R.H. |
| Rule | FCC Part 15.407 (h) / RSS-247 6.3 |
| Method | FCC KDB 905462 D02 |

Requirements

Client without Radar Detection Requirements Prior to Use of a Channel

1. Non-Occupancy Period

minimum 30 minutes

Client without Radar Detection Requirements During Normal Operation

1. Channel Closing Time

200 ms + an aggregate of 60 ms over remaining 10 second period using Radar Type 0 starting at beginning of Channel move time plus any additional control signals not counting quiet periods during the remaining 10 second period.

2. Channel Move Time

10 seconds using Radar Type 0

Radar Type 0

Pulse width = 1 μ sec

PRI = 1428 μ sec

Number of Pulses = 18

Test Parameters

| | |
|-----------|--|
| Frequency | 5520, 5660, 5500, 5280 MHz |
| Settings | RBW 8 MHz |
| Settings | Peak Detector |
| EUT Spec | Client with no monitoring; Conducted Setup for Client with injection at the Master |
| EUT Spec | Battery operated |
| Notes | EUT Setup to connect to Master and perform data streaming using 'I-Perf'. Channel loading shown to be greater than 17%. |

Instrumentation



Date : 29-Sep-2017

Test : DFS

Job : C-2826

PE : Shane Dock

Customer : GE Healthcare

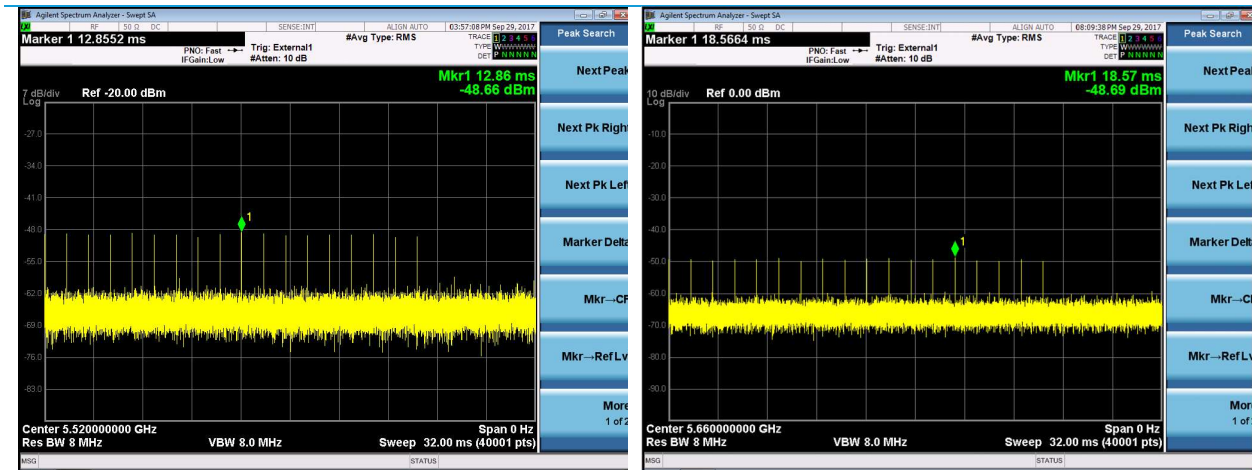
Quote : 317060

| No. | Asset | Description | Manufacturer | Model | Serial | Cal Date | Cal Due Date | Equipment Status |
|-----|------------|---|-------------------|---------------|--------------|------------|--------------|---------------------|
| 1 | CC 000259C | Function / Arbitrary Waveform Generator | Agilent | 33250A | US40000583 | 11/21/2016 | 11/21/2017 | Active Calibration |
| 2 | CC 000314C | Vector Signal Generator | Agilent | E4438C | US 41469143 | 5/4/2017 | 5/4/2019 | Active Calibration |
| 3 | CC 000710C | Oscilloscope | Agilent | MSO8104A | MY45001068 | 11/22/2016 | 11/22/2017 | Active Calibration |
| 4 | EE 960087 | Spectrum Analyzer | Agilent | N9010A | MY53400296 | 12/22/2016 | 12/22/2017 | Active Calibration |
| 5 | EE 960183 | Splitter | mini-circuits | ZFSC-2-10G + | S F707601702 | 4/24/2017 | 4/24/2018 | Active Verification |
| 6 | EE 960093 | Splitter/Combiner | mini-circuits | ZFSC-2-10G | SF702900616 | 2/27/2017 | 2/27/2018 | Active Verification |
| 7 | AA 960143 | Cable - Phaseflex | Gore | EKD01D01048.0 | 5546519 | 6/29/2016 | 12/31/2017 | Active Calibration |
| 8 | AA 960144 | Cable - Phaseflex | Gore | EKD01D010720 | 5800373 | 6/29/2016 | 12/31/2017 | Active Verification |
| 9 | AA 960173 | Cable - low loss 1m | A.H. Systems, Inc | SAC-26G-1 | 388 | 5/15/2017 | 5/15/2018 | Active Verification |

Master:

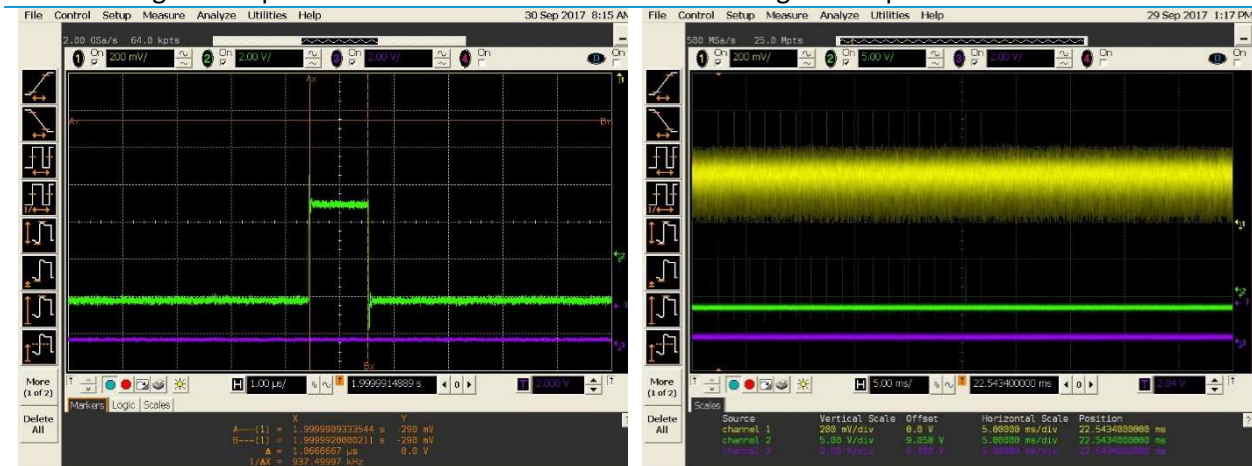
| Description | Manufacturer | Model Number | Serial Number |
|---|--------------|-------------------|---------------|
| Access point with DFS FCC ID: LDK102061, LDK102062 IC: 2461B-102061, 2461B-102062 | CISCO | AIR-AP 1252AG-AK9 | FTX154590DB |

Setup Plots



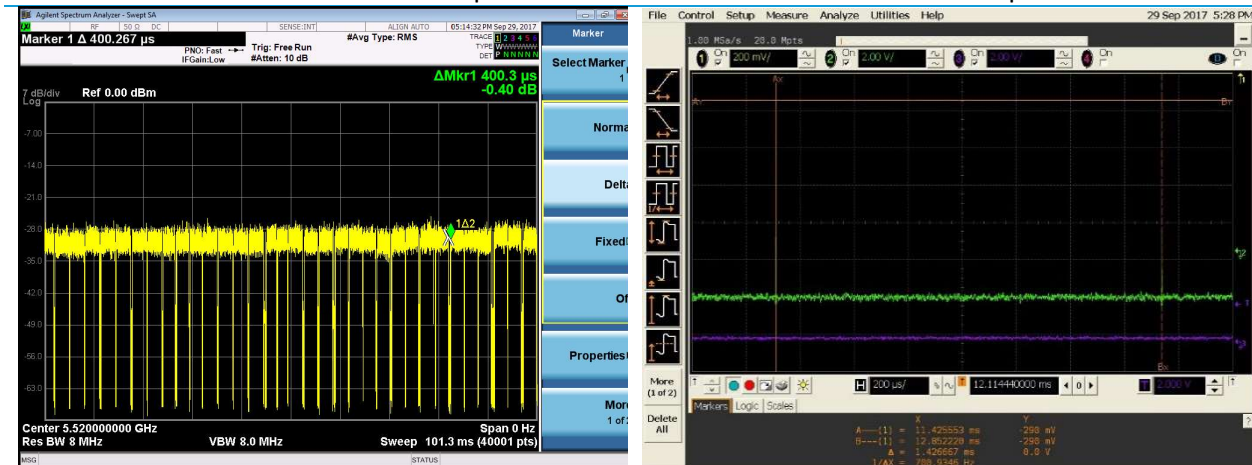
DFS Signal at input of master 5520 MHz

DFS Signal at input of master 5660 MHz



Radar Pulse 0: Pulse width 1 μs

Radar Pulse 0: 18 pulses

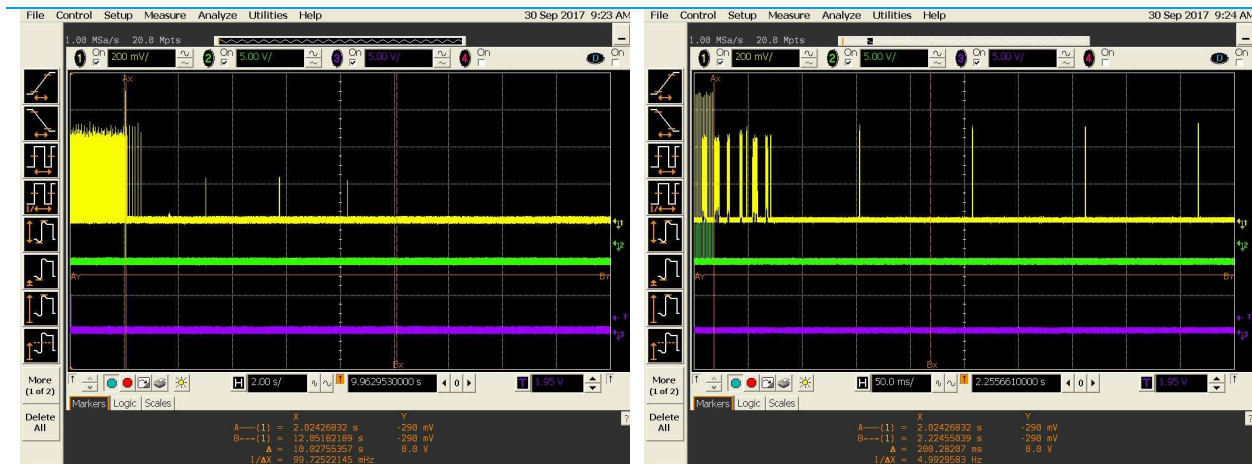


Duty Cycle 86.8 %

Radar Pulse 0: PRI 1.428 ms

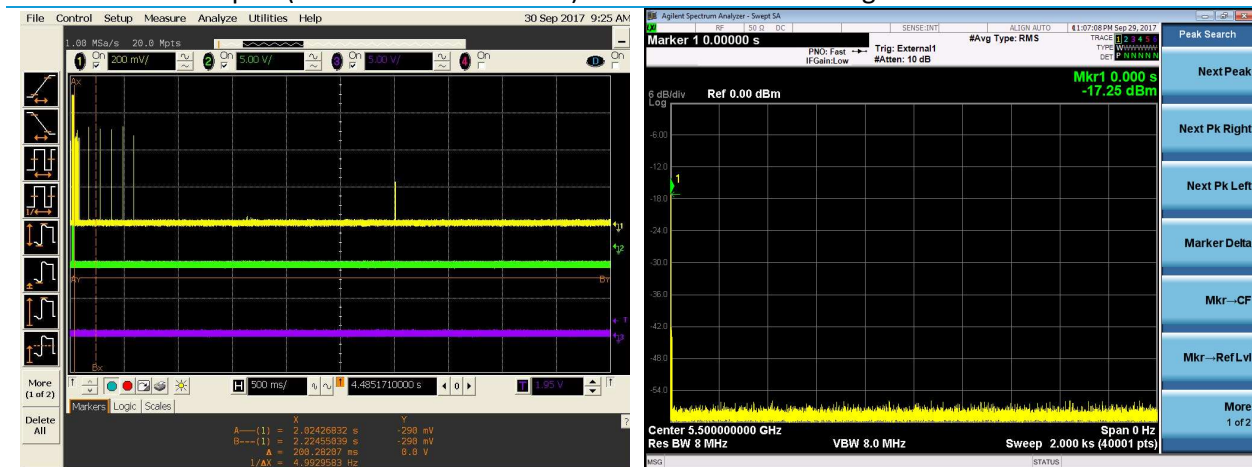
| | | |
|------------------------|---------------|-------------------------|
| Company: GE Healthcare | | Name: PPD |
| Report: 317085 C | Page 16 of 18 | Model: See Section 2.1 |
| Job: C-2826 | | Serial: See Section 2.1 |

Results



5280 MHz 20s plot (channel move time 10s)

Channel Closing Transmission Time 200 ms



4 pulses of 369 μ s after 200 ms then 3 pulse trains of 50 151 μ s pulses = 9.07 ms total

Channel Non-Occupancy Period (30 minutes)

| | | |
|------------------------|---------------|-------------------------|
| Company: GE Healthcare | | Name: PPD |
| Report: 317085 C | Page 17 of 18 | Model: See Section 2.1 |
| Job: C-2826 | | Serial: See Section 2.1 |

6 REVISION HISTORY

| Version | Date | Notes | Person |
|---------|----------|---------------|------------|
| 0 | 10/18/17 | First Draft | Adam Alger |
| 1 | 10/25/17 | Revised Draft | Shane Dock |
| 2 | 10/26/17 | Final Draft | Shane Dock |
| 3 | 2/8/18 | Updated Draft | Shane Dock |

END OF REPORT