
# Report On

FCC DFS Testing of the
Yota Devices Ltd YotaPhone2/ YD201
In accordance with FCC CFR 47 Part 15E and FCC 06-96

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2ADHW201

Document 75927375 Report 04 Issue 2 December 2014

Product Service

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**REPORT ON**

FCC DFS Testing of the
Yota Devices Ltd YotaPhone2/ YD201
In accordance with FCC CFR 47 Part 15E and FCC 06-96

Document 75927375 Report 04 Issue 2

December 2014

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**PREPARED BY**

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Authorised Signatory

**DATED** 10 December 2014

**This report has been up-issued to Issue 2 to correct the applicants name.**

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15E and FCC 06-96. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

J Hurley

UKAS TESTING 0141

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**CONTENTS**

Product Service

**SECTION 1**

**REPORT SUMMARY**

FCC DFS Testing of the
Yota Devices Ltd YotaPhone2/ YD201
In accordance with FCC CFR 47 Part 15E and FCC 06-96

## 1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC DFS Testing of the Yota Devices Ltd YotaPhone2/ YD201 to the requirements of FCC CFR 47 Part 15E and FCC 06-96.

| | |
|---|---|
| Objective | To perform FCC DFS Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer | Yota Devices Ltd |
| Model Number(s) | YotaPhone2/ YD201 |
| Serial Number(s) | Not Serialised (75927375-TSR0007)<br>WWAN IMEI 358993041450369 |
| Hardware Version | P2 |
| Software Version | 3.9 |
| Number of Samples Tested | 2 |
| Test Specification/Issue/Date | FCC CFR 47 Part 15E (2013)<br>FCC 06-96 (2006) |
| Incoming Release<br>Date | Application Form<br>3 December 2014 |
| Disposal<br>Reference Number<br>Date | Held Pending Disposal<br>Not Applicable<br>Not Applicable |
| Order Number<br>Date | 52831<br>15 September 2014 |
| Start of Test | 13 November 2014 |
| Finish of Test | 13 November 2014 |
| Name of Engineer(s) | J Hurley |
| Related Document(s) | 905462 D01 UNII DFS Compliance Procedures Old Rules v01<br>ETSI TR 100 028: 2001 |

## 1.2 TEST REQUIREMENTS

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

| Requirement | Operational Mode | | |
|---|---|---|---|
| | Master | Client Without DFS | Client With DFS |
| 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 |
| U-NII Detection Bandwidth | Yes | Not required | Yes |

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## 1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15E and FCC 06-96 is shown below.

| Section | Spec Clause | Test Description | Result | Comments/Base Standard |
|---|---|---|---|---|
| 802.11(a) | | | | |
| 2.1 | NA | Calibration of Test Setup | Pass | |
| 2.2 | 15.407 (h)(2)(iii) | In-Service Monitoring | Pass | |
| 802.11(n) - 20 MHz BW | | | | |
| 2.1 | NA | Calibration of Test Setup | Pass | |
| 2.2 | 15.407 (h)(2)(iii) | In-Service Monitoring | Pass | |
| 802.11(ac) - 20 MHz BW | | | | |
| 2.1 | NA | Calibration of Test Setup | Pass | |
| 2.2 | 15.407 (h)(2)(iii) | In-Service Monitoring | Pass | |

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## 1.4 APPLICATION FORM

| EQUIPMENT DESCRIPTION | |
|---|---|
| Model Name/Number | YD201 |
| Part Number | - |
| Hardware Version | P2 |
| Software Version | 3.9 |
| FCC ID | 2ADHW201 |
| Technical Description (Please provide a brief description of the intended use of the equipment) | SmartPhone |

| TYPE OF EQUIPMENT | |
|---|---|
| ☐ | Master |
| ☐ | Client with Radar Detection |
| ☒ | Client without Radar Detection |
| ☐ | Wi-Fi Direct Support |

| TRANSMITTER TECHNICAL CHARACTERISTICS | |
|---|---|
| FREQUENCY CHARACTERISTICS | |
| ☒ | 5.150 GHz to 5.250 GHz |
| ☒ | 5.250 GHz to 5.350 GHz |
| ☒ | 5.470 GHz to 5.725 GHz |
| ☐ | 5.725 GHz to 5.825 GHz |
| ☒ | Please confirm the EUT does not operate in the frequency band 5600 – 5650 MHz |
| ☐ | Off Channel CAC Implemented<br>Off Channel CAC within 5600 – 5650 MHz band hours, (1 – 24)<br>Off Channel CAC outside 5600 – 5650 MHz band minutes, (6 – 240) |
| Note: DFS is not required in the ranges 5.15 – 5.25 GHz and 5.725 – 5.825 GHz | |

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| TRANSMITTER RF POWER CHARACTERISTICS | |
|---|---|
| Maximum rated transmitter output power as stated by manufacturer | |
| Conducted Power | 15.5 dBm |
| Maximum Antenna Gain | -2.4 dBi |
| EIRP | 13.7 dBm |
| Minimum rated transmitter output power as stated by manufacturer (if applicable) | |
| Conducted Power | dBm |
| Maximum Antenna Gain | dBi |
| EIRP | dBm |
| Is TPC supported? | ☒ Yes ☐ No |
| If Yes, provide a description of operation. | |
| Equipment operating with constant duty cycle | |

| POWER SOURCE | | | |
|---|---|---|---|
| ☐ AC mains supply | | State voltage | |
| AC supply frequency | (Hz) | VAC | |
| ☒ DC supply | | | |
| Nominal voltage | 3.8V | | |

| SYSTEM ARCHITECTURE | | | |
|---|---|---|---|
| ☒ | Frame Based | | |
| ☐ | IP Based | | |
| ☐ | Other | If other please state | |
| ☒ | 802.11(a) | Receiver Bandwidth: | MHz |
| ☒ | 802.11(n) – 20 MHz | Receiver Bandwidth: | MHz |
| ☒ | 802.11(n) – 40 MHz | Receiver Bandwidth: | MHz |
| ☒ | 802.11(ac) – 20 MHz | Receiver Bandwidth: | MHz |
| ☐ | 802.11(ac) – 40 MHz | Receiver Bandwidth: | MHz |
| ☐ | 802.11(ac) – 80 MHz | Receiver Bandwidth: | MHz |

| DECLARATION | | | |
|---|---|---|---|
| No parameter or information relating to the detected radar waveforms is available or accessible to the end user. | | | |
| ☒ | True | ☐ | False |

| MISCELLANEOUS (Master Device Only) | |
|---|---|
| Power-on cycle time* | 3s |
| * Time from switching on the UUT to the point at which Channel Availability Check (CAC) commences | |

| UNIFORM SPREADING (Master Device Only) |
|---|
| Describe how the meter provides, on aggregate, uniform channel loading of the spectrum across all channels. |
| OFDM |

| ANTENNA OPTIONS | |
|---|---|
| **Antenna 1** | |
| Antenna Description: | Daul band Antenna (2.4 GHz and 5.5 GHz) |
| Antenna Model: | IFA |
| Antenna Maximum Gain: | -2.4 dBi (for 5 GHz) |
| Antenna Frequency Range: | 5.15 - 5.85 GHz |
| **Antenna 2** | |
| Antenna Description: | |
| Antenna Model: | |
| Antenna Maximum Gain: | |
| Antenna Frequency Range: | |
| **Antenna 3** | |
| Antenna Description: | |
| Antenna Model: | |
| Antenna Maximum Gain: | |
| Antenna Frequency Range: | |
| **Antenna 4** | |
| Antenna Description: | |
| Antenna Model: | |
| Antenna Maximum Gain: | |
| Antenna Frequency Range: | |
| **Antenna 5** | |
| Antenna Description: | |
| Antenna Model: | |
| Antenna Maximum Gain: | |
| Antenna Frequency Range: | |

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature:  Name: Jukka Ollila

Position held: Test Lead Date: 3 December 2014

## 1.5 PRODUCT INFORMATION

### 1.5.1 Technical Description

The Equipment Under Test (EUT) was a Yota Devices Ltd YotaPhone2/ YD201. A full technical description can be found in the manufacturer's documentation.

The EUT is a Client without Radar Detection device.

## 1.6 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. See individual test clauses.

The EUT was powered from a 3.8 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

## 1.7 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

## 1.8 MODIFICATION RECORD

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|---|---|---|---|
| **Serial Number: WWAN IMEI 358993041450369** | | | |
| 0 | As supplied by manufacturer. | N/A | N/A |
| **Serial Number: Not Serialised (75927375-TSR0007)** | | | |
| 0 | As supplied by manufacturer. | N/A | N/A |
| 1 | Revised Power table with new power settings provided by email from the customer. | Provided by email from Natividad Caro García. | 04 August 2014 |

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

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## 1.9 DFS TEST SYSTEM

The DFS system consists of hardware and software. The Hardware uses a PXI chassis with PXI instruments populating the chassis. The instruments used are a Vector Signal Generator, a Digitiser, Frequency References and a Dual Core PC. The measurement and analysis software runs on the PC and controls the instruments within the mainframe via commands on the PXI bus. Various markers are contained within the generated waveforms. The markers are used to trigger the measurement system at the appropriate points. An external trigger is also provided at the SMB output on the Vector Signal Generator which is employed where a Spectrum Analyser is used in place of the Aeroflex Digitiser. These are described within the test procedure for the applicable test.

The Aeroflex DFS software generates the pulses in accordance with FCC 06-96.

Short Pulse Radar Test Waveform (Types 1-4)

The short pulse radar simulation is a conventional amplitude pulse with varying pulse widths, pulse rate intervals (PRI) and number of pulses. General characteristics for these types and number of repetitions required by the standard are as follows:

| Radar Type | Pulse Width (µsec) | PRI (µsec) | Number of Pulses |
|---|---|---|---|
| 1 | 1 | 1428 | 18 |
| 2 | 1-5 | 150-230 | 23-29 |
| 3 | 6-10 | 200-500 | 16-18 |
| 4 | 11-20 | 200-500 | 12-16 |

FCC 06-96 - Table 5 – Short Pulse Radar Test Waveforms

Long Pulse Radar Test Waveform (Type 5)

The long pulse radar simulation is a 12 second concatenated series of chirps, chosen randomly. The general characteristics for type 5 and number of repetitions required by the standard are as follows:

| Radar Type | Pulse Width (µsec) | Chirp Width (MHz) | PRI (µsec) | Number of Pulses per *Burst* | Number of *Bursts* |
|---|---|---|---|---|---|
| 5 | 50-100 | 5-20 | 1000-2000 | 1-3 | 8-20 |

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FCC 06-96 - Table 6 – Long Pulse Radar Test Waveform

A Type 5 Radar sequence is constructed in the following way:

1) The user provides the required level based on the calibration and the test frequency.
2) The Burst_Count, (a number between 8 and 20 inclusive), is chosen representing the number of "bursts" (or waveform segments). Type 5 waveform length is 12 seconds, thus each "burst" length will be BL = 12/ Burst_Count.
3) Pulse_Count, a number between 1 and 3 inclusive is chosen for each burst segment (1 through Burst_Count) representing the number of chirped pulses for each burst segment.
4) For each burst segment, the following chirp parameters are randomly chosen (all chirped pulses within a given burst segment are the same, whether 1, 2, or 3 chirped pulses are chosen):
a) Frequency width (5 MHz to 20 MHz, a linear and symmetrical ramp)
b) Pulse period (50 µs to 100 µs)
c) Pulse Rate Interval (1 ms to 2 ms, in 1 µs increments)
d) The start of the first pulse in a given burst segment is randomly chosen (in 1 µs increments) between 1 µs and [(the total burst length - (total of all pulse periods within a burst) + (the total space between pulses within a burst)]. Or stated otherwise, 1 µs to [ (BL - (Pulse_Count * pulse period) + (Pulse_Count - 1)* randomly chosen PRI Interval)].

Frequency Hopping Test Waveform (Type 6)

The frequency hopping radar simulation emits 9 1 µs wide amplitude pulses with a 333 µs PRI spacing on a randomly chosen frequency, hops to another randomly chosen frequency, emits another 9 pulses and then continues this sequence for 100 different frequencies chosen using a pseudo random sequence. General characteristics for type 6 and number of repetitions required by the standard are as follows:

| Radar Type | Pulse Width (µsec) | PRI (µsec) | Pulses per Hop | Hopping Rate (kHz) | Hopping Sequence Length (msec) |
|---|---|---|---|---|---|
| 6 | 1 | 333 | 9 | 0.333 | 300 |

FCC 06-96 - Table 7 – Frequency Hopping Radar Test Waveform

The frequency hopping Radar is generated in the following way:

a) The user inputs the required level based on the calibration and a frequency within the EUT detection bandwidth.
b) A sequence of 100 numbers, (n = 1 to 100), are randomly chosen from between 1 to 475 and then removed from the sequence producing 100 unique random numbers.
c) Frequency assignments are 5250 MHz + n.
d) If the list generated from steps (b) and (c) does not include at least one frequency which is between 5250 to 5350 MHz or 5470 to 5725 MHz, the list is regenerated.
e) Secondly, in order to verify that at least one frequency in the list is at the EUT frequency plus or minus ½ the EUT detection bandwidth (i.e. at least one of the frequencies in the list must conflict with the EUT's operation such that the EUT will attempt to relocate when the sequence is played), the frequency supplied by the user is inserted into the list, replacing one selection.

Using the supplied Aeroflex software, the pulses are automatically generated and the required numbers of trials are created for each Radar Type – except in the case of Radar Type 1 which

has no changeable attributes. The pulses are saved as Arbitrary Waveform files which are then selected by the user for use in the scenario being tested.

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**SECTION 2**

**TEST DETAILS**

FCC DFS Testing of the
Yota Devices Ltd YotaPhone2/ YD201
In accordance with FCC CFR 47 Part 15E and FCC 06-96

## 2.1 CALIBRATION OF TEST SETUP

### 2.1.1 Specification Reference

FCC CFR 47 Part 15E and FCC 06-96

### 2.1.2 Equipment Under Test and Modification State

YotaPhone2/ YD201 S/N: Not Serialised (75927375-TSR0007) - Modification State 1

### 2.1.3 Date of Test

13 November 2014

### 2.1.4 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 23.7 - 23.8°C |
| Relative Humidity | 41.8 - 42.0% |

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### 2.1.5 Test Results

802.11(a)

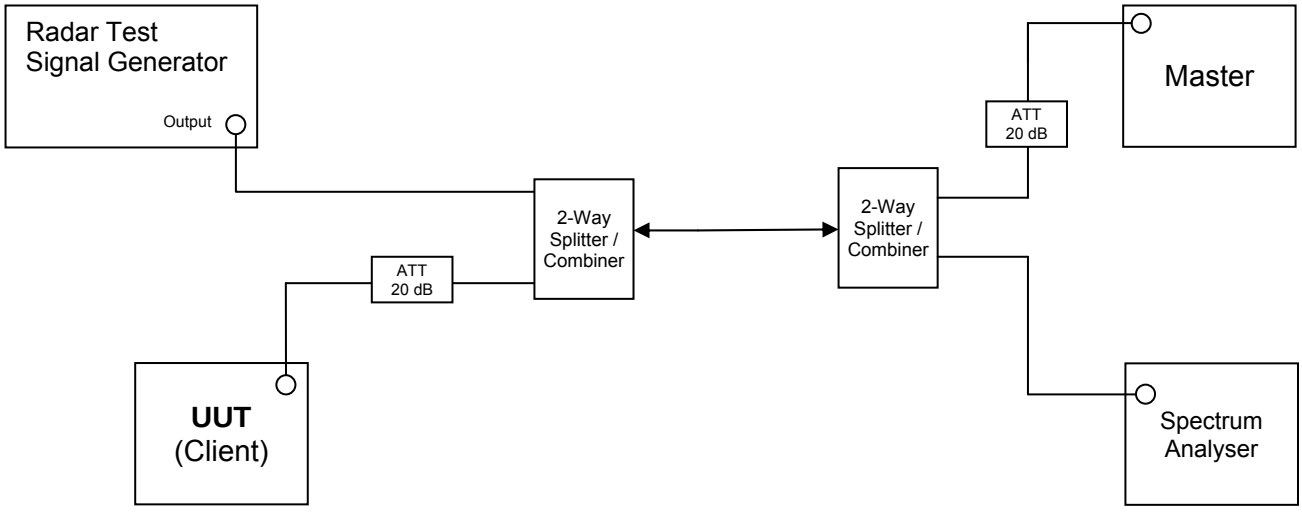
In this test equipment configuration, Radar signals are injected at the Master. The configuration ensures that the Radar pulses are received only by the Master device and not the Client. To calibrate the Radar pulses, the master was replaced by a Spectrum Analyser. The required Radar Waveform, (Type 1), was loaded into the Arbitrary Waveform Generator. The Spectrum Analyser was set to zero Span and the RBW and VBW set to 3MHz. The sweep time was set to display the entire burst and triggered on the Radar Burst. The output level of the Radar Signal Generator was adjusted to give the correct level as defined in the table below with the 1dB correction accounted for. Trace data showing the used Radar Pulses was recorded.

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.<br>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. | |

Test Equipment Setup

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



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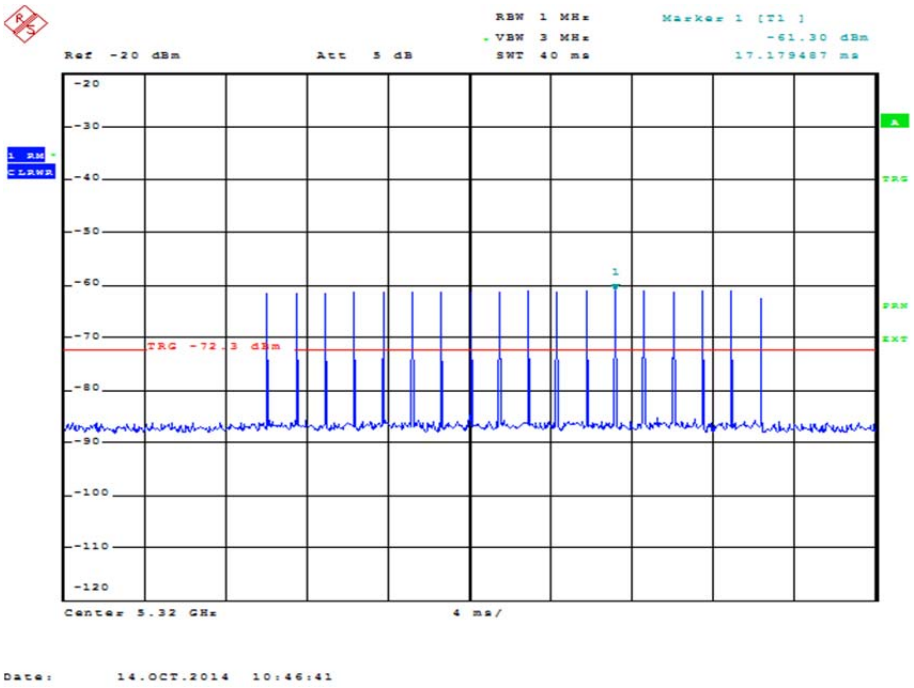
Radar Pulse Type 1

Short Radar Pulse Characteristics

| Radar Type | Pulse Width (µs) | PRI (µs) | Number Of Pulses |
|---|---|---|---|
| 1 | 1 | 1428 | 18 |

Client without Radar Detection

Radar Type 1 Plot



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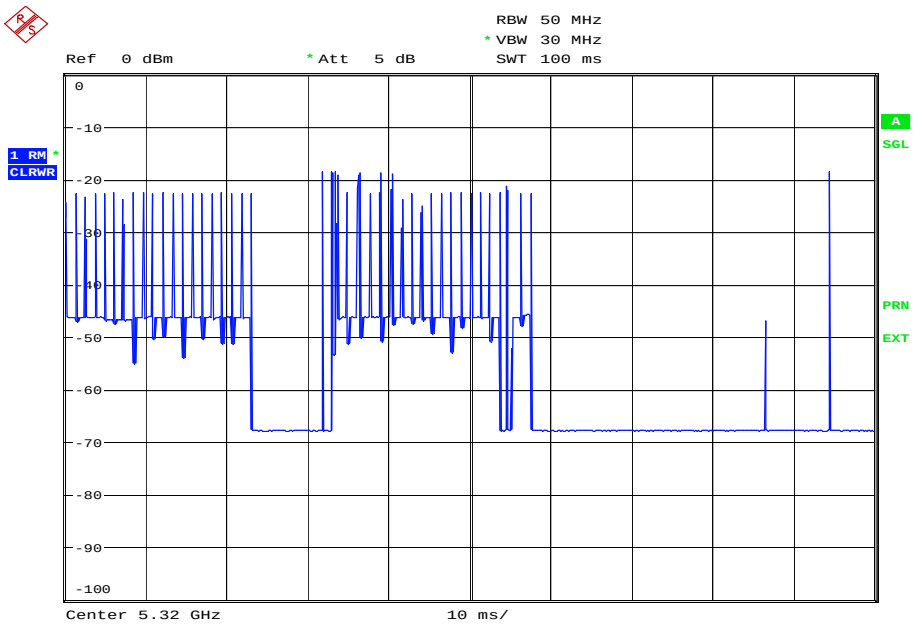
## Channel Loading Plot




Date: 26.SEP.2014 11:36:49

802.11(ac) - 20 MHz BW

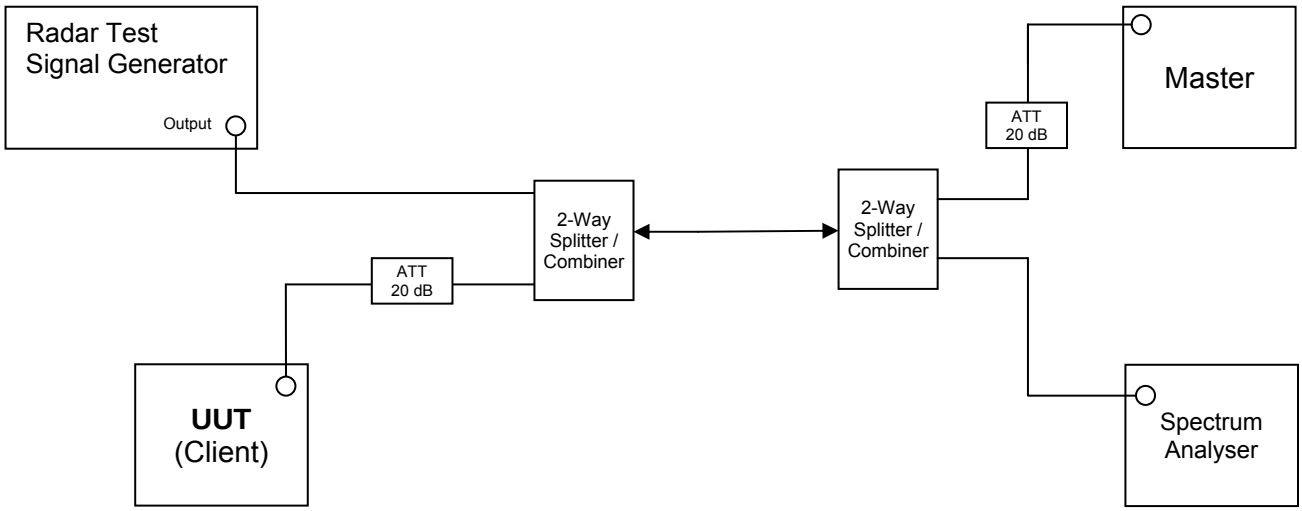
In this test equipment configuration, Radar signals are injected at the Master. The configuration ensures that the Radar pulses are received only by the Master device and not the Client. To calibrate the Radar pulses, the master was replaced by a Spectrum Analyser. The required Radar Waveform, (Type 1), was loaded into the Arbitrary Waveform Generator. The Spectrum Analyser was set to zero Span and the RBW and VBW set to 3MHz. The sweep time was set to display the entire burst and triggered on the Radar Burst. The output level of the Radar Signal Generator was adjusted to give the correct level as defined in the table below with the 1dB correction accounted for. Trace data showing the used Radar Pulses was recorded.

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.<br>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. | |

Test Equipment Setup

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



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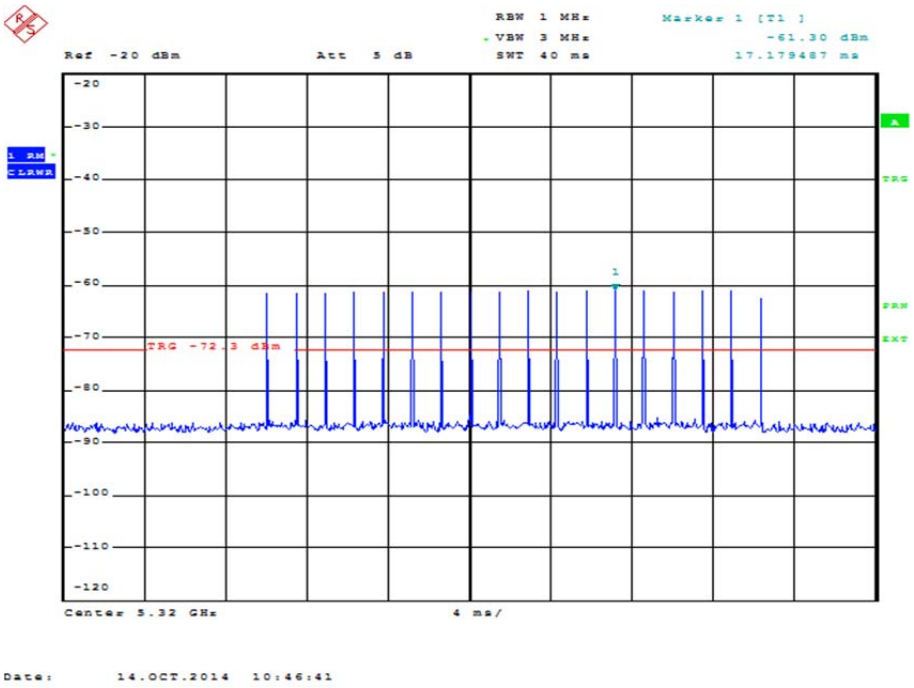
Radar Pulse Type 1

Short Radar Pulse Characteristics

| Radar Type | Pulse Width (µs) | PRI (µs) | Number Of Pulses |
|---|---|---|---|
| 1 | 1 | 1428 | 18 |

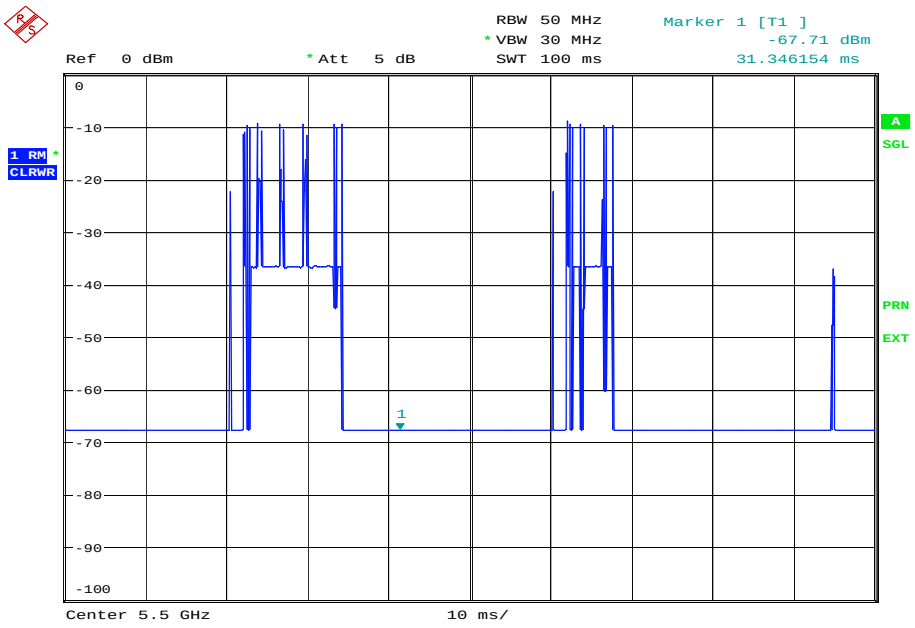
Client without Radar Detection

Radar Type 1 Plot



Product Service

## Channel Loading Plot



802.11(n) - 20 MHz BW

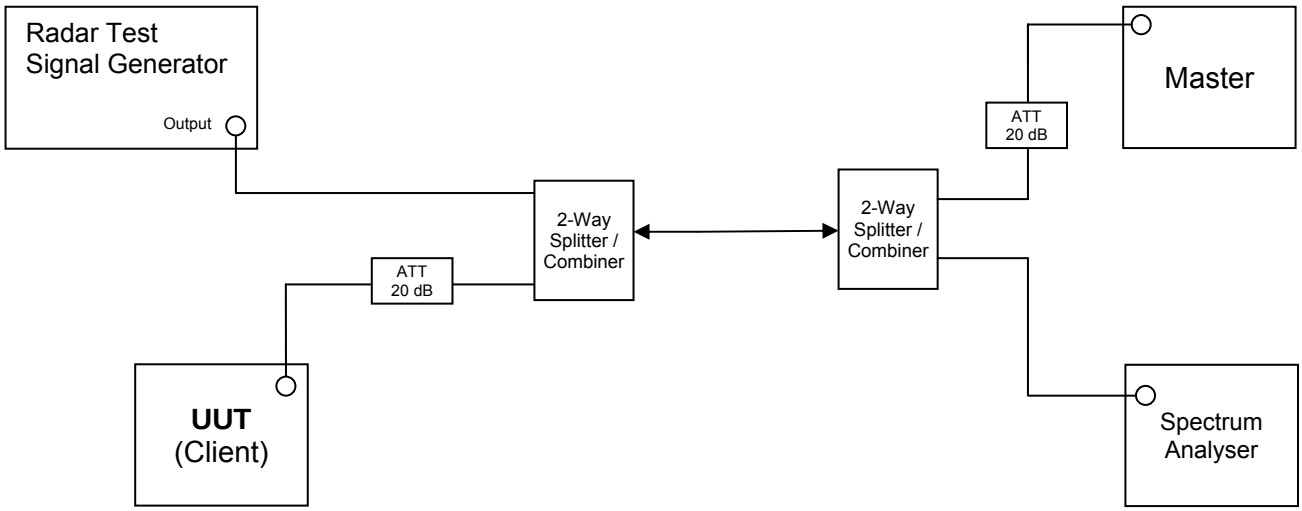
In this test equipment configuration, Radar signals are injected at the Master. The configuration ensures that the Radar pulses are received only by the Master device and not the Client. To calibrate the Radar pulses, the master was replaced by a Spectrum Analyser. The required Radar Waveform, (Type 1), was loaded into the Arbitrary Waveform Generator. The Spectrum Analyser was set to zero Span and the RBW and VBW set to 3MHz. The sweep time was set to display the entire burst and triggered on the Radar Burst. The output level of the Radar Signal Generator was adjusted to give the correct level as defined in the table below with the 1dB correction accounted for. Trace data showing the used Radar Pulses was recorded.

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.<br>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. | |

Test Equipment Setup

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



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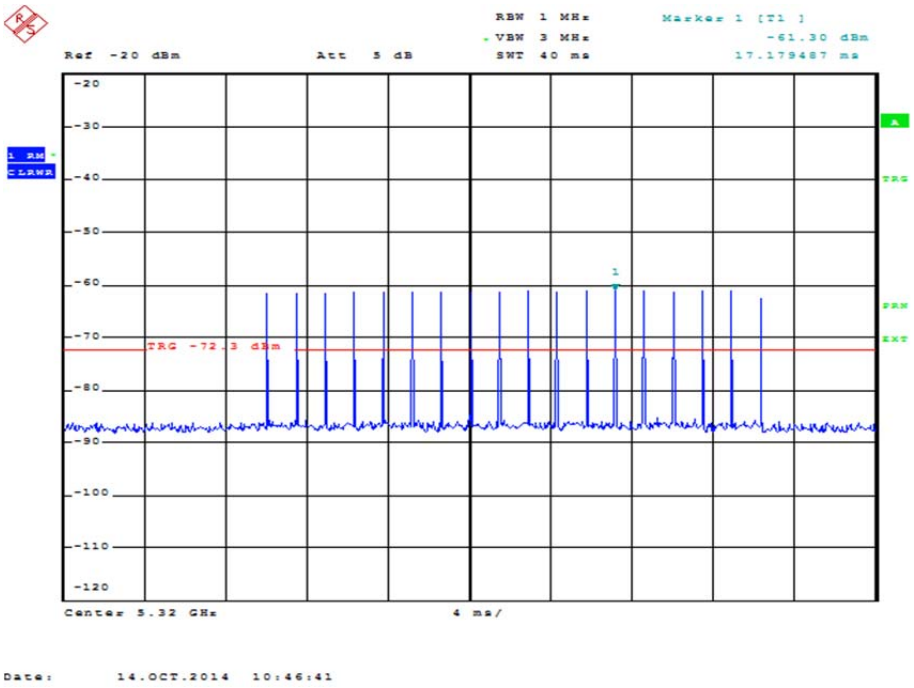
Radar Pulse Type 1

Short Radar Pulse Characteristics

| Radar Type | Pulse Width (µs) | PRI (µs) | Number Of Pulses |
|---|---|---|---|
| 1 | 1 | 1428 | 18 |

Client without Radar Detection

Radar Type 1 Plot



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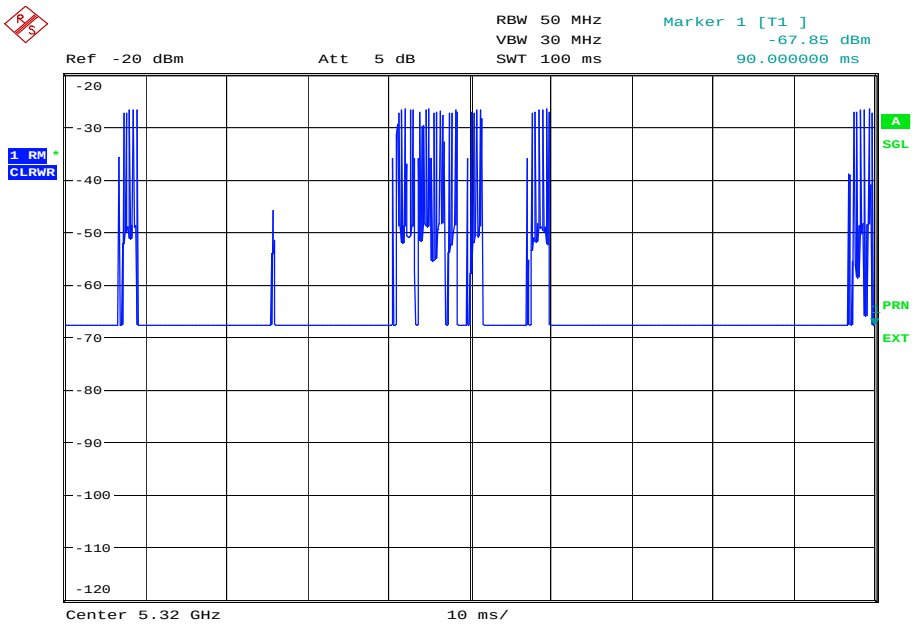
## Channel Loading Plot

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## 2.2 IN-SERVICE MONITORING

### 2.2.1 Specification Reference

FCC CFR 47 Part 15E and FCC 06-96, Clause 15.407 (h)(2)(iii)

### 2.2.2 Equipment Under Test and Modification State

YotaPhone2/ YD201 S/N: YotaPhone2/ YD201 - Modification State 1
YotaPhone2/ YD201 S/N: WWAN IMEI 358993041450369 - Modification State 0

### 2.2.3 Date of Test

13 November 2014

### 2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.2.5 Test Procedure

Client without Radar Detection

The EUT was associated with the FCC Approved Master devices FCC ID: UZ7MB82 and FCC ID: Q9DAPIN0224225. A pc was connected via an Ethernet cable to the Master device and the FCC defined audio/video file was streamed to the Client device using Windows Media Player.

Radar Pulse Type 0 was then transmitted and the Spectrum monitored. The transmissions from the UUT were observed for a period of 12 seconds after the final injected Radar Pulse. The Channel Move Time and the Channel Closing Time were measured and recorded.

The plot also shows 1 seconds prior to the radar pulses being applied to the UUT.

Initially, the UUT was removed from the test setup and replaced with a Spectrum Analyser. A Type 1 Radar burst was sent from the signal generator and its level adjusted until the required level of -61dBm/-63dBm was achieved. The Spectrum Analyser was then replaced with the UUT.

The UUT was configured to stream the FCC designated MPEG/Audio file using Windows Media Player version 12. Using the Aeroflex DFS Software, the Radar burst was injected to the Master/Client. The test software triggered the capture mechanism of the PXI Digitiser and data was collected of the Radar burst, the Master and Client devices. The data was analysed with the Channel Move time being measured at the final point where transmissions ceased. It was checked that all transmissions stopped within the 10 second period defined from the point of the end of the final Radar pulse + 10 seconds. In addition, the aggregate on time during the first 200ms and the following 9.8 seconds of the Channel Move Time was computed by the Aeroflex DFS Software.

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The markers on the trace data correspond to the following time periods:

Red - End Of Radar Burst, (T1)

Purple - End Of 200ms Period, (T1 + 200 ms)

Yellow - End Of Channel Move Time, (T1 + 10 seconds)

### 2.2.6 Environmental Conditions

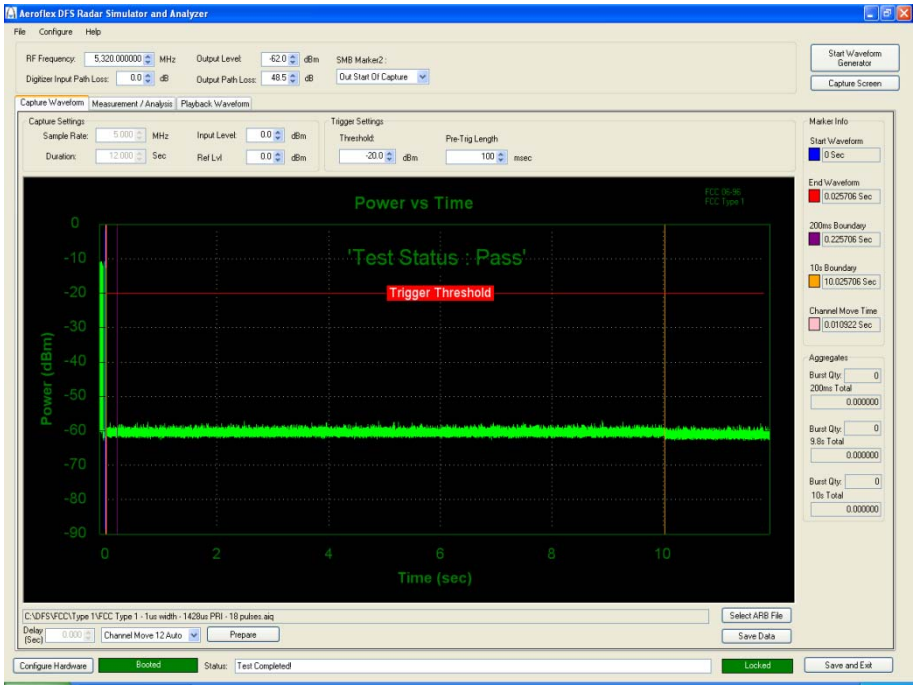
Ambient Temperature 23.7 - 23.8°C
Relative Humidity 41.8 - 47.8%

### 2.2.7 Test Results

802.11(a)

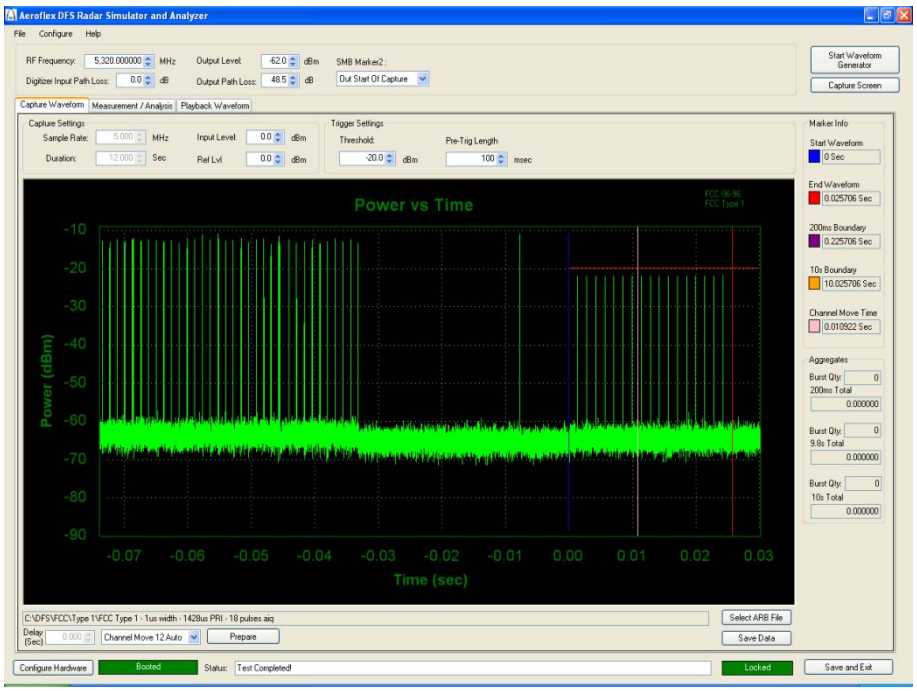
| | |
|---|---|
| Channel Move Time | 0.010922 seconds |
| Channel Closing Time (Aggregate Time During 200ms) | 0 ms |
| Channel Closing Time (Aggregate Time During +200ms to 10s) | 0 ms |
| Channel Closing Time (Aggregate Time During 10s) | 0 ms |

Overall Power vs Time Display, showing channel closing and move time



Product Service

Zoom of Radar Burst, Access Point and Client Signalling



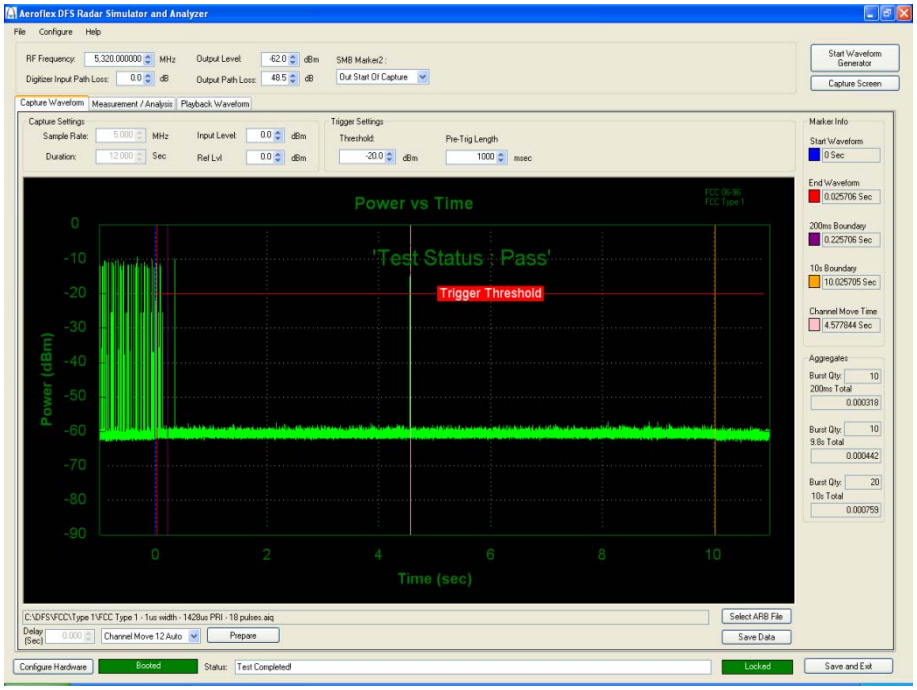

Limit Clause 15.407 (h)(2(iii) and FCC 06-96, Table 4

| | |
|---|---|
| Channel Move Time | <10s |
| Channel Closing Time<br>(Aggregate Time During 200ms) | <200ms |
| Channel Closing Time<br>(Aggregate Time During +200ms to 10s) | <60ms |

802.11(ac) - 20 MHz BW

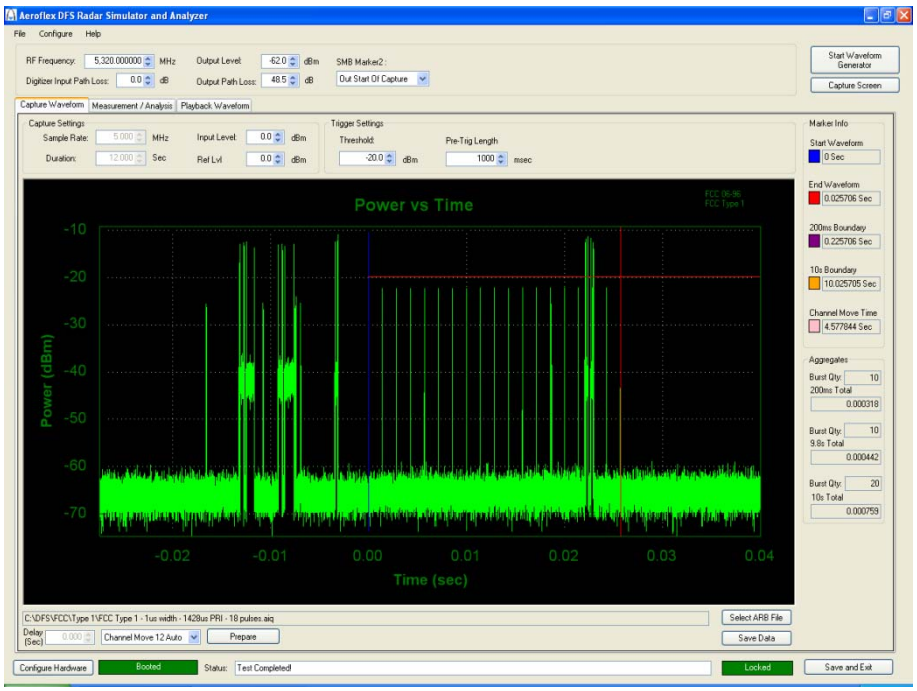
| | |
|---|---|
| Channel Move Time | 4.577844 seconds |
| Channel Closing Time<br>(Aggregate Time During 200ms) | 0.318 ms |
| Channel Closing Time<br>(Aggregate Time During +200ms to 10s) | 0.442 ms |
| Channel Closing Time<br>(Aggregate Time During 10s) | 0.759 ms |

Overall Power vs Time Display, showing channel closing and move time



Product Service

Zoom of Radar Burst, Access Point and Client Signalling



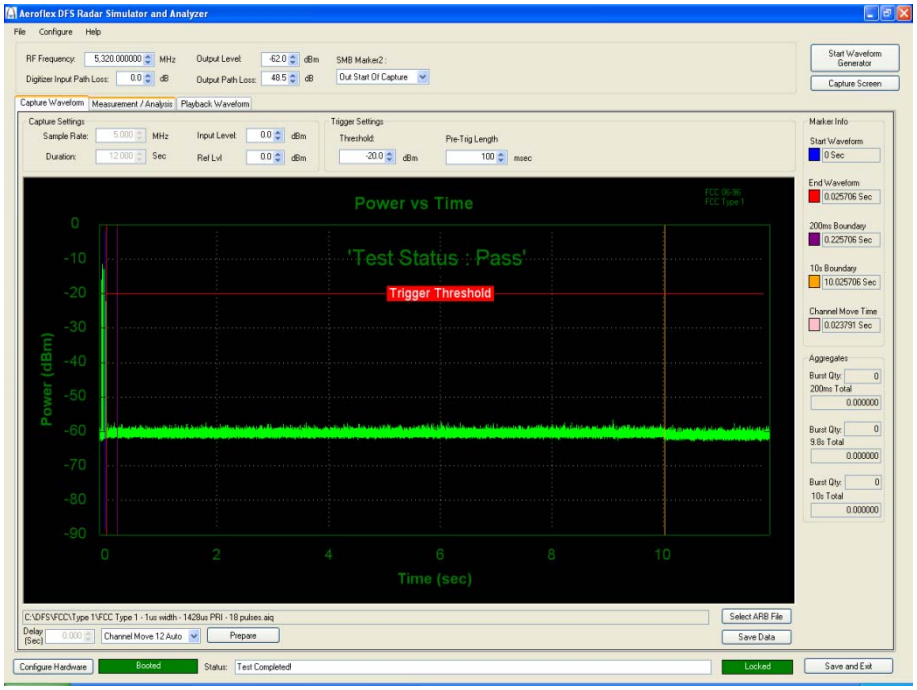

Limit Clause 15.407 (h)(2(iii) and FCC 06-96, Table 4

| | |
|---|---|
| Channel Move Time | <10s |
| Channel Closing Time<br>(Aggregate Time During 200ms) | <200ms |
| Channel Closing Time<br>(Aggregate Time During +200ms to 10s) | <60ms |

802.11(n) - 20 MHz BW

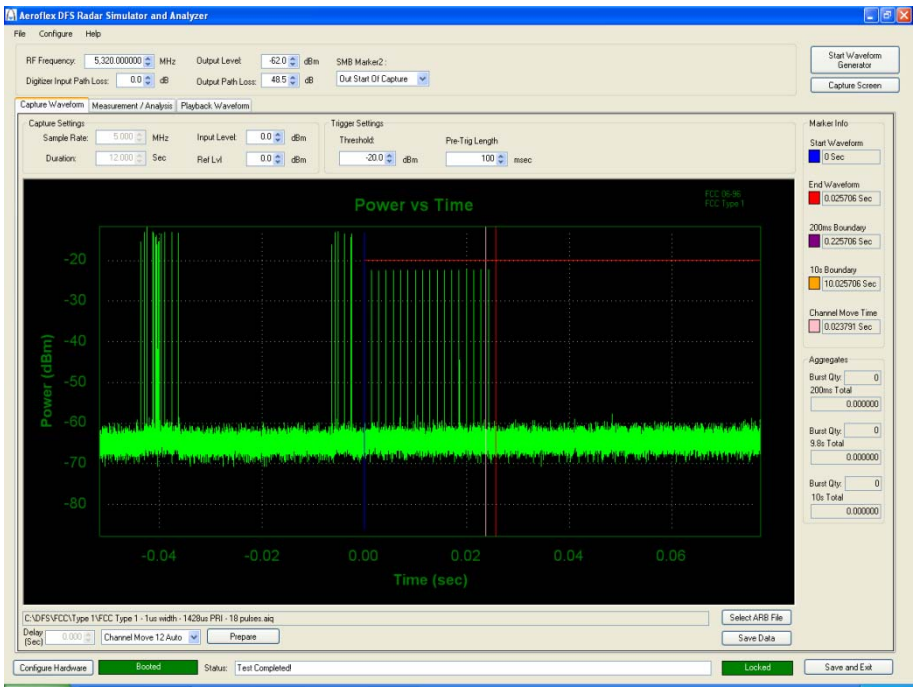
| | |
|---|---|
| Channel Move Time | 0.023791 seconds |
| Channel Closing Time<br>(Aggregate Time During 200ms) | 0 ms |
| Channel Closing Time<br>(Aggregate Time During +200ms to 10s) | 0 ms |
| Channel Closing Time<br>(Aggregate Time During 10s) | 0 ms |

Overall Power vs Time Display, showing channel closing and move time



Product Service

Zoom of Radar Burst, Access Point and Client Signalling




Limit Clause 15.407 (h)(2(iii) and FCC 06-96, Table 4

| | |
|---|---|
| Channel Move Time | <10s |
| Channel Closing Time<br>(Aggregate Time During 200ms) | <200ms |
| Channel Closing Time<br>(Aggregate Time During +200ms to 10s) | <60ms |

Product Service

**SECTION 3**

**TEST EQUIPMENT USED**

Product Service

## 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| Instrument | Manufacturer | Type No. | TE No. | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| **Section 2.2 - In-Service Monitoring** | | | | | |
| Power Supply Unit | Hewlett Packard | 6253A | 441 | - | O/P Mon |
| 20dB/2W Attenuator | Narda | 4772-20 | 462 | - | TU |
| Multimeter | Iso-tech | IDM101 | 2424 | 12 | 26-Sep-2015 |
| Signal Analyser | Rohde & Schwarz | FSQ 26 | 3545 | 12 | 6-Aug-2015 |
| PXI RF Digitizer | Aeroflex | 3025 | 4012 | 24 | 3-Oct-2015 |
| PXI RF Synthesizer | Aeroflex | 3010 | 4013 | 24 | 3-Oct-2015 |
| PXI RF Synthesizer | Aeroflex | 3010 | 4014 | 24 | 3-Oct-2015 |
| PXI Digital RF Signal Generator | Aeroflex | 3025 | 4015 | 24 | 3-Oct-2015 |
| 1800-6000 MHz Power Splitter | Mini-Circuits | ZN2PD-63-S+ | 4055 | - | O/P Mon |
| 1800-6000 MHz Power Splitter | Mini-Circuits | ZN2PD-63-S+ | 4056 | - | O/P Mon |
| Timing Module | FIME | | 4431 | - | TU |
| 802.11(a,n) Access Point | Motorola | AP-650 | 4452 | - | TU |

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

## 3.2 SUPPORT TEST EQUIPMENT

| Instrument | Manufacturer | Type No. | Serial Number |
|---|---|---|---|
| Computer | Dell Inc. | DCSM | 36DJP2J |

Product Service

## 3.3 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

| Test Discipline | MU |
|---|---|
| In-Service Monitoring | Time: ± 0.47 %<br>Power: ± 1.29 dB |

Product Service

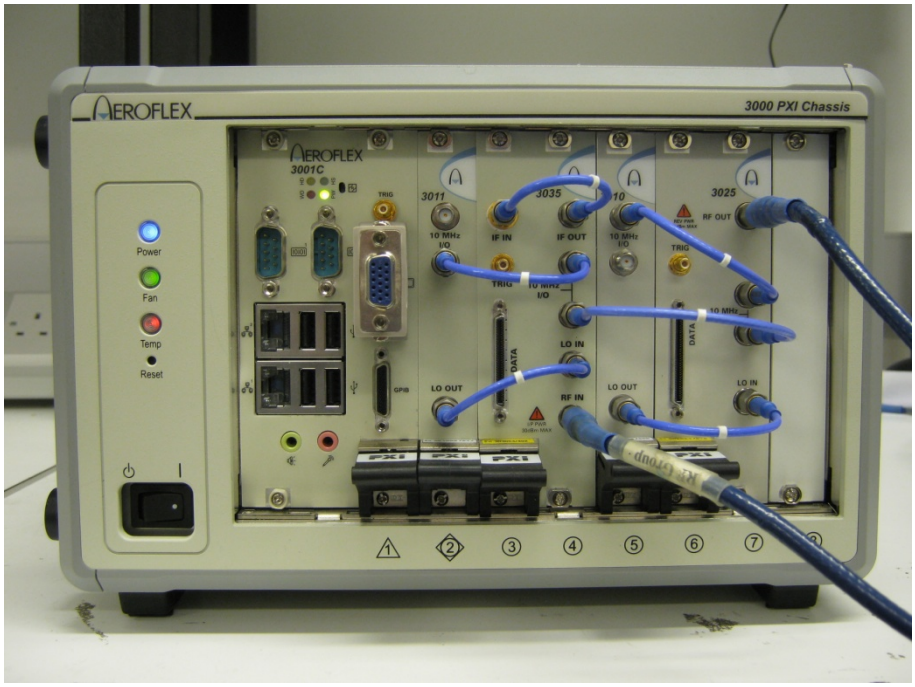
## SECTION 4

## PHOTOGRAPHS

## 4.1 TEST SET-UP PHOTOGRAPHS

See test set-up photographs exhibit “75927375 FCC Set Up Photos.pdf”.

## 4.2 DFS TEST EQUIPMENT




Test Set Up

## SECTION 5

## ACCREDITATION, DISCLAIMERS AND COPYRIGHT

## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).