DFS Test Report

FCC 15.407 & RSS-210, Issue 8

For

Model Name: A1427
Apple TV

FCC ID: BCGA1427
IC ID: 579C-A1427

TEST REPORT #: EMC_ APPLE_089_11001 _DFS
DATE: 2011-01-31

ACCREDITED
TESTING LABORATORY
Certificate #2135.01

Bluetooth
Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Test Lab
LAB CODE 20020328-00

FCC listed: A2LA accredited

IC recognized # 3462B

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

TABLE OF CONTENTS

1 Assessment

The following is in compliance with the DFS criteria specified in FCC rules Part 15.407 of the Code of Federal Regulations and Industry Canada Standard RSS-210.

Company	Description	Model #
Apple Inc.	The device is a digital media receiver designed to play internet content onto a TV through an HDMI port. It incorporates WiFi and Bluetooth radios.	A1427

This report is reviewed by:

Date	Section	Name	Signature
2012-01-31	Compliance	Sajay Jose (Lab Manager)	

This report is prepared by:

Date	Section	Name	Signature
2012-01-31	Compliance	Calvin Lee (EMC Engineer)	Calvin Lee Digitally signed by Calvin Lee DN: cn=Calvin Lee, c=US, o=CETECOM Inc, ou=Compliance, email=calvin.lee@cetecomusa.com Date: 2012.01.31 11:13:08 -08'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Director:	Heiko Strehlow
Responsible Project Leader:	Sajay Jose

2.2 Identification of the Client

Applicant's Name:	Apple Inc.
Street Address:	1 Infinite Loop Mail Stop26A
City/Zip Code	Cupertino, California 95014
Country	USA
Contact Person:	Marc Douat
Phone No.	408-862-2927
e-mail:	mdouat@apple.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as above.
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment Under Test (EUT)

3.1 Specification of the Equipment under Test

<table>
<tr><td>Marketing Name / Model No:</td><td>Apple TV/A1427</td></tr>
<tr><td>HW / SW Revision :</td><td>EVT/9B123</td></tr>
<tr><td>FCC-ID / IC-ID:</td><td>BCGA1427 / 579C-A1427</td></tr>
<tr><td>Product Description:</td><td>The device is a digital media receiver designed to play internet content onto a TV through an HDMI port. It incorporates WiFi and Bluetooth radios.</td></tr>
<tr><td>Frequency Bands supported:</td><td>BT2.1+ EDR: ISM Band 2400-2483.5 MHz
BT 4.0: ISM Band 2400-2483.5 MHz
WLAN 802.11 a/b/g/n: 5150 MHz-5350 MHz and 5470 MHz-5725 MHz</td></tr>
<tr><td>Type(s) of Modulation:</td><td>Bluetooth: GFSK, π/4 DQPSK, 8DPSK;
WLAN: CCK, OFDM</td></tr>
<tr><td>Power Supply:</td><td>100-240V/50-60Hz 6 Watts</td></tr>
<tr><td>Prototype / Production unit:</td><td>Prototype</td></tr>
<tr><td colspan="2">EUT Specifications for mode of test: WLAN 802.11 a/b/g/n</td></tr>
<tr><td>Frequency Range:</td><td>WLAN: 5180-5250MHz, 5250 – 5350 MHz, 5470 – 5725 MHz</td></tr>
<tr><td>Type(s) of Modulation:</td><td>BPSK, OFDM</td></tr>
<tr><td>Antenna Type/Gain:</td><td>Integrated Antenna: PIFA
Antenna Gain: (the values below represent the max. antenna gain in the given bands and have been provided by the applicant)
<table>
<tr><th colspan="3">Max Gains (dBi)</th></tr>
<tr><th>Band</th><th>Ant1
PIFA</th><th>Ant0
PIFA</th></tr>
<tr><td>2400-2483.5</td><td>3.7</td><td>-</td></tr>
<tr><td>5150-5250</td><td>4.5</td><td>2.4</td></tr>
<tr><td>5250-5350</td><td>4.1</td><td>-</td></tr>
<tr><td>5470-5725</td><td>4.5</td><td>-</td></tr>
<tr><td>5745-5850</td><td>4.6</td><td>-</td></tr>
</table>
Note: Antenna 0 will only be used at one frequency, 5200MHz.</td></tr>
</table>

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	Sample	HW/SW Version
1	PT662763	Conducted	EVT/9B123

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Serial Number
1	Display Monitor	Insight	N/A	N/A
2	Client Mac Book Pro	Apple	F0566A00	CN-08U808-12961-39B-4505
3	Server PC	Sony	A1150	YD6124XQVJ1
4	Access Point	Proxim	AP-800	08UC51500415
5	Router	D-Link	ERB2310	F3113A9000186
6	AC Power Cord	Apple	N/A	N/A
7	HDMI Cable	N/A	N/A	N/A

4 Applicability of DFS requirements

Requirement	Operational mode		
	Master	Slave Without Radar Detection	Slave With Radar Detection
Channel Availability Check	Yes	Not required	Not required
UNII Detection Bandwidth	Yes	Not required	Yes
In-Service Monitoring	Yes	Not required	Yes
Channel Shutdown	Yes	Yes	Yes
Non-Occupancy Period	Yes	Not required	Yes
Uniform Spreading	Yes	Not required	Not required

5 Radar test signals

5.1 Parameters of Short Pulse Radar Test Waveforms (FCC 06-96, Section 6.1)

Radar Type	Pulse Width (µsec)	PRI (µs)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
1	1	1428	18	60%	30
2	1–5	150-230	23-29	60%	30
3	6–10	200-500	16-18	60%	30
4	11–20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

5.2 Parameters of Long Pulse Radar Test Waveforms (FCC 06-96, Section 6.2)

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µs)	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

5.3 Parameters of Frequency Hopping Radar Test Waveforms (FCC 06-96, Section 6.3)

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

6 Conducted Measurements

Conducted measurements were performed according to FCC 06-96 and meet the requirements given by RS-210 (Annex A9.3). The measurements were performed on channel 132 (5660 MHz) of the DFS bands. 20 MHz bandwidth was used for tests. The DFS threshold used was -63 dBm. Radar Type 1 of the Short Pulse Test Waveforms was used for tests (see 5.1).
This test procedure is accepted for evaluation of the device against the requirements in RSS-210 as well.

6.1 Channel Move Time/Channel Closing Transmission Time & Non-Occupancy Period 5.66GHz

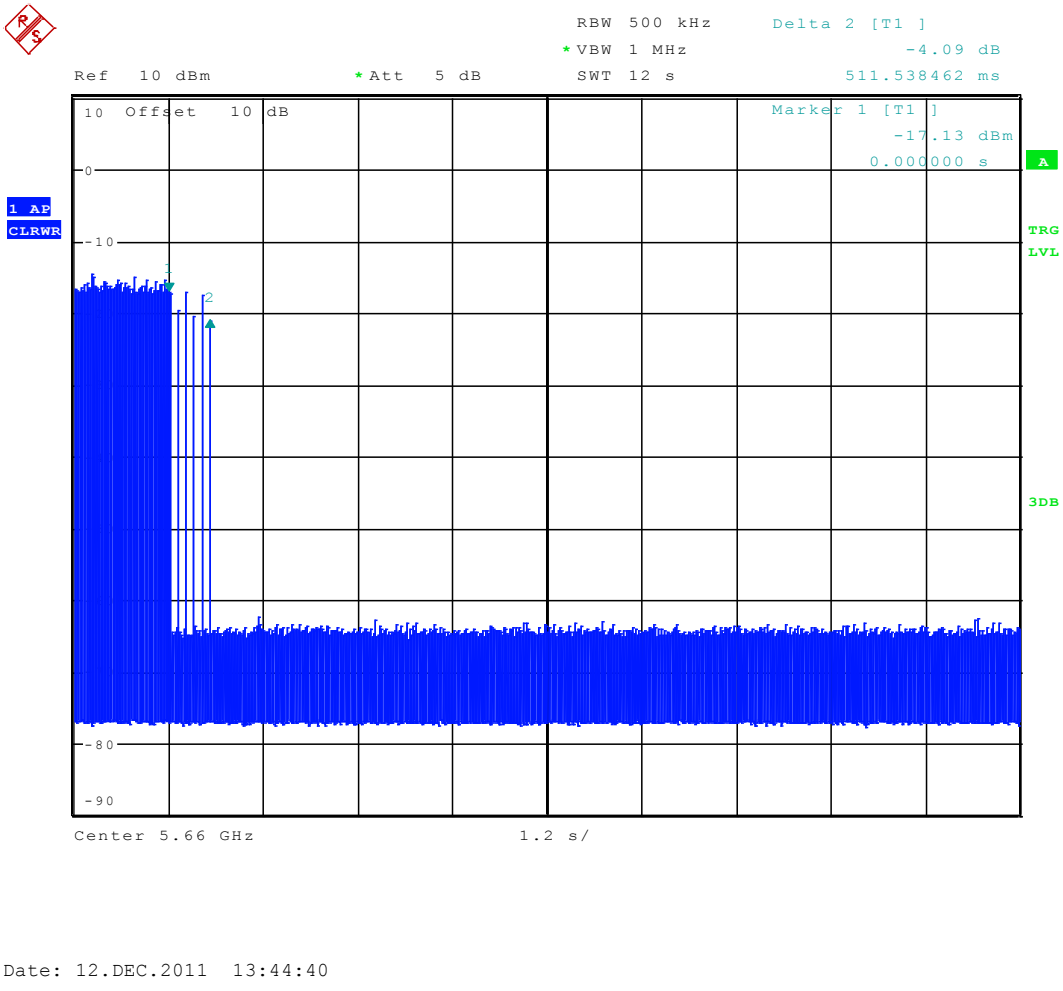
6.1.1 Limits

The *Channel Move Time* shall not exceed 10 seconds as given by the FCC 06-96 and RS-210 (Annex A9.3)

The *Channel Closing Transmission Time* shall not exceed 200ms + an aggregate of 60ms as given by the FCC 06-96 and 260ms as given by the RS-210 (Annex A9.3)

6.1.2 Results

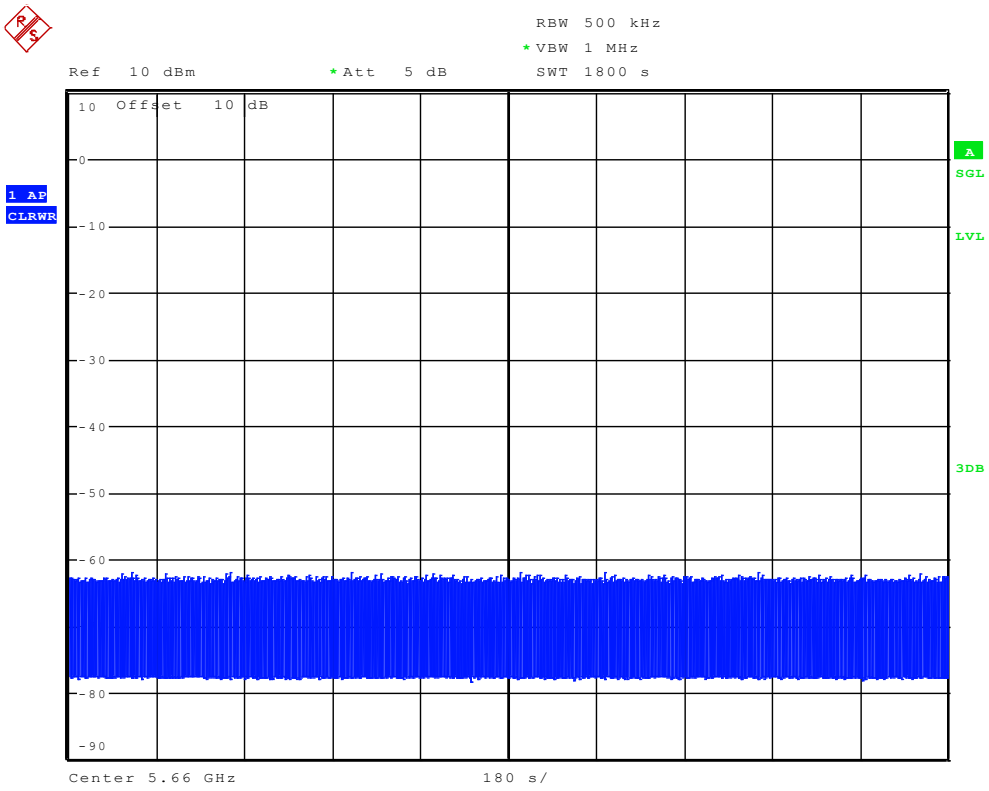
Channel Move Time and Closing Transmission Time 5.66 GHz
Measured Move Time = ≤ 1s



Channel Closing Transmission time 5.66 GHz

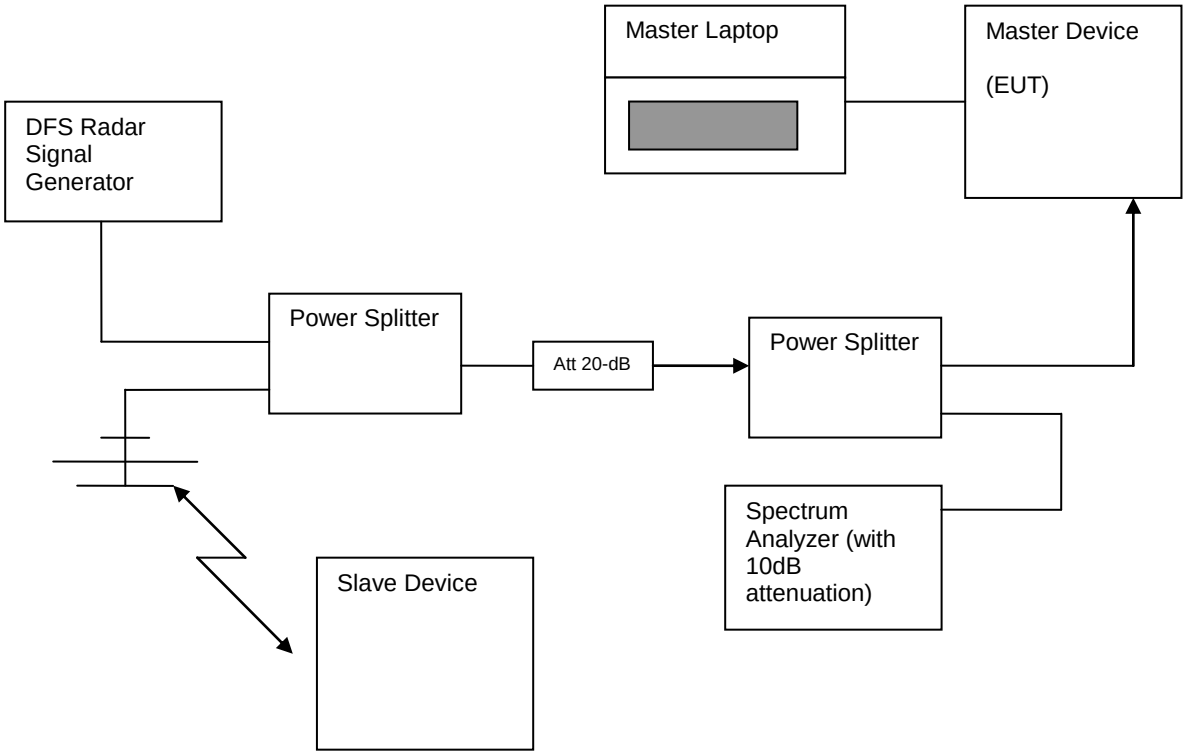
Analyzer Total bins	625
# of Bins	562.50
Analyzer Sweep (s)	12.00
Analyzer (ms)	12,000.0
Transmission Time (seconds)	10.800
Transmission Time (ms)	10,800.0
Dwell time per bin (second)	0.01920
Dwell time per bin (ms)	19.20000
Number of bins with WLAN Tx	3.0
Aggregate (seconds)	0.0576
Aggregate (ms)	57.6
FCC result	Pass

Non-Occupancy Period 5.66GHZ



Date: 12.DEC.2011 14:29:29

7 Block Diagram



8 Test Equipment And Ancillaries Used For Tests

Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2012
ASCOR Upconverter	7206	National Instruments	N/A	N/A
DFS Waveform Generator / PXI 5421 Card	NI PXI-1042	National Instruments	E965F1	July 2012
DFS Signal Generator / PXI 5610 Card	NI PXI 1042	National Instruments	E93740	July 2012

9 Test Set-Up Pictures

See document # EMC_ APPLE_89_11001 _DFS.PIC

10 Report History

Date	Report Name	Changes to report	Report prepared by
2012-01-31	EMC_ APPLE_089_11001 _DFS	First Version	Calvin Lee