



Wi-Fi 802.11 a, n
FCC/IC Test Report

FOR:
Bosch Security Systems BV

Model Name/ Product Marketing Name:
DCNM-WD

Product Description:
DICENTIS Wireless Device

FCC ID: UX8-DCNMWD
IC ID: 1249D-DCNMWD

47 CFR PART 15.407 U-NII, DFS
RSS-210 Annex A9.3

TEST REPORT #: EMC_CETEC-119-15001_WD_DFS_rev2
DATE: 2015-04-28



**FCC :
Accredited**

**IC recognized #
3462B-1**

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: info@cetecomusa.com ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following equipment (and as identified in Ch.3 of this test report) was evaluated against the applicable criteria specified in FCC CFR Title 47 Part 15 Subpart E and RSS-210 Annex A9.3.

No deviations were ascertained during the course of the tests performed.

Company	Description	Model Number/PMN
Bosch Security Systems BV	DICENTIS Wireless Device	DCNM-WD

Responsible for Testing Laboratory:

2015-04-28	Compliance	Franz Engert (Manager Compliance)	 Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Compliance, email=franz.engert@cetecom.com Date: 2015.04.29 10:22:01 -07'00'
Date	Section	Name	Signature

Responsible for the Report:

2015-04-28	Compliance	Douglas Antioco (EMC Engineer)	Douglas Antioco 2015.04.28 14:29:12 -07'00'
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the 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 Manager:	Franz Engert
Responsible Project Leader:	Douglas Antioco

2.2 Identification of the Client

Applicant's Name:	Bosch Security Systems BV
Street Address:	Torenalle 49
City/Zip Code	5617 BA Eindhoven
Country	Netherlands
Contact Person:	Ruud Leurs
Phone No.	+31 4 02 57 70 63
e-mail:	Ruud.leurs@nl.bosch.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Bosch Security Systems BV
Manufacturers Address:	Torenalle 49
City/Zip Code	5617 BA Eindhoven
Country	Netherlands

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Product Description	DICENTIS Wireless Device
Product Marketing Name (PMN)/ Model No:	DCNM-WD
HW Version :	01/00
Hardware Version Identification Number (HVIN):	WPEA-121N
SW Version :	B538
FCC-ID :	UX8-DCNMWD
IC ID:	1249D-DCNMWD
Product Description:	DICENTIS Wireless Access Point
Authorized Frequency Range:	Nominal bands: 5150 – 5250 (band 1) 5250 – 5350 (band 2) 5470 – 5725 (band 3) 5.725– 5825 (band 4)
Modes of Operation	Wi-Fi: 802.11a/n; Client U-NII Device without Radar Detection, TPC Functionality
Type(s) of Modulation:	BPDK, QPSK, 16-QAM, 64-QAM
Channel Bandwidth(s):	20/40
Antenna/Antenna gain:	5GHz: 5 dBi Peak Gain
Maximum Declared Output Powers:	Conducted: 15 dBm (0.0316 W) EIRP : 20 dBm (0.1 W)
Power Supply	Nominal Voltage 7.5 V DC by Removable Battery
Operating temperature range	5 to 45 °C
Prototype / Production unit	Prototype unit

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	045896245822031025	01/00	B538	Conducted Unit

3.3 Identification of Ancillary equipment

AE #	Type	Manufacturer	Model	Serial Number
1	Rechargeable Lithium-Ion Battery Pack	Bosch	DCNM-WLIION	TF14240065
2	Ethernet Broadband Router	D-Link	EBR-231	F3113A4004046

3.4 Dates of Testing

2/16/2014 – 3/25/2014

3.5 Testing Notes

- To accommodate conducted testing, the antenna ports were connected via Tyco Ultraminiture Coax Connector & Cable Assembly, UMCC to STD SMA BHD Jack (Part Number 2032440-1) which has 50 ohm Characteristic impedance and 0.24 dB maximum insertion loss from DC to 6GHz. Antenna ports that were not in use were terminated with 50 ohms.
- Channel loading was accomplished using the Iperf network facility. Details are provided in section 7.1.1 of this report.
- Full testing was performed on software version B490. After software upgrade to B538, a spot check was performed for the Channel Move time and Channel Closing time. The measurement data for this spot check is located in Section 7.3.

4 Subject of Investigation

The objective of the measurements applied by CETECOM Inc. was to establish compliance of the EUT as described under Ch. 3 of this Test Report, with the applicable criteria specified in

- FCC CFR47 Parts 15.407
- 905462 D03 UNII Clients without Radar Detection New Rules
- 905462 D02 v01r01 UNII DFS Compliance Procedures New Rule
- RSS-210 Annex A9.3

This test report is to support a request for new equipment authorization under the
FCC ID: UX8-DCNMWD
IC ID: 1249D-DCNMWD

5 Summary of Measurement Results

Technical Requirement	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§15.407 (h)(2)(iii) (h)(2)(iv) RSS-210 A9.3b	In Service Monitoring	Nominal	802.11n HT40	■	□	□	□	Pass
§15.407 (h)(2)(iii)	In Service Monitoring Spot Check	Nominal	802.11n HT40	■	□	□	□	Pass

Note: NA= Not Applicable; NP= Not Performed.

6 Measurements

6.1 Measurement Uncertainty

	Uncertainty in dB Conducted measurement
standard deviation k=1	0.63
95% confidence interval in dB	1.24
95% confidence interval in dB in delta to Result	+/-0.7dB

6.2 Test Conditions

Temperature: 19°C to 25°C;
Operating Voltage: 48 V DC for radio measurements;
Relative Humidity 20% to 50%

7 Technical Requirements Specifications

7.1 General Requirements

Reference: KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r01

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	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.		

Table 4: DFS Response Requirement Values

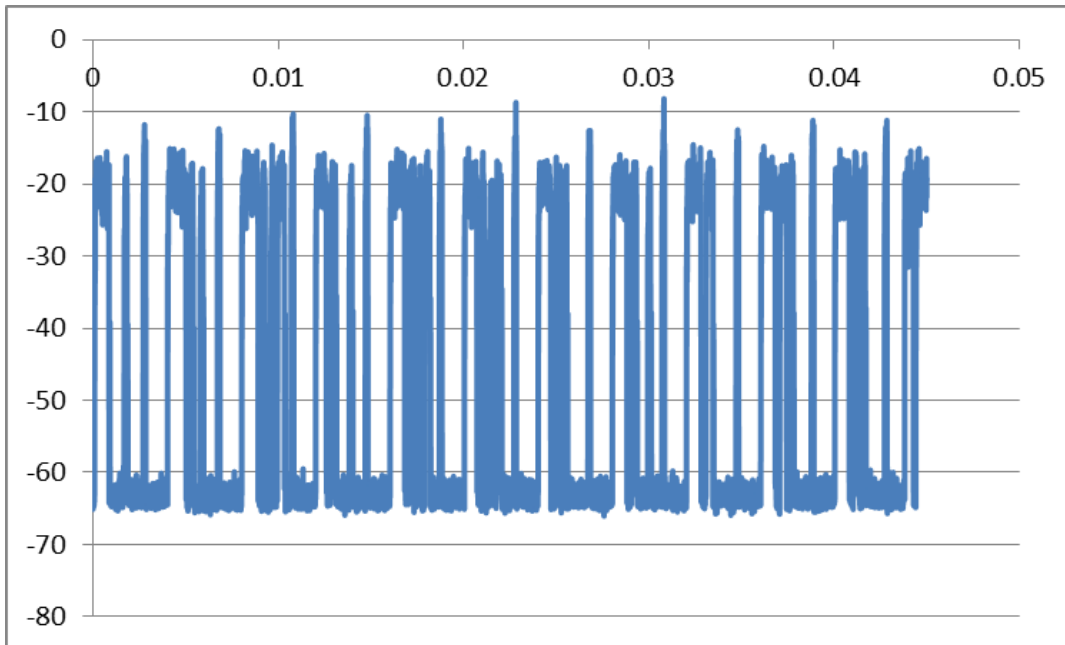
Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel</i> 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 <i>U-NII Detection Bandwidth</i> 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.	

7.1.1 Channel Loading

Per KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r01 section 7.7 (b), a channel loading of 17% or greater must be utilized during testing requiring traffic. Unless otherwise noted, this was achieved by running an Iperf process using UDP data streams.

Iperf is a network testing tool that creates Transmission Control Protocol (TPC) and User Datagram Protocol (UDP) data streams.

HT40 Mode



Note: For HT40 mode, the Duty Cycle of 34.3% was calculated from the raw data of a 45 ms sweep on Channel 102 (5510 MHz).

7.2 In Service Monitoring

7.2.1 Reference

KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r01 Section 7.8.3

7.2.2 Requirements

Verify the Channel Closing time, Channel Move Time and the Non-occupancy Period during In-Service Monitoring according to the requirements in the table below.

Table 4: DFS Response Requirement Values

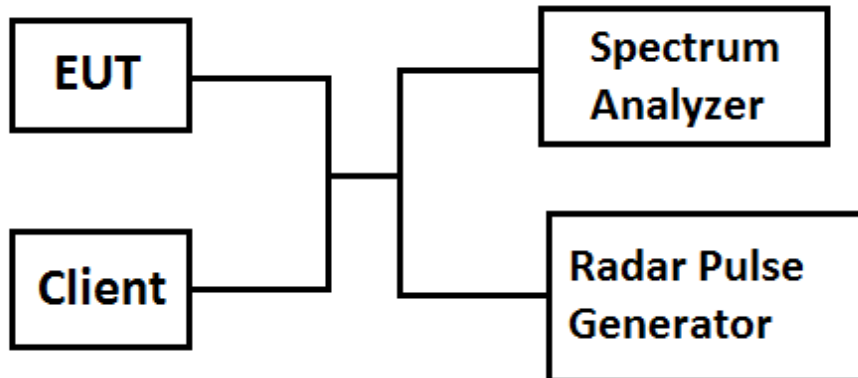
Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel</i> 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 <i>U-NII Detection Bandwidth</i> 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.	

7.2.3 Test Setup

This test was performed on a 40 MHz bandwidth DFS channel with traffic in a conducted setup according to KDB 905462 D02 v01 r01 section 7.8.3.

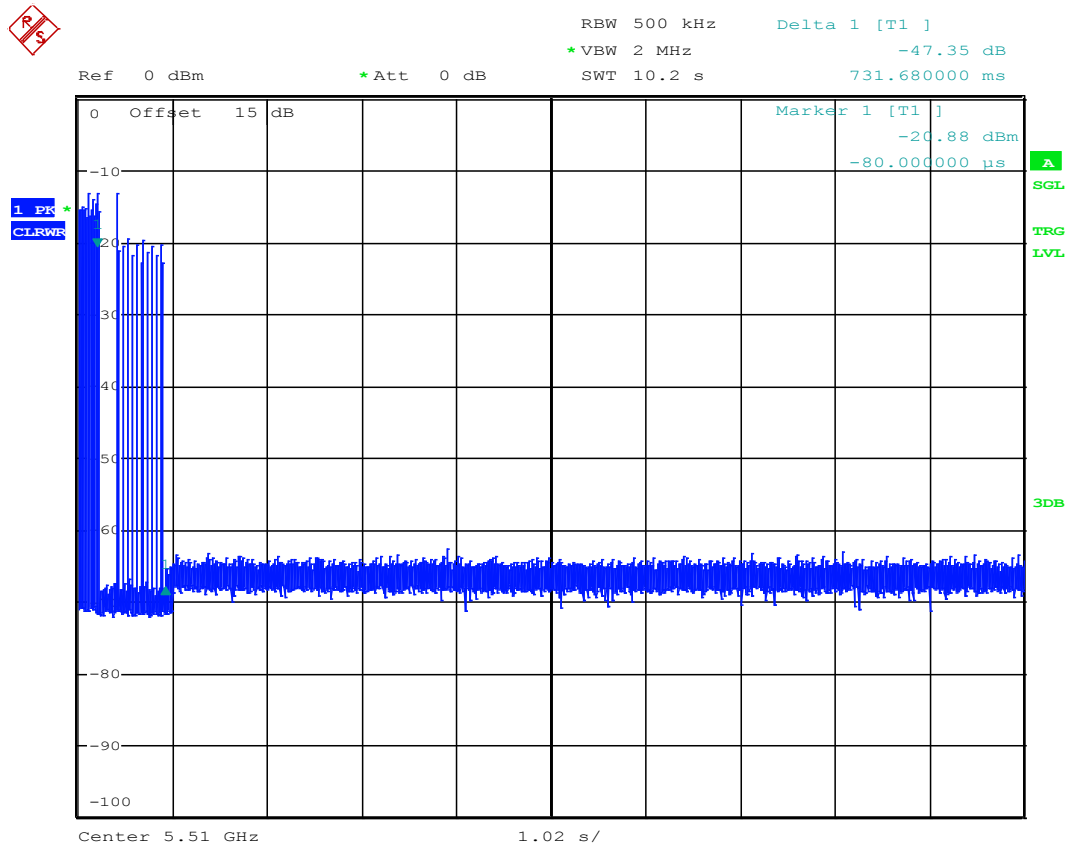
See Section 7.1.1 for Channel Loading description. Per KDB 905462 D02, Pulse 0 was applied.

Block Diagram



7.2.4 Test Results

7.2.4.1 Channel Closing time and Channel Move time (-200ms trigger offset)

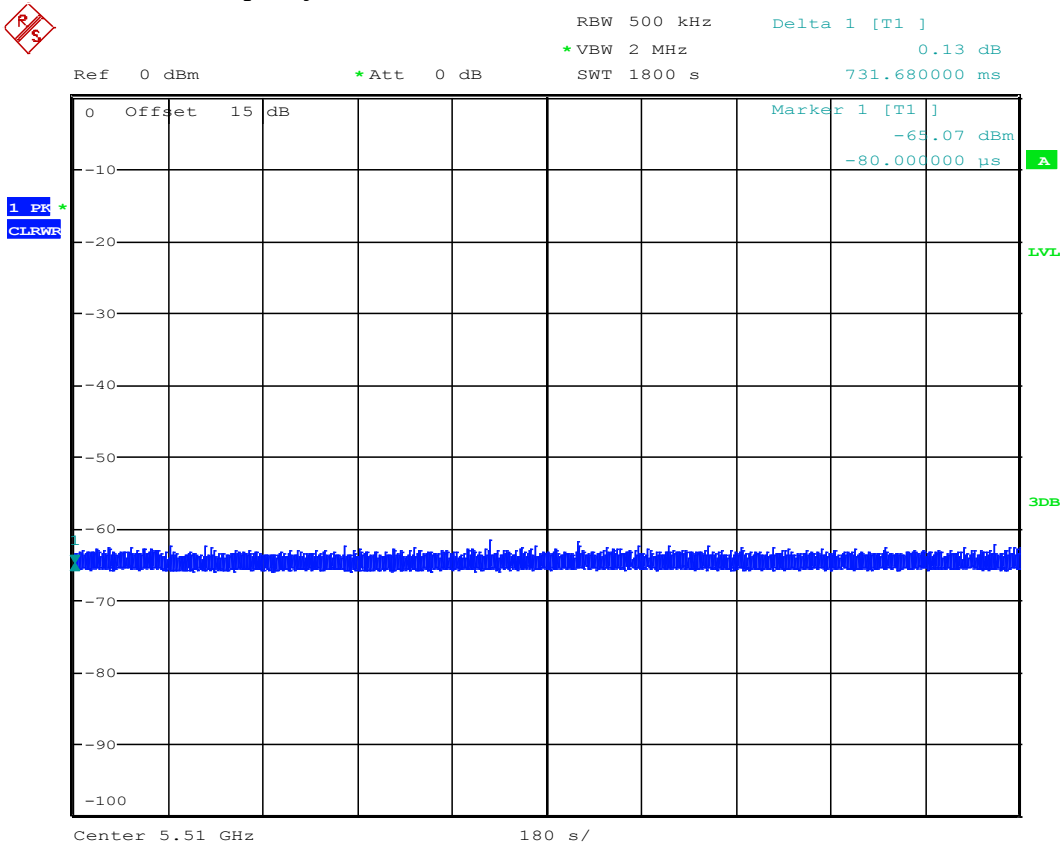


Date: 12.MAR.2015 13:32:45

Note: Analyzation of the trace obtained from this plot measured an aggregate of 32.6 ms of transmission on-time after the radar pulse was applied. The temporal resolution of the trace data is 340 us per data point.



7.2.4.2 Non-occupancy Period



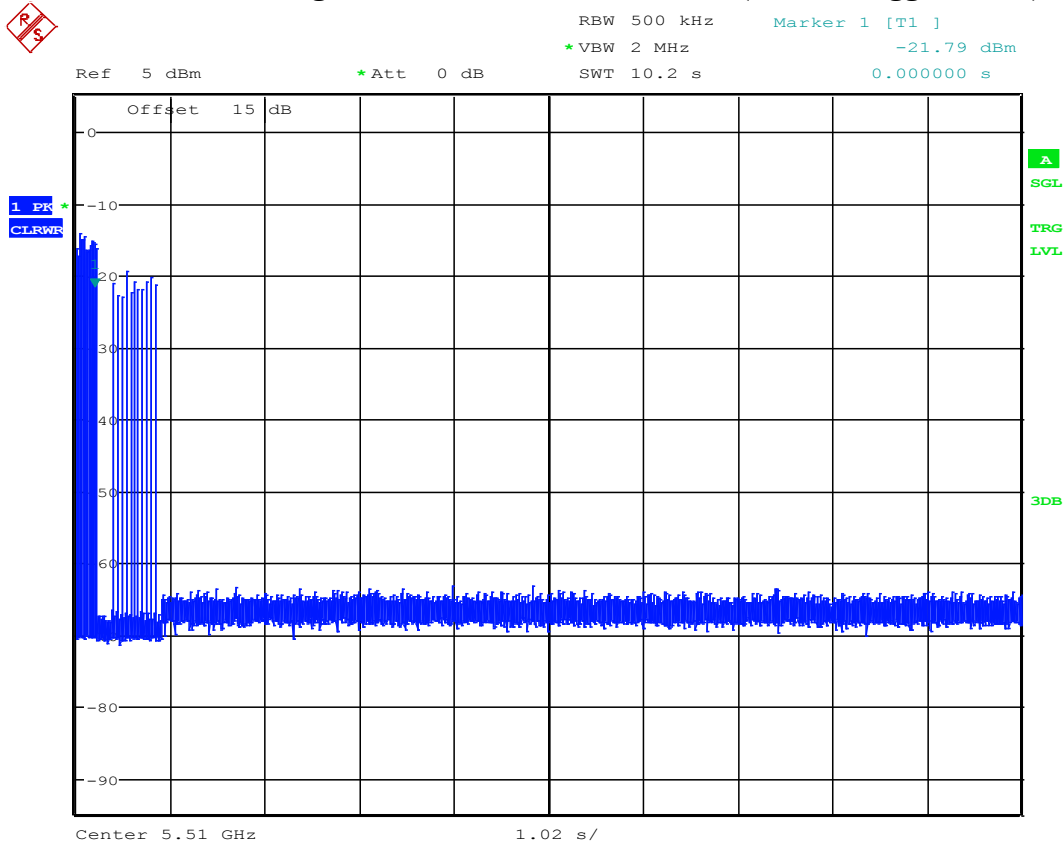
Date: 12.MAR.2015 14:07:18

7.2.5 Test Verdict
Pass

7.3 In Service Monitoring Spot Check

Spot check was performed to verify DFS Functionality after a software version upgrade to B538.

7.3.1 Channel Closing time and Channel Move time (-200ms trigger offset)



Date: 25.MAR.2015 13:51:54

Note: Analyzation of the trace obtained from this plot measured an aggregate of 12.6 ms of transmission on-time after the radar pulse was applied. The temporal resolution of the trace data is 340 us per data point.

8 Test Equipment and Ancillaries used for tests

Item Name	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Spectrum Analyzer	R&S	FSU26	200065	2 Years	6/15/2013
DFS Generator / PXI-5421 card	National Instruments	NI PXI-1042	E965F1	3 years	7/3/2012
DFS Upconverter PXI-5610 card	National Instruments	NI PXI-1042	E93740	3 years	6/29/2012

9 Revision History

Date	Report Name	Changes to report	Report prepared by
2015-04-06	EMC_CETEC-119-15001_WD_DFS	First version	Douglas Antioco
2015-04-24	EMC_CETEC-119-15001_WD_DFS_rev1	Added relevant references to RSS-210 in the cover page, Sections 1, 4 and 5. Added IC ID number and updated hardware revision of the EUT.	Douglas Antioco
2015-04-28	EMC_CETEC-119-15001_WD_DFS_rev2	Added PMN to cover page, section 1, 3.1. Added HVIN to section 3.1	Douglas Antioco