

TEST REPORT

Test report no.: 1-1554-01-18/09



Testing laboratory

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Accredited test laboratory:

The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

The area of testing is recognized by the FCC and IC.
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3462C-1 (IC)
Certification ID: DE 0001 (FCC)
Accreditation ID: DE 0002 (IC)

Applicant

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Test standard/s

47 CFR Part 15 Title 47 of the Code of Federal Regulations; Chapter I
Part 15 - Radio frequency devices
Subpart E - UNII Devices

For further applied test standards please refer to section 3 of this test report.

Test item

Kind of test item: **WLAN module**
Model name: **Connect Core Wi-i.Mx51**
FCC ID: **MCQ-50M1699**
IC ID: **1846A-50M1699**
Power supply: **100 - 240 V AC, 50 / 60 Hz, 0.6 A**

Test performed:

2011-01-17 Meheza Walla

Test report authorised:

2011-01-17 Karsten Gerald



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2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations 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 ICT Services GmbH.

2.2 Application details

Date of receipt of order:	2010-09-22
Date of receipt of test item:	2010-11-11
Start of test:	2011-01-14
End of test:	2011-01-14
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2009-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices Subpart E - UNII Devices

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
Relative humidity:		45 %
Air pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	100 - 240 V AC

5 Test laboratories sub-contracted

None

6 Test item

Kind of test item:	WLAN module
Type identification:	Connect Core Wi-i.Mx51
S/N serial number:	Prototype 55001445-01
HW hardware status:	no information available!
SW software status:	no information available!
Frequency band [MHz]:	5150 MHz – 5250 MHz ISM band 1 (lowest channel 5180; highest channel 5240 MHz) 5250 MHz – 5350 MHz ISM band 2 (lowest channel 5260; highest channel 5320 MHz) 5470 MHz – 5725 MHz ISM band 3 (lowest channel 5500; highest channel 5700 MHz)
Type of modulation:	ODFM technology with BPSK; QPSK; 16- & 64-QAM modulation
Number of channels:	ISM band 1: 4 ISM band 2: 4 ISM band 3: 11
Antenna:	external rod antenna
Power supply:	100 - 240 V AC, 50 / 60 Hz
Temperature range:	-20 °C to +55 °C

7 Summary of measurement results

- No deviations from the technical specifications were ascertained
- There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	47 CFR Part 15 §15.407	Passed	2011-01-17	only DFS

Test Specification Clause	Test Case	Temperature / Voltage	Pass	Fail	NA	NP	Results (max.)
§15.407 (h)(2) (iii)	Channel move time and channel closing transmission time	nominal / nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.407 (h)(2) (iv)	Non-Occupancy Period	nominal / nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

8 RF measurement testing

8.1 Description of test setup

8.1.1 Conducted measurements

Setup

Figure 1 shows a setup whereby the UUT is a RLAN device operating in slave mode, without Radar Interference Detection function. This setup also contains a RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device.

Figure 1 shows an example

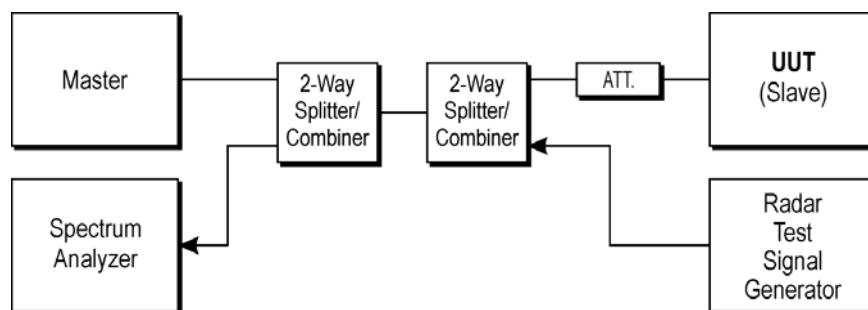


Figure 1: Setup

8.1.2 Parameters of DFS test signals

1. Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 mW	-64 dBm
< 200 mW	-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.

2. 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 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 transmission.

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 Channel changes (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%. Measurements are performed with no data traffic.

8.2 DFS test results

8.2.1 Channel move time / channel closing transmission time

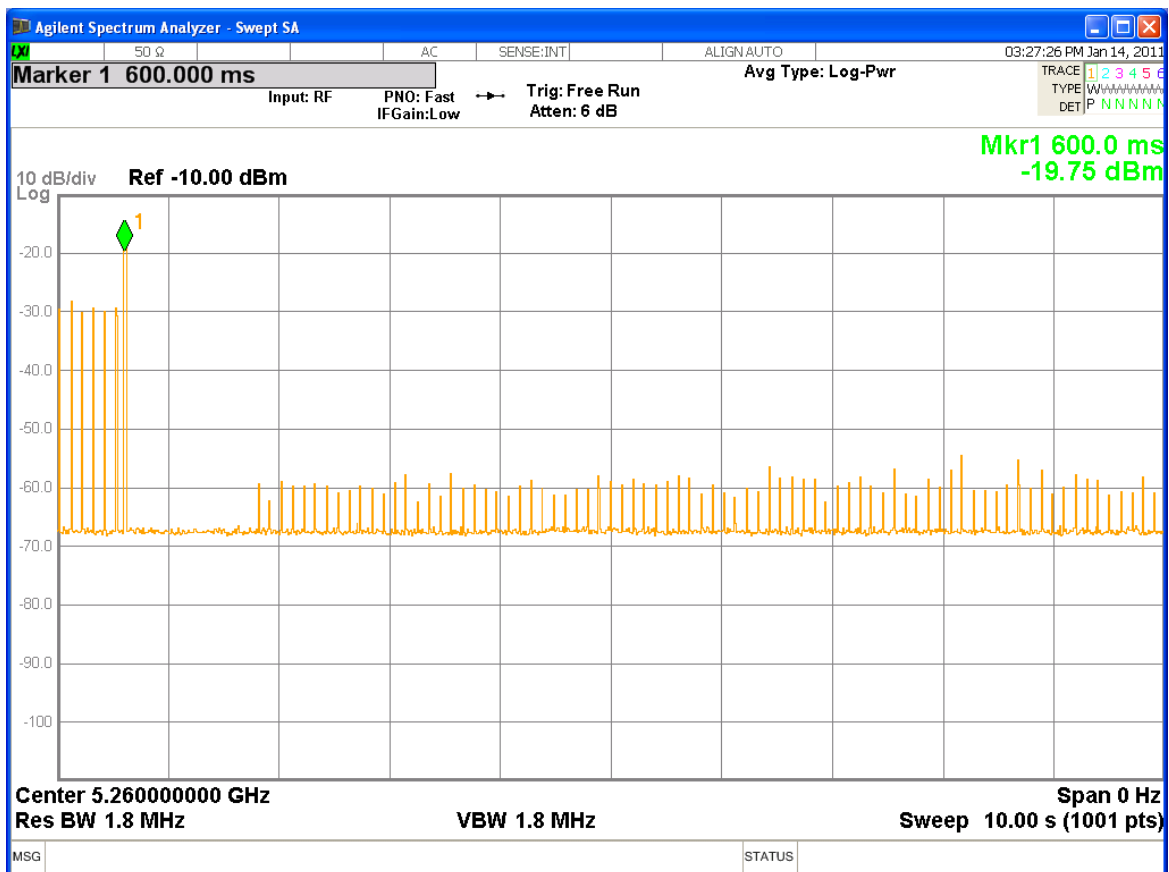
Description:

Channel Move Time. After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

Test Procedure:

Perform the test with one of the type 1 to type 4 short pulse radar waveforms.

Result:



Marker 1 shows the radar pulse. On the plot you can see that no transmissions occur after sending the radar burst. The time difference between the recognition of the radar burst by the AP and its last transmission is called as Channel Move Time (Limit: 10 s). The accumulated transmission time after detection of a radar signal is called as channel closing transmission time (Limit: in total 200 ms).

Final verdict: Pass

8.2.2 Non-Occupancy Period

Description:

Non-occupancy Period. A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The nonoccupancy period starts at the time when the radar system is detected.

Test Procedure:

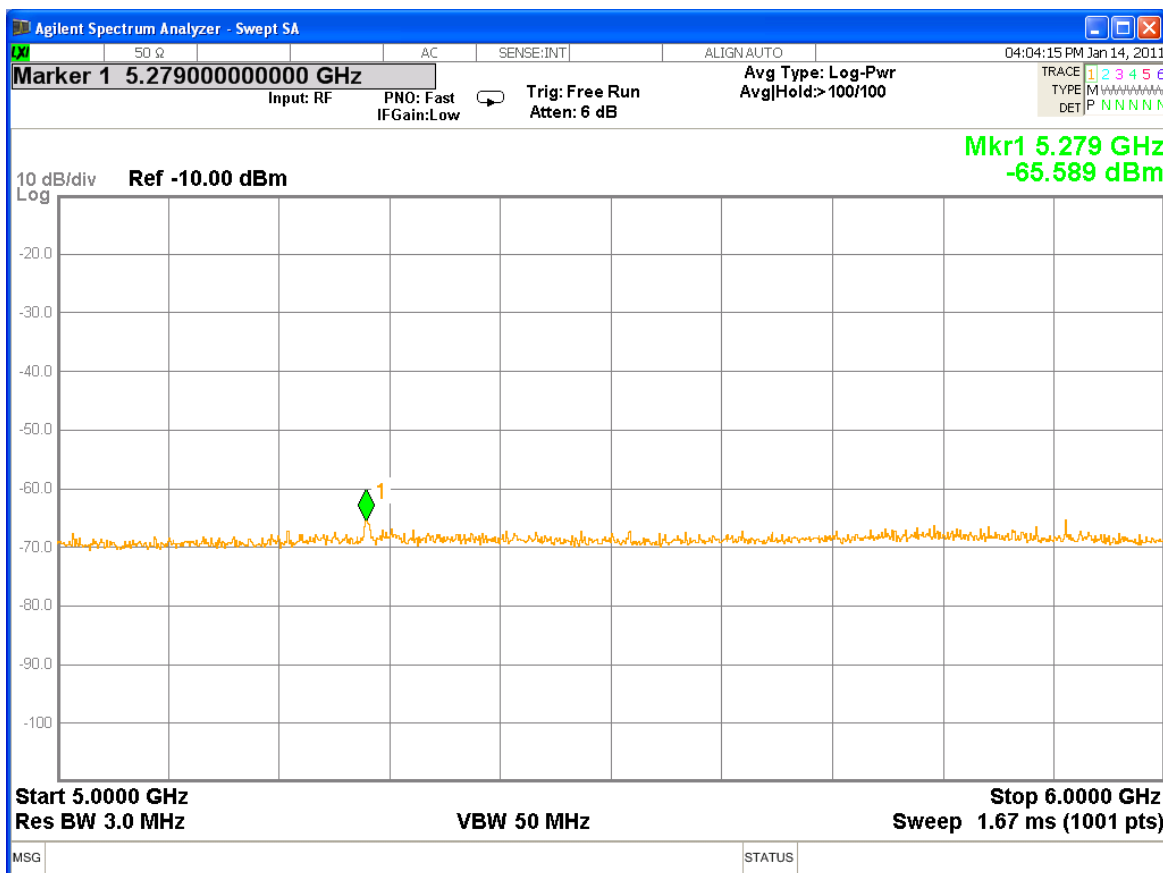
Client device is not permitted to transmit beacons on DFS frequencies.

- 1) Non-associated test:
The master has been off, monitor the analyzer on the test mode frequency that have been selected for testing, power up the client for 30 minutes to make sure no beacons have been transmitted.
- 2) Associated test:
Associate the master and client and stream the movie as specified for non- occupancy test. Transmit Radar type 1; monitor the test frequency to make sure no beacons have been transmitted for 30 minutes.

Mode	Results
Non-Associated	No Beacons transmit
Associated	No transmissions

Please refer to the following plots.

1) Non-associated:



The plot shows no transmissions over a 30 minutes period over the whole frequency band 5 GHz - 6 GHz.

2) Associated:



In the plot above you can see, that the client does not transmit any emission within 30 minutes after having received the “stop transmit” order from the Access Point (DFS-Master).

Final verdict: Pass

9 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Spectrum Analyzer	MXA	Agilent	US46220229	300003805	k	2010-09-08	2010-09-08
2	n. a.	Signal Generator	SMU200A	Rohde & Schwarz	101633	300003496	k	2008-08-27	2011-09-27
3	n. a.	Power-Splitter	11667B	Hewlett Packard	00616	300002421	ev		
4	n. a.	Power-Splitter	DMS 211	Technical Research Manufacturing Inc.	9321		ev		
5	n. a.	Cables	Sucotest 18	Huber & Suhner	div.		ev		
6	U025	Attenuator 30dB, k-con.	Inmet	40A-30dB	div.		ev		

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
v!k!	Attention: extended calibration interval	*	next calibration ordered / currently in progress
NK!	Attention: not calibrated		

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2011-01-17

Annex B Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software
UUT		Unit under Test