

Electromagnetic Compatibility EMC TEST REPORT 266892-5

Test Report

Electromagnetic Compatibility (EMC)



Equipment Under Test: WLAN module

Model: WF111-E
(Covers also models WF111-A and WF111-N)

Manufacturer: Bluegiga Oy
Sinikalliontie 5 A
FI-02630 ESPOO
Finland

Customer: Bluegiga Oy
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FI-02630 ESPOO
Finland

The Equipment Under Test Complies With Following Standard(s)

Title of the standard - Product / test environment	Reference standard
Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; – Part 1: Common technical requirements	EN 301 489-1 v.1.8.1
Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; – Part 17 Specific conditions for 2,4 GHz wideband transmission systems	EN 301 489-17 v.1.3.2

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Equipment Under Test (EUT)

Bluetooth module	
Model:	WF111-E
Type:	-
Serial:	-

Tests performed for WF111-E are deemed to cover also the parallel models WF111-A and WF111-N. Differences between the modules are:

WF111-E is equipped with U.FL connector for external antenna

WF111-A is equipped with integrated chip antenna

WF111-N is equipped with a pad on module edge

Description of the EUT

WF111 is a general use IEEE 802.11 (Wi-Fi) transceiver module meant to provide wireless connectivity for various microprocessor platforms. WF111 supports the IEEE 802.11b/g/n wireless networking standards with a single spatial stream and 20 MHz or 22 MHz bandwidth, allowing bitrates of up to 72.2 Mbps. WF111 provides embedded system designers with easy add-on connectivity without requiring RF design skills.

Power Requirements

DC-operated	
Operating voltage range	2.7 – 3.6VDC
Normal input voltage:	3.3 VDC

Mechanical Size of the EUT

Height: 2.10 mm	Width: 12.00 mm	Depth: 19.00 mm
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Equipment category and characteristics

Operating Frequency Range (OFR):	2412 – 2472 GHz
Channels:	13
Channel separation:	5 MHz
Channel bandwidth:	20 MHz (b-mode) 22 MHz (g/n-mode)
Effective isotropic radiated power:	+19.51 dBm
Transmission technique:	DSSS, OFDM
Antenna gain: WF111-A	0.5 dBi
Antenna gain: WF111-E	2.14 dBi
Antenna gain: WF111-N	2.14 dBi

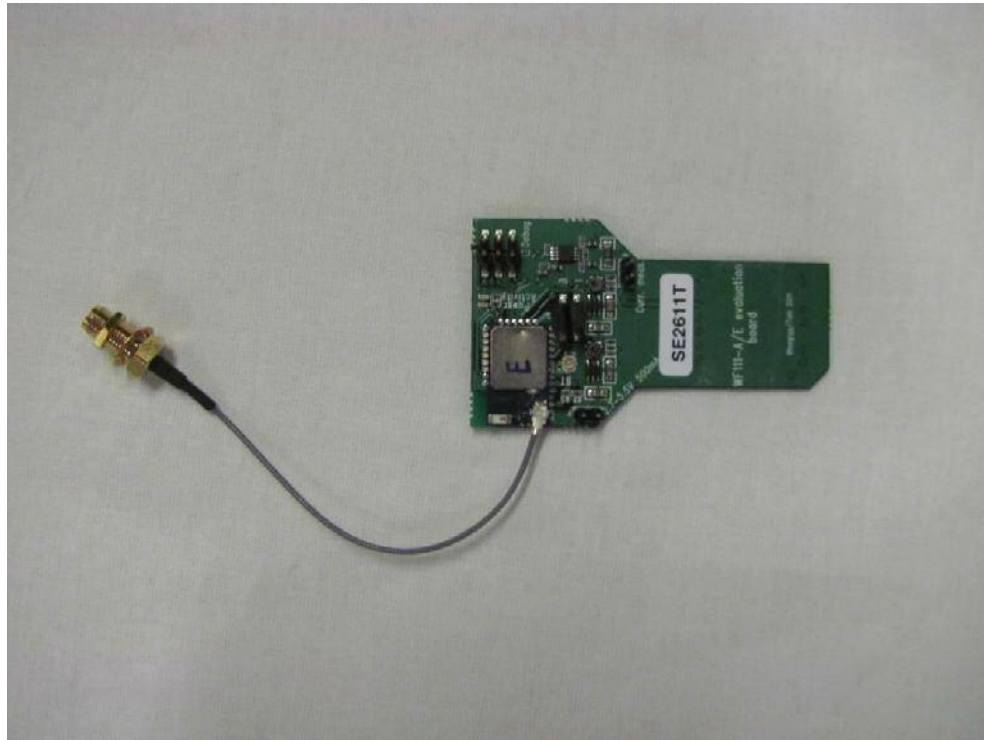
Cable Lengths and Types

Cable:	Length:	Type:
DC power cable	1,5 m	Unshielded

Peripherals

External DC power supply.

Photographs of the EUT



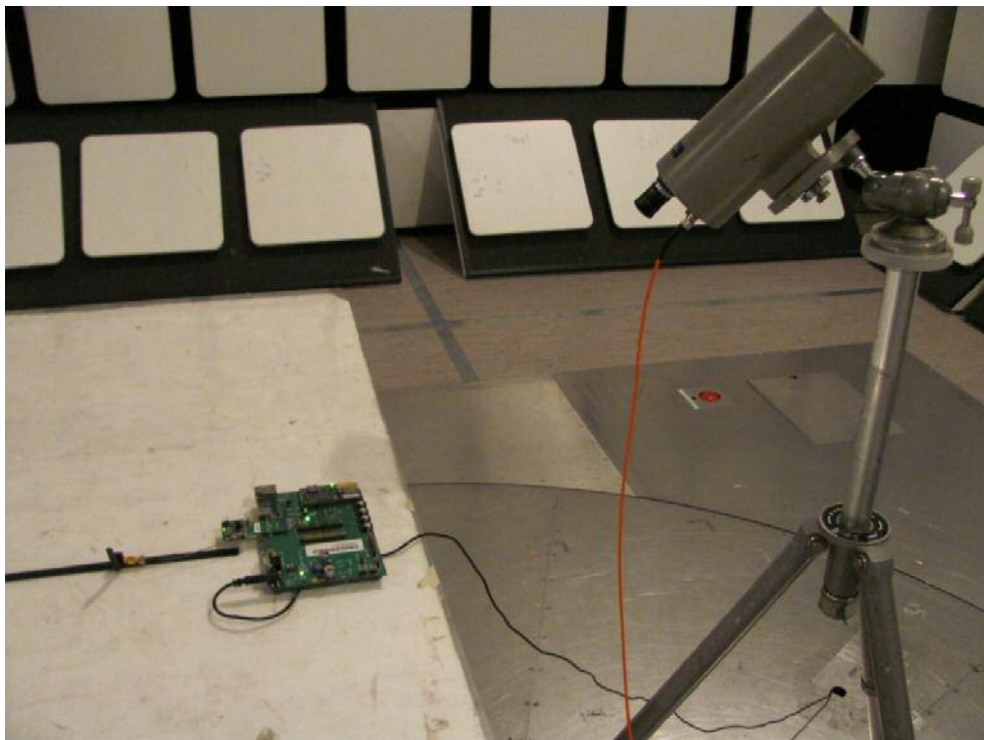
Photograph 1. The EUT WF111-E



Photograph 2. Radiated immunity test set-up (80 to 1000 MHz).



Photograph 3. Radiated immunity test set-up (1.4 to 2.7 GHz).



Photograph 4. The EUT monitoring in stand-by mode.

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EUT Test Conditions during Testing

When the EUT was tested in standby mode and the activity LED was monitored with a camera. During the activity mode the EUT was pinged with a laptop PC and the pinged data was monitored. The PC was connected with a shielded Ethernet cable to the WLAN D-link modem which was inside the chamber. The active frequency range of the EUT was ignored.

Test Suite

Measurement/Test	Reference standard		Result
Radiated RF-field Immunity	EN 61000-4-3:2006	-	PASS

IMMUNITY TEST RESULTS

Radiated RF-field Immunity

Basic standard: EN 61000-4-3
Tested by: THI, RRE
Date: 12.7.2012, 10.8.2012
Temperature: 21 °C
Humidity: 54 – 64 % RH
Barometric pressure: 1008 hPa, 1018 hPa
Performance criteria: A
Test result: **PASS**

Test plan

Test was done in a semi-anechoic chamber. Signal generator was set to 1 % logarithmic step size with used dwell time in each frequency. The floor of the chamber was covered by ferrite tiles. Due to a very small size of the EUT only two sides of the EUT were tested with both antenna polarizations.

The EUT was placed on a non-conductive table 0.8 m above non-reflecting ground plane.

Test results

Frequency range:	80-1000 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 s
Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and left side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test.

Frequency range:	1400-2700 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 s
Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and left side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test in stand-by mode. When the EUT was pinged from the PC the performance of the EUT was reduced when frequency range 2.0 to 2.2 GHz was tested (lost packets).

TEST EQUIPMENT

Radiated RF-field Immunity Test

Manufacturer	Type	Serial no	Inv. no
AMPLIFIER RESEARCH			
Amplifier 60W	60S1G3	313200	7915
Amplifier 200W	200W1000M2A	-	5027
Antenna (1-4.2 GHz)	AT4002	20738	8014
AGILENT			
Signal generator	33250A	MY40013138	8007
ROHDE & SCHWARZ			
Antenna (80-1300 MHz)	HL 023 A1	354135/016	8015
Test software	EMC-32	Ver. 8.30.0	-
BOONTON			
Power meter	4300	87105ED	4962
Power sensor	51013-4E	29017	5030
DEISEL			
Antenna mast	MA 240	240/455	7896
Turntable	DS 430	-	-
COMTEST			
Controller	HD 100	100/457	-