

Electromagnetic Compatibility EMC TEST REPORT 271987-1

Test Report

Electromagnetic Compatibility (EMC)



Equipment Under Test: Bluetooth module

Model: BLE112-A
BLE112-E
BLE112-N

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

Customer: Bluegiga Oy
Sinikalliontie 5 A
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.1.9.2
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.2.2.1

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Issued by:



Jari Merikari
Technical Manager

Date: 9.4.2013

Checked by:



Rauno Repo
Testing Engineer

Table of Contents

PRODUCT DESCRIPTION	4
Equipment Under Test (EUT)	4
Description of the EUT	4
Power Requirements	4
Mechanical Size of the EUT	5
Equipment category and characteristics	5
Cable Lengths and Types	5
Photographs of the EUT	6
Disclaimer	9
TEST CONDITIONS	10
EUT Test Conditions During Testing	10
SUMMARY OF TESTING	11
Test Suite	11
IMMUNITY TEST RESULTS	12
Radiated RF-field Immunity	12
TEST EQUIPMENT	14
Radiated RF-field Immunity Test	14

Equipment Under Test (EUT)

Bluetooth module	
Model:	BLE112-A
Type:	-
Serial:	-

Bluetooth module	
Model:	BLE112-E
Type:	-
Serial:	-

Bluetooth module	
Model:	BLE112-N
Type:	-
Serial:	-

Description of the EUT

The equipments under test are low energy single mode Bluetooth modules targeted for low power sensors and accessories.

Differences between the modules are:

BLE112-A is equipped with integrated chip antenna

BLE112-E is equipped with U.FL connector for external antenna

BLE112-N is equipped with RF pin

Power Requirements

Battery operated	
Operating voltage range	2,0 – 3,6VDC
Normal input voltage:	3V coin battery or 2 x 1,5V AAA batteries

Mechanical Size of the EUT

Height: 2,03 mm	Width: 12,05 mm	Depth: 18,10 mm
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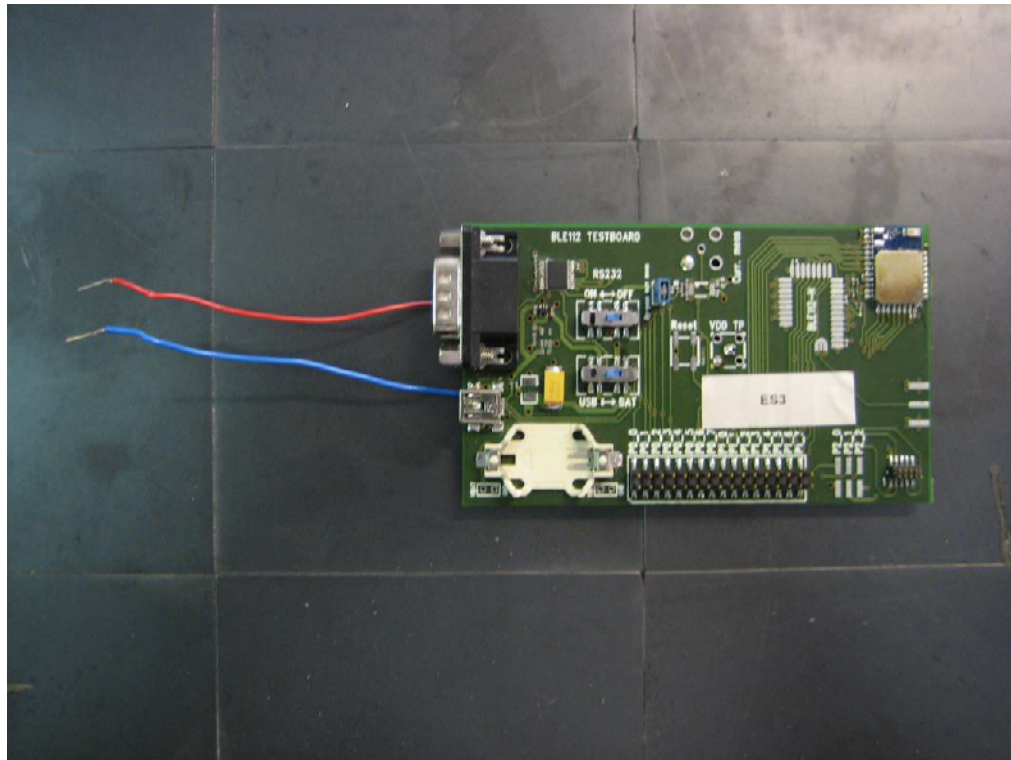
Equipment category and characteristics

Operating Frequency Range (OFR):	2402 – 2480 GHz
Channels:	40
Channel separation:	2 MHz
Channel bandwidth:	1.5 MHz (20dB BW)
Effective isotropic radiated power:	+3 dBm
Transmission technique:	FHSS
Antenna gain: BLE112-A	0.5 dBi
Antenna gain: BLE112-E	2.3 dBi
Antenna gain: BLE112-N	2.3 dBi

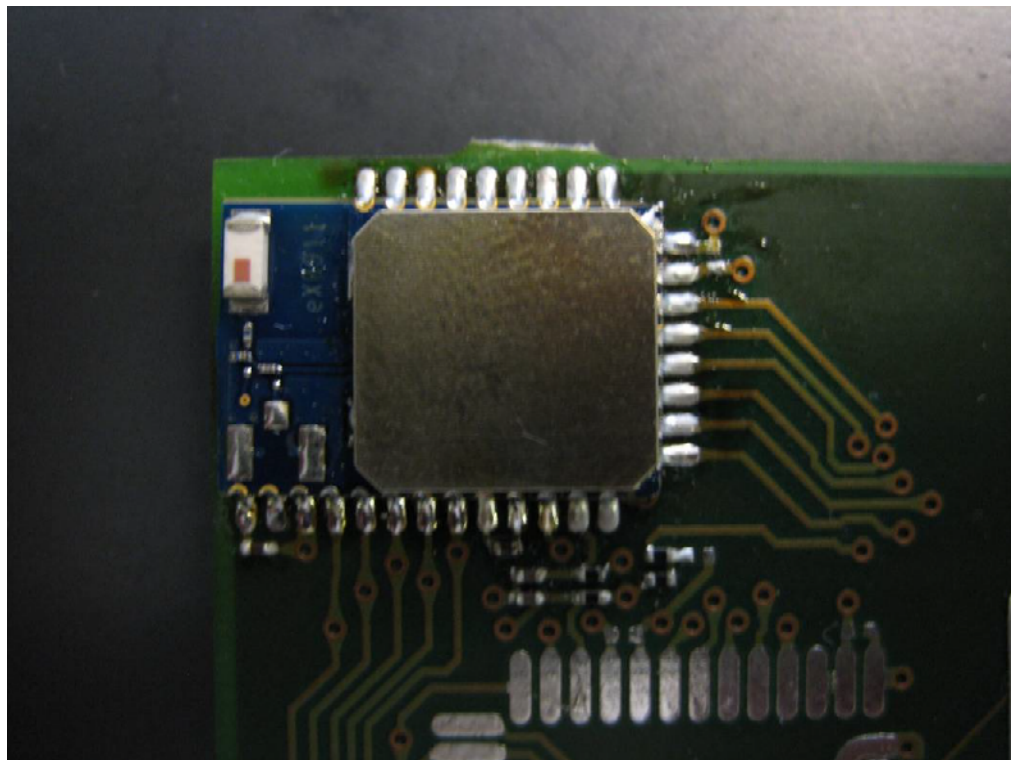
Cable Lengths and Types

Cable:	Length:	Type:
USB	1,0 m	Unshielded
DC power cable	2,0 m	Unshielded

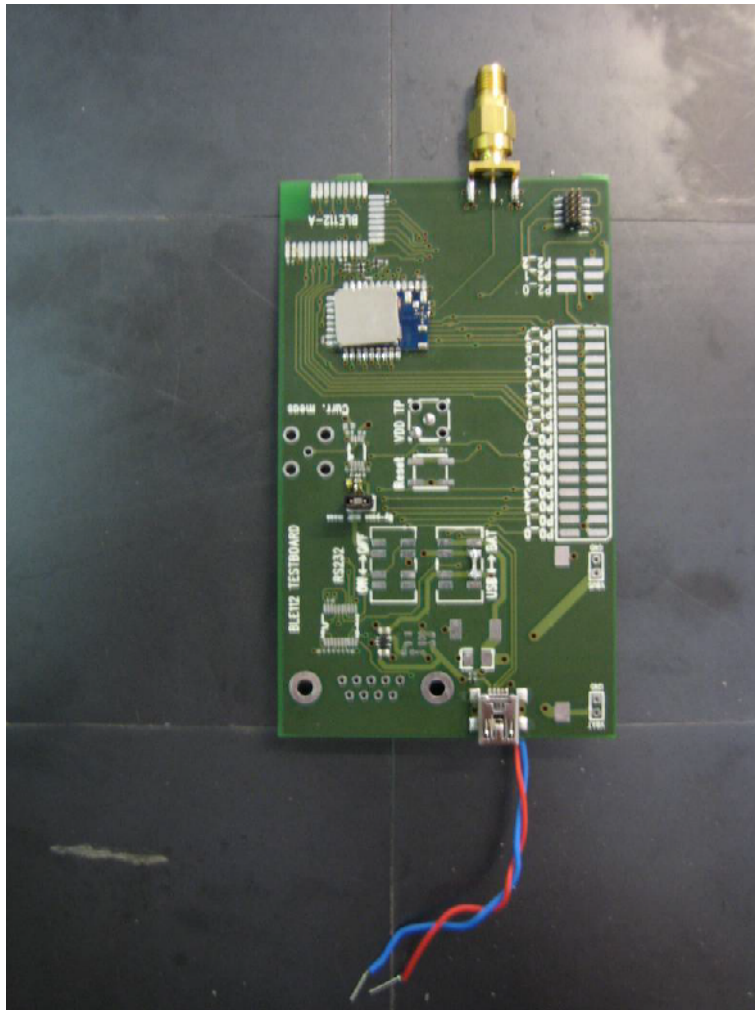
Photographs of the EUT



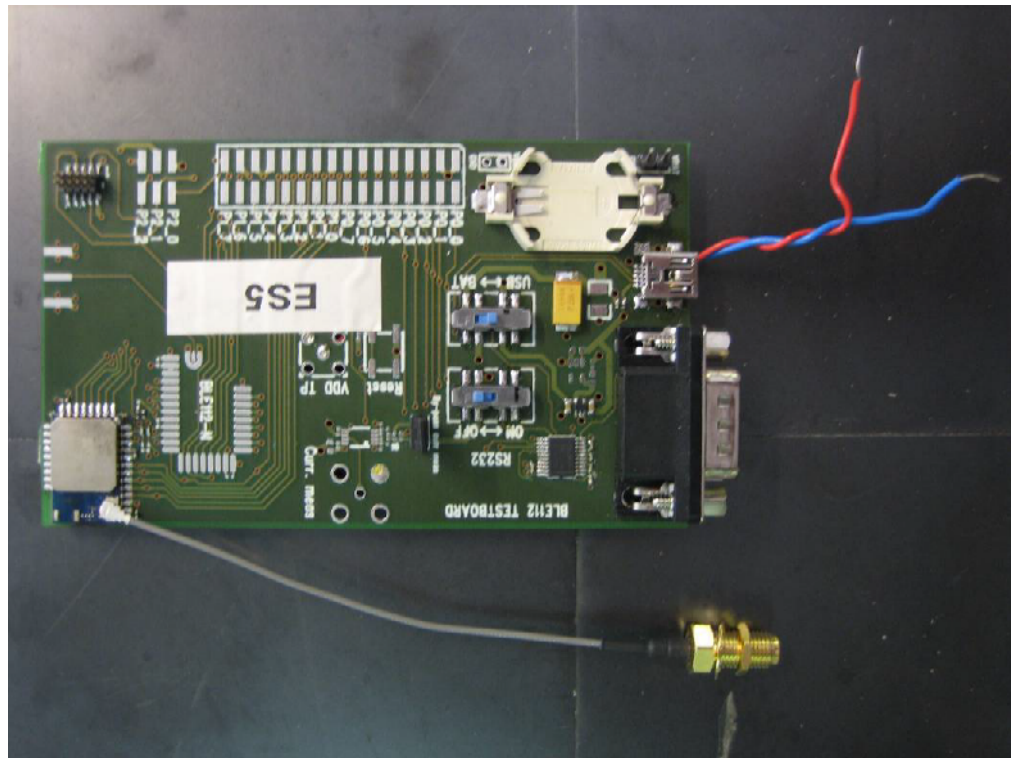
Picture 1. BLE112-A.



Picture 2. BLE112-A module.



Picture 3. BLE112-E.



Picture 4. BLE112-N.

Disclaimer

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EUT Test Conditions During Testing

During the radiated immunity test the EUT was paired with the auxiliary equipment (another Bluetooth module) which was located outside of the chamber. The EUT was communicating continuously with the AE and the link between these was established by using Tx / Rx antenna inside the chamber. The connection and data transfer was monitored with the PC during the test.

The EUT was powered via USB port by using the laptop computer located inside the chamber.

Test Suite

Measurement/Test	Reference standard	Amendment	Result
Radiated RF-field Immunity	EN 61000-4-3:2006	A1:2008, A2:2010	PASS

This test report contains EMC tests reported earlier in the test report number 264 152-1. This test report has been issued due to the newer version of the standards. No re-testing has been performed to the EUTs.

IMMUNITY TEST RESULTS

Radiated RF-field Immunity

Basic standard: EN 61000-4-3
Tested by: JJM
Date: 19.5 – 20.5.2011
Temperature: 21.5 – 23.0°C
Humidity: 30 - 37%
Performance criteria: A
Test result: **PASS**

Test plan

Test was done in an anechoic chamber which size is 8.64 x 6.24 x 5.52 meter. 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. Both, transmitter and the receiver were placed on a wooden table 0.8 m above non-reflecting ground plane and tested at the same time as a system.

Exclusion band for the test was 2 280 – 2 607,675 MHz.

Test results

BLE112-A

Frequency range:	80-1000 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 sec

Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and right 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 sec

Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and right side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test.

BLE112-E

Frequency range:	80-1000 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 sec

Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and right side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test.
Antenna polarization:	Vertical

Frequency range:	1400-2700 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 sec

Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and right side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test.

BLE112-N

Frequency range:	80-1000 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 sec

Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and right side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test.
Antenna polarization:	Vertical

Frequency range:	1400-2700 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	2 sec

Antenna polarization:	Horizontal and vertical
EUT test side:	Front of the test board and right side of the test board facing the antenna
Test remark:	No loss of functions / transmission during the test.

TEST EQUIPMENT

Radiated RF-field Immunity Test

Manufacturer	Type	Serial no	Inv. no
AMPLIFIER RESEARCH			
Antenna (1 - 4.2 GHz)	AT4002	-	5025
Amplifier	200W1000M2A	-	5027
Field probe (80 MHz - 40 GHz)	FP3080A	19846	5023
KALMUS			
Amplifier (80 – 1000 MHz)	757LCB-CE	-	7957
GTC-RF			
Amplifier (1 - 3 GHz)	GRF5007-1	1544	5028
EMC AUTOMATION			
Antenna (80 - 1000 MHz)	EA 1000-4-3	P11861	5005
Dual directional coupler (80 - 1000 MHz)	DC 440165	P950	5006
Switch module	RSM-1	9095	5033
System interface	SI 200	0086	5021
Video camera cntr.	VCC-01	2895	5025
ROHDE & SCHWARTZ			
RF powermeter	URV55	1029.1701.02	7928
Test software	EMC32	-	-
HEWLETT PACKARD			
Signal generator	8648C	3629U00855	5012
EMCO			
Antenna (1 – 18 GHz)	3117	29617	7293