Electromagnetic Compatibility EMC

TEST REPORT

290042-3-1

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Test Report

Electromagnetic Compatibility (EMC)

FINAS
Finnish Accreditation Service
T004 (EN ISO/IEC 17025)

Equipment Under Test:	Bluetooth Low Energy Module
Model:	BGM13P22A BGM13P22E BGM13P32A BGM13P32E BGX13P22GA
Trade Mark:	Silicon Labs
Manufacturer/Customer:	Silicon Laboratories Finland Oy Bertel Jungin aukio 3 FI-02600, ESPOO FINLAND

Tests have been performed according to the following standard(s)

Title of the standard	Reference standard	Version
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU	EN 301 489-1	V2.1.1
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	EN 301 489-17	V3.1.1

Date: 30 October 2018

Issued by:

Jani Tuomela
Testing Engineer

Date: 30 October 2018

Checked by:

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Equipment under test (EUT)

Trade mark:	Silicon Labs
Model:	BGM13P22A, BGM13P22E, BGM13P32A, BGM13P32E, BGX13P22GA
Type:	Bluetooth Low Energy Module
Serial no:	-

General description

BGM13P is a Bluetooth low energy module with two antenna variants. Variant A is equipped with chip antenna while the E variant has RF connector for the use of external antenna.

The BGX13P22GA is electrically identical to the BGM13P22A. It has a new brand name to indicate that, instead of our customers having to flash the module with their own application on top of our Bluetooth stack and radio, this module comes with an application developed and pre-flashed by Silicon Labs, on top of the same Bluetooth stack and radio, for a specific functionality (Bluetooth Classic's SPP simulation over BLE GATT transactions for a transparent UART communication).

Ratings and specifications of the EUT

Type of power supply:	Supplied by the end product (tested while supplied by the development board/ laboratory power supply)
Rated voltage:	2.0 - 3.8 V (tested with 3.3 V)
Rated current:	-
Rated frequency:	DC
EUT dimensions:	20 x 15 x 2 mm
Operating Frequency Range (OFR):	2402 - 2480 MHz
Channels:	40

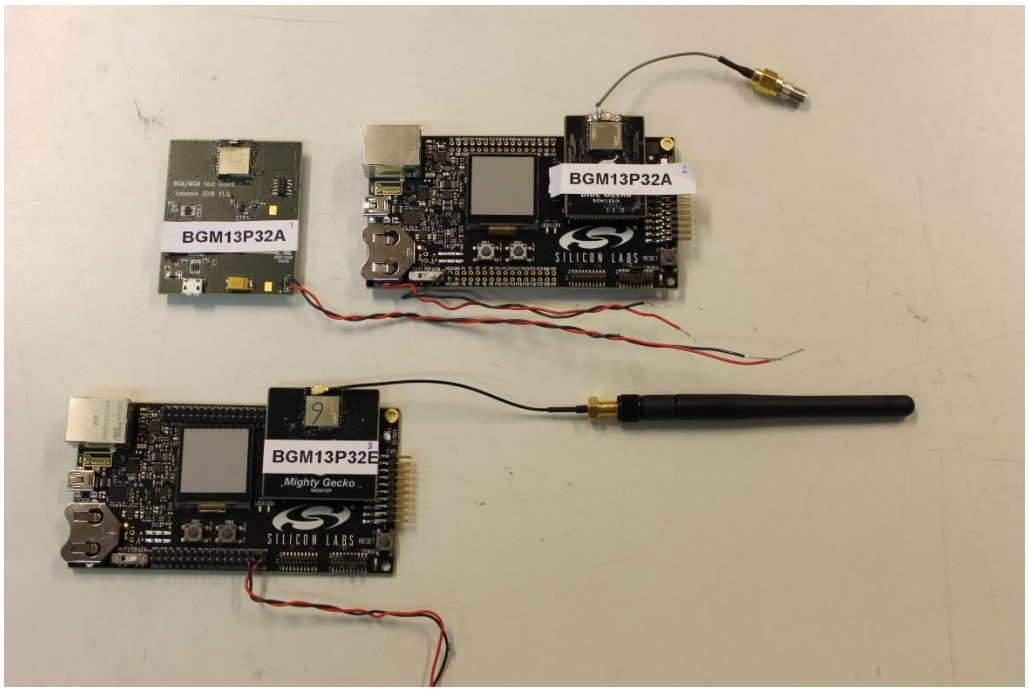
Cables

USB cable	1 m	Twisted pair, shielded, from supply to support board

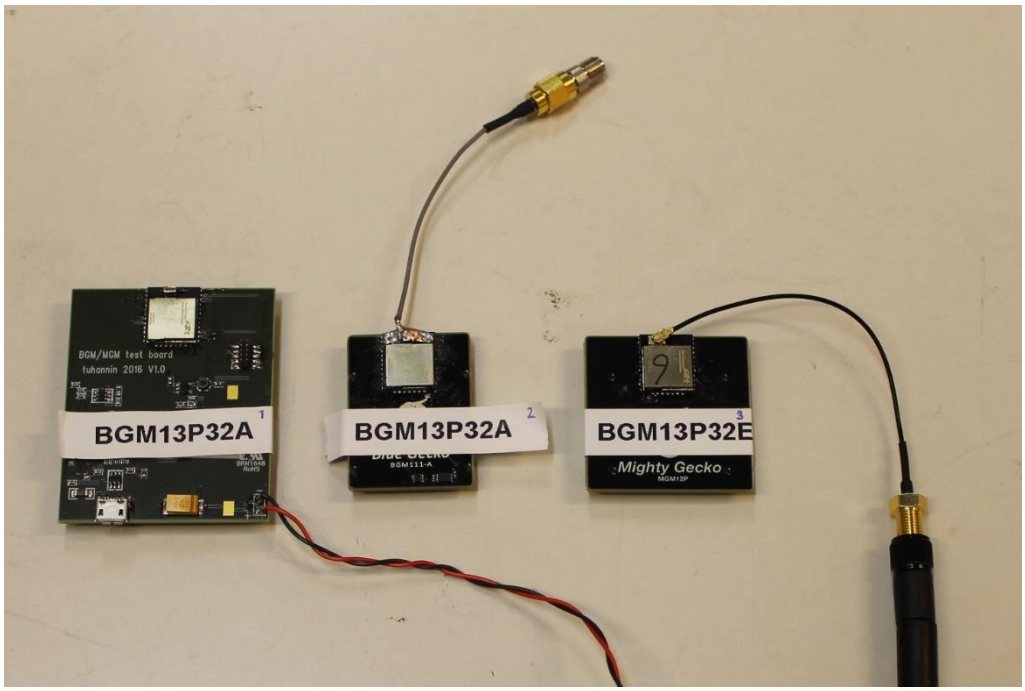
Peripherals

Test PC	HP Probook
Mobile phone	Huawei HONOR P7 lite
Tablet	Lenovo Tab3

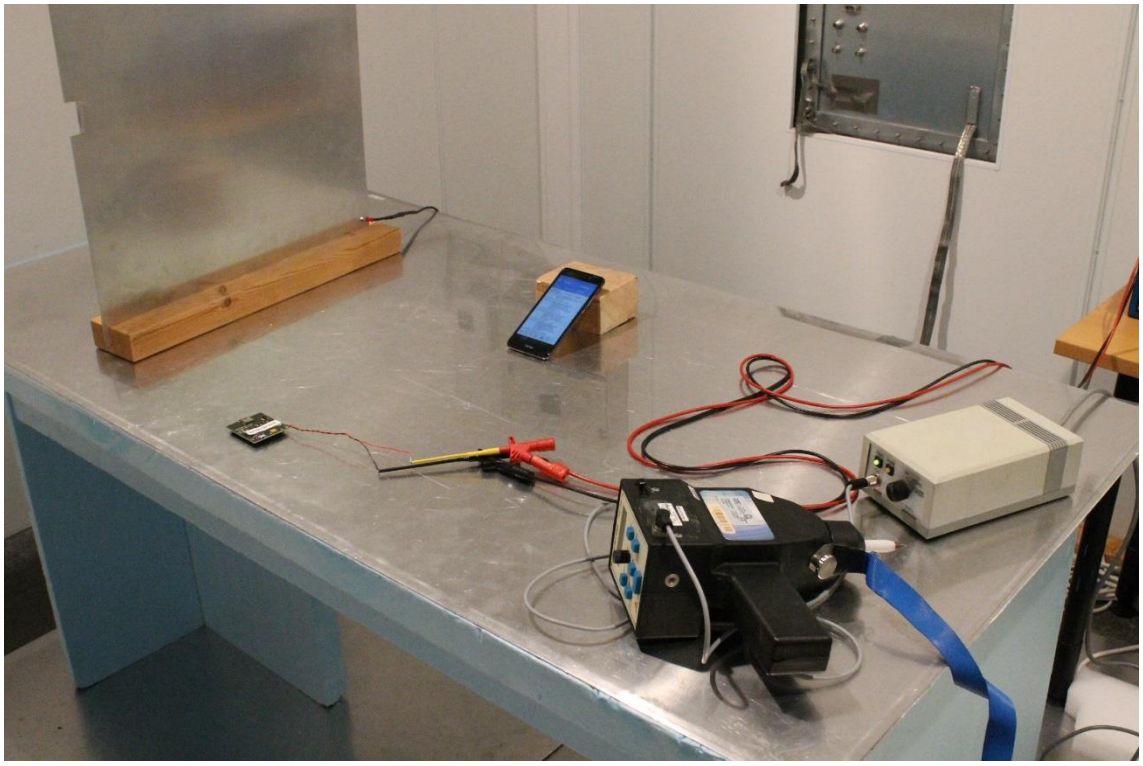
Photographs of the EUT



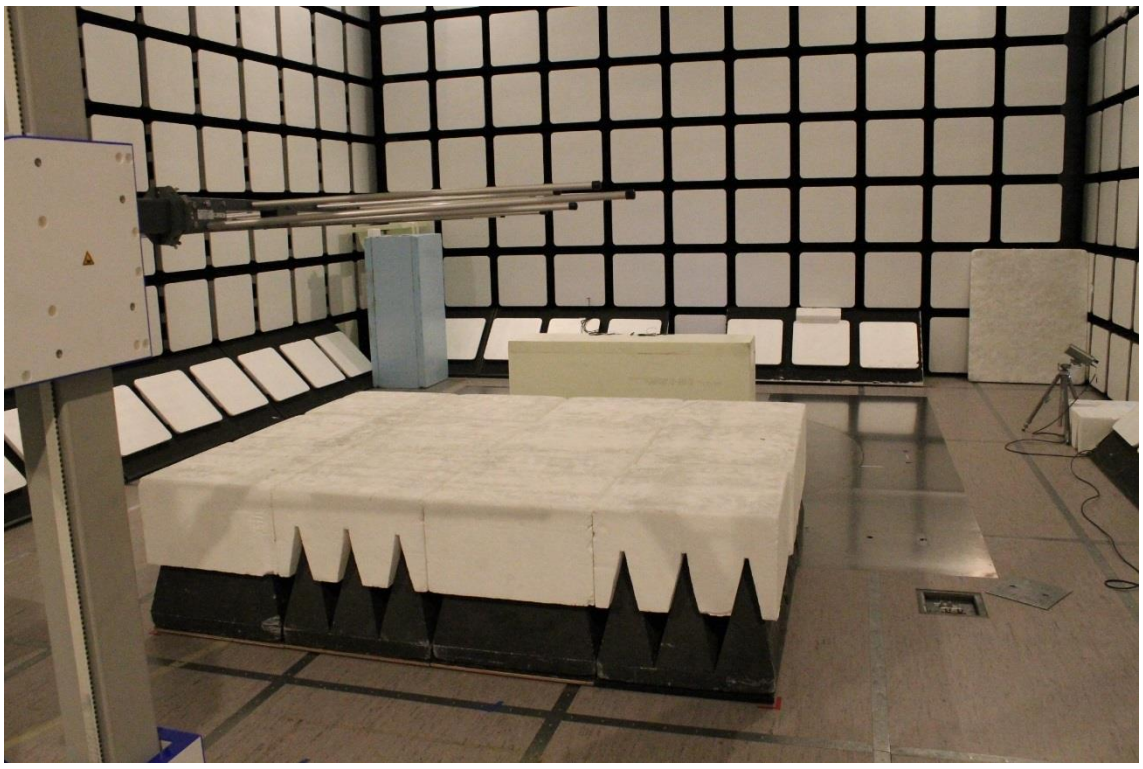
Photograph 1: The equipment under test (EUT)



Photograph 2: The equipment under test (EUT) and supportive development board



Photograph 3: Test setup during ESD tests



Photograph 4: Test setup during RF-field immunity test (Antenna may vary)

Test conditions

Configuration of the EUT was made to correspond to the actual assembling conditions as far as possible. Continuous data transfer was set between EUT and mobile phone/tablet, data link was monitored during the test.

The EUT was tested together with its parallel model.

Performance criteria

Performance criterion A **Continuous phenomena applied to Transmitters and Receivers (CT, CR)**	
The communication link shall be maintained during and after the test. The EUT shall continue to operate as intended, during and after the test, no degradation of performance or loss of function is allowed. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. No errors are allowed in transmission.	
Representative parameter	**Acceptable level of performance**
Connection	Communication link shall maintain during the test.

Performance criterion B **Transient phenomena applied to Transmitters and Receivers (TT, TR)**	
The communication link shall be maintained during and after the test. After the test, the EUT shall continue to operate as intended. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.	
Representative parameter	**Acceptable level of performance**
Connection	Pairing shall be maintained during test. Criterion A applies after the phenomena.

Performance criterion C	
Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance after recovering.	
Representative parameter	**Acceptable level of performance**
Connection	Module can be paired after the test. Criterion A applies after the connection has been established.

Test suite

Measurement/Test	Reference clause		Test site	Result
Radiated Emissions	EN 55032:2015		-	**N/A** (1
Conducted Emissions	EN 55032:2015		-	**N/A** (2
Harmonic Current Emissions	EN 61000-3-2:2006	A1:2009, A2:2009	-	**N/A** (2
Voltage Fluctuation And Flicker	EN 61000-3-3:2013		-	**N/A** (2
Electrostatic Discharge Immunity	EN 61000-4-2:2009		5m	**PASS**
Radiated RF-field Immunity	EN 61000-4-3:2006	A1:2008 A2:2010	5m	**PASS**
Electrical Fast Transient Immunity	EN 61000-4-4:2012		-	**N/A** (2
Surge Immunity	EN 61000-4-5:2006		-	**N/A** (2
Conducted RF-field Immunity	EN 61000-4-6:2006		-	**N/A** (2
Voltage Dips and Short Interruptions Immunity	EN 61000-4-11:2004		-	**N/A** (2
Possible test case verdicts: Test case does not apply to the EUT: EUT does meet the requirement: EUT does not meet the requirement: Test was not performed:		N/A P (Pass) F (Fail) N/T		

1) Applicable only to ancillary equipment not incorporated in the radio equipment

2) No AC mains, cables shorter than 3m

Testing location / address: SGS Fimko Ltd
Karakaarenkuja 4
FI-02610, ESPOO
FINLAND

Electrostatic Discharge Immunity

Standard:	EN 61000-4-2
Tested by:	JAT
Date:	20 October 2017
Temperature:	22 °C
Humidity:	23 % RH
Barometric pressure:	1014 hPa
Performance criteria:	B
Test result:	**PASS**

Test plan

Tests were done by using the air discharge to non-conductive and the contact discharge to all conductive parts of the EUT. Also the indirect contact discharges were given to VCP (Vertical Coupling Plate) and HCP (Horizontal Coupling Plane) in order to simulate the objects placed near to the EUT. All four sides of the EUT were tested with both polarities. At least ten discharges were given with both polarities to the selected points.

Test results

Discharge method:	Air discharge
Test levels:	± 2 kV, ± 4 kV, ± 8 kV
EUT test point:	No test point, the EUT is plain PCB module and proper ESD protection is needed in the end product
Test remarks:	-
Discharge method:	Contact discharge
Test levels:	± 2 kV, ± 4 kV
EUT test point:	RF connector shell
Test remarks:	No loss of function was observed
Discharge method:	Indirect contact discharge
Test level:	± 2 kV, ± 4 kV
EUT test side:	Bottom, front, rear, left and right sides
Test remarks:	No loss of function was observed

The humidity was lower than what is specified in the basic standard. The test may therefore be more severe than intended. Since the EUT passed the test no effort was made to increase the humidity to the specified range of 30–60%.

Radiated RF-field Immunity

Standard:	EN 61000-4-3
Tested by:	JAT
Date:	6 October 2017
Temperature:	23 °C
Humidity:	33 % RH
Barometric pressure:	982 hPa
Performance criteria:	A
Test result:	**PASS**

Test plan

Test was done in a fully anechoic chamber. Signal generator was set to 1 % logarithmic step size with used dwell time in each frequency. EUT were tested with both antenna polarizations.

Test results

Frequency range:	80-6000 MHz
Modulation:	80% AM with 1 kHz modulation frequency
Test level:	3 V/m
Dwell time:	0.5 s
Antenna polarization:	Horizontal and vertical
EUT test side:	Back, left side (Due to small size of the EUT)
Test remark:	No loss of performance was observed

Test Equipment

Radiated RF-field Immunity

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ANTENNA	A.H. SYSTEMS	SAS-200/518	inv:7873	-	-
SPECTRUM ANALYZER	AGILENT	E7405A	inv:9746	2016-01-07	2018-01-07
RF SIGNAL GENERATOR	AGILENT	E8257C (250kHz - 20GHz)	inv:7292	2015-06-09	2018-06-09
RF POWER AMPLIFIER	AR	200W1000M2A	inv:5027	-	-
RF POWER AMPLIFIER	AR	60S1G3	inv:7915	-	-
ANTENNA	AR	AT4002	inv:8014	-	-
POWER SUPPLY	DELTA	SM 130-25D	inv:10406	-	-
ANTENNA	EMCO	3115	inv:7892	2016-02-24	2018-02-24
FIELD PROBE	ETS LINDGREN	HI-6105	inv:9759	2017-05-17	2019-05-17
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	-	-
ANTENNA MAST	MATURO	TAM 4.0E	inv:10181	-	-
SIGNAL SWITCHING UNIT	ORBIS	EMS SSU	inv:10411	-	-
RF AMPLIFIER	ROHDE & SCHWARZ	BBA150	inv:10456	-	-
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
ANTENNA	ROHDE & SCHWARZ	HL 023 A1	inv:8015	-	-
POWER SENSOR	ROHDE & SCHWARZ	NRP-Z91	inv:10443	2017-03-31	2019-03-31
POWER SENSOR	ROHDE & SCHWARZ	NRP-Z91	inv:10444	2017-03-31	2019-03-31
POWER SUPPLY	CALIFORNIA INSTR.	5001 iX Series II	inv:7826	-	-

Electrostatic Discharge Immunity

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
IONIZIZING AIR BLOWER	AEROSTAT PC	SOMCO ION	sn:124140033683062	-	-
ESD GENERATOR	HAEFELY	PESD1600	9756	2017-10-11	2018-10-11
VERTICAL COUPLING PLANE	SGS FIMKO	EDS_V5m1	inv:10413	-	-
ELECTROSTATIC FIELD METER	WOLFGANG WARMBIER	EFM 51	inv:9116	2013-04-30	-