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SAR EXCLUSION DOCUMENT

Document 75947809-05 Issue 01

2.4 GHz BT Transmitter:

Product standard: EN 50663:2017 Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz)
Basic standard: EN 62479:2010 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

EN 62479 Section 4.1 Route B and 4.2 Low-power exclusion level P_{max}

EN 62479 Section 4.1 states: If the electrical power used by or radiated by the equipment is sufficiently low, the electromagnetic fields emitted will be incapable of producing exposures that exceed the basic restrictions.

Four routes A, B, C or D can be used to demonstrate compliance. The route selected is B;

B The input power level to electrical or electronic components that are capable of radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined below.

The applicable low power exclusion level P_{max} from EN 62479 Table A.1 is 20 mW corresponding to;

- ICNIRP (guideline in accordance with Council Recommendation 1999/519/EC),
- General Public (exposure tier)
- Head and trunk (region of body)

Low Power Exclusion Result (Integral Antenna):

Frequency (MHz)	Power Output mW	Antenna Gain Ratio	Duty Cycle %	Maximum Power (EIRP) * (mW)	Separation Distance mm	P_{max} Exemption Limit ** (mW)	SAR Test Exclusion (Yes/No)
2480	0.89	1.41	98	1.23	0	20	Yes
2402	0.89	1.41	98	1.23	0	20	Yes

Approved by .....

Jon Kenny
Authorised Signatory

Date 09 April 2020

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Low Power Exclusion Result (External Antenna):

Frequency (MHz)	Power Output mW	Antenna Gain Ratio	Duty Cycle %	Maximum Power (EIRP) * (mW)	Separation Distance mm	P_{max} Exemption Limit ** (mW)	SAR Test Exclusion (Yes/No)
2480	0.89	2.09	98	1.82	0	20	Yes
2402	0.89	2.09	98	1.82	0	20	Yes

* Maximum declared output power (EIRP) of the device including tolerance.
** Select power from EN 62479 Table A.1 for the applicable exposure.

The Low Power exclusion threshold has been evaluated using the method described above from information supplied by the manufacturer. Based on the evaluation above, the EUT is categorically excluded from SAR/RF exposure testing.

Note: the maximum radiated power output EIRP shown in the low power exclusion result is given by:

Integral Antenna
$P_{EIRP} = P_o \times G_i \times$ Duty Factor
P_{EIRP} = 0.89 mW x 1.41 x 0.98 = 1.23 mW
Where:
P_o = 10^(-0.5 dBm/10) = 0.89 mW
G_i = 10^(1.5 dBi/10) = 1.41
Duty factor = 98 %/100 = 0.98

External Antenna
$P_{EIRP} = P_o \times G_i \times$ Duty Factor
P_{EIRP} = 0.89 mW x 2.09 x 0.98 = 1.82 mW
Where:
P_o = 10^(-0.5 dBm/10) = 0.89 mW
G_i = 10^(3.2 dBi/10) = 2.09
Duty factor = 98 %/100 = 0.98

Approved by .....
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Date 09 April 2020

Manufacturer's Declaration of Product information (extract):

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	Unshielded wireless radio SiP (System-in-Package) module implementing the Bluetooth Low Energy (BLE) technology according to the 5.2 specification. The BLE stack implements the 1 and 2 Msym/s PHYs, but not the Coded PHYs, and has no direction-finding capabilities. The module comes with an RF pin meant to route the RF signal to either an external antenna or to an adjacent pin for making use of the integral antenna
Manufacturer:	Silicon Laboratories Finland Oy
Model:	BGM220S12A
Part Number:	

If more than one frequency band is supported, please confirm which combinations of bands are capable of Simultaneous Transmit.	

Frequency Band 1: Please detail (one entry for each band), e.g GSM 900 / WCDMA FDD I etc .

Antenna Model:	Integral, discrete / Reference external dipole	
Antenna length:	- / 14.2	cm
Bottom frequency:	2402	MHz
Middle frequency:	2440	MHz
Top frequency:	2480	MHz

Maximum power (input to the antenna including a tolerance):	-0.5	dBm
Antenna gain (or maximum gain allowed):	Integral: +1.5 External: +3.2	dBi

Or

Field Strength Measurement:		dBµA/M
Measurement Distance:		cm

Separation distance from antenna to the user/bystander	20 for Mobile case. To be determined for Portable case.	cm
Transmitter Duty Cycle:	98 or 4.88 depending on the mode of operation, connection or advertisements	%

Frequency Band 2: Please detail (one entry for each band), e.g GSM 900 / WCDMA FDD I etc

Antenna Model:	Integral, discrete / Reference external dipole	
Antenna length:	- / 14.2	cm
Bottom frequency:	2401	MHz
Middle frequency:	Only two channels in this optional use case	MHz
Top frequency:	2481	MHz

Maximum power (input to the antenna including a tolerance):	-0.5	dBm
Antenna gain (or maximum gain allowed):	Integral: +1.5 External: +3.2	dBi

Or

Field Strength Measurement:		dBµA/M
Measurement Distance:		cm

Separation distance from antenna to the user/bystander	20 for Mobile case. To be determined for Portable case.	cm
Transmitter Duty Cycle:	3.6	%

I hereby declare that the information supplied is correct and complete.

Name: Tom Nordman

Position held: Marketing Director of IoT Wireless Products at Silicon Laboratories Finland Oy,

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Date: 18 March 2020