

EN 62311 Report

Report No.: SECDBM-WTW-P22030865

Test Model: MGM240P22A, MGM240P32A, MGM240P32N

Series Model: BGM240P22A, BGM240P32A, BGM240P32N (refer to item 2.1 for more details)

Received Date: Mar. 22, 2022

Test Date: Apr. 08 ~ Jun. 13, 2022

Issued Date: Jun. 27, 2022

Applicant: Silicon Laboratories Finland Oy

Address: Alberga Business Park - Bldg D/Floor 5, Bertel Jungin aukio 3, 02600 ESPOO, FINLAND

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan



This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 General Information	5
2.1 General Description of EUT	5
2.2 Measurement Uncertainty	7
2.3 Maximum Measurement Uncertainty	7
3 RF Exposure Measurement.....	8
3.1 Introduction.....	8
3.2 Limits	8
3.3 Normative Reference Classification of The Assessment Methods	8
3.4 Test Results.....	9

Release Control Record

Issue No.	Description	Date Issued
SECDBM-WTW-P22030865	Original release.	Jun. 27, 2022

1 Certificate of Conformity

Product: Bluetooth Low Energy and 802.15.4 wireless radio module

Brand: Silicon Labs

Test Model: MGM240P22A, MGM240P32A, MGM240P32N

Series Model: BGM240P22A, BGM240P32A, BGM240P32N (refer to item 2.1 for more details)

Sample Status: Engineering samples fully representing the production models


Applicant: Silicon Laboratories Finland Oy

Test Date: Apr. 08 ~ Jun. 13, 2022

Standards: EN IEC 62311:2020

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :  , **Date:** Jun. 27, 2022
Polly Chien / Specialist

Approved by :  , **Date:** Jun. 27, 2022
Jeremy Lin / Project Engineer

2 General Information

2.1 General Description of EUT

Product	Bluetooth Low Energy and 802.15.4 wireless radio module	
Brand	Silicon Labs	
Test Model	MGM240P22A, MGM240P32A, MGM240P32N	
Series Model	BGM240P22A, BGM240P32A, BGM240P32N	
Model Difference	Refer to note	
Status of EUT	Engineering samples fully representing the production models	
Power Supply Rating	1.8Vdc to 3.8Vdc (from host equipment)	
Normal Testing Voltage	3.3Vdc	
Temperature Operating Range	-40~105℃	
Modulation Type	Bluetooth LE	GFSK
	802.15.4	O-QPSK
Transfer Rate	Bluetooth LE	1MBaud with 1Mbps transfer rate 1MBaud with coded 125Kbps transfer rate 1MBaud with coded 500Kbps transfer rate 2MBaud with 2Mbps transfer rate
	802.15.4	250kbps
Operating Frequency	Bluetooth LE	2402 ~ 2480MHz
	802.15.4	2405 ~ 2480MHz
Number of Channel	Bluetooth LE	40
	802.15.4	16
EIRP Power (Measured Max. Average)	Bluetooth LE	Mode A1 (MGM240P32A / High power 1M): 19.81dBm Mode A2 (MGM240P32A / High power 2M): 19.67dBm Mode B1 (MGM240P32N / High power 1M): 19.92dBm Mode B2 (MGM240P32N / High power 2M): 19.93dBm Mode C1 (MGM240P22A / Low power 1M): 9.99dBm Mode C2 (MGM240P22A / Low power 2M): 11.02dBm
	802.15.4	Mode A (MGM240P32A / High power): 11.78dBm Mode B (MGM240P32N / High power): 11.79dBm Mode C (MGM240P22A / Low power): 9.89dBm
Antenna Type	Bluetooth LE	Refer to note
	802.15.4	
Antenna Connector	Refer to note	
Accessory Device	NA	
Data Cable Supplied	NA	

Note:

1. All models are listed as below. Model MGM240P22A, MGM240P32A and MGM240P32N are the representative for final test.

Product Spec.	Model		
	MGM240P22A (covers BGM240P22A)	MGM240P32A (covers BGM240P32A)	MGM240P32N (covers BGM240P32N)
	Low-Power/ Bluetooth Low Energy and 802.15.4 (802.15.4 being disabled for BGM240P22A)	High-Power/ Bluetooth Low Energy and 802.15.4 (802.15.4 being disabled for BGM240P32A)	High-Power/ Bluetooth Low Energy and 802.15.4 (802.15.4 being disabled for BGM240P32N)
Max nominal RF TX power, as declared by manufacturer	10dBm	20dBm	20dBm
Antenna type	integral antenna	integral antenna	RF pin
Hardware	<p>MGM240P22A (and BGM240P22A) --> hardware variants with integral antenna and 10dBm max power, to be tested as DTS for both 802.15.4 and Bluetooth Low Energy</p> <p>MGM240P32A (and BGM240P32A) --> hardware variants with integral antenna and 20dBm max power, to be tested as DTS for 802.15.4 and FHSS for Bluetooth Low Energy</p> <p>MGM240P32N (and BGM240P32N) --> hardware variants with RF pin and 20dBm max power, to be tested as DTS for 802.15.4 and FHSS for Bluetooth Low Energy</p> <p>These three hardware variants should be RF tested separately, because PAs are configured differently and also antenna matching components are different between them, meaning for example that conducted RF measurements cannot be assumed to deliver the exact same results across the three samples.</p> <p>MGM modules are the ones under testing as they support both 802.15.4 and Bluetooth Low Energy, whereas the BGM modules are the series models because they are exactly the same except for the 802.15.4 being disabled by a hardcoded software configuration during production.</p>		

2. The antenna information is listed as below.

No.	Type	Connector	Gain (dBi)	Remark
1	Integral antenna	NA	1.82	For model: MGM240P22A, MGM240P32A, BGM240P22A, BGM240P32A
2	External reference dipole antenna**	SMA Male	2.80	For model: MGM240P32N, BGM240P32N

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

** The dipole antenna is not sold with the EUT, but is used during testing as a reference antenna for radiated measurements of the parts with the RF pin.

3. The following samples are provided by client and used for testing.

Sample	Model
A	MGM240P32A
B	MGM240P32N
C	MGM240P22A

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Parameter	Uncertainty
RF output power, conducted (EN 300 328)	$\pm 1.371\text{dB}$

2.3 Maximum Measurement Uncertainty

For the test methods, according to EN 300 328 standard, the measurement uncertainty figures shall be calculated in accordance with ETR 100 028-1 [4] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Maximum measurement uncertainty

Parameter	Uncertainty
RF output power, conducted (EN 300 328)	$\pm 1.5\text{ dB}$

3 RF Exposure Measurement

3.1 Introduction

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current.

3.2 Limits

According to EN 62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.

Frequency Range	E-Field Strength (V/m)	H-Field Strength (A/m)	B-Field (μ T)	Equivalent Plane Wave Power Density S_{eq} (W/m ²)
0-1 Hz	—	3.2×10^4	4×10^4	—
1-8 Hz	10 000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0.025-0.8 kHz	$250/f$	$4/f$	$5/f$	—
0.8-3 kHz	$250/f$	5	6.25	—
3-150 kHz	87	5	6.25	—
0.15-1 MHz	87	$0.73/f$	$0.92/f$	—
1-10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	—
10-400 MHz	28	0.073	0.092	2
400-2 000 MHz	$1.375 f^{1/2}$	$0.0037 f^{1/2}$	$0.0046 f^{1/2}$	$f/200$
2 ~ 300 GHz	61	0.16	0.20	10

3.3 Normative Reference Classification of The Assessment Methods

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

Far Field Calculation Formula

$$E = \eta_0 H = \frac{\sqrt{30PG(\theta, \phi)}}{r}$$

G = antenna gain relative to an isotropic antenna
 θ, ϕ = elevation and azimuth angles to point of investigation
r = distance from observation point to the antenna
 η_0 = Characteristic impedance of free space

3.4 Test Results

Calculation for Maximum E.I.R.P.

Mode	Frequency Band (MHz)	Output Power E.I.R.P. (dBm)	Output Power E.I.R.P. (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
Bluetooth LE						
A1	2402 ~ 2480	19.81	95.719	8.473	61	Pass
A2		19.67	92.683	8.337	61	Pass
B1		19.92	98.175	8.581	61	Pass
B2		19.93	98.401	8.591	61	Pass
C1		9.99	9.977	2.735	61	Pass
C2		11.02	12.647	3.080	61	Pass
802.15.4						
A	2405 ~ 2480	11.78	15.066	3.361	61	Pass
B		11.79	15.101	3.365	61	Pass
C		9.89	9.750	2.704	61	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

---END---