



AN1048: Regulatory Certifications BGM121/BGM123 SiP Module

Silicon Labs wireless modules are certified to meet regulatory certifications such as FCC and CE. When using Silicon Labs pre-certified modules, customers can refer to these certifications and related certification test reports to meet the regulatory compliance.

Certification requirements depend on regions and modules. This document highlights the main differences between the different modules, module types, and certification requirements between different countries.

The document also describes a list of requirements that the pre-certified module must meet to get a full modular certification and differences between CE and FCC and other countries.

CE is not a certification and there is no modular certification as in FCC. CE requires a declaration from a manufacturer that the product meets the requirements of the R&TTE or RED directive. For example, the BGM12x SiP module certification for CE does not differ from traditional PCB modules such as Blue Gecko BGM111.

FCC has two main categories: full modular approval and limited modular approval. A module that does not meet the criteria set for a full certification, as in the case of lack of metallic shield or crystals assembled into the module, is certified to limited modular approval category. Similarly as with full modular approval, the end product will be labeled with the modules FCC ID. BGM12x SiP module shields the passive components into the substrate that acts as an intrinsic shield, but does not include metallic shield on top due to its highly optimized size and performance. However, the module fully meets radiated testing requirements of FCC and other standards without the metallic shield. The current state of FCC rules require metallic shielding. For this reason, when using BGM12x SiP modules, customers need to file a Class 2 Permissive Change (C2PC).

The SoC/IC level wireless components cannot be pre-certified because they don't have a fixed RF path and antenna. Customers need to do RF measurements to validate the design compliance with the regulatory rules.

KEY FEATURES OR KEY POINTS

- BGM12x SiP module has full CE Compliance and limited modular FCC.
- BGM12x complies with all radiated measurement requirements.
- All customer designs that use certified module in co-location with another transmitter, or are using a certified module closer to human body than the specific certificate allows, need to re-evaluate the human RF exposure.

1. Introduction

Table 1.1. Summary of main regulatory certifications of Silicon Labs Blue Gecko Modules

Certification	BGM12x SiP Module	BGM11x PCB Module
Japan	Modular Certification	Modular Certification
CE	Pre-certification	Pre-certification
FCC	Limited Modular Certification	Modular Certification
ISED	Limited Modular Certification	Modular Certification
South Korea	N/A	Modular Certification
Other Regions	—	—

1.1 Customer Process for BGM12x SiP Module Certification

- When product design including BGM12x SiP module is finalized, the customer shall contact the company providing certification services which does their product general FCC, CE, and other country regulatory certifications and perform compliance testing on the final product.
- The company providing the certification services will use Silicon Labs certification test reports and finalize the certification for the customer.
 - Documents can be downloaded at public certification databases
 - Documents can be downloaded at <http://www.silabs.com/>
- www.silabs.com/support serves customers and certification houses with any questions

2. Compliance testing

2.1 Market and Application-specific Certification Examples

- Europe: CE
- USA: FCC
- Canada: ISED (Former IC)
- South-Korea: KC
- Japan : MIC (commonly known as Telec)
- Australia : RCM
- Typically split into three separate categories:
 - RF
 - EMC
 - Safety
- Application-specific requirements:
 - Medical
 - Automotive
 - Aviation

2.2 CE

- CE requires a declaration from a manufacturer that the product meets the requirements of the R&TTE or RED directive.
- The manufacturer of the end product is responsible for the product being compliant.
- Typically, test evidence (reports) must be presented.
- Optionally, NB (Notified Body) opinion can be asked as a formal “certificate”.
- Relevant standards for radio products:
 - RF: EN300328 (radio emissions).
 - EMC: EN301489 (other emissions and immunity).
 - Safety: EN60950 (safety).
- Limitations
 - CE is not a certification so there is no modular certification. Each end product will require its own test evidence of compliance. Typically conducted test results can be inherited from the modules test reports. The radiated tests and immunity tests must be performed with the end product assembly.
 - If TX power is >13 dBm (20 mW), RF exposure needs to be evaluated.
 - Typically requires SAR (Specific Absorption Rate) testing.
 - Depends however on end product and use case such as a proximity to human body.
 - RF exposure evaluation should be consulted from a suitable test laboratory if the product’s TX power exceeds 13dBm.
 - Multiple radios used in a single end product
 - If co-located radios are transmitting simultaneously – RF exposure must be re-evaluated.
 - If co-located radios are NOT transmitting simultaneously – RF exposure independent for each radio.
 - For non-adaptive transmitters, the maximum EIRP is +10 dBm. For non-hopping transmitters, the maximum PSD (Power Spectral Density) is 10 mW/MHz. In practice, these requirements limit the maximum nominal TX Power of 802.15.4-based protocols to +11 dBm and Bluetooth LE to +9 dBm with antenna gain of 0 dBi. If the antenna gain is higher, the TXP must be reduced accordingly.

Countries Following the CE Standard: EU countries, EFTA countries – Iceland, Norway, Switzerland (and Liechtenstein), French DOMs, Guadeloupe, Martinique, French Guiana, Reunion, Afghanistan, Andorra, Georgia, Gibraltar, Maldives, Monaco, San Marino, Sao Tome and Principe, Seychelles, Vatican City, Faroe Islands, Greenland, Svalbard, Azores, Madeira, Canary Islands, Guernsey, Jersey, Isle of Man, Montserrat, Pitcairn Islands.

2.3 FCC

- Types of authorization
 - Certification (radio)
 - DoC (computer peripheral)
 - Verification (other electronic devices)
- Full modular approval
 - End product using a radio with full modular approval will not need radio certification testing if the restrictions mentioned in the modules grant are met
- Limited modular approval
 - Each new host PCB requires reassessment (C1PC or C2PC)
 - Class 1 Permissive Change (C1PC)
 - Changes that do not increase emissions or change RF characteristics
 - Class 2 Permissive Change (C2PC)
 - Changes that increase emissions or any changes to remove the particular restrictions mentioned in the grant (different type of an antenna, co-location with other radios, RF layout change, and so on)
 - Official test report required, must be filed with FCC
- Relevant standards for a product implementing a radio
 - Intentional radiators 47 CFR FCC Part 15C
 - Unintentional radiators 47 CFR FCC Part 15B
- FCC Limitations
 - Typical scenarios requiring extra testing with FCC in case of
 - Co-location of radios
 - Antenna change
 - Product used close to a human body
 - Limitations are described in the products FCC grant
 - If restrictions cannot be met – end customer needs to file C2PC

Countries Following the FCC Standard: United States of America, Anguilla, American Samoa, Bolivia, Cayman Islands, El Salvador, Federated States of Micronesia, Guam, Guatemala, Marshall Islands, Northern Mariana Islands, Palau, Panama, Puerto Rico, Virgin Islands (US).

2.4 ISEDC (Formerly Known as IC)

ISEDC is similar to the FCC with a few differences, which are:

- RF exposure requirements in ISEDC are stricter than the FCC. Typically, more separation to human body is required unless measuring the SAR.
- Labeling requirements are slightly different in ISEDC than in FCC. In ISEDC, the particular model of the device has to be labeled in addition to the ID.
- Using BGM121 or BGM122 SiP module in a new host requires notification to ISEDC Canada to demonstrate how the module maintains the ISEDC conditions requiring notifying ISEDC with a Class 4 Permissive Change (C4PC)

2.5 MIC Japan

MIC Japan (previously Telec) doesn't have modular approval. MIC Japan only has a generic approval of a radio device. The requirement is that the radio must be able to operate as a standalone. This means that BGM121A and BGM123A meet the MIC requirements and can be used as pre-certified components.

- Limitations
 - The radio must operate as a standalone (SiP module versions without built-in antenna such as BGM121N and BGM123N versions do not meet the MIC requirement).
 - PSD limit is similar to EU 10 mW/MHz. However, because of the test procedure, this takes into account the duty cycle relaxation.

2.6 Korea KC

- Limitations
 - A module without a shield cannot be certified. Currently, BGM121 and BGM123 do not have Korean certifications and require RF testing the same way as an SoC.

Requires in country testing. All testing takes place in Korea.

2.7 Brazil and China

Require in-country testing and certification grant holder is the company at the country. Contact your test house for more details. Silicon Labs will share the design materials with the test house.

3. Specific Absorption Rate (SAR) and Co-located Radios

Customer designs that use certified module in co-location with another transmitter, or are using a certified module closer to human body than the specific certificate allows, need to re-evaluate the human RF exposure. See Silicon Labs module datasheets that define these in detail.

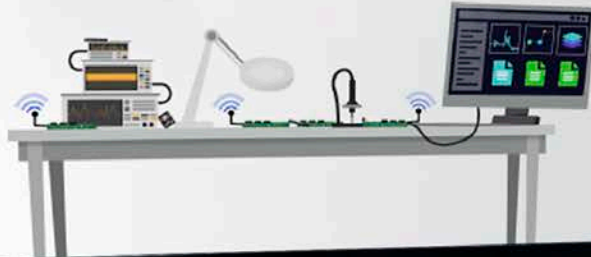
Different certifications have different SAR requirements. For example, the SAR exclusion thresholds are described in detail in the FCC KDB 447498. ISEDC exclusion thresholds are described in RSS-102 Issue 5. RF exposure restrictions for each module are described in detail in relevant datasheets. If the end product doesn't meet the criteria mentioned in the datasheet, customers need to re-evaluate the RF exposure with the end product, which may require SAR testing. FCC and ISEDC must be notified and Class 2 Permissive Change is required to allow either co-location or using the transmitter closer to human body than what the module certificate allows.

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