

RADIO FREQUENCY LIGHTING EMC: FCC & EU COMPLIANCE

Global expertise to launch products to market faster

Lighting products which use radio frequencies to operate are subject to specific requirements, including those from the US Federal Communications Commission (FCC). Intertek experts help manufacturers quickly and efficiently attain FCC approval.



Radio Frequency Lighting Products

Lighting products which use radio frequencies (RF) to operate are subject to a range of requirements around the world to ensure that they do not cause harmful interference to radiocommunications services. Regulations include the Federal Communications Commission (FCC) requirement for radiated emissions testing of RF lighting, LEDs, and ballasted lighting.

In most cases, RF light-emitting diode (LED) devices use electronic drivers that operate at frequencies similar to those used in digital electronic products. For that reason, the FCC requires RF LED products to undergo electromagnetic compatibility (EMC) testing to ensure they meet the radiated and line-conducted emissions limits and do not cause harmful interference.

Intertek's experts help manufacturers navigate the FCC requirements, as well as overlapping global requirements, for lighting products. We recommend considering these requirements early in the product design process.

EMC During the Development Cycle

It is critical that EMC testing is used throughout the development cycle, including defining the intended environment so immunity levels and emissions limits can be identified. EMC requirements should also be specified to external vendors based on the intended environment, allowing early detection of EMC issues for quick resolution.

FCC Compliance for RF Lighting Devices – FCC Part 18

RF lighting devices are subject to compliance with FCC part 18. Some examples of these products include:

- Fluorescent lighting
- High intensity discharge (HID) lighting
- Gas Discharge Lighting

LED lighting devices are not considered to be RF lighting devices.

Under this rule, limits for radiated emissions have been set for both non-consumer equipment and products intended for consumers. Limits vary depending on the product type and

frequency of operation. Devices are required to cease operation if harmful interference occurs.

In addition to limits on radiated emission, it is also necessary to consider variations in limits for line-conducted emissions. The allowable limits for line-conducted emissions under vary depending on the product type and frequency at which it operates. Given variations in limits for both types of emissions, accurate testing is a necessity to gain certification.

FCC 18.212 includes label requirements. The product must be supplied with a statement that "This device complies with Part 18 of the FCC rules." The manufacturer must also provide a unique identification for the product and must identify the responsible party in the United States by name, address, and telephone number or internet contact information. This information can be supplied on an insert, in the manual, on the packaging, or as an e-label. The unique identifier must also appear on the product. The FCC logo may be used on the label, optionally.

FCC 18.213 includes information to user requirements for devices radiating RF energy. The manufacturer must provide an advisory statement – either on the product packaging or with other user documentation – stating that the device may cause interference to radio equipment. The statement should also caution against installing the device near maritime safety communications equipment or other critical navigation/communication equipment operating between 0.45–30 MHz.

FCC Compliance for RF LED Lighting – FCC Part 15 Subpart B

RF LED products are classified as “unintentional radiators,” per the FCC. These products are subject to EMC testing requirements under FCC Part 15 Subpart B. The FCC also published guidance for RF LED lighting in KDB article 640677, which extends the frequency range of testing to 1,000 MHz. Past FCC rules did not specify testing in this range for lighting devices.

Depending on the product class (A or B) and operating frequency, it must meet limits for electromagnetic radiated emissions of 39–54 dB(μV/m) and limits for AC line-conducted emissions of 46–79 dB(μV/m). Devices are required to cease operation if harmful interference occurs.

Device information to user requirements are also included in Part 15, to state the product’s compliance to FCC rules. Additional warnings about changing or modifying the device must be included in the device manual, with troubleshooting instructions to counteract potential interference. Additional information to user requirements are found in part 2, including the requirement to provide a unique identification for the product and identify the responsible party in the U.S. by name, address, and telephone number or internet contact information. This information can be supplied on an insert, in the manual, on the packaging, or as an e-label. The unique identifier must also appear on the product. The FCC logo may be used on the label, optionally.

European Union (EU) Compliance, per EMC Directive 2014/30/EU

EMISSIONS: EN 55015 (CISPR15)

Covers radiated emissions and conducted emissions with specific limits for:

- Radiated emissions, 9 kHz to 30 MHz (magnetic field component)
- Radiated emissions, 30 MHz to 300 MHz (electric field component)
- AC line conducted emissions

EN 55011 applies to RF lighting operating in ISM bands, but contains similar requirements to EN 55015 for radiated and line conducted emissions.

IMMUNITY: EN 61547

Covers specific parameters and refers to IEC standards for: electro-static discharge, radiated RF field, electrical fast transients, surge, RF conducted, power-frequency magnetic field, voltage dips/interruptions.

Compliance for Lighting Devices with Built-in Radios – FCC & EU

FCC

Requirements for radio-controlled devices using Zigbee or Bluetooth at 2.4 GHz:

- FCC Part 15 C
- Measured in accordance with the procedures in ANSI C63.10-2013 and applicable KDBs
- Falls under authorization procedure of certification

Requirements for radio-controlled devices using Zigbee or Bluetooth at 2.4 GHz, if using preapproved radio module:

- FCC specifies retest to FCC Part 15 C in host product to confirm compliance
- Label with contains FCC ID: XXX-XXXXX
- Falls under authorization procedure of Supplier’s Declaration of Conformity

EU

Requirements for radio controlled devices using Zigbee or Bluetooth at 2.4 GHz:

- Radio Equipment Directive (RED) - Directive 2014/53/EU
- Radio requirements tested to ETSI EN 300 328
- General EMC requirements tested to ETSI EN 301 489-1 and ETSI EN 301 489-17
- RF exposure evaluation and safety testing required

Requirements for radio controlled devices using Zigbee or Bluetooth at 2.4 GHz, if using preapproved radio module:

- Retest on the radio frequency portion against ETSI EN 300 328
- Perform emissions against applicable product family on host device
- General EMC requirements tested to ETSI EN 301 489-1 & ETSI EN 301 489-17
- RF exposure evaluation required

About Intertek

Intertek is an FCC-designated Telecommunication Certification Body (TCB) and can certify radio devices. Our network of accredited FCC test labs can test RF LED devices to FCC and global requirements. Our expertise enable us to test and certify a variety of products through our global network of facilities, including many equipped with 5 and 10 meter semi-anechoic chambers and outdoor area test sites (OATS).

Intertek is a leading Total Quality Assurance provider to industries worldwide with a business model designed to get high-quality lighting products to market quickly and efficiently. Our breadth of services allows clients to save time and money by bundling EMC testing with other quality assurance needs. With decades of experience in the lighting industry, Intertek navigates global requirements, helping you to quickly design and launch innovative products.

FOR MORE INFORMATION



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