

YOUR WIRELESS COMMUNICATION CERTIFICATION REFERENCE

LEARN ABOUT



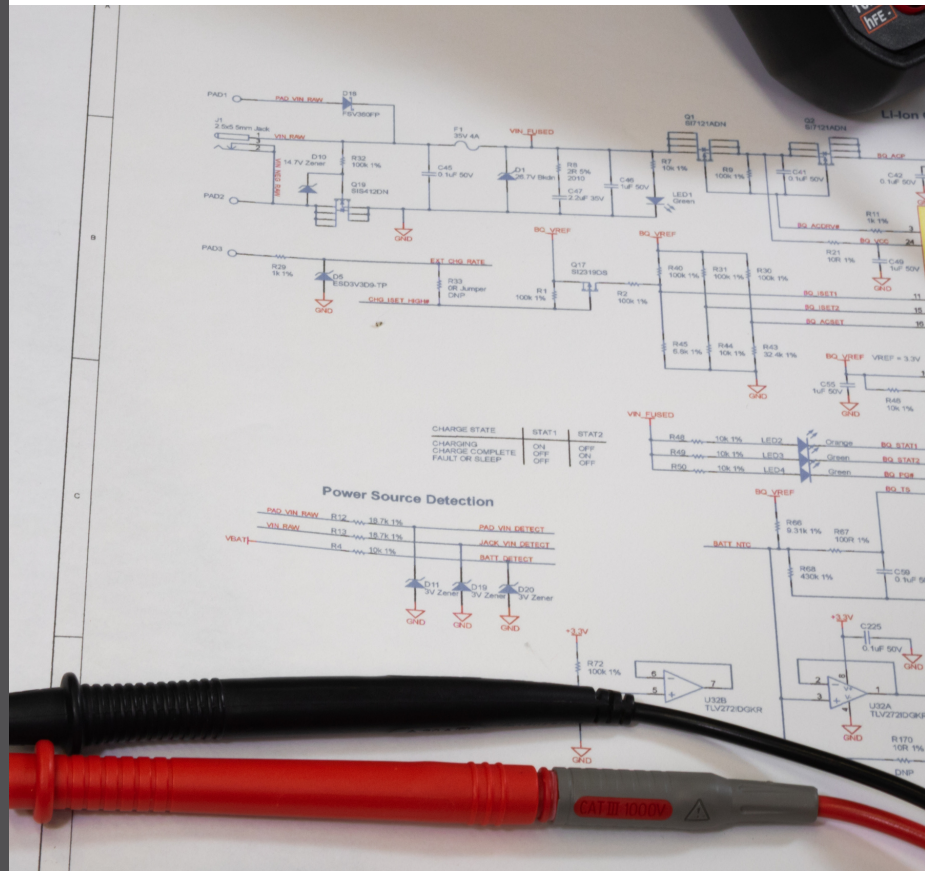
Safety and Regulatory
Compliance



Industry Alliance/
Consortium Group
Compliance of Electronic
Devices



Licensed &
Unlicensed Frequency
Bands Certification



RF WIRELESS RADIO CERTIFICATION SUMMARY

Certification requirements for electronic and electrical hardware devices are complex. Incorporating wireless modules that provide services like Bluetooth, Wi-Fi and/or GPS into your device can trigger additional considerations, such as those related to intellectual property. NeuronicWorks can help you determine which certifications & regulatory compliance approvals you will need to market your device and what you need to consider before incorporating modules like Bluetooth®, GPS and Wi-Fi into your device.

Receiving the group certification approval (your product will be listed on the group's online database) allows you to apply the mark and guarantees easy interoperability with other products on the same communication protocol. Without proper testing and certification, any interoperability problems are the manufacturers (aka. product owner) responsibility.

To book a free consultation with an experienced member of our Regulatory Standards and Certifications team, reach out to NeuronicWorks at info@neuronicworks.com

SAFETY CERTIFICATION OF ELECTRONIC DEVICES

In North America, your electronic or electrical hardware device likely requires safety certification, typically from a Certification Accredited Body or CAB, (i.e., UL LLC, CSA, NEMKO Canada, TUV SUD Canada, Intertek, etc.) to a published CSA/UL harmonized safety standard or ANSI/CAN/UL safety standard. These standards make reference to other CSA, UL, IEEE and/or ASTM published safety standards for sub-assemblies and components.

Regulatory Compliance of Electronic Devices

In North America, your electronic hardware device will also require a Supplier Declaration of Conformity for Electro Magnetic Compatibility (EMC), and if your hardware device incorporates one or more Wireless Radio protocol communication SoCs or modules, then US FCC and Canadian ISED regulatory compliance certification (use of non-certified SoC or module) or approval (use of pre-certified modules) is needed. These approvals/certifications are legally required by Federal Telecommunications authorities (ISED Canada, US FCC) and must be performed by ISED and FCC authorized accredited laboratories.

In the European Union and EEA (European Economic Area), self-certification with a signed, dated EU Declaration of Conformity is created by the device manufacturer's Regulatory Compliance Officer to the published EU Directives (Low Voltage, EMC, Radio Equipment, RoHS, WEEE) and the applicable harmonized standards, depending on the type of device, and what industries it will be sold. All testing to these standards should be performed by reputable laboratories ISO/IEC 17025:2017 accredited to the above standards.

The range of certifications and regulatory compliance requirements can vary depending on the function of your device and the markets where you want to sell. To get an appreciation of which certifications and/or approvals you may need to market your device, you can consult [this NeuronicWorks primer](#).

INDUSTRY ALLIANCE COMPLIANCE OF ELECTRONIC DEVICES

Hardware devices that incorporate unlicensed and/or licensed frequency band(s) wireless radio protocol SoCs or Modules will require one or more of the following qualification paths:

1. Industry Alliance or Consortium Group certification to carry the mark legally on their devices; this involves design review, testing by an authorized Group/Alliance testing laboratory for functionality per the latest group specification.
2. Industry Alliance or Consortium Group qualification/approval (no mark shown, but review of the hardware device design to ensure that there is no change/deviation of the Industry / Consortium group certified wireless radio protocol SoC or module functionality).

UNLICENSED FREQUENCY BANDS CERTIFICATION

a. Bluetooth

(Operation within the 2400–2483.5 MHz frequency band)

In order to use Bluetooth® in your design, you may need to qualify and declare your product through the Bluetooth Qualification and Declaration processes. Products must be qualified on or before the date you start selling or distributing the product. The Qualification process will help ensure that you're meeting the requirements of the Bluetooth Patent and Copyright Licensing Agreement as well as the Bluetooth Trademark License Agreement, and all other Bluetooth specifications. The use of Bluetooth in your device may also require you to certify/approve the device itself. Details can be found on [the Bluetooth® website](#).

b. GPS

(Operation within the 1164 – 1300 MHz and 1559 – 1610 MHz Frequency bands)

Unlike Bluetooth®, you can incorporate a GPS receiver that uses GPS satellite services into your device without needing to register or qualify for the use of GPS. There is no cost associated with the use of GPS data. The use of GPS modules in your device may however require you to certify/approve the device itself.

c. Wi-Fi

(Operation within the 2400–2483.5 MHz, and 5725–5850 MHz frequency bands)

Wi-Fi technology is based on the Institute of Electrical and Electronics (IEEE) wireless communication standard 802.11. Wi-Fi brands such as Wi-Fi® and Wi-Fi Direct® are trademarks owned by the Wi-Fi Alliance®. Many Wi-Fi identifiers can be used freely and are license-free; however, brands related to Wi-Fi Alliance certification marks are only available to members of the Wi-Fi Alliance and only for use on certified products. Information about the use of Wi-Fi brands and the Wi-Fi Alliance is available [here](#).

d. Sigfox (Star topology)

(Operation within the 902-928 MHz frequency band – USA/Canada or 868 – 873 MHz frequency band - Europe)

Sigfox technology is based on Short Range Device (SRD) ETSI EN radio standards. In addition to US FCC and Canadian FCC regulatory compliance, end products using Sigfox wireless chips or modules must have Sigfox consortium certification. Information about the Sigfox certification is available [here](#).

e. LoRaWAN (Star topology)

(Operation within the 902-928 MHz frequency band – USA/Canada or 868 – 873 MHz frequency band – Europe, and 2400–2483.5 MHz worldwide)

LoRaWAN technology is based on Short Range Device (SRD) ETSI EN radio standards; it is an official ITU-T Y.14480 standard. In addition to US FCC and Canadian FCC regulatory compliance, end products using LoRaWAN wireless chips or modules must have LoRa Alliance formal Certification (for official online LoRaWAN end-device recognition) or be tested (operates per the LoRaWAN standard). Information about the LoRa Alliance certification is available: [here](#)

f. Z-Wave (Mesh topology)

(Operation within the 902-928 MHz frequency band – USA/Canada or 868 –873 MHz frequency band - Europe)

Z-Wave technology is based on Short Range Device (SRD) ETSI EN radio standards. In addition to US FCC and Canadian FCC regulatory compliance, end products using Z-Wave wireless chips or modules must have Z-Wave Alliance certification. Information about the Z-Wave Alliance certification is available [here](#).

g. Zigbee (Mesh or Star topology)

(Operation within the 2400–2483.5 MHz frequency band)

Zigbee technology is based on the Institute of Electrical and Electronics (IEEE) wireless communication standard 802.15.4. In addition to US FCC and Canadian FCC regulatory compliance, end products using Zigbee wireless chips or modules must have Zigbee certification from the Connectivity Standards Alliance (CSA). Information about the Zigbee CSA certification is available: [here](#).

h. THREAD (Star topology IPv6 network-based)

(Operation within the 2400–2483.5 MHz frequency band)

THREAD technology is based on the Institute of Electrical and Electronics (IEEE) wireless communication 802.15.4 standard. In addition to US FCC and Canadian FCC regulatory compliance, end products using THREAD wireless radio chips or modules must have THREAD Group certification. Information about the THREAD group certification is available: [here](#).

NOTE:

1. Many of the above Industry Alliances or Consortium groups require annual paid memberships. For all wireless Radio Operation protocols above, the certification and testing must be done at each group's authorized or accredited test laboratories.
2. Recently, the Connectivity Standards Alliance (CSA) has released the Matter protocol, supported by manufacturers of Home Automation SoCs and Modules, that will bridge the LPWAN wireless communications protocols (Zigbee, Z-Wave) to network IP-based wireless communications protocols (THREAD, Wi-Fi, Bluetooth). A good FAQ on the Matter protocol is available from Silicon Labs: [here](#).

LICENSED FREQUENCY BANDS CERTIFICATION

Hardware devices that incorporate license frequency band protocol communication SoCs or Modules require US FCC and Canadian ISED regulatory compliance certification (use of non-certified SoC or module) or approval (use of pre-certified modules) prior to Industry/Consortium group certification. In North America, all electronic devices incorporating cellular communication must pass Mobile Network Operator (MNO) industry certification (PTCRB) and mobile network operator certification (Canada: Rogers, TELUS, Bell Mobility; USA: AT&T, T-Mobile and /or Verizon). These additional tests must be performed at PTCRB and MNO-authorized test laboratories.

- 4G LTE and/or 5G NR cellular (person-to-server data, person-to-person voice and/or data communication, 3GPP Category 1 to Category 12)

Each cellular network provider only uses specific 4G LTE E-UTRA FDD, SDL or TDD duplex mode frequency bands and/or 5G NR (New Radio) FDD, SDL or TDD duplex mode) Frequency Range 1 bands; you should ensure that your FCC, ISED and PTCRB-certified cellular module operates in the bands for each cellular network provider that your customers may use.

- 4G LTE Cat M1, 4G LTE Cat M2 or 4G LTE Cat NB1/NB2 Machine to Machine - M2M data communication, 3GPP Category M1, M2 - high data rate or 3GPP Category NB1, NB2 – low data rate)

Each cellular network provider only uses specific 4G LTE E-UTRA (FDD, SDL or TDD duplex mode) frequency bands; you should ensure that your FCC, ISED and PTCRB-certified cellular module operate in the bands for each cellular network provider that your customers may use.

To obtain details on the above-licensed frequency band cellular data communications protocol:

1. 4G LTE E-UTRA licensed spectrum frequency bands are active or obsolete, and which licensed spectrum frequency bands are used by worldwide cellular network providers: [LTE frequency bands - Wikipedia](#)
2. 5G NR licensed spectrum frequency bands that are currently active: [5G NR frequency bands - Wikipedia](#)

The range of Wireless Radio Operation certifications and approvals can vary depending on the function of your device and the regions where you want to sell your device. To get an appreciation of the frequency bands, data rates, range, power usage and network topology, and the applicable Industry/ Alliance group or Consortium certification you may need to market your device, you can consult [this NeuronicWorks primer](#).

To book a free consultation with an experienced member of our Regulatory Standards and Certifications team, reach out to NeuronicWorks at info@neuronicworks.com



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