

ISP4520

Application note AN200201



ISP4520 – LoRa WAN Global Coverage, Regulation, and Regional Parameters

Introduction

Scope

This document is aimed to give an overview of the differences between the different ISP4520 product variants, and which territories they can be used in. It also gives a brief overview of radio certification and regulation, and LoRaWAN regional parameters.

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Revision History

Revision	Date	Ref	Change Description
R0	13/02/2020	nw pg	Preliminary release
R1	09/05/2022	pd pg	Document layout update

1. Overview

LoRa WAN operates in unlicensed spectrum (ISM Bands), meaning that – subject to meeting basic wireless regulatory requirement – no licence or payment is needed to operate devices.

Unfortunately, the bands permitted for use, and the other limitations (duty cycles, output power rules etc) vary from country to country, so a solution must be configured for the zone it will be used in.

The ISP4520 is designed to be used in the upper ISM Bands, meaning those in the region 800 – 900 Mhz). There are also lower ISM bands (around 400 – 500 Mhz), but the ISP4520 is not designed to use those bands.

2. Regulation and Regional Parameters

It is important to distinguish between the legal regulation of radio devices, and the regional parameters for LoRa WAN operation.

Regulation is defined by each country (or in the case of the European Union, at EU level), and this defines what a radio device is allowed to do, in terms of what frequency bands can be used, what is maximum output power permitted and so on. Normally, Radio devices must be certified by the relevant national body (e.g. The FCC – Federal Communications Commission for the United States). ISP devices are pre-certified in key territories for the electronics market.

LoRaWAN regional parameters are based on and consistent with national regulation, but also define such things as which precise bands will be used to listen on for network join requests, preamble codes and other more detailed protocol definition elements. Parameter sets can be loaded onto ISP devices to support a specific country. LoRa WAN regional parameters are defined by the LoRa Alliance, and available on the LoRa Alliance Resource Hub <https://lora-alliance.org/resource-hub>. However, there is no legal obligation to follow requirements that go above and beyond national regulation, for a private solution.

3. Key Regions and matching products

There are currently three variations of the ISP4520, aimed at different markets. The key differences between the products are

- ✚ The central frequency band that they are tuned for
- ✚ The output power that they are capable of

The more minor regulatory differences (precise bands permitted, duty cycle etc) are accommodated by software configuration.

3.1. ISP4520-EU

This product is tuned to operate over a frequency range of 853 - 883 Mhz. As the suffix indicates, it is designed to meet the requirements of EU regulation, which is common across all **European Union** countries, and it is certified to meet European regulations.

However, the same product can also be used to cover **India, Russia** and most of the **Middle East** and **Africa**, as these territories use bands the same as or similar/overlapping with the EU bands. The product is not however pre-certified for these territories.

3.2. ISP4520-US

This product is tuned to operate over the frequency range 900 - 930 Mhz. It is designed to meet the requirements of United States regulation and is certified to meet US FCC regulations. It uses a different Semtech LoRa chip to the other variants (SX1262, as opposed to SX1261), as this version has an integrated power amplifier supporting +22 dBm output power, which is permitted in the **United States**, but generally not elsewhere (+14 dBm being more typically the limit elsewhere).

The same product can be used for **Canada** and most of **South America**.

3.3. ISP4520-AS

This product is tuned to the same 900 - 930 Mhz frequency range as the US variant but uses the SX1261 with +14 dBm output power. It is designed to be used in Asia-Pacific countries and is certified for the **Japanese** market. Most Asia-Pacific countries – **Japan, Korea, Taiwan, Australia** and many others use marginally different bands around the same frequency for which the ISP4520-AS is also adapted.

However, **China** uses a unique 779 Mhz frequency band and Insight SiP does NOT have a product that supports the Chinese market.

4. Summary and Conclusion

With the ISP4520 family, Insight SiP has products that are certified and adapted to the US, EU and Japanese markets. The relevant variant can be used in those countries without issue.

The products are also functionally capable of supporting the regulatory requirements of operation in practically every country in the world (excluding Mainland China); however, they are not certified outside the above countries, and therefore customers would need to certify their products for the relevant territories they wanted to deploy them in..

For any territory outside of the United States, European Union or Japan, we would advise customers to familiarise themselves with the national regulation and any defined LoRaWAN regional parameters (if required) in order to define their solution.