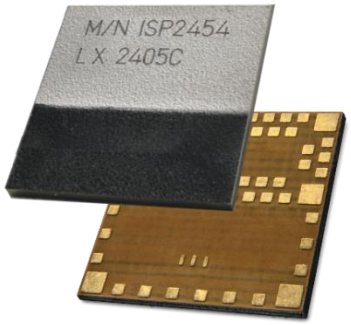
# ISP2454
## Data Sheet

# Bluetooth 6.0 Low Energy Module
### Supporting Mesh, NFC
### With built-in MCU & Antenna

This ultra-small LGA module, 8 x 8 x 1 mm, is based on the nRF54L15 Chip. Its powerful Cortex™ M33 with TrustZone technology CPU, 1524 KB nonvolatile memory (RRAM) and 256 KB memory RAM combined with an optimized antenna offers the perfect solution for Bluetooth connectivity. The solution is best in class for RF performance and low power consumption. Multiple digital and analogue interfaces give optimum flexibility for sensor integration.




## Key Features

- Multi-protocol 2.4GHz Ultra Low Power
- Bluetooth 6.0 & Mesh
- 2.4 GHz proprietary protocol
- NFC-A Tag for OOB pairing in option
- RF Transceiver based on Nordic Semiconductor nRF54L15
- PSA Certified Level 3
- Fully integrated RF matching and Antenna
- Integrated 32 MHz. 32 kHz Clock (option)
- 4MB Flash Memory (option)
- DC/DC converter with load circuit
- ARM Cortex M33 with TrustZone technology
- 1524 KB nonvolatile memory (RRAM) and 256 KB memory RAM
- Up to 32 GPIOs
- Interfaces SPI, QSPI, I2C, I2S, UART, PWM, PDM
- Single 1.7 to 3.6 V supply
- Very small size 8.0 x 8.0 x 1 mm
- Temperature -40 to +105 °C

## Applications

- Connected sensors for medical devices, healthcare, sport, fitness, industrial ...
- IoT applications, connected objects
- Wearable technology
- Home automation
- Beacons

## Certifications

- Bluetooth SIG
- CSA Matter and Thread
- CE
- FCC, IC
- TELEC
- RoHS, Reach & POP compliant
- Conflict Mineral Declaration
- Cyber Resilience Act Declaration

## Document Revision History

| Revision | Date | Ref | Change Description |
|---|---|---|---|
| R0 | 09/08/2024 | er pg | Preliminary release |
| R1 | 11/03/2025 | bh pg | Update based on information of Nordic datasheet v0.8 |
| R2 | 05/06/2025 | cr pg | Certification update |
| R3 | 07/11/2025 | cr bh pg | Moisture sensitivity recommendation update, Tape and Reel update to indicate feed direction of the reel and position of modules within the reel. 32.768 kHz Crystal configuration note added. Certification and marking updated. Pin description updated for Pin 20 and Pin 22. Quality and User information updated. |
| R4 | 21/11/2025 | cr | Pin description updated for Pin 20 and Pin 22. Schematic updated |
| R5 | 17/12/2025 | cr pg | Updated Block Diagram and Schematic<br>Pin description updated<br>Added module variant with 32kHz Xtal + 4MB flash memory options |

## Contents

## 1. Block Diagram & Features

This module is based on nRF54L15 Nordic Semiconductor 2.4GHz wireless System on Chip (SoC) integrating a 2.4 GHz transceiver, an ARM Cortex -M33 with TrustZone technology, RRAM and RAM memory, analog and digital peripherals.

It can support BLE, Mesh and a range of proprietary 2.4 GHz protocols. Fully qualified stacks for nRF54L15 are freely available for operating in Central role, Peripheral role, Scanning and Advertising.

The Cyber Resilience Act (CRA) is embodied in the EU regulation 2024/2847. ISP2454 rely on microprocessors that have been designed with Platform Security Architecture (PSA) certification in mind. It is certified to PSA Level 3. This level of platform security reduces the risks of vulnerabilities occurring.

Ultra-low power consumption and advanced power management enable battery lifetimes up to several years on a coin cell battery. Even though its very small size 8 x 8 x 1 mm, the module integrates, in addition to the wireless SoC, all required decoupling and load capacitors, DC-DC converter, 32 MHz crystal, 32.768 kHz crystal (option), 4MB flash memory (option), RF matching circuit and antenna.

The ISP2454 is available in 3 different versions:

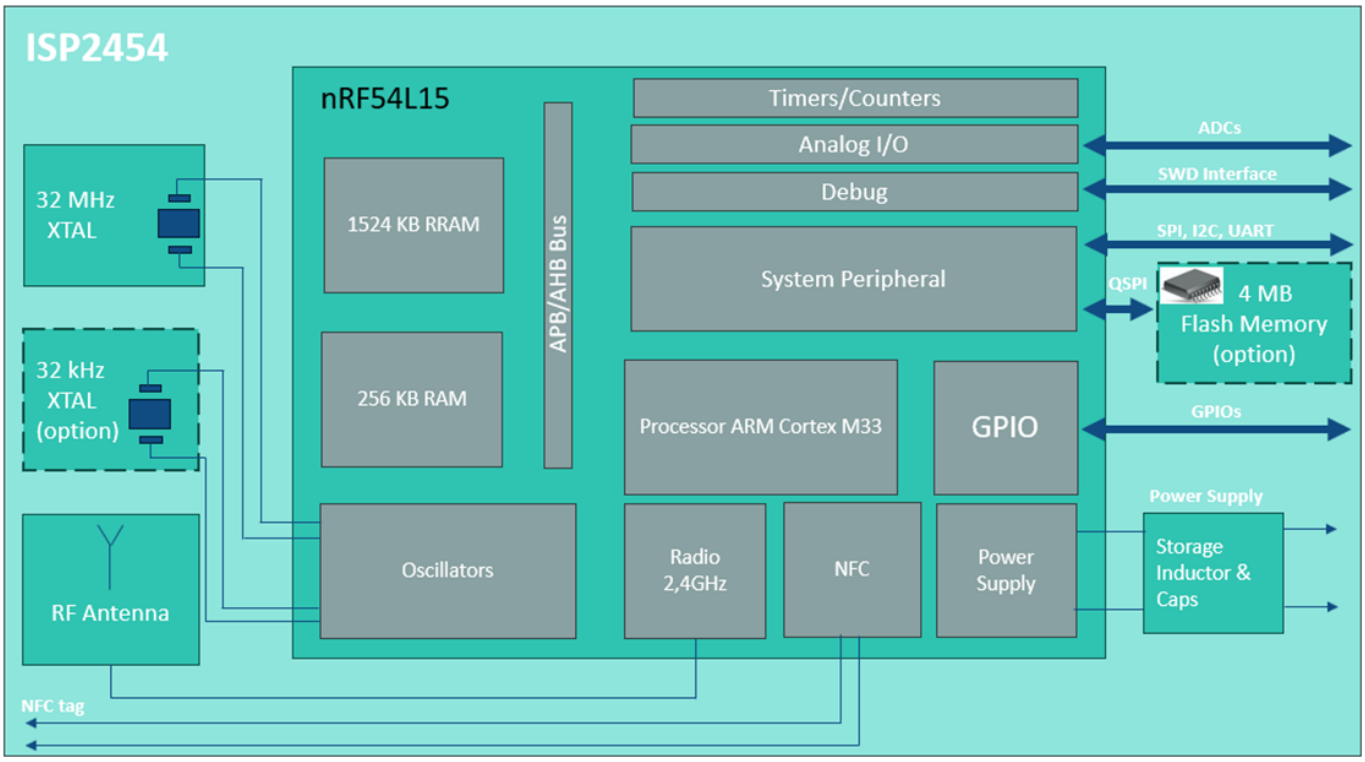
- **ISP2454-LL** provides only the 32 MHz crystal, without the 32.768 kHz crystal and without the 4MB flash memory, especially suited for application that does not require the best energy savings.

- **ISP2454-LX** provides the 2 crystals at 32 MHz and 32.768 kHz, but does not provide the 4MB flash memory.

- **ISP2454-LP** provides the 2 crystals at 32 MHz and 32.768 kHz and the 4MB flash memory, especially suited for application that requires larger memory size like Matter for instance.

Only the addition of a suitable DC power source is necessary for module connectivity. Sensor applications require the further addition of appropriate sensors. The antenna was designed to be optimized with several standard ground plane sizes. When NFC function is available, the NFC tag antenna can be connected externally.

## Block diagram



# 2. Specifications

## 2.1. General Notice

The electrical specifications of the module are directly related to the Nordic Semiconductor specifications for nRF54L15 chipset. Below information is only a summary of the main parameters. For more detailed information, especially about current consumption, please refer to the up-to-date specification of the chipset available on Nordic Semi website.

Note that the current Nordic Semi datasheet is preliminary and many parameters are still TBD - to be defined: https://www.nordicsemi.com/Products/nRF54L15

## 2.2. Absolute Maximum Ratings

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Supply Voltage respect to ground - VCC | -0.3 | | 3.6 | V |
| IO Pin Voltage VIO VCC ≤3.5V | -0.3 | | VCC+0.3 | V |
| IO Pin Voltage VIO VCC >3.5V | | | 3.6 | V |
| Maximum received signal strength at < 0.1% PER | | | 0 | dBm |
| NFC Antenna pin current | | | 130 | mA |
| Module Total Capacity | | | 11.2 | µF |
| Module Total Inductance | | | 5.3 | µH |
| Storage Temperature | -40 | | 105 | °C |
| Moisture Sensitivity Level | | | 2 | - |
| ESD Human Body Model | | | 1 | kV |
| ESD Charged Device Model | | | 500 | V |
| Flash Endurance | 10000 | | | Cycles |
| Retention at 85°C | 10 | | | years |
| Retention at 105°C | 2 | | | years |

**ATTENTION**

CONSERVE PRECAUTION FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES
Human Body Model Class 3A

## 2.3. Operating Conditions

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Operating Supply Voltage, independent of DCDC enable | 1.7 | | 3.6 | V |
| Extended Industrial Operating Temperature Range | -40 | +25 | +105 | °C |

## 2.4. Power Consumption

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| RX only run current, 1 Mbps/1 Mbps Bluetooth LE mode (1) | | 3.3 | | mA |
| TX current, Transmitter active 0 dBm Output Power (2) | | 3.7 | | mA |
| TX current, Transmitter active -4 dBm Output Power (2) | | 2.8 | | mA |
| TX current, Transmitter active -8 dBm Output Power (2) | | 2.2 | | mA |
| TX current, Transmitter active -12 dBm Output Power (2) | | 1.9 | | mA |
| TX current, Transmitter active -16 dBm Output Power (2) | | 1.7 | | mA |
| TX current, Transmitter active -40 dBm Output Power (2) | | 1.2 | | mA |
| System OFF, no RAM retention, wake on Pin | | 0.6 | | µA |
| System ON, 64 KB RAM retention, wake on Pin | | 1.3 | | µA |
| System OFF, GRTC and LFXO active, no RAM retention, wake on Pin | | 0.8 | | µA |
| System ON, GRTC and LFXO active, 64 KB RAM retention, wake on Pin | | 1.5 | | µA |
| Additional RAM retention current per 64 KB block | | 600 | | nA |

*(1) DCDC enable, Power supply 3V, 1 Mbps*
*(2) DCDC enable, Power supply 3V*

## 2.5. Clock Sources

| Reference clocks | Max | Unit |
|---|---|---|
| Internal High Frequency Clock for RF Stability:<br>32 MHz Crystal Frequency Tolerance *(1)* | +/- 40 | ppm |
| Internal Low Frequency Clock for BLE Synchronization:<br>32.768 kHz Crystal Frequency Tolerance *(see note 2 for internal capacitance recommended value)* | +/- 20 | ppm |
| Internal Low Frequency Clock for BLE Synchronization:<br>RC Oscillator *(3)* | +/- 40 | ppm |

**(1)** *Including initial tolerance, drift, aging, and frequency pulling*

**(2)** *We recommend changing the internal default capacitance value by the 19pF updated value:*

*The intention is that you set the value in the devicetree overlay file, e.g. you can find in:*
*\zephyr\boards\nordic\nrf54l15dk\nrf54l_05_10_15_cpuapp_common.dtsi*
*And*
*\zephyr\boards\nordic\nrf54l15dk\nrf54l15dk_nrf54l15_cpuapp.dts*

```
&lfxo {
load-capacitors = "internal";
load-capacitance-femtofarad = <19000>;   /* enter this
value
};
```

*From the following file you can find the possible configurations:*
*\zephyr\dts\bindings\clock\nordic,nrf54l-lfxo.yaml*

```
load-capacitance-femtofarad:
  type: int
  enum:
    - 4000
    - 4500
    - 5000
    .............
      - 18000
      - 19000    /* add this value
  description: |
    Load capacitance in femtofarads. This property is only used
when
    load-capacitors is set to "internal".
```

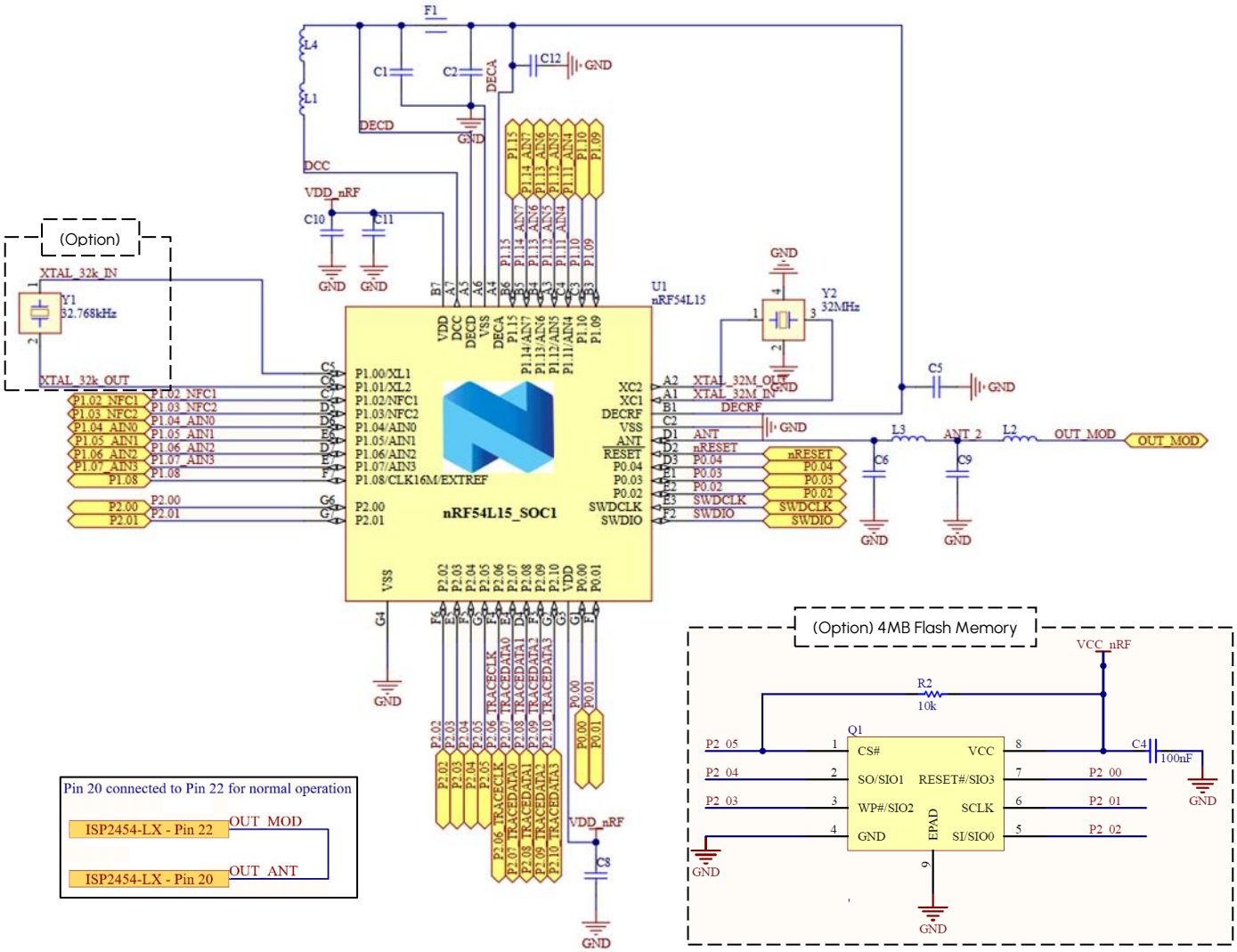
*Change it there, recompile the project, flash the updated project and reset the board.*

**(3)** *Frequency tolerance after calibration assuming frequent calibration*

## 2.6. Radio Specifications

| Transmit Frequency Error | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Frequency Range | 2402 | | 2480 | Mhz |
| Channel 0 to 39 Spacing | | 2 | | Mhz |
| Output Power Channels 0 to 39 | -8 | | +8 | dBm |
| Rx sensitivity Level for BER <0,1% ideal Tx | -98 | | | dBm |
| Antenna Gain | | 0.6 | | dBi |
| EIRP | -7.4 | | 8.6 | dBm |
| Range Open field @1m height 1Mbps no coding | | 60 | | m |
| Data Rate | 1000 / 2000 / 500 and 125 | | | kbps |

## 2.7. Electrical Schematic



## 3. Pin Description

The module uses an LGA format with a double row of pads on a 0.65 mm pitch.
Not Connected pads must be connected to isolated metal pads on the application PCB.
Not Applicable pads are not available in the related module variant.

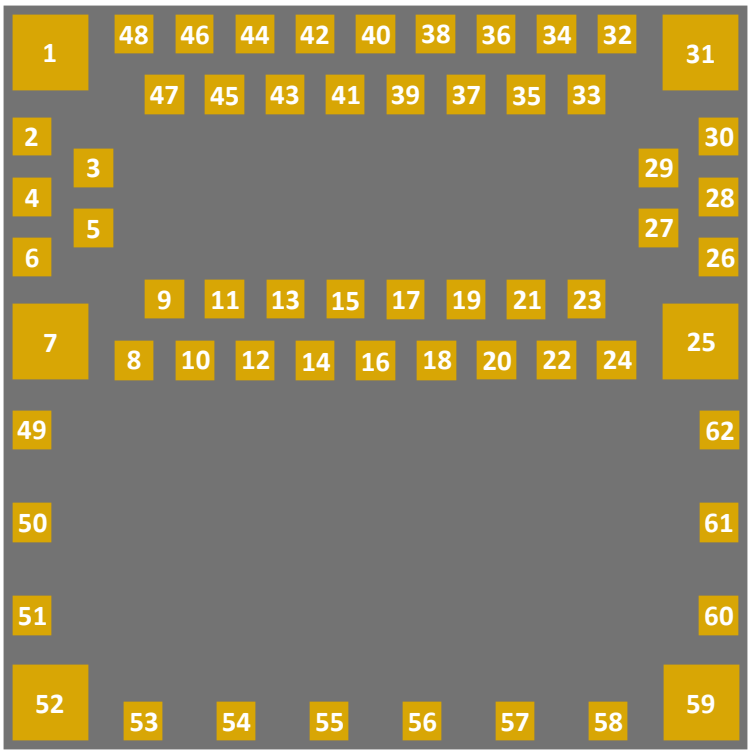
The pinout is the same for versions **ISP2454-LL** and **ISP2454-LX** which do not integrate the optional 4 MB flash memory.

For version **ISP2454-LP** integrating the 4 MB flash memory, several IOs from port P2 are no more available since they are connected to the internal memory.

| Pin | Type | ISP2454-LL, ISP2454-LX variants | ISP2454-LP variant |
|---|---|---|---|
| 1 | Ground | VSS | VSS |
| 2 | General purpose I/O<br>NFC Antenna Connection | P1.02_NFC1 | P1.02_NFC1 |
| 3 | General purpose I/O | P2.03 | *Not Connected* |
| 4 | General purpose I/O<br>NFC Antenna Connection | P1.03_NFC2 | P1.03_NFC2 |
| 5 | General purpose I/O<br>Trace port output | P2.10_TRACEDATA3 | P2.10_TRACEDATA3 |
| 6 | General purpose I/O | P2.01 | *Not Connected* |
| 7 | Ground | VSS | VSS |
| 8 | Ground | VSS | VSS |
| 9 | General purpose I/O<br>Trace port output | P2.08_TRACEDATA1 | P2.08_TRACEDATA1 |
| 10 | General purpose I/O | P1.10 | P1.10 |
| 11 | General purpose I/O<br>Trace port output | P2.07_TRACEDATA0 | P2.07_TRACEDATA0 |
| 12 | Ground | VSS | VSS |
| 13 | Pin Reset | nRESET | nRESET |
| 14 | Ground | VSS | VSS |
| 15 | General purpose I/O<br>Trace port clock output | P2.06_TRACECLK | P2.06_TRACECLK |
| 16 | Ground | VSS | VSS |
| 17 | General purpose I/O | P1.15 | P1.15 |
| 18 | Ground | VSS | VSS |
| 19 | General purpose I/O | P1.08 | P1.08 |
| 20 | This pin is connected to the internal antenna. It should be connected to Pin 22 OUT_MOD for normal operation | OUT_ANT | OUT_ANT |
| 21 | Ground | VSS | VSS |

| Pin | Type | ISP2454-LL, ISP2454-LX variants | ISP2454-LP variant |
|---|---|---|---|
| 22 | This pin is the RF I/O pin of the BLE module. It should be connected to Pin 20 OUT_ANT for normal operation | OUT_MOD | OUT_MOD |
| 23 | Ground | VSS | VSS |
| 24 | Ground | VSS | VSS |
| 25 | Ground | VSS | VSS |
| 26 | Power supply (1.7 – 3.6V) | VDD_nRF | VDD_nRF |
| 27 | General purpose I/O | P0.01 | P0.01 |
| 28 | Serial Wire Debug I/O | SWDIO | SWDIO |
| 29 | General purpose I/O | P0.00 | P0.00 |
| 30 | Serial Wire Debug Clock Input | SWDCLK | SWDCLK |
| 31 | Ground | VSS | VSS |
| 32 | General purpose I/O | P0.02 | P0.02 |
| 33 | General purpose I/O | P0.04 | P0.04 |
| 34 | General purpose I/O | P0.03 | P0.03 |
| 35 | General purpose I/O<br>Analog input | P1.06_AIN2 | P1.06_AIN2 |
| 36 | General purpose I/O<br>Analog input | P1.07_AIN3 | P1.07_AIN3 |
| 37 | General purpose I/O<br>Trace port output | P2.09_TRACEDATA2 | P2.09_TRACEDATA2 |
| 38 | General purpose I/O<br>Analog input | P1.05_AIN1 | P1.05_AIN1 |
| 39 | General purpose I/O | P1.09 | P1.09 |
| 40 | General purpose I/O<br>Analog input | P1.04_AIN0 | P1.04_AIN0 |
| 41 | General purpose I/O<br>Analog input | P1.13_AIN6 | P1.13_AIN6 |
| 42 | General purpose I/O | P2.05 | *Not Connected* |
| 43 | General purpose I/O<br>Analog input | P1.12_AIN5 | P1.12_AIN5 |
| 44 | General purpose I/O | P2.04 | *Not Connected* |
| 45 | General purpose I/O<br>Analog input | P1.14_AIN7 | P1.14_AIN7 |
| 46 | General purpose I/O | P2.02 | *Not Connected* |
| 47 | General purpose I/O | P2.00 | *Not Connected* |
| 48 | General purpose I/O<br>Analog input | P1.11_AIN4 | P1.11_AIN4 |
| 49-62 | Mechanical Pads | *Not Connected* | *Not Connected* |

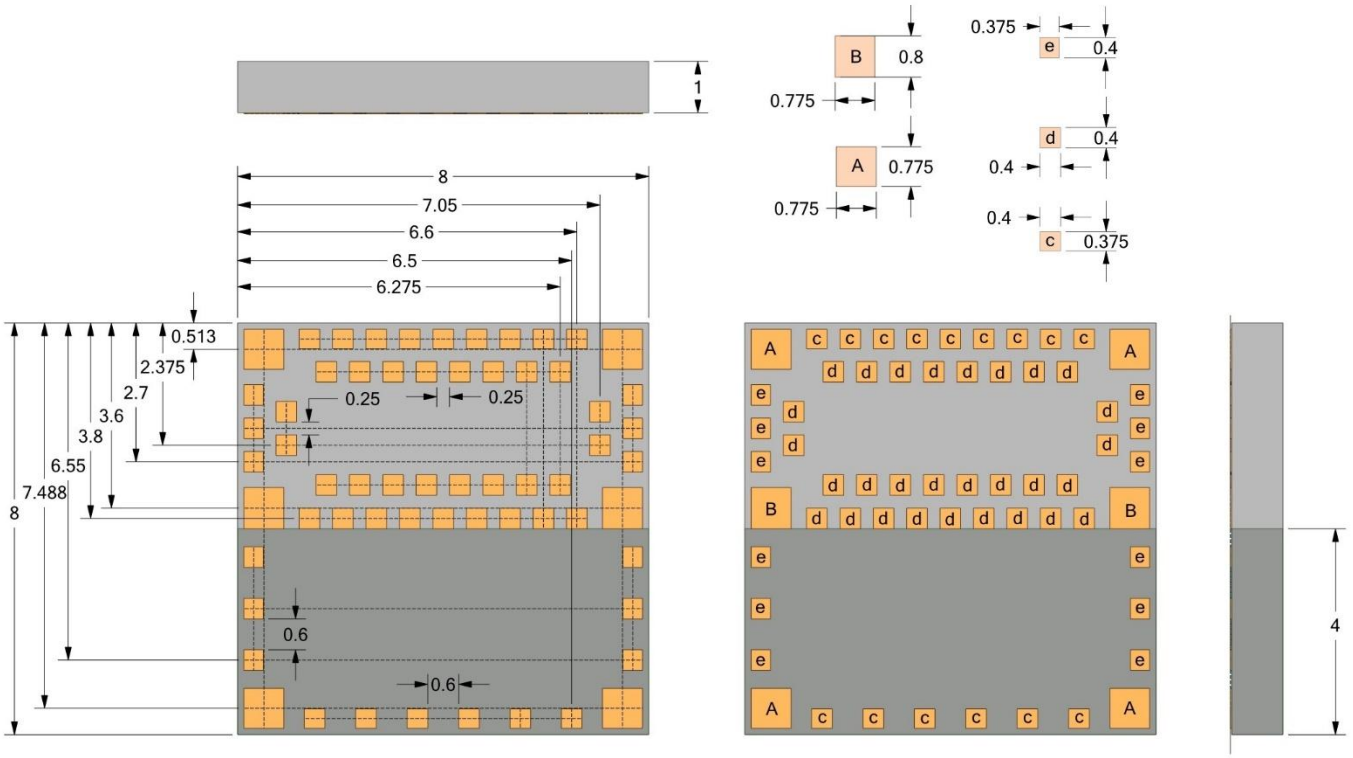
## ISP2454 Pinout Top View



# 4. Mechanical Outlines

## 4.1. Mechanical Dimensions

### Dimensional drawing for 8 x 8 x 1 mm, 62-Pad LGA Package




Dimensions in mm
Tolerance : +/- 0.03 mm

## 4.2. SMT Assembly Guidelines

For PCB Land Patterns and Solder Mask layout, Insight SiP recommends using the same dimensions as module pads.

For implementations in which most or all of the inner pads are used Insight SiP recommends the use of capped vias placed in the center of each pad.

For standard PCB types (no micro vias - all vias are top to bottom): we use nominal 0.4mm catch pads with 0.2mm vias. The vias should be plugged and capped to avoid solder wicking.

For HDI PCB types having micro vias on a layer-by-layer basis: we use 0.25mm catch pads and 0.1mm copper filled laser vias. Ideally the via is centered in the pad.

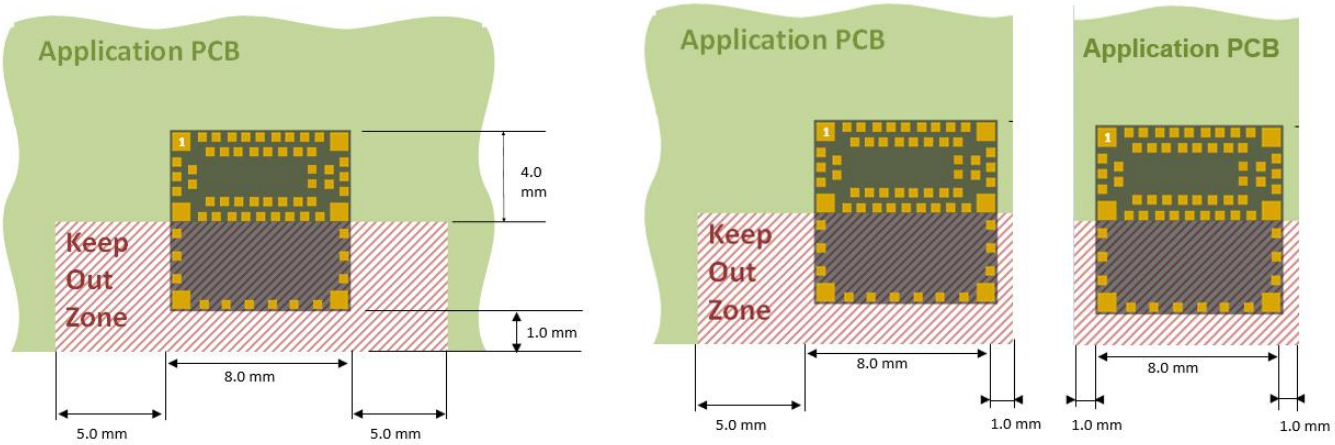
For reduced pinout implementations we recommend using external pads only. The use of a small number of internal pads can be accommodated by placing normal vias in the center of the device. In this case only the required pads should be Solder Mask opened and the vias tented with solder mask to prevent short circuits.

Please contact Insight SiP for more detailed information.

### 4.3. Antenna Keep-Out Zone

For optimal antenna performance, the module should be placed 1 mm from the PCB edge. And it is recommended to respect a metal exclusion zone to the edge of the board: no metal, no traces and no components on any application PCB layer except mechanical LGA pads.

When the module is placed on a large PCB dimension, 5mm lateral keep out zone is recommended. But when the PCB size is smaller, it is possible to place the module in either corner and reduce the lateral keep out zone as described below.



# 5. Product Development Tools

## 5.1. Hardware

In order to assist clients in developing their Bluetooth Smart solutions based on the ISP2454, Insight SIP offers an Evaluation Board containing:

- One Interface Board with an integrated Segger J-Link.
- One Test Board

Using this evaluation board, product developers have a working solution as a starting point to develop their own products. Time to market is saved by avoiding starting from a blank sheet of paper.

## 5.2. Firmware

ISP2454 uses the nRFConnect SDK from Nordic Semiconductor running zephyr RTOS.
The SDK supplies examples and is an ideal starting point for firmware development.
More information can be found on Nordic Semiconductor website.

## 5.3. Development Tools

The following development tools and software are recommended for using and testing ISP2454 module:

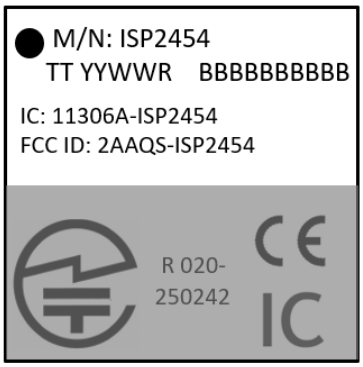
- nRFConnect SDK
- Microsoft Visual Studio Code.

# 6. Package & Ordering Information

## 6.1. Marking

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | /N | : | I | S | P | 2 | 4 | 5 | 4 | | | | | | | | |
| T | T | | Y | Y | W | W | R | | B | B | B | B | B | B | B | B | B |

| | |
|---|---|
| ISP2454 | Part Number |
| TT | 2 letters Module Version |
| YY | 2 digits year number |
| WW | 2 digits week number |
| R | 1 letter Hardware revision |
| BBBBBBBBBB | 10 caracters Build code |



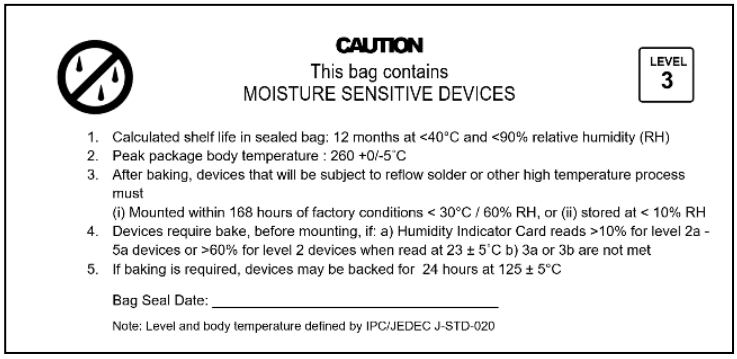

Certification labels for CE, FCC, IC and Telec are printed directly on the module when applicable.

## 6.2. Package Labelling

A label indicating the Module Part Number, Quantity, Date Code, Lot Code and Country of Origin is applied to the bag, the reel and the box, whichever is applicable.

Information is available with bar code 1D according to Code 39 and bar code 2D according to Data Matrix ECC 200 from ECIA standard.


A second label on the bag is present to indicate the MSL level and packaging date.



## 6.3. Prototype Packaging

For engineering samples and prototype quantities up to 99 units, deliveries are provided in thermoformed trays.

They are delivered in vacuumed sealed pack with desiccant pack and humidity sensors. Please see section 7.2 for more information on moisture sensitivity.

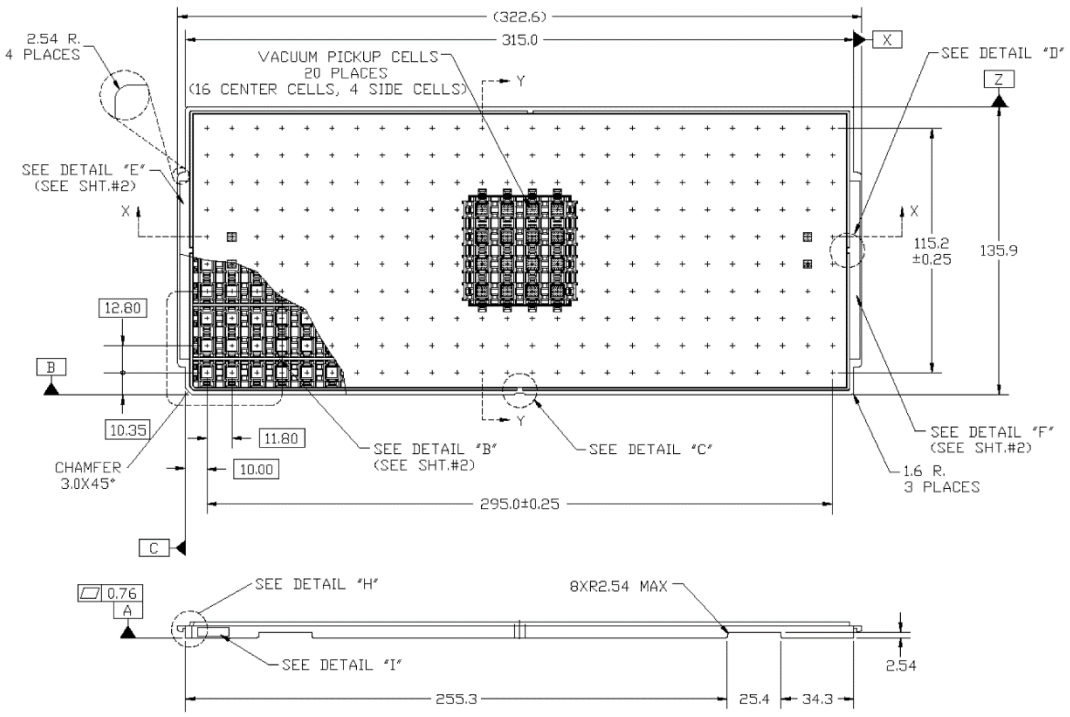
Please order with "ST" code packaging suffix.

## 6.4. Jedec Trays

For pre-production volumes, ISP2454 are available in Jedec trays.

They are delivered in vacuumed sealed pack with desiccant pack and humidity sensors. These Jedec trays are also suitable for further baking at 125°C. Please see section 7.2 for more information on moisture sensitivity. Please order with "JT" code packaging suffix.

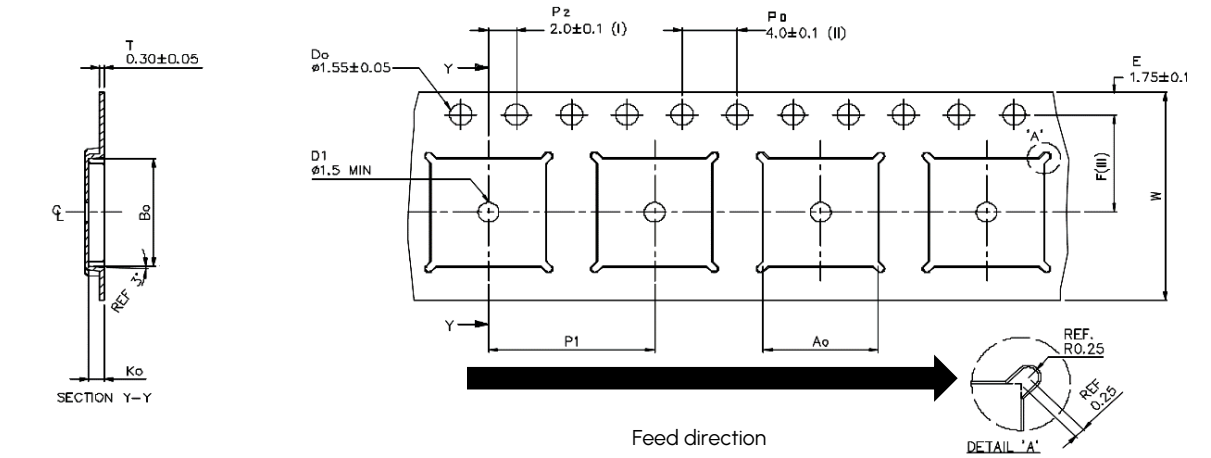
Refer to tray sizes below. Complete information on Jedec trays is available on request.



## 6.5. Tape and Reel

ISP2454 are also available in Tape & Reel. They are delivered in vacuumed sealed pack with desiccant pack and humidity sensors. Reels are proposed in standard quantities of 500 units (180mm / 7" reel). Please order with "RS" code packaging suffix for 500-unit reel.

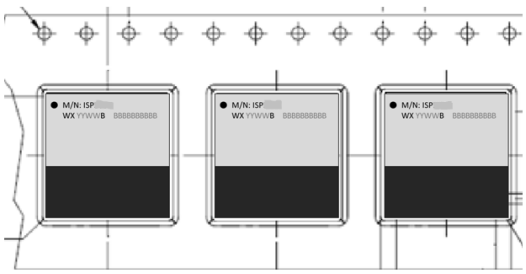
This packaging is not suitable for high temperature baking.




| | |
|---|---|
| Ao | 8.30 +/−0.1 |
| Bo | 8.30 +/−0.1 |
| Ko | 1.10 +/−0.1 |
| F | 7.50 +/−0.1 |
| P1 | 12.00 +/−0.1 |
| W | 16.00 +/−0.3 |

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



*Top view position of modules within the reel.*

Reels are packed in a box of approximately 220 x 220 x 50 mm.



## 6.6. Ordering Information

| | | | |
|---|---|---|---|
| ISP2454 | | | Part Number |
| | - LL | | Version without 32kHz crystal and without 4MB memory |
| | - LX | | Version with 32kHz crystal and without 4MB memory |
| | - LP | | Version with 32kHz crystal and with 4MB memory |
| | | - EB | Evaluation Board |
| | | - TB | Test board |
| | | - ST | Standard Tray |
| | | - JT | Jedec Tray Packaging |
| | | - RS | Reel of 500 units |

# 7. Storage and Soldering Information

## 7.1. Storage and Handling

- Keep this product away from other high frequency devices which may interfere with operation such as other transmitters and devices generating high frequencies.
- Do not expose the module to the following conditions:
  - Corrosive gasses such as Cl2, H2S, NH3, SO2, or NOX
  - Extreme humidity or salty air
  - Prolonged exposure to direct Sunlight
  - Temperatures beyond those specified for storage
- Do not apply mechanical stress.
- Do not drop or shock the module.
- Avoid static electricity, ESD and high voltage as these may damage the module.

**ATTENTION**

CONSERVE PRECAUTION FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

## 7.2. Moisture Sensitivity

ISP2454 has been tested MSL-3 according to standards

All plastic packages absorb moisture. During typical solder reflow operations when SMDs are mounted onto a PCB, the entire PCB and device population are exposed to a rapid change in ambient temperature. Any absorbed moisture is quickly turned into superheated steam. This sudden change in vapor pressure can cause the package to swell. If the pressure exerted exceeds the flexural strength of the plastic mold compound, then it is possible to crack the package. Even if the package does not crack, interfacial delamination can occur.

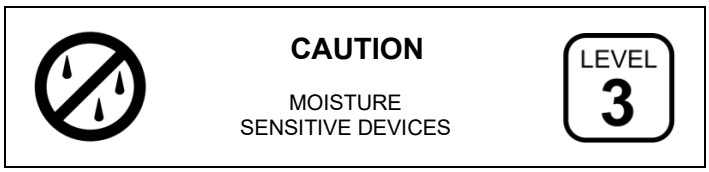
To prevent such failures, baking is mandatory before assembly under the following conditions (per JEDEC standards J-STD-033 and J-STD-020):

- The vacuum-sealed moisture barrier bag has been stored for more than 12 months from the date of sealing.
- The moisture barrier bag seems to be damaged or the humidity indicator card shows humidity levels above the acceptable threshold.
- The bag has been opened, and the components have been exposed to ambient conditions (approximately <=30°C/60% RH) for more than 168 hours.

In case one the above condition is true, please follow the baking instructions below before assembly:

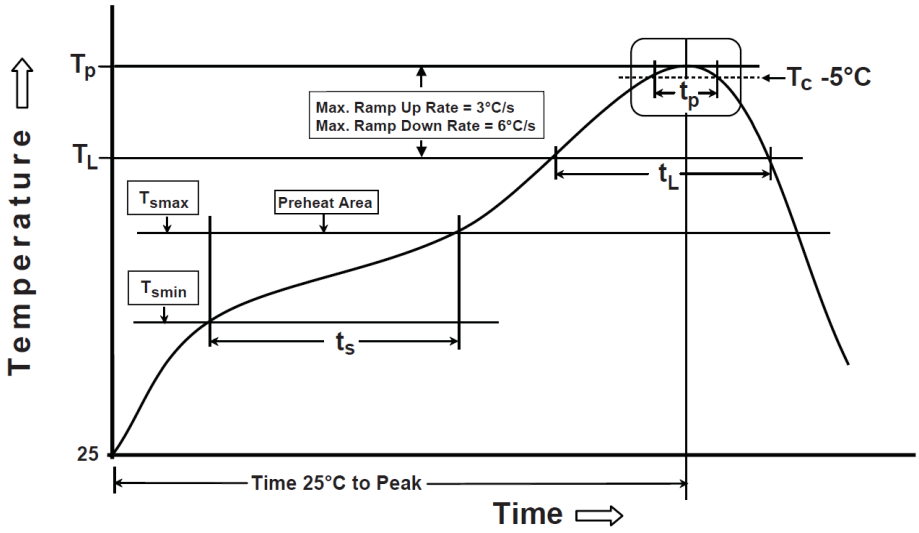
- Remove the modules from the reels, place them in trays or plates capable of withstand elevated temperatures
- Bake them at 125°C for 24 hours (Minimum required bake time for MSL3 components with 1 mm thickness before assembling is 8 hours according to JEDEC J-STD-033D in table 4-1)

After baking, modules can be handled at room conditions (approximately <=30°C/60% RH) for up to 168 hours before assembly.




## 7.3. Soldering information

Recommendation for RoHS reflow process is according to Jedec J–STD-020 and 033 standard profiles.




| | |
|---|---|
| Preheat/Soak<br>Temperature Min ($T_{smin}$)<br>Temperature Max ($T_{smax}$)<br>Time ($t_s$) from ($T_{smin}$ to $T_{smax}$) | <br>150 °C<br>200 °C<br>60-120 sec |
| Ramp-up rate ($T_L$ to $T_p$) | 3 °C/sec max |
| Liquidous temperature ($T_L$)<br>Time ($t_L$) maintained above $T_L$ | 217 °C<br>60-150 sec |

| | |
|---|---|
| Peak package body temperature ($T_p$) | 260°C<br>(+0/-5°C) |
| Classification Temperature ($T_c$)<br>Time ($t_p$) maintained above $T_C$-5 °C | 260 °C<br>30 sec |
| Ramp-down rate ($T_p$ to $T_L$) | 6 °C/sec max |
| Time 25 °C to peak temperature | 8 mn max |

# 8. Quality and User information

## 8.1. Certifications

- Bluetooth SIG Declaration N° Q374670
- CE: CE certified, Declaration of Conformity n°TR251101 - Complies with RED 2014/53/EU,
- EN300328 V2.2.2
- FCC – FCC ID: 2AAQS-ISP2454 – Certified (Part 15.247)
- ISED - IC: 11306A-ISP2454, Model: ISP2454 – Certified (RSS-247)
- Japan: TELEC Certification n°020-250242
- RoHS3 compliant
- Reach compliant
- Minerals responsible initiative compliant

## 8.2. EC – CE Certification

This device can be operated in at least one Member State without infringing applicable requirements on the use of radio spectrum.

## 8.3. USA – User information

This intends to inform how to specify the FCC ID of our module "ISP2454" on the product. Based on the Public Notice from FCC, the host device should have a label which indicates that it contains our module. The label should use below example wording or any similar wording that expresses the same meaning:

| "Contains FCC ID: 2AAQS-ISP2454" |
|---|

The label of the host device should also include the below FCC Statement. When it is not possible, this information should be included in the User Manual of the host device:

| *"This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions.*<br>*(1)This device may not cause harmful interference*<br>*(2)This device must accept any interference received, including interference that may causeundesired operation.*<br>*Caution: Any Changes or modifications not expressly approved by the party responsible forcompliance could void the user's authority to operate the equipment."* |
|---|

## 8.4. Canada – User information

This intends to inform how to specify the IC of our module "ISP2454" on the product. According to Canadian standards "RSS-210" and "RSS-Gen" the host device should have a label which indicates that it contains our module. The label should use below example wording or any similar wording that expresses the same meaning:

| *"Contains IC: 11306A-ISP2454"* |
|---|

The label of the host device should also include the below IC Statement. When it is not possible, this information should be included in the User Manual of the host device:

| *"This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.*<br><br>*Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."* |
|---|

## 8.5. RF Exposure Information

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65 and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE).
This device should be installed and operated with minimum 10 mm between the radiator and your body.

## 8.6. Informations concernant l'exposition aux fréquences radio (RF)

La puissance de sortie émise par l'appareil de sans-fil est inférieure à la limite d'exposition aux fréquences radio d'Industry Canada (IC). Ce module a également été évalué et démontré conforme aux limites d'exposition aux RF d'IC dans des conditions d'exposition à des appareils mobiles et/ou portables.
Cet appareil doit être installé et utilisé avec un minimum de 10 mm entre le radiateur et votre corps.

## 8.7. Discontinuity

Normally a product will continue to be manufactured as long as all of the following are true:
- The manufacturing method is still available.
- There are no replacement products.
- There is demand for it in the market.

In case of obsolescence, Insight SiP will follow Jedec Standard JSD-48. A Product Discontinuation Notice (PDN) will be sent to all distributors and made available on our website. After this, the procedure goes as follows:
- Last Order Date will be 6 months after the PDN was published.
- Last Shipment Date will be 6 months after Last Order Date, i.e. 12 months after PDN.

### 8.8. Disclaimer

Insight SiP's products are designed and manufactured for general consumer applications, so testing and use of the product shall be conducted at customer's own risk and responsibility. Please conduct validation and verification and sufficient reliability evaluation of the products in actual condition of mounting and operating environment before commercial shipment of the equipment. Please also pay attention (i) to apply soldering method that don't deteriorate reliability, (ii) to minimize any mechanical vibration, shock, exposure to any static electricity, (iii) not to overstress the product during and after the soldering process.

The products are not designed for use in any application which requires especially high reliability where malfunction of these products can reasonably be expected to result in personal injury or damage to the third party's life, body or property, including and not limited to (i) aircraft equipment, (ii) aerospace equipment, (iii) undersea equipment, (iv) power plant control equipment, (v) medical equipment, (vi) transportation equipment, (vii) traffic signal equipment, (viii) disaster prevention / crime prevention equipment.

The only warranty that Insight SiP provides regarding the products is its conformance to specifications provided in datasheets. Insight SiP hereby disclaims all other warranties regarding the products, express or implied, including without limitation any warranty of fitness for a particular purpose, that they are defect-free, or against infringement of intellectual property rights. Insight SiP customers agree to indemnify and defend Insight SiP against all claims, damages, costs and expenses that may be incurred, including without any limitation, attorney fees and costs, due to the use of products.