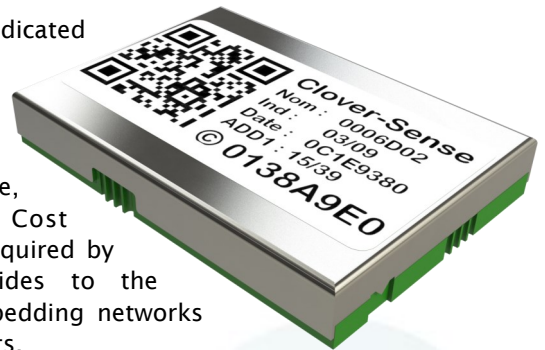# Clover-Sense®

Clover-Sense® is a state-of-art wireless module dedicated to Wireless Sensor application (WSN). As dedicated hardware platform of INEO-SENSE Clover® solutions, it perfectly fits the requirement for supporting Clover-Core based firmware. Thanks to special focus on Low power, Ultra long range, Robustness, Coexistence, Security and Cost optimization, this module addresses all targets required by wireless sensors application. Ineo-Sense provides to the industrial market a scalable wireless module embedding networks management services for plug-and-play deployments.

It is the result of a highly integrated low-power RF transceiver module embedding high-speed and low-power MCU constructed in a metal shielded package.

This turnkey module differs form the other in that it natively support the 3 ISM bands (433, 868 and 915MHz), and moreover, both Clover-Net and LoRaWAN communication in a single application, capable of achieving significant longer range than existing RF transceivers.

Plug & Play

Only power supply and communication link are enough to make the module up and running. Featured IOs are ready to connect, like Radio activity output for LEDs, Rx Scan HW control, periodic sending HW disabler…

Applications

Implemented either has modem or as heart of a device by embedding a custom application, this module fits to Asset tracking, Remote monitoring, Metering, M2M, security wearables and many other battery powered internet of things (IoT) edge nodes applications.
Capable of dynamically switch from Clover-Net to LoRaWAN, it simplifies use with features like auto network JOIN, periodic sending and more.

Platform as a Framework

Delivered by default with modem application, the macro component is not just a communication module.

As the cornerstone of the INEO-SENSE Clover solutions, this is also the foundation of the Clover-Core, a development Framework which provides the multimode Communication Stack as libraries with user-friendly APIs, but also all advanced features with very high added value to build a solution which takes benefit of all INEO-SENSE knowledge in a minimum of time.

In these advanced feature, we can cite complex full 2-way mechanisms like smart communication settings management, spontaneous messages, requests waiting answers (single and multi-frame), fast inventory broadcasts or even smart RF medium management, all of them taking care of power consumption for battery powered applications.

Moreover, unprecedented functions are available such as Network management, RTC auto –propagation, local and Over The Air firmware update, parameters and advanced datalogging management (data and events), device zoning and so.
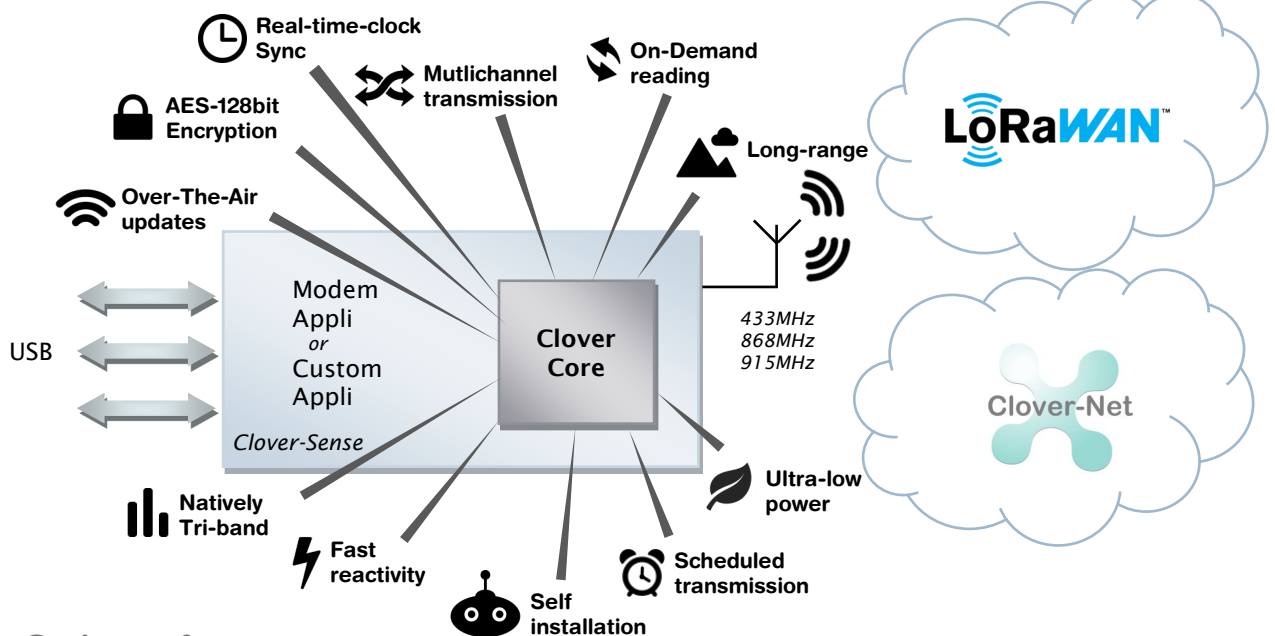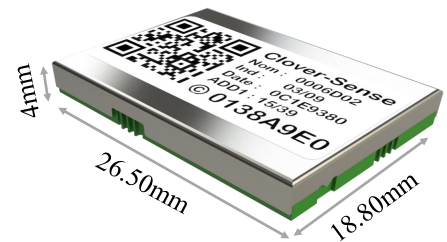
As Design Center, Ineo-Sense introduces a project and then let you continue developing it with its support.

Hardware features

- Size : 27 x 19 x 4 mm
- Surface mounting module
- Native Tri-band Design 433, 868, 915 Mhz
- Sensitivity up to –136dBm
- Average weight : 10 grams
- Metallic shielded for FCC modular approval
- Real time operating Systems Free RTOS
- Optional NFC interface for parameter setting
- Tx: 30mA @ 13 dbm — Rx : 12mA @ -136dBm
- Newest generation low power 32-bit ARM Cortex-M0+
- 128kB Serial flash memory available for event datalogging
- Operating temperature :-20° to +70° C (–4° to 158°F)
- 12 GPIO dedicated to application including SPI, I²C, ADC, UART
- Optimum industrial conception for efficient cost positioning

Main added-values

- Dedicated Profile Network configuration
- AES 128 encryption with embedded key generator
- Use Multi-channels to avoid collision
- Multiprotocol communication (Clover-Net, LoRaWan, ...)
- Delivered with appli modem by default
- Can embed a custom applicative firmware
- Robust against physical and electronic interferences
- Fast event reactivity, huge coexistence ability
- CE & EN 300-220 & FCC 15-247 Compliant

26.50mm   18.80mm   4mm

Real-time-clock Sync
AES-128bit Encryption
Over-The-Air updates
Mutlichannel transmission
On-Demand reading
Long-range
USB
Modem Appli *or* Custom Appli
Clover-Sense
Clover Core
433MHz 868MHz 915MHz
LoRaWAN
Clover-Net
Natively Tri-band
Fast reactivity
Self installation
Scheduled transmission
Ultra-low power

Order references

Order #	Description
CLV-SEN-MD-XXX-001	Clover-Sense standard version

Clover-Net generic features

- Transmission range up to 5,000m line of sight, up 500m indoor.
- Real-time 2-way communications: Scheduled transmission, automatic alarms and on-demand reading.
- Robust against physical and electronic interferences.
- Fast event reactivity, huge coexistence ability.
- Low cost for mass deployment
- Auto RTC propagation

- Native Three bands compatibilities (433, 868 and 915Mhz)
- CE & EN 300-220 & FCC 15-247 compliant
- LoRaWAN compatible
- Use Multi-channel frequencies and FHSS to avoid collision.
- Dedicated alarm frequency channel.
- Data Encryption by AES 128 with dynamic key mixt
- Include Full networks services (Broadcast with answer, Repeater, Mesh, ...)