swarm bee LE V3

Compact, low-power, 2.4 GHz Chirp radio & sensor module

The swarm bee LE V3 is a 2.4 GHz Chirp Spread Spectrum module, suitable for a variety of IoT implementations. The small form factor, low power consumption and long-range transceiver, enables wearable and covert product designs.

swarm bee LE V3 module
(22 mm x 23 mm x 4.4 mm)

swarm bee LE V3 integrates nanotron's location RF-Chip nanoLOC and is complemented with embedded accelerometer and temperature sensors. With low external component requirements, the *swarm* bee LE V3 is an ideal choice for personnel, equipment and asset tracking products, where in- and outdoor location sensing is critical.

swarm bee LE V3 based tags, when deployed with nanoANQ anchors and our IoT Platform, provide the most comprehensive Real Time Location System (RTLS) on the market today.

- **Engage markets with a small footprint module – suiting wearables, asset-tags or cap-lamps**
- **Deliver higher performance applications by extending the range (+4dB RF P_{out})**
- **Cut integration time with "tag ready" swarm bee design**

Chirp Spread Spectrum technology

The *swarm* bee LE V3 is based upon the nanoLOC transceiver chipset. With a configurable transmission power output, the module is capable of radio range up to 1,000 m. Typical applications are 300 - 500 m. The increased output power further stabilizes the communication reliability and connection robustness.

The module enables autonomous time-of-flight (ToF) ranging, anchor based time distance of arrival (TDOA) tracking as well as concurrent wireless communication of sensor data based on the Chirp Spread Spectrum RF standard from nanotron Technologies.

Short time-to-market

Range and distance measurements are derived via the swarm bee's module to module direct ranging feature, without the need for additional infrastructure.

A set of four full featured GPIO pins allow connecting external sensors and actuators to control or wake-up the swarm bee LE V3 module.

A complete API command set eliminates the need to implement a dedicated firmware to control the module. The module can be managed via serial interface and over-the-air (OTA). Higher level functions like ranging or messaging can be executed by a single API command.

Future-Proof

Concurrent ranging, tracking and data communication with the same module guarantees future-proofness. The *swarm* bee LE V3 can be deployed as a basic tag (for assets, vehicle, people) or as a smart tag with an external host. The module supports:

- **ToF-based ranging**
- **TDoA-based tracking with anchor infrastructure**

Its on-board MEMS sensor detects 3D acceleration and temperature changes off-the-shelf, enabling you to provide context to the ingested location data.

With four different energy saving modes, the module easily adapts to different requirements to extend battery life.

Key Specifications

Features	
RF standard	Chirp, 2.4 GHz, ISM band
RF frequency range	2.4 to 2.4835 GHz, (80 MHz BW)
RF transfer rates	1 Mbps 80/1, 250 Kbps 80/4
RF output power	Configurable, -12 to +20 dBm
RF sensitivity	80/1 mode: -89 dBm typ. 80/4 mode: -95 dBm typ.
MCU type	ARM Cortex M4

Software	
Firmware update	FOTA, over UART

Ranging and positioning	
Typ. airtime per ranging cycle	1.8 ms
Ranging accuracy[1]	1 m
Range	TApp[2].: 300-500 m, Cap[3].: 1,000 m

Interfaces	
Host interface	UART (115 kbps to 1 Mbps)
RF interface	50 Ohm RF Port
Other	4x GPIOs, 1x ADC

Electrical data	
Supply voltage	3.3 V to 5.5 V
Current consumption	
TX mode, active (+20 dBm)	max. 230 mA
RX mode, active	max. 55 mA
Standby mode	6.5 mA
Nap mode	max. 20 µA [4]
Snooze mode	max. 3 µA
Deep sleep	max. 3 µA

Package and dimensions	
Dimensions	22 mm x 23 mm x 4.4 mm
Weight	4 grams

Environmental and quality	
Operating temperature	-30°C to +85°C

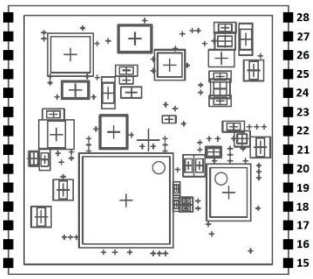
Certifications and approvals	
Type approvals (planned)	Europe (ETSI RED) US (FCC/CFR) Canada (IC RSS)

[1] 90%, 1-hour static, 10m distance, RSSI -65 dBm
[2] Typical Applications
[3] Range Capability

[4] Mode dependent

Pin Description

Pin No.	Pin Name	Pin No.	Pin Name
1	Reserved	28	Reserved
2	Reserved	27	DIV_COEX
3	GND	26	TX_ON
4	Reserved	25	DIO_3
5	GND	24	DIO_2
6	Reserved	23	DIO_1
7	VIN	22	DIO_0
8	GND	21	ADC_IN
9	A_MODE	20	GND
10	/NRST	19	USART1_RX
11	MOD_EN	18	GND
12	USART1_TX	17	RF_PORT
13	+2V6	16	GND
14	Reserved	15	/TX_RX



Ordering Information

Order No.	Description
MN03SWBLE	*swarm* bee LE V3
BN03SWBLP	*swarm* bee LE V3 DK+ Development Kit

Feature Highlights

- **Form factor: 22 mm x 23 mm x 4.4 mm**
- **Extended range (+4dB RF P_{out})**
- **Castellated pin shapes**
- **Minimized integration effort with low external component requirement**
- **Stand-alone (tag) or host-based operation**
- **Firmware update over-the-air (FOTA)**
- **Long battery life with smart power modes**
- **RSSI detection**

swarm bee LE V3 DK+ Development Kit:

- **Module performance reference standard**
- **Eased design-in with extended swarm API**
- **PCB size: 80mm x 100mm**

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About nanotron, An Inpixon Company
Nanotron Technologies GmbH, an Inpixon company (Nasdaq: INPX) is a leading provider of electronic location awareness solutions. If knowing what, where and when is mission-critical to your business, rely on nanotron with Location Running.
Nanotron's solutions deliver precise position data augmented by context information in real-time. Location Running means, reliably offering improved safety and increased productivity, 24 hours a day, 7 days per week: Location-Awareness for the Internet of Things (IoT).

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