



PRELIMINARY DATASHEET M:EXPLORE.MINI  
ILMSENS GMBH

AN INFORMATION COMPANY

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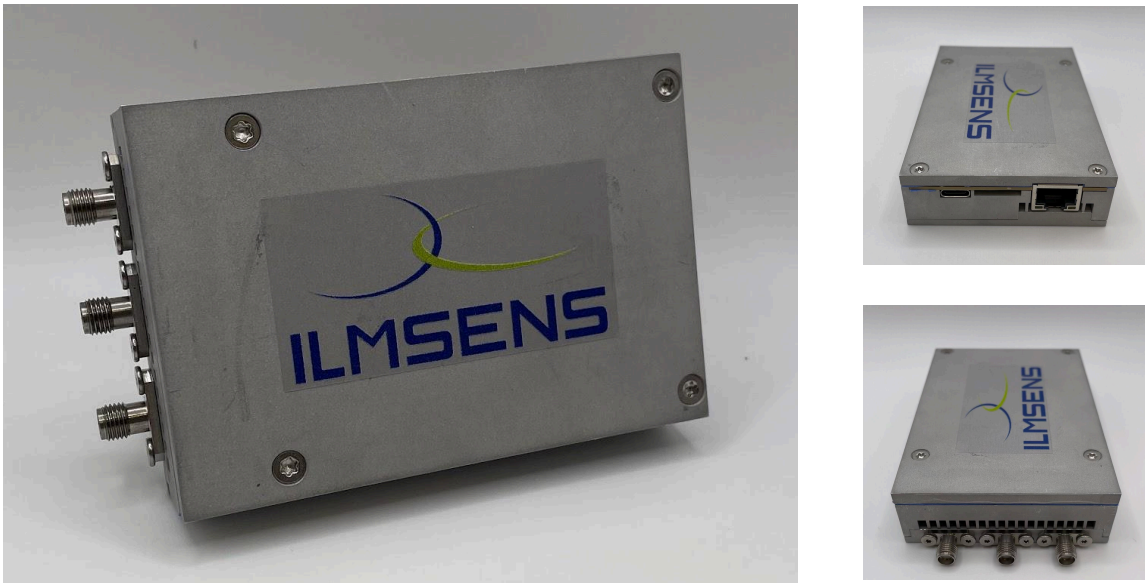
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### Document history

Date	Action / Changes	Document Version
31.03.2025	Initial version	1.0



**m:explore.mini** - our next generation ultra-wideband (UWB) compact sensor. The versatile platform is using our unique M-Sequence pseudo-noise design that leverages SiP (System in Package) technology.

Suitable for many applications, such as

- high resolution short range radar
- vector network analyser
- time domain reflectometer
- impedance spectroscopy

The m:explore.mini includes 1 UWB baseband transmitter and 2 UWB baseband receivers working in parallel. It combines high speed measurements with excellent signal and timebase stability.

### Configuration options

- stimulus length
  - MLBS9: 511 M-sequence chips
  - MLBS12: 4095 M-sequence chips
- clocking/bandwidth options
  - 13.312 GHz system clock | 6 GHz bandwidth in baseband (standard conf.)

## RF properties

### *UWB baseband transmitter:*

- UWB pseudo-noise signal
  - no high voltage peaks:  $0.8 V_{pp}$  max.
  - low field strength operation (when connected to antennas)
  - low crest factor / PAPR:  $CF \approx 2.6$  typ. ( $PAPR \approx 8.3$  dB)
- extremely stable generation driven by phase locked RF system clock
- instantaneous 10 dB bandwidth: 0.1 - 6 GHz
- Ambiguity time and range: (1-way range in air)
  - MLBS9 / 13.312 GHz:  $T_{amb} \approx 38.4$  ns  $R_{amb} \approx 11.5$  m
  - MLBS12 / 13.312 GHz:  $T_{amb} \approx 307.6$  ns  $R_{amb} \approx 92.3$  m
- output power: ca. -7 dBm
- Tx RF-port: SMA-Female (SE 50 R)
- output power-down feature (software controlled) – Tx stand-by.

### *UWB baseband receivers:*

- 2 coherent Rx working in parallel
- continuous, synchronous sub-sampling operation: 1:512 pre-scaler
- UWB analogue input bandwidth:
  - 0.1 - 6 GHz (@13.312 GHz system clock)
- input 1 dB compression point:  $P_{1dB} \approx -18$  dBm
- system performance:
  - MLBS9:  $\approx$  nom. 160 dB
  - MLBS12:  $\approx$  nom. 170 dB
  - UWB pulse at equivalent Tx output power referred to Rx noise floor at maximum integration time
  - can be extended by external amplifiers
- instantaneous dynamic range:  $> 130$  dB(s)
- measured from P1dB to receiver noise floor with 1 s integration time
- extremely stable timebase derived from transmitter clock:
  - timebase jitter:  $< 20$  fs (rms)
- RF-ports: SMA-Female (SE 50 R)

## Digital backend

- GBit Ethernet interface
- USB-C used for power supply
- configurable measurement timing
  - synchronous averaging to improve SNR
  - wait cycles to balance measurement rate and averaging aperture
- measurement speed:
  - MLBS9 / 13.312 GHz:  $MR_{\max} \approx 530$  measurements / s
  - MLBS12 / 13.312 GHz:  $MR_{\max} \approx 132$  measurements / s
  - Actual max. speed depends on capabilities of control computer
  - digital correlation in external control computer to suppress noise

## Dimensions and power supply

- Dimensions (WxHxD): 65 x 22 x 105 mm
- Weight: 246 g
- Power supply rating : DC +5 V, 1.2 A
- Operating temp. range: 0 .. +35°C (< 90% rel. humidity, non-condensing)
- Storage temp. range : -10.. +60°C (< 90% rel. humidity, non-condensing)
- convection/active cooling by integrated fan

## Software

- MatLab support (Windows™):
  - GUI for easy measurements and continuous data storage based on instrument control toolbox (TCP/IP)
- Programming interface:
  - TCP/IP protocols for device control and data transfer (separate TCP ports)
  - Support for Windows™ 7, 10 on x32 and x64 architectures
  - Support for Debian™ and Ubuntu™ Linux on x32, x64, and armhf/arm64 architectures

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