

SH-4240 HS / SH-4240 HSIQ – Datasheet



SH-4240 HS - our ultra-fast real-time ultra-wideband (UWB) sensor. The SH-42xx device family uses our innovative m-Sequence pseudo-noise design and provides an extremely high measurement rate - **more than 100,000 measurements per second** are possible.

Suitable for many applications, such as

- high resolution short range radar
- detection and tracking of fast moving objects
- High-Speed UWB Channel Sounding
- MIMO UWB sensor network

The compact **SH-4240 HS (m:mimo.hs)** includes 1 UWB baseband transmitter and 2 UWB baseband receivers working in parallel. It optionally comes with a solid state mass storage drive to capture measured data in real-time, i.e. more than 100,000 measurements per second. Due to our proven m:Sequence technology, it features excellent signal and timebase stability. The **SH-4240 HSIQ (m:mimo.hsiq)** version features an additional frequency conversion frontend for extended UWB bands with 1 ext. UWB transmitter and parallel high-speed I/Q reception (1 complex ext. UWB receiver realised with both baseband receive channels).

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)
- extremely stable generation driven by phase locked RF clock
 - Option 1: internal RF clock source (stand-alone operation)
 - Option 2: externally provided RF clock source (e.g. for MIMO sensor networks)
- instantaneous 10 dB bandwidth
 - 0.1 - 6 GHz @ 14.791 GHz RF clock
 - 0.1 - 6 GHz @ 13.312 GHz RF clock
 - 0.1 - 4 GHz @ 9.22 GHz RF clock
 - 0.1 - 3 GHz @ 6.75 GHz RF clock
- total output power: ca. -7 dBm (baseband)
- 2 stimulus options available
 - MLBS9: t_{amb} = 34.5 | 38.4 | 55.4 | 75.7 ns
 r_{amb} = 10.4 | 11.5 | 16.6 | 22.7 m (air)
 - MLBS12: t_{amb} = 276.9 | 307.6 | 444.1 | 606.6 ns
 r_{amb} = 83.1 | 92.3 | 133.2 | 182.0 m (air)
- RF-port: SMA-F
- output power-down feature, optionally with real-time operation

UWB baseband receiver:

- UWB analogue 10 dB input bandwidth
 - 0.1 - 6 GHz @ 14.791 GHz RF clock
 - 0.1 - 6 GHz @ 13.312 GHz RF clock
 - 0.1 - 4 GHz @ 9.22 GHz RF clock
 - 0.1 - 3 GHz @ 6.75 GHz RF clock
- 2-channel 14 Bit ADC
- continuous, synchronous sub-sampling operation (1:256 | 1:256 | 1:128 | 1:128)
- high-speed real-time acquisition:
 - MLBS9: 113,067 | 101,761 | 140,961 | 103,198 measurements/s
 - MLBS12: 14,109 | 12.698 | 17.590 | 12.877 measurements/s
- extremely stable timebase derived from transmitter RF clock
 - timebase jitter < 16 fs (rms)
- input 1 dB compression point P1dB ca. -14 dBm
- system performance: > 125 dB (can be extended by external amplifiers)
- instantaneous dynamic: > 115 dB (@ P1dB and 100 measurements/s)
- RF-port: SMA-F

UWB frequency conversion options:

- IS-IQ-UP-DOWN-FCC
 - RF clock: 6.75 GHz
 - UWB analogue 10 dB bandwidth: 3.75 GHz .. 9.75 GHz
 - Option 1: sequential IQ-conversion with 2 Rx channels (non-real-time)
 - Option 2: parallel IQ-conversion with 1 complex Rx channel (real-time)
- IS-IQ-UP-DOWN-ECC
 - RF clock: 6.00 GHz
 - UWB analogue 10 dB bandwidth: 6.30 GHz .. 8.20 GHz
 - sequential IQ-conversion with 2 Rx channels (non-real-time)
- IS-IQ-UpDown-9G22
 - RF clock: 9.22 GHz
 - UWB analogue 10 dB bandwidth: 5.22 GHz .. 13.22 GHz
 - parallel IQ-conversion with 1 complex Rx channel (real-time)
- IS-UD-30G
 - RF clock: 14.791 GHz
 - UWB analogue 10 dB bandwidth: 24.0 GHz .. 28.5 GHz
 - Lower sideband conversion with 2 Rx channels (real-time)

Digital backend

- LAN: 100 MBit/s Fast Ethernet 100BaseT for setup and control of measured data
- configurable synchronous averaging to improve SNR and wait cycles to configure measurement rate/timing (non-real-time operation)
- integrated buffer memory
- non-real-time measurement rate: up to 200/s (MLBS9, actual max. speed depends on capabilities of control computer and LAN network)
- digital correlation in control computer to suppress noise
- Optional real-time mass storage drive:
 - High-performance solid state drive
 - 512 GByte - enough for more than 36 | 40 | 29 | 40 min of continuous measurement (2 Rx @ 14.791 | 13.312 | 9.22 | 6.75 GHz RF clock)

Dimensions and power supply

- Dimensions (WxHxD) : 115 mm x 115 mm x 240 mm (dep. on options)
- Power supply rating: DC +12 .. +14 V, 1 .. 2 A (depending on options)
- convection/active cooling by integrated fan
- Operating temp. range: +5..+30°C (< 90% rel. humidity, non-condensing)
- Storage temp. range: -10..+60°C (< 90% rel. humidity, non-condensing)



Rev. 1.00

Software:

- MEX-API for MatLab (Windows 7/8.x/10, 32 & 64 bit)
- Device control and non-real-time data transfer from MatLab GUI
- Real-time data import tool based on MatLab
- Future support: API library for Win 7, Win 8, Win 10 and Linux

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