

PNI – TCM5LT

360° Tilt Compensated 3-axis Compass Module



General Description

The TCM5LT uses advanced algorithms, with hard iron and soft iron corrections, to provide highly accurate heading information, in **any orientation**. This is accomplished by integrating 3-axis magnetic field sensing, 3-axis tilt sensing, and compass heading into a single module. The output information of the unit will indicate accurate attitude position (X, Y and Z coordinates) of the module and can be used in systems requiring full 360° rotation. Advanced electronics and built in algorithms counter the effects of hard and soft iron interference, making the TCM5LT accurate in most any environment. PNI's patented Magneto-Inductive (MI) sensors and pioneering processor technology combine to provide all this performance under a low power budget that extends mission duration.

The magnetic sensors and accelerometers are calibrated to operate from -40 to 85°C; hence the measurement is very stable over temperature and inherently free from offset drift



Features

- Tilt compensated compass heading over full 360° rotation
- High accuracy compass heading: 0.3°
- Ultra low power (sleep) mode: 85-220 μ A
- High resolution: 0.1°
- High repeatability: 0.05°
- Multiple measurement modes: Compass heading, magnetic field and tilt
- Calibrated field measurement range: $\pm 125 \mu$ T (± 1.25 Gauss)
- High resolution field measurement: 0.05μ T (0.0005 Gauss)
- Advanced calibration: Hard and Soft Iron
- Compact size: 3.3 x 3.1 x 1.3 cm
- Calibrated magnetic field intensity in 3 dimensions.
- Data output via logic level using a binary high performance protocol for superior data integrity and scalability
- Improved start-up time over the TCM5L: 40-70 mSec from power down for valid measurement; 10-25 mSec from power down to power up acknowledgement.
- Simplified calibration routine requiring only 12 calibration points available for difficult to maneuver applications

Ordering Information

| NAME | Part Number | Package |
|--------|-------------|---------|
| TCM5LT | 12720 | Each |

PNI – TCM5LT 360° Tilt Compensated 3-axis Compass Module

| Parameter | TCM5LT | Units |
|--|--|-------------|
| Heading Specifications | | |
| Accuracy with <70° of tilt | 0.3° | Deg RMS |
| Accuracy with >70° of tilt | 0.5° | |
| Resolution | 0.1° | |
| Repeatability [1] | 0.05° | |
| Max Dip Angle w/ accuracy | 85° | Deg |
| Magnetometer Specifications | | |
| Calibrated Field Measurement Range | ± 125 | µT |
| Magnetic Resolution | ± .05 | |
| Magnetic Repeatability | ± 0.1 | |
| Tilt Specification | | |
| Pitch Accuracy | 0.2° | Deg RMS |
| Roll Accuracy | 0.2° for Pitch < 65° 0.5° for Pitch < 80° 1.0° for Pitch < 86° | |
| Tilt Range | ± 90° pitch ± 180° roll | |
| Tilt Resolution | < 0.01° | Deg |
| Tilt Repeatability [1] | 0.05° | Deg RMS |
| Calibration | | |
| Hard Iron Calibration | Yes | |
| Soft Iron Calibration | Yes | |
| Mechanical Specifications | | |
| Dimensions (L x W x H) | 3.3 x 3.1 x 1.3 | cm |
| Weight | 12 | grams |
| Mounting Options | Screw mounts/standoff Horizontal or Vertical | |
| Interface Connector | 4-pin | |
| I/O Specifications | | |
| Latency from power-down to valid measurement | ≤ 70 | mSec |
| Latency from power-down to power-up | ≤ 25 | |
| Maximum Sample Rate | 20 | samples/sec |
| UART Communication Rate | 300 to 115200 | baud |
| Output Formats | Binary High Performance Protocol | |
| Power Specifications | | |
| Supply Voltage | 3.3 to 5.5 (unregulated) | VDC |
| Current Draw – Poll mode | 11.5 RMS | mA |
| Current Draw – Push mode | 7.2 RMS | |
| Idle Mode | 7.2 – 11.5 | µA |
| Sleep Mode | 85 – 220 | |
| Environmental Specifications | | |
| Operating Temperature | -40° to 85° | C |
| Storage Temperature | -40° to 85° | |
| Shock | Up to 2500 G's per MIL-STD-810F | |
| Vibration | Qualified to MIL-STD-810F | |
| Humidity | Non-condensing/Qualified to MIL-STD-810F | |

[1] Repeatability is based on statistical data at ±3 sigma limit about the mean