

- **Vibration-tolerant tilt sensor**
- **Thermal compensation**
- **Designed for dynamic applications**
- **Dual-axis – pitch and roll**
- **Dual sensing per axis for error detection**
- **12Vdc or 24Vdc supply**
- **CANopen or J1939 CANbus output**
- **IP67 enclosure**
- **Integrated Deutsch DT04 connector**



The VTS2021 is a dual-axis, vibration-tolerant tilt sensor that offers an optimal combination of performance, safety and cost in dynamic applications, such as industrial vehicles.

IMU technology and fast-acting software algorithms filter out disturbances caused by vibration and vehicle motion, to provide output stability without the measurement delays usually associated with heavily-damped, alternative sensing methods.

Each measurement axis has two sensing elements, which are constantly compared to ensure correct operation. If an error is detected, the condition is communicated to the host electronics; so allowing a safe

situation to be assumed. Each output signal is calibrated to account for thermal drift, ensuring accuracy over the operating temperature range.

Powered from a voltage supply range of 6-48Vdc, the sensor provides output data over CANbus using CANopen or J1939 protocol.

The sealed design offers exceptional levels of performance with respect to water, dust, shock, vibration and temperature, meaning the sensor is ideal for use in hostile, on- and off-highway vehicle environments. Electrical connection is via an integrated 4-pin Deutsch DT04 connector.

SPECIFICATIONS

ELECTRICAL

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|-----------------------------|---|
| MEASUREMENT RANGE | Dual axis, $\pm 64^\circ$ |
| SUPPLY VOLTAGE | 6-48Vdc unregulated (12V and 24V systems) |
| SUPPLY CURRENT | <40mA at 12Vdc |
| SHORT-CIRCUIT PROTECTION | All connections to all connections |
| OVER-VOLTAGE PROTECTION | Up to 60Vdc at ambient temperature |
| REVERSE POLARITY PROTECTION | Up to -48Vdc |
| POWER-ON SETTLEMENT | <500ms |

OUTPUT

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|--------------------|---|
| PROTOCOL | J1939 or CANopen |
| LINEARITY | < $\pm 2\%$ |
| RESOLUTION | J1939: 16 bit output, 0.002° per bit CANopen: devices up to and including $\pm 30^\circ$ range, 0.001° per bit CANopen: devices above $\pm 30^\circ$ range, 0.01° per bit |
| OUTPUT NOISE | ± 2 bits typical |
| THERMAL DRIFT | <0.5° total at 10° inclination |
| REPEATING ACCURACY | $\leq 2\%$ of full scale range |

MECHANICAL

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|------------------------------------|---|
| MAXIMUM MEASURABLE OPERATING SPEED | 250°/s |
| WEIGHT | <150g |
| CONNECTOR | Integrated connector to suit Deutsch DT04 |

EMC DATA

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|--------------------------------|--------------------------|
| RF IMMUNITY | EN61000-6-2, ISO 11452-2 |
| RADIATED EMISSIONS | EN61000-6-3, CISPR25 |
| CONDUCTED IMMUNITY | ISO 11452-4 |
| ELECTROSTATIC DISCHARGE | ISO10605 |
| POWER FREQUENCY FIELD IMMUNITY | EN 61000-4-8 |
| TRANSIENT PROTECTION | ISO7637-2, pulses 1-5 |

ENVIRONMENTAL

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|-----------------------------|---|
| OPERATING TEMPERATURE RANGE | -40°C to 85°C in accordance with BS EN 60068-2-14 |
| STORAGE TEMPERATURE RANGE | -50°C to 90°C in accordance with BS EN 60068-2-1 and BS EN 60068-2-2 |
| HUMIDITY | BS EN 60068-2-30, BS EN 60068-2-38 |
| SEALING | IP69K, IP67 |
| VIBRATION | BS EN 60068-2-64, 14.7gn rms, 20-2000Hz random |
| SHOCK | BS EN 60068-2-27, 50g, 11ms, 3 shocks per axis (9 total) |
| DROP TEST | 1m drop onto concrete to BS EN 60068-2-32 |
| MTTFd | > 385 years |
| SALT SPRAY | EN 60068-2-52 test Kb severity 2 (72 hrs) |
| CHEMICAL RESISTANCE | Hydraulic Oil Chevron Rando HD, Antifreeze Water mixture 50/50 ethylene glycol, Degreasers, Steam, Battery Acid, Water and Snow, Salt Water, Spray Paint, Acrylic based paints, Epoxy based paints, Oil based paints, Paint strippers, Ether, Hydrochloric Acid, Diesel fuel, Petrol, Phosphoric Acid, Isopropyl Alcohol, Calcium Chloride, Magnesium Chloride, Potassium Chloride, Sodium Hydroxide, Calcium Hydroxide, Ammonium Hydroxide, AdBlue, Herbicide, Fertilizer, Urea Nitrogen, Insect Repellant |

All values recorded at room temperature of 23°C, unless otherwise stated