Penny & Giles

Sealed Tilt Sensor

STT280

- **No moving parts – MEMS technology**
- **Compact 28mm diameter body**
- **Unlimited mechanical life**
- **Absolute measurement**
- **Measurement range ±10-60°**
- **High resolution ±0.07°**
- **Analog output – 0.5-4.5V**
- **5V or 8-30V supply**
- **Over-voltage protection**
- **Reverse polarity protection**
- **Low power consumption**
- **Sealing to IP68**
- **Crush-proof mounting flange**

The STT280 is a tilt sensor that is sealed in a compact, 28mm diameter body, which has been designed to provide reliable, fit-and-forget tilt measurement sensing for even the most arduous of operating environments.

Solid-state 3D-MEMS (Micro-Electro-Mechanical-Systems) technology is used to measure the sensor's inclination relative to the gravity of the earth. As there are no moving or contacting parts, this sensing method provides distinct advantages in terms of reliability, stability and compactness over fluid based, electrolytic and pendulum operated devices.

Four measurement ranges – ±10°, ±20°, ±30° and ±40° – with resolution of ±0.07° are available, and each provides a 0.5-4.5V output analog signal across the angular span, with a nominal 2.5V signal at 0° tilt.

A choice of power supply options – 5V and 8-30V – is also offered meaning the sensor can be used in conjunction with a regulated supply or connected directly to an unregulated source, such as a battery. Reverse polarity and over-voltage protection is included, while the current consumption is less than 6.5mA.

The sensor body is manufactured from high strength, corrosion resistant material and has a protection rating of IP68. A wide operating temperature range and EMC immunity of 100V/m mean the STT280 is ready for use in the harshest of environments. Typical applications include: road construction equipment, cranes and booms, scissor lifts, agricultural vehicles, container handling and hydraulic lift systems.

SPECIFICATIONS

SUPPLY	
SUPPLY VOLTAGE	5Vdc ± 0.5Vdc or 8-30Vdc
SUPPLY CURRENT	< 6.5mA
OVER VOLTAGE	Up to 40Vdc (-40°C to 60°C)
REVERSE POLARITY PROTECTED	Yes
POWER-ON TIME	< 1s to within 1% of final output
CONNECTIONS	Flying leads
OUTPUT	
MEASUREMENT RANGE	±10°, ±20°, ±30° and ±60°
OUTPUT LAW	5V supply: 8-30V supply: ((k*sin Θ) + 0.5)*100 % of Vsupply (5*k*sin Θ) + 2.5 V k = 2.3035 for ±10° k = 1.1695 for ±20° k = 0.8000 for ±30° k = 0.4619 for ±60°
OUTPUT VOLTAGE (5V SUPPLY)	10-90% of Vsupply, 50% of Vsupply for 0° tilt
OUTPUT VOLTAGE (8-30V SUPPLY)	0.5-4.5V, 2.5V for 0° tilt
DEVIATION FROM OUTPUT LAW	< ±1% of output voltage span
RESOLUTION	±0.07°
OUTPUT NOISE	<1mV rms
ZERO TEMP. COEFFICIENT (Ø = 0)	<0.01°/°C
SENSITIVITY TEMP. COEFFICIENT	<0.015% of measured angle/°C
FREQUENCY RESPONSE	1.5Hz (-3dB) nominal
SETTLING TIME	<500ms to within 1% of final output
HYSTERESIS & REPEATABILITY	±0.07°
CROSS-AXIS SENSITIVITY†	<4.0% of normal axis sensitivity
LOAD RESISTANCE	10kΩ min. to GND
SHORT CIRCUIT PROTECTION	Output to GND and Output to 5V max.
MECHANICAL	
WEIGHT	26g
FIXING	2 x 4.50mm slots with ±10° adjustment. Max. tightening 2Nm
PHASING (ORIENTATION)	0° when cable is vertically down
ENVIRONMENTAL	
OPERATING TEMPERATURE‡	5V supply: -40°C to 125°C 8-30V supply: -40°C to123°C @ 8V reducing linearly to 112°C @ 30V
STORAGE TEMPERATURE	-55°C to 125°C
VIBRATION	EN 60068-2-64:1995 Sec 8.4 (14gn rms) 20-2000Hz random
SHOCK	3m drop onto concrete (absolute maximum 20,000g)
EMC	EN 61000-4-3:1999 100v/M 80M-1GHz & 1.4-2.7GHz (2004/108/EC)
SEALING	IP68 to 2m for 24h duration

† Cross-axis sensitivity determines how much inclination perpendicular to the measuring axis couples to the output.
‡ If the maximum operating temperature is exceeded, the voltage regulator will shut down to protect the device from overheating. Data based on maximum supply current.

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