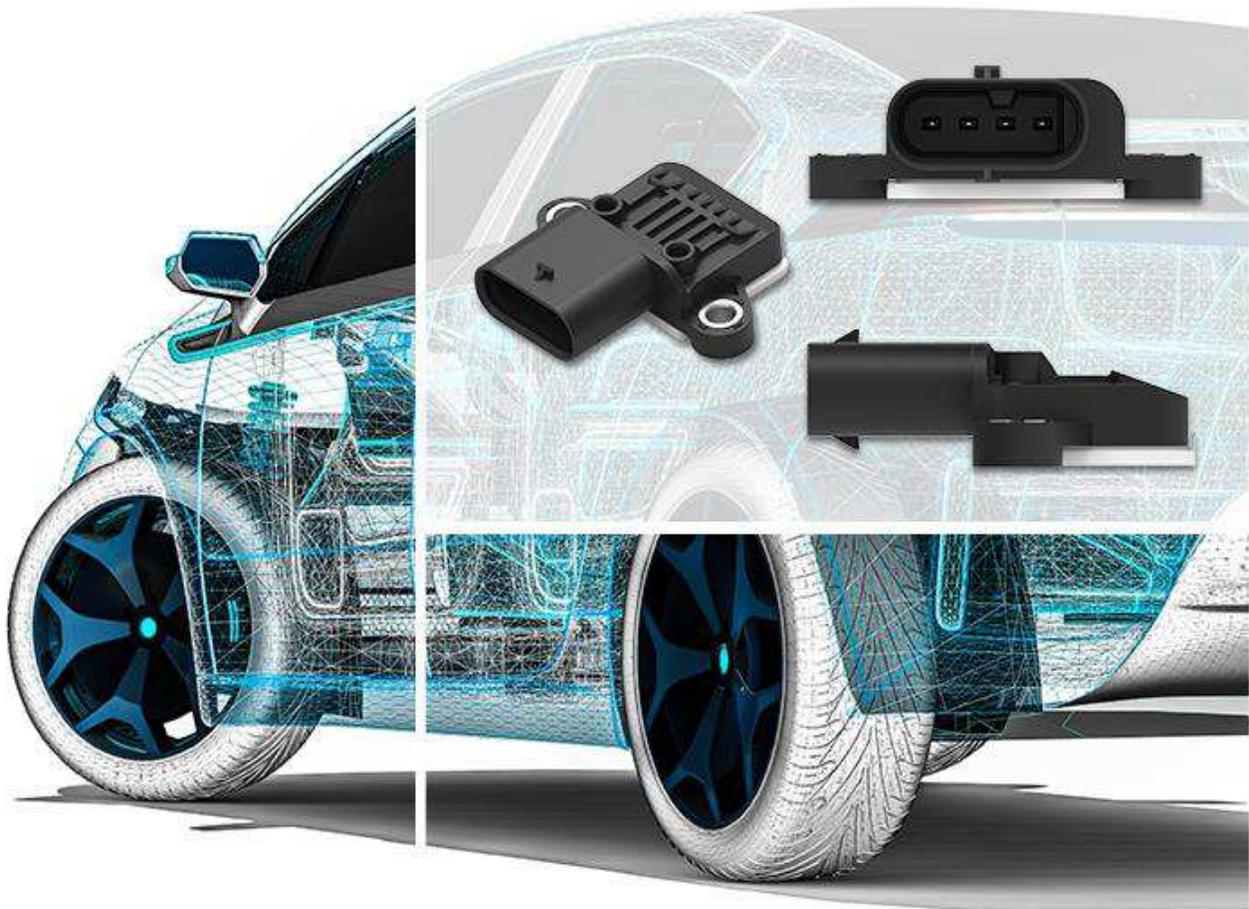


T40 AUTOMOTIVE POSITION SENSOR

Non-contact 3D-Hall Position Sensor for Automotive Applications



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Non-contact 3D-Hall position sensor



T40 PLATFORM AUTOMOTIVE POSITION SENSOR

Non-contact 3D-Hall position sensors

TE Connectivity's (TE) T40 automotive position sensor is a non-contact position sensor measuring travel position (or angle position) in transmission, chassis, engine, steering, clutch, and brake applications. It can be configured with analog, PWM, or SENT output.

The core of this sensor consists of a dual-die 3D-Hall technology IC. A permanent magnet attached to the moving component will generate a stable magnetic field. The sensor detects the travel or angle of the target magnet by sensing the magnetic flux density (magnitude) in multiple axes, which are then transformed to output position signal(s). The dual complementary outputs are independent, originating from separate and isolated silicon dies, called dual die.

The T40 automotive position sensor is designed for harsh automotive environments, such as powertrain applications with high temperature, vibration, shock and sealing requirements.

While a standard configuration is available, the sensor is highly customizable through factory programming. This allows for customer specific transfer functions, output types, and magnetic environment compensation. Hardware changes are also available, depending on requirements and business conditions.

Contact your TE Account Manager for more information.

Non-contact sensing for linear movements (angular sensing available)

Robust in Harsh Environments

Flexible Communication Protocols

Fully Redundant Sensor with Standard Configuration in Production & Ready for RFQ

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T40 AUTOMOTIVE POSITION SENSOR

Non-contact 3D-Hall position sensor

Features/Advantages

- Non-contact sensing for linear movements (angular sensing available)
- Robust in Harsh Environments: Vibration, Shock, Operating Temperature up to +150° C
- PWM interface (Analog or SENT also possible)
- Small geometry
- Fully Redundant Sensor

Capability

- SAE J1455 Environmental standards
- IEC 60529 / IPX9K sealing
- ISO16750-2 / SAE J1113/13 ESD / Overvoltage standards
- ASIL-B capable or equivalent
- ASIL-C potentially available; contact factory

Ordering Information

Description	Part Number
Standard Version	2343826-2

Contact us for availability of other variants

Specifications

Product Materials

Sensor Housing	PA66 GF30, Black, Laser Markable (standard version, PBT available in the future)
Terminals	Copper Alloy with Ag plating
Compression Limiter	Al
Laser Welded Cover	PA66 GF30, Natural (standard version, PBT available in the future)
PCB	FR4
Standard Magnet	NEO30SH, 10X18X8, Mass 9.18g ~ 11g

Electrical & Temperature Conditions

Connection Interface

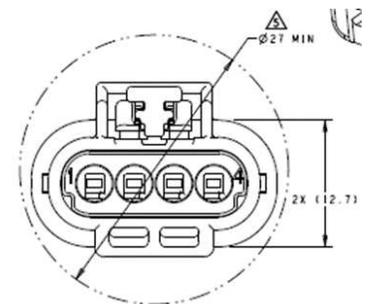
Pin Number	Dual-Output	Remarks
1	GND	Power Ground
2	PWM_{OUT1}	PWM Output Signal #1
3	PWM_{OUT2}	PWM Output Signal #2
4	V_{SUP}	Power Supply

Recommended TE Mating Connector BOM

Housing 4Pos Key B: TE P/N [1-1456426-6](#)

Terminal (4 pcs): 20 AWG – Silver: TE P/N [1670146-3](#)

Single Wire Seal (4 pcs) - Silicone: TE P/N [967067-1](#) (HIGH TEMP TE P/N [2098582-1](#))



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Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Operating Temperature Range		T_{AMB}	-40		150 ⁽¹⁾	° C
Supply Voltage		V_{sup}	4.75	5.00	5.25	V
Supply Current Consumption	-40°C < T_J < 170°C (T_J = Junction Temp @ IC)	I_{sup}		8	35	mA

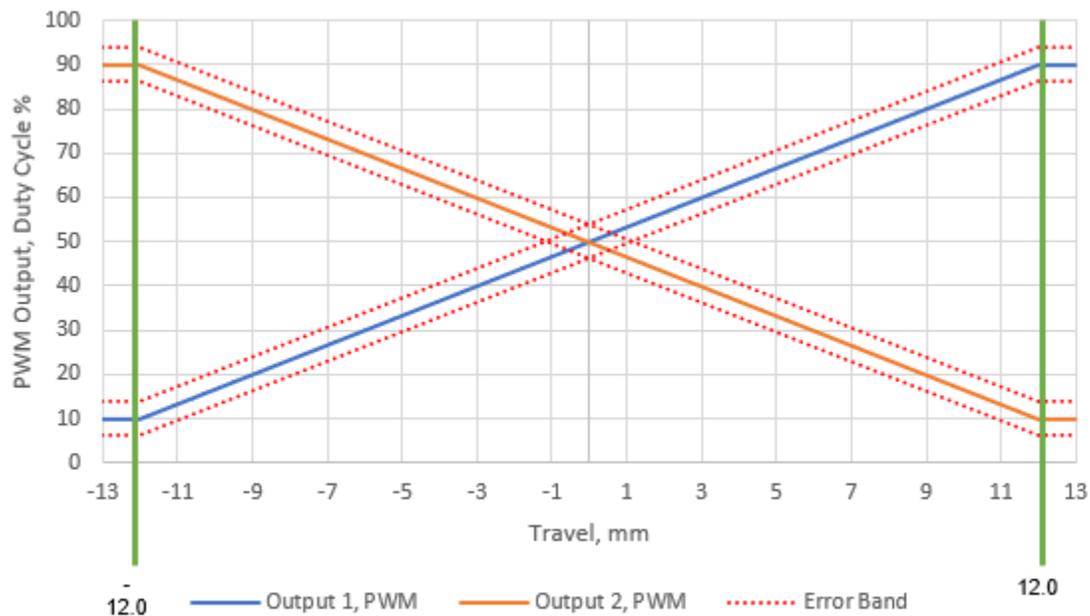
Note 1: current thermal shock and temperature cycling were conducted at 135 °C

Output Characteristics (Standard)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Output High Voltage	Based on suggested load circuit	V_{OUTH}	4.80			V
Output Low Voltage	Based on suggested load circuit	V_{OUTL}			0.20	V
PWM Frequency ⁽²⁾	Programmed to 500Hz	f_{PWM}	450	500	550	Hz
Diagnostic Behavior	PWM Frequency, All	f_{PWM}	225	250	275	Hz
	Duty Cycle, Loss of Magnet	DC	59.3	62.5	65.7	%DC
	Duty Cycle, Over Voltage	DC	71.2	75	78.8	%DC

Note 2: PWM frequency can be programmed to 1k Hz and 2k Hz

Output Signal transfer curve (standard)



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Validation and EMC Testing Data

No	Test	level	Standard	Functional Class*																								
1	High Temperature (operating)	T=150°; T=336h	SAE J1455 June 2006	A																								
2	Low Temperature (operating)	T=-40°C, t=336h	SAE J1455 June 2006	A																								
3	Temperature Cycling	T=135/-40°C, t=15/15min, N=250 cycles, t_Trans<=20 min	SAE J1455 June 2006	A																								
4	Thermal Shock	T=135/-40°C, t=30/30min, N=250 cycles, t_Trans<=30s	SAE J1455 June 2006	C																								
5	Vibration Profile	T=50h each axis; Monitored	See 109-32118 5.9	C																								
6	Humidity	N=30 cycles, 8 Hours per cycle <table border="1" data-bbox="506 743 914 909"> <thead> <tr> <th colspan="3">Humidity Cycle</th> </tr> <tr> <th>Temperature</th> <th>Humidity</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>150°C</td> <td>Ambient</td> <td>120 minutes</td> </tr> <tr> <td>Transition</td> <td>Transition</td> <td>90 minutes</td> </tr> <tr> <td>-40°C</td> <td>Ambient</td> <td>120 minutes</td> </tr> <tr> <td>Transition</td> <td>Transition</td> <td>60 minutes</td> </tr> <tr> <td>38°C</td> <td>90%RH</td> <td>60 minutes</td> </tr> <tr> <td>Transition</td> <td>Transition</td> <td>30 minutes</td> </tr> </tbody> </table>	Humidity Cycle			Temperature	Humidity	Duration	150°C	Ambient	120 minutes	Transition	Transition	90 minutes	-40°C	Ambient	120 minutes	Transition	Transition	60 minutes	38°C	90%RH	60 minutes	Transition	Transition	30 minutes	SAE J1455 June 2006	A
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7	Sealing	IPX9K	IEC 60529	A																								
8	Salt Spray	Fog Test for 96 hours	SAE J1455 June 2006	A																								
9	Chemical Testing	Brush Test	SAE J1455 June 2006	A																								

No	Test	Level	Standard	Functional class*
1	ESD Non-Operating	Packaging & Handling Contact Discharge±8 kV Air Discharge ±15 kV	SAE J1113/13	C
2	Undervoltage Testing	+5V (0.25V decrement every steps)	ISO16750-2 Section 4.6.2	C
3	Overvoltage Testing	+18V (From 5V, 0.1V increment step to 7V and 11V step to 18V)	ISO16750-2, Section 4.3	C
4	Reverse Polarity Testing	±6V to all I/O Pins excepts -18V to Supply and Ground pins	ISO16750-2, Section 4.7	C

***Note for Functional Class:**

Class A: All functions of the device/system as designed during and after the test.

Class B: All functions of the device/system perform as designed during the test. However, one or more of them may go beyond the specified tolerance. All functions return automatically to within normal limits after the test. Memory functions shall remain class A.

Class C: One or more functions of a device/system do not perform as designed during the test but return automatically to normal operation after the test.

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Configurations for Applications

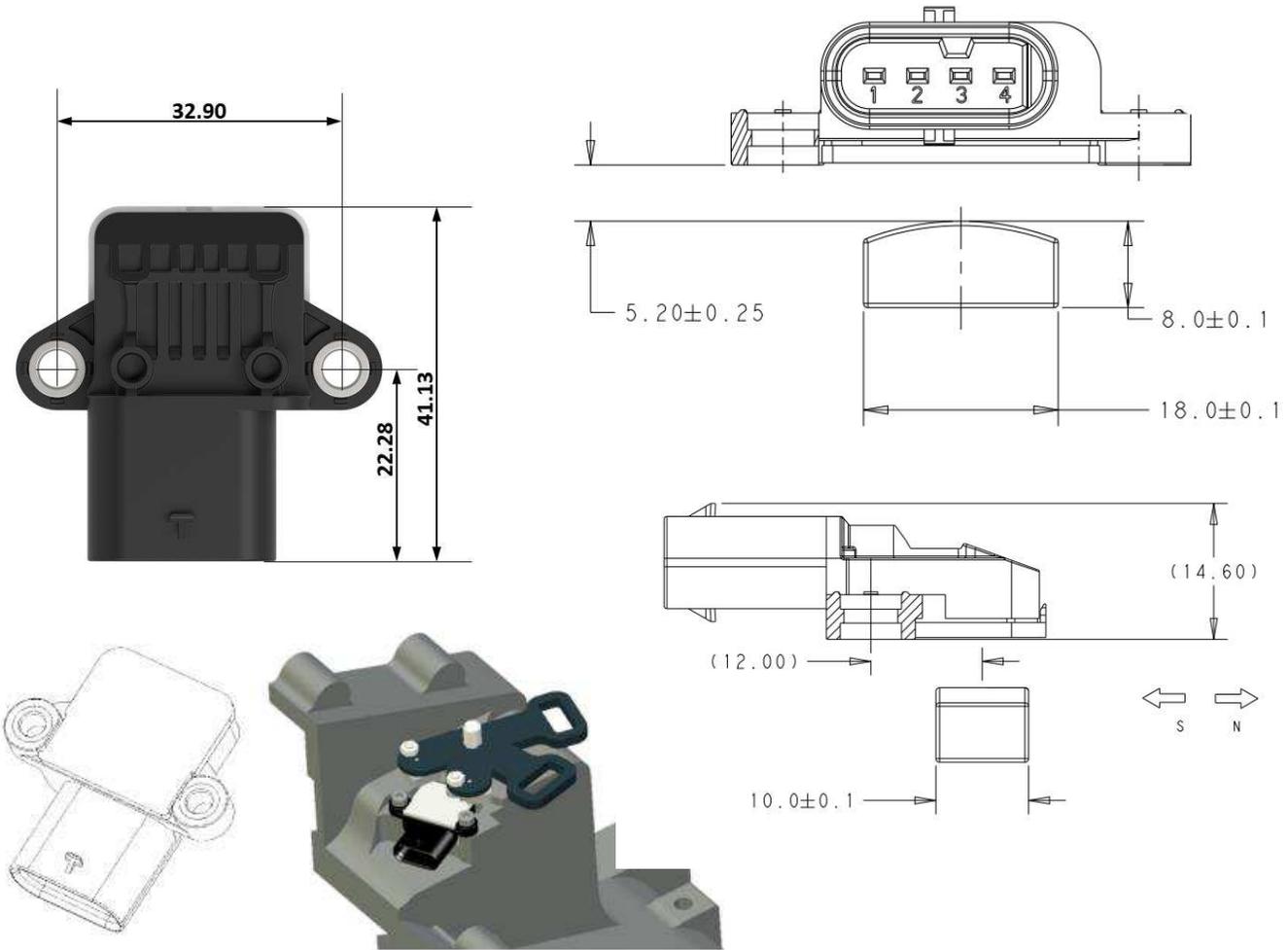
Programmable Features (Custom Configurations)

	Standard Configuration	Programmable (same hardware)	New hardware and programming	Notes
Output Type	PWM (500 Hz)	PWM Frequency: 250, 500, 1K, 2K	Single Output, Analog Output, SENT output	
Linear Range	±12mm	Up to ±50mm (Arc length sensing for rotary Applications)	Up to ±50mm (Arc length sensing for rotary Applications)	Travel range depends on Airgap and Magnet Selection
Rotary Range	-	-	Up to 360° (on-Axis), 120° Arc-segment (off-Axis)	
Supply Voltage	5V ± 0.25V	-	Battery Voltage 12V, 16V Max, Sleep Mode	
Transfer Function	10 & 90% DC Guard bands, 3.33%DC /mm (80/24)	Flexible	Any	
Magnet	TE P/N 2290217 (8x18x10mm)	Flexible	Any	Magnet Selection depends on travel range and Airgap
Airgap	5.20 ±0.25 mm	Up to 8mm in general	Up to 8mm in general	Airgap depends on travel range and Magnet Selection

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Dimensional Data



Mechanical Specification

Parameter	Conditions	Symbol	Value	Unit	Remarks
Air gap of sensor	IC silicon die active area surface to magnet surface	EAG	5.20 ±0.25	mm	Based on Sensor Mounting to Magnet Surface
Travel range of signal			±12.0	mm	

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