



## Features

- Pressure ranges:
  - From 5 to 30 PSI
- Pressure type:
  - ✓ gage
  - ✓ differential
  - ✓ asymmetric differential
- 24 bits ADC
- I<sup>2</sup>C digital and analog output interface available
- Pressure total error band :  $\pm 1\%$  FS (digital & analog)
- Pressure calibrated and temperature compensated output
- Compensated temperature range: -20 to 85°C

## Applications

- Patient monitoring
- Ventilators
- Gas Flow Instrumentation
- Air Flow Measurement
- Pressure Transmitters
- Pneumatic Gauges
- Pressure Switches
- Safety Cabinets

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# TPS MEDIUM PRESSURE DIGITAL & ANALOG SENSOR

## Gage & Differential Pressure Sensors

The TPS (TE Connectivity Pressure Sensors) are medium pressure MEMS sensors offering state-of-the-art pressure transducer technology and CMOS mixed signal processing technology to produce either an analog and/or digital output fully conditioned, multi-order pressure and temperature compensated. This series provide a JEDEC standard SOIC-16 package with vertical porting option. It is available in gage and differential configurations. With the dual porting, a reference measurement is possible to minimize errors due to changes in ambient pressure.

The total error band after board mount and system level autozero is less than 1%FS. The warmup behavior and long-term stability further confirms its expected performance over the life of the part.

Combining the pressure sensor with a signal-conditioning ASIC in a single package simplifies the use of advanced silicon micro-machined pressure sensors. The pressure sensor can be mounted directly on a standard printed circuit board and a high level, calibrated pressure signal can be acquired from the digital interface. This eliminates the need for additional circuitry, such as a compensation network or microcontroller containing a custom correction algorithm.

The TPS products are shipped in tape & reel.

# 1 PERFORMANCE SPECIFICATION

## 1.1 Part Number & Calibrated Pressure Ranges

Dual vertical port configuration :

Part number	Alias <sup>1</sup>	P <sub>MIN</sub> (PSI)	P <sub>MAX</sub> (PSI)
20032306-00	TPS-005SG-CA1N-00-T	0	+5
20032307-00	TPS-015SG-CA1N-00-T	0	+15
20032308-00	TPS-030SG-CA1N-00-T	0	+30
20032309-00	TPS-005SD-CA1N-00-T	-5	+5
20032310-00	TPS-015SD-CA1N-00-T	-15	+15

Note :

1. Alias description is given on last datasheet page.

## 1.2 Absolute Maximum Ratings

All parameters are specified at VDD = 5.0 V supply voltage at 25°C, unless otherwise noted.

Characteristic	Symbol	Min	Max	Units
Compensated Temperature	T <sub>COMP</sub>	-20	85	°C
Operating Temperature <sup>(a)</sup>	T <sub>OP</sub>	-40	105	°C
Storage Temperature <sup>(a)</sup>	T <sub>STG</sub>	-40	125	°C
Supply Voltage	V <sub>DD</sub>	-0.3	6	V
Media Compatibility <sup>(a)</sup>		Clean, dry air compatible with wetted materials <sup>(b)</sup>		

Burst pressure and proof pressure by pressure range

Max Operating Pressure range P <sub>max</sub> (PSI)	Proof Pressure <sup>(a, c)</sup> P <sub>Proof</sub> (PSI)	Burst Pressure <sup>(a, d)</sup> P <sub>Burst</sub> (PSI)
Up to P <sub>max</sub> = 5PSI	25	40
Up to P <sub>max</sub> = 30PSI	45	75

Notes:

- Tested on a sample basis.
- Wetted materials include Silicon, glass, gold, aluminum, copper, silicone, epoxy, mold compound.
- Proof pressure is defined as the maximum pressure to which the device can be taken and still perform within specifications after returning to the operating pressure range.
- Burst pressure is the pressure at which the device suffers catastrophic failure resulting in pressure loss through the device.

## 1.3 ESD

Description	Condition	Symbol	Min	Max	Units
ESD HBM Protection at all Pins	JEDEC JESD47	V <sub>ESD(HBM)</sub>	-2	2	kV

## 1.4 External Components

Description	Symbol	Min	Typ	Max	Units
Supply bypass capacitor	C <sub>VDD</sub>		100		nF

## 1.5 Operating Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	VDD		3.0	5.0	5.5	V
Sleep supply Current	I <sub>slp_25oC</sub>	VDD = 5.0V, T = 25°C (no conversion, DAC off)		1.8	8	μA
Standby supply Current	I <sub>sty_25oC</sub>	VDD = 5.0V, T = 25°C (no conversion, DAC off, fast_start = "1")		156	200	μA
Supply current during analog output	I <sub>aout</sub>	VDD = 5.0 V, T = 25°C, hvreg off, buffer on, ratiometric output		362		μA
Supply current during active conversion <sup>1</sup>	I <sub>ac_p</sub> I <sub>ac_Tr</sub> I <sub>ac_Tdsvdd</sub>	VDD = 5.0 V, T = 25°C, svdd = 1.8 V, fadc = 1 MHz excluding sensor current		2058 1857 1715		μA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Conversion time for 1 conversion(P, T1 or T2) based on: fadc = 1 MHz fast start no CRC no reload with calculation with transfer  add 10 us from sleep mode	Tconv	OSR = 0 OSR = 1 OSR = 2 OSR = 3 OSR = 4 OSR = 5 OSR = 6 OSR = 7 OSR = 8 OSR = 9	0.07 0.10 0.15 0.27 0.50 0.96 1.89 3.76 7.48 14.93	0.08 0.11 0.17 0.30 0.56 1.07 2.09 4.14 8.24 16.43	0.09 0.12 0.19 0.33 0.62 1.19 2.32 4.59 9.14 18.24	ms
Start up time	Tstart	Applying Power Supply to digital output ready		16.2		ms
Wake up time	Twaket	Wake up from sleep mode Wake up from standby		30 0		μs
Digital I/O leakage	Ileak	VDD = 5.0 V, T = 25°C	-1		1	μA

**Note :**

- Analog output add 200μA

## 1.6 Operating Characteristics Table

All parameters are specified at V<sub>DD</sub> = 5.0 V supply voltage at 25°C, unless otherwise noted.

Characteristic	Symbol	Min	Typ	Max	Units
Digital Pressure Output @P <sub>MIN</sub>	DOUT <sub>MIN</sub>		10		%Full Scale
Digital Pressure Output @P <sub>MAX</sub>	DOUT <sub>MAX</sub>		90		%Full Scale
Digital Full-Scale Span	DFS		80		%Full Scale
Resolution			24		Bits
Digital Output Total Error Band	DACC	-1		+1	%FS
Analog Pressure Output @P <sub>MIN</sub>	AOUT <sub>MIN</sub>		10		%VDD
Analog Pressure Output @P <sub>MAX</sub>	AOUT <sub>MAX</sub>		90		%VDD
Analog Full-Scale Span	AFS		80		%VDD
Analog Output Total Error Band	AACC	-1		+1	%Full Scale
Temperature accuracy	TACC		1		°C

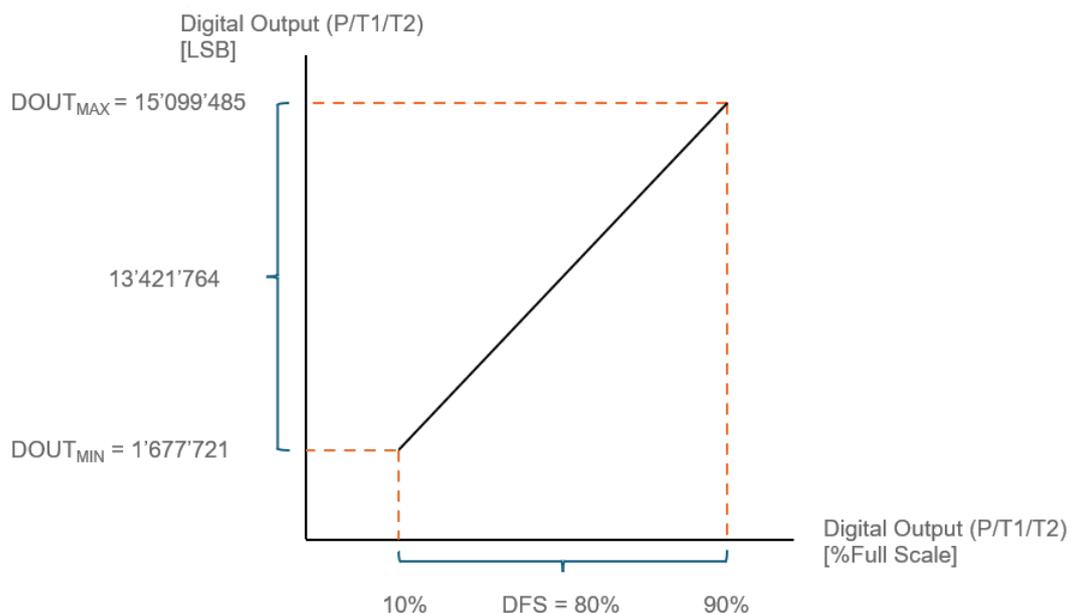
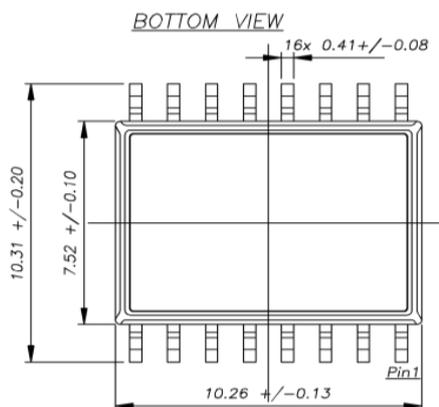
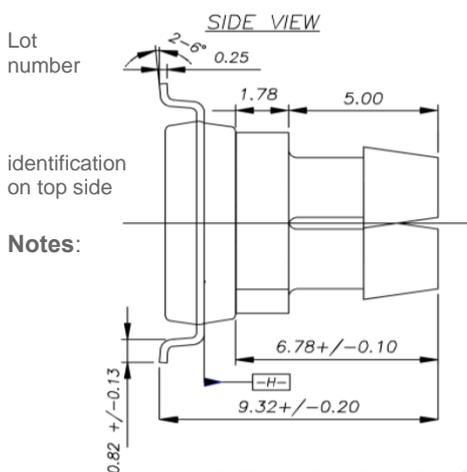
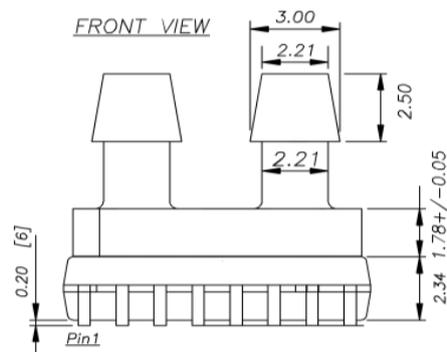
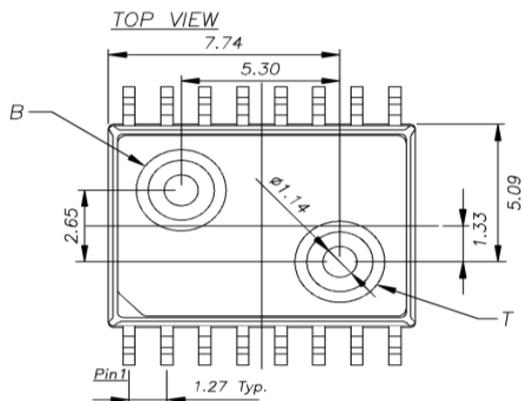


Figure 1: Digital Output / %FS Output

## 2 PACKAGE DIMENSIONS

SOIC-16 Dual Vertical port (C) Package Dimensions



- All dimensions in units of [mm]
- Moisture Sensitivity Level (MSL): Level 3
- Wetted materials: Silicon, glass, gold, aluminum, copper, silicone, epoxy, mold compound.
- [B] is tube connected to bottom side of sensor die.
- [T] is tube connected to top side of sensor die. Topside pressure is positive pressure. An increase in topside pressure will result in an increase in sensor output.
- Bottom plate is anodized lid.
- Robust JEDEC SOIC-16 package for automated assembly
- Manufactured according to ISO9001, ISO14001 and ISO/TS 16949 standards

## 2.1 Pinout functions

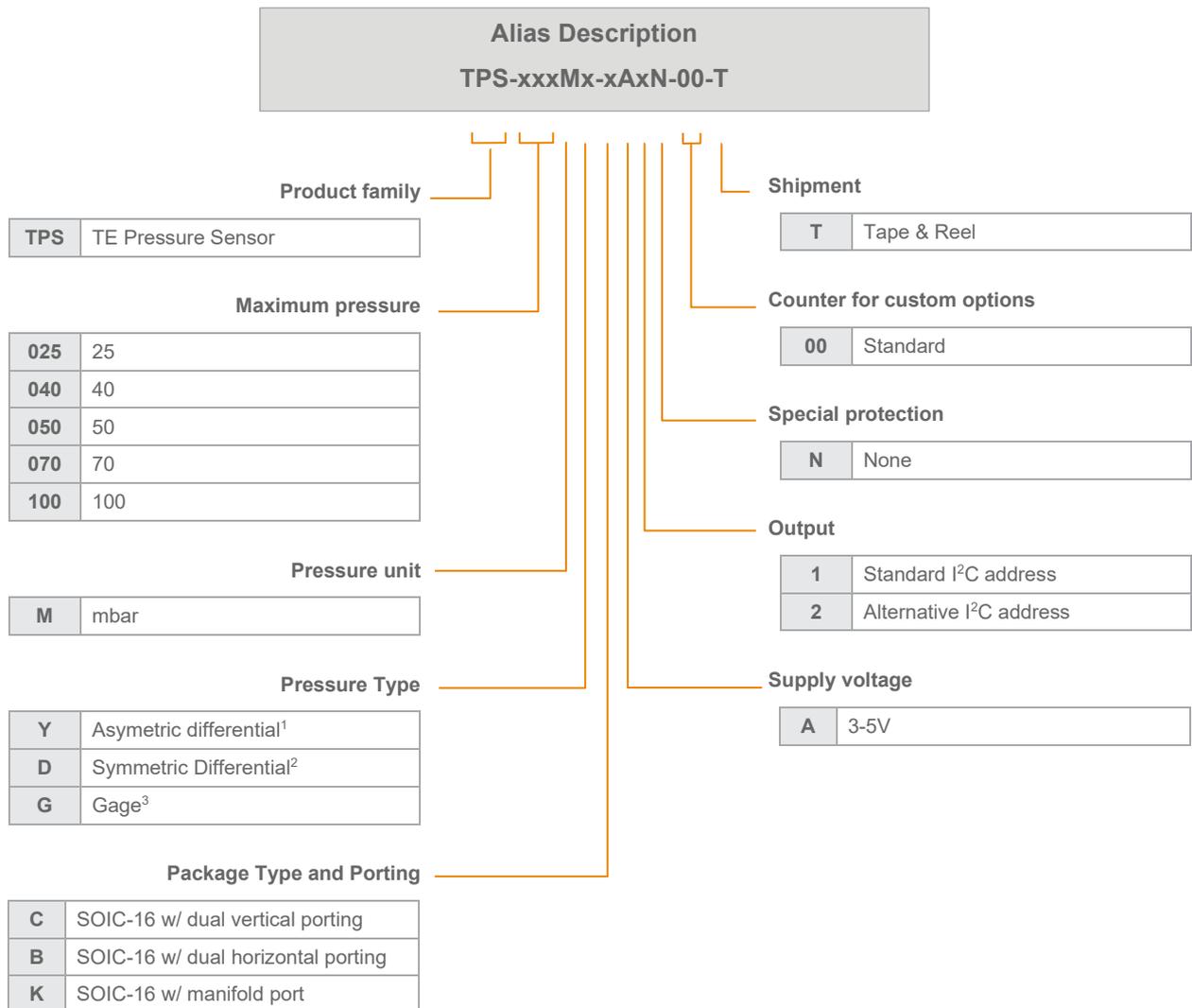
### Dual port

Dual port	
Pin No	Pin Function
1	Aout
2	-
3	-
4	-
5	-
6	-
7	SDO
8	-
9	-
10	SDA
11	SCL
12	VSS
13	-
14	-
15	-
16	VDD

**Notes:**

- SDO : Refer to chapter 7.

. Alias description



Notes :

1. Minimum pressure is -5 mbar as standard.
2. Minimum pressure is negative value of maximum pressure
3. Minimum pressure is 0 mbar.