The **TRVF Series** is a fully compensated harsh-media, digital I2C and analog outputs, pressure-sensor package designed to handle today's toughest pressure-sensing environments with temperatures between -40°C and 150°C.

The unique pressure port isolates onboard electronics, and the three wetted materials—silicon, glass, and ceramic—enable the TRVF Series to withstand a variety of harsh media.

The TRVF design isolates the the FR-4 high TG substrate mechanical stress from the MEMs die avoiding possible offset shifts caused during the encapsulation process. Factory pre-calibrated parts can be assembled without re-calibration or offset voltage corrections after assembly.

The Spring Contacts make the assembling process easier and faster.

COMPANY: Merit Sensor is a leader in piezoresistive pressure sensing and partners with clients to create high performing solutions for a variety of applications and industries.

SENTIUM: Merit Sensor products incorporate a proprietary Sentium® technology developed to provide a best-in-class operating temperature range and superior stability.

TECHNOLOGY: Merit Sensor utilizes a piezoresistive Wheatstone bridge in a design that anodically bonds glass to a chemically etched silicon diaphragm. All products are RoHS compliant.

CAPABILITIES: Merit Sensor designs, engineers, fabricates, dices, assembles, tests, sells and services die and packaged products from a state-of-the-art facility near Salt Lake City, Utah
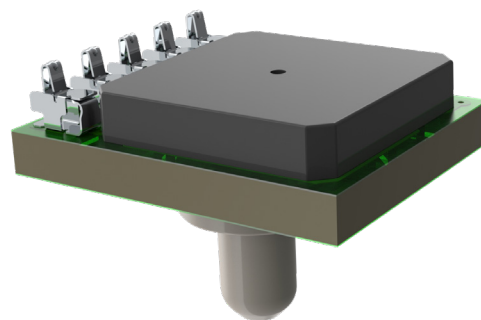
FEATURES

Pressure Range	1 to 500 psi / 0.07 to 34.5 bar / 7 to 3450 kPa
Temperature Range	-40°C to 150°C
Pressure Type	Absolute or gage
Electrical Connection	SMD solder pads or Spring Contacts
Output	Digital I2C and Analog Ratiometric 0.5V – 4.5V,
Electrical Protection	output short circuit and supply high voltage / reverse polarity up to 40V

APPLICATIONS

Industrial: Pneumatic systems, water levels, water pressure. It is also used for air-conditioning and other refrigerant systems, portable-measurement and analysis instrumentation, and industrial automation.

Automotive: Monitor the pressure of transmission fluid, fuel systems, oil systems, exhaust gas, HVAC systems, Airbrake systems, etc.

Medical: Equipment for diagnosis and analysis.

TRVF Series Part Number Configurator*

TRVF-XXXXX-XXXX

Full Scale Pressure
0001 = 1 psi
0015 = 15 psi
0100 = 100 psi
0500 = 500 psi

Pressure Type
A = Absolute
G = Gage

Pressure port
0 = Ceramic Button

Electrical Connection Type:
0 = 5 spring contacts

Packaging
0 = Tape and Reel
1 = Tray

Accuracy
1 = 2.5% FS (standard)
2 = 1% FS (high accuracy)

*Custom calibration available upon request

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1600 W. Merit Parkway · South Jordan, Utah · 84095 · USA

TRVFseriesDS.001

MERIT SENSOR™

SPECIFICATIONS

Parameter	Minimum	Typical	Maximum	Units	Notes
Electrical					
Supply Voltage (Vs)	4.5	5	5.5	V	
Supply Current	5.5	7	10	mA	@5.00V supply
Supply Over Voltage Protection			40	V	Device will cease operation during supply voltage fault.
Reverse polarity Protection	-40			V	Device will cease operation during supply voltage fault.
Output overvoltage protection	-40		40	V	Device will cease operation during supply voltage fault.
ESD Protection	>= 4000			V	According to the Human Body Model
Performance					
Output Range (Vout)	10		90	%Vs	
Output Clipping	5		95	%Vs	
Resolution			0.024	%FS	@12bits
Startup Time			10	ms	
Response Time			5.0	ms	

Accuracy
  Standard
  High Accuracy
	-2.50
	-1.00
			2.50
			1.00
				%FS	Accuracy includes all error for hysteresis and linearity over the entire operating temperature range. It does not include lifetime drift. -40°C to150°C

Lifetime Drift	-0.5		0.5	%FS	@1000hrs / 150°C
Static Proof Pressure	2.5x			FS	
Burst Pressure	5.0x			FS	
Burst Pressure (500 PSI part)	1500			PSI	
Environmental					
Operating Temperature	-40		150	°C	
Storage Temperature	-55		150	°C	
Weight		1.35		g	
Digital Interface (for reference only)					
I2C™ voltage level HIGH	0.8x			Vdd	
I2C™ voltage level LOW			0.2x	Vdd	
SCL clock frequency			400	kHz	fSCL
I 2C™ bit count	0		32768	counts	
Bus free time between start and stop condition	1.3			us	tI2C_BF
Hold time start condition	0.6			us	tI2C_HD_STA
Setup time repeated start condition	0.6			us	tI2C_SU_STA
Low period SCL/SDA	1.3			us	tI2C_L
High period SCL/SDA	0.6			us	tI2C_H
Data hold time	0.1			us	tI2C_HD_DA
Data setup time	0.1			us	tI2C_SU_DAT
Rise time SCL/SDA			0.3	us	tI2C_R
Fall time SCL/SDA			0.3	us	tI2C_F
Setup time stop condition	0.6			us	tI2C_SU_STO
Noise interception SDA/SCL			50	ns	tI2C_NI (spike suppression)

PRELIMINARY

I²C TIMING DIAGRAM (FOR REFERENCE ONLY)
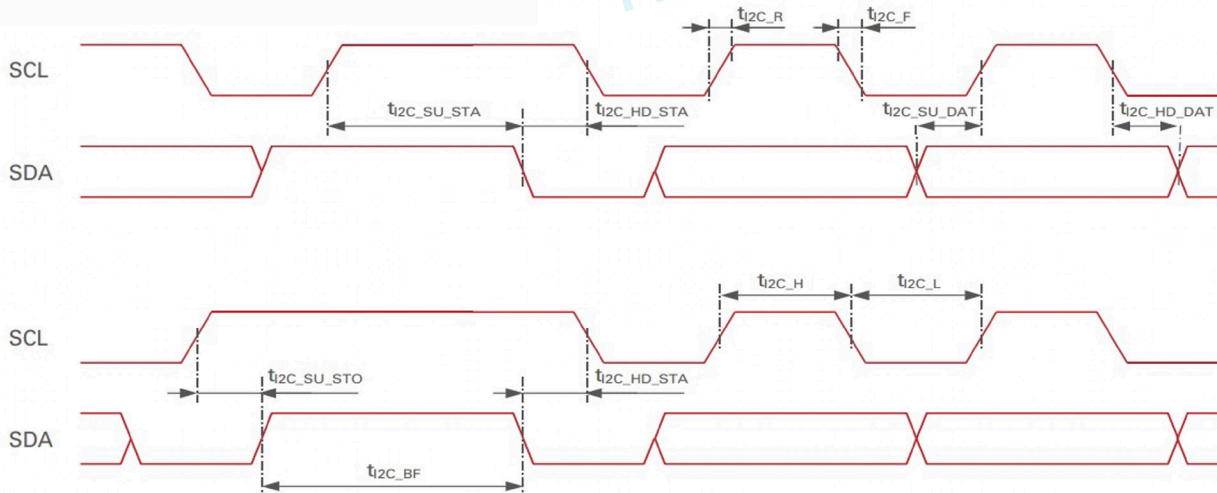
SENSOR TRVF I2CTM COMMUNICATION
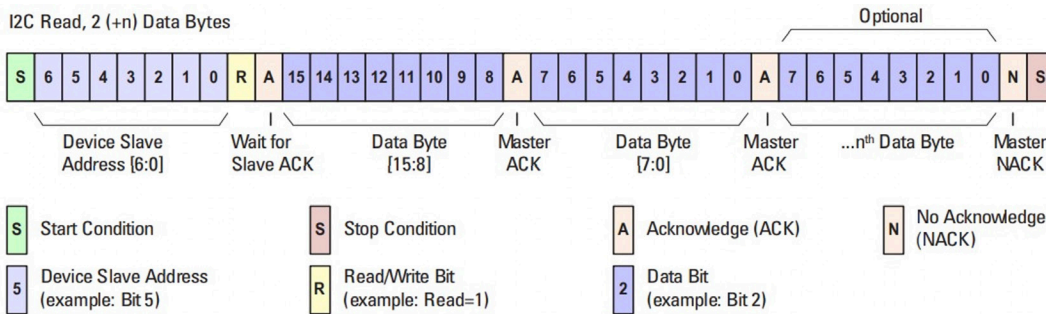

NOTE: Standard address = 0x28

The correct command to write to the unit for setting up the data read is "0x2E 0x21 0x00". This write command interrupts the normal operation of the ASIC and should only be used once to "activate" the register that holds the pressure data. Once the register is activated, any subsequent read of the device will return the data from that register.
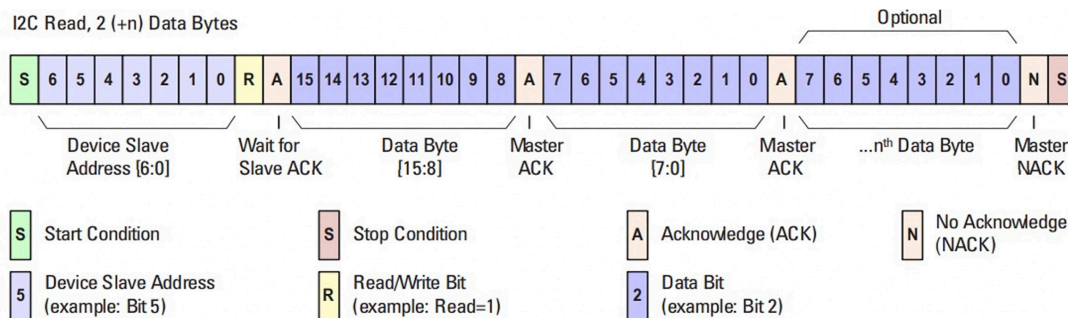
A read command will return the data from the output register. It will not interrupt the normal processing of the ASIC. Three bytes of data should be read… the first byte is the original command (0x2E), the next two bytes are the pressure output in counts.

TRANSFER FUNCTION FORMULAS

$$P_{psi} = (P_{max} - P_{min}) \cdot \left(\frac{P_{counts} - 0.1 \cdot Max}{0.8 \cdot Max} \right) + P_{min}$$

Where

P_{psi}	= Measured Pressure in PSI
P_{Max}	= Maximum Pressure
P_{Min}	= Minimum Pressure
V_{min}	= Minimum Volatage (Usually 0.5V)
V_{max}	= Maximum Volatage (Usually 4.5V)
V_{out}	= Output voltage

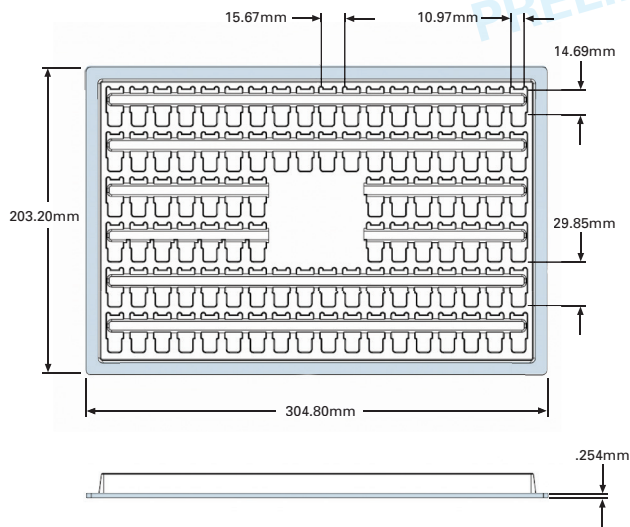### Analog

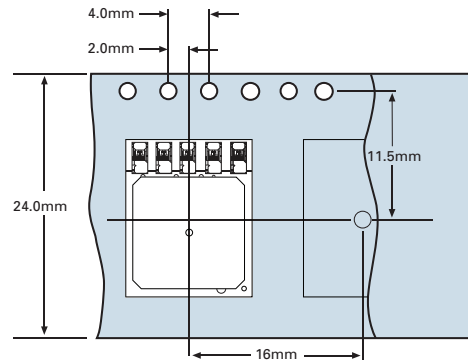$$P_{psi} = (P_{max} - P_{min}) \cdot \left(\frac{V_{out} - V_{min}}{V_{max} - V_{min}} \right) + P_{min}$$

Where

P_{psi}	= Measured Pressure in PSI
P_{counts}	= Pressure Counts from Merit Sensor Part
P_{Min}	= Minimum Pressure
P_{max}	= Maximum Pressure
MAX	= 32768 = 15 Bits

PACKAGING AND SHIPPING (TRAY)

PRELIMINARY

15.67mm 10.97mm
14.69mm
203.20mm
29.85mm
304.80mm
.254mm

PACKAGING AND SHIPPING (TAPE AND REEL)

4.0mm
2.0mm
11.5mm
24.0mm
16mm

ELECTRICAL

Vs

MEMS

ASIC

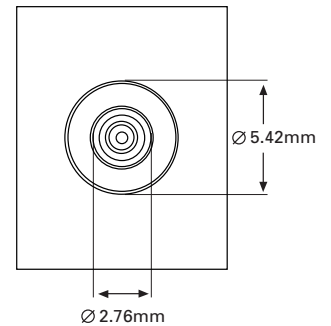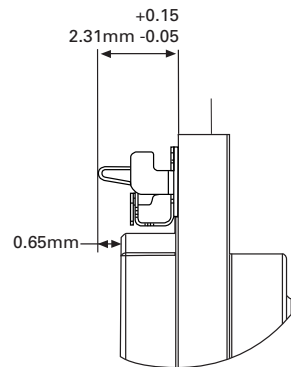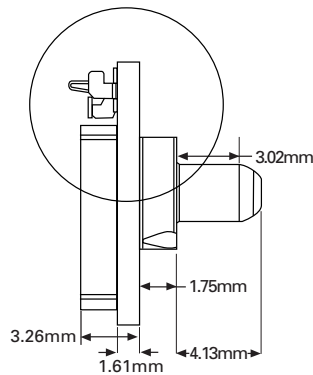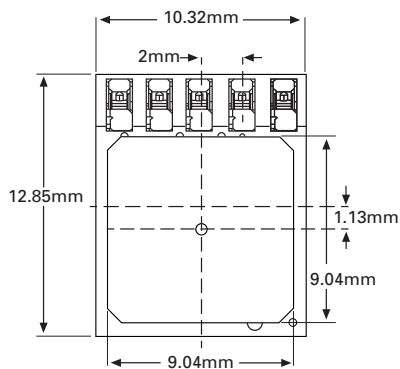SCL (I²C)
SDA (I²C)

Vout (Analog)

Gnd

A_Out
SDA
GND
SCL
Vs
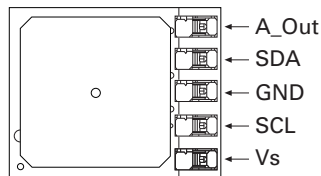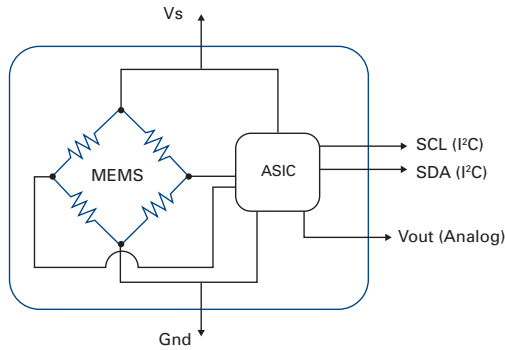
Note: Power supply decoupling and output filtering included

DIMENSIONS FOR STANDARD OPTIONS (in millimeters):

Dimensions for reference only. Engineering drawings (with tolerance) available upon order

10.32mm
2mm
12.85mm
1.13mm
9.04mm
9.04mm

SMD Solder Pads Size: 2.1 X 1.0mm

3.02mm
1.75mm
3.26mm
4.13mm
1.61mm

+0.15
2.31mm -0.05
0.65mm

Ø 5.42mm
Ø 2.76mm

Spring Contact Recommended Deflection:
0.65mm ±0.25mm (Normal Force @0.65mm = 0.67N)

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Merit Sensor](#):
  [TRVF-0001G-0010](#) [TRVF-0015A-0010](#) [TRVF-0015G-0010](#) [TRVF-0100A-0010](#) [TRVF-0100G-0010](#) [TRVF-0500A-0010](#) [TRVF-0500G-0010](#)