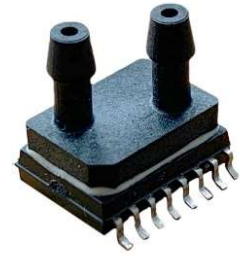


The MCT-SM9543 Series  
Ultra Low Pressure Digital Sensor  
JEDEC SOIC16 Standard Package  
Dual Ported Barb Ports  
Digital Temperature & Pressure Outputs  
I<sup>2</sup>C & SPI Protocols



### DESCRIPTION

Advanced Sensors Multi Chip Technology (MCT) SM9543 Series incorporates the latest mixed signal ASIC (Application Specific Integrated Circuit) with a ultra low pressured RTV bonded silicon gage to provide a leading *Digital Output* design for medical, life science and pneumatic control industries in a small SOIC-16 package. The MCT-SM9543 Series provides a 14bit digital pressure and 11 bit digital temperature output in SPI and I<sup>2</sup>C protocols. The designs superior performance provides 1% Total Error across a wide temperature range of -10 to 60 °C while the ASIC's advanced design sets safety critical operations at the forefront with internal error checking of the sensor's input and output lines. Given these features and an available lower power option; the MCT-SM9543 series is the ideal choice for OEM customers.

### APPLICATIONS

- Medical Equipment
- Respirators
- Sleep Apnea
- Hospital Beds
- Nebulizers
- Exhaust Hoods
- Building Automation
- HVAC
- VAV
- Clogged Filter Detection

### FEATURES

- Digital Temperature & Pressure Output
- Insensitive To Mounting Orientation
- 3.3 & 5.0Vdc Supply Voltages
- Low Overall Errors, 1.0%TEB
- I2C & SPI Outputs
- Custom Outputs and Ranges Available

### SPECIFICATIONS

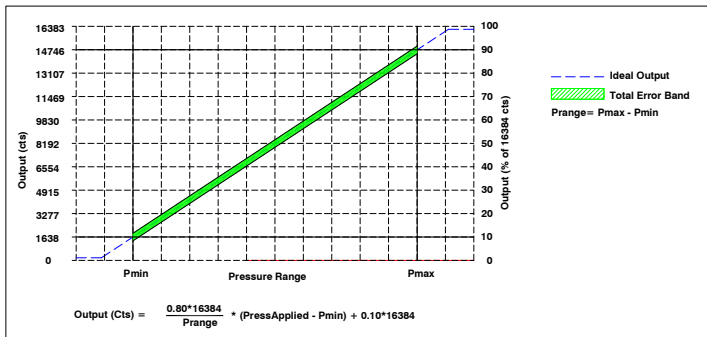
|                                   | Symbol | Min   | Typical    | Max  | Unit  | Note      |
|-----------------------------------|--------|-------|------------|------|-------|-----------|
| <b>Performance Specifications</b> |        |       |            |      |       |           |
| Supply Voltage                    |        | 2.7V  | 3.3        | 5.50 | V     |           |
| Current Consumption               |        |       |            | 3    | mA    |           |
| Standby Current                   |        |       | 0.5        |      | µA    | -L Option |
| Pressure Resolution               |        |       |            | 14   | bits  |           |
| Temperature Resolution            |        |       |            | 11   | bits  |           |
| Output (Type 1) at Pmin           |        |       | 1638       |      | cts   |           |
| Output (Type 1) at Pmax           |        |       | 14746      |      | cts   |           |
| Output (Type 2) at Pmin           |        |       | 819        |      | cts   |           |
| Output (Type 2) at Pmax           |        |       | 15564      |      | cts   |           |
| Pressure Accuracy                 |        | -0.25 |            | 0.25 | %FSS  | 2         |
| Total Error Band                  | TEB    | -1.0  |            | 1.0  | %FSS  | 3         |
| Temperature Accuracy              |        |       | 1.5        |      | °C    |           |
| Long Term Stability               |        |       | ±0.4       |      | %FSS  |           |
| Conversion Time                   |        |       | 1.0        |      | mS    | 4         |
| Power On to Valid Data            |        |       |            | <10  | mS    | 5         |
| Weight                            |        |       |            | 3    | grams |           |
| Compensated Temperature           |        |       | -10 to 60  |      | °C    | 6         |
| Operating Temperature             |        |       | -40 to 125 |      | °C    | 6         |

| SPECIFICATIONS                     | Symbol | Min                                      | Typical | Max | Unit | Note      |
|------------------------------------|--------|--|---------|-----|------|-----------|
| <b>Absolute Maximum Conditions</b> |        |  |         |     |      | <b>10</b> |
| Supply Voltage                     |        | -5.0                                     |         | 6   | V    |           |
| Storage Temperature                |        | -50                                      |         | 150 | °C   |           |
| Package Integrity, Common Mode     |        |  |         | 50  | psi  | 7         |
| Proof Pressure                     |        |  |         | 3x  |      | 8         |
| Burst Pressure                     |        |  |         | 5x  |      | 9         |
| Media Compatibility                |        | CDA, Non Ionic, Non Corrosive Gases      |         |     |      |           |
| Peak reflow temperature (SMT)      |        | 15s max at 250 °C                        |         |     |      |           |
| Moisture Sensitivity Level         |        | MSL 1                                    |         |     |      |           |
| ESD susceptibility (HBM)           |        | ±4kV                                     |         |     |      |           |
| Wetted Materials                   |        | RTV, Epoxy, Silicon, Gold, Aluminum, LCP |         |     |      |           |

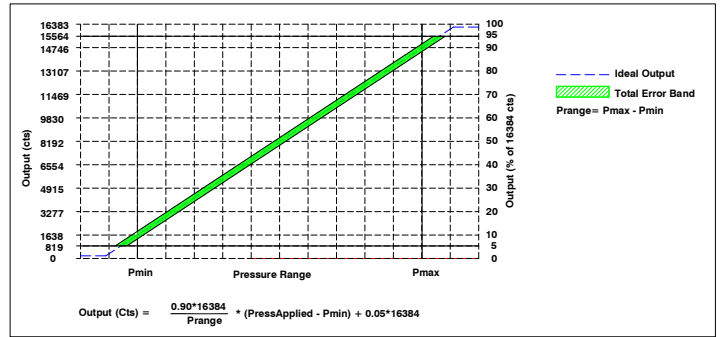
**Reference Conditions:** Vsupply: 3.30Vdc or 5.00, Ta=25°C, Positive Pressure Port A

1. All specification at reference conditions unless otherwise noted.
2. Maximum deviation from a Best Fit Straight Line through Pmin and Pmax measured at 25 °C. Errors included Pressure Non Linearity, Pressure Hysteresis and Repeatability.
3. Maximum deviation from the Ideal Transfer Function expressed as a percentage of the %FSS over the compensated temperature range. Includes calibration errors (Offset & Span), temperature errors (Offset & Span), pressure non-linearity, pressure and thermal hysteresis. TEB Errors for mBar Ranges below
4. The time for the output DAC to be updated with new data.
5. The time for the output DAC to have valid data after a power on reset.
6. Compensated and operating temperature for mBar ranges are 0 °C to 60 °C and -20 °C – to 105 °C, respectively.
7. Maximum pressure the sensor package can withstand without rupture.
8. Maximum pressure without degrading sensor’s performance specifications.
9. Maximum pressure the silicon diaphragm can withstand without rupture.
10. Exceeding Absolute Maximum Specification may damage the device. Extended exposure beyond the operating conditions may affect device reliability.

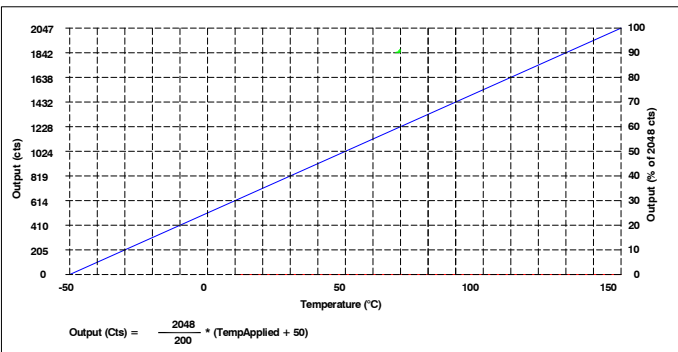
### PRESSURE AND TEMPERATURE TRANSFER FUNCTIONS



Type 1, 10-90%, Pressure Transfer Function

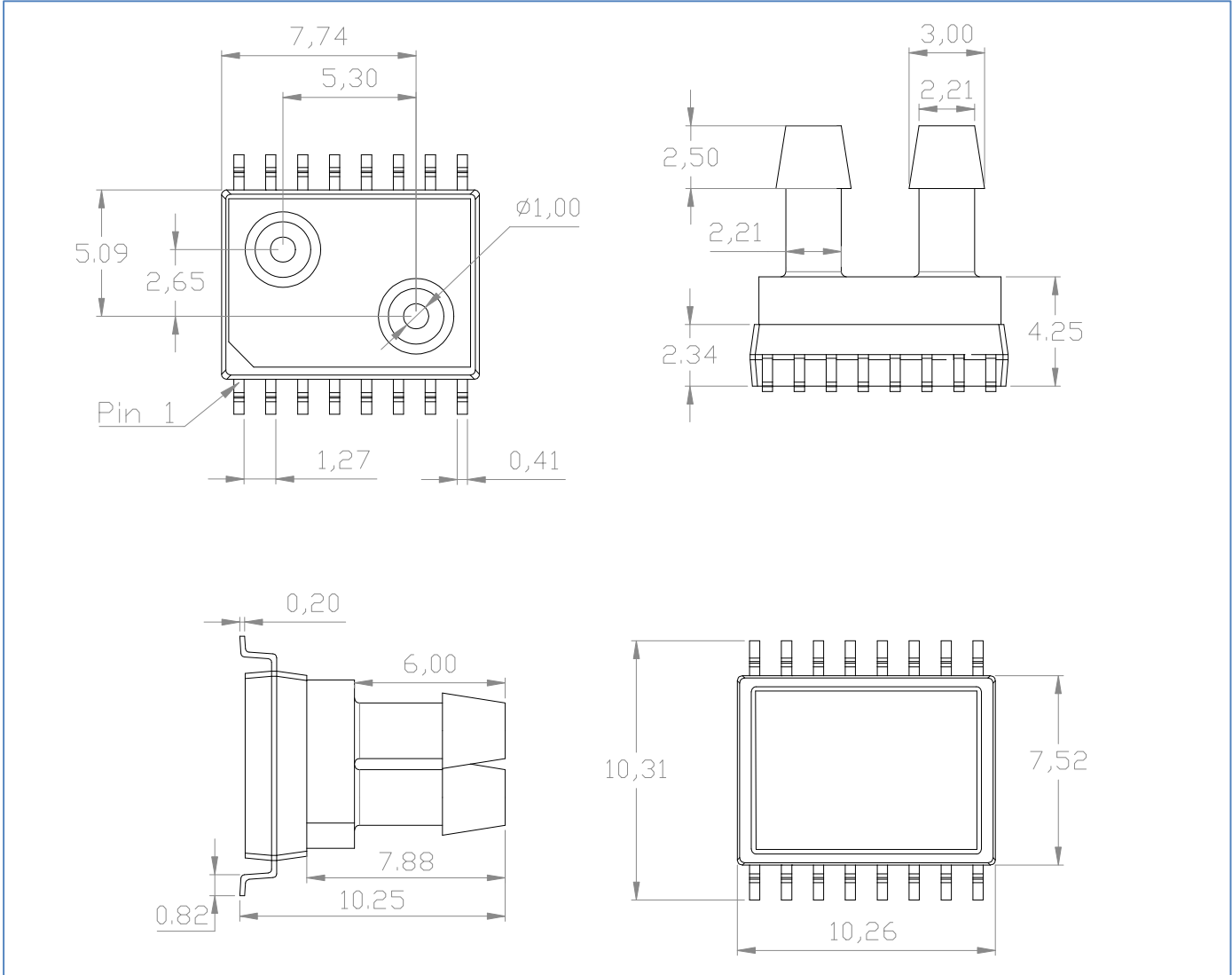


Type 2, 5-95%, Pressure Transfer Function

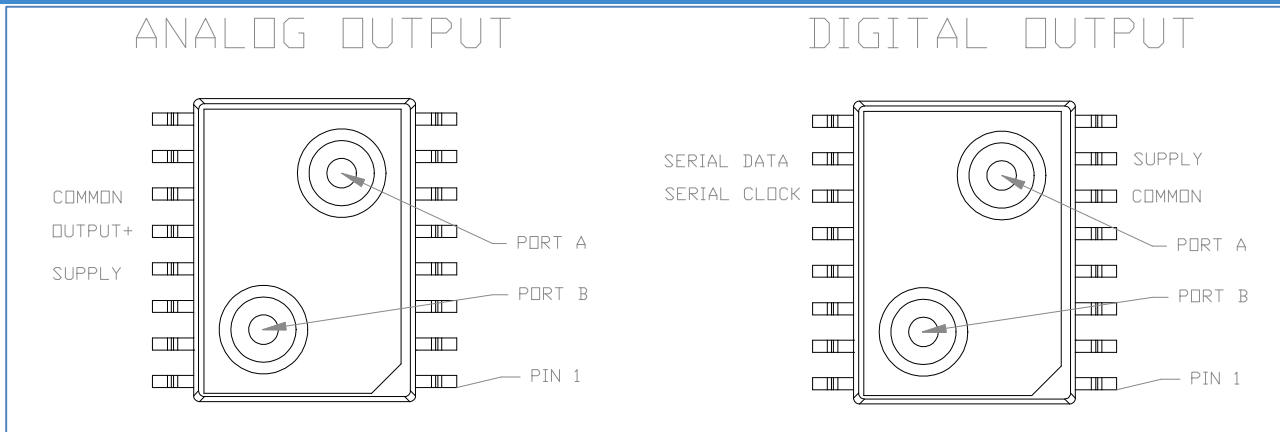


Temperature Transfer Function

### MECHANICAL DIMENSIONS in [mm]



### PORT DESIGNATION



### PART NUMBERING FOR ORDERS

| Series     | Port Type               | Package Style | Pressure Range | Pressure Units | Pressure Type (Range Availability) [Package Availability]  | Calibrated Voltage       | Output Type   | Digital Protocol  | Options                           |
|------------|-------------------------|---------------|----------------|----------------|--|--------------------------|---|---|-----------------------------------|
| MCT-SM9543 | VBD=Vertical Barb, Dual | J= J lead SMT | 005            | MB=mBar        | G= Gage (All Ranges) [All Port Types]<br><br>A=Absolute (All Ranges) [All Port Types]<br><br>B=Bidirectional (All Ranges) [All Port Types] | 3=3.3Vdc<br><br>5=5.0Vdc | Type1= 10 -90% of Supply Voltage<br><br>Type2= 5 -95% of Supply Voltage | I1=I2C, 0x28H<br>I2=I2C, 0x38H<br>I3=I2C, 0x48H [All Packages]<br><br>S1=SPI [All Packages] | -G Gel Coat<br><br>-PG Potted Gel |
|            |                         |               | 010            |                |  |                          |   |   |                                   |
|            |                         |               | 025            | KP=kPa         |  |                          |   |   |                                   |
|            |                         |               | 050            |                |  |                          |   |   |                                   |
|            |                         |               | 001            | PS=PSI         |  |                          |   |   |                                   |
|            |                         |               | 002            |                |  |                          |   |   |                                   |
| 005        | CW=cmH20                |               |                |                |  |                          |   |   |                                   |
| 030        |                         |               |                |                |  |                          |   |   |                                   |
| 010        |                         | IW=inH20      |                |                |  |                          |   |   |                                   |
| 020        |                         |               |                |                |  |                          |   |   |                                   |
| 040        |                         |               |                |                |  |                          |   |   |                                   |
| 100        |                         |               |                |                |  |                          |   |   |                                   |
|            |                         |               | 002            |                |  |                          |   |   |                                   |
|            |                         |               | 005            |                |  |                          |   |   |                                   |
|            |                         |               | 010            |                |  |                          |   |   |                                   |
|            |                         |               | 020            |                |  |                          |   |   |                                   |

#### Part Number Example:

**MCT-SM9543 VBDJ005PSB3111 Vertical Barbed Dual Port, J Leaded SMT Package, -5 to +5 PSI Range, 3.3Vdc Supply, I2C Protocol 0x28H, Pmin=-5, Pmax=+ 5 PSI, 10% to 90% cts.**

### WARRANTY

Pressure sensors have a limited one-year warranty to the original purchaser. AVSensors will repair or replace, at its option, without charge those items it finds defective. This is the buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall AVSensors be liable for consequential, special, or indirect damages. This warranty does not apply to units that have been modified, misused, neglected or installed where the application exceeds published ratings. Specifications may change without notice. The information supplied is believed to be accurate and reliable as of this printing, however, we assume no responsibility for its use.