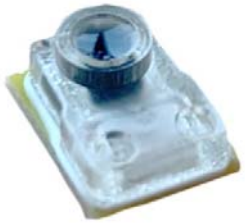
Disposable Blood Pressure Sensor

Low Cost Disposable

Dielectric Gel Barrier

Fully Tested & Calibrated

mV or 24 bits I2C Output



Descriptions

The SA5650 is a fully piezo resistive silicon pressure sensor for use in medical applications such as filtration, chromatography or invasive blood pressure monitoring. The sensor is designed to be used with automated assembly equipment and can be dropped directly into a customer's pressure housing. The sensor is designed to meet the requirements as described in the Association for the Advancement of Medical Instrumentation (AAMI) specification BP22 for medical application like Blood Pressure Transducers.

The pressure sensor consists of a pressure sensing element mounted on a PCB board. SMT resistors on the PCB are laser trimmed or ASIC adjacent to the sensing element for compensation and calibration. A polycarbonate or polysulfone plastic cap is attached to the PCB substrate to provide an easy method of attachment to the customer's assembly and protection for the sensing element. A dielectric gel is placed over the sensor to provide electrical and fluid isolation.

The products are shipped on a tape and reel. Performance characteristics and packaging can be easily tailored on a special order basis to meet the requirements of specific customers.

Features and Applications

Low Cost
Small Size and Reliable Performance
Gel Isolation for Liquids
Operates from 5°C to 50°C
Compatible for Automated Assembly
1% Accuracy for Replacements
5.0 or 40 µV/V/mmHg Sensitivity
Customization for OEM Applications

Surgical Procedures
Intensive Care Units
Infusion Pumps
Kidney Dialysis Machines
Vacuum Assisted Birth
Intrauterine Monitoring
Filtration
Chromatography

Performance specifications

Unless otherwise specified: Supply Voltage: 6.0 V_{DC}, Ambient Temperature: 23°C

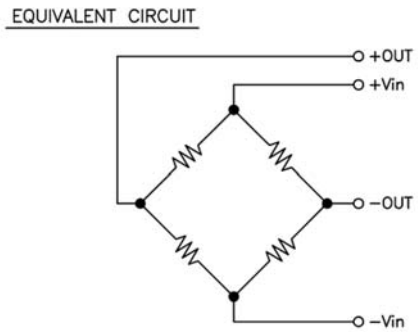
Operating Pressure Range	-50		300	mmHg	
	1		150	psi	
Over Pressure	125		150	psi	
Zero Pressure Offset	-20		20	mmHg	
Sensitivity	4.95	5.00	5.05	µV/V/mmHg	1
Calibration	97.5	100	102.5	mmHg	2
Linearity and Hysteresis (-50 to 100 mmHg)	-1		1	mmHg	3
Linearity and Hysteresis (100 to 300 mmHg)	-1.5		1.5	% Output	3
Linearity and Hysteresis (5 to 150 psi)	-1.5		1.5	% Output	3
Input Impedance					
SA5650-mV	1200		3200	Ω	
SA5650-DO	NA		NA	Ω	
Output Impedance	300		1000	Ω	

Output Symmetry	0.95		1.05	Ratio	4
Supply Voltage	1	6	10	V_{DC} or V_{AC} rms	
Risk Current (@ 230 or 120 V_{AC} rms, 50 or 60Hz)			2	µA	
Warm-Up Time		5		Seconds	
Frequency Response		1200		Hz	
Offset Drift			1	mmHg	5
Thermal Span Shift	-0.1		0.1	%/°C	6
Thermal Offset Shift	-0.3		0.3	mmHg/°C	6
Phase Shift (@ 5KHz)			5	Degrees	
Light Sensitivity (3000 Foot Candle)		1		mmHg	
Defibrillator withstand (400 joules)	5			Discharges	7
Sterilization (ETO)	5			Cycles	8
Operating Temperature	5		50	°C	
Storage Temperature	-25		+70	°C	
Humidity (External)	10-90% (non-condensing)				
Operating Product Life	168 Hours for Medical related application				
Shelf Life	5 Years				
Dielectric Breakdown	$10000V_{DC}$				
Media Interface	Dielectric Gel				
Volume Displacement	4.5×10^{-4} mm^3				
Weight	0.5 grams				

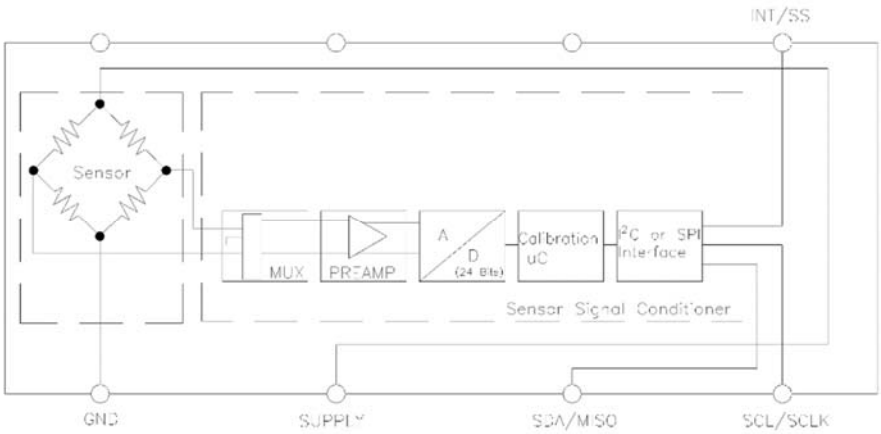
Notes

1. Sensitivity can be calibrated according to customer request from 5-40uV/V/mmHg
2. Output of sensor with no pressure applied and a certain specified resistor placed across +SUPPLY to +OUTPUT.
3. Best fit straight line.
4. Defined as common mode symmetry between any output and supply terminal.
5. Over an 8 hour time period after a 10 second warm-up.
6. Over operating temperature range 5°C–50°C with respect to 23°C.
7. One discharge per minute performed by customer.
8. Sterilization performed by customer, compatible with ETO, GAMMA, or E-Beam sterilization.
9. After curing, meniscus of gel shall be flush to .035" [.89mm] below surface
10. The configuration with polycarbonate plastic cap is not suitable for surface mount operation.
    The configuration with polysulfone plastic cap is suitable for surface mount operation.

Equivalent Circuit



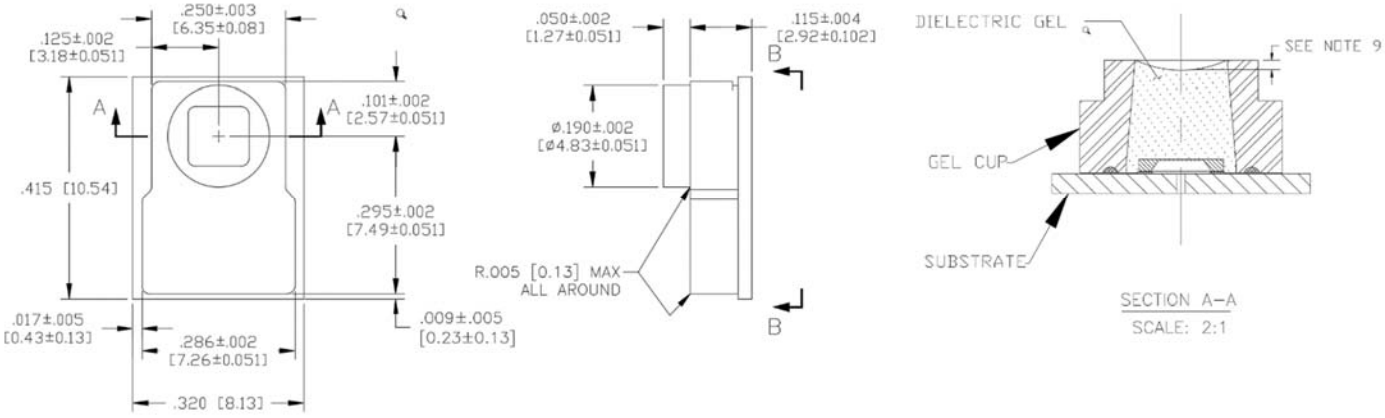
SA5650-mV

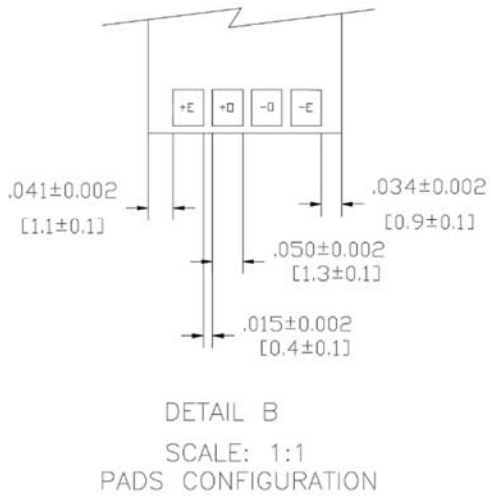


SA5650-DO

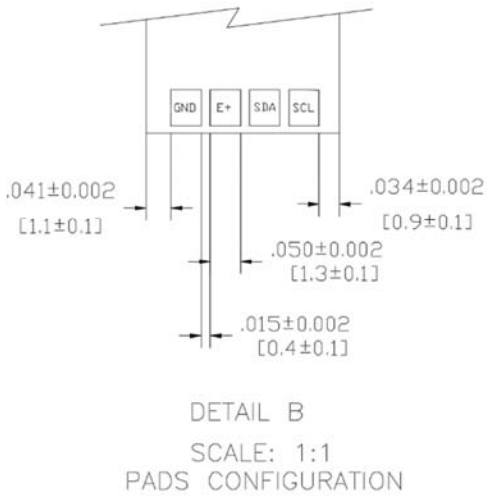
Dimensions and Pad configurations

Units: Inch (millimeter)



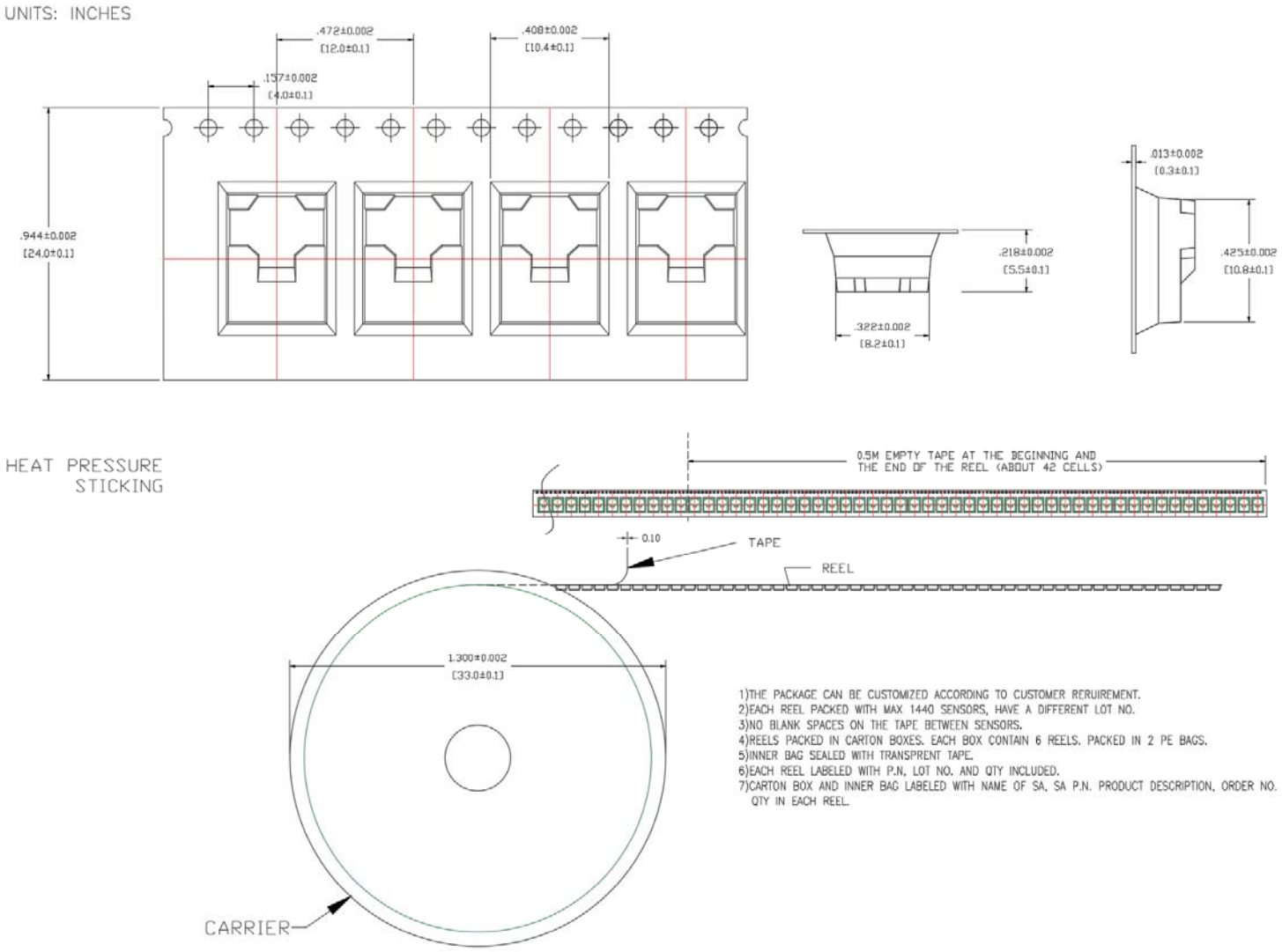


SA5650-mV



SA5650-DO

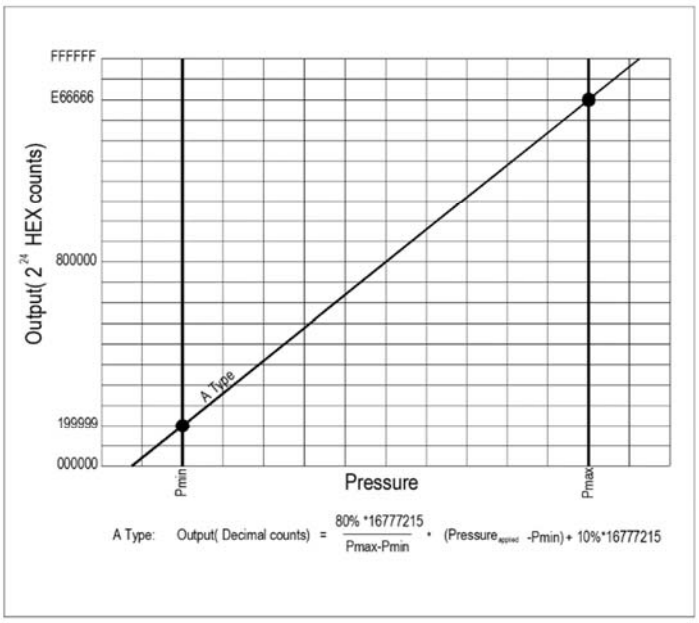
Shipping Tape and Reel information

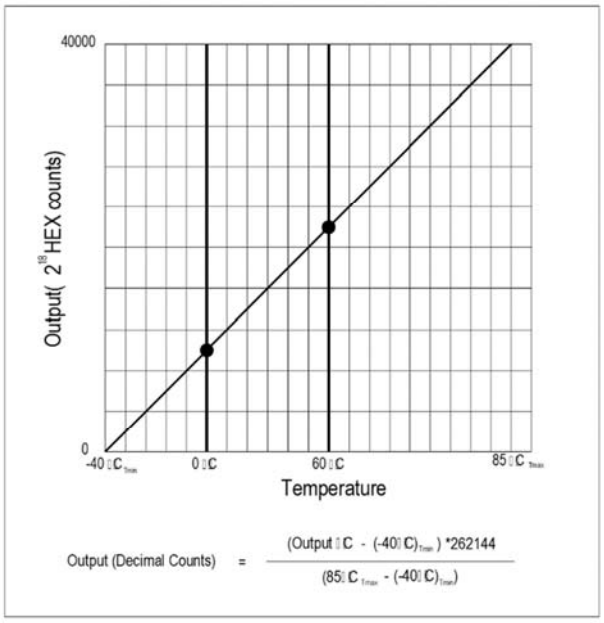


Ordering information

SA5650 -	XX	-	XXX	-	X
			Pressure range		Pressure Unit
	Output type- mV		030		M- mmHg
			100		P- PSI
	Output type- I2C		150		

Digital Output Calculation





I2C Protocol

I2C INTERFACE PARAMETERS					
PARAMETERS	SYMBOL	MIN	TYP	MAX	UNITS
SCLK CLOCK FREQUENCY	FSCL	100		400	KHz
START CONDITION HOLD TIME RELATIVE TO SCL EDGE	tHDSTA	0.1			uS
MINIMUM SCL CLOCK LOW WIDTH @1	tLOW	0.6			uS
MINIMUM SCL CLOCK HIGH WIDTH @1	tHIGH	0.6			uS
START CONDITION SETUP TIME RELATIVE TO SCL EDGE	tSUSTA	0.1			uS
DATA HOLD TIME ON SDA RELATIVE TO SCL EDGE	tHDDAT	0			uS
DATA SETUP TIME ON SDA RELATIVE TO SCL EDGE	tSUDAT	0.1			uS
STOP CONDITION SETUP TIME ON SCL	tSUSTO	0.1			uS
BUS FREE TIME BETWEEN STOP AND START CONDITION	tBUS	2			uS
@1 COMBINED LOW AND HIGH WIDTHS MUST EQUAL OR EXCEED MINIMUM SCL PERIOD.					

I2C INTERFACE TIMING DIAGRAM