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NOTES: UNLESS OTHERWISE SPECIFIED

1. INPUT
   OPERATING SUPPLY VOLTAGE RANGE (Vs): 2.7 TO 5.5 VDC
   INPUT VOLTAGE PROTECTION: -0.3 TO 6 VDC ON Vin PIN,
   -0.3 TO Vs+0.3 ON ALL OTHER PINS
   PROOF PRESSURE (MIN): 1.0 PSI (70 mbar)
   BURST PRESSURE (MIN): 1.5 PSI (103.4 mbar)

2. OUTPUT:
   14-BIT DIGITAL OUTPUT COUNT
   DIGITAL COUNT AT NULL (0% FS): 1638
   DIGITAL COUNT AT FULL SCALE (100% FS): 14745

RANGE	TOTAL ERROR BAND AT 25°C
0-2" 0-5mbar	2% OF SPAN
±2" ±5mbar	1% OF SPAN
0-5" 0-12.5mbar	
±5" ±12.5mbar	
0-10" 0-25mbar	

3. TEMPERATURE ERROR (0 TO 60°C): 0.05% / °C (% OF FULL SCALE SPAN)
   TEMPERATURE ERROR (-20 TO 0°C AND 60 TO 85°C): 5% OF FULL SCALE SPAN

4. ACCURACY: 0.25% MAX (% OF FULL SCALE SPAN)
   (RSS OF LINEARITY, HYSTERESIS AND REPEATABILITY)

5. EXCITATION CURRENT: < 2.5mA

6. RESPONSE TIME: 0.5 ms

7. ENVIRONMENTAL
   OPERATING TEMPERATURE RANGE: -20°C TO 85°C
   STORAGE TEMPERATURE RANGE: -40°C TO 85°C
   VIBRATION: 10 G'S PEAK TO PEAK SINUSOIDAL (20 TO 1600Hz)
   SHOCK: 50 G'S, 1/2 SINEWAVE, 11mSEC PULSE, 18 PULSES (6 PER AXIS)

8. HUMIDITY: UP TO 92% RH IN A NON-CONDENSING ENVIRONMENT

9. RELIABILITY:
   EXPECTED OPERATING LIFE: 10 MILLION FULL PRESSURE CYCLES MINIMUM
   SHELF LIFE: 10 YEARS MINIMUM
   STABILITY: ±1% OF FULL SCALE SPAN FOR 1 YEAR

10. MATERIAL:
    SUBSTRATE: ALUMINA
    COVERS: PPS, 40% GLASS FILLED, BLACK
    SEAL: SILICONE
    TERMINAL PINS: PHOSPHOR BRONZE, TIN PLATED

11. MEDIA: DRY AIR

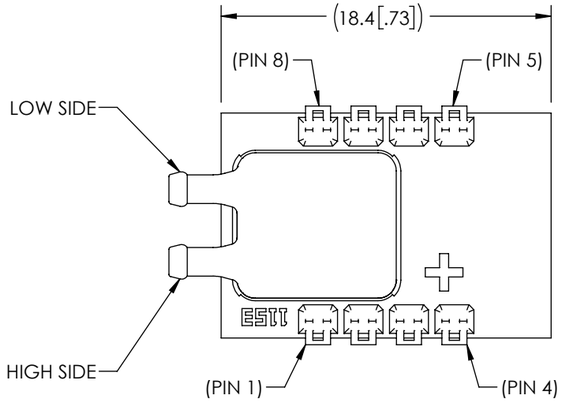
12. PRESSURE CONNECTIONS: TUBE FITTING

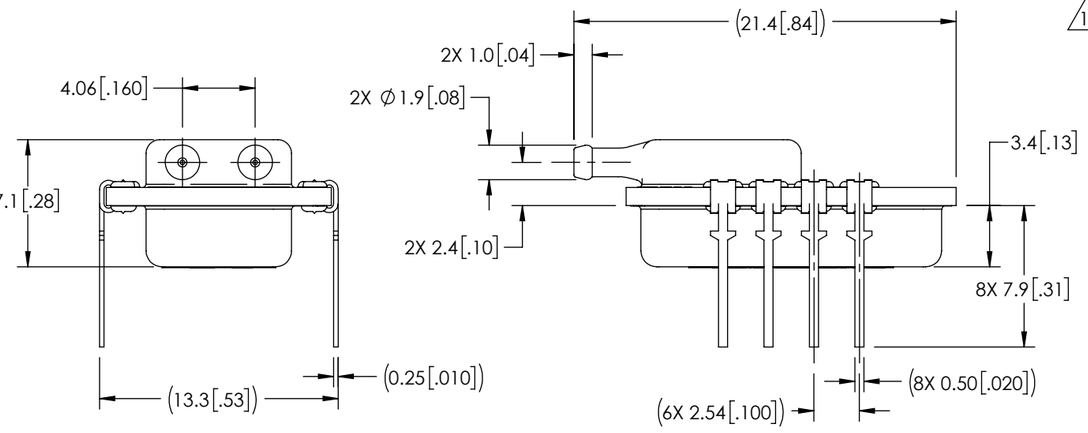
13. WEIGHT: 3.5g MAX

14. ORIENTATION SENSITIVITY:
    ± 0.1% OF FULL SCALE SPAN

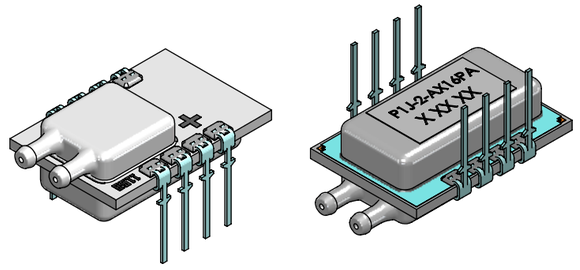
△15. CALIBRATION SOFTWARE FOR SPI OUTPUT HAS NOT BEEN IMPLEMENTED, PLEASE CONTACT THE FACTORY FOR FUTURE REQUEST.

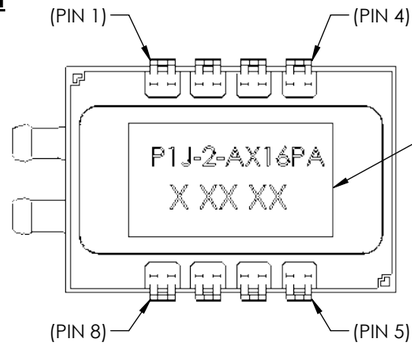
PIN #	OUTPUT TYPE	
	-8 (SPI)	-A THRU -F (I^2C)
1	GND	GND
2	VSUP	VSUP
3	MISO	SDA
4	SCLK	SCL
5	SS	INT
6	N/C	N/C
7	N/C	N/C
8	N/C	N/C





P1J-2-AX16PA SHOWN





PART NUMBER DESIGNATION:
P1J-2-A X 16 P A

PRESSURE RANGE
0-2" H20..... 2
±2" H20..... 2B
0-5" H20..... 5
±5" H20..... 5B
0-10" H20..... 10
±10" H20..... 10B
0-5 mbar..... 5MB
±5 mbar..... 5MBB
±6 mbar..... 6MBB
0-12.5 mbar..... 12.5MB
±12.5 mbar... 12.5MBB
0-25 mbar..... 25MB
±25 mbar..... 25MBB

△15 OUTPUT TYPE
SPI..... 8
I^2C, 28 hex..... A
I^2C, 38 hex..... B
I^2C, 48 hex..... C
I^2C, 58 hex..... D
I^2C, 68 hex..... E
I^2C, 78 hex..... F

SEAL MATERIAL (EXTERNAL)
A..... NONE

BUILT-IN ELECTRICAL CONNECTOR
P..... TERMINAL PIN

PRESSURE PORT
16..... BARB OR TUBE FITTING

SEAL MATERIAL (INTERNAL)
X..... NONE

RECOMMENDED PCB LAYOUT

DATE CODE EXAMPLE: C 1 0 1 5
C MARCH
10 10th DAY OF THE MONTH
15 CURRENT YEAR

PROPOSED SPECIFICATIONS & CONFIGURATIONS FOR PROTOTYPE ONLY -SUBJECT TO CHANGE-

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REMOVE BURRS AND BREAK SHARP EDGES:
MACHINED FILLET RADII TO BE
SPECIAL CHARACTERISTICS PER QCP 154
⌂ SIGNIFICANT TOTAL NUMBER
◊ CRITICAL TOTAL NUMBER
< S > SAFETY CRITICAL TOTAL NUMBER
UNLESS OTHERWISE SPECIFIED

DO NOT SCALE THIS DRAWING
DIMENSIONS ARE IN MILLIMETERS WITH [INCHES] OPTIONAL
DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994
TOL: X ± 0.25 [.XXX ± .010]
X.X ± 0.8 [.XX ± .03] FRACT ± 1/32
X.XX ± 0.25 [.XXX ± .010] ANG ± 1/2°
DRAFT ANGLE 1/2° MAX
√ FINISH PER ASME B46.1-2009 ALL MACHINED SURFACES
THREADS SHALL BE IN ACCORDANCE WITH ASME B1.1-2003
ABBREVIATIONS PER ASME Y1.1-1989

THIRD ANGLE PROJECTION
PART TO BE CLEAN AND OIL FREE
SEE ECO # 10006749 FOR DOCUMENT APPROVALS
ECO DATE: 7/2/19
CUSTOMER
CUSTOMER SPEC. NO.
CUSTOMER DWG. NO.

Sensata Technologies

TITLE
PRESSURE TRANSDUCER

SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	22863	P1J rev E-DWG	E

SCALE NONE | CAD: SOLIDWORKS | SHEET 1 OF 3

F0914 Rev. A

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I²C COMMUNICATION

I²C INTERFACE:

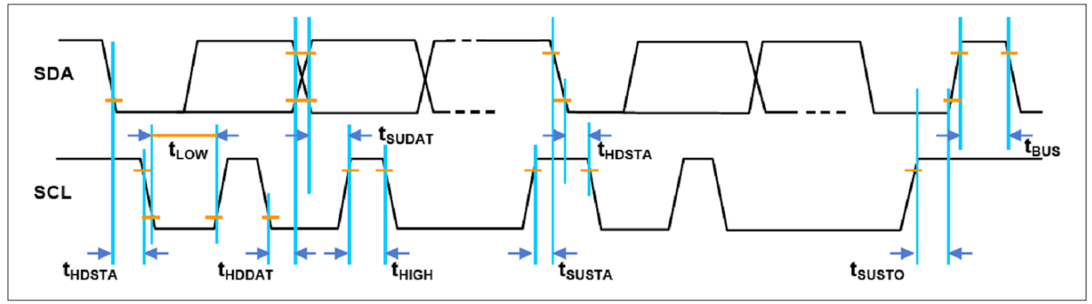
OUTPUT						
RESOLUTION	12 Bits MINIMUM (11BITS MINIMUM FOR 0-2" AND 0-5mb RANGE)					
UPDATE RATE	0.5 ms					
VOLTAGE	**SYMBOL**	**CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNITS**
HIGH-LEVEL INPUT VOLTAGE	V_{IH}	-	0.8 X V_{DD}	-	V_{DD}	V
LOW-LEVEL INPUT VOLTAGE	V_{IL}	-	-	-	0.2 X V_{DD}	V
HIGH-LEVEL OUTPUT VOLTAGE	V_{OH}	-	V_{DD} -0.2	-	V_{DD}	V
LOW-LEVEL OUTPUT VOLTAGE	V_{OL}	-	0	-	0.2	V
PARAMETER						
OUTPUT SOURCING CURRENT	I_{OH_SDA}	SDA @V_{OH}, MIN	-1.9	-3.1	-4.8	mA
	I_{OH_INT}	INT @V_{OH}, MIN	-0.63	-1.2	-1.9	mA
OUTPUT SINK CURRENT	I_{OL_SDA}	SDA @V_{OL}, MAX	2.3	3.9	6.2	mA
	I_{OL_INT}	INT @V_{OL}, MAX	0.85	1.7	3.0	mA
LOAD CAPACITANCE AT SDA	C_{SDA}	@ 400kHz	-	-	200	pF
PULL-UP RESISTOR	R_{I2C_PU}	-	0.5	1	50	kΩ
INPUT CAPACITANCE (EACH PIN)	C_{I2C_IN}	-	-	-	10	pF

TIMING:

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
SCL clock frequency	f_{SCL}	100		400	kHz
Start condition hold time relative to SCL edge	t_{HDSTA}	0.1			µs
Minimum SCL clock low width [1)]	t_{LOW}	0.6			µs
Minimum SCL clock high width [1)]	t_{HIGH}	0.6			µs
Start condition setup time relative to SCL edge	t_{SUSTA}	0.1			µs
Data hold time on SDA relative to SCL edge	t_{HDDAT}	0			µs
Data setup time on SDA relative to SCL edge	t_{SUDAT}	0.1			µs
Stop condition setup time on SCL	t_{SUSTO}	0.1			µs
Bus free time between stop condition and start condition	t_{BUS}	2			µs

1) Combined low and high widths must equal or exceed minimum SCLK period.

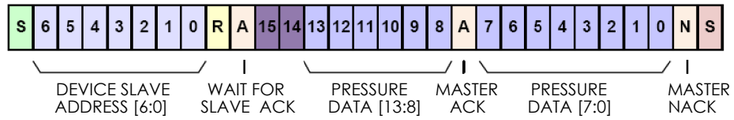
TIMING DIAGRAM:



NOTE: THERE ARE THREE ADJUSTMENTS TO THE I²C IMPLEMENTATION COMPARED WITH THE ORIGINAL I²C PROTOCOL:

- Sending a start-stop condition without any transitions on the CLK line (no clock pulses in between) creates a communication error for the next communication, even if the next start condition is correct and the clock pulse is applied. An additional start condition must be sent, which results in restoration of proper communication.
- The restart condition—a falling SDA edge during data transmission when the CLK clock line is still high—creates the same situation. The next communication fails, and an additional start condition must be sent for correct communication.
- A falling SDA edge is not allowed between the start condition and the first rising SCL edge. If using an I²C™ address with the first bit 0, SDA must be held low from the start condition through the first bit.

I²C COMMUNICATION:



S Start Condition
5 Device Slave Address (example: Bit 5)
2 Data Bit (example: Bit 2)
R Read/Write Bit (example: Read=1)
A Acknowledge (ACK)
N No Acknowledge (NACK)
S Stop Condition
Status Bit

DIAGNOSTIC FEATURES:

THE P1J OFFERS A FULL SUITE OF DIAGNOSTIC FEATURES TO ENSURE ROBUST SYSTEM OPERATION. THE DIAGNOSTIC STATES ARE INDICATED BY A TRANSMISSION OF THE STATUS OF THE 2 MSBs OF THE BRIDGE HIGH BYTE DATA OR BY A SATURATED OUTPUT AT $3FFF_H$

STATUS BITS (2 MSBs OF OUTPUT PACKAGE)	DEFINITION
00	NORMAL OPERATION, GOOD DATA PACKET
01	RESERVED (WILL NOT BE SEEN DURING OPERATION)
10	STALE DATA: DATA THAT HAS ALREADY BEEN FETCHED SINCE THE LAST MEASUREMENT CYCLE. NOTE: IF A DATA FETCH IS PERFORMED BEFORE OR DURING THE FIRST MEASUREMENT AFTER POWER-ON RESET, THEN "STALE" WILL BE RETURNED, BUT THIS DATA IS ACTUALLY INVALID BECAUSE THE FIRST MEASUREMENT HAS NOT BEEN COMPLETED
11	DIAGNOSTIC CONDITION EXISTS

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15 SPI COMMUNICATION

SPI READINGS WILL BE PROVIDED IN A DUPLEX 3-WIRE READ ONLY FORMAT. THE ENTIRE OUTPUT PACKET CONSISTS OF 4 BYTES (32 bits). THE HIGH BYTE OF THE PRESSURE DATA IS TRANSMITTED FIRST, FOLLOWED BY THE LOW BYTE. THEN 14 bits OF OPTIONAL TEMPERATURE DATA [(TC13:0]) ARE SENT. THE LAST 2 bits OF THE FINAL BYTE ARE "DO NOT CARE" AND SHOULD BE IGNORED. IF THE OPTIONAL TEMPERATURE DATA IS REQUIRED, PLEASE CONTACT THE KAVLICO SALES TEAM. FOR ALL OTHER APPLICATIONS, THE READ CAN BE TERMINATED AFTER THE 2ND BYTE.

SPI INTERFACE:

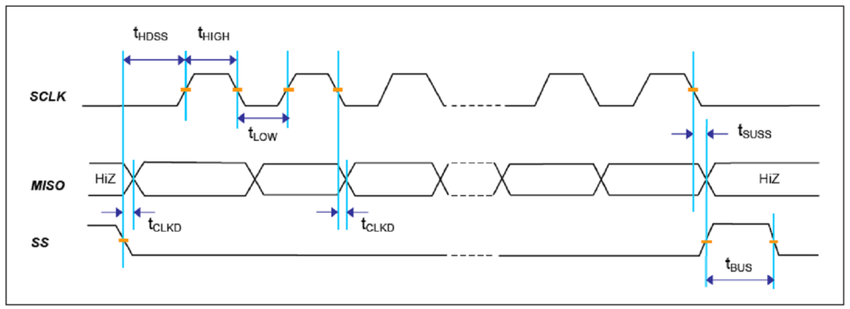
OUTPUT						
RESOLUTION	12 Bits MINUMUM (11 BITS MINIMUM FOR 0-2" AND 0-5mb RANGE)					
UPDATE RATE	0.5 ms					
VOLTAGE	**SYMBOL**	**CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNITS**
HIGH-LEVEL INPUT VOLTAGE	V_{IH}	-	0.8 X V_{DD}	-	V_{DD}	V
LOW-LEVEL INPUT VOLTAGE	V_{IL}	-	-	-	0.2 X V_{DD}	V
HIGH-LEVEL OUTPUT VOLTAGE	V_{OH}	-	V_{DD} -0.2	-	V_{DD}	V
LOW-LEVEL OUTPUT VOLTAGE	V_{OL}	-	0	-	0.2	V
PARAMETER						
OUTPUT SOURCING CURRENT	I_{OH_MISO}	MISO @V_{OH} , MIN	-1.9	-3.1	-4.8	mA
	I_{OH_SS}	SS @V_{OH} , MIN	-0.63	-1.2	-1.9	mA
OUTPUT SINK CURRENT	I_{OL_MISO}	MISO @V_{OL} , MAX	2.3	3.9	6.2	mA
	I_{OL_SS}	SS @V_{OL} , MAX	0.85	1.7	3.0	mA
INPUT CAPACITANCE (EACH PIN)	C_{I2C_IN}	-	-	-	10	pF

TIMING:

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
SCLK clock frequency	f_{SCL}	50		800	kHz
SS drop to first clock edge	t_{HDSS}	2.5			µs
Minimum SCLK clock low width 1)	t_{LOW}	0.6			µs
Minimum SCLK clock high width 1)	t_{HIGH}	0.6			µs
Clock edge to data transition	t_{CLKD}	0		0.5	µs
Rise of SS relative to last clock edge	t_{SUSS}	0.1			µs
Bus free time between rise and fall of SS	t_{BUS}	2			µs

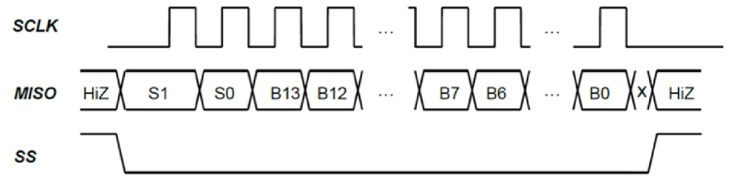
1) Combined low and high widths must equal or exceed minimum SCLK period.

TIMING DIAGRAM:



NOTE: THE MISO LINE IS SETUP TO CHANGE STATE ON THE FALLING EDGE OF THE SCLK CLOCK. ACCORDINGLY, THE MASTER SHOULD SAMPLE THE DATA ON THE RISING EDGE OF THE SCLK SIGNAL.

OUTPUT PACKET WITH POSITIVE EDGE SAMPLING:



PACKET = [{S(1:0), B(13:8)}, { B(7:0)}] WHERE
S(1:0) = STATUS bits OF PACKET (NORMAL, STALE DIAGNOSTIC)
B(13:8) = UPPER 6 bits OF 14-bit PRESSURE DATA
B(7:0) = LOWER 8 bits OF 14-bit PRESSURE DATA
HiZ = HIGH IMPEDANCE

DIAGNOSTIC FEATURES:

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STATUS BITS (2 MSBs OF OUTPUT PACKAGE)	DEFINITION
00	NORMAL OPERATION, GOOD DATA PACKET
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11	DIAGNOSTIC CONDITION EXISTS

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SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	22863	P1J-DWG	E
SCALE NONE	CAD: SOLIDWORKS	SHEET 3 OF 3	