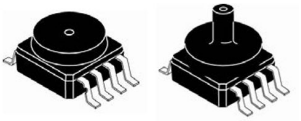
MPXV6115V6, MPXV6115VC6

Datasheet

-115 to 0 kPa, gauge, and absolute pressure sensor

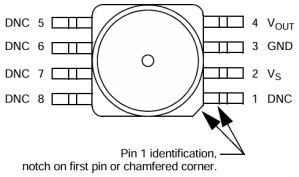
Small outline package



MPXV6115V6U/6T1
Case 98ASB17756C

MPXV6115VC6U
Case 98ASB17757C

Top view



Pinout

Features

- Improved accuracy at high temperature
- 1.5% maximum error from 0 to 85 °C
- Ideally suited for microprocessor- or microcontroller-based systems
- Temperature compensated from -40 to +125 °C
- Durable thermoplastic surface mount package

Applications

- Vacuum pump monitoring
- Brake booster monitoring

Description

The MPXV6115V series sensor integrates on-chip, bipolar op-amp circuitry and thin film resistor networks to provide a high output signal and temperature compensation. The small form factor and high reliability of on-chip integration make this pressure sensor a logical and economical choice for the system designer.

The MPXV6115V series piezoresistive transducer is a state-of-the-art, monolithic, signal conditioned, silicon pressure sensor. This sensor combines advanced micromachining techniques, thin film metallization, and bipolar semiconductor processing to provide an accurate, high level analog output signal that is proportional to applied pressure.

1 Ordering Information

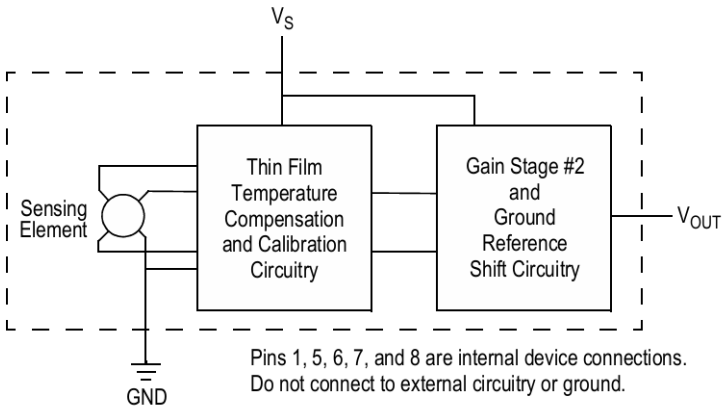
Ordering information									
Device name	Shipping	Package	None	Single	Dual	Gauge	Differential	Absolute	Device Marking
			# of Ports			Pressure Type			
Small Outline Package									
MPXV6115V6U	Rail	98ASB17756C	•			Vacuum/ Gauge			MPXV6115V
MPXV6115V6T1	Tape and Reel	98ASB17756C	•			Vacuum/ Gauge			MPXV6115V
MPXV6115VC6U	Rail	98ASB17757C		•		Vacuum/ Gauge			MPXV6115V

2 General Description

2.1 Block diagram

Figure 1 shows a block diagram of the internal circuitry integrated on a pressure sensor chip.

Figure 1. Integrated pressure sensor block diagram



2.2 Pinout

Figure 2. Device pinout (top view)

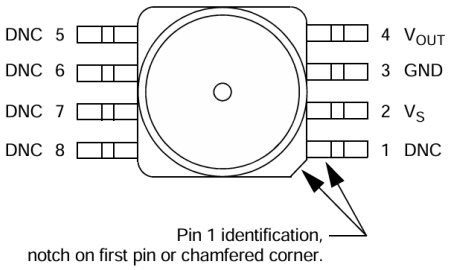


Table 1. Pin functions

Pin	Name	Function
1	DNC	Do not connect to external circuitry or ground. Pin 1 is notated by the notch in the lead or chamfered corner.
2	V_S	Voltage supply
3	GND	Ground
4	V_{OUT}	Output voltage
5	DNC	Do not connect to external circuitry or ground.
6	DNC	Do not connect to external circuitry or ground.
7	DNC	Do not connect to external circuitry or ground.
8	DNC	Do not connect to external circuitry or ground.

3 Mechanical and Electrical Specifications

3.1 Maximum ratings

Table 2. Maximum ratings(1)

Parametrics	Symbol	Value	Units
Maximum pressure (P1 > P2)	P_{max}	400	kPa
Storage temperature	T_{stg}	-40 to +125	°C
Operating temperature	T_A	-40 to +125	°C
Output source current @ full-scale output(2)	I_o+	0.5	mAdc
Output sink current @ minimum pressure offset(2)	I_o-	-0.5	mAdc

1. Exposure beyond the specified limits may cause permanent damage or degradation to the device.
2. Maximum output current is controlled by effective impedance from V_{OUT} to GND or V_{OUT} to V_S in the application circuit.

3.2 Operating characteristics

Table 3. Operating characteristics (V_S = 5.0 V_{DC}, T_A = 25 °C unless otherwise noted, P1 > P2.)

Characteristic	Symbol	Min	Typ	Max	Unit
Pressure range	POP	–115	—	0	kPa
Supply voltage(1)	V_S	4.75	5.0	5.25	V_{DC}
Supply current	I_o	—	6.0	10	mAdc
Full-scale output(2) (0 to 85 °C), @ V_S = 5.0 Volts	V_{FSO}	4.534	4.6	4.665	V_{DC}
Full-scale span(3) (0 to 85 °C), @ V_S = 5.0 Volts	V_{FSS}	—	4.4	—	V_{DC}
Accuracy(4) (0 to 85 °C)	—	—	—	±1.5	$\%V_{FSS}$
Sensitivity	V/P	—	38.26	—	mV/kPa
Response time(5)	t_R	—	1.0	—	ms
Warm-up time(6)	—	—	20	—	ms
Offset stability(7)	—	—	±0.5	—	$\%V_{FSS}$

1. Device is ratiometric within this specified excitation range.
2. Full-scale output (V_{FSO}) is defined as the output voltage at the maximum or full rated pressure.
3. Full-scale span (V_{FSS}) is defined as the algebraic difference between the output voltage at full rated pressure and the output voltage at the minimum rated pressure.
4. Accuracy is the deviation in actual output from nominal output over the entire pressure range and temperature range as a percent of span at 25 °C due to all sources of error including the following:
   Linearity: Output deviation from a straight line relationship with pressure over the specified pressure range.
   Temperature hysteresis:Output deviation at any temperature within the operating temperature range, after the temperature is cycled to and from the minimum or maximum operating temperature points, with zero differential pressure applied.
   Pressure hysteresis: Output deviation at any pressure within the specified range, when this pressure is cycled to and from minimum or maximum rated pressure at 25 °C
   TcSpan: Output deviation over the temperature range of 0 to 85 °C, relative to 25 °C.
   TcOffset: Output deviation with minimum pressure applied, over the temperature range of 0 to 85 °C, relative to 25 °C.

5. Response time is defined as the time for the incremental change in the output to go from 10% to 90% of its final value when subjected to a specified step change in pressure.
6. Warm-up time is defined as the time required for the product to meet the specified output voltage after the pressure has been stabilized.
7. Offset stability is the product's output deviation when subjected to 1000 cycles of Pulsed Pressure, Temperature Cycling with Bias Test.

4 On-chip Temperature Compensation and Calibration

Figure 3 illustrates the absolute sensing chip in the basic small outline chip carrier ().

Figure 4 shows a typical application circuit (output source current operation).

Figure 5 shows the sensor output signal relative to pressure input. Typical minimum and maximum output curves are shown for operation over 0 to 85 °C temperature range. The output will saturate outside of the rated pressure range.

A fluorosilicone gel isolates the die surface and wire bonds from the environment, while allowing the pressure signal to be transmitted to the silicon diaphragm. The MPXV6115V series pressure sensor operating characteristics, internal reliability and qualification tests are based on use of dry air as the pressure media. Media other than dry air may have adverse effects on sensor performance and long-term reliability. Contact the factory for information regarding media compatibility in your application.

The MPXV6115V is optimized to perform in vacuum pressures applied to port P1. The sensor is calibrated and temperature compensated to give a positive electrical output upon measuring a vacuum pressure up to the rated pressure of up to -115 kPa where the output will be the full-scale voltage listed in Table 3.

Figure 3. Cross-sectional diagram (not-to-scale)

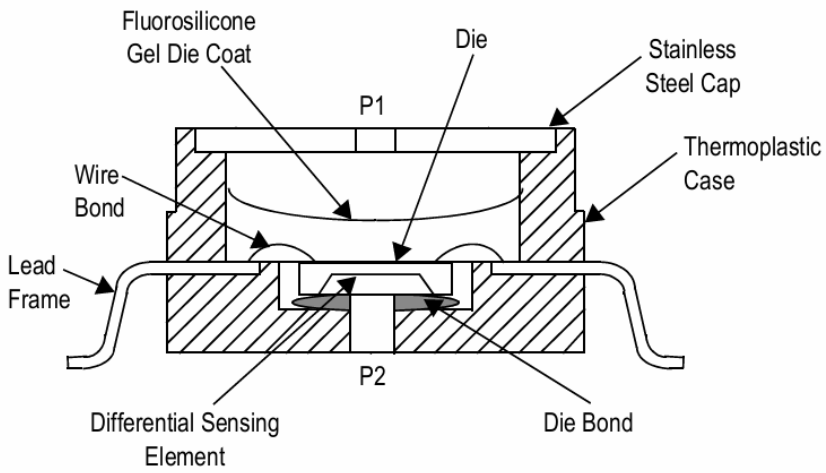


Figure 4. Typical application circuit (output source current operation)

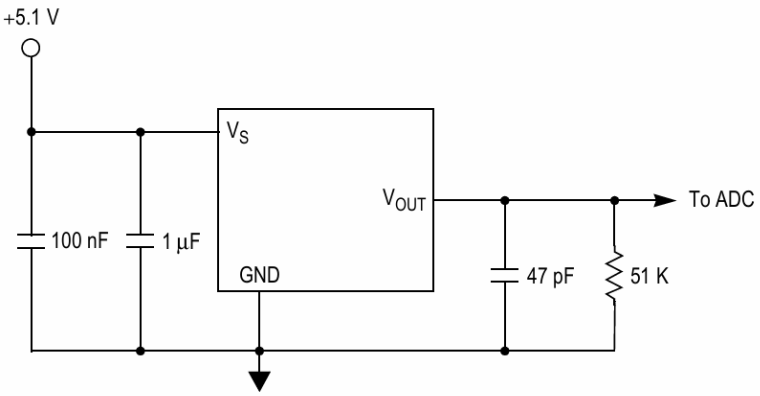


Figure 5. **Output vs. Absolute Pressure**

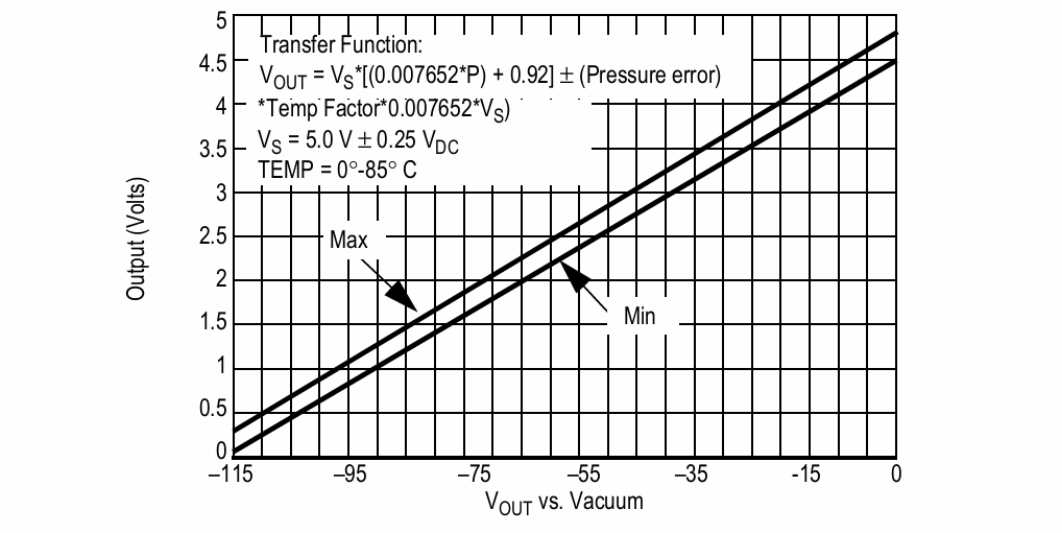
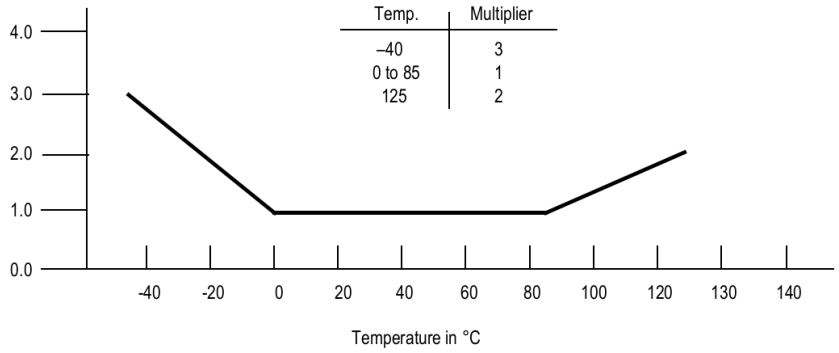


Figure 6. **Transfer function**

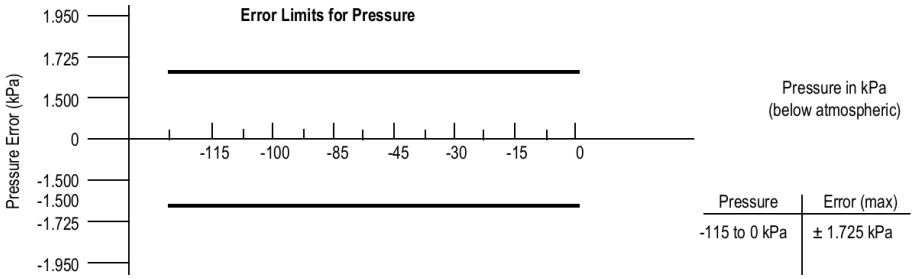
Nominal Transfer Value: $V_{OUT} = V_S$ x (0.007652 x P + 0.92)
± (Pressure Error x Temp. Factor x 0.007652 x V_S)
V_S = 5.0 ± 0.25 V_{DC}

Figure 7. **Temperature error band**



NOTE: The temperature multiplier is a linear response from 0 to –40 °C and from 85 to 125 °C.

Figure 8. **Pressure error band**



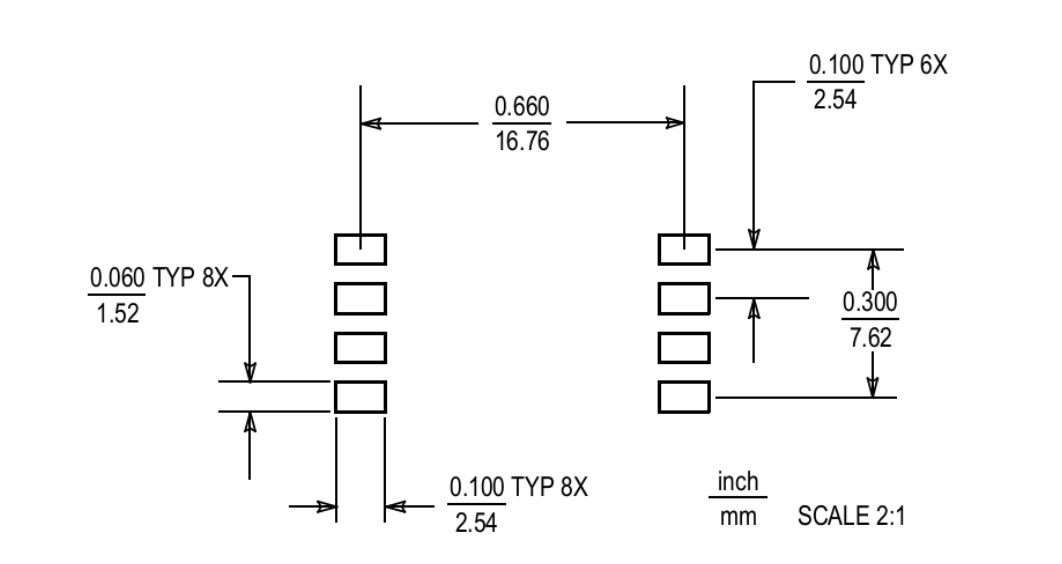
Pressure	Error (max)
-115 to 0 kPa	± 1.725 kPa

5 Package Information

5.1 Minimum recommended footprint for surface mounted applications

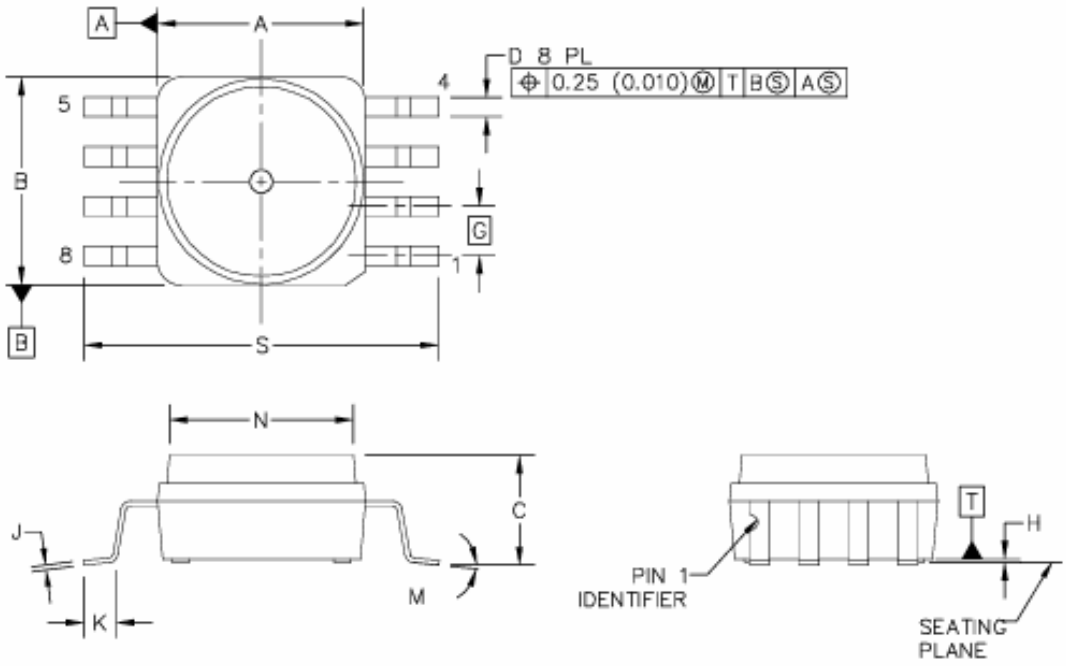
Surface mount board layout is a critical portion of the total design. The footprint for the surface mount packages must be the correct size to ensure proper solder connection interface between the board and the package. With the correct footprint, the packages will self align when subjected to a solder reflow process. It is always recommended to design boards with a solder mask layer to avoid bridging and shorting between solder pads.

Figure 9. SOP footprint (case 98ASB17756C)



5.2 Package Dimensions

Figure 10. **Case 98ASB17756C, small outline package, surface mount**



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	10.54	10.79	0.415	0.425
B	10.54	10.79	0.415	0.425
C	5.38	5.84	0.212	0.230
D	0.96	1.07	0.038	0.042
G	2.54 BSC		0.100 BSC	
H	0.05	0.25	0.002	0.010
J	0.23	0.28	0.009	0.011
K	1.55	1.80	0.061	0.071
M	0°	7°	0°	7°
N	10.29	10.54	0.405	0.415
S	18.01	18.41	0.709	0.725

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION "A" AND "B" DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.

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	STANDARD: NON-JEDEC	
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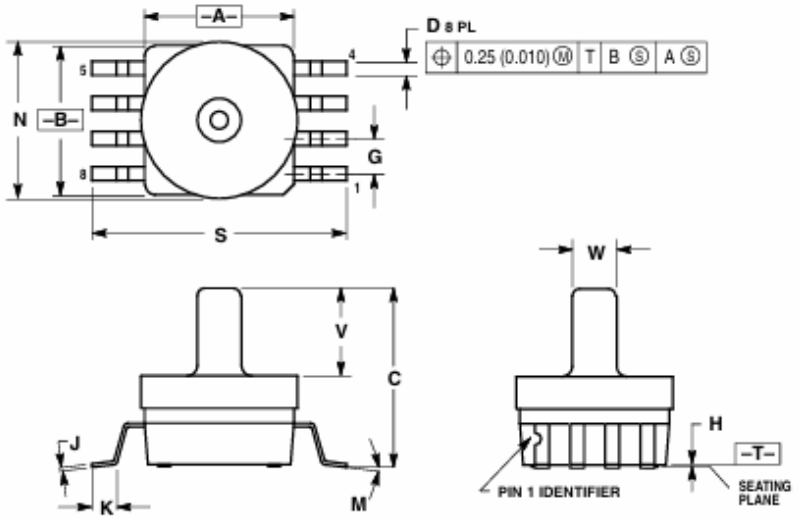
Figure 11. Case 98ASB17757C, small outline package, through-hole



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.415	0.425	10.54	10.79
B	0.415	0.425	10.54	10.79
C	0.500	0.520	12.70	13.21
D	0.038	0.042	0.96	1.07
G	0.100 BSC		2.54 BSC	
H	0.002	0.010	0.05	0.25
J	0.009	0.011	0.23	0.28
K	0.061	0.071	1.55	1.80
M	0°	7°	0°	7°
N	0.444	0.448	11.28	11.38
S	0.709	0.725	18.01	18.41
V	0.245	0.255	6.22	6.48
W	0.115	0.125	2.92	3.17

Revision history

Table 1. **Document revision history**

Date	Revision	Changes
09-Jun-2026	1	Initial release from ST, rebranded NXP document

Contents

1 **Ordering Information** 2
2 **General Description** 3
2.1 Block diagram 3
2.2 Pinout 3
3 **Mechanical and Electrical Specifications** 4
3.1 Maximum ratings 4
3.2 Operating characteristics 4
4 **On-chip Temperature Compensation and Calibration** 6
5 **Package Information** 9
5.1 Minimum recommended footprint for surface mounted applications 9
5.2 Package Dimensions 10
Revision history 12

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