

# PS113

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## **3-Channel Secondary Monitoring IC**



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## PS113

### 3-Channel Secondary Monitoring IC

#### General Description

PS113 is specially designed for switching power supply system. Three important functions of PS113 are the following: over-voltage protection, short circuit protection and power good signal generating.

OVP (Over Voltage Protection) monitors 5V, 12V and 3.3V to protect our power supply and PC, when one of these supply voltages exceeds their normal operation voltage.

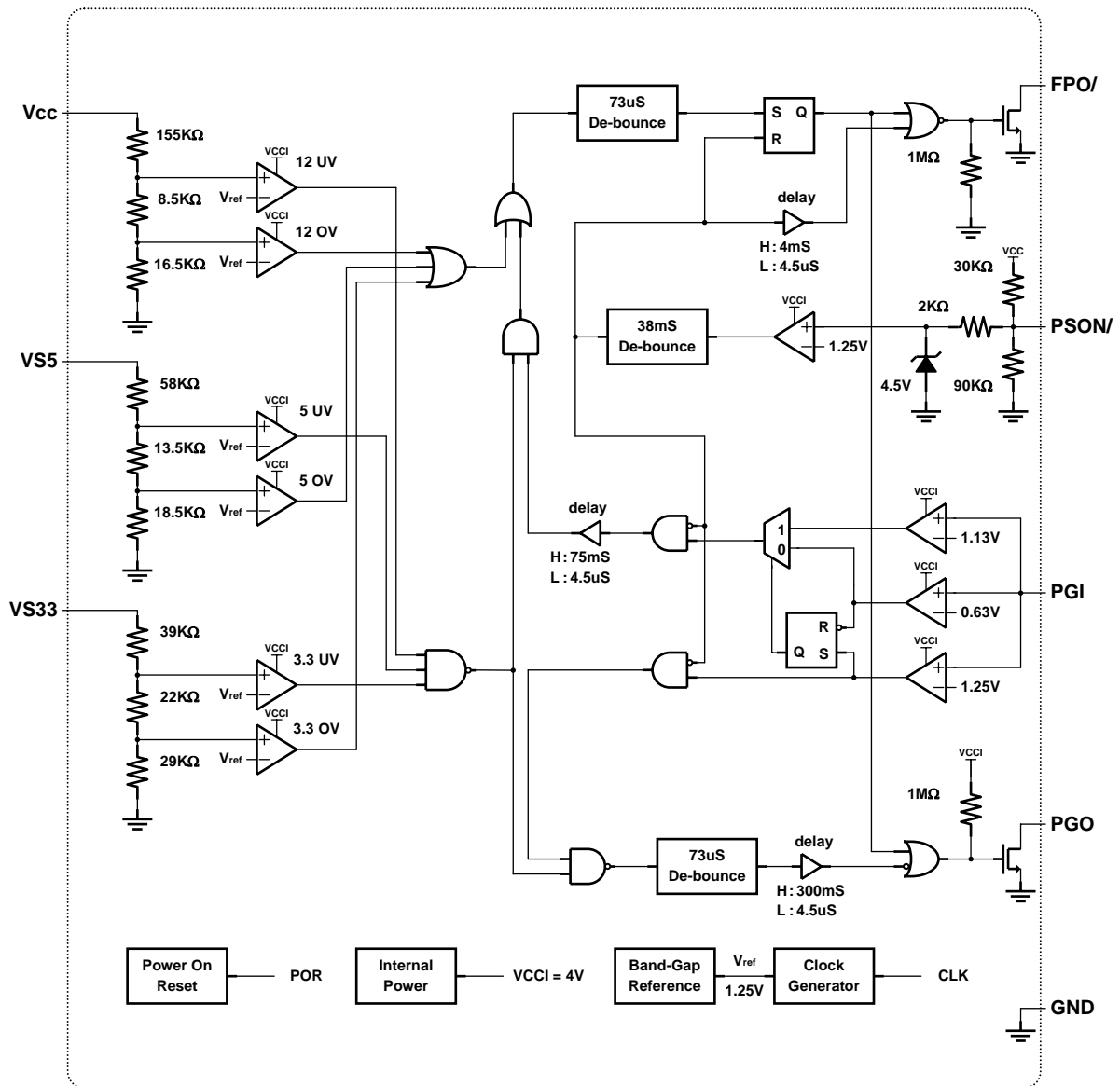
Short circuit protection is done by UVP (Under Voltage Protection). When power supply is in short circuit, the supply voltages will be much smaller than their normal operation voltages. We can use UVP to monitor our power supply whether it is in the dangerous power load.

Power good signal generating notifies personal computer when power supply is ready or power supply is going to shutdown, therefore it can provide a reliable power supply environment.

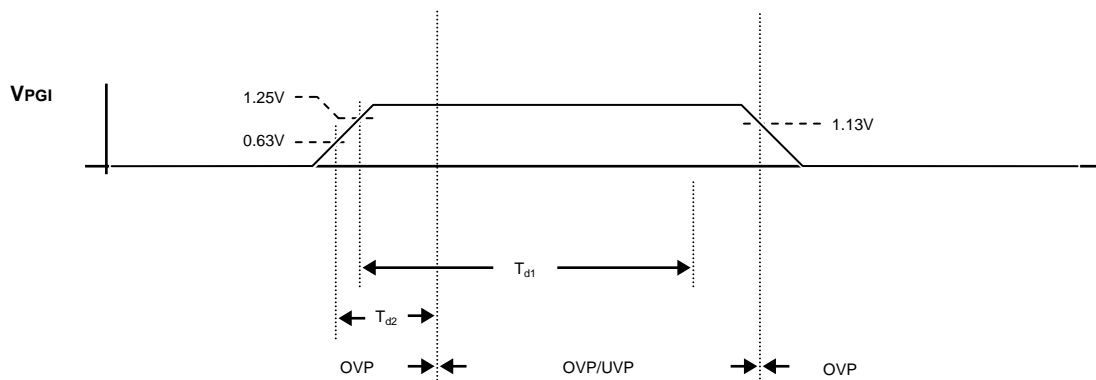
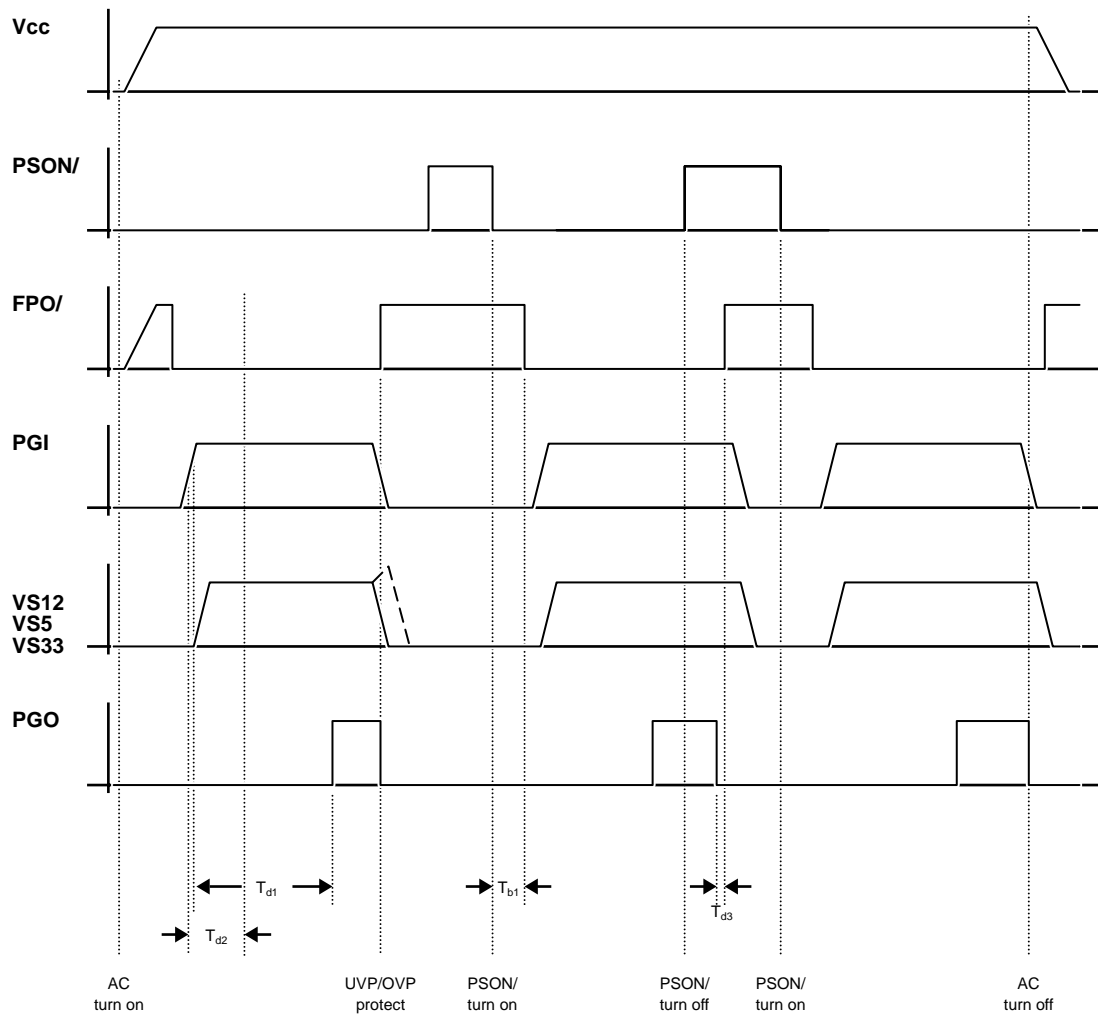
#### Features

- Over voltage protection and lock out
- Short circuit protection and lock out
- Fault protection output with open drain output stage
- Open drain power good output signal for power good input
- Built-in 300ms power good delay
- 75ms delay for short-circuit turn on protection
- 38ms PSON control de-bounce
- 73us de-bounce for noise immunity
- Wide power supply range from 4V to 16V
- Pin to pin compatible with TPS3510
- Special care for AC power off
- Additional 12V UVP protection

## Block Diagram



## Timing Chart



## Pin Descriptions

| Pin No | PIN NAME | Descriptions  |
|--------|----------|---|
| 1      | PGI      | Power good input signal pin                               |
| 2      | GND      | Ground  |
| 3      | FPO      | Inverted fault protection output ,open drain output stage |
| 4      | PSON     | ON/OFF control input pin                                  |
| 5      | VS33     | 3.3V over/under voltage protection input pin              |
| 6      | VS5      | 5.0V over/under voltage protection input pin              |
| 7      | VCC      | Supply voltage/12V over voltage protection input pin      |
| 8      | PGO      | Power good output signal pin , open drain output stage    |

## Absolute Maximum Ratings

| Parameter             |                     | Rating      | Unit                         |   |
|-----------------------|---------------------|-------------|------------------------------|---|
| Storage Temperature   | (T <sub>stg</sub> ) | -40 to +125 | °C                           |   |
| Operating Temperature | (T <sub>opr</sub> ) | -30 to +90  | °C                           |   |
| Supply Voltage        | (V <sub>cc</sub> )  | VCC         | V                            |   |
| Input Voltage Range   | (V <sub>i</sub> )   | VS33,VS5    | -0.5 to V <sub>cc</sub> +0.5 | V |
|                       |                     | PGI         | -0.5 to +16.0                | V |
|                       |                     | PSON/       | -0.5 to V <sub>cc</sub> +0.5 | V |
| Output Voltage Range  | (V <sub>o</sub> )   | FPO/        | -0.5 to +16.0                | V |
|                       |                     | PGO         | -0.5 to V <sub>cc</sub> +0.5 | V |
| ESD Susceptibility*   | (V <sub>ESD</sub> ) | > 2500      | V                            |   |

\* Human Body Model (HBM).

## Electrical characteristics, V<sub>cc</sub>=12V, T<sub>a</sub> = 25°C. (unless otherwise specified)

### Power Supply Section

| Parameter  | Conditions              | MIN | TYP | MAX  | Unit |
|--|-------------------------|-----|-----|------|------|
| Supply Voltage                                       |                         | 3.8 | 5.0 | 16.0 | V    |
| Supply Current                                       | V <sub>PSON/</sub> = 5V |     | 2   | 3    | mA   |
| Power On Reset Threshold Voltage (V <sub>POR</sub> ) |                         |     | 3.6 |      | V    |
| Power On Reset Hysteresis (V <sub>HYST</sub> )       |                         |     |     | ±0.6 | V    |

## Electrical Characteristics (Continued)

### Over-Voltage Section

| Parameter              |      | Conditions | MIN  | TYP  | MAX  | Unit |
|------------------------|------|------------|------|------|------|------|
| Over-Voltage Threshold | VS33 |            | 3.7  | 3.9  | 4.1  | V    |
|                        | VS5  |            | 5.7  | 6.1  | 6.5  | V    |
|                        | VS12 |            | 13.2 | 13.8 | 14.4 | V    |

### Under-Voltage Section

| Parameter               |      | Conditions | MIN | TYP | MAX | Unit |
|-------------------------|------|------------|-----|-----|-----|------|
| Under-Voltage Threshold | VS33 |            | 2.0 | 2.2 | 2.4 | V    |
|                         | VS5  |            | 3.3 | 3.5 | 3.7 | V    |
|                         | VS12 |            | 8.5 | 9.0 | 9.5 | V    |

### PSON/, Analog Input

| Parameter                 |  | Conditions | MIN | TYP | MAX | Unit |
|---------------------------|--|------------|-----|-----|-----|------|
| Threshold Voltage         |  |            | 0.9 | 1.2 | 1.5 | V    |
| Hysteresis ( $V_{HYST}$ ) |  |            |     | ±50 |     | mV   |

### PGI, Analog Input

| Parameter                            |  | Conditions | MIN  | TYP  | MAX  | Unit |
|--------------------------------------|--|------------|------|------|------|------|
| Threshold Voltage for start $T_{d1}$ |  |            | 1.16 | 1.25 | 1.33 | V    |
| Threshold Voltage for start $T_{d2}$ |  |            | 0.60 | 0.63 | 0.75 | V    |
| Threshold Voltage for mask OC,UV     |  |            | 1.05 | 1.13 | 1.21 | V    |
| Hysteresis ( $V_{HYST}$ )*           |  |            |      | ±50  |      | mV   |

\* All of the comparator for PGI input in block diagram.

### PGO, Open Drain Digital Output

| Parameter                             |  | Conditions      | MIN | TYP | MAX | Unit |
|---------------------------------------|--|-----------------|-----|-----|-----|------|
| Leakage Current ( $I_{LKG}$ )         |  | $V_{PGO}=5V$    |     |     | 5   | uA   |
| Low Level Output Voltage ( $V_{OL}$ ) |  | $I_{SINK}=10mA$ |     |     | 0.4 | V    |

## Electrical Characteristics (Continued)

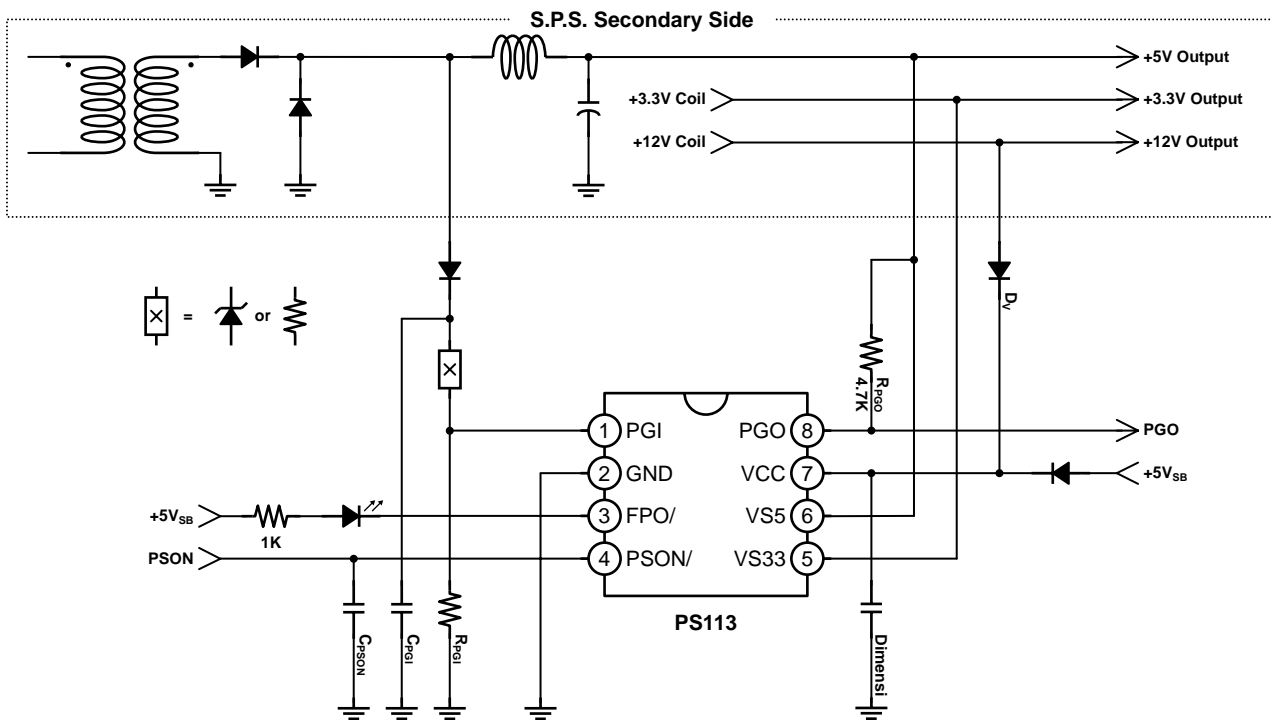
### FPO/, Open Drain Digital Output

| Parameter                             | Conditions      | MIN | TYP | MAX | Unit    |
|---------------------------------------|-----------------|-----|-----|-----|---------|
| Leakage Current ( $I_{LKG}$ )         | $V_{FPO}=5V$    |     |     | 5   | $\mu A$ |
| Low Level Output Voltage ( $V_{OL}$ ) | $I_{SINK}=10mA$ |     |     | 0.3 | V       |
|                                       | $I_{SINK}=30mA$ |     |     | 0.7 | V       |

### Switching Characteristics, $V_{CC}=5V, T_a = 25^\circ C$ .

| Parameter                             | Conditions | MIN | TYP | MAX | Unit    |
|---------------------------------------|------------|-----|-----|-----|---------|
| PGI to PGO Delay Time ( $T_{d1}$ )    |            | 200 | 300 | 480 | mS      |
| Short Circuit Delay Time ( $T_{d2}$ ) |            | 49  | 75  | 100 | mS      |
| PGO to FPO/ Delay Time ( $T_{d3}$ )   |            | 2   | 4   | 6   | mS      |
| PSON/ De-bounce Time ( $T_{b1}$ )     |            | 24  | 38  | 50  | mS      |
| Noise De-glitch Time ( $T_{b2}$ )     |            | 47  | 73  | 120 | $\mu S$ |

## Application

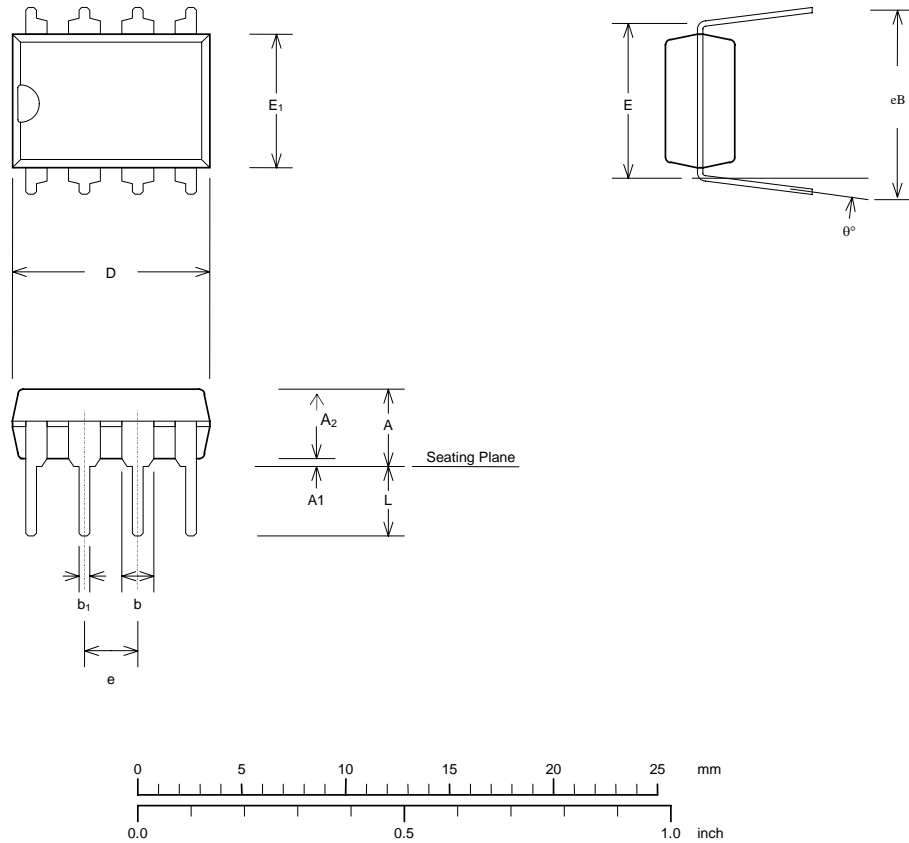


Note1: Zener diode or resistor or both of them can be used in component X.

Note2: The bypass capacitor  $C_{by}$  suggests to be 0.1 $\mu F$ ~ 10 $\mu F$  and layout nearby pin VCC.

## Package Specification

( 8-pin DIP )

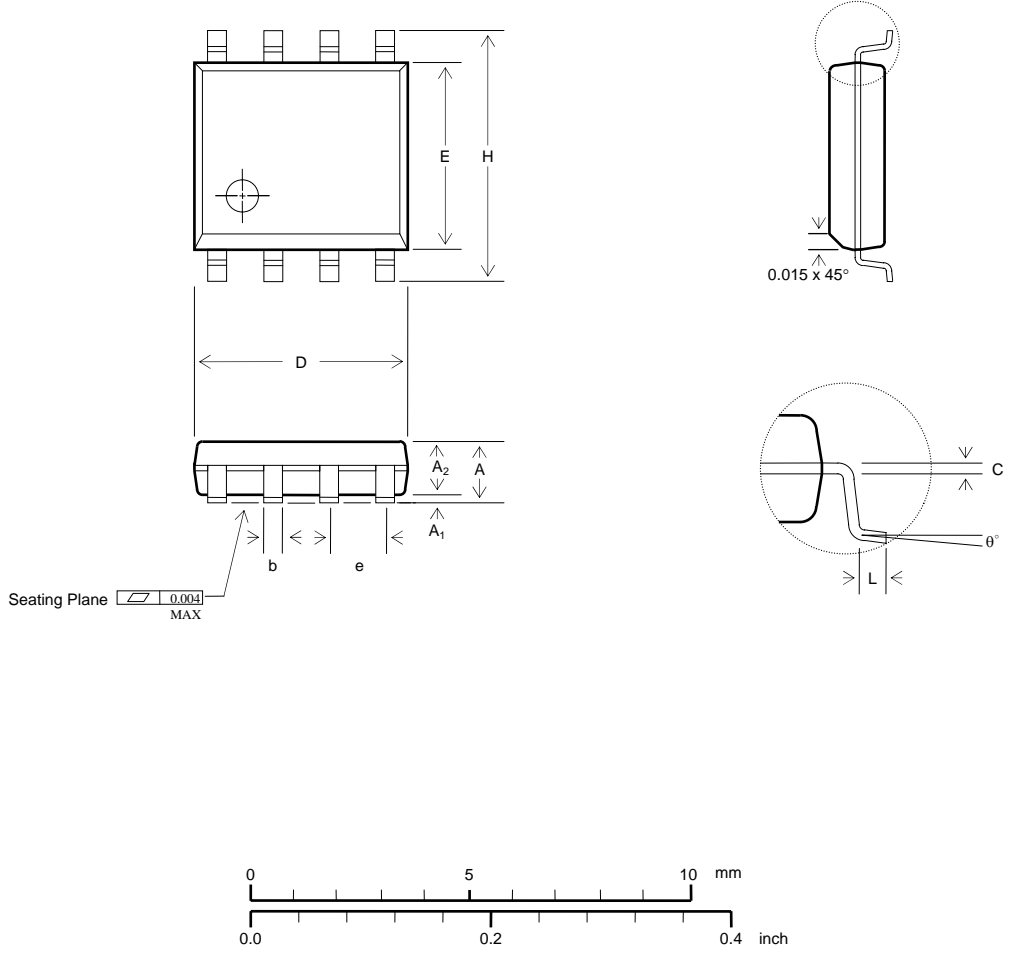


| Symbol         | Dimension in mm |        |        | Dimension in inch |        |       | NOTE |
|----------------|-----------------|--------|--------|-------------------|--------|-------|------|
|                | Min             | Normal | Max    | Min               | Normal | Max   |      |
| A              |                 |        | 5.334  |                   |        | 0.210 |      |
| A <sub>1</sub> | 0.381           |        |        | 0.015             |        |       |      |
| A <sub>2</sub> | 3.175           | 3.302  | 3.429  | 0.125             | 0.13   | 0.135 |      |
| b              |                 | 1.524  |        |                   | 0.06   |       |      |
| b <sub>1</sub> |                 | 0.457  |        |                   | 0.018  |       |      |
| D              | 9.017           | 9.271  | 10.160 | 0.355             | 0.365  | 0.4   |      |
| E              | 7.366           | 7.620  | 7.874  | 0.290             | 0.300  | 0.310 |      |
| E <sub>1</sub> | 6.223           | 6.376  | 6.528  | 0.245             | 0.251  | 0.257 |      |
| e              |                 | 2.540  |        |                   | 0.100  |       |      |
| eB             | 8.509           | 9.017  | 9.525  | 0.335             | 0.355  | 0.375 |      |
| L              | 2.921           | 3.302  | 3.810  | 0.115             | 0.13   | 0.150 |      |
| $\theta^\circ$ | 0               | 7      | 15     | 0                 | 7      | 15    |      |



**Package Specification (Continued)**

( 8-pin SOP )



| Symbol         | Dimension in mm |        |       | Dimension in inch |        |       | NOTE |
|----------------|-----------------|--------|-------|-------------------|--------|-------|------|
|                | Min             | Normal | Max   | Min               | Normal | Max   |      |
| A              | 1.346           |        | 1.753 | 0.053             |        | 0.069 |      |
| A <sub>1</sub> | 0.102           |        | 0.254 | 0.004             |        | 0.010 |      |
| A <sub>2</sub> | 1.346           |        | 1.499 | 0.053             |        | 0.059 |      |
| b              |                 | 0.406  |       |                   | 0.016  |       |      |
| c              |                 | 0.203  |       |                   | 0.008  |       |      |
| D              | 4.801           |        | 4.978 | 0.189             |        | 0.196 |      |
| E              | 3.810           |        | 3.988 | 0.150             |        | 0.157 |      |
| e              |                 | 1.270  |       |                   | 0.050  |       |      |
| H              | 5.791           |        | 6.198 | 0.228             |        | 0.244 |      |
| L              | 0.406           |        | 1.270 | 0.016             |        | 0.050 |      |
| $\theta^\circ$ | 0               |        | 8     | 0                 |        | 8     |      |

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