

## SG6510X1 — PC Power Supply Supervisors

### Features

- Over-Voltage Protection (OVP) for 3.3V, 5V, 12V
- Under-Voltage Sense (UVS) and Under-Voltage Protection (UVP) for 3.3V, 5V
- Open-Drain Output for PGO and FPO Pins
- 300ms Power-Good Delay
- 75ms Turn-on Delay for 3.3V and 5V
- 2.8ms PSON Control to FPO Turn-off Delay
- 38ms /38ms PSON Control Debounce
- 350µs Width Noise Deglitches
- 2ms UVP Debounce Time
- 1ms UVS Debounce Time
- No Lockup During the Fast AC Power On/Off
- Brownout Protection Function for 3.3V and 5V
- Wide Supply Voltage Range from 4V to 15V


### Description

SG6510 is designed to provide the voltage supervisor function, remote on/off PSON function, power-good (PGO) indicator function, and fault protection (FPO) function for switching power systems.

For the supervisor function, it provides the over-voltage protection (OVP) monitoring for 3.3V, 5V, and 12V (12V via VDD pin); under-voltage sense (UVS) monitoring for 3.3V and 5V; and under-voltage protection (UVP) monitoring for 3.3V and 5V. When 3.3V or 5V voltage is decreasing to 2.8V and 4.2V, respectively, the under-voltage sense (UVS) function is enabled to reset the PGO signal from high to low. If 3.3V or 5V voltage is further decreasing to 2.5V and 3.6V, respectively, FPO is set high to turn off the PWM controller IC. To achieve better immunity for lightning surge glitch and to prevent accidental power shut down during dynamic loading condition, the debounce time for UVP and UVS is 2ms/1ms, respectively. The deglitch time for OVP is 75µs for better noise immunity. During an AC sag or brownout situation, UVP functions can still be enabled to protect power supply in case of output short circuit.

The power supply is turned on after 38ms debounce time when the PSON signal is set from high to low. To turn off the power supply, the PSON signal is set from low to high and the debounce time is 38ms. The PGI circuitry provides a sufficient power-down warning signal for PGO. When PGI input is lower than the internal 1.2V reference voltage, after 350µs debounce time, the PGO signal is pulled low.

### Ordering Information

| Part Number | Operating Temperature Range | Package |  Eco Status | Packing Method |
|-------------|-----------------------------|---------|---|----------------|
| SG6510DY1   | -40°C to +125°C             | DIP-8   | Green   | Tube           |
| SG6510DZ1   | -40°C to +125°C             | DIP-8   | RoHS  | Tube           |
| SG6510SZ1   | -40°C to +125°C             | SOP-8   | RoHS  | Tape & Reel    |
| SG6510SY1   | -40°C to +125°C             | SOP-8   | Green   | Tape & Reel    |

 For Fairchild's definition of "green" please visit: [http://www.fairchildsemi.com/company/green/rohs\\_green.html](http://www.fairchildsemi.com/company/green/rohs_green.html).

### Application Diagram

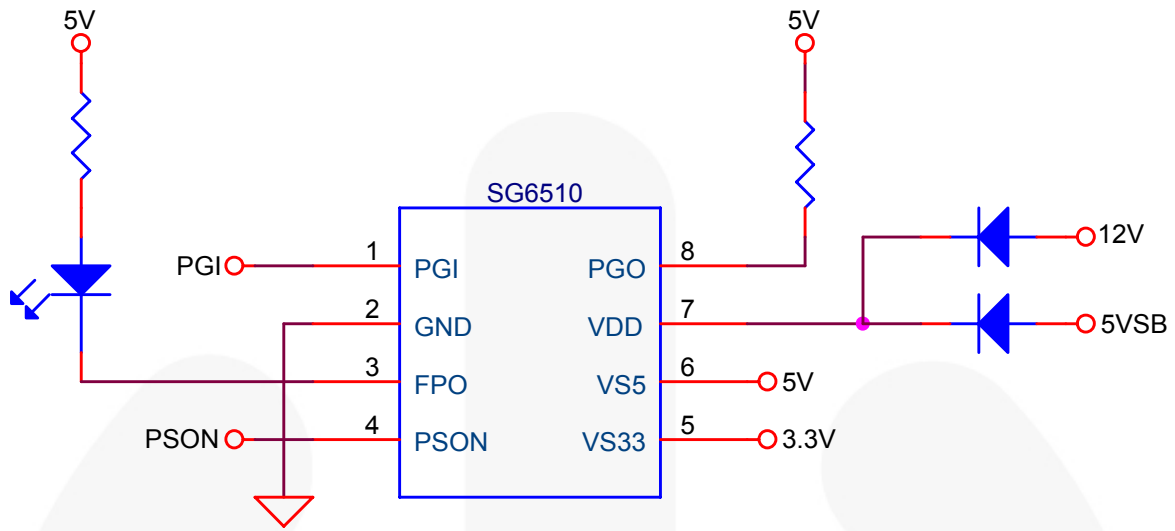


Figure 1. Typical Application

Internal Block Diagram

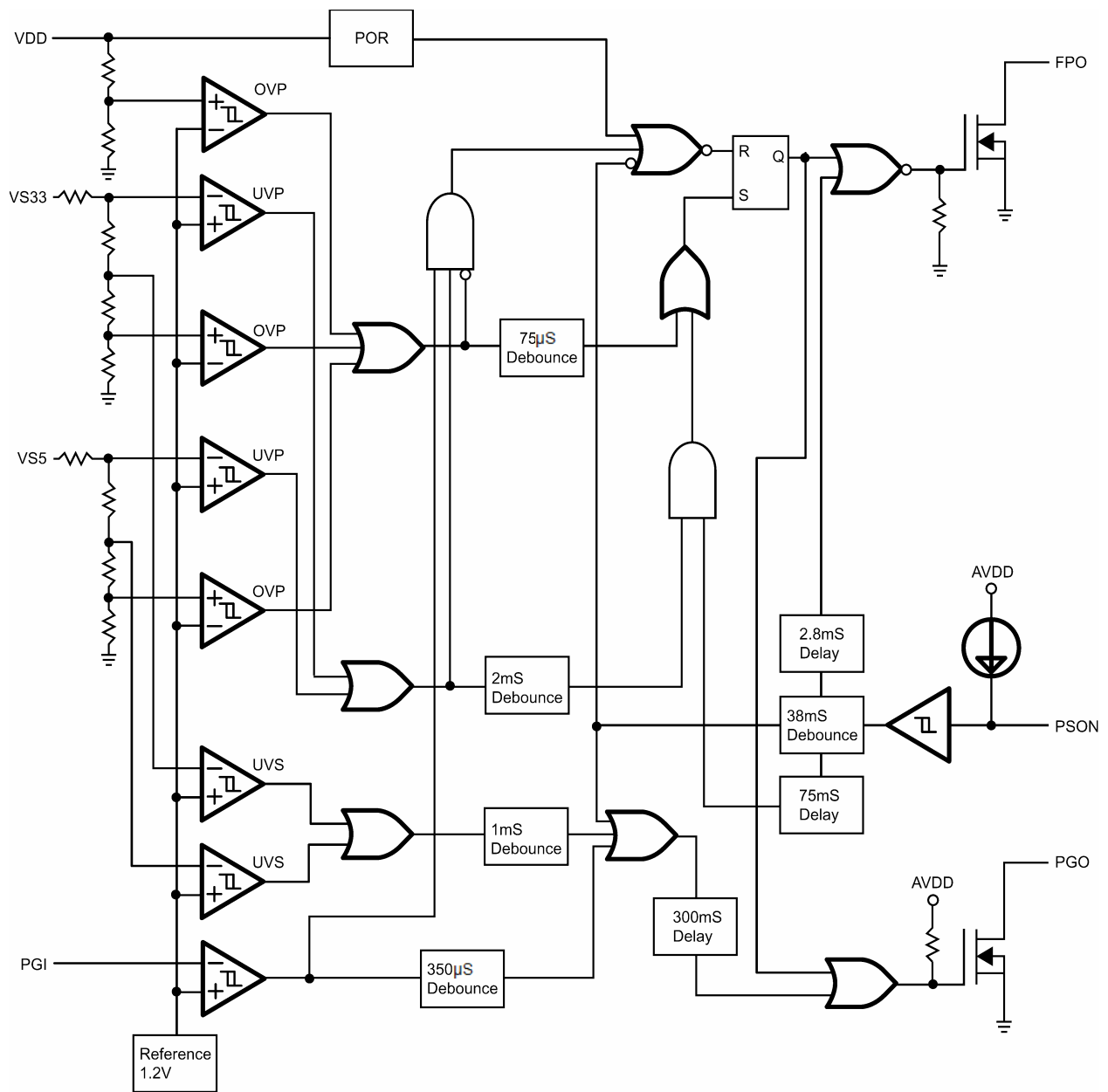
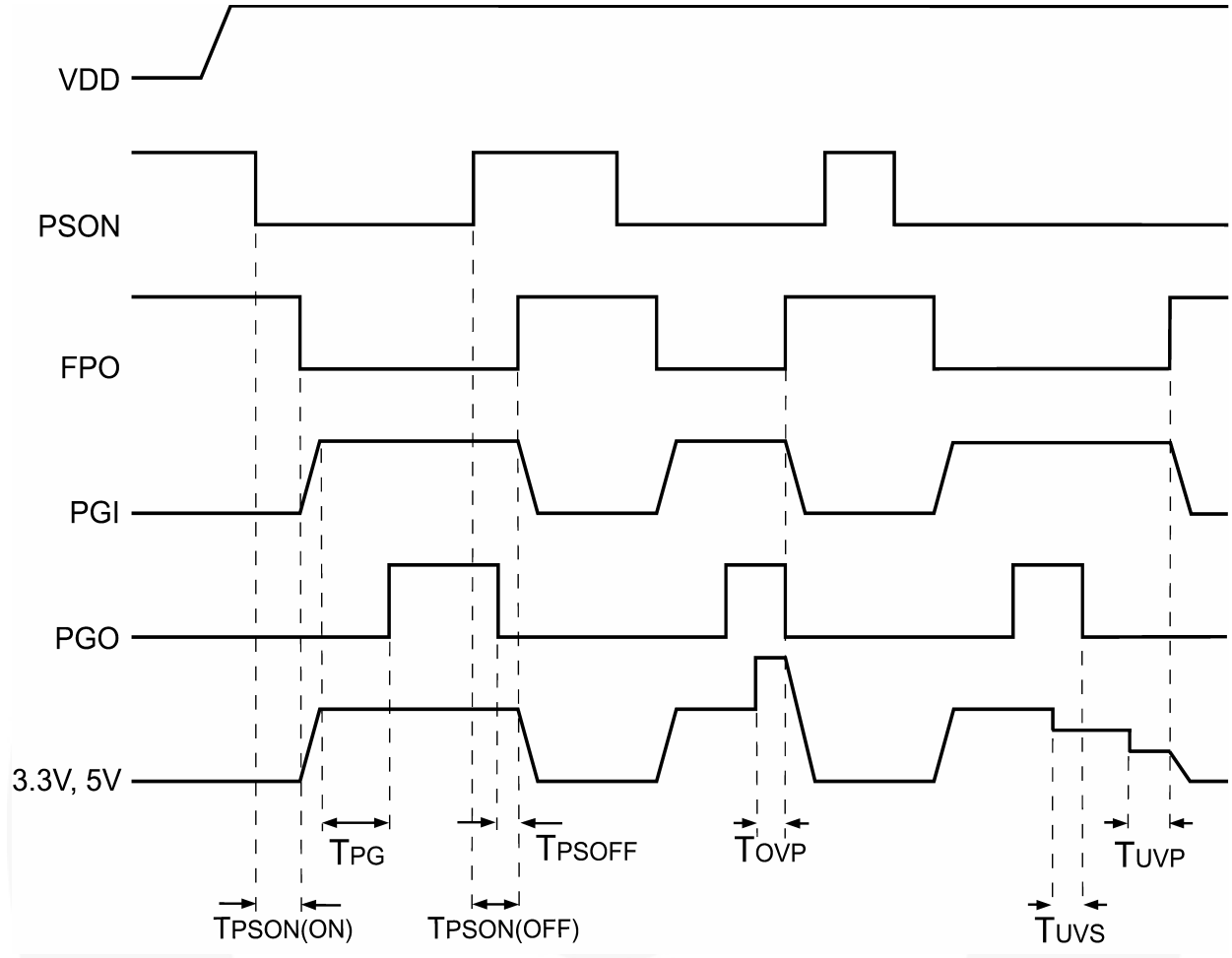
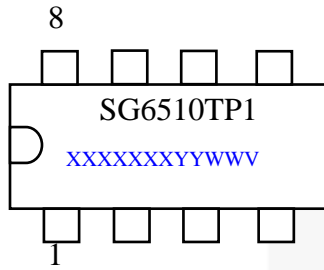


Figure 2. Functional Block Diagram

Timing Diagram

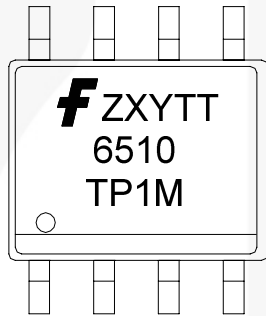


### Marking Information



T: D = DIP  
 P: Z = Lead Free  
 Null = regular package  
 XXXXXXXX: Wafer Lot  
 YY: Year; WW: Week  
 V: Assembly Location

※ Marking for SG6510DZ1 (Pb-free)  
 SG6510SZ1 (Pb-free)



1<sup>st</sup> line  
 Z: Assembly plant code  
 X: Year code  
 Y: Week code  
 TT: Die run code  
 3<sup>rd</sup> line  
 T: Package type (D = DIP, S=SOP)  
 P: Y=Green package  
 M: Manufacture flow code

※ Marking for SG6510DY1 (Green-compound)  
 SG6510SY1 (Green-compound)

Figure 3. Top Mark

## Pin Configurations

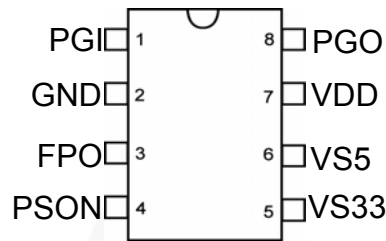


Figure 4. Pin Configuration

## Pin Definitions

| Pin # | Name | Type         | Description  |
|-------|------|--------------|--|
| 1     | PGI  | Analog Input | Power-good input. For ATX SMPS, it detects main AC voltage under-voltage and/or failure.   |
| 2     | GND  | Supply       | Ground.  |
| 3     | FPO  | Logic Output | Fault protection output (invert). Output signal to control the PWM IC. For example, it controls the PWM IC of primary side through an opto-coupler. When FPO is low, the main SMPS is operational. |
| 4     | PSON | Logic Input  | Remote on/off logic input from CPU or main-board. Turn on/off the PWM output after a 38ms delay.   |
| 5     | VS33 | Analog Input | 3.3 V over/under-voltage control sense input.  |
| 6     | VS5  | Analog Input | 5 V over/under-voltage control sense input.  |
| 7     | VDD  | Supply       | Supply voltage; 4V ~ 15V. For ATX SMPS, it is connected to 5V-standby and 12V through diodes, respectively.  |
| 8     | PGO  | Logic Output | Power-good logic output, 0 or 1(open-drain). Power good = 1 means that the power is good for operation. The power-good delay is 300ms.   |

### Function Table

| PGI      | PSON | UV Sense<br>(3.3V or 5V) | UV Protection<br>(3.3V or 5V) | OV Protection | FPO | PGO |
|----------|------|--------------------------|-------------------------------|---------------|-----|-----|
| PGI<1.2V | L    | No                       | No                            | No            | L   | L   |
| PGI<1.2V | L    | Yes                      | No                            | No            | L   | L   |
| PGI<1.2V | L    | No                       | Yes                           | No            | L   | L   |
| PGI<1.2V | L    | No                       | No                            | Yes           | H   | L   |
| PGI<1.2V | L    | Yes                      | Yes                           | No            | L   | L   |
| PGI<1.2V | L    | Yes                      | No                            | Yes           | H   | L   |
| PGI<1.2V | L    | No                       | Yes                           | Yes           | H   | L   |
| PGI<1.2V | L    | Yes                      | Yes                           | Yes           | H   | L   |
| PGI>1.2V | L    | No                       | No                            | No            | L   | H   |
| PGI>1.2V | L    | Yes                      | No                            | No            | L   | L   |
| PGI>1.2V | L    | No                       | Yes                           | No            | H   | L   |
| PGI>1.2V | L    | No                       | No                            | Yes           | H   | L   |
| PGI>1.2V | L    | Yes                      | Yes                           | No            | H   | L   |
| PGI>1.2V | L    | Yes                      | No                            | Yes           | H   | L   |
| PGI>1.2V | L    | No                       | Yes                           | Yes           | H   | L   |
| PGI>1.2V | L    | Yes                      | Yes                           | Yes           | H   | L   |
| X        | H    | X                        | X                             | X             | H   | L   |

X = Don't care

FPO = L means: fault IS NOT latched

FPO = H means: fault IS latched

PGO = L means: fault

PGO = H means: No fault

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol           | Parameter                            |                      | Min. | Max. | Unit |
|------------------|--------------------------------------|----------------------|------|------|------|
| V <sub>DD</sub>  | DC Supply Voltage                    |                      | -0.3 | 16   | V    |
| V <sub>i</sub>   | Input Voltage                        | PSON, VS33, VS5, PGI | -0.3 | 8.0  | V    |
| V <sub>OUT</sub> | Output Voltage                       | FPO                  | -0.3 | 16   | V    |
|                  |                                      | PGO                  | -0.3 | 8.0  | V    |
| T <sub>A</sub>   | Operating Free Air Temperature Range |                      | -40  | +85  | °C   |
| T <sub>STG</sub> | Storage Temperature Range            |                      | -55  | +150 | °C   |
| T <sub>L</sub>   | Soldering Temperature                |                      |      | +260 | °C   |
| ESD              | Electrostatic Discharge Capability   | Human Body Model     |      | 2    | KV   |

**Note:**

1. Stresses above those listed may cause permanent damage to the device.

## Recommended Operating Conditions

| Symbol             | Parameter                                 |                      | Min. | Max. | Unit |
|--------------------|---|----------------------|------|------|------|
| V <sub>DD</sub>    | DC Supply Voltage                         |                      | 4    | 15   | V    |
| V <sub>IL</sub>    | Input Voltage                             | PSON, VS33, VS5, PGI |      | 7    | V    |
| V <sub>OUT</sub>   | Output Voltage                            | FPO                  |      | 15   | V    |
|                    |   | PGO                  |      | 7    |      |
| I <sub>OSINK</sub> | Output Sink Current                       | FPO                  |      | 20   | mA   |
|                    |   | PGO                  |      | 10   |      |
| T <sub>R</sub>     | Supply Voltage Rising Time <sup>(2)</sup> |                      | 1    |      | ms   |
| T <sub>A</sub>     | Operating Free Air Temperature Range      |                      | -30  | 85   | °C   |

**Note:**

2. V<sub>DD</sub> rising and falling slew rate must be less than 14V/ms.

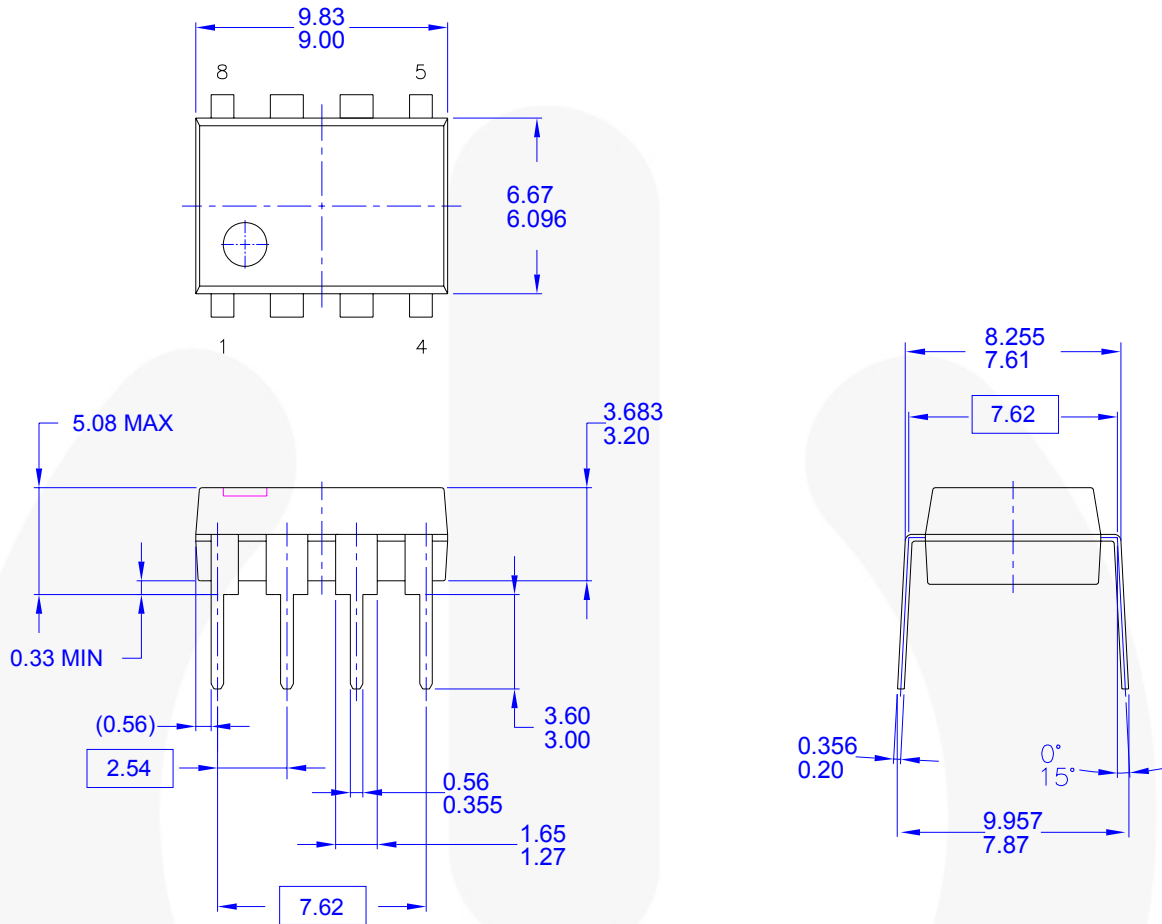


## Electrical Characteristics

Unless otherwise noted,  $V_{DD}=12V$  and  $T_A=25^\circ C$ .

| Symbol                            | Parameter                        | Conditions                    | Min. | Typ. | Max. | Units   |
|-----------------------------------|----------------------------------|-------------------------------|------|------|------|---------|
| <b>Over-Voltage Protection</b>    |                                  |                               |      |      |      |         |
| $V_{OVP}$                         | Over-Voltage Protection VS33     |                               | 3.7  | 3.9  | 4.1  | V       |
|                                   | Over-Voltage Protection VS5      |                               | 5.7  | 6.1  | 6.5  |         |
|                                   | Over-Voltage Protection $V_{DD}$ |                               | 13.2 | 13.8 | 14.4 |         |
| $I_{LKG}$                         | Leakage Current (FPO)            | $V_{FPO} = 5V$                |      |      | 5    | $\mu A$ |
| $V_{OL}$                          | Low-Level Output Voltage (FPO)   | $I_{sink} 20mA$               |      |      | 0.7  | V       |
| $t_{D-VDDOVP}$                    | Timing, OVP to Protection        |                               | 33   | 75   | 110  | ms      |
| <b>Under-Voltage and PGI, PGO</b> |                                  |                               |      |      |      |         |
| $V_{PGI}$                         | Input Threshold Voltage PGI      |                               | 1.15 | 1.20 | 1.25 | V       |
| $V_{UVS}$                         | Under-Voltage Sense VS33         |                               | 2.6  | 2.8  | 3.0  | V       |
|                                   | Under-Voltage Sense VS5          |                               | 4.0  | 4.2  | 4.4  |         |
| $V_{UVP}$                         | Under-Voltage Protection VS33    |                               | 2.3  | 2.5  | 2.7  | V       |
|                                   | Under-Voltage Protection VS5     |                               | 3.4  | 3.6  | 3.8  |         |
| $t_{UVS}$                         | Timing UVS to Sense (PG)         |                               | 0.6  | 1.0  | 1.5  | ms      |
| $t_{UVP}$                         | Timing UVP to Protection (FPO)   |                               | 1.3  | 2.0  | 3.0  | ms      |
| $I_{LKG}$                         | Leakage Current (PGO)            | $PGO = 5V$                    |      |      | 5    | $\mu A$ |
| $V_{OL}$                          | Low-Level Output Voltage (PGO)   | $V_{DD} = 12V, I_{SINK} 10mA$ |      |      | 0.7  | V       |
| $t_{UVE}$                         | Under-Voltage Enable Delay Time  |                               | 49   | 75   | 114  | ms      |
| $t_{PG}$                          | Timing PG Delay                  | PGI to PGO                    | 200  | 300  | 450  | ms      |
|                                   | Noise Deglitch Time              | PGI to PGO                    | 200  | 350  | 450  |         |
| <b>PSON Control</b>               |                                  |                               |      |      |      |         |
| $I_{PSON}$                        | Input Pull-up Current            | $PSON = 0V$                   | 100  | 160  | 220  | $\mu A$ |
| $V_{IH}$                          | High-Level Input Voltage         |                               | 2.40 | 1.85 |      | V       |
| $V_{IL}$                          | Low-Level Input Voltage          |                               |      | 1.35 | 1.2  | V       |
| $t_{PSON}$                        | Timing, PSON to On/Off           | On                            | 24   | 38   | 57   | ms      |
|                                   |                                  | Off                           | 24   | 38   | 57   |         |
| $t_{PSOFF}$                       | Timing PG Low to Power Off       |                               | 1.6  | 2.8  | 4.5  | ms      |
| <b>Total Device</b>               |                                  |                               |      |      |      |         |
| $I_{DD}$                          | Supply Current                   | $PSON = 5V/V_{DD} = 5V$       |      | 0.7  | 1.5  | mA      |

Physical Dimensions



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO JEDEC MS-001 VARIATION BA
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
  - D) DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994
  - E) DRAWING FILENAME AND REVISION: MKT-N08FREV2.

Figure 5. 8-Pin, DIP-8 Package

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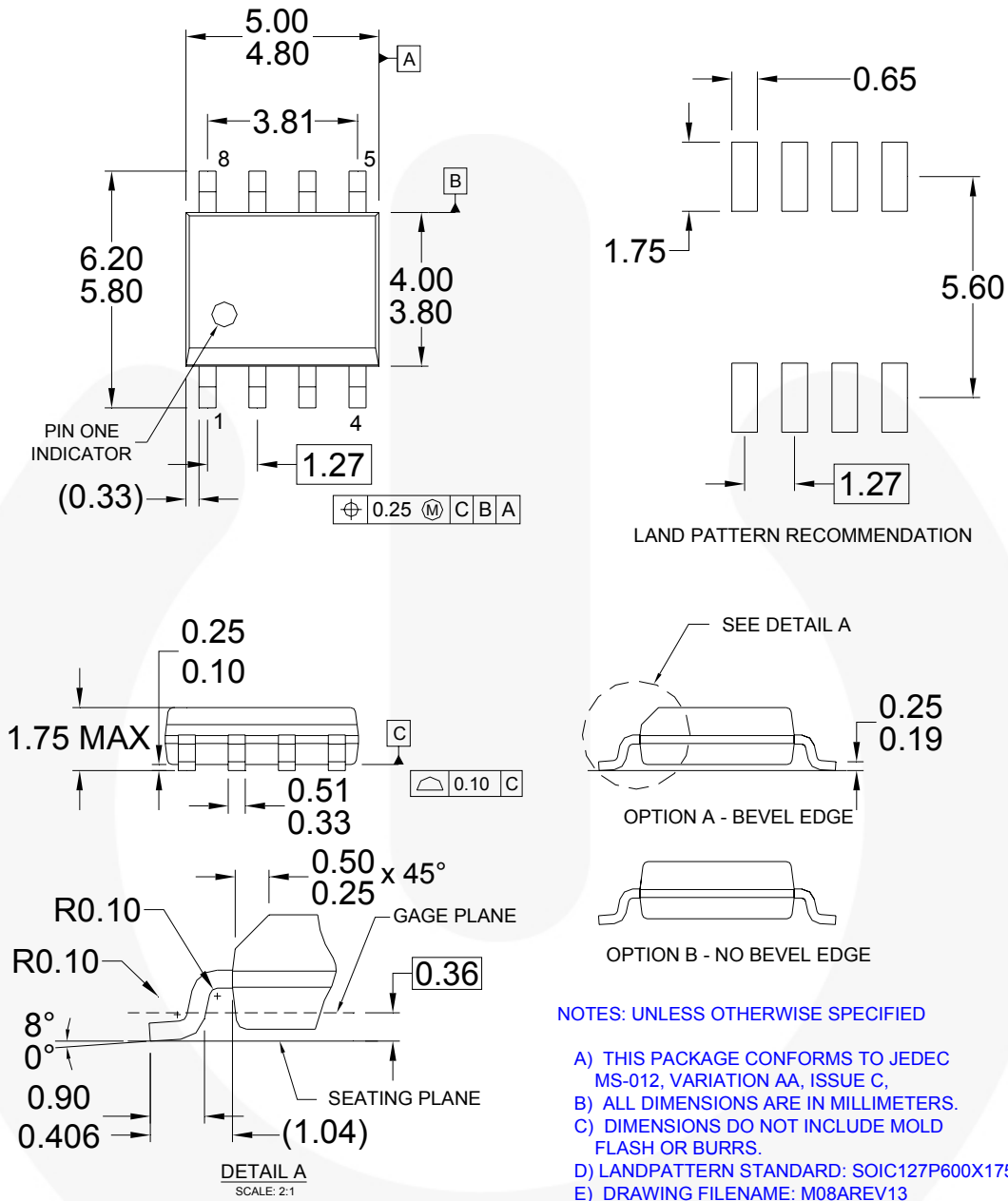


Figure 6. 8-Pin SOP Package







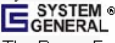
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