SUPPLY VOLTAGE MONITOR
ISSUE 4 – JULY 2006

DEVICE DESCRIPTION
The ZM33164-3 is a three terminal under voltage monitor circuit for use in microprocessor systems. The threshold voltage of the device has been set to 2.68 volts making it ideal for 3 volt circuits.

Included in the device is a precise voltage reference and a comparator with built in hysteresis to prevent erratic operation. The ZM33164-3 features an open collector output capable of sinking at least 10mA which only requires a single external resistor to interface to following circuits.

Operation of the device is guaranteed from one volt upwards, from this level to the device threshold voltage the output is held low providing a power on reset function. Should the supply voltage, once established, at any time drop below the threshold level then the output again will pull low.

The device is available in a TO92 package for through hole applications as well as SOT223 for surface mount requirements.

FEATURES
- SOT223 and TO92 packages
- Power on reset generator
- Automatic reset generation
- Low standby current
- Guaranteed operation from 1 volt
- Wide supply voltage range
- Internal clamp diode to discharge delay capacitor
- 2.68 volt threshold for 3 volt logic
- 60mV hysteresis prevents erratic operation

APPLICATIONS
- Microprocessor systems
- Computers
- Computer peripherals
- Instrumentation
- Automotive
- Battery powered equipment

SCHEMATIC DIAGRAM

![Schematic Diagram](image-url)
TYPICAL CHARACTERISTICS

- Input Current vs. Input Voltage
- Output Voltage vs. Input Voltage
- Output Saturation Voltage vs. Sink Current
- Reset Delay Time
- Clamp Diode Forward Current vs. Voltage
- Threshold Voltage vs. Temperature
### ZM33164-3

**ABSOLUTE MAXIMUM RATING**
- Input Supply Voltage: -1 to 12V
- Offstate Output Voltage: 12V
- Onstate Output Sink Current(Note 1): Internally limited
- Forward Current(Note 1): 100mA
- Operating junction temperature: 150°C
- Operating Temperature: -40 to 85°C
- Storage Temperature: -65 to 150°C

**TEST CONDITIONS**
- (Tamb=25°C for typical values, Tamb=-40 to 85°C for min/max values (Note3))

### COMPARATOR

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>MIN</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Voltage High state output (Vcc increasing)</td>
<td>V\text{IH}</td>
<td>2.55</td>
<td>2.71</td>
<td>2.8</td>
<td>V</td>
</tr>
<tr>
<td>Threshold Voltage Low state output (Vcc decreasing)</td>
<td>V\text{IL}</td>
<td>2.55</td>
<td>2.65</td>
<td>2.8</td>
<td>V</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>V\text{H}</td>
<td>0.03</td>
<td>0.06</td>
<td>0.15</td>
<td>V</td>
</tr>
</tbody>
</table>

### OUTPUT

| Output sink saturation: (V\text{cc}=2.4V, I\text{sink}=8.0mA) | V\text{OL} | 0.46 | 1.0 | V |
| (V\text{cc}=2.4V, I\text{sink}=2.0mA) | | 0.15 | 0.4 | V |
| (V\text{cc}=1.0V, I\text{sink}=0.1mA) | | 0.25 | | V |
| Onstate output sink current (V\text{cc} = Output=2.4V) | I\text{sink} | 10 | 20 | 60 | mA |
| Offstate output leakage current (V\text{cc} = Output=3V) | I\text{oh} | 0.02 | 0.5 | | µA |
| Clamp diode forward voltage (I=10mA) | V\text{f} | 0.6 | 1.2 | 1.5 | V |
| Propagation delay (V\text{in} 3V to 2.4V, R\text{f}=10k, T\text{amb}=25°C) | T\text{d} | 2.5 | | | µs |

### TOTAL DEVICE

| Operating input voltage range | V\text{cc} | 1.0 to 10 | |
| Quiescent input current (V\text{cc}=3V) | I\text{q} | 125 | 190 | µA |
ZM33164-3

TIMING DIAGRAM

Note 4: A time delayed reset can be accomplished with the additional Cd.

\[ T_{DV} = R C_d \ln \left( \frac{1}{1 - \frac{V_{TH} - V_{IN}}{V_{OUT}}} \right) \]

- \( T_{DV} \): Time (Seconds)
- \( V_{TH} \): Microprocessor Reset Threshold
- \( V_{IN} \): Power Supply Voltage
- \( V_{OUT} \): Microprocessor Output

APPLICATION CIRCUIT

Vin = Power Supply Voltage

\[ \text{TDY} = \frac{1}{RC_d} \ln \left( \frac{1}{1 - \frac{V_{TH}}{V_{IN}}} \right) \]
ZM33164-3

**CONNECTION DIAGRAMS**

**TO92 Package Suffix – C**

- Gnd
- Vcc
- Out

*Bottom View*

**SOT223 Package Suffix – G**

- Vcc
- Gnd
- Out

*Top View – Pin 4 floating or connected to pin 2*

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Part Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZM331643G</td>
<td>SOT223</td>
<td>ZM331643</td>
</tr>
<tr>
<td>ZM331643C</td>
<td>TO92</td>
<td>ZM331643</td>
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