MCP100/101

Microcontroller Supervisory Circuit with Push-Pull Output

FEATURES

- Holds microcontroller in reset until supply voltage reaches stable operating level
- Resets microcontroller during power loss
- Precision monitoring of 3V, 3.3V, and 5V systems
- 7 voltage trip points available
- Active low RESET pin (MCP100) or active high RESET (MCP101)
- Push-pull output
- Holds RESET/RESET for 350 ms (typical)
- Guaranteed RESET/RESET to $V_{DD} = 1.0V$
- Accuracy of $\pm 125mV$ for 5V systems and $\pm 75mV$ for 3V systems over temperature
- 45 $\mu A$ typical operating current
- Temperature range:
  - Industrial (I): -40°C to +85°C

DESCRIPTION

The Microchip Technology Inc. MCP100/101 is a voltage supervisory device designed to keep a microcontroller in reset until the system voltage has reached the proper level and stabilized. It also operates as protection from brown-out conditions when the supply voltage drops below a safe operating level. Both devices are available with a choice of seven different trip voltages and both have push-pull outputs. The MCP100 has a low active RESET pin and the MCP101 has a high active RESET pin. The MCP100/101 will assert the RESET/RESET signal whenever the voltage on the $V_{DD}$ pin is below the trip-point voltage.

PACKAGES

- TO-92 with 'D' Bondout
  - MCP100
  - MCP101
- TO-92 with 'H' Bondout
  - MCP100
  - MCP101
- SOT-23-3
  - MCP100
  - MCP101

BLOCK DIAGRAM
MCP100/101

1.0 ELECTRICAL CHARACTERISTICS

1.1 Maximum Ratings*

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<th>Parameter</th>
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*Notice: Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC AND AC CHARACTERISTICS

All parameters apply at the specified temp and voltage ranges unless otherwise noted.

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VDD = 1.0 - 5.5V
Industrial (I):-40°C to +85°C
2.0 APPLICATIONS INFORMATION

2.1 The Need for Supervisory Circuits

For many of today's microcontroller applications, care must be taken to prevent low power conditions that can cause many different system problems. The most common causes are brown-out conditions where the system supply drops below the operating level momentarily, and the second, is when a slowly decaying power supply causes the microcontroller to begin executing instructions without enough voltage to sustain SRAM and producing indeterminate results.

2.2 Negative Going $V_{DD}$ Transients

Many system designers implementing POR circuits are concerned about the minimum pulse width required to cause a reset. Figure 2-2 shows typical transient duration vs. reset comparator overdrive for which the MCP100/101 will not generate a reset pulse. It shows that the farther below the trip point the transient pulse goes, the duration of the pulse required to cause a reset gets shorter. A 0.1 µF bypass cap mounted as close as possible to the $V_{DD}$ pin provides additional transient immunity.
### 2.3 Effect of Temperature on Timeout Period ($t_{RPU}$)

The timeout period ($t_{RPU}$) determines how long the device remains in the reset condition. This is controlled by an internal RC timer and is effected by both $V_{DD}$ and temperature. The graph shown in Figure 2-3 shows typical response for different $V_{DD}$ values and temperatures.

#### FIGURE 2-3: Typical $t_{RPU}$ vs. Temperature

- $V_{DD} = 5V$
- $V_{DD} = 4V$
- $V_{DD} = 3V$
- $V_{DD} = 6V$

#### FIGURE 2-4: $I_{DD}$ vs. Temperature

#### FIGURE 2-5: Normalized $V_{TRIP}$ vs. Temperature

- $V_{DD} = 5V$
- $V_{DD} = 3V$
- $V_{DD} = 5.5V$
- $V_{DD} = 4V$

#### FIGURE 2-6: $V_{OL}$ vs. $I_{OL}$

#### FIGURE 2-7: Normalized $I_{OL}$ vs. Temperature

* Multiply value at 25°C by this factor to determine the value at temperature.
FIGURE 2-8: \( V_{DD} - V_{OH} \) vs. \( I_{OH} \)

FIGURE 2-9: Normalized \( V_{OH} \) vs. Temperature

* Multiply value at 25°C by this factor to determine the value at temperature.
NOTES:
MCP100/101 PRODUCT IDENTIFICATION SYSTEM

Package:  
- TO = TO-92 (3-lead) [offered in bags only]
- TT = SOT-23 (3-lead) [offered in tape & reel only]

Temperature Range:  
- I = –40˚C to +85˚C (only offered in I)

Bondout Option (TO-92 only):  
- D = D Bond Option (see bond option chart below)
- H = H Bond Option

RESET/RESET

V\text{TRIP} Voltage:  
- 270 = 2.55 \leq V\text{TRIP} \leq 2.70
- 300 = 2.85 \leq V\text{TRIP} \leq 3.00
- 315 = 3.00 \leq V\text{TRIP} \leq 3.15
- 450 = 4.25 \leq V\text{TRIP} \leq 4.50
- 460 = 4.35 \leq V\text{TRIP} \leq 4.60
- 475 = 4.50 \leq V\text{TRIP} \leq 4.75
- 485 = 4.60 \leq V\text{TRIP} \leq 4.85

Device:  
- MCP100 = Supervisor circuit with active low RESET output
- MCP100T = Supervisor circuit with active low RESET output (tape & reel)
- MCP101 = Supervisor circuit with active high RESET output
- MCP101T = Supervisor circuit with active high RESET output (tape & reel)

Product Identification Options for MCP100/101

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<th>TO-92 with D Bondout</th>
<th>TO-92 with H Bondout</th>
<th>SOT-23-3</th>
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Example of Product Identification:  
For the MCP100 (active low RESET pin) with V\text{TRIP} range of 2.55V - 2.70V in TO-92 package with 'H' bond option in industrial temp range, the part number would be: MCP100-270H I/TO.

Sales and Support

Data Sheets  
Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:
1. Your local Microchip sales office
2. The Microchip Corporate Literature Center U.S. FAX: (602) 786-7277
3. The Microchip Worldwide Site (www.microchip.com)

Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

New Customer Notification System  
Register on our web site (www.microchip.com/cn) to receive the most current information on our products.
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