



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





The Infinite Bandwidth Company™

MIC834

Comparator with Reference

Final Information

General Description

The MIC834 is a micropower, precision voltage comparator with an on-chip voltage reference.

The threshold is adjusted by the choice of two external resistors. Voltage detection threshold is accurate to 1.5%.

Supply current is extremely low (1.5µA, typical), making it ideal for portable applications.

The MIC834 is supplied in Micrel's IttyBitty™ 5-lead SOT-23-5 package.

Features

- Optimized for PDAs, cellular telephones, pagers, and other battery-powered devices
- Input and output can be pulled up to 6V regardless of supply voltage
- High ±1.5% voltage threshold accuracy
- Built in hysteresis for noise suppression
- Extremely low 1.5µA typical supply current
- Immune to brief input transients
- 5-lead SOT-23 package

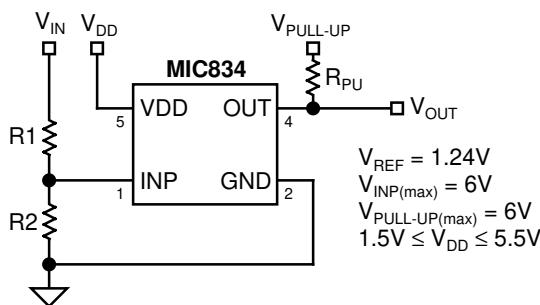
Applications

- PDAs
- Pagers
- Cordless phones
- Consumer electronics
- Embedded controllers
- Personal electronics

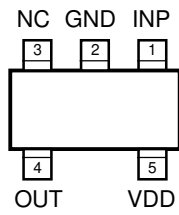
Ordering Information

| Part Number | Marking | Accuracy | Temperature Range | Package |
|-------------|---------|----------|-------------------|----------|
| MIC834BM5 | B12 | 1.5% | -40°C to +85°C | SOT-23-5 |

Typical Application



Pin Configuration



SOT-23-5 (M5)

Pin Description

| Pin Number | Pin Name | Pin Function |
|------------|----------|--|
| 1 | INP | Input: Analog input to the comparator. When $V_{INP} > V_{REF} + V_{HYST}$, V_{OUT} is asserted to a logic-high level output. |
| 2 | GND | Ground |
| 3 | NC | No Connect |
| 4 | OUT | Output: Active-high, open-drain output. This output is de-asserted when $V_{INP} < V_{REF}$, indicating a low voltage input. The output is asserted when $V_{INP} > V_{REF} + V_{HYST}$. |
| 5 | VDD | Power Supply (Input): Independent supply input for internal circuitry. |

Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{DD}) -0.3V to +7V
 Input Voltage (V_{INP}) +7V
 Output Current (I_{OUT}) 20mA
 Storage Temperature (T_S) -65°C to +150°C
 ESD Rating, **Note 3** 2kV

Operating Ratings (Note 2)

Supply Voltage (V_{DD}) +1.5V to +5.5V
 Input Voltage (V_{INP}) -0.3V to 6V
 Ambient Temperature Range (T_A) -40°C to +85°C
 Junction Temperature (T_J) Internally Limited
 Package Thermal Resistance (θ_{JA}) 260°C/W

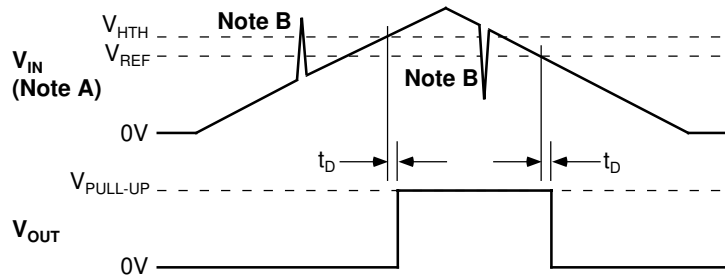
Electrical Characteristics

1.5V ≤ V_{DD} ≤ 5.5V; T_A = +25°C, **bold** values indicate -40°C ≤ T_A ≤ +85°C; unless noted

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|------------|-----------------------------------|---|--------------|-------|--------------|-------|
| I_{DD} | Supply Current | output not asserted | | 1.5 | 3 | μA |
| I_{INP} | Input Leakage Current | | | 0.005 | 10 | nA |
| V_{REF} | Reference Voltage | | 1.221 | 1.240 | 1.259 | V |
| V_{HYST} | Hysteresis Voltage, Note 4 | | 10 | 23 | 35 | mV |
| t_D | Propagation Delay | $V_{INP} = 1.352V$ to $1.128V$ | | 12 | | μs |
| | | $V_{INP} = 1.143V$ to $1.367V$ | | 8 | | μs |
| V_{OUT} | Output Voltage-Low, Note 5 | OUT de-asserted, $I_{SINK} = 1.6mA$, $V_{DD} \geq 1.6V$ | | 0.05 | 0.3 | V |
| | | OUT de-asserted, $I_{SINK} = 100\mu A$, $V_{DD} \geq 1.2V$, | | 0.005 | 0.4 | V |

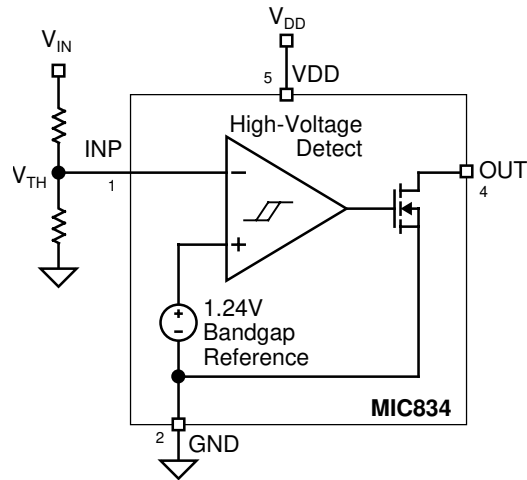
- Note 1.** Exceeding the absolute maximum rating may damage the device.
- Note 2.** The device is not guaranteed to function outside its operating rating.
- Note 3.** Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.
- Note 4.** $V_{HTH} = V_{REF} + V_{HYST}$.
- Note 5.** V_{DD} operating range is 1.5V to 5.5V. Output is guaranteed to be held low down to $V_{DD} = 1.2V$.

Functional Diagram



- Note A.** V_{IN} here represents the attenuated input voltage, as applied to the INP pin; i.e., V_{INP} .
- Note B.** Brief transients are ignored by the MIC834. See "Applications Information."

Block Diagram



Functional Description

The MIC834 monitors the input voltage and detects when it is higher than a programmed level (plus V_{HYST}). This condition asserts the active-high output. An external pull-up resistor is used to produce a logic-one output. When the input voltage falls below the programmed threshold ($V_{\text{INP}} < V_{\text{REF}}$), the output stage is on.

Voltage Low Output

The voltage-low output (OUT) is an active-high, open-drain output which sinks current when the MIC834 detects a low input voltage.

Trip Points

Input voltage is monitored by a comparator via a voltage divider network. The divided voltage is compared to an internal reference voltage. When the voltage at the input pin INP exceeds the internal reference voltage (plus V_{HYST}), the output is pulled high by an external resistor.

V_{HYST} is typically 23mV, and is added to the programmed threshold voltage for positive-going inputs. Decreasing inputs trip at the user-programmed threshold voltage.

The tolerance of the switching threshold on the falling edge is equal to the tolerance of just the voltage reference. The tolerance of the switching threshold on the rising edge is equal to the tolerance of the voltage reference *plus* the tolerance of the hysteresis voltage.

Applications Information

Output

Since the MIC834 output is an open-drain MOSFET, most applications will require a pull-up resistor. The value of the resistor should not be too large or leakage effects may dominate. 470k Ω is the maximum recommended value. Note that the output may be pulled up as high as 6V regardless of the IC's supply voltage. See "Electrical Characteristics."

Programming the Threshold

The voltage threshold is calculated using:

$$V_{IN(lo)} = V_{REF} \left(\frac{R1 + R2}{R2} \right)$$

where:

$$V_{REF} = 1.240V$$

In order to provide the additional criteria needed to solve for the resistor values, the resistors can be selected such that they have a given total value, that is, $R1 + R2 = R_{TOTAL}$. A value such as 1M Ω for R_{TOTAL} is a reasonable value because it draws minimum current but has no significant effect on accuracy.

When working with large resistors, a small amount of leakage current can cause voltage offsets that degrade system accuracy. The maximum recommended total resistance from V_{IN} to ground is 3M Ω . The accuracy of the resistors can be chosen based upon the accuracy required by the system. The inputs may be subjected to voltages as high as 6V steady-state without adverse effects of any kind regardless of the IC's supply voltage. This applies even if the supply voltage is zero. This permits the situation in which the IC's supply is turned off, but voltage is still present on the inputs. See "Electrical Characteristics."

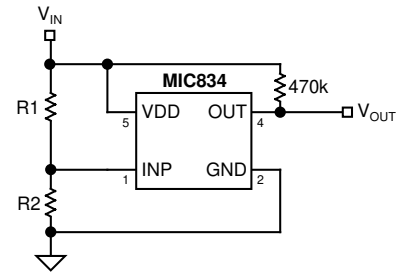


Figure 1. Example Circuit

Input Transients

The MIC834 is inherently immune to very short negative-going "glitches." Very brief transients may exceed the $V_{IN(lo)}$ threshold without tripping the output.

As shown in Figure 2, the narrower the transient, the deeper the threshold overdrive that will be ignored by the MIC834. The graph represents the typical allowable transient duration for a given amount of threshold overdrive that will not generate an output.

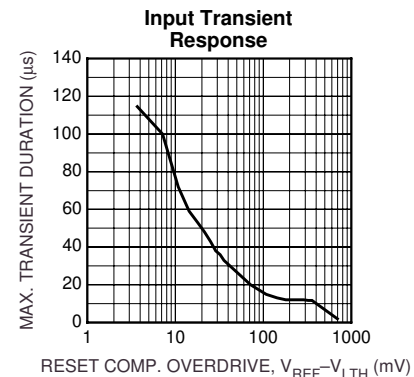
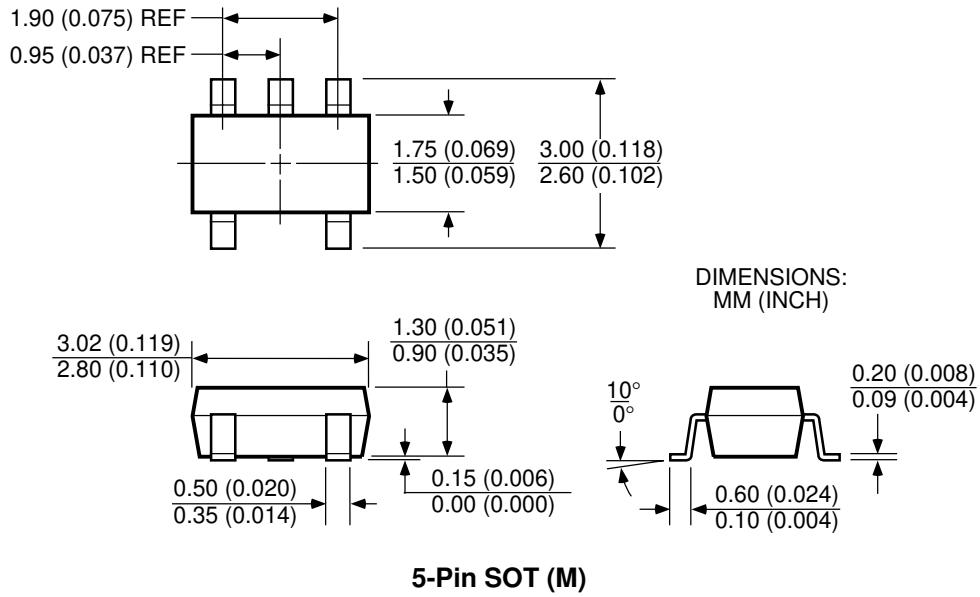


Figure 2. Input Transient Response

Package Information



MICREL INC. 1849 FORTUNE DRIVE SAN JOSE, CA 95131 USA

TEL + 1 (408) 944-0800 FAX + 1 (408) 944-0970 WEB <http://www.micrel.com>

This information is believed to be accurate and reliable, however no responsibility is assumed by Micrel for its use nor for any infringement of patents or other rights of third parties resulting from its use. No license is granted by implication or otherwise under any patent or patent right of Micrel Inc.

© 2001 Micrel Incorporated