# MC33460, MC33461

# Under Voltage Detector Series

The MC33460 and MC33461 series are ultra–low power CMOS under–voltage detectors with very tight threshold accuracy specifically designed for accurate monitoring of power supplies. The devices are optimized for use in battery powered systems where low quiescent current and small packaging are required. The device generates an active–low signal whenever the input voltage falls below the factory set ±2% threshold. Hysteresis is provided to ensure reliable output switching.

The MC33460/1 series features a highly accurate voltage reference, a comparator with a precision voltage threshold, and built–in hysteresis to prevent erratic operation and a choice of output configurations between Open Drain (MC33460) and complementary push–pull (MC33461). The products are offered in 9 standard voltage thresholds ranging from 0.9V to 4.5V. Other threshold voltages from 1.0 to 5.0V are available in 100mV steps. The devices can operate to a very low input voltage level and are housed in the ultra–miniature SC–82AB package.

### Features

- Available in Open Drain or Push–Pull Output
- Output State Guaranteed to $V_{in}$ = 0.8 V
- Tight Detector Voltage Accuracy (±2.0%)
- Extended Temperature Operation (–40°C to 85°C)
- Ultra Low Quiescent Current (0.8 μA at $V_{in}$ = 1.5 V typical)
- Wide Range of Operating Voltage (0.7 V to 10 V)

### Applications

- Low Battery Detector
- Power–Fail Indicator
- Microprocessor Reset Generator
- Window Comparator
- Battery Backup Circuit

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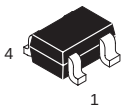
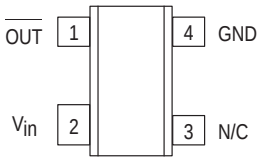



**SC–82AB**
**SQ SUFFIX**
**CASE 419C**

**PIN CONNECTIONS**



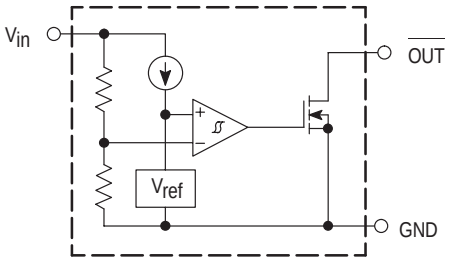

(Top View)

**ORDERING INFORMATION**

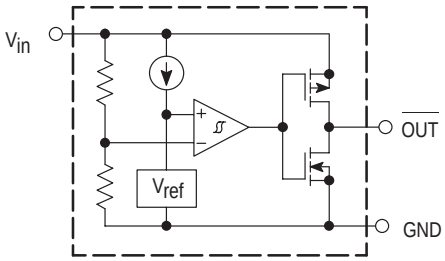
See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

**Representative Block Diagrams**

**MC33460**
**Nch Open Drain Configuration**




**MC33461**
**CMOS Configuration**

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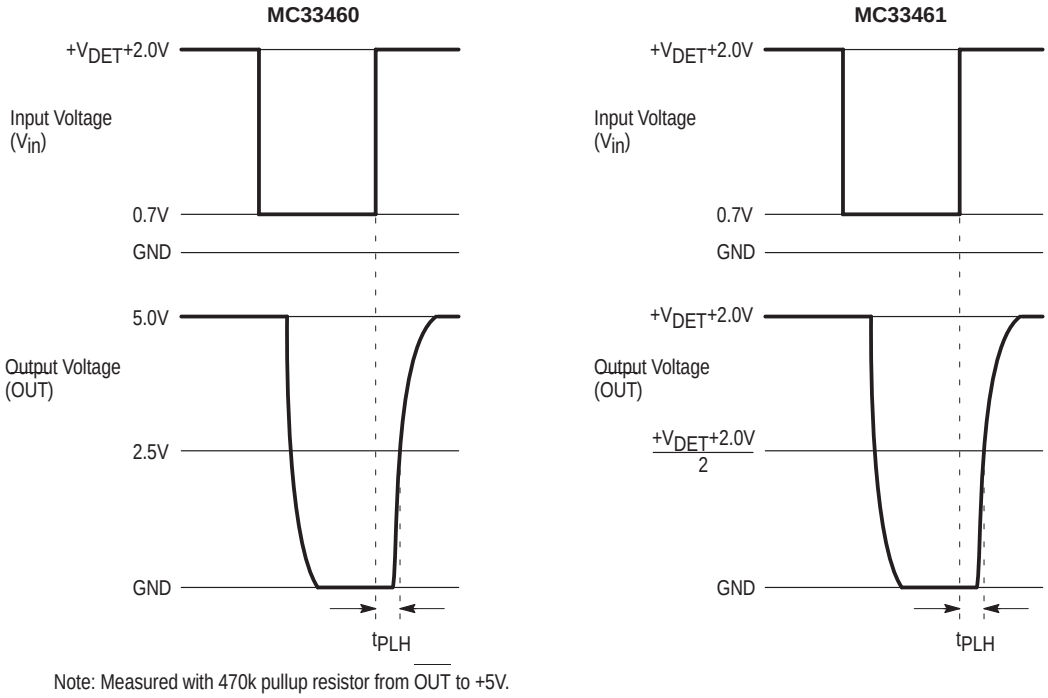
June, 2000 – Rev. 3
Publication Order Number:
MC33460/D

## ORDERING INFORMATION

| Device | Threshold Voltage | Type | Marking | Package (Qty/Reel) |
|---|---|---|---|---|
| MC33460SQ–09ATR | 0.9 | Nch Open Drain | K9 | 3000 Units on 7 inch Reel |
| MC33460SQ–20ATR | 2.0 | | M0 | |
| MC33460SQ–27ATR | 2.7 | | M7 | |
| MC33460SQ–28ATR | 2.8 | | M8 | |
| MC33460SQ–30ATR | 3.0 | | N0 | |
| MC33460SQ–32ATR | 3.2 | | N2 | |
| MC33460SQ–41ATR | 4.1 | | P1 | |
| MC33460SQ–42ATR | 4.2 | | P2 | |
| MC33460SQ–43ATR | 4.3 | | P3 | |
| MC33460SQ–45ATR | 4.5 | | P5 | |
| MC33461SQ–09CTR | 0.9 | CMOS | T9 | |
| MC33461SQ–20CTR | 2.0 | | V0 | |
| MC33461SQ–27CTR | 2.7 | | V7 | |
| MC33461SQ–28CTR | 2.8 | | V8 | |
| MC33461SQ–30CTR | 3.0 | | W0 | |
| MC33461SQ–32CTR | 3.2 | | W2 | |
| MC33461SQ–41CTR | 4.1 | | X1 | |
| MC33461SQ–42CTR | 4.2 | | X2 | |
| MC33461SQ–43CTR | 4.3 | | X3 | |
| MC33461SQ–45CTR | 4.5 | | X5 | |

## MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{in}$ | 12 | V |
| Output Voltage (CMOS) | $V_{OUT1}$ | –0.3 to $V_{in}$+0.3 | V |
| Output Voltage (Nch Open Drain) | $V_{OUT2}$ | –0.3 to 12 | V |
| Output Current | $I_{OUT}$ | 70 | mA |
| Power Dissipation | $P_D$ | 150 | mW |
| Operating Ambient Temperature | $T_A$ | –40 to +85 | °C |
| Storage Temperature Range | $T_{stg}$ | –40 to +125 | °C |
| Lead Temperature (Soldering) | $T_{solder}$ | 260°C, 10 s | – |




Note: Measured with 470k pullup resistor from $\overline{OUT}$ to +5V.

**Figure 1. $T_{pd}$ Measurement Conditions**

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 0.9** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 0.882 | 0.900 | 0.918 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.027 | 0.045 | 0.063 | V |
| Supply Current ($V_{in}$ = 0.8 V)<br>($V_{in}$ = 2.9 V) | $I_{in}$ | –<br>– | 0.8<br>1.0 | 2.4<br>3.0 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 0.85V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>0.05<br>1.0 | <br>0.05<br>0.50<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 2.0** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 1.96 | 2.00 | 2.04 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.06 | 0.10 | 0.14 | V |
| Supply Current ($V_{in}$ = 1.9 V)<br>($V_{in}$ = 4.0 V) | $I_{in}$ | –<br>– | 0.9<br>1.1 | 2.7<br>3.3 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 2.7** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 2.646 | 2.700 | 2.754 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.081 | 0.135 | 0.189 | V |
| Supply Current ($V_{in}$ = 2.6 V)<br>($V_{in}$ = 4.7 V) | $I_{in}$ | –<br>– | 0.9<br>1.1 | 2.7<br>3.3 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 2.8** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 2.744 | 2.800 | 2.856 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.084 | 0.140 | 0.196 | V |
| Supply Current ($V_{in}$ = 2.7 V)<br>($V_{in}$ = 4.8 V) | $I_{in}$ | –<br>– | 0.9<br>1.1 | 2.7<br>3.3 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 3.0** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 2.94 | 3.00 | 3.06 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.09 | 0.15 | 0.21 | V |
| Supply Current ($V_{in}$ = 2.87 V)<br>($V_{in}$ = 5.0 V) | $I_{in}$ | –<br>– | 1.0<br>1.2 | 3.0<br>3.6 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 3.2** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 3.136 | 3.200 | 3.264 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.096 | 0.160 | 0.224 | V |
| Supply Current ($V_{in}$ = 3.07 V)<br>($V_{in}$ = 5.2 V) | $I_{in}$ | –<br>– | 1.0<br>1.2 | 3.0<br>3.6 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 4.1** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 4.018 | 4.1 | 4.182 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.135 | 0.225 | 0.315 | V |
| Supply Current ($V_{in}$ = 3.94 V)<br>($V_{in}$ = 6.1 V) | $I_{in}$ | –<br>– | 1.1<br>1.3 | 3.3<br>3.9 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 6.9V, $V_{in}$ = 8.0V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.5 | <br>0.05<br>2.0<br>3.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 4.2** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 4.116 | 4.2 | 4.284 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.126 | 0.210 | 0.296 | V |
| Supply Current ($V_{in}$ = 4.04 V)<br>($V_{in}$ = 6.2 V) | $I_{in}$ | –<br>– | 1.1<br>1.3 | 3.3<br>3.9 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 4.3** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 4.214 | 4.300 | 4.386 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.129 | 0.215 | 0.301 | V |
| Supply Current ($V_{in}$ = 4.14 V)<br>($V_{in}$ = 6.3 V) | $I_{in}$ | –<br>– | 1.1<br>1.3 | 3.3<br>3.9 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 2.4V, $V_{in}$ = 4.5V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.0 | <br>0.05<br>2.0<br>2.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

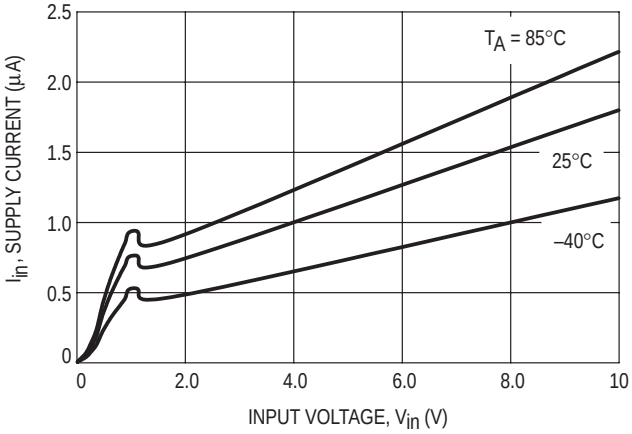
**ELECTRICAL CHARACTERISTICS** (For all values $T_A$ = 25°C, unless otherwise noted.)

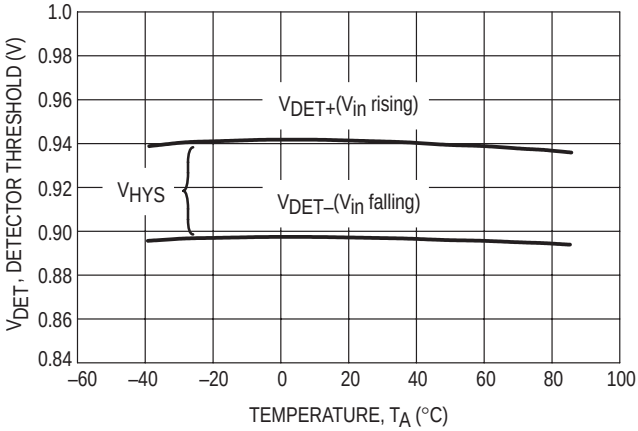
| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **MC33460/461 – 4.5** | | | | | |
| Detector Threshold ($V_{in}$ Falling) | $V_{DET-}$ | 4.410 | 4.500 | 4.590 | V |
| Detector Threshold Hysteresis | $V_{HYS}$ | 0.135 | 0.225 | 0.315 | V |
| Supply Current ($V_{in}$ = 4.34 V)<br>($V_{in}$ = 6.5 V) | $I_{in}$ | –<br>– | 1.1<br>1.3 | 3.3<br>3.9 | μA |
| Maximum Operating Voltage | $V_{in(max)}$ | – | – | 10 | V |
| Minimum Operating Voltage<br>(–40°C≤$T_A$≤85°C) | $V_{in(min)}$ | –<br>– | 0.55<br>0.65 | 0.70<br>0.80 | V |
| Output Current ($\overline{OUT}$)<br>Nch ($V_{out}$ = 0.05V, $V_{in}$ = 0.70V)<br>($V_{out}$ = 0.50V, $V_{in}$ = 1.5V)<br>CMOS Output High ($V_{out}$ = 5.9V, $V_{in}$ = 8.0V) | $I_{OUT}$ | <br>0.01<br>1.0<br>1.5 | <br>0.05<br>2.0<br>3.0 | <br>–<br>–<br>– | <br>mA<br>mA<br>mA |
| Output Delay Time (Note 1) | $t_{pd}$ | – | – | 100 | μs |
| Detector Threshold Temperature Coefficient (–40°C≤$T_A$≤85°C) | $\Delta V_{DET-}/\Delta T$ | – | ±100 | – | PPM/°C |

**NOTES:** 1.Refer to Figure 1 for test conditions for measurement.

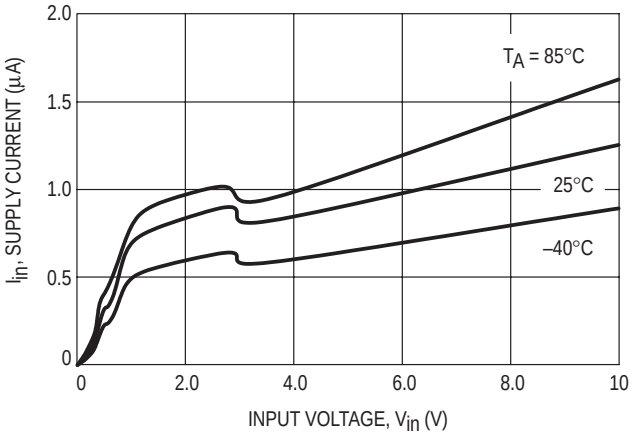
## TYPICAL CHARACTERISTICS

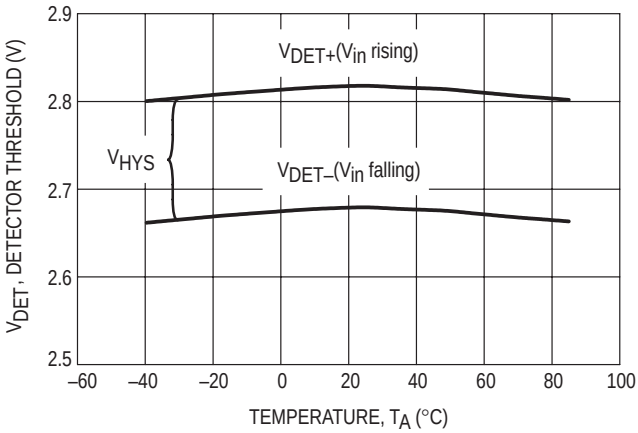
### MC33461–0.9




### MC33461–2.7




### MC33461–4.5

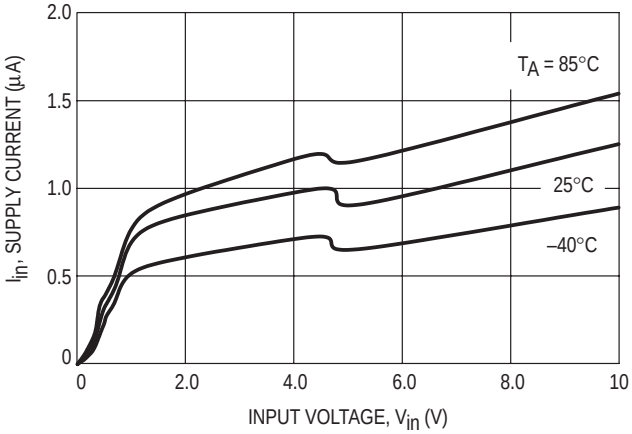



**Figure 2. Supply Current vs. Input Voltage**

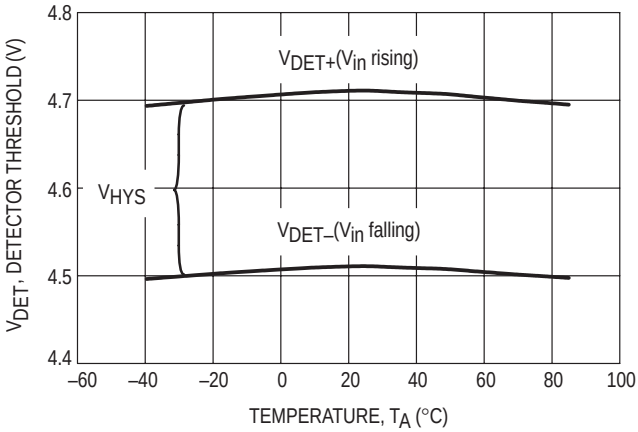
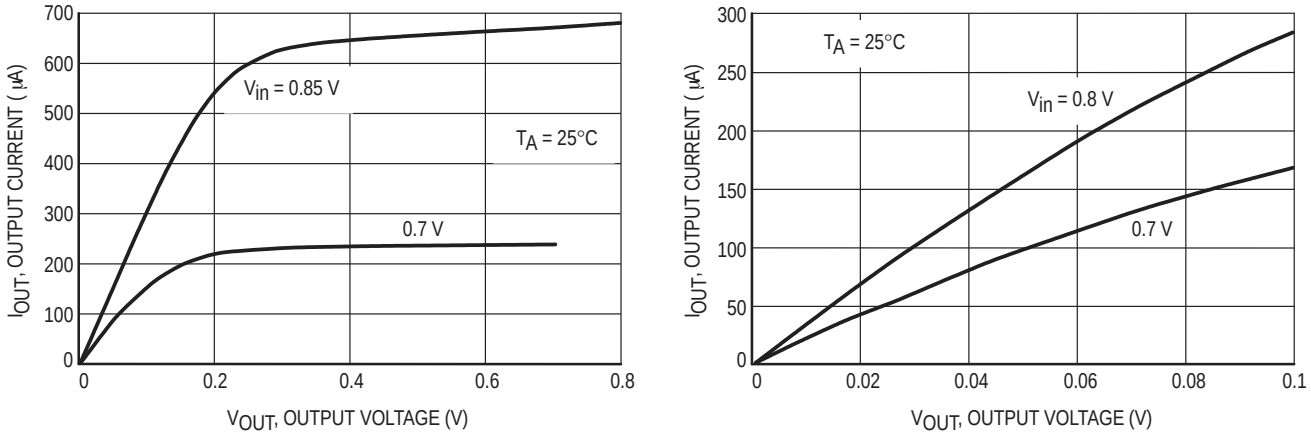
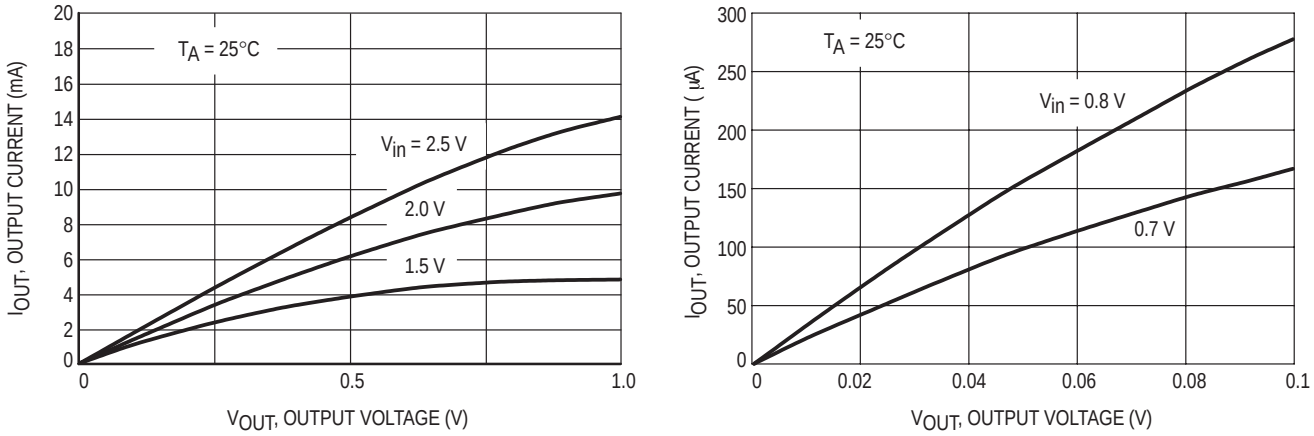



**Figure 3. Detector Threshold Hysteresis vs. Temperature**

**MC33461−0.9**




**MC33461−2.7**




**MC33461−4.5**

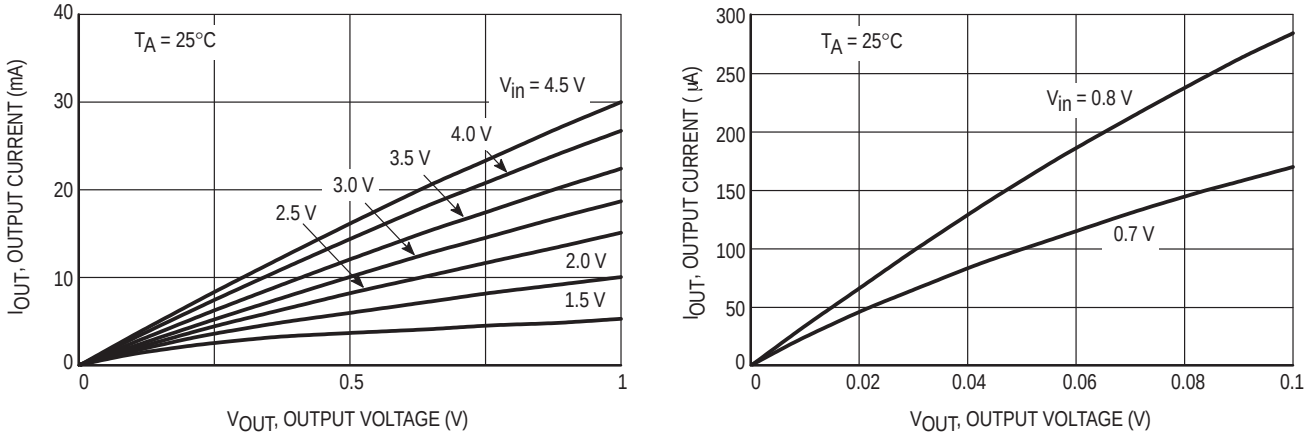



**Figure 4. Nch Output Current versus $V_{in}$**

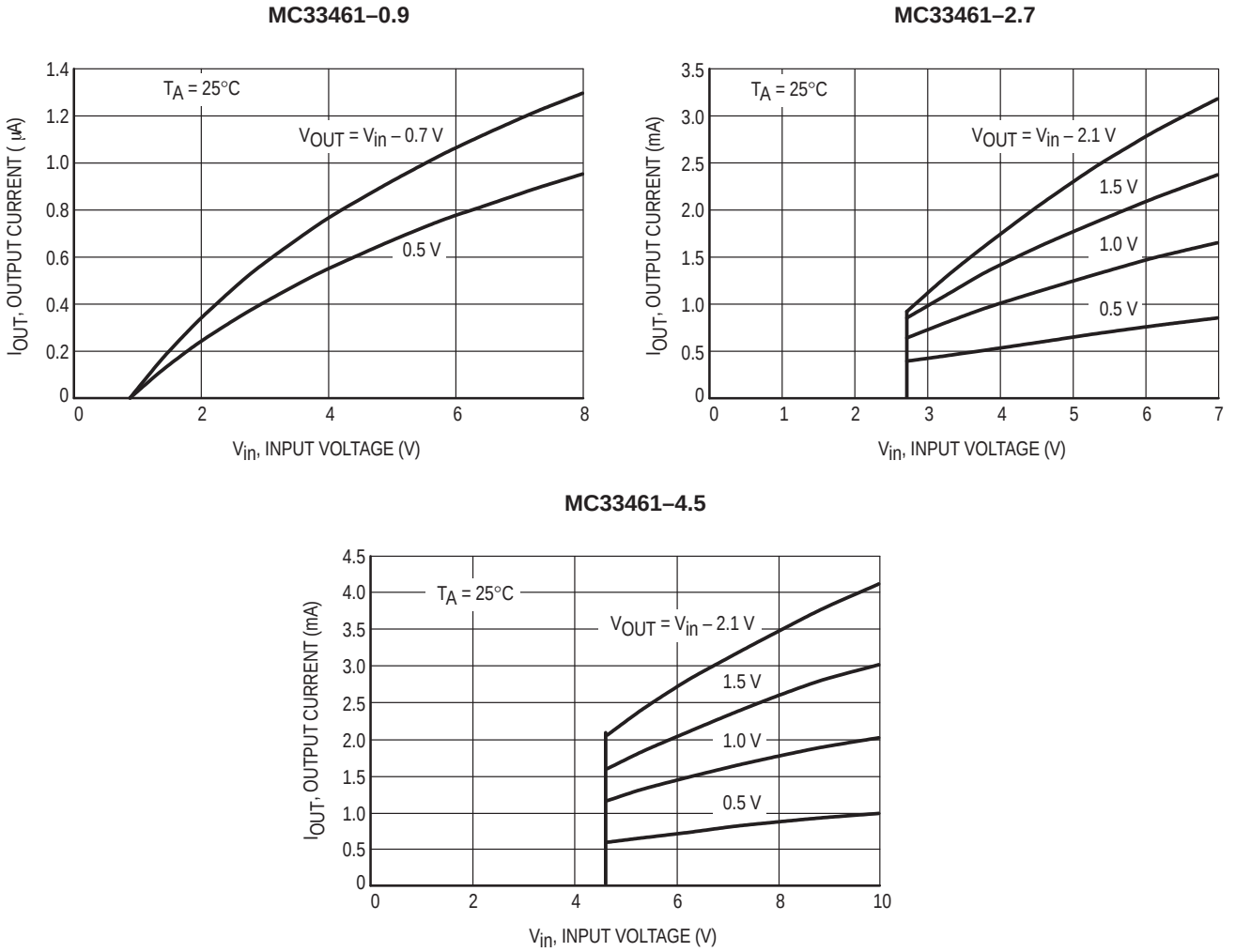



**Figure 5. Output Current High versus Input Voltage**

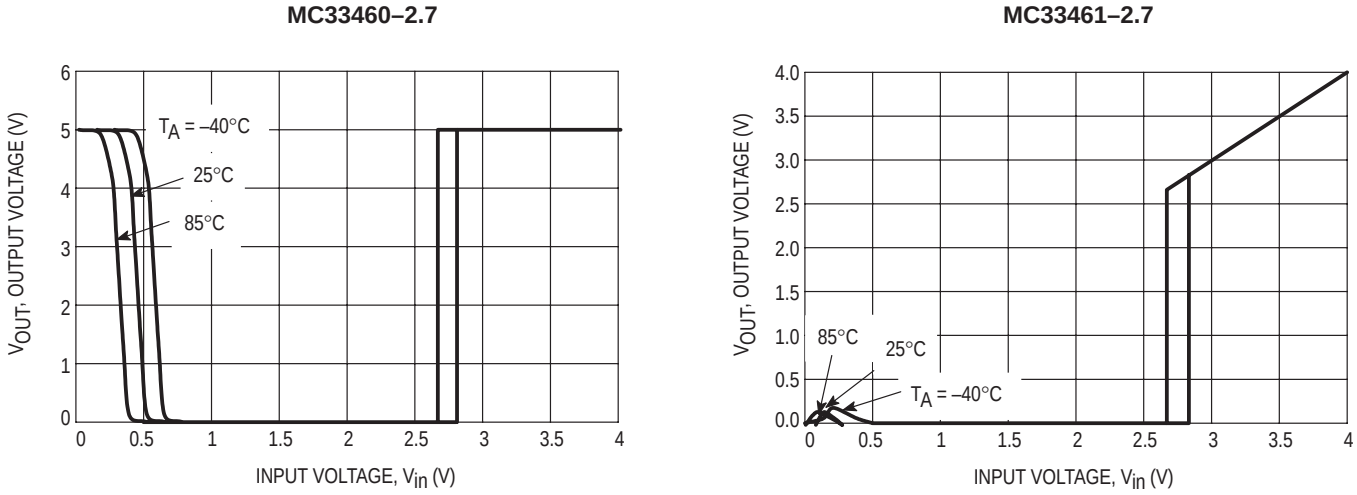



**Figure 6. Typical Output Voltage versus Input Voltage**

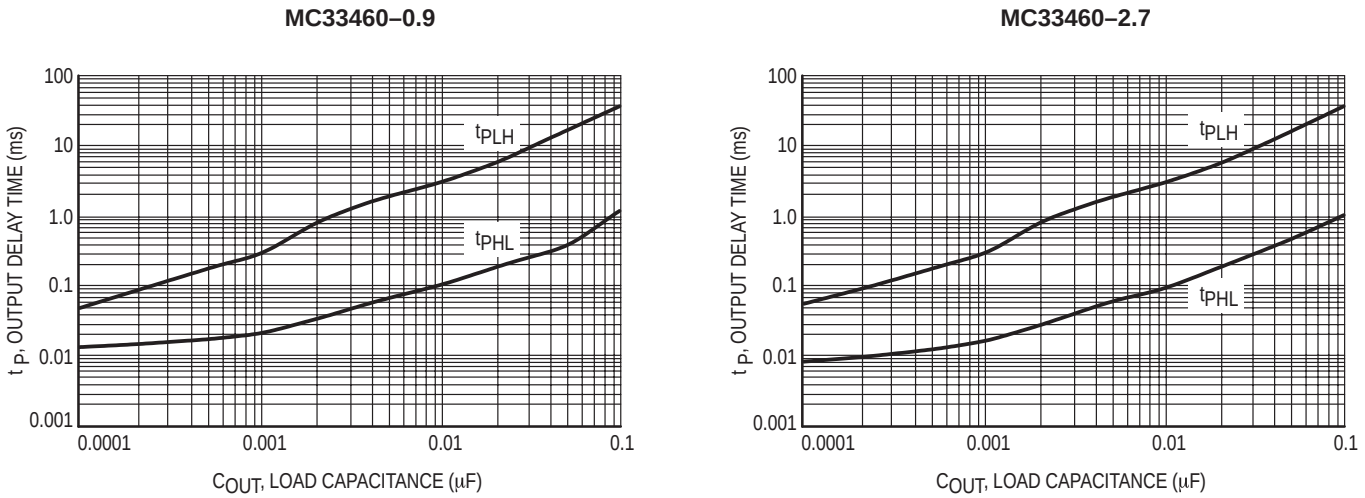
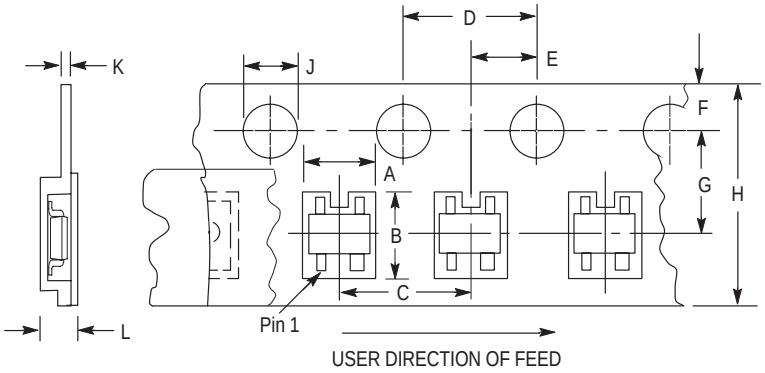



**Figure 7. Output Delay Time versus Load Capacitance**




| | |
|---|---|
| A | 2.2mm |
| B | 2.6mm |
| C | 4.0±0.1mm |
| D | 4.0±0.1mm |
| E | 2.0±0.05mm |
| F | 1.75±0.1mm |
| G | 3.5±0.05mm |
| H | 8.0±0.3mm |
| J | 1.5+0.1mm |
| K | 0.2±0.1mm |
| L | 1.6mm Max |

**Figure 8. Taping Specifications**

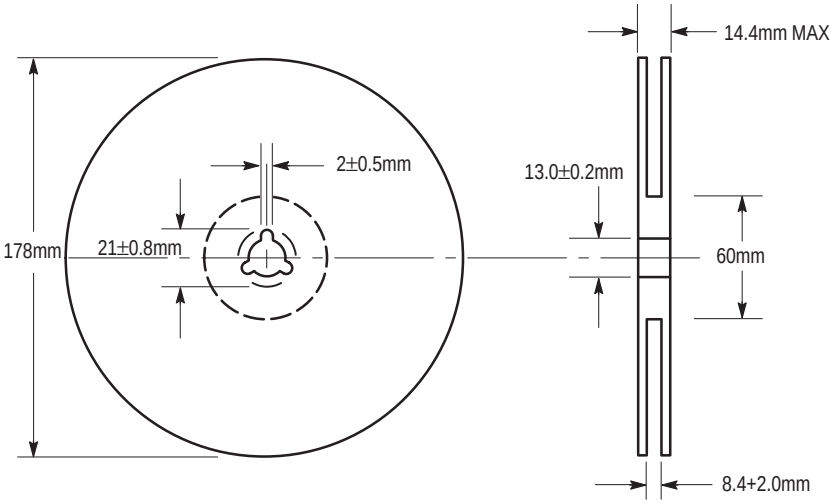
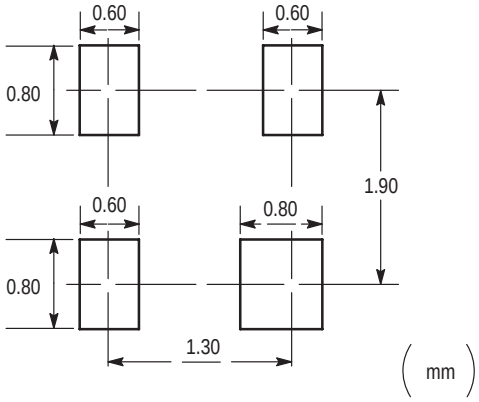



**Figure 9. Reel Dimensions**

# INFORMATION FOR USING THE SC–82AB SURFACE MOUNT PACKAGE

## MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.




**SC–82AB**

## SOLDERING PRECAUTIONS

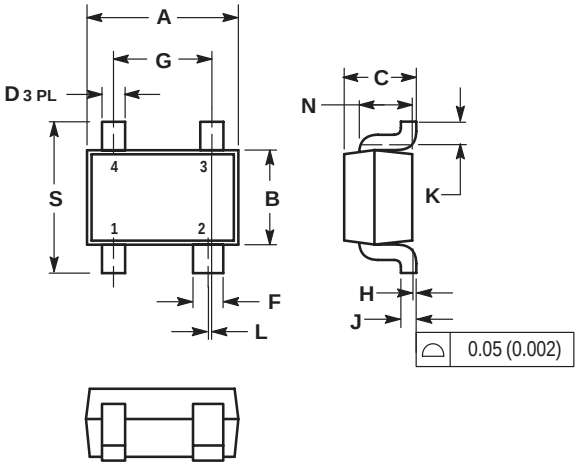
The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

## PACKAGE DIMENSIONS

**(SC–82AB)**
**SQ SUFFIX**
PLASTIC PACKAGE
CASE 419C–01
ISSUE O




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 1.8 | 2.2 | 0.071 | 0.087 |
| B | 1.15 | 1.45 | 0.045 | 0.057 |
| C | 0.8 | 1.1 | 0.031 | 0.043 |
| D | 0.2 | 0.4 | 0.008 | 0.016 |
| F | 0.3 | 0.5 | 0.012 | 0.020 |
| G | 1.1 | 1.5 | 0.043 | 0.059 |
| H | 0.0 | 0.1 | 0.000 | 0.004 |
| J | 0.10 | 0.26 | 0.004 | 0.010 |
| K | 0.1 | — | 0.004 | — |
| L | 0.05 BSC | | 0.002 BSC | |
| N | 0.7 REF | | 0.028 REF | |
| S | 1.8 | 2.4 | 0.07 | 0.09 |

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