# PRECISION MICROPOWER SHUNT VOLTAGE REFERENCES

## Description

The LM4040 is a family of bandgap circuits designed to achieve precision micro-power voltage references of 2.5V, 3.0V, 3.3V, 4.096V, and 5.0V. The devices are available in 0.2% B-grade, 0.5% C-grade, and 1% D-grade initial tolerances.

They are available in small outline SOT23 surface mount packages, which are ideal for applications where space is at a premium.

Excellent performance is maintained over the 60µA to 15mA operating current range with a typical temperature coefficient of only 20ppm/°C. The device is designed to be highly tolerant of capacitive loads, which maintains excellent stability.

This device offers a pin for pin compatible alternative to the LM4040 voltage reference.

## Features

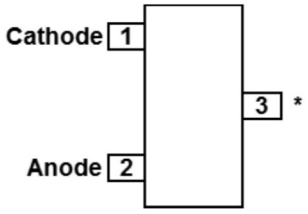
- Small Package: SOT23
  - SC70-5 Variants Are End of Life (EOL)
- No Output Capacitor Required
- Output Voltage Tolerance
  - LM4040B: ±0.2% at +25°C
  - LM4040C : ±0.5% at +25°C
  - LM4040D: ±1% at +25°C
- Low Output Noise
- (10Hz to 10kHz) 45µ$V_{RMS}$
- Wide Operating Current Range 60µA to 15mA
- Extended Temperature Range -40°C to +125°C
- Low Temperature Coefficient 100 ppm/°C (max)
- Green Molding in Small Package SOT23
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (LM4040Q)**

## Applications

- Battery Powered Equipment
- Precision Power Supplies
- Portable Instrumentation
- Portable Communications Devices
- Notebook and Palmtop Computers
- Data Acquisition Systems

## Pin Assignments

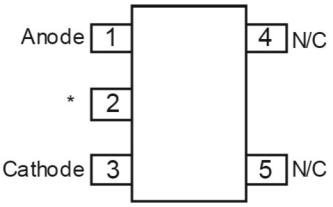
**(Top View)**




* Pin 3 must be left floating or connected to pin 2

**SOT23**

**(Top View)**




**SC70-5****

* Pin 2 must be left floating or connected to pin 1.

** SC70-5 variants are End of Life (EOL).

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Absolute Maximum Ratings (Voltages to Anode Unless Otherwise Stated)

| Parameter | Rating | Unit |
|---|---|---|
| Continuous Reverse Current | 20 | mA |
| Continuous Forward Current | 10 | mA |
| Operating Junction Temperature | -40 to +150 | °C |
| Storage Temperature | -55 to +150 | °C |

Caution: Stresses greater than the *Absolute Maximum Ratings* specified above, may cause permanent damage to the device. These are stress ratings only; functional operation of the device at conditions between maximum recommended operating conditions and absolute maximum ratings is not implied. Device reliability may be affected by exposure to absolute maximum rating conditions for extended periods of time.

(Semiconductor devices are ESD sensitive and may be damaged by exposure to ESD events. Suitable ESD precautions should be taken when handling and transporting these devices.)

Unless otherwise stated voltages specified are relative to the Anode pin.

## Package Thermal Data

| Package | $\theta_{JA}$ | $P_{DIS}$ $T_A$ = +25°C, $T_J$ = +125°C |
|---|---|---|
| SOT23 | 380°C/W | 330mW |

## Recommended Operating Conditions

| Parameter | Min | Max | Unit |
|---|---|---|---|
| Reverse Current | 0.06 | 15 | mA |
| Operating Ambient Temperature Range | -40 | +125 | °C |

## Electrical Characteristics (Test conditions: $T_A$ = +25°C, unless otherwise specified.)

**LM4040-25**

| Symbol | Parameter | Conditions | | Typ | LM4040 B Limits | LM4040 C Limits | LM4040 D Limits | Unit |
|---|---|---|---|---|---|---|---|---|
| | | — | $T_A$ | | | | | |
| $V_{REF}$ | Reverse Breakdown Voltage | $I_R$ = 100µA | +25°C | 2.5 | — | — | — | V |
| | Reverse Breakdown Voltage Tolerance | $I_R$ = 100µA | +25°C | — | ±5 | ±12 | ±25 | mV |
| | | | -40 to +85°C | | ±21 | ±29 | ±49 | |
| | | | -40 to +125°C | | ±30 | ±38 | ±63 | |
| $I_{RMIN}$ | Minimum Operating Current | — | +25°C | 45 | 60 | 60 | 65 | µA |
| | | | -40 to +85°C | — | 65 | 65 | 70 | |
| | | | -40 to +125°C | | 68 | 68 | 73 | |
| $\Delta V_R/\Delta T$ | Average Reverse Breakdown Voltage Temperature Coefficient | $I_R$ = 10mA | -40 to +125°C | ±20 | — | — | — | ppm/°C |
| | | $I_R$ = 1mA | | ±15 | ±100 | ±100 | ±150 | |
| | | $I_R$ = 100µA | | ±15 | — | — | — | |
| $\Delta V_R/\Delta I_R$ | Reverse Breakdown Change with Current | $I_{RMIN} \le I_R \le$ 1mA | +25°C | 0.3 | 0.8 | 0.8 | 1.0 | mV |
| | | | -40 to +85°C | — | 1.0 | 1.0 | 1.2 | |
| | | | -40 to +125°C | | 1.0 | 1.0 | 1.2 | |
| | | 1mA ≤ $I_R$ ≤ 15mA | +25°C | 2.5 | 6.0 | 6.0 | 8.0 | |
| | | | -40 to +85°C | — | 8.0 | 8.0 | 10.0 | |
| | | | -40 to +125°C | | 8.0 | 8.0 | 10.0 | |
| $Z_R$ | Dynamic Output Impedance | $I_R$ = 1mA, f = 120Hz $I_{AC} = 0.1I_R$ | | 0.3 | 0.8 | 0.9 | 1.1 | Ω |
| $e_n$ | Noise Voltage | $I_R$ = 100µA 10Hz < f < 10kHz | | 35 | — | — | — | $\mu V_{RMS}$ |
| $V_R$ | Long Term Stability (Non Cumulative) | t = 1000Hrs, $I_R$ = 100µA | | 120 | — | — | — | ppm |
| $V_{HYST}$ | Thermal Hysteresis | ΔT = -40°C to +125°C | | 0.08 | — | — | — | % |

## Electrical Characteristics (continued) (Test conditions: $T_A$ = +25°C, unless otherwise specified.)

**LM4040-30**

| Symbol | Parameter | Conditions | | Typ | LM4040 B Limits | LM4040 C Limits | LM4040 D Limits | Unit |
|---|---|---|---|---|---|---|---|---|
| | | — | $T_A$ | | | | | |
| $V_{REF}$ | Reverse Breakdown Voltage | $I_R$ = 100µA | +25°C | 3.0 | — | — | — | V |
| | Reverse Breakdown Voltage Tolerance | $I_R$ = 100µA | +25°C | — | ±6 | ±15 | ±30 | mV |
| | | | -40 to +85°C | | ±26 | ±34 | ±59 | |
| | | | -40 to +125°C | | 37 | ±45 | ±75 | |
| $I_{RMIN}$ | Minimum Operating Current | — | +25°C | 47 | 62 | 62 | 67 | µA |
| | | | -40 to +85°C | — | 67 | 67 | 72 | |
| | | | -40 to +125°C | | 70 | 70 | 75 | |
| $\Delta V_R/\Delta T$ | Average Reverse Breakdown Voltage Temperature Coefficient | $I_R$ = 10mA | -40 to +125°C | ±20 | — | — | — | ppm/°C |
| | | $I_R$ = 1mA | | ±15 | ±100 | ±100 | ±150 | |
| | | $I_R$ = 100µA | | ±15 | — | — | — | |
| $\Delta V_R/\Delta I_R$ | Reverse Breakdown Change with Current | $I_{RMIN} \le I_R \le$ 1mA | +25°C | 0.4 | 0.8 | 0.8 | 1.0 | mV |
| | | | -40 to +85°C | — | 1.1 | 1.1 | 1.3 | |
| | | | -40 to +125°C | | 1.1 | 1.1 | 1.3 | |
| | | 1mA ≤ $I_R$ ≤ 15mA | +25°C | 2.7 | 6.0 | 6.0 | 8.0 | |
| | | | -40 to +85°C | — | 9.0 | 9.0 | 11.0 | |
| | | | -40 to +125°C | | 9.0 | 9.0 | 11.0 | |
| $Z_R$ | Dynamic Output Impedance | $I_R$ = 1mA, f = 120Hz $I_{AC}$ = 0.1$I_R$ | | 0.4 | 0.9 | 0.9 | 1.2 | Ω |
| $e_n$ | Noise Voltage | $I_R$ = 100µA 10Hz < f < 10kHz | | 35 | — | — | — | $\mu V_{RMS}$ |
| $V_R$ | Long Term Stability (Non-Cumulative) | t = 1000Hrs, $I_R$ = 100µA | | 120 | — | — | — | ppm |
| $V_{HYST}$ | Thermal Hysteresis | ΔT = -40°C to +125°C | | 0.08 | — | — | — | % |

## Electrical Characteristics (cont.) (@$T_A$ = +25°C, unless otherwise specified.)

**LM4040-33**

| Symbol | Parameter | Conditions | | Typ | B Limits | C Limits | D Limits | Units |
|---|---|---|---|---|---|---|---|---|
| | | - | $T_A$ | | | | | |
| $V_{REF}$ | Reverse Breakdown Voltage | $I_R$ = 100µA | +25°C | 3.3 | | | | V |
| | Reverse Breakdown Voltage Tolerance | $I_R$ = 100µA | +25°C | — | ±6.6 | ±16.5 | ±33 | mV |
| | | | -40 to +85°C | | ±28 | ±38 | ±65 | |
| | | | -40 to +125°C | | ±40 | ±50 | ±83 | |
| $I_{RMIN}$ | Minimum Operating Current | — | +25°C | 47 | 62 | 62 | 67 | µA |
| | | | -40 to +85°C | — | 67 | 67 | 72 | |
| | | | -40 to +125°C | | 70 | 70 | 75 | |
| $\Delta V_R/\Delta T$ | Average Reverse Breakdown Voltage Temperature Coefficient | $I_R$ = 10mA | -40 to +125°C | ±20 | — | — | — | — |
| | | $I_R$ = 1mA | | ±15 | ±100 | ±100 | ±150 | ppm/°C |
| | | $I_R$ = 100µA | | ±15 | | | | — |
| $\Delta V_R/\Delta I_R$ | Reverse Breakdown Change With Current | $I_{RMIN}$ $I_R$ < 1mA | +25°C | 0.4 | 0.8 | 0.8 | 1 | mV |
| | | | -40 to +85°C | — | 1.1 | 1.1 | 1.3 | |
| | | | -40 to +125°C | | 1.1 | 1.1 | 1.3 | |
| | | 1mA < $I_R$ < 15mA | +25°C | 2.7 | 6 | 6 | 8 | |
| | | | -40 to +85°C | — | 9.0 | 9 | 11 | |
| | | | -40 to +125°C | | 9.0 | 9 | 11 | |
| $Z_R$ | Dynamic Output Impedance | $I_R$ = 1mA, f = 120Hz, $I_{AC}$ = 0.1$I_R$ | | 0.4 | 0.9 | 0.9 | 1.2 | Ω |
| $e_n$ | Noise Voltage | $I_R$ = 100µA, 10Hz < f < 10kHz | | 35 | — | — | — | $\mu V_{RMS}$ |
| $V_R$ | Long Term Stability (Non-Cumulative) | t = 1000Hrs, $I_R$ = 100µA | | 120 | — | — | — | ppm |
| $V_{HYST}$ | Thermal Hysteresis | ΔT = -40°C to = +125°C | | 0.08 | — | — | — | % |

## Electrical Characteristics (cont.) (@$T_A$ = +25°C, unless otherwise specified.)

**LM4040-41**

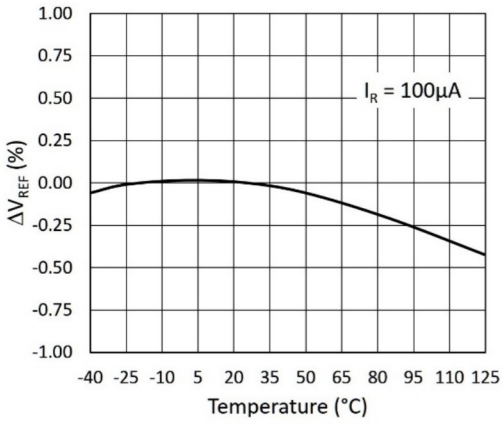
| Symbol | Parameter | Conditions | | Typ | B Limits | C Limits | D Limits | Units |
|---|---|---|---|---|---|---|---|---|
| | | | $T_A$ | | | | | |
| $V_{REF}$ | Reverse Breakdown Voltage | $I_R$ = 100µA | +25°C | 4.096 | — | — | — | V |
| | Reverse Breakdown Voltage Tolerance | $I_R$ = 100µA | +25°C | — | ±8.2 | ±20 | ±41 | mV |
| | | | -40 to +85°C | | ±35 | ±47 | ±81 | |
| | | | -40 to +125°C | | ±49 | ±60 | ±102 | |
| $I_{RMIN}$ | Minimum Operating Current | — | +25°C | 50 | 83 | 83 | 83 | µA |
| | | | -40 to +85°C | — | 88 | 88 | 88 | |
| | | | -40 to +125°C | | 88 | 88 | 88 | |
| $\Delta V_R/\Delta T$ | Average Reverse Breakdown Voltage Temperature Coefficient | $I_R$ = 10mA | -40 to +125°C | ±30 | — | — | — | — |
| | | $I_R$ = 1mA | | ±20 | ±100 | ±100 | ±150 | ppm/°C |
| | | $I_R$ = 100µA | | ±20 | — | — | — | — |
| $\Delta V_R/\Delta I_R$ | Reverse Breakdown Change With Current | $I_{RMIN}$ $I_R$ < 1mA | +25°C | 0.5 | 0.9 | 0.9 | 1.2 | mV |
| | | | -40 to +85°C | — | 1.2 | 1.2 | 1.5 | |
| | | | -40 to +125°C | | 1.2 | 1.2 | 1.5 | |
| | | 1mA < $I_R$ < 15mA | +25°C | 3 | 7 | 7 | 9 | |
| | | | -40 to +85°C | — | 10 | 10 | 13 | |
| | | | -40 to +125°C | | 10 | 10 | 13 | |
| $Z_R$ | Dynamic Output Impedance | $I_R$ = 1mA, f = 120Hz, $I_{AC}$ = 0.1$I_R$ | | 0.5 | 1 | 1 | 1.3 | Ω |
| $e_n$ | Noise Voltage | $I_R$ = 100µA, 10Hz < f < 10kHz | | 64 | — | — | — | $\mu V_{RMS}$ |
| $V_R$ | Long Term Stability (Non-Cumulative) | t = 1000Hrs, $I_R$ = 100µA | | 120 | — | — | — | ppm |
| $V_{HYST}$ | Thermal Hysteresis | ΔT = -40°C to = +125°C | | 0.08 | 80 | | | % |

## Electrical Characteristics (cont.) (Test conditions: $T_A$ = +25°C, unless otherwise specified.)

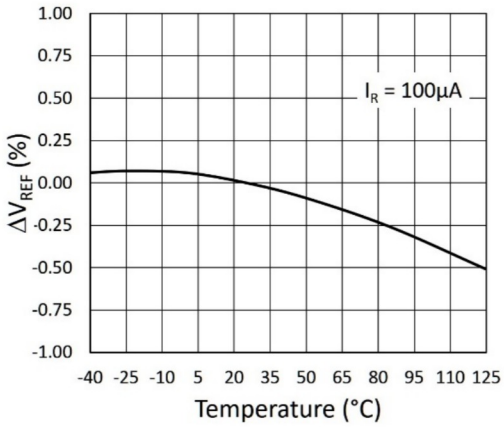
**LM4040-50**

| Symbol | Parameter | Conditions | | Typ | LM4040 B Limits | LM4040 C Limits | LM4040 D Limits | Units |
|---|---|---|---|---|---|---|---|---|
| | | — | $T_A$ | | | | | |
| $V_{REF}$ | Reverse Breakdown Voltage | $I_R$ = 100µA | +25°C | 5.0 | — | — | — | V |
| | Reverse Breakdown Voltage Tolerance | $I_R$ = 100µA | +25°C | — | ±10 | ±25 | ±50 | mV |
| | | | -40 to +85°C | | ±43 | ±58 | ±99 | |
| | | | -40 to +125°C | | ±60 | ±75 | ±125 | |
| $I_{RMIN}$ | Minimum Operating Current | — | +25°C | 54 | 74 | 74 | 79 | µA |
| | | | -40 to +85°C | — | 80 | 80 | 85 | |
| | | | -40 to +125°C | | 83 | 83 | 88 | |
| $\Delta V_R/\Delta T$ | Average Reverse Breakdown Voltage Temperature Coefficient | $I_R$ = 10mA | -40 to +125°C | ±30 | — | — | — | ppm/°C |
| | | $I_R$ = 1mA | | ±20 | ±100 | ±100 | ±150 | |
| | | $I_R$ = 100µA | | ±20 | — | — | — | |
| $\Delta V_R/\Delta I_R$ | Reverse Breakdown Change with Current | $I_{RMIN}$ ≤ $I_R$ ≤ 1mA | +25°C | 0.5 | 1.0 | 1.0 | 1.3 | mV |
| | | | -40 to +85°C | — | 1.4 | 1.4 | 1.8 | |
| | | | -40 to +125°C | | 1.4 | 1.4 | 1.8 | |
| | | 1mA ≤ $I_R$ ≤ 15mA | +25°C | 3.5 | 8.0 | 8.0 | 10.0 | |
| | | | -40 to +85°C | — | 12.0 | 12.0 | 15.0 | |
| | | | -40 to +125°C | | 12.0 | 12.0 | 15.0 | |
| $Z_R$ | Dynamic Output Impedance | $I_R$ = 1mA, f = 120Hz $I_{AC}$ = 0.1$I_R$ | | 0.5 | 1.1 | 1.1 | 1.5 | Ω |
| $e_n$ | Noise Voltage | $I_R$ = 100µA 10Hz < f < 10kHz | | 80 | — | — | — | $\mu V_{RMS}$ |
| $V_R$ | Long Term Stability (Non-Cumulative) | t = 1000Hrs, $I_R$ = 100µA | | 120 | — | — | — | ppm |
| $V_{HYST}$ | Thermal Hysteresis | ΔT = -40°C to +125°C | | 0.08 | — | — | — | % |

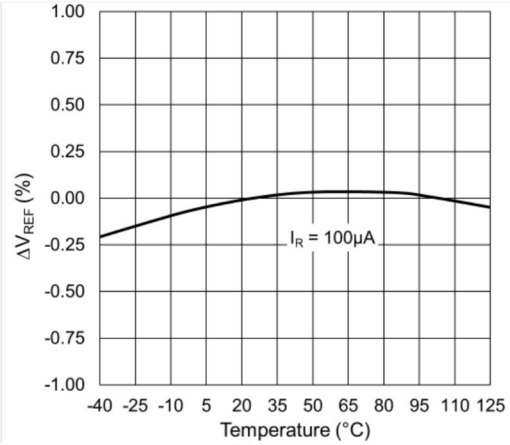
## Typical Characteristics – Reference Voltage Temperature Coefficient at 100µA



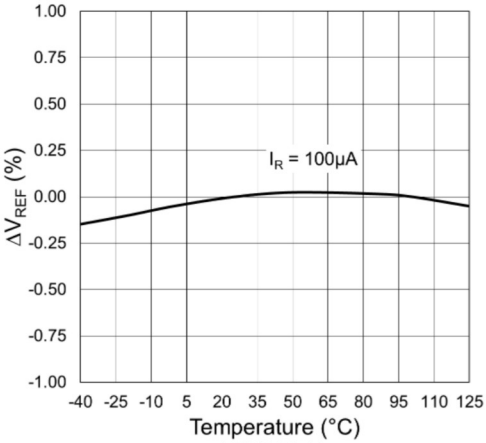

LM4040-25



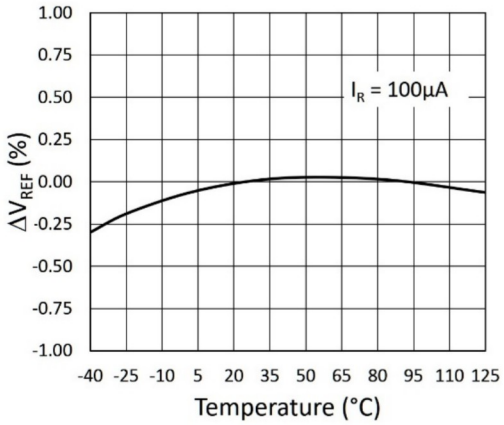

LM4040-30




LM4040-33

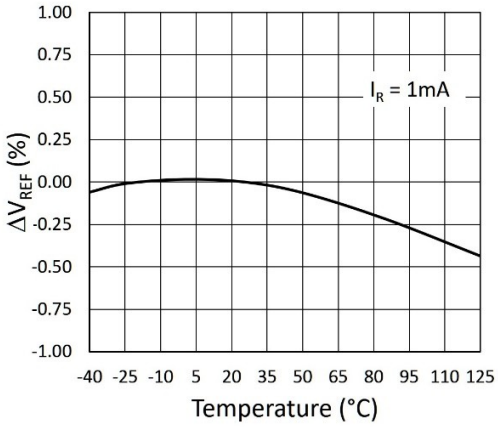



LM4040-41

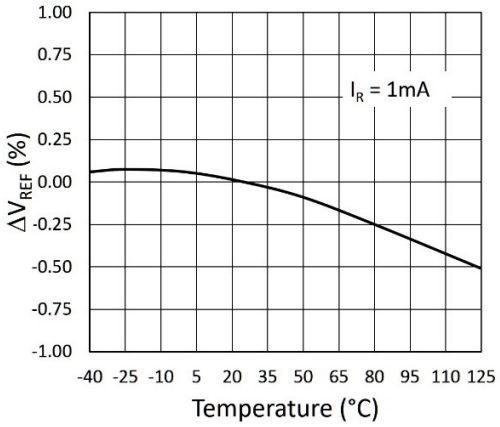



LM4040-50

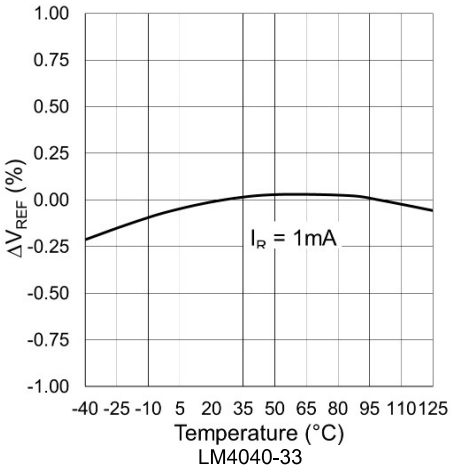
## Typical Characteristics – Reference Voltage Temperature Coefficient at 1mA



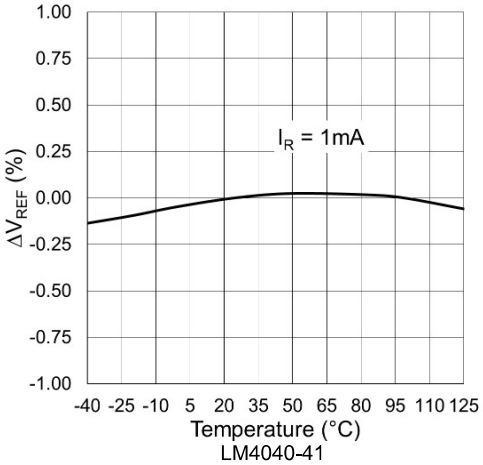
LM4040-25



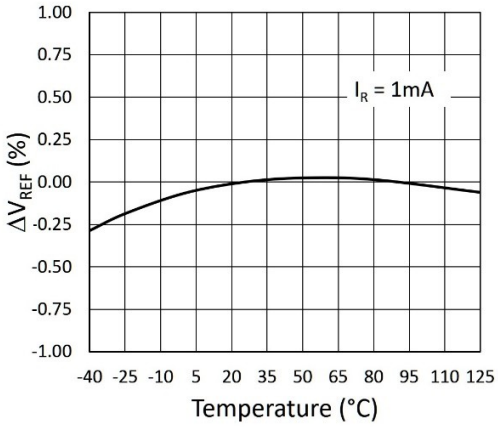
LM4040-30



LM4040-33

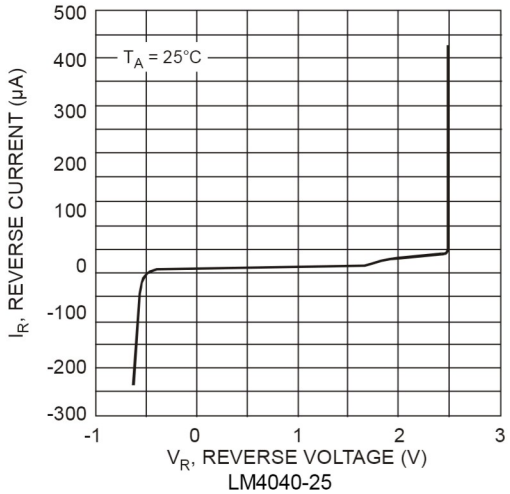


LM4040-41

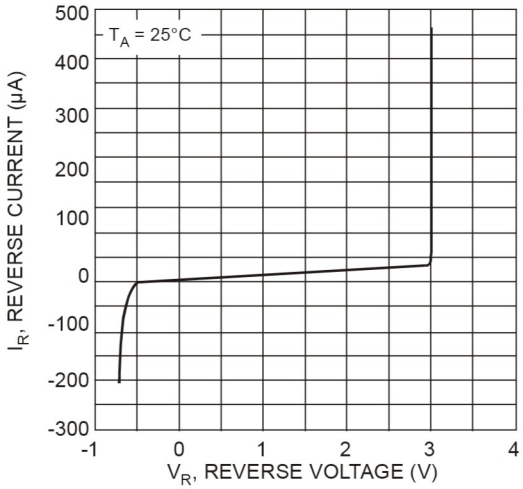


LM4040-50

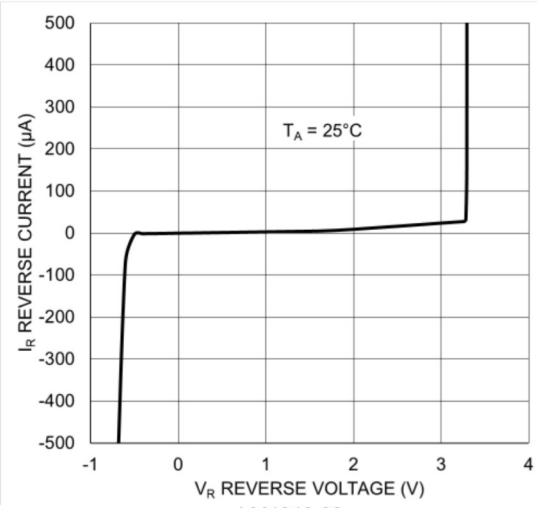
## Typical Characteristics – Reverse Characteristics



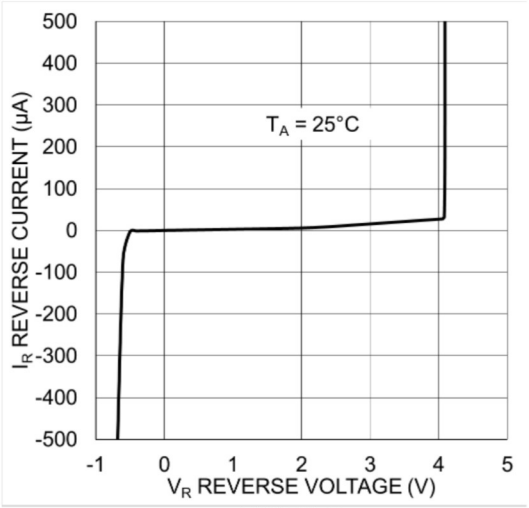

LM4040-25



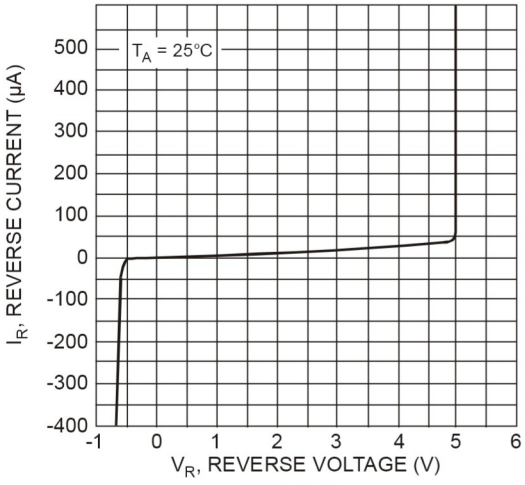

LM4040-30




LM4040-33

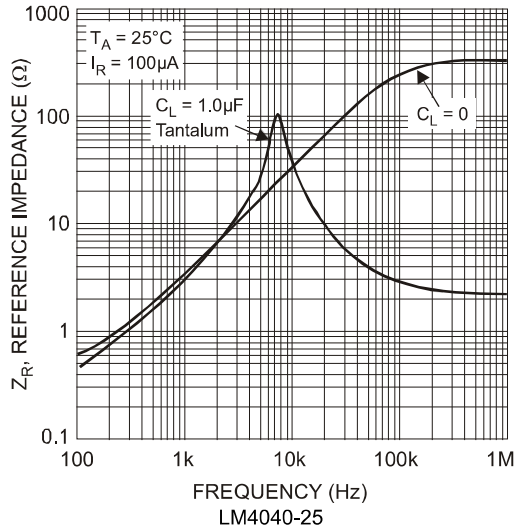



LM4040-41

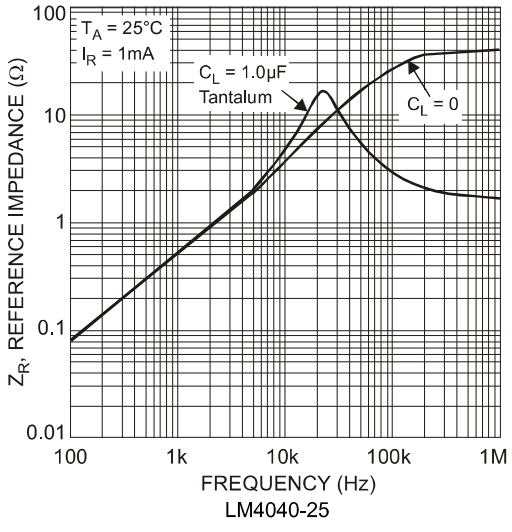



LM4040-50

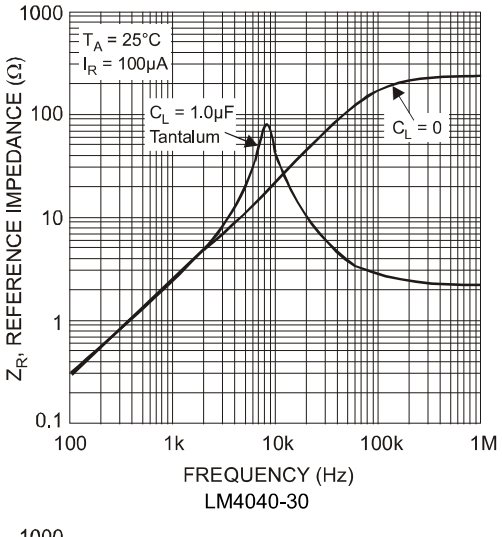
## Typical Characteristics LM4040Q Reference Impedance



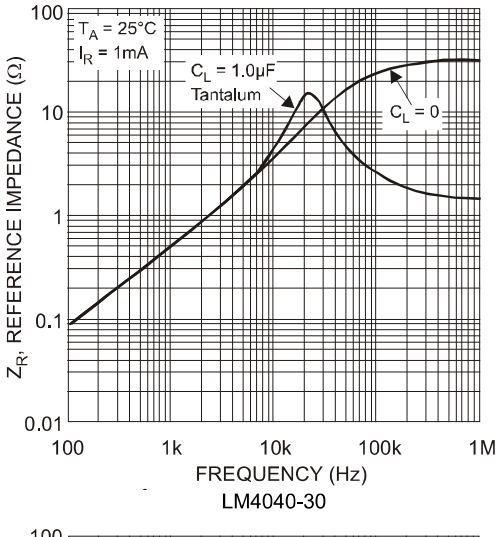

LM4040-25



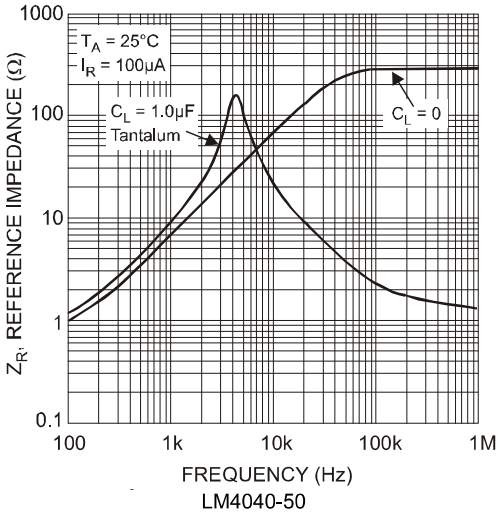

LM4040-25



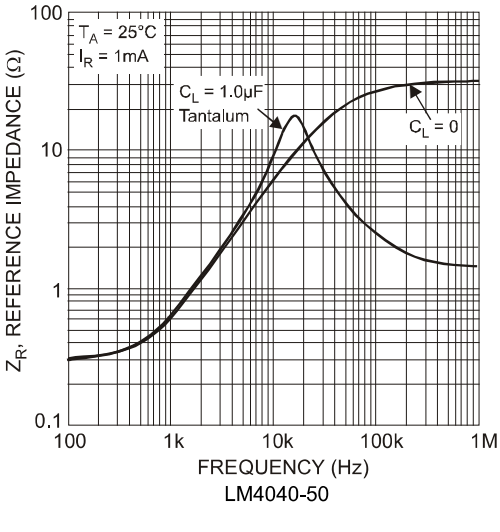

LM4040-30




LM4040-30

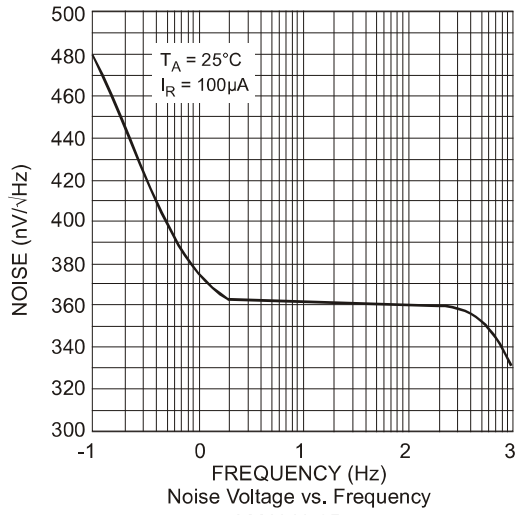



LM4040-50



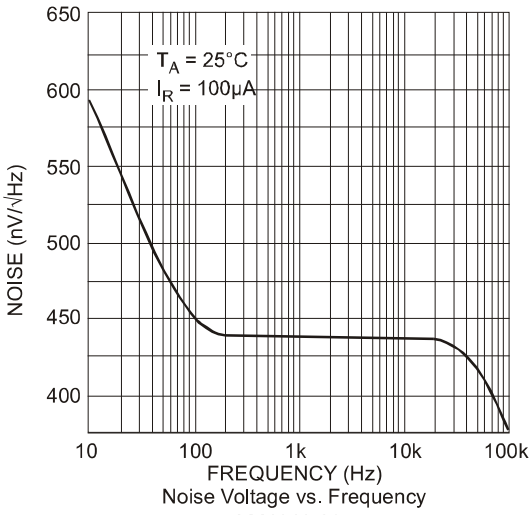

LM4040-50

## Typical Characteristics LM4040Q Noise Characteristics



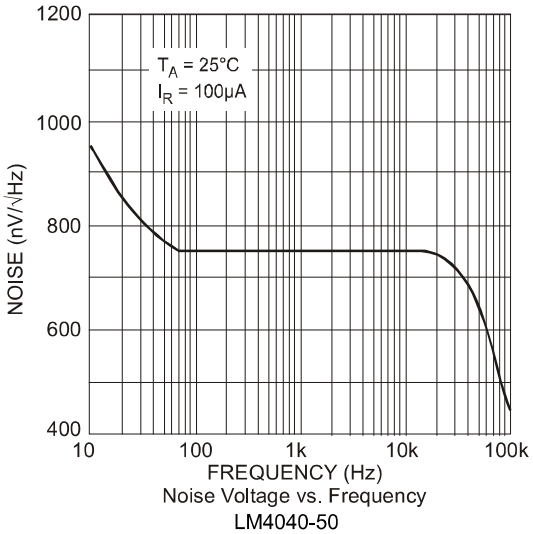

Noise Voltage vs. Frequency

LM4040-25




Noise Voltage vs. Frequency

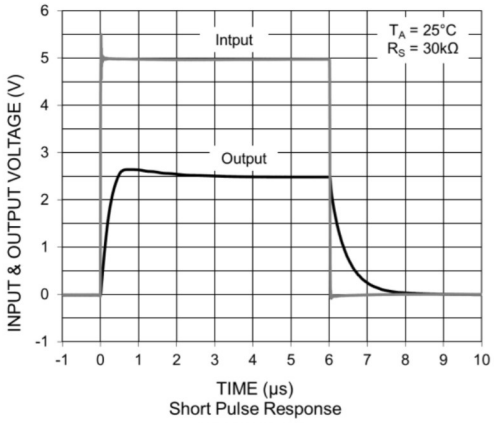
LM4040-30



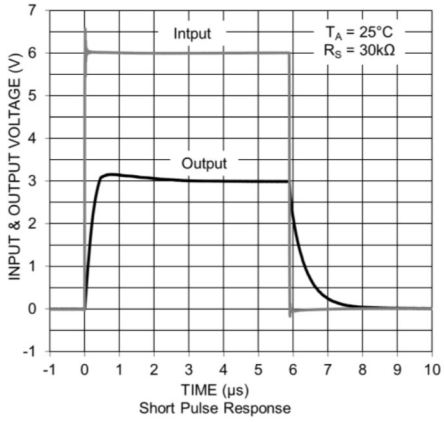

Noise Voltage vs. Frequency

LM4040-50

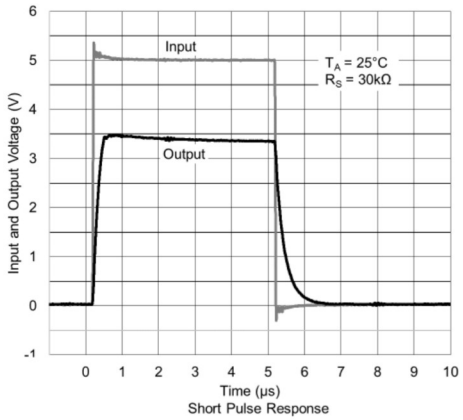
## Start Up Characteristics LM4040Q Short Pulse



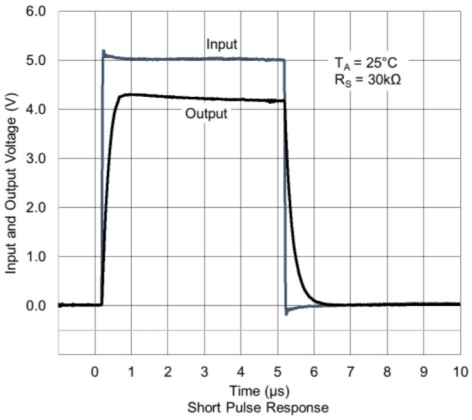

LM4040-25



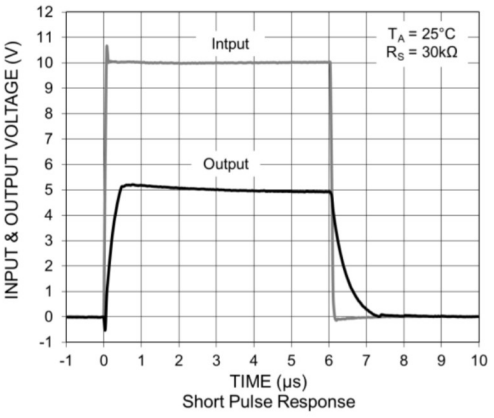

LM4040-30




LM4040-33

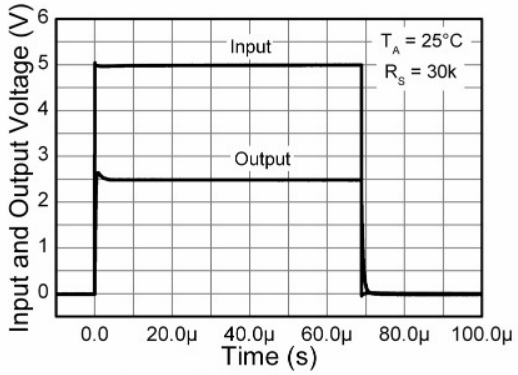



LM4040-41



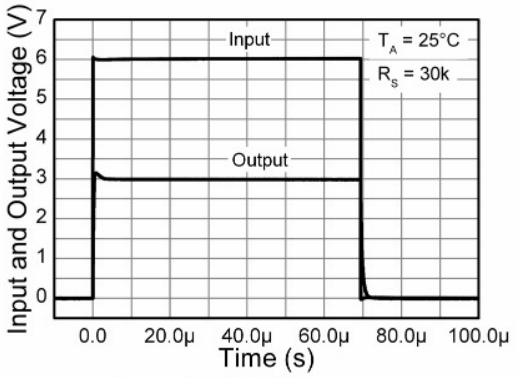

LM4040-50

## Start Up Characteristics LM4040Q Long Pulse



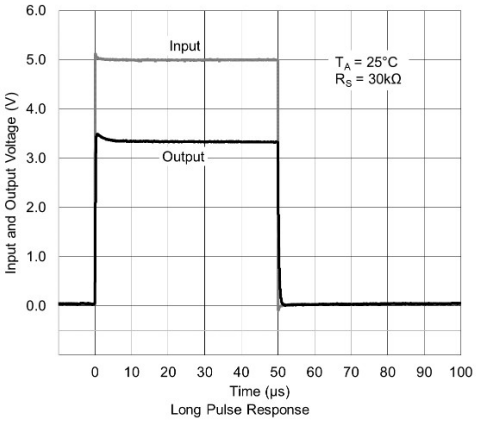

Long Pulse Response

LM4040-25



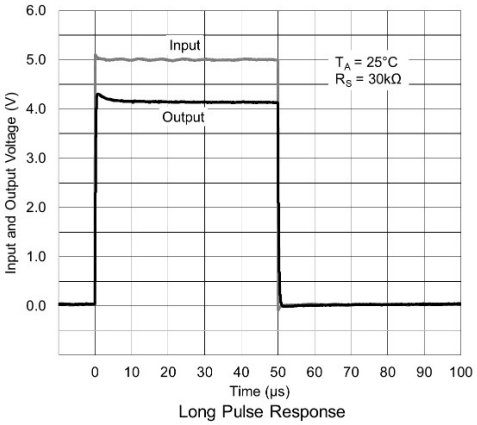

Long Pulse Response

LM4040-30



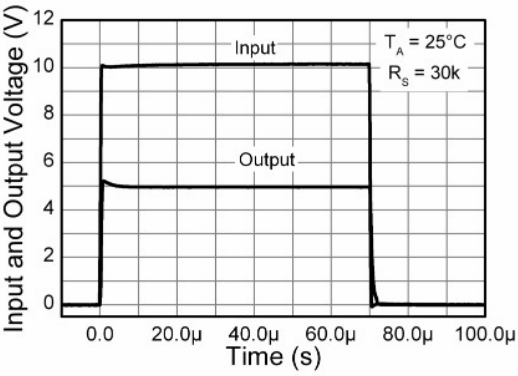

Long Pulse Response

LM4040-33




Long Pulse Response

LM4040-41




Long Pulse Response

LM4040-50

## Application Information

In a conventional shunt regulator application (Figure 1), an external series resistor ($R_S$) is connected between the supply voltage, $V_S$, and the LM4040.

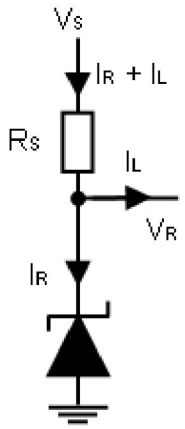



Figure 1

$R_S$ determines the current that flows through the load ($I_L$) and the LM4040 ($I_R$). Because load current and supply voltage can vary, $R_S$ should be small enough to supply at least the minimum acceptable $I_R$ to the LM4040 even when the supply voltage is at its minimum and the load current is at its maximum value. When the supply voltage is at its maximum and $I_L$ is at its minimum, $R_S$ should be large enough so that the current flowing through the LM4040 is less than 15mA.

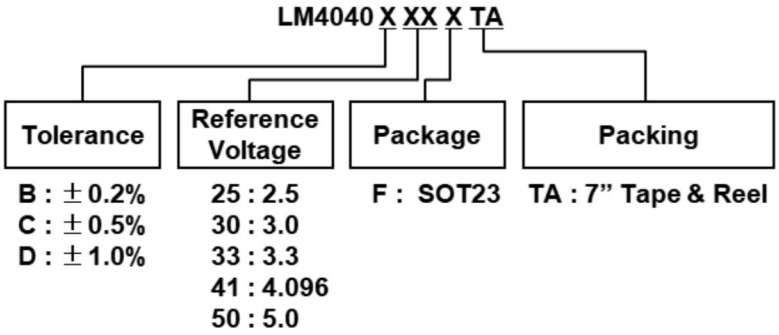
$R_S$ is determined by the supply voltage, ($V_S$), the load and operating current, ($I_L$ and $I_R$), and the LM4040's reverse breakdown voltage, $V_R$.

$$R_S = \frac{V_S - V_R}{I_L + I_R}$$

**Printed Circuit Board Layout Considerations**

The LM4040 device in the SOT23 package has the die attached to pin 3, which results in an electrical contact between pin 2 and pin 3. Therefore, pin 3 of the SOT23 package must be left floating or connected to pin 2.

## Ordering Information




| Part Number | +25°C Tol | Voltage (V) | Status (Note 4) | Package (Note 5) | Identification Code | Reel Size | Tape Width | Quantity per Reel |
|---|---|---|---|---|---|---|---|---|
| LM4040B25FTA | 0.2% | 2.5 | Full Production | SOT23 | R2B | 7", 180mm | 8mm | 3000 |
| LM4040B30FTA | | 3.0 | Full Production | SOT23 | R3B | 7", 180mm | 8mm | 3000 |
| LM4040B33FTA | | 3.3 | Full Production | SOT23 | 3B3 | 7", 180mm | 8mm | 3000 |
| LM4040B41FTA | | 4.096 | Full Production | SOT23 | 4B1 | 7", 180mm | 8mm | 3000 |
| LM4040B50FTA | | 5.0 | Full Production | SOT23 | R5B | 7", 180mm | 8mm | 3000 |
| LM4040C25FTA | 0.5% | 2.5 | Full Production | SOT23 | R2C | 7", 180mm | 8mm | 3000 |
| LM4040C30FTA | | 3.0 | Full Production | SOT23 | R3C | 7", 180mm | 8mm | 3000 |
| LM4040C33FTA | | 3.3 | Full Production | SOT23 | 3C3 | 7", 180mm | 8mm | 3000 |
| LM4040C41FTA | | 4.096 | Full Production | SOT23 | 4C1 | 7", 180mm | 8mm | 3000 |
| LM4040C50FTA | | 5.0 | Full Production | SOT23 | R5C | 7", 180mm | 8mm | 3000 |
| LM4040D25FTA | 1% | 2.5 | Full Production | SOT23 | R2D | 7", 180mm | 8mm | 3000 |
| LM4040D30FTA | | 3.0 | Full Production | SOT23 | R3D | 7", 180mm | 8mm | 3000 |
| LM4040D33FTA | | 3.3 | Full Production | SOT23 | 3D3 | 7", 180mm | 8mm | 3000 |
| LM4040D41FTA | | 4.096 | Full Production | SOT23 | 4D1 | 7", 180mm | 8mm | 3000 |
| LM4040D50FTA | | 5.0 | Full Production | SOT23 | R5D | 7", 180mm | 8mm | 3000 |

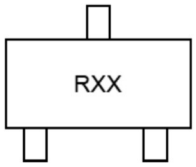
See LM4040Q datasheet for Automotive-compliant versions with AEC-Q100 qualification.

Notes: 4. SC70-5 (H5 package code) options are End Of Life (EOL). Package information can be found at end of datasheet.
5. Package dimensions and pad layout can be found on our website at http://www.diodes.com/package-outlines.html.

## Marking Information

**(1) SOT23**
**LM4040-25, LM4040-30, LM4040-50**

(Top View)

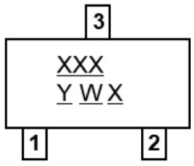



RXX : Identification Code

| Part Number | Identification Code |
|---|---|
| LM4040B25FTA | R2B |
| LM4040B30FTA | R3B |
| LM4040B50FTA | R5B |
| LM4040C25FTA | R2C |
| LM4040C30FTA | R3C |
| LM4040C50FTA | R5C |
| LM4040D25FTA | R2D |
| LM4040D30FTA | R3D |
| LM4040D50FTA | R5D |

**LM4040-33, LM4040-41**

(Top View)



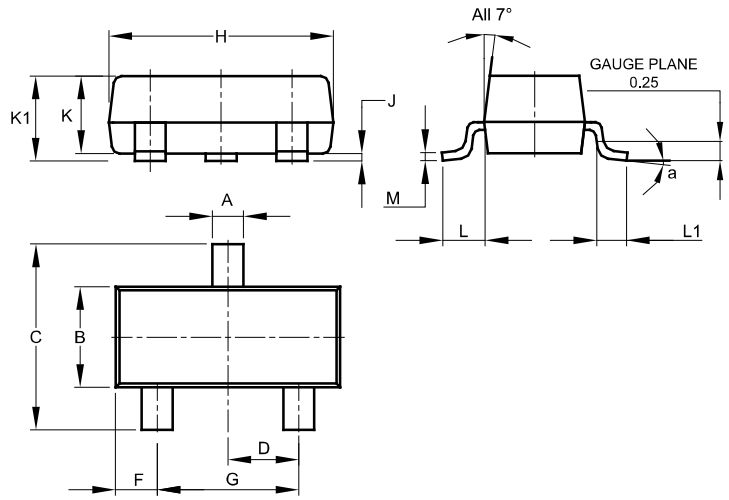

XXX : Identification code
Y : Year : 0~9
W : Week: A~Z : 1~26 week; a~z : 27~52 week; z represents 52 and 53 week
X : Internal code

| Part Number | Identification Code |
|---|---|
| LM4040B33FTA | 3B3 |
| LM4040B41FTA | 4B1 |
| LM4040C33FTA | 3C3 |
| LM4040C41FTA | 4C1 |
| LM4040D33FTA | 3D3 |
| LM4040D41FTA | 4D1 |

## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**

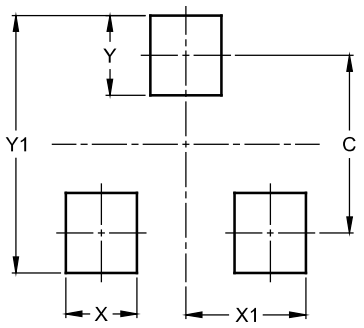



| SOT23 | | | |
|---|---|---|---|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT23**



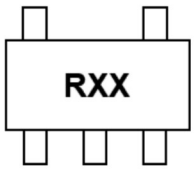

| Dimensions | Value (in mm) |
|---|---|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

## SC70-5 (H5) End of Life Options

| Part Number | +25°C Tol | Voltage (V) | Status (Note 4) | Package (Note 5) | Identification Code | Reel Size | Tape Width | Quantity per Reel |
|---|---|---|---|---|---|---|---|---|
| LM4040B25H5TA | 0.2% | 2.5 | End of Life | SC70-5 | R2B | 7", 180mm | 8mm | 3000 |
| LM4040B30H5TA | | 3.0 | End of Life | SC70-5 | R3B | 7", 180mm | 8mm | 3000 |
| LM4040B50H5TA | | 5.0 | End of Life | SC70-5 | R5B | 7", 180mm | 8mm | 3000 |
| LM4040C25H5TA | 0.5% | 2.5 | End of Life | SC70-5 | R2C | 7", 180mm | 8mm | 3000 |
| LM4040C30H5TA | | 3.0 | End of Life | SC70-5 | R3C | 7", 180mm | 8mm | 3000 |
| LM4040C50H5TA | | 5.0 | End of Life | SC70-5 | R5C | 7", 180mm | 8mm | 3000 |
| LM4040D25H5TA | 1% | 2.5 | End of Life | SC70-5 | R2D | 7", 180mm | 8mm | 3000 |
| LM4040D30H5TA | | 3.0 | End of Life | SC70-5 | R3D | 7", 180mm | 8mm | 3000 |
| LM4040D50H5TA | | 5.0 | End of Life | SC70-5 | R5D | 7", 180mm | 8mm | 3000 |

**Marking Information**

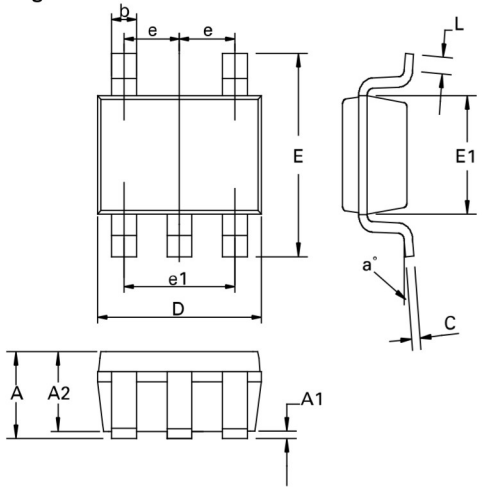
(Top View)




RXX : Identification code

| Part Number | Identification Code |
|---|---|
| LM4040B25H5TA | R2B |
| LM4040B30H5TA | R3B |
| LM4040B50H5TA | R5B |
| LM4040C25H5TA | R2C |
| LM4040C30H5TA | R3C |
| LM4040C50H5TA | R5C |
| LM4040D25H5TA | R2D |
| LM4040D30H5TA | R3D |
| LM4040D50H5TA | R5D |

**Package Outline Dimensions**




| Dim. | Min. | Max. | Typ. |
|---|---|---|---|
| A | 1.1 | 0.8 | - |
| A1 | 0.1 | - | - |
| A2 | 1 | 0.8 | - |
| b | 0.3 | 0.15 | - |
| C | 0.25 | 0.08 | - |
| D | 2.00 BSC | | |
| E | 2.10 BSC | | |
| E1 | 1.25 BSC | | |
| e | 0.65 BSC | | |
| e1 | 1.30 BSC | | |
| L | 0.46 | 0.26 | - |
| a° | 0 | 8 | - |

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