



# High-Precision, +2.5V Reference

**MX580**

## General Description

The MX580 is a high-performance, three-terminal voltage reference which provides a stable +2.5V source for 8-, 10-, and 12-bit data converters and analog functions. A temperature-compensated internal bandgap operates from 4.5V to 30V and consumes only 1.5mA.

The reference can be connected directly to a number of CMOS analog-to-digital and digital-to-analog converters and is especially convenient in +5V powered systems. An initial untrimmed accuracy of 0.4% and temperature stability of 10ppm/°C allow adjustment-free designs in many precision applications.

Available packages include TO-52 metal cans for commercial and military temperature grades, as well as 8-pin SO packages for commercial grade devices.

## Applications

CMOS Data Conversion  
Digital Panel Meters  
Portable Instrumentation  
Remote Measurement Systems  
Logic-Powered Analog Systems

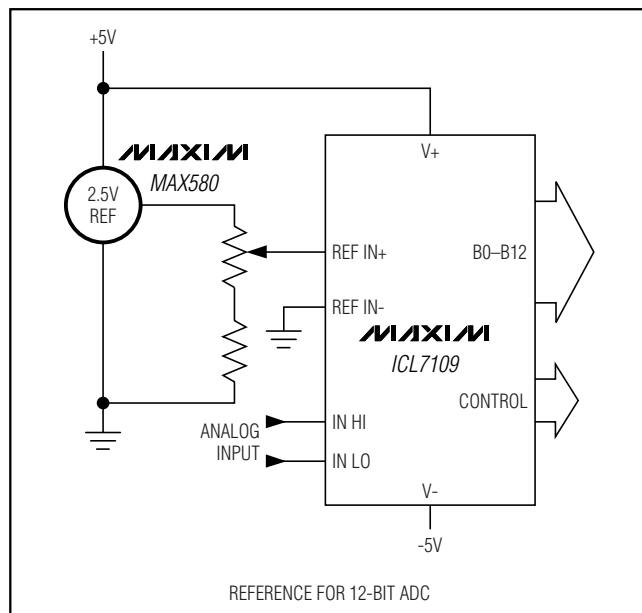
## Features

- ◆ 2.500V  $\pm 0.4\%$  Accuracy (MX580L/M)
- ◆ 10ppm/°C Temperature Stability (MX580M)
- ◆ No Adjustments
- ◆ 250 $\mu$ V Long-Term Stability
- ◆ 1.5mA Quiescent Current
- ◆ 4.5V to 30V Operation

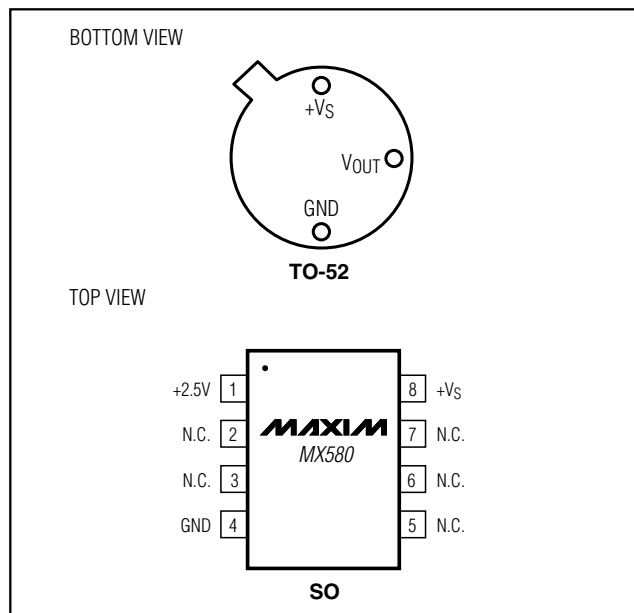
## Ordering Information

| PART      | TEMP RANGE      | PIN-PACKAGE | TOLERANCE   |
|-----------|-----------------|-------------|-------------|
| MX580JH   | 0°C to +70°C    | TO-52 Can   | $\pm 75$ mV |
| MX580KH   | 0°C to +70°C    | TO-52 Can   | $\pm 25$ mV |
| MX580LH   | 0°C to +70°C    | TO-52 Can   | $\pm 10$ mV |
| MX580MH   | 0°C to +70°C    | TO-52 Can   | $\pm 10$ mV |
| MX580JCSA | 0°C to +70°C    | 8 SO        | $\pm 75$ mV |
| MX580KCSA | 0°C to +70°C    | 8 SO        | $\pm 25$ mV |
| MX580LCSA | 0°C to +70°C    | 8 SO        | $\pm 10$ mV |
| MX580JESA | -40°C to +85°C  | 8 SO        | $\pm 75$ mV |
| MX580KESA | -40°C to +85°C  | 8 SO        | $\pm 25$ mV |
| MX580SH   | -55°C to +125°C | TO-52 Can   | $\pm 25$ mV |

## Typical Application Circuit



## Pin Configurations



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## ABSOLUTE MAXIMUM RATINGS

Input Voltage ( $V_{IN}$  to GND) .....-0.3V, +40V  
 Continuous Power Dissipation  
   TO-52 Metal Can (derate 2.8mW/°C above +25°C) ....350mW  
   SO (derate 5.3mW/°C above +75°C) .....400mW  
 Output Short-Circuit Duration (Note 1) .....Indefinite  
 Operating Temperature Range  
   Commercial (J, K, L, M) .....0°C to +70°C  
   Military (S) .....-55°C to +125°C

Storage Temperature Range .....-65°C to +175°C  
 Lead Temperature (soldering, 10s) .....+300°C  
 Thermal Resistance, Junction to Ambient  
   TO-52 Metal Can.....+360°C/W  
   SO .....+170°C/W  
 Junction to Case  
   TO-52 Metal Can.....+100°C/W  
   SO .....+55°C/W

**Note 1:** Absolute maximum power dissipation must not be exceeded.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## ELECTRICAL CHARACTERISTICS

( $V_{IN}$  = +15V.  $T_A$  = +25°C, unless otherwise noted.)

| PARAMETER                                                           | SYMBOL            | CONDITIONS                                           |          | MIN | TYP | MAX       | UNITS             |
|---------------------------------------------------------------------|-------------------|------------------------------------------------------|----------|-----|-----|-----------|-------------------|
| Output Voltage Tolerance                                            |                   | $I_L = 0\text{mA}$                                   | MX580J/S |     |     | ±75       | mV                |
|                                                                     |                   |                                                      | MX580K   |     |     | ±25       |                   |
|                                                                     |                   |                                                      | MX580L/M |     |     | ±10       |                   |
| Output Voltage Change with Temperature<br>(Temperature Coefficient) |                   | $T_A = 0^\circ\text{C to } +75^\circ\text{C}$        | MX580J   |     |     | 15 (85)   | mV<br>(ppm/°C)    |
|                                                                     |                   |                                                      | MX580K   |     |     | 7 (40)    |                   |
|                                                                     |                   |                                                      | MX580L   |     |     | 4.3 (25)  |                   |
|                                                                     |                   |                                                      | MX580M   |     |     | 1.75 (10) |                   |
|                                                                     |                   | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$      | MX580J   |     |     | 20 (64)   |                   |
|                                                                     |                   |                                                      | MX580K   |     |     | 12 (38)   |                   |
|                                                                     |                   | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$     | MX580S   |     |     | 25 (55)   |                   |
| Line Regulation                                                     |                   | $I_L = 0\text{mA}, 4.5\text{V} < V_{IN} < 7\text{V}$ | MX580J/S |     | 0.3 | 3         | mV                |
|                                                                     |                   |                                                      | MX580K   |     | 0.3 | 2         |                   |
|                                                                     |                   |                                                      | MX580L/M |     |     | 1         |                   |
|                                                                     |                   | $I_L = 0\text{mA}, 7\text{V} < V_{IN} < 30\text{V}$  | MX580J/S |     | 1.5 | 6         |                   |
|                                                                     |                   |                                                      | MX580K   |     | 1.5 | 4         |                   |
|                                                                     |                   |                                                      | MX580L/M |     |     | 2         |                   |
| Load Regulation                                                     |                   | $I_L = 0\text{mA to } 10\text{mA}$                   |          |     |     | 10        | mV                |
| Quiescent Supply Current                                            | $I_Q$             | $I_L = 0\text{mA}$                                   |          |     | 1.0 | 1.5       | mA                |
| Noise                                                               | $e_n(\text{P-P})$ | 0.1Hz to 10Hz                                        |          |     | 60  |           | μV <sub>P-P</sub> |
| Stability                                                           |                   | Long term                                            |          |     | 250 |           | μV                |
|                                                                     |                   | Per month                                            |          |     | 25  |           |                   |

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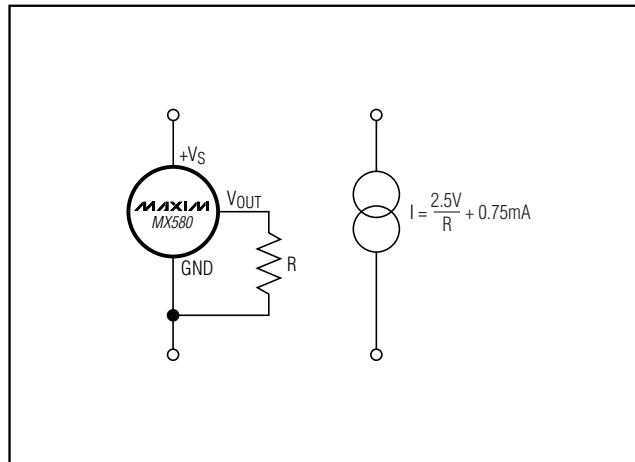


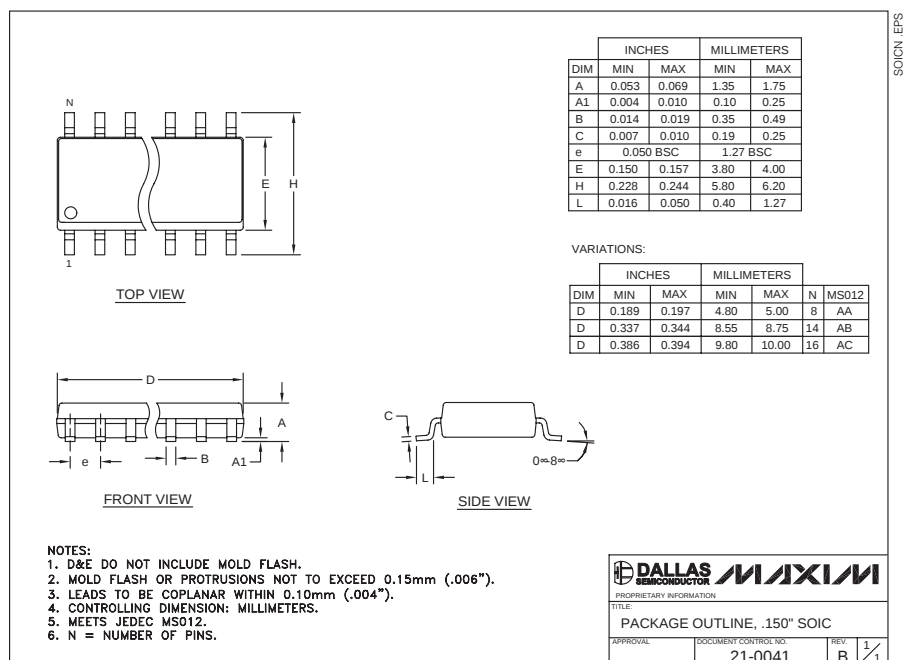
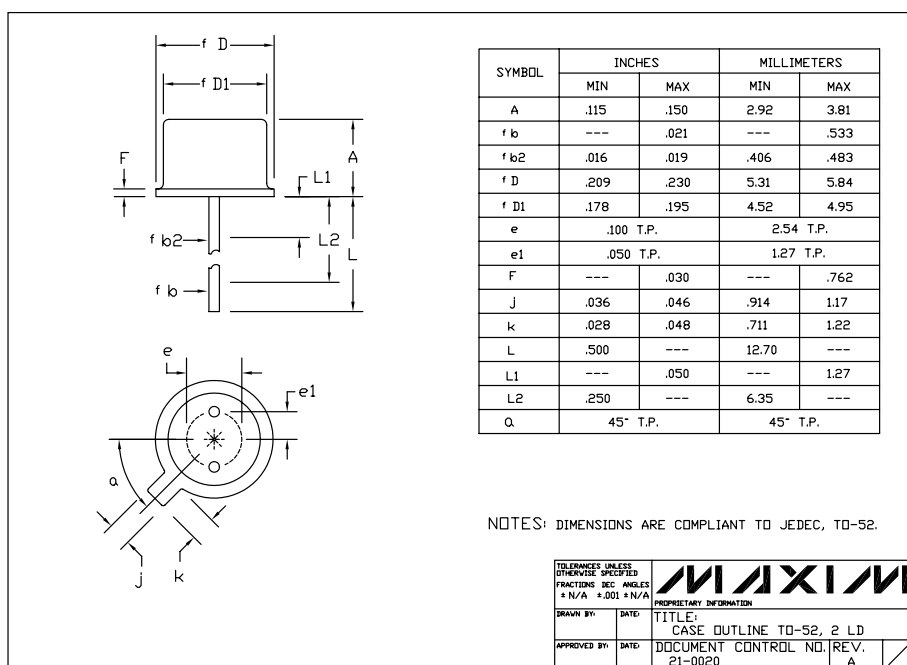
Figure 1. Two-Component Precision Current Limiter

**MX580**

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## Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).)



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