19-0911; Rev 1; 8/96

MAXIM

High Precision +2.5 Volt 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 A-to-D and D-to-A converters and is especially convenient in +5V powered systems. An inital 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 lead small outline for commercial grade devices.

Applications

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

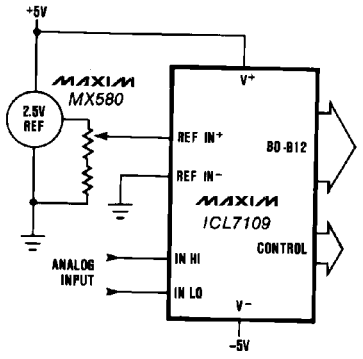
Features

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

Ordering Information

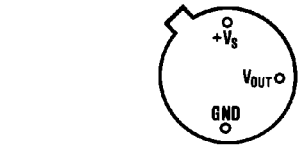
PART	TEMP. RANGE	PACKAGE	TOLERANCE
MX580JH	0°C to +70°C	TO-52 Can	±75mV
MX580KH	0°C to +70°C	TO-52 Can	±25mV
MX580LH	0°C to +70°C	TO-52 Can	±10mV
MX580MH	0°C to +70°C	TO-52 Can	±10mV
MX580JCSA	0°C to +70°C	8 Lead SO	±75mV
MX580KCSA	0°C to +70°C	8 Lead SO	±25mV
MX580LCSA	0°C to +70°C	8 Lead SO	±10mV
MX580JESA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

Typical Application

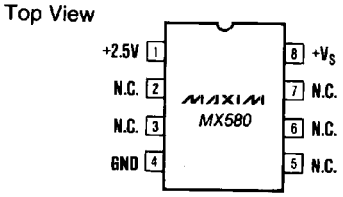


Reference for 12-Bit A/D Converter

Pin Configurations



TO-52



8 Lead Small Outline

High Precision +2.5 Volt Reference

ABSOLUTE MAXIMUM RATINGS

Input Voltage V_{IN} to GND . . . . . -0.3V, +40V
Power Dissipation
  TO-52 Metal Can (Derate 2.8mW/°C above +25°C) . . 350mW
  Small Outline (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 10sec) . . . . . +300°C
Thermal Resistance, Junction to Ambient
  TO-52 Metal Can . . . . . +360°C/W
  Small Outline Package . . . . . +170°C/W
Junction to Case
  TO-52 Metal Can . . . . . +100°C/W
  Small Outline Package . . . . . +55°C/W

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 = 0mA	MX580J/S MX580K MX580L/M			±75 ±25 ±10	mV
Output Voltage Change with Temperature (Temperature Coefficient)		T_A = 0°C to +70°C	MX580J MX580K MX580L MX580M			15 (85) 7 (40) 4.3 (25) 1.75 (10)	±mV (ppm/°C)
		T_A = -40°C to +85°C	MX580J MX580K			20 (64) 12 (38)	
		T_A = -55°C to +125°C	MX580S MX580 MX580			25 (55) 11 (25) 4.5 (10)	
Line Regulation		I_L = 0mA +4.5V < V_{IN} < +7V	MX580J/S MX580K MX580L/M		0.3 0.3	3 2 1	mV
		I_L = 0mA, +7V < V_{IN} < +30V	MX580J/S MX580K MX580L/M		1.5 1.5	6 4 2	
Load Regulation		I_L = 0mA to 10mA				10	mV
Quiescent Supply Current	I_Q	I_L = 0mA			1.0	1.5	mA
Noise	e_{NP-P}	0.1Hz to 10Hz			60		μV_{P-P}
Stability Long Term Per Month					250 25		µV

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

High Precision +2.5 Volt Reference

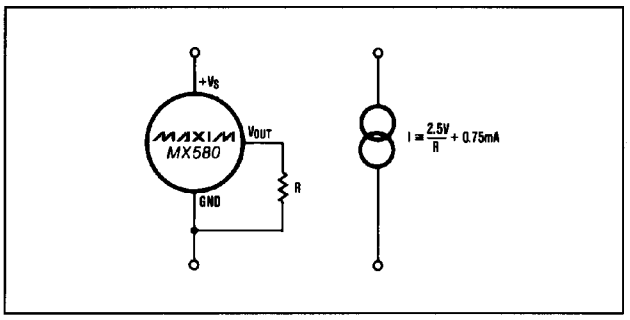
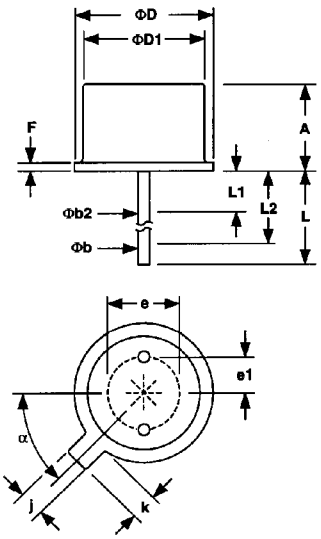


Figure 1. Two-Component Precision Current Limiter

High Precision +2.5 Volt Reference

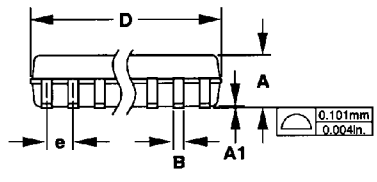
Package Information

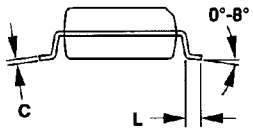


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.115	0.150	2.92	3.81
Φb	–	0.021	–	0.533
Φb2	0.016	0.019	0.406	0.483
ΦD	0.209	0.230	5.31	5.84
ΦD1	0.178	0.195	4.52	4.95
e	0.100		2.54	
e1	0.050		1.27	
F	–	0.030	–	0.762
j	0.036	0.046	0.914	1.17
k	0.028	0.048	0.711	1.22
L	0.500	–	12.70	–
L1	–	0.050	–	1.27
L2	0.250	–	6.35	–
α	45°		45°	

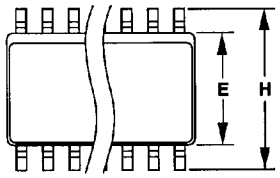
21-0020A

2-PIN TO-52 PACKAGE





DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
E	0.150	0.157	3.80	4.00
e	0.050		1.27	
H	0.228	0.244	5.80	6.20
L	0.016	0.050	0.40	1.27



Narrow SO SMALL-OUTLINE PACKAGE (0.150 in.)

DIM	PINS	INCHES		MILLIMETERS	
		MIN	MAX	MIN	MAX
D	8	0.189	0.197	4.80	5.00
D	14	0.337	0.344	8.55	8.75
D	16	0.386	0.394	9.80	10.00

21-0041A