

**FEATURES**

- Trimmed Bandgap Design ..... 0.2%
- Wide Operating Current Range ..... 60µA to 20mA
- Low Dynamic Impedance ..... 0.25Ω
- Available in SOT-23, TO-92 and SO-8

**APPLICATIONS**

- Cellular Phones
- Portable Computers
- Instrumentation
- Automotive

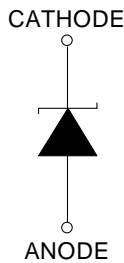
**DESCRIPTION**

The CLM4040 is a two terminal precision voltage reference with thermal stability guaranteed over temperature, a typical dynamic impedance of 0.25Ω and very sharp turn-on characteristics. The device has a fixed output of 2.5V for input currents between 60µA to 20mA and is an excellent choice for battery operated applications. Available in three tolerances, 0.5%, 1.0% and 2.0% and in three package outlines, SOT-23, SO-8 and TO-92.

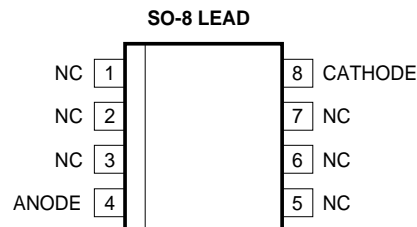
**ORDERING INFORMATION**

Part	Package	Tolerance	Temp. Range
CLM4040CS	SOT-23	0.5%	-40°C to +85°C
CLM4040DS	SOT-23	1.0%	-40°C to +85°C
CLM4040ES	SOT-23	2.0%	-40°C to +85°C
CLM4040CY	SO-8	0.5%	-40°C to +85°C
CLM4040DY	SO-8	1.0%	-40°C to +85°C
CLM4040EY	SO-8	2.0%	-40°C to +85°C
CLM4040CN	TO-92	0.5%	-40°C to +85°C
CLM4040DN	TO-92	1.0%	-40°C to +85°C
CLM4040EN	TO-92	2.0%	-40°C to +85°C

**SYMBOL DIAGRAM AND PIN CONFIGURATIONS**

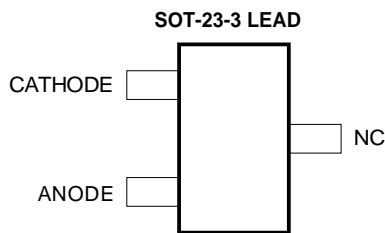


1T-15



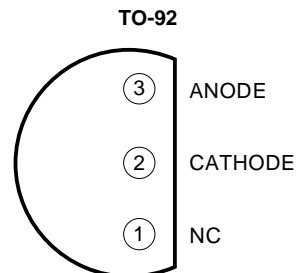
TOP VIEW

1T-13



TOP VIEW

1T-12



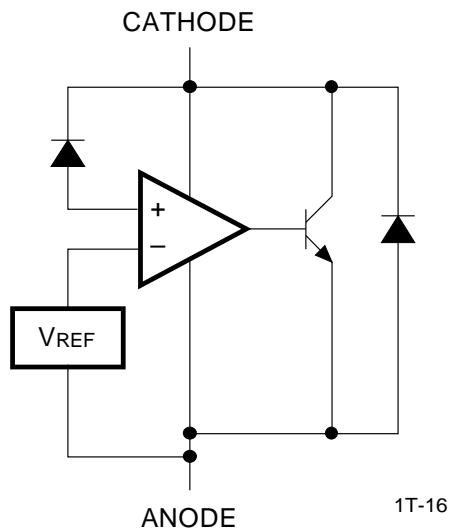
TOP VIEW

1T-14

**ABSOLUTE MAXIMUM RATINGS**

SYMBOL	PARAMETER	MAXIMUM	UNITS
	Reverse Current	20	mA
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	
T <sub>LEAD</sub>	Lead Temperature (Soldering) 10 Seconds	260	
ESD	ESD Rating	2	kV

**BLOCK DIAGRAM**



**ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$  unless otherwise specified

SYMBOL	PARAMETER	CLM4040C (0.5%)			CLM4040D (1.0%)			UNITS	CONDITIONS	
		MIN	TYP	MAX	MIN	TYP	MAX			
V <sub>Z</sub>	Reverse Breakdown Voltage	2.488	2.500	2.512	2.475	2.500	2.525	V	I <sub>Z</sub> = 100μA	T <sub>A</sub> = 25°C
		2.471	2.500	2.529	2.451	2.500	2.549			T <sub>A</sub> = -40 to +85°C
I <sub>Z(MIN)</sub>	Minimum Breakdown Current		60	80		60	80	μA		
$\frac{\Delta V_Z}{\Delta T}$	Reverse Breakdown Voltage Temperature Coefficient			±100			±150	ppm/°C	I <sub>Z</sub> = 10mA I <sub>Z</sub> = 1mA I <sub>Z</sub> = 100μA	T <sub>A</sub> = -40 to +85°C
$\frac{\Delta V_Z}{\Delta T_Z}$	Ratio of Change in V <sub>Z</sub> to Change in I <sub>Z</sub>			0.8			1.0	mV	I <sub>Z(MIN)</sub> ≤ I <sub>Z</sub> ≤ 1mA	T <sub>A</sub> = 25°C
				1.0			1.2			T <sub>A</sub> = -40 to +85°C
				6.0			8.0		1mA ≤ I <sub>Z</sub> ≤ 12mA	T <sub>A</sub> = 25°C
				8.0			10.0			T <sub>A</sub> = -40 to +85°C
Z <sub>R</sub>	Reverse Dynamic Impedance		0.25	0.9		0.25	1.1	Ω	I <sub>Z</sub> = 1mA, f = 120Hz, I <sub>AC</sub> = 0.1 I <sub>Z</sub>	
e <sub>N</sub>	Wideband Noise (RMS)		20			35		μA	I <sub>Z</sub> = 100μA 10Hz ≤ f ≤ 10kHz ΔV <sub>Z</sub>	
ΔV <sub>Z</sub>	Long Term Stability of Reverse Breakdown Voltage		120			120		ppm	t = 1000 Hours T = 25°C ± 0.1°C I <sub>Z</sub> = 100μA	

**ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$  unless otherwise specified

SYMBOL	PARAMETER	CLM4040E (2.0%)			UNITS	CONDITIONS	
		MIN	TYP	MAX			
V <sub>Z</sub>	Reverse Breakdown Voltage	2.450	2.500	2.500	V	I <sub>Z</sub> = 100μA	T <sub>A</sub> = 25°C
		2.426	2.500	2.500			T <sub>A</sub> = -40 to +85°C
I <sub>Z(MIN)</sub>	Minimum Breakdown Current		60	80	μA		
$\frac{\Delta V_Z}{\Delta T}$	Reverse Breakdown Voltage Temperature Coefficient			±150	ppm/°C	I <sub>Z</sub> = 10mA I <sub>Z</sub> = 1mA I <sub>Z</sub> = 100μA	T <sub>A</sub> = -40 to +85°C
$\frac{\Delta V_Z}{\Delta T_Z}$	Ratio of Change in V <sub>Z</sub> to Change in I <sub>Z</sub>			1.0	mV	I <sub>Z(MIN)</sub> ≤ I <sub>Z</sub> ≤ 1mA	T <sub>A</sub> = 25°C
				1.2			T <sub>A</sub> = -40 to +85°C
				6.0		1mA ≤ I <sub>Z</sub> ≤ 12mA	T <sub>A</sub> = 25°C
				10.0			T <sub>A</sub> = -40 to +85°C
Z <sub>R</sub>	Reverse Dynamic Impedance		0.25	1.1	Ω	I <sub>Z</sub> = 1mA, f = 120Hz, I <sub>AC</sub> = 0.1 I <sub>Z</sub>	
e <sub>N</sub>	Wideband Noise (RMS)		20		μA	I <sub>Z</sub> = 100μA 10Hz ≤ f ≤ 10kHz ΔV <sub>Z</sub>	
ΔV <sub>Z</sub>	Long Term Stability of Reverse Breakdown Voltage		120		ppm	t = 1000 Hours T = 25°C ± 0.1°C I <sub>Z</sub> = 100μA	