

Precision Micropower Bandgap Shunt Reference



CLM4041

FEATURES

- Low Voltage Operation 1.225V
- Trimmed Bandgap Design 0.1%
- Wide Operating Current Range 60 μ A to 20mA
- Low Dynamic Impedance 0.25 Ω
- Available in SOT-23, TO-92 and SO-8

APPLICATIONS

- Cellular Phones
- Portable Computers
- Instrumentation
- Automotive

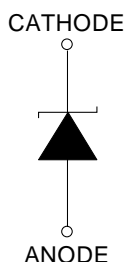
DESCRIPTION

The CLM4041 is a two terminal precision voltage reference with thermal stability guaranteed over temperature, a typical dynamic impedance of 0.25 Ω and very sharp turn-on characteristics. The device has a fixed output of 1.225V for input currents between 60 μ A 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.

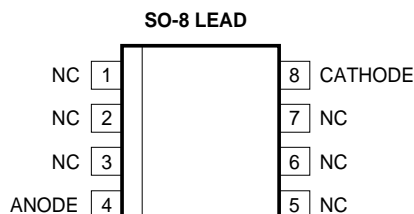
ORDERING INFORMATION

Part	Package	Tolerance	Temp. Range
CLM4041CS	SOT-23	0.5%	-40°C to +85°C
CLM4041DS	SOT-23	1.0%	-40°C to +85°C
CLM4041ES	SOT-23	2.0%	-40°C to +85°C
CLM4041CY	SO-8	0.5%	-40°C to +85°C
CLM4041DY	SO-8	1.0%	-40°C to +85°C
CLM4041EY	SO-8	2.0%	-40°C to +85°C
CLM4041CN	TO-92	0.5%	-40°C to +85°C
CLM4041DN	TO-92	1.0%	-40°C to +85°C
CLM4041EN	TO-92	2.0%	-40°C to +85°C

SYMBOL DIAGRAM AND PIN CONFIGURATIONS

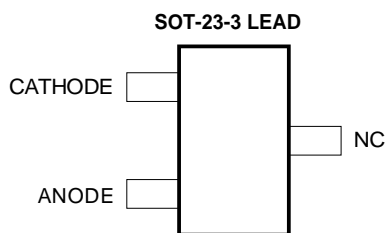


1T-15



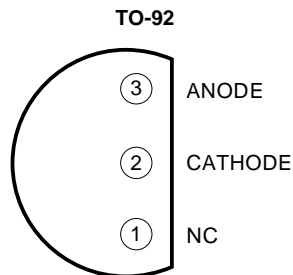
TOP VIEW

1T-13



TOP VIEW

1T-12



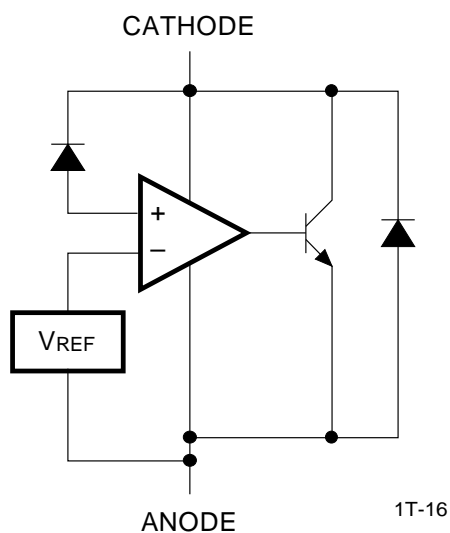
TOP VIEW

1T-14

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	MAXIMUM	UNITS
	Reverse Current	20	mA
T _A	Operating Temperature Range	-40 to +85	°C
T _J	Operating Junction Temperature Range	-40 to +150	
T _{STG}	Storage Temperature Range	-65 to +150	
T _{LEAD}	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	CLM4041C (0.5%)			CLM4041D (1.0%)			UNITS	CONDITIONS	
		MIN	TYP	MAX	MIN	TYP	MAX			
V_Z	Reverse Breakdown Voltage	1.219	1.225	1.231	1.213	1.225	1.237	V	$I_Z = 100\mu\text{A}$	$T_A = 25^\circ\text{C}$
		1.211	1.225	1.239	1.201	1.225	1.249			$T_A = -40 \text{ to } +85^\circ\text{C}$
$I_{Z(\text{MIN})}$	Minimum Breakdown Current		30	60		30	60	μA		
$\frac{\Delta V_Z}{\Delta T}$	Reverse Breakdown Voltage Temperature Coefficient			± 100			± 150	$\text{ppm}/^\circ\text{C}$	$I_Z = 10\text{mA}$ $I_Z = 1\text{mA}$ $I_Z = 100\mu\text{A}$	$T_A = -40 \text{ to } +85^\circ\text{C}$
$\frac{\Delta V_Z}{\Delta T_Z}$	Ratio of Change in V_Z to Change in I_Z			1.5			2.0	mV	$I_{Z(\text{MIN})} \leq I_Z \leq 1\text{mA}$	$T_A = 25^\circ\text{C}$
				2.0			2.5			$T_A = -40 \text{ to } +85^\circ\text{C}$
				6.0			8.0		$1\text{mA} \leq I_Z \leq 12\text{mA}$	$T_A = 25^\circ\text{C}$
				8.0			10.0			$T_A = -40 \text{ to } +85^\circ\text{C}$
Z_R	Reverse Dynamic Impedance		0.25	1.5		0.25	2.0	Ω	$I_Z = 1\text{mA}$, $f = 120\text{Hz}$, $I_{AC} = 0.1 I_Z$	
e_N	Wideband Noise (RMS)		20			20		μA	$I_Z = 100\mu\text{A}$ $10\text{Hz} \leq f \leq 10\text{kHz}$ ΔV_Z	
ΔV_Z	Long Term Stability of Reverse Breakdown Voltage		120			120		ppm	$t = 1000 \text{ Hours}$ $T = 25^\circ\text{C} \pm 0.1^\circ\text{C}$ $I_Z = 100\mu\text{A}$	

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

SYMBOL	PARAMETER	CLM4041E (2.0%)			UNITS	CONDITIONS	
		MIN	TYP	MAX			
V_Z	Reverse Breakdown Voltage	1.200	1.225	1.250	V	$I_Z = 100\mu\text{A}$	$T_A = 25^\circ\text{C}$
		1.189	1.225	1.261			$T_A = -40 \text{ to } +85^\circ\text{C}$
$I_{Z(\text{MIN})}$	Minimum Breakdown Current		30	60	μA		
$\frac{\Delta V_Z}{\Delta T}$	Reverse Breakdown Voltage Temperature Coefficient			± 150	$\text{ppm}/^\circ\text{C}$	$I_Z = 10\text{mA}$ $I_Z = 1\text{mA}$ $I_Z = 100\mu\text{A}$	$T_A = -40 \text{ to } +85^\circ\text{C}$
$\frac{\Delta V_Z}{\Delta T_Z}$	Ratio of Change in V_Z to Change in I_Z			2.0	mV	$I_{Z(\text{MIN})} \leq I_Z \leq 1\text{mA}$	$T_A = 25^\circ\text{C}$
				2.5			$T_A = -40 \text{ to } +85^\circ\text{C}$
				8.0		$1\text{mA} \leq I_Z \leq 12\text{mA}$	$T_A = 25^\circ\text{C}$
				10.0			$T_A = -40 \text{ to } +85^\circ\text{C}$
Z_R	Reverse Dynamic Impedance		0.25	2.0	Ω	$I_Z = 1\text{mA}$, $f = 120\text{Hz}$, $I_{AC} = 0.1 I_Z$	
e_N	Wideband Noise (RMS)		20		μA	$I_Z = 100\mu\text{A}$ $10\text{Hz} \leq f \leq 10\text{kHz}$ ΔV_Z	
ΔV_Z	Long Term Stability of Reverse Breakdown Voltage		120		ppm	$t = 1000 \text{ Hours}$ $T = 25^\circ\text{C} \pm 0.1^\circ\text{C}$ $I_Z = 100\mu\text{A}$	