

August 1997

## Low Voltage Reference

### Features

- **Low Bias Current (Min)** .....50 $\mu$ A
- **Low Dynamic Impedance**
- **Low Reverse Voltage**
- **Low Cost**

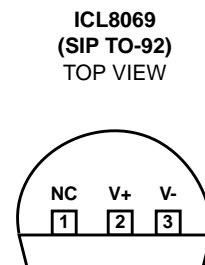
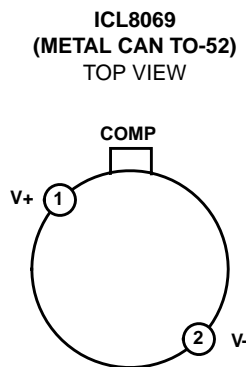
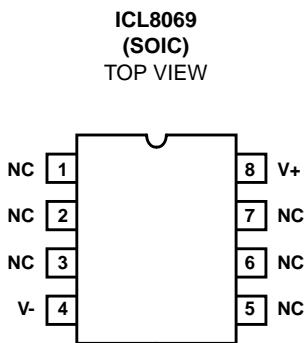
### Description

The ICL8069 is a 1.2V temperature-compensated voltage reference. It uses the band-gap principle to achieve excellent stability and low noise at reverse currents down to 50 $\mu$ A. Applications include analog-to-digital converters, digital-to-analog converters, threshold detectors, and voltage regulators. Its low power consumption makes it especially suitable for battery operated equipment.

### Ordering Information

PART NUMBER	MAXIMUM TEMP/CO	TEMP. RANGE (°C)	PACKAGE	PKG. NO.
ICL8069CCZR	0.005%/°C	0 to 70	SIP Package (TO-92)	Z3.05
ICL8069CCSQ	0.005%/°C	0 to 70	Metal Can Package (TO-52)	T2.A
ICL8069DCZR	0.01%/°C	0 to 70	SIP Package (TO-92)	Z3.05
ICL8069DCSQ	0.01%/°C	0 to 70	Metal Can Package (TO-52)	T2.A
ICL8069CCBA	0.005%/°C	0 to 70	8 Ld SOIC	M8.15
ICL8069DCBA	0.01%/°C	0 to 70	8 Ld SOIC	M8.15
ICL8069CMSQ	0.005%/°C	-55 to 125	Metal Can Package (TO-52)	T2.A
ICL8069DMSQ	0.01%/°C	-55 to 125	Metal Can Package (TO-52)	T2.A

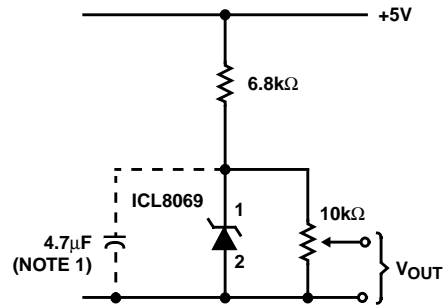
### Pinouts



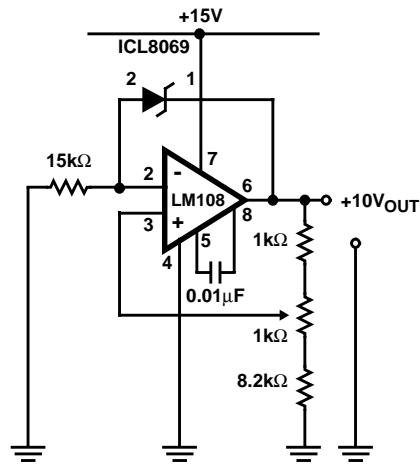
# ICL8069

## Functional Block Diagrams

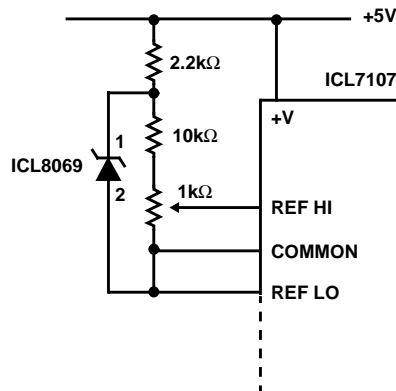
### SIMPLE REFERENCE (1.2V OR LESS)



### BUFFERED 10V REFERENCE USING A SINGLE SUPPLY



### DOUBLE REGULATED 100mV REFERENCE FOR ICL7107 ONE-CHIP DPM CIRCUIT



# ICL8069

## Absolute Maximum Ratings

Reverse Voltage ..... See Note 3  
 Forward Current ..... 10mA  
 Reverse Current ..... 10mA

## Operating Conditions

Temperature Ranges  
 ICL8069C ..... 0°C to 70°C  
 ICL8069M ..... -55°C to 125°C

## Thermal Information

Thermal Resistance (Typical, Note 1)	$\theta_{JA}$ (°C/W)	$\theta_{JC}$ (°C/W)
SOIC Package	170	N/A
SIP (TO-92) Package	200	N/A
Metal Can Package	200	120

Power Dissipation Limited by MAX Forward/Reverse Current  
 Maximum Junction Temperature (Metal Can Package) ..... 175°C  
 Maximum Junction Temperature (SOIC Package) ..... 150°C  
 Maximum Storage Temperature Range ..... -65°C to 150°C  
 Maximum Lead Temperature (Soldering 10s) ..... 300°C  
 (SOIC - Lead Tips Only)

*CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.*

### NOTE:

- $\theta_{JA}$  is measured with the component mounted on an evaluation PC board in free air.

## Electrical Specifications $T_A = 25^\circ\text{C}$ Unless Otherwise Specified

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Reverse Breakdown Voltage	$I_R = 500\mu\text{A}$	1.20	1.23	1.25	V
Reverse Breakdown Voltage Change	$50\mu\text{A} \leq I_R \leq 5\text{mA}$	-	15	20	mV
Reverse Dynamic Impedance	$I_R = 50\mu\text{A}$	-	1	2	$\Omega$
	$I_R = 500\mu\text{A}$	-	1	2	$\Omega$
Forward Voltage Drop	$I_F = 500\mu\text{A}$	-	0.7	1	V
RMS Noise Voltage	$10\text{Hz} \leq F \leq 10\text{kHz}$ , $I_R = 500\mu\text{A}$	-	5	-	$\mu\text{V}$
Long Term Stability	$I_R = 4.75\text{mA}$ , $T_A = 25^\circ\text{C}$	-	1	-	ppm/kHR
Breakdown Voltage Temperature Coefficient	$I_R = 500\mu\text{A}$ , $T_A = \text{Operating Temperature Range (Note 3)}$	-	-	0.005	%/°C
		-	-	0.01	%/°C
Reverse Current Range	1.18V to 1.27V	0.050	-	5	mA

### NOTES:

- If circuit strays in excess of 200pF are anticipated, a 4.7 $\mu\text{F}$  shunt capacitor will ensure stability under all operating conditions.
- In normal use, the reverse voltage cannot exceed the reference voltage. However when plugging units into a powered-up test fixture, an instantaneous voltage equal to the compliance of the test circuit will be seen. This should not exceed 20V.
- For the military part, measurements are made at 25°C, -55°C, and 125°C. The unit is then classified as a function of the worst case  $T_C$  from 25°C to -55°C, or 25°C to 125°C.

Typical Performance Curves

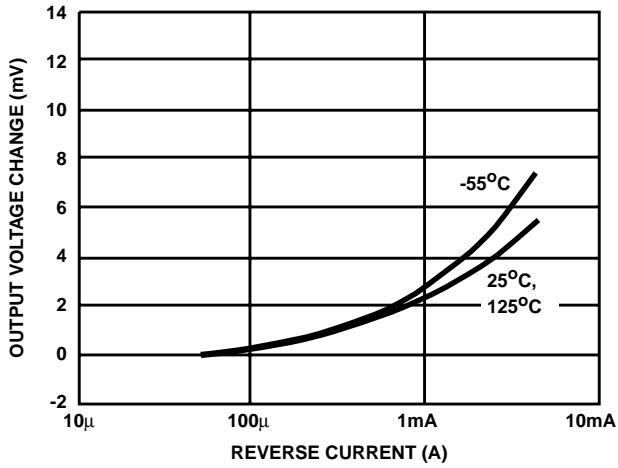


FIGURE 1. VOLTAGE CHANGE AS A FUNCTION OF REVERSE CURRENT

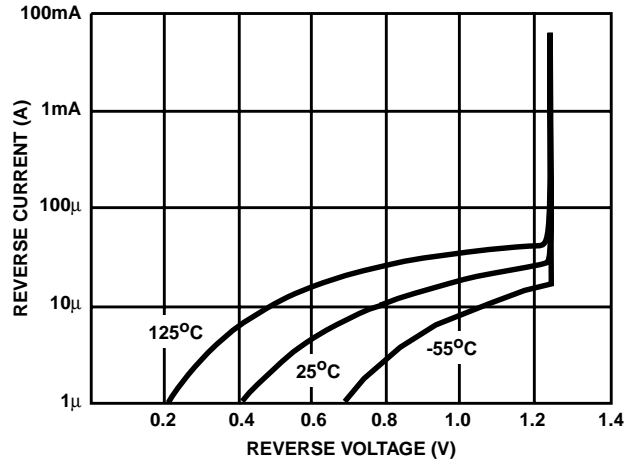


FIGURE 2. REVERSE VOLTAGE AS A FUNCTION OF CURRENT

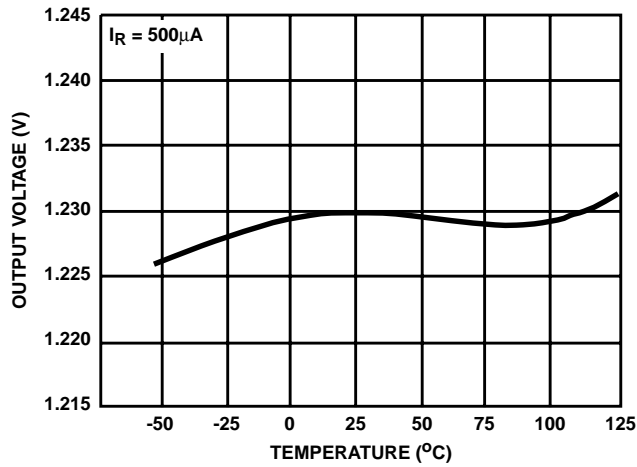


FIGURE 3. REVERSE VOLTAGE AS A FUNCTION OF TEMPERATURE