HARRIS Semiconductor

ICL8069

August 1997

Low Voltage Reference

Features

- **Low Bias Current (Min) 50μA**
- **Low Dynamic Impedance**
- **Low Reverse Voltage**
- **Low Cost**

Description

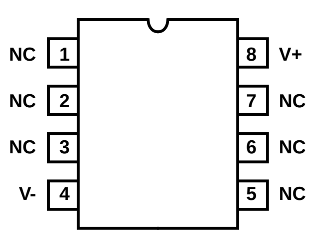
The ICL8069 is a 1.2V temperature-compensated voltage reference. It uses the band-gap principle to achieve excellent stability and low noise at reverse currents down to 50μA. Applications include analog-to-digital converters, digital-to-analog converters, threshold detectors, and voltage regulators.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

Ordering Information

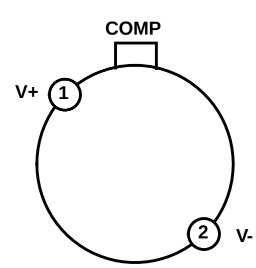
PART NUMBER	MAXIMUM TEMPCO	TEMP. RANGE (^oC)	PACKAGE	PKG. NO.
ICL8069CCZR	0.005%/^{o}C	0 to 70	SIP Package (TO-92)	Z3.05
ICL8069CCSQ	0.005%/^{o}C	0 to 70	Metal Can Package (TO-52)	T2.A
ICL8069DCZR	0.01%/^{o}C	0 to 70	SIP Package (TO-92)	Z3.05
ICL8069DCSQ	0.01%/^{o}C	0 to 70	Metal Can Package (TO-52)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

Pinouts

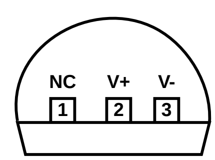
ICL8069
(SOIC)
TOP VIEW



ICL8069
(METAL CAN TO-52)
TOP VIEW

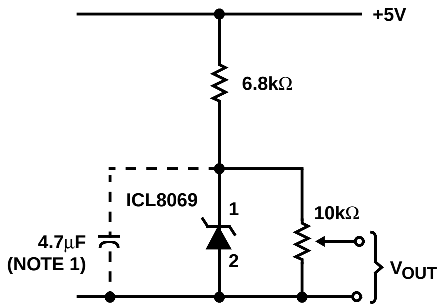


ICL8069
(SIP TO-92)
TOP VIEW

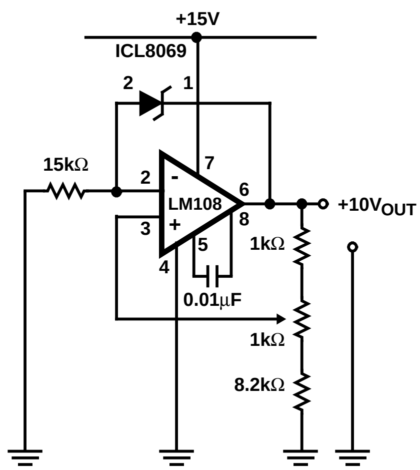


Functional Block Diagrams

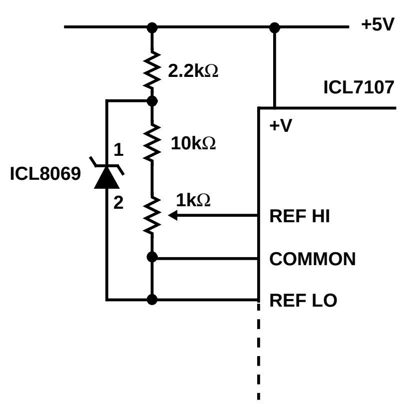
SIMPLE REFERENCE (1.2V OR LESS)



BUFFERED 10V REFERENCE USING A SINGLE SUPPLY



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



Absolute Maximum Ratings

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

Operating Conditions

Temperature Ranges
ICL8069C . . . . 0^oC to 70^oC
ICL8069M . . . . -55^oC to 125^oC

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JA} (^oC/W)	θ_{JC} (^oC/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^oC
Maximum Junction Temperature (SOIC Package) . . . . 150^oC
Maximum Storage Temperature Range . . . . -65^oC to 150^oC
Maximum Lead Temperature (Soldering 10s) . . . . 300^oC
(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:

1. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications

$T_A = 25^oC$ Unless Otherwise Specified

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Reverse Breakdown Voltage	$I_R = 500\mu A$	1.20	1.23	1.25	V
Reverse Breakdown Voltage Change	$50\mu A \le I_R \le 5mA$	-	15	20	mV
Reverse Dynamic Impedance	$I_R = 50\mu A$	-	1	2	Ω
	$I_R = 500\mu A$	-	1	2	Ω
Forward Voltage Drop	$I_F = 500\mu A$	-	0.7	1	V
RMS Noise Voltage	$10Hz \le F \le 10kHz$, $I_R = 500\mu A$	-	5	-	µV
Long Term Stability	$I_R = 4.75mA$, $T_A = 25^oC$	-	1	-	ppm/kHR
Breakdown Voltage Temperature Coefficient ICL8069C	$I_R = 500\mu A$, T_A = Operating Temperature Range (Note 3)	-	-	0.005	%/^oC
ICL8069D		-	-	0.01	%/^oC
Reverse Current Range	1.18V to 1.27V	0.050	-	5	mA

NOTES:

1. If circuit strays in excess of 200pF are anticipated, a 4.7µF shunt capacitor will ensure stability under all operating conditions.
2. 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.
3. For the military part, measurements are made at 25^oC, -55^oC, and 125^oC. The unit is then classified as a function of the worst case T_C from 25^oC to -55^oC, or 25^oC to 125^oC.

Typical Performance Curves

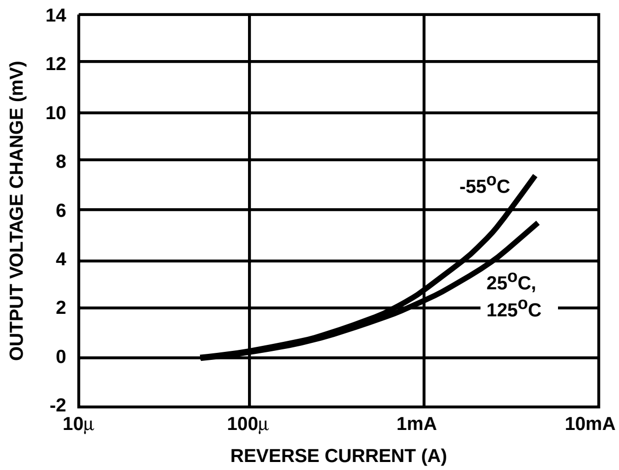


FIGURE 1. VOLTAGE CHANGE AS A FUNCTION OF REVERSE CURRENT

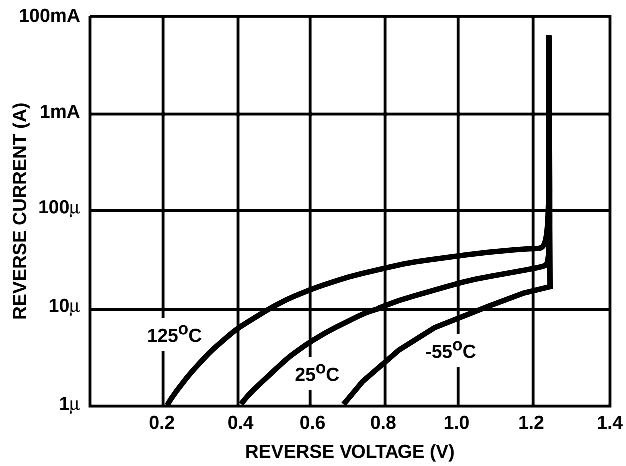


FIGURE 2. REVERSE VOLTAGE AS A FUNCTION OF CURRENT

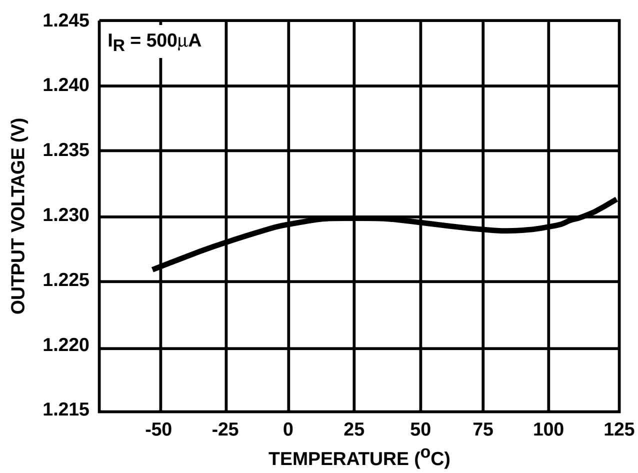


FIGURE 3. REVERSE VOLTAGE AS A FUNCTION OF TEMPERATURE