

ALPHA SEMICONDUCTOR

Excellence in Analog Power Products

AS8069

Low Tempco Voltage Reference 1.23 Volts

FEATURES

- Low drift 10ppm/°C
- Low dynamic impedance 0.6 ΩTyp.
- Operating current 50µA to 5mA
- Low power 60µW @ Iin=50µA
- Two-terminal "Zener" operation
- Low output tolerance ±1.25%
- Low noise 5µV p-p Typ.
- Direct replacements for ICL8069
- Low cost

APPLICATIONS

- A to D and D to A Converters
- Constant Current Source
- Digital Voltmeter
- Power Supply Monitor
- Precision Regulators

PRODUCT DESCRIPTION

The ALPHA Semiconductor's AS8069 is a 2-terminal band-gap precision voltage reference that provides a stable fixed output voltage of 1.23 volts. ALPHA Semiconductor's design, process, and precise on chip trimming enable us to achieve a low temperature coefficient as low as 10 ppm/°C and ±4% reference tolerance. The AS8069 is an excellent choice for applications which are looking for low input current between 50µA to 5mA, low drift over temperature, low noise, low power, and low cost.

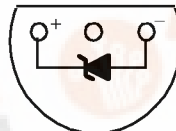
The AS8069 is available in many versions, which are specified for 0°C to +70°C operation. They are offered in packages of TO-92 and TO-52 in -55°C to +125°C in metal can packages (TO-52).

ORDERING INFORMATION

PART NUMBER	MAX TEMPCO ppm/°C	PACKAGE TYPE	TEMP. RANGE
AS8069ACSQ	10	TO-52	COM.
AS8069BCSQ	25	TO-52	COM
AS8069CCSQ	50	TO-52	COM
AS8069CMSQ	50	TO-52	MIL
AS8069DCSQ	100	TO-52	COM
AS8069DMSQ	100	TO-52	MIL
AS8069CCZR2	50	TO-92	COM
AS8069DCZR2	100	TO-92	COM
AS8069CCZR	50	TO-92	COM
AS8069DCZR	100	TO-92	COM

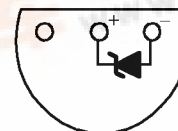
PIN CONNECTIONS

TO-92(2 PIN)
Plastic Package



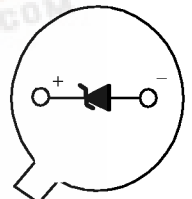
Bottom View

TO-92(3 PIN)
Plastic Package



Bottom View

TO-52
Plastic Package



Bottom View



AS8069

ABSOLUTE MAXIMUM RATINGS

Forward Current.....10 mA
 Reverse Current.....10 mA
 Max Power Dissipation.....750 mW TO-52 Pkg.
 600 mW TO-92 Pkg.
 Operating Temperature.....MIL. TO-52 Pkg.
 COM. TO-92 Pkg.

Storage Temperature-65 to +200°C TO-52 Pkg.
 -65 to +150°C TO-92 Pkg.
 Lead Temperature+260°C

ELECTRICAL CHARACTERISTICS at $I_{in} = 500\mu A$, and $T_a = +25^\circ C$, unless otherwise noted.

Parameters	Conditions	AS8069ACSQ			AS8069BCSQ			AS8069CCSQ			S8069CMSQ/CCZR			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Output Voltage		1.23		1.24	1.22		1.24	1.22		1.25	1.22		1.25	V
Output Impedance	$I_r=50\mu A$		0.6	2		0.6	2		0.6	2		0.6	2	Ω
Noise Voltage	$0.1Hz \leq f \leq 10Hz$		5			5			5			5		μV p-p
Tempco	Note 1		5	10			25			50			50	ppm/ $^\circ C$
Turn-On Settling	0.1% of V out		15			15			15			15		μSec
Operating Current	Note 2	0.05		5	0.05		5	0.05		5	0.05		5	mA
Operating Temp. Range		0		70	0		70	0		70	-55/0		125/70	$^\circ C$

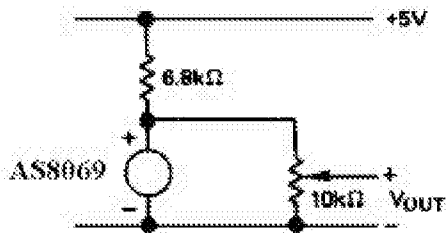
Parameters	Conditions	AS8069DCSQ			AS8069CCZR2			AS8069DCZR2			AS8069DMSQ/DCZR			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Output Voltage		1.22		1.25	1.22		1.25	1.22		1.25	1.22		1.25	V
Output Impedance	$I_R=50\mu A$		0.6	2		0.6	2		0.6	2		0.6	2	Ω
Noise Voltage	$0.1Hz \leq f \leq 10Hz$		5			5			5			5		μV p-p
Tempco	Note 1		60	100			50			100			100	ppm/ $^\circ C$
Turn-On Settling	0.1% of V out		15			15			15			15		μSec
Operating Current	Note 2	0.05		5	0.05		5	0.05		5	0.05		5	mA
Operating Temp. Range		0		70	0		70	0		70	-55/0		125/70	$^\circ C$

Note 1: Three-point measurement guarantees the error band over the specified temperature range.

Note 2: Optimum performance is obtained at currents below 500 μA .

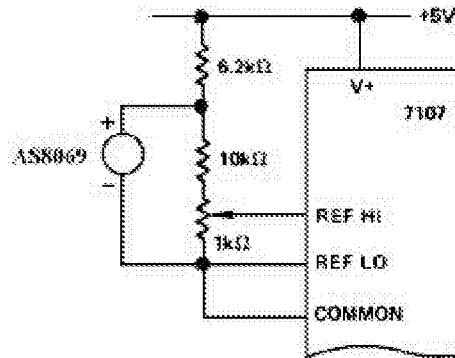
APPLICATION INFORMATION

The AS8069 acts as a two terminal shunt type regulator. This device provides a constant output current at a wide range of input current of 50µA to 20mA. The below figure shows a simplified connection of an output voltage of 1.2V or less. The minimum capacitor of 1000pF is required for additional filtering to provide lower noise.



Basic Configuration for 1.2V or Less

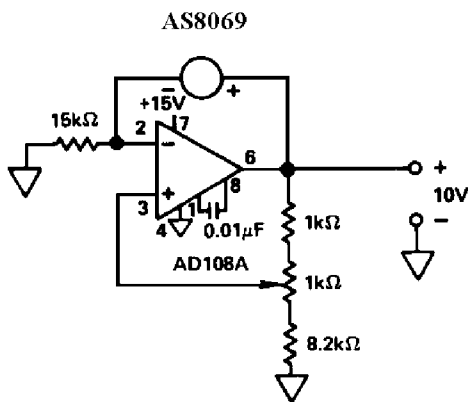
The AS8069 low power operation makes it suitable for battery operated equipment. This device is ideal for use with CMOS analog-to-digital converter as a reference. The below figure shows this device used with two common integrating type CMOS A/D converters.



With 7107 Panel Meter A/D

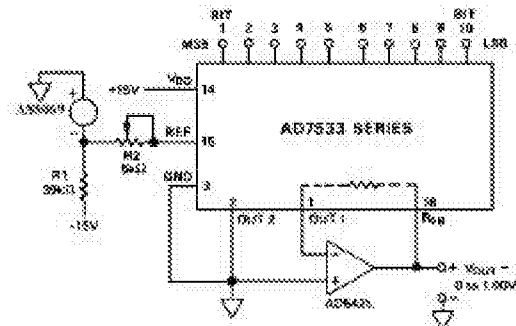
AS8069 Used as Reference for CMOS A/D Converters

The AS8069 can be used as a building block for reference voltage. The below figure will show the circuit design that produces a buffer 10V output and a supply current of 2mA.



Single-Supply Buffered 10V Reference

The AS8069 is also suitable to use with CMOS digital-to-analog converter. This figure shows the requirement of DAC in negative reference voltage in order to provide a positive output range. The below circuit shows AS8069/05 supplying the -1.0V reference to multiplying DAC



AS8069 as Reference for 10-Bit CMOS DAC

The AS8069 is used in portable equipment as a voltage regulator compared switch mode design, also very fast recovery after current surges. Some precaution should be taken in selection of output capacitance. Too high an ESR could endanger the stability of the circuit design.