iA1189S

High Sensitivity Hall Effect Latch

1. Description

iA1189S Hall-effect sensor is a temperature stable, stress-resistant sensor. Superior high-temperature performance is made possible through a dynamic offset cancellation that utilizes chopper-stabilization. This method reduces the offset voltage normally caused by device over molding, temperature dependencies, and thermal stress.

iA1189S includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger. Advanced CMOS wafer fabrication processing is used to take advantage of low-voltage requirements, component matching, very low input-offset errors, and small component geometries.

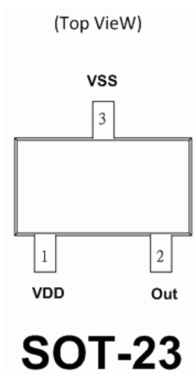
2. Features

- CMOS Hall IC Technology.
- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high temperature
- Good ESD Protection.

3. Applications

- Fan motor
- 3 phase BLDC motor application
- Speed sensing
- Solid-State Switch
- Linear Position Detection
- Angular Position Detection
- Proximity Detection

4. Pin Assignments



5. Marking Information

Product Name	Package	Marking
iA1189S	SOT-23	189XX X : Date Code

6. Ordering Code

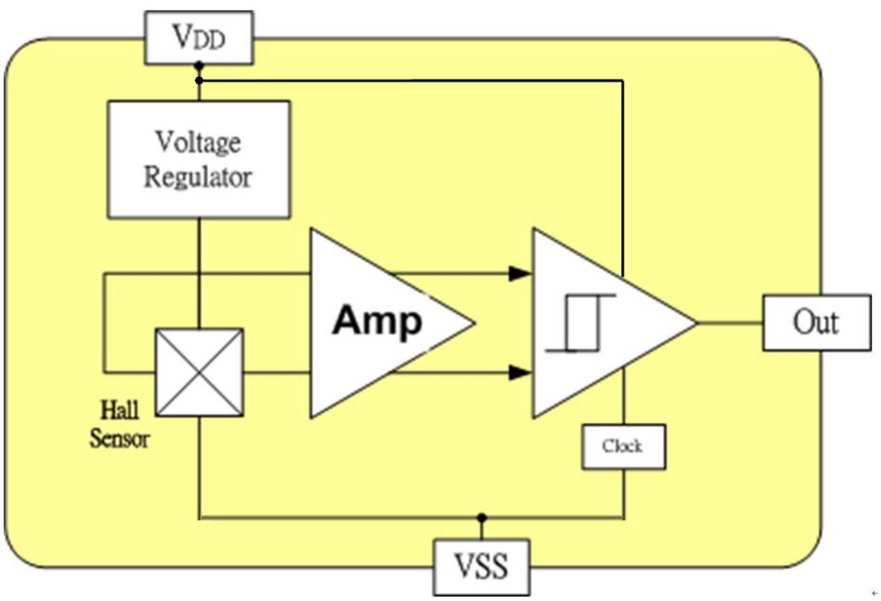
iA1189S☐ └── Assembly Material	Assembly Material G: Halogen and Lead Free Device

Note: inergy defines "Green" as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight ; Follow IEC 61249-2-21 and IPC/JEDEC J-STD-020C)

7. Pin Definitions

Name	Pin	Description
V_{DD}	1	Power Supply
V_{OUT}	2	Inverter Output, no pull up resistor require.
V_{SS}	3	Ground

8. Block Diagram



9. Absolute Maximum Ratings

(T_A = 25 ºC)

Characteristics		Values	Unit
Supply Voltage (V_{DD})		6.0	V
Reverse Voltage,(V_{DD} / V_{out})		-0.3	V
Output current, (I_{SINK})		50	mA
Operating Temperature Range, (T_A)		-40 ~ +125	℃
Storage temperature Range, (T_S)		-55 ~ +150	℃
Maximum Junction Temp,(T_J)		150	℃
Thermal Resistance	(θ_{JA})	543	℃/W
	(θ_{JC})	410	℃/W
Package Power Dissipation(P_D)		230	mW

10. Electrical Characteristics

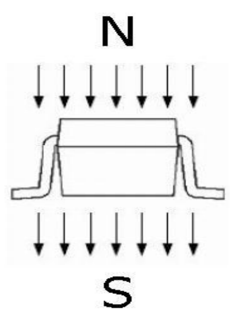
(DC Operating Parameters ：T_A =+25℃, V_{DD}=5V)

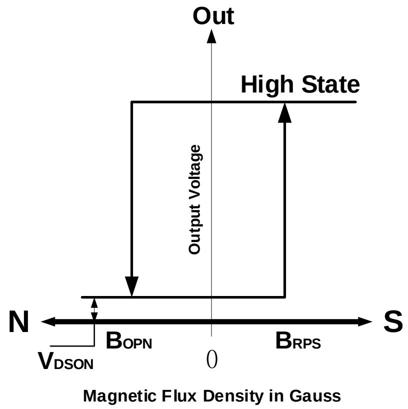
Parameters	Test Conditions	Min.	Typ.	Max.	Units
Supply Voltage,(V_{DD})	Operating	2.5		5.5	V
Supply Current,(I_{DD})			1.7	3.0	mA
Output Saturation Voltage, (V_{DSON})	I_{out}=20mA,B<B_{OP}			400.0	mV
Output Leakage Current, (I_{off})	I_{OFF} B>B_{RP}, V_{OUT} = 5V			10.0	uA
Output Rise Time, (T_R)	CL =1nF , Out=0V~3V		2.2		uS
Output Fall Time, (T_F)	CL =1nF , Out=5V~0.5V		0.04		uS
Electro-Static Discharge	HBM	4			KV
Operate Point, (B_{OP})		-35		-10	Gauss
Release Point, (B_{RP})		10		35	Gauss
Hysteresis,(B_{HYS})	$\|B_{OP}$ - $B_{RP}\|$		45		Gauss

11. Output Behavior versus Magnetic Polar

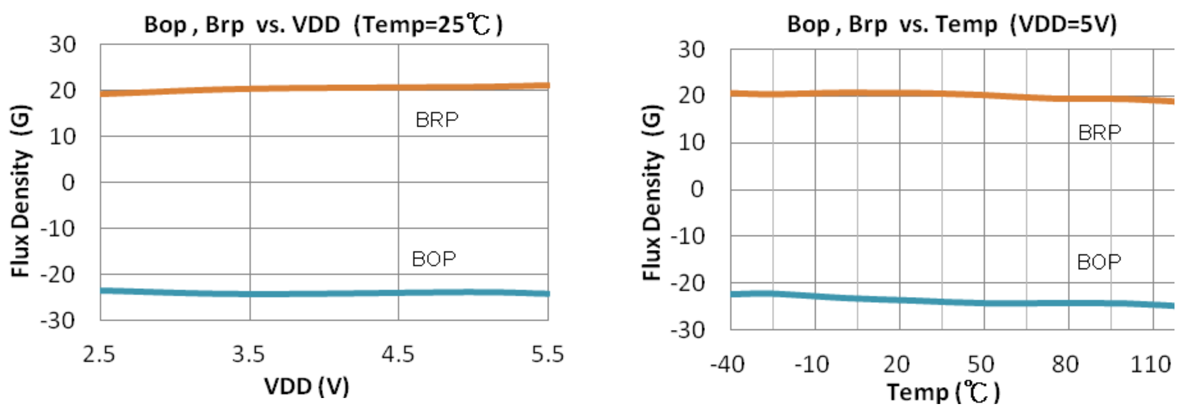
(*DC Operating Parameters T_A = -40 to 125℃, V_{DD} =2.5 to 5 V*)

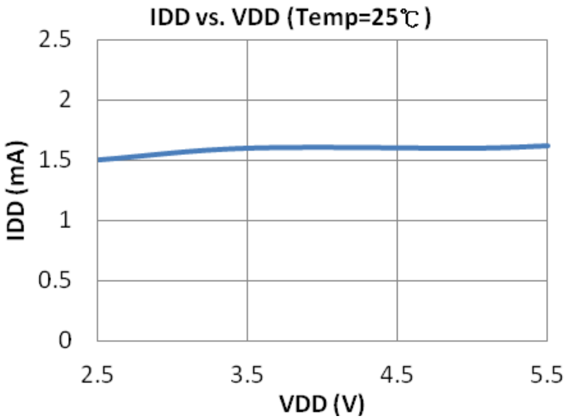
Parameter	***Test condition***	***OUT***
South pole	B>BRP	High
North pole	B<BOP	Low

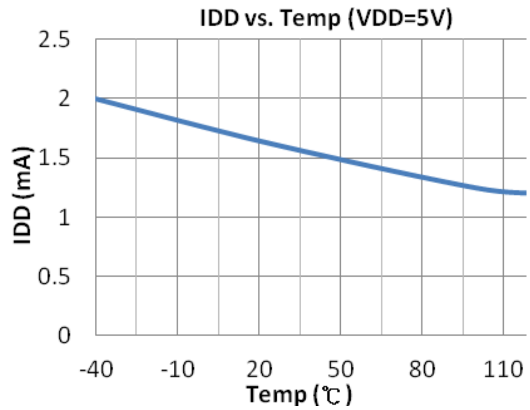




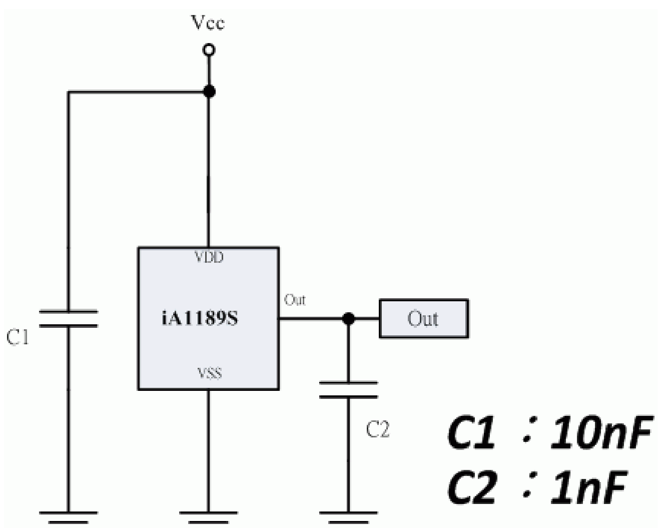
12. Typical Characteristics







13. Typical Application circuit



14. Package Power Dissipation

The power dissipation of the Package is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, Ta. Using the values provided on the data sheet for the package, PD can be calculated as follows:

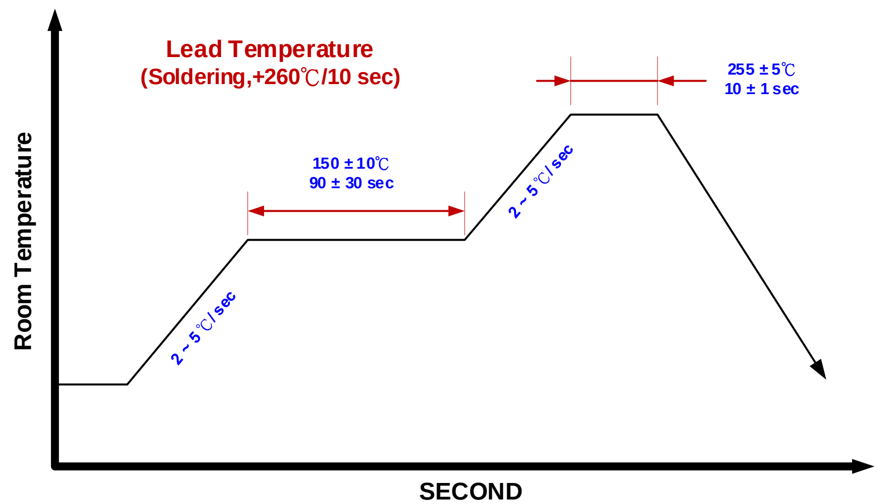
$$P_D = \frac{T_{J(max)} - Ta}{R_{\theta ja}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature Ta of 25°C, one can calculate the power dissipation of the device which in this case is 606 mW.

$$P_D(I3) = \frac{150°C - 25°C}{206°C/_W} = 606mW$$

The 206℃/W for the sot23 package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 606 mW. There are other alternatives to achieving higher power dissipation from the Package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

15. IR reflow curve

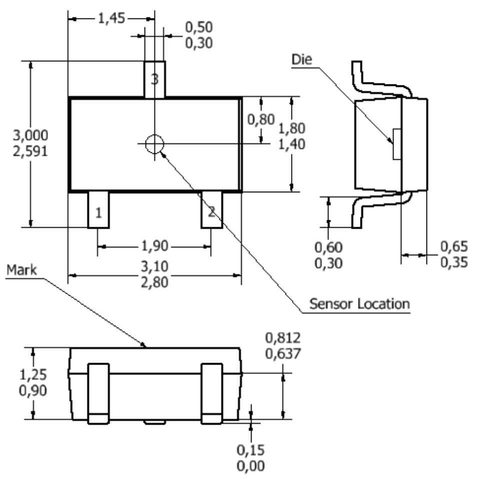


Soldering Condition

16. Package Dimensions

SOT-23 Package

(Top View)



NOTES:

1. Controlling dimension: mm
2. Leads must be free of flash and plating voids
3. Lead thickness after solder plating will be 0.254mm maximum
4. Land Pattern (For reference only)