iA1173S

High Sensitivity Built-in Pull High Res Hall Effect Latch

1. Description

iA1173S 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.

iA1173S includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger. Advanced DMOS wafer fabrication processing is used to take advantage of low-voltage requirements, component matching, very low input-offset errors, and small component geometries.

This device requires the presence of both south and north polarity magnetic fields for operation. In the presence of a south polarity field of sufficient strength, the device output sensor on, and only switches off when a north polarity field of sufficient strength is present.

The package type is in a Halogen Free version has been verified by third Lab

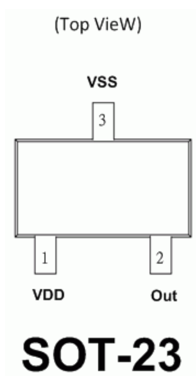
2. Features

- DMOS Hall IC Technology.
- Reverse bias protection on power supply pin.
- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high Temp condition.
- Good ESD Protection.
- 100% tested at 125 ℃
- Customer sensitivity/Temperature selection are available

3. Applications

- High temperature Fan motor
- 3 phase BLDC motor application
- Speed sensing
- Position sensing
- Current sensing
- Revolution counting
- Solid-State Switch
- Linear Position Detection
- Angular Position Detection
- Proximity Detection

4. Pin Assignments



5. Marking Information

Product Name	Package	Marking
iA1173S	SOT-23	173XX X : Date Code

6. Ordering Code

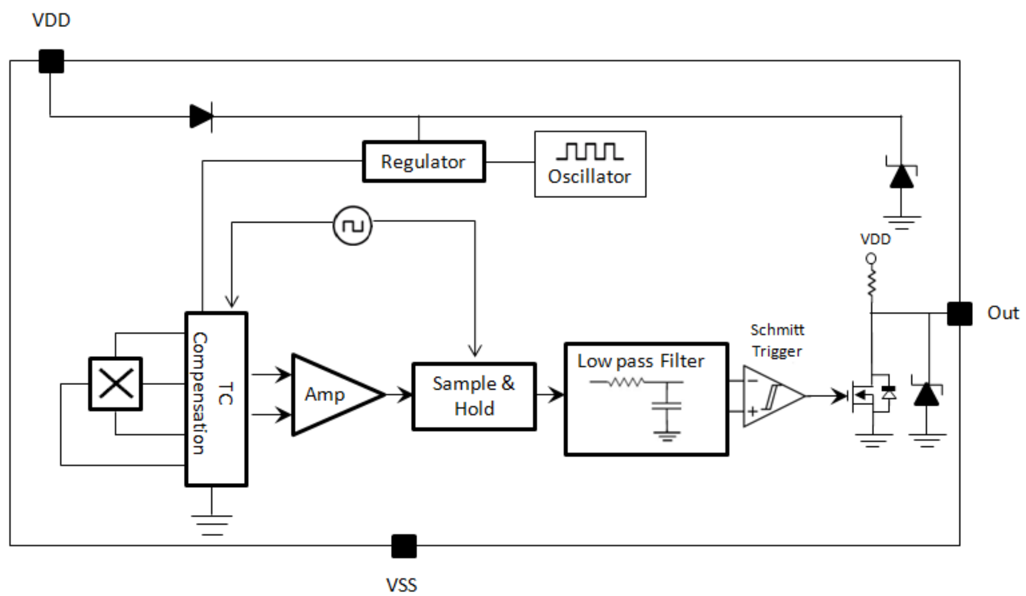
iA1173S □	Assembly Material G: Halogen and Lead Free Device

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
Out	2	Output
V_{SS}	3	Ground

8. Block Diagram



9. Absolute Maximum Ratings *(T_A = 25 ºC)*

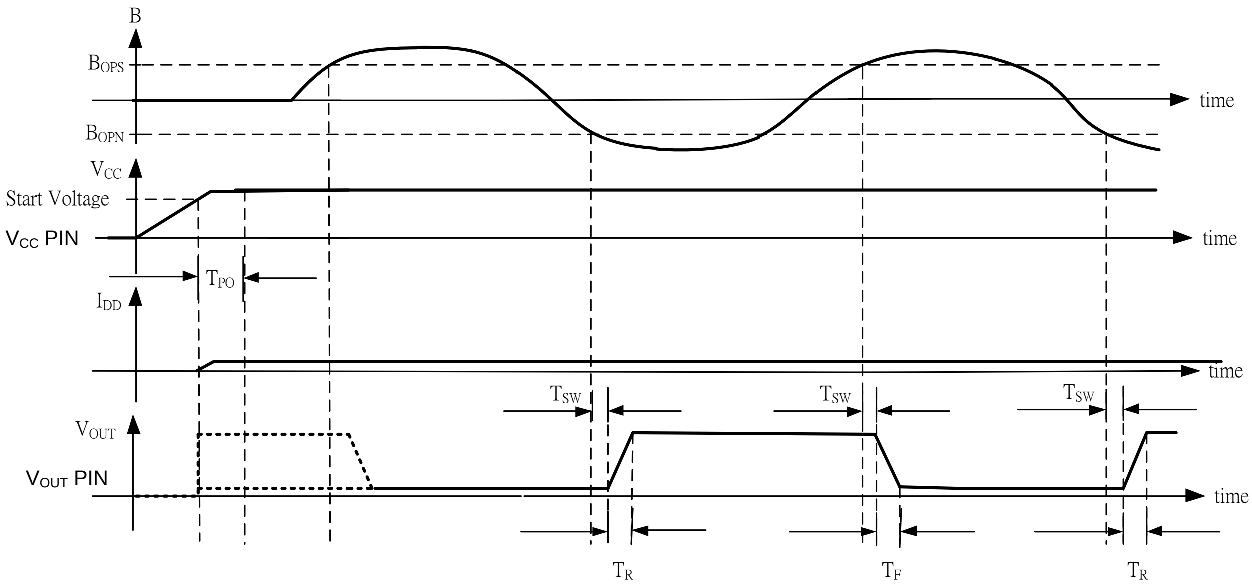
Characteristics		Values	Unit
Supply Voltage (***V_{DD}***)		28	V
Output Voltage,(***Vout***)		28	V
Reverse Voltage, (***V_{DD} / Vout***)		-0.3	V
Output current, (***I_{SINK}***)		25	mA
Operating Temperature Range, (***T_A***)		-40 ~ +125	℃
Storage temperature Range, (***T_S***)		-65 ~ +150	℃
Maximum 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}=12V)

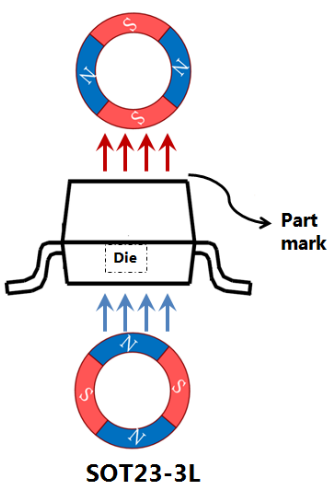
Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, (V_{DD})	Operating	2.5		26.0	V
Supply Current, (I_{DD})	B<B_{OP}		2.5	5.0	mA
Output Saturation Voltage, (V_{DSON})	I_{OUT}=20mA, B>B_{OP}			400.0	mV
Output Leakage Current, (I_{OFF})	I_{OFF} B<B_{RP}, V_{OUT} = 12V			15.0	uA
Power-On Time, (T_{PO})	Power-On		150		uS
Output Switch Frequency, (F_{SW})	Operating	3			kHz
Output Rise Time, (T_R)	C_L =20pF		0.1	0.45	uS
Output Fall Time, (T_F)	C_L =20pF		0.05	0.45	uS
Electro-Static Discharge	HBM	4			KV
Pull-up Resistor, (R_A)			10		KΩ
Operate Point, B_{OPS}(B_{OPN})	B>B_{OPS}(B<B_{OPN}), V_{OUT} On	5		60	Gauss
Release Point, B_{RPS}(B_{RPN})	B<B_{RPS}(B>B_{RPN}), V_{OUT} Off	-60		-5	Gauss
Hysteresis, (B_{HYS})	|B_{OPX}- B_{RPX}|		60		Gauss

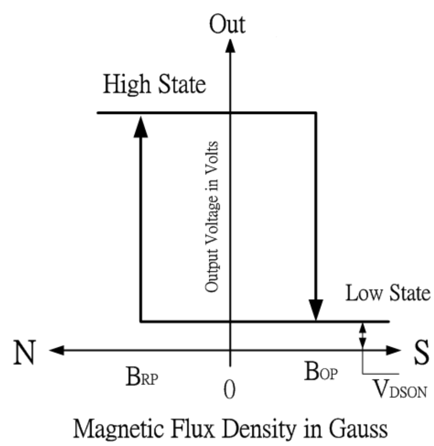
11.Timing waveform diagram



- *Power-On time (T_{PO})*：
  When input voltage to V_{DD} of IC, IC can be normal working after Power-On Time (T_{PO})
- *Output switch time, (T_{SW})*：
  The time from magnetic field change to output signal begin to transit is called output switch time.
- *Output Rise time, (T_R)*：
  During Output voltage from low voltage to high voltage, it's called output rise time.
- *Output Fall Time, (T_F)*：
  During Output voltage from high voltage to low voltage, it's called output fall time.

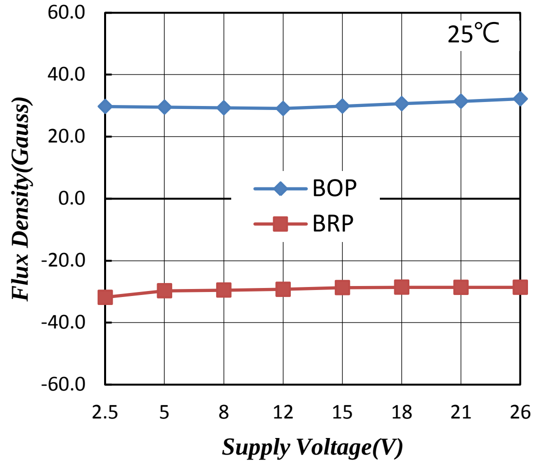
12. Output Behavior versus Magnetic Polar



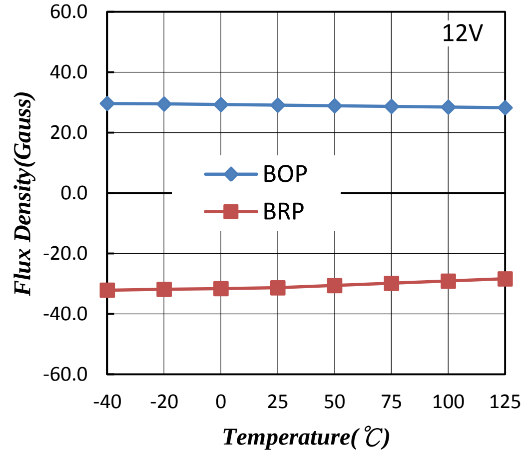


13. Typical Characteristics

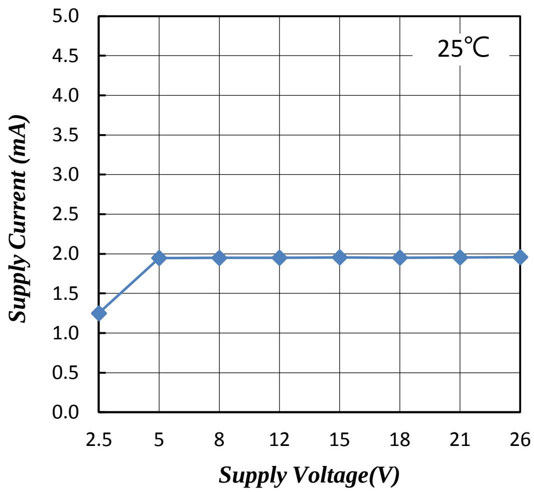
Typical Supply Voltage (V_{DD}) Versus Flux Density



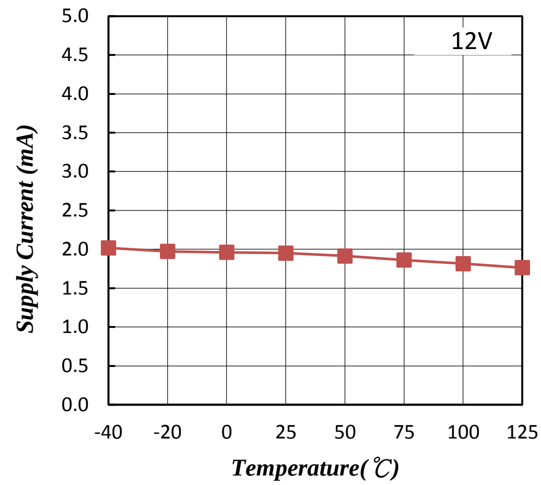
Typical Temperature (T_A) Versus Flux Density



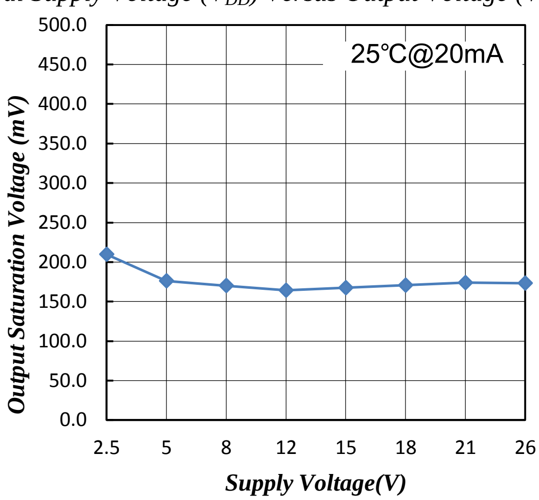
Typical Supply Voltage (V_{DD}) Versus Supply Current (I_{DD})



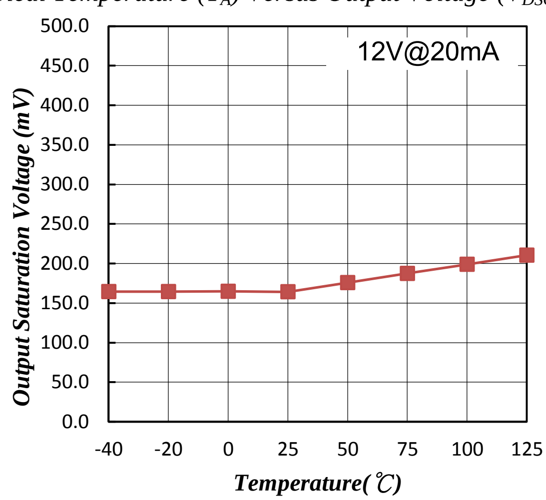
Typical Temperature (T_A) Versus Supply Current (I_{DD})



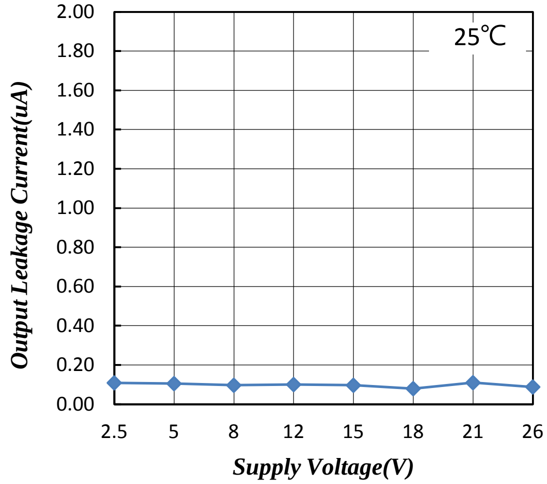
Typical Supply Voltage (V_{DD}) Versus Output Voltage (V_{DSON})



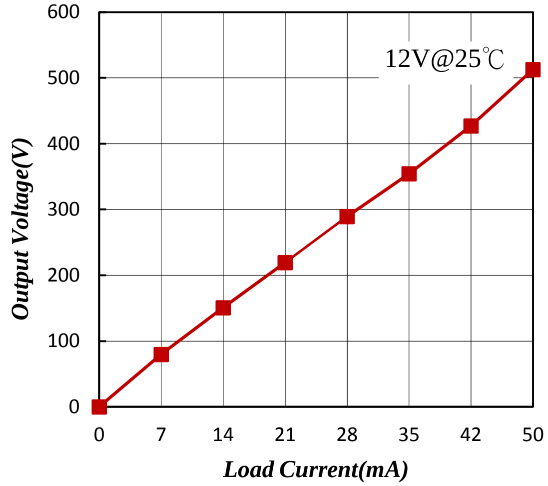
Typical Temperature (T_A) Versus Output Voltage (V_{DSON})



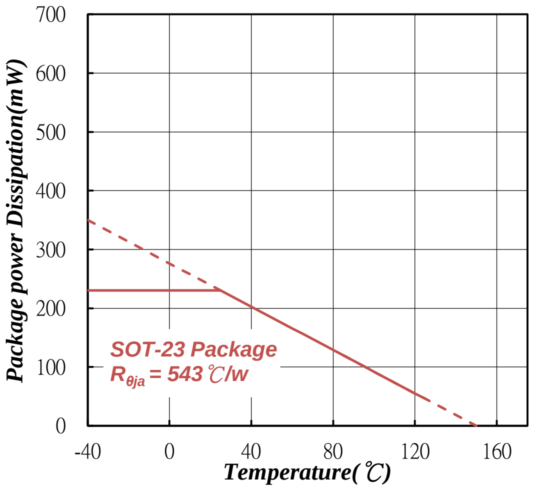
Typical Supply Voltage (V_{DD}) Versus Leakage Current (I_{OFF})



Typical Load Current (I_L) Versus Output Voltage (V_{OUT})



Power Dissipation versus Temperature (T_A)



14. 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:

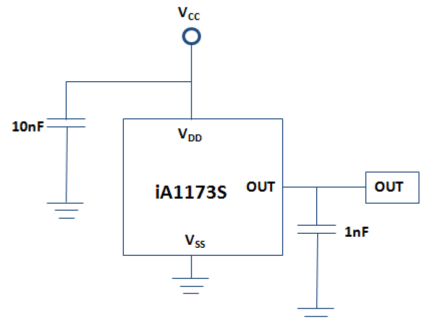
$$P_D = \frac{T_{J(max)} - Ta}{R_{\theta ja}}$$

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 230 mW.

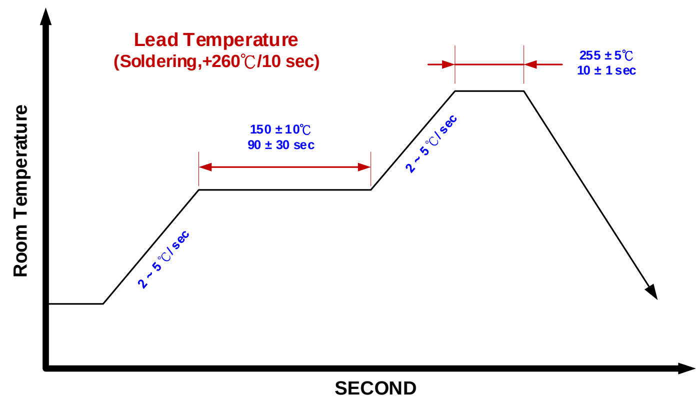
$$P_D = \frac{150°C - 25°C}{543°C/_W} = 230mW$$

The 543℃/W for the SOT-23 package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 230 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. Typical Application circuit



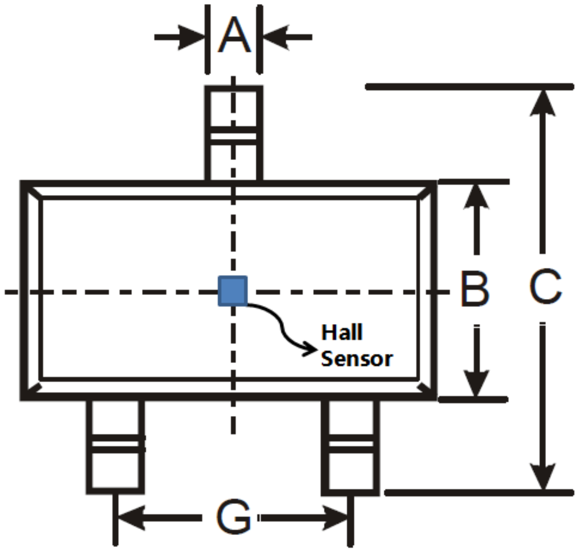
16. IR reflow curve



Soldering Condition

17. Package Dimensions

Package Type : SOT23-3L



SOT23-3L			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm