# Ultra High Sensitivity Hall Effect Latch

## 1. Description

iA1188D 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.

iA1188D 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.

iA1188D is rated for operation between the ambient temperatures -40℃ to 125℃. The two package styles available provide magnetically optimized solutions for most applications. iA1188D is an SOT-23, a miniature low-profile surface-mount package.

Package is Halogen Free standard and which have been verified by third party lab.

## 2. Features

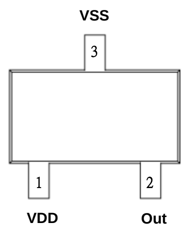
- DMOS Hall IC Technology.
- Reverse bias protection on power supply pin.
- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high Temp condition.
- Good ESD Protection.

## 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
- High ESD Capability

## 4. Pin Assignments

(Top VieW)




**SOT-23**

## 5. Marking Information

| Product Name | Package | Marking |
|---|---|---|
| iA1188D | SOT-23 | 188XX X: Date Code |

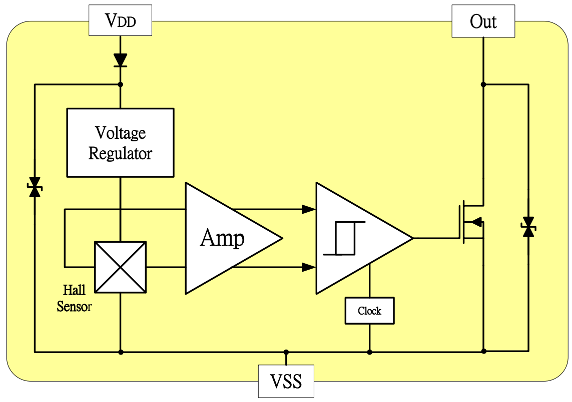
## 6. Ordering Code

| |
|---|
| iA1188D |

## 7. Pin Definitions

| Name | Pin | Description |
|---|---|---|
| $V_{DD}$ | 1 | Power Supply |
| $V_{OUT}$ | 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***) | | -28/-0.3 | V |
| Output current (***$I_{SINK}$***) | | 50 | mA |
| Operating Temperature Range (***$T_A$***) | | -40 ~ +125 | ℃ |
| Storage temperature Range (***$T_S$***) | | -65 ~ +150 | ℃ |
| Maximum Junction Temp (***$T_J$***) | | 150 | ℃ |
| Thermal Resistance | ($\theta_{JA}$) | 543 | ℃/w |
| | ($\theta_{JC}$) | 410 | ℃/w |
| Package Power Dissipation ($P_D$) | | 230 | mW |

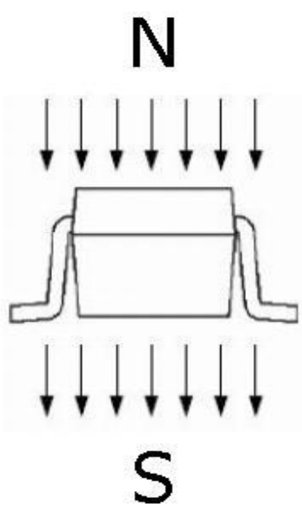
## 10. Electrical Characteristics

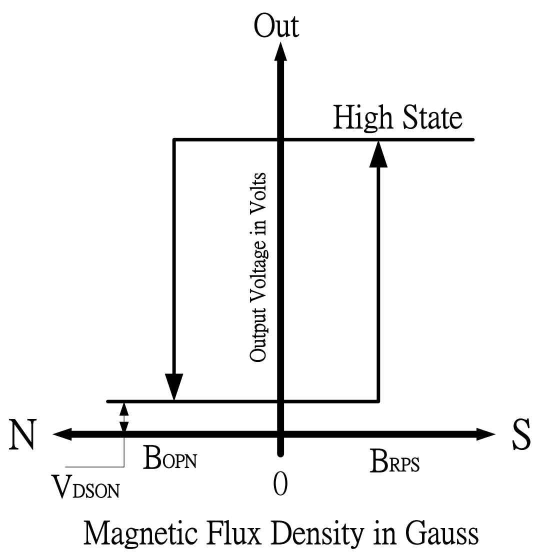
*(DC Operating Parameters：$T_A$=+25℃, $V_{DD}$=12V)*

| Parameters | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Supply Voltage ($V_{DD}$) | Operating | 2.5 | | 26.0 | V |
| Supply Current ($I_{DD}$) | $B<B_{OP}$ | | | 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 | | | 10.0 | uA |
| Output Rise Time, ($T_R$) | $R_L$=1.1KΩ, CL =20pF | | 0.04 | 0.45 | uS |
| Output Fall Time, ($T_F$) | $R_L$=820Ω; CL =20pF | | 0.18 | 0.45 | uS |
| Electro-Static Discharge | HBM | 4 | | | KV |
| Operate Point, ($B_{OP}$) | | -25 | | -5 | Gauss |
| Release Point, ($B_{RP}$) | | 5 | | 25 | Gauss |
| Hysteresis ($B_{HYS}$) | $\|B_{OP} - B_{RP}\|$ | | 30 | | Gauss |

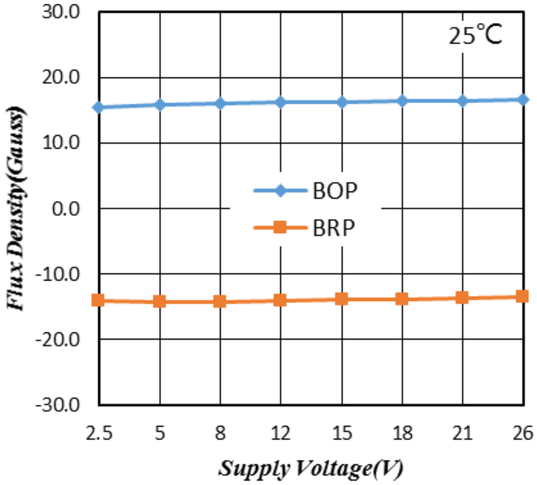
## 11. Output Behavior versus Magnetic Polar

(*DC Operating Parameters $T_A$ = -40 to 125℃, $V_{DD}$ =2.5 to 24 V*)

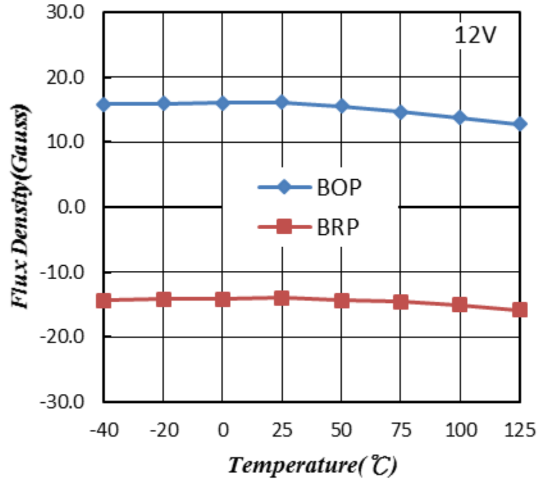


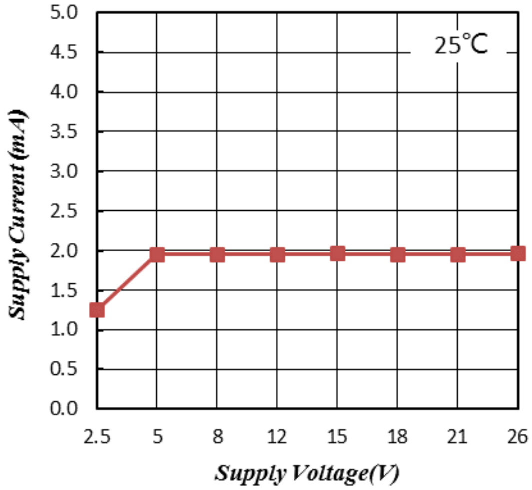
## 12. Typical Characteristics



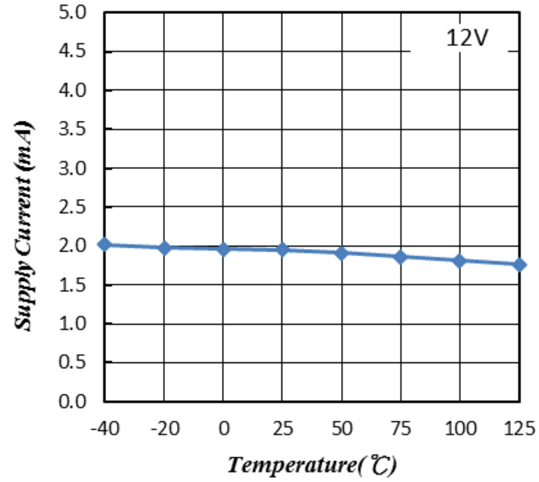

Supply Voltage (VDD) Vs. Flux Density



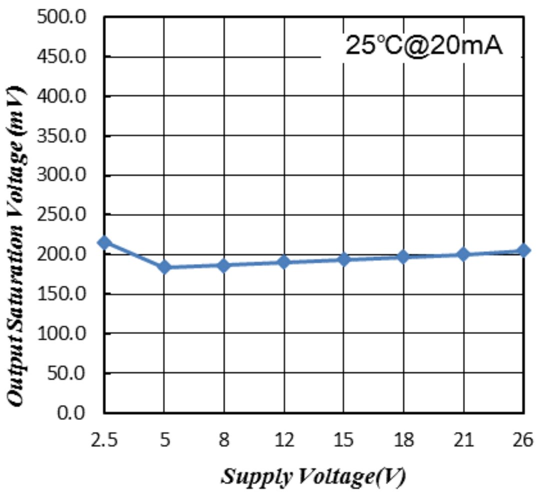

Temperature ($T_A$) Vs. Flux Density



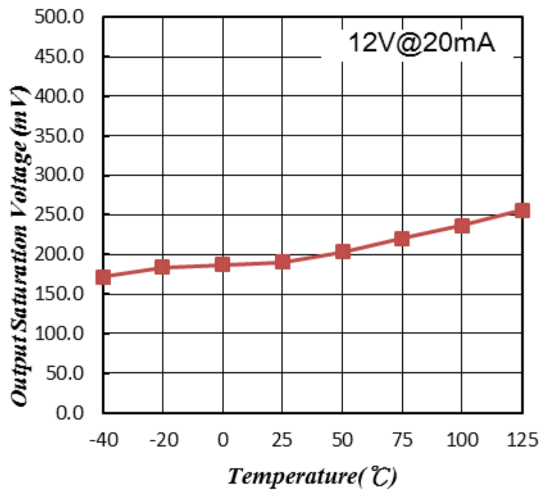

Supply Voltage (VDD) Vs. Current (IDD)




Temperature (TA) Vs. Current (IDD)

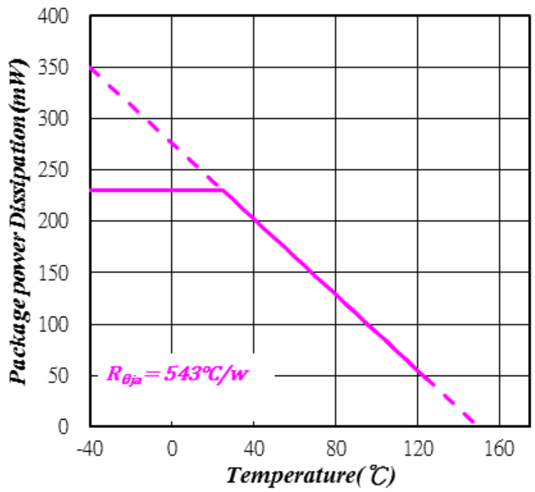



Supply Voltage ($V_{DD}$) Vs. Output Voltage ($V_{DSON}$)



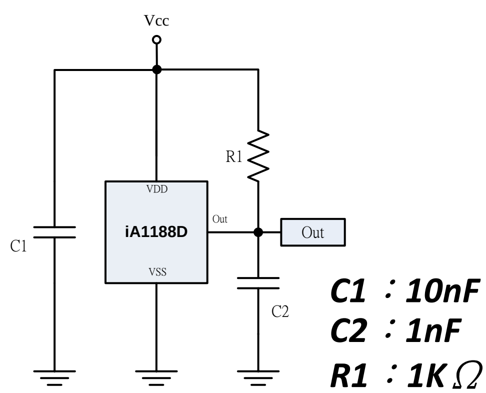

Temperature ($T_A$) Vs. Output Voltage ($V_{DSON}$)

## 12. Typical Characteristics (Cont.)




Power Dissipation Vs. Temperature ($T_A$)

## 13. Typical Application circuit

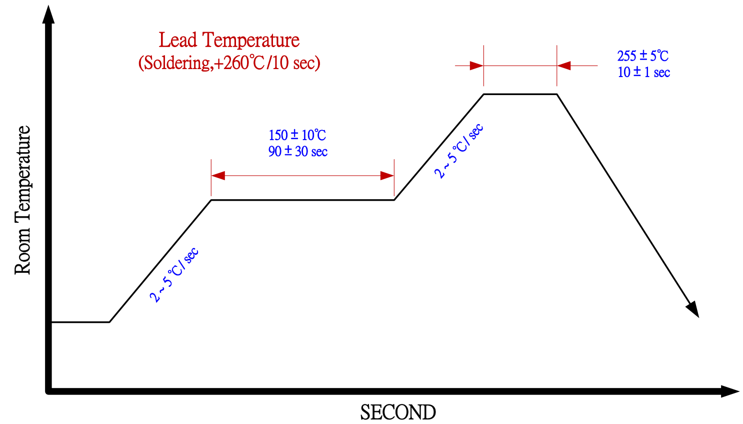



## 14. Package Power Dissipation

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:

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

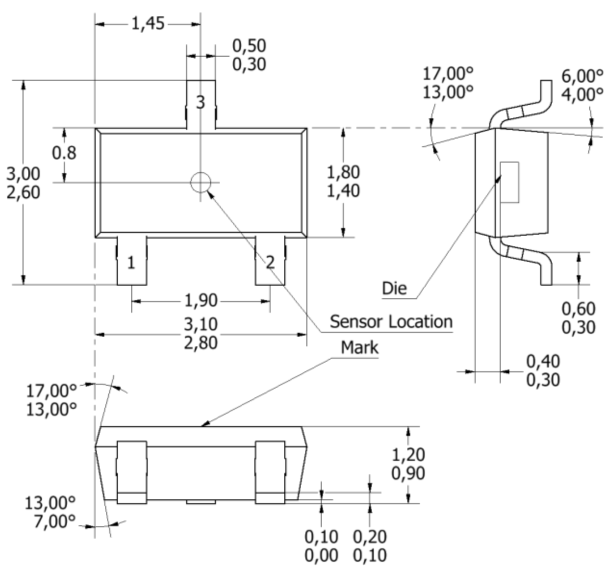
## 15. IR reflow curve




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. (For reference only) Land Pattern