SH193 Hall Effect Latch with Built-in Pull-up Resistor

SH193 is an ultra-high sensitivity Hall effect latch designed in advanced DMOS technology. The following are integrated on a single silicon chip: voltage regulator, ESD protection, Hall voltage generator, chopper stabilized small-signal amplifier, Schmitt trigger, open-drain output and built-in pull-up resistor. Since the pull-up resistor is built, external pull-up resistor is not required. Superior high-temperature performance is made possible through a dynamic offset cancellation that utilizes chopper-stabilization.

Features

- Ultra-high sensitivity (1.5mT typ.)
- Built-in pull-up resistor (10kΩ)
- Stable temperature characteristics
- Good ESD protection (HBM4kV min.)

Typical Applications

- High temperature fan motor
- 3 phase BLDC motor
- Speed sensing
- Position sensing
- Current sensing
- Revolution counting

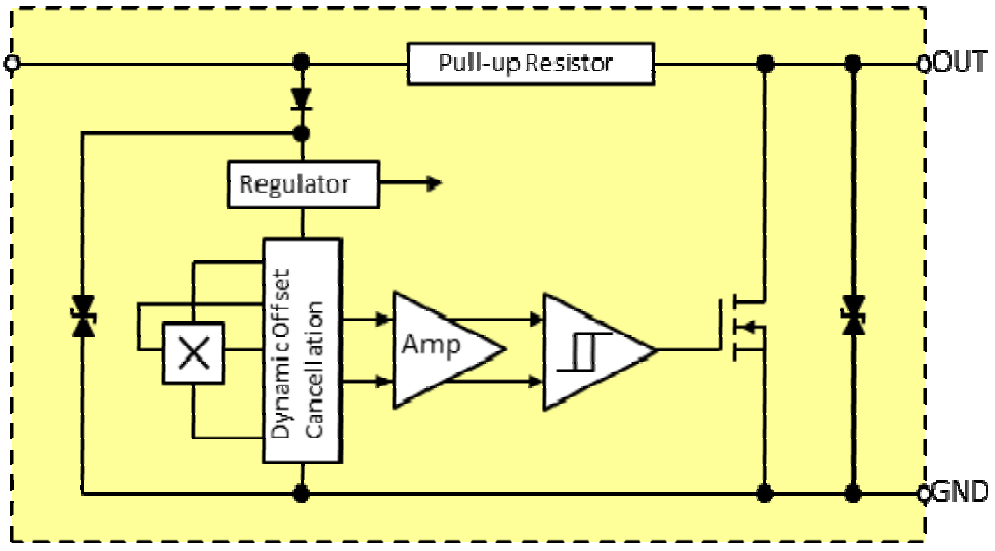
Order Information

Order No.	Part No.	Temperature	Package	—	Packing
SH193KUA	SH193	K	UA		
SH193KSO-TR	SH193	K	SO	—	TR

Legend:

Temperature Code:	K (-40℃～125℃)
Package Code:	UA (TO92S), SO (SOT23)
Packing Code:	Brank (Balk, 500pcs/Bag), TR (Tape & Reel, 3,000pcs/Reel)

Functional Block Diagram



Absolute Maximum Ratings (T_A=25℃)

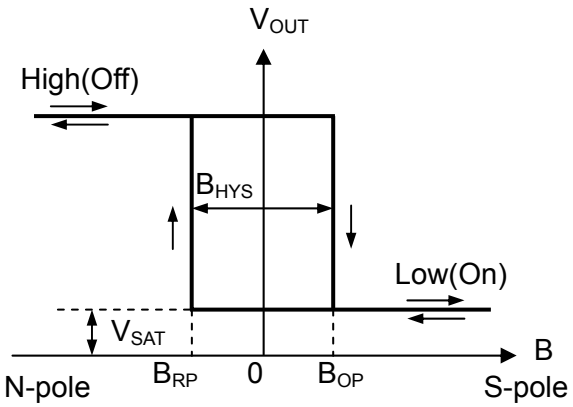
Parameter	Symbol	Value Min	Value Max	Unit
Supply Voltage	V_{DD}	-0.3	18	V
Output Voltage	V_{OUT}	-0.3	18	V
Output Current	I_{SINK}	-	13	mA
Operating Temperature Range (K)	T_A	-40	125	℃
Storage Temperature Range	T_S	-65	150	℃
Maximum Junction Temperature	T_J		150	℃
Power Dissipation (UA/SO)	P_D		606/230	mW

Electrical Characteristics (T_A=25℃, V_{DD}=12V)

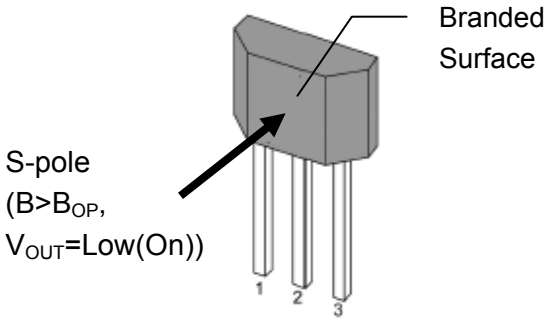
Parameter	Test Condition	Symbol	Value Min	Value Typ	Value Max	Unit
Supply Voltage		V_{DD}	2.5	-	16	V
Consumption Current	V_{OUT}=High	I_{DD}	-	-	5	mA
Output Saturation Voltage	V_{OUT}=Low	V_{SAT}	-	-	0.4	V
Output Leakage Current	V_{OUT}=12V(High)	I_{LEAK}	-	-	10	μA
Output Rise time	R_L=1.1kΩ, C_L=20pF	t_R	-	0.04	0.45	μs
Output Fall time	R_L=820Ω, C_L=20pF	t_F	-	0.18	0.45	μs
Electro-Static Discharge	HBM		4	-	-	kV
Built-in Pull-up Resistor		R_{PU}		10		kΩ

UA-package *Magnetic Characteristics* (*T_A=25℃, V_{DD}=12V*)

Parameter	Test Condition	Symbol	Value Min	Value Typ	Value Max	Unit
Operate Point	S pole to branded side	B_{OP}	0.5	-	2.5	mT
Release Point	N pole to branded side	B_{RP}	-2.5	-	-0.5	mT
Hysteresis		B_{HYS}	-	3	-	mT



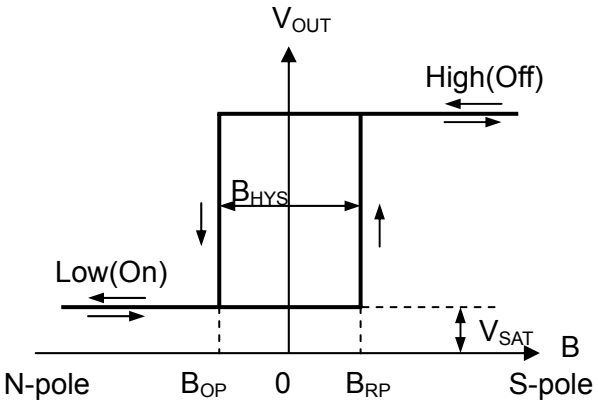
Switching Characteristics



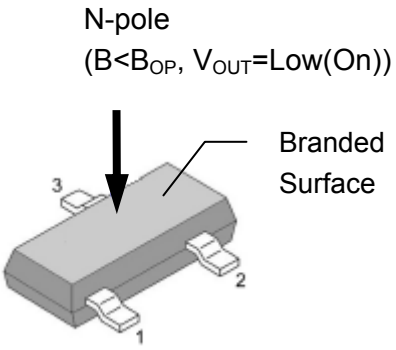
UA-package

SO-package *Magnetic Characteristics* (*T_A=25℃, V_{DD}=12V*)

Parameter	Test Condition	Symbol	Value Min	Value Typ	Value Max	Unit
Operate Point	N pole to branded side	B_{OP}	-2.5	-	-0.5	mT
Release Point	S pole to branded side	B_{RP}	0.5	-	2.5	mT
Hysteresis		B_{HYS}	-	3	-	mT

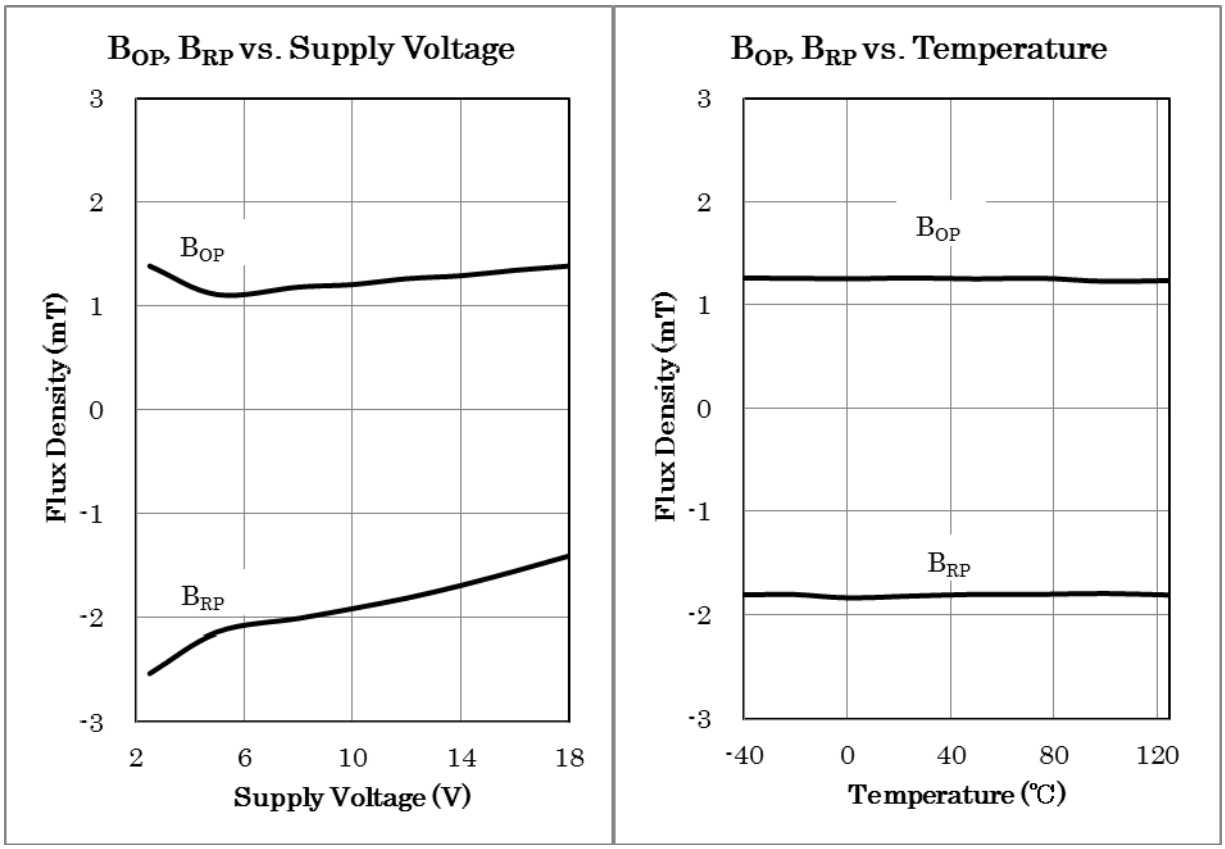


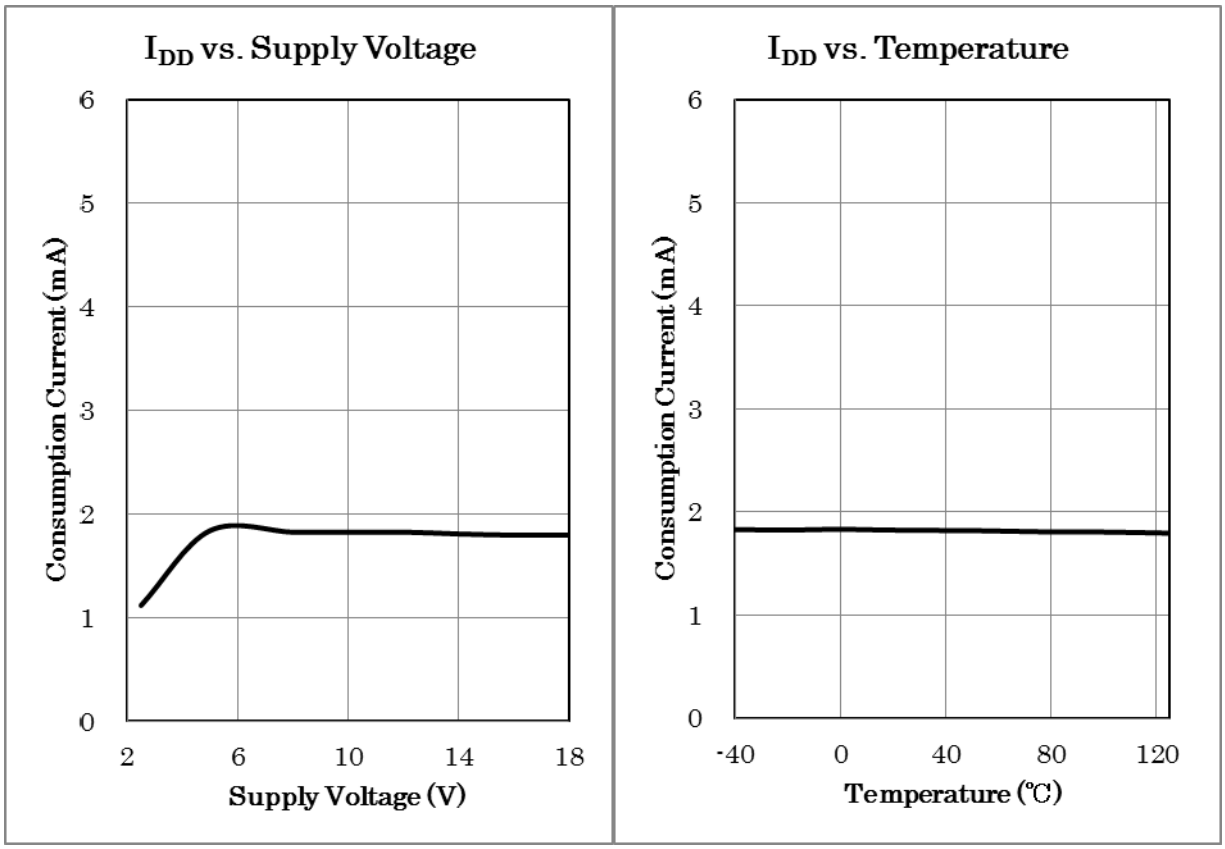
Switching Characteristics



SO-package

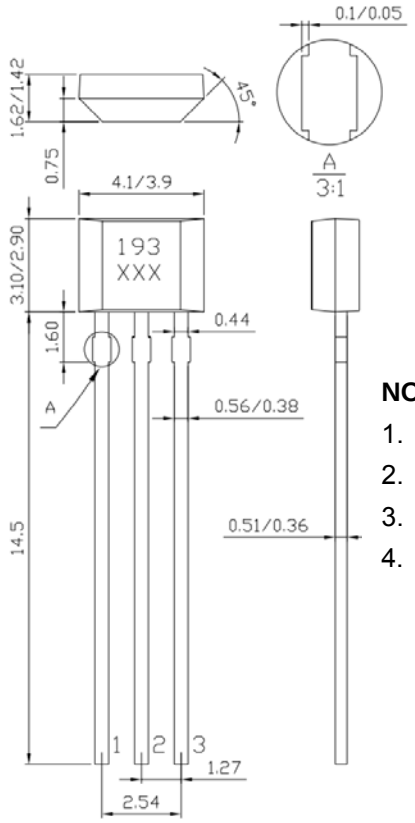
Performance Graphs



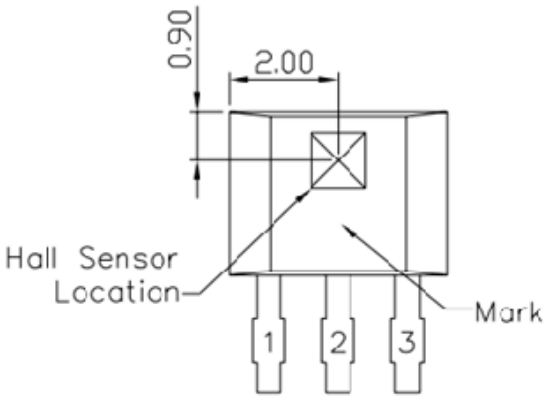


Sensor Location, Package Dimension and Marking

UA-package: TO92S



Hall sensor location



NOTES:

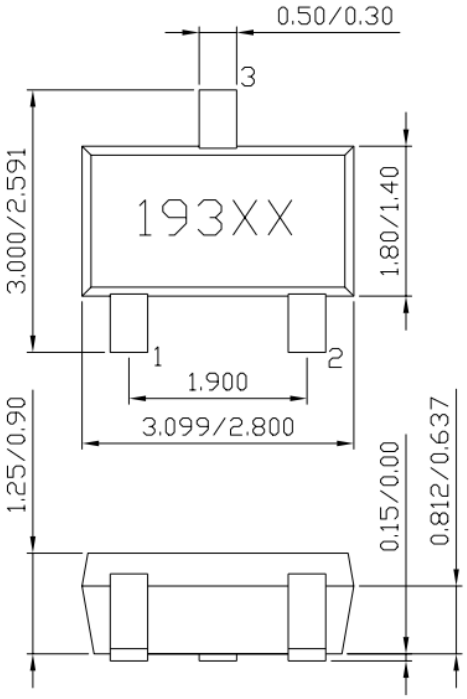
1. Controlling dimension: mm;
2. Leads must be free of flash and plating voids
3. Do not bend leads within 1 mm of lead to package interface
4. PINOUT:

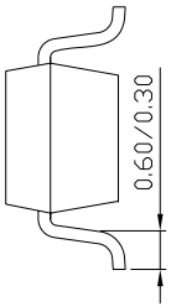
   Pin 1 V_{DD}

   Pin 2 GND

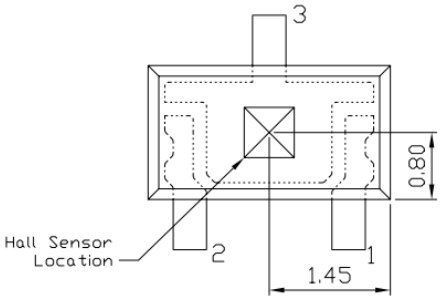
   Pin 3 Output

SO-package: SOT23
(Upper View)





Hall sensor location
(Bottom View)



NOTES:

1. PINOUT:

   Pin 1 V_{DD}

   Pin 2 Output

   Pin 3 GND
2. Controlling dimension: mm;
3. Lead thickness after solder plating will be 0.254mm maximum.