Pull-up Resistor Integrated Hall Effect Latch

DESCRIPTION

TSH193 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.

TSH193 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, Pull-up resistor output. 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.

FEATURES

- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high Temp condition.
- Pull-up resistor integrated
- ESD Protection >4kV HBM
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition

APPLICATION

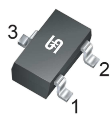
- High temperature fan motor
- 3 phase BLDC motor application
- Speed sensing, position sensing
- Revolution counting
- Solid-state switch
- Angular position detection
- Proximity detection

Pb Pb-Free RoHS COMPLIANT HALOGEN FREE

TO-92S

Pin Definition:
1. V_{CC}
2. Ground
3. Output

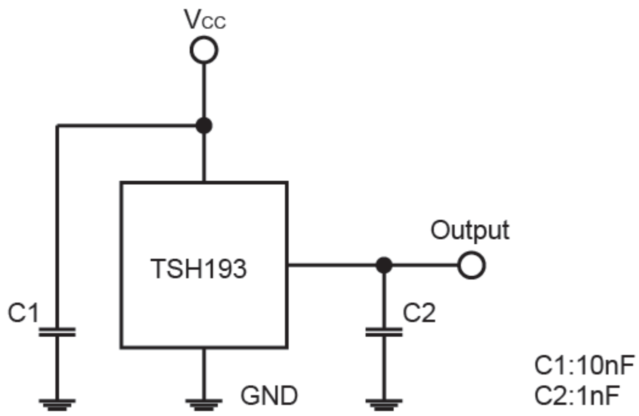
SOT-23



Pin Definition:
1. V_{CC}
2. Output
3. Ground

Notes: Moisture sensitivity level: level 3. Per J-STD-020

TYPICAL APPLICATION CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Supply voltage		V_{CC}	18	V
Output current		I_{OUT}	13	mA
Magnetic flux density			Unlimited	Gauss
Operating Temperature Range		T_{OPR}	-40 to +125	°C
Storage temperature range		T_{STG}	-55 to +150	°C
Maximum Junction Temperature		T_J	150	°C
Package Power Dissipation	TO-92S	P_D	606	mW
	SOT-23		230	

THERMAL PERFORMANCE

PARAMETER		SYMBOL	LIMIT	UNIT
Thermal Resistance - Junction to Case	TO-92S	$R_{\Theta JC}$	206	°C/W
	SOT-23		543	
Thermal Resistance - Junction to Ambient	TO-92S	$R_{\Theta JA}$	148	°C/W
	SOT-23		410	

Note: Considering 6 cm^2 of copper board heat-sink

ELECTRICAL SPECIFICATIONS
(DC Operating Parameters： T_A=+25°C, V_{CC}=12V)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	Operating	2.5	--	16	V
Supply Current	$B<B_{OP}$	--	--	5	mA
Output Saturation Voltage	$B>B_{OP}$	--	--	400	mV
Output Leakage Current	I_{OFF} $B<B_{RP}$, V_{OUT}=12V	--	--	10	μA
Output Rise Time	R_L=1.1KΩ, C_L=20pF	--	0.04	0.45	μs
Output Fall Time	R_L=820Ω; C_L=20pF	--	0.18	0.45	μs
ESD	HBM	4	--	--	kV
Pull-up Resistor		--	10	--	kΩ
Operate Point (B_{OP})		5	--	25	Gauss
Release Point (B_{RP})		-25	--	-5	Gauss
Hysteresis (B_{OP} - B_{RP})		--	30	--	Gauss

Note: 1G (gauss) = 0.1mT (millitesla)

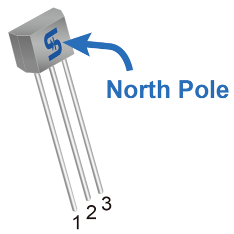
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSH193CT B0G	TO-92S	1kpcs / Bag
TSH193CX RFG	SOT-23	3kpcs / 7"Reel

OUTPUT BEHAVIOR VERSUS MAGNETIC POLE

DC Operating Parameters: T_A = -40 to 125°C, V_{CC} = 2.5~18V

Parameter	Test condition	OUT (TO-92S)	OUT (SOT-23)
North pole	$B>B_{OP}$	Hi	Low
South pole	$B<B_{RP}$	Low	Hi

<table>
<tr><th colspan="2">TO-92S</th><th colspan="2">SOT-23</th></tr>
<tr>
<td>
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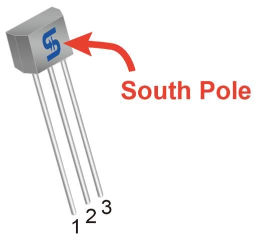
<td>
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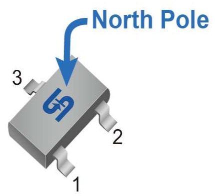
<td>
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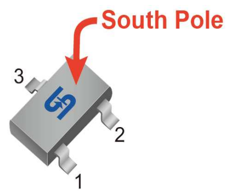
<td>
</td>
</tr>
<tr><td>OUT=Hi
(V_{CC})</td><td>OUT=Low
(V_{DSON})</td><td>OUT=Low
(V_{DSON})</td><td>OUT=Hi
(V_{CC})</td></tr>
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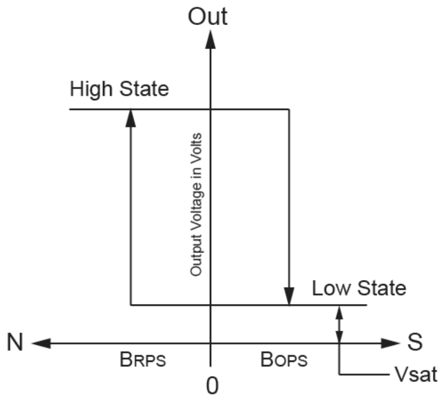
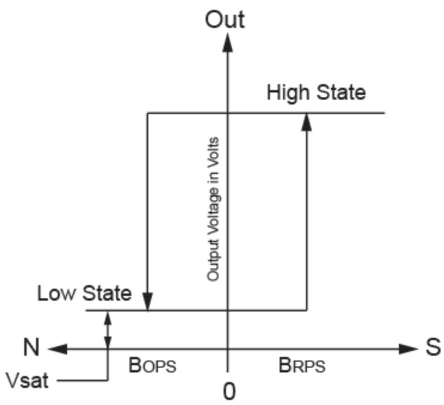
<td colspan="2">

TO-92S - Magnetic Flux Density in Gauss</td>
<td colspan="2">

SOT-23 - Magnetic Flux Density in Gauss</td>
</tr>
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CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

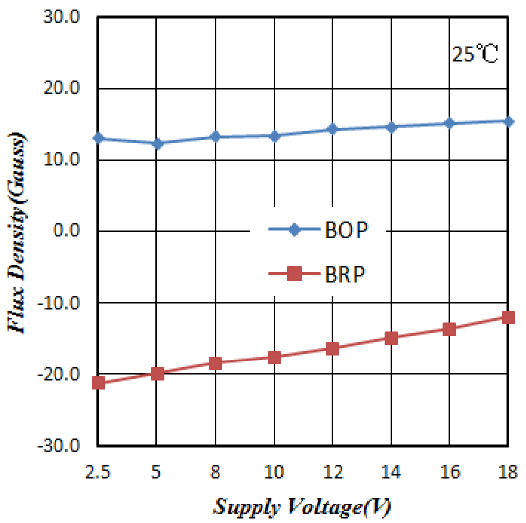


Figure 1. Flux Density vs. Supply Voltage

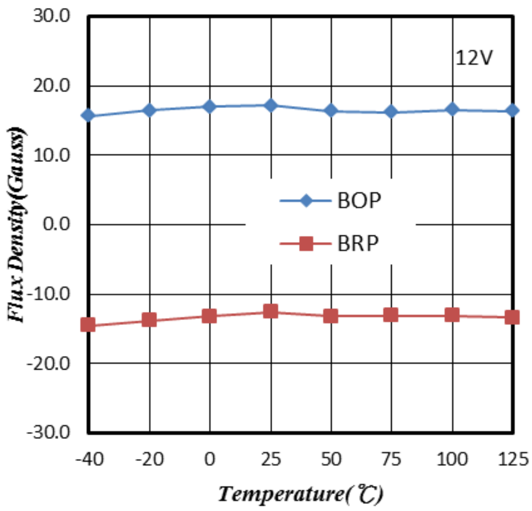


Figure 2. Flux Density vs. Temperature

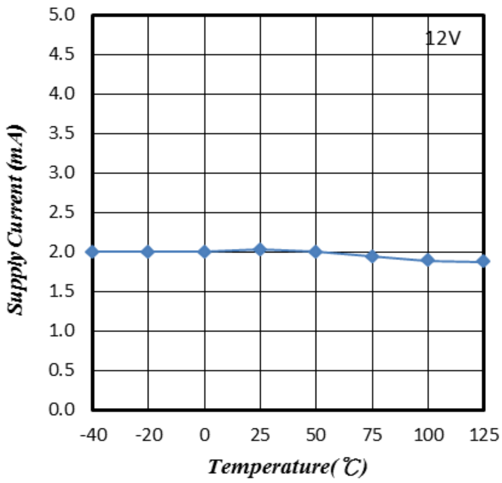


Figure 3. Supply Current vs. Temperature

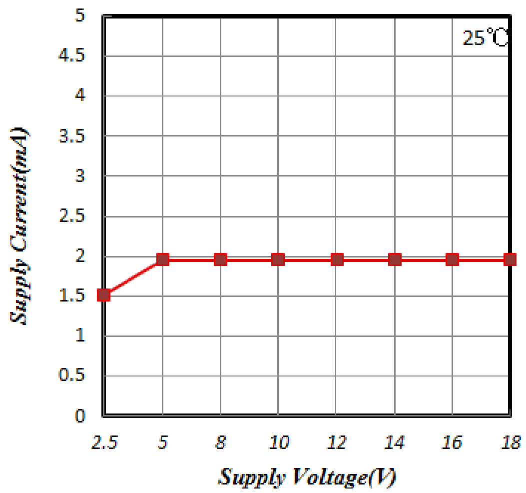


Figure 4. Supply Current vs. Supply Voltage

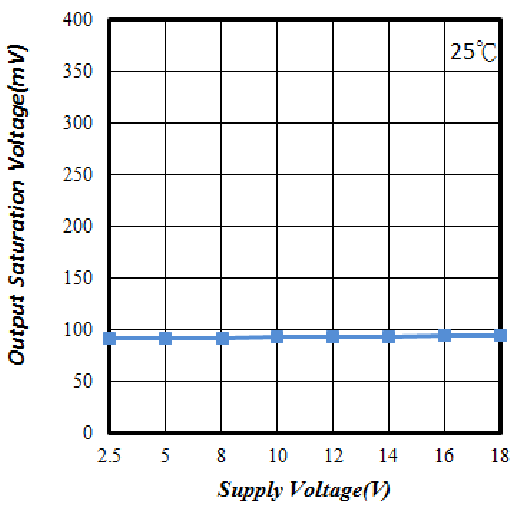


Figure 5. Saturation Voltage vs. Supply Voltage

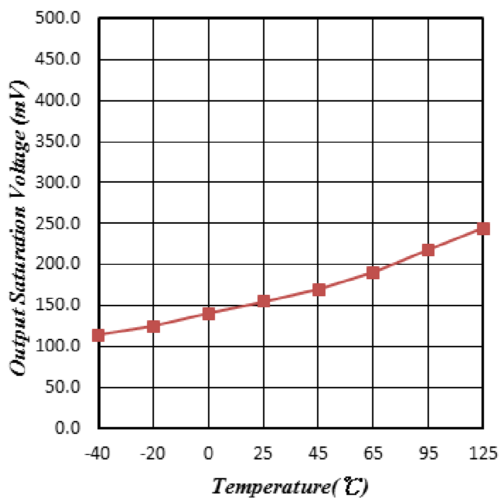


Figure 6. Saturation Voltage vs. Temperature

CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

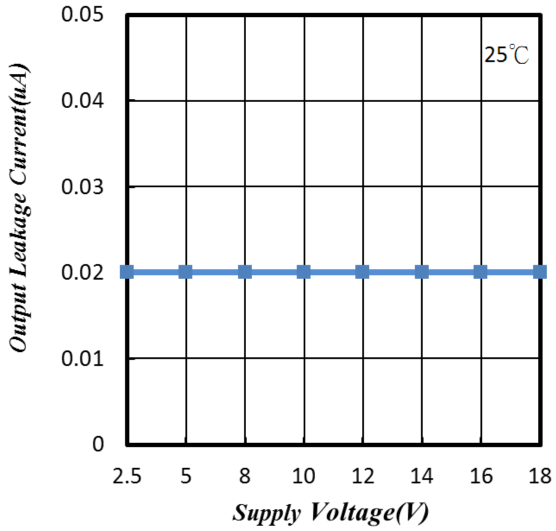


Figure 7. Leakage Current vs. Supply Voltage

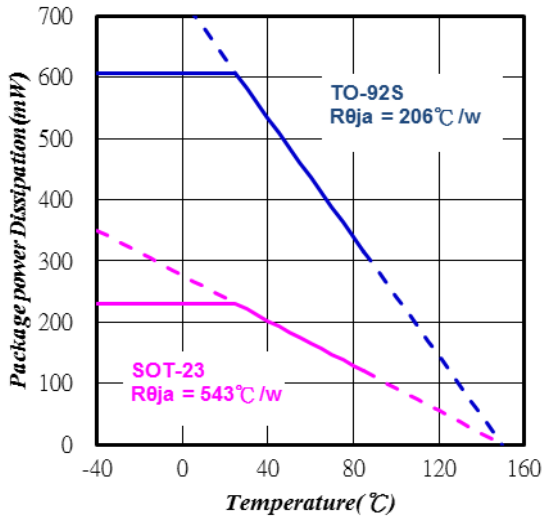
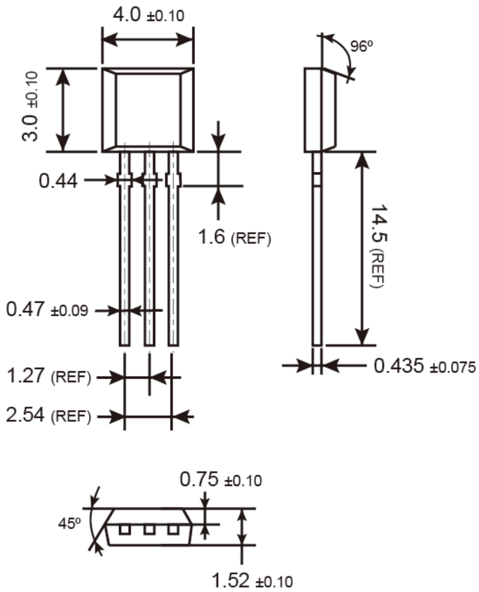
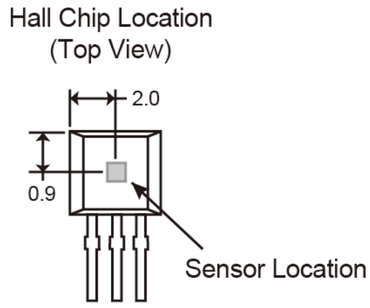


Figure 8. Power Dissipation vs. Temperature

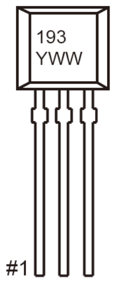
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-92S





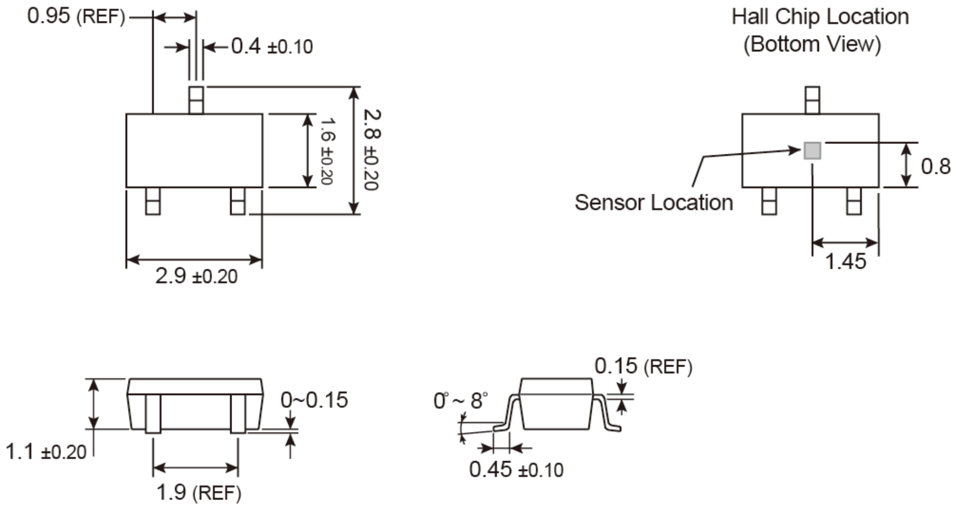
MARKING DIAGRAM



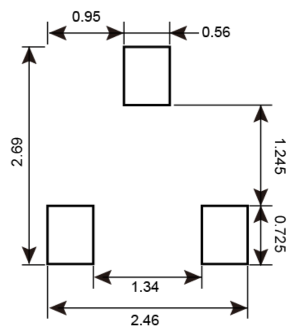
193 = Device Code
Y = Year Code
WW = Week Code (01~52)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

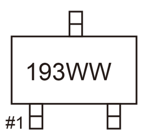
SOT-23



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



193 = Device Code
WW = Week Code Table

Notice