Ultra-High Sensitivity Hall Effect Latch

DESCRIPTION

TSH188 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. TSH188 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.

FEATURES

- 100% tested at 125°C
- Reverse bias protection on power supply pin
- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high Temp condition
- RoHS Compliant
- Halogen-free

APPLICATION

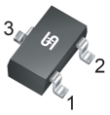
- High temperature Fan motor
- 3 phase BLDC motor application
- Speed sensing, Position sensing, Current sensing
- Revolution counting
- Solid-State Switch
- Linear/Angular Position Detection

Pb-Free RoHS COMPLIANT HALOGEN FREE

TO-92S

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

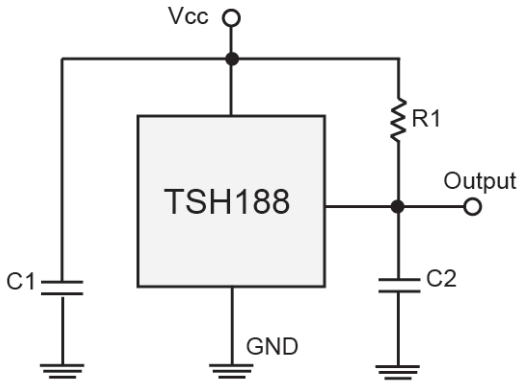
SOT-23



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

Notes: SOT-23 MSL 1 (Moisture Sensitivity Level) per J-STD-020

TYPICAL APPLICATION CIRCUIT



C1 : 10nF
C2 : 1nF
R1 : 1kΩ

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Supply voltage		V_{CC}	28	V
Output Voltage		V_{OUT}	28	V
Reverse voltage		$V_{CC/OUT}$	-28	V
Magnetic flux density			Unlimited	Gauss
Output current		I_{OUT}	50	mA
Operating Temperature Range		T_{OPR}	-40 to +125	°C
Storage temperature range		T_{STG}	-55 to +150	°C
Maximum Junction Temp		T_J	150	°C
Package Power Dissipation	TO-92S	P_D	606	mW
	SOT-23		230	

Note: Do not apply reverse voltage to V_{CC} and V_{OUT} pin, It may be caused for Miss function or damaged device

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

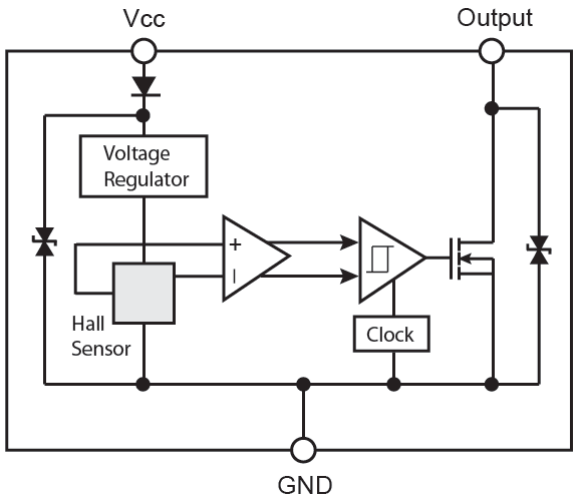
ELECTRICAL SPECIFICATIONS (DC Operating Parameters：T_A=25°C, V_{CC}=12V)					
PARAMETER	**CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNIT**
Supply Voltage	Operating	2.5	--	24	V
Supply Current	B<B_{OP}	--	--	5	mA
Output Saturation Voltage	I_{OUT} = 20mA, B>B_{OP}	--	--	400	mV
Output Leakage Current	I_{OFF} B<B_{RP}, V_{OUT} = 12V	--	--	10	μA
Internal Oscillator Chopper Frequency		--	69	--	kHz
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
Operate Point		5(-25)	--	25(-5)	Gauss
Release Point		-25(5)	--	-5(25)	Gauss
Hysteresis		--	30	--	Gauss

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

ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSH188CT B0G	TO-92S	1Kpcs / Bulk Bag
TSH188CT A3G	TO-92S	2Kpcs / Ammo
TSH188CX RFG	SOT-23	3Kpcs / 7” Reel

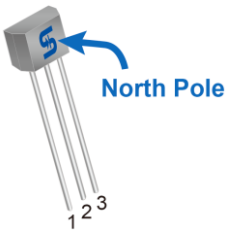
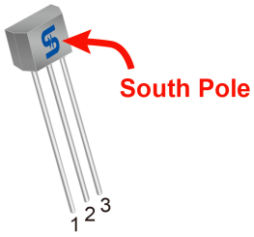
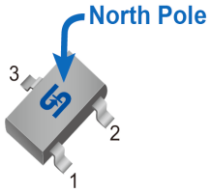
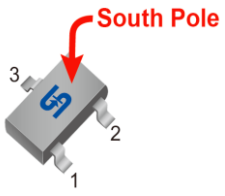
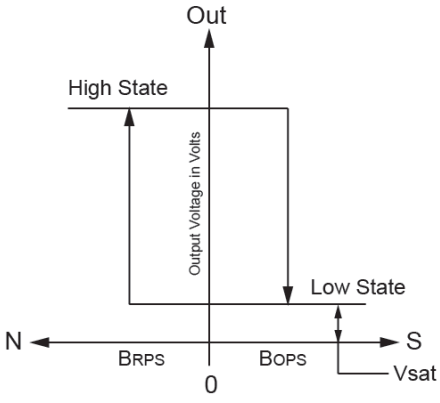
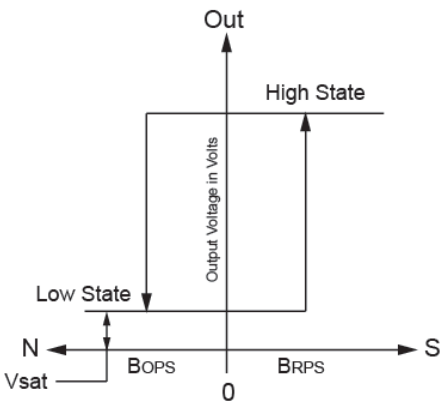
BLOCK DIAGRAM



OUTPUT BEHAVIOR vs. MAGNETIC POLE

DC Operating Parameters: T_A = -40 to 125°C, V_{CC} = 2.5V ~ 24V

PARAMETER	TEST CONDITION	OUT (TO-92S)	OUT (SOT-23)
North pole	B>B_{OP}	Open (Hi)	Low
South pole	B<B_{RP}	Low	Open (Hi)

TO-92S		SOT-23	
			
OUT=Hi (Pull-up Voltage)	OUT=Low (VDSon)	OUT=Low (VDSon)	OUT=Hi (Pull-up Voltage)
			
TO-92S - Magnetic Flux Density in Gauss		SOT-23 - Magnetic Flux Density in Gauss	

CHARACTERISTIC PERFORMANCE

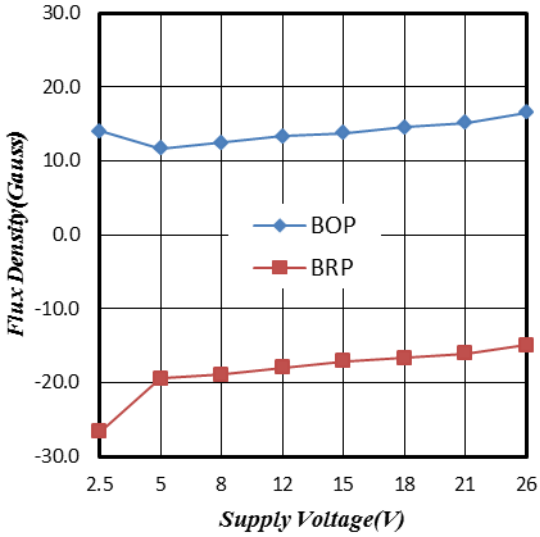


Figure 1. Supply Voltage vs. Flux Density

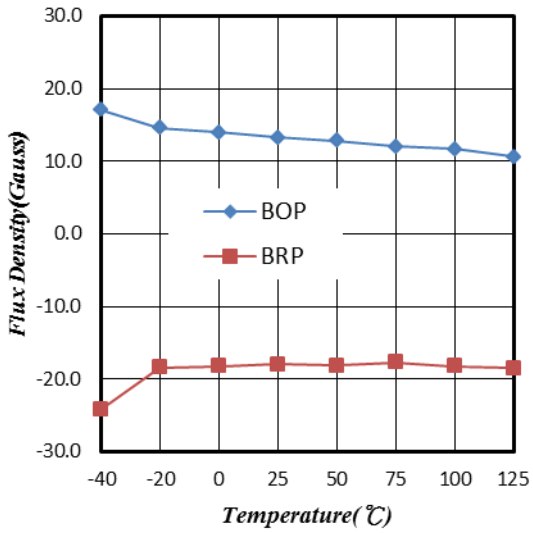


Figure 2. Temperature vs. Flux Density

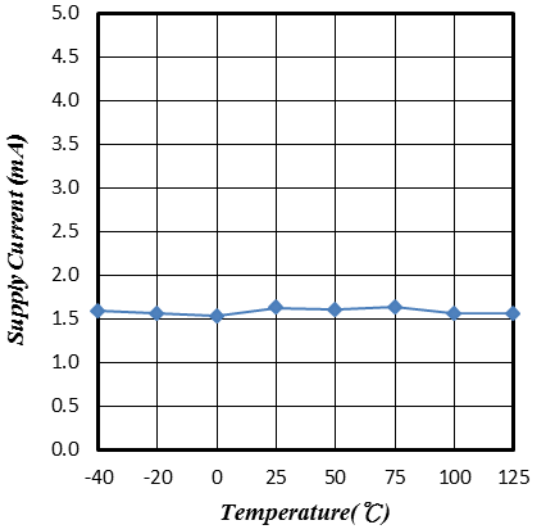


Figure 3. Supply Current vs. Temperature

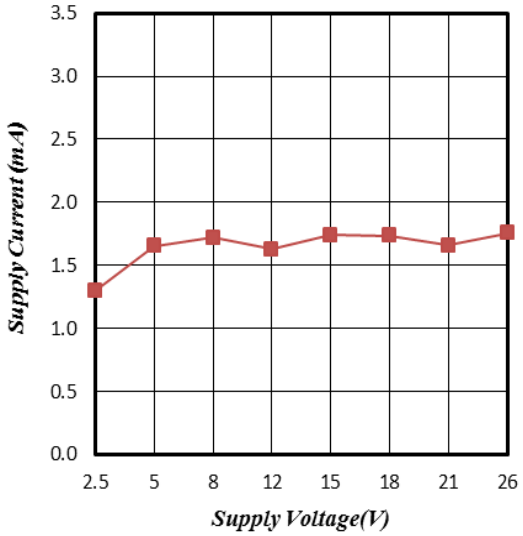


Figure 4. Supply Current vs. Supply Voltage

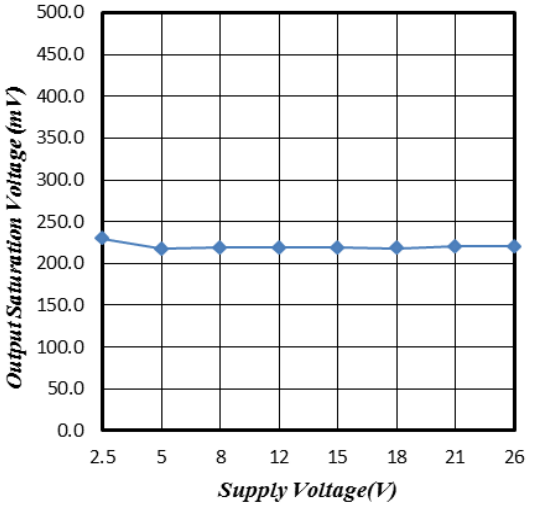


Figure 5. Supply Voltage vs. Saturation Voltage

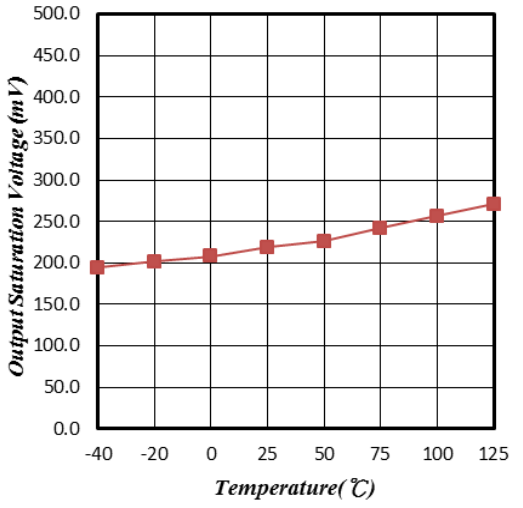


Figure 6. Saturation Voltage vs. Temperature

CHARACTERISTIC PERFORMANCE (CONTINUE)

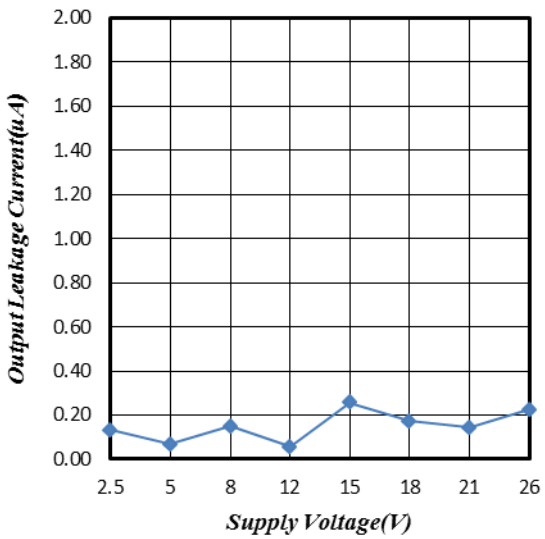


Figure 7. Supply Voltage vs. Leakage Current

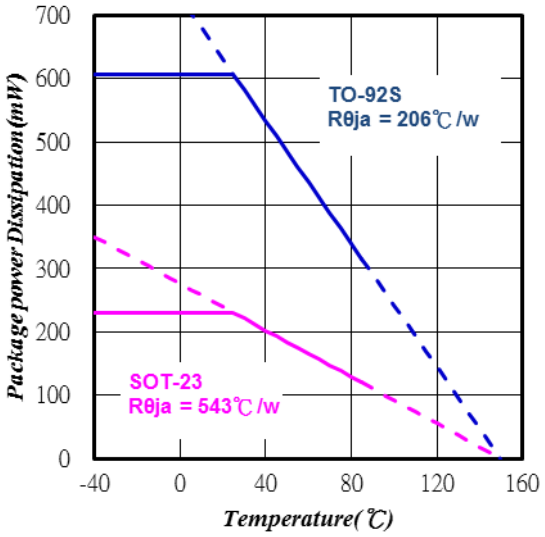


Figure 8. Temperature vs. Power Dissipation

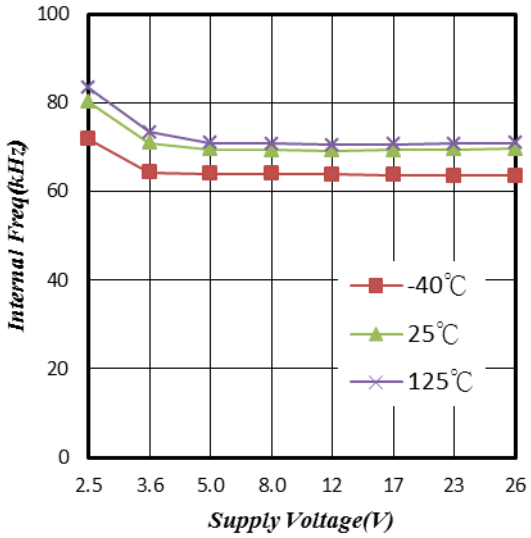


Figure 9. Supply Voltage vs. Internal Frequency

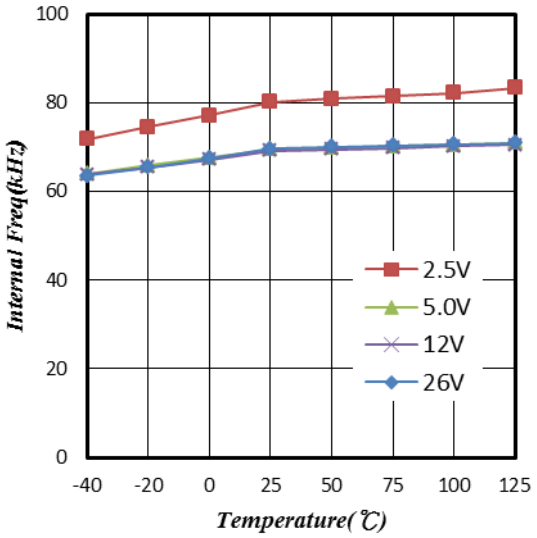
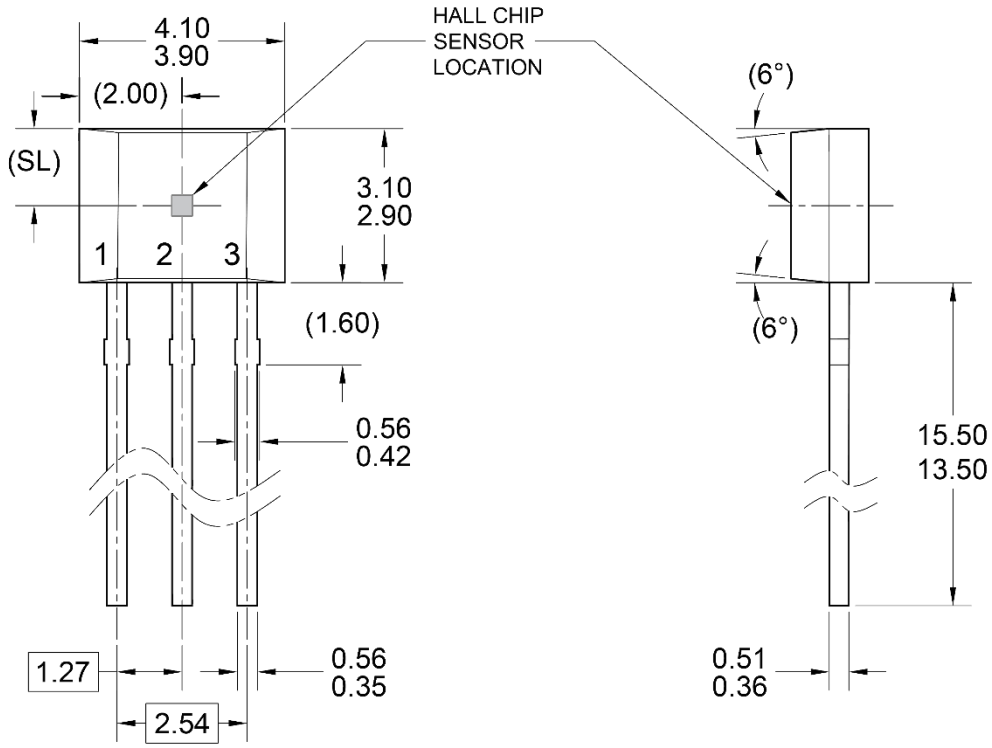
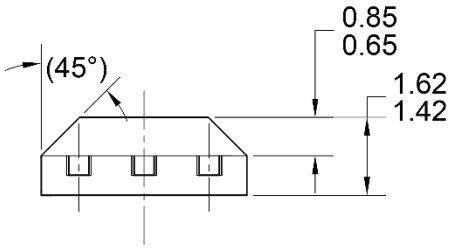


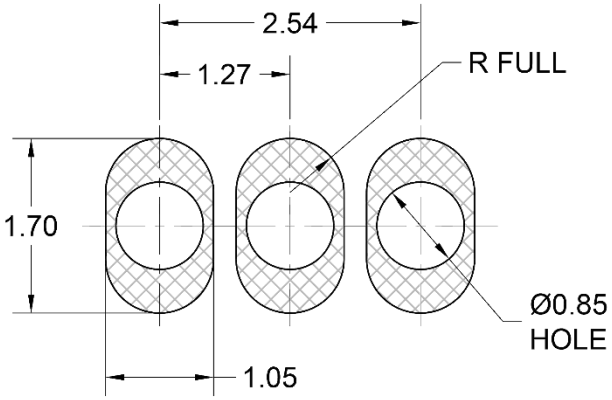
Figure 10. Temperature vs. Internal Frequency

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

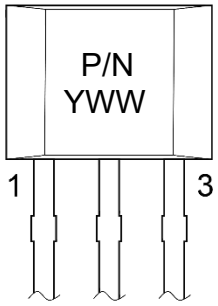
TO-92S







SUGGESTED PAD LAYOUT
(SCALE: 2X)



MARKING DIAGRAM

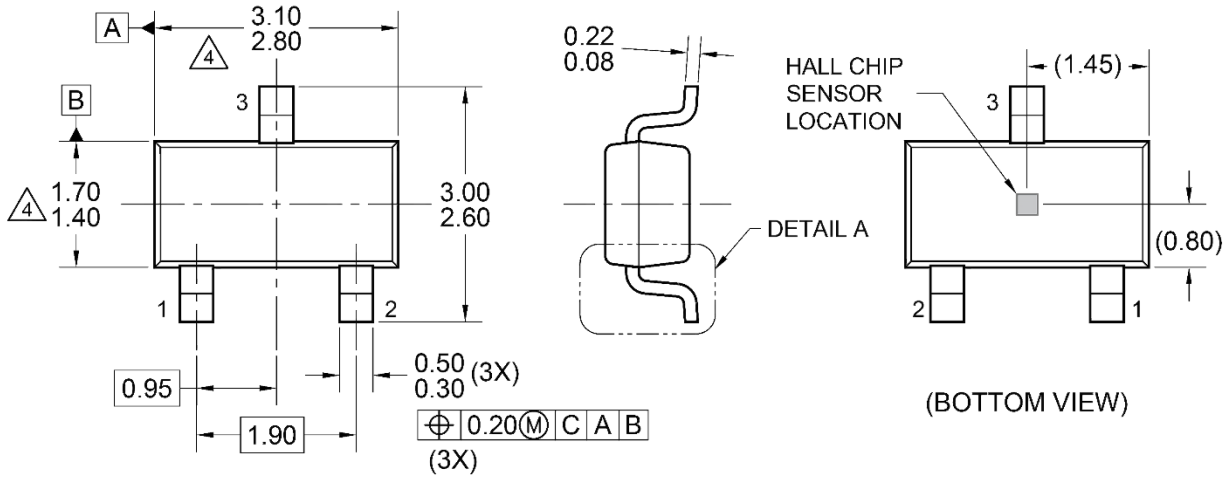
P/N = 188
Y = Year code
WW = Week code (01~52)

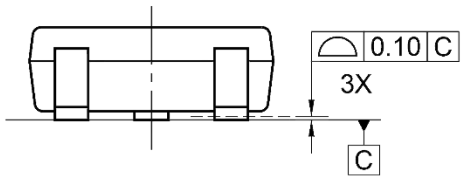
NOTES: UNLESS OTHERWISE SPECIFIED

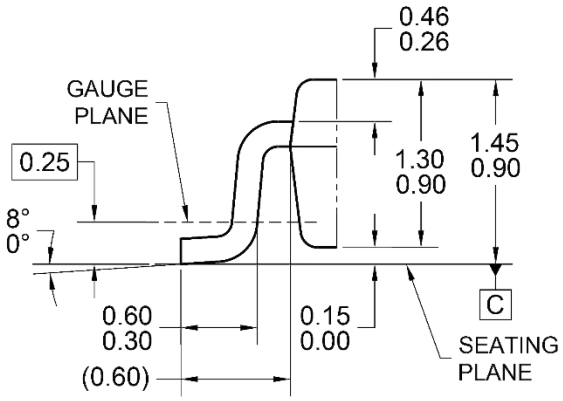
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. SENSOR LOCATION (SL) : 0.90 REF
4. DWG NO REF: HQ2SD07-TO92S-010 REV B.

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

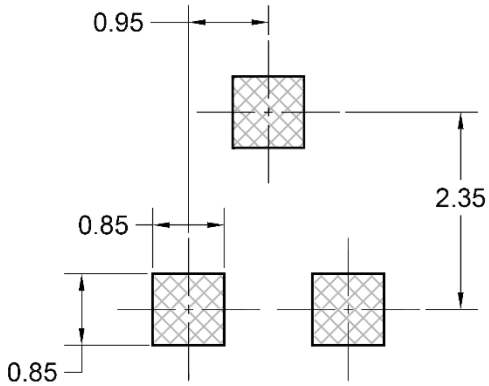
SOT-23



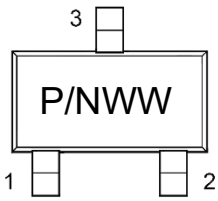




DETAIL A, ROTATED -90°
(SCALE 2:1)



SUGGESTED PAD LAYOUT



MARKING DIAGRAM

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: EIAJ ED-7500A, SC-59.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-SOT23SL-146 REV A.

P/N = 188
WW = Date code (Refer to coding table)

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