

Micropower Omni-Polar Hall Effect Switch

DESCRIPTION

TSH248 Hall-effect sensor is a temperature stable, stress-resistant, micro-power switch. 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.

TSH248 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, open-drain output. Advanced CMOS wafer fabrication processing is used to take advantage of low-voltage requirements, component matching, very low input-offset errors and small component geometries.

FEATURES

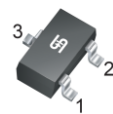
- CMOS Hall IC Technology
- Solid-State Reliability
- Low power consumption for battery applications
- Operation voltage range from 2.5V~3.5V
- RoHS Compliant
- Halogen-free

APPLICATION

- Solid state switch
- Lid close sensor for power supply devices
- Magnet proximity sensor for reed switch replacement in high duty cycle applications.
- Handheld Wireless Handset Awake Switch (Flip
- Cell/PHS Phone/Note Book/Flip Video Set)



TSOT-23

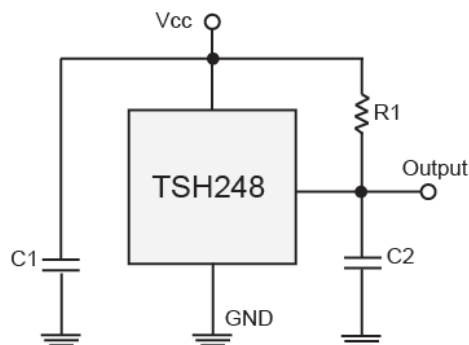


Pin Definition:

1. V_{CC}
2. Output
3. Ground

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

TYPICAL APPLICATION CIRCUIT



C1 : 10nF
C2 : 100pF
R1 : 100kΩ

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Supply voltage	V_{CC}	5	V
Output Voltage	V_{OUT}	5	V
Reverse voltage	$V_{CC/OUT}$	-0.3	V
Magnetic flux density		Unlimited	G
Output current	I_{OUT}	2	mA
Operating Temperature Range	T_{OPR}	-40 to +85	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$
Maximum Junction Temp	T_J	150	$^\circ\text{C}$
Package Power Dissipation	P_D	230	mW

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Thermal Resistance - Junction to Case	$R_{\theta JC}$	410	$^\circ\text{C/W}$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	543	$^\circ\text{C/W}$

Note: Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

ELECTRICAL SPECIFICATIONS (DC Operating Parameters : $T_A = 25^\circ\text{C}$, $V_{CC} = 3\text{V}$)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	Operating	2.5	--	3.5	V
Supply Current	Awake State	--	2.5	4.0	mA
	Sleep State	--	8.0	12	μA
	Average	--	10	16	μA
Output Low Voltage	$I_{OUT} = 1\text{mA}$	--	--	0.3	V
Output Leakage Current	Output off	--	--	1	μA
Awake Mode Time	Operating	--	70	--	μs
Sleep Mode Time	Operating	--	70	--	ms
Duty Cycle		--	0.1	--	%

MAGNETIC SPECIFICATIONS (DC Operating Parameters : $T_A = 25^\circ\text{C}$, $V_{CC} = 3\text{V}$)

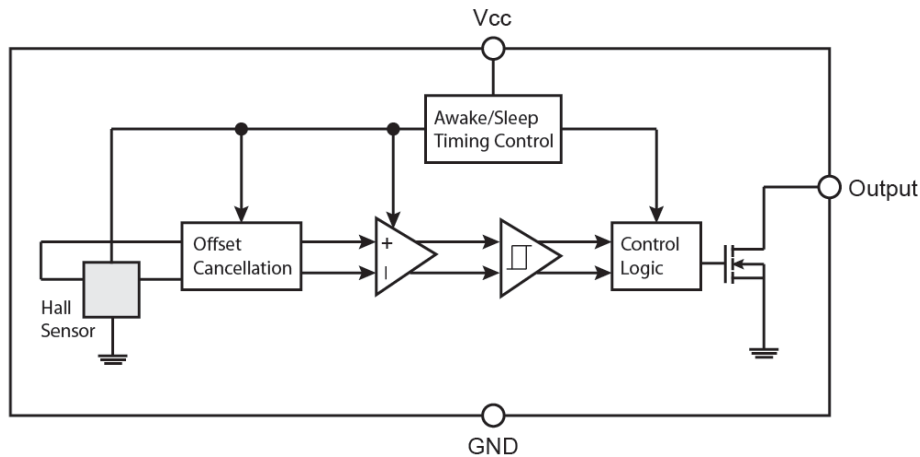
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Point	B _{OPS}	N pole to branded side, $B > B_{OP}$, V_{OUT} On	6	--	60	Gauss
	B _{OPN}	S pole to branded side, $B > B_{OP}$, V_{OUT} On	-60	--	-6	Gauss
Release Point	B _{RPS}	N pole to branded side, $B < B_{RP}$, V_{OUT} Off	5	--	59	Gauss
	B _{RPN}	S pole to branded side, $B < B_{RP}$, V_{OUT} Off	-60	--	-5	Gauss
Hysteresis	B _{HYS}	$ B_{OPx} - B_{RPx} $	--	7	--	Gauss

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

ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSH248CX RFG	TSOT-23	3kpcs / 7" Reel

BLOCK DIAGRAM

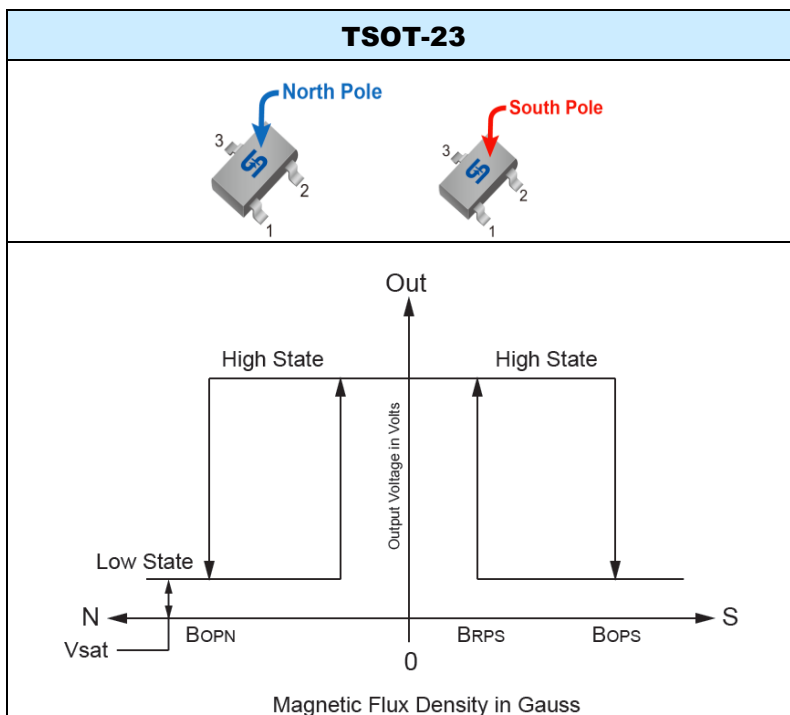


Note: Static sensitive device; please observe ESD precautions. Reverse V_{CC} protection is not included. For reverse voltage protection, a 100 Ω resistor in series with V_{CC} is recommended.

OUTPUT BEHAVIOR vs. MAGNETIC POLE

DC Operating Parameters: $T_A = -40$ to 85°C , $V_{CC} = 2.5\text{V} \sim 3.5\text{V}$

PARAMETER	TEST CONDITION	OUT
South pole	$B < B_{op} [(-60) \sim (-6)]$	Low
Null or weak magnetic field	$B = 0$ or $B < B_{RP}$	Open (Pull-up Voltage)
North pole	$B > B_{op} (60 \sim 6)$	Low



CHARACTERISTIC PERFORMANCE

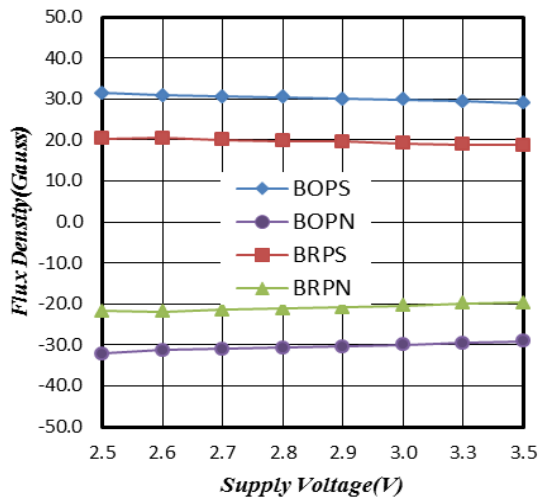


Figure 1. Flux Density vs. Supply Voltage

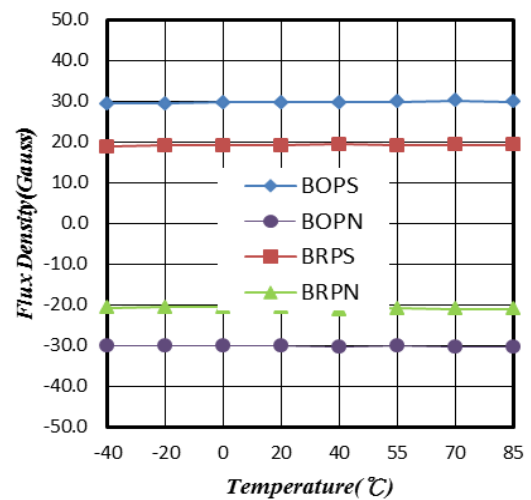


Figure 2. Flux Density vs. Temperature

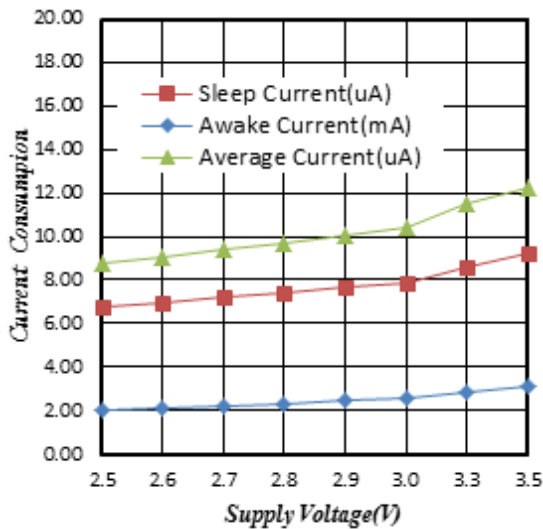


Figure 3. Supply Current vs. Supply Voltage

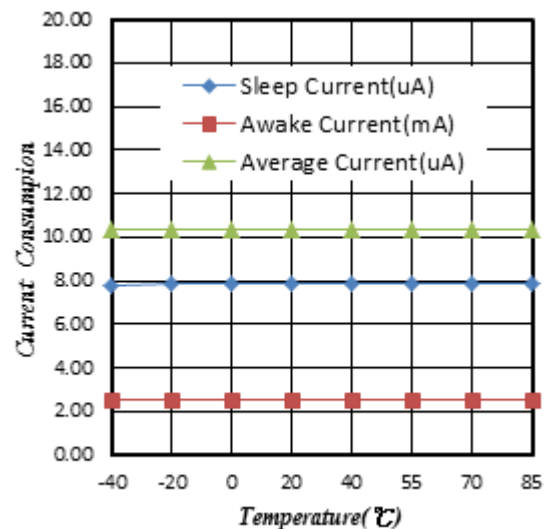


Figure 4. Supply Current vs. Temperature

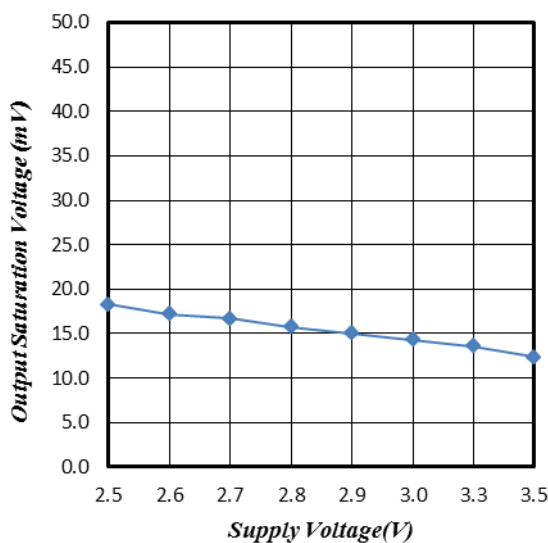


Figure 5. Output Saturation Voltage vs. Supply Voltage

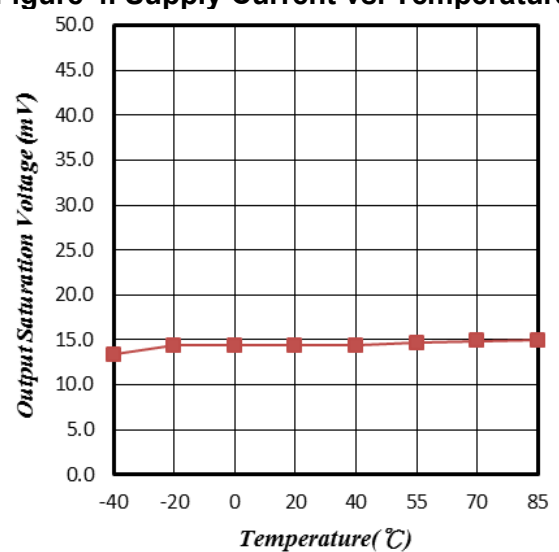


Figure 6. Output Saturation Voltage vs. Temperature

CHARACTERISTIC PERFORMANCE (CONTINUE)

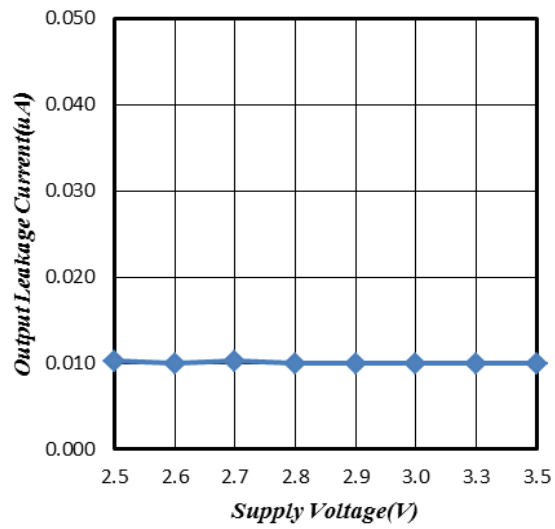
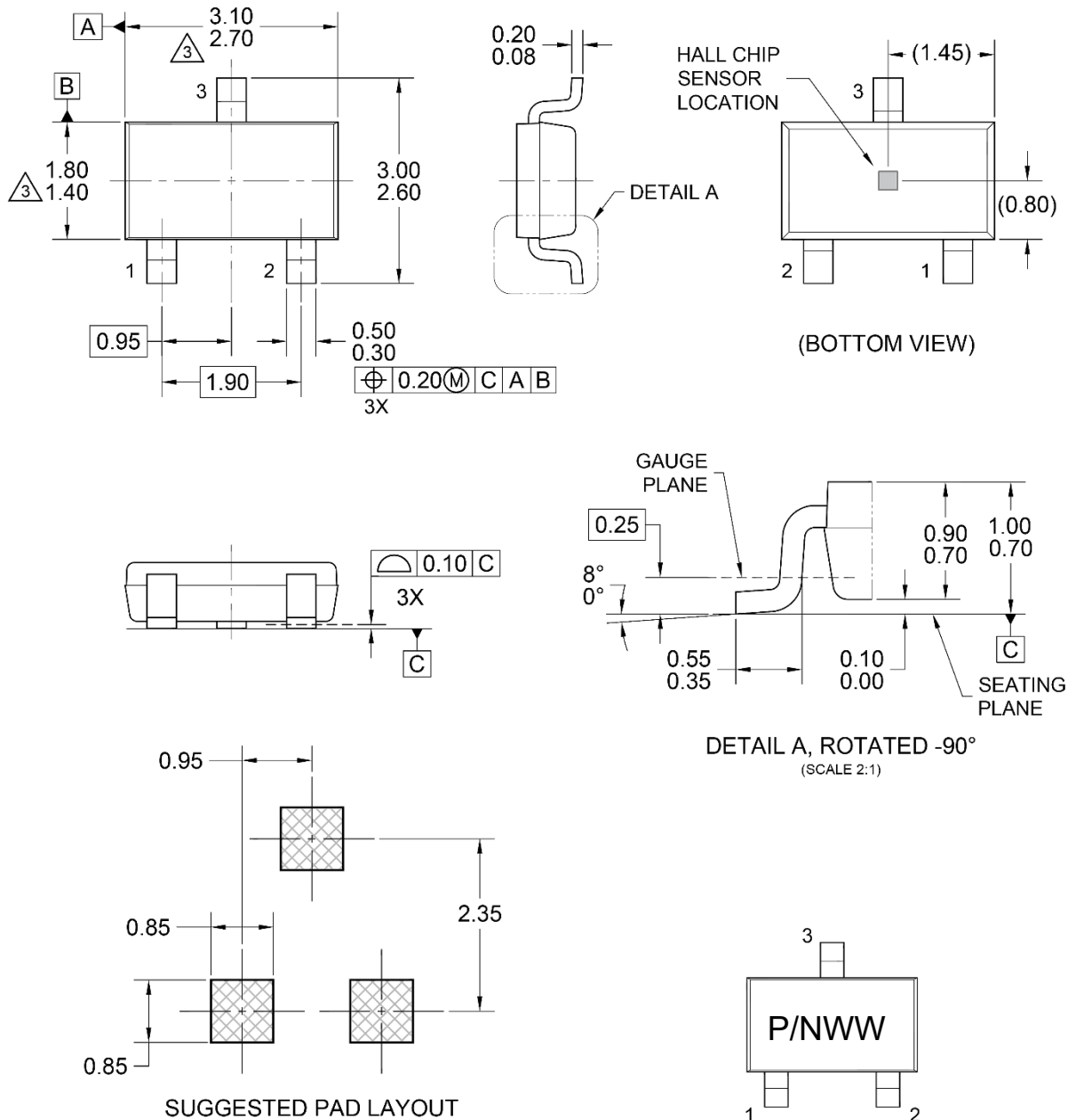


Figure 7. Output Leakage Current vs. Supply Voltage

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TSOT-23



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. DWG NO REF:HQ2SD07-TSOT23SL-147 REV A.

MARKING DIAGRAM

P/N = 248
WW = Date code (Refer to coding table)

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Purchasers are solely responsible for the choice, selection, and use of TSC products and TSC assumes no liability for application assistance or the design of Purchasers' products.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.