CMOS Omnipolar High Sensitivity Micropower Hall Switch

1. *Features*

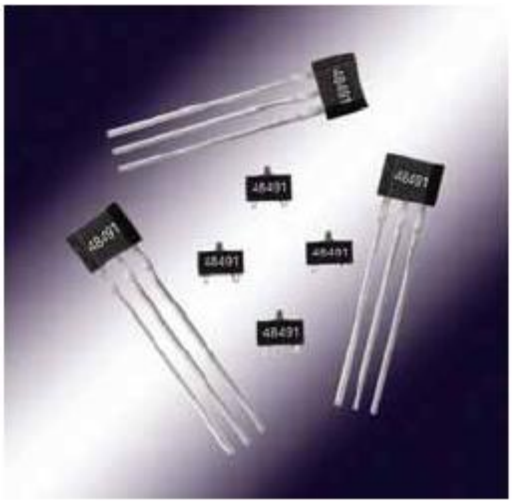
Micropower consumption for battery powered applications

Omnipolar, output switches with absolute value of North or South pole from magnet

Operation down to 2.5V

High sensitivity for direct reed switch replacement applications

Chopper stabilized amplifier stage



2. *Description*

The JTM90248 Omnipolar Hall effect sensor IC is fabricated from mixed signal CMOS technology .It incorporates advanced chopper-stabilization techniques to provide accurate and stable magnetic switch points.

The circuit design provides an internally controlled clocking mechanism to cycle power to the Hall element and analog signal processing circuits. This serves to place the high current-consuming portions of the circuit into a “Sleep” mode. Periodically the device is “Awakened” by this internal logic and the magnetic flux from the Hall element is evaluated against the predefined thresholds. If the flux density is above or below the Bop/Brp thresholds then the output transistor is driven to change states accordingly. While in the “Sleep” cycle the output transistor is latched in its previous state. The design has been optimized for service in applications requiring extended operating lifetime in battery powered systems.

The output transistor of the JTM90248 will be latched on (Bop) in the presence of a sufficiently strong South or North magnetic field facing the marked side of the package. The output will be latched off (Brp) in the absence of a magnetic field.

3． *Applications*

Solid state switch

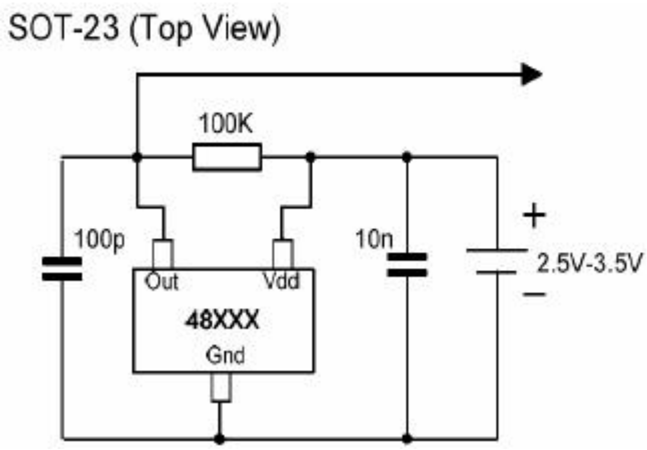
Handheld Wireless Handset Awake Switch

Lid close sensor for battery powered devices

Magnet proximity sensor for reed switch replacement in low duty cycle applications

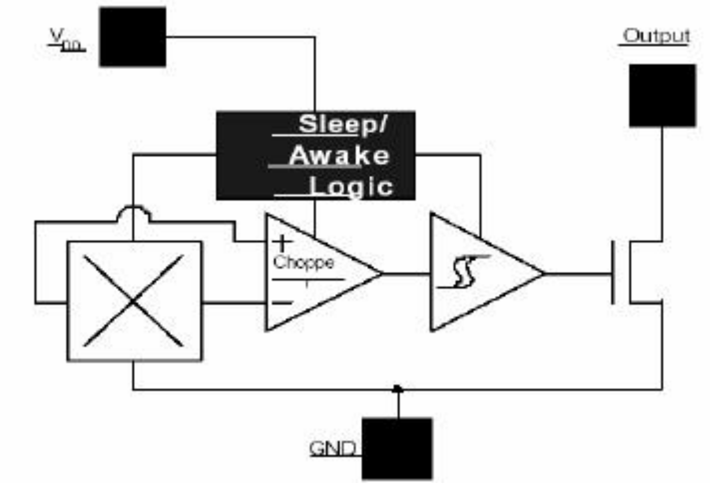
4． *Typical Application Circuit*

Eastera's pole-independent sensing technique allows for operation with either a north pole or south pole magnet orientation, enhancing the manufacturability of the device. The state-of-the-art technology provides the same output polarity for either pole face.



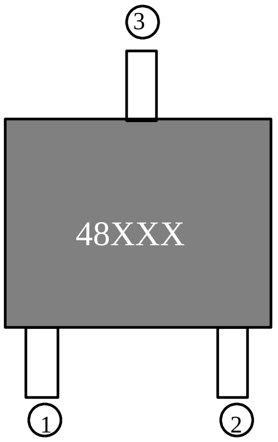
It is strongly recommended that an external bypass capacitor be connected (in close proximity to the Hall sensor) between the supply and ground of the device to reduce both external noise and noise generated by the chopper-stabilization technique. This is especially true due to the relatively high impedance of battery supplies.

5． *Functional Block Diagram*



6. *Pinning*

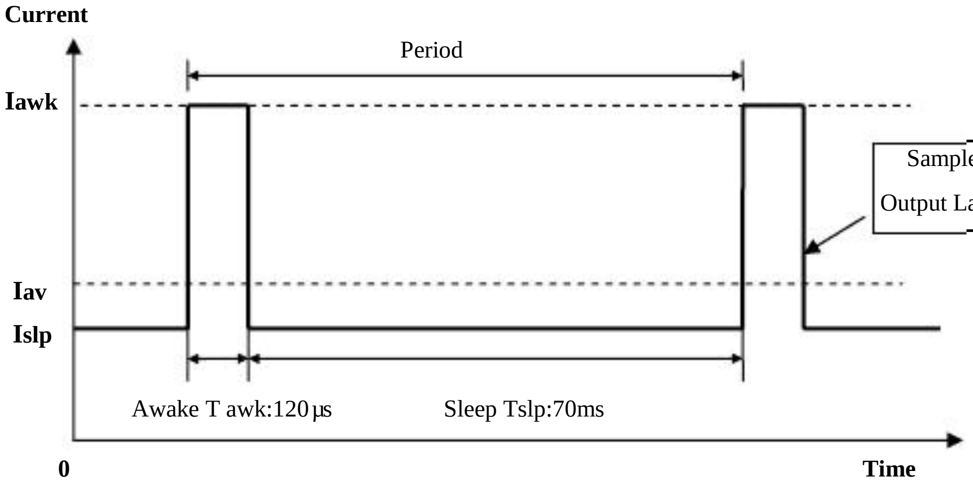
Mark View



Pin Description

NAME	NO	STATUS	DESCRIPTION
Vdd	1	P	Power Supply
Out	2	O	output
Gnd	3	P	IC Ground

7. *Internal Timing Circuit*



8. *Absolute Maximum Ratings*

Parameter	Symbol	Value	Units
Supply Voltage(operating)	V_{DD}	5	V
Supply Current	I_{DD}	5	mA
Output Voltage	V_{OUT}	5	V
Output Curent	I_{OUT}	5	mA
Operating Temperature Range	T_A	-40 to 85	°C
Storage Temperature Rang	T_S	-50 to 150	°C
ESD Sensitivity	-	4000	V

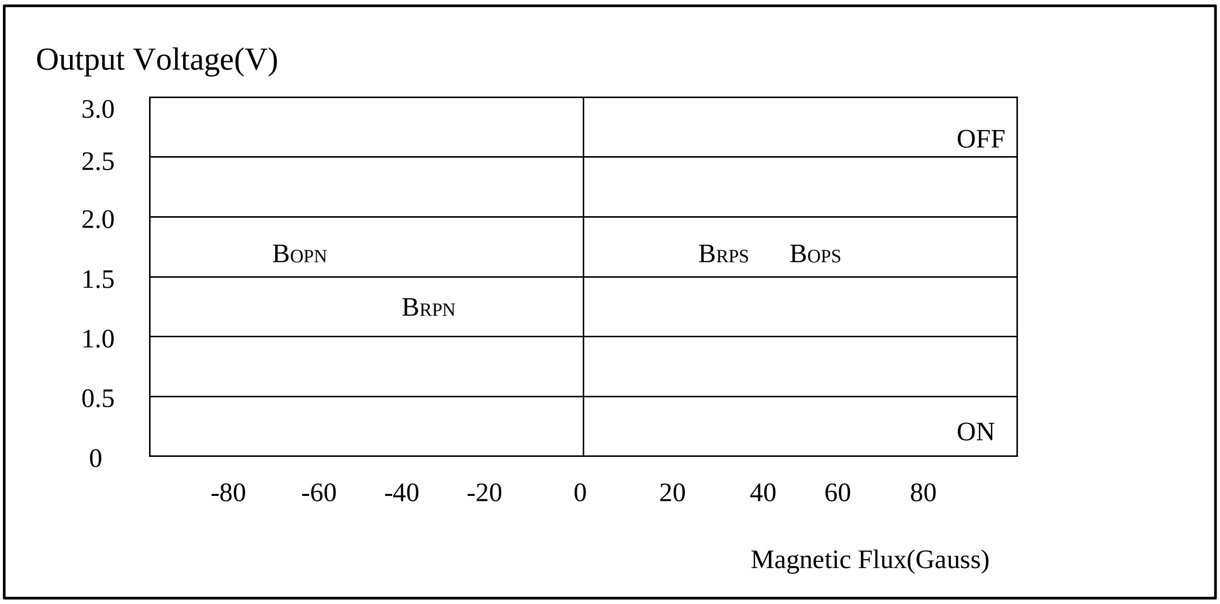
Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum rated conditions for extended periods may affect device reliability.

9． *DC Electrical Characteristics*

DC Operating Parameters: T_A = 25℃, V_{DD}=2.75V.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating voltage	V_{DD}	Operating	2.5	3	5.5	V
Supply current	I_{DD}	Average		7		µA
Output Current	I_{OUT}				1.0	mA
Saturation Voltage	V_{SAT}	=I_{OUT} 1mA			0.4 V	
Awake mode time	T_{AW}	Operating		175		µS
Sleep mode time	T_{SL}	Operating			70	mS

10． *Magnetic Characteristics*



Operating Parameters: T_A = 25℃, V_{DD}=2.75V_{DC}.

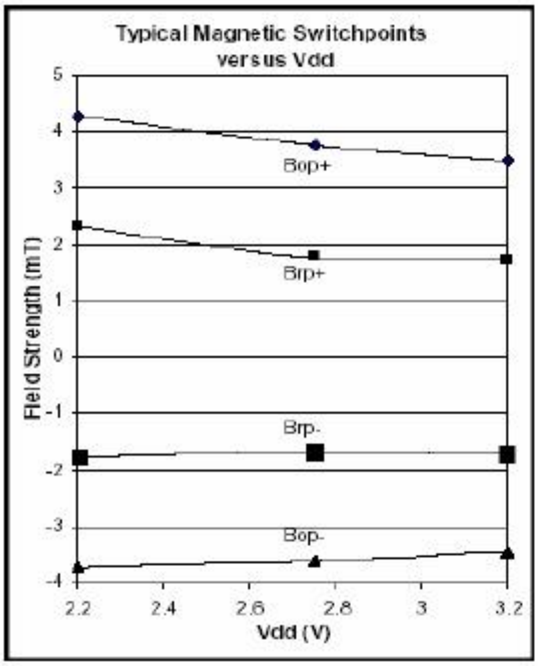
PARAMETER	Symbol	Min	Type	Max	Units
Operating Point	Bop	-	+/-38	+/-60	Gs
Release Point	Brp	+/-5	+/-21	-	Gs
Hysteresis	Bhys	-	17	-	Gs

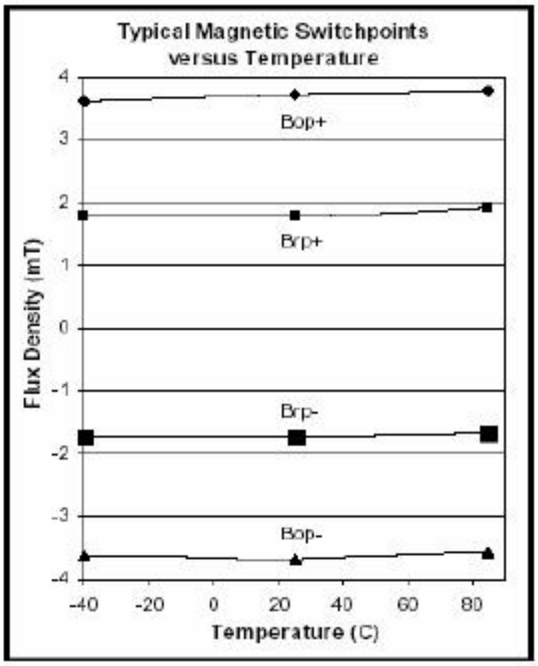
11． *ESD Protection*

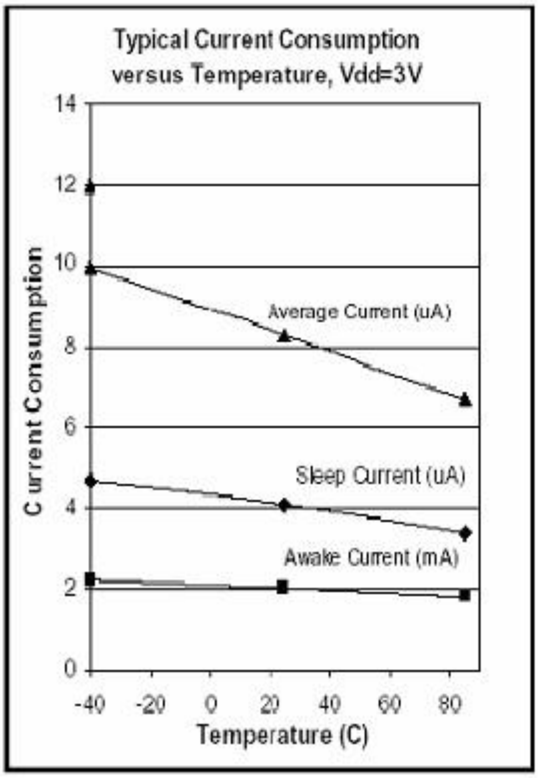
Human Body Model (HBM) tests according to: Mil. Std. 883F method 3015.7

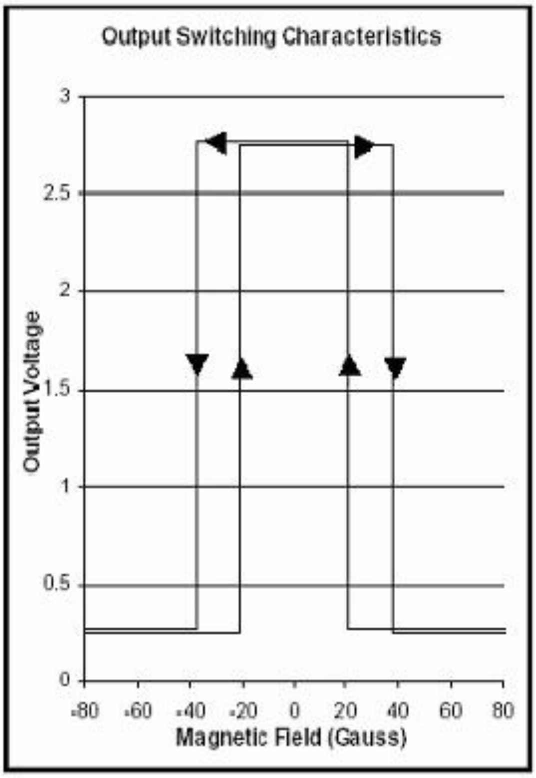
Parameter	Symbol	Limit Values		Unit	Notes
		Min	Max		
ESD Voltage	**V_{ESD}**		**±4**	**kV**	

12. Performance Characteristics









13． Unique Features

CMOS Hall IC Technology

The chopper stabilized amplifier uses switched capacitor techniques to eliminate the amplifier offset voltage, which, in bipolar devices, is a major source of temperature sensitive drift. CMOS makes this advanced technique possible. The CMOS chip is also much smaller than a bipolar chip, allowing very sophisticated circuitry to be placed in less space. The small chip size also contributes to lower physical stress and less power consumption.

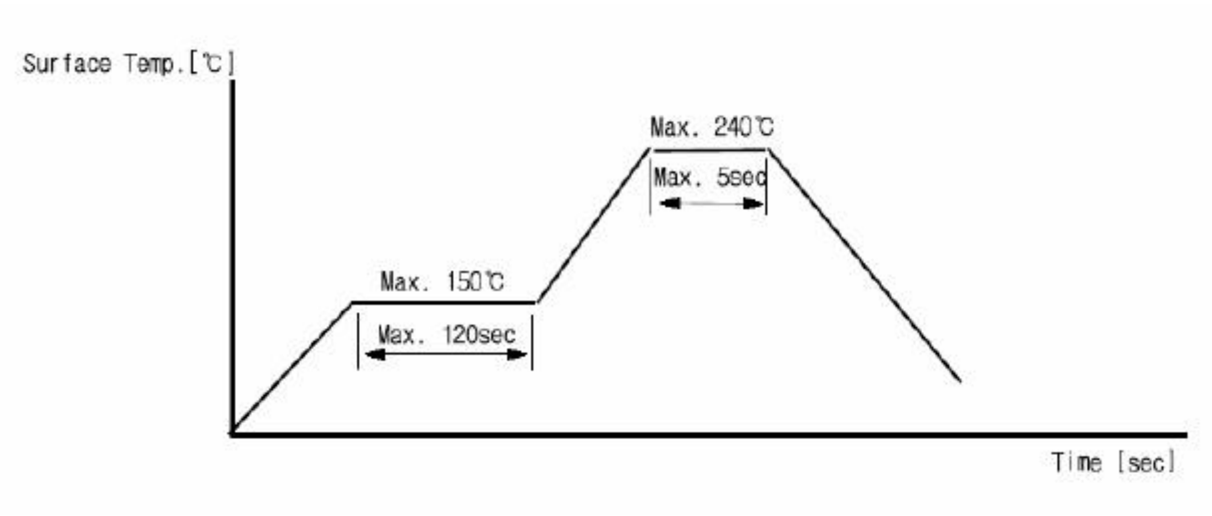
Installation Comments

Consider temperature coefficients of Hall IC and magnetics , as well as air gap and life time variations. Observe temperature limits during wave soldering. Typical IR solder-reflow profile:

No Rapid Heating and Cooling.

Recommended Preheating for max. 2minutes at 150°C

Recommended Reflowing for max. 5seconds at 240°C

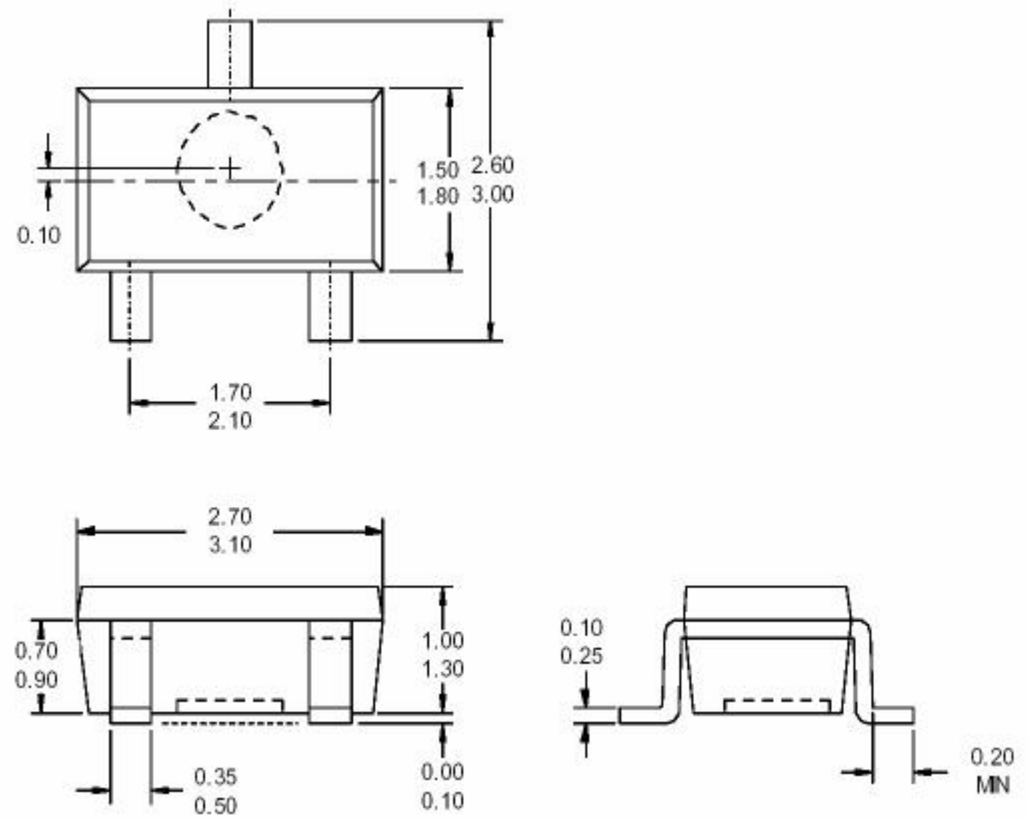


14． ESD Precautions

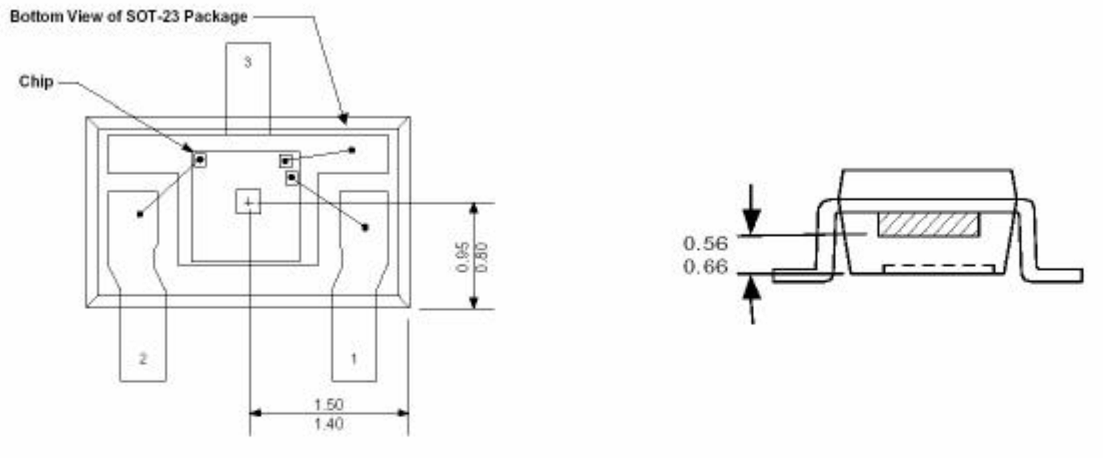
Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

15. *Package Information*

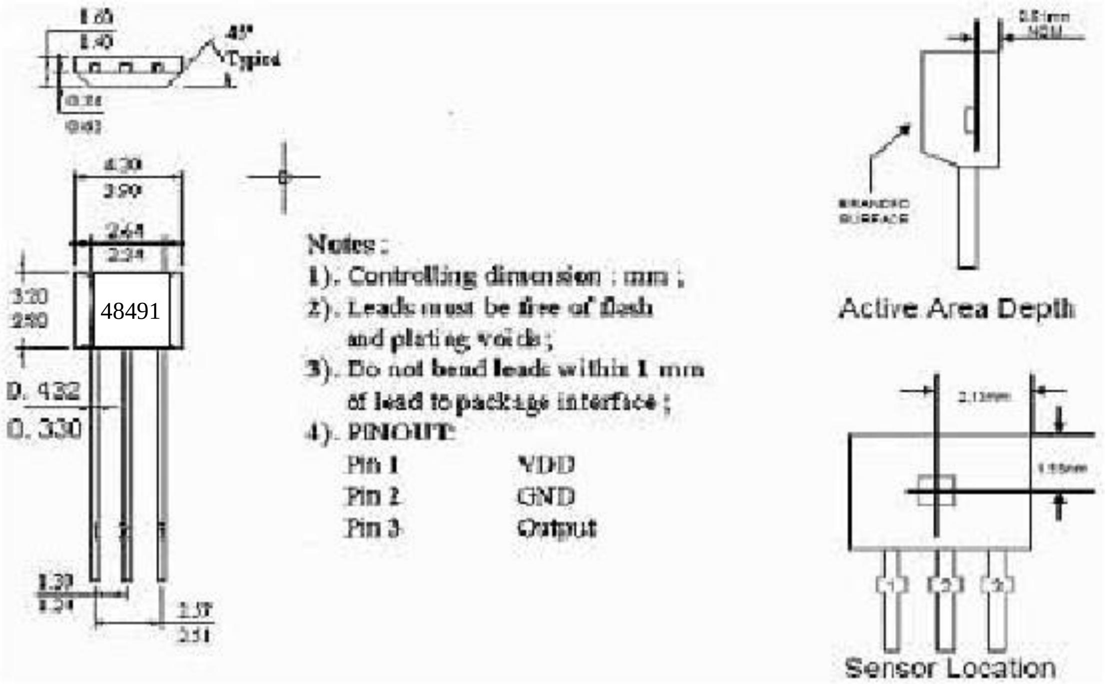
15.1 SOT-23 Package Physical Characteristics



SOT-23 Package Hall Location



15.2 TO-92 Package Physical Characteristics



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	VDD
Pin 2	GND
Pin 3	Output

Active Area Depth

Sensor Location