

# Date Sheet



The "Huaxin" brand was founded in 2003 and has a history of 19 years. The company is mainly engaged in Hall elements, has a group of senior professional device design, integrated circuit design and test engineers, and has a first-class development and test platform. We have developed a number of high-end products with independent intellectual property rights, such as RF LDMOS series and RF VDMOS series, which represent China's integrated circuit level.

## HX251

## Omnipolar Hall Switch

HX251 Hall-effect sensor is a temperature stable, stress-resistant, Low Tolerance of Sensitivity 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.

HX251 is special made for low operation voltage, 1.65V, to active the chip which is includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, CMOS output driver. 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. This device requires the presence of omni-polar magnetic fields for operation.

The package type is in a Halogen Free version has been verified by third party Lab.

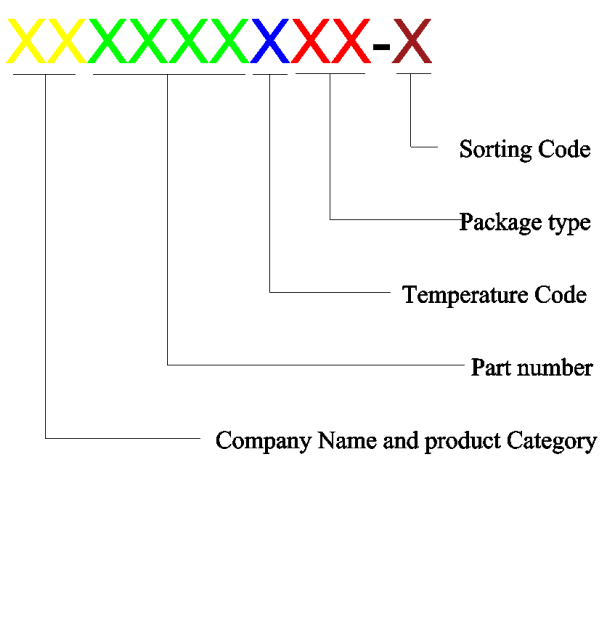
### ***Features and Benefits***

- CMOS Hall IC Technology
- Strong RF noise protection
- 1.65 to 6V for battery-powered applications
- Omni polar, output switches with absolute value of North or South pole from magnet
- Operation down to 1.65V, Micro power consumption
- High Sensitivity for reed switch replacement applications
- Multi Small Size option
- Low sensitivity drift in crossing of Temp. range
- Ultra Low power consumption at 5uA (Avg)
- High ESD Protection, HMB >  $\pm 4\text{KV}$  (min)
- Totem-pole output

### ***Applications***

- Solid state switch
- Handheld Wireless Handset Awake Switch ( Flip Cell/PHS Phone/Note Book/Flip Video Set)
- Lid close sensor for battery powered devices
- Magnet proximity sensor for reed switch replacement in low duty cycle applications
- Water Meter
- Floating Meter
- PDVD
- NB

### Ordering Information

	<p><b>Company Name and Product Category</b> HX:HX Hall Effect/MP:HX Power IC</p> <p><b>Part number</b> 6286,6275,6278,6287,6383,6474,6571,6572,6573,6574... If part # is just 3 digits, the forth digit will be omitted.</p> <p><b>Temperature range</b> E: 85 °C, I: 105 °C, K: 125 °C, L: 150 °C</p> <p><b>Package type</b> UA:TO-92S,VK:TO-92S(4pin),VF:TO-92S(5pin),SO:SOT-23, SQ:QFN-3,ST:TSOT-23,SN:SOT-553,SF:SOT-89(5pin), SS:TSOT-26,SD:DFN-6</p> <p><b>Sorting</b> <math>\alpha</math>, <math>\beta</math>, Blank.....</p>
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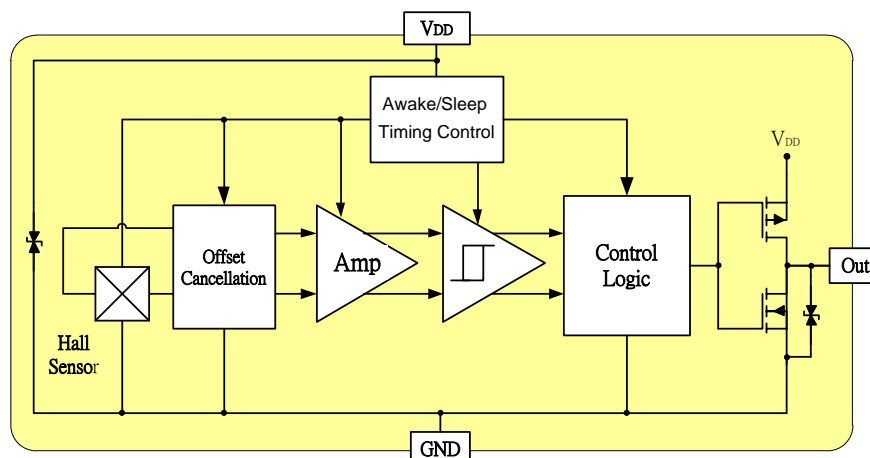
**Part No.**  
HX251EST  
HX251ESQ  
HX251EUA

**Temperature Suffix**  
E (-40°C to + 85°C)  
E (-40°C to + 85°C)  
E (-40°C to + 85°C)

**Package Type**  
ST (TSOT-23)  
SQ (SQ2020-3)  
UA (TO-92S)

Custom sensitivity selection is available by HX sorting technology

### Functional Diagram



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

**HBM** >  $\pm 4KV$  which is verified by third party lab.

#### Absolute Maximum Ratings At( $T_a=25^{\circ}\text{C}$ )

Characteristics		Values	Unit
Supply voltage, ( $V_{DD}$ )		6	V
Output Voltage, ( $V_{out}$ )		6	V
Reverse Voltage, ( $V_{DD}$ ) ( $V_{out}$ )		-0.3	V
Magnetic flux density		Unlimited	Gauss
Output current, ( $I_{out}$ )		1	mA
Operating temperature range, ( $T_a$ )		-40 to +85	$^{\circ}\text{C}$
Storage temperature range, ( $T_s$ )		-65 to +150	$^{\circ}\text{C}$
Maximum Junction Temp, ( $T_j$ )		150	$^{\circ}\text{C}$
Thermal Resistance	( $\theta_{JA}$ ) ST/UA/SQ/SP	310 / 206 / 543 / 625	$^{\circ}\text{C}/\text{W}$
	( $\theta_{JC}$ ) ST/UA/SQ/SP	223 / 148 / 410 / 116	$^{\circ}\text{C}/\text{W}$
Package Power Dissipation, ( $P_D$ ) ST/UA/SQ/SP		400 / 230 / 606 / 230	mW

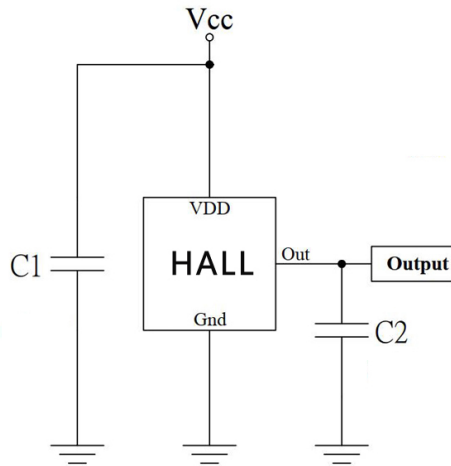
**Note:** Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

#### Electrical Specifications

DC Operating Parameters :  $T_a=25^{\circ}\text{C}$ ,  $V_{DD}=1.8\text{V}$

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, ( $V_{DD}$ )	Operating	1.65		6	V
Supply Current, ( $I_{DD}$ )	Awake State		1.4	3	mA
	Sleep State		3.6	7	$\mu\text{A}$
	Average		5	10	$\mu\text{A}$
Output Leakage	Output off			1	$\mu\text{A}$
Output High	$I_{OUT}=0.5\text{mA}(\text{Source})$	$V_{DD}-0.2$			V
Output Low	$I_{OUT}=0.5\text{mA}(\text{Sink})$			0.2	V
Awake mode time, ( $T_{aw}$ )	Operating		40	80	$\mu\text{S}$
Sleep mode time, ( $T_{SL}$ )	Operating		40	80	mS
Duty Cycle, ( $D, C$ )			0.1		%
Electro-Static Discharge	HBM	4			KV
Operate Point, ( $B_{OPS}$ ) ( $B_{OPN}$ )	S pole to branded side, $B > BOP$ ,		30	55	Gauss
	N pole to branded side, $B > BOP$ ,	-55	-30		
Release Point ( $B_{RPS}$ ) ( $B_{RPN}$ )	S pole to branded side, $B < BRP$ ,	10	20		Gauss
	N pole to branded side, $B < BRP$ ,		-20	-10	
Hysteresis, ( $B_{HYS}$ )	$ BOPx - BRPx $		10		Gauss

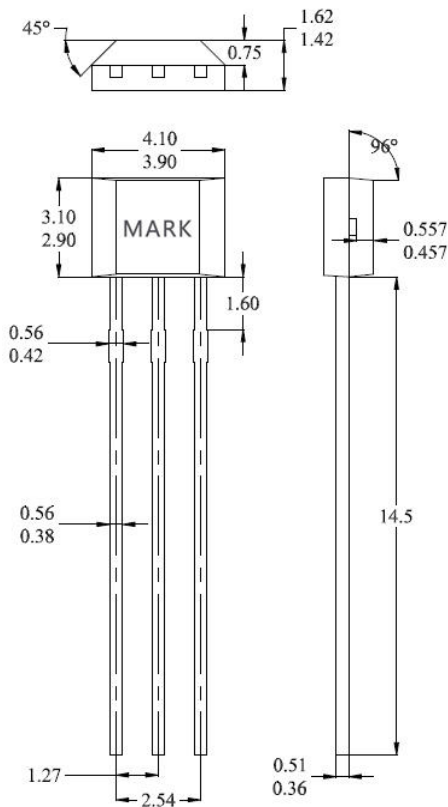
### Typical Application circuit



C1 : 10nF  
C2 : 100pF

### Sensor Location, package dimension and marking

#### UA Package

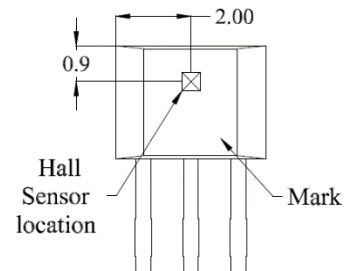


#### NOTES:

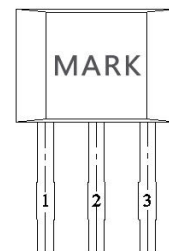
1. Controlling dimension: mm
2. Leads must be free of flash and plating voids
3. Do not bend leads within 1 mm of lead to package interface.
4. PINOUT:

Pin 1	VCC
Pin 2	GND
Pin 3	Output

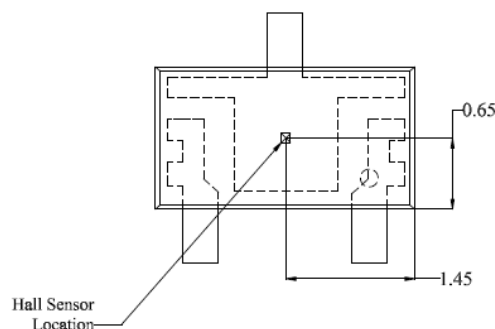
#### Hall Chip Location



#### Output Pin Assignment (Top View)

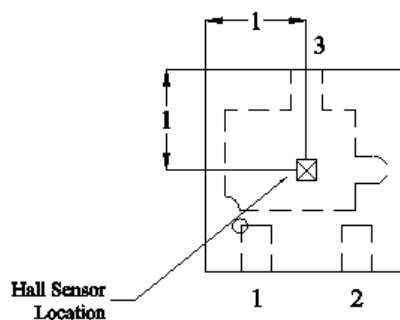


### Hall Plate Chip Location (Bottom View)

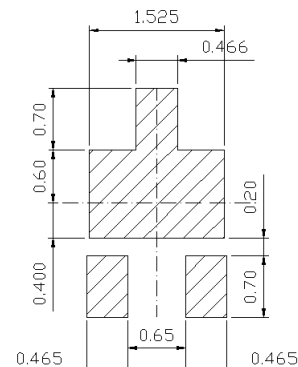


1. PINOUT (See Top View at left :)  
Pin 1      $V_{DD}$   
Pin 2     Output  
Pin 3     GND
2. Controlling dimension: mm
3. Lead thickness after solder plating will be 0.254mm maximum

### Hall Plate Chip Location (Top View)



1. PINOUT (See Top View at left)  
Pin 1    VDD  
Pin 2    Output  
Pin 3    GND
2. Controlling dimension: mm;
3. Chip rubbing will be 10mil maximum;
4. Chip must be in PKG. center.



### **Warm reminder**

1. Hall is a sensitive device. Please take electrostatic protection measures during use and storage.

2. During the installation process, the Hall should try to avoid applying mechanical stress to the Hall body. If the pins need to be bent, please operate at a distance of 3 mm from the root of the lead.

3. Recommended soldering temperature: soldering with electric soldering iron, the recommended temperature is 350°C, the longest is 5 seconds.

Wave soldering: The recommended maximum temperature is 260°C, the longest is 3 seconds

Infrared reflow soldering: recommended maximum 245°C, maximum 10 seconds

4. It is not recommended to exceed the parameters in the data sheet. Although the Hall will work normally under the limit parameters, it may cause damage to the Hall or the actual product under extreme conditions for a long time. In order to ensure the normal operation of the Hall and the product For safety and stability, please use it within the scope of the data sheet.

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