

AR257 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.

AR257 is special made for low operation voltage, 1.7V, to active the chip which 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 unipolar magnetic fields for operation.

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

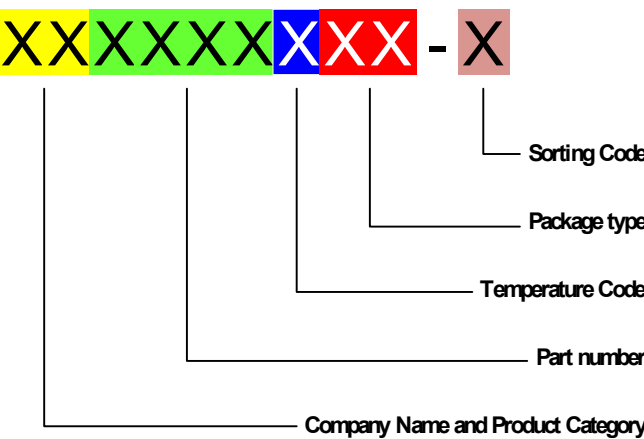
Features and Benefits

- CMOS Hall Effect IC
- Totem - pole output
- Omni polar output switch
- Micro - power consumption
- Low working voltage at 1.7V
- High ESD protection

Applications

- Solid state switch
- Handheld Wireless Handset Awake Switch (Flip Cell/PHS Phone/Note Book/Flip Video Set)
- Magnet proximity sensor for reed switch replacement in low duty cycle applications
- Water Meter
- PDA
- PDVD
- NB
- Pad PC

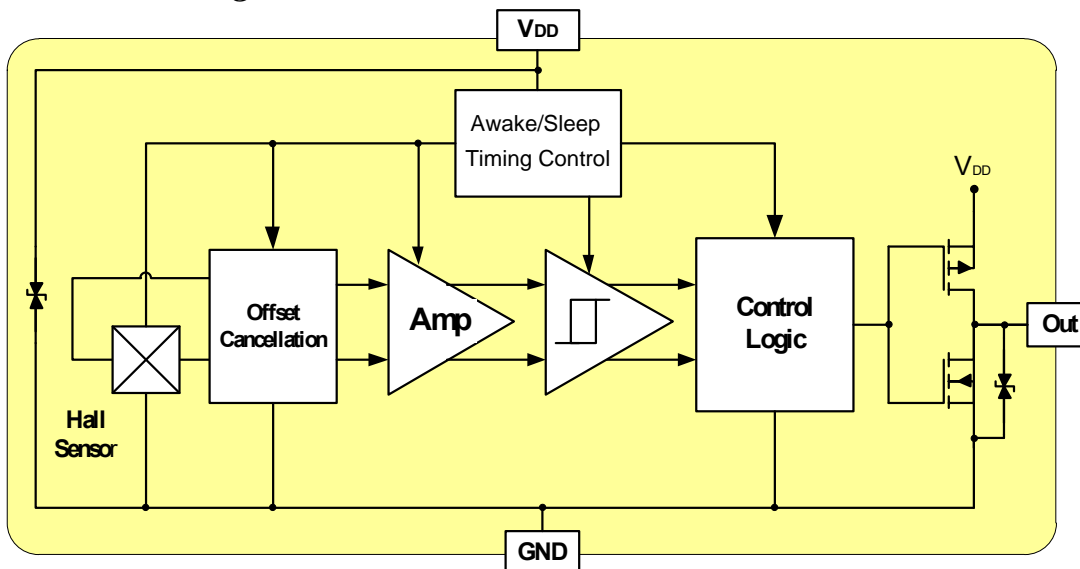
Ordering Information

	<p>Company Name and Product Category</p> <p>Part number 181,182,183,184,185,248,249,276,477,381,381F,381R,382..... If part # is just 3 digits, the fourth digit will be omitted.</p> <p>Temperature range E: 85 °C, I: 105 °C, K: 125 °C, L: 150 °C</p> <p>Package type 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)</p> <p>Sorting α,β,Blank.....</p>
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Part No.	Temperature Suffix	Package Type
AR257 EST	E (-40°C to + 85°C)	ST (TSOT-23)
AR257 ESP	E (-40°C to + 85°C)	SP (PSOT-23)
AR257 EUA	E (-40°C to + 85°C)	UA (TO-92S)

Custom sensitivity selection is available by anerxin sorting technology

Functional Diagram



Note: Static sensitive device; please observe ESD precautions. Reverse V_{DD} protection is not included. For reverse voltage protection, a 100Ω resistor in series with V_{DD} is recommended.
AR257, HBM > $\pm 4KV$ which is verified by third party lab.

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

Characteristics		Values	Unit
Supply voltage, (V_{DD})		7	V
Output Voltage, (V_{out})		7	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	(θ_{JA}) ST / SP / UA	310 / 625/ 206	$^\circ\text{C}/\text{W}$
	(θ_{JC}) ST / SP / UA	223 / 115/ 148	$^\circ\text{C}/\text{W}$
Package Power Dissipation, (P_D) ST / SP		400 / 200/ 606	mW

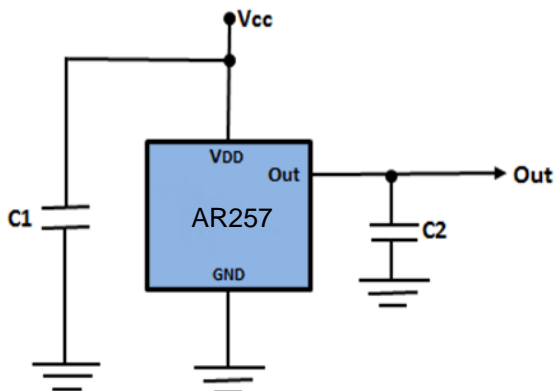
Note: Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

Electrical Specifications

DC Operating Parameters : $T_a=25\text{ }^\circ\text{C}$, $V_{DD}=2.0\text{V}$

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, (V_{DD})	Operating	1.7		5.5	Volts
Supply Current, (I_{DD})	Awake State		1.4	3	mA
	Sleep State		3.5	7	μA
	Average		5	10	μA
Output Leakage Current, (I_{off})	Output off			1	μA
Output High Voltage, (V_{OH})	$I_{OUT}=0.5\text{mA}$ (Source)	$V_{DD}-0.2$			V
Output Low Voltage, (V_{OL})	$I_{OUT}=0.5\text{mA}$ (Sink)			0.2	V
Awake mode time, (T_{aw})	Operating		40	80	μs
Sleep mode time, (T_{SL})	Operating		40	80	mS
Duty Cycle, (D, C)			0.1		%
Electro-Static Discharge	HBM	4			KV

Typical application circuit



C1 : 10nF

C2 : 100pF

AR257E ST/SP/UA Magnetic Specifications

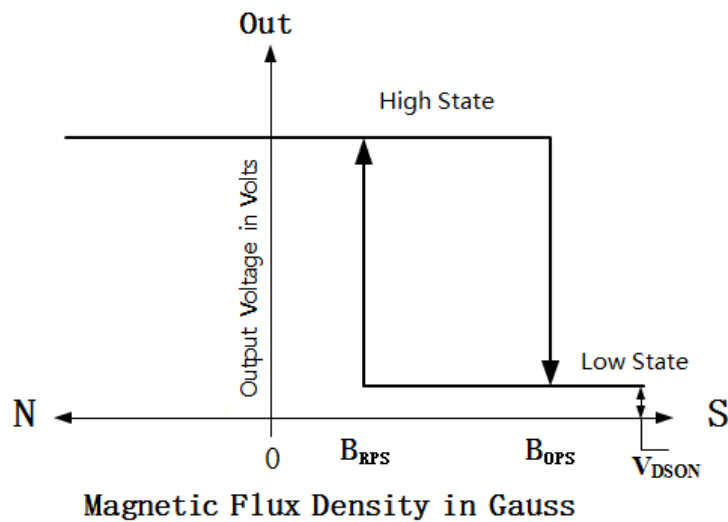
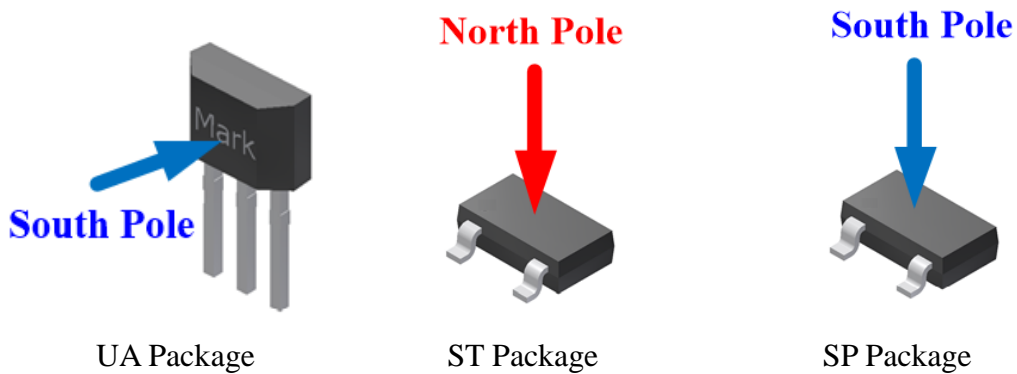
DC Operating Parameters : $T_a=25\text{ }^\circ\text{C}$, $V_{DD}=2.0\text{V}$

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Operating Point	B_{OP}	N pole to branded side, $B > B_{OP}$, Vout On		30	50	Gauss
Release Point	B_{RP}	N pole to branded side, $B < B_{RP}$, Vout Off	10	20		Gauss
Hysteresis	B_{HY}	$ B_{OPx} - B_{RPx} $		10		Gauss

AR257ES T/SP/UA Output Behavior versus Magnetic Polar

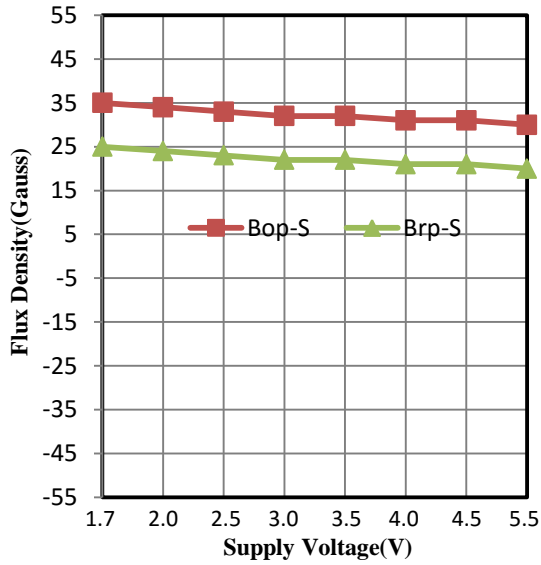
DC Operating Parameters : $T_a = -40\text{ to }85\text{ }^\circ\text{C}$, $V_{DD} = 1.7\text{ to }5.5\text{V}$

Parameter	Test condition	OUT(ST)	Parameter	Test condition	OUT(SP/UA)
Null or weak magnetic field	$B=0$ or $B < B_{RP}$	High	Null or weak magnetic field	$B=0$ or $B < B_{RP}$	High
North pole	$B < B_{op}[(-50)\sim(-10)]$	Low	South pole	$B > B_{op}(50\sim10)$	Low

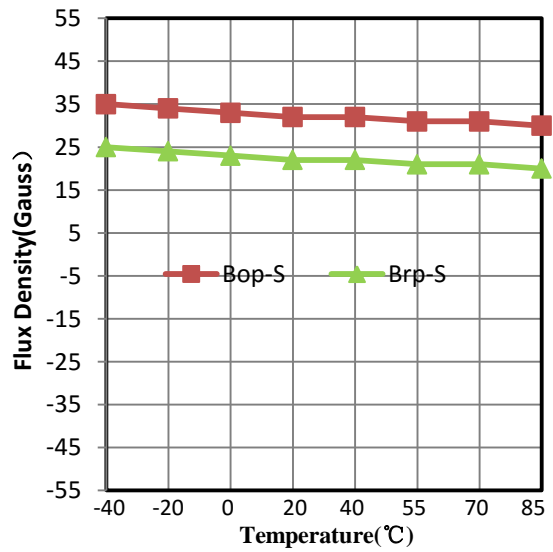


Performance Graph

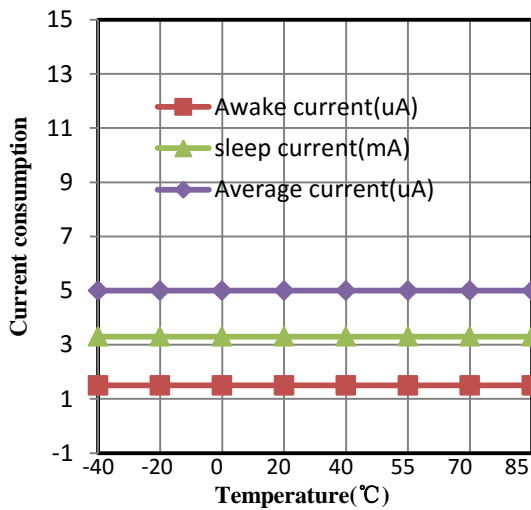
Typical Supply Voltage(V_{DD}) Versus Flux Density



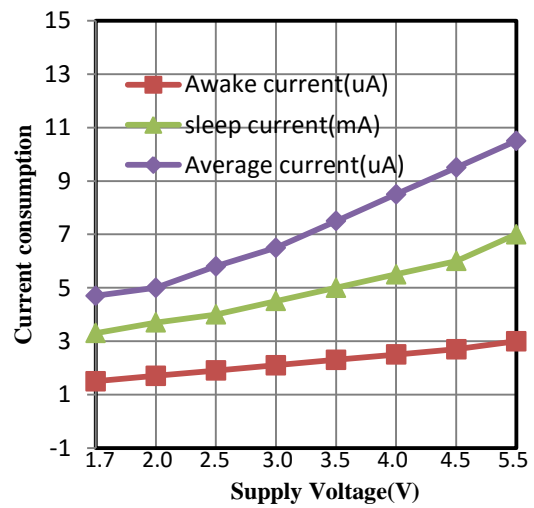
Typical Temperature(T_A) Versus Flux Density



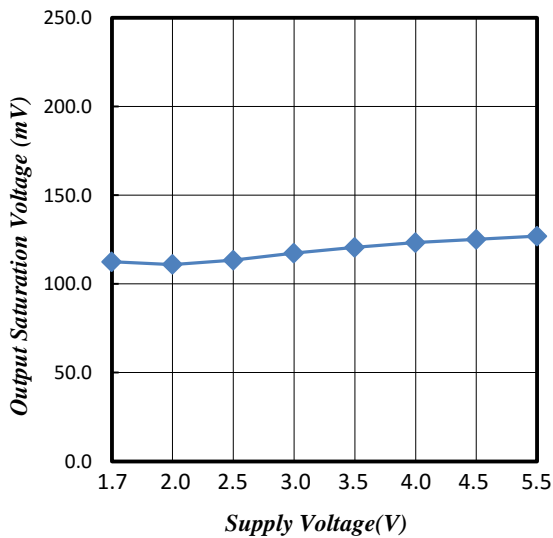
Typical Temperature(T_A) Versus Supply Current(I_{DD})



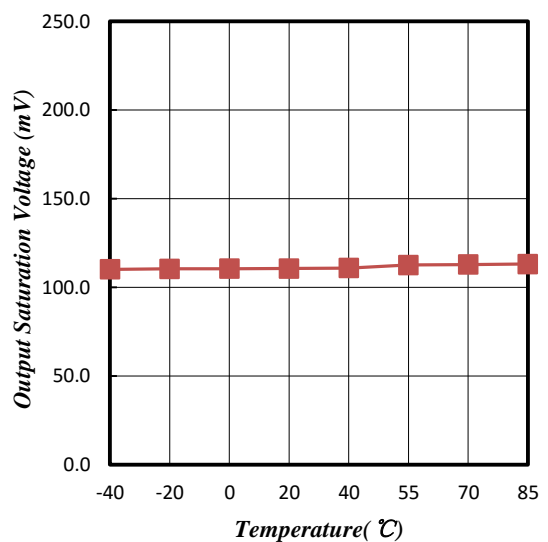
Typical Supply Voltage(V_{DD}) Versus Supply current current(I_{DD})



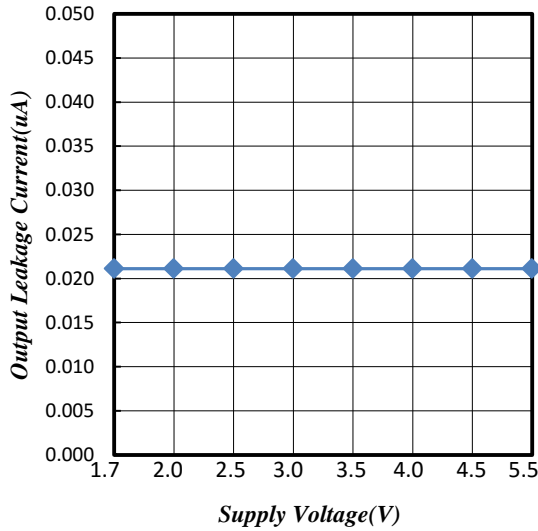
Typical Supply Voltage(V_{DD}) Versus Output Voltage(V_{DSON})



Typical Temperature(T_A) Versus Output Voltage(V_{DSON})



Typical Supply Voltage (V_{DD}) Versus Leakage Current (I_{OFF})



Package Power Dissipation

The power dissipation of the Package is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, T_a . Using the values provided on the data sheet for the package, PD can be calculated as follows:

$$P_D = \frac{T_{J(max)} - T_a}{R_{\theta ja}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature T_a of 25 °C, one can calculate the power dissipation of the device which in this case is 230 milliwatts.

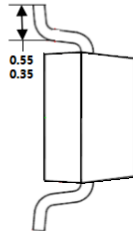
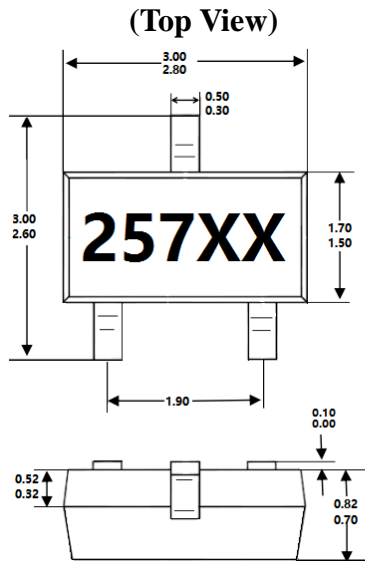
$$P_D (ST) = \frac{150^\circ\text{C} - 25^\circ\text{C}}{310^\circ\text{C}/\text{W}} = 400\text{mW}$$

The 310°C/W for the ST package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 230 milliwatts. There are other alternatives to achieving higher power dissipation from the Package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

Sensor Location, package dimension and marking

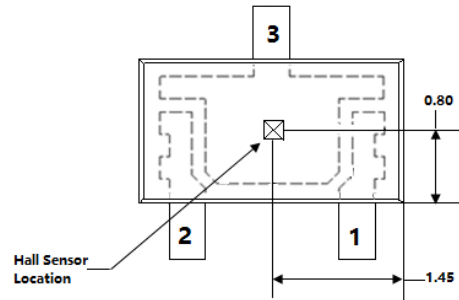
AR257 Package

ST Package (TSOT-23)



Hall Plate Chip Location

(Bottom view)



NOTES:

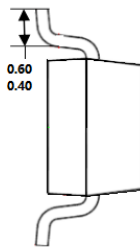
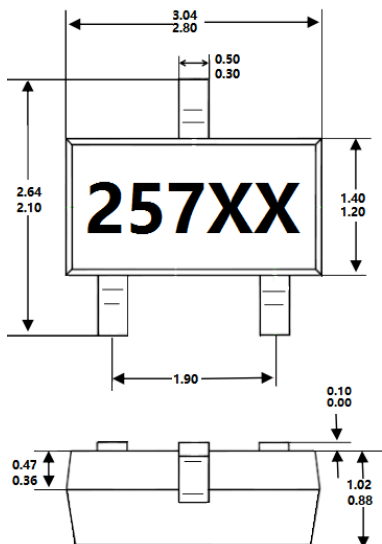
1. PINOUT (See Top View at left:)

- Pin 1** VDD
- Pin 2** Output
- Pin 3** GND

2. Controlling dimension: mm;

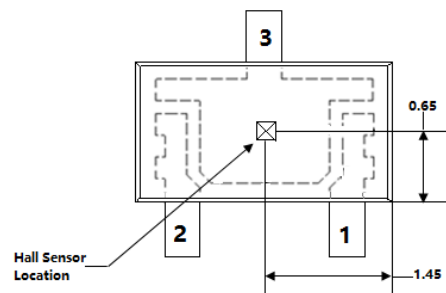
SP Package (PSOT-23)

(Top View)



Hall Plate Chip Location

(Bottom view)



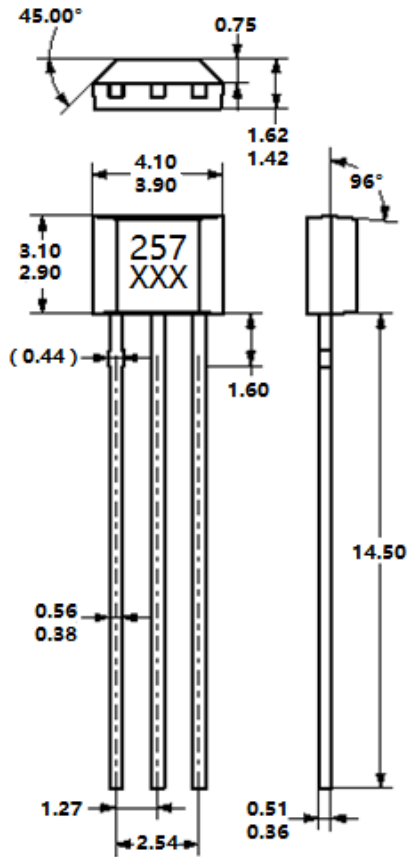
NOTES:

1. PINOUT (See Top View at left:)

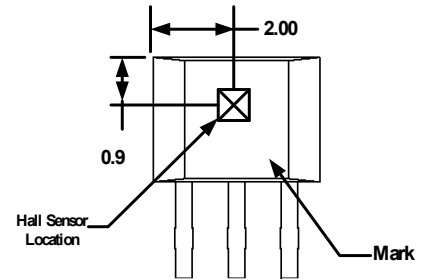
- Pin 1** VDD
- Pin 2** Output
- Pin 3** GND

2. Controlling dimension: mm;

UA Package



Hall Chip location

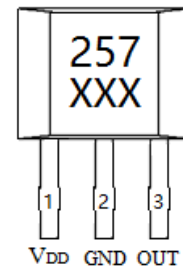


NOTES:

- 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:

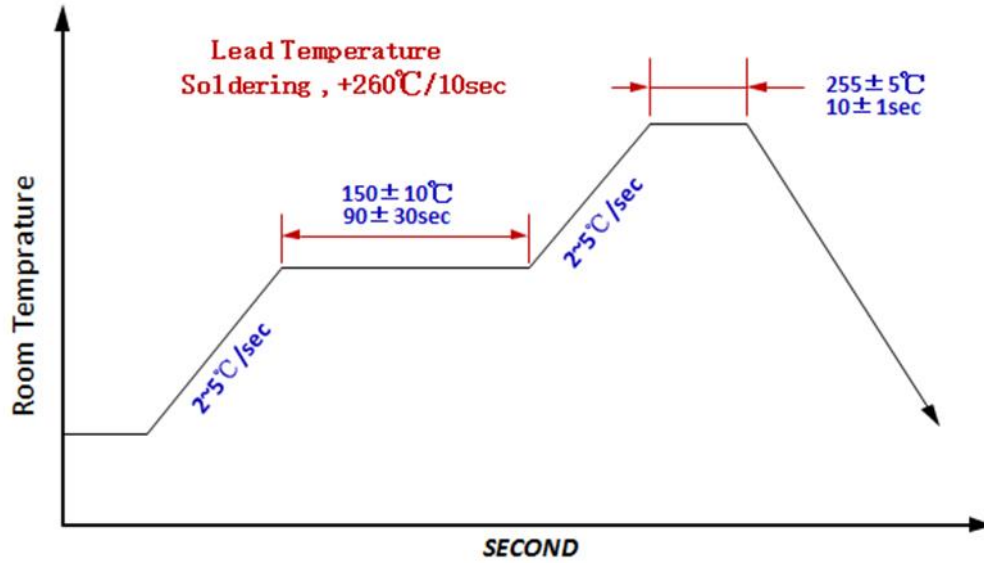
- | | |
|-------|-----------------|
| Pin 1 | V _{DD} |
| Pin 2 | GND |
| Pin 3 | Output |

Output Pin Assignment (Top view)

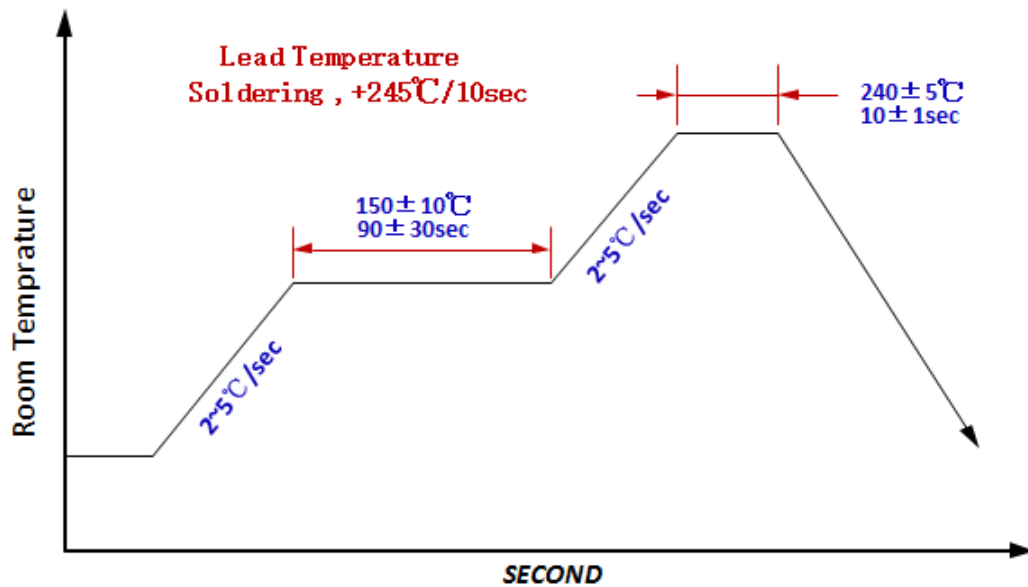




IR reflow curve



ST/SP Soldering Condition



UA Soldering Condition