MH193 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.

MH193 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, Pull-up resistor output. 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.

MH193 is rated for operation between the ambient temperatures –40℃ and 85℃ for the E temperature range, and –40℃ to 125℃ for the K temperature range. The two package styles available provide magnetically optimized solutions for most applications. Package SO is an SOT-23, a miniature low-profile surface-mount package, while package UA is a three-lead ultra mini SIP for through-hole mounting.

Packages is Halogen Free standard and which have been verified by third party lab.

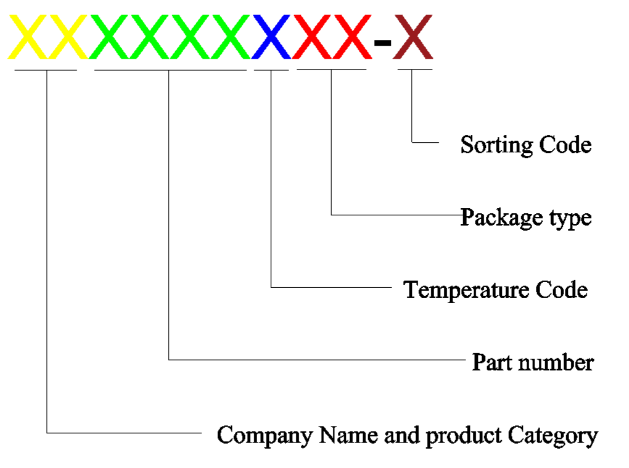
Features and Benefits

- DMOS Hall IC Technology
- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high Temp condition.
- Switching offset compensation at typically 69kHz
- Pull-up resistor output
- Good ESD Protection.
- 100% tested at 125 ℃ for K.
- Custom sensitivity / Temperature selection are available.
- RoHS compliant 2011/65/EU and Halogen Free

Applications

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

Ordering Information



Company Name and Product Category

MH:MST Hall Effect/MP:MST Power IC

Part number

181,182,183,184,185,248,249,276,477,381,381F,381R,382…..

If part # is just 3 digits, the forth digit will be omitted.

Temperature range

E: 85 ℃, I: 105 ℃, K: 125 ℃, L: 150 ℃

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), SS:TSOT-26,SD:DFN-6

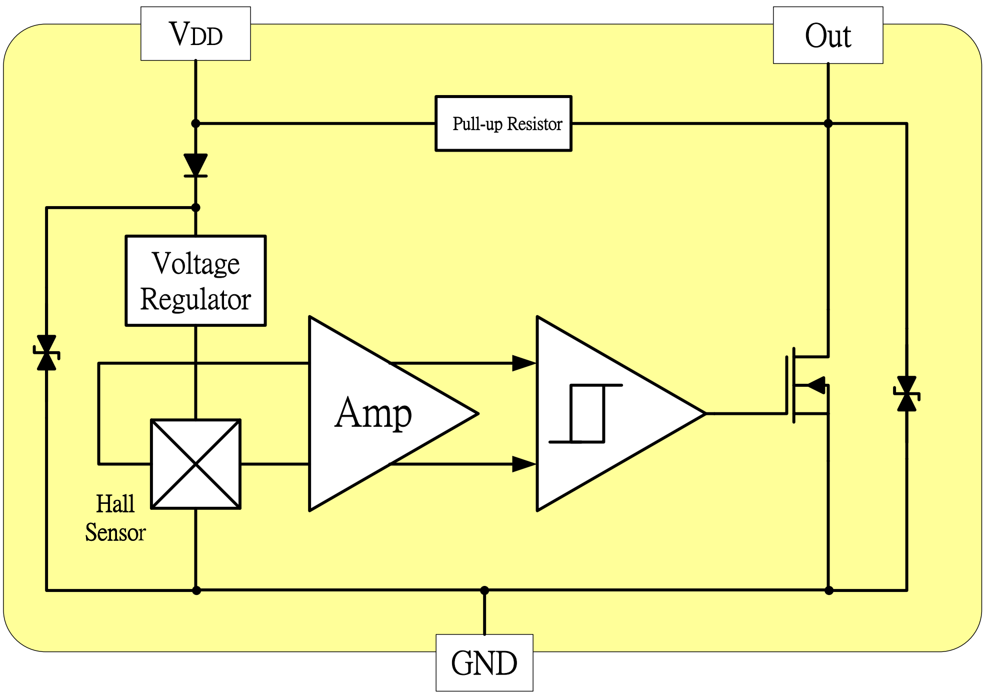
Sorting

α,β,Blank…..

Part No.	Temperature Suffix	Package Type
MH193KUA	K (-40°C to + 125°C)	UA (TO-92S)
MH193KSO	K (-40°C to + 125°C)	SO (SOT-23)
MH193EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH193ESO	E (-40°C to + 85°C)	SO (SOT-23)

KUA spec is using in industrial and automotive application. Special Hot Testing is utilized.

Functional Diagram



Absolute Maximum Ratings *At (Ta=25℃)*

Characteristics		Values	Unit
Supply voltage, (V_{DD})		28	V
Output Voltage,(V_{out})		28	V
Reverse Voltage, (V_{DD} / V_{out})		-0.3	V
Output current, (I_{SINK})		25	mA
Operating Temperature Range, (T_A)	"E" Class	-40 ~ +85	℃
	"K" Class	-40 ~ +125	℃
Storage temperature range, (T_S)		-65 to +150	℃
Maximum Junction Temp,(T_J)		150	℃
Thermal Resistance	(θ_{JA}) UA / SO	206 / 543	℃/W
	(θ_{JC}) UA / SO	148 / 410	℃/W
Package Power Dissipation, (P_D) UA / SO		606 / 230	mW

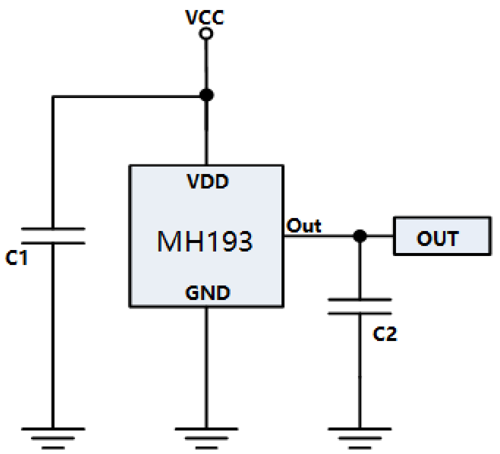
Note: *Do not apply reverse voltage to* V_{DD} *and* V_{OUT} *Pin, It may be caused for Miss function or damaged device.*

Electrical Specifications

DC Operating Parameters： T_A*=+25℃,* V_{DD}*=12V*

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage,(V_{DD})	Operating	2.5		26	V
Supply Current,(I_{DD})	$B<B_{OP}$			5.0	mA
Output Saturation Voltage, (V_{sat})	$B>B_{OP}$			400.0	mV
Output Leakage Current, (I_{off})	I_{OFF} $B<B_{RP}$, V_{OUT} = 12V			10.0	uA
Internal Oscillator Chopper Frequency,(fOSC)			69		kHz
Output Rise Time, (T_R)	R_L=1.1KΩ, CL =20pF		0.04	0.45	uS
Output Fall Time, (T_F)	R_L=820Ω; CL =20pF		0.18	0.45	uS
Electro-Static Discharge	HMB	4			KV
Pull-up Resistor, (R_a)			10		KΩ

Typical application circuit



C1：10nF
C2 ： 1nF

MH193 Magnetic Specifications

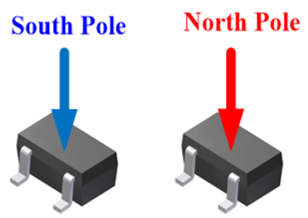
DC Operating Parameters ： T_A=+25℃, V_{DD}=12V

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
Operate Point	B_{OP}	UA(SO)	5		25	Gauss
Release Point	B_{RP}	UA(SO)	-25		-5	Gauss
Hysteresis	B_{HYS}			30		Gauss

Output Behavior versus Magnetic Pole

DC Operating Parameters ：Ta = -40 to 125℃, V_{DD} = 2.5 to 26V

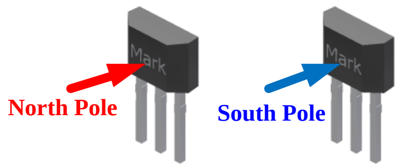
Parameter	Test condition	UA OUT	SO OUT(R)
North pole	B>B_{OP}	Hi	Low
South pole	B<B_{RP}	Low	Hi



OUT=Hi (V_{DD})

OUT=Low (V_{DSON})

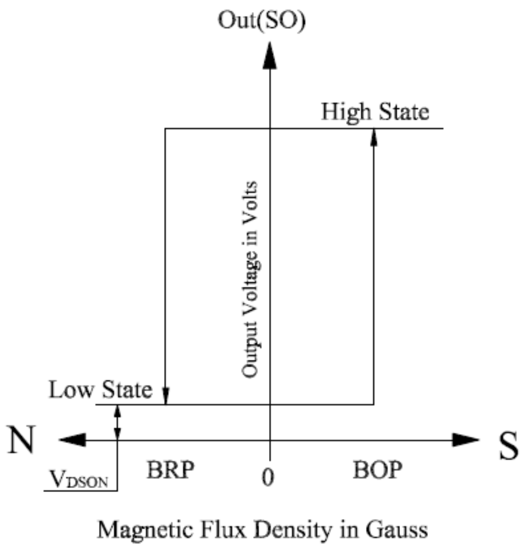
SO package

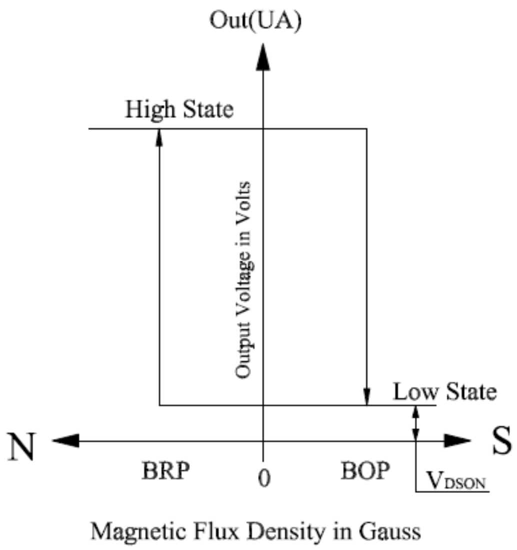


OUT=Hi (V_{DD})

OUT=Low (V_{DSON})

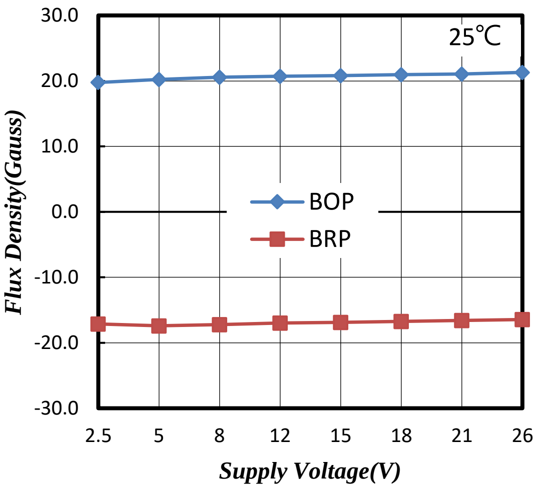
UA package



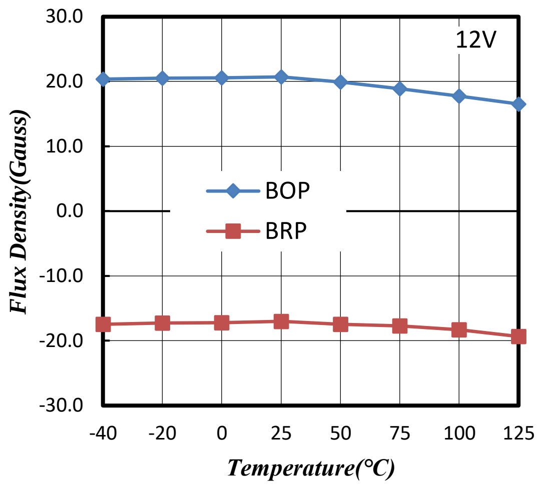


Performance Graph

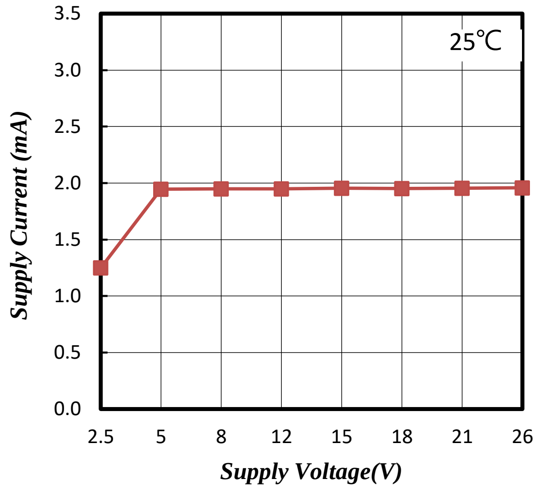
Typical Supply Voltage(V_{DD}) Versus Flux Density



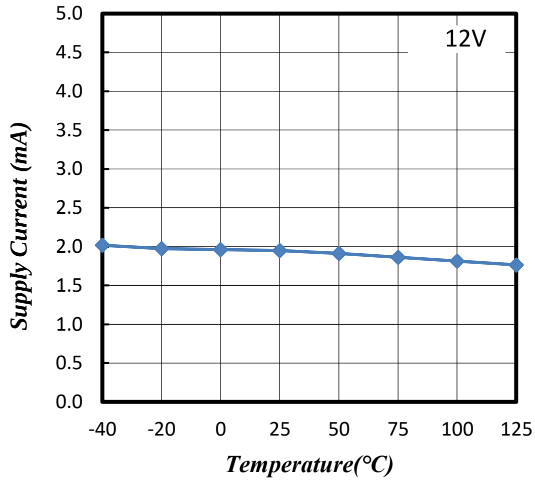
Typical Temperature(T_A) Versus Flux Density



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

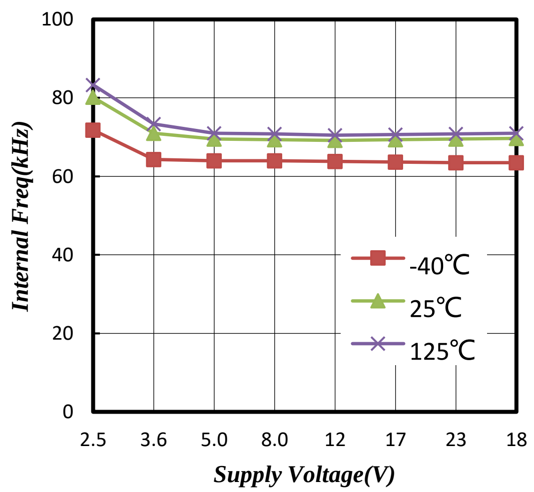


Typical Temperature(T_A) Versus Supply Current(I_{DD})



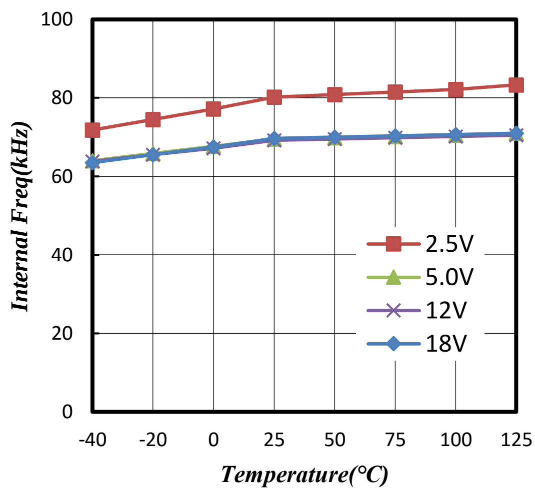
Typical Supply Voltage(V_{DD}) Versus Output Voltage(V_{DSON})

Typical Supply Voltage(V_{DD}) Versus Internal Freq(fosc)

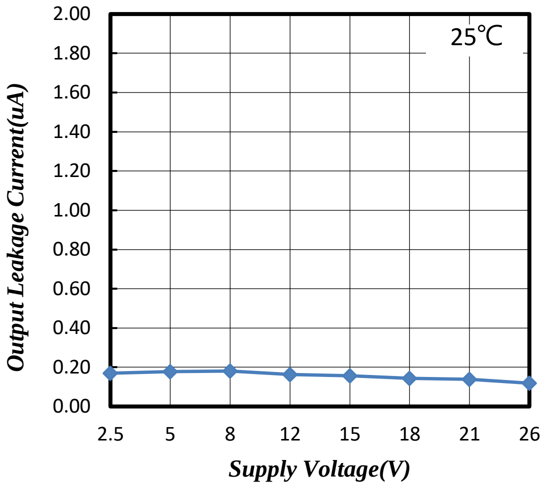


Typical Temperature(T_A) Versus Output Voltage(V_{DSON})

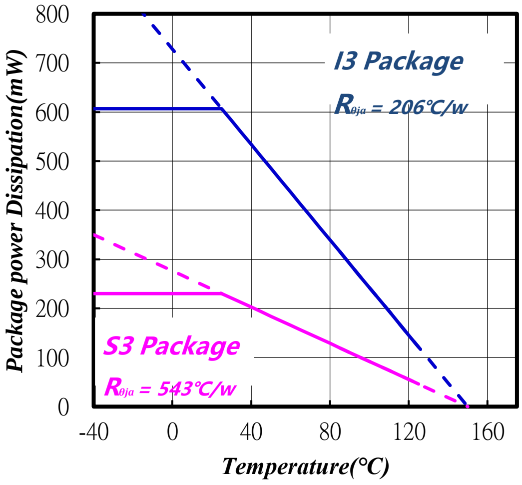
Typical Temperature(T_A) Versus Internal Freq(fosc)



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



Power Dissipation versus Temperature(T



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, Ta. Using the values provided on the data sheet for the package, PD can be calculated as follows:

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

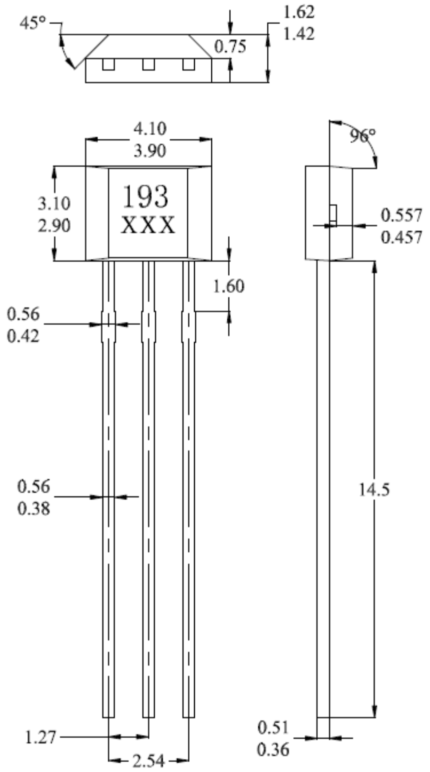
The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature Ta of 25°C, one can calculate the power dissipation of the device which in this case is 606 milliwatts.

$$P_D(UA) = \frac{150℃ - 25℃}{206℃/w} = 606mW$$

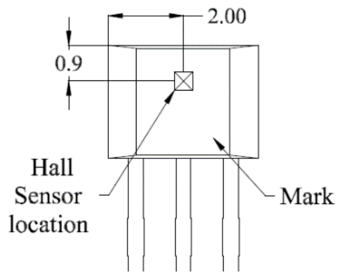
The 206°C/W for the UA package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 606 milliwatts. There are other alternatives to achieving higher power dissipation from the Package. Another alternative would be to use a ceramic substrate 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

UA Package



Hall Chip location



NOTES:

1).Controlling dimension: mm

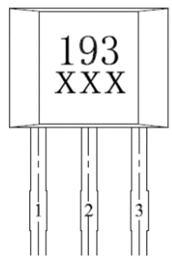
2).Leads must be free of flash and plating voids

3).Do not bend leads within 1 mm of lead to package interface.

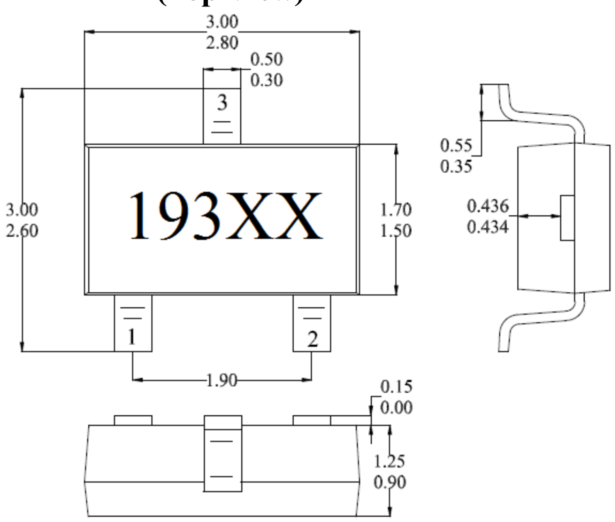
4).PINOUT:

Pin 1	V_{DD}
Pin 2	GND
Pin 3	Output

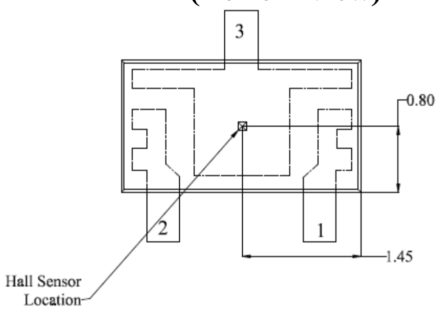
Output Pin Assignment
(Top view)



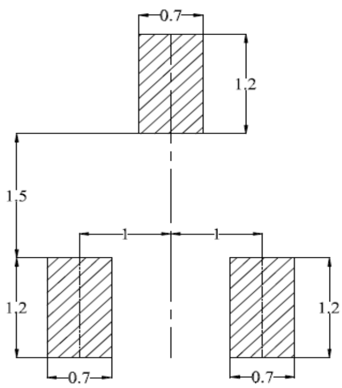
SO Package
(Top View)



Hall Plate Chip Location
(Bottom view)



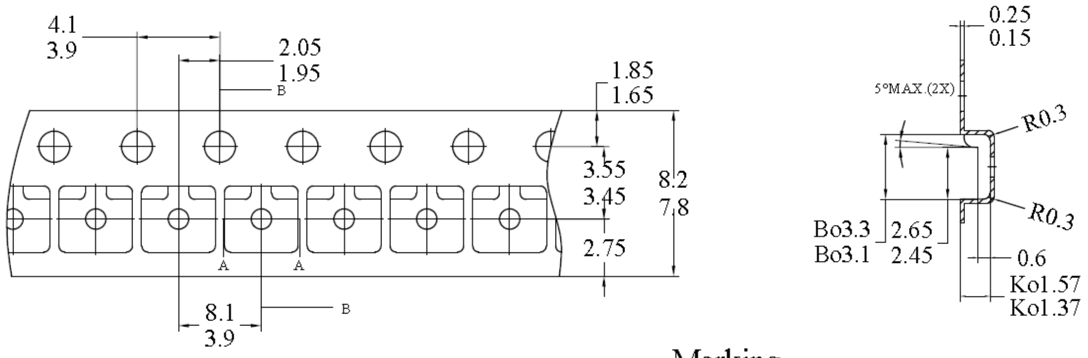
(For reference only)Land Pattern

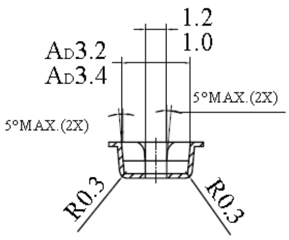


NOTES:

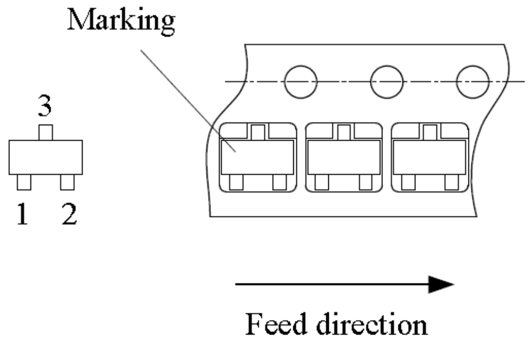
1. PINOUT (See Top View at left :)
   Pin 1 V_{DD}
   Pin 2 Output
   Pin 3 GND
2. Controlling dimension: mm
3. Lead thickness after solder plating will be 0.254mm maximum

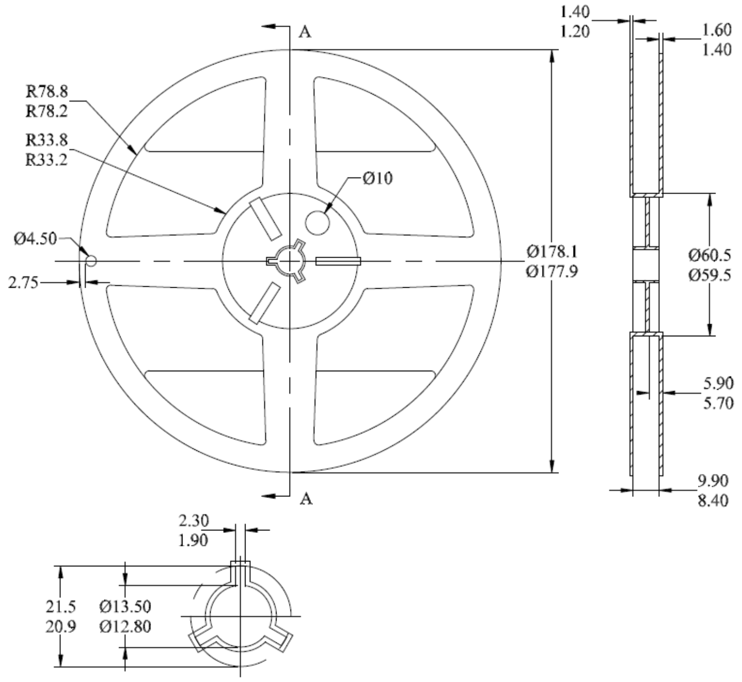
Sot-23 package Tape On Reel Dimension





SECTION A-A

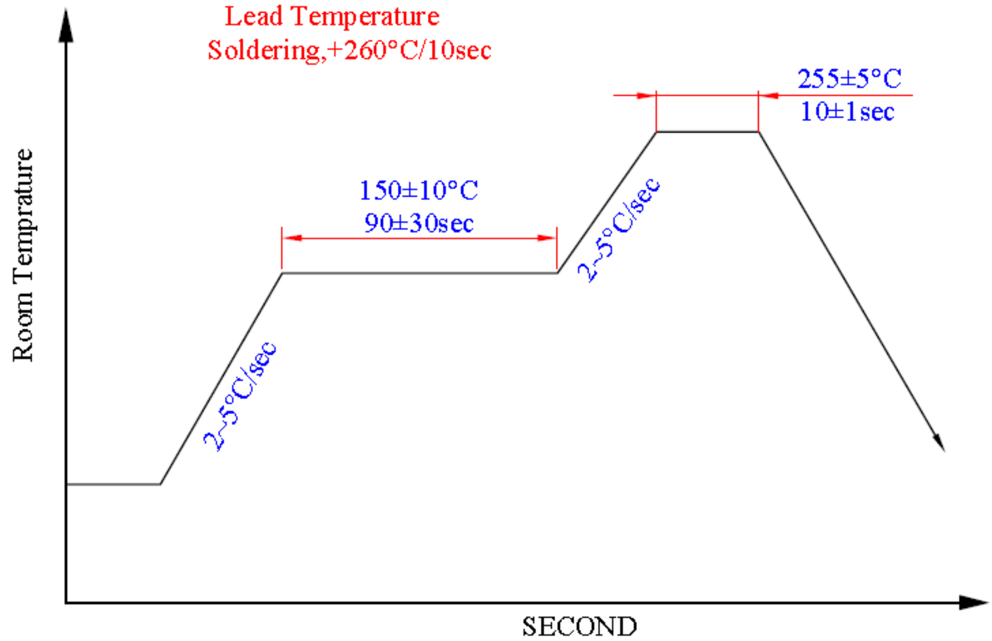




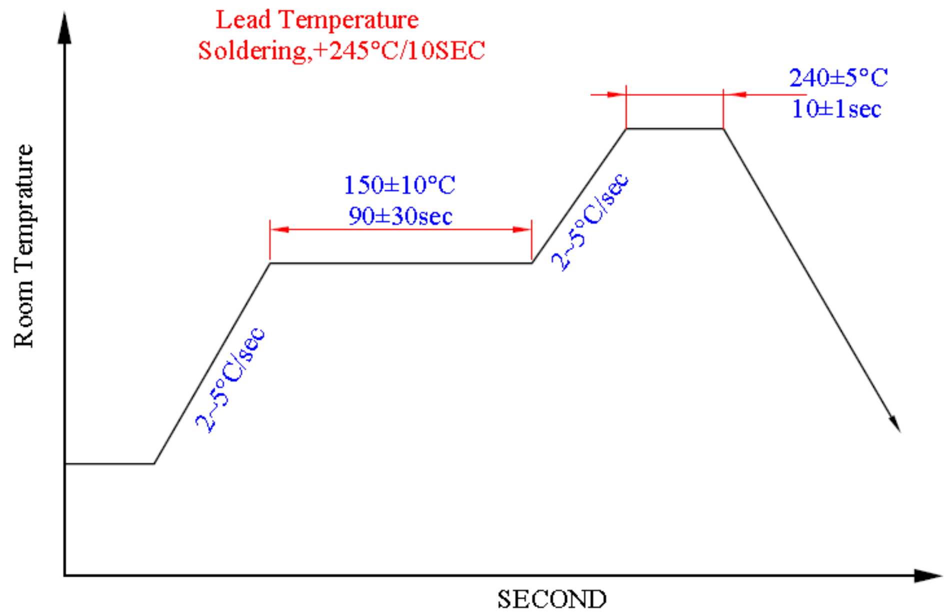
NOTES:

1. Material: Conductive polystyrene;
2. DIM in mm;
3. 10 sprocket hole pitch cumulative tolerance ±0.2;
4. Camber not to exceed 1mm in 100mm;
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole;
6. (S.R. OHM/SQ) Means surface electric resistivity of the carrier tape.

IR reflow curve



SO Soldering Condition



UA Soldering Condition

Packing specification:

Package	Bag	Box	Carton	Carton	Carton
TO-92S-3L	1,000pcs/bag	10 bags/box	10 boxes/carton	5 boxes/carton	4 boxes/carton
SOT-23-3L	3,000pcs/reel	5 reels/box	6 boxes/carton	6 boxes/carton	6 boxes/carton

TO-92S-3L	Weight	SOT-23-3L	Weight
1000pcs/bag	0.11kg	3000pcs/reel	0.12kg
10 bags/box	1.26kg	5 reels/box	0.73kg
10 boxes/carton	13.38kg	6boxes/carton	4.84kg
5 boxes/carton	6.82kg	6boxes/carton	4.84kg
4 boxes/carton	5.54kg	6boxes/carton	4.84kg

SOT Package Inner box label ：Size: 5cm*8cm

SOT Carton label ：Size: 6 cm * 9cm

UA Package Inner box label ：Size: 5cm*8cm

***UA Carton label*：**Size: 6 cm * 9cm

Combine:

When combine lot, one reel could have two D/C and no more than two DC. One carton could have two devices, no more than two;