

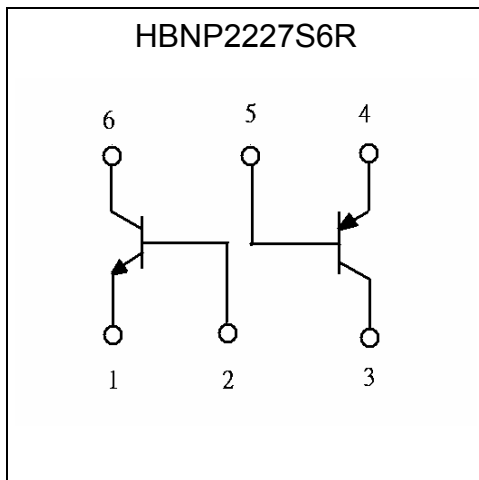
## General Purpose NPN / PNP Epitaxial Planar Transistors (dual transistors)

# HBNP2227S6R

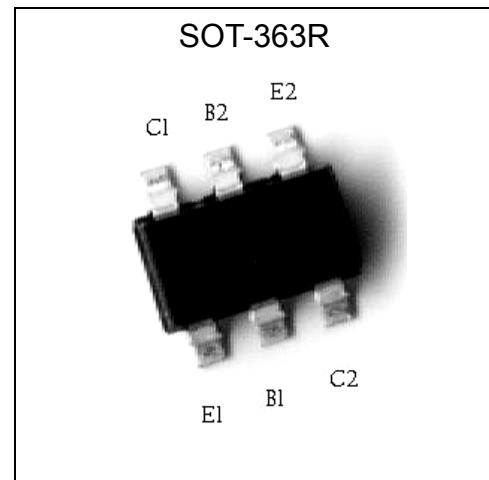
### Features

- Includes a PN2222A chip and PN2907A chip in a SOT-363R package.
- Mounting possible with SOT-323 automatic mounting machines.
- Transistor elements are independent, eliminating interference.
- Mounting cost and area can be cut in half.
- Pb-free lead plating package.

### Equivalent Circuit



### Outline



### Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits		Unit
		TR1 (NPN)	TR2 (PNP)	
Collector-Base Voltage	V <sub>CBO</sub>	75	-60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	-5	V
Collector Current	I <sub>C</sub>	600	-600	mA
Power Dissipation	P <sub>d</sub>	200(total) *1		mW
Junction Temperature	T <sub>j</sub>	150		°C
Storage Temperature	T <sub>stg</sub>	-55~+150		°C

Note: \*1 150mW per element must not be exceeded.



**Characteristics (Ta=25°C)**

**• TR1 (NPN)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CB0</sub>	75	-	-	V	I <sub>C</sub> =10μA
BV <sub>CEO</sub>	40	-	-	V	I <sub>C</sub> =10mA
BV <sub>EB0</sub>	6	-	-	V	I <sub>E</sub> =10μA
I <sub>CB0</sub>	-	-	10	nA	V <sub>CB</sub> =60V
I <sub>CEX</sub>	-	-	10	nA	V <sub>CE</sub> =60V, V <sub>EB</sub> =3V
I <sub>EBO</sub>	-	-	10	nA	V <sub>EB</sub> =3V
*V <sub>CE(sat)</sub>	-	-	0.3	V	I <sub>C</sub> =150mA, I <sub>B</sub> =15mA
*V <sub>CE(sat)</sub>	-	-	1.0	V	I <sub>C</sub> =500mA, I <sub>B</sub> =50mA
*V <sub>BE(sat)</sub>	0.6	-	1.2	V	I <sub>C</sub> =150mA, I <sub>B</sub> =15mA
*V <sub>BE(sat)</sub>	-	-	2.0	V	I <sub>C</sub> =500mA, I <sub>B</sub> =50mA
h <sub>FE</sub>	35	-	-	-	V <sub>CE</sub> =10V, I <sub>C</sub> =100μA
h <sub>FE</sub>	50	-	-	-	V <sub>CE</sub> =10V, I <sub>C</sub> =1mA
h <sub>FE</sub>	75	-	-	-	V <sub>CE</sub> =10V, I <sub>C</sub> =10mA
*h <sub>FE</sub>	100	-	300	-	V <sub>CE</sub> =10V, I <sub>C</sub> =150mA
*h <sub>FE</sub>	35	-	-	-	V <sub>CE</sub> =1V, I <sub>C</sub> =150mA
*h <sub>FE</sub>	40	-	-	-	V <sub>CE</sub> =10V, I <sub>C</sub> =500mA
f <sub>T</sub>	300	-	-	MHz	V <sub>CE</sub> =20V, I <sub>C</sub> =20mA, f=100MHz
C <sub>ob</sub>	-	-	8	pF	V <sub>CB</sub> =10V, f=1MHz

\*Pulse Test: Pulse Width ≤380μs, Duty Cycle ≤2%

**• TR2 (PNP)**

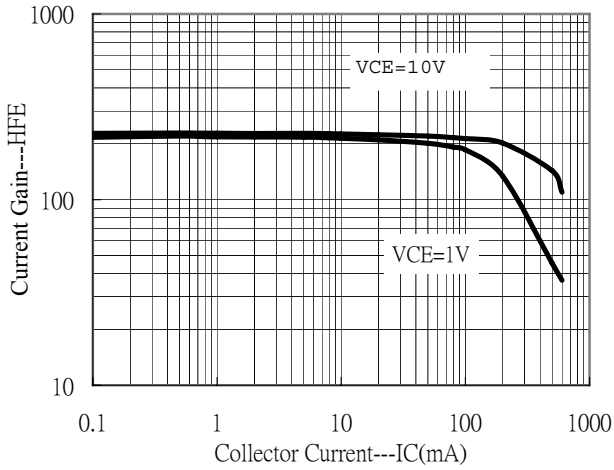
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CB0</sub>	-60	-	-	V	I <sub>C</sub> =-10μA
BV <sub>CEO</sub>	-60	-	-	V	I <sub>C</sub> =-10mA
BV <sub>EB0</sub>	-5	-	-	V	I <sub>E</sub> =-10μA
I <sub>CB0</sub>	-	-	-10	nA	V <sub>CB</sub> =-50V
I <sub>CEX</sub>	-	-	-50	nA	V <sub>CE</sub> =-30V, V <sub>EB</sub> =-0.5V
I <sub>EBO</sub>	-	-	-10	nA	V <sub>EB</sub> =-3V
*V <sub>CE(sat)</sub>	-	-	-0.4	V	I <sub>C</sub> =-150mA, I <sub>B</sub> =-15mA
*V <sub>CE(sat)</sub>	-	-	-1.6	V	I <sub>C</sub> =-500mA, I <sub>B</sub> =-50mA
*V <sub>BE(sat)</sub>	-	-	-1.3	V	I <sub>C</sub> =-150mA, I <sub>B</sub> =-15mA
*V <sub>BE(sat)</sub>	-	-	-2.6	V	I <sub>C</sub> =-500mA, I <sub>B</sub> =-50mA
h <sub>FE</sub>	75	-	-	-	V <sub>CE</sub> =-10V, I <sub>C</sub> =-100μA
h <sub>FE</sub>	100	-	-	-	V <sub>CE</sub> =-10V, I <sub>C</sub> =-1mA
h <sub>FE</sub>	100	-	-	-	V <sub>CE</sub> =-10V, I <sub>C</sub> =-10mA
*h <sub>FE</sub>	100	-	300	-	V <sub>CE</sub> =-10V, I <sub>C</sub> =-150mA
*h <sub>FE</sub>	50	-	-	-	V <sub>CE</sub> =-10V, I <sub>C</sub> =-500mA
f <sub>T</sub>	200	-	-	MHz	V <sub>CE</sub> =-20V, I <sub>C</sub> =-50mA, f=100MHz
C <sub>ob</sub>	-	-	8	pF	V <sub>CB</sub> =-10V, f=1MHz

\*Pulse Test: Pulse Width ≤380μs, Duty Cycle ≤2%

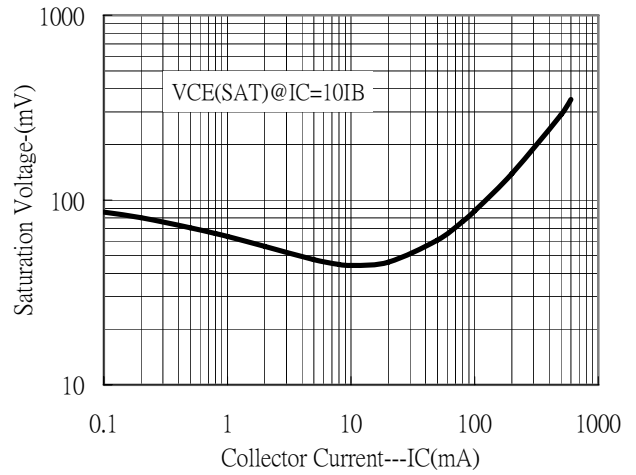
**Characteristic curves**

• **TR1 (NPN)**

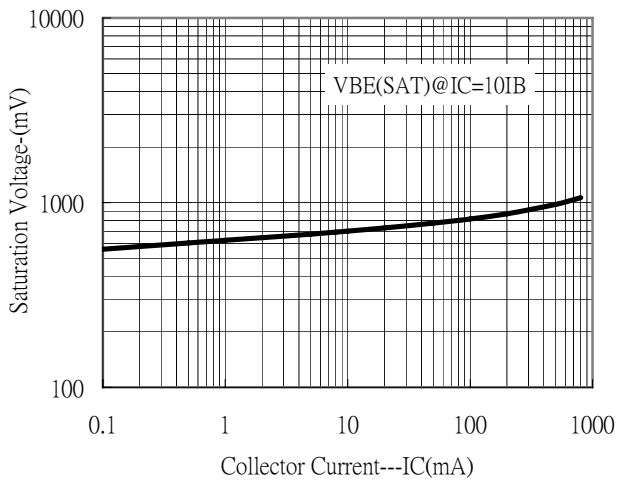
Current Gain vs Collector Current



Saturation Voltage vs Collector Current

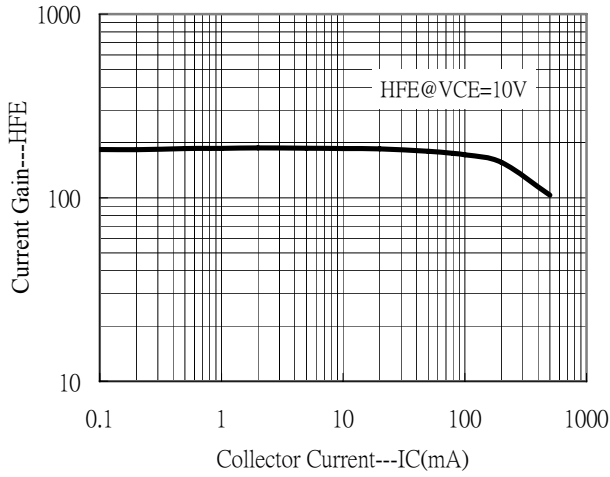


Saturation Voltage vs Collector Current

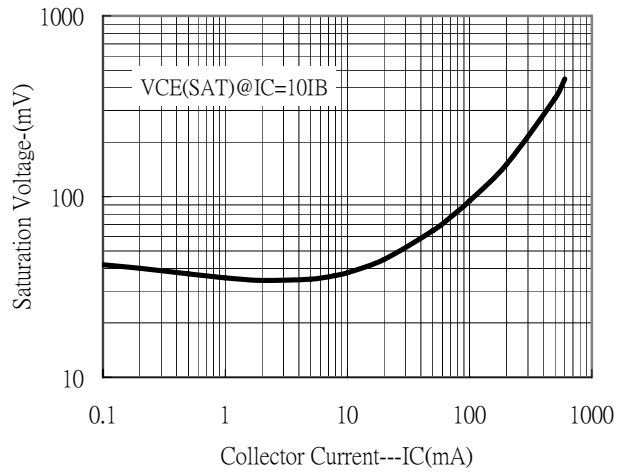


• **TR2 (PNP)**

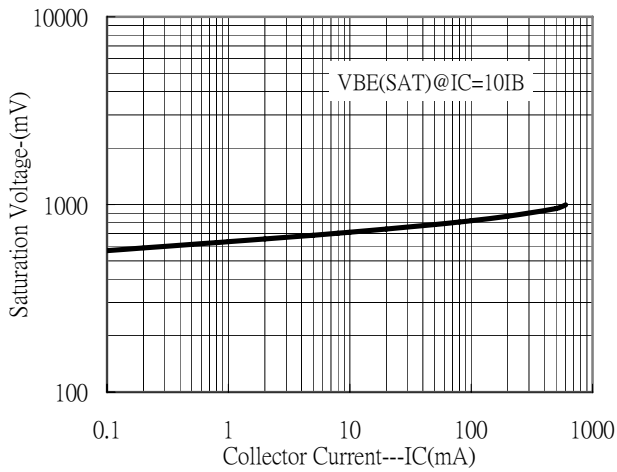
Current Gain vs Collector Current



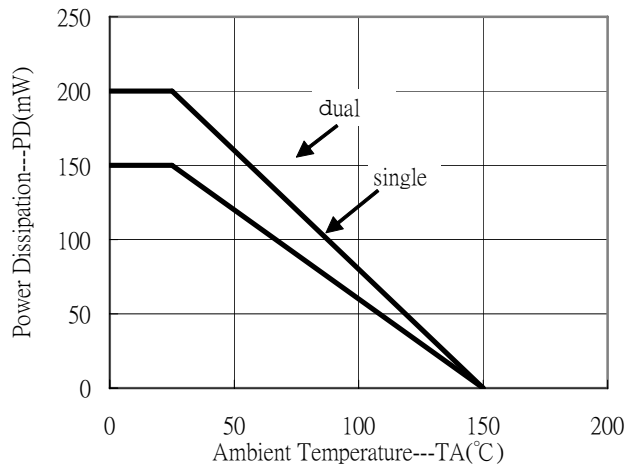
Saturation Voltage vs Collector Current



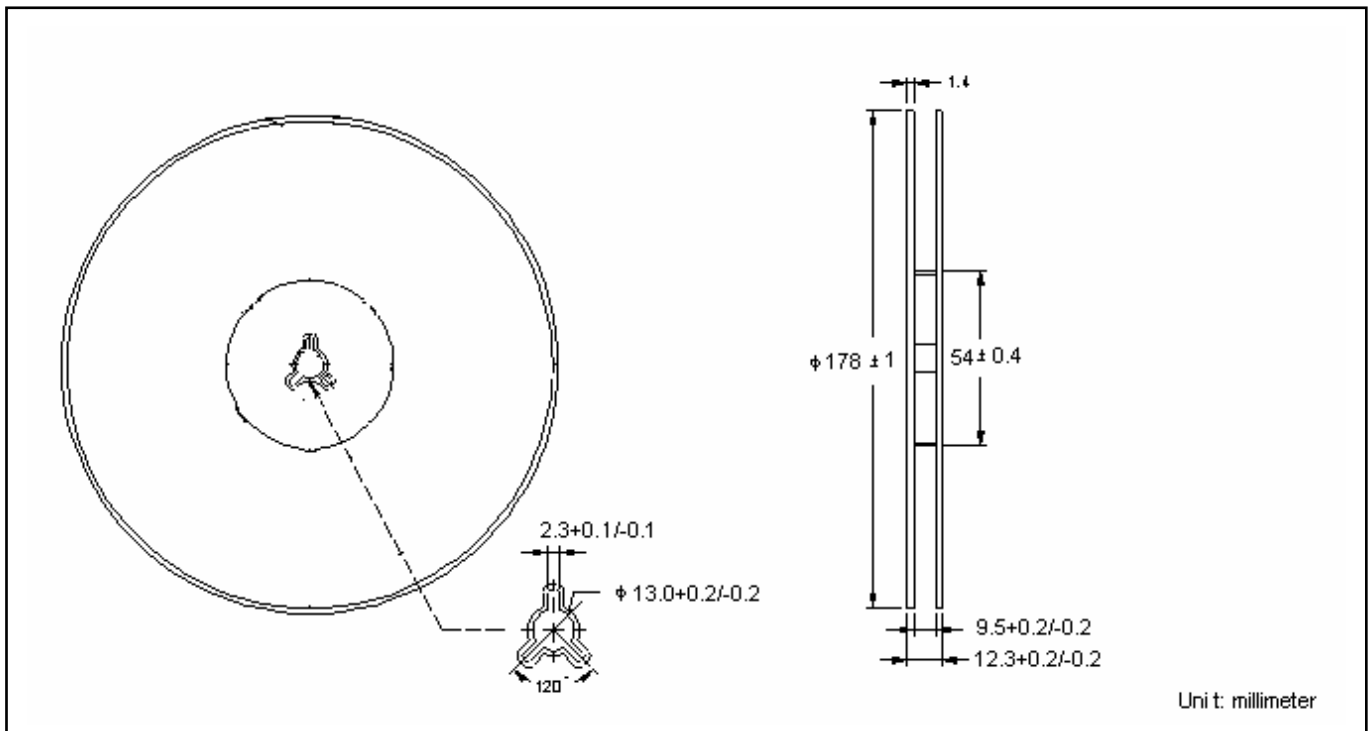
Saturation Voltage & Collector Current



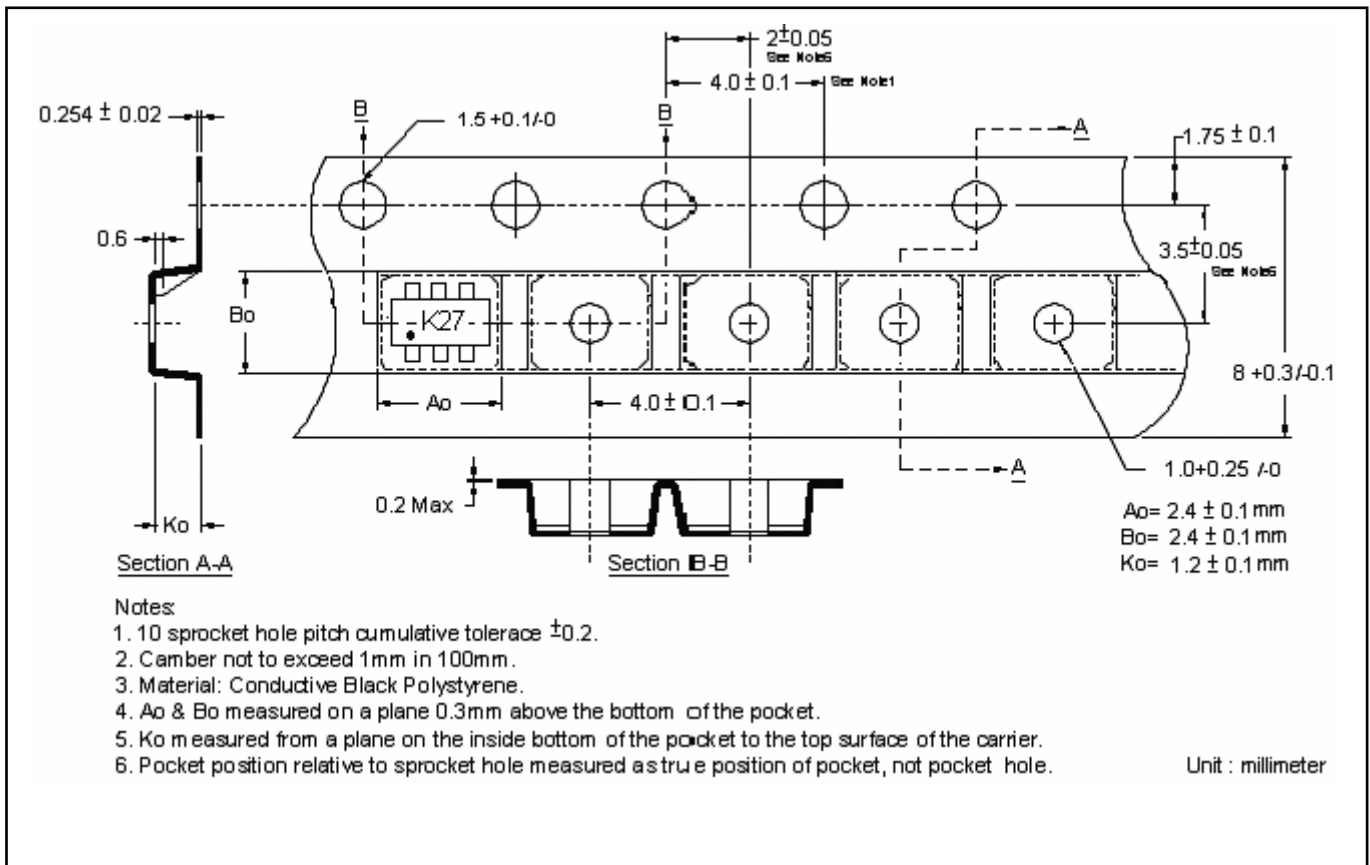
Power Derating Curves



**Reel Dimension**



**Carrier Tape Dimension**



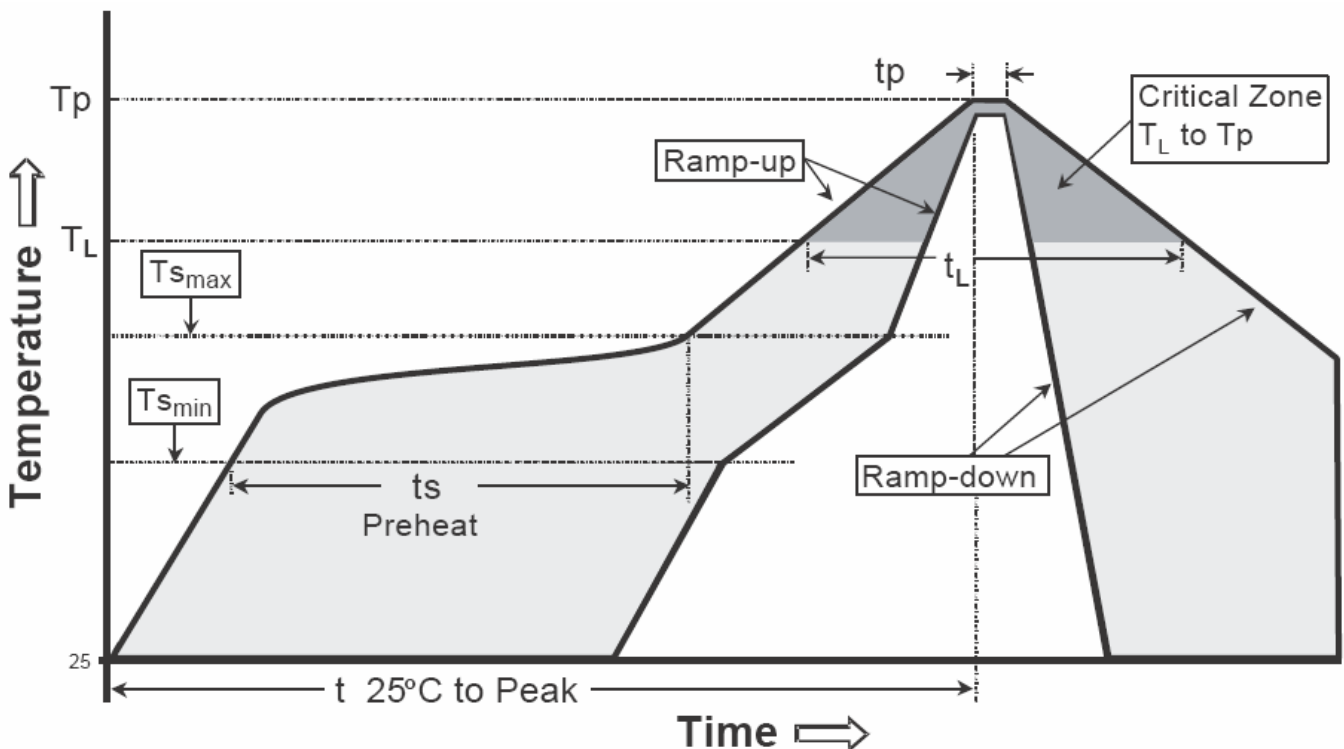
**Notes:**

1. 10 sprocket hole pitch cumulative tolerance  $\pm 0.2$ .
2. Camber not to exceed 1mm in 100mm.
3. Material: Conductive Black Polystyrene.
4.  $A_0$  &  $B_0$  measured on a plane 0.3mm above the bottom of the pocket.
5.  $K_0$  measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

**Recommended wave soldering condition**

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

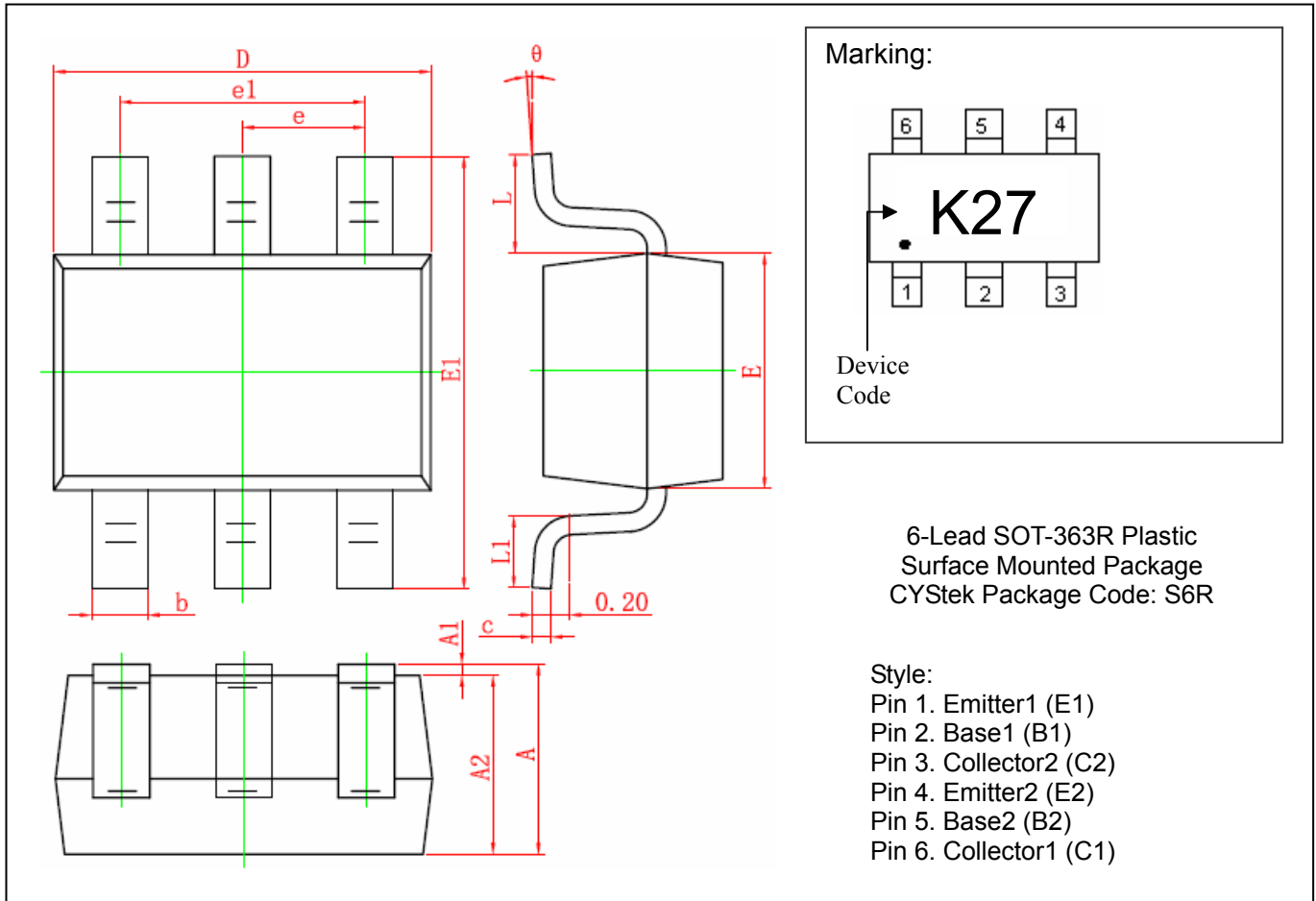
**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>p</sub> )	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

**SOT-363 Dimension**



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043	E1	2.150	2.450	0.085	0.096
A1	0.000	0.100	0.000	0.004	e	0.650	TYP	0.026	TYP
A2	0.900	1.000	0.035	0.039	e1	1.200	1.400	0.047	0.055
b	0.150	0.350	0.006	0.014	L	0.525	REF	0.021	REF
c	0.080	0.150	0.003	0.006	L1	0.260	0.460	0.010	0.018
D	2.000	2.200	0.079	0.087	theta	0°	8°	0°	8°
E	1.150	1.350	0.045	0.053					

**Notes :** 1. Controlling dimension : millimeters.  
 2. Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.  
 3. If there is any question with packing specification or packing method, please contact your local CYStek sales office.

**Material :**

- Lead : Pure tin plated.
- Mold Compound : Epoxy resin family, flammability solid burning class:UL94V-0.

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