

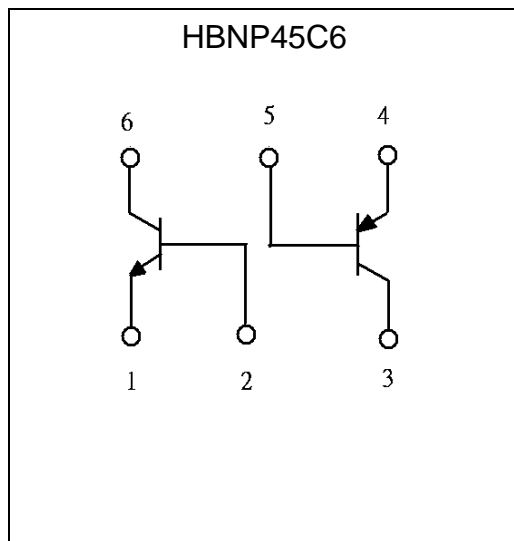
## General Purpose NPN / PNP Epitaxial Planar Transistors (dual transistors)

# HBNP45C6

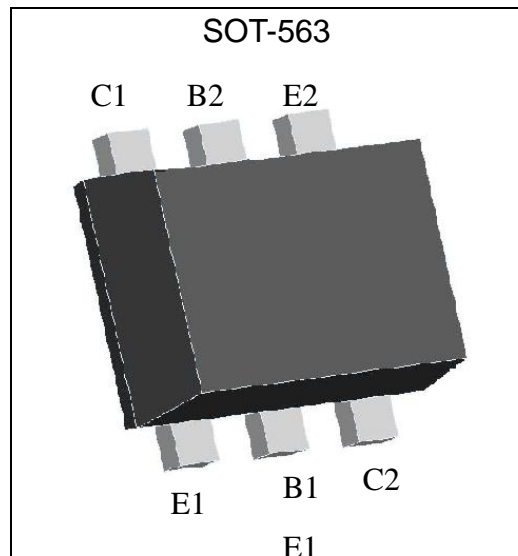
### Features

- Includes a BTC2412 chip and a BTA1037 chip in a SOT-563 package.
- Mounting possible with SOT-523 automatic mounting machines.
- Transistor elements are independent, eliminating interference.
- Mounting cost and area can be cut in half.
- Pb-free lead plating and halogen-free package.

### Equivalent Circuit



### Outline



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

Parameter	Symbol	Limits		Unit
		TR1 (NPN)	TR2 (PNP)	
Collector-Base Voltage	V <sub>CB0</sub>	60	-60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	50	-50	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	-6	V
Collector Current	I <sub>C</sub>	150	-150	mA
Power Dissipation	P <sub>d</sub>	150(total) *1		mW
Junction Temperature	T <sub>j</sub>	150		°C
Storage Temperature	T <sub>stg</sub>	-55~+150		°C

Note: \*1 120mW per element must not be exceeded.



**Characteristics** (Ta=25°C)

• **TR1 (NPN)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CB0</sub>	60	-	-	V	I <sub>C</sub> =100μA
BV <sub>CEO</sub>	50	-	-	V	I <sub>C</sub> =1mA
BV <sub>EBO</sub>	7	-	-	V	I <sub>E</sub> =50μA
I <sub>CB0</sub>	-	-	0.1	μA	V <sub>CB</sub> =60V
I <sub>EBO</sub>	-	-	0.1	μA	V <sub>EB</sub> =7V
*V <sub>CE(sat)</sub>	-	0.2	0.4	V	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA
*h <sub>FE</sub>	200	-	600		V <sub>CE</sub> =6V, I <sub>C</sub> =1mA
f <sub>T</sub>	80	180	-	MHz	V <sub>CE</sub> =12V, I <sub>C</sub> =2mA, f=100MHz
C <sub>ob</sub>	-	2	3.5	pF	V <sub>CB</sub> =12V, f=1MHz

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

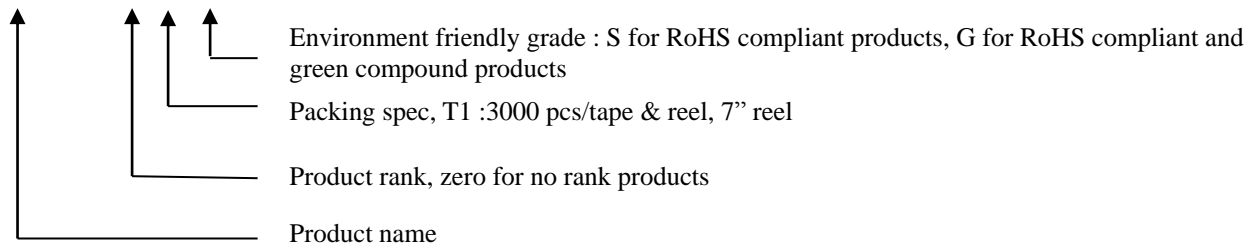
• **TR2 (PNP)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CB0</sub>	-60	-	-	V	I <sub>C</sub> =-50μA
BV <sub>CEO</sub>	-50	-	-	V	I <sub>C</sub> =-1mA
BV <sub>EBO</sub>	-6	-	-	V	I <sub>E</sub> =-50μA
I <sub>CB0</sub>	-	-	-0.1	μA	V <sub>CB</sub> =-60V
I <sub>EBO</sub>	-	-	-0.1	μA	V <sub>EB</sub> =-6V
*V <sub>CE(sat)</sub>	-	-0.25	-0.5	V	I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA
*h <sub>FE</sub>	200	-	600		V <sub>CE</sub> =-6V, I <sub>C</sub> =-1mA
f <sub>T</sub>	60	140	-	MHz	V <sub>CE</sub> =-12V, I <sub>C</sub> =-2mA, f=100MHz
C <sub>ob</sub>	-	4	5	pF	V <sub>CB</sub> =-12V, f=1MHz

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

**Ordering Information**

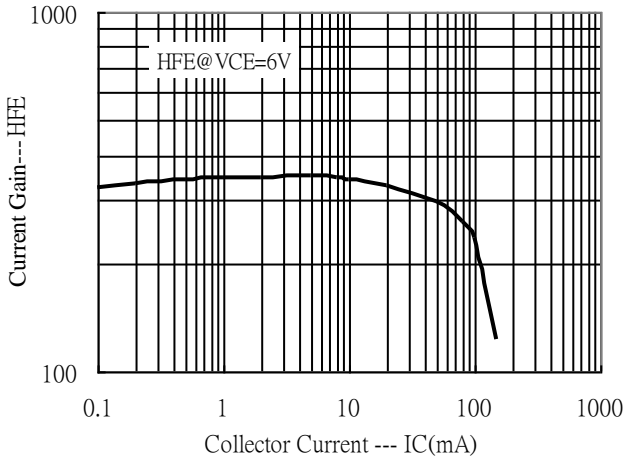
Device	Package	Shipping
HBNP45C6-0-T1-G	SOT-563 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel



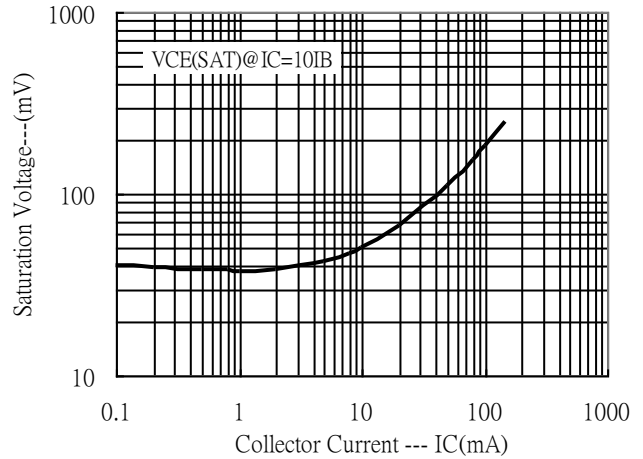
**Characteristic curves**

**• TR1 (NPN)**

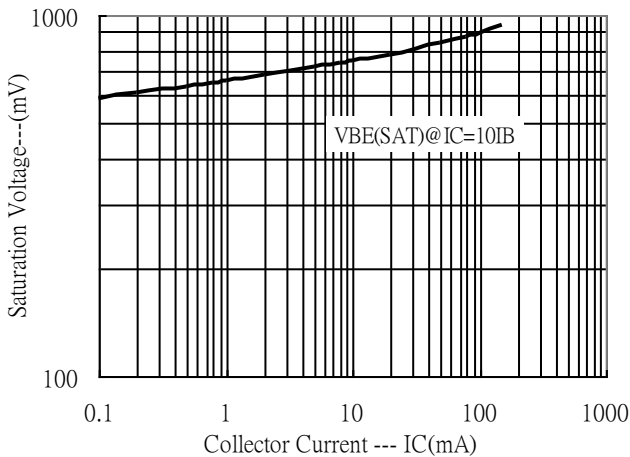
Current Gain vs Collector Current



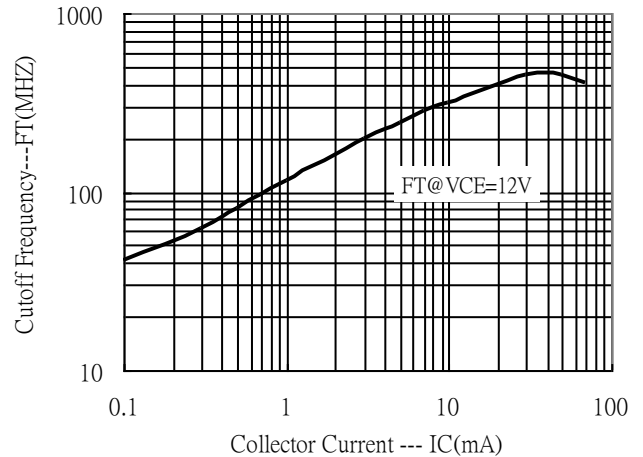
Saturation Voltage vs Collector Current



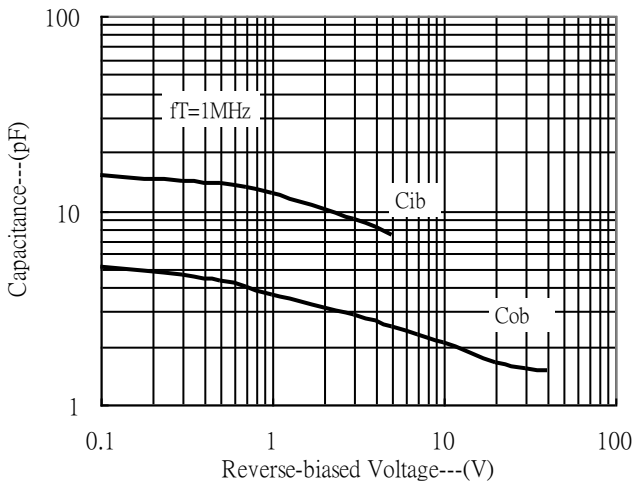
Saturation Voltage vs Collector Current



Cutoff Frequency vs Collector Current

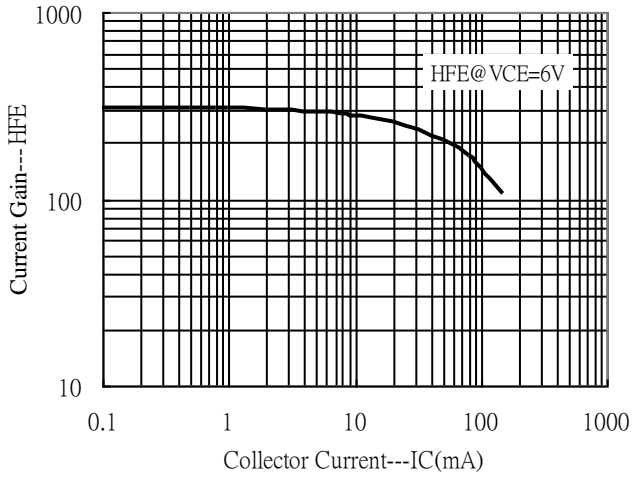


Capacitance Characteristics

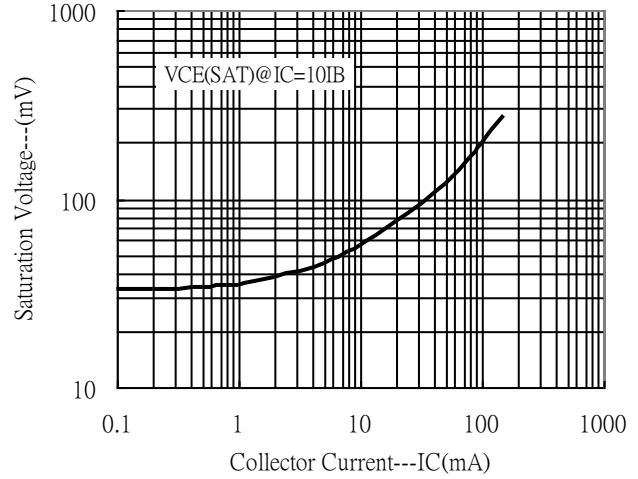


• **TR2 (PNP)**

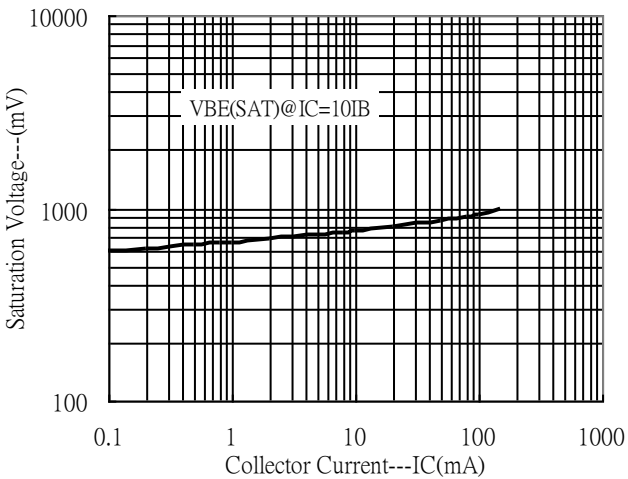
Current Gain vs Collector Current



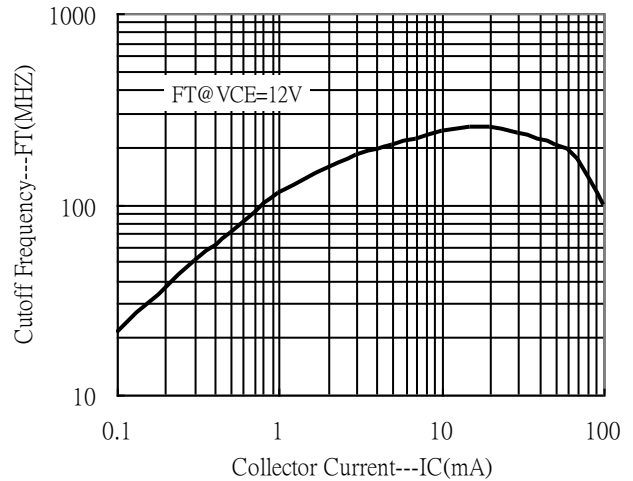
Saturation Voltage vs Collector Current



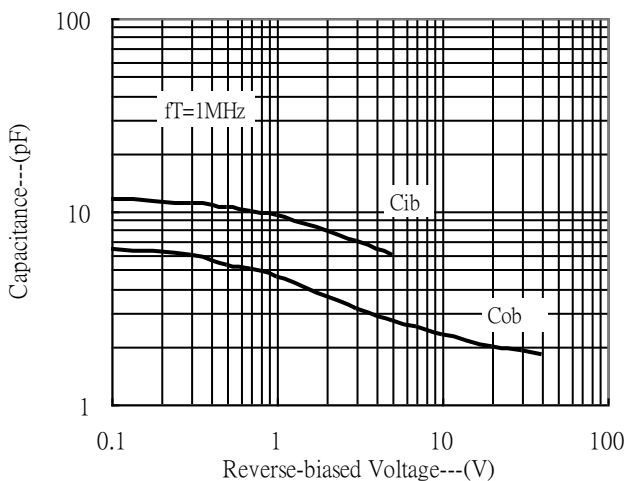
Saturation Voltage vs Collector Current



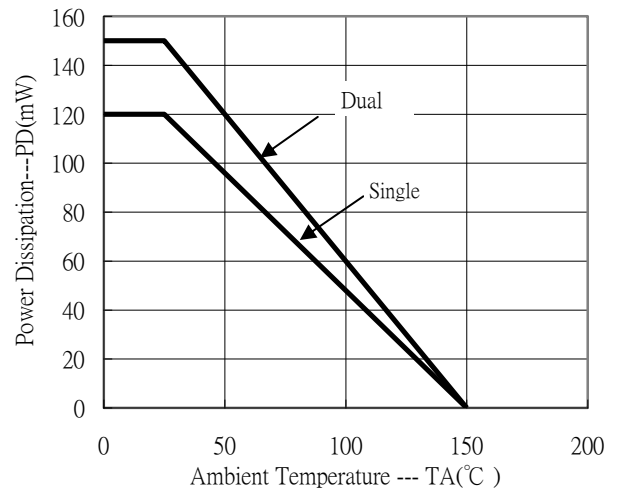
Cutoff Frequency vs Collector Current



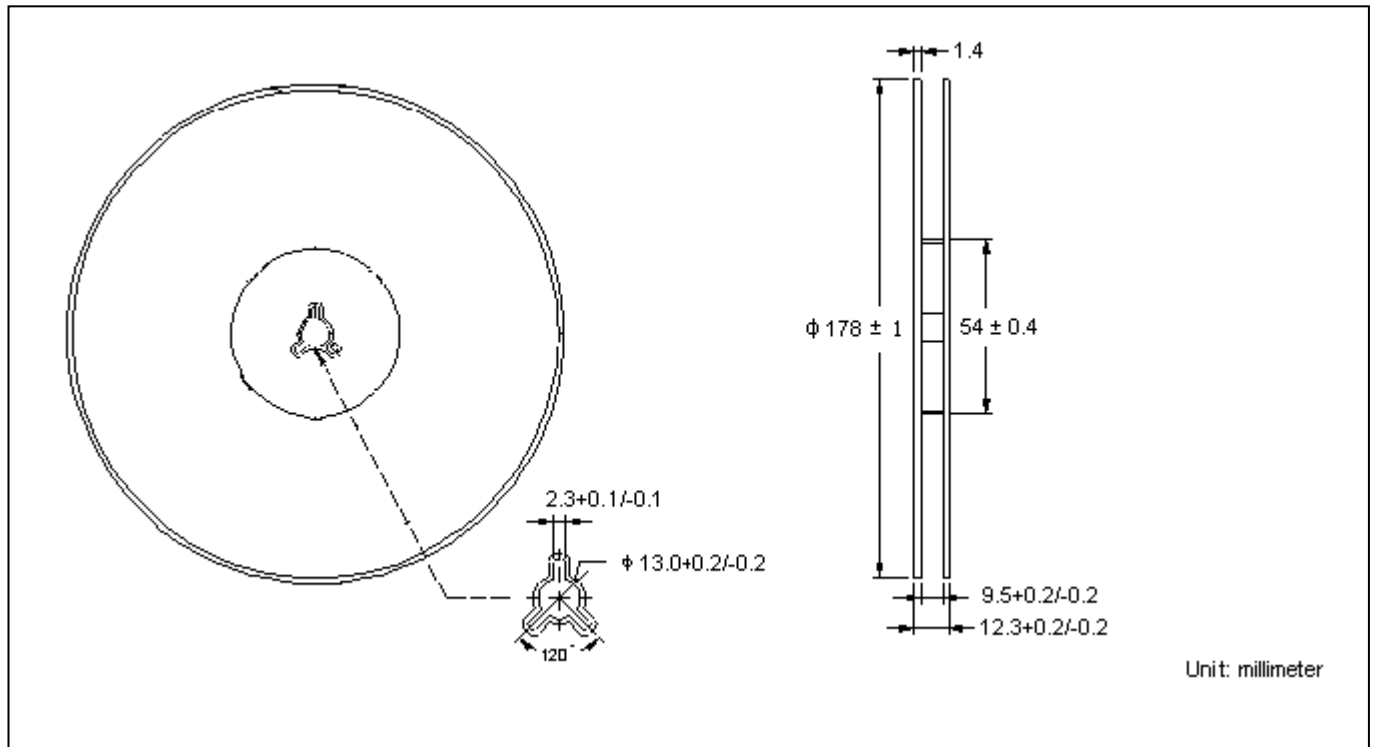
Capacitance Characteristics



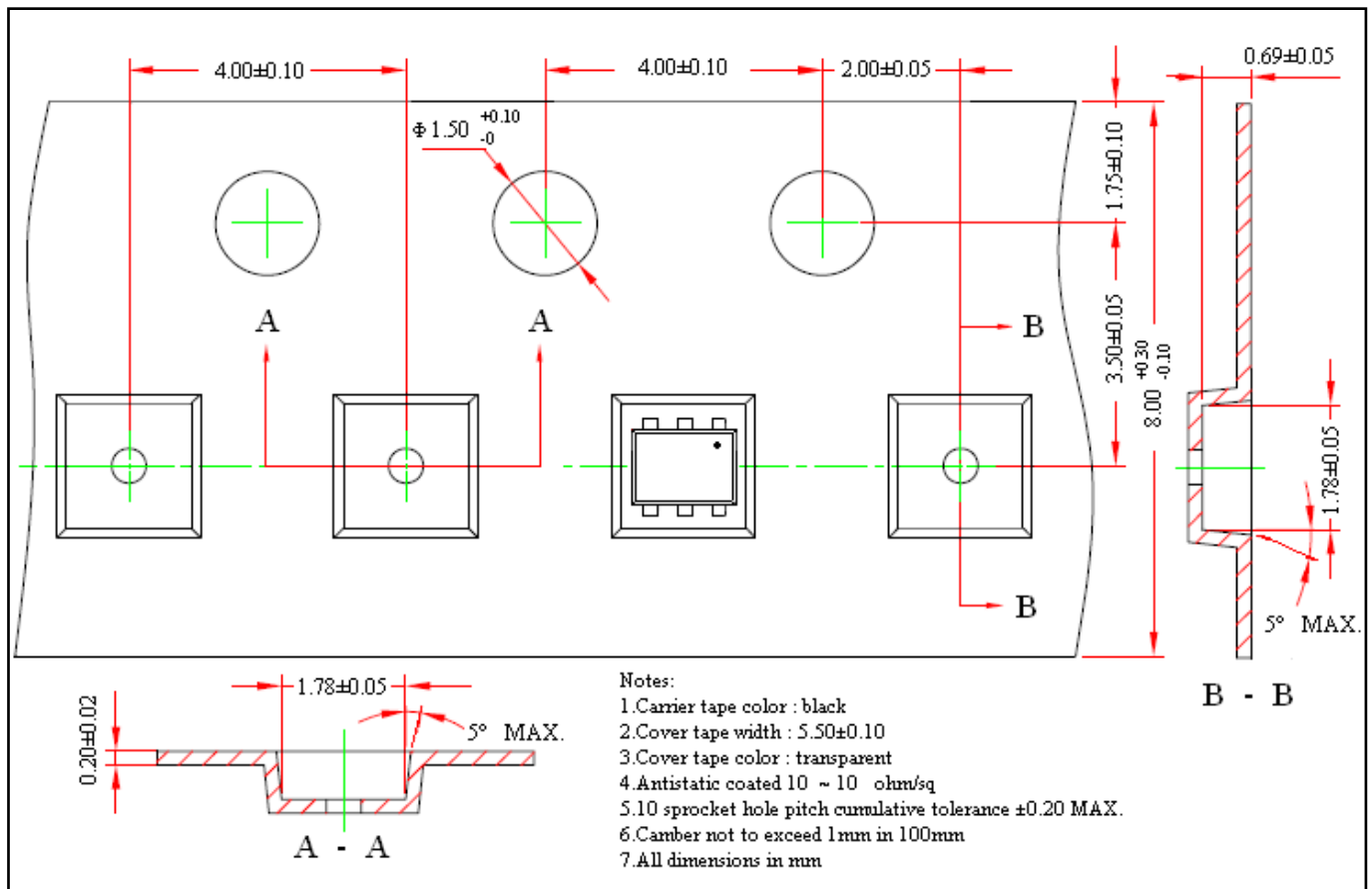
Power Derating Curves



**Reel Dimension**



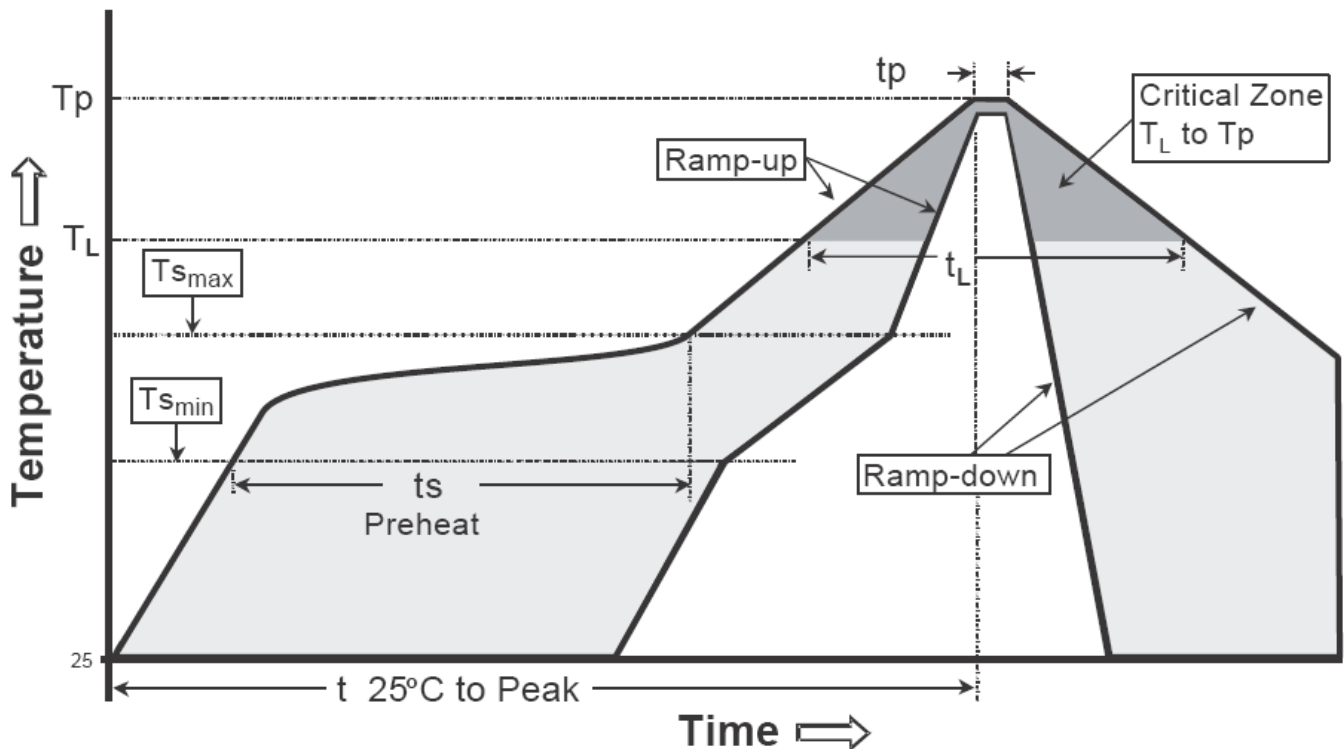
**Carrier Tape Dimension**



**Recommended wave soldering condition**

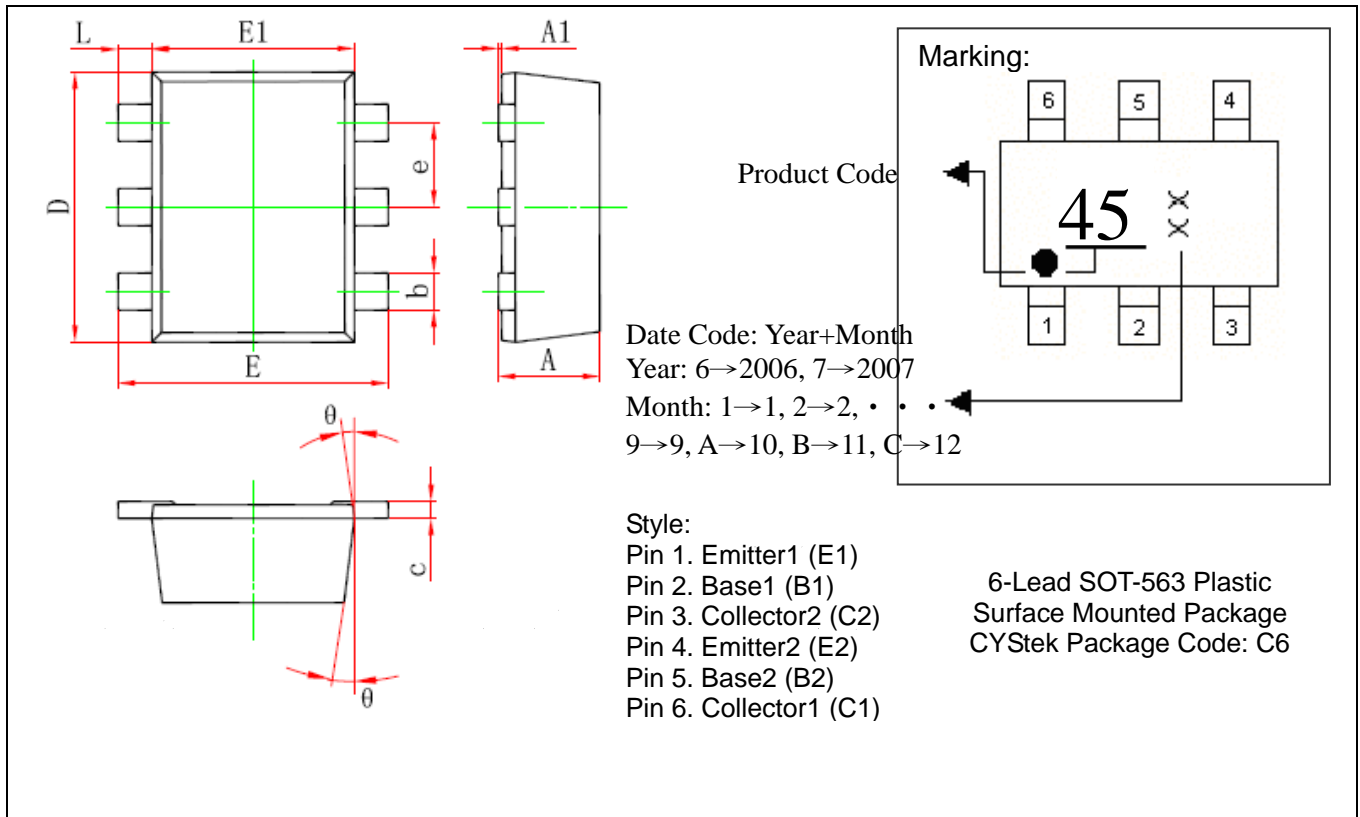
Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	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.

**SOT-563 Dimension**



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.021	0.024	0.525	0.600	b	0.007	0.011	0.170	0.270
A1	0.000	0.002	0.000	0.050	E1	0.043	0.051	1.100	1.300
e	0.018	0.022	0.450	0.550	E	0.059	0.067	1.500	1.700
c	0.004	0.006	0.090	0.160	L	0.004	0.012	0.100	0.300
D	0.059	0.067	1.500	1.700	θ	7° REF		7° REF	

**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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