

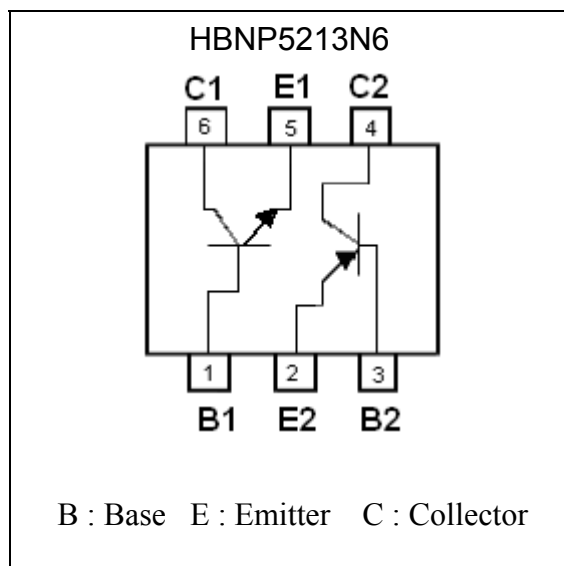
NPN AND PNP Dual Epitaxial Planar Transistors

HBNP5213N6

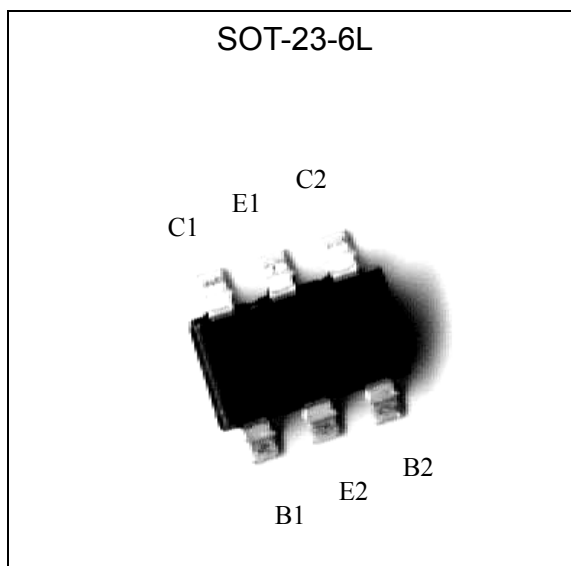
Features

- High BV_{CEO}
- High current
- Excellent DC current gain characteristics
- Pb-free lead plating and halogen-free package

Equivalent Circuit

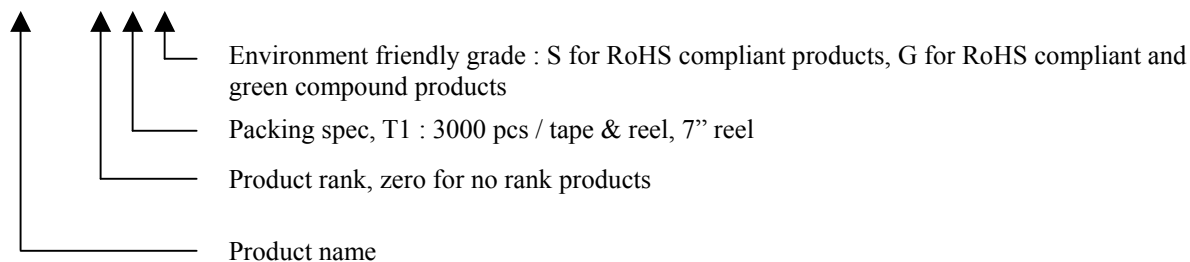


Outline



Ordering Information

Device	Package	Shipping
HBNP5213N6-0-T1-G	SOT-23-6L (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel



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

Parameter	Symbol	Limits		Unit
		NPN	PNP	
Collector-Base Voltage	V _{CBO}	100	-100	V
Collector-Emitter Voltage	V _{CEO}	80	-80	V
Emitter-Base Voltage	V _{EBO}	7	-7	V
Collector Current(DC) (Note 1)	I _C	1	-1	A
Peak Collector Current (Note 2)	I _{CP}	2	-2	A
Peak Base Current (Note 2)	I _{BP}	200	-200	mA
Total Power Dissipation (Note 1)	P _d	1.14		W
Linear Derating Factor		0.01		W / °C
Operating Junction and Storage Temperature	T _j , T _{stg}	-55~+150		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	R _{th,ja}	110		°C/W

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t_≤5 sec; 180°C/W when mounted on minimum copper pad
2.Pulse width limited by maximum junction temperature

NPN Electrical Characteristics (T_j=25°C, unless otherwise specified)

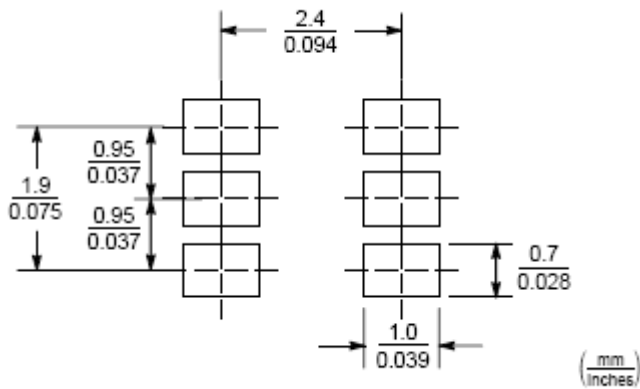
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV _{CBO}	100	-	-	V	I _C =50μA
BV _{CEO}	80	-	-	V	I _C =1mA
BV _{EBO}	7	-	-	V	I _E =50μA
I _{CBO}	-	-	100	nA	V _{CB} =100V, I _E =0
I _{EBO}	-	-	100	nA	V _{EB} =7V, I _C =0
*V _{CE(SAT)}	-	0.15	0.3	V	I _C =500mA, I _B =20mA
*V _{CE(SAT)}	-	-	0.5	V	I _C =1A, I _B =50mA
*V _{BE(SAT)}	-	-	1.2	V	I _C =1A, I _B =50mA
*h _{FE} 1	180	-	390	-	V _{CE} =10V, I _C =150mA
*h _{FE} 2	60	-	-	-	V _{CE} =10V, I _C =500mA
f _T	150	230	-	MHz	V _{CE} =10V, I _C =50mA, f=100MHz
C _{ob}	-	6	15	pF	V _{CB} =10V, I _E =0A, f=1MHz

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

PNP Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

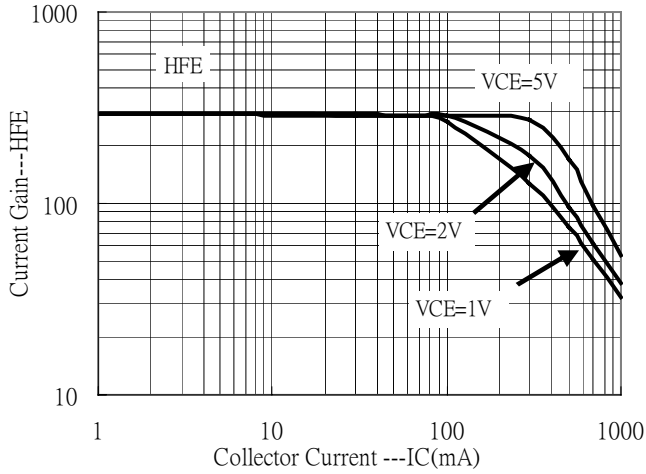
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-100	-	-	V	$I_C=-100\mu\text{A}$
BV_{CEO}	-80	-	-	V	$I_C=-10\text{mA}$
BV_{EBO}	-7	-	-	V	$I_E=-10\mu\text{A}$
I_{CBO}	-	-	-100	nA	$V_{CB}=-100\text{V}$
I_{EBO}	-	-	-100	nA	$V_{EB}=-7\text{V}$
$*V_{CE(sat)1}$	-	-0.16	-0.3	V	$I_C=-500\text{mA}$, $I_B=-50\text{mA}$
$*V_{CE(sat)2}$	-	-	-0.6	V	$I_C=-700\text{mA}$, $I_B=-35\text{mA}$
$*V_{BE(sat)}$	-	-	-1.2	V	$I_C=-1\text{A}$, $I_B=-50\text{mA}$
$*h_{FE1}$	180	-	390	-	$V_{CE}=-10\text{V}$, $I_C=-150\text{mA}$
$*h_{FE2}$	50	-	-	-	$V_{CE}=-10\text{V}$, $I_C=-500\text{mA}$
f_T	150	200	-	MHz	$V_{CE}=-10\text{V}$, $I_C=-50\text{mA}$, $f=100\text{MHz}$
C_{ob}	-	11	15	pF	$V_{CB}=-10\text{V}$, $I_E=0\text{A}$, $f=1\text{MHz}$

*Pulse Test: Pulse Width $\leq 380\mu\text{s}$, Duty Cycle $\leq 2\%$

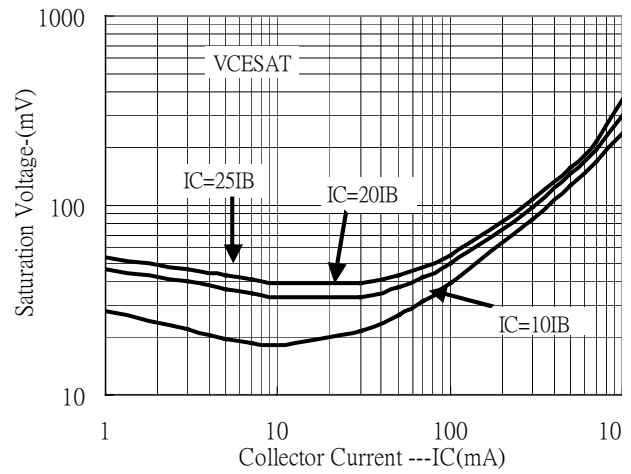
Recommended Soldering Footprint


Q1, NPN Typical Characteristics

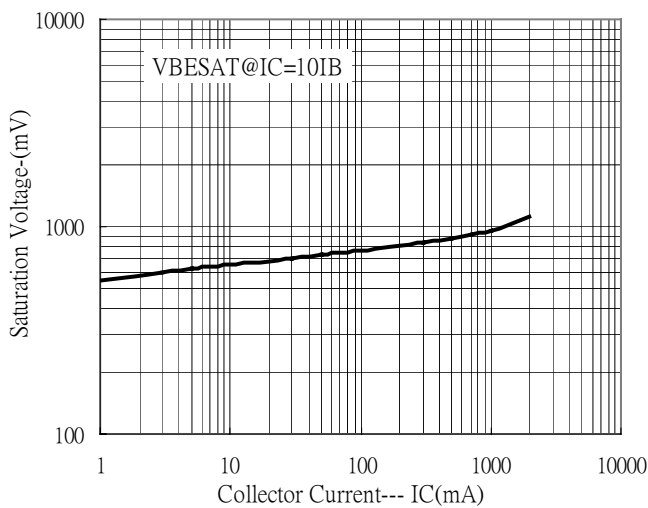
Current Gain vs Collector Current



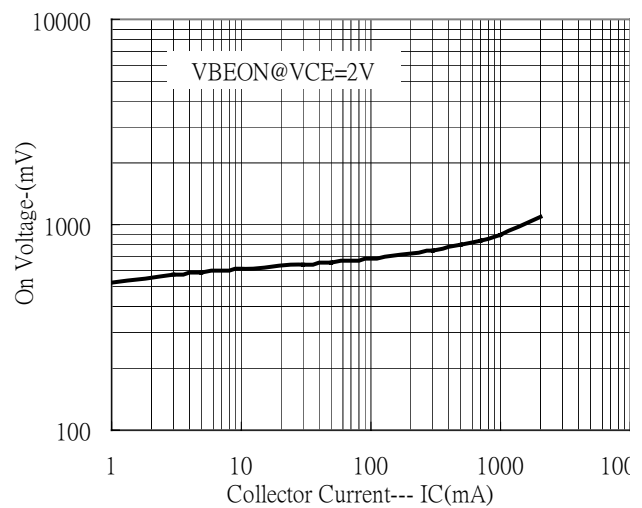
Saturation Voltage vs Collector Current



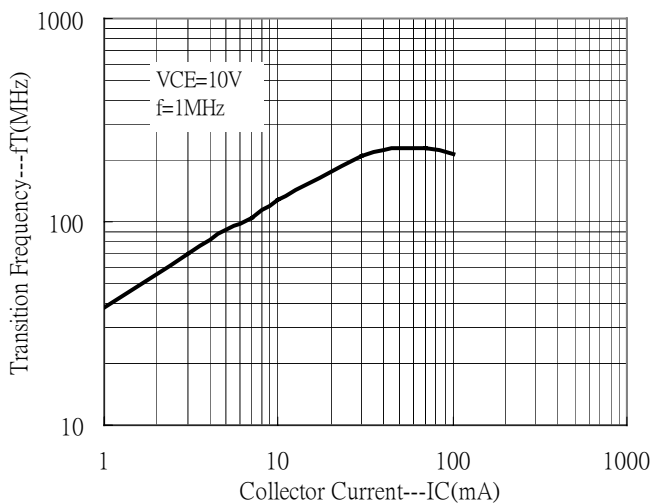
Saturation Voltage vs Collector Current



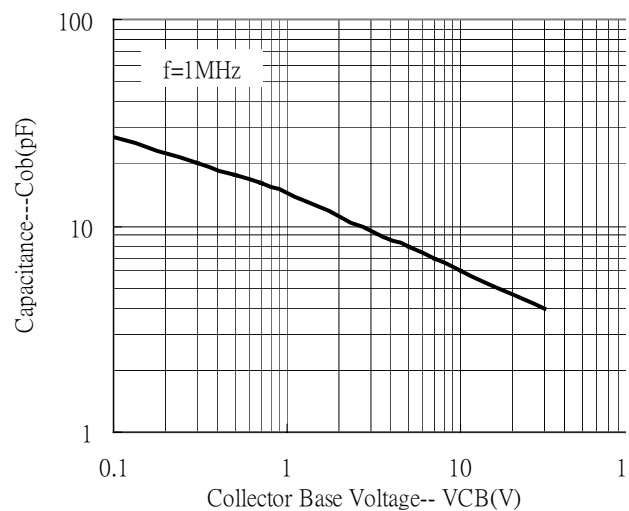
On Voltage vs Collector Current



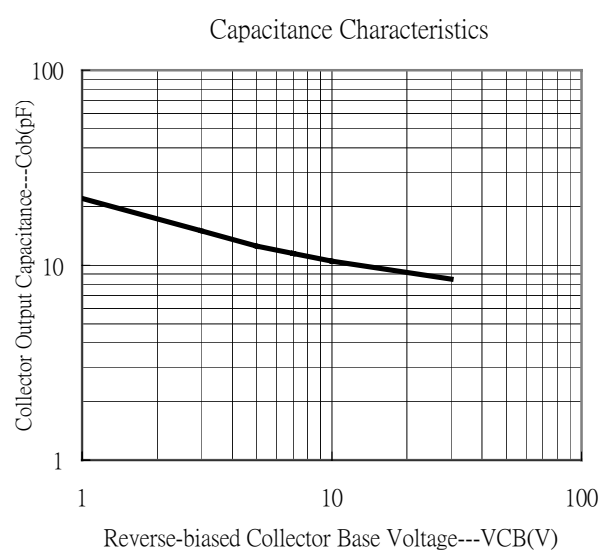
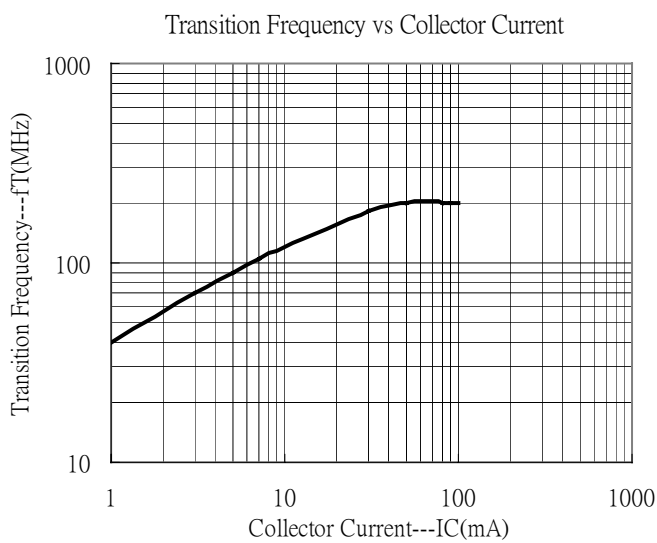
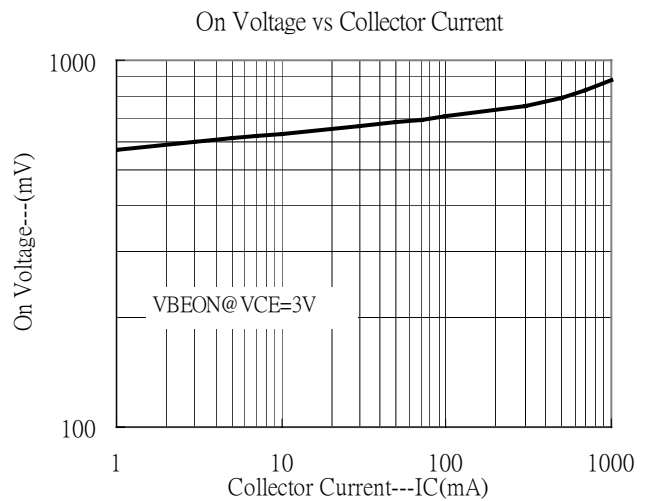
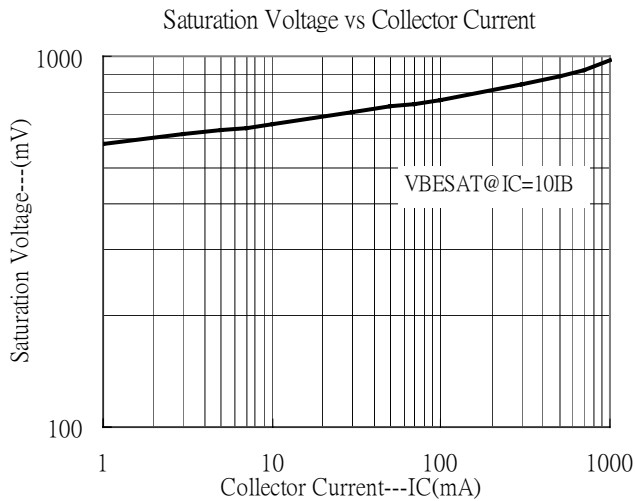
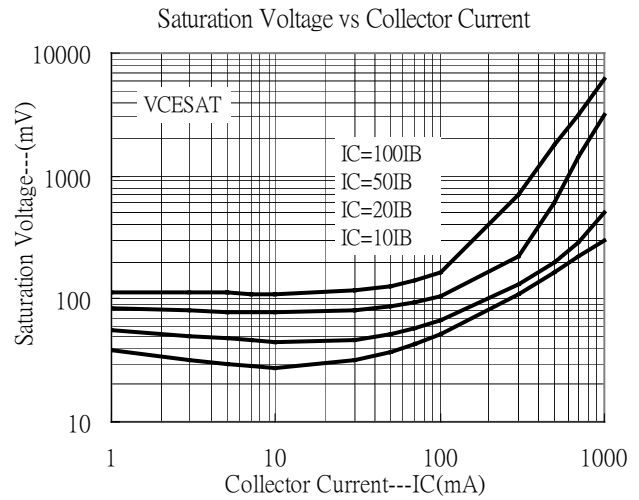
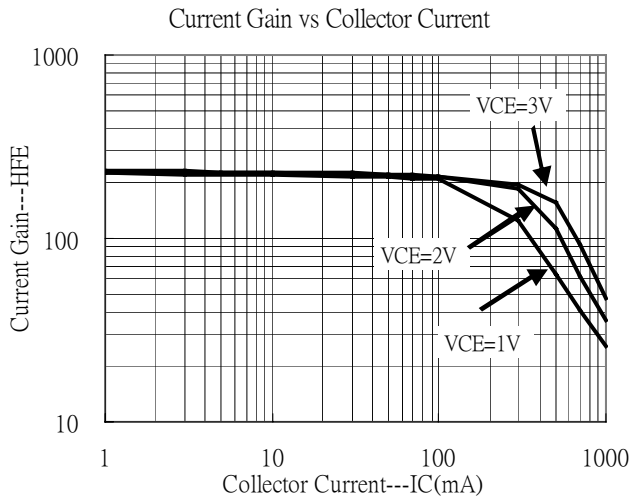
Transition Frequency vs Collector Current



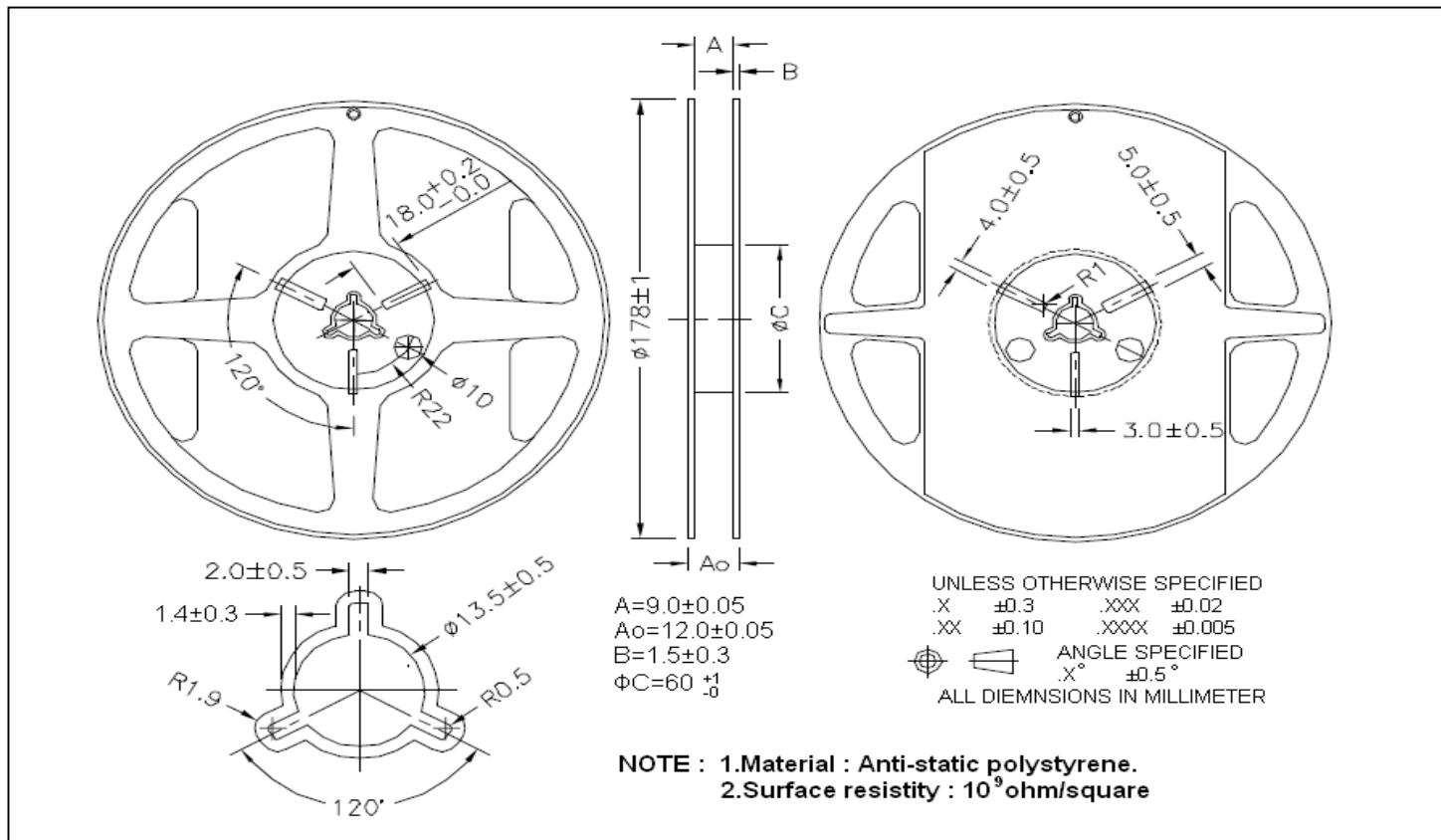
Capacitance Characteristics



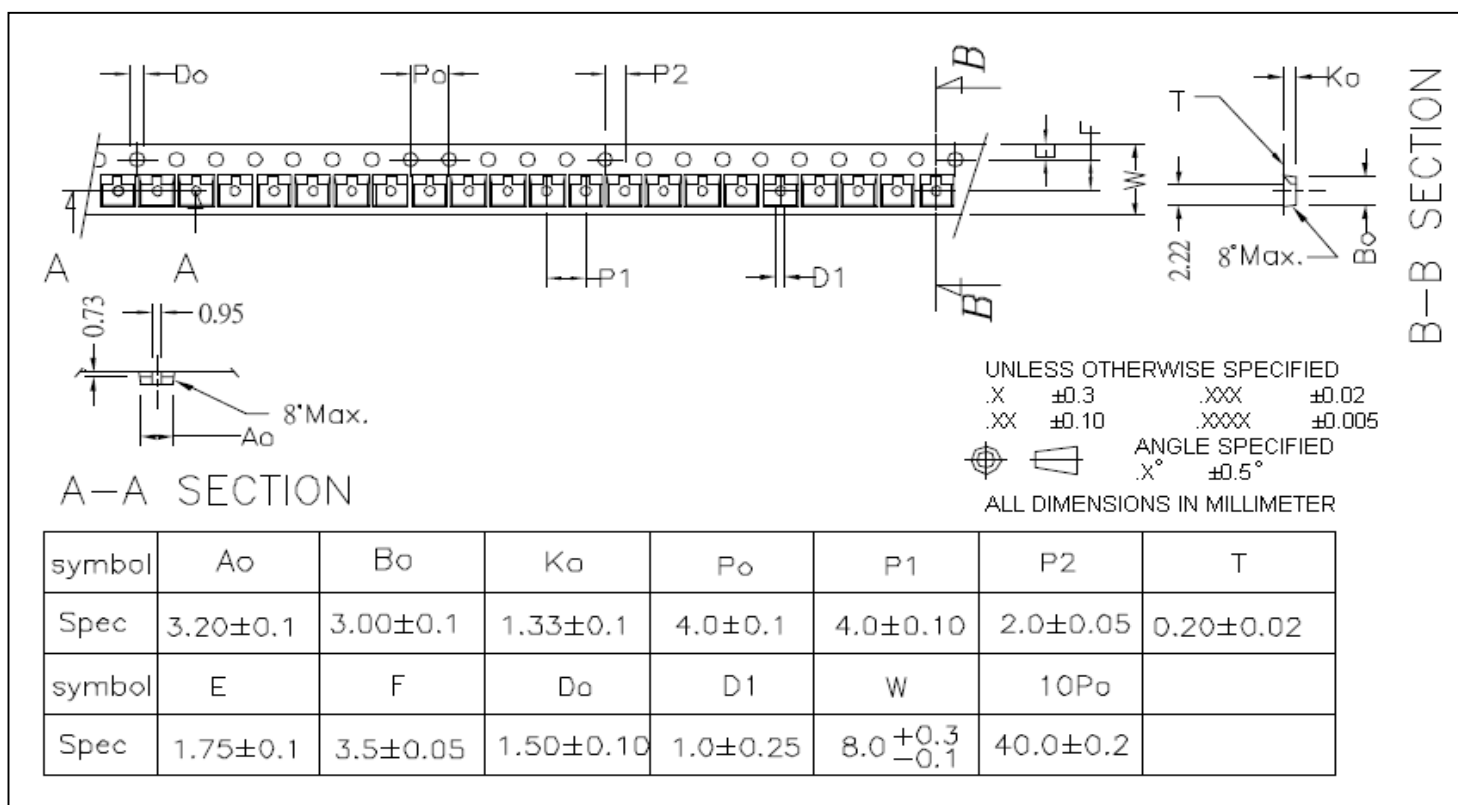
Q2, PNP Typical Characteristics



Reel Dimension



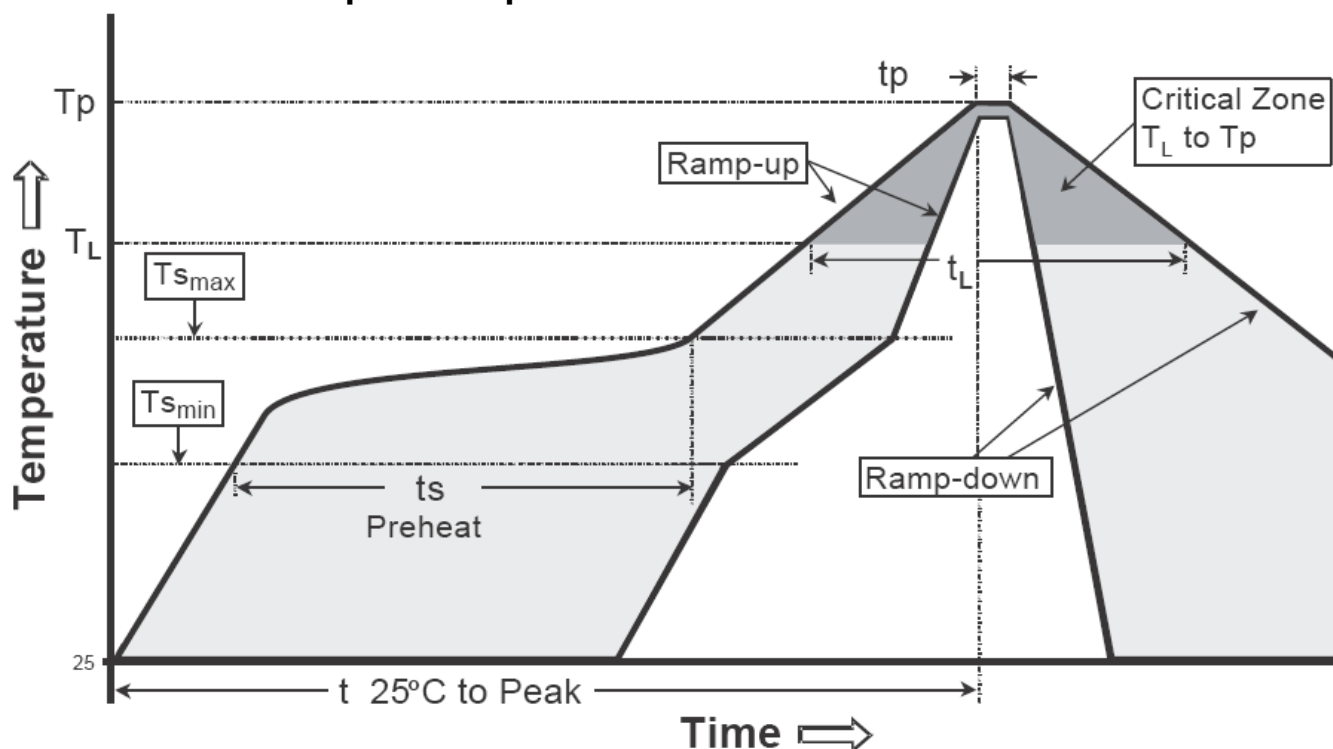
Carrier Tape Dimension



Recommended wave soldering condition

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

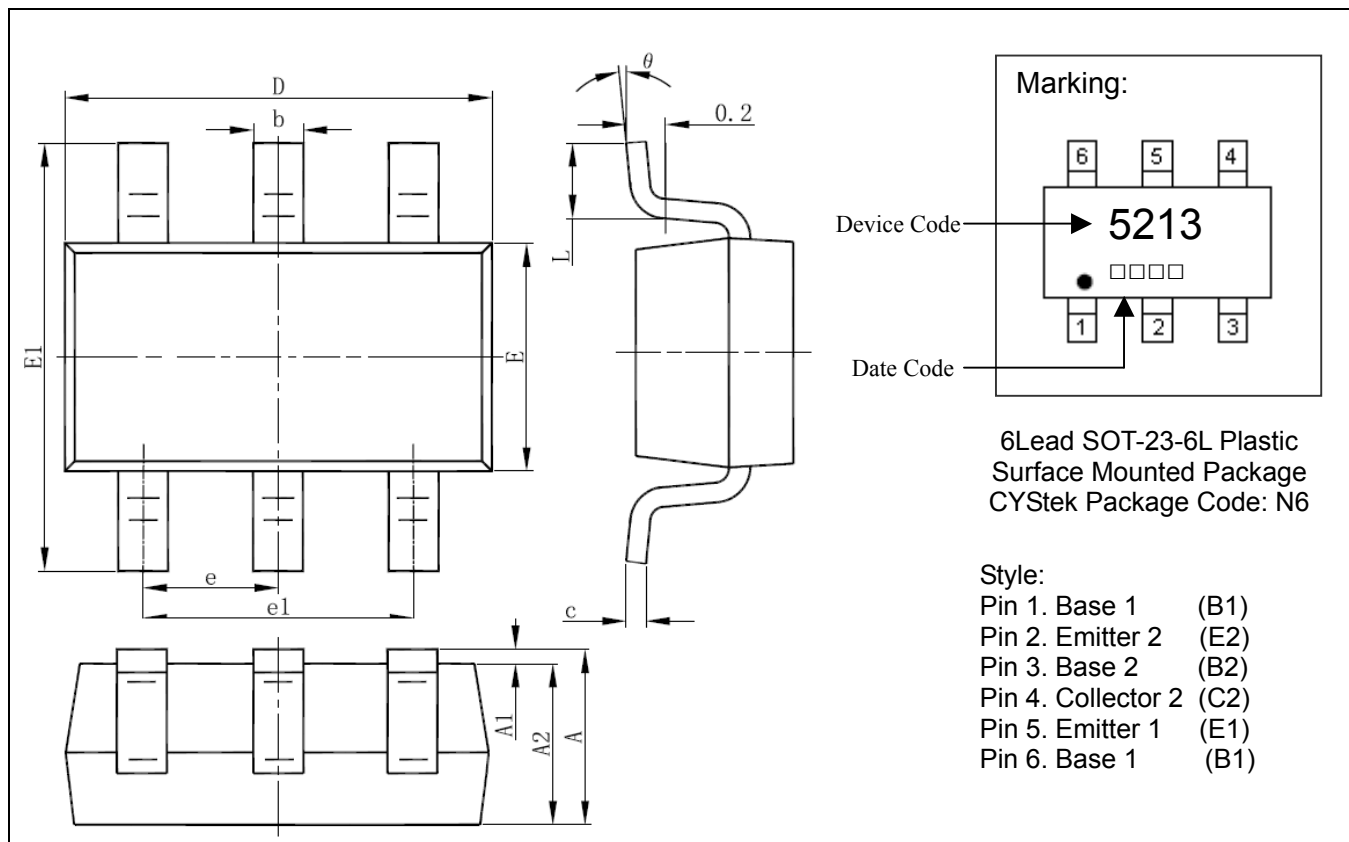
Recommended temperature profile for IR reflow



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 (TL)	183°C	217°C
- Time (tL)	60-150 seconds	60-150 seconds
Peak Temperature(TP)	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-23-6L Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049	E	1.500	1.700	0.059	0.067
A1	0.000	0.100	0.000	0.004	E1	2.650	2.950	0.104	0.116
A2	1.050	1.150	0.041	0.045	e	0.950 (BSC)		0.037 (BSC)	
b	0.300	0.500	0.012	0.020	e1	1.800	2.000	0.071	0.079
c	0.100	0.200	0.004	0.008	L	0.300	0.600	0.012	0.024
D	2.820	3.020	0.111	0.119	θ	0°	8°	0°	8°

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.