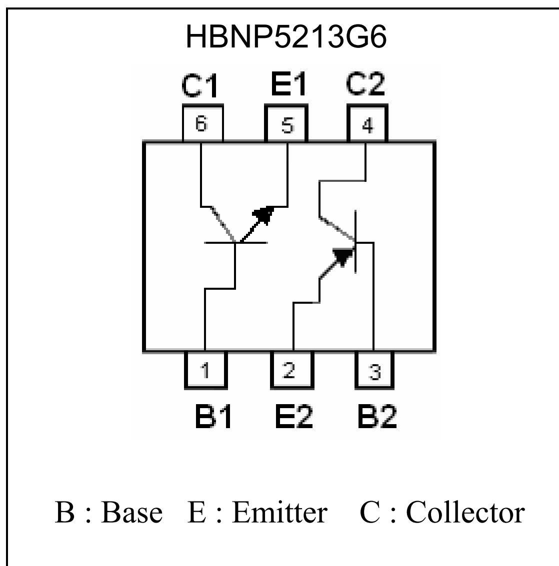
NPN AND PNP Dual Epitaxial Planar Transistors

HBNP5213G6

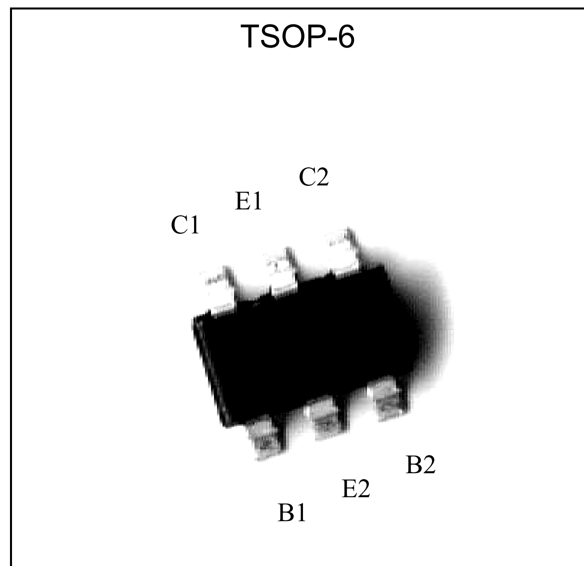
Features

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

Equivalent Circuit

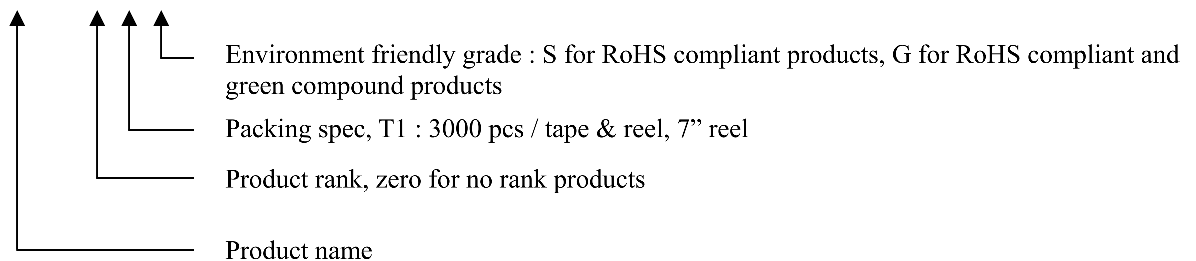


Outline



Ordering Information

Device	Package	Shipping
HBNP5213G6-0-T1-G	TSOP-6 (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)	Pd	1.14		W
Linear Derating Factor		0.01		W / °C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,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 (Tj=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
Cob	-	6	15	pF	V_{CB}=10V, I_E=0A, f=1MHz

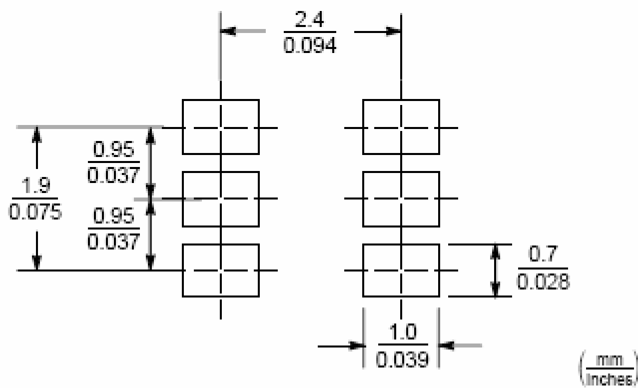
*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

PNP Electrical Characteristics (Tj=25°C, unless otherwise specified)

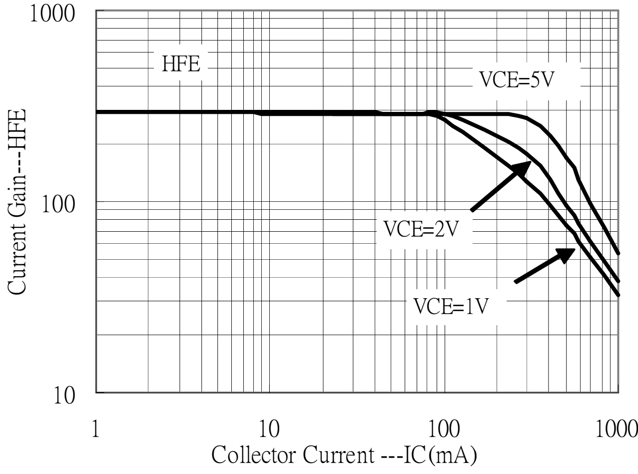
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-100	-	-	V	I_C=-100μA
BV_{CEO}	-80	-	-	V	I_C=-10mA
BV_{EBO}	-7	-	-	V	I_E=-10μA
I_{CBO}	-	-	-100	nA	V_{CB}=-100V
I_{EBO}	-	-	-100	nA	V_{EB}=-7V
*$V_{CE(sat)}$1	-	-0.16	-0.3	V	I_C=-500mA, I_B=-50mA
*$V_{CE(sat)}$2	-	-	-0.6	V	I_C=-700mA, I_B=-35mA
*$V_{BE(sat)}$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

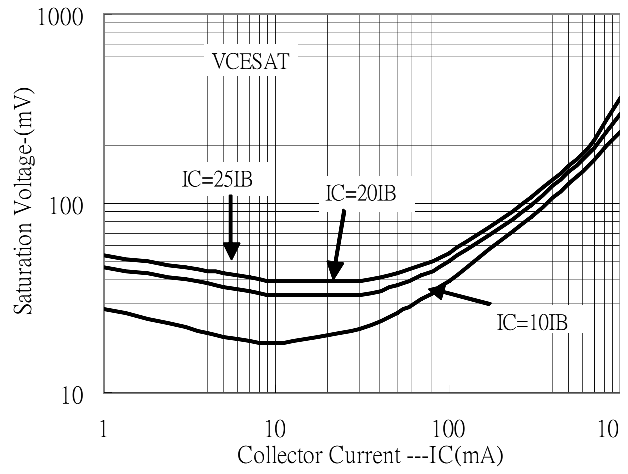
*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

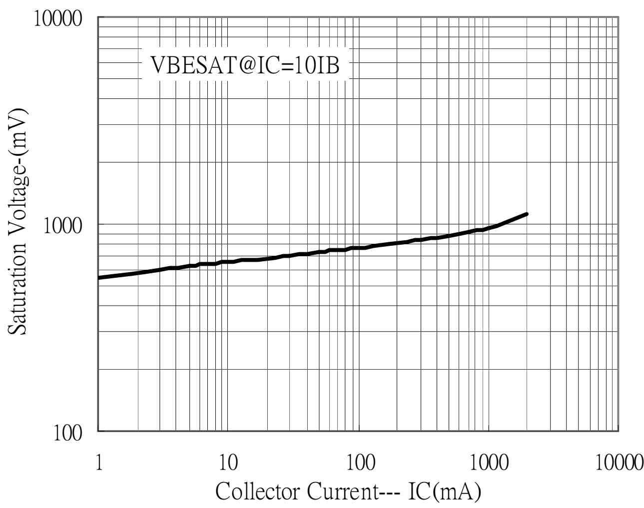
Recommended Soldering Footprint

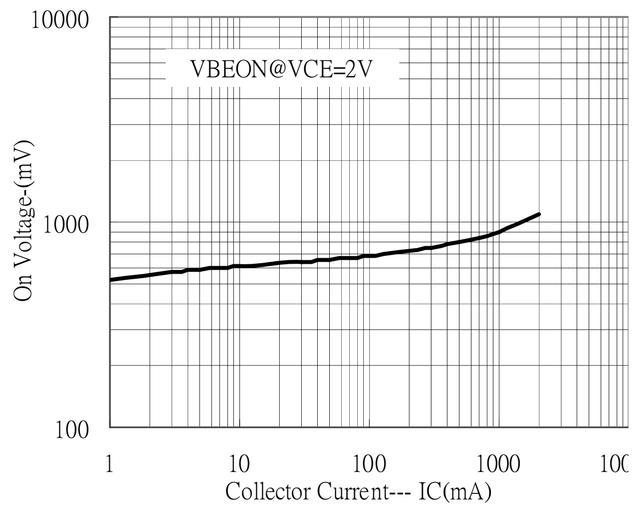


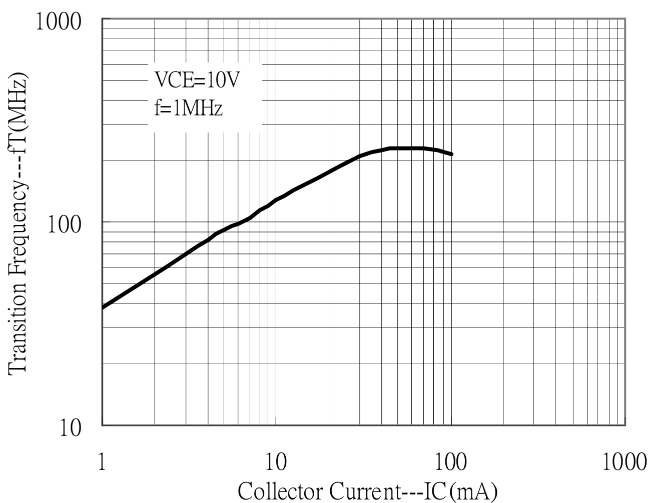
Q1, NPN Typical Characteristics

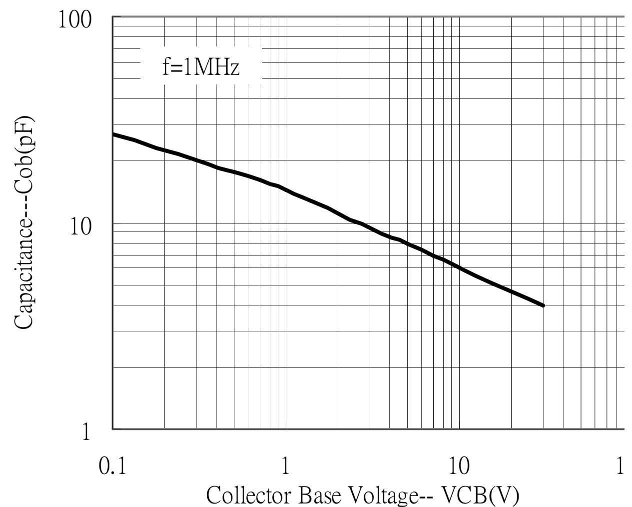




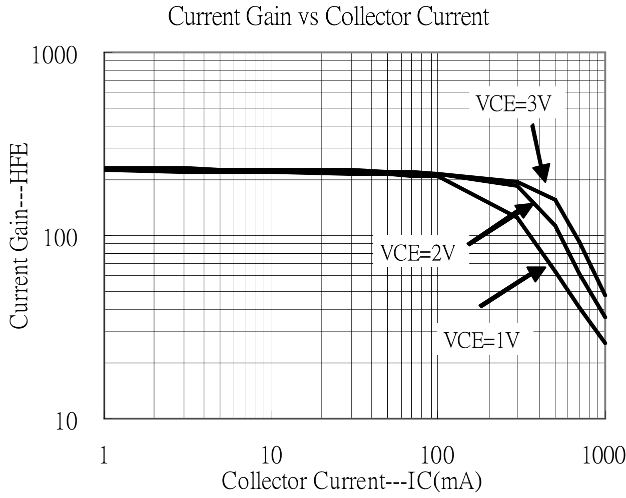


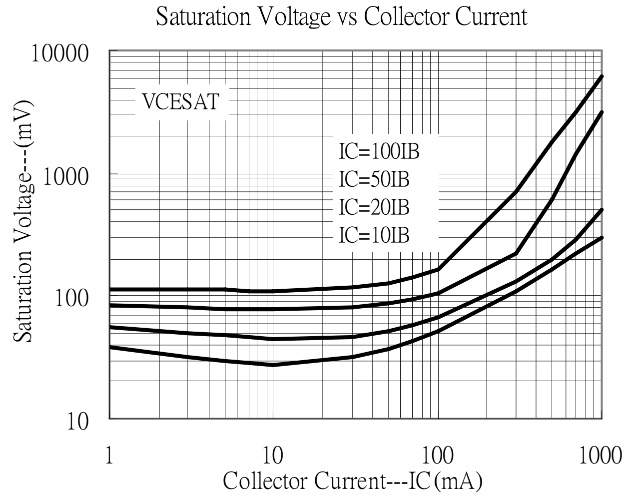


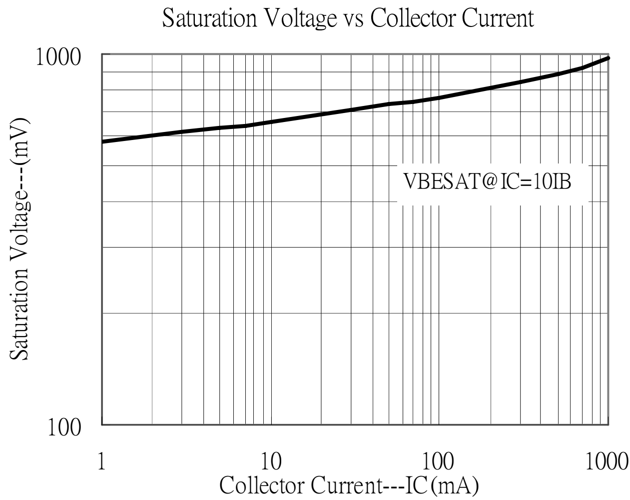


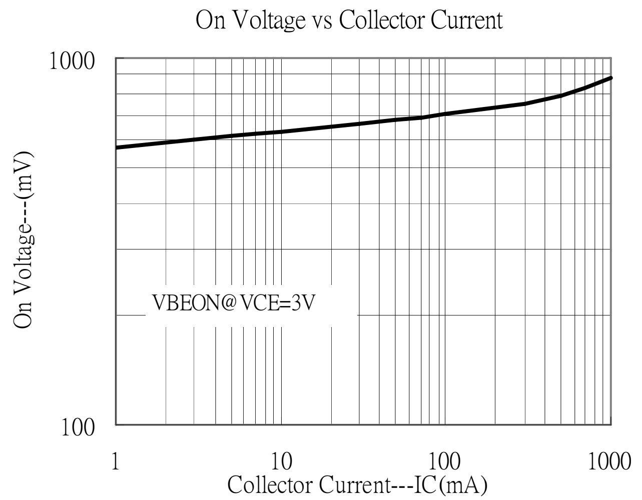


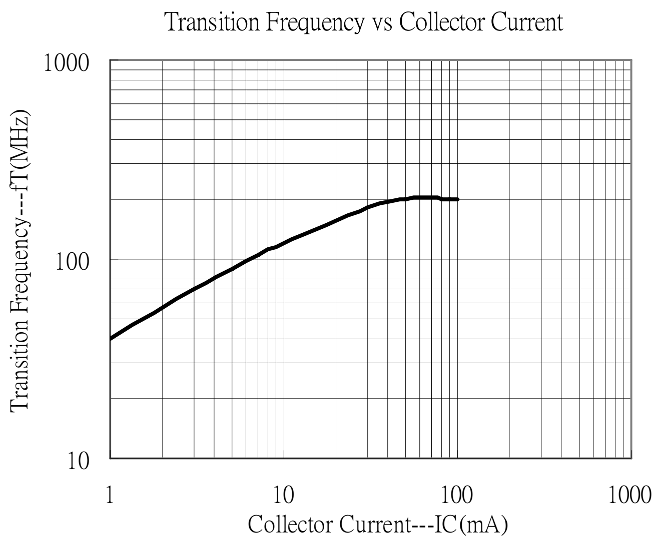
Q2, PNP Typical Characteristics

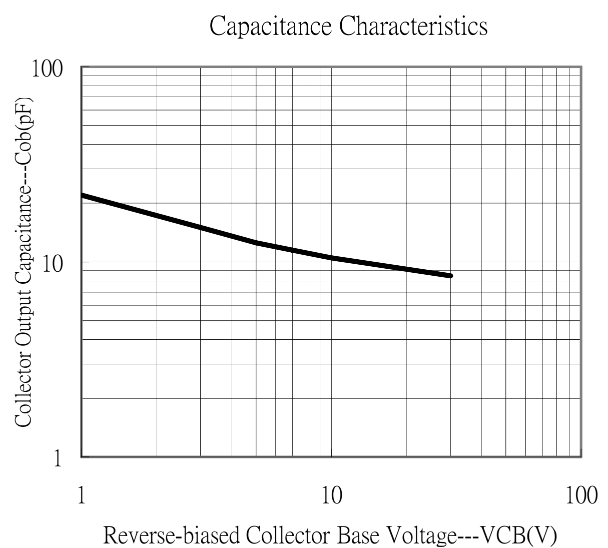




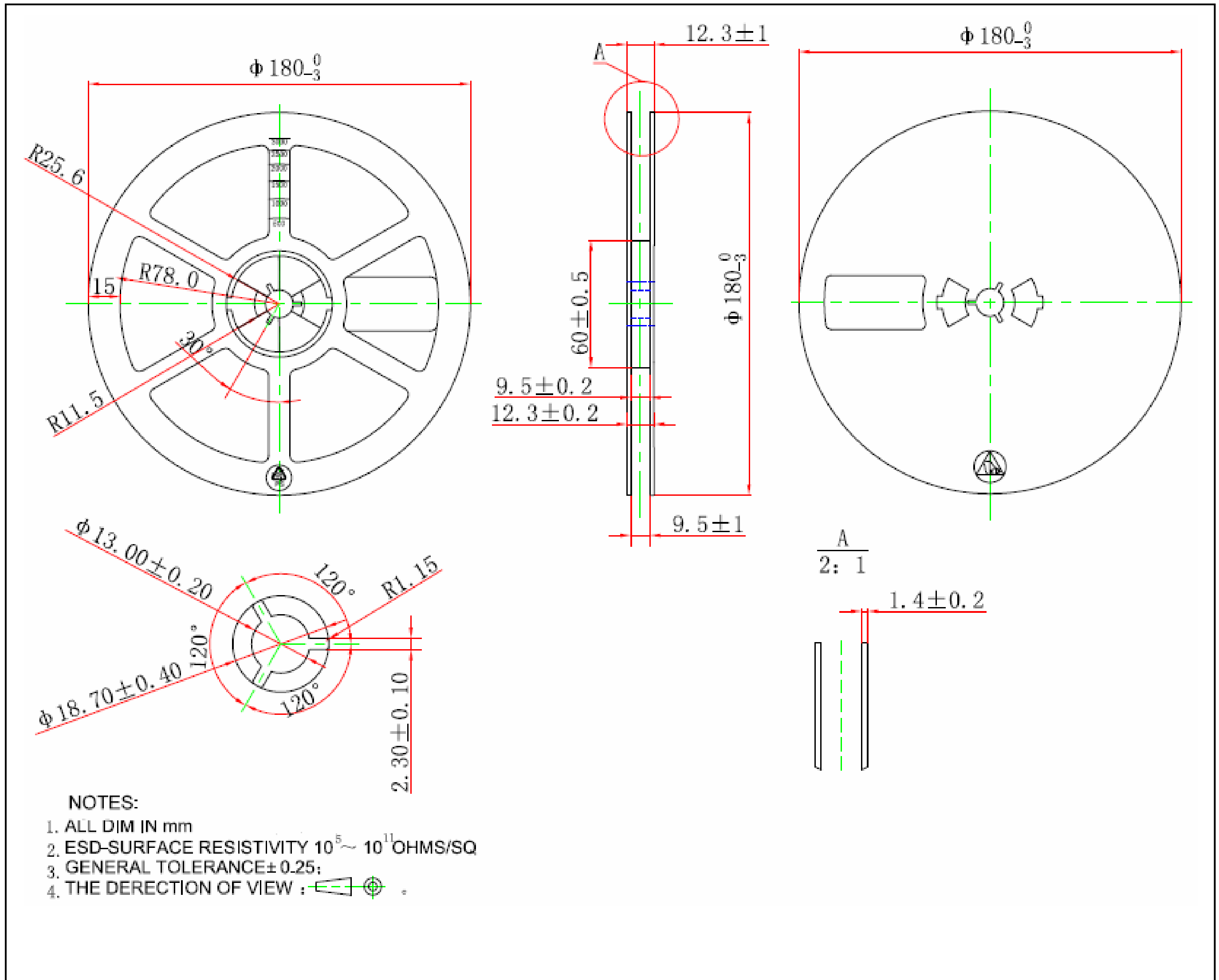




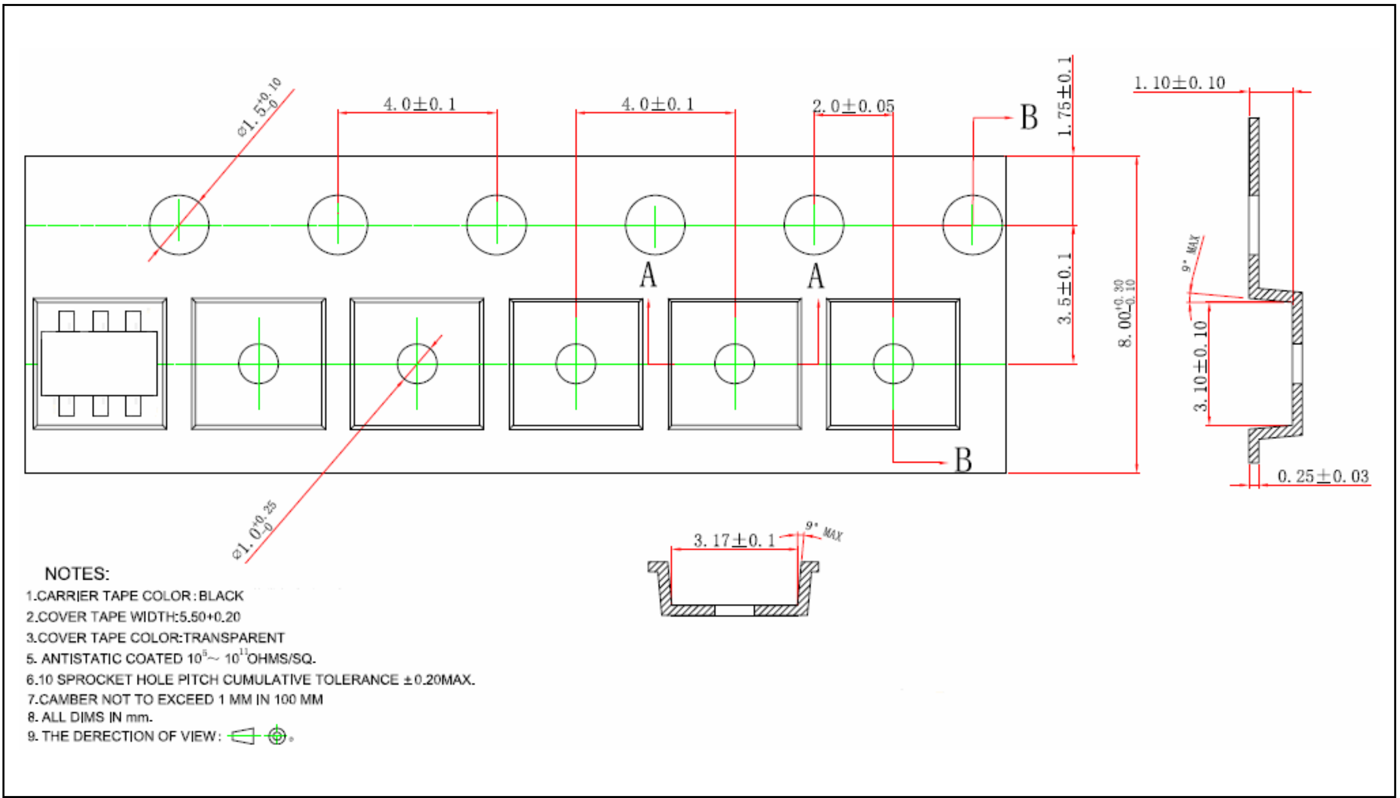




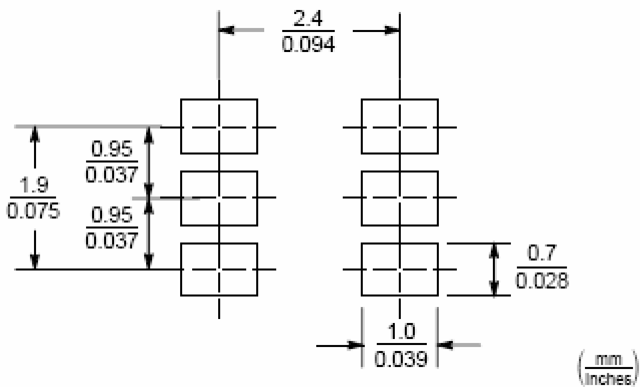
Reel Dimension



Carrier Tape Dimension



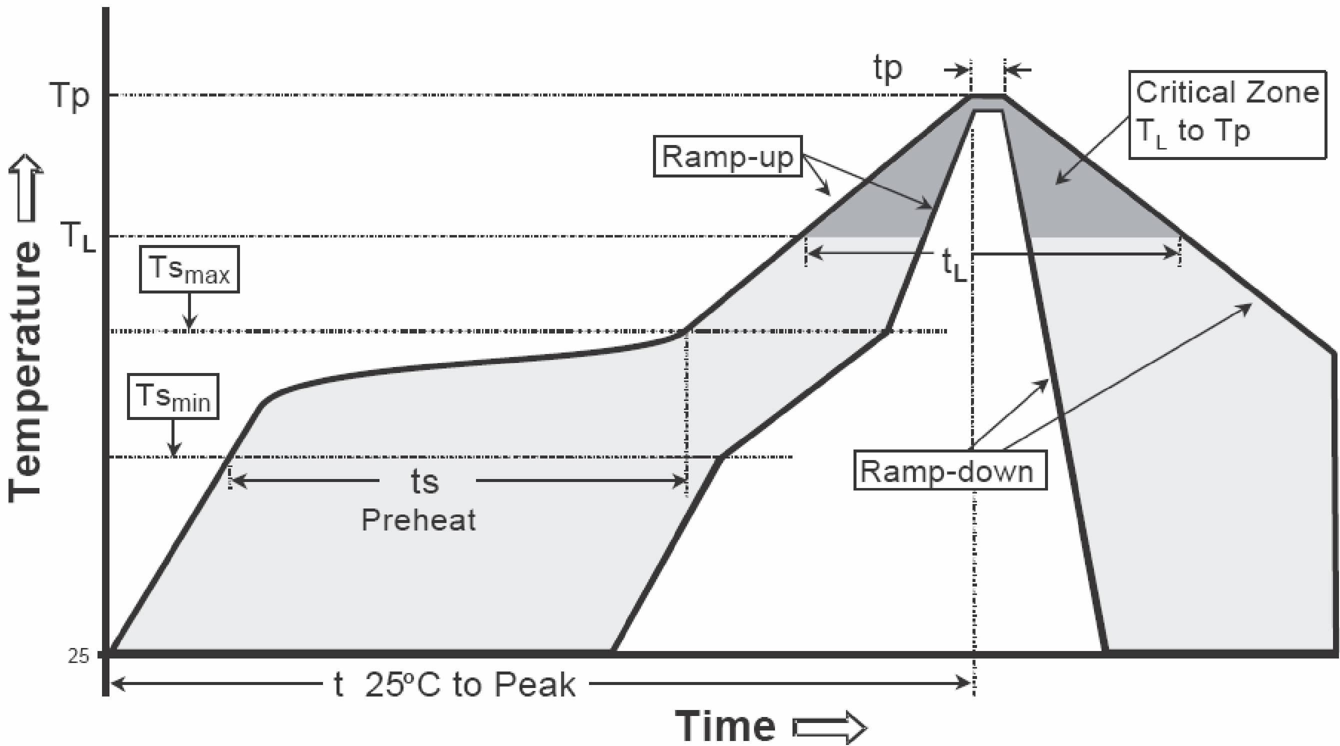
Recommended Soldering Footprint



Recommended wave soldering condition

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

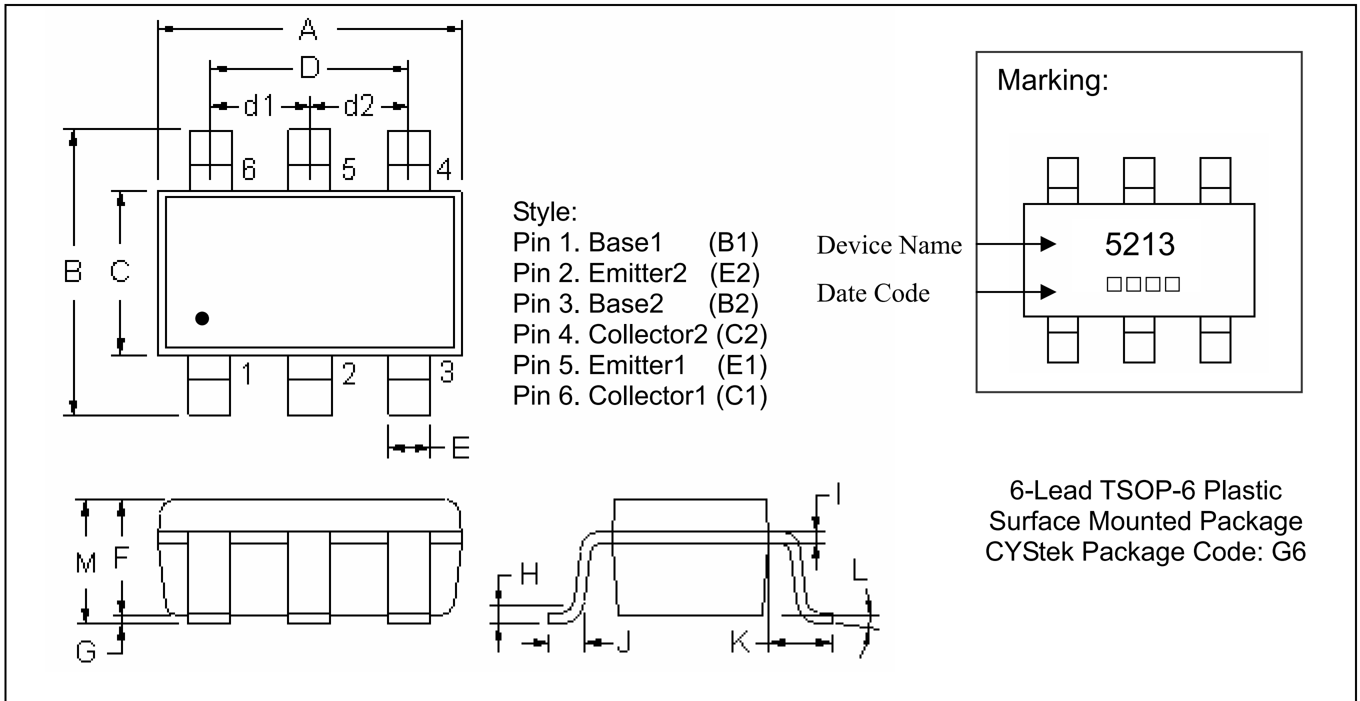
Recommended temperature profile for IR reflow



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) −Temperature Max(Ts max) −Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_P)	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.

TSOP-6 Dimension



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1063	0.1220	2.70	3.10	G	0	0.0039	0	0.10
B	0.1024	0.1181	2.60	3.00	H	-	0.0098	-	0.25
C	0.0551	0.0709	1.40	1.80	I	0.0047 REF		0.12 REF	
D	0.0748 REF		1.90 REF		J	0.0177 REF		0.45 REF	
d1	0.0374 REF		0.95 REF		K	0.0236 REF		0.60 REF	
d2	0.0374 REF		0.95 REF		L	0°	10°	0°	10°
E	0.0118	0.0197	0.30	0.50	M	-	0.0433	-	1.10
F	0.0276	0.0394	0.70	1.00					

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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