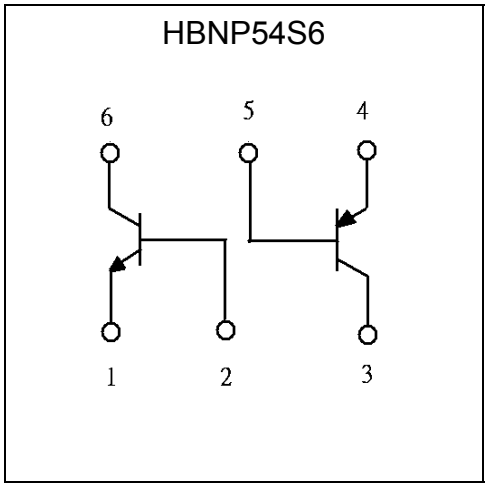
General Purpose NPN / PNP Epitaxial Planar Transistors (dual transistors)

HBNP54S6

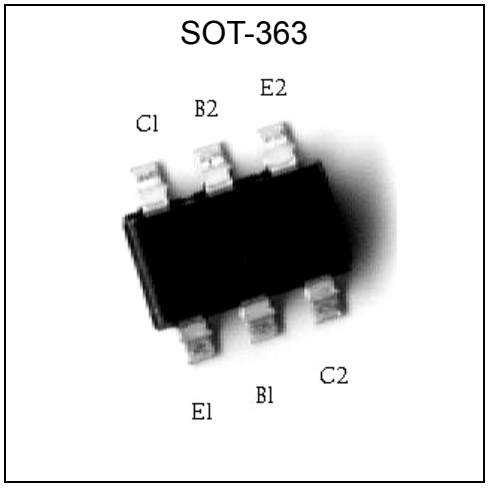
Features

- Includes a BTC3906 chip and BTA1514 chip in a SOT-363 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



Ordering Information

Device	Package	Shipping
HBNP54S6-0-T1-G	SOT-363 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T1 : 3000 pcs / tape & reel, 7” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits		Unit
		TR1 (NPN)	TR2 (PNP)	
Collector-Base Voltage	V_{CBO}	180	-160	V
Collector-Emitter Voltage	V_{CEO}	160	-160	V
Emitter-Base Voltage	V_{EBO}	6	-6	V
Collector Current	I_C	600	-600	mA
Power Dissipation	Pd	200(total) *1		mW
Junction Temperature	Tj	150		°C
Storage Temperature	Tstg	-55~+150		°C

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

Characteristics (Ta=25°C)

•Q1, TR1 (NPN)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	180	-	-	V	I_C=100μA
BV_{CEO}	160	-	-	V	I_C=1mA
BV_{EBO}	6	-	-	V	I_E=10μA
I_{CBO}	-	-	50	nA	V_{CB}=180V
I_{EBO}	-	-	50	nA	V_{EB}=6V
*$V_{CE(sat)}1$	-	0.1	0.15	V	I_C=10mA, I_B=1mA
*$V_{CE(sat)}2$	-	-	0.2	V	I_C=50mA, I_B=5mA
*$V_{BE(sat)}1$	-	-	0.9	V	I_C=10mA, I_B=1mA
*$V_{BE(sat)}2$	-	-	1.0	V	I_C=50mA, I_B=5mA
*$h_{FE}1$	100	-	-	-	V_{CE}=5V, I_C=1mA
*$h_{FE}2$	120	-	270	-	V_{CE}=5V, I_C=10mA
*$h_{FE}3$	40	-	-	-	V_{CE}=5V, I_C=50mA
f_T	100	-	-	MHz	V_{CE}=20V, I_C=10mA, f=100MHz
Cob	-	-	6	pF	V_{CB}=20V, I_E=0A,f=1MHz

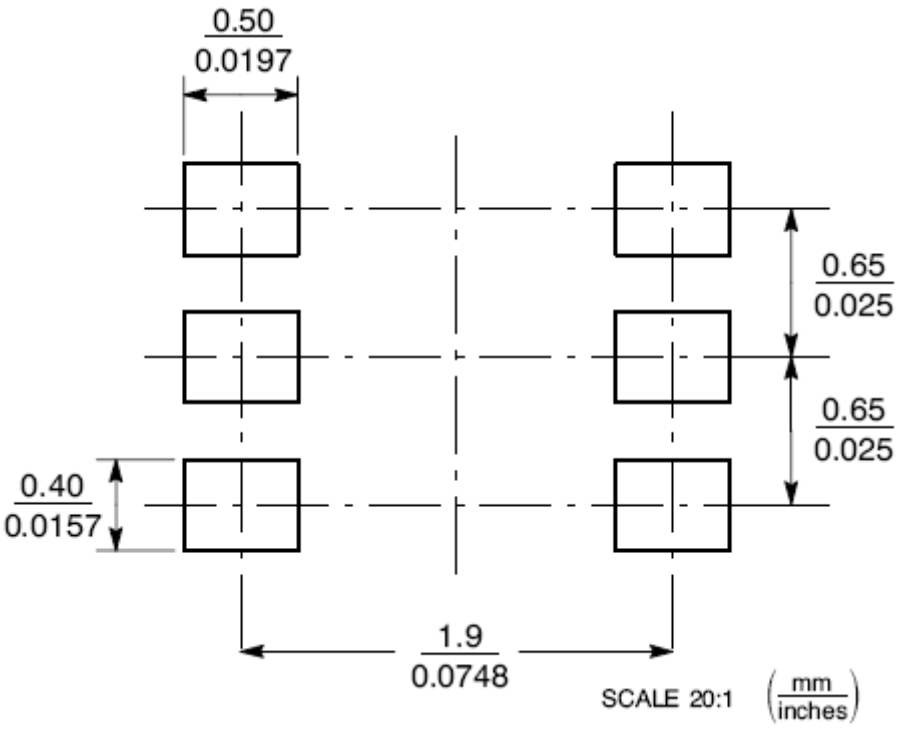
*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

• Q2, TR2 (PNP)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-160	-	-	V	I_C=-50μA
BV_{CEO}	-160	-	-	V	I_C=-1mA
BV_{EBO}	-6	-	-	V	I_E=-50μA
I_{CBO}	-	-	-50	nA	V_{CB}=-160V
I_{EBO}	-	-	-50	nA	V_{EB}=-6V
*$V_{CE(sat)}$1	-	-	-0.2	V	I_C=-10mA, I_B=-1mA
*$V_{CE(sat)}$2	-	-	-0.3	V	I_C=-50mA, I_B=-5mA
*$V_{BE(sat)}$1	-	-	-0.9	V	I_C=-10mA, I_B=-1mA
*$V_{BE(sat)}$2	-	-	-1.0	V	I_C=-50mA, I_B=-5mA
*h_{FE}1	90	-	-	-	V_{CE}=-5V, I_C=-1mA
*h_{FE}2	120	-	270	-	V_{CE}=-5V, I_C=-10mA
*h_{FE}3	40	-	-	-	V_{CE}=-5V, I_C=-50mA
f_T	100	-	-	MHz	V_{CE}=-30V, I_C=-10mA, f=100MHz
Cob	-	-	6	pF	V_{CB}=-30V, I_E=0A,f=1MHz

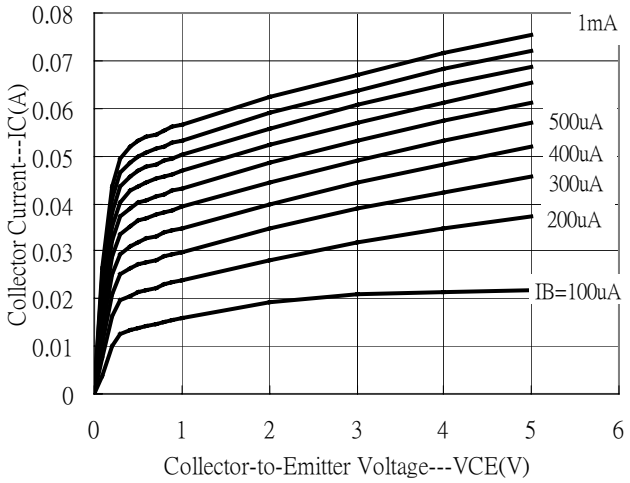
*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

Recommended Soldering Footprint

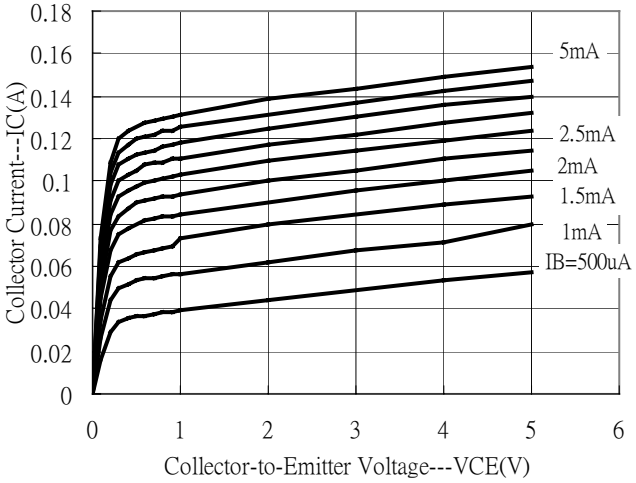


Q1, Typical Characteristics

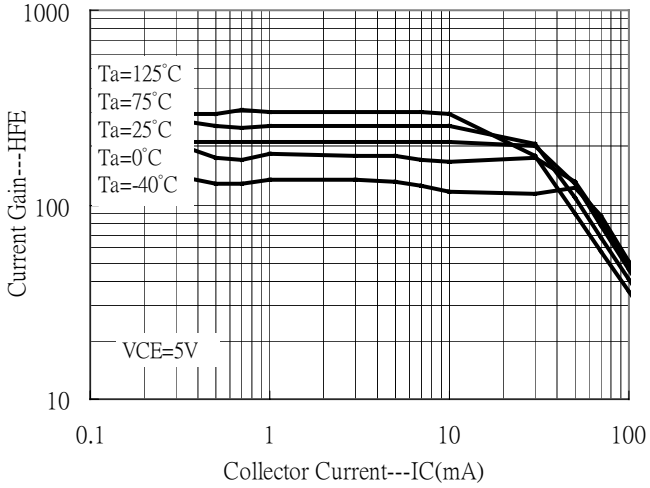
Emitter Grounded Output Characteristics



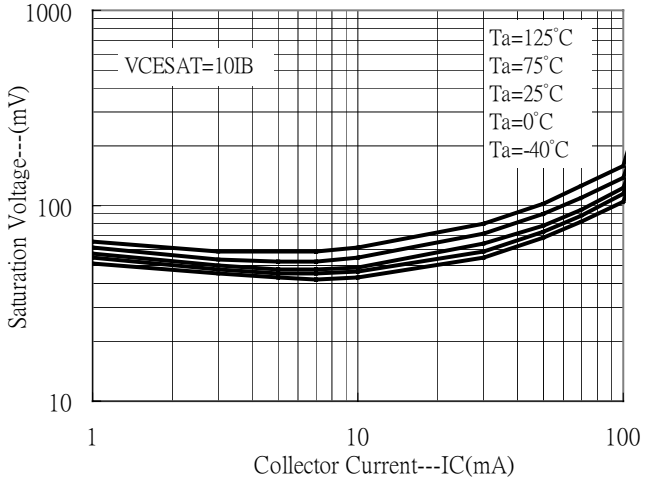
Emitter Grounded Output Characteristics



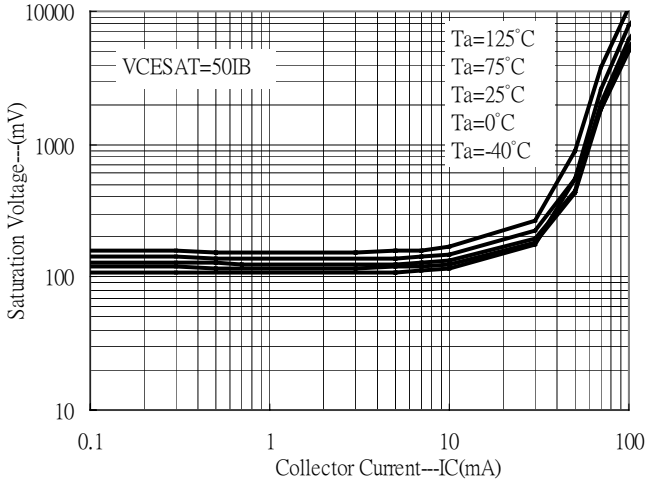
Current Gain vs Collector Current



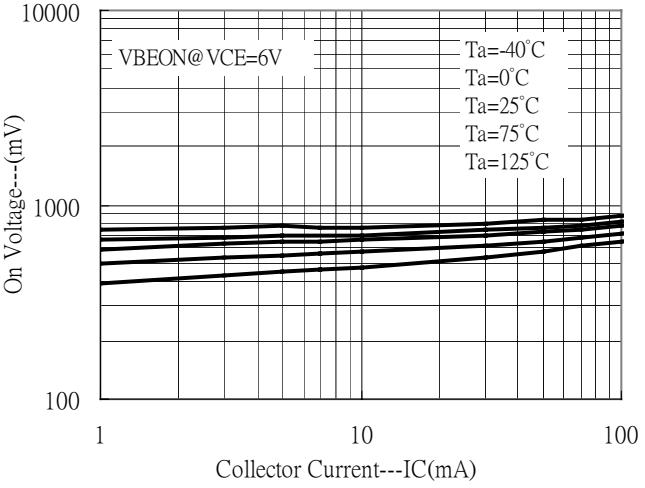
Saturation Voltage vs Collector Current



Saturation Voltage vs Collector Current

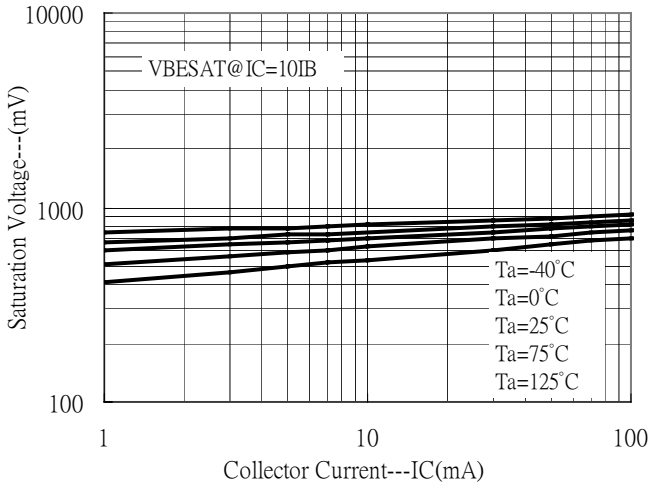


On Voltage vs Collector Current

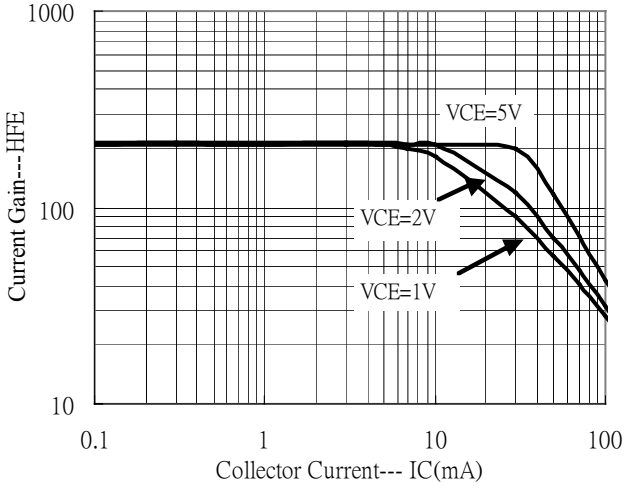


Q1, Typical Characteristics(Cont.)

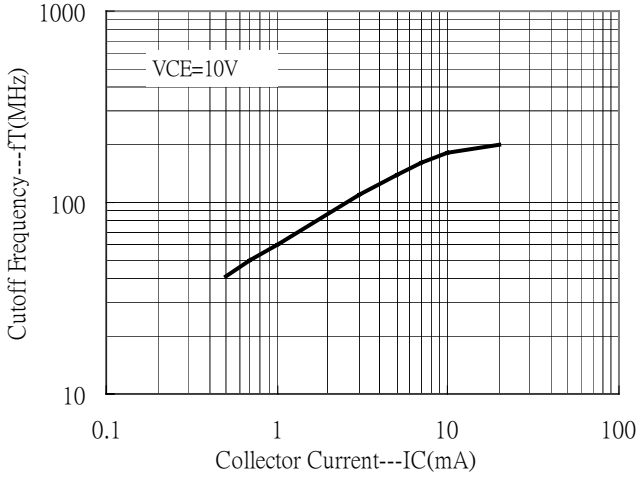
Saturation Voltage vs Collector Current



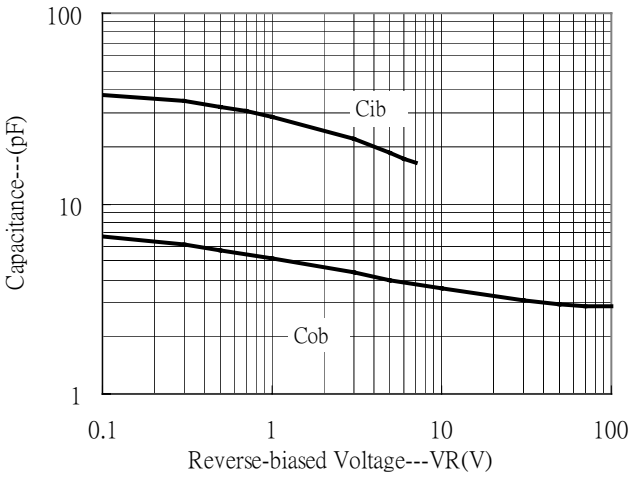
Current Gain vs Collector Current



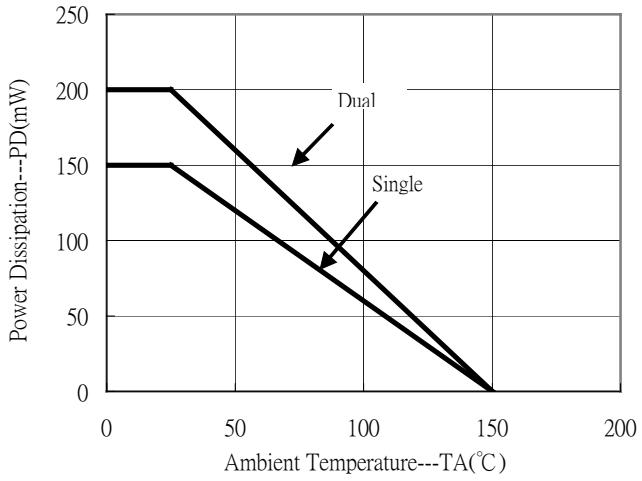
Cutoff Frequency vs Collector Current



Capacitance vs Reverse-biased Voltage

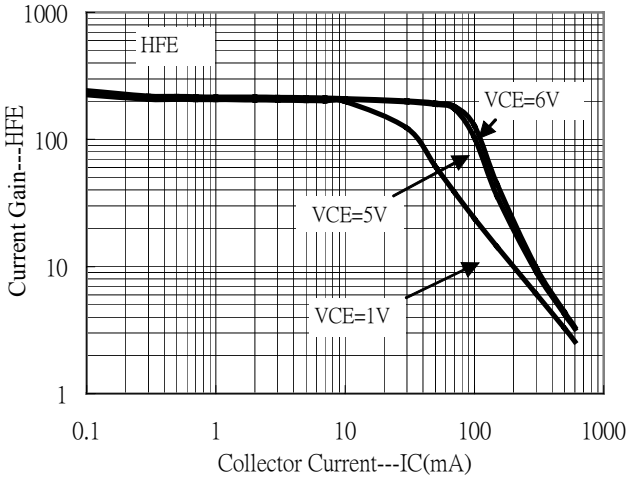


Power Derating Curves

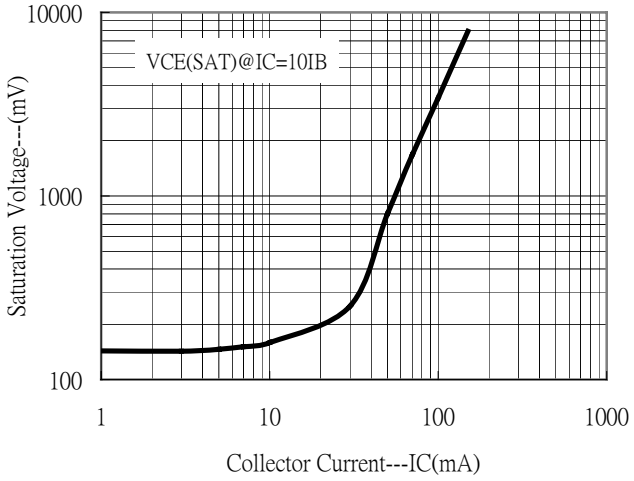


Q2, Typical Characteristics

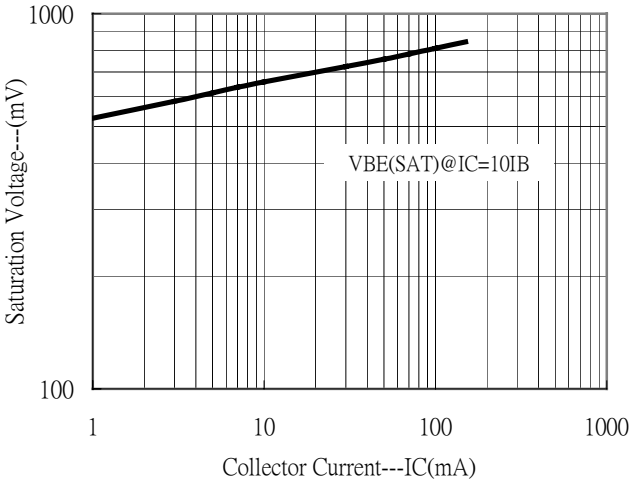
Current Gain vs Collector Current



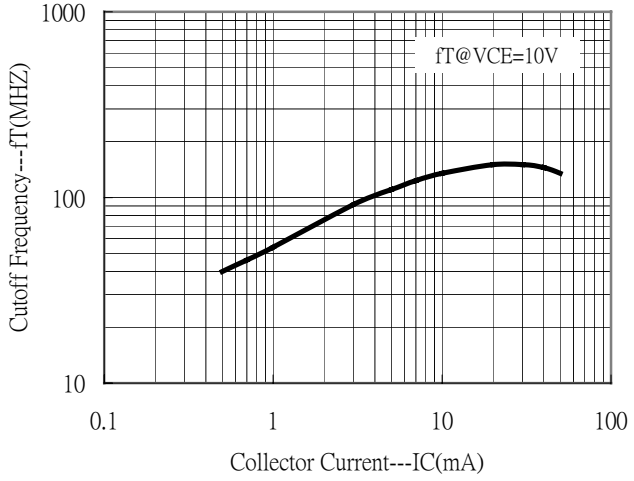
Saturation Voltage vs Collector Current



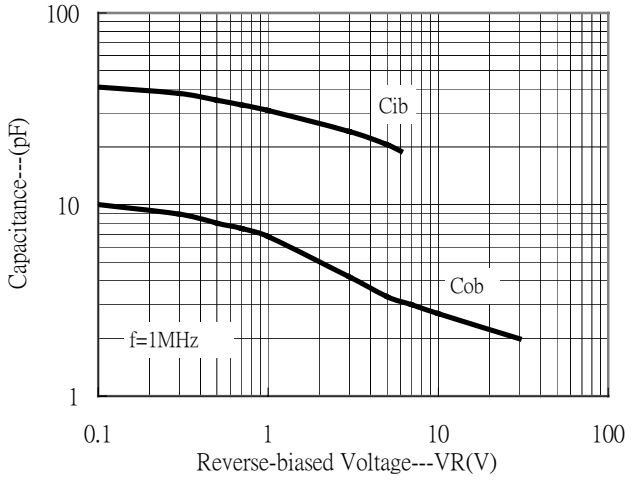
Saturation Voltage vs Collector Current



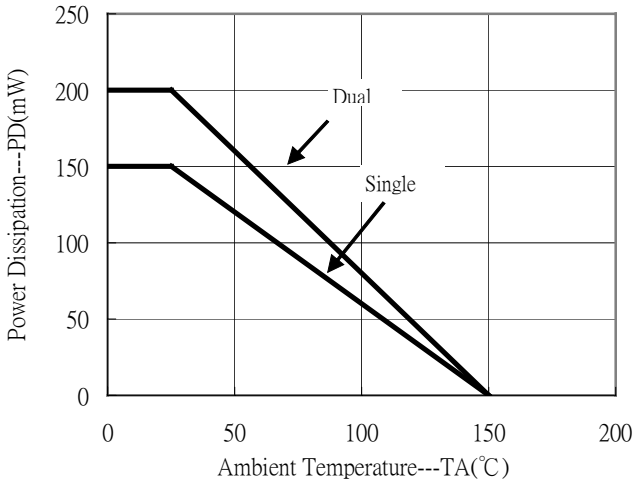
Cutoff Frequency vs Collector Current



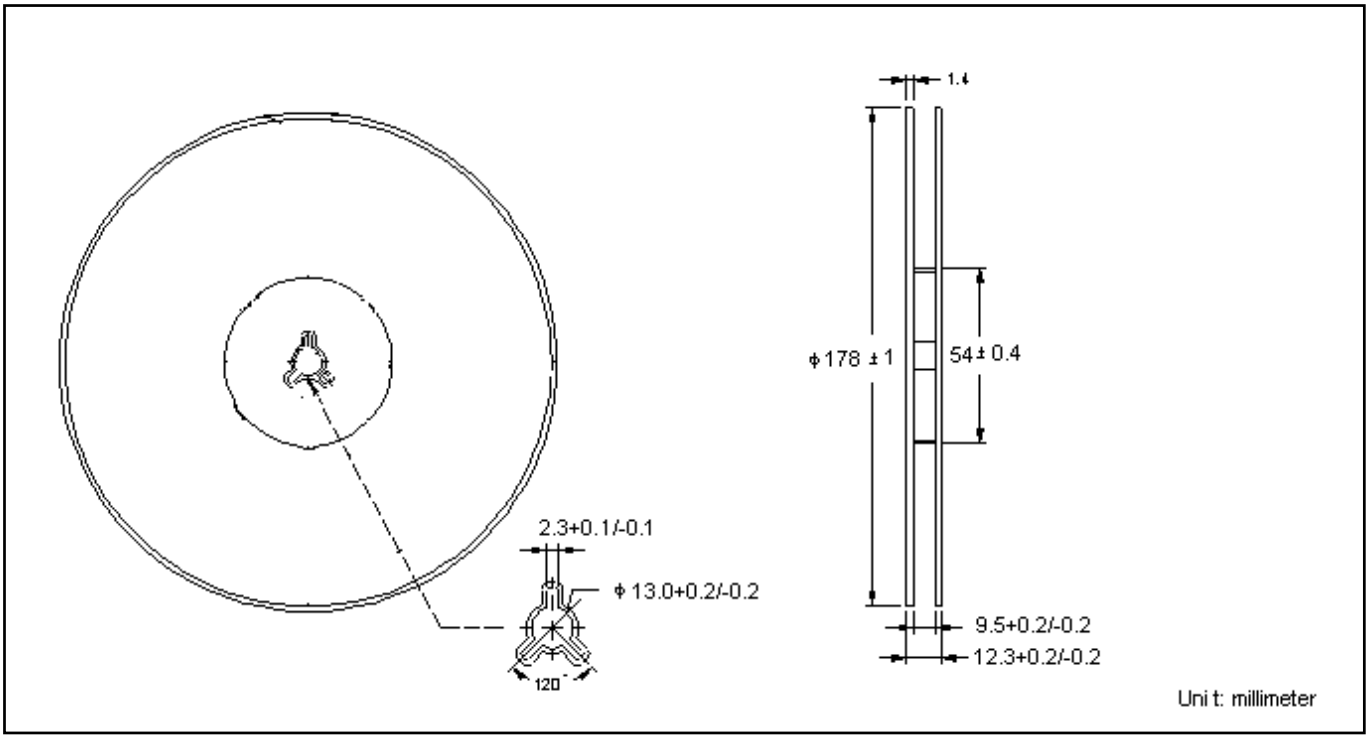
Capacitance Characteristics



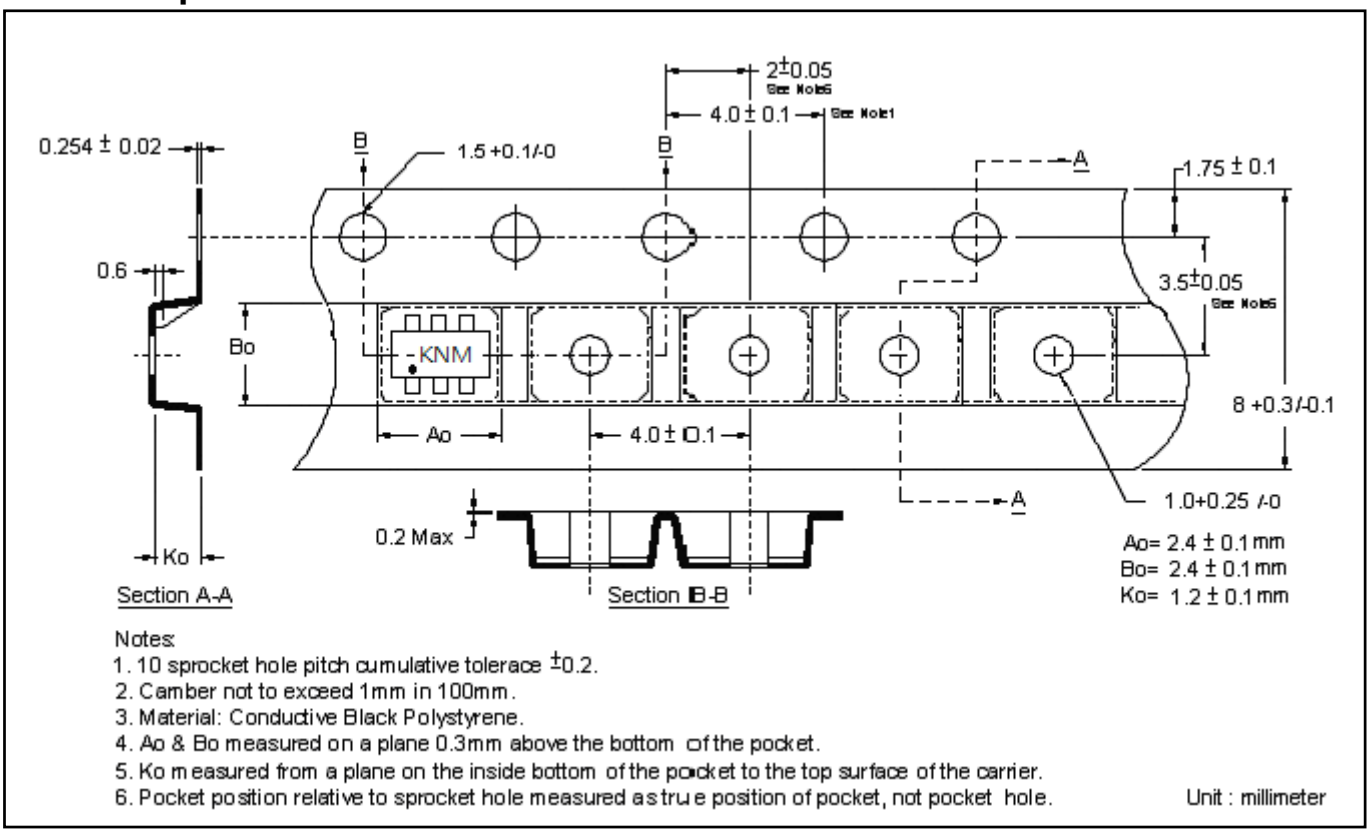
Power Derating Curves



Reel Dimension



Carrier Tape Dimension



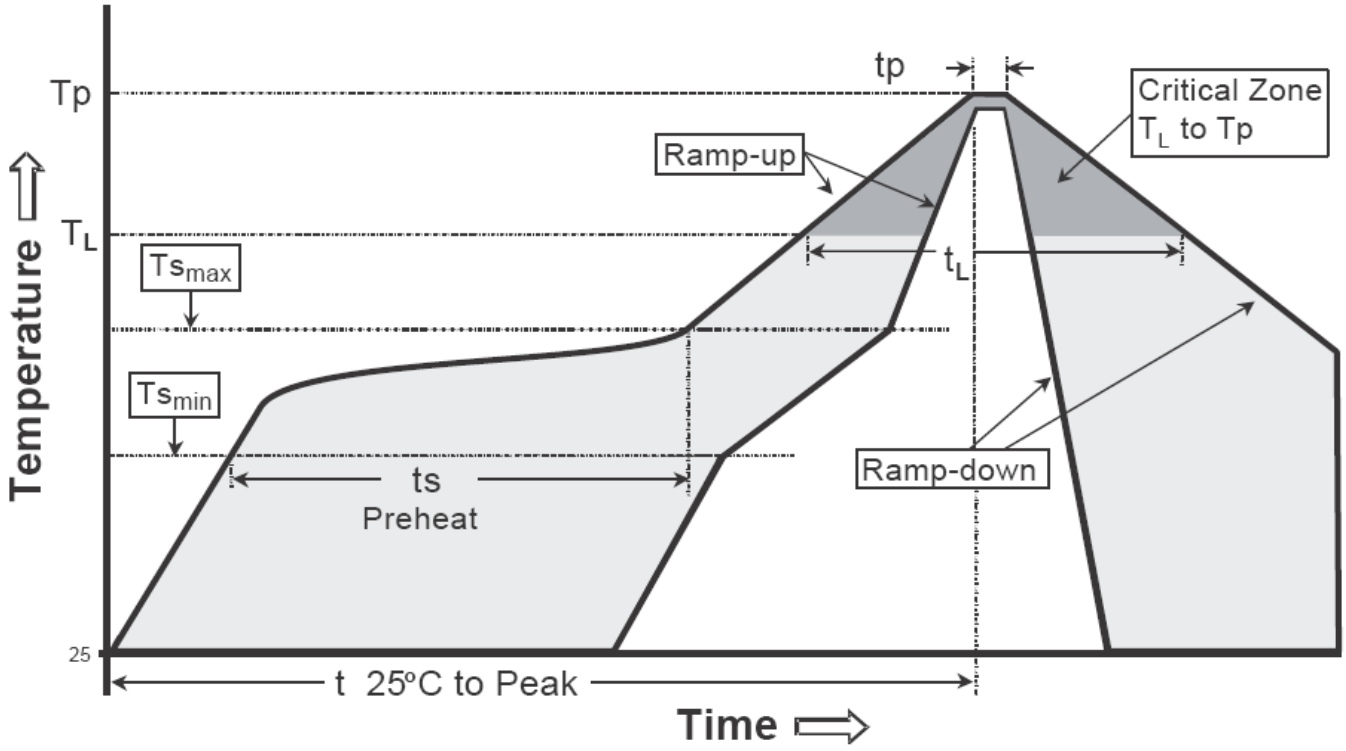
Notes:
1. 10 sprocket hole pitch cumulative tolerace ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: Conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : millimeter

Recommended wave soldering condition

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

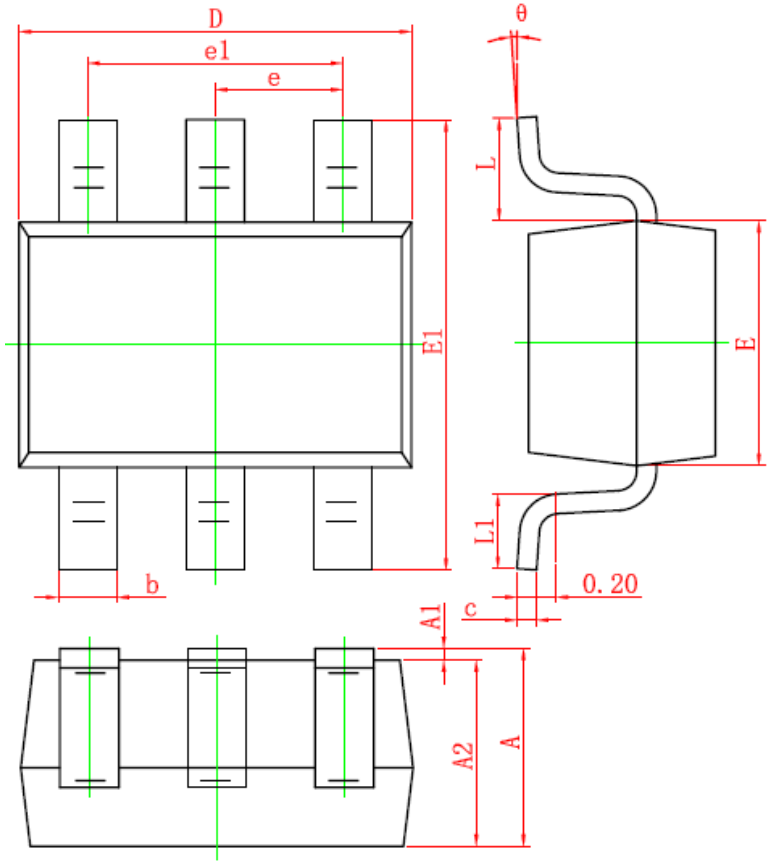
Recommended temperature profile for IR reflow



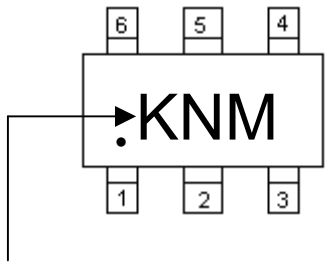
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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.

SOT-363 Dimension



Marking:



6-Lead SOT-363 Plastic
Surface Mounted Package
CYStek Package Code: S6

Style:
Pin 1. Emitter1 (E1)
Pin 2. Base1 (B1)
Pin 3. Collector2 (C2)
Pin 4. Emitter2 (E2)
Pin 5. Base2 (B2)
Pin 6. Collector1 (C1)

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	θ	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.