



TO-92



**Pin Definition:**

1. Emitter
2. Collector
3. Base

### PRODUCT SUMMARY

<b><math>BV_{CEO}</math></b>	530V
<b><math>BV_{CBO}</math></b>	900V
<b><math>I_C</math></b>	1.5A
<b><math>V_{CE(SAT)}</math></b>	0.5V @ $I_C=0.5A, I_B=0.1A$

### Features

- High Voltage
- High Speed Switching

### Structure

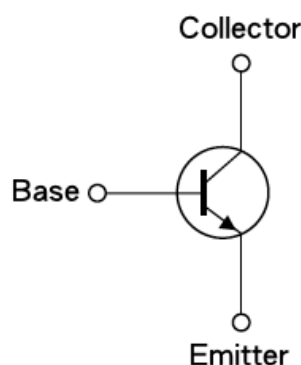
- Silicon Triple Diffused Type
- NPN Silicon Transistor

### Ordering Information

Part No.	Package	Packing
TS13003HVCT B0	TO-92	1Kpcs / Bulk
TS13003HVCT B0G	TO-92	1Kpcs / Bulk
TS13003HVCT A3	TO-92	2Kpcs / Ammo
TS13003HVCT A3G	TO-92	2Kpcs / Ammo

**Note:** "G" denote for Halogen Free Product

### Block Diagram



### Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Collector-Base Voltage	$V_{CBO}$	900	V
Collector-Emitter Voltage	$V_{CEO}$	530	V
Emitter-Base Voltage	$V_{EBO}$	10	V
Collector Current	DC	1.5	A
	Pulse	3	
Maximum Power Dissipation	$P_D$	0.5	W
	$P_{tot}$	1.96	W
Operating Junction Temperature	$T_J$	+150	°C
Operating Junction and Storage Temperature Range	$T_{STG}$	- 55 to +150	°C

### Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Case Thermal Resistance	$R_{\theta JC}$	64	°C/W
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	248	°C/W

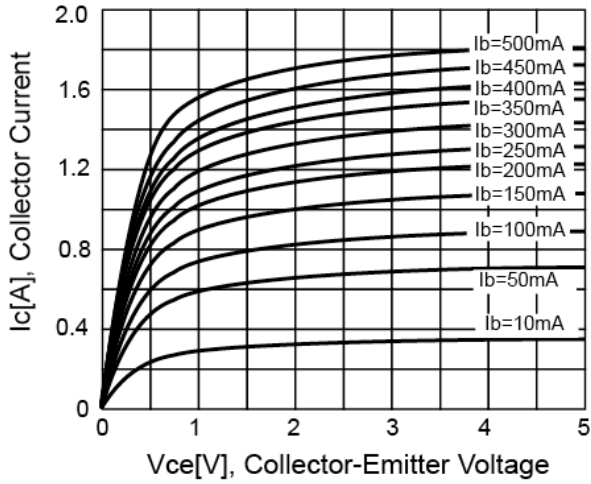
**Electrical Specifications** (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Collector-Base Voltage	I <sub>C</sub> =1mA, I <sub>B</sub> =0	BV <sub>CBO</sub>	900	--	--	V
Collector-Emitter Breakdown Voltage	I <sub>C</sub> =10mA, I <sub>E</sub> =0	BV <sub>CEO</sub>	530	--	--	V
Emitter-Base Breakdown Voltage	I <sub>E</sub> =1mA, I <sub>C</sub> =0	BV <sub>EBO</sub>	9	--	--	V
Collector Cutoff Current	V <sub>CB</sub> =800V, I <sub>E</sub> =0	I <sub>CBO</sub>	--	--	10	uA
Emitter Cutoff Current	V <sub>EB</sub> =10V, I <sub>C</sub> =0	I <sub>EBO</sub>	--	--	0.5	uA
Collector-Emitter Saturation Voltage	I <sub>C</sub> =0.5A, I <sub>B</sub> =0.1A	V <sub>CE(SAT)1</sub>	--	0.3	0.5	V
	I <sub>C</sub> =1A, I <sub>B</sub> =0.25A	V <sub>CE(SAT)2</sub>	--	0.5	1	
	I <sub>C</sub> =1.5A, I <sub>B</sub> =0.5A	V <sub>CE(SAT)3</sub>	--	0.9	2	
Base-Emitter Saturation Voltage	I <sub>C</sub> =0.5A, I <sub>B</sub> =0.1A	V <sub>BE(SAT)1</sub>	--	--	1	V
	I <sub>C</sub> =1A, I <sub>B</sub> =0.25A	V <sub>BE(SAT)2</sub>	--	--	1.2	
DC Current Gain	V <sub>CE</sub> =10V, I <sub>C</sub> =10mA	h <sub>FE</sub>	15	--	40	
	V <sub>CE</sub> =10V, I <sub>C</sub> =400mA		20	--	40	
	V <sub>CE</sub> =10V, I <sub>C</sub> =1A		6	--	40	
<b>Dynamic Characteristics</b>						
Frequency	V <sub>CE</sub> =10V, I <sub>C</sub> =0.1A	f <sub>T</sub>	4	--	--	MHz
Output Capacitance	V <sub>CB</sub> =10V, f=0.1MHz	Cob	--	21	--	pF
<b>Resistive Load Switching Time (Ratings)</b>						
Delay Time	V <sub>CC</sub> =125V, I <sub>C</sub> =1A, I <sub>B1</sub> = I <sub>B2</sub> = 0.2A, t <sub>p</sub> =25uS Duty Cycle ≤1%	t <sub>d</sub>	--	0.05	0.2	uS
Rise Time		t <sub>r</sub>	--	1.1	--	uS
Storage Time		t <sub>STG</sub>	--	2	4	uS
Fall Time		t <sub>f</sub>	--	0.4	0.7	uS

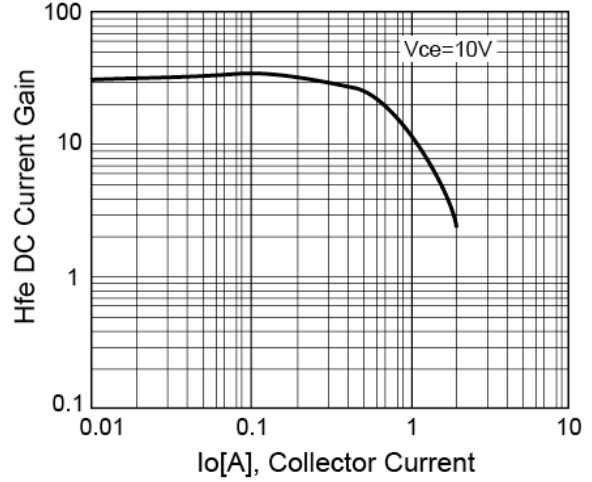
**Note:** pulse test: pulse width ≤300uS, duty cycle ≤2%

**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

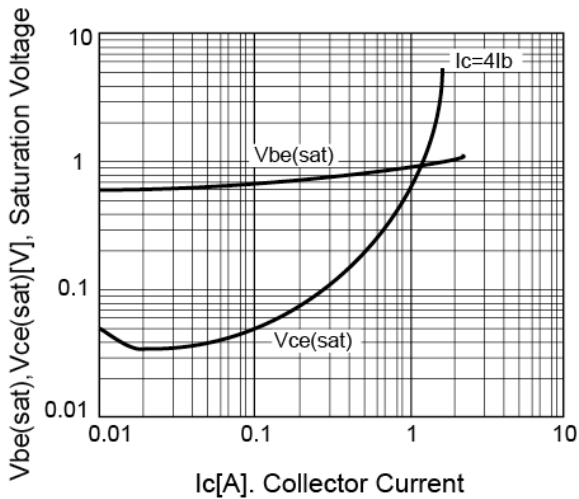
**Figure 1. Static Characteristics**



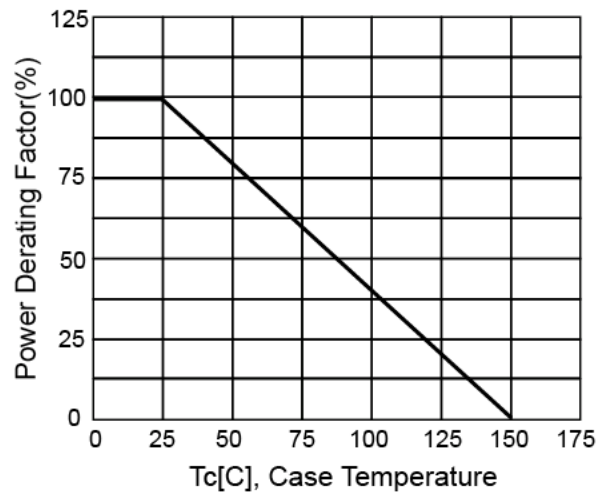
**Figure 2. DC Current Gain**



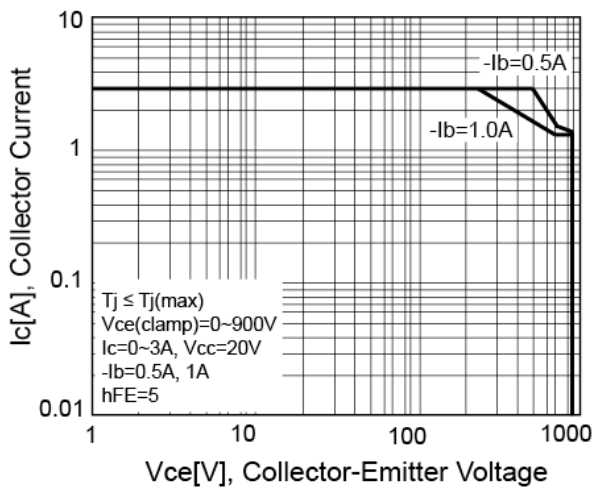
**Figure 3.  $V_{CE(SAT)}$  V.S.  $V_{BE(SAT)}$**



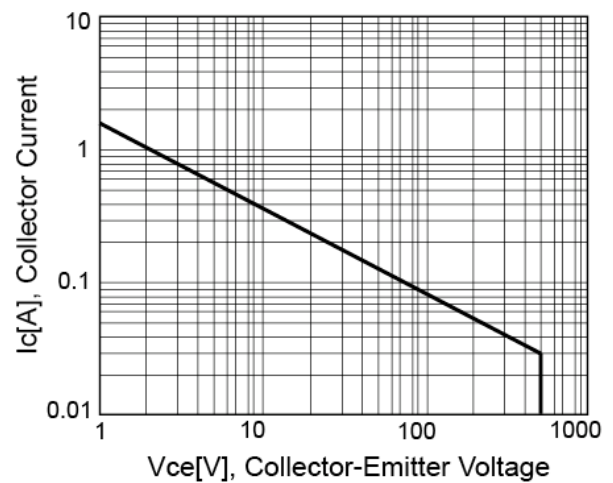
**Figure 4. Power Derating**



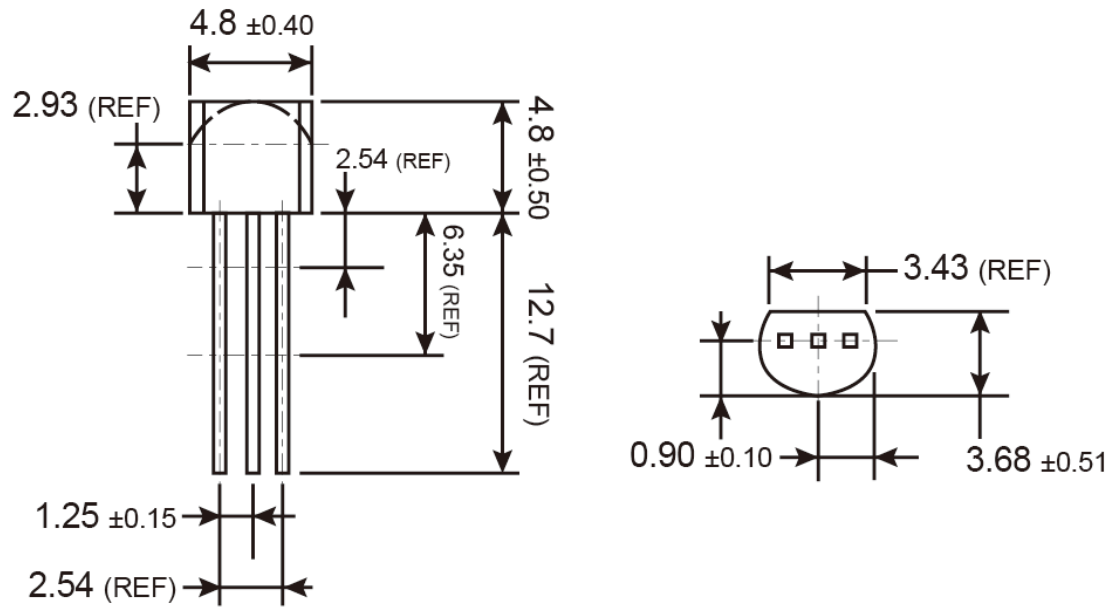
**Figure 5. Reverse Bias SOA**



**Figure 6. Safety Operating Area**

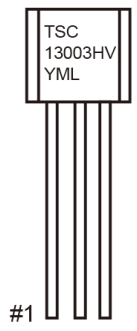


**TO-92 Mechanical Drawing**



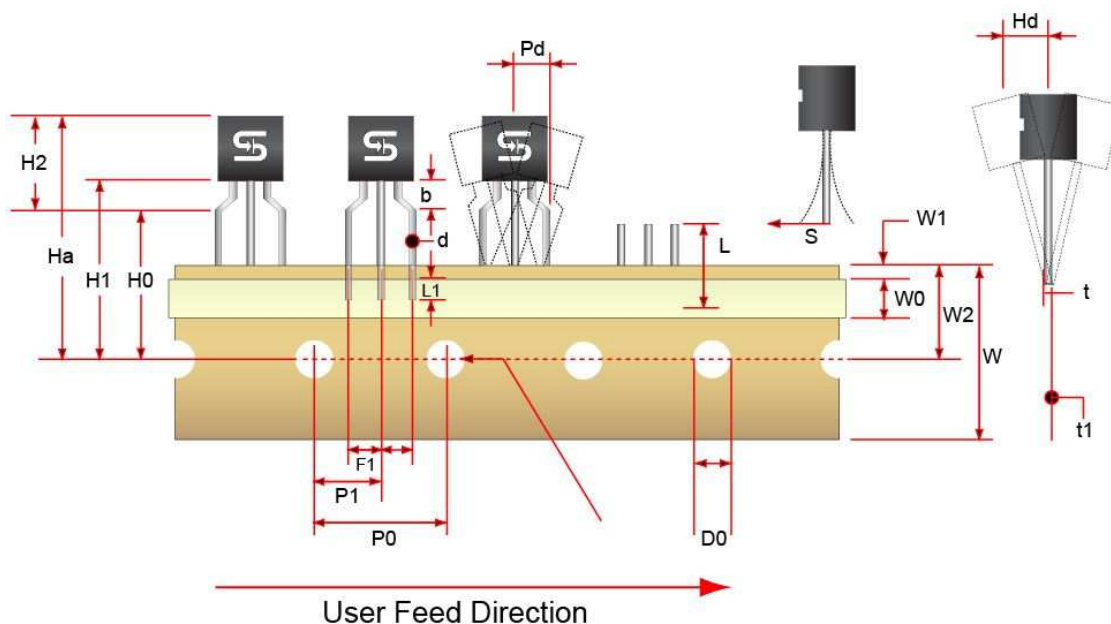
Unit: Millimeters

**Marking Diagram**



- Y** = Year Code
- M** = Month Code  
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- = Month Code for Halogen Free Product  
 (O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

**TO-92 Ammo Pack Mechanical Drawing**



**Tape Dimension**

Item Description	Symbol	Dimension
Base of Package to Lead Bend	b	3.0 (typ.)
Component Height	$H_a$	23.57 (typ.)
Lead Clinch Height	$H_0$	16.0 $\pm$ 0.5
Component Base Height	$H_1$	19.0 $\pm$ 0.5
Component Top to Lead Bend	$H_2$	8.0 (max)
Component Alignment (side / side)	$P_d$	1.02 (max)
Component Alignment (front / back)	$H_d$	0.79 (max)
Feed Hole Pitch	$P_0$	12.7 $\pm$ 0.3
Hole Center to Component Center	$P_1$	6.25 $\pm$ 0.4
Lead Spread	$F_1$	2.5 $\pm$ 0.3
Lead Thickness	d	0.46 (typ.)
Cut Lead Length	L	10.9 (max)
Taped Lead Length	$L_1$	5.31 (typ.)
Taped Lead Thickness	t	0.81 $\pm$ 0.2
Carrier Tape Thickness	$t_1$	0.5 $\pm$ 0.2
Carrier Tape Width	W	18.0 $\pm$ 0.5
Hold – down Tape Width	$W_0$	0.5 $\pm$ 0.2
Hold – down Tape position	$W_1$	9.0 $\pm$ 0.7
Feed Hole Position	$W_2$	6.0 $\pm$ 0.2
Sprocket Hole Diameter	$D_0$	4.0 $\pm$ 0.2
Lead Spring Out	S	0.1 (max)

Note: All dimensions are in millimeter.

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