TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TS13003B

High Voltage NPN Transistor

TO-92



Pin Definition:
1. Emitter
2. Collector
3. Base

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	1.5A
$V_{CE(SAT)}$	0.8V @ I_C / I_B = 0.5A / 0.1A

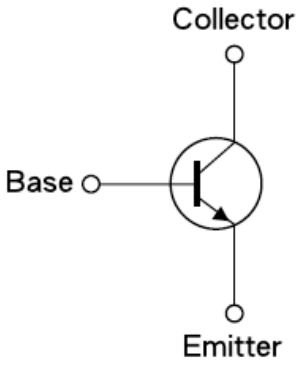
Features

- High Voltage
- High Speed Switching

Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor

Block Diagram



Ordering Information

Part No.	Package	Packing
TS13003BCT B0	TO-92	1Kpcs / Bulk
TS13003BCT B0G	TO-92	1Kpcs / Bulk
TS13003BCT A3	TO-92	2Kpcs / Ammo
TS13003BCT A3G	TO-92	2Kpcs / Ammo

Note: “G” denote for Green Product

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

Parameter		Symbol	Limit	Unit
Collector-Base Voltage		V_{CBO}	700V	V
Collector-Emitter Voltage		V_{CEO}	400V	V
Emitter-Base Voltage		V_{EBO}	9	V
Collector Current	DC	I_C	1.5	A
	Pulse		3	
Collector Power Dissipation		P_D	1.5	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 Ambient Thermal Resistance	$R\Theta_{JA}$	121.4	°C/W

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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Collector-Base Voltage	I_C = 1mA, I_B = 0	BV_{CBO}	700	--	--	V
Collector-Emitter Breakdown Voltage	I_C = 10mA, I_E = 0	BV_{CEO}	400	--	--	V
Emitter-Base Breakdown Voltage	I_E = 1mA, I_C = 0	BV_{EBO}	9	--	--	V
Collector-Emitter Cutoff Current	V_{CE} = 400V, I_B = 0	I_{CEO}	--	--	1	uA
Collector-Emitter Cutoff Current @45°C	V_{CE} = 400V, I_B = 0	I_{CEO}	--	0.5	--	uA
Collector Cutoff Current	V_{CB} = 700V, I_E = 0	I_{CBO}	--	--	1	uA
Collector Cutoff Current @45°C	V_{CB} = 700V, I_E = 0	I_{CBO}	--	0.2	--	uA
Emitter Cutoff Current	V_{EB} = 9V, I_C = 0	I_{EBO}	--	0.1	1	uA
Collector-Emitter Saturation Voltage*	I_C / I_B = 0.5A / 0.1A	$V_{CE(SAT)1}$	--	0.2	0.5	V
	I_C / I_B = 1.0A / 0.25A	$V_{CE(SAT)2}$	--	0.3	1	
	I_C / I_B = 1.5A / 0.5A	$V_{CE(SAT)3}$	--	0.5	3	
Base-Emitter Saturation Voltage*	I_C / I_B = 0.5A / 0.1A	$V_{BE(SAT)1}$	--	--	1.1	V
	I_C / I_B = 1.0A / 0.25A	$V_{BE(SAT)2}$	--	--	1.3	
DC Current Gain*	V_{CE} = 2V, I_C = 10mA	$h_{FE}1$	6	--	40	
	V_{CE} = 2V, I_C = 400mA	$h_{FE}2$	23	--	40	
	V_{CE} = 2V, I_C = 1A	$h_{FE}3$	8	--	40	
Dynamic						
Frequency	V_{CE} = 10V, I_C = 0.1A	f_T	4	--	--	MHz
Output Capacitance	V_{CB} = 10V, f = 0.1MHz	Cob	--	21	--	pF
Resistive Load Switching Time (Ratings)						
Delay Time	V_{CC} = 125V, I_C = 1A,	t_d	--	0.05	0.2	uS
Rise Time	I_{B1} = I_{B2} = 0.2A,	t_r	--	0.6	1	uS
Storage Time	t_p = 25uS	t_{STG}	--	2	4	uS
Fall Time	Duty Cycle ≤1%	t_f	--	0.2	0.7	uS

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

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Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

Figure 1. Static Characteristics

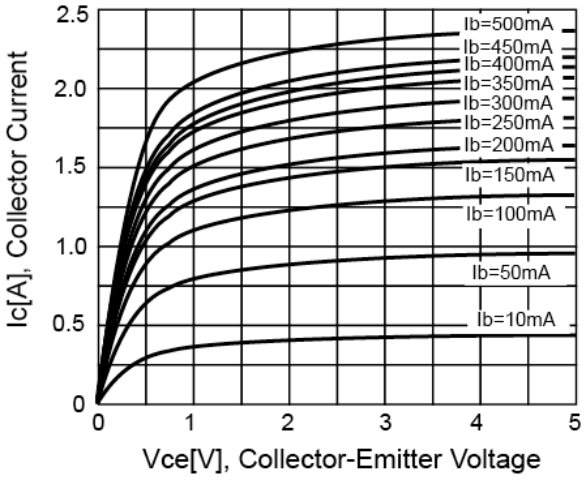


Figure 2. DC Current Gain

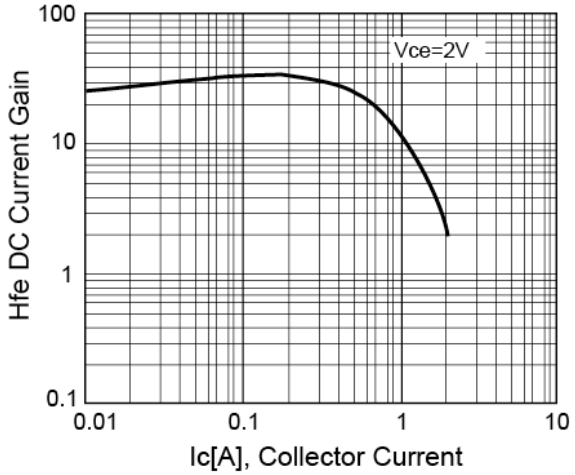


Figure 3. $V_{CE(SAT)}$ v.s. $V_{BE(SAT}$

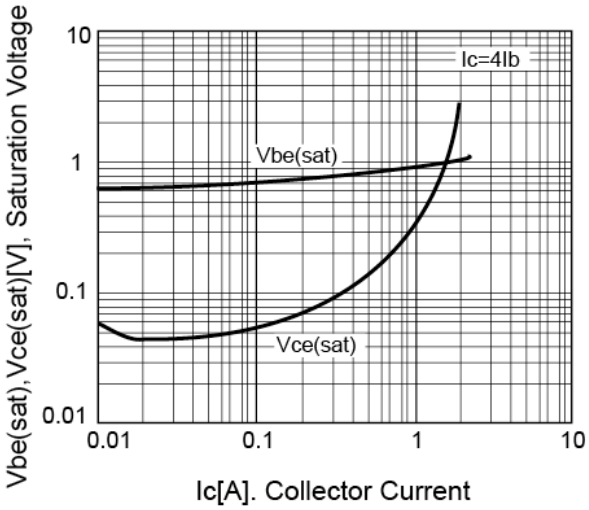


Figure 4. Power Derating

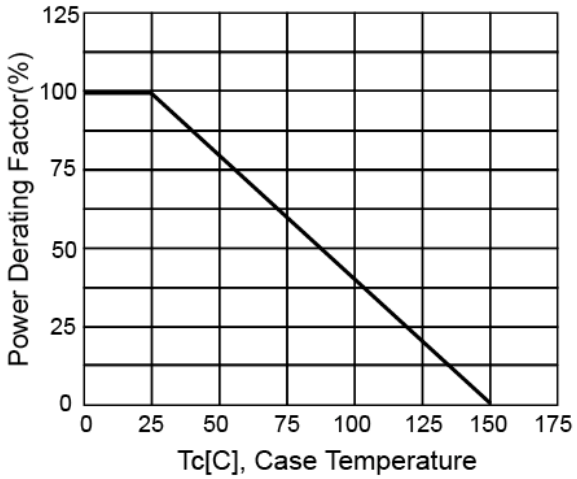


Figure 5. Reverse Bias SOA

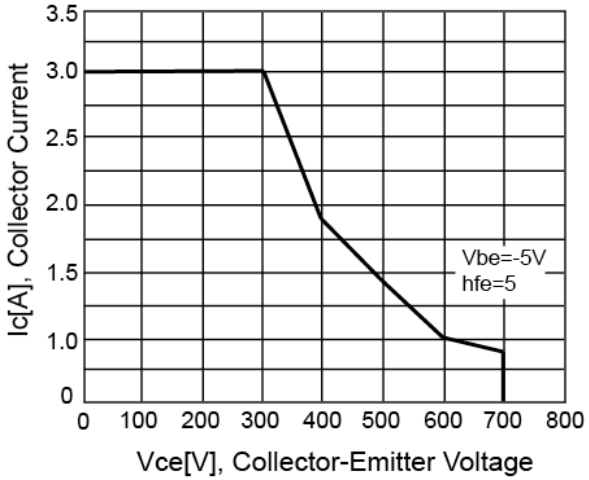
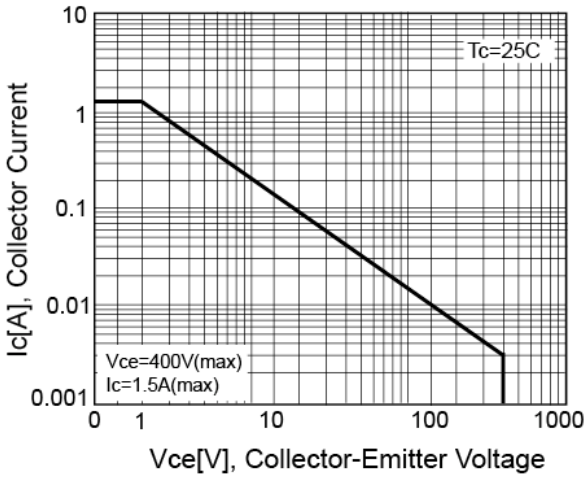
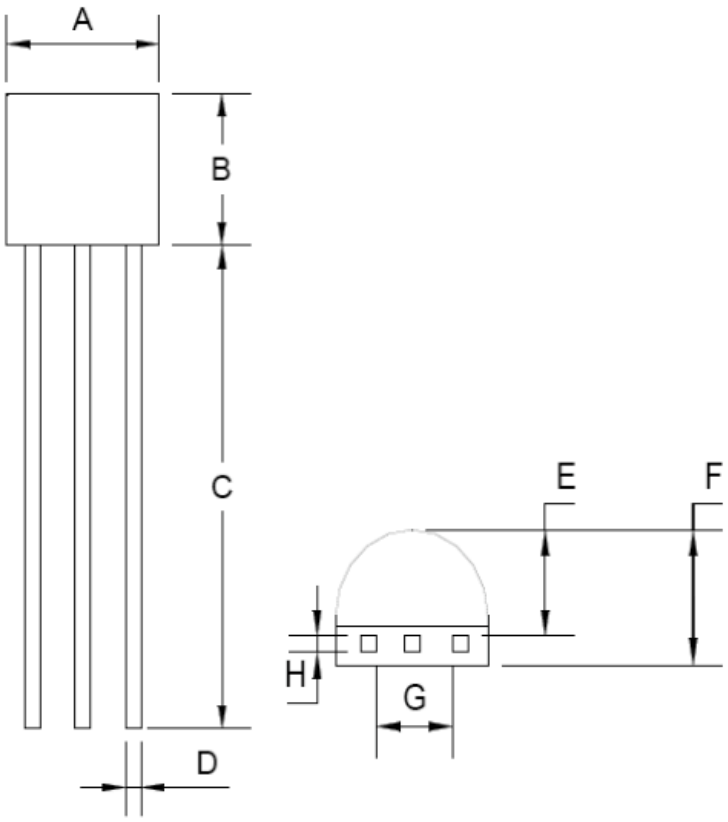


Figure 6. Safety Operating Area



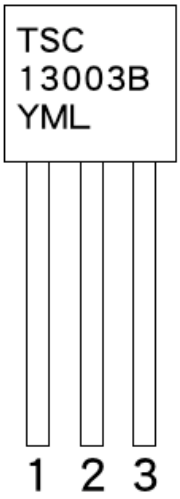
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TO-92 Mechanical Drawing



TO-92 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30(typ)		0.563(typ)	
D	0.43	0.49	0.017	0.019
E	2.19	2.81	0.086	0.111
F	3.30	3.70	0.130	0.146
G	2.42	2.66	0.095	0.105
H	0.37	0.43	0.015	0.017

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)
L = Lot Code

TO-92 Ammo Pack Specification

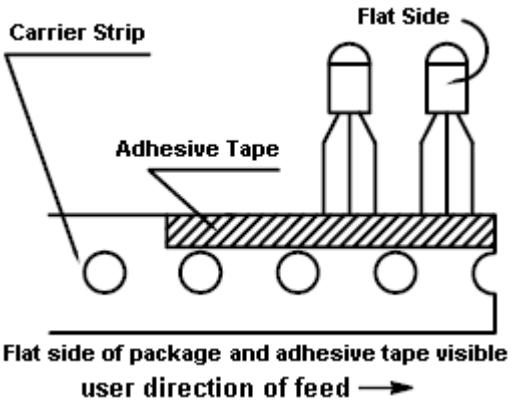
Ammo Pack

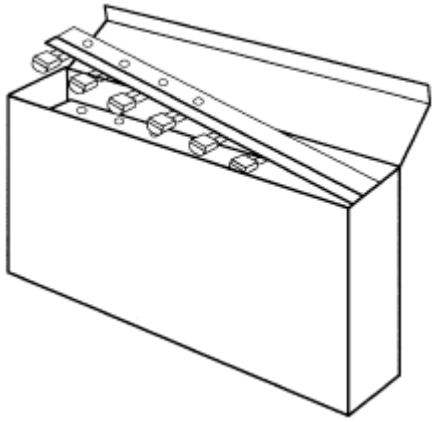
1.1. Ammo pack in box.

1.2. Qty / Box: 2,000pcs

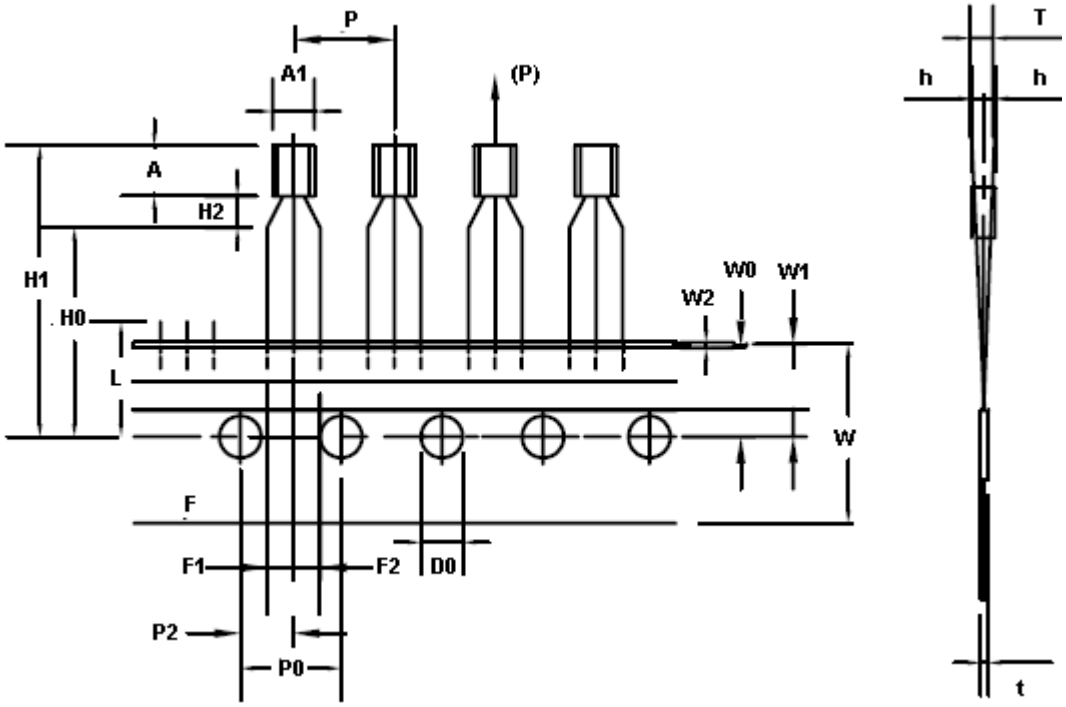
1.3. Peel Strength: must be 13grams (minimum).

1.4. Part Orientation: Marking on flat side





Tape Dimension



A1	A	T	P	P0	P2	F	W	W0
4.6±0.2	4.5±0.3	3.6±0.3	12.7±1	12.7±0.3	6.25±0.4	6.02±0.6	18.0±0.5	6.0±0.2
W1	**W2**	**H0**	**H1**	**L**	**D0**	**t**	**F1, F2**	**H2**
9.0±0.7	0.5±0.2	16±0.5	23 (typ)	11	4.0±0.2	0.86±0.3	2.50±0.3	3.0 (typ)

unit: mm

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