

TS13002A

High Voltage NPN Transistor

TO-92

Pin Definition:

1. Emitter
2. Collector
3. Base

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	0.3A
$V_{CE(SAT)}$	1.5V @ $I_C / I_B = 200mA / 20mA$

Features

- High Voltage
- High Speed Switching

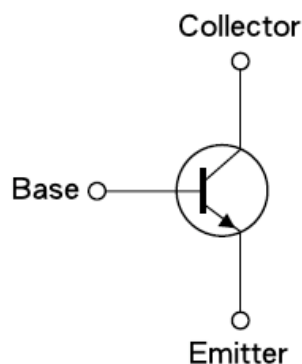
Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor

Ordering Information

Part No.	Package	Packing
TS13002ACT B0	TO-92	1Kpcs / Bulk
TS13002ACT B0G	TO-92	1Kpcs / Bulk
TS13002ACT A3	TO-92	2Kpcs / Ammo
TS13002ACT A3G	TO-92	2Kpcs / Ammo

Note: "G" denote for Green Product

Block Diagram

Absolute Maximum Rating ($T_a = 25^\circ\text{C}$ 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	0.3	A
	Pulse	0.5	
Collector Power Dissipation	P_D	0.6	W
Operating Junction Temperature	T_J	+150	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_{STG}	- 55 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Ambient Thermal Resistance	$R\theta_{JA}$	122	$^\circ\text{C/W}$

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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 Cutoff Current	V _{CB} = 700V, I _E = 0	I _{CBO}	--	--	1	uA
Emitter Cutoff Current	V _{EB} = 7V, I _C = 0	I _{EBO}	--	--	1	uA
Collector-Emitter Saturation Voltage	I _C / I _B = 50mA / 10mA	V _{CE(SAT)1}	--	0.2	0.4	V
	I _C / I _B = 100mA / 10mA	V _{CE(SAT)2}	--	0.45	1	
	I _C / I _B = 200mA / 20mA	V _{CE(SAT)3}	--	1	1.5	
Base-Emitter Saturation Voltage	I _C / I _B = 50mA / 10mA	V _{BE(SAT)1}	--	--	1	V
	I _C / I _B = 100mA / 10mA	V _{BE(SAT)2}	--	--	1.2	
DC Current Gain	V _{CE} = 10V, I _C = 10mA	h _{FE1}	15	--	40	
	V _{CE} = 10V, I _C = 100mA	h _{FE2}	25	--	40	
	V _{CE} = 10V, I _C = 280mA	h _{FE3}	12	--	24	
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)						
Rise Time	V _{CC} = 125V, I _C = 100mA, I _{B1} = I _{B2} = 20mA, t _p = 25uS Duty Cycle ≤1%	t _r	--	1.1	--	uS
Storage Time		t _{STG}	--	2	4	uS
Fall Time		t _f	--	0.2	0.7	uS

Note : pulse test: pulse width $\leq 5\text{mS}$, duty cycle $\leq 10\%$

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

Figure 1. Static Characteristics

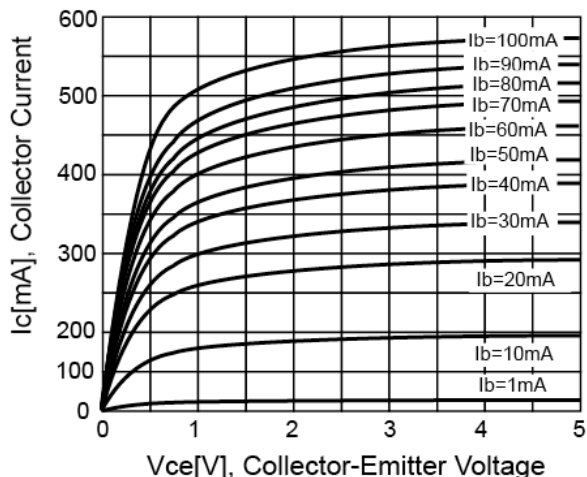


Figure 2. DC Current Gain

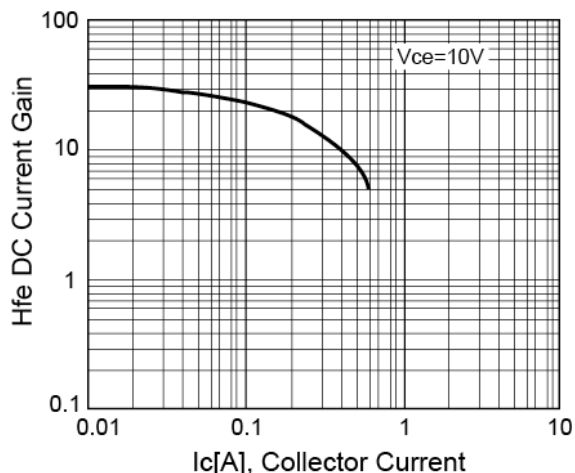


Figure 3. $V_{CE(SAT)}$ V.S. $V_{BE(SAT)}$

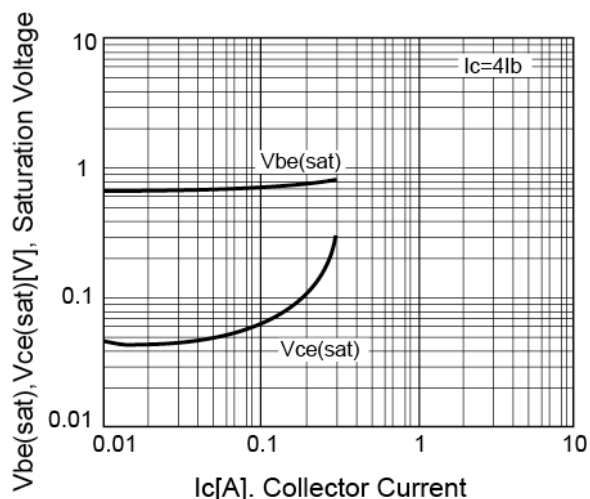


Figure 4. Power Derating

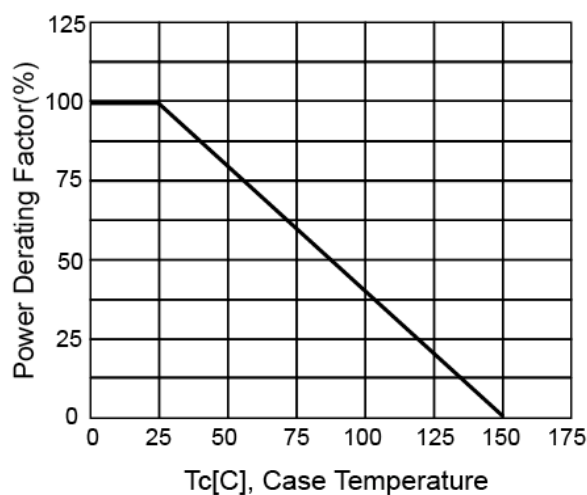


Figure 5. Reverse Bias SOA

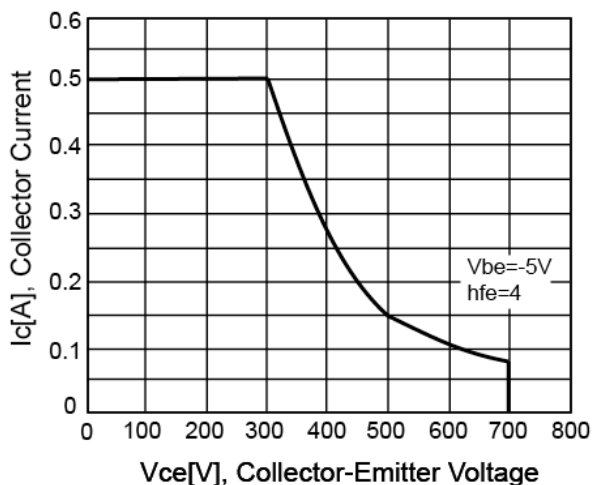
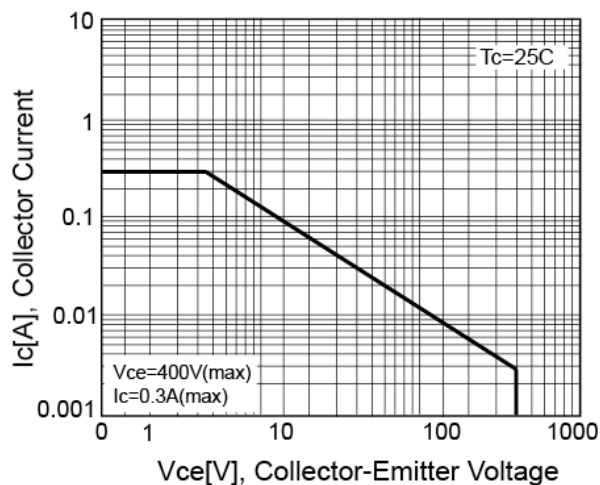
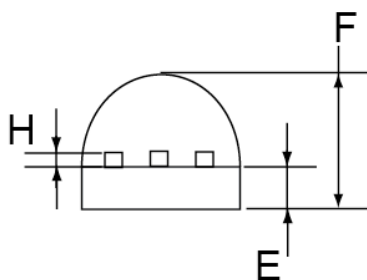
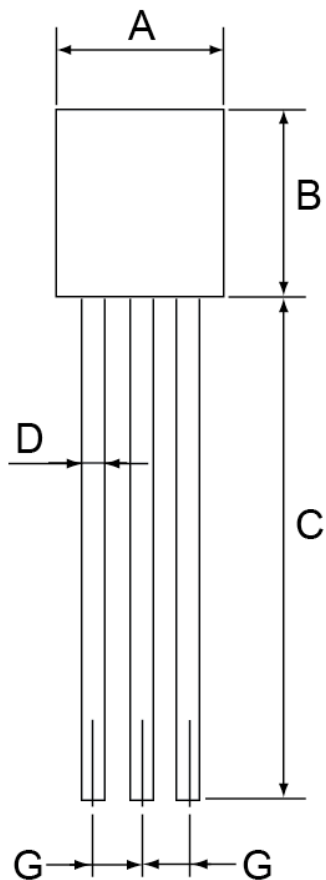


Figure 6. Safety Operating Area

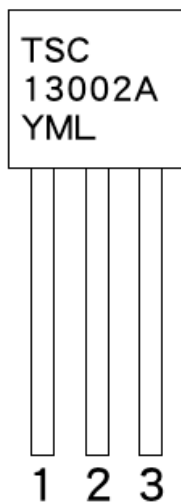


TO-92 Mechanical Drawing



DIM	TO-92 DIMENSION			
	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	13.53 (typ)		0.532 (typ)	
D	0.39	0.49	0.015	0.019
E	1.18	1.28	0.046	0.050
F	3.30	3.70	0.130	0.146
G	1.27	1.31	0.050	0.051
H	0.33	0.43	0.013	0.017

Marking Diagram



Y = Year Code

M = Month Code

(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, **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**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)

L = Lot Code

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