



TSC128D

High Voltage Fast-Switching NPN Power Transistor

TO-220

**Pin Definition:**

1. Base
2. Collector
3. Emitter

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	4A
$V_{CE(SAT)}$	1.5V @ $I_C / I_B = 2.5A / 0.5A$

Features

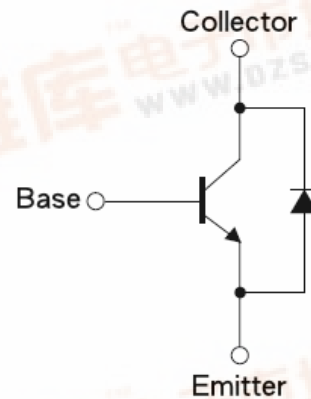
- High Voltage
- High Speed Switching

Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor
- Integrated Antiparallel Collector-Emitter Diode

Ordering Information

Part No.	Package	Packing
TSC128DCZ C0	TO-220	50pcs / Tube

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	I_C	4	A
Collector Peak Current ($t_p < 5\text{ms}$)	I_{CM}	8	A
Base Current	I_B	2	A
Base Peak Current ($t_p < 5\text{ms}$)	I_{BM}	4	A
Total Dissipation	P_{tot}	70	W
Maximum Operating Junction Temperature	T_J	+150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-65 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Case Thermal Resistance	$R\theta_{JC}$	1.78	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R\theta_{JA}$	62.5	$^\circ\text{C/W}$



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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Collector-Base Voltage	$I_C = 1\text{mA}$, $I_B = 0$	BV_{CBO}	700	--	--	V
Collector-Emitter Breakdown Voltage	$I_C = 10\text{mA}$, $I_E = 0$	BV_{CEO}	400	--	--	V
Emitter-Base Breakdown Voltage	$I_E = 1\text{mA}$, $I_C = 0$	BV_{EBO}	9	--	--	V
Collector Cutoff Current	$V_{CB} = 700\text{V}$, $I_E = 0$	I_{CBO}	--	--	100	uA
Collector Cutoff Current	$V_{CE} = 400\text{V}$, $I_B = 0$	I_{CEO}	--	--	250	uA
Emitter Cutoff Current	$V_{EB} = 7\text{V}$, $I_C = 0$	I_{EBO}	--	--	10	uA
Collector-Emitter Saturation Voltage	$I_C = 0.5\text{A}$, $I_B = 0.1\text{A}$	$V_{CE(SAT)1}$	--	--	0.7	V
	$I_C = 1\text{A}$, $I_B = 0.2\text{A}$	$V_{CE(SAT)2}$	--	--	1	
	$I_C = 2.5\text{A}$, $I_B = 0.5\text{A}$	$V_{CE(SAT)3}$	--	--	1.5	
	$I_C = 4\text{A}$, $I_B = 1\text{A}$	$V_{CE(SAT)4}$	--	0.9	--	
Base-Emitter Saturation Voltage	$I_C = 0.5\text{A}$, $I_B = 0.1\text{A}$	$V_{BE(SAT)1}$	--	--	1.1	V
	$I_C = 1\text{A}$, $I_B = 0.2\text{A}$	$V_{BE(SAT)2}$	--	--	1.2	
	$I_C = 2.5\text{A}$, $I_B = 0.5\text{A}$	$V_{BE(SAT)3}$	--	--	1.3	
DC Current Gain	$V_{CE} = 5\text{V}$, $I_C = 10\text{mA}$	Hfe	10	--	--	
	$V_{CE} = 5\text{V}$, $I_C = 2\text{A}$		12	--	32	
	$V_{CE} = 5\text{V}$, $I_C = 2.5\text{A}$		8	--	--	
Forward Voltage Drop	$I_f = 2\text{A}$	Vf	--	--	2	V
Turn On Time	$V_{CC} = 250\text{V}$, $I_C = 2\text{A}$,	t_{ON}	--	--	0.6	uS
Storage Time	$I_{B1} = I_{B2} = 0.4\text{A}$, $t_p = 25\text{uS}$	t_{STG}	2.5	3.0	3.5	uS
Fall Time	Duty Cycle < 1%	t_f	--	0.2	0.3	uS

Notes: Pulsed duration = 300uS, duty cycle ≤ 2%

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

Figure 1. Static Characteristics

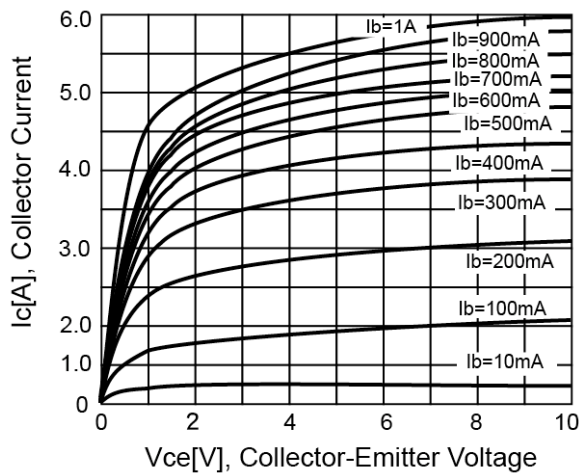


Figure 2. DC Current Gain

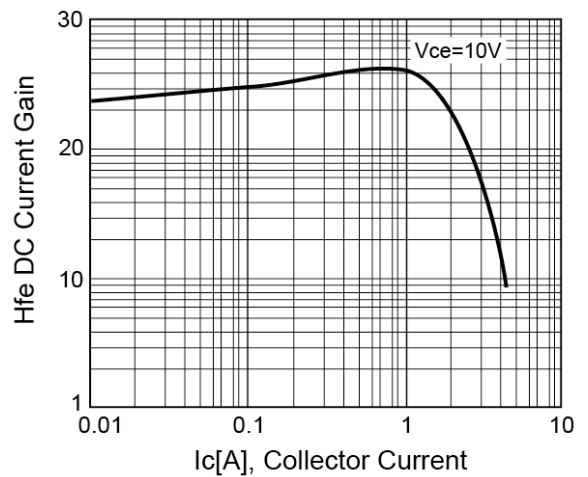


Figure 3. $V_{ce(sat)}$ v.s. $V_{be(sat)}$

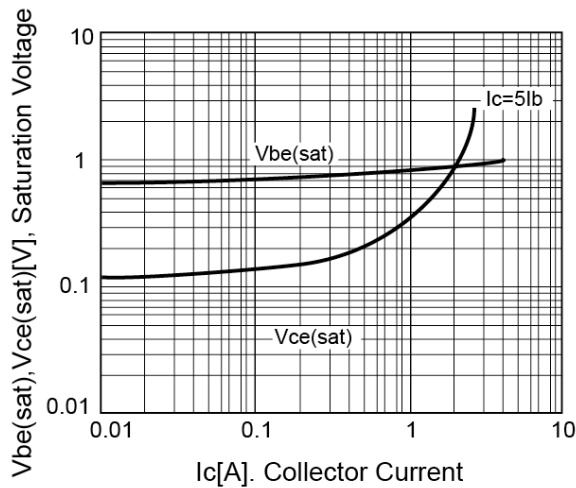


Figure 4. Power Derating

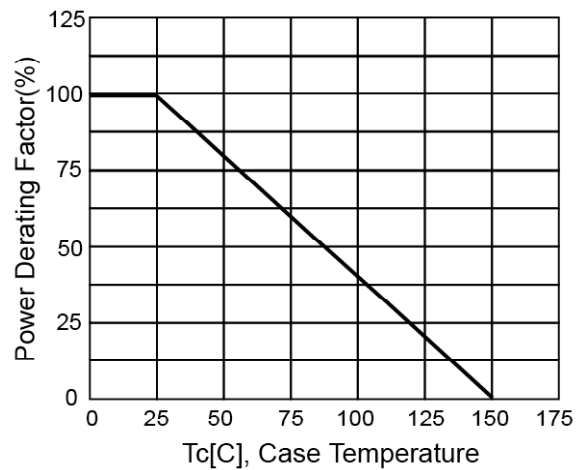


Figure 5. Reverse Bias SOA

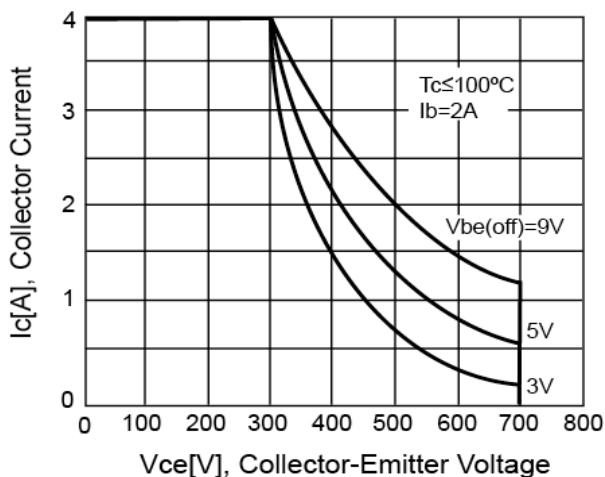
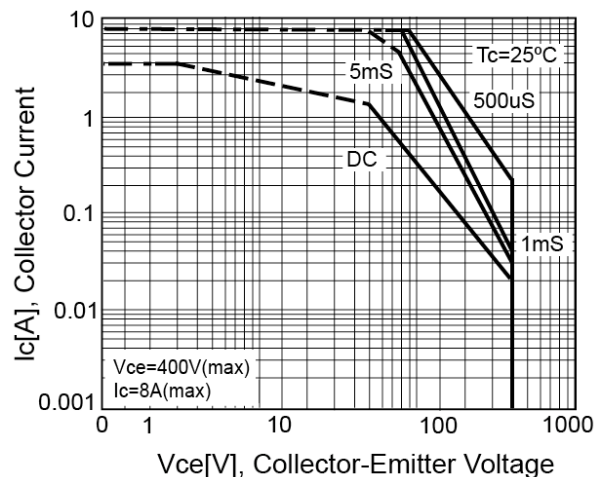
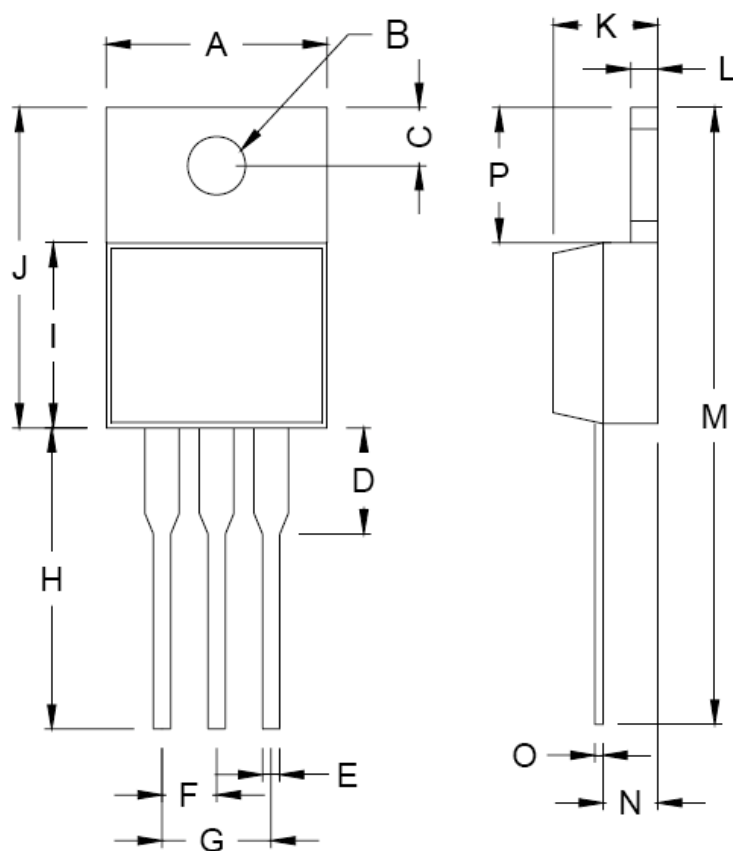


Figure 6. Safety Operating Area

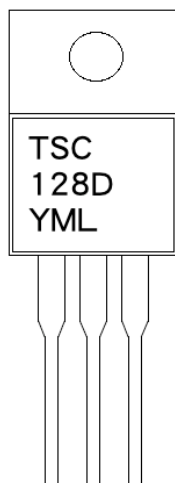


TO-220 Mechanical Drawing



DIM	TO-220 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.31	10.550	0.366	0.415
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	2.22	3.22	0.087	0.127
E	0.78	0.98	0.030	0.038
F	2.34	2.65	0.092	0.104
G	4.69	5.31	0.184	0.209
H	12.32	13.88	0.485	0.546
I	8.74	9.26	0.344	0.364
J	15.07	16.07	0.593	0.632
K	4.35	4.65	0.171	0.183
L	1.16	1.40	0.045	0.055
M	27.39	30.35	1.078	1.194
N	1.785	2.675	0.070	0.105
O	1.50	1.75	0.059	0.068
P	5.75	7.65	0.226	0.301

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)
- L** = Lot Code



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