

## High Voltage Fast-Switching NPN Power Transistor

TO-220



ITO-220



**Pin Definition:**

1. Base
2. Collector
3. Emitter

**PRODUCT SUMMARY**

$BV_{CEO}$	400V
$BV_{CBO}$	700V
$I_C$	8A
$V_{CE(SAT)}$	1.5V @ $I_C / I_B = 5A / 1A$

**Features**

- High Voltage Capability
- Very High Speed Switching

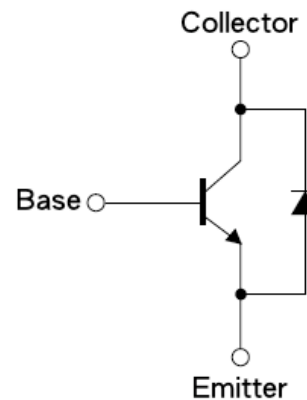
**Applications**

- Electronic Ballasts for Fluorescent Lighting
- Flyback and Forward Single Transistor Low Power Converters

**Ordering Information**

Part No.	Package	Packing
TSC148DCZ C0	TO-220	50pcs / Tube
TSC148DCI C0	ITO-220	50pcs / Tube

**Block Diagram**



**Absolute Maximum Rating** ( $T_a = 25^{\circ}C$  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	$I_C$	8	A
Collector Peak Current ( $t_p < 5ms$ )	$I_{CM}$	16	A
Base Current	$I_B$	4	A
Base Peak Current ( $t_p < 5ms$ )	$I_{BM}$	8	A
Total Dissipation	TO-220	80	W
	ITO-220	36	W
Maximum Operating Junction Temperature	$T_J$	+150	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	-65 to +150	$^{\circ}C$

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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Collector-Base Voltage	$I_C = 1\text{mA}, I_B = 0$	$BV_{CBO}$	700	--	--	V
Collector-Emitter Breakdown Voltage <sup>a</sup>	$I_C = 1\text{mA}, I_E = 0$	$BV_{CEO}$	400	--	--	V
Emitter-Base Breakdown Voltage	$I_E = 0.1\text{mA}, I_C = 0$	$BV_{EBO}$	9	--	--	V
Collector Cutoff Current	$V_{CB} = 700\text{V}, I_E = 0$	$I_{CBO}$	--	--	10	$\mu\text{A}$
Collector Cutoff Current	$V_{CE} = 400\text{V}, I_E = 0$	$I_{CEO}$	--	--	100	$\mu\text{A}$
Emitter Cutoff Current	$V_{EB} = 9\text{V}, I_C = 0$	$I_{EBO}$	--	--	100	$\mu\text{A}$
Collector-Emitter Saturation Voltage <sup>a</sup>	$I_C = 2\text{A}, I_B = 0.4\text{A}$	$V_{CE(SAT)1}$	--	--	0.8	V
	$I_C = 5\text{A}, I_B = 1\text{A}$	$V_{CE(SAT)2}$	--	--	1.5	
	$I_C = 8\text{A}, I_B = 2\text{A}$	$V_{CE(SAT)3}$	--	--	2	
Base-Emitter Saturation Voltage <sup>a</sup>	$I_C = 4\text{A}, I_B = 0.4\text{A}$	$V_{BE(SAT)1}$	--	--	1.2	V
	$I_C = 5\text{A}, I_B = 1\text{A}$	$V_{BE(SAT)2}$	--	--	1.6	
DC Current Gain	$V_{CE} = 5\text{V}, I_C = 2\text{A}$	Hfe	18	--	40	
	$V_{CE} = 5\text{V}, I_C = 5\text{A}$		8	--	25	
Diode Forward Voltage	$I_f = 3\text{A}$	Vf	--	--	2	V
<b>Resistive Load Switching Time (Ratings)</b>						
Turn On Time	$V_{CC} = 125\text{V}, I_C = 5\text{A},$ $I_{B1} = I_{B2} = 1\text{A},$ $t_p = 25\mu\text{S}$ Duty Cycle < 1%	$t_{ON}$	--	--	0.6	$\mu\text{S}$
Storage Time		$t_{STG}$	--	1.3	1.6	$\mu\text{S}$
Fall Time		$t_f$	--	--	0.3	$\mu\text{S}$

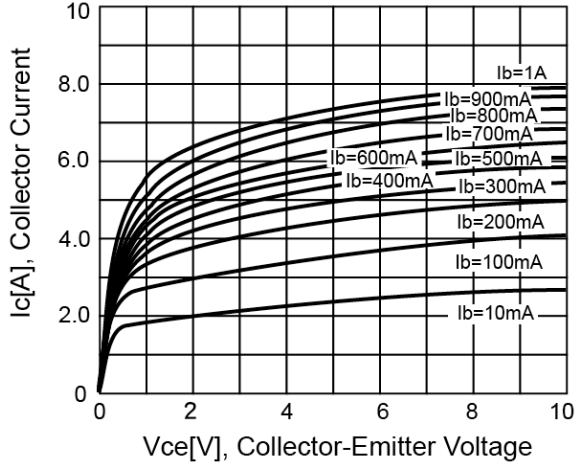
Notes:

 a. Pulsed duration = 300 $\mu\text{S}$ , duty cycle  $\leq 2\%$

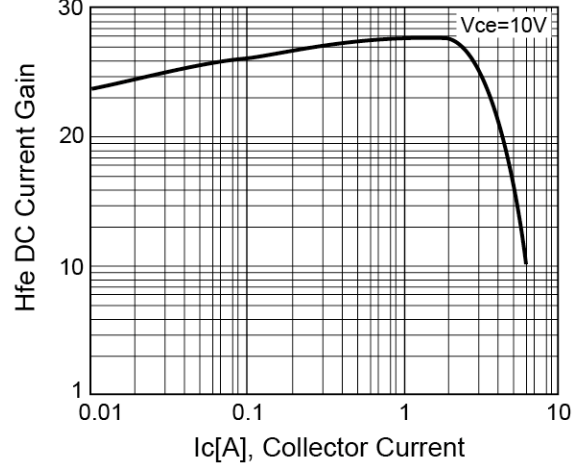
**High Voltage Fast-Switching NPN Power Transistor**

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

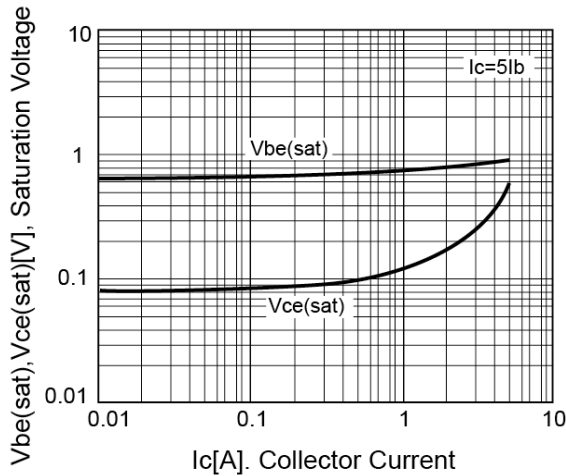
**Figure 1. Static Characteristics**



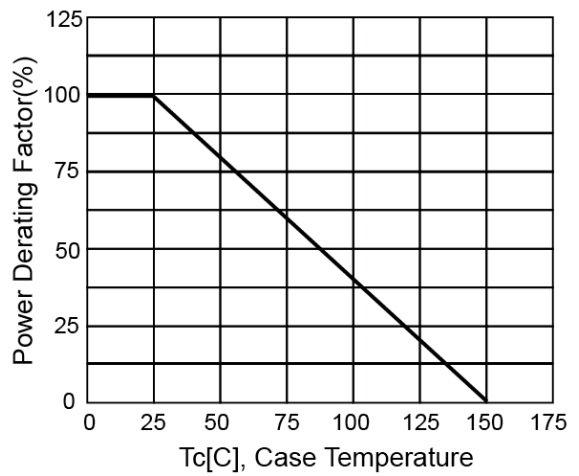
**Figure 2. DC Current Gain**



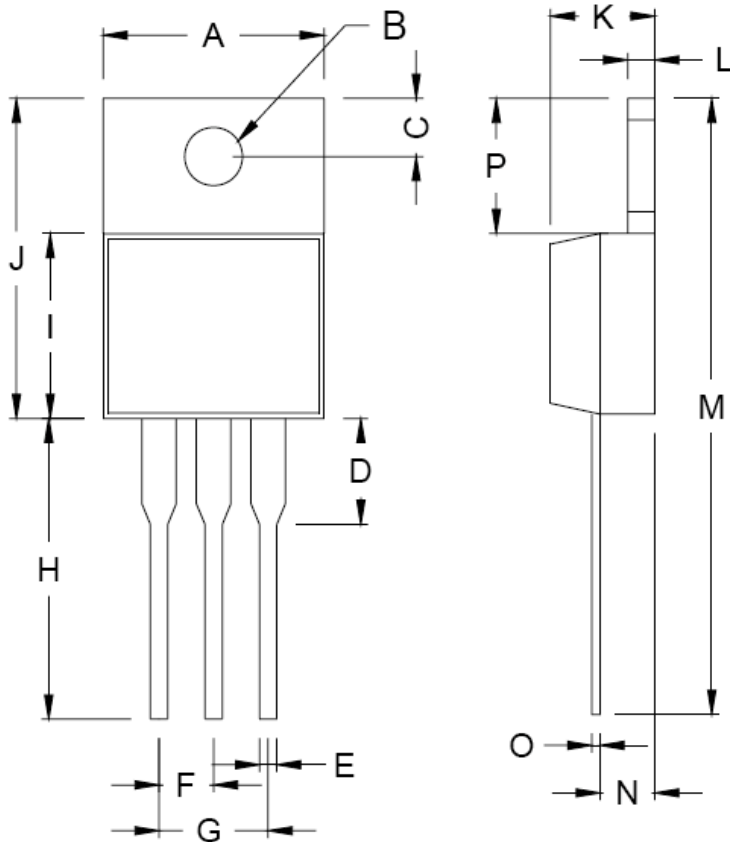
**Figure 3. Vce(sat) v.s. Vbe(sat)**



**Figure 4. Power Derating**

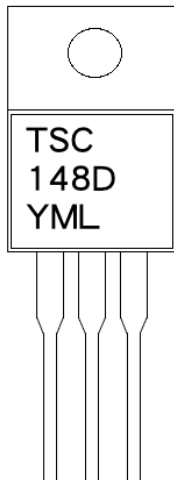


### TO-220 Mechanical Drawing



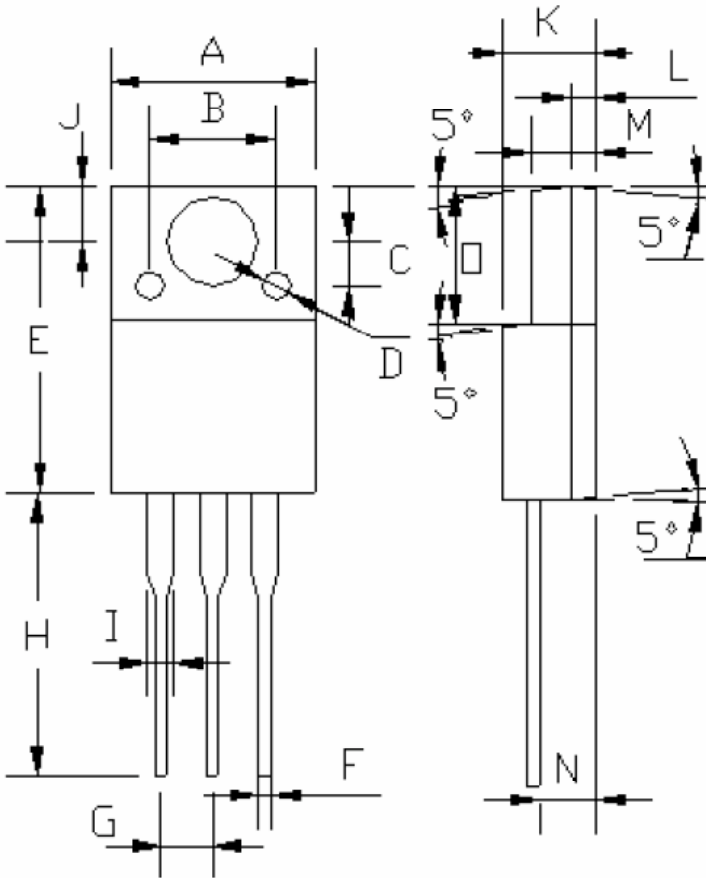
TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.31	10.550	0.366	0.415
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	2.22	3.22	0.087	0.127
E	0.78	0.98	0.030	0.038
F	2.34	2.65	0.092	0.104
G	4.69	5.31	0.184	0.209
H	12.32	13.88	0.485	0.546
I	8.74	9.26	0.344	0.364
J	15.07	16.07	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



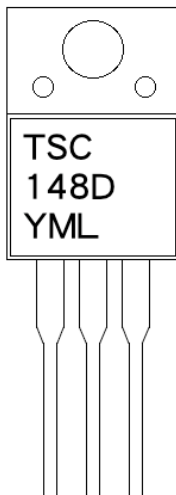
- Y** = Year Code
- M** = Month Code  
(A=Jan, B=Feb, C=Mar, D=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- L** = Lot Code

### ITO-220 Mechanical Drawing



DIM	ITO-220 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.96	10.36	0.392	0.407
B	6.20 (typ.)		0.244 (typ.)	
C	2.20 (typ.)		0.087 (typ.)	
D	1.40 (typ.)		0.055 (typ.)	
E	15.07	16.07	0.593	0.632
F	0.80 (typ.)		0.031 (typ.)	
G	2.44	2.64	0.096	0.104
H	13.08	13.48	0.514	0.530
I	1.47 (max.)		0.057 (max.)	
J	3.20	3.40	0.125	0.133
K	4.60	4.80	0.181	0.188
L	1.15 (typ.)		0.045 (typ.)	
M	2.44	2.64	0.096	0.104
N	2.60	2.80	0.102	0.110
O	6.55	6.65	0.258	0.262

### Marking Diagram



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