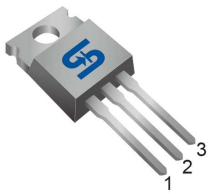
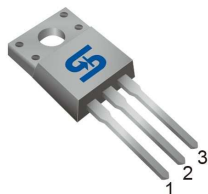


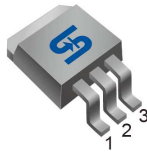
TO-220



ITO-220



TO-263
(D²PAK)



Pin Definition:

1. Base
2. Collector
3. Emitter

PRODUCT SUMMARY

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

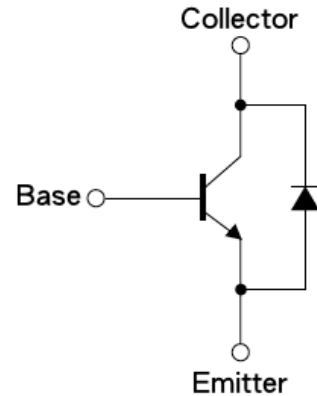
Features

- Build-in Free-wheeling Diode Makes Efficient Anti-saturation Operation
- No Need to Interest an hfe Value Because of Low Variable Storage-time Spread Even Though Corner Spirit Product.
- Low Base Drive Requirement
- Suitable for Half Bridge Light Ballast Application

Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor
- Integrated Anti-parallel Collector-Emitter Diode

Block Diagram



Ordering Information

Part No.	Package	Packing
TSC148DCZ C0	TO-220	50pcs / Tube
TSC148DCI C0	ITO-220	50pcs / Tube
TSC148DCM RN	TO-263	800pcs / 13" Reel

Absolute Maximum Rating ($T_a = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Collector-Base Voltage	V_{CBO}	700	V
Collector-Emitter Voltage	V_{CEO}	400	V
Emitter-Base Voltage	V_{EBO}	9	V
Collector Current	I_C	8	A
Collector Peak Current ($t_p < 5\text{ms}$)	I_{CM}	16	A
Base Current	I_B	4	A
Base Peak Current ($t_p < 5\text{ms}$)	I_{BM}	8	A
Total Dissipation @ $T_c=25^\circ\text{C}$	TO-220, TO-263	80	W
	ITO-220	36	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
Thermal Resistance - Junction to Case	TO-220	$R\theta_{JC}$	1.78	$^{\circ}\text{C/W}$
	ITO-220		5	
	TO-263		1.78	
Thermal Resistance - Junction to Ambient	TO-220	$R\theta_{JA}$	62.5	$^{\circ}\text{C/W}$
	ITO-220		62.5	
	TO-263		62.5	

Electrical Specifications ($T_a = 25^{\circ}\text{C}$ 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 ^a	$I_C = 1\text{mA}, I_E = 0$	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	μA
Collector Cutoff Current	$V_{CE} = 400\text{V}, I_E = 0$	I_{CEO}	--	--	100	μA
Emitter Cutoff Current	$V_{EB} = 9\text{V}, I_C = 0$	I_{EBO}	--	--	100	μA
Collector-Emitter Saturation Voltage ^a	$I_C = 2\text{A}, I_B = 0.4\text{A}$	$V_{CE(SAT)1}$	--	--	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 ^a	$I_C = 4\text{A}, I_B = 0.4\text{A}$	$V_{BE(SAT)1}$	--	--	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
Resistive Load Switching Time (Ratings)						
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	μS
Storage Time		t_{STG}	--	1.3	1.6	μS
Fall Time		t_f	--	--	0.3	μS

Notes:

a. Pulsed duration = 300 μS , duty cycle $\leq 2\%$

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

Figure 1. Static Characteristics

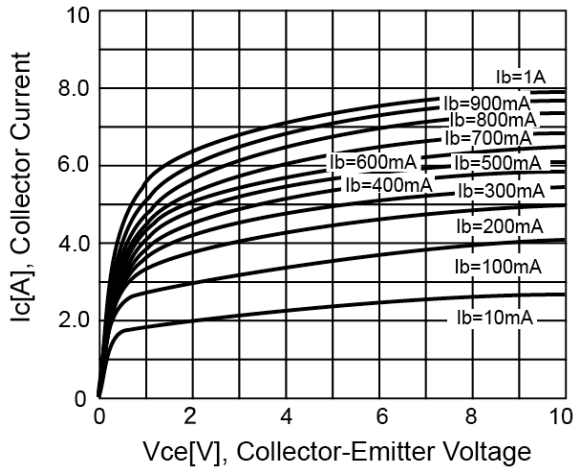


Figure 2. DC Current Gain

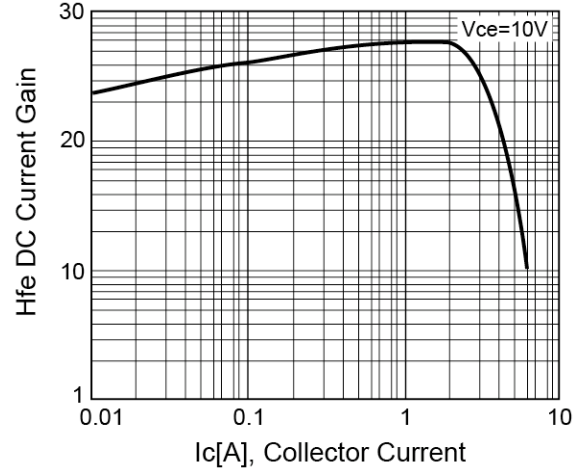


Figure 3. $V_{ce(sat)}$ v.s. $V_{be(sat)}$

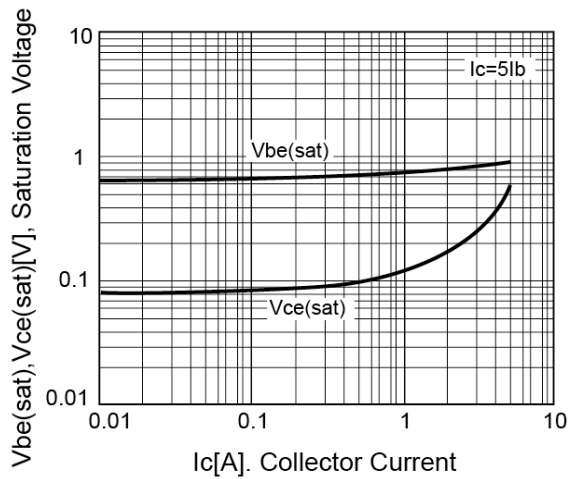
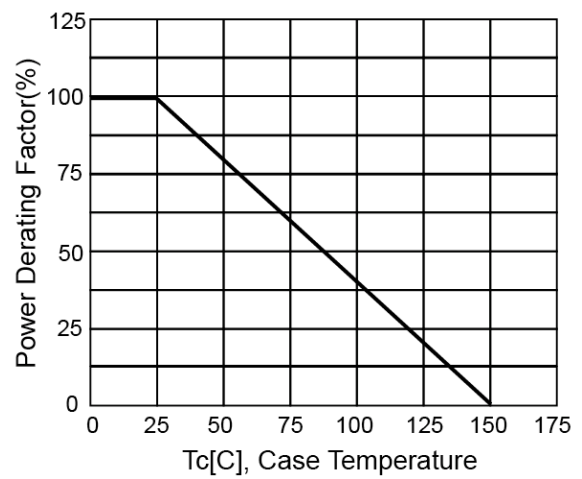
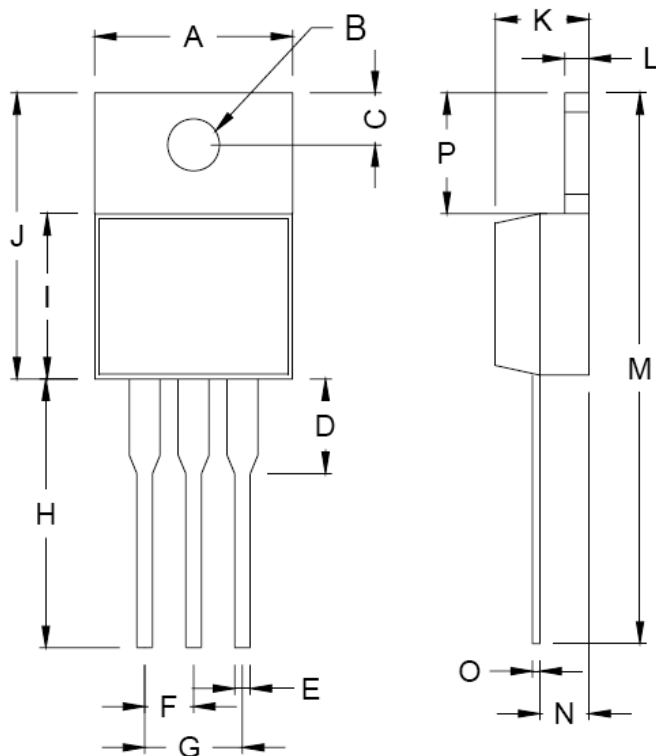


Figure 4. Power Derating

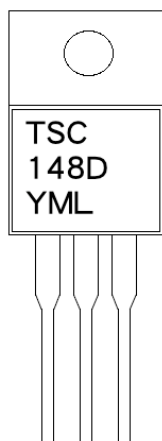


TO-220 Mechanical Drawing



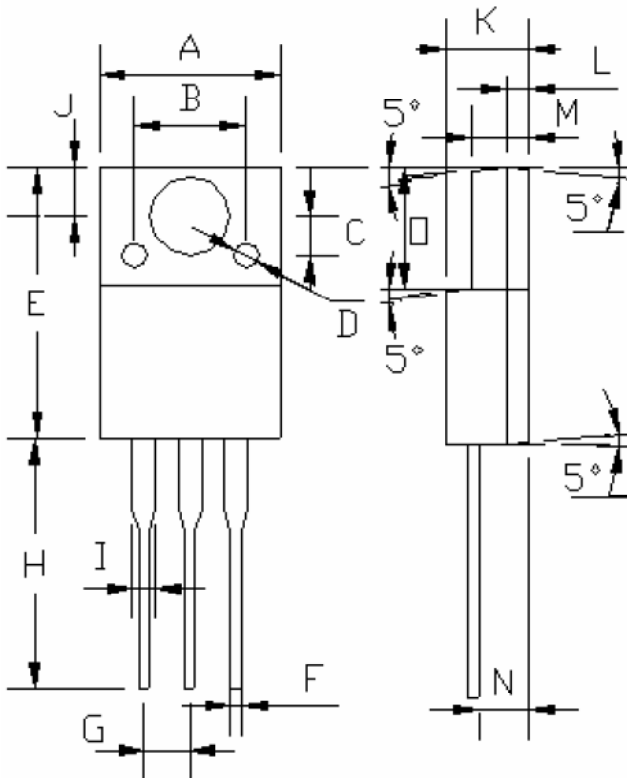
TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.31	10.550	0.366	0.415
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	2.22	3.22	0.087	0.127
E	0.78	0.98	0.030	0.038
F	2.34	2.65	0.092	0.104
G	4.69	5.31	0.184	0.209
H	12.32	13.88	0.485	0.546
I	8.74	9.26	0.344	0.364
J	15.07	16.07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



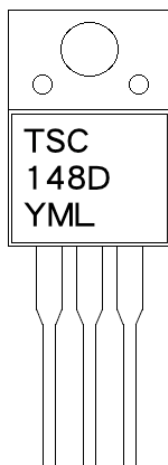
- Y = Year Code
M = Month Code
(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
L = Lot Code

ITO-220 Mechanical Drawing



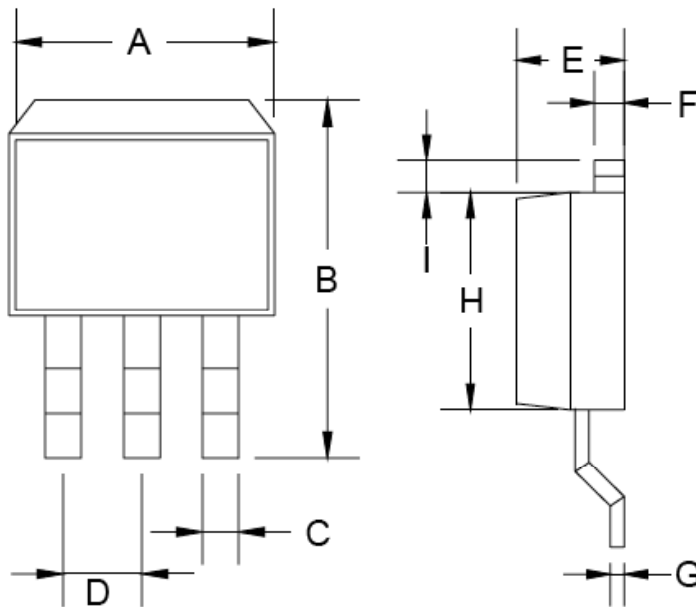
ITO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.96	10.36	0.392	0.407
B	6.20 (typ.)		0.244 (typ.)	
C	2.20 (typ.)		0.087 (typ.)	
D	1.40 (typ.)		0.055 (typ.)	
E	15.07	16.07	0.593	0.632
F	0.80 (typ.)		0.031 (typ.)	
G	2.44	2.64	0.096	0.104
H	13.08	13.48	0.514	0.530
I	1.47 (max.)		0.057 (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



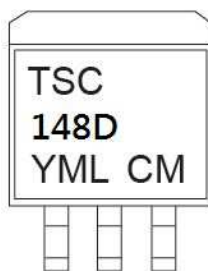
- Y** = Year Code
M = Month Code
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
L = Lot Code

TO-263 Mechanical Drawing



DIM	TO-263 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	14.605	15.875	0.575	0.625
C	0.508	0.991	0.020	0.039
D	2.420	2.660	0.095	0.105
E	4.064	4.830	0.160	0.190
F	1.118	1.400	0.045	0.055
G	0.450	0.730	0.018	0.029
H	8.280	8.800	0.325	0.346
I	1.140	1.400	0.044	0.055
J	1.480	1.520	0.058	0.060

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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