



TO-251
(IPAK)



TO-252
(DPAK)



Pin Definition:

1. Base
2. Collector
3. Emitter

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	2A
$V_{CE(SAT)}$	1.1V @ $I_C / I_B = 1A / 0.25A$

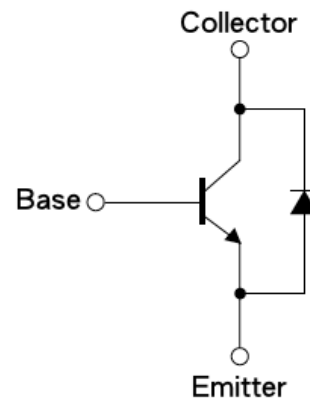
Features

- 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 Comer Spirit Product.
- Low Base Drive Requirement
- Suitable for Half Bridge Light Ballast Application

Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor with Diode

Block Diagram



Ordering Information

Part No.	Package	Packing
TSC5302DCP RO	TO-252	2.5Kpcs / 13" Reel
TSC5302DCP ROG	TO-252	2.5Kpcs / 13" Reel
TSC5302DCH C5	TO-251	75pcs / Tube
TSC5302DCH C5G	TO-251	75pcs / Tube

Note: "G" denote for Halogen Free Product

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}	10	V
Collector Current	I_C	2	A
Collector Peak Current ($t_p < 5\text{ms}$)	I_{CM}	4	A
Base Current	I_B	1	A
Base Peak Current ($t_p < 5\text{ms}$)	I_{BM}	2	A
Total Dissipation @ $T_c \leq 25^\circ\text{C}$	TO-251	1.5	W
	TO-252	25	
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	$R\theta_{JC}$	6.25	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R\theta_{JA}$	100	$^\circ\text{C/W}$

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 ^a	I _C = 10mA, I _E = 0	BV _{CEO}	400	--	--	V
Emitter-Base Breakdown Voltage	I _E = 1mA, I _C = 0	BV _{EBO}	10	--	--	V
Collector Cutoff Current	V _{CB} = 700V, I _E = 0	I _{CBO}	--	--	1	uA
Emitter Cutoff Current	V _{EB} = 9V, I _C = 0	I _{EBO}	--	--	1	uA
Collector-Emitter Saturation Voltage ^a	I _C =0.5A, I _B =0.1A	V _{CE(SAT)1}	--	--	0.5	V
	I _C =1A, I _B =0.25A	V _{CE(SAT)2}	--	1.1	1.5	
Base-Emitter Saturation Voltage ^a	I _C =0.5A, I _B =0.1A	V _{BE(SAT)1}	--	--	1.1	V
	I _C =1A, I _B =0.25A	V _{BE(SAT)2}	--	--	1.2	
DC Current Gain	V _{CE} =5V, I _C =10mA	h _{FE} 1	10	--	--	
	V _{CE} =5V, I _C =400mA	h _{FE} 2	10	--	30	
	V _{CE} =5V, I _C =1A	h _{FE} 3	5	--	--	
Turn On Time	V _{CC} =250V, I _C =1A, I _{B1} =I _{B2} =0.2A, t _p =25uS Duty Cycle<1%	t _{ON}	--	0.15	0.3	uS
Storage Time		t _{STG}	--	0.5	0.9	uS
Fall Time		t _f	--	0.2	0.4	uS
Diode						
Fall Time	I _C =1A	t _F	--	--	800	uS
Forward Voltage Drop	I _C =1A	V _f	--	--	1.4	V

Notes:

a. Pulsed duration = 300uS, duty cycle ≤ 2%

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

Figure 1. Static Characteristics

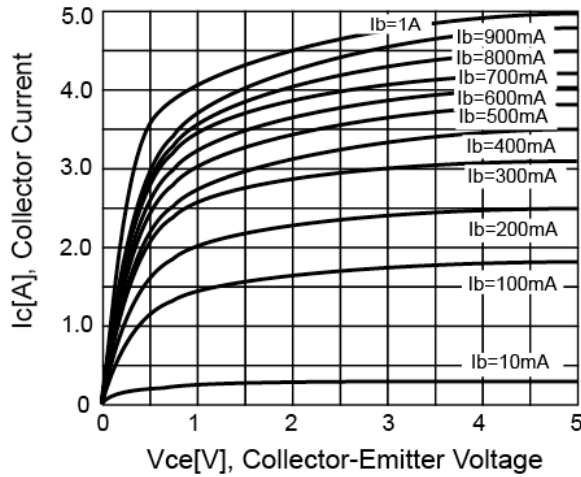


Figure 2. DC Current Gain

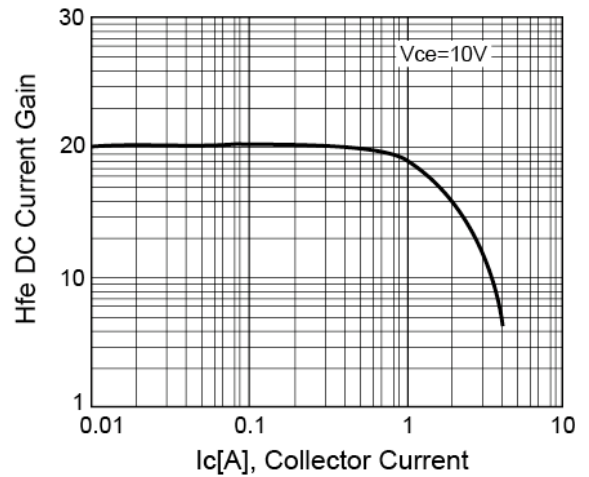


Figure 3. $V_{ce(sat)}$ v.s. $V_{be(sat)}$

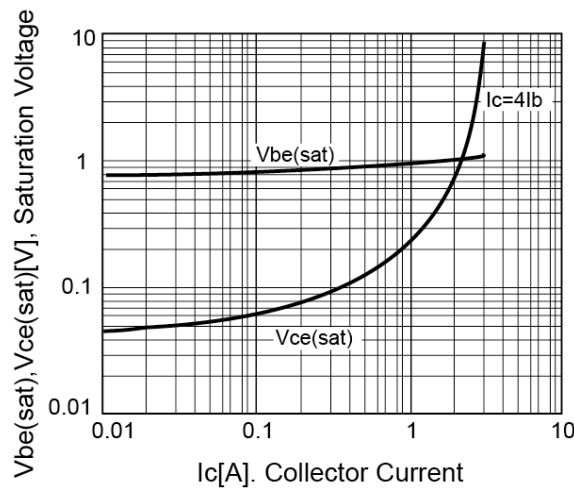


Figure 4. Power Derating

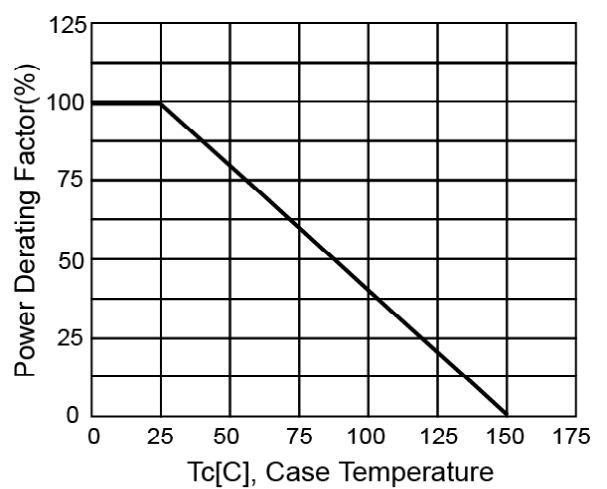


Figure 5. Reverse Bias SOA

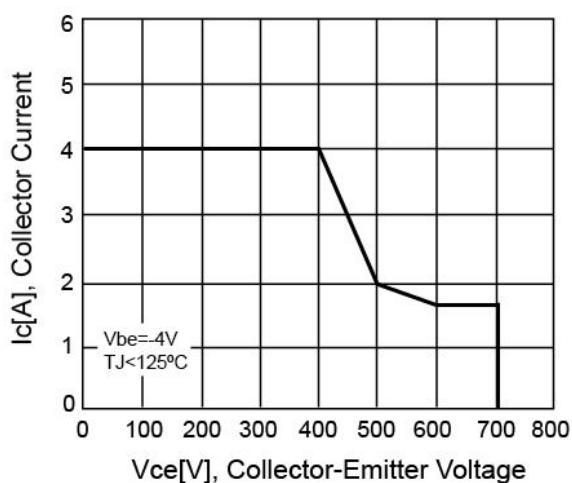
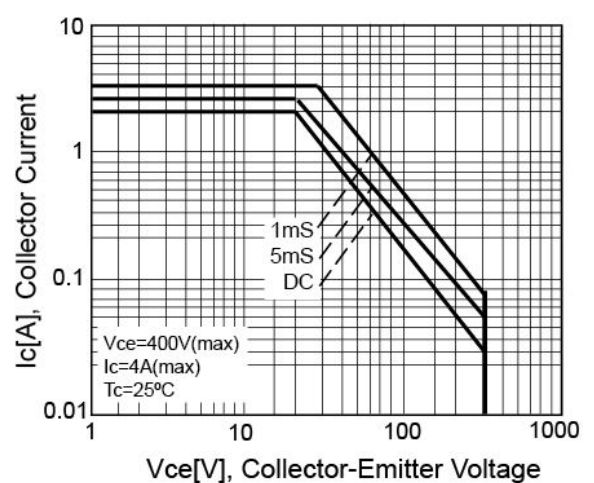
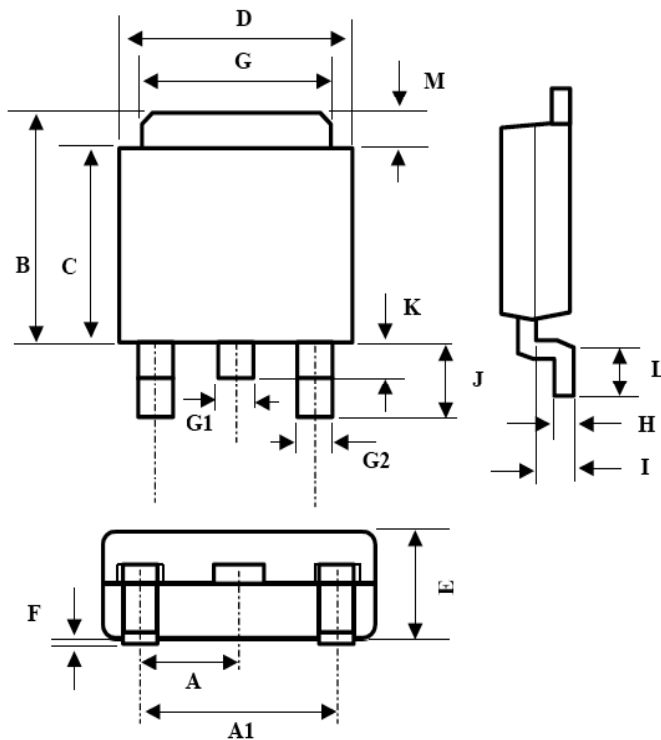


Figure 6. Safety Operating Area

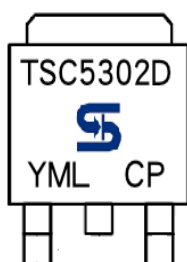


TO-252 Mechanical Drawing



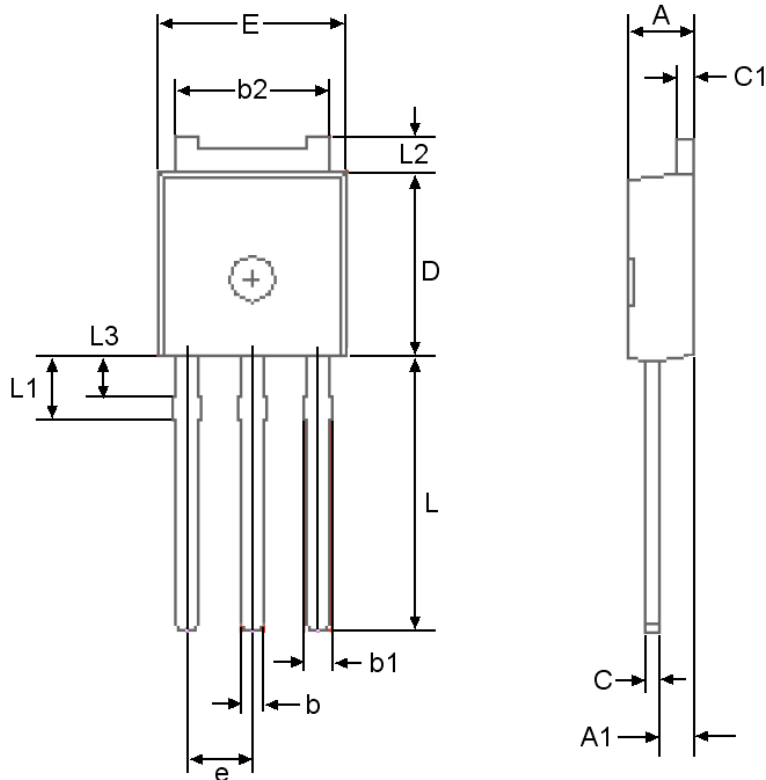
TO-252 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.290 BSC		0.090 BSC	
A1	4.600 BSC		0.180 BSC	
B	7.000	7.200	0.275	0.283
C	6.000	6.200	0.236	0.244
D	6.400	6.604	0.252	0.260
E	2.210	2.387	0.087	0.094
F	0.010	0.127	0.000	0.005
G	5.232	5.436	0.206	0.214
G1	0.666	0.889	0.026	0.035
G2	0.633	0.889	0.025	0.035
H	0.508 REF		0.020 REF	
I	0.900	1.500	0.035	0.059
J	2.743 REF		0.108 REF	
K	0.660	0.940	0.026	0.037
L	1.397	1.651	0.055	0.065
M	1.100 REF		0.043 REF	

Marking Diagram



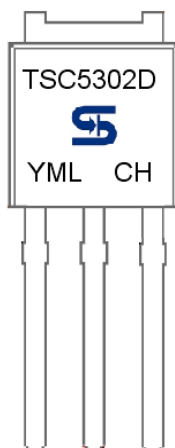
- Y** = Year Code
- M** = Month Code
(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- = Month Code for Halogen Free Product
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

TO-251 Mechanical Drawing



TO-251 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.19	2.38	0.086	0.094
A1	0.89	1.14	0.035	0.045
b	0.64	0.89	0.025	0.035
b1	0.76	1.14	0.030	0.045
b2	5.21	5.46	0.205	0.215
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.97	6.10	0.235	0.240
E	6.35	6.73	0.250	0.265
e	2.28 BSC.		0.90 BSC.	
L	8.89	9.65	0.350	0.380
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060

Marking Diagram



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TSC5302D

High Voltage NPN Transistor with Diode

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