



TO-251  
(IPAK)



TO-252  
(DPAK)



**Pin Definition:**

1. Base
2. Collector
3. Emitter

**PRODUCT SUMMARY**

<b><math>BV_{CEO}</math></b>	400V
<b><math>BV_{CBO}</math></b>	700V
<b><math>I_C</math></b>	3A
<b><math>V_{CE(SAT)}</math></b>	0.17V @ $I_C=1A, I_B=0.25A$

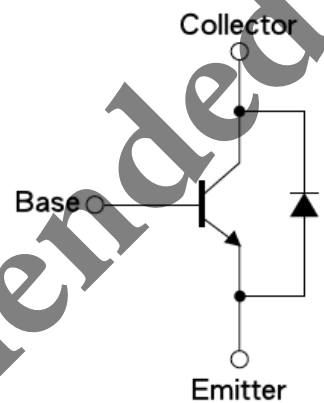
**Features**

- Build-in Free-wheeling Diode Makes Efficient Anti-saturation Operation
- No Need to Interest an  $h_{FE}$  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
TSC5303DCP ROG	TO-252	2.5kpcs / 13" Reel
TSC5303DCH C5G	TO-251	75pcs / Tube

**Note:** "G" denotes Halogen Free Products

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

Parameter	Symbol	Limit	Unit
Collector-Base Voltage	$V_{CBO}$	700	V
Collector-Emitter Voltage @ $V_{BE}=0V$	$V_{CES}$	700	V
Collector-Emitter Voltage	$V_{CEO}$	400	V
Emitter-Base Voltage	$V_{EBO}$	9	V
Collector Current	$I_C$	3	A
Collector Peak Current ( $t_p < 5ms$ )	$I_{CM}$	6	A
Base Current	$I_B$	1.5	A
Base Peak Current ( $t_p < 5ms$ )	$I_{BM}$	3	A
Power Total Dissipation @ $T_C=25^\circ\text{C}$	$P_{DTOT}$	30	W
Maximum Operating Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R\theta_{JC}$	4.15	$^{\circ}\text{C}/\text{W}$
Thermal Resistance - Junction to Ambient	$R\theta_{JA}$	75	$^{\circ}\text{C}/\text{W}$

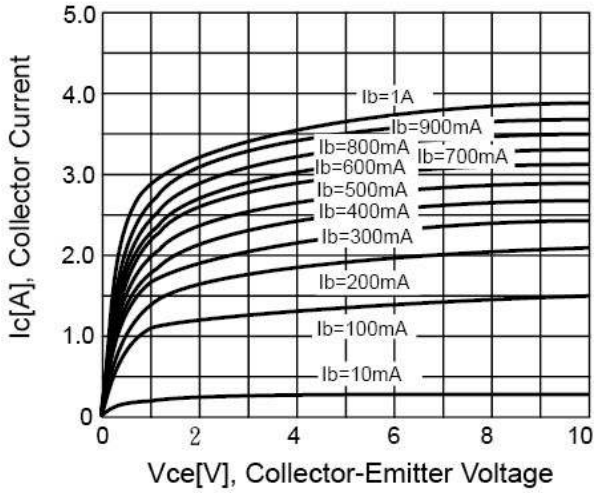
### Electrical Specifications (Ta = 25 $^{\circ}\text{C}$ unless otherwise noted)

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	$I_C = 10\text{mA}, I_E = 0$	$BV_{CEO}$	400	--	--	V
Emitter-Base Breakdown Voltage	$I_E = 1\text{mA}, I_C = 0$	$BV_{EBO}$	9	--	--	V
Collector Cutoff Current	$V_{CB} = 700\text{V}, I_E = 0$	$I_{CBO}$	--	--	10	$\mu\text{A}$
Collector Cutoff Current	$V_{CE} = 400\text{V}, I_B = 0$	$I_{CEO}$	--	--	10	$\mu\text{A}$
Emitter Cutoff Current	$V_{EB} = 7\text{V}, I_C = 0$	$I_{EBO}$	--	--	10	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$I_C = 0.4\text{A}, I_B = 0.1\text{A}$	$V_{CE(SAT)1}$	--	0.10	0.7	V
	$I_C = 1\text{A}, I_B = 0.25\text{A}$	$V_{CE(SAT)2}$	--	0.17	1	
	$I_C = 2\text{A}, I_B = 0.5\text{A}$	$V_{CE(SAT)3}$	--	0.55	--	
Base-Emitter Saturation Voltage	$I_C = 1\text{A}, I_B = 0.25\text{A}$	$V_{BE(SAT)1}$	--	--	1.1	V
	$I_C = 2\text{A}, I_B = 0.5\text{A}$	$V_{BE(SAT)2}$	--	--	1.2	
DC Current Gain	$V_{CE} = 5\text{V}, I_C = 10\text{mA}$	$h_{FE}$	10	--	--	
	$V_{CE} = 5\text{V}, I_C = 1\text{A}$		15	--	30	
	$V_{CE} = 5\text{V}, I_C = 2\text{A}$		5	--	--	
Forward Voltage Drop	$I_F = 2\text{A}$	$V_f$	--	--	2	V
Turn On Time	$V_{CC} = 250\text{V}, I_C = 1\text{A}$	$t_{ON}$	--	0.2	0.6	$\mu\text{s}$
Storage Time	$I_{B1} = I_{B2} = 0.2\text{A}, t_p = 25\mu\text{s}$	$t_{STG}$	--	2.7	4.5	$\mu\text{s}$
Fall Time	Duty Cycle < 1%	$t_f$	--	0.16	0.3	$\mu\text{s}$

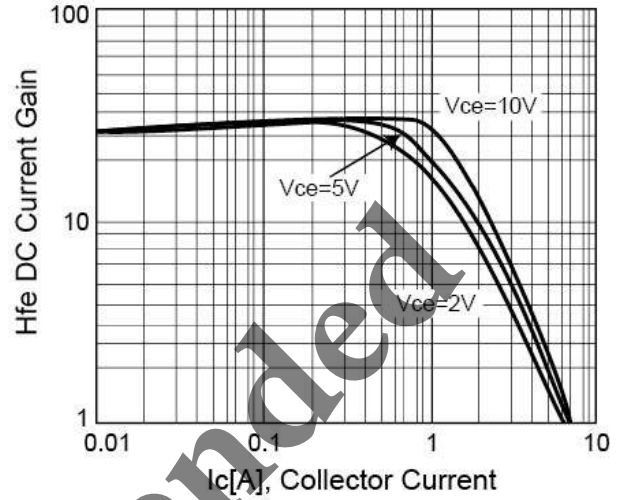
**Note:** Pulsed duration = 380 $\mu\text{s}$ , duty cycle  $\leq 2\%$

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

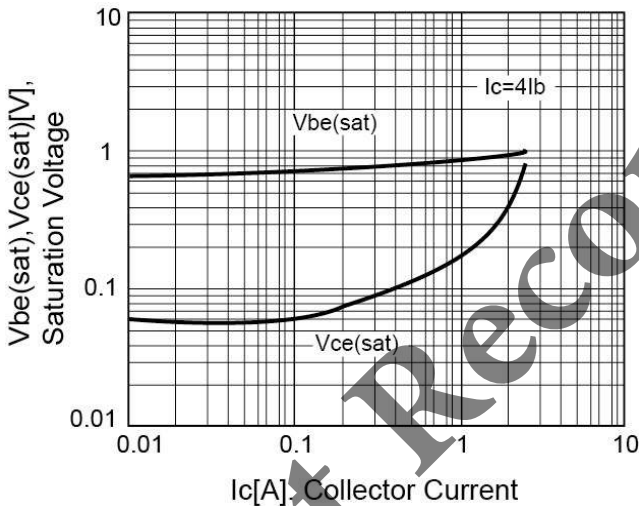
**Figure 1. Static Characteristics**



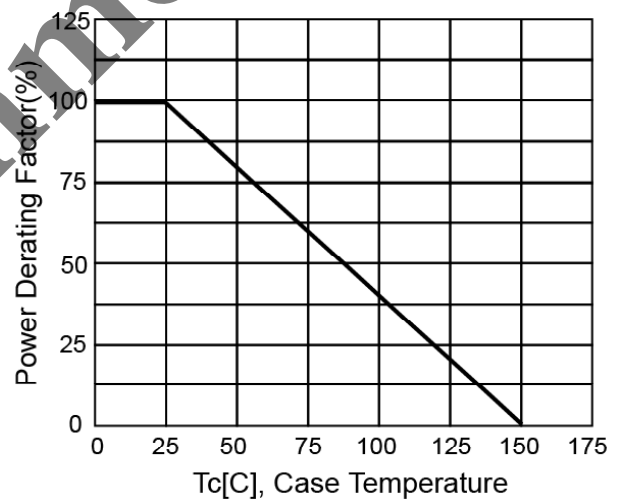
**Figure 2. DC Current Gain**



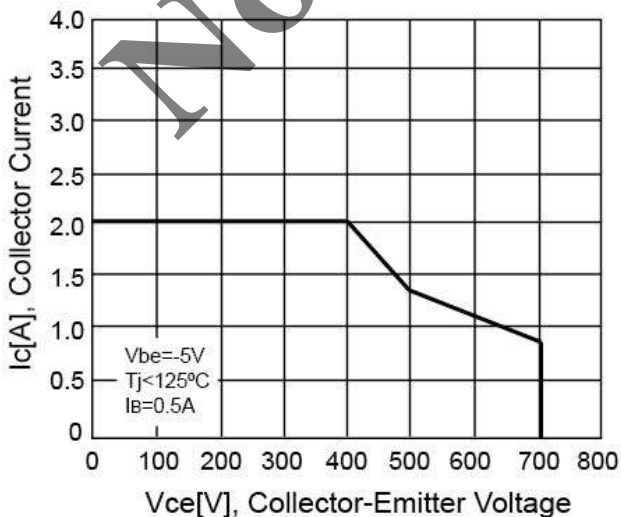
**Figure 3. Vce(sat) v.s. Vbe(sat)**



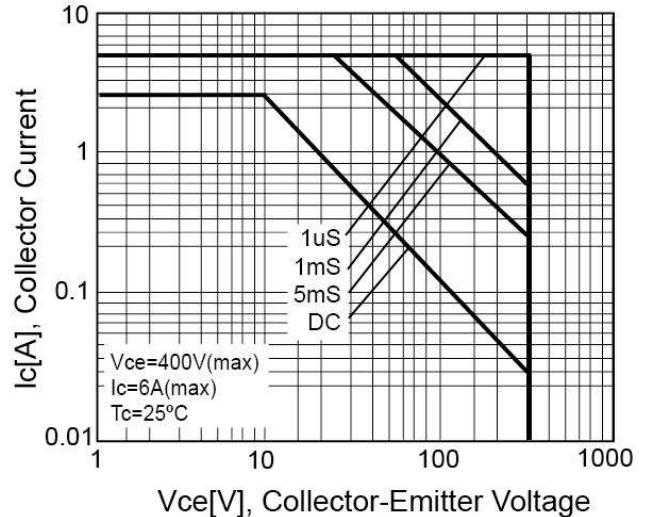
**Figure 4. Power Derating**



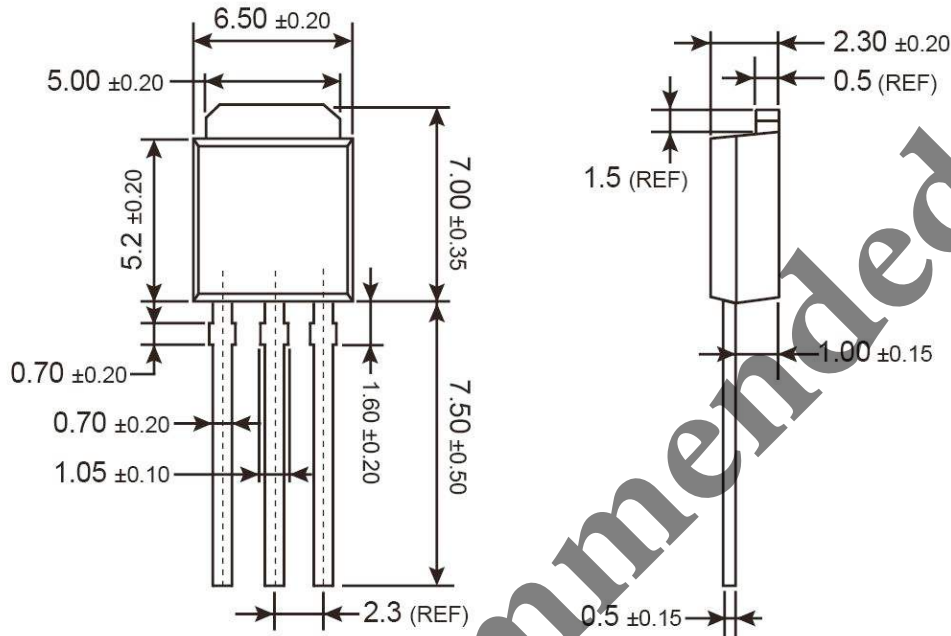
**Figure 5. Reverse Bias SOA**



**Figure 6. Safety Operating Area**

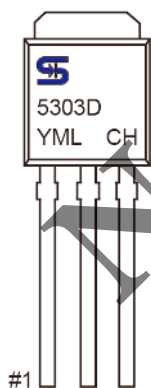


**TO-251 Mechanical Drawing**



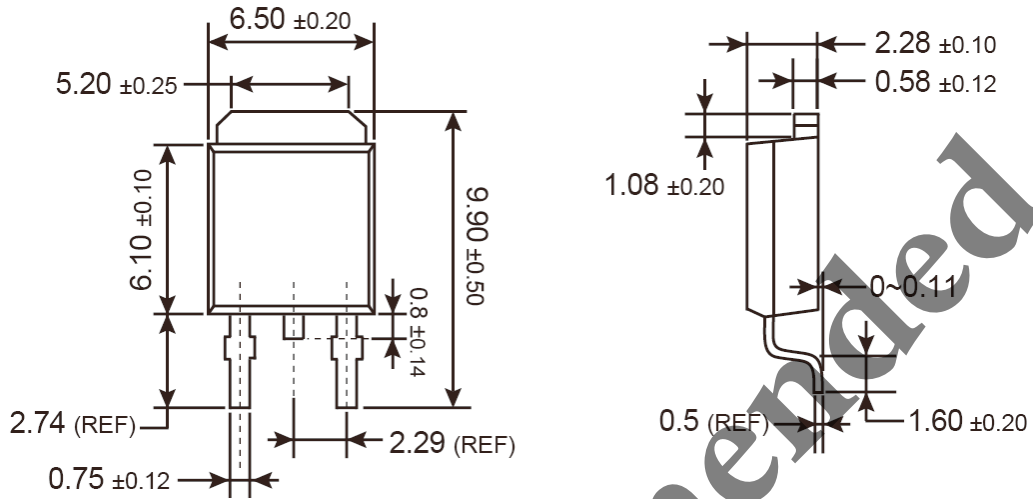
Unit: Millimeters

**Marking Diagram**



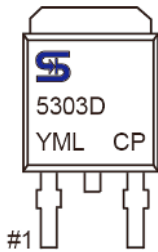
- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

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Not Recommended

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