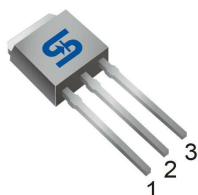


TO-251
(IPAK)



TO-252
(DPAK)



Pin Definition:

1. Base
2. Collector
3. Emitter

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	4A
$V_{CE(SAT)}$	0.25V (Typ.) @ $I_C=0.5A$, $I_B=0.1A$

Features

- Build-in Free-wheeling Diode Makes Efficient Anti-saturation Operation
- Low Base Drive Requirement
- Suitable for Half Bridge Light Ballast Application

Structure

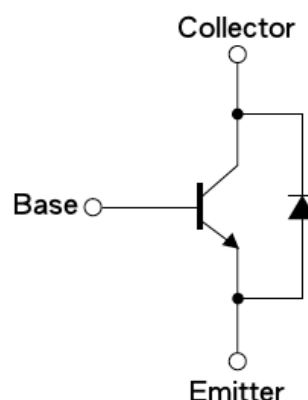
- Silicon Triple Diffused Type
- NPN Silicon Transistor
- Integrated Anti-parallel Collector-Emitter Diode

Ordering Information

Part No.	Package	Packing
TSC5304EDCP ROG	TO-252	2.5Kpcs / 13" Reel
TSC5304EDCH C5G	TO-251	75pcs / Tube

Note: "G" denote for Halogen Free Product

Block Diagram



Absolute Maximum Rating (Ta = 25°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	4	A
Collector Peak Current (tp <5ms)	I_{CM}	8	A
Base Current	I_B	2	A
Base Peak Current (tp <5ms)	I_{BM}	4	A
Power Total Dissipation @ $T_c=25^\circ C$	P_{DTOT}	35	W
Maximum Operating Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R\theta_{JC}$	3.57	$^{\circ}\text{C}/\text{W}$
Thermal Resistance - Junction to Ambient	$R\theta_{JA}$	68	$^{\circ}\text{C}/\text{W}$

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	$I_C = 10\text{mA}, I_E = 0$	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	μA
Collector Cutoff Current	$V_{CE} = 400\text{V}, I_B = 0$	I_{CEO}	--	--	250	μA
Emitter Cutoff Current	$V_{EB} = 7\text{V}, I_C = 0$	I_{EBO}	--	--	10	μA
Collector-Emitter Saturation Voltage	$I_C = 0.5\text{A}, I_B = 0.1\text{A}$	$V_{CE(SAT)1}$	--	0.25	0.7	V
	$I_C = 1\text{A}, I_B = 0.2\text{A}$	$V_{CE(SAT)2}$	--	0.5	1	
	$I_C = 2.5\text{A}, I_B = 0.5\text{A}$	$V_{CE(SAT)3}$	--	1.2	1.5	
	$I_C = 4\text{A}, I_B = 1\text{A}$	$V_{CE(SAT)4}$	--	0.5	--	
Base-Emitter Saturation Voltage	$I_C = 1\text{A}, I_B = 0.2\text{A}$	$V_{BE(SAT)1}$	--	--	1.1	V
	$I_C = 2\text{A}, I_B = 0.5\text{A}$	$V_{BE(SAT)2}$	--	--	1.2	
DC Current Gain	$V_{CE} = 5\text{V}, I_C = 10\text{mA}$	Hfe	10	--	--	
	$V_{CE} = 5\text{V}, I_C = 1\text{A}$		17	--	37	
	$V_{CE} = 5\text{V}, I_C = 2\text{A}$		12	--	32	
Forward Voltage Drop	$I_F = 2\text{A}$	V_f	--	--	2	V
Turn On Time	$V_{CC} = 250\text{V}, I_C = 1\text{A}, I_{B1} = I_{B2} = 0.2\text{A}, t_p = 25\mu\text{S}$	t_{ON}	--	0.2	0.6	μS
Storage Time		t_{STG}	--	3.0	4.5	μS
Fall Time	Duty Cycle < 1%	t_f	--	0.2	0.3	μS
Turn On Time	$V_{CC} = 5\text{V}, I_C = 0.1\text{A}, I_{B1} = I_{B2} = 0.02\text{A}, t_p = 25\mu\text{S}$	t_{ON}	--	0.35	0.6	μS
Storage Time		t_{STG}	6.5	--	8.5	μS
Fall Time	Duty Cycle < 1%	t_f	--	0.3	0.6	μS

Notes: Pulsed duration = 380 μS , duty cycle $\leq 2\%$

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

Figure 1. Static Characteristics

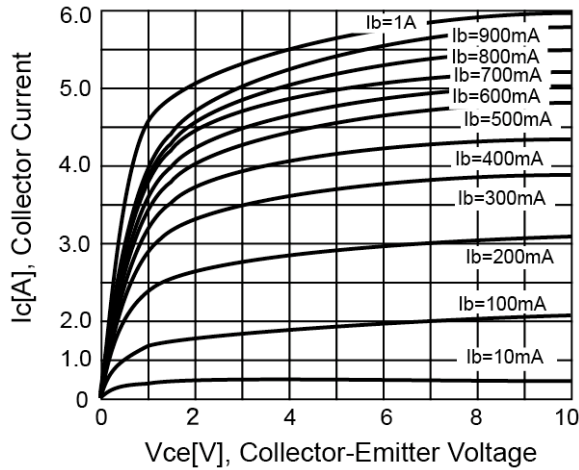


Figure 2. DC Current Gain

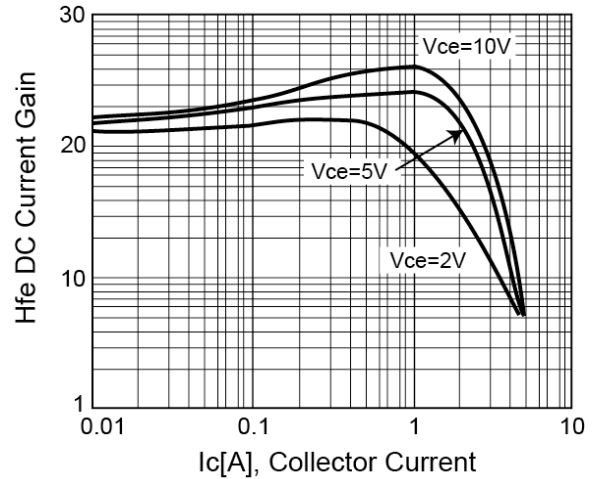


Figure 3. $V_{ce(sat)}$ v.s. $V_{be(sat)}$

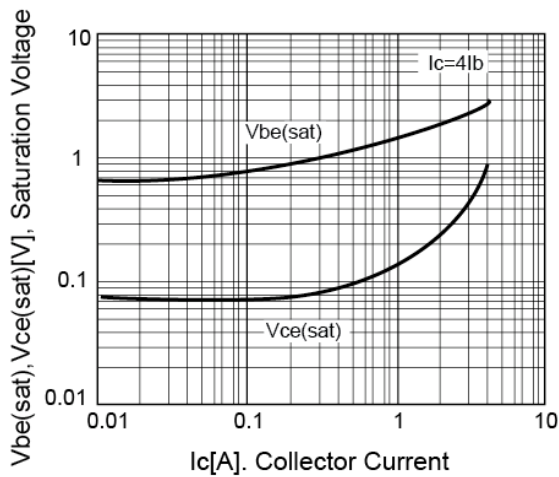


Figure 4. Power Derating

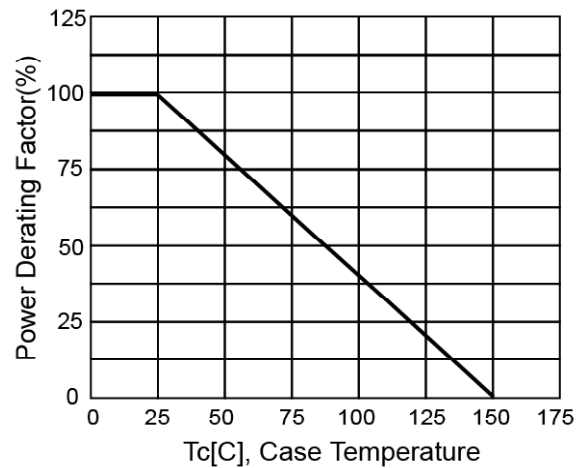


Figure 5. Reverse Bias SOA

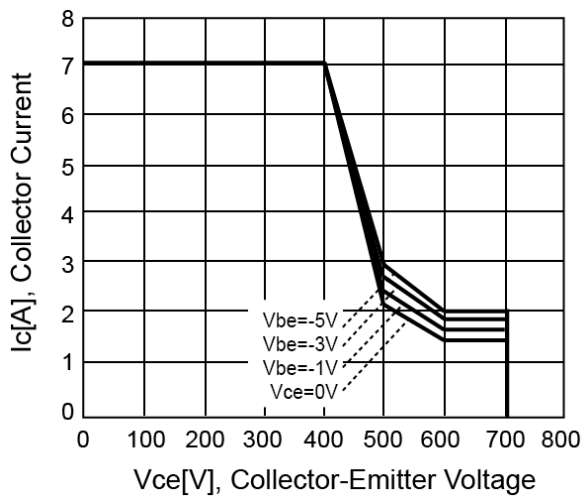
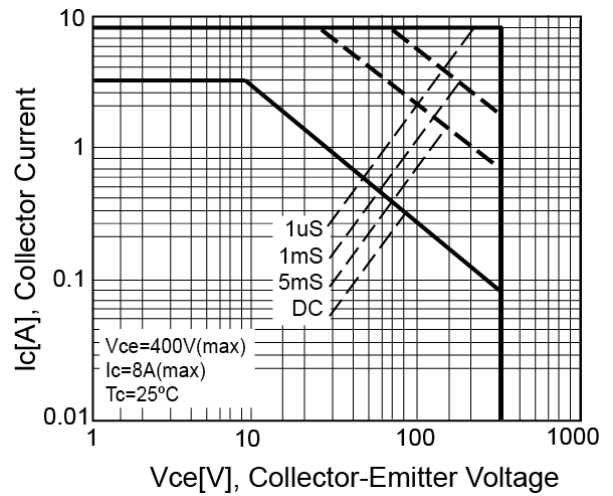
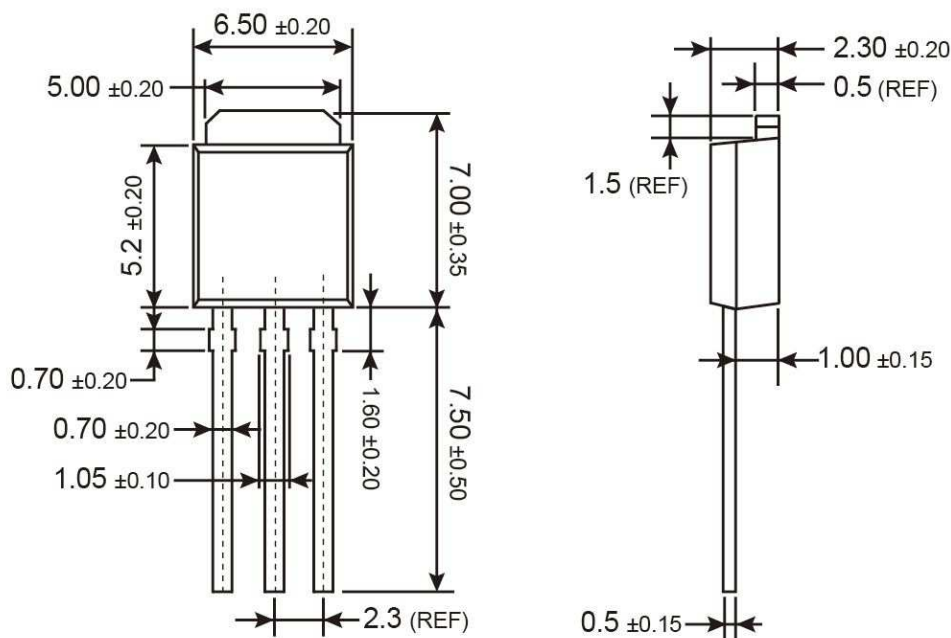


Figure 6. Safety Operating Area

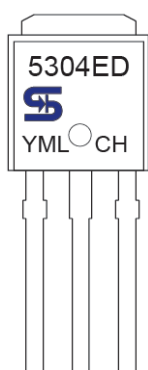


TO-251 Mechanical Drawing



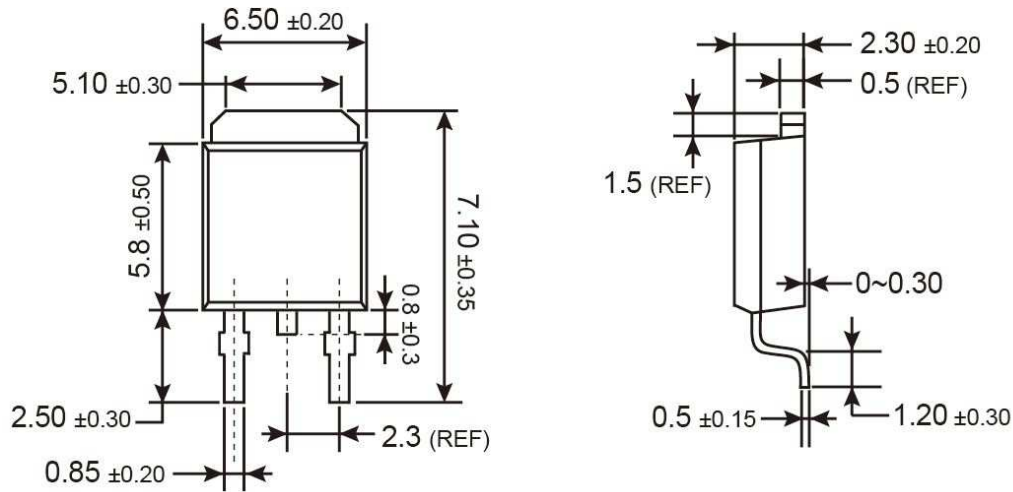
Unit: Millimeters

Marking Diagram



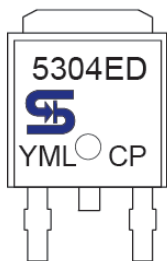
- Y** = Year Code
- M** = Month Code for Halogen Free Product
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

TO-252 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

TSC5304ED

High Voltage NPN Transistor with Diode

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.