



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 @ $I_C / I_B = 1A / 0.25A$ |

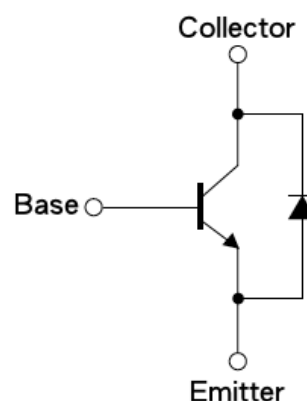
Features

- 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 ($T_a = 25^{\circ}C$ 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 ($t_p < 5ms$) | I_{CM} | 4 | A |
| Base Current | I_B | 1 | A |
| Base Peak Current ($t_p < 5ms$) | I_{BM} | 2 | A |
| Total Dissipation @ $T_c \leq 25^{\circ}C$ | TO-251 | 1.5 | W |
| | TO-252 | 25 | |
| Maximum Operating Junction Temperature | T_J | +150 | $^{\circ}C$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}C$ |

Thermal Performance

| Parameter | Symbol | Limit | Unit |
|--|----------------|-------|---------------|
| Junction to Case Thermal Resistance | $R\theta_{JC}$ | 6.25 | $^{\circ}C/W$ |
| Junction to Ambient Thermal Resistance | $R\theta_{JA}$ | 100 | $^{\circ}C/W$ |

Electrical Specifications (Ta = 25°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 | $I_C = 10\text{mA}, I_E = 0$ | BV_{CEO} | 400 | -- | -- | V |
| Emitter-Base Breakdown Voltage | $I_E = 1\text{mA}, I_C = 0$ | BV_{EBO} | 10 | -- | -- | V |
| Collector Cutoff Current | $V_{CB} = 700\text{V}, I_E = 0$ | I_{CBO} | -- | -- | 1 | uA |
| Emitter Cutoff Current | $V_{EB} = 9\text{V}, I_C = 0$ | I_{EBO} | -- | -- | 1 | uA |
| Collector-Emitter Saturation Voltage ^a | $I_C = 0.5\text{A}, I_B = 0.1\text{A}$ | $V_{CE(SAT)1}$ | -- | -- | 0.5 | V |
| | $I_C = 1\text{A}, I_B = 0.25\text{A}$ | $V_{CE(SAT)2}$ | -- | 1.1 | 1.5 | |
| Base-Emitter Saturation Voltage ^a | $I_C = 0.5\text{A}, I_B = 0.1\text{A}$ | $V_{BE(SAT)1}$ | -- | -- | 1.1 | V |
| | $I_C = 1\text{A}, I_B = 0.25\text{A}$ | $V_{BE(SAT)2}$ | -- | -- | 1.2 | |
| DC Current Gain | $V_{CE} = 5\text{V}, I_C = 10\text{mA}$ | $h_{FE 1}$ | 10 | -- | -- | |
| | $V_{CE} = 5\text{V}, I_C = 400\text{mA}$ | $h_{FE 2}$ | 10 | -- | 30 | |
| | $V_{CE} = 5\text{V}, I_C = 1\text{A}$ | $h_{FE 3}$ | 5 | -- | -- | |
| Turn On Time | $V_{CC} = 250\text{V}, I_C = 1\text{A},$ $I_{B1} = I_{B2} = 0.2\text{A}, t_p = 25\text{uS}$ 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 | $I_C = 1\text{A}$ | t_f | -- | -- | 800 | uS |
| Forward Voltage Drop | $I_C = 1\text{A}$ | 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

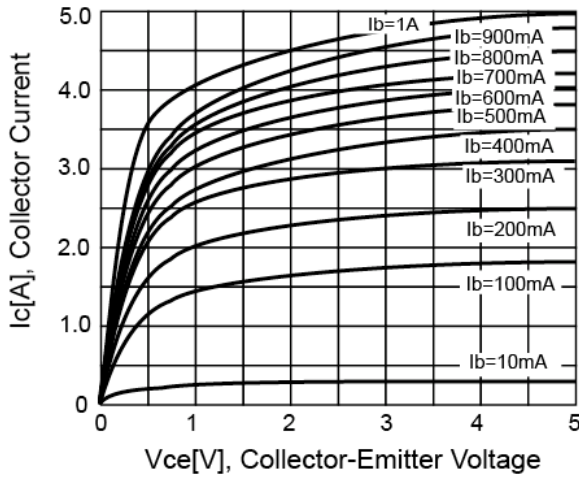


Figure 2. DC Current Gain

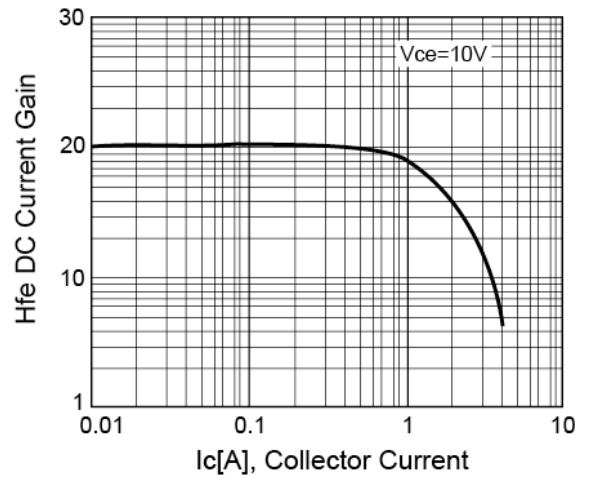


Figure 3. Vce(sat) v.s. Vbe(sat)

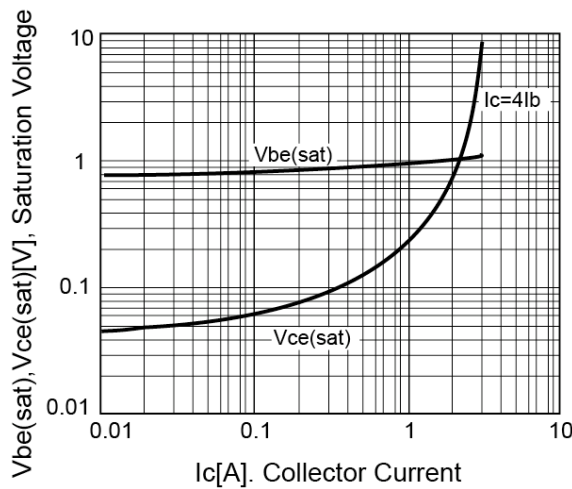


Figure 4. Power Derating

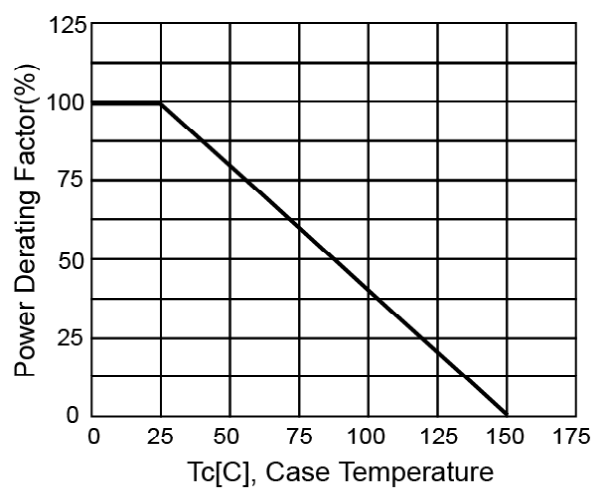


Figure 5. Reverse Bias SOA

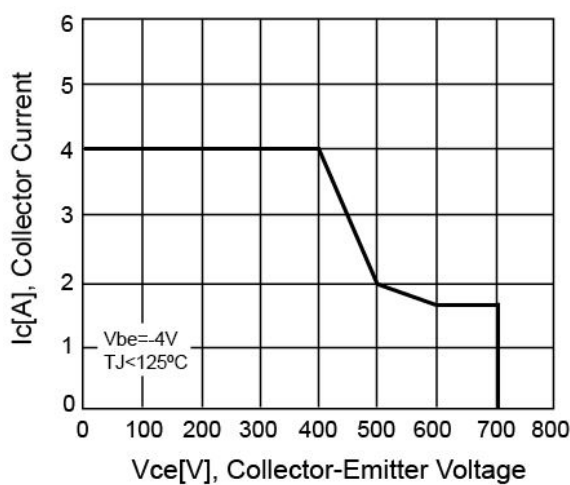
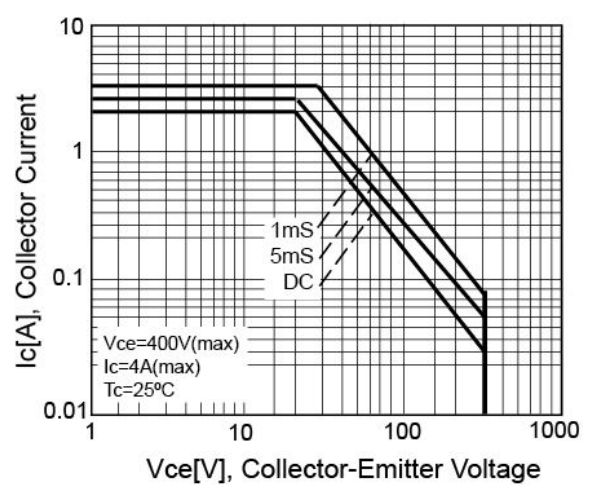
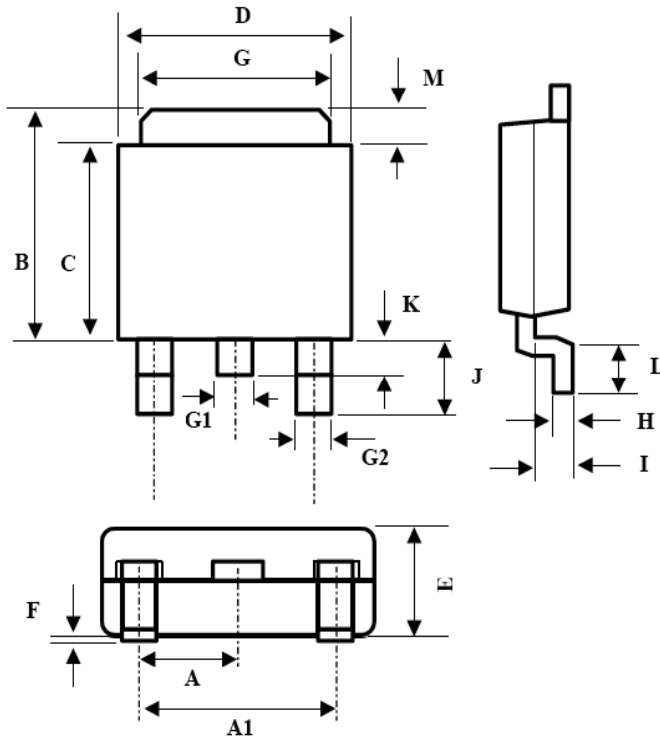


Figure 6. Safety Operating Area

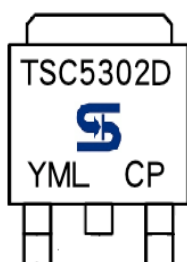


TO-252 Mechanical Drawing



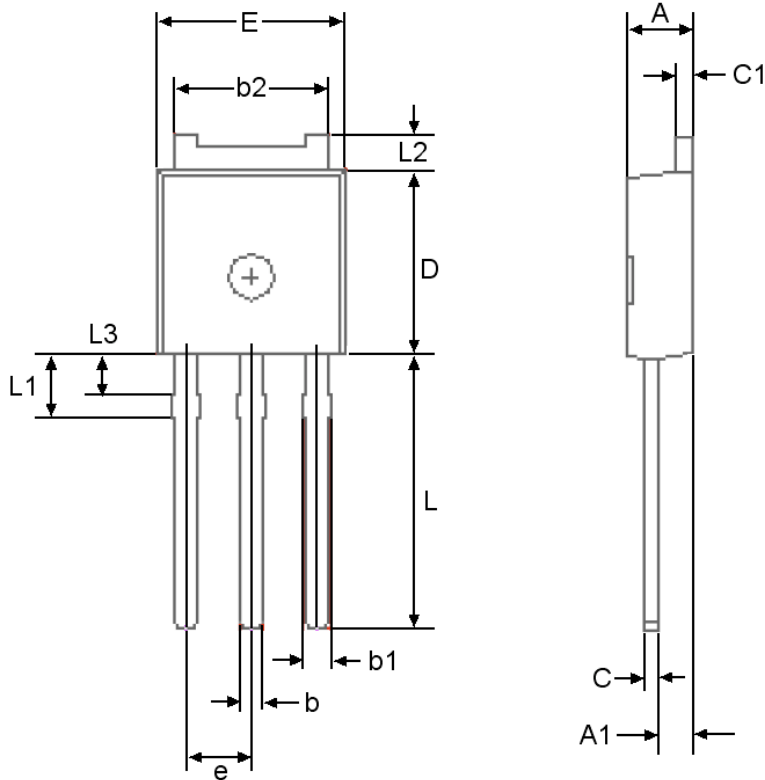
| TO-252 DIMENSION | | | | |
|------------------|-------------|-------|-----------|-------|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 2.290 BSC | | 0.090 BSC | |
| A1 | 4.600 BSC | | 0.180 BSC | |
| B | 7.000 | 7.200 | 0.275 | 0.283 |
| C | 6.000 | 6.200 | 0.236 | 0.244 |
| 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



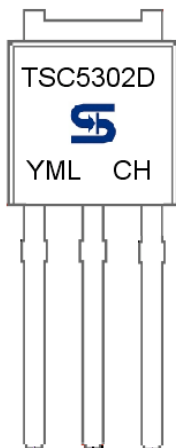
- Y** = Year Code
- M** = Month Code
(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- = Month Code for Halogen Free Product
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

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



- 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)
- YML** = 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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